



**FAA-APPROVED**  
**AIRPLANE FLIGHT MANUAL SUPPLEMENT**  
**FOR**

Make and Model Airplane

Reg. No. \_\_\_\_\_

Ser. No. \_\_\_\_\_

**This Supplement must be attached to the FAA Approved Airplane Flight Manual when the Trio Pro Pilot Autopilot is installed and activated in accordance with STC SA04230CH. The Information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures and Performance information not contained in this Supplement, consult the basic Airplane Flight Manual.**

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*AIR-712 for*  
**Manager, Flight Test & Human Factors Branch, AIR-710**  
**Federal Aviation Administration**

24 July 2023  
**Approved Date**



**LOG OF REVISIONS**

Rev. No.	Page Number(s)	Description	FAA Approval
New	ALL	Original Release July 19, 2017	Timothy P. Smyth, CHI - ACO Manager, AIR-7C0 July 19, 2017
A	1	Added STC Number to Page 1	Timothy P. Smyth, CHI - ACO Manager, AIR-7C0  July 19, 2017
B	ALL	Changed reference from specific aircraft make/model to reference to Approved Model List (AML) Number. Updated header/footer to match. Updated signature block. Changed format and content to match guidance in AC 23-8C Appendix 5 and AC 23-17C on autopilots.	Ryan B. Nelson, FTP, AIR-713 May 10, 2019
C	1, 3, 4,5, 7,9, 10,11,12, 14, 15, 18, 19, ,20, 21, 25, 26, 27, 28, 29, 30, 34, 37, 38, 39	Page 1 Signature block revised, Table of contents page numbers edited, Section 1 added "The Trio autopilot is designed to receive data from approved primary flight instruments", Section 2: added Limitations for Handheld GPS and new 220322 SW operation with External EFIS. Section 2.4 instrument approach limitation revised to 500ft, Section 3.1 "The autopilot only receives data, it does not supply data to any flight instrument" added, Section 3.1.1 minor edits, Added Section 3.1.2 Uncommanded Autopilot Disconnect, Section 4.1.1, 4.1.2, 4.1.3 minor edits, Section 4.1.7: added Source Select Switch operation and minor edits, Section 4.2.1 added "the initial intercept angle will be approximately 30 degrees and minor edits, Section 4.2.2 added "note for Intercept feature, Section 4.2.4 edited step to V NAV sequence and minors edits, Section 4.2.5 numbering sequence edited, Section 4.3 was added for Operation with Garmin and Aspen EFIS External Control Systems, Section 4.4 Configuration for Electronic Flight Instrument System Control added for Operation with Garmin and Aspen EFIS External Control Systems, Section 7 footer revised IAW with FAA Memo, Section 7.2.2 minor edits, Section 7, page 39: added Image 5 – Autopilot Source Select Switch	Thomas H. Bryant, FTP, AIR-712 July 24, 2023



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## SECTION 1 GENERAL

### 1.1 Overview

This Airplane Flight Manual Supplement (AFMS) details Pre-Flight and In-Flight operating procedures for the Trio Pro Pilot Autopilot (AP).

This AFMS must be carried in the aircraft. The AFMS must be available to the pilot at all times.

The Trio Pro Pilot autopilot is a tool that is provided to the aircraft pilot. The autopilot is intended to assist the pilot with cockpit workload management.

The Trio autopilot is designed to operate with an approved, installed GPS unit. The Trio autopilot is designed to receive data from approved primary flight instruments.

The pilot is responsible to familiarize himself or herself with the operating procedures of the Trio Pro Pilot Autopilot. The ability of the autopilot to provide optimum assistance and performance to the pilot is directly proportional to the pilot's knowledge of the autopilot operating procedures.

Trio Avionics and The STC Group LLC recommend that the pilot possess a clear and complete understanding of the Pro Pilot autopilot, its operational modes, and operational procedures in Visual Meteorological Conditions (VMC), prior to using it under Instrument Flight Rules (IFR).



## SECTION 2 LIMITATIONS

The Trio Pro Pilot Operating Manual, Part Number 132000XX (XX defines the revision number), must be carried in the aircraft and be readily accessible to the pilot at all times.

Handheld or portable GPS units are only approved for VFR operations.

Software version 220322E or later is required to receive data from electronic flight instrument systems along with the AP source select switch. See IMAGE 5 SECTION 7.

### 2.1 AIRSPEED LIMITATIONS

1. 300 knots or the maximum speed of the aircraft, whichever is lower.
2. The specific aircraft make, and model airspeed limitation must be complied with.

### 2.2 MINIMUM ENGAGEMENT ALTITUDE

1. 500 feet AGL.
2. In flight autopilot operation is prohibited below an altitude of 500 feet AGL.

### 2.3 MAXIMUM OPERATING ALTITUDE

1. 20,000 feet MSL or service ceiling of the aircraft, whichever is lower.

### 2.4 INSTRUMENT APPROACHES

1. This autopilot has not been evaluated to meet certification requirements for coupled instrument procedures below 500 FT AGL. This autopilot is not approved for coupled instrument approaches below 500 feet AGL.
2. V NAV terminology referenced in this manual is standard TRIO systems nomenclature and should not be construed as authorizing VNAV operations as defined by FAA policy.



**NOTE:**

The FAA definition of **VNAV** specifies a descent to a specific GPS location in space. The Trio definition of V NAV (note the space between the letter “V” and “NAV”) refers to the ability of the Trio Pro Pilot autopilot to perform vertical navigation functions, not a specific GPS location in space.



## SECTION 3 - EMERGENCY/ABNORMAL PROCEDURES

### 3.1 EMERGENCY PROCEDURES

Any servo fault will result in an immediate disconnect of that servo from the flight controls.

A message is displayed on the front panel of the autopilot showing the type of fault that resulted in the disconnect condition.

In all cases of an autopilot fault or malfunction the pilot should rely on the primary flight instruments to ensure safety of flight.

The autopilot only receives data, it does not supply data to any flight instrument.

The servos are designed to exert little force (approximately 3 ft. lbs.) on the flight control system(s). Any abnormal autopilot control inputs can be easily overridden by the pilot while the autopilot is engaged.

Several methods can be used to disconnect and/or power off the autopilot and autopilot servos. These methods are described in the following procedures.

#### 3.1.1 AUTOPILOT MALFUNCTION (IMAGES IN SECTION 7.2)

1. Control of aircraft: **MAINTAIN** (manually overpower autopilot)
2. Autopilot: **DISCONNECT** (options below)
  - **MOMENTARILY PRESS the yoke mounted PCS button** (refer to Image 4).
  - **PLACE, the autopilot power switch into the OFF position** (refer to Images 1 and 3).

**NOTE:**

The location of the power switch for the Panel Mount autopilot controller will vary by installation and space availability.

- **PULL the autopilot circuit breaker** (refer to Image 3).

**NOTE:**

Circuit breaker placement will vary by installation and space available.

**END OF PROCEDURE**



### 3.1.2 UNCOMMANDED AUTOPILOT DISCONNECT

1. **FLASHING H NAV SERVO LED OR V NAV SERVO LED WHEN NOT USING PILOT CONTROLLED STEERING**
  - a. Indicates an automatic servo disconnect.
  - b. An alarm message indicating the type of servo fault is displayed on the autopilot display panel, and an aural tone is transmitted to the audio system.

### 3.2 MAXIMUM ALTITUDE LOSS

**NOTE:**

The pilot should operate the aircraft in an “in-trim” condition at all times. In-trim flight will permit the aircraft to fly in the proper flight configuration. Proper in-flight configuration is required to prevent altitude excursions.

#### 3.2.1 ALTITUDE LOSS DURING A MALFUNCTION AND RECOVERY

1. The maximum altitude **loss** that can be expected after an autopilot malfunction and a 3 second delay in recovery is listed below for different phases of flight:
  - Climb: 150 ft.
  - Cruise: 150 ft.
  - Maneuvering: 150 ft.
  - Descent: 100 ft.

### 3.3 ABNORMAL PROCEDURES

1. No change to the Airplane Flight Manual (AFM) or Pilot Operating Handbook (POH).





## SECTION 4 - NORMAL OPERATING PROCEDURES

### 4.1 PRE-FLIGHT PROCEDURES

#### 4.1.1 POWER UP TEST

**NOTE:**

This section discusses what must be accomplished when “powering up” the Pro Pilot Autopilot.

1. **Record** the current altimeter setting for later entry into the A/P
2. Power up the AP system.
3. Utilize the power switch on the Instrument Mount or the separate power switch on the Panel Mount autopilot controller. See IMAGE 3 SECTION 7.

**NOTE:**

The location of the power switch for the Panel Mount autopilot controller will vary by installation and space availability.

4. The Pro Pilot will briefly display the logo screen that displays the current software release and serial number.



5. This will be followed by a screen requesting verification of the current field elevation or altitude.



**NOTE:**

If the autopilot power is cycled, in flight, the above screen will read “ALTITUDE SET”.

6. Enter the field elevation, or current, altitude into the autopilot.



7. If the GPS is not yet powered up, after about 7 seconds the display will show the NO GPS message and the TRK LED will be extinguished. SEE IMAGE 1 or IMAGE 2 SECTION 7 for location of buttons or LED's



8. The TRK LED is illuminated after the GPS signal is acquired.
9. Center the flight controls.
10. Press the H NAV button.
11. Verify that the H NAV LED is illuminated.
12. Press the V NAV button.
13. Verify that the V NAV LED is illuminated.

#### 4.1.2 SERVO TEST

1. Center the controls in roll and pitch.
2. Verify that the H NAV LED and V NAV LED are illuminated.
3. Using the control yoke, override the roll servo to left and release.
4. Verify that the control yoke returns to the neutral position.
5. Using the control yoke, override the roll servo to right and release.
6. Verify that the control yoke returns to the neutral position.
7. Override the pitch servo to half (approx) pitch up position and release.
8. Verify the control yoke returns to the starting position (neutral).
9. Override the pitch servo to half (approx) pitch down and release.
10. Verify the control yoke returns to the starting position (neutral).

#### 4.1.3 SERVO DISCONNECT TEST

1. Press the V NAV button to release the pitch servo.
2. Verify 3 audible beeps are heard as the servo disconnects.
3. Verify the control yoke is free and correct, for pitch.
4. Press the H NAV button to release the roll servo.
5. Verify 3 audible beeps are heard as the servo disconnects.
6. Verify the control yoke is free and correct, for roll.



#### **4.1.4 SERVO DISCONNECT TEST USING PCS (PILOT CONTROLLED STEERING) BUTTON**

1. Center the controls in roll and pitch.
2. Press the H NAV and V NAV buttons.
3. Verify that the H NAV LED and V NAV LED are illuminated.
4. Place the controls in a full up and down and the full right and left positions overriding servo slip clutches.
5. Press the PCS, once, to disconnect the servos.
6. Verify 3 audible beeps are heard as the servo disconnects.
7. Verify the control yoke is free and correct.

#### **4.1.5 SERVO DISCONNECT TEST USING POWER SWITCH**

1. Center the controls in roll and pitch.
2. Press the H NAV and V NAV buttons.
3. Verify that the H NAV LED and V NAV LED are illuminated.
4. Place the power switch to OFF.
5. Verify that the H NAV LED and V NAV LED are extinguished.
6. Verify the control yoke is free and correct.

#### **4.1.6 SERVO DISCONNECT TEST USING THE CIRCUIT BREAKER**

1. Power ON the autopilot and enter current barometric altitude.
2. Press the H NAV and V NAV buttons.
3. Verify that the H NAV LED and V NAV LED are illuminated.
4. Pull the autopilot circuit breaker.
5. Verify that the H NAV LED and V NAV LED are extinguished.
6. Verify the control yoke is free and correct.
7. Reset the circuit breaker.

#### **END OF POWER UP TEST PROCEDURE**



#### 4.1.7 RUNUP

1. Prior to Taxi; Power ON the autopilot with the Source Select Switch in GPS mode. Source Select switch will not be installed if an approved EFIS is not installed and/or is not connected to the autopilot

**NOTE:**

This allows the inertial rate sensors to bias during the taxi and runup checks.

2. Enter barometric altitude or field elevation from the altimeter into the A/P.

**NOTE:**

The autopilot will display NO FPLAN in the upper right display field if no flight plan or DIRECT TO waypoint has been entered into the GPS. The autopilot will also be set to CRS Mode since no flight plan is available.

3. Load the flight plan into the GPS.
4. Vertical navigation may be programmed into the autopilot during runup.
5. Press the V MODE Button and observe that the ARROW on the screen points to the right.

**NOTE:**

The V MODE button sequences through the vertical mode control menus.

**ALT HLD → AS/VS → ALT SEL → ELEV(ALT) SET**

Pressing and holding the V MODE button for three seconds clears all V NAV settings (AS/VS mode, ALT SEL mode) and returns the vertical mode to ALT HLD.

6. In the VS screen enter the desired Vertical Speed.
7. Press the V MODE Button, to advance to the Altitude Select screen.
8. Enter the desired preselect altitude for the flight.

**NOTE:**

Vertical speed and / or the desired cruise altitude may be adjusted in the climb.

9. Press the V MODE Button, to advance to the Altitude Set screen.
10. Verify the displayed altitude agrees with the aircraft altimeter and adjust if necessary. Press the Encoder Knob to activate the climb and preselected altitude. The VS is automatically displayed in the screen. SEE IMAGE 2 SECTION 7.



## **RUNUP ‘Continued’**

### **NOTE:**

If the V NAV servo is ON, VSP ACT will be displayed on the right side of the screen.  
If the V NAV servo is OFF, VSP SUSP (Suspend) will be displayed on the right side of the screen.

### **NOTE:**

If the V NAV, or H NAV servos are inadvertently left engaged after the runup is complete, the servos will automatically be disengaged during the takeoff roll.

11. Press the H MODE button and verify that the ARROW on the screen points to the left.



## 4.2 IN-FLIGHT PROCEDURES

### CAUTION:

THE AUTOPILOT SHOULD NOT BE ENGAGED UNTIL SAFELY CLEAR OF THE AIRPORT TRAFFIC AREA AND ABOVE 500 FT AGL.

### 4.2.1 LATERAL NAVIGATION

1. Verify that the ARROW on the screen points to the left (HMODE functions). If not press the H MODE button to shift the Arrow / Encoder for H NAV mode selections.



2. When safely clear of the airport traffic area and above 500 feet AGL press the H NAV and V NAV buttons.
3. Verify that the H NAV LED and V NAV LED are illuminated.
4. Verify that the TRK LED is illuminated.
5. The autopilot will capture and track the flight plan programmed into the GPS interfaced to the TRIO autopilot.
6. To fly a pilot (or controller requested vector) course.
  - a. Press the HMODE button to illuminate the CRS LED.
  - b. Enter the desired course using the Encoder Knob.
7. To Intercept the original course,
  - a. Press the HMODE button.
  - b. The INT (Intercept) LED illuminates to indicate Intercept Mode.
  - c. The autopilot will intercept the original flight plan TRK programmed into the GPS interfaced to the TRIO autopilot.

### NOTE:

The initial intercept angle will be approximately 30 degrees. The course to intercept the original track can be adjusted by rotating the Encoder when in the INT mode.

8. When a GPS DIRECT TO function is selected the autopilot will fly the DIRECT TO track.



## 4.2.2 LATERAL NAVIGATION FUNCTIONS

### NOTE:

The Trio autopilot controls aircraft lateral navigation using a flight plan in the GPS while in TRK mode. This could be a **DIRECT TO** or a multi-waypoint flight plan. Navigating in **TRK** mode using a flight plan is referred to in this document as “Track”.

CRS, Course mode, is used to fly a GPS referenced ground track. This will differ from actual aircraft heading depending on wind conditions. This would typically be used when flying an ATC issued vector. In this manual the term used for this action is flying a “course”.

### H NAV SERVO BUTTON

- Activates the roll servo ON or OFF when momentarily pressed.
- Activates the LEFT AUTO 180 function when pressed, and held, for three (3) seconds. Refer to Section 4.2.6.

### H MODE BUTTON

- Switches the Rotary Encoder operation to H NAV functions on first press.
- Changes the autopilot mode between TRK (Track), CRS (Course) and INT (Intercept) modes (TRK → CRS → INT).

### NOTE

**The intercept mode will be bypassed to TRK if the cross track error (XTK) is less than 0.5 NM**

### TRK MODE

- Tracks a flight plan or DIRECT TO command from the host GPS



### **BTW – BEARING TO WAYPOINT**

- The upper left field in display screen displays the bearing to a waypoint from the current position.

### **GTK – GROUND TRACK**

- The lower left field in the display screen displays the current ground track.

### **TRACK OFFSET (TOP)**

- The Rotary Encoder and the Rotary Encoder pushbutton press and turn function is used to set the Track Offset value.





### **ROTARY ENCODER (ENCODER KNOB)**

- **PRESS** the Rotary Encoder and pushbutton to sequence GPS data in the upper right display field.
- **TURN** the Encoder Knob to select the lower right display field GPS data.
- **DOUBLE-CLICK** the Encoder Knob to scan incoming GPS data in the lower right display field.
- Rotating the Encoder Knob counterclockwise immediately returns the display to the rate-of-turn display.

### **CRS MODE – COURSE MODE**

- Course Mode allows the pilot to command a ground track.
- The upper left field in the display indicates the commanded ground track (CMD).
- The lower left field in the display indicates the current ground track (GTK).
- The Rotary Encoder is used to select the commanded ground track.



### **INT MODE – INTERCEPT MODE**

- Flies a preselected intercept track to return to the GPS flight plan.
- Sequences back to TRK mode automatically when the flight plan has been intercepted.
- The upper left display field shows intercept course (INT)
- The upper right display field shows intercept distance to flight plan (INT).
- The lower left field displays the current ground track (GTK).



- The Pilot can use the rotary Encoder Knob to modify the intercept



angle back to the flight plan.

- **PRESS** the Rotary Encoder and pushbutton to sequence the GPS data displayed in the upper right display field.

**NOTE:**

Intercept (INT) will not engage if the cross-track error (XTK) is less than 0.5 NM.

### 4.2.3 VERTICAL NAVIGATION

1. When safely clear of the airport traffic area and above 500 feet AGL press the V NAV button to engage the vertical servo.
2. Verify that the V NAV LED is illuminated.
3. Verify the Vertical Navigation (V NAV) function is active (ACT in display).

**NOTE:**

VSP indicates Vertical Speed Mode (VS) with a pre-selected altitude active (VSP). With no altitude pre-selected only VS is displayed.



4. The autopilot will capture the vertical speed (VS) that was programmed prior to flight.
5. If a vertical profile was not programmed prior to flight, the autopilot will be placed into altitude hold, ALT HLD, mode upon reaching the desired cruise altitude by pressing the V NAV button.
6. The ALT HLD LED will illuminate when the desired altitude is captured.

**NOTE:**

The aircraft must be trimmed for level flight when the desired altitude is captured. Press the PCS button is used to disconnect the servo. Trim the aircraft. Once the aircraft is “in trim” Press the V NAV button to re-engage the vertical servo. As the aircraft burns fuel during the flight trim should be checked. The autopilot will display Trim UP and Trim DN messages if trimming is required.



## 4.2.4 VERTICAL NAVIGATION FUNCTIONS (REFER TO IMAGES 1 AND 2 IN SECTION 7)

### V NAV SERVO ON/OFF BUTTON

- Turns the pitch servo ON or OFF by pressing the button
- Activates the right AUTO 180 function when pressed for three seconds

### V MODE PUSHBUTTON

- Switches the Rotary Encoder operation to V NAV functions on first press of V MODE button if the arrow on the display was pointing to the left.
- Allows setting parameters and controlling V NAV associated functions.
- Sequences through the vertical mode control menus [ ALT HLD → AS/VS → ALT SEL → ELEV(ALT) SET ].
- Pressing and holding for three seconds clears all V NAV settings (VS mode, ALT SEL mode) and returns the vertical mode to ALT HLD.

### ALT HOLD MODE

- Always activates when V NAV is turned on the first time if no other V NAV functions (VS rate, ALT SEL) have been set.

### VS MODE

- Allows setting the vertical rate for a climb or descent.
- Turning the Encoder Knob sets the vertical rate.
- The upper right display changes from VS SET to VS ARM.
- With ARM active pressing the Encoder Knob will activate the vertical rate if the servo is ON. If the servo is OFF the display will read SUSP (suspend) until the servo is turned ON.
- VS ACT will be displayed in the upper right when the servo is ON.
- Pressing the Encoder Knob while VS is active will force the ALT HLD mode and put the VS mode in suspend. Pressing the Encoder again will cancel the ALT HLD mode and return the VS mode to active.



## **ALT SEL**

- Sets a preselected altitude.
- When selected initially it displays the current altitude.
- Rotate the Encoder Knob to adjust the preselected altitude.
- Pushing the Encoder and rotating the Knob will change altitude in 1000 ft increments.
- Rotating the Encoder Knob will change altitude in 100 ft increments.
- The display will change from ALT SEL to ALT ARM.
- Press the Encoder Knob.
- The current altitude being used by the autopilot is displayed.
- Correct the altitude, if necessary, by rotating the Encoder Knob.
- Pressing the Encoder Knob will activate the VS rate and altitude preselect.

### **NOTE:**

If ERR is displayed in the VS or ALT SEL screens you have selected a climb rate with a preselected altitude below your current altitude, or a descent with a preselected altitude above your current altitude. The selected vertical rate will be active but the preselect function will remain inactive until the mismatch is cleared.



## 4.2.5 ALARMS

### 1. FLASHING H NAV SERVO LED OR V NAV SERVO LED WHEN NOT USING PILOT CONTROLLED STEERING

- a. Indicates an automatic servo disconnect.
- b. An alarm message indicating the type of servo fault is displayed on the autopilot display panel, and an aural tone is transmitted to the audio system.

### 2. FLASHING WAYPOINT IDENTIFIER IN THE LOWER RIGHT DISPLAY FIELD

- a. Indicates a negative or no closing velocity on the TO waypoint.
- b. This occurs when the aircraft has passed the last waypoint in the flight plan or the aircraft is flying away from the current waypoint.

### 3. ERR DISPLAYED ON THE VS OR ALT SEL DISPLAY

- a. Indicates that a combination of preselected altitude and vertical rate has been set that is incorrect.
- b. Correct one of these parameters to clear the error condition.

#### NOTE:

If ERR is displayed in the VS or ALT SEL screens you have selected a climb rate with a preselected altitude below your current altitude, or a descent with a preselected altitude above your current altitude. The selected vertical rate will active but the preselect function will remain inactive until the mismatch is cleared.

### 4. MINIMUM AIRSPEED

- a. The minimum airspeed threshold has been exceeded.
- b. The autopilot is taking corrective action.

#### NOTE:

Minimum airspeed is set at the factory. 1.3 times  $V_s$  for individual aircraft models.



## 5. MAXIMUM AIRSPEED

- a. The maximum airspeed threshold has been exceeded.
- b. The autopilot is taking corrective action.

### NOTE:

**Maximum** airspeed is set at the factory to **Vne -10 kts** for individual aircraft models.

## 4.2.6 SAFETY FEATURES

### 1. AUTO SERVO DISCONNECT ON TAKEOFF

- a. Automatically ensures the servos are not engaged during takeoff.
- b. If the pilot fails to disconnect either, or both servos, prior to takeoff the autopilot computers will recognize this situation and disconnect the servos from the flight controls.

### 2. MINIMUM AND MAXIMUM AIRSPEED ENVELOPE PROTECTION

#### NOTE:

Airspeed envelope protection is only active with the autopilot ON and engaged.

- a. Automatically takes vertical control of the aircraft when the minimum or maximum airspeed thresholds are exceeded, and the servos are ON.
- b. If the airspeed decays below the minimum airspeed threshold the autopilot will take control and perform an immediate pitch over to capture the minimum airspeed and maintain that airspeed.
- c. If the maximum airspeed is exceeded the autopilot will gently pitch the airplane up to reduce the airspeed below the maximum airspeed setting.
- d. In both cases, visual and aural alarms are provided to the pilot.
- e. The minimum airspeed alarm is released by pressing any autopilot button.
- f. The maximum airspeed alarm will reset automatically when the airspeed decays below the threshold setting.



### 3. AUTO 180

- a. Activates an automatic 180 degree turn procedure for inadvertent VFR into IMC conditions.
- b. In the event of inadvertent penetration into IMC conditions during VFR flight, the “AUTO 180” feature can be activated.
- c. The AUTO 180 feature will automatically energize both the H NAV and V NAV servos, place the aircraft in altitude hold mode, and execute either a right or left 180 degree turn to exit the IMC conditions.

#### NOTE:

The autopilot will display CMD in the upper left display field and the reciprocal of the ground track in the lower left display. A flashing TRN 180 message is displayed in the top right field of the screen. The lower display line will show a digital rate-of-turn indicator.

- d. H NAV servo ON/OFF button activates the left AUTO 180 function when pressed for three seconds.
- e. The V NAV servo ON/OFF button activates the right AUTO 180 function when pressed for 3 seconds.

### 4. RECOVER – REFER TO IMAGE 3 IN SECTION 7

- a. Automatically returns the aircraft to straight and level flight to prevent loss of control.
- b. Recover Mode is enabled by pressing and holding the instrument panel mounted RECOVER button for 1 second.
- c. Bank Angle Limitation – 30°
- d. Pitch Angle Limitation – 15°

### 5. TRACK OFFSET POSITION - TOP

- a. Track Offset Position is used to side step the route centerline in the TRK mode when flying crowded airways or passing navigation fixes during VFR operations.
- b. Track Offset Position, TOP, allows up to three nautical miles either to the right or the left of the desired track.



- c. Track Offset is enabled by pressing and turning the Rotary Encoder while in the track (TRK) mode.
- d. Selecting the CRS or INT modes clears Track Offset Mode.

## 6. CIRCLE LAST WAYPOINT

- a. Circles last flight plan waypoint.
- b. This feature is automatically activated when enabled in the PREFERENCES menu when the last waypoint in a flight plan or GO TO has been passed.





## 4.3 Electronic Flight Instrument System Control (EFIS)

### 4.3.1 Introduction

The following section is intended for aircraft with an electronic flight instrument system connected to the Trio Pro Pilot autopilot. The Trio Pro Pilot autopilot will include an A/P Source Select Switch (toggle between GPS and EFIS). The following functional capabilities are available when the A/P Source Select Switch is placed in the EFIS position with the autopilot placed in CRS mode.

**Table 1. – Available Functions with Electronic Flight Instrument System Control**

Electronic Flight Instrument Systems	Autopilot Function
Garmin G5	Heading Course Barometric Altitude Altitude Select
Aspen E5 / Pro Max	Heading Course Barometric Altitude Altitude Select Autosensing and Autoconfiguration for RNAV GPS Approach

### 4.3.2. Heading

The electronic flight instrument system heading bug selection will be used by the autopilot to command the heading mode.

Autopilot annunciation when Heading is activated (See **Figure 1 in Section 4.3.7**)

- “SEL” = Commanded Heading
- “HDG” = Aircraft Heading

### 4.3.3 Course

The electronic flight instrument system course pointer will be used by the autopilot to command the course mode.

Autopilot annunciation when Course is activated (See **Figure 2 in Section 4.3.7**)

- “SEL” = Commanded Course
- “CRS” = Aircraft Course

Note: OBS must be selected on the GPS and the G5 for the Garmin G5 Pointer function. See **Section 4.4.1**



#### 4.3.4 Barometric Altitude

The autopilot automatically receives electronic flight instrument system Barometric Altitude information, if available.

#### 4.3.5 Altitude Select

The electronic flight instrument system altitude bug selection will be used by the autopilot to command the target altitude.

1. Enter pre-selected altitude on flight instrument system.
2. After 3 seconds, autopilot will display VSP ACT and begin climb or descent if servo is engaged. (See **Figure 3 Section 4.3.7**)

Note: Autopilot will display VSP SUSP if servo is not engaged.

3. Autopilot will capture pre-selected altitude and enter ALT HOLD. See **Figure 4 Section 4.3.7**)

#### 4.3.6 Autosensing and Autoconfiguration for RNAV GPS Approach

**HNAV** - The autopilot will laterally navigate the aircraft while executing a GPS RNAV approach. When the GPSV light blinks the autopilot will automatically shift to the CRS mode thereby following the flight plan from the GPS navigator.

**VNAV** - The autopilot will vertically navigate the aircraft while executing a GPS RNAV approach. GPSV light will first blink, then the GPSV light will turn solid when aircraft reaches the active approach. Autopilot will command the bend over and follow the glideslope. Autopilot must be disengaged off at 500 ft AGL.

**Missed Approach** - The autopilot will follow the GPS lateral guidance for the missed approach. GPS flight plan must be active with the AP Source Select Switch in the GPS position. The pilot must control the vertical mode during the missed approach.



### 4.3.7 Autopilot Annunciations for External Flight Guidance Equipment



Figure 1 – Selected Heading



Figure 2 -Selected Course



Figure 3 – Vertical Speed Active



Figure 4 – Altitude Hold



## **4.3.8 Failure Modes – Electronic Flight Instrument System**

### **4.3.8.1 GPS Failure (Auto Enable or EXT Heading Enable Selected)**

If a GPS failure occurs the autopilot will revert to EFIS control and display the following information: selected heading (SEL XXX HDG XXX) and “NO GPS” on the right hand of the screen. The selected heading bug will remain active for lateral navigation.

### **4.3.8.2 EFIS Failure**

If an EFIS failure occurs the autopilot will revert back to autopilot front panel control and display the following information: commanded ground track (CMD XXX GTK XXX). The autopilot will remain fully functional if GPS remains active.

### **4.3.8.3 GPS Failure - Aspen (EXT Course Enable Selected)**





If a GPS failure occurs the autopilot will revert to EFIS control and display the following information: selected heading (SEL XXX CRS XXX) and “NO GPS” on the right hand of the screen. The selected course bug will remain active for lateral navigation.

### **4.3.8.4 GPS Failure – Garmin G5 (EXT Course Enable Selected)**

If a GPS failure occurs the autopilot will revert to wing leveler mode and display the following information: “NO GPS” on the center of the screen.



## 4.4 Configuration for Electronic Flight Instrument System Control PREFERENCES SETTINGS:

- **AP CRS ENABLE** - This is the normal autopilot CRS mode if an electronic flight instrument system is not part of the equipment suite, is not being used, or the selected input faults.  
A black rectangular display showing the text "SELECT CRS MODE" on the first line and "=AP CRS ENABLE" on the second line in yellow-green characters.
- **EXT HDG ENABLE** - This selection allows the electronic flight instrument system heading bug to select the heading input for autopilot control. EXT HDG ENABLE can be set to lock out the course information coming from the EFIS.  
A black rectangular display showing the text "SELECT CRS MODE" on the first line and "=EXT HDG ENABLE" on the second line in yellow-green characters.
- **EXT CRS ENABLE** - This selection allows the electronic flight instrument system course pointer, or OBS to control the autopilot. EXT CRS ENABLE can be set to lock out the heading information coming from the EFIS.  
A black rectangular display showing the text "SELECT CRS MODE" on the first line and "=EXT CRS ENABLE" on the second line in yellow-green characters.
- **AUTO ENABLE** - This setting allows automatic sensing of which input is being used for navigation. If the electronic flight instrument system has both course and heading output functions, control is passed to either one when the respective pointer is moved greater than 2 degrees from its static setting. For example, assume the heading bug is being used to control the HNAV. If the pilot then rotates the course indicator greater than 2 degrees, control will shift to the course indicator for lateral navigation.  
A black rectangular display showing the text "SELECT CRS MODE" on the first line and "=AUTO ENABLE" on the second line in yellow-green characters.



## 4.4.1 SELECTED vs SLAVED Functionality

### TRIO EXT COURSE

ASPEN	AUTO COURSE DISABLED	Autopilot will follow the selected course pointer
ASPEN	AUTO COURSE ENABLE	Autopilot will follow the slaved course pointer
G5	NORMAL	Autopilot will follow the slaved course pointer
G5	OBS	Autopilot will follow the selected course pointer

### TRIO AUTO ENABLE

ASPEN	AUTO COURSE DISABLED	Autopilot will follow either selected Heading bug or selected Course pointer
ASPEN	AUTO COURSE ENABLE	Autopilot will follow either selected Heading bug or activation of a slaved Course input
G5	NORMAL	Autopilot will follow either selected Heading bug or activation of a slaved Course input
G5	OBS	Autopilot will follow either selected Heading bug or selected Course pointer



## SECTION 5 - PERFORMANCE

### 5.1 PERFORMANCE

1. No change to the Airplane Flight Manual (AFM) or Pilot Operating Handbook (POH).



## **SECTION 6 – LOADING INFORMATION**

### **6.1 WEIGHT AND BALANCE**

1. See aircraft weight and balance information for equipment weight & location.

### **6.2 LOADING**

1. No change to the Airplane Flight Manual (AFM) or Pilot Operating Handbook (POH).





## **SECTION 7 – SYSTEM DESCRIPTION**

### **7.1 EQUIPMENT DESCRIPTION**

The Trio Pro Pilot Autopilot (autopilot) is a rate-based autopilot. The autopilot system is comprised of an autopilot control head, a roll servo, a pitch servo, interface harness, bracketry, and hardware necessary to mount the servos and attach the servos to the aircraft roll and pitch control systems.

The Trio Pro Pilot autopilot control head is available in two (2) configurations. The instrument mount autopilot control head fits into a standard 3.125” instrument panel hole. Refer to Image 1. The panel mount control head is installed in a 6.25” x 2.0” slot. Refer to Image 2.

### **7.2 CONTROL MODES**

#### **7.2.1 LATERAL (ROLL) CONTROL**

The lateral modes allow basic wing leveling and navigation functions.

The autopilot may be interfaced to either a portable or panel mounted GPS for the navigation functions. The autopilot system may be interfaced to heading and course control systems. For example, an Aspen PFD, or Garmin G5, for navigation functions.

#### **TRK MODE – TRACK MODE**

Tracks a flight plan or DIRECT TO command from the host GPS.

#### **GPSS LED**

When the blue GPSS LED is illuminated, the Trio autopilot is receiving GPS bank angle and is actively controlling lateral navigation.

When the blue GPSS LED is flashing, the Trio autopilot is receiving GPS bank angle but is NOT actively controlling lateral navigation.



## **CRS MODE – COURSE MODE**

Course Mode allows the pilot to command a ground track.

## **INT MODE – INTERCEPT MODE**

Intercept mode enables the autopilot to intercept back to a flight plan route after a controller requested vector or after other off-track navigation is cancelled.

## **7.2.2 VERTICAL (PITCH) CONTROL**

### **GPSV LED**

#### **NOTE:**

The following LED indications are applicable to instrument approach procedures. Trio Pro Pilot is not approved for use during instrument approach procedures below 500 feet AGL.

When the blue GPSV LED is illuminated, the Trio autopilot is receiving valid bank angle and vertical deviation from the GPS and the autopilot is controlling vertical and lateral navigation.

When the blue GPSV LED is flashing the autopilot is receiving valid vertical deviation from the GPS but is not controlling vertical navigation.

### **ALT HOLD - ALTITUDE HOLD**

Used to hold altitude.

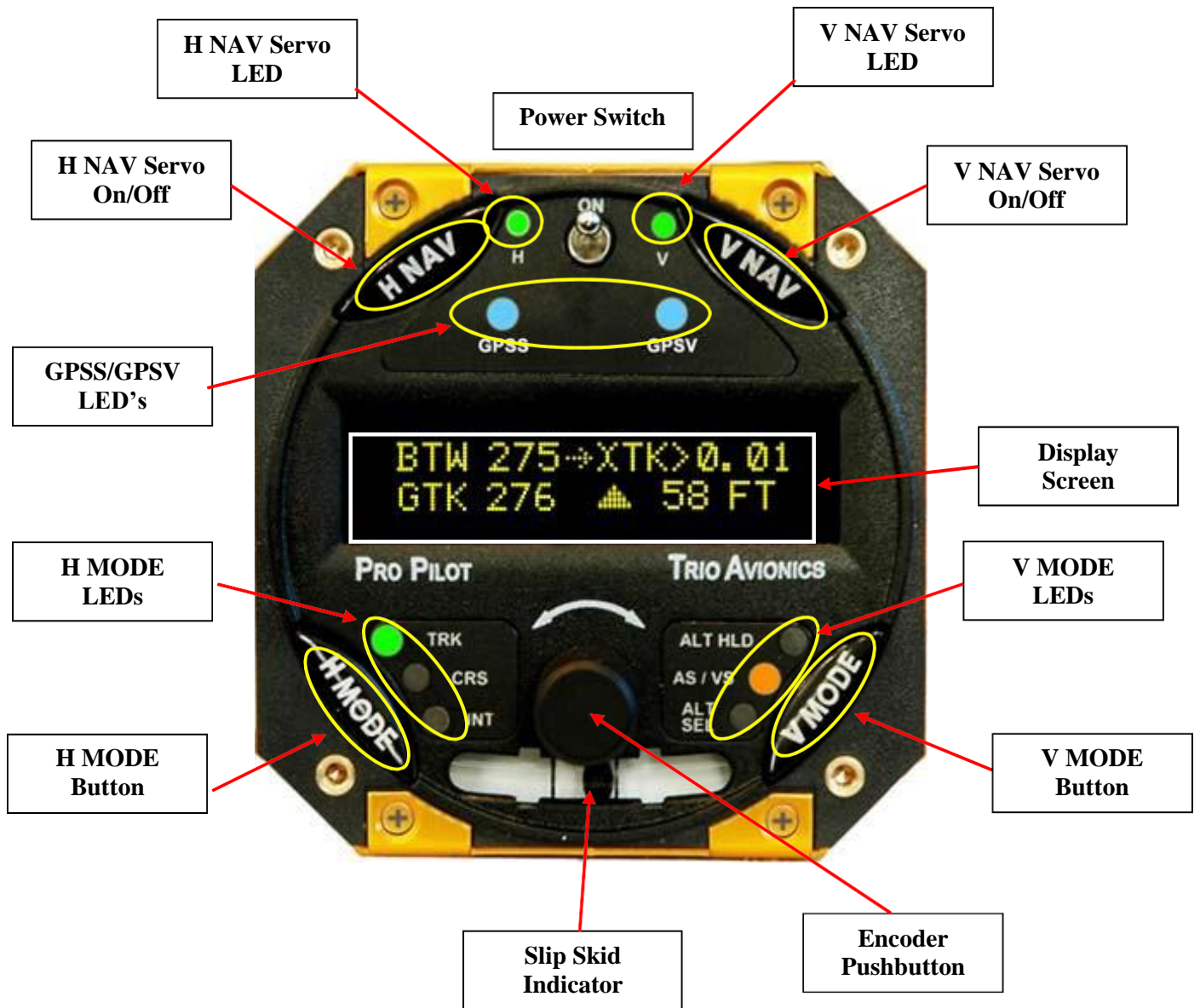
Altitude Hold always activates when V NAV is turned on the first time if no other V NAV functions, i.e. VS rate, ALT SEL, have been set.

### **AS / VS MODE – AIRSPEED / VERTICAL SPEED MODE**

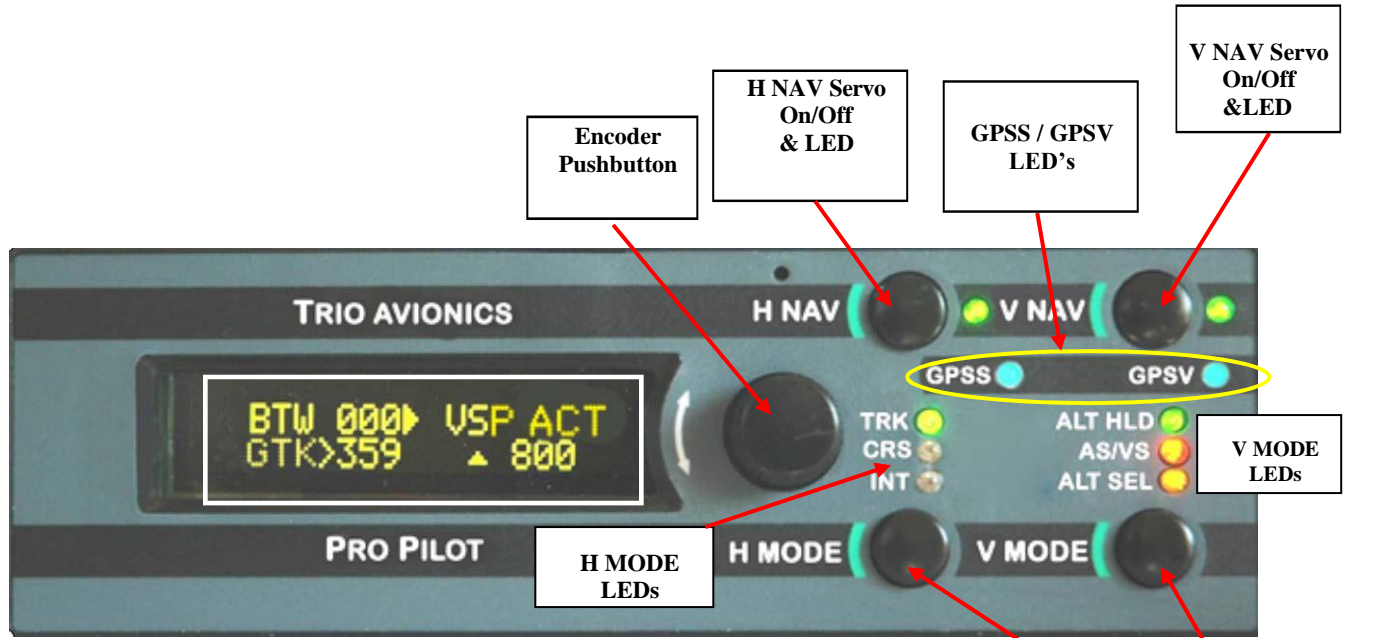
AS / VS mode allows the pilot to set the vertical rate for a climb or descent. Vertical modes may be controlled by either vertical speed or airspeed.

### **ALT SEL MODE – ALTITUDE SELECT MODE**

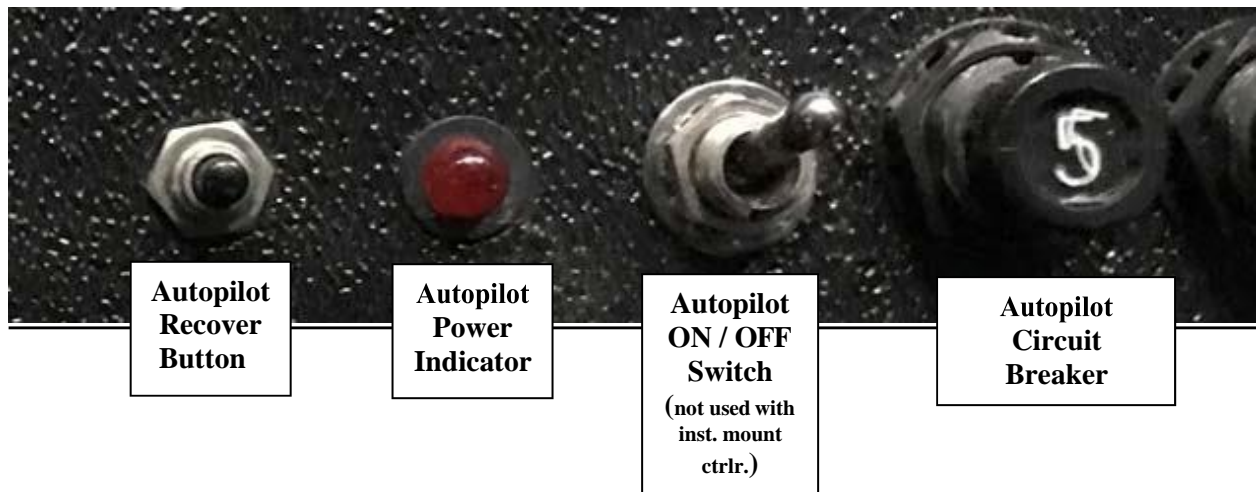
Altitude Select Mode enables the pilot to enter a preselected altitude.



**Image 1**  
**Trio Pro Pilot Autopilot Controller**  
**Instrument Mount**



**Image 2**  
**Trio Pro Pilot Autopilot Controller**  
**Panel Mount**



**Image 3**  
**Trio Autopilot Recover / Power Switches**



## **RECOVER BUTTON**

- In the event of a loss of control situation the RECOVER function will command both servos ON and initiate a straight-ahead wings level recovery.

## **ON/OFF SWITCH – POWER SWITCH**

- Disconnects all control head power and servo power.
- This switch is located on the front panel face of the Instrument mount unit (refer to Image 1).
- The power switch for the panel mount unit is located as a separate switch on the instrument panel (refer to Image 3).

## **CIRCUIT BREAKER**

- The instrument panel mounted circuit breaker disconnects airframe power to the autopilot system.



**Image 4**  
**Pilot Controlled Steering (PCS) Button**

## **PILOT CONTROLLED STEERING (RED YOKE BUTTON) PCS**

- The PCS button disconnects both the V NAV and H NAV servos when momentarily pressed (refer to Image 4).
- When the Pilot Controlled Steering (PCS) button is pressed and held for more than 3 seconds the roll and pitch servos are disengaged until the PCS button is



released.

- Pressing and holding the PCS button allows the pilot to fly the airplane to a specific altitude and/or ground track.
- When the PCS button is released the servos automatically reengage and the aircraft will hold the ground track in the course (CRS) mode.
- If the vertical rate is less than 200 Feet Per Minutes when the PCS button is released the autopilot will capture altitude hold.

**NOTE:**

The autopilot can be configured to use airspeed or vertical speed during climb or descent. Whether the autopilot uses Vertical Speed or Airspeed is configured during autopilot installation.

- If the vertical rate is greater than +/-200 FPM the autopilot will resume the actual vertical speed, or airspeed, when the PCS button is released.



A/P SOURCE SELECT SWITCH PLACARDS



**Image 5**  
**Autopilot Source Select Switch**

The **A/P Source Select** Switch (Image 5) allows the autopilot source to be switched between the EFIS and the GPS navigator.

The **A/P Source Select** Switch should be placed in the GPS position on startup to allow the autopilot to receive necessary GPS information.

This aircraft will be labeled with the installed EFIS model and GPS model. For example, it might be labeled Aspen/430W or G5/440.