

TEXTRON Lycoming

Reciprocating Engine Division/
Subsidiary of Textron Inc.
652 Oliver Street
Williamsport, PA 17701 U.S.A.

SERVICE INSTRUCTION

DATE: March 26, 1982 Service Instruction No. 1418
Engineering Aspects are
FAA Approved

SUBJECT: Combustion Chamber Cleaning Procedure

MODEL AFFECTED: All Avco Lycoming Piston Engines.

TIME OF COMPLIANCE: As required.

Numerous reports from the field, along with tests conducted at Avco Lycoming show that cylinder head combustion deposits which are mainly caused by tetraethyl lead in fuel, can result in fouled spark plugs or an indication of a reduction of engine performance. While combustion chamber deposits form in all engines, the degree is affected by the type of operation, such as training or short flights, poor fuel management, improper leaning, and the amount of tetraethyl lead in the fuel.

In view of this condition Avco Lycoming has borrowed an approved and proven walnut shell blasting procedure from our turbine division. This procedure allows cleaning of the combustion chamber without removing the cylinder assemblies from the engine. Normal trouble shooting procedures such as an inspection of the induction system, air filters, carburetor heat; if applicable, throttle and mixture controls, fuel metering device for over-rich or over-lean conditions, magnetos, spark plugs, valve clearance, cylinder compression and calibration of tachometer and manifold pressure gauge should be accomplished before proceeding with this cleaning procedure. Part I of this instruction explains the procedure used to prepare and clean the combustion chambers on applicable engines. Part II defines parts required to assemble an inexpensive blast gun, and lists assembly instructions.

WARNING

Walnut shells (Type 12/20 Grit 17) are the only blasting material approved for use with the cylinder cleaning procedure.

PART I

Anytime an indication of a reduction of engine performance is determined to be the result of combustion deposit buildup, the following procedure may be followed:

WARNING

Make certain that the ignition switch is in the off position and the magneto switch wires are connected to the magneto and switch. This will prevent accidental firing of the engine as it is rotated.

1. Remove intake and exhaust pipes. This step is not mandatory but in order to insure that both the intake and exhaust valves are closed during the cleaning operation, it is a recommended part of the procedure.

2. Remove spark plugs from the cylinder to be cleaned.

3. Cover the engine, and accessories with a drop cloth, canvas tarp or other suitable material. Seal the crankcase breather, this will keep loose particles from being blown into the crankcase.

4. Rotate the engine moving the piston thru the intake stroke until both valves of the cylinder to be cleaned are closed. Valve position can be observed thru the intake and exhaust ports if the pipes are removed. A compression gage or similar method can also be used to determine if both valves are closed.

WARNING

Due to the abrasive quality of walnut shells, the operator, or anyone in the vicinity, should have a full face shield and have no bare skin exposed during the blasting operation.

NOTE

We recommend that a vacuum cleaner be connected to the lower spark plug port, this will pull most of the used material from the cylinder during the blasting procedure. A used spark plug may be drilled through to make a vacuum cleaner hose adapter.

5. Using approximately 80 lbs. psi air pressure, insert the blast nozzle into the top spark plug port and open the air valve.

6. Slowly rotate the blast nozzle in the spark plug port until all lead deposits are removed. Approximately 5 minutes of blasting; alternating from the bottom to the top spark plug port should remove all deposits from the combustion chamber. The vacuum cleaner hook up should be attached to the opposite spark plug port during the blasting operation.

NOTE

If the intake and exhaust pipes are not removed, it may be difficult to insert the cleaning nozzle into the bottom spark plug port. However, it is possible to clean the combustion chamber from the top spark plug port but Avco Lycoming

recommends the use of a boroscope to determine when the combustion chamber is completely clean.

7. Using air pressure and the vacuum cleaner hook up, clean the cylinder of any residue of walnut shells and combustion deposits. Walnut shells can be reused if care is exercised to insure they are not contaminated by material other than that removed from the cylinder during the cleaning operation.

8. Replace the spark plugs. This will keep foreign material from entering the cylinder while the remaining cylinders are being cleaned.

9. Rotate the engine and clean the remaining cylinders using the same procedure.

10. Reassemble the engine, using new gaskets as required.

11. Remove the seal from the crankcase breather.

12. Make an entry in the engine logbook for future reference, this will enable you to establish the engine operating time required for the lead build up to recur.

NOTE

Approximately 1 gallon of walnut shells is sufficient to complete this cleaning operation if the walnut shells are reclaimed thru a clean vacuum system.

PART II

Parts illustrated in Figure 1 of this instruction will enable you to assemble a suitable blasting gun. These parts are available in most hardware or plumbing supply stores.

A source for bags of walnut shell blasting material is:

COMPOSITION MATERIALS INC.
26 Sixth Street
Stamford, Connecticut 06905

Order Type 12/20 Grit 17

PHONE: (203) 324-0000 or TELEX: 131454

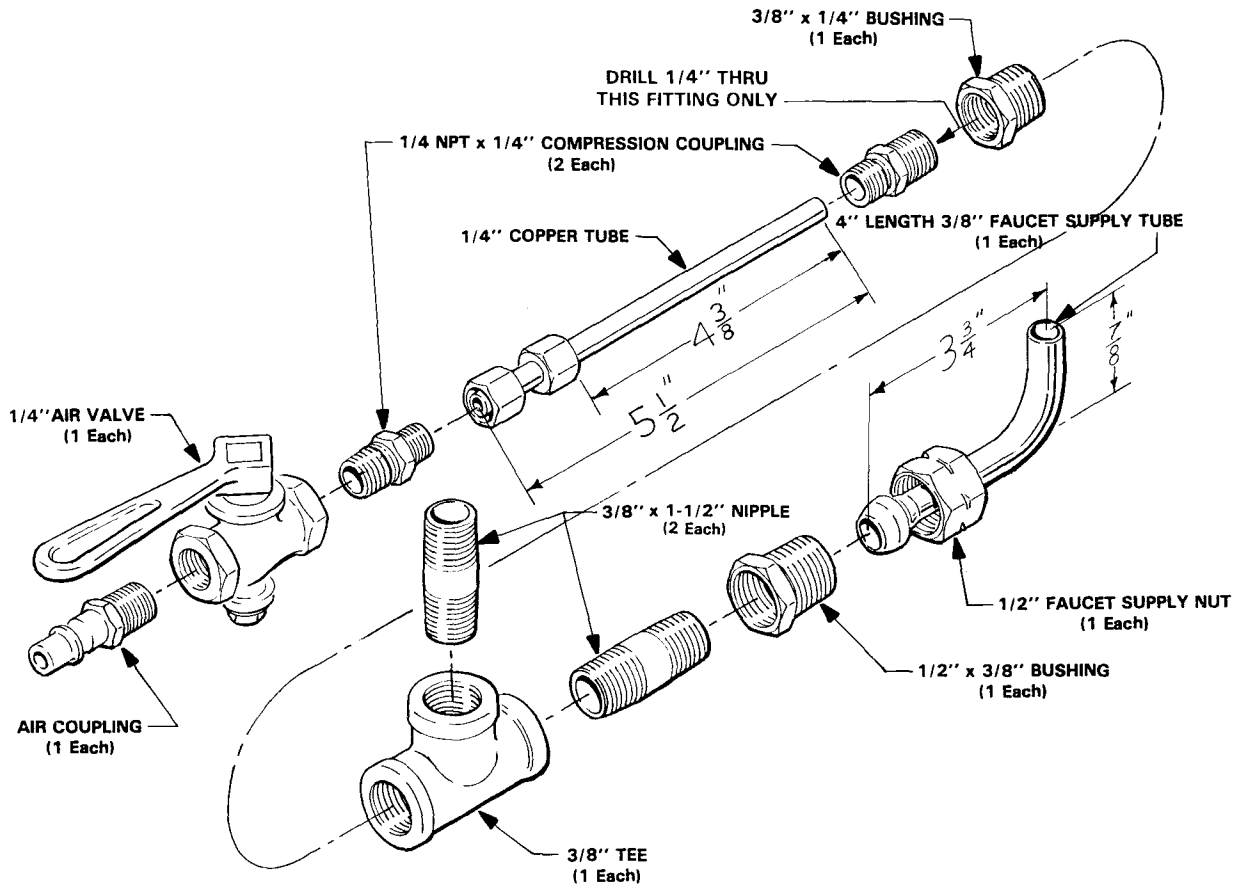


Figure 1. Individual Components Required to Build Suggested Blasting Gun

Blast Gun Material

QUANTITY	DESCRIPTION
2	1/4 NPT x 1/4" Compression Coupling
1	3/8" x 1/4" Bushing
1	3/8" Tee
2	3/8" x 1-1/2" Nipple
1	1/2" x 3/8" Bushing
1	1/2" Faucet Supply Nut
1	3/8" Faucet Supply Tube
1 PC	1/4" Copper Tubing - 5-1/2" Long
1	1/4" Valve
1	Air Connector Coupling
4 to 6 ft.	5/8" ID Clear Plastic Hose
2	1" Hose Clamps
3 in.	1/2" Copper Tubing
1	1/2" Copper Tee
1	1 Gal. or Larger Metal Can

ASSEMBLY INSTRUCTIONS

1. Drill a 1/4" hole completely through one of the 1/4 NPT x 1/4" compression couplings.
2. Assemble one end of the 1/4" tube into the unmodified 1/4 NPT x 1/4" compression coupling and tighten.
3. Pass the tube through the drilled out 1/4" compression coupling but do not tighten at this time.
4. Place one of the 3/8" x 1/4" bushings on the tube and tighten to the compression coupling.
5. Slide tube through coupling and extend approximately 4-3/8" past the end of the inner coupling nut. See Figure 1. The tube should end in the chamber of the 1/2 x 3/8" bushing. See Figure 2.
6. Using Figure 1 and 2 as a guide, finish assembling the blast gun.
7. The 3/8" faucet supply tube comes in various lengths. We recommend bending the tube as shown in Figure 1 prior to cutting it to length.

NOTE

Care must be exercised when bending the tube. To prevent crimping the tube, a suitable tube bending tool must be used.

SUPPLY TANK DESCRIPTION AND ASSEMBLY

Any suitable metal (1 gal. or larger) container may be used. Use a 1/2" copper tee and pipe, solder or braze into bottom of the tank as shown in Figure 3.

NOTE

Do not block off tee as this is a vent. A better pattern of shells may be obtained by blocking off part of the vent opening with a piece of tape. See Figure 3. We recommend experimenting with the vent opening size until the best spray pattern is achieved.

A heavy walled clear plastic supply hose is preferred. However, any correct size hose that won't collapse from the suction required to pull the walnut shells from the tank can be used.

There are many and varied ways and materials that could be used to manufacture a similar blasting gun and achieve the same results. However, Avco Lycoming has used a gun such as described in this instruction with excellent results.

If you decide to make a gun of your own design, please take note that the 1/4" air tube must extend into a larger area such as the 1/2" x 3/8" bushing as the walnut shells must pass out the nozzle around the tube and that this larger area creates a suction effect. See Figure 2.

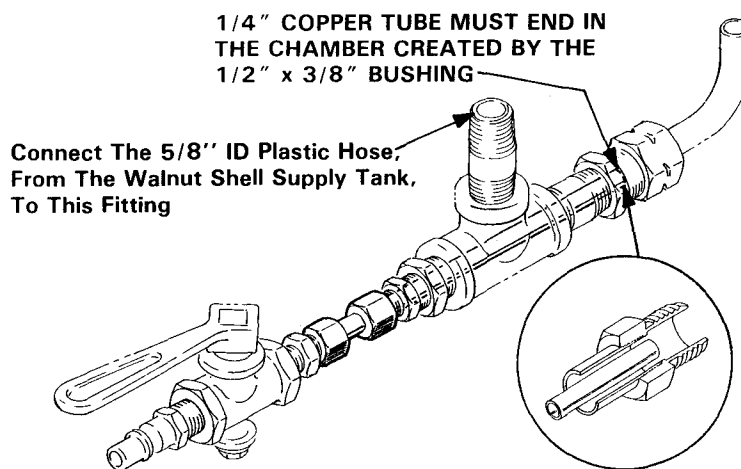


Figure 2. View of Assembled Blast Nozzle

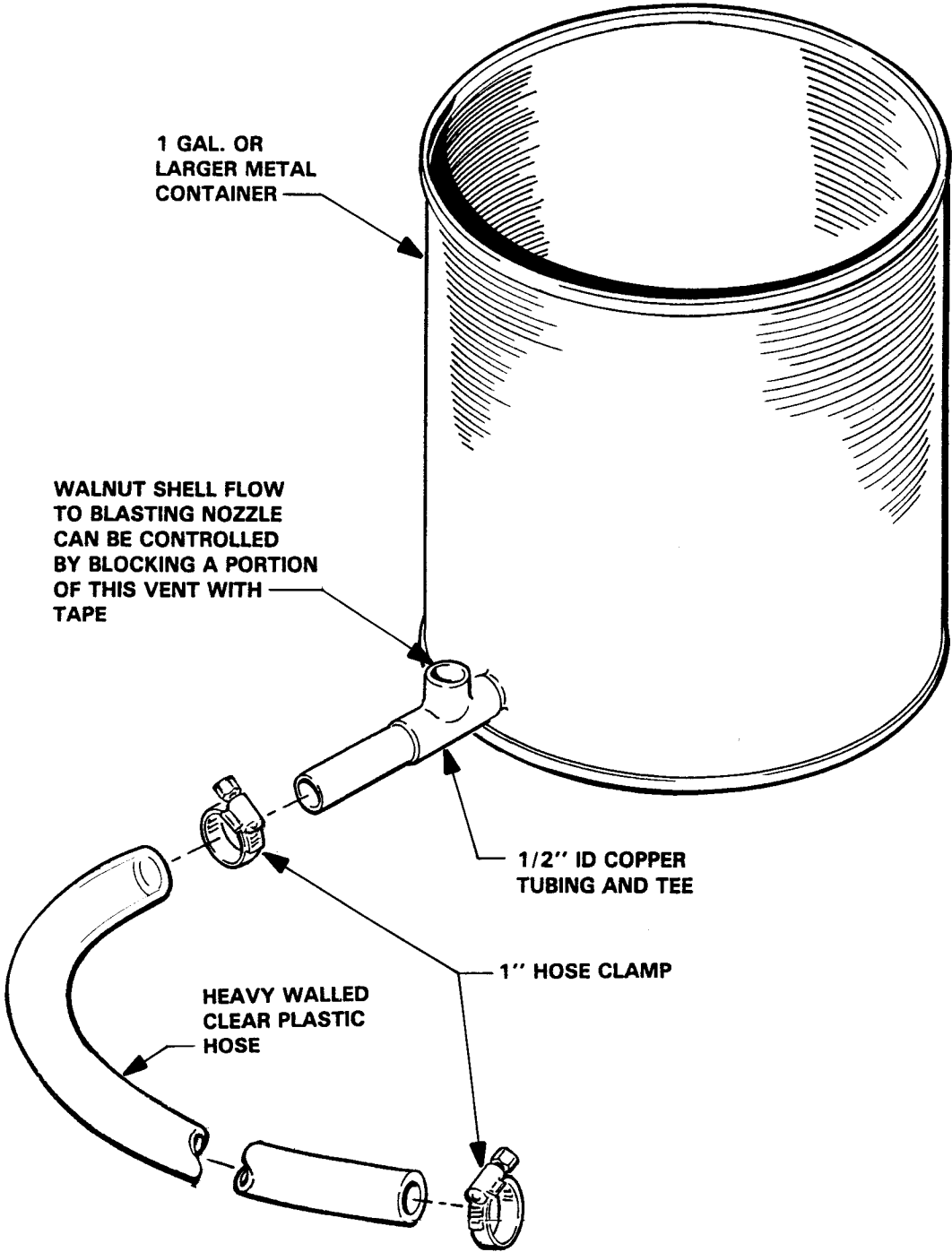


Figure 3. View of Walnut Shell Container