



TRIDEN

AUTOMATIC FLIGHT CONTROL SYSTEM

PILOT'S OPERATING HANDBOOK

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Rev B 02-05-03

FACTORY SERVICE CENTERS

Century Flight Systems, Inc. has established Factory owned and operated Customer Service Center. The personnel operating this Center are dedicated to providing Customer Satisfaction with our products.

Besides providing technical consultation, Service Center personnel also provide competent repairs and spares support to our dealers as well as direct customer in or out of warranty repair service. The location of our Factory Service Center is:

3010 FM 1195
Mineral Wells, Texas 76067

Product Support
Telephone: (940) 325-2517

If any time you need service at the Center please call and arrange an appointment. This way, we can minimize shop repair time.

LOG OF REVISIONS

Original – E.O. #17906 dated 09-06-01

Revision A dated 10-01-02

Add further description of Low Voltage Warning page 3. Added Contrast Adjust Procedure to page 4.
Add Manual Self Test description to page 6. Corrected typo's on page 6, page 8 and an error on page 10.

Revision B dated 2-05-03

Clarify procedure for loss of electric trim autopilot engaged and autopilot disengaged page

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FORWARD

The Century Flight Systems, Inc. TRIDEN SERIES Autopilot is an advanced General Aviation Flight Control System utilizing "State of the Art" electronic techniques.

In this handbook we have detailed the features, functions and general operating instructions of the TRIDEN SERIES System.

We suggest that you do two things:

1. Read this handbook and your Airplane Flight Manual Supplement. The handbook presents general operating procedures. Each aircraft installation has an Airplane Flight Manual Supplement or Autopilot Handbook that contains FAA approved flight procedures and operating limitations in that particular model aircraft. The appropriate AFM Supplement is a document, which must be aboard U.S. Registered Aircraft with the autopilot installed.
2. Spend some VFR time with the equipment to become familiar with its operation so that you may have the full benefit of its capabilities.



THE TRIDEN SERIES 3-AXIS IFCS FEATURES

TRIDEN SERIES AUTOPILOT

This autopilot only version uses a standard artificial horizon in combination with a directional gyro (DG) or an NSD-360A, NSD-1000 Horizontal Situation Indicator (HSI). A Century Flight Systems, Inc. Yaw Damper (Y/D) may be incorporated with the TRIDEN SERIES when a Y/D is certified for your plane. An outstanding feature of the TRIDEN SERIES is that it has a rate based inner loop for short-term dynamics. This means that rate information is derived from the horizon so that motion about the roll and pitch axis is programmed to occur at a rate appropriate to the activity. Examples of controlled rate motion are as follows:

ROLL AXIS

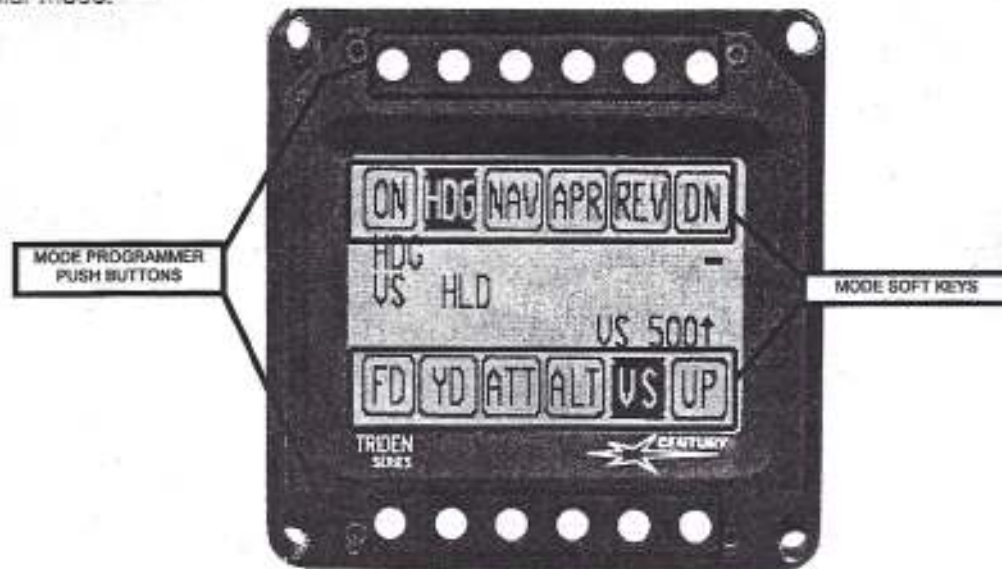
Heading Command - Roll at 5° per second diminishing near bank limit. Navigation Soft Mode - Roll at 2.5 degrees per second to reduced bank limit (8°). Gust Disturbances - Resisted by certificated servo velocity.

PITCH AXIS

Command Attitude - 0.7° per second attitude change. Gust Recovery - Maximum rate consistent with passenger comfort. Maximum System Capability - 2.4° per second.

CENTURY OPERATING CONTROLS

The MODE PROGRAMMER push-button switches are adjacent to the corresponding soft keys for any particular mode.



The MODE STATUS DISPLAY light intensity is controlled by the aircraft lighting rheostat. The TRIDEN SERIES Autopilot is activated with the Aircraft Avionics Master switch and operates in a low power state until the autopilot operation is desired. Mode selection is made by pushing the desired mode switch. The selected mode soft key will become reversed video on the Display. Additional information may also be displayed in the status field of the Display.



*NOTE: When a low bus voltage condition exists (less than approximately 11 volts for a 14 volt system or 20 volts for a 28 volt system). The last two characters of the lateral mode status field will flash "LV" in inverse video.

A separate Trim Master switch is located on the Control Panel. The Autopilot Engage Switch activates Autotrim Function.

CONTRAST ADJUST

The LCD contrast is controlled automatically for temperature variations and is set for a comfortable viewing level, however, in the event of extremely hot or cold cabin conditions a provision has been incorporated to allow for some adjustment of the display contrast.

The LCD contrast is manually adjustable for 9 levels of control. To manually adjust the display contrast, proceed as follows:

1. After completion of self test, ensure that the Autopilot is disengaged and the Flight Director, if installed is OFF.
2. Simultaneously press and hold both the UP and the DN switches until the CONTRAST ADJUST page is displayed. The page comes up at the default level of 5.
3. Press the INCREASE switch (right most switch on the bottom row) each actuation of the switch increases the contrast (darkens the display) up to level 9, the next press rolls the contrast adjustment over to level 1 (lightest display).
4. After a suitable contrast level is displayed, press the EXIT switch (second from the right on lower switch row) to return to the operate page.
5. Note that after the cabin temperature has reached a normal level it may be necessary to set the contrast to the default level 5. To do this enter then exit the contrast adjust page.

AUTOPILOT ON-OFF

Autopilot engage is accomplished by pressing the momentary ON / OFF switch adjacent to the ON soft key on the display. The Autopilot will engage in the HDG and ATT modes, the autopilot will synchronize to the existing aircraft pitch attitude.

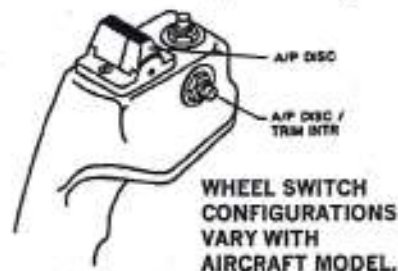
In HDG mode the aircraft will track the heading selected on the DG or HSI. In NAV, APR, or REV modes the aircraft will intercept and track any properly programmed radio-defined course. Instructions for proper radio setup in these modes are included in this manual.

In ATT HLD mode the autopilot will synchronize to the aircraft pitch attitude upon engagement.

In ALT HLD mode the aircraft will synchronize to the indicated altitude present at the time of engagement.

In the optional VS, vertical speed mode the autopilot will climb or descend at a rate approximating the programmed vertical speed.

The autopilot may be disengaged by pressing the momentary ON/OFF switch on the programmer, by pressing the AP OFF switch on the control wheel trim switch by pressing the Master Disconnect/Trim Interrupt switch, if present on the control wheel or by interrupting power at the Aircraft Master switch. Disengagement causes audible and visual disconnect announcements.



MANUAL ELECTRIC TRIM - With the Aircraft Avionics and Trim Master switches on, a manually operated electric trim function is activated by the control wheel trim switch. This switch serves a dual function:

1. Disengage the Autopilot.
2. Activate manual electric trim.

Moving the red portion of the trim switch forward or aft will cause autopilot disengagement. Moving both parts of the trim switch forward or aft simultaneously will disengage the autopilot and cause the trim to run up or down.

MASTER DISCONNECT/TRIM INTERRUPT

Many TRIDEN SERIES autopilots incorporate an additional switch on the control wheel (usually a red button). Pressing this button will disconnect the TRIDEN SERIES, the Yaw Damper (if installed), and will interrupt the operation of the Trim System. Release of the button will restore power to the Trim System. However, the Autopilot will return to the HDG and ATT mode and will require re-engagement in order to resume automatic flight.

AUTOTRIM

The TRIDEN SERIES autopilot is equipped with automatic pitch trim. When the Trim Master switch is on, engaging the autopilot activates Autotrim. The Autotrim system is fail safe in design. The integrity of the trim system is verified by the preflight test.

PREFLIGHT TEST SEQUENCE

TRIDEN SERIES WITH AUTOTRIM PREFLIGHT PROCEDURES

NOTE

During system functional check the system must be provided adequate D.C. voltage (12.0 VDC or 24 VDC min.) and instrument air (4.2 in. Hg. Min.). It is recommended that the engine be operated to provide the necessary power and that the aircraft be positioned in a level attitude, during the functional check. Due to the weight of the elevator in certain models of aircraft, steps 4 and 5 may not move the control wheel. To verify correct direction of commands, support elevators to remove weight and continue steps.

AUTOPILOT/AUTOTRIM

To be performed before the first flight of each day.

1. Trim Master switch - ON.
2. After completion of the built in self test Engage autopilot.
3. Move the heading bug left and right of the lubber line. Observe that the control wheel moves in the direction of the heading bug displacement.
4. Press the DN switch - verify that the control wheel moves in the down direction. Verify that after approximately a 3 second delay, the trim moves in the down direction.
5. Press the UP switch - verify that the control wheel moves in the up direction. Verify that after approximately a 3 second delay, the trim moves in the up direction.
6. Turn Trim Master Switch OFF, momentarily press OFF then reengage AP and conduct steps 3 & 4 on page 6, then return to step 7.
7. Turn Trim Master Switch ON.
8. Grasp control wheel and override roll and pitch servo actuators to assure override capability.
9. Hold control yoke and disengage autopilot by activating the AP OFF switch on the control wheel or by the computer ON / OFF switch.
10. Check controls through full travel in roll and pitch to assure complete autopilot disengagement.

COMMAND TRIM SYSTEM

To be performed before the first flight of each day.

1. Using the control wheel trim switch, verify normal trim up and down operation.
2. Move red portion of trim switch forward and aft. Observe that the trim system does not operate.
3. Release the red bar on the control wheel trim switch. Move the black portion fore and aft. Observe that the trim system does not operate.

CAUTION

Any failure of the above procedures indicates that a failure exists in the system and the system shall not be operated until the failure has been located and corrected.

CAUTION

Check the elevator trim setting before takeoff.

PREFLIGHT TEST SEQUENCE

TRIDEN SERIES TRIM PROMPT PREFLIGHT PROCEDURES

NOTE

During system functional check the system must be provided adequate D.C. voltage (12.0 VDC or 24 VDC min.) and instrument air (4.2 in. Hg. Min.). It is recommended that the engine be operated to provide the necessary power and that the aircraft be positioned in a level attitude, during the functional check. Due to the weight of the elevator in certain models of aircraft, steps 4 and 5 may not move the control wheel. To verify correct direction of commands, support elevators to remove weight and continue steps.

AUTOPILOT/TRIM PROMPT

To be performed before the first flight of each day.

1. After completion of the built in self test Engage autopilot.
2. Move the heading bug left and right of the lubber line. Observe that the control wheel moves in the direction of the heading bug displacement.
3. Press the DN switch - verify that the control wheel moves in the down direction. Verify that after approximately a 3 second delay, the TRIM DN prompt is displayed.
4. Press the UP switch - verify the control wheel moves in the up direction. Verify that after approximately a 3 second delay, the TRIM UP prompt is displayed.
5. Grasp control wheel and override roll and pitch servo actuators to assure override capability.
6. Hold control yoke and disengage autopilot by activating the AP OFF switch on the control wheel or by the computer ON/OFF switch.
7. Check controls through full travel in roll and pitch to assure complete autopilot disengagement.

CAUTION

Any failure of the above procedures indicates that a failure exists in the system and the system shall not be operated until the failure has been located and corrected.

CAUTION

Check the elevator trim setting before takeoff.

MANUALLY INITIATED SELF TEST

Intended for ground maintenance functions only, a manually initiated self test if available. This function is not authorized for use in flight.

In order to initiate self test the unit must have previously successfully completed a power up self test routine, the Autopilot must be disengaged, and the flight director command bars, if installed, must be stowed (off). Then proceed as follows:

1. With the Operate page displayed, ensure the Autopilot is not engaged, ensure the Flight Director command bars, if installed, are stowed out of view.
2. Simultaneously press and hold both the VS and the UP switches, (two most right hand switches on the lower row) until the display blanks. Unit will run the self test routine.

LATERAL OPERATING MODES

HEADING

In HDG mode the autopilot will capture and hold the heading selected on the DG or HSI. HDG soft key will be reverse video and HDG message will be displayed.

NAVIGATION with a Standard Directional Gyro Installed

In NAV mode the autopilot has an automatic 45-degree VOR-LOC intercept angle. Selected angle intercepts are standard when the system is equipped with NSD-360A, NSD-1000 or other HSI. When executing an intercept, the computer determines the rate at which the aircraft is closing upon the selected radio-defined course and at the proper time an on-course turn is initiated. Thirty-five seconds after the on-course turn the computer will reduce its bank limits to 13 degrees. After 70 seconds the bank limits will be reduced to 8 degrees to produce a 'soft' navigation mode when tracking a VOR signal. The system will remain in 'soft' mode during station passage. However, if a new course, which requires re-intercept, is selected, the 'soft' mode will unlock and the 45° intercept sequence will occur.

NOTE

When an HSI is installed momentary actuation of any of the lateral radio switches will enter the select angle intercept mode in which the AP will track the heading but until the on course turn is commanded,

prFgle intercept mode and initiate the automatic 45° intercept mode. If the CDI is within 15% of full scale this will cause couple bypass when the NAV Switch is pressed and held. This can be convenient when flying GPS or VOR when the track or radial you are on is desired.

NOTE

The NAV mode should be used when executing a holding pattern on the localizer to prevent automatic glideslope coupling.

NOTE

When radio receiver is tuned to a localizer frequency, the coupler will operate with localizer (APR) dynamics in the NAV mode.

HEADING SYSTEMS

In systems equipped with a DG the autopilot heading bug must be set to match the selected VOR/LOC course when in NAV, APR, or REV modes. For Ioran or GPS tracking, set the heading bug to the "desired bearing" information. In systems equipped with an NSD-360A, NSD-1000 or other HSI instrument, the heading bug is disabled when in the NAV, APR, or REV modes. In these modes the azimuth information to the autopilot is provided by the radio course pointer.



NOTE

In systems equipped with an NSD-360A, NSD-1000 or other HSI always set the radio course pointer to the Front Course Inbound Heading when operating in the APR or REV modes.

NOTE

In systems equipped with a DG, during an instrument approach, the heading bug must be set to match course for the segment of the approach being flown when using the NAV, APR, or REV modes.

NOTE

See section on operating techniques for additional operating instructions for the NSD-360A, NSD-1000 and the DG.

SELECTED INTERCEPT ANGLE

In systems equipped with a NSD-360A, NSD-1000 or other HSI, a selected intercept angle function is standard while operating in the NAV, APR, and REV modes.

Selected angle intercepts are initiated by performing the following steps:

1. While operating in the HDG mode, set the course pointer to the desired radial.
2. Set the heading bug on the NSD to the desired intercept heading.
3. Press and release the NAV, APR or REV mode button.

NOTE

Holding the NAV, APR, or APR or REV button for approximately ½ second will bypass Select Angle Intercept Mode.

Both HDG and the selected lateral mode ARM will now be displayed. As the aircraft begins its on-course turn, the HDG message will be removed and the lateral mode CPL will be displayed indicating that the system has captured the selected radio course and is now receiving azimuth input from the radio course pointer.

NOTE

If valid radio signal is lost after initiating a selected angle intercept, the message FLAG will be displayed, the autopilot will remain in the HDG mode.

APPROACH

The APR mode provides select angle VOR-LOC intercepts when the system is equipped with an NSD-360A, NSD-1000 or other HSI. The intercept, crosswind, and tracking sequences are similar to those described in the NAV mode of operation except that 35 seconds after the on-course turn the bank angles are reduced to 12 degrees. The APR mode has additional enabling logic for the automatic glideslope arm, capture, and track sequence and must be used on ILS approaches.

REVERSE (Back Course)

The REV mode is for use in tracking the localizer back course Inbound and front course Outbound or VOR course Outbound. Selected angle intercepts automatic 45 degree intercepts crosswind correction and tracking are as described in the APR mode except that response to radio signals is reversed.

NOTE

When using an NSD-360A, NSD-1000 or other HSI always set the radio course pointer to the inbound front course localizer heading.

NOTE

When using a DG, always set the heading bug to the final approach heading to the airport.

PITCH OPERATING MODES

ALTITUDE HOLD

ALT HLD mode will cause the aircraft to maintain the pressure altitude present at the time of ALT engagement. ALT HLD may be engaged at maximum rate of climb or descent, but for passenger comfort, rate of climb or descent should be reduced to 1,000 feet per minute or less prior to ALT engagement. Depressing the pitch ATT switch will shift the AP mode back to ATT HLD mode.

VERTICAL SPEED

VS mode will cause the aircraft to climb or descend at a rate approximating the programmed vertical speed. To display the vertical speed set-up field, momentarily press the VS switch. The VS set field will be displayed in inverse video indicating VS 000. The VS soft key will remain forward video and the previously programmed vertical mode ALT HLD, ATT or GS will remain active.

The initial momentary press of the UP or DN switch will increase the value in the VS set field to 500 FPM UP or DN respectfully with an arrow (↑↓) following the VS value indicating the direction of the selected VS command. Each additional press of the UP or DN switches will increase or decrease the VS command value in 100 FPM increments, ranging from 1000↑ to 1000↓. After the desired vertical speed is entered in the VS set field momentary activation of the VS switch will enter the VS mode of operation. The vertical speed can be modified by use of the UP and DN switches. Each press of UP or DN changes vertical speed by 100 ft.

NOTE

When the VS set-up field is visible, pressing and holding the UP or DN switch will change the vertical speed value as outlined above and after 1 second will command the ALT HLD or ATT pitch modifier. Modifiers are never available in the GS mode.

ATTITUDE

ATT mode places pitch attitude command with the UP and DN switches. Pitch is always synchronized to the existing aircraft attitude after pitch attitude modification. When engaging the autopilot or when transferring the system to ATT from any other vertical mode, the aircraft will maintain its existing attitude.

UP and DN SWITCHES

The pitch modifier switches are momentary push-button type, located on the right side of the Flight Computer, used to modify the airplane's programmed vertical modes. 1. UP/DN switches in ATT mode. Pressing and holding the UP or DN switch in the attitude mode causes the aircraft to rotate nose up or nose down at a rate of approximately seven tenths of one degree per second. Release of the switch will sync the pitch to the attitude present at the time of switch release. 2. UP/DN switches in ALT HLD mode. Pressing and holding the UP or DN switch in the altitude hold mode causes the aircraft to climb or descend at approximately a 500 FPM rate. Release of the switch will sync the altitude to the altitude present at the time of switch release. This function can be used for small corrections in altitude. 3. UP/DN switches in VS mode. Momentarily pressing the UP or DN switch will increase or decrease the

programmed vertical speed in 100 FPM increments. UP will nose the aircraft up increasing the rate of climb or decreasing the rate of descent. DN will nose the aircraft over thus decreasing the rate of climb or increasing the rate of descent. (SEE Vertical Speed)

GLIDESLOPE COUPLING

In the presence of selected APR mode only and other enabling logic, the glideslope function is fully automatic. Therefore, no GS engage switch is used. GS mode may be entered from either ATT, ALT or VS mode, from above or below the glideslope.

Capture of the glideslope depends upon satisfying conditions, which will complete the arming sequence. After arming, capture will occur just before glideslope interception so as to rotate smoothly to interception. This "anticipative capture" point is determined by the rate of closure satisfying a computer equation. In order for the GS mode to arm, the following conditions must exist simultaneously:

1. NAV radio channeled to localizer frequency.
2. Localizer deviation must be less than 90 percent either side of center.
3. A valid localizer signal (no flag).
4. A valid glideslope signal (no flag).
5. APR mode selected or armed.

When these conditions are met the GS ARM will be displayed in conjunction with the active pitch mode messages indicating glideslope is armed. When "anticipative capturing" occurs, the active pitch mode messages will be removed leaving only the message GS CAP indicating that transition to the glideslope signal has occurred. The GS mode may be deactivated by selection of the ALT HLD or ATT pitch mode selection of VS will put the Pitch Mode into ALT HLD but automatic recapture of the glideslope may occur. Selecting any other Lateral Mode eg. HDG, NAV or REV will place the Pitch Mode into ALT HLD.

NOTE

The NAV mode should be used when executing a holding pattern on the localizer to prevent automatic glideslope coupling.

NOTE

When radio receiver is tuned to a localizer frequency, the coupler will operate with localizer (APR) dynamics in the NAV mode.

CWS MODE

(Pitch Sync) - The system is equipped with a control wheel steering switch located on the horn of the control wheel(s). When depressed, this switch will disengage the roll and pitch servos to allow manual maneuvering. When released the system will re-engage in the lateral (roll) mode previously in use. If the autopilot is in ALT HLD mode the system will synchronize to the indicated altitude present upon release of the CWS switch. If the autopilot is in the VS mode the system will resume the programmed rate of climb or descent. If the Autopilot is in the ATT mode the system will synchronize to the pitch attitude present at the time of release.



TRIDEN SERIES TRIM PROMPTING

The TRIDEN SERIES may be ordered as a Trim Prompting autopilot. This means automatic control (autotrim) of the elevator trim is not provided on these systems. When the autopilot displays TRIM UP or TRIM DOWN on the display, the pilot should manually move the pitch trim control of his aircraft in the direction indicated on the autopilot. When the autopilot determines that the trim condition is satisfied, the trim message will be removed and the pilot should stop his trim action. There are 2 degrees of trim prompting. For a small trim error the trim prompt will be displayed in normal video. A large trim error will cause the prompt to be displayed in inverse video. A large error not corrected for a period of approximately 20 seconds will generate an audible prompt. The alert will repeat every 20 seconds until the large error is corrected.

NOTE

Loss of Electric Trim with Autopilot Engaged-

In an autotrim system loss of Trim A+, such as popping the circuit breaker or turning off the trim master switch, will cause the system to automatically switch to the trim prompting mode, a voice message "AUTOTRIM FAIL - TRIM PROMPT MODE ACTIVE" will sound every six seconds. To silence the message, the pilot must disengage the autopilot. The pilot should then turn off the trim master switch, and manually trim the aircraft's pitch trim. Autopilot reengagement **using trim prompt commands** is then authorized.

Loss of Electric Trim with autopilot Disengaged-

In an autotrim system loss of Trim A+, such as popping the circuit breaker or turning off the trim master switch, will cause the system to automatically switch to the trim prompting mode, a voice message "AUTOTRIM FAIL - TRIM PROMPT MODE ACTIVE" will sound every six seconds. Momentarily pressing either the UP or DN switches will silence the alert. The pilot should then turn off the trim master switch. Autopilot engagement **using trim prompt commands** is then authorized.

REVIEW OF INTERLOCKS AND FAILURE WARNINGS

The TRIDEN SERIES Systems include a number of automatic interlocks that will prevent system operation or individual mode operation if the input information is not valid or if other pre-requisite conditions do not exist. In addition to the interlocks, the system will annunciate various failure conditions as advisory information for the pilot. Following is a brief description of the interlocks and warnings provided.

INTERLOCKS

Autopilot engagement is inhibited unless valid gyro excitation is being provided by the system. If the navigation information becomes invalid during selected angle intercepts the appropriate NAV/APR/REV message along with FLAG will be displayed and automatic mode switching from HDG to the armed navigation mode will be inhibited.

WARNINGS

LOW VOLTAGE

When the aircraft bus voltage provided the system falls below the minimum required for reliable system function, LV will be displayed.

ATTITUDE GYRO EXCITATION

Absence of valid gyro excitation will cause the autopilot to disengage and the message "GYRO FAIL" will be displayed. The autopilot cannot be re-engaged.

AP DISENGAGEMENT

Anytime the autopilot is disengaged the message AP disengage will be displayed and sound an audible warning "Autopilot Disconnect". The audible warning will repeat three times unless canceled by momentarily pressing one of the AP disconnects on the control wheel.

NOTE

Re-engagement of the autopilot will not silence the disconnect alert.

NAVIGATION INFORMATION INVALID

The appropriate navigation FLAG mode annunciations will be displayed when selected and invalid navigation signals are present (NAV flag in view).

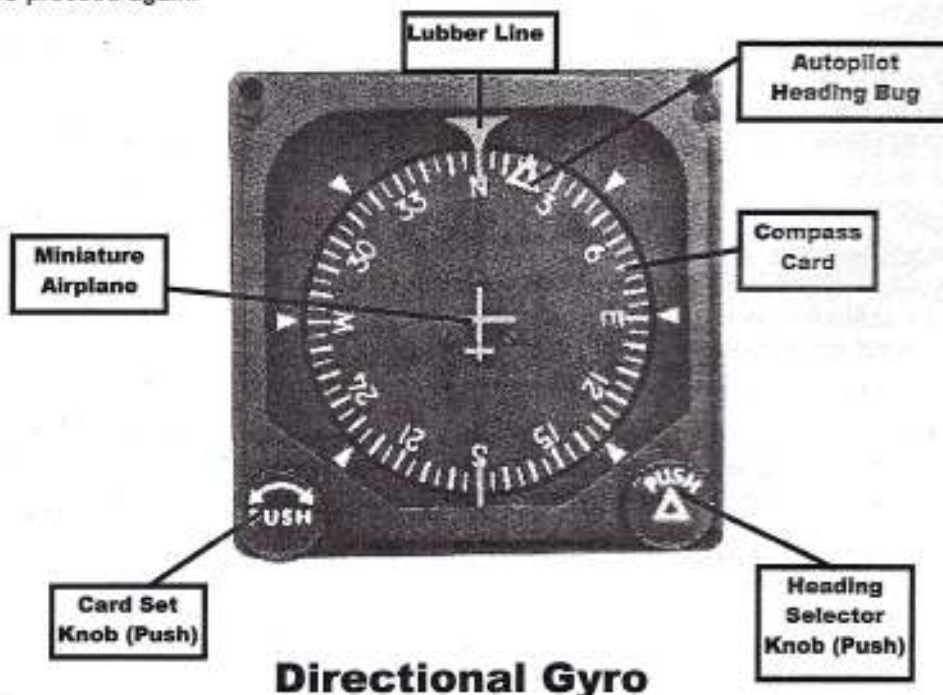
GLIDESLOPE INFORMATION INVALID

The display will present the message GS CAUT and display the reason for the caution when glideslope information is invalid or any other GS Arming condition is lost (FRQ, when a localizer frequency is not channeled. LDV, when localizer deviation is greater than 90% either side of center. FLAG, when an invalid localizer flag is present. GSFL, when a glideslope flag exists, or when APR mode is de-selected) after glideslope capture. If valid glideslope information or any other GS Arming condition is not available during the arming sequence, the system will not arm and glideslope capture will not occur.

YAW DAMPER SYSTEM (YAW DAMPER EXPANDED SYSTEMS ONLY)

The Century Flight Systems, Inc. Yaw Damper system may be installed as an expansion to the TRIDEN SERIES. The system has only one control - the YD Push Button. This expansion may be operated

without the autopilot engaged. For pilot assistance and passenger comfort, its function is to add additional stability to the yaw axis of the aircraft and minimize any tendency to hunt or Dutch roll in the aircraft. In addition, the Yaw Damper incorporates an "electronic slip/skid sensor" to assist in coordinating turns and trimming the aircraft under conditions of asymmetric power. The Yaw Damper does not ordinarily compensate for rudder trim variations with speed changes and therefore may "bump" the rudder controls slightly when engaged. The Yaw Damper is automatically engaged when the TRIDEN SERIES autopilot is engaged. The Yaw Damper may also be engaged through the YD switch on the TRIDEN SERIES if autopilot engagement is not desired. A YD soft key on the display of the TRIDEN SERIES confirms the Yaw Damper is engaged. The Yaw Damper may be disengaged by pressing the YD switch on the TRIDEN SERIES or by pressing the Master Disconnect or the Master Disconnect/Trim Interrupt switch (if system has autotrim) located on the control wheel. The YD indication will become normal video to indicate disengagement. On some models of aircraft, the Yaw Damper cannot be incorporated into the TRIDEN SERIES Autopilot. On those models the Yaw Damper is considered as stand-alone. To engage the Yaw Damper the pilot will have to press the remote mounted panel switch. This switch is an electromechanical switch, which will illuminate to confirm Yaw Damper engagement. To disengage, the switch must be pressed again.



Directional Gyro

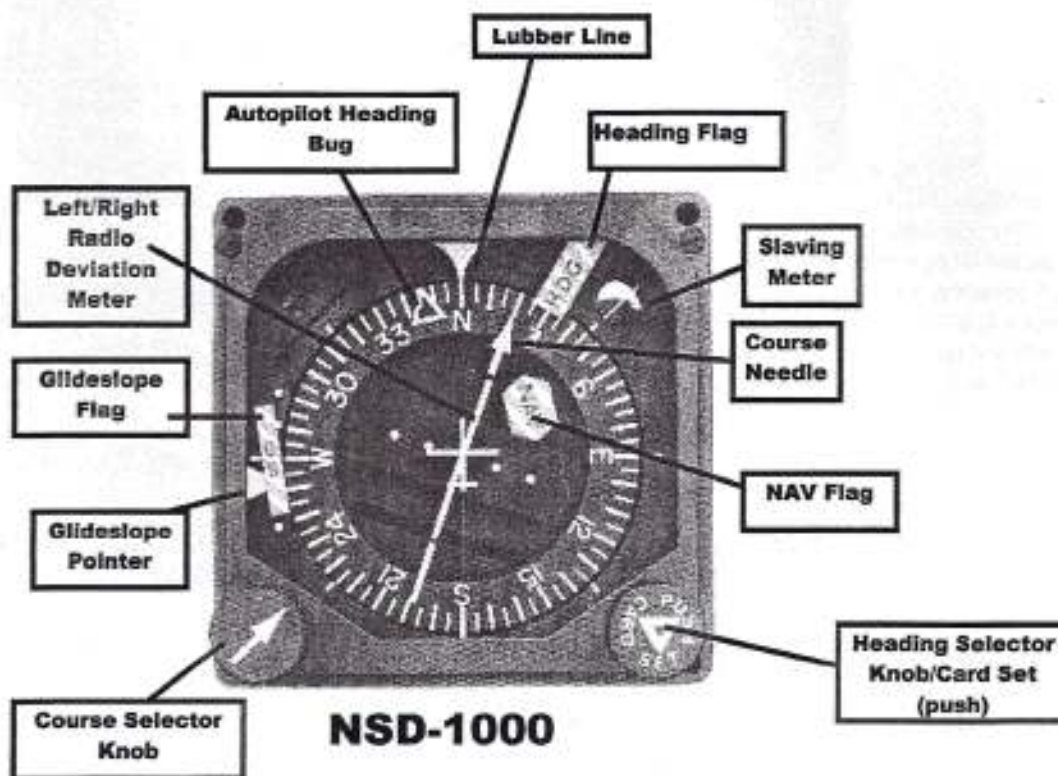
The Heading Selector DG replaces the standard directional gyro and provides a fully visible heading indicator around the normal DG opening. The DG dial is marked in 5-degree intervals and numbered each 30 degrees around its azimuth. A center index is provided at the top to align selected headings. Additional indices are located each 45 degrees to facilitate rapid turn selection without mental arithmetic. Any heading may be selected, either before or after engagement, and turns up to 180 degrees may be programmed directly, either right or left. If the heading indicator is rotated beyond 180 degrees from the DG card heading, the heading selector will command a reversal in bank to reach the resultant selected heading in the shortest direction.

The DG card is normally set to the magnetic compass with the card set knob on the left in the usual fashion, while the heading selector indicator is rotated by the heading selector knob on the right. It will still be necessary for the pilot to verify the compass card heading with the magnetic compass periodically. Direction of rotation of both the knobs and indicator commands the same direction of turn.

NSD-360A, NSD-1000 AND OTHER HEADING SYSTEMS

The TRIDEN SERIES autopilot may be optionally equipped with the Century Flight Systems, Inc. NSD-360A or NSD-1000 HSI. The explanation which follows will be based on Century's HSI, however the principles will apply equally to the heading systems of other manufacturers provided the differences in design, features and concepts are ascertained and allowed for such as slaving, knob location, size, etc.

The NSD-360A and the NSD-1000 (Navigation Situation Display) are basically identical units except for the gyro capsule. The 360A is an air driven gyro where as the 1000 is an electric gyro. The HSIs have electrically servoed heading card driven by the information processed from the gyro capsule. Warning flags and indicators include NAV flag, glideslope flag, TO/FROM meter and heading flag. Lateral radio information is presented by the left/right meter and vertical radio information is presented by the glideslope meter. Autopilot heading information is represented by positioning the heading bug to the desired heading track.



Autopilot course information is derived from course needle position (direction) and left/right radio information (deviation from desired radio track) to provide precise intercept and track capability.

NOTE

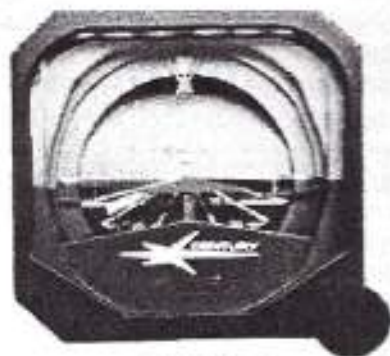
The TRIDEN SERIES is capable of using radio information provided by a loran or GPS. There are several important factors to consider when using those units with the autopilot and HSI.

Because the HSI incorporates an integrated course/left-right display and an OBS resolver, a switching device will be required in order for the HSI to display the selected information.

Most manufacturers of loran and GPS have the capability to adjust the course width (CDI sensitivity) of their units. Course width is measured in nautical miles from full scale left to full-scale right deflection of the CDI. If the course width is too wide, the autopilot will be insensitive to the movement of the CDI. If the course width is too narrow, the autopilot will be overly responsive to the CDI movement.

For proper autopilot operation with a loran or GPS, the autopilot needs both direction and deviation. Directional information is provided by the heading bug, if a DG is being used, or by the course needle, when an HSI is being used. When a waypoint is called up, the loran or GPS will display a "desired track". The heading bug or course arrow must match this "desired track". If you use multiple legs in a flight, you must match the heading bug or course arrow with the new "desired track".

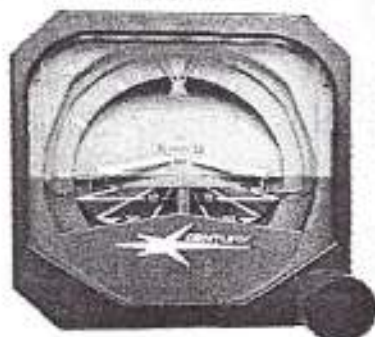
TRIDEN SERIES FLIGHT DIRECTOR STEERING HORIZON SINGLE QUE



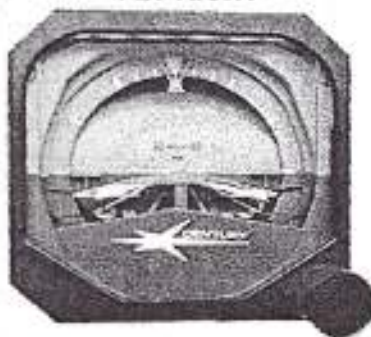
FLY LEFT



FLY RIGHT



FLY UP



FLY DOWN

With the addition of the Flight Director expansion, the pilot may choose to program a particular flight sequence and monitor autopilot maneuvering by observing the steering bar or he may switch the autopilot off and place himself in the control system loop by following commands of the steering bar. Pressing the FD switch on the computer will activate the flight director steering bars and the FD soft key will go reverse video. The great advantage of the Flight Director is that the computer observes many inputs, compares these inputs to the sequence programmed by the pilot and resolves differences into combinations of four commands: Fly Up, Fly Down, Fly Left and Fly Right. To accomplish the programmed maneuver, the pilot need only to "fly the delta into the inverted 'vee' of the steering bar".



The Flight Director may be switched off and the steering bars stowed out of view by momentarily pressing the FD switch on the flight computer. While the FD is on, the autopilot will stay in the mode of operation if the autopilot is disengaged or when it is re-engaged. When the FD is off and the autopilot is engaged or disengaged, the autopilot will revert to the default modes of operation, which is the HDG and ATT mode.

NOTE

The pilot should always keep in mind that the Steering Horizon displays COMPUTED DATA and will give a command-satisfied indication if the pitch attitude and heading are satisfactory for normal conditions. The system cannot compensate for inadequate power or airspeed to accomplish the desired maneuver, therefore, a raw data display is mandatory with the Flight Director display so that the pilot is constantly presented with concise data on his heading and actual position on the Localizer, Glideslope and VOR radial. For this reason, whenever the Flight Director expansion is added, it is recommended that an HSI be installed also.

MAINTENANCE

The TRIDEN SERIES has been designed and manufactured to render reliable service; however, some of the system components will require a regular inspection and service. It is important that agencies selected for service are properly qualified and equipped to render service on the TRIDEN SERIES.

We have listed several items below to assist you in monitoring your system maintenance.

1. Gyro Filters - The gyros used with the TRIDEN SERIES are precision devices whose performance and service life are in part dependent upon the quality of the air supply. Poor air quality can significantly reduce gyro life (to hours) and performance by contaminating bearings. Regular filter maintenance is good investment.
2. Aircraft Static Systems - Air leaks and water entrapment can significantly affect altitude hold performance. Static System maintenance and checks help not only the AFCS, but assure proper function of static instruments. Altitude Hold units used by Century Flight Systems, Inc., should NOT be disconnected during static system checks as they are designed to withstand such test without damage.
3. Periodic inspection and maintenance is recommended for those items of the autopilot, which attach to the aircraft control systems. During normal inspection is a good time to make these simple checks on the autopilot.
 - A. Inspect the bridle cable on the Pitch, Roll, and Yaw Servos for:
 1. Condition
 2. Tension
 3. Freedom - move controls through full range of travel.
 - A. Inspect bridle Cable clamps for:
 1. Obstruction.
 2. Bolt Torque - 55 ± 5 -inch pounds of torque. Note: This higher than normal is FAA approved and required.
 3. Gap between clamp halves - .005" minimum, assure that cables are under clamping pressure.
 - A. Inspect Trim Capstans for:
 1. Evidence of wear
 2. The clutch should slip instead of cable on capstan if overpowered.
 - A. Inspect Trim Cables for:
 1. Fraying
 2. Proper tension (high end of spec is usually best).
 3. Freedom of travel.

EMERGENCY OPERATION

Check the Flight Manual Supplement located in the Installation Manual for the TRIDEN.

LIMITED WARRANTY CENTURY FLIGHT SYSTEMS INC.

Each new Century Flight Systems Inc. Autopilot or HSI is warranted by the manufacturer to be free from defects in material and workmanship under normal use, subject to the following conditions:

1. Century Flight Systems Inc. will through its designated service facilities at its option either repair or replace new components which, shall within (12) months (NSD 1000 HSI Systems are covered under this Limited Warranty for a period of twenty-four (24) months after date of installation or aircraft delivery to first retail customer, whichever is later, be found, to Century Flight Systems Inc. satisfaction, to have been defective in material or workmanship under normal use.
2. The Warranty Registration must be signed and returned to Century Flight Systems Inc. within ten days of equipment installation date or aircraft delivery to first retail customer. In the event that the registration card is not returned within this time, the date of shipment from the factory or aircraft delivery to first retail customer whichever is later, will be deemed to be the installation date.
3. This warranty will not apply to any product which has been installed, repaired or altered in any way whatsoever in Century Flight Systems Inc. opinion to adversely affect its performance or reliability, or which has been subject to misuse, contamination, negligence, or accident.
4. Equipment should be shipped prepaid to the address below, removal and/or reinstallation costs are covered when performed by a Century Flight Systems, Inc. Warranty Dealer or a Designated OEM Warranty Dealer in the case of a new production aircraft.
5. This is Century Flight Systems Inc. sole express warranty with respect to the goods supplied herein. CENTURY FLIGHT SYSTEMS INC. MAKES NO OTHER EXPRESS WARRANTY OF ANY KIND WHATSOEVER. CENTURY FLIGHT SYSTEMS INC. EMPLOYEES MAY HAVE MADE ORAL STATEMENTS ABOUT THE PRODUCTS DESCRIBED IN THIS CONTRACT. SUCH STATEMENTS DO NOT CONSTITUTE WARRANTIES, SHALL NOT BE RELIED UPON BY THE CUSTOMER, AND ARE NOT PART OF THE SALE CONTRACT.
6. THE DURATION OF ANY IMPLIED WARRANTY, AND OF ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED TO (12) MONTHS (NSD 1000 HSI SYSTEMS ARE COVERED UNDER THIS LIMITED WARRANTY FOR A PERIOD OF TWENTY-FOUR (24) MONTHS AND SHALL NOT EXCEED 30 MONTHS FROM DATE OF ORIGINAL CENTURY FLIGHT SYSTEMS INVOICE COMMENCING AS OUTLINED IN ITEMS 1. AND 2. TO THE FULL EXTENT PERMITTED BY APPLICABLE LAW, CONSEQUENTIAL DAMAGE OR BREACH OF ANY WARRANTY ARE HEREBY DISCLAIMED AND EXCLUDED BY CENTURY FLIGHT SYSTEMS, INC.

CENTURY FLIGHT SYSTEMS, INC.
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