



# SERVICE LETTER

No. 740

Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.

April 20, 1976

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Subject: Aviation Fuel Requirements; Avco Lycoming Engines rated for 80/87 Octane Fuel.

Models Affected: All Piper models in which carbureted, 80/87 octane fuel rated Avco Lycoming engines are installed.

Compliance Time: Operation/maintenance information only; refer to Avco Lycoming Service Letter No. L-185A dated March 26, 1976, copy attached, for specific recommendations relative to operational/maintenance time requirements.

Purpose: To inform all Piper owners operating carbureted, 80/87 octane fuel rated Avco Lycoming engines of the existence of certain operational and maintenance procedures which will reduce or maintain lead deposits at a minimum when using higher lead content aviation fuel (i.e., low lead 100 LL-Blue, and the higher lead content 100 octane-Green) more than 25% of engine operating time. Refer to attached copy of Avco Lycoming Service Letter No. L-185A, dated March 26, 1976, for further details relative to this matter.

Instructions: Because of the limited availability of 80/87 octane fuel and with the subsequent use of the 100 LL (Blue) and 100 octane (Green) aviation fuel, certain alterations to previous standard operational and maintenance procedures (listed in the attached copy of Avco Lycoming Service Letter No. L-185A) must be adhered to.  
NOTE: The recommendations appearing in Avco Lycoming Service Letter No. L-185A supersede all previously published operational/maintenance data appearing in Pilot's Operating Manual/Owner Handbooks, Service Manuals, Periodic and Programmed Inspection procedures, etc. whenever a contradiction appears.

Piper Aircraft Corporation strongly urges that all affected operators/owners of Piper models in which carbureted 80/87 octane fuel rated Avco Lycoming engines are installed understand and adhere to the data contained in Avco Lycoming Service Letter No. L-185A, dated March 26, 1976, a copy of which is attached to this service release, to insure proper operation of your Avco Lycoming engine (s) when exposed to use of the higher octane aviation fuel.

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Effectivity Date:

This Service Letter is effective upon receipt.

Summary:

The failure to adhere with the recommendations contained in the attached copy of Avco Lycoming Service Letter No. L-185A dated March 26, 1976, may result in sufficient amounts of fuel/air mixture and oil-borne contaminants reaching high temperature areas in the engine where they can be "baked out", causing possible conditions such as exhaust valves sticking in the guides, etc. Engine roughness may occur and persist, in which event preparation should be made for a precautionary landing at the pilot's discretion and prompt remedial action taken.

# AVCO LYCOMING DIVISION

WILLIAMSPORT, PENNSYLVANIA 17701

## Service Letter



Service Letter No. L185A  
(Supersedes Service Letter No. L185 and  
Reprint in Lycoming Flyer Issue No. 25)  
March 26, 1976

TO: All Owners and Operators of Avco Lycoming Aircraft Engines

SUBJECT: The Use of Higher Octane Aviation Fuel, 100 LL Blue or 100 Green, for Engines Rated for 80/87 Octane Fuel

We have received many inquiries from the field expressing concern over the limited availability of 80/87 grade fuel and associated questions from use of higher leaded fuel in engines rated for grade 80/87 fuel. The leading fuel suppliers indicate that in some areas 80/87 grade aviation fuel is not available. It is further indicated that the trend is toward phase out of 80/87 aviation grade fuel. The low lead 100 LL Avgas, blue color, which is limited to 2ml tetraethyl lead per gallon and the higher 100 aviation fuel, color green, with a maximum of 4.0ml tetraethyl lead per gallon are available. Whenever 80/87 is not available you should use the lowest lead 100 grade fuel available. Automotive fuels should never be used as a substitute for aviation fuel in aircraft engines.

The continuous use, more than 25% of the operating time, with the higher leaded fuels can result in increased engine deposits both in the combustion chamber and in the engine oil. It may require increased spark plug maintenance and more frequent oil changes. The frequency of spark plug maintenance and oil drain periods will be governed by the amount of lead per gallon and the type of operation. Operation at full rich mixture requires more frequent maintenance periods; therefore it is important to use proper approved mixture leaning procedures.

To reduce or keep engine deposits at a minimum when using the higher leaded fuels, 100 LL Avgas, blue or 100, green, it is essential that the following four conditions of operation and maintenance are applied.

- A. Fuel management required in all modes of flight operation. (See A, GENERAL RULES.)
- B. Prior to engine shutdown run up to 1200 RPM for one minute to clean out any unburned fuel after taxiing in. (See B, ENGINE SHUT-DOWN.)
- C. Replace lubricating oil and filters each 50 hours of operation, under normal environmental conditions. (See C, LUBRICATION RECOMMENDATIONS.)
- D. Proper selection of spark plug types and good maintenance are necessary. (See D, SPARK PLUGS.)

The use of economy cruise engine leaning whenever possible will keep deposits to a minimum. Pertinent portions of the manual leaning procedures as recommended in Avco Lycoming Service Instruction No. 1094 are reprinted here for reference.

### A. GENERAL RULES.

1. Never lean the mixture from full rich during take-off, climb or high performance cruise operation unless the airplane owners manual advises otherwise. However, during take-off from high elevation airports or during climb at higher altitudes, roughness or reduction of power may occur at full rich mixture. In such a case the mixture may be adjusted only enough to obtain smooth engine operation. Careful observation of temperature instruments should be practiced.
2. Operate the engine at maximum power mixture for performance cruise powers and at best economy mixture for economy cruise power; unless otherwise specified in the airplane owners manual.
3. Always return the mixture to full rich before increasing power settings.
4. During let-down and reduced power flight operations it may be necessary to manually lean or leave mixture setting at cruise position prior to landing. During the landing sequence the mixture control should then be placed in the full rich position, unless landing at high elevation fields where leaning may be necessary.

## 5. Methods for manually setting maximum power or best economy mixture.

a. Engine Tachometer - Airspeed Indicator Method: The tachometer and/or the airspeed indicator may be used to locate, approximately, maximum power and best economy mixture ranges. When a fixed pitch propeller is used, either or both instruments are useful indicators. When the airplane uses a constant speed propeller, the airspeed indicator is useful. Regardless of the propeller type, set the controls for the desired cruise power as shown in the owners manual. Gradually lean the mixture from full rich until either the tachometer or the airspeed indicator are reading peaks. At peak indication the engine is operating in the maximum power range.

b. For Cruise Powers: Where best economy operation is allowed, by the manufacturer, the mixture is first leaned from full rich to maximum power, then leaning is slowly continued until engine operation becomes rough or until engine power is rapidly diminishing as noted by an undesirable decrease in airspeed. When either condition occurs, enrich the mixture sufficiently to obtain an evenly firing engine or to regain most of the lost airspeed or engine RPM. Some slight engine power and airspeed must be sacrificed to gain a best economy mixture setting.

c. Exhaust Gas Temperature Method - (EGT): Refer to Service Instruction No. 1094 for procedure.

Recommended fuel management, manual leaning, will not only result in less engine deposits and reduced maintenance cost but will provide more economic operation and fuel saving.

## B. ENGINE SHUT-DOWN.

The deposit formation rate can be greatly retarded by controlling ground operation to minimize separation of the non-volatile components of the higher leaded aviation fuels. This rate can be accelerated by (1) Low mixture temperatures and (2) Excessively rich fuel/air mixtures associated with idling and taxiing operations. Therefore, it is important that engine idling speeds should be maintained at their proper 600 to 650 RPM range with the idle mixture adjusted properly to provide smooth idling operation.

## C. LUBRICATION RECOMMENDATIONS.

Many of the engine deposits formed by use of the higher leaded fuel are in suspension within the engine oil and are not removed by a full flow filter. When sufficient amounts of these contaminants in the oil reach high temperature areas of the engine they can be baked out, resulting in possible malfunctions such as in exhaust valve guides, causing sticking valves. When using the higher leaded fuels, the recommended oil drain period of 50 hours should not be extended and if the occurrences of valve sticking is noted, all guides should be reamed using the procedures as stated in Service Instruction No. 1116, and a reduction in oil drain periods and oil filter replacement used.

## D. SPARK PLUGS.

Spark plugs should be rotated from top to bottom on a 50 hour basis and serviced on a 100 hour basis. If excessive spark plug lead fouling occurs the selection of a hotter plug, from the approved list in Service Instruction No. 1042 may be necessary; however, depending on the type of lead deposit formed, a colder plug from the approved list may better resolve the problem. Depending on the lead content of the fuel and the type of operation, more frequent cleaning of the spark plugs may be necessary. Where the majority of operation is at low power, such as patrol, a hotter plug would be advantageous. Where the majority of operation is at high cruise powers a colder plug is recommended.

NOTE: Revision "A" - Text generally revised for clarification.