WARNING—HIGH PRESSURE—WARNING

UP TO 3000 POUNDS PER SQUARE INCH

DO NOT POINT SPRAY GUN AT ANY PART OF THE HUMAN BODY

FLUID UNDER HIGH PRESSURE CAN PENETRATE THE SKIN AND CAUSE SEVERE INTERNAL INJURY

IN CASE OF INJURY OBTAIN MEDICAL ATTENTION IMMEDIATELY
BE SURE TO REPORT NATURE OF INJURY AND TYPE OF FLUID OR SOLVENT TO THE DOCTOR

Be sure you understand ALL of the instructions thoroughly BEFORE operating any part of an airless equipment system.

CONSULT YOUR BINKS REPRESENTATIVE TO CLEAR UP ANY ITEMS OF INSTRUCTION YOU DO NOT UNDERSTAND

These instructions are designed as a guide for operators of Binks Airless Equipment. Set-up, operation, and maintenance information is listed to aid in keeping the equipment in good, trouble-free condition.

Trouble shooting charts are listed to aid in isolating malfunctions that may occur in an airless pump or gun.

Refer to the Parts Sheet supplied with each component for specific operation and maintenance instructions, as well as parts listings.

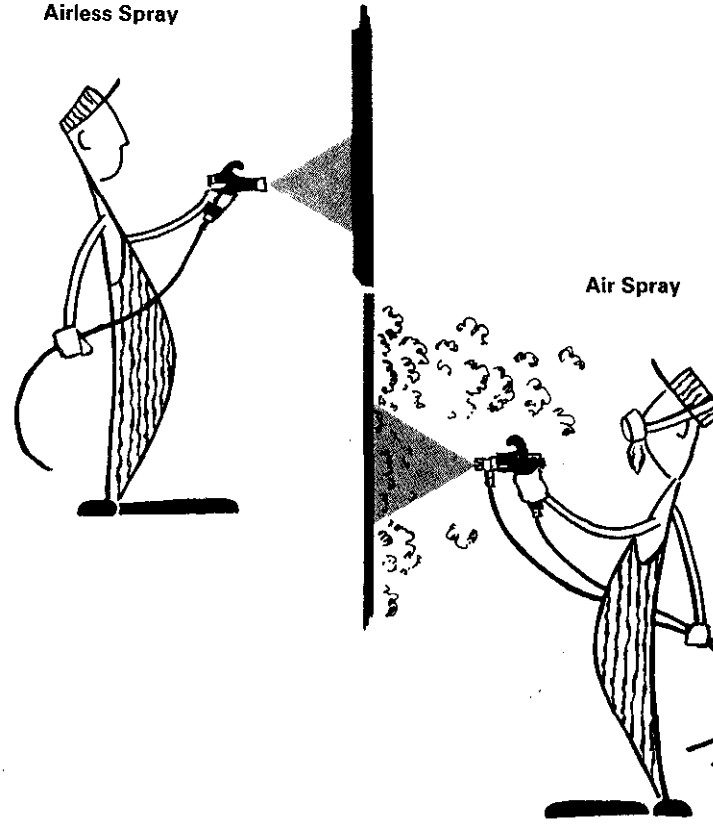
AIRLESS SPRAYING

Airless spraying is a method of spray application that does not directly use compressed air to atomize the paint or other coating material. Hydraulic pressure is used to atomize the fluid by pumping it at high pressure (500 to 4500 psi) through a small orifice in the spray nozzle. As the fluid is released at these high pressures, it is separated into small droplets resulting in a very fine, or atomized spray. The fluid is discharged from a small nozzle orifice at such a high velocity that the material tears itself apart and sufficient momentum remains to carry the minute particles to the surface.

Since air is not used to atomize the material, the term "Airless" is used to describe this method.

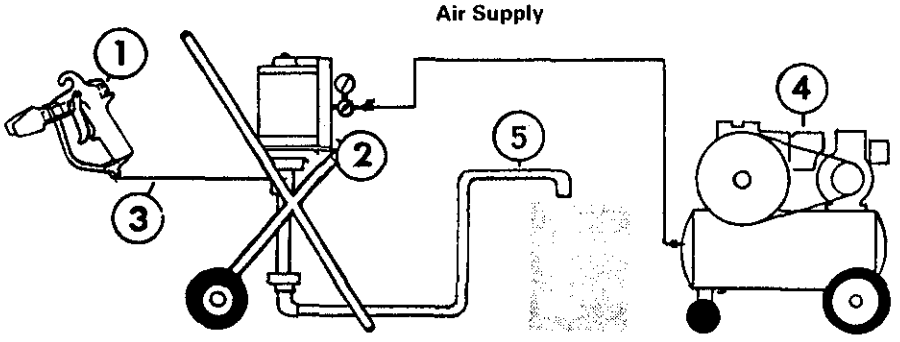
Water is hydraulically atomized, for example, using the fine spray adjustment on a garden hose nozzle; however, it is accomplished with low pressure because of the low viscosity of water. Paint and other coating materials have a higher viscosity; therefore they require higher pressures, requiring a pump.

Air pressure is required only to operate the air motor which powers the reciprocating airless fluid pump. A pump develops fluid pressures at a given ratio depending on size of the air motor piston and the effective area of the fluid piston. Example: A pump rated at 25:1, develops fluid pressure 25 times the air pressure applied to the air motor. For 100 psi air pressure, 2500 psi fluid pressure results.



BASIC AIRLESS SYSTEMS

Dead End System: Dead end systems are used for the majority of standard quality finishing jobs. The gun is connected to the pump with a single hose. When the gun is spraying, the pump delivers fluid under pressure adjusted by the air pressure to the pump. When the gun is not spraying, the fluid pressure and air pressure are balanced and the pump stops. The quality and economy of the finish is dependent upon operator skill, fluid preparation and nozzle size. Dead end spray is usually employed with non-heated paint.



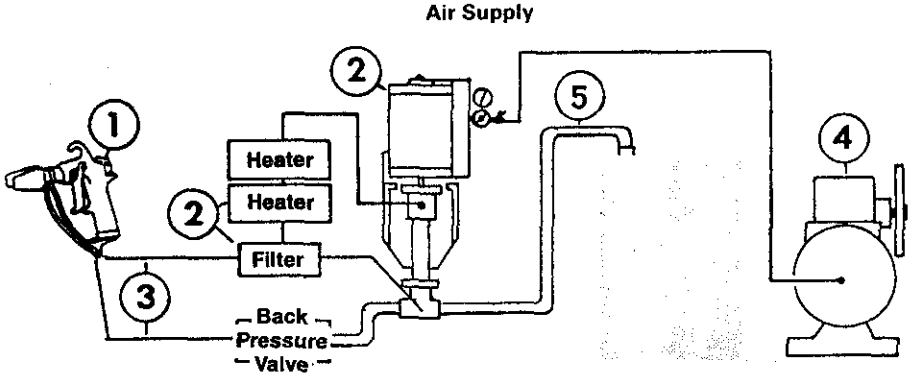
Dead-End Airless System

1. Gun
2. Pump
3. Hose
4. Compressor, electric motor or gas engine
5. Siphon tube
6. Material supply

DEAD-END SYSTEM

Used for the majority of standard quality spray finishing applications. Usually employed with non-heated methods.

Circulating System: Circulating systems are used for high quality, high production finishes. The gun is connected to the pump with one hose, and to a pressure regulating valve with another hose. The pump provides paint under pressure continuously. The back pressure regulating valve provides a constant fluid pressure and volume for the gun when spraying. When not spraying, the constant pressure is still available as the pump is recirculating the paint. The quality and economy of the finish is less dependent upon the operator's skill or paint preparation, and is more uniform because of mechanical consistency of pressure and volume control. Circulating systems are usually used with heated paint.

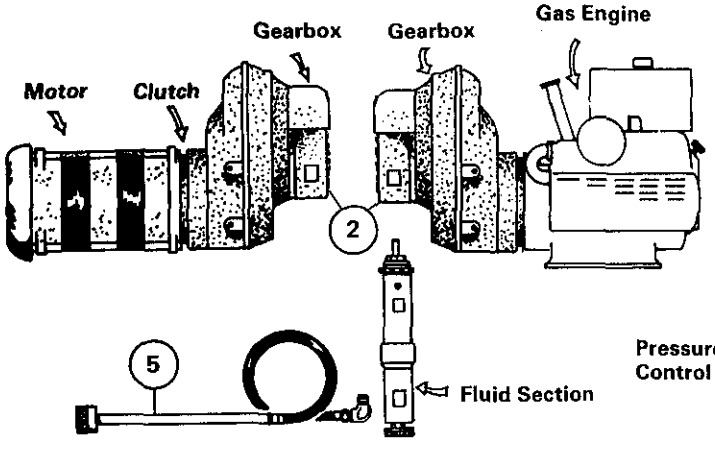


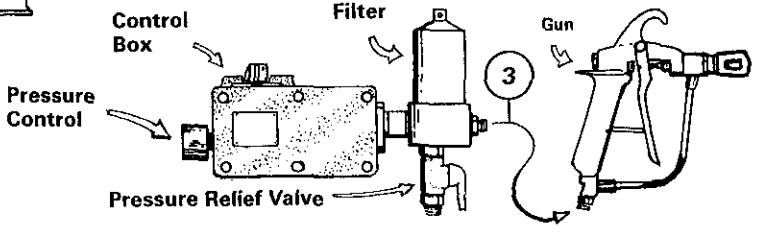
Hot Circulating Airless System

HOT CIRCULATING SYSTEM

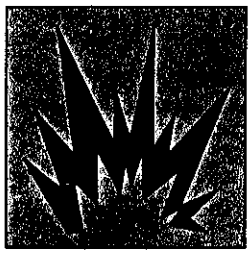
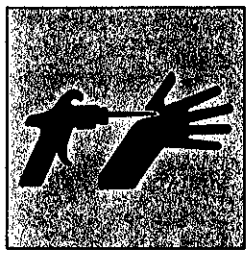
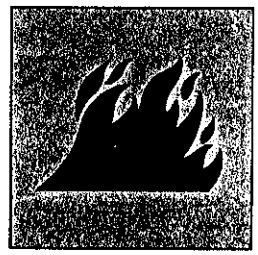
For high quality, high production finishes where pigment settling is a problem. Recirculating systems are normally employed with hot airless spraying.

AIRLESS—ELECTRIC POWERED and GASOLINE POWERED: The basic components of an electric driven airless pump are the fluid section, gearbox, and electric motor.





⚠ WARNING

HIGH PRESSURE CAN CAUSE SERIOUS INJURY IF EQUIPMENT IS INSTALLED OR USED INCORRECTLY —**READ, UNDERSTAND, AND OBSERVE** ALL WARNINGS AND INSTRUCTIONS IN THIS MANUAL.

OPERATE EQUIPMENT ONLY AFTER ALL INSTRUCTIONS ARE CLEARLY UNDERSTOOD.

Injection Hazard

1. The Sprayer pumps coatings at high pressure (2500 PSI/173 Bar). If you spray yourself or anyone else at close range, the stream of material can puncture the skin and cause great harm (possible amputation).
2. NEVER point the spray gun at yourself or anyone else. The tip guard provides some protection against injection injuries, but is mainly a warning device. NEVER remove the tip guard. Never point the spray gun at your hands, fingers, or body. ALWAYS keep the spray gun trigger safety catch locked in the OFF position when not in use.
3. DO NOT cover the tip guard and attempt to "blow back" fluid. This is not an air sprayer.
4. If injury occurs, see your doctor immediately! DO NOT TREAT THIS AS A SIMPLE CUT. Inform your doctor specifically of what fluid was injected.

Avoid Static Sparking

Static electricity charge builds up by high velocity liquid flowing through a hose during flushing, cleaning, or spraying operations. Proper grounding of the airless system safely dissipates this charge.

All high pressure airless systems must be grounded to avoid dangerous static sparking, explosion, or fire when spraying or flushing with flammable liquids.

- Use Binks NO-WIRE conductive hose in all airless spraying operations. Be sure gun and hose have continuity. Check continuity weekly with ohmmeter. Overall (end to end) resistance of unpressurized hose must not exceed 29 megohm (max.) for any coupled length or combination of hose lengths.
- Make sure the airless pump is grounded. Never operate the unit when it is on a non-grounded platform. Electric airless units are grounded through the grounding prong on the plug. The electric cord or receptacle must be grounded. Do not alter or remove grounding prong.
- When flushing or cleaning with a combustible solvent, always use an open metallic container for receiving the waste solvent. Ground the solvent receptacle.
- Bond the spray gun to the waste container with a grounding wire. Be sure there is good metal to metal contact.
- Always remove spray tip when flushing the airless system. Operate the pump at the lowest possible pressure.

General Warnings

1. NEVER leave a pressurized sprayer unattended.
2. DO NOT use fluids, coatings, or chemicals that are not compatible with nylon hoses.
3. Periodically inspect all hose for leaks and/or abrasions and tighten all connections before use. DO NOT ATTEMPT TO REPAIR a defective hose. REPLACE it with another conductive hose.
4. Follow all warnings and precautions of the coating and solvent manufacturers.
5. ALWAYS relieve pressure in the system by turning by pass valve to BYPASS or triggering spray gun before disassembly of any component parts.

Replacement Parts

The Airless Sprayer is designed to use authorized parts only. When using this pump with parts that do not comply with the minimum specifications and safety devices of Binks, the user assumes all risks and liabilities.

HOW TO SELECT AN AIRLESS PUMP

Type of materials to be sprayed, size of job, volume of air available; all are considerations which govern the selection of the particular airless pump that is right for you and the reason for the wide variety of pumps in our line. When selecting an airless unit, answer these questions:

1. What type of material is to be sprayed?
   Determining the general characteristics of the materials to be sprayed is an important step toward proper pump selection.

Low viscosity materials such as stains and lacquers can be sprayed the small orifice nozzles (.007 to .018).

To obtain the flow of heavier viscosity materials, larger orifice nozzles and higher ratio pumps are required. Refer to the Airless Nozzle Flow Chart below and select a nozzle range which is best suited for the matrial to be sprayed.

2. How much material volume does the job require?
   In the pressure columns of the Airless Nozzle Flow Chart, two sets of figures are shown: An ounce per minute delivery rate and a CFM figure. By dividing the ounce per minute figure into 128 (128 ounces per gallon) you can determine how many nozzles of a particular size can be operated from a 1 GPM pump.
3. How much air should be available?
   Adequate air supply for efficient operation is determined by multiplying the number of nozzles to be used by the CFM fgure in the Airless Nozzle Flow Chart. Allowance should be made for additional air operated accessories such as agitators, etc.

AIRLESS NOZZLE FLOW CHART

Delivery in Ounces Per Minute and C.F.M. Required

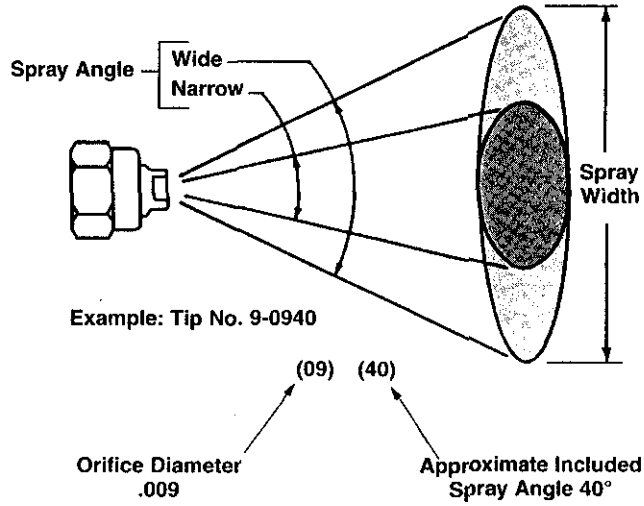
ORIFICE	500 P.S.I.	1000 P.S.I.	1500 P.S.I.	2000 P.S.I.	2500 P.S.I.
WATER					
.007	4. oz.— .5 cfm	5. oz.— .66 cfm	6. oz.— .8 cfm	6.7 oz.— 1.4 cfm	7 oz.— 1.7 cfm
.009	4.5 oz.— .58 cfm	5.7 oz.— .76 cfm	6.8 oz.— .87 cfm	8.4 oz.— 1.8 cfm	10 oz.— 2.7 cfm
.011	6.5 oz.— .8 cfm	8.5 oz.—1.1 cfm	12. oz.— 2. cfm	14. oz.— 2.9 cfm	15 oz.— 3.8 cfm
LACQUER					
.013	12. oz.— .8 cfm	15. oz.—1.1 cfm	19. oz.— 3. cfm	22. oz.— 4.5 cfm	26 oz.— 6.4 cfm
.015	13. oz.—1.1 cfm	19. oz.—2.5 cfm	24. oz.— 4. cfm	27. oz.— 5.7 cfm	32 oz.— 8. cfm
.016	14. oz.—1.3 cfm	22. oz.—2.9 cfm	29. oz.— 4.8 cfm	34. oz.— 7. cfm	39 oz.— 9.7 cfm
LATEX PAINT					
.018	12. oz.—1. cfm	19. oz.—2.5 cfm	26. oz.— 4.2 cfm	35. oz.— 7.4 cfm	44 oz.—10. cfm
.021	14. oz.—1.2 cfm	24. oz.—3.5 cfm	32. oz.— 5.3 cfm	46. oz.— 9.5 cfm	56 oz.—13. cfm
PLASTISOL					
.026		21. oz.—2.7 cfm	34. oz.— 5.7 cfm	51. oz.—11. cfm	65 oz.—16. cfm
.031		26. oz.—3.3 cfm	48. oz.— 7.4 cfm	65. oz.—14. cfm	85 oz.—21. cfm
.036		32. oz.—4.2 cfm	68. oz.—11. cfm	95. oz.—20. cfm	126 oz.—31. cfm
COAL TAR EPOXY					
.043		31. oz.—4. cfm	61. oz.—10. cfm	105. oz.—22. cfm	143 oz.—36. cfm
.072		72. oz.—9.5 cfm	112. oz.—18. cfm	151. oz.—32. cfm	190 oz.—46. cfm

NOTE: There are variables in equipment and fluids which cause this chart to be approximate; however, it is sufficiently accurate for proper equipment selection. The C.F.M. ratings are maximum under continuous duty conditions.

AIRLESS TIP SELECTION

Tips are selected by their orifice size (.007 to .072 inches) and fan angle (10 to 80 degrees). The proper selection is determined by the fan width required for the specific job and by the orifice size that will supply the desired amount of liquid and accomplish proper atomization of the material. Tips also determine the size of pump that must be used to properly spray the coating.

For light viscosity fluids, smaller orifice tips generally are desired. For heavier viscosity fluids, larger orifice tips are preferred. The quantity of fluid sprayed is determined by the size of the orifice; the thickness is determined by the orifice and the fan angle.



The following general table may be of some help when choosing airless nozzle tip orifices.

Airless Nozzle Tip Orifices	Viscosity Range	Like
.007–.010	Very Thin	Acetone
.011–.013	Thin	Water
.015–.021	Medium	SAE #10 Oil
.026–.036	Heavy	SAE #50 Oil
.043–.072	Very Heavy	Petroleum Jelly

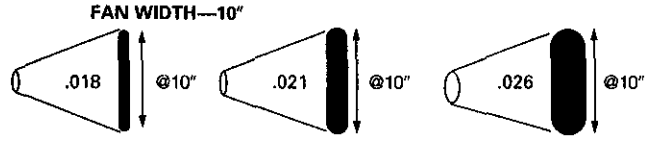
The chart below lists recommended tips.

BINKS AIRLESS TIP SELECTION CHART

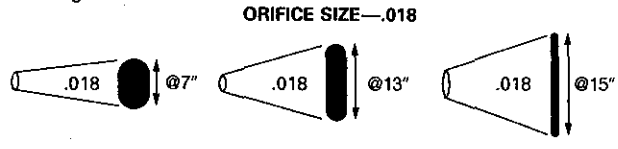
Type of Paints	Viscosity◆ (seconds)	Tip No.	Orifice Size (inches)	Spray Angle (degrees)	Spray Width■ (inches)
Lacquers, Sealers, Stains	20–25	9-1140	.011	40	7.5
		9-1330	.013	25	5.5
		9-1350*	.013	50	9.0
Automotive Primers, Lacquers, Enamels	20–25	9-1540	.015	40	8.5
		9-1580	.015	80	13.0
Aluminums, Iso-Alkyds, Primers, Plastic Enamels, Alkyd Flats, Road Stripping	30–35	9-1540*	.015	40	8.5
		9-1580	.015	80	13.0
		9-1840	.018	40	10.0
		9-1860*	.018	65	13.5
Latex, Rustic & Shakes Mill Whites	35–45	9-1540*	.015	40	8.5
		9-1580	.015	80	13.0
		9-1840	.018	40	10.0
		9-1860*	.018	65	13.0
		9-2180*	.021	80	17.0
		9-2660	.026	65	17.0
		9-3170	.031	65	15.0

◆No. 4 Ford Cup. ■With nozzle tip at 12 inches from work surface. *Most frequently used.

Note: As the orifice size increases, while maintaining the same fan width size, the greater the volume of coating will be applied to the same area.



Conversely, the larger the fan width size, while maintaining the same orifice size, will result in the same amount of material being applied over a greater surface area.



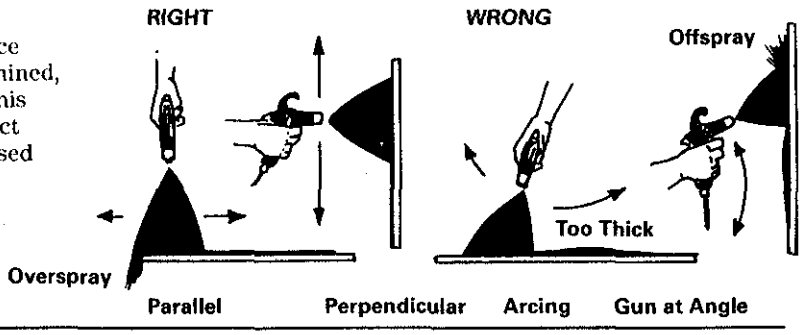
Open air supply to pump and increase air pressure at pump until pattern and/or material can be obtained at the spray gun.

The gun should be held PERPENDICULAR and moved PARALLEL to the surface in order to obtain a uniform coating of material.

Uneven film thickness and excessive offspray can be caused by ARCING the gun. When arcing, the heaviest deposit of paint occurs when the gun is perpendicular to the work in the center of the arc, and lightest at the ends of the arc (see below right). Arcing is caused by using only wrist or forearm movement.

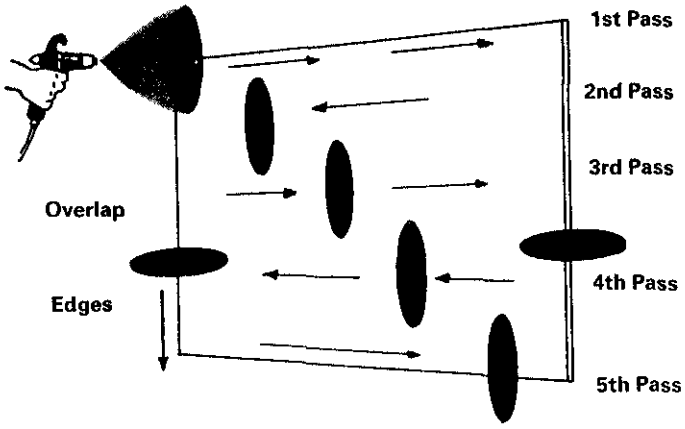
The wrist, elbow, and shoulder must all be used. Once the best working distance (10 to 15 inches) is determined, the spray gun should be moved across the work at this optimum distance throughout the stroke. Some object shapes do not allow this practice, but it should be used whenever possible.

The proper SPEED allows a full wet coat application with each stroke. If the desired film thickness cannot be obtained with a single stroke or pass because of "sagging", then two or more coats can be applied with a flash-off period between each coat. The spray movement should be at a comfortable rate. If the spray gun movement is excessive in order to avoid flooding the work, then the fluid nozzle orifice is too large or the fluid pressure is too high. If the stroke speed is very slow in order to apply full wet coats, then the fluid pressure should be increased slightly or a larger tip is required.

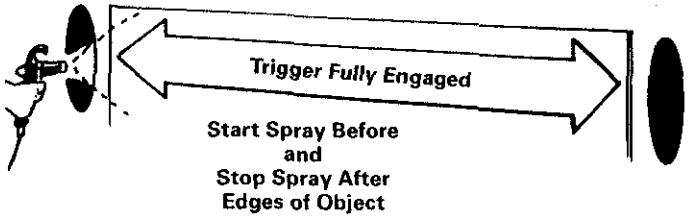


SPRAYING TECHNIQUES

Proper LAPPING (the distance between strokes) is essential in producing uniformity of film thickness. The overlap should be the minimum required to give the degree of uniformity desired. The more uniform the lapping is maintained, the more uniform the film thickness will be.



TRIGGERING the gun is required to conserve material and to prevent excessive paint buildup at the end of each stroke.



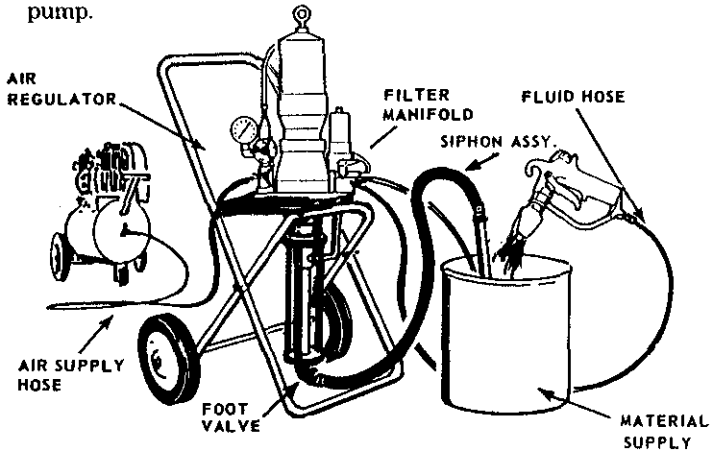
PRECAUTIONARY NOTES

The following precautions must be observed for personal safety and for protection of equipment:

1. Keep air compressors as far as feasible away from painting area, in order to lessen the possibility of compressor contamination and to aid in keeping the equipment clean.
2. Operating with excess fluid pressures does not improve the finish, but only shortens the life of the equipment and increases wear of the spray gun fluid tip.
3. Never attempt to remove the hose or gun before releasing the pressure from the outfit.
4. Never use standard hardware to modify the pump. Use high pressure fittings only.
5. The special high pressure nylon braided hose supplied is standard equipment by Binks. This hose must not be kinked, bent, or subjected to abrasion.
6. Under no circumstances should the spray gun be carelessly handled, nor its spray (particularly when the nozzle is removed) directed at close proximity to any part of the human body.
7. Never attempt to change the spray tip without first relieving pressure or disengaging spray gun trigger.
8. Carefully handle the hose connections, joints, and seating surfaces on the spray gun to prevent damage to the sealing surfaces.
9. All airless spray units must be grounded to prevent the possibility of fires, electrical arcing, shocks, etc.

AIRLESS OPERATING CHECKLIST

The operator should become familiar with all components, identified below, before attempting to operate an airless pump.



START-UP PROCEDURE
(air coupled models)

YES

1. Connect air supply hose to air control. Make sure hose size, connections and fittings are large enough to prevent a restricted air supply. 3/8" or larger is recommended. ..... ___
2. Connect high pressure hose between filter manifold (pump outlet) and spray gun (less nozzle tip). Tighten connections securely..... ___
* 3. Connect one end of the high pressure return hose to the remaining spray gun connection and the other end to the back pressure control valve. If two hoses of different sizes are used, the smaller diameter hose is the return. ..... ___
4. If unit has siphon hose, connect to the pump. All connections must be tight and the strainer should be clean. Periodically grease fitting with lubricant. Fill solvent cup as required..... ___
5. Regulator should be backed off (closed)..... ___
6. Open air supply valve to regulator. ..... ___
7. Immerse fluid section or siphon tube in solvent compatible with fluid to be sprayed. (Refer to paint manufacturer's recommendations.) ..... ___
8. With trigger held back or pressure release valve open, direct spray gun into solvent container and slowly increase air pressure on the regulator to operate pump slowly, and prime system. .. ___
* 9. Open back pressure control valve..... ___
10. Increase air regulator pressure and run pump for approximately 1/2 minute at a moderate speed..... ___
11. Release trigger of spray gun and wait for pump to stall (stop running), or close pressure release valve..... ___
*12. Close back pressure control valve. ..... ___
13. Remove siphon hose or pump from solvent..... ___
14. Open regulator and slowly pump solvent out of system..... ___
*15. Open back pressure control valve..... ___
16. Allow air to flow through system for about 1/2 minute..... ___
17. Check any air-operated accessories for proper functioning..... ___
18. Shut off air supply by closing regulator..... ___
19. Follow material supplier's recommendations for preparing material to be sprayed. ..... ___
20. Fill paint container with clean paint. ..... ___
21. Immerse siphon hose or pump in paint container..... ___
22. Select tip and gasket (and insert if needed). Install securely in spray gun. ..... ___
23. Increase air pressure until pump begins to operate. ..... ___
24. Prime system with paint..... ___
25. Let pump stall..... ___
*26. Close back pressure recirculating control valve.. ___
27. Test spray pattern. Increase air pressure (if required) and test at 5 psi increments until desired spray pattern is reached using *minimum* air pressure..... ___
*28. Turn paint heater ON (if so equipped)..... ___
*29. Open back pressure recirculating control valve slowly. The pump should operate at approximately 30 strokes per minute (top to bottom is one stroke). ..... ___
*30. Check for proper spray pattern. When the pump is circulating the back pressure control valve gauge should drop 100 to 200 psi when spraying. ___

*Indicates steps for a circulating system.

NOTE: Control of spray pattern is accomplished by:
a. Proper tip selection for flow rate and fan pattern size.
b. Fluid pressure adjustment.
c. Changing the viscosity of the material

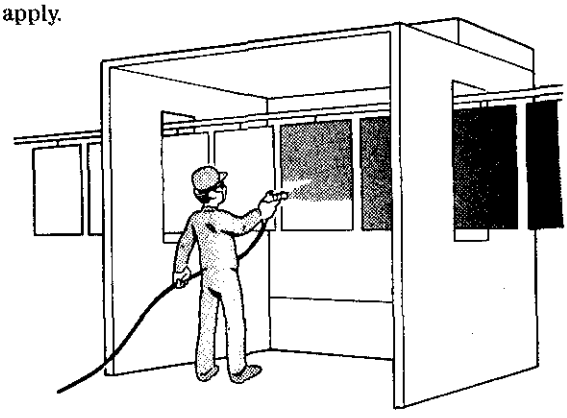
EQUIPMENT SETUP
(Electric or Gasoline Driven Models)

The electric or gasoline powered airless outfits are simple to set up and operate. Once unpackaged from their shipping carton, simply connect the high pressure airless hose to the fluid outlet manifold fitting and attach the airless spray gun to the hose. If a siphon kit is to be used, attach it to the fluid section inlet.

The electric unit requires 120 VAC, 60 cycles. The gasoline unit requires a gallon of lead free gas for 3½ hours of continuous operation. Be sure to check oil level of the gasoline engine.

All Binks airless pumps are factory tested, using light oil, before shipment. This test fluid must be purged from the system before actual spray operations begin.

Place the pump fluid section or siphon kit into a container of solvent compatible with the material you are going to apply.



TO START

YES

1. Turn the Pressure Adjusting Knob to low pressure and open the Pressure Relief Valve..... ——
2. Turn unit ON. (If gas powered, start engine and turn unit ON.) ..... ——
3. If unit does not run, turn the Pressure Adjusting Knob to higher pressure..... ——
4. When material begins to flow from drain tube on Pressure Relief Valve, close the Pressure Relief Valve. The pump will now build up to pressure. ... ——
5. Trigger the spray gun, with nozzle removed, into solvent container until system is clean..... ——
6. Shut the pump OFF and OPEN the Pressure Relief Valve..... ——
7. Engage spray gun SAFETY and replace the nozzle tip and guard on spray gun and tighten securely... ——
8. Remove solvent container and replace with material you are going to apply. Turn the unit ON. ..... ——
9. Adjust the spray pattern with the Pressure Adjusting Knob. When the pattern is right, the pressure is right. Excessive fluid pressure will only distort the pattern and cause undue wear of the equipment..... ——

TIP PLUGGING

The most common cause of tip plugging is foreign matter, paint skin, or residue in the hose or pump from a previous application. The strainers and filters remove the majority of the particles, but some pass through and occasionally plug the tip. Thorough cleaning of the equipment and proper straining of the paint are the ONLY positive remedies.

Excessively large paint pigments are also a cause of tip plugging. Heavy accumulations of pigments in the strainers is an indication of this problem. Increasing the tip size is a help; however, this may create a problem of controlling the desired coating.

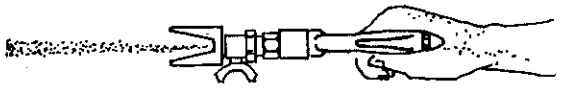
Heavy materials should be sprayed with large tips and NO strainers or filters. In many cases the fluid can be thinned slightly more than that recommended. This not only may help prevent plugged tips, but also allow spraying at lower fluid pressure.

Strainer plugging generally causes tails, the loss of proper spray patterns and may seem to be a plugged tip. Always check the strainer if spray patterns cannot be maintained and the tip is clean. Or, when using Rapid-Clean Nozzle accessory, rotate handle 180 degrees.

TIP CLEANING can be accomplished as follows:

YES

1. Relieve fluid pressure..... ——
2. Set trigger lock to "locked" position..... ——
3. Remove cap, nozzle tip, and gasket..... ——
4. Flush nozzle tip with solvent, then blow air through tip and visually check for obstructions.... ——
5. Reinstall gasket, nozzle tip, and cap..... ——
6. Or, when using Rapid-Clean Nozzle accessory, rotate handle 180 degrees to "Clean-out" position, and back flush. ..... ——



CAUTION: Do not turn Twist-Tip handle when gun trigger is pulled.

SHUT-DOWN PROCEDURE AND MAINTENANCE

YES

1. Close air pressure regulator..... ——
2. Remove pump or siphon hose from fluid container..... ——
3. Release fluid pressure by aiming gun into fluid reservoir and pulling trigger, until fluid ceases to flow, or by opening the high pressure release valve..... ——
4. Remove nozzle tip, gasket, and insert if used and place in solvent. ..... ——
5. Insert pump foot valve or siphon hose in container of compatible solvent..... ——
6. Pump paint from system by opening air regulator slowly until fluid pours from gun and direct flow into paint container..... ——
7. When solvent flows from the gun, direct the stream into the solvent container. ..... ——
8. Allow the solvent to circulate for several minutes through the gun. ..... ——
9. Circulate with several short flush cycles, triggering gun periodically to flex the packings free of paint. Short flush cycles with clean solvents are more effective than a long cleaning flush cycle. Continue until system pumps clean solvent during second or third cycle, increase pump pressure 10 lbs. above previous spraying pressure and trigger gun..... ——

*10. Close the back pressure circulating control valve..... ——

11. Remove pump or siphon hose from solvent and continue flow until system pumps air for about 30 seconds..... ——

*12. Open the back pressure recirculating control valve..... ——

13. Shut off air supply and trigger gun until all pressure is relieved or open the high pressure release valve..... ——
14. Remove filters and clean by flushing with solvent; use soft brush if required, and forcing air from the inside through the filter to remove residual particles. Reassemble when clean..... ——
15. Wipe exterior parts that come in contact with paint until clean using solvent-dampened rags... ——
16. Repeat Steps 5 and 7 using petroleum base solvent (kerosene, mineral spirits or lacquer thinner). Close air supply to pump but keep system filled with solvent. Solvent should be a solution of 4 parts solvent and 1 part 10 weight oil (or Binks solvent 42-175). ..... ——
17. Operate pump until fluid section piston shaft is in the "down" position (or down stroke). This will prevent paint from hardening on piston shaft and the solvent will keep the residual paint pliable. ..... ——
18. Release excessive pressure from the system..... ——
19. Clean tip (and insert) with solvent and blow air through tip (and insert). Visually check both for obstructions. Tips should be stored in a small solvent filled container..... ——
20. Disconnect air supply, and rotate trigger lock to "off" position. Pump should be stored in normal operation position so that solvent will not drain out of pump. ..... ——

AIRLESS SPRAY GUN INFORMATION

The airless spray gun is specifically designed for use with high fluid pressures. Some spray guns use a tungsten carbide ball and seat in the fluid shut-off, and a tungsten carbide fluid tip for maximum wear resistance and service life. A fluid filter may be inserted in the gun when fine filtration is required. Tip screens may be installed to reduce tip plugging. Some spray guns contain a trigger release for safety when removing or replacing the nozzle tip. Diffuser nuts may be installed behind the spray tip, so that when the tip is removed, any fluid accidentally released would not be harmful. In some models the fluid enters the gun at the base of the handle. This allows greater freedom of movement and provides a better balanced gun which, together with easy trigger pull and light weight, reduces operator fatigue.

It is necessary to change the nozzle tip when spray pattern or orifice size changes are required.

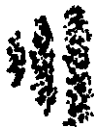
An optional sapphire spray insert is available which must be as large or larger than the spray tip orifice size. When installed in the fluid passage, this insert causes an increased fluid velocity which is an aid in fluid atomization. These inserts provide a "softer" spray pattern and reduce "tailing" of the pattern edges, especially when using latex or vinyl base materials.

CLEANING PROCEDURE FOR AIRLESS SPRAY GUN

		YES
1.	Release all pressure from airless system and drain out any solvent or paint.	____
2.	Remove spray gun from hose.	____
3.	Remove retaining nut, tip, washer, gasket, insert, and filter from spray gun.	____
4.	Place removed parts in container of compatible solvent for soaking.	____
5.	Clean spray gun with solvent-dampened rags. Do not submerge entire spray gun in solvent; probe with a soft bristle brush if necessary to thoroughly clean.	____
6.	Inspect spray gun for broken or worn parts. (Refer to Part Sheet.)	____
7.	Lubricate needle, packing and all points of wear.	____
8.	Clean tip, washer, gasket, insert, and filter with air blow gun and, if required, a stiff bristle brush.	____
9.	Observe tip insert and filter by holding up to light, and inspect for cleanliness.	____
10.	Securely replace tip, washer, gasket, insert, and filter in spray gun.	____
11.	Replace spray gun on hose and secure.	____
12.	Fill unit with solvent to check spray gun for leaks, operation, and proper spray pattern.	____

SPRAY PATTERN PROBLEMS

Problem	Cause	Remedy
Tails 	1. Inadequate fluid delivery. 2. Fluid not atomizing. 3. Insufficient fluid velocity. 4. Material too cohesive.	1. Increase fluid pressure. 2. Change to smaller tip orifice size. 3. Reduce fluid viscosity. 4. Clean gun and filter(s). 5. Reduce number of guns using pump. 6. Install properly matched sapphire insert.
Heavy Centered Pattern 	1. Worn tip. 2. Fluid will not spray with airless.	1. Same as above. 2. Change to air atomized method.
Distorted Pattern 	1. Plugged or worn nozzle tip.	1. Clean or replace nozzle tip.
Pattern Expanding & Contracting (Surge) 	1. Pulsating fluid delivery. 2. Insufficient air supply to pump. 3. Leak in suction tube. 4. Pump capacity too low. 5. Material too viscous.	1. Change to a smaller tip orifice size. 2. Install pulsation chamber in system or drain existing one. 3. Reduce number of guns. 4. Increase air supply to air motor. 5. Remove restrictions in system. Clean or remove screens or filters; use larger hose or pump if necessary. 6. Inspect siphon tube and hose assembly for leak. 7. Reduce fluid viscosity.
Round Pattern 	1. Worn tip. 2. Fluid too heavy for tip. 3. Fluid will not spray with airless.	1. Replace tip. 2. Increase fluid pressure. 3. Thin material. 4. Change nozzle tip. 5. Install sapphire insert. 6. Change to air-atomizing system.
Hour Glass 	1. Fluid too cohesive. (Adhesive-type materials). 2. Cannot spray material with airless.	1. Increase fluid pressure. 2. Thin material. 3. Install sapphire insert. 4. Change to air-atomizing system.

Trouble	Cause	Remedy
Spitting Gun 	1. Air in system. 2. Dirty gun. 3. Needle cartridge out of adjustment or damaged. 4. Broken or chipped needle seat. 5. Packing nut too tight or not lubricated. 6. Twist tip or nozzle tip screen dirty.	1. Inspect connections and siphon hose for leak. 2. Disassemble and clean gun. 3. Inspect needle cartridge and adjust or replace. 4. Replace damaged needle seat. 5. Loosen and lubricate packing. 6. Replace twist tip with standard airless tip. Clean nozzle tip screen.
Gun Will Not Shut Off	1. Worn parts, broken or chipped needle seat. 2. Needle cartridge out of adjustment. 3. Dirty gun. 4. Packing gland or nut too tight.	1. Inspect spray gun. Replace defective parts. 2. Inspect needle cartridge and clean. 3. Disassemble and clean spray gun. 4. Loosen gland or packing nut and lubricate needle.
Gun Does Not Spray Any Fluid	1. No paint. 2. Plugged filters or tip. 3. Broken needle in spray gun.	1. Check fluid supply. 2. Clean filters or tip. 3. Replace broken needle.

TROUBLE SHOOTIN AIRLESS PUMP

Trouble	Probable Cause	Remedy
Insufficient Material Flow. (Pump operates but does not stall)	1. No paint. 2. Foot strainer clogged. 3. Pump will not prime. Material too heavy. 4. Leak in spray system. 5. Air leak in siphon hose. 6. Foreign material lodged in foot valve. 7. Dry or worn packings. 8. Broken or worn ball or valve seats 9. Air motor piston shaft separated from fluid shaft. *10. Back Pressure Recirculating Control Valve open.	1. Check fluid supply. 2. Clean foot strainer. 3. Thin material and operate pump more slowly to get prime. 4. Repair leaks and tighten connections. 5. Tighten connection on siphon hose. Check for damage. 6. Remove pump from paint and clean valve foot. 7. Replace packings in accordance with part sheet. 8. Inspect and replace broken or worn parts. 9. Inspect and repair. *10. Close valve. If closed and still by-passing fluid, repair or replace valve.
No Material Flow (Pump not operating)	1. Loss of air pressure. 2. Plugged supply lines, filters or tip. 3. Icing of air motor. 4. After a long period of storage, piston cups may be stuck to cylinder wall. 5. Pilot valve or autocycle stuck. 6. Air valve actuator piston stuck. 7. Trip rod adjustment too loose. Air piston hits on bottom casting before tripping pilot valve. 8. Malfunctioning or worn air valve.	1. Check air supply. 2. Clean hose, filters, and tip. 3. Install an oiler with antifreeze. 4. Increase air pressure until piston cups loosen; then decrease air pressure for normal operation. 5. Remove and check for proper adjustment, plugging, worn or damaged parts, binding or leaking seals. 6. Remove and check for binding, lubricate. 7. Tighten trip rod adjustment screw. 8. Refer to air valve part sheet for proper procedures.
Loss of Power Under Load, Air Hissing During Exhaust	1. Insufficient air supply. 2. Air motor piston cups or cylinder wall scored.	1. Check for sufficient air supply. 2. Replace worn or damaged parts.
Slide Block or Auto Cycle Valve Move Too Slowly	1. Piston cups swollen and binding. 2. Actuator piston or valve surface plate dirty or binding.	1. Replace piston cups and lubricate. 2. Remove, clean and lubricate.
Air Motor Valve or Auto Cycle Valve Leak Under Load	1. Surface plates or valve block plate stuck, balls seats scored or dirty. 2. Auto cycle valve out of adjustment.	1. Replace damaged parts. Clean and lubricate 2. Adjust auto cycle valve (see part sheet).
Pilot Valve or Auto Cycle Valve Hissing Constantly. Loss of Pump Power	1. Pilot valve or auto cycle valve seals damaged. 2. Auto cycle valve out of adjustment.	1. Replace damaged parts. 2. Adjust auto cycle valve (see part sheet).
Material Flow Sluggish Or Pumping On One Stroke Only	1. Insufficient air pressure or volume (CFM). Too small I.D. hose. Too long a hose. Too small a compressor. Kinked or tangled hose. 2. Fluid piston ball valves not seating or unseating properly.	1. Check air supply, hose length, hose I.D., pump air requirements. Check hose. 2. Remove fluid section and inspect for wear, stuck or broken parts, and clean or replace (see part sheet). 3. Replace piston cups or cylinder (see part sheet).

GENERAL COMPARISON

Factor	Airless Spraying	vs.	Conventional Spraying
1. Means of Atomization	High velocity of fluid using hydraulic pressure thru small orifice.		Fluid stream torn apart by jets of compressed air.
2. Pattern Control	Nozzle shape and size—must change nozzle to change pattern.		Control or air and fluid pressure provide complete control of pattern.
3. Air Volume	Approx. 1/4 to 1/2 of air spray (100 psi).		4 to 20 CFM
4. Air Pressure Requirements	High pressure (100 psi) required.		Medium to low air pressure best (50 to 75 psi).
5. Fluid Pressure Requirements	600 to 4000 psi.		Low pressures—generally to 18 psi at nozzle.
6. Fluid Delivery	Medium to high delivery. Provides fastest application speeds. Excellent for large areas.		Low to medium delivery. Usually not more than 32 oz. per min. Less speed than airless—more control.
7. Air Contamination	More overspray (material that misses the object) but less fog and rebound (material that bounces back from the surface).		Less overspray. More fog and rebound. Proportional to the atomizing pressure. Higher pressure—more fog.
8. Materials	Not all materials can be sprayed. Requires uniform fine grinds (particle size 0–.008). Heavy pigmented, fiber filled, abrasive or cohesive materials will not work.		Materials that flow can be sprayed.
9. Material Preparation	Requires considerable care in preparation to ensure proper patterns with no tip plugging.		Less care required. Follow material supplier's recommendations.
10. Maintenance	More required because higher pressure pumping equipment and smaller fluid tip orifices are required.		Less required because equipment is more basic.
11. Product Contamination	No contamination from air line impurities.		Impurities in the air supply can spoil the finish.
12. Spraying Advantage	Materials may be sprayed into cavities and corners with little rebound coming from the opening.		Difficult to spray into cavities and corners because of the large amounts of air required to atomize the materials; create an air cushion which inhibits paint deposition.
13. Atomization	Generally coarser atomization.		Fine atomization for all high-quality finishes.

AIRLESS SPRAYING
COMMON TERMS USED WHEN DESCRIBING AIRLESS SPRAYING

Airless Spraying—The method of using high pressure to create high fluid velocity which atomizes paint material without using air.

Airless Pump—A pump designed to create high fluid pressures which are needed in airless spraying.

Siphon Feed Pump—A pump that has a hose connected to the foot valve which enables the pump to siphon material out of standard containers.

Solvent Cup—A cup put on a pump around the upper packings which will help lubricate the pump and carry off any excess heat caused by the operation of the pump.

Siphon Tube—The tube and hose assembly which connects to the foot valve of the pump.

In-Line Filter—A filter which connects in the paint line of an airless unit before the spray gun.

Spray Gun Swivel—Connects between the spray gun and hose which makes it easier to work with and prevents tangles with airless hose.

Airless Gun—A special gun designed to withstand high pressure and has only one fluid hose connection.

Airless Nozzle Tip—A nozzle tip made of tungsten carbide with a small hole in it in sizes from .007 to .072 of an inch.

Spray Angle—The angle that is cut into a nozzle tip which will determine the spray fan pattern.

Orifice—The size of the hole cut into a nozzle tip.

Insert (Micro Spray Orifice—Pre-Orifice)—A tip placed before a nozzle tip with an orifice of the same size or larger which will add velocity to the material—gives consistency and finer atomization.

"Twist-Tip" Nozzle Cleaner—Facilitates the cleaning of airless tips by being able to reverse the tip and blow back paint through tip to clean it.

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