Attachment 4

To Operations Group Factual Report

DCA13IA058

Stall Protection System

27.2.12 Stall Protection

1. The stall protection system provides aural and visual indications of an impending stall and, in addition, activates a stick shaker followed by a stick pusher if no corrective recovery action is taken by the crew.
2. The system is controlled by a stall protection computer (SPC) which computes trip points to activate the various warnings using the following inputs:
   a. Angle of attack (AOA), lateral acceleration, flap position, WOW & Mach.
3. Operation
   a. As angle of attack increases, the SPC activates various trip points in turn, as follows:

APPROACHING STALL:

- Continuous ignition activated
- Stick shaker activated (AP disengages)

JUST PRIOR TO STALL:

- Stall warning warbler sounds
- STALL warning lights illuminate
- Stick pusher enabled

   b. If the rate of change of AOA is high (greater than 1°/sec), the SPC lowers the trip points to ensure that the pitching momentum does not carry the aircraft into the stall.
   c. The pusher may be disabled by pressing and holding the red AP/SP DISC button on either control wheel. Once the button is released, the stick pusher is capable of immediately resuming the pushing action. The pusher will also be disabled if less than 0.5G is reached as it operates. In emergency, the pusher may be overcome by a pull force of approximately 80 lbs. Both pilot and copilot STALL PTCT PUSHER switches must be on for the stick pusher to activate.

1. INTRODUCTION

The purpose of the stall protection system (SPS) is to provide a warning of an impending stall when the airplane attitude approaches a high angle of attack (AOA) and to prevent stall penetration when the airplane nears the computed stall angle. The system alerts the flight crew by means of visual, aural, and tactile (stick shaker) indications.

The stall protection system includes the following components:

- Stall Protection Computer (SPC)
- Two AOA vanes,
- Two stick shaker units,
- One stick pusher assembly,
- Two STALL PTCT pusher, ON/OFF switches,
- Two pusher disconnect switches, and
- Two stall warning test switchlights.

The stick pusher mechanism is armed by selecting the STALL PTCT pusher switches on the pilot and copilot side panels.

NOTE

Both the pilot and copilot STALL PTCT switches must be selected ON to arm the stick pusher system. Selecting either switch OFF disables the stick pusher system.

Angle of attack vanes, located on each side of the forward fuselage, measure the airplane attitude in relation to the ambient airstream. The stall protection computer uses the AOA information and airspeed to compute the stall angles.

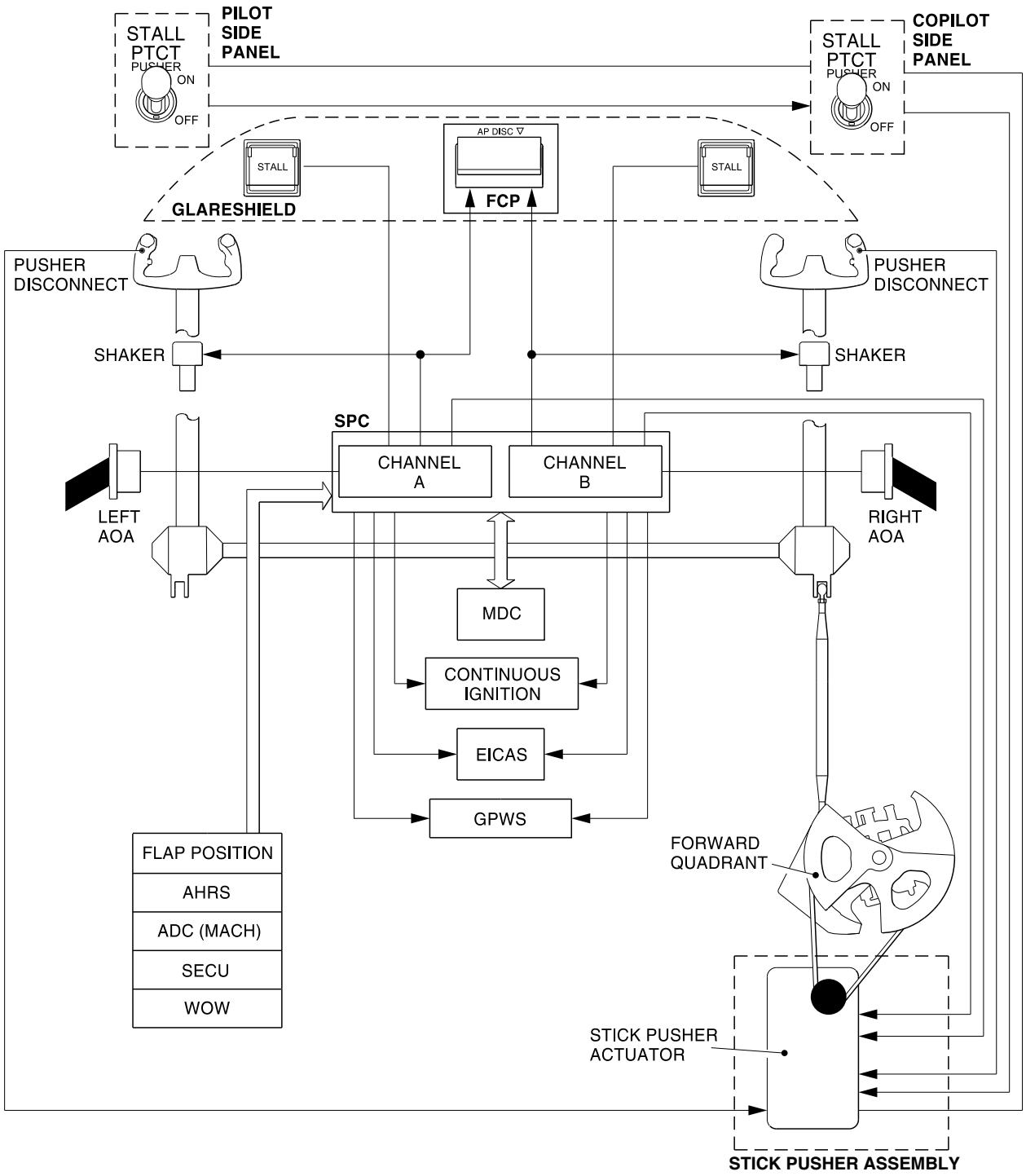
When the airplane approaches a high AOA, the stall protection computer will:

- Warn the crew of an impeding stall through the stick shaker,
- Activate the engine auto-ignition system, and
- Disengage the autopilot.

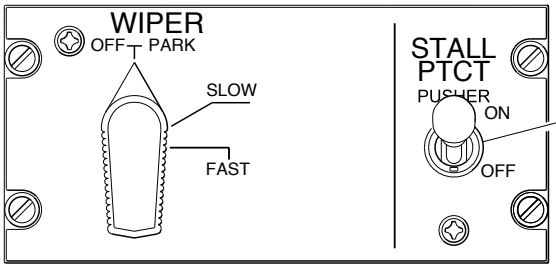
If the AOA still continues to approach the critical stall point and no corrective action is taken:

- Stick pusher mechanism is activated to prevent the airplane from entering a stall,
- STALL switch/lights flash red, and
- Stall warbler sounds.

The stick pusher can be stopped by pressing and holding the AP/SP DISC switch on the pilot or copilot control wheel.



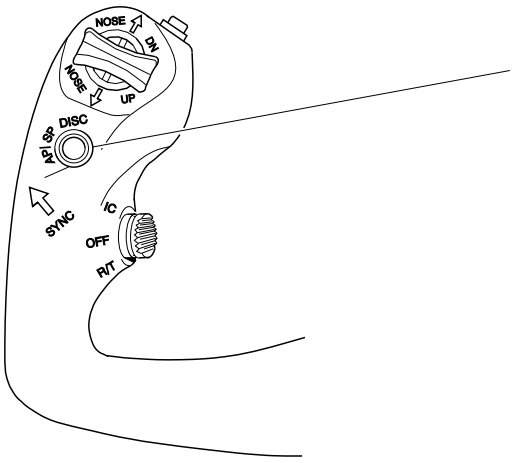
Stall Protection System – Schematic
Figure 27–35–1



Stall Protection Panel
Pilot and Copilot Side Panels

STALL PTCT PUSHER
Used to control operation of stick pusher.

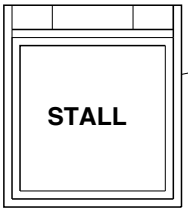
NOTE
Both pilot and copilot switches must be selected on to engage the stick pusher.



Pilot and Copilot Control Wheels

AP/SP DISC (red)
Used to disengage the autopilot and to momentarily deactivate the stall protection system.
- Press to disengage the autopilot and to momentarily disable the stick pusher.
- Release to reactivate the stick pusher.

Stall Protection – Controls
Figure 27–35–2

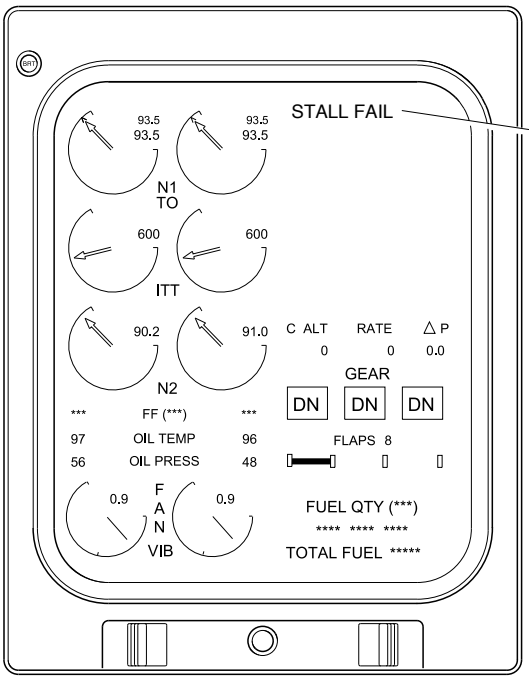


STALL (Guarded)
Used to initiate stall protection system test while airplane is in a weight–on–wheels condition.
- STALL (red) light flashes to indicate an impending stall condition

Warbler tone alerts flight crew of impending a stall condition.

Left and Right Glareshield

Stall Test
To initiate the stall protection system test, momentarily press either STALL light and verify that:
- Pilot's stick shaker is activated.
- CONT, ON light on.
- CONT IGNITION status message on.
- Copilot's stick shaker is activated.
- Stick pusher is activated and STALL switches flash.
- EICAS R/H elevator surface pointer indicates full travel or copilot control column is against forward stop.
- Stick pusher is de–activated and STALL switches out.
- Pilot's stick shaker stops.
- Copilot's stick shaker stops.
- CONT, ON light out.
- CONT IGNITION status message out.



STALL FAIL caution (amber)
Indicates that the pusher is deactivated or has failed or one channel of the stall protection computer has failed or the angle of attack sensor has failed.

Primary Page

NOTES
1. If the copilot's side AP/SP DISC button is pushed, it is considered normal operation that the control columns return to normal position more slowly.
2. Pressing STALL light a second time during the stall protection test, will interrupt the test sequence.

Stall Protection – Test and EICAS Messages
Figure 27–35–3

A. System Circuit Breakers

System	Sub-System	CB Name	Bus	CBP	Location
Stall Protection System	Pusher	STALL PROT STICK PUSHER	BATT BUS	1	Q1
	Computer	STALL PROT L CH			Q2
		STALL PROT R CH	DC ESS BUS	4	C7

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