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# **Pilot's Operating Handbook and FAA Approved Airplane Flight Manual Supplement for Stick Shaker**

When the stall warning stick shaker system is installed on the aircraft in accordance with SB2X-27-19, this supplement is applicable and must be inserted in the Supplements section of the Pilot's Operating Handbook (POH). This document must be carried in the airplane at all times. Information in this supplement adds to, supersedes, or deletes information in the basic POH.

 TC ODA Administrator, ODA-834662-CE, for  
Manager, Flight Test & Human Factors Branch, AIR-710  
Federal Aviation Administration

01 April 2024  
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## Foreword

No change from basic Pilot's Operating Handbook.

## Section 1 - General

No change from basic Pilot's Operating Handbook.

## Section 2 - Limitations

System, Instrument and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Night	IFR Day	IFR Night	
FLIGHT CONTROLS					
Stick Shaker	-	-	-	-	

## Section 3 - Emergency Procedures

No change from basic Pilot's Operating Handbook.

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## Section 3A - Abnormal Procedures

### Heated Lift Transducer Malfunction (w/ IPS Installed)

- ◆ If ice forms on lift transducer vane:
    - a. STALL VANE HEAT Circuit Breaker ..... CYCLE
    - b. Pitot Heat ..... CYCLE OFF, ON
  - ◆ If ice remains on lift transducer vane:
    - a. Stall Warning System ..... EXPECT NO RELIABLE INDICATION
- This includes:
- Impending Stall Warning
  - Stall Speed Indication
  - Stick Shaker Vibration
- b. Airspeed ..... MONITOR, DO NOT STALL
  - c. Fly published  $V_{REF}$  Speeds ..... MINIMUM 88 KIAS W/ 50% FLAPS

Procedure Complete

• NOTE •

Airframe buffet before the stall is a good indication of an impending stall.

The stall warning aural alert typically activates prematurely if there is ice accumulated on the lift transducer vane.

## Section 4 - Normal Procedures

### Stalls

Aircraft stall characteristics are conventional. Power-off stalls may be accompanied by a slight nose bobbing if full aft stick is held. Power-on stalls are marked by a high sink rate at full aft stick. Power-off stall speeds at maximum weight for both forward and aft CG positions are presented in Section 5 - Stall Speeds.

When practicing stalls at altitude, as the airspeed is slowly reduced, you will notice a slight airframe buffet, hear the stall warning horn sound, and the “stall, stall, stall” aural alert between 5 and 10 knots before the stall, feel a stick shaker vibration in the side stick, and see the Crew Alerting System display a STALL Warning annunciation. Normally, the stall is marked by a gentle nose drop and the wings can easily be held level or in the bank with coordinated use of the ailerons and rudder. Upon stall warning in flight, recovery is accomplished by immediately reducing back pressure to reduce the angle of attack and to maintain safe airspeed, adding power as required and rolling wings level with coordinated use of the controls.

#### • WARNING •

**Use care to avoid uncoordinated, abrupt or abused control inputs when close to stall.**

#### • Note •

If Stall Warning is inoperative, Autopilot Underspeed Protection will not be provided in Altitude Critical Modes (ALT, GS, GP, TO and GA), and Low Speed ESP will not be available.

## Section 5 - Performance Data

No change from basic Pilot’s Operating Handbook.

## Section 6 - Weight & Balance

No change from basic Pilot’s Operating Handbook.

## Section 7 - Airplane and Systems

### Stall Warning System

#### Overview

The airplane is equipped with an aural stall warning system and stick shakers which provide visual, tactile, and oral cues of an imminent stall to the crew.

*Serials w/o IPS:* As the airplane approaches a stall, the low pressure on the upper surface of the wings moves forward around the leading edge of the wings. As the low pressure area passes over the stall warning inlet, a slight negative pressure is sensed by the pressure switch. The pressure switch then provides a signal to cause the warning horn to sound, the red STALL warning CAS annunciation to illuminate, and the stick shaker to activate.

*Serials w/ IPS installed:* Stall warning is provided by the lift transducer, mounted on the leading edge of the RH wing and the stall warning computer located under the cabin floor. The lift transducer senses the force of the airstream on the vane, producing an electrical output to the stall warning computer.

The stick shaker generates a vibration into the side stick via a DC gear-motor, spinning a weight mounted to the forward side of the side stick.

#### Operation

*Serials w/o IPS:* The airplane is equipped with an electro-pneumatic stall warning system to provide audible warning of an approach to aerodynamic stall. The system consists of an inlet in the leading edge of the right wing, a pressure switch and associated plumbing, and the avionics system aural warning system.

The stick shaker will generate tactile feedback in the side stick while stall warning is active, except when below 50 feet in a normal landing scenario.

#### Lift Transducer (w/ IPS Installed)

When the stall warning set-point is reached, the stall warning computer provides a signal to the avionics system to activate the stall warning aural alert, CAS message, and stick shaker. The stall warning computer also provides the information used to generate the dynamic stall speed awareness indication (red band) on the airspeed tape which indicates the relative proximity to the aircraft stall speed based on the wing loading (weight, angle of bank, etc). The stall warning computer operates on 28 VDC supplied through the 5-amp STALL WARNING circuit breaker on Essential Bus 2.

Ice protection for the lift transducer is provided by two faceplate heaters, one vane heater and one case heater using the PITOT HEAT switch. To prevent overheating during ground operations, a signal from the avionics is used to operate the heaters at 25% power during ground operation or 100% power while in the air.

The stall warning computer receives a signal from the avionics system to reduce nuisance stall warning while the aircraft is on the ground. The stall warning is inhibited when ground speed is less than 30 knots or airspeed is less than 50 KTAS. To allow a preflight check of the system, stall warning is enabled if RPM is less than 500 and flaps are set to 100%.

An IPS-ON discrete signal is sent to the stall warning computer when the ice protection system is set to ON. This adds additional stall warning margin to the aircraft beyond the required 5 KIAS to account for ice contamination on unprotected surfaces. Although this ensures the required margin is maintained during/after an icing encounter, it may be excessive when the aircraft is not contaminated by ice shapes.

### **Indications**

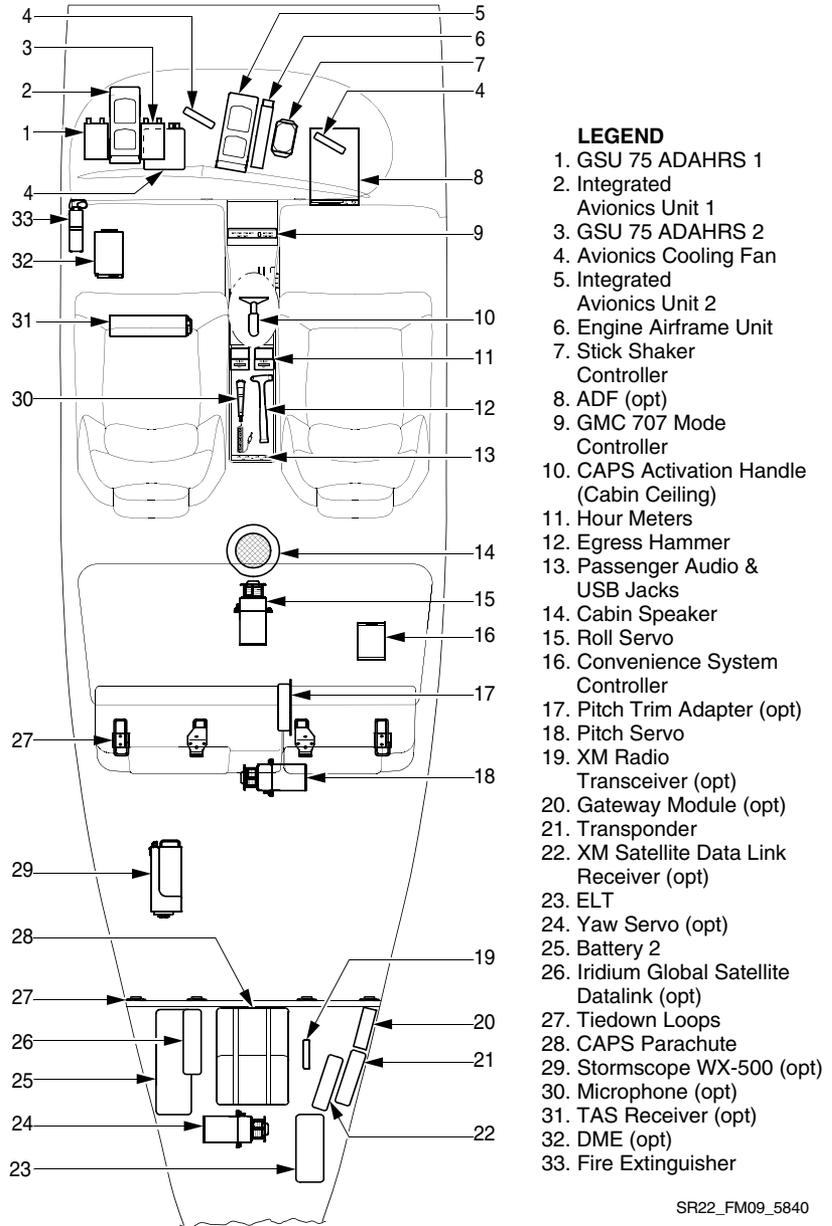
The warning sounds at approximately 5 knots above stall; slightly greater margins are observed in turning and accelerated flight.

In the event of a stall warning system malfunction (e.g., ice accretion or other contamination at the pressure port), the STALL WARN FAIL alert will be annunciated; the aural stall warning and stick shaker are suppressed until the fault clears.

### **Protection**

The system operates on 28 VDC supplied through the 5-amp STALL WARNING circuit breaker on Essential Bus 2.

*Serials w/ IPS installed:* The lift transducer heat is powered by 28 VDC supplied through the 10-amp STALL VANE HEAT circuit breaker on Non-Essential Bus.



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**Figure 7-1:**  
**Equipment Locations**  
NOT FAA APPROVED

## **Section 8 - Handling and Servicing**

No change from basic Pilot's Operating Handbook.

## **Section 10 - Safety Information**

No change from basic Pilot's Operating Handbook.