Q. I cannot trigger my spray gun. What causes this problem?
A. Trigger safety is in the SAFETY position. Put trigger safety in SAFETY OFF position. Refer to your Instruction Manual for the operation of your particular spray gun's safety. The gun housing may be blocked from pumping a highly viscous material with a lot of filler that has packed behind the gun needle and will not allow the gun needle to move. Disassemble and thoroughly clean the spray gun.

Q. What parts of the spray gun require lubrication?
A. The fluid needle packing A, the air valve packing B and the trigger bearing screw C require daily lubrication with a non-silicone/non-petroleum gun lube. The fluid needle spring D should be coated lightly with petroleum jelly or a non-silicone grease (i.e., lithium). Lubricate each of these points after every cleaning in a gun washer.

Q. What causes a top or bottom-heavy spray pattern?
A.

Top or bottom-heavy spray pattern
Rt. or lt.-heavy spray pattern
Center-heavy spray pattern
Split spray pattern

Horn holes plugged - clean holes with non-metallic point (i.e., toothpick)
Obstruction on top or bottom of fluid tip - clean
Cap and/or tip seat dirty - clean

Q. What causes the spray pattern of my airless gun to feather?
A. The problem you refer to as feathering is also known as tailing. This is due to low fluid pressure at the tip. To avoid feathering or tailing, increase the fluid spray pressure by increasing the pressure at the pressure control knob. If the pressure control knob is turned all the way up you may have to thin the paint or reduce the length of airless hose being used.

Q. How should the air cap be cleaned?
A. Remove the air cap from the gun and immerse it in clean solvent. If necessary, use a bristle brush to clean dried paint. Blow it dry with compressed air. If the small holes become clogged, soak the cap in clean solvent. If reaming the holes is necessary, use a toothpick, a broom straw or some other soft implement. Cleaning holes with a wire, a nail or a similar object could permanently damage the cap by enlarging the jets, resulting in a defective spray pattern.
Q. How can I make my tips last longer? What causes tip wear?
A. Fluid tip wear on airless/air assist airless guns is caused by several factors.
   • The pressure being used.
   • The size and shape of the tip.
   • The abrasiveness of the material being sprayed
   • The tip material
   • Fluid pressure
     o The higher the fluid pressure, the greater the wear.
   • Tip size and shape
     o Smaller tip sizes result in shorter tip life with other factors being equal.
     o Larger tip sizes result in longer tip life with other factors being equal.
     o Shorter pattern sizes give longer tip life than taller pattern tips.
   • Material abrasiveness
     o Highly abrasive materials will result in a shorter tip life when compared to low or non-abrasive materials.
   • Tip materials
     o The quality of the materials will help determine tip life. Higher quality materials like carbide, while more expensive to manufacture, will not wear as quickly as carbon based material.

Q. How does tip wear affect my setup?
A.
   • Flow rate increases
     o As the tip wears, the physical opening in the tip increases. An increase from .015” to .017” (two one-thousands of an inch) may result in a 33% increase in flow rates. How quickly this happens depends on the factors listed above.
   • Pattern size decreases
     o The tip will wear out in the top and bottom portions of the tip opening. This will result in a smaller pattern size. It will continue to decrease in size as the tip wears.

Q. How does tip wear affect my spraying?
A.
   • Tip wear is gradual, usually over days or weeks. The operator will attempt to compensate by doing the following:
   • Increase fluid pressure (an attempt to achieve an acceptable pattern). This will increase fluid delivery even more.
   • Back away from the part (an attempt to achieve a larger pattern). This may result in a dryer spray pattern.
   • Increase gun speed (an attempt to prevent runs and sags).
Q. How long should a gun last before needing to be rebuilt? What can I do to make it last longer?
A. This depends on what material you're spraying and how many gallons sprayed per day. For example, with lacquers, guns don't need rebuilding as often because lacquers don't have solids in them. In contrast, the high solids in blockfillers are abrasive and require more frequent gun rebuilding.

One way to increase gun life before repacking is to thoroughly clean your gun at the end of every day. Be sure to trigger the gun before removing the diffuser and when installing the diffuser. If you don't, the diffuser will score around the ball on the new needle which can lead to premature wear. Your gun will develop a leak and this will cause spitting.

Q. Why did my airless gun stop spraying?
A. The tip may be clogged. Turn the black plastic arrow shaped handle to the unplug position (arrow facing rear of the gun). Aim the gun into a waste paint container. Squeeze the trigger for a second. Return arrow shaped handle to the spray position (arrow facing forward) to begin spraying. Always set the spray gun trigger safety when working with the spray tip.

Q. Why is my gun spitting a small paint stream of paint after I release the trigger?
A. The cause of the problem is that the needle is not seating properly in the seat. You will need to either purchase a kit for the gun needle and seat or you may only need to clean the needle and seat assembly. Residue or debris may cause the needle to move off to the side before seating.

Tip extensions, extension poles and tip filters can also cause spitting or a stream of fluid after the gun is released due to decompression of the paint trapped between the gun and the tip. Fluid pressure dissipating through the tip causes this spitting or paint stream. An automatic shut-off valve will prevent this problem.

Q. How do I know what size needle and nozzle is best for my application?
A. Although every job may have slightly different requirements, for most materials it is best to choose a mid-size, or No. 3, needle and nozzle. If your paint is thicker than standard oil-based enamel, you may want to consider a larger size. Remember that there is no one tip that is perfect for all jobs. Needles and nozzles are quick and easy to change out. So try different sizes until you find what works best.

Q. Why am I getting a meager flow from my tip?
A.
1. Tip is partially plugged. Reverse the spray tip and trigger the gun to clear clog per instructions in your manual. Remove and clean the tip, but do not use any metal objects to clean it with because the tip carbide could be
chipped and damaged.

2. Pressure switch is set too low. Increase pressure by turning the knob clockwise.

3. Filters in sprayer or gun are plugged. Remove and clean the filters or replace as needed.

4. Tip is too large or worn out. Replace the tip with proper size for the material being sprayed and within the rated tip size of the sprayer.

5. Material is too thick. Let the paint warm to room temperature if the paint is cold or thin the paint according to the manufacturers instructions.

6. Paint hose is too long and/or too small diameter. Use shorter and/or larger diameter hose.

7. Extension cord is too long or not a heavy enough gage. You should always use as short of an extension cord as possible and it should be at least 12 gage or larger.

8. Valve seat, ball or gasket is worn out or valve may have been loose, causing leakage and damage. Replace valve.

9. Pressure switch is defective/worn out. Replace pressure switch.

10. The suction hose is blocked, kinked, or cracked and leaking air or suction filter is blocked. Examine the hose and filter and clean or replace as necessary.

Q. Why do I get streaks in my spray pattern?
A. Streaks in the spray pattern, especially heavy bands at the outside edge, is an indication of low pressure at the tip. Turn up the pressure control knob until these bands are eliminated. If the sprayer is already at maximum, you may have to use larger diameter hose or shorten the length of the hose to reduce the pressure drop. Also, make sure any paint filters in the system are clean, because there will be a pressure drop across a restricted or plugged screen.

Sprayers are rated for a maximum tip size. Using a tip that is larger than the maximum size or a tip that is worn larger will cause low pressure. The tip should also be the proper size for the type of material being sprayed.

Q. How do I choose an airless tip?
A. The size of an airless fluid tip will depend on the following:
   • The fluid delivery requirements.
   • The size of the pattern required.
   • The viscosity of the material being sprayed.
   • The type and amount of solids in the material beings sprayed.
   • The type of filtration in the system.
   • The pump pressure available

Let’s go through basic tip sizes first. Fluid tips generally have a size listed in thousandths of an inch. The size in normally the diameter of an equivalent circle. Thus we may have 4 or 5 tips that have identical opening sizes (ie .015”). While the sizes may be all the same, the
shape of the opening is not. Imagine taking a 15 in flexible circle and changing the shape from a circle to an oval. How many different size ovals could we make?

Tips may also have an indication of the pattern size or angle of spray. That will vary with the manufacturer.

Looking at Figure 1, the areas of all the circles are the same size.

Tip “A” would provide:
- The least amount of resistance
- The least amount of "tip plugging"
- The least amount of tip wear
- The shorter / rounder pattern

Tip “E” would provide:
- The highest amount of resistance
- The highest chance of "tip plugging"
- The highest amount of tip wear
- The taller / narrower pattern

Figure 1

Fluid Delivery Requirements
Most manufacturers have charts available that give flow rates for various tip measured using oils of a specific viscosity at specific pressures.
A good rule of thumb for fluid delivery is:
- Doubling the fluid pressure will result in about a 40 percent increase in delivery.

Pattern Size Requirements
The choice of pattern size typically correlate directly to the job at hand. Most manufacturers have several pattern sizes available for a given tip opening. Match the size to your job requirements.

Material Viscosity
Higher viscosity materials will result in lower flow rates. Another factor to consider is the temperature of the coating material. Higher solids materials will be easier to spray and atomize better if heated. Check your Technical Data Sheet for the coatings maximum recommended temperature

Material Solids
Material solids directly affect the viscosity of the material. Higher solids material typically require larger tip openings. The particle size of the pigment will also determine how frequently the tip 'plugs'. Use larger tip sizes if tip plugging happens frequently.

**Filtration**
Due to the narrow openings of most tips, filtration is highly recommended. Passing the material through a coarse strainer may be adequate on the shorter pattern tips, but a fine filter usually is required for the taller pattern tips.

**Pump pressure**
Use a pump that has enough pressure available to do the job. You should try to size a pump for no more than 70% of its rated pressure range.

**Q. What criteria should be known when selecting a Spray Gun?**

**A.** The selection of a spray gun is an important decision to make in the design of a spray system. Matching the gun and fluid source to the application is of utmost importance. Failure to choose the correct equipment generally results in lower efficiencies, increased coating costs, increased emissions, higher booth filter costs, etc.

To match the spray gun to the application, the following criteria must be known:

- **Fluid Viscosity**
  Generally listed as high, medium and low - manufacturers' charts will usually indicate the capabilities of their air caps and fluid nozzles in terms of viscosity. If one knows the viscosity in centipoise or time in a viscosity cup, it is a simple matter of conversion to the criteria listed.

- **Fluid Flow**
  Generally listed in ounces, cc, ml or gallons per minute - spray gun charts will generally indicate a range of flow rates for a given fluid tip / air cap combination.

- **Production Rate**
  Production speed will dictate what the flow rate of the equipment should be. Obviously, a line running a 30 feet per minute with 6 square foot parts will require a higher flow rate than a line moving at 10 feet per minute with 2 square foot parts.

- **Available Air (psi & cfm)**
  In most plants, the available air is adequate to supply the necessary air required by a spray gun.
  - Problems usually show up when:
    - Restrictive quick disconnects are used
    - Small I.D. air hoses are used (i.e. ¼”)
    - Air hose longer that necessary is being used.
    - Compressors too small in size
  Keep in mind, a typical industrial air cap consumes 20+ CFM

- **Fan Pattern Size**
  Pattern size is one parameter listed for an air cap. It should be matched to the part being sprayed. Pattern sizes range from as small as one inch to several feet.
• **Atomization Required**
  A “Class A” finish is not required for all applications. Applying a finish to a garden utensil would not necessarily be the same as the hood of an automobile. A stain applied to wood that is to be wiped off would dictate a very low level of atomization. If a lower level of atomization is required, an air cap with a lower CFM ($$$) would be selected.

• **Atomization Type**
  - Air Atomized
    - Conventional Air Spray
      Conventional air spray is the lowest in efficiency of the different atomization types, but yields good atomization with difficult to atomize coatings. Conventional air spray may not be permitted by Federal, state or local rules for some industries.
    - HVLP (High Volume Low Pressure)
      An air atomized spray gun with a limit of 10 psi at the air cap. Since there is a legal limit (10 psi) in many cases, choosing the proper air cap for the above criteria is critical.
  - Hydraulically Atomized
    - Airless
      Uses high fluid pressure (1000-5000 psi) to atomize. Capable of very high flow rates, lower in atomization capabilities than air atomized equipment.
    - Air Assist Airless
      Uses high fluid pressure (300-1500 psi) to atomize. At these lower pressures (compared to airless) the top and bottom of the pattern have a difficult time atomizing. An air cap is added for the sole purpose of eliminating the “tails”. Quality of finish is between air atomized and airless guns.

• **Fluid Delivery System**
  - Suction Feed
    Suction feed guns have been around for a century. While they are simple to operate, they are the most inefficient of the group. The range of motion is somewhat restricted since the pick-up tube must remain in the fluid to function. It is available in conventional air spray and HVLP.
  - Gravity Feed
    Gravity feed guns depend on gravity (cup is on top) to supply fluid to the gun. As a result, some control of the gun is gained over suction feed. Maximum use of the material due to gravity is also a plus.
  - Pressure Feed
    Allows maximum control of the required pressures (air and fluid). The source of the coating is dependent on the amount used during
a given time period. Available sources include pressurized attached cups, pressure pots (.5 to 60 gallons) and pumps (both low and high pressure)

Given the above criteria, a competent equipment supplier can match the equipment to the application.

**Q. What are the advantages of "triggering" a spray gun?**

**A.** Triggering a spray gun refers to momentarily releasing the trigger when the spray gun has passed the end of the part and is moving to the position for the next spray pass. The amount of paint wasted does not appear to be significant for those who do not release the trigger between passes. The following example shows otherwise:

**Example:**

Operator spraying 50% of 7 hour day  
Flow rate = 10 oz/min  
Coating Cost = $10.00 / gallon  
Trigger time = 1/5 (.2) second  

Using the above figures:

<table>
<thead>
<tr>
<th>Wasted Coatings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cc lost at each spray stroke end</td>
</tr>
<tr>
<td>Part size requires 6 gun strokes</td>
</tr>
<tr>
<td>1 gun triggers per stroke, 6 Total</td>
</tr>
<tr>
<td>1 cc x 6 strokes = 6 cc lost per part</td>
</tr>
<tr>
<td>Production rate = 2 parts/minute</td>
</tr>
<tr>
<td>420 minutes x 2 parts / min. = 840 parts</td>
</tr>
<tr>
<td>840 Parts x 6 cc = 1.33 Gallons/Gun/Day</td>
</tr>
<tr>
<td>3,785 cc / gal</td>
</tr>
<tr>
<td>1.33 Gal./Day x 240 Days / Yr. = 319 Gal./Yr.</td>
</tr>
<tr>
<td>$10 Cost x 319 Gal. = $3,190 Finish Waste Per Year</td>
</tr>
<tr>
<td>$3,190 Lost For One Gun</td>
</tr>
</tbody>
</table>

**VOC Reduction**

- 30% Solids, 70% VOC  
- 8 Lbs. / Gal x 319 Gal. = 2,552 Lbs. Liquid Sprayed / Yr.  
- 2,000 Lbs ./ Ton  
- .9 Tons Emissions Generated by One Gun (applies against your VOC permit)

**Waste Disposal Considerations**

- 319 Gal. X 30% Solids = 95.7 Gal. Solid Waste  
- $200 / Drum Disposal Cost = $348  
- $348 Waste Cost Generated by one Gun  

<table>
<thead>
<tr>
<th>Total Cost of 1 cc Wasted per Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish Cost</td>
</tr>
<tr>
<td>Item</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>VOC Permit</td>
</tr>
<tr>
<td>Disposal</td>
</tr>
<tr>
<td>Total Cost of 1 cc</td>
</tr>
</tbody>
</table>

Obviously higher flow rates and higher coating costs would increase the figures above. In addition to the above, increased booth filter usage would be an issue.