



Date: 1/14/2019
Subject: Superior Air Parts XP-400 Engine Ignition Timing Specification Change
Applications: All Superior Air Parts XP-400 Engines

Issue: Superior Air Parts has confirmed detonation induced damage in some of its XP-400 engines. Superior Air Parts has concluded through testing that these events have been precipitated by the current ignition timing specification of the XP-400 engine of 25 degrees before top dead center. Furthermore, the use of electronic ignition systems that utilize a timing advance feature can, in certain circumstances, add additional stress to the engine. Our testing has concluded that engine operation at 25 degrees or advanced of 25 degrees can impose stresses to the engine that are outside design limitations. These timing induced stresses can increase the probability of incipient, moderate, or in some cases, severe detonation. Detonation forces of any kind can lead to fatigue fractures of the crankshaft and damage to other internal engine components. Superior Air Parts has now changed the timing specification from 25 degrees before top dead center to 20 degrees before top center to avoid detrimental stresses to the engine and crankshaft.

Superior Air Parts has determined that the timing change will have very little impact on engine performance but will reduce the internal stress of the engine dramatically.

All Superior XP-400 engines equipped with electronic ignition systems should be configured with the smallest Variable Timing Limit curve. In the case of the E-Mag Electronic Ignition System, the variable timing limit should be set on the "A" curve. Details of the variable timing limit feature can be found in the E-Mag Installation and Operations Guide under the Installation and Timing section. The variable timing feature will limit or advance the firing angle over a range of operational conditions. However, you must consult your respective ignition system installation and operations guide or manufacturer for timing advance features. Superior Air Parts recommends against customization of electronic ignition system firing angles in an effort to gain additional performance or economy. If you have questions regarding the electronic ignition system equipped on your engine, please contact Superior Air Parts Product Support at 972-829-4600.

As stated in the XP-400 Product Information, the engine should never be operated on auto fuel.

Time of Compliance:

Immediate

Any engine that has not been mounted on to the airframe and not accumulated flight time may have the ignition timing corrected to 20 degrees before top center in accordance with this document. The engine plate shall be vibro-etched to indicate the new timing specification. See Fig 1 for correct data plate modification format. No further action is required. These engines may be returned to Superior Air Parts for the ignition timing correction to 20 degrees before top center. Superior Air Parts will cover the cost of shipping and labor required to retune the engine.

Engines that have not accumulated flight time but have been mounted to the airframe may have their timing changes to 20 degrees before top center. The engine plate shall be vibro-etched to indicate the new timing specification. See Fig 1 for correct data plate modification format. No further action is required. Superior Air Parts will send a qualified representative to your location and correct the timing in compliance with this document.

Engines that have accumulated any flight time must have the engine disassembled and, using non-destructive testing methods, the crankshaft inspected for the presence of fatigue cracking or piston and connecting rod damage caused by incipient, moderate, or severe detonation. The engines must be removed and sent to Superior Air Parts or its authorized representative for disassembly and inspection.

- The engine should immediately be removed from service and returned to Superior Air Parts for disassembly and examination
- Shipping crate will be provided to you for return of the engine and Superior Air Parts will cover the cost of shipping
- The engine will be disassembled and inspected for accelerated wear and steel parts will be non-destructively tested. After inspection, the engine will be reassembled, timing set to new specification, tested, data plate corrected, and returned to you.

Additionally, any modifications to ignition timing other than 20 degrees before top center can result in excessive stress being applied to the internal engine components and could lead to engine damage and subsequent failure. Furthermore, any engine, part or component that has been modified without the approval of Superior Air Parts will void any applicable warranty coverage.

Therefore, Superior Air Parts prohibits any such performance modifications to its engines or parts. If you have any questions regarding this bulletin, please contact Superior Air Parts Technical Support at 972-829-4600

Superior Air Parts recognizes this is an inconvenience to its valued customers and will work diligently to ensure each engine is in compliance and done so in the most expeditious manner possible.



Figure 1. Corrected Data Plate Format