CAFF Information Bulletin

January 12, 2010

N6016C S-TEC 55X Autopilot and King KCS 55A HSI Upgrade

N6016C has recently completed a major avionics upgrade which includes an HSI and Autopilot. This package provides substantial benefits for both VFR and IFR operation. This bulletin provides information essential to operate the new system in VMC under VFR. A full checkout with an instructor will be required for IFR operation. Please read and understand the contents of this bulletin. Resolve any questions with an instructor before your next flight. Complete handbooks are available for your use in the office. A downloadable *pdf* file of the autopilot handbook is available online. This bulletin is for information and familiarization only.

KING HORIZONTAL SITUATION INDICATOR (HSI)

The King KCS 55A HSI is an electrically powered slaved compass system incorporating an integrated Lubber Line, Heading Select Bug, Course Select Arrow, Course Deviation Indicator, dual Glide Slope Pointers, To-From Indicator, VOR/LOC and GS deviation scales, NAV warning flag and a Compass (HDG) warning flag. The flux detector and gyro for the system are mounted in the tail of the aircraft aft of the baggage compartment.

SLAVED GYRO MODE (button in) The directional gyro is automatically slaved to the flux detector.

FREE GYRO MODE (button out) The compass card functions as a traditional DG using the clockwise and counterclockwise adjustment buttons to manually slave to the alcohol compass.

S-TEC FIFTY FIVE X AUTOPILOT

The S-TEC Fifty Five X is an electrically powered 2-axis (pitch & roll) rate based autopilot. It is fully integrated with the GNS 530 and HSI to provide a sophisticated avionics suite for both VFR and IFR operation.

ROLL MODE The 55X uses turn rate information from the rate gyro in the turn coordinator as well as heading and course information from the HSI to control the lateral axis. The Roll Servo is connected to the ailerons. In GPS Steer Mode (GPSS) information from the HSI is not used.

PITCH MODE The 55X uses altitude information from its own altitude transducer (NOT from the aircraft altimeter) and vertical acceleration from an accelerometer located in the autopilot control display unit as inputs for pitch control. The pitch axis can also couple to an electronic glide slope from either an ILS or GPS. The pitch servo is connected to the elevator and the pitch trim servo is connected to the elevator trim tab. The pitch trim servo is also used for manual electric trim when the pitch channel of the autopilot is not engaged.

COCKPIT CONTROLS AND INDICATORS

Forward Instrument Panel

- Horizontal Situation Indicator replaces the DG and #1 OBS
- KA 51A Slaving Meter added to control HSI
- S-TEC 55X Autopilot Control Display Unit (CDU) replaces old Cessna autopilot
- S-TEC turn coordinator replaces old turn coordinator
- Remote Comm Recall button added to GNS 530

Avionics Panel

- Autopilot Master Switch
- Trim Master Switch
- AP Circuit Breaker
- Trim Circuit Breaker
- Compass System Circuit Breaker

Control Wheel

- Manual Electric Trim Switch (TRIM)
- Autopilot Disconnect/Trim Interrupt Switch (AP DISC)
- Control Wheel Steering Switch (CWS)

SYSTEM AND INSTALLATION NOTES

- HSI is married to the GNS 530.
- OBS is married to VHF NAV 2.
- The autopilot gets its heading information from the HIS.
- The autopilot gets its navigation information (VOR, LOC, GS, or GPS) from the GNS 530 unit only.
- In GPS Steer (GPSS) the autopilot gets its course signal directly from the GNS 530 and the course set on the HSI is immaterial.

- When tracking a VOR or LOC course with the autopilot the appropriate course MUST be selected on the HSI with the chartreuse course arrow (the autopilot uses this as a heading reference).
- If the vacuum system, attitude gyro, or attitude indicator fail the autopilot will still be fully functional.
- If the gyro compass system fails, the autopilot can still fly a GPS course using GPS Steer (GPSS).
- Remote Comm Recall Button (located to the right of the GNS 530) recalls user selected VHF Comm frequencies stored in the AUX section of the GNS 530 and places the selected frequency in the standby position of the GNS 530 Comm frequency display.
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Autopilot Preflight

(Accomplish after Before Take-Off Check)

WARNING

It is imperative to understand that when the autopilot is engaged while on the ground the system is fully functional. That means that the pitch trim servo can drive the pitch trim tab if commanded by the autopilot. Therefore, after disconnecting the autopilot upon completing the autopilot preflight check, the pitch trim must be rechecked for the proper take-off setting.

1. AP & Trim CB's set
2. AP & Trim Master Switches ON (UP)
3. "RDY" annunciated on AP Control Display Unit (CDU)
4. Engage HDG Mode and confirm "HDG" annunciated and "RDY" extinguished
5. Disengage AP by pressing AP DISC Switch. Observe:
    a. "HDG" annunciation extinguished
    b. Audible alert sounds
    c. "RDY" annunciation flashes
    d. After 5 seconds "RDY" annunciation stops flashing but remains and audible alert is silenced. (NOTE: Pressing and Holding AP DISC will limit audible alert to a single beep.)
6. Recheck Stabilizer Trim set to take-off position

INFLIGHT OPERATION OF AUTOPILOT

WARNING

CAFF VFR Restriction: DO NOT engage or use autopilot in any mode below 1000 feet AGL.

NOTE

A roll mode of the autopilot must be engaged before a pitch mode can be engaged.

ROLL MODES

HDG (one push) Engages the Heading Mode. Autopilot will follow heading bug on HSI. Good technique is to set Heading Bug to current heading before engaging HDG. "RDY" will extinguish and "HDG" will be annunciated.

NAV (one push) Engages the Navigation Mode. Autopilot will track selected course (VOR, LOC,GPS) on HSI. "NAV" will be annunciated.

NAV-NAV (push NAV button twice) Engages GPS Steering Mode. "NAV" and "GPSS" will be annunciated. Autopilot will track GPS course to active waypoint. Course need not be set in HSI although it is a good technique to do so. This is the preferred mode for flying a GPS track.

To Intercept a Course from a Selected Heading: Press and hold the HDG button, then simultaneously press the NAV button (twice for GPSS), then release both. "HDG" and "NAV" (and "GPSS" if NAV pressed twice) will be annunciated. The autopilot will hold the heading selected by the heading bug until intercepting the selected course. At that time "HDG" will extinguish and "NAV" ("NAV" and "GPSS" if NAV pressed twice) will remain.

APR and **REV** for IFR use

PITCH MODES

ALT (one push) Engages the Altitude Hold Mode. "ALT" will be annunciated. In this mode the altitude may be adjusted in +/- 20 foot increments by rotating the VS knob CW or CCW one click for each 20 feet. Range is +/- 360 feet of the originally selected altitude.

VS (one push) Engages the Vertical Speed Mode. Initially the vertical speed will be that of aircraft when VS button pushed. For example, if vertical speed of aircraft was 500 fpm up at time of engagement, the annunciation would be "VS +5". While in VS mode, the vertical speed may be adjusted in increments of 100 feet up or down by rotating the vertical speed select knob CW or CCW. Range is +/- 1600 FPM from originally captured vertical speed.

WARNING

In the Vertical Speed Mode there is no airspeed protection! YOU must monitor your airspeed and adjust your VS and /or power as necessary to prevent dangerously low airspeed or stall.

CONTROL WHEEL STEERING MODE (CWS)

NOTE

The CWS Mode can only be engaged if both a roll mode and pitch mode are already engaged.

Press and hold the CWS button on the control wheel. This disengages both the roll and pitch servos. Maneuver the aircraft to the desired attitude and allow it to stabilize for 2-3 seconds. Release the CWS button to engage the CWS Mode. Autopilot will maintain turn rate and climb rate at time of engagement. “CWS” and “VS +/- #” will be annunciated.

EMERGENCY PROCEDURE

WARNING

If a Runaway Trim condition is encountered accomplish the RUNAWAY TRIM Emergency Procedure immediately to prevent a full nose up or full nose down trim condition.

RUNAWAY TRIM

1. **AP DISC/TRIM INTR Switch ……PRESS/HOLD**
2. **Trim Master Switch…….OFF**
3. **Trim Circuit Breaker……...PULL**