GLASTAR SERVICE BULLETIN 33

MANDATORY

Subject: O-320 and O-360 exhaust system [P/N 925-02000-01 and 925-03000-01, respectively] inspection requirements

Applicability: Exhaust systems shipped after 9/24/97 **and** installed on Dynafocal-mount Lycoming engines

Discussion: Examples of the stainless-steel exhaust systems sold by Stoddard-Hamilton for both the Lycoming O-320 and O-360 engines have exhibited premature cracking where the exhaust stack meets the muffler inside the heat muff. Being subject to extreme heat and vibration, exhaust systems are naturally limited-life items, but these failures have occurred after as little as 15 hours in service, which is clearly unacceptable. (This worst-case failure occurred when the GlaStar prototype was first put on floats, and this flight regime would of course be expected to be harder on all aircraft systems.)

The S-H exhaust systems are patterned closely after the certificated system used on various models of the Citabria and Decathlon aircraft. On consulting our vendor (the same company that makes the certificated exhausts for American Champion Aircraft) about these failures, we learned that all the certificated exhausts are used on conical-mount engines, whereas all the premature failures occurred on Dynafocal-mount engines.

The Dynafocal mount was developed to isolate the airframe from engine vibration. The by-product of this isolation, however, is that the Dynafocal-mount engine itself (as well as anything attached rigidly to it) vibrates all the more vigorously. The vibration of a conical-mount engine is transmitted more directly into the airframe. Since the exhaust system is mounted rigidly to the engine, we hypothesize that the observed cracking was caused by the extra vibration of the Dynafocal-mount engines.

To correct this problem, we have changed our prescribed installation procedures for these exhaust systems. The new procedures call for trimming the exhaust stack to a shorter length and enlarging the cowling cutout around the exhaust stack. The former change results in less mass being cantilevered off the muffler as well as changing the harmonic characteristics of the entire exhaust system. The latter change eliminates the

possibility of the exhaust stack physically contacting the cowling. Both these changes took effect with the publication of the GlaStar Exhaust System Installation Instructions (P/N 063-09030-01) on 9/24/97.

We believe that these two changes in installation procedures will prevent premature cracking of the exhaust system. Unfortunately, only time in service can positively confirm or disprove this belief. Meanwhile, any exhaust system cracks naturally pose serious safety-of-flight concerns, especially if they occur inside the heat muff, leading to the possibility of the direct infiltration of exhaust into the cabin. For this reason, the inspection procedures outlined below are mandated for all O-320 and O-360 exhaust systems in service until further notice.

Required Actions:

A) As a **mandatory pre-flight item, inspect your exhaust system for cracking before every flight**. Because of the nature and location of the observed cracking, this inspection can be performed simply by grasping the end of the exhaust stack firmly and wiggling it back and forth. There will naturally be a small amount of flex in the system, but any significant movement of the stack or any squeaking noise indicates the presence of cracking. **In addition**, inspect for evidence of contact between the exhaust stack and the cowling. This will most likely show up as rub marks on the stack. Relieve any points of contact on the cowling **before further flight**.

B) At intervals not to exceed **every twenty-five hours of flight time**, the entire exhaust system should be visually inspected for cracking. Such an inspection should include the removal of the heat muff portion of the system to enable a thorough inspection of the joints between the muffler and the outlets welded to it. This inspection can be scheduled to coincide with oil changes to minimize inconvenience and downtime.

Any evidence of cracking found will render the aircraft unairworthy until suitable repairs are made.

At such time as an adequate record of time in service without further cracking problems is established for these systems, these inspection requirements will be rescinded. Any such modification of these requirements will be communicated in a supplement to this service bulletin.

Recommended Action: Stoddard-Hamilton **strongly recommends** the installation of a carbon monoxide detector in all GlaStar cabins. Either a sophisticated electronic annunciator or a simple, inexpensive "Dead Spot"-type detector can prove to be a lifesaver in the event of an exhaust leak.