

EZ-1 Altitude Hold

Trio Avionics

LCD Switch

Rotary Encoder & Pushbutton

**Automatic Trim
Error Sensing
and Display**

**Precise Pressure
Sensing for Altitude
Control**

TRIO AVIONICS

DN ← UP

ALT
HOLD

**G Force Sensing
Prevents Overstress-
ing the Aircraft**

**Fine Altitude
Adjustment with
Rotary Encoder**

Solid State MEMs Gyro

A True Revolution in Altitude Hold Systems

The LCD switch provides a graphical message display for system messages, alerts and warning advisories.

A rotary encoder is employed to make fine adjustments to aircraft altitude, change system settings and adjust display characteristics.

SAFETY is #1. The EZ-1 Altitude Hold system incorporates an all-new "Gold Standard" servo that was designed with safety as the prime consideration. Some safety features are:

Complete motor and geartrain disconnect when not engaged, free from any system drag.

Reliable slip clutch provides immediate pilot override.

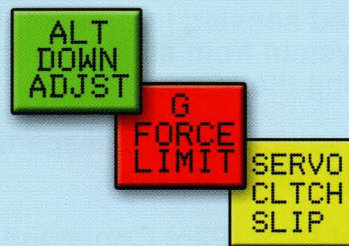
Dual microprocessors in the servo (an industry first). The main processor handles all control functions and communications to the AH (Altitude Hold) module, and has disconnect authority if it senses a problem. A second, supervisory processor monitors all system activity and communications and will also disconnect the servo if it detects irregularities.

AH module monitors G forces. Will disconnect the servo to prevent high wing stress. Also releases the servo when sensing prolonged (pilot induced) clutch slip.

Triple protected motor drivers continuously report their condition to the processors.

System provides for remote servo disconnect switch on control stick.

Audio alert upon servo disconnect.



Sample LCD Display Screens

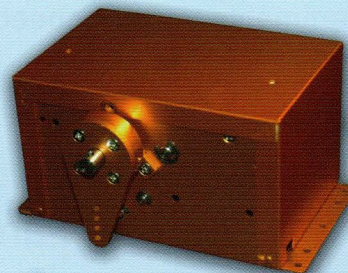
LCD Switch & Encoder



AH Module



Servo



New "Gold Standard" Servo

Trio Avionics

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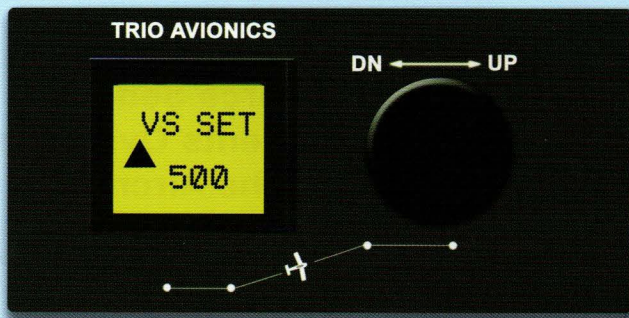
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EZ-2



Airspeed sensing to prevent the altitude hold system from stalling or over-speeding the aircraft

Easily select climb or descent rates with the rotary encoder

Vertical PCS (Pilot Command Steering)

Altitude Hold with Vertical Speed (VS) Select

The EZ-2 incorporates all of the features of the EZ-1 and adds the ability to select climb and descent rates. Vertical speeds are selectable in 100 fpm increments.

Once a desired vertical speed is entered the pilot simply presses the LCD switch and the EZ-2 will initiate the climb or descent rate that was entered.

The EZ-2 contains a sensor that monitors the aircraft airspeed and will prevent the EZ-2 from stalling or over-speeding the aircraft in climbs and descents. The owner will set these limit speeds to suit the individual aircraft by selecting a setup menu and flying the aircraft to the desired airspeed. Once that speed is achieved, a simple push of the button saves the setting in permanent memory.

Once the min and max airspeeds are entered, if the pilot sets a descent rate that causes the aircraft to reach the limit airspeed, the EZ-2 will decrease the descent rate to hold that airspeed. Likewise, if an excessive rate of climb is entered, the EZ-2 will limit the climb rate to prevent a stall.

When a climb or descent has been initiated, the pilot may easily change the commanded vertical speed by rotating the encoder knob. For instance, the climb rate may be gradually reduced as the aircraft approaches the desired altitude to avoid overshooting.

Pressing and holding a remote disconnect switch will invoke the PCS mode. Upon release, the aircraft will hold the current rate of climb or descent.

EZ-3



Select destination altitude

Programmable vertical speed

Altitude Hold with VS and Altitude Preselect

The EZ-3 contains all of the features of the EZ-1 and EZ-2 and adds the ability to pre-select a destination altitude.

Altitude pre-select is a valuable asset when flying in Positive Control airspace. It can help prevent overshooting ATC designated altitudes. It is also an aid to those flying under Class B airspace, who are concerned about inadvertent intrusion into controlled airspace.

Setting the destination altitude is easily accomplished using the rotary encoder. Once the altitude is entered, pressing the LCD switch will initiate a climb or descent to the desired altitude. Upon reaching the destination altitude, the system will sound an alert and automatically enter the "Altitude Hold" mode, level the aircraft and maintain the selected altitude.

The user may employ the setup menu to specify a default vertical speed to use once the altitude is entered. During climb or descent, the vertical speed may be altered by rotating the encoder or using the Vertical PCS mode.

The EZ-2 and EZ-3 are available as upgrades to the EZ-1

PRO PILOT

Autopilot



Track - Course - Intercept - Altitude Hold - Climb/Descent
Altitude PreSelect - GPSS - GPSV - Auto Trim - Fuel Flow
Auto Recover Mode - Automatic 180° Turn - Pilot Command Steering
Track Offset Capability - Advanced Safety Features

Trio



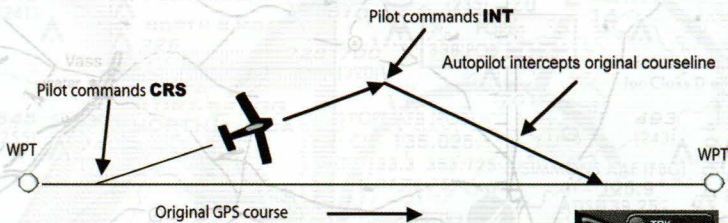
Avionics

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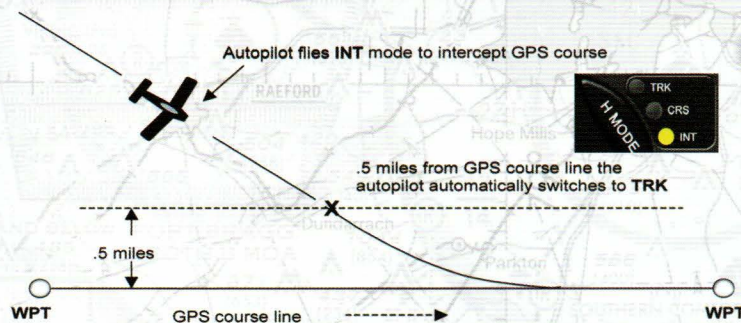
Horizontal and Vertical navigation modes provide great flexibility



Track mode (TRK) - used for area navigation tracking a host GPS flight plan (or GOTO data).

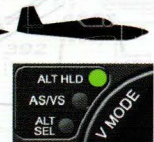


Course mode (CRS) - provides vector navigation as illustrated above when it is necessary to deviate from the GPS flight plan. CRS mode uses the GPS ground track to provide "heading bug" functionality for flying ATC vectors, avoiding restricted airspace, circumnavigating weather or vectoring around conflicting air traffic.



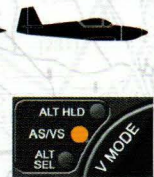
Intercept mode (INT) - used to intercept a predefined GPS desired track (DTK) as illustrated above. The INT mode also uses the GPS signal to provide the aircraft groundtrack. This mode is useful to regain the original flight plan track after circumnavigating the flight obstacles.

Altitude Hold - holds the current altitude. Use the encoder knob to make adjustments for barometric corrections.



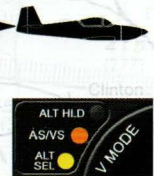
AS/VS -

allows pilot to command a climb or descent at a selected rate. Pilot may choose the desired vertical speed, or may elect to climb or descend at specific airspeeds by employing Pilot Command Steering. Airspeed limiting prevents the autopilot from stalling or over-speeding the aircraft.



Altitude Pre-select (ALT SEL) -

provides the capability to select a target altitude. The pilot may also choose the climb/descent rate, or employ a default rate previously entered into the setup menu. Climb/descent rates decrease when approaching the target altitude to assure a smooth intercept.



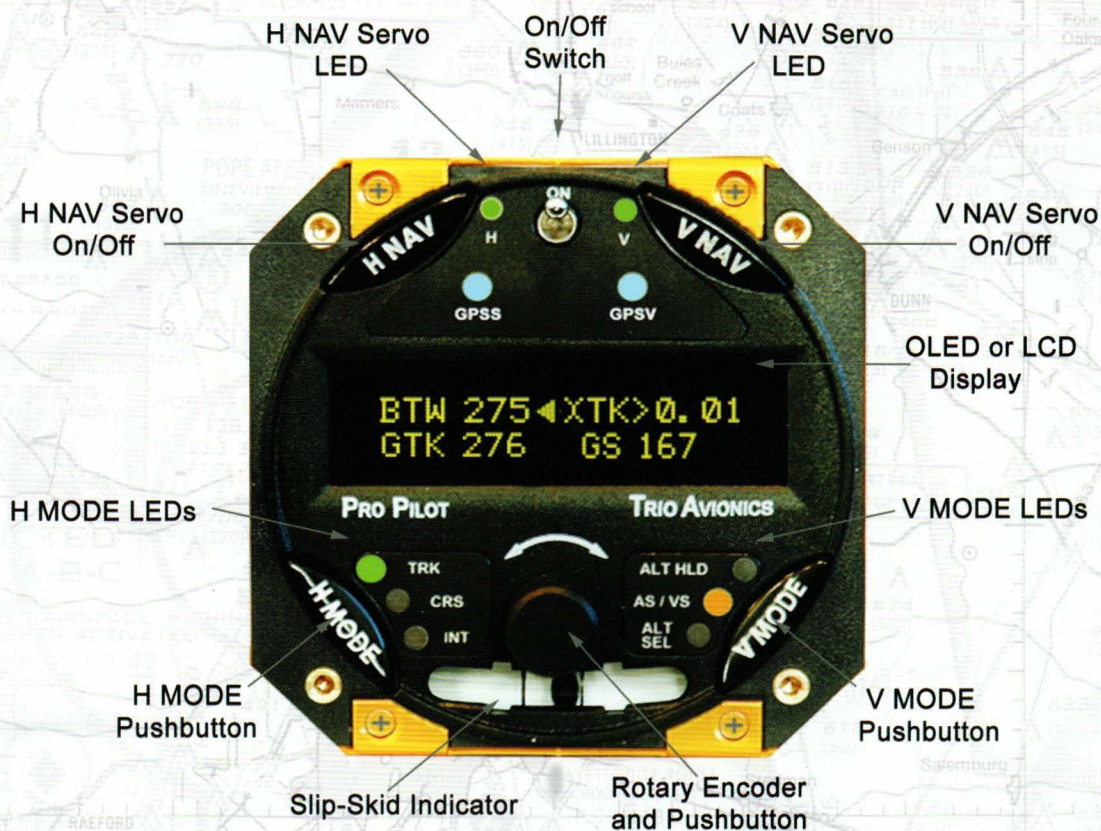
Auto-Trim - if the aircraft has an electric pitch trim system, this optional feature will keep the elevator trim properly adjusted for all phases of autopilot controlled vertical flight.

Pro Pilot Standard Features

- Trim Sensing with Annunciator
- Remote Disconnect for Servos
- Auto Servo Disconnect on Takeoff
- Pilot Command Steering
- Adjustable Turn Rate
- Configurable Data Windows
- Programmable Flight Timers

- Automatic Recover Mode
- Emergency Course Reversal
- Selectable Track Offset
- Speed Controlled Bank Angle
- GPS Data Scan
- Turn Coordinator with Slip-Skid
- Gold Standard Servos

Trio Avionics designs and manufactures products engineered for outstanding performance while keeping them attractively priced. Innovative design and the use of modern solid state sensors provide superior navigation capability at a competitive price. Our products are designed by pilots for pilots, and we fly them every day.



The Pro Pilot autopilot system provides a high-quality, low cost navigation solution for certified and experimental aircraft

The Pro Pilot is distinctive in the feature set that it offers to the aircraft owner.

- Unique Safety Features - "G" force limiting, automatic servo disconnect on takeoff, "intelligent" servos with full disconnect authority in the event of a malfunction, redundant "supervisory" microprocessors, voice alarms and audible warnings are just a few of the safety considerations. Additionally, flight safety is enhanced by bank angle limiting, Min and Max airspeed limits, track offset capability, and pitch and roll trim sensing. Servos accidentally left engaged during preflight disconnect automatically during the takeoff roll. Trio's "automatic 180 degree turn" feature (for VFR pilots encountering poor weather) has been credited with saving lives. Auto Level Mode provides automatic recovery from unusual attitudes to straight-and-level flight.

- Ease of Operation - Basic operation is as easy as "turn it on and push the button." Advanced features are easily accessible by means of tactile buttons and a rotary encoder. Multi-color LEDs and a bright OLED display screen provide a clear picture of functions and displayed data (LCD screen is available upon request).

- Ergonomic Design - The Pro Pilot is a fit companion to today's sleek, efficient aircraft. The industrial design reflects an understanding that "functional but boxy" isn't what modern aircraft owners want in their instrument panels.

- GPSS - GPS steering uses GPS generated roll commands via an ARINC 429 data input.

- GPSV - GPS Vertical Steering using ARINC 429 vertical data input from advanced WAAS enabled, approach capable GPS systems.

- Fuel Management - Uses a fuel flow sensor and GPS data to provide information on current fuel consumption, fuel used, time and distance remaining. Annunciates low fuel warning.

Fuel Management Option for the Pro Pilot

The fuel management option for the Pro Pilot allows the pilot to view multiple fuel parameters. It provides a means to accurately measure fuel flow (in gallons or liters), fuel remaining and fuel used. It employs the GPS data to compute available range and time remaining. This feature requires the installation of a small pushbutton on the panel or control stick.



The fuel flow in **GPH** (gallons per hour) or **LPH** (liters per hour) is always available in the variable data on the bottom right quadrant of the display. Rotating the encoder knob will cycle through the GPS data screens to bring this data into view. A small momentary pushbutton, mounted to the instrument panel or control stick allows the pilot to view additional fuel parameters.

Pressing the remote pushbutton, regardless of what is being shown on the autopilot display screen, will bring up the displays as shown below. Each fuel display will remain viewable for a variable period before timing out and returning to the normal autopilot display. However, if the button is pressed again during that period, the screen will advance to the next fuel display. In this manner, all fuel parameters are always available with the press of a button.

Several screens are available when using the remote pushbutton. The first screen presented is the screen that was on the display when last viewed. In the example below this would be the GPH display

BTW 245 FUEL GPH
GTK 244 8.0

The first time the button is pressed the right hand side of the screen will show a larger display of the **FUEL GPH**.

BTW 245 FUEL REM
GTK 244 31.2 GAL

The second press of the button will display the **FUEL REM** (Fuel Remaining) screen.

BTW 245 TIME REM
GTK 244 2:46

Pressing again will advance the screen to show the **TIME REM** (Time Remaining) which indicates the time until the tanks are empty.

BTW 245 USED
GTK 244 31.2 GAL

The next screen presents **USED** (Fuel Used). This parameter will accumulate until the pilot resets it as described below.

BTW 245 FUEL RNG
GTK 244 237 MI

FUEL RNG (Fuel Range) to advise the pilot how far the aircraft can fly (at the current speed and fuel consumption) until fuel depletion.

The display will also show a flashing warning if the remaining fuel falls below a quantity that was previously entered in the **CONFIGURATION** menu. When this

LOW FUEL ALARM
8 GAL

warning is displayed, it will stay on the screen until the pilot acknowledges it by pressing the remote fuel pushbutton, or any other button on the control head. The button must be pressed while the warning is present on the screen. Once it has been acknowledged it will not appear again.

SET FUEL USED TO
ZERO IN 4 SEC

The fuel **USED** will accumulate until reset by the pilot. If desired, it can be left to accumulate for a multi day cross country flight even though fuel has been added multiple times. The fuel **USED** may be reset to zero by pressing and holding the remote pushbutton for 5 seconds. After one second, the display above will appear, showing a countdown. If the switch is held until the countdown reaches "0", the fuel **USED** display will be reset to "0" when the **FUEL USED = ZERO** display appears. If the button is released before the display reads **FUEL USED = ZERO**, the

FUEL USED = ZERO

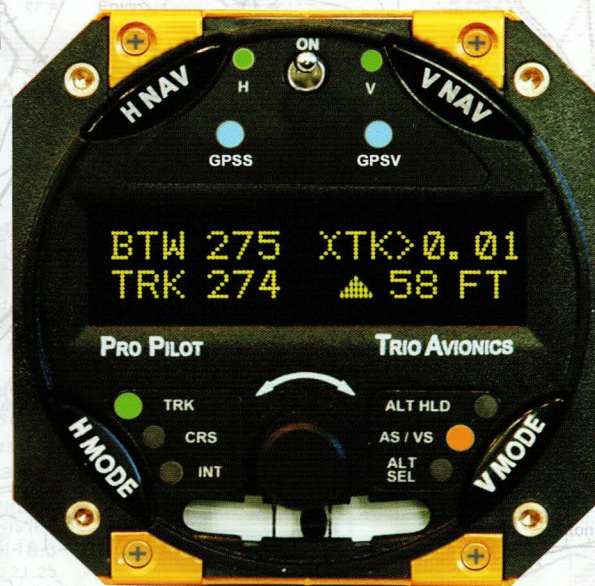
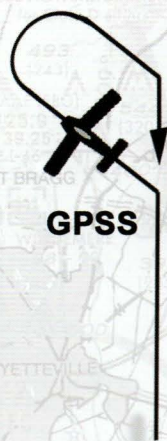
fuel **USED** will remain unchanged.

GPSS and GPSV Options for the Pro Pilot

GPSS and GPSV are acronyms for "GPS Steering" and "GPS Vertical Steering". These features use the ARINC 429 data stream provided by some GPS receivers and EFIS systems. When a WAAS enabled, approach-certified GPS receiver is used the autopilot will follow the roll commands to the extent that it will fly complete lateral flight plans, including procedure turns and RNAV GPS approaches. The GPSV function allows vertical tracking of RNAV LPV, LNAV/VNAV and LNAV +V descents into approved airports.

The GPSS LED illuminates when there is a valid ARINC 429 signal available and the autopilot is in the Track (TRK) mode. When the GPSS option is installed the Pro Pilot will always default to the GPSS mode when the data is present. In the event that the GPSS becomes inactive (i.e. on a localizer approach) the GPSS LED extinguishes and the Pro Pilot immediately begins to track the Aviation Data (AVLINK) or NMEA 0183 signal that it receives on a separate data input line.

Procedure Turn



GPSV

As the aircraft approaches the waypoint prior to the Final Approach Fix, it is in the Altitude Hold mode. Once inside the initial waypoint, the GPSV LED will begin to flash, indicating that the descent signal is present. The bottom right side of the display changes to indicate that the descent line is above the aircraft. The distance to the descent line is displayed in feet.

line is above the aircraft. The distance to the descent line is displayed in feet.

Just prior to intercepting the descent line, the Pro Pilot will command a "bend over" to initiate the intercept without overshoot. The GPSV LED then glows steadily, indicating the descent profile is active. As the aircraft tracks the vertical descent, the display continues to show vertical tracking accuracy (in feet, above or below the line).

Pro Pilot Rack Mount



Gold Standard Servo



The Gold Standard servo is unique in the industry.

The servo has inherent "intelligence" capability acquired by the two internal microprocessors that govern its operation. It has full authority to disconnect itself from the controls if it senses anything that deviates from normal operational conditions. It watches motor driver currents and temperatures (both servo and auto-trim) as well as short circuits. It monitors crank arm positions and will disconnect (and alert the pilot) in abnormal circumstances - i.e. extreme elevator/aileron positions. It will also disconnect itself if it detects a communications error. A reliable slip clutch allows the pilot to override the servo in emergency situations. It fully disconnects the internal gears when not engaged so the pilot will not feel any drag on the control system.

The servo communicates with the control head via a high-speed bidirectional data bus. This unique capability allows it to inform the control head (and the pilot, via the display screen) of any unusual activity within the servo. For instance, it can notify the pilot if the clutch is not properly adjusted. If critical activity is reported, the control module will immediately remove all power from the servo, releasing the controls and (if installed) automatic trim system.

Pro Pilot Specifications



Weight

Control Head 10.4 ounces / 294 grams
Each Servo 27 ounces / 765 grams

Current draw @ 12 VDC

Power On - servos off 308 ma
Servos engaged, at rest 600 ma
Servos engaged and moving 1.6 amp



4.0 inches
102 mm



3.25 inches
83 mm

Control head fits standard 3-1/8" instrument cutout

Stack Mount

2.0 inches
50.8 mm

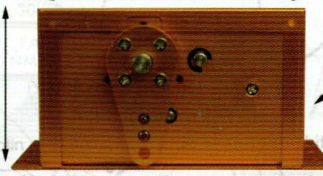


Depth
3.75 inches
96 mm

6.25 inches / 159 mm

4.75 inches / 121 mm

2.9 inches
74 mm



Width
4 inches
102 mm

5.75 inches / 146 mm

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Trio



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