



**SUPPLEMENT A034 ELECTRONIC STABILITY AND
PROTECTION SYSTEM (ESP)**

AFMS-A034

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01
GENERAL

01-01 Supplement Introduction

Description

1 GENERAL INFORMATION

With OÄM 50-009 the installation and operation of the Electronic Stability and Protection (ESP) system is approved.

The Electronic Stability and Protection (ESP) is an optional part of the Garmin G1000 NXi Integrated Avionics System.

The information contained in this Supplement is to be used in conjunction with the complete AFM. The limitations and information contained herein either supplement or, in the case of conflict, override those in the Airplane Flight Manual.

This Supplement is a permanent part of the AFM and must remain in the AFM at all times, when the Electronic Stability and Protection (ESP) is installed.

01-02 Definitions and Abbreviations

Description

1 Acronyms

Airspeeds

v_{sw} Stall Warning Speed

Equipment

AFCS Automatic Flight Control System

CWS Control Wheel Steering Switch

ESP Electronic Stability and Protection System

USP Underspeed Protection System

01-03 G1000 NXi Avionics System

Description

1 G1000 NXi Avionics System

1 Electronic Stability and Protection (ESP)

The Electronic Stability and Protection System (ESP) is an optional part of the Garmin G1000 NXi Integrated Avionics System.

The ESP system provides automatic stability augmentation and envelope protection for the airplane through the use of a control force feedback system. This will aid pilot recognition and recovery from inadvertent excessive pitch, roll and airspeed excursions when the autopilot is switched off.

The ESP system can be enabled and disabled on the AUX - SYSTEM SETUP 2 page on the MFD. Once the flight has ended and power is removed from the Garmin G1000 NXi system, ESP will default to 'Enabled' on the next power-up.

For further details refer to the Garmin G1000 NXi Pilot's Guide

2 Autopilot Underspeed Protection (USP)

For airplanes that have ESP installed, the AFCS is able to detect and protect against underspeed situations, while the autopilot is engaged.

When the AFCS is engaged and a non-altitude critical mode (LVL, PIT, FLC, VS, VNV) and airspeed falls below the minimum threshold, which is specific to each flap setting:

UP	80 KIAS
T/O	75 KIAS
LDG	70 KIAS,

the AFCS automatically enters the minimum airspeed mode. A MINSPD annunciation appears above the airspeed tape, and the AFCS causes the airplane to pitch down to maintain a safe airspeed. An aural "AIRSPEED" alert will sound once.

If the AFCS is engaged in an altitude critical mode (ALT, GS, GP and GA) and the aural stall warning is triggered, the AFCS will maintain a wingslevel roll attitude and pitch the airplane down to maintain an airspeed that will cause the aural stall warning to stop playing, plus 2 KIAS. Also, an aural "AIRSPEED" alert will sound every 5 seconds.

All underspeed protection modes are exited automatically when there is enough airplane performance to follow the originally selected flight director mode and reference.

3 Coupled Go-Around

ESP-equipped airplanes are capable of flying fully coupled go-around maneuvers. Pressing the GA button on the power lever will not disengage the autopilot. Instead, the autopilot will attempt to capture and track the flight director command bars. If insufficient airplane performance is available to follow the commands, the AFCS will enter altitude- critical underspeed protection mode when the stall warning sounds.

03
EMERGENCY PROCEDURES

03-01 UNDERSPEED PROTECT ACTIVE

Emergency operation procedure

1 UNDERSPEED PROTECT ACTIVE

**UNDERSPEED
PROTECT ACTIVE**

Underspeed Protection is active.

The UNDERSPEED PROTECT ACTIVE warning may also be accompanied by a yellow MINSPD annunciator above the airspeed tape display and the aural 'AIRSPEED' alert.

- A POWER lever.....increase power as required to correct underspeed
- B Airplane attitude and altitude.....monitor

NOTE

If a large power addition is made, expect distinctive transmission to a nose-up pitch attitude, since the AP/FD aggressively returns to the original altitude or glidepath / slope. In case the airplane diverts significantly from the desired altitude or attitude, disconnect A/P or reselect vertical / lateral A/P mode.

After underspeed condition is corrected:

- C Autopilot.....reselect vertical and lateral modes (if necessary)
- D POWER lever.....adjust as required

NOTE

Autopilot Minimum Airspeed Mode provides a pitch down command to maintain 2 KIAS above stall warning off airspeed. Underspeed protection is not available below 200 feet AGL, except in go-around mode.

03A
ABNORMAL OPERATING PROCEDURES

03A-01 MINSPD

Special operation

1 MINSPD

MINSPD

AFCS entered Minimum Airspeed Mode.

- A POWER lever.....increase power as required to correct underspeed
- B Airplane attitude, speed and altitude.....monitor

After Minimum Airspeed Mode condition is corrected:

- C Autopilot.....reselect vertical and lateral modes (if necessary)
- D POWER lever.....adjust as required

NOTE

Autopilot Underspeed Protection Mode provides a pitch down command to maintain:

Flaps UP: 80 ± 2 KIAS,

Flaps T/O: 75 ± 2 KIAS,

Flaps LDG: 70 ± 2 KIAS,

or v_{sw} off ± 2 KIAS

depending on the vertical mode selected. Underspeed protection is not available below 200 feet AGL, except in go-around mode.

03A-02 Windshear Encounter

Special operation

1 Windshear Encounter

- A AP DISC switch.....press and hold
- B Perform established windshear escape procedures.

After exiting windshear:

- C AP DISC switch.....release
- D Autopilot.....if required

03A-03 ESP Disengagement

Special operation

1 ESP Disengagement

If necessary, ESP may be manually disconnected using any of the following methods:

- A AP DISC switch.....press and hold
CWS button.....press and hold
AUX-SYSTEM SETUP 2 page on MFDdisable stability and protection

If all three methods are NOT successful:

- B AFCS/ESP circuit breaker.....pull

04
NORMAL OPERATING PROCEDURES

04-01 Before Starting Engine
Pre-operation procedure

1 Before Starting the Engine

The following item is amended to read:

- A G1000 NXi.....wait until power-up completed.
Verify splash screen shows ESP.
Press ENT on MFD to acknowledge.

04-02 Before Taxiing
Pre-operation procedure

1 Before Taxiing

The following item is added:

A MFD.....select AUX page System SETUP 2,
verify Stability & Protection STATUS;
DISABLE if desired.

04-03 Climb AFCS
Normal operation procedure

1 Climb

If necessary, ESP may be manually disconnected using any of the following methods:

- A AP DISC switch.....press and hold
- CWS button.....press and hold
- AUX-SYSTEM SETUP 2 page on MFDdisable stability and protection

04-04 Cruise AFCS
Normal operation procedure

1 Cruise

If necessary, ESP may be manually disconnected using any of the following methods:

- A AP DISC switch.....press and hold
- CWS button.....press and hold
- AUX-SYSTEM SETUP 2 page on MFDdisable stability and protection

04-05 Descent AFCS
Normal operation procedure

1 Descent

If necessary, ESP may be manually disconnected using any of the following methods:

- A AP DISC switch.....press and hold
- CWS button.....press and hold
- AUX-SYSTEM SETUP 2 page on MFDdisable stability and protection

04-06 Approach and Landing AFCS
Normal operation procedure

1 Approach and Landing

If necessary, ESP may be manually disconnected using any of the following methods:

- A AP DISC switch.....press and hold
- CWS button.....press and hold
- AUX-SYSTEM SETUP 2 page on MFDdisable stability and protection

04-07 Go Around AFCS

Normal operation procedure

1 Go Around

Autopilot Coupled Go-Around

- | | | |
|---|-------------------------|---|
| A | Control Stick..... | grasp firmly |
| B | GO AROUND button..... | push – Verify GA // GA on PFD in lateral and vertical mode fields, autopilot will not disengage. |
| C | Autopilot..... | verify airplane pitches up following flight director command bars |
| D | Balked Landing..... | execute |
| E | Mode Control Panel..... | press NAV to Fly Published Missed Approach Procedure
press HDG to Fly ATC Assigned Missed Approach Heading |

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. The G1000 NXi may not provide correct guidance, until the airplane is established on a defined leg of the procedure.

- | | | |
|---|-------------------------------|------------------------------------|
| F | Altitude Preselect (ALT)..... | verify Set to appropriate altitude |
|---|-------------------------------|------------------------------------|

NOTE

When the GA button is pressed, the Flight Director command bars will command 6° nose up and wings level, the HSI nav source automatically switches to GPS, the flight plan sequences to the first published missed approach leg, and automatic leg sequencing resumes. The autopilot will remain engaged, and fly the published missed approach procedure, once the airplane is established on a segment of the missed approach procedure and NAV mode is selected.

The flight plan can only contain one approach procedure at a time. If the pilot attempts to load another instrument approach at this time, the airplane will depart from the missed approach procedure and turn directly towards the first waypoint in the new approach.

Do not attempt to load or activate a new approach, while flying the missed approach procedure until ready to fly the new approach.

Recommended Procedures Following a Missed Approach:***To repeat the instrument approach procedure currently loaded into the flight plan:***

- A Activate Vectors-To-Final, if being radar vectored by ATC,
OR
- B If flying the entire instrument approach procedure, activate a DIRECT TO the desired initial waypoint. Follow the appropriate procedure for the instrument approach being flown.

To proceed to an alternate airport (This procedure will allow the pilot to enter the route to the alternate before leaving the missed approach holding fix):

- A Highlight the first enroute waypoint in the flight plan.
- B Begin entering waypoints in the desired route order. Do not attempt to load a new approach at this time.
- C CLR all waypoints after the last waypoint in the route to the alternate and the currently loaded instrument approach header.
- D When ready to proceed to the alternate, highlight the first enroute waypoint in the route to the alternate airport. ACTIVATE a DIRECT TO that waypoint.
- E When enroute to the alternate, a new instrument approach may be loaded into the flight plan.

07
**DESCRIPTION OF THE AIRPLANE AND ITS
SYSTEMS**

07-01 Electronic Stability and Protection System (ESP) Description

1 Electronic Stability and Protection System (ESP)

The Electronic Stability and Protection System (ESP) is an optional part of the Garmin G1000 NXi Integrated Avionics System. This information supplements the information presented in the Airplane Flight Manual.

The ESP system provides automatic stability augmentation and envelope protection for the airplane through the use of a control force feedback system. This will aid pilot recognition and recovery from inadvertent excessive pitch, roll and airspeed excursions when the autopilot is switched off.

The ESP system can be enabled and disabled on the AUX - SYSTEM SETUP 2 page on the MFD. Once the flight has ended and power is removed from the Garmin G1000 NXi system, ESP will default to 'Enabled' on the next power-up.

For more information refer to the Garmin G1000 NXi Pilot's Guide.