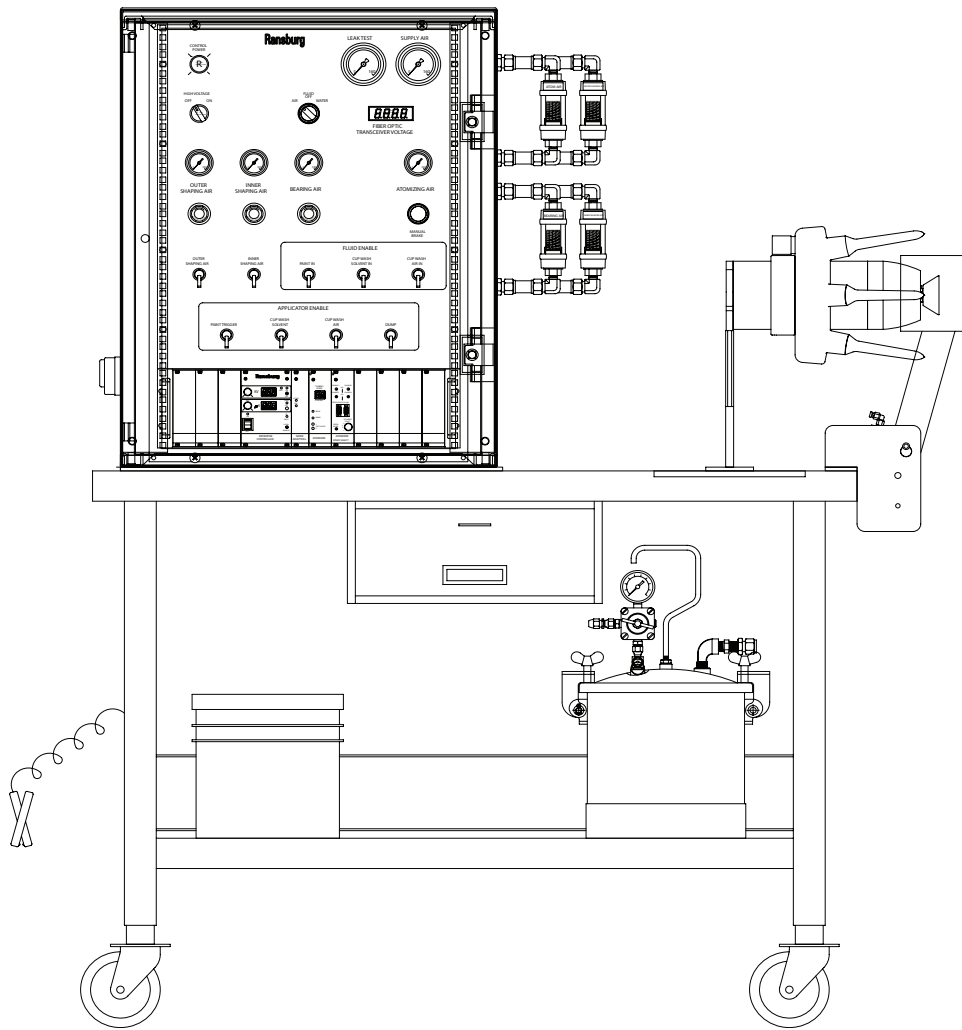


## MMA-303 DIRECT & INDIRECT TEST STATION



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

Service Manual Price: \$30.00 (U.S.)



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# SAFETY

## SAFETY PRECAUTIONS

Before operating, maintaining or servicing any Ransburg electrostatic coating system, read and understand all of the technical and safety literature for your 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 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 Ransburg representative or Ransburg.



### WARNING

- The user **MUST** read and be familiar with the Safety Section in this manual and the 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**, 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 3.

## NOTE


- The high voltage is interlocked electrically with the fluid trigger switches. When a fluid switch is triggered on, the HV will automatically be turned off.


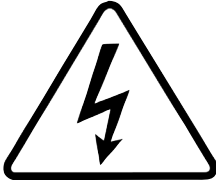
## NOTES



## WARNING

- Wear the proper safety protection such as eye and ear protection.
- NEVER wear loose clothing while working around the applicator.
- NEVER run the applicator with anyone near the bell. Serious injury **COULD OCCUR** if the bell is contacted while it is rotating.
- **NEVER** stop the rotation of the bell by hand. Use the manual air brake supplied on the test stand panel.
- Ensure ALL items in the test area are grounded. Ensure there are **NO** open containers of flammable materials in the test area.

<p><b>AREA</b> Tells where hazards may occur.</p>	<p><b>HAZARD</b> Tells what the hazard is.</p>	<p><b>SAFEGUARDS</b> Tells how to avoid the hazard.</p>
<p><b>Spray Area</b></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, 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 bypass is intended for use only during setup 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>The paint process and equipment should be set up and operated in accordance with NFPA-33, NEC, and OSHA requirements.</p>

<b>AREA</b> Tells where hazards may occur.	<b>HAZARD</b> Tells what the hazard is.	<b>SAFEGUARDS</b> Tells how to avoid the hazard.
<p><b>General Use and Maintenance</b></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.</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. Reference OSHA, NFPA-33, and your insurance company requirements.</p>
<p><b>Electrical Equipment</b></p> 	<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 shutdown 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-33).</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>

# INTRODUCTION

## GENERAL INFORMATION

The Ransburg **Applicator Performance Test Stand** was developed to assist in determining the applicator's level of performance in an off-line condition. Ensuring the applicator functions properly after any maintenance has been performed to it off-line reduces the costs associated with verifying performance during production. With line speeds critical to the through-put of a facility, every uptime minute counts to underwrite profitability. This Test Stand device helps to ensure the applicator performs correctly when it is put into service.

This Test Stand will verify performance of single fluid applicators, bearing air, shaping air, brake air, turbine drive air, and fiber optic functionality. As well, it checks kV and  $\mu$ A electrical performance of the applicator.

The Test Stand was developed with the user and the safety of the user in mind. The user must become familiar with the overall function and operation of the unit.

### NOTE

- For all test station toggle switches, with the switch lever in the "UP" position, the valve it describes is "ON" or "actuated."

## SPECIFICATIONS

### Electrical / Physical

<b>Air Requirements:</b>	1" NPT(F) Inlet 3/4" ID Air Line to Stand 100 psi (6.4 bar) min. 0.3 to 0.6 Micron Filtration
<b>Dimensions</b>	
<b>Height:</b>	67" (1702 cm)
<b>Width:</b>	30" (762 cm)
<b>Length:</b>	48" (1219 cm)
<b>Fluids:</b>	Use distilled or deionized water only for testing
<b>Maximum Fluid Pressure:</b>	80 psi (5.2 bar)

### Test Specification Summary

<b>Output Voltage:</b>	Indirect - 70 kV max. Direct - 90 kV max.
<b>Fluid Leaks:</b>	No pressure drop for 2 minutes
<b>Bearing Air Flow Rate:</b>	1.7 to 2.8 SCFM
<b>Turbine Air Flow at 70K RPM:</b>	17 SCFM max.
<b>Outer Shaping Air Flow:</b>	3-5 SCFM @ 25 psig 7-10 SCFM @ 60 psig
<b>Inner Shaping Air Flow:</b>	4-7 SCFM @ 25 psig 10-13 SCFM @ 60 psig
<b>Fiber Optic Voltage:</b>	.68V @ 50K RPM min.



# FEATURES

- 1 Main Control Panel
- 2 Air Flow Meters
- 3 Test Applicator
- 4 Table
- 5 Pressure Pot
- 6 Dump Bucket
- 7 High Voltage Cascade

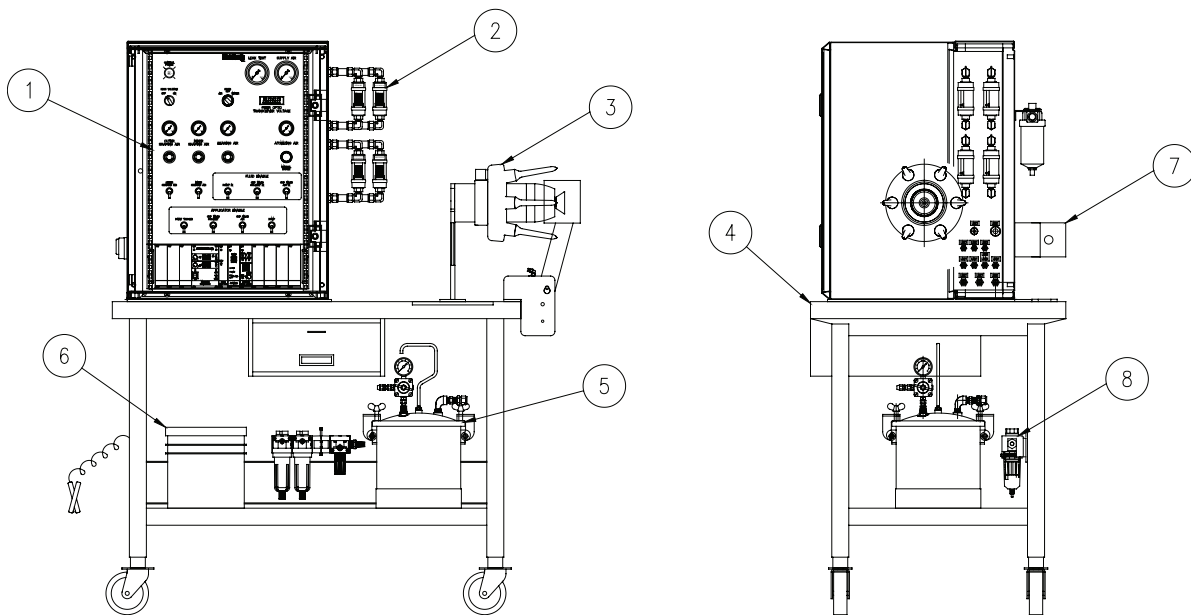


Figure 1a: Basic Station Features

- 1 Power Control - On/Off Button
- 2 Main Air Gauges - Leak Down, Supply Air
- 3 Fiber Optic Voltage Readout
- 4 Air Flow Meter - Atom Air
- 5 Air Flow Meter - Outer Shaping Air
- 6 Air Flow Meter - Bearing Air
- 7 Air Flow Meter - Inner Shaping Air
- 8 Fluid Enable - Paint In, Cup Wash Solvent In, Cup Wash Air In
- 9 Atomizer Speed Select Card
- 10 Atomizer Card
- 11 MicroPak Power Supply
- 12 Applicator Enable, Paint Trigger, Cup Wash Solvent, Cup Wash Air, Dump
- 13 Regulated Function Gauges - Bearing Air, Outer Shaping Air, Inner Shaping Air
- 14 High Voltage - On/Off Switch

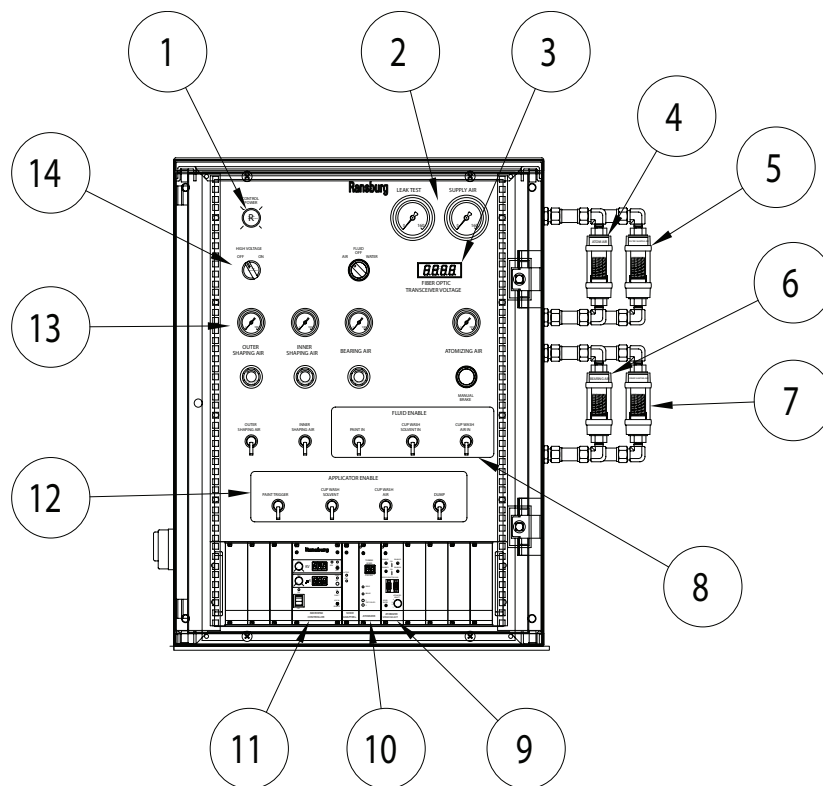


Figure 1b: Basic Station Features

## NOTES

# INSTALLATION

## SETUP PROCEDURE

**Note: Refer to MMA-303 Service Manual for all parts and part number identifications.**

1. Ensure that ground connections, cart ground, and applicator ground are made to a true earth ground.

### WARNING

- If true earth ground is not made, injury to personnel or serious damage may occur to the equipment.
- Ensure ALL items in the test area are grounded. Insure there are NO open containers of flammable materials in the test area.

2. Provide air filtration to the manifold that has the capability of passing 136 SCFM with particulate removal of .3 to .6 micron particle size (bearing air filtration is provided with the stand).

3. Provide a minimum 3/4-inch ID air line to the filter at the manifold inlet. A minimum of 100 psig pressure is required at the manifold inlet.

4. Install water supply line and air pressure line to the pressure pot.

### WARNING

- NEVER use solvent as a test fluid for this device!
- Using any material OTHER than distilled water or de-ionized water may cause fire during the test. Use only distilled water or de-ionized to test the applicator.

5. Fill the pressure pot liner with approximately one (1) gallon of either de-ionized or distilled water.

### NOTE

- When opening dump valve for any test, hold tubing securely by hand or clamp to prevent whipping.

6. Plug the unit into a suitable 110/120V outlet.

## INITIAL TEST SETTINGS

1. High voltage is off unless instructed to turn on. Main power off.

2. Fluid enable off (toggle switch lever in the down position).

3. Attach the applicator to the Test Stand bracket with three (3) M10 screws (78268-00).

4. Connect tubing from the Test Stand to the applicator as labeled.

5. Supply 100 psig air pressure to the stand, reference supply air gage on panel. If required, adjust air input regulator attached to stand.

6. Set speed select to 00.

7. Adjust bearing air regulator to 90 psig minimum.

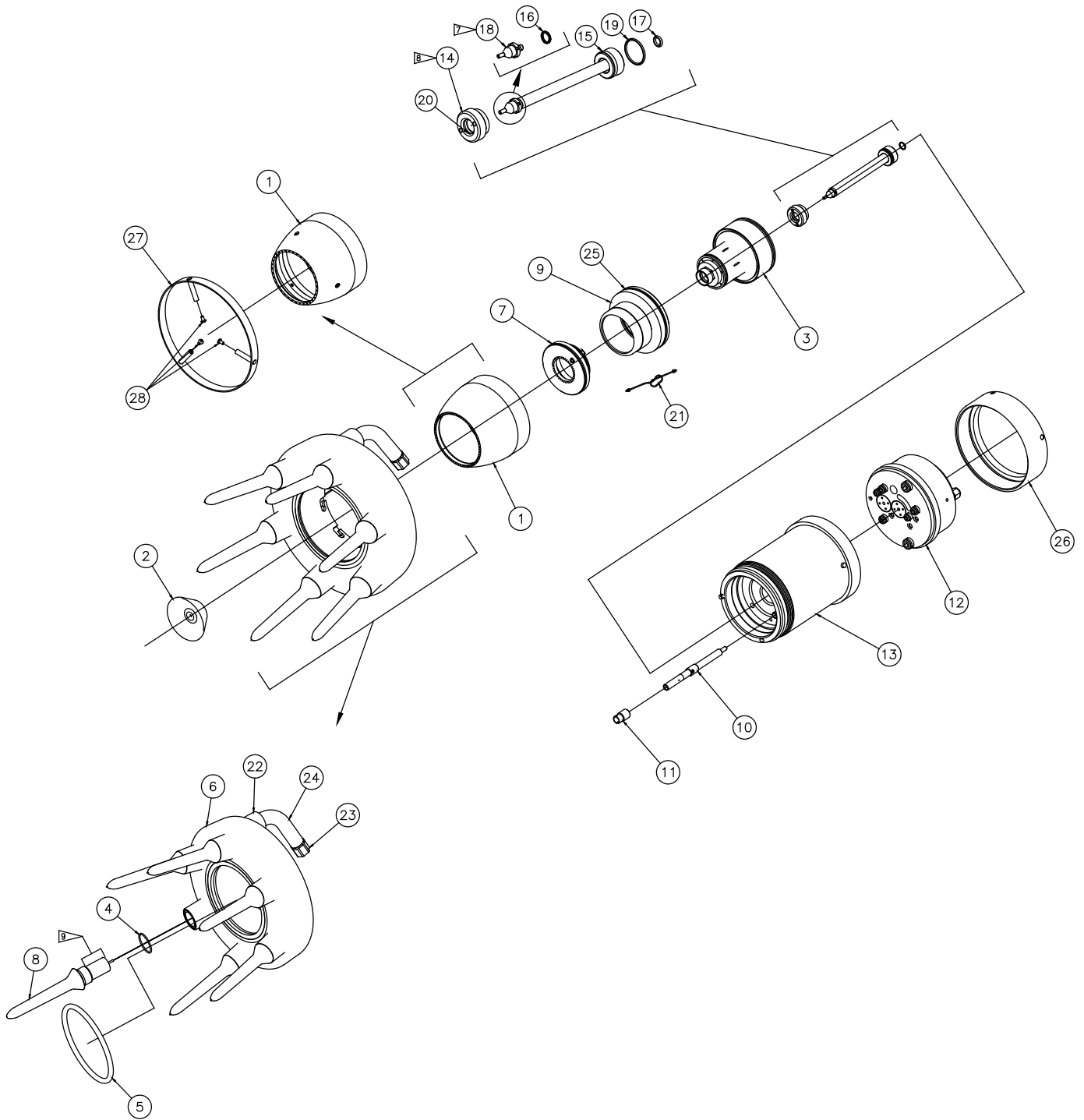





Figure 2: MMA-303 Assembly

<b>MMA-303 ASSEMBLY - PARTS LIST (Figure 2)</b>			
<b>Item #</b>	<b>Part #</b>	<b>Description</b>	<b>Qty</b>
1	<b>Table C - "C"</b>	Shroud/Shaping Air Ring	1
2	<b>Table A - "A"</b>	Assembly, Bell	1
3	A11081-00	Turbine Assembly	1
4	<b>Table C - "F"</b>	O-Ring, Solvent Proof	6
5	<b>Table C - "G"</b>	O-Ring, Encapsulated	1
6	<b>Table C - "H"</b>	High Voltage Ring	1
7	<b>Table C - "D"</b>	Shaping Air Manifold Assembly (Indirect Charge)	1
8	<b>Table C - "I"</b>	Electrode Assembly	6
9	<b>Table C - "E"</b>	Turbine Retaining Ring	1
10	A11531-00	Assembly, Fiber Optic Transmitter	1
11	78278-00	Nut, Fiber Optic, Tensioning	1
12	A11554-00	Mounting, Manifold Assembly	1
13	A11558-00	Atomizer Body Assembly	1
14	A11226-00	Retainer, Fluid Tube	1
15	A11245-00	Feed Tube	1
16	79001-44	O-Ring, Solvent Proof	1
17	79001-40	O-Ring, Solvent Proof	1
18	<b>Table B - "B"</b>	Fluid Tip	1
19	79001-41	O-Ring, Solvent Proof	1
20	79001-42	O-Ring, Solvent Proof	1
21	A11351-02	Assembly, Cupwash Tubing	1
22	<b>Table C - "J"</b>	Locknut, High Voltage Tube	1
23	<b>Table C - "K"</b>	Ferrule Nut, 3/8" OD	1
24	<b>Table C - "L"</b>	Bent Tube	1
25	79001-11	O-Ring, Solvent Proof	1
26	A11559-00	Ring, Quick Disconnect	1
27	<b>Table C - "M"</b>	Repulsion Ring	1
28	<b>Table C - "N"</b>	Button, 6-32 X 1/4" Long	3

<b>PARTS LIST BULLET DEFINITION TABLE (Figure 2)</b>	
	Tighten to 50-70 lbs•in (5.65-7.9 Nm) torque.
	Torque fluid tube into atomizer body using tool A11229-00 to 65-75 lbs•in.
	Torque fluid tip using tool A11229-00 to 25-30 lbs•in (2.83-3.39 Nm).

### TEST TRIGGERS

1. Ensure fluid supply is OFF.
2. Turn “Fluid” switch to AIR.
3. Toggle the “Paint In” switch on (up) to supply air pressure to the applicator.
4. Toggle on the “Paint Trigger” switch; air should be escaping from the feed tube. Turn off the “Paint Trigger”.
5. Toggle on the “Dump” switch; air should be escaping from the Dump port of the applicator. Turn off the “Dump” switch.
6. Toggle “Paint In” switch to the off (down) position.
7. Turn on the “Cup Wash Air In” switch, now turn on the “Cup Wash Air” trigger, air should be escaping from the feed tube and cup wash spout. Turn off the “Cup Wash Air” trigger and the “Cup Wash Air In” switch.
8. Turn on the “Cup Wash Solvent In” switch; now turn on the “Cup Wash Solvent” switch, air should be escaping from the feed tube and cup wash spout. Turn off the “Cup Wash Solvent” and “Cup Wash Solvent In”.

### Static Decay/Water Pressure Test

The purpose of this section of the test is to verify that each of the valves in the applicator will pass fluid. Also, this test verifies all seals along the fluid passages have been properly installed to prevent any leakage.

1. Ensure all toggle switches are set to the “off” or “down” position.
2. Position the applicator where any water sprayed out of the bell may be collected and properly disposed of.

3. Verify there is no residual pressure in the pressure pot included with the test stand. Turn the regulator dial on the pressure pot counter-clockwise until all pressure is released. Pull the bleed-off valve to release any remaining pressure.



4. Loosen the pressure pot clamps until the lid may be removed from the pot. Fill the pressure pot with de-ionized or distilled water.
5. Close the lid, tighten the lid clamps so that the lid is secure and no air pressure may escape.
6. Turn the Fluid switch to “Water” position.
7. Turn the “Fluid Air” regulator to the pressure pot to 80 psi. Make sure you have distilled water in the pot.
8. Make sure the dump line is secured in the bucket and the dump valve is in the “Open” position.
9. Turn on “Paint In” and “Solvent In” in the Fluid Enable section.
10. Activate the “Dump” trigger until the air is completely purged from the manifold. You will see water running from the Dump output. Turn the Dump switch off which will stop the water flow. Turn “Fluid” switch to “Off”. Leak gauge should stay at pressure.
11. Observe the applicator for any possible water leakage, wait 3 minutes. No seepage is allowed.
12. If leak is found, turn the “Fluid” switch to “Air” and activate the dump until all water is evacuated. Turn “Fluid” switch to “off”. Repair leak and repeat the test.

13. If no leak is found, turn the “Fluid” switch to “Air”. Open the Dump to purge out the water.
14. When all water has been evacuated, close the dump, turn off all switches and turn the “Fluid” to “Off”.

### Air Test

1. Turn the “Fluid” switch to “Air” then “Off” to pressurize the system.
2. Observe the leak test gauge. The pressure must not drop more than 2 psi in 10 seconds.
3. Open the “Dump” to de-pressurize the system and turn off all of the trigger valves. Switch the “Dump” to “Off”
4. Turn the “Fluid Air” regulator to 0 psig. Open the manual relief valve on the pressure pot. Turn all switches off. Ensure “Fluid Enable” switches are all off.

## TURBINE TEST

The purpose of this test is to verify the applicator rotates properly and sprays reasonably well. With de-ionized or distilled water as the test fluid it is difficult to accurately assess the spray performance characteristics. However, it can give a relative indication of how well the bell will spray in production.

### NOTE

- Bell cup and shroud must be attached to end of turbine.

### Bearing Air/Drive Air Test

This test is to verify the applicator responds to changes in set points in the speed selector.

1. Raise the safety spin guard and lock it in place with the pin.
2. Adjust the air regulator for bearing air to 90 psig minimum.
3. The turbine shaft must rotate freely with bearing air supplied.
4. Set the atomizer speed select to 30,000 rpm.
5. Toggle Enable 1 “on” or in the “up” position on the Atomizer Speed Select card. Then press the “Speed Enter” button. The turbine should now begin spinning. This should be audible.
6. Adjust the speed select to 50,000 rpm. Press the “Speed Enter” button to enter the new speed. An audible difference in speed should be detected. Adjust the speed again to 70,000 rpm and press “Speed Enter” to enter the new speed.
7. Observe the Atomizing Air gauge. At 70,000 rpm the air consumption should not exceed 17.0 SCFM.

### Fiber Optic Transceiver Test

1. While the turbine is spinning observe the “Fiber Optic Transceiver Voltage” display. The voltage must be greater than .75mV.
2. If the voltage is out of range, there are several possible causes. The most likely are:
  - a. Transmitter inside the bell is bad or is positioned incorrectly. Refer to the MMA-303 service manual for instructions to correct the problem.
  - b. Transmitter (75911) or cable (SMC-424-XX) is not properly connected or may be broken.



3. On the atomizer speed select card, toggle the "Enable 1" switch off or down.
4. Stop the spinning turbine shaft by pressing the manual brake button on the front panel of the test station. Do not allow the turbine to spin in the reverse direction or it may damage the unit.

### **WARNING**

- During any part of the turbine tests where the applicator bell is rotating, **DO NOT** come near or in contact with the spinning bell. Because of the bell rotational speed, injury can easily occur. Locate the bell in a position where minimal exposure to anyone passing by may come in contact with the spinning bell.
- **NEVER** use any fluid other than distilled or de-ionized water to test the applicator performance. Using any other material will cause a risk of fire or severe personal injury.

### **NOTE**

- If these are bad, the applicator most likely will not rotate because the atomizer card will shut the air to the turbine off.

### **WARNING**

- **DO NOT** use your hand or any object to stop bell cup rotation.

### **CAUTION**

- **DO NOT** hold manual brake button in below 5K RPM.

## HIGH VOLTAGE TEST

### In-Direct Charge Test (70kV Maximum)

1. Install the High Voltage Cable to the High Voltage Ring and Cascade as prescribed in the applicator service manual. Ensure all components are properly grounded.
2. Install the ground cable into the HV/GND port of the mounting manifold.
3. Turn on the main power to the Micro Pak. Display should be reading 00 on the kV and  $\mu$ A display.
4. Turn on the kV enable switch. kV should be reading what has been set by adjusting the dial.
5. Using the High Voltage probe (76634-00) check the actual voltage from the High Voltage Ring by placing the High Voltage Test Probe on the High Voltage Ring Probe tips. Test Probe display should match the Micro Pak display.
6. Turn off the power supply to the MicroPak.

### Direct Charge Test (90 kV Maximum)

1. Install the High Voltage Cable to the applicator and Cascade as prescribed in the applicator service manual. Ensure all components are properly grounded.
2. Turn on the main power to the Micro Pak. Display should be reading 00 on the kV and  $\mu$ A display.
3. Turn on the kV enable switch. kV should be reading what has been set by adjusting the dial.
4. Using the High Voltage Probe (76634-00) check the actual voltage from the High Voltage Ring by placing the High Voltage Test Probe on the bell cup. Test Probe display should match the Micro Pak display.
5. Turn off the power supply to the MicroPak.

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# **MAINTENANCE**

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If any maintenance is required, consult factory for spare part availability.

## **NOTES**

## NOTES

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# WARRANTY POLICIES

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## LIMITED WARRANTY

**Ransburg** will replace or repair without charge any part and/or equipment that fails within the specified time (see below) because of faulty workmanship or material, provided that the equipment has been used and maintained in accordance with Ransburg's written safety and operating instructions, and has been used under normal operating conditions. Normal wear items are excluded.

**THE USE OF OTHER THAN RANSBURG APPROVED PARTS VOIDS ALL WARRANTIES.**

**SPARE PARTS:** One hundred and eighty (180) days from date of purchase, except for rebuilt parts (any part number ending in "R") for which the warranty period is ninety (90) days.

**EQUIPMENT:** When purchased as a complete unit, (example: guns, power supplies, control units, etc.), is one (1) year from date of purchase. **WRAPPING THE APPLICATOR IN PLASTIC, SHRINK-WRAP, ETC., WILL VOID THIS WARRANTY.**

**RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERIALS. THERE ARE NO IMPLIED WARRANTIES NOR WARRANTIES OF EITHER MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. RANSBURG ASSUMES NO LIABILITY FOR INJURY, DAMAGE TO PROPERTY OR FOR CONSEQUENTIAL DAMAGES FOR LOSS OF GOODWILL OR PRODUCTION OR INCOME, WHICH RESULT FROM USE OR MISUSE OF THE EQUIPMENT BY PURCHASER OR OTHERS.**

**EXCLUSIONS:** If, in Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, Ransburg will assume no responsibility for repair or replacement of the item or items. The purchaser, therefore will assume all responsibility for any cost of repair or replacement and service related costs if applicable.

## APPENDIX

### PAINT AND SOLVENT SPECIFICATIONS

	REA™ / EFM™	REM™ / M90™	NO. 2 HAND GUN	TURBODISK™	AEROBELL® II*** AEROBELL® AEROBELL® 33 RMA-101™
RECOMMENDED VISCOSITY USING A ZAHN NO. 2	18 TO 30 SEC	18 TO 30 SEC	20 TO 60 SEC	20 TO 60 SEC	20 TO 60 SEC
PAINT ELECTRICAL RESISTANCE**	.1 MΩ TO ∞	.1 MΩ TO ∞	.1 TO 1 MΩ	.1 MΩ TO ∞	.1 MΩ TO ∞
RECOMMENDED DELIVERY (UP TO)	1000 cc/min	1500 cc/min	180 cc/min	1000 cc/min	500 cc/min

### GUIDE TO USABLE SOLVENT SELECTION

Chemical Name	Common Name	Category	Flash Point†† (TCC)	*CAS Number	Evap. Rate†	Elec. Res.**
DICHLOROMETHANE	Methylene Chloride	Chlorinated Solvents		75-09-2	14.5	HIGH
VM & P NAPHTHA	Naptha	Aliphatic Hydrocarbons	65°F	8030-30-6	10	HIGH
ACETONE		Ketones	-18°F	67-64-1	5.6	LOW
METHYL ACETATE		Esters	90°F	79-20-9	5.3	LOW
BENZENE		Aromatic Hydrocarbons	12°F	71-43-2	5.1	HIGH
ETHYL ACETATE		Esters	24°F	141-78-6	3.9	MEDIUM
2-BUTANONE	MEK	Ketones	16°F	78-93-3	3.8	MEDIUM
ISO-PROPYL ACETATE		Esters	35°F	108-21-4	3.4	LOW
ISOPROPYL ALCOHOL	IPA	Alcohols	53°F	67-63-0	2.5	LOW
2-PENTANONE	MPK	Ketones	104°F	107-87-9	2.5	MEDIUM
METHANOL	Methyl Alcohol	Alcohols	50°F	67-56-1	2.1	LOW
PROPYL ACETATE	n-Propyl Acetate	Esters	55°F	109-60-4	2.1	LOW
TOLUOL	Toluene	Aromatic Hydrocarbons	48°F	108-88-3	1.9	HIGH
METHYL ISOBUTYL KETONE	MIBK	Ketones	60°F	108-10-1	1.6	MEDIUM
ISOBUTYL ACETATE		Esters	69°F	110-19-0	1.5	LOW
ETHANOL	Ethyl Alcohol	Alcohols		64-17-5	1.4	LOW
<b>BUTYL ACETATE</b>		<b>Esters</b>	<b>78°F</b>	<b>123-86-4</b>	<b>1.0</b>	<b>LOW</b>
ETHYLBENZENE		Aromatic Hydrocarbons	64°F	100-41-4	.89	HIGH
1-PROPANOL	n-Propyl Alcohol	Alcohols	74°F	71-23-8	.86	LOW
2-BUTANOL	sec.-Butyl Alcohol	Alcohols	72°F	78-92-2	.81	LOW
XYLOL	Xylene	Aromatic Hydrocarbons	79°F	1330-02-07	.80	HIGH
AMYL ACETATE		Esters	106°F	628-63-7	.67	MEDIUM
2-METHYLPROPANOL	iso-Butyl Alcohol	Alcohols	82°F	78-83-1	.62	LOW
METHYL AMYL ACETATE		Esters	96°F	108-84-9	.50	LOW
5-METHYL-2-HEXANONE	MIAK	Ketones	96°F	110-12-3	.50	MEDIUM
1-BUTANOL	n-Butyl Alcohol	Alcohols	95°F	71-36-3	.43	LOW
2-ETHOXYETHANOL		Glycol Ethers	164°F	110-80-5	.38	LOW
2-HEPTANONE	MAK	Ketones	102°F	110-43-0	.40	MEDIUM
CYCLOHEXANONE		Ketones	111°F	108-94-1	.29	MEDIUM
AROMATIC-100	SC#100	Aromatic Hydrocarbons	111°F		.20	HIGH
DIISOBUTYL KETONE	DIBK	Ketones	120°F	108-83-8	.19	MEDIUM
1-PENTANOL	Amyl Alcohol	Alcohols		71-41-0	.15	LOW
DIACETONE ALCOHOL		Ketones	133°F	123-42-2	.12	LOW
2-BUTOXYETHANOL	Butyl Cellosolve	Glycol Ethers	154°F	111-76-2	.07	LOW
CYCLOHEXANOL		Alcohols	111°F	108-93-0	.05	LOW
AROMATIC-150	SC#150	Aromatic Hydrocarbons	149°F		.004	HIGH
AROMATIC-200		Aromatic Hydrocarbons	203°F		.003	HIGH

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\* CAS Number: Chemical Abstract Service Number.

\*\* Electrical Resistance using the Ransburg Meter.

\*\*\* Solvent Base Configuration Only.

† Information Obtained From: <http://solvdb.ncms.org>

†† The lowest temperature at which a volatile fluid will ignite.

Evaporation Rate is Based Upon Butyl Acetate Having a Rate of 1.0

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**NOTE:** Chart provides resistance and control information that we feel is necessary when using Ransburg equipment.

VISCOSITY CONVERSION CHART																		
Poise	Centipoise	Parlin 7	Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
.1	10	27	11	20			5	A-4			60	30	16					10
.15	15	30	12	25			8	A-3			80	34	17					11
.2	20	32	13	30	15	12	10				100	37	18					12
.25	25	37	14	35	17	15	12	A-2			130	41	19					13
.3	30	43	15	39	18	19	14	A-1			160	44	20					14
.4	40	50	16	50	21	25	18	A			210	52	22				19	15
.5	50	57	17		24	29	22			30	260	60	24				20	16
.6	60	64	18		29	33	25	B		33	320	68	27				21	18
.7	70		20		33	36	28			35	370		30				23	21
.8	80		22		39	41	31	C		37	430		34				24	23
.9	90		23		44	45	32			38	480		37	10			26	25
1.0	100		25		50	50	34	D		40	530		41	12	10		27	27
1.2	120		30		62	58	41	E		43	580		49	14	11		31	31
1.4	140		32			66	45	F		46	690		58	16	13		34	34
1.6	160		37				50	G		48	790		66	18	14		38	38
1.8	180		41				54		000	50	900		74	20	16		40	43
2.0	200		45				58	H		52	1000		82	23	17	10	44	46
2.2	220						62	I		54	1100			25	18	11		51
2.4	240						65	J		56	1200			27	20	12		55
2.6	260						68			58	1280			30	21	13		58
2.8	280						70	K		59	1380			32	22	14		63
3.0	300						74	L		60	1475			34	24	15		68
3.2	320							M			1530			36	25	16		72
3.4	340							N			1630			39	26	17		76
3.6	360							O		62	1730			41	28	18		82
3.8	380										1850			43	29	19		86
4.0	400							P		64	1950			46	30	20		90
4.2	420										2050			48	32	21		95
4.4	440							Q			2160			50	33	22		100
4.6	460							R		66	2270			52	34	23		104
4.8	480								00	67	2380			54	36	24		109
5.0	500							S		68	2480			57	37	25		112
5.5	550							T		69	2660			63	40	27		124
6.0	600							U		71	2900			68	44	30		135
7.0	700									74	3375				51	35		160
8.0	800								0	77	3380				58	40		172
9.0	900							V		81	4300				64	45		195
10.0	1000							W		85	4600					49		218
11.0	1100									88	5200					55		
12.0	1200									92	5620					59		

VISCOSITY CONVERSION CHART (Continued)																		
Poise	Centipoise	Parlin 7	Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
13.0	1300							X		95	6100						64	
14.0	1400								1	96	6480							
15.0	1500									98	7000							
16.0	1600									100	7500							
17.0	1700									101	8000							
18.0	1800							Y			8500							
19.0	1900										9000							
20.0	2000									103	9400							
21.0	2100										9850							
22.0	2200										10300							
23.0	2300							Z	2	105	10750							
24.0	2400									109	11200							
25.0	2500							Z-1		114	11600							
30.0	3000									121	14500							
35.0	3500							Z-2	3	129	16500							
40.0	4000									133	18500							
45.0	4500							Z-3		136	21000							
50.0	5000										23500							
55.0	5500										26000							
60.0	6000							Z-4	4		2800							
65.0	6500										30000							
70.0	7000										32500							
75.0	7500										35000							
80.0	8000										37000							
85.0	8500										39500							
90.0	9000										41000							
95.0	9500										43000							
100.0	10000							Z-5	5		46500							
110.0	11000										51000							
120.0	12000										55005							
130.0	13000										60000							
140.0	14000										65000							
150.0	15000							Z-6			67500							
160.0	16000										74000							
170.0	17000										83500							
180.0	18000										83500							
190.0	19000										88000							
200.0	20000										93000							
300.0	30000										140000							

**Note:** All viscosity comparisons are as accurate as possible with existing information. Comparisons are made with a material having a specific gravity of 1.0.

VOLUMETRIC CONTENT OF HOSE OR TUBE (English Units)							
I.D. (in)	cc/ft	Cross Section (in <sup>2</sup> )	Length				
			5ft. (60")	10ft. (120")	15ft. (180")	25ft. (300")	50ft. (600")
1/8	2.4	.012	.003 gal. .4 fl. oz.	.006 gal. .8 fl. oz.	.010 gal. 1.2 fl. oz.	.016 gal. 2.0 fl. oz.	.032 gal. 4.1 fl. oz.
3/16	5.4	.028	.007 gal. .9 fl. oz.	.014 gal. 1.8 fl. oz.	.022 gal. 2.8 fl. oz.	.036 gal. 4.6 fl. oz.	.072 gal. 9.2 fl. oz.
1/4	9.7	.049	.013 gal. 1.6 fl. oz.	.025 gal. 3.3 fl. oz.	.038 gal. 4.9 fl. oz.	.064 gal. 8.2 fl. oz.	.127 gal. 16.3 fl. oz.
5/16	15.1	.077	.020 gal. 2.5 fl. oz.	.040 gal. 5.1 fl. oz.	.060 gal. 7.6 fl. oz.	.100 gal. 12.7 fl. oz.	.199 gal. 25.5 fl. oz.
3/8	21.7	.110	.029 gal. 3.7 fl. oz.	.057 gal. 7.3 fl. oz.	.086 gal. 11.0 fl. oz.	.143 gal. 18.4 fl. oz.	.287 gal. 36.7 fl. oz.
1/2	38.6	.196	.051 gal. 6.5 fl. oz.	.102 gal. 13.1 fl. oz.	.153 gal. 19.6 fl. oz.	.255 gal. 32.6 fl. oz.	.510 gal. 65.3 fl. oz.

VOLUMETRIC CONTENT OF HOSE OR TUBE (Metric Units)							
I.D. (mm)	cc/m	Cross Section (mm <sup>2</sup> )	Length				
			1.5m	3.0m	4.5m	6.0m	7.5m
3.6	10.2	10.2	15.3 cc	30.5 cc	45.8 cc	61.1 cc	76.3 cc
5.6	24.6	24.6	36.9 cc	73.9 cc	110.8 cc	147.8 cc	184.7 cc
6.8	36.3	36.3	54.5 cc	109.0 cc	163.4 cc	217.9 cc	272.4 cc
8.8	60.8	60.8	91.2 cc	182.5 cc	273.7 cc	364.9 cc	456.2 cc

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# Ransburg

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