

STC GROUP LLC
480 RUDDIMAN DRIVE
MUSKEGON, MICHIGAN 49445

REPORT NO: 1032002 REV B

TRIO AUTO PILOT INSTALLATION INSTRUCTIONS

PIPER AIRCRAFT CORPORATION PA-32
STRAIGHT WING

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DATE:	11/30/2022
WRITTEN BY:	Ahmed J. Abdulshafi
APPROVED BY:	Jeffrey Odum



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REFERENCES

The following documents form a part of this report. Unless a specific revision of one of these documents is specified, the revision in effect at the time of original issue of this document shall apply.

DWG 413000XX Trio Pro Pilot System Wiring Diagram

Piper Aircraft Corporation PA-32 Service Manual Straight Wing

Piper Aircraft Corporation PA-32 Parts Catalog Straight Wing

Industry Specifications and Standards:

1. MMPDS-09 Metallic Materials Properties Development and Standardization
2. AC 43.13-1B Aircraft Inspection, Repair & Alterations

Other Data:

ER1006 – STC GROUP LLC Program Engineering Record.



ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ASSY	Assembly
Autopilot	Trio Pro Pilot Autopilot
C.G.	Center of Gravity
ER	Engineering Record
FAA	Federal Aviation Administration
F.S.	Fuselage Station
ICA	Instructions for Continued Airworthiness
INCH	Inches
LH	Left Hand
OEM	Original Equipment Manufacturer
OUTBD	Outboard
PCS	Pilot Controlled Steering
Recover	Recover Button
RH	Right Hand
Servo	Trio Gold Standard Servo
STC	Supplemental Type Certificate
WS	Wing Station



1.0 GENERAL

Thank you for your purchase of the TRIO Pro Pilot Autopilot for your aircraft. This document is written to ensure your installation is simple, safe, and professionally completed. Before you begin: Read All Instructions!

This installation procedure provides information and data necessary to install the Trio Auto Pilot Controller along with the Pitch and Roll servos in a Piper Aircraft, Inc. aircraft with a **straight wing**.

You may contact The STC Group LLC for hardware and servo installation questions. Contact Trio Avionics, Inc with all autopilot related questions.

Check all items included in the kit to ensure all parts are accounted for. You may compare the contents of the kit with the Illustrated Parts Catalog. Please contact us if there are missing items.

The STC Group Technical Support is available 0800 to 1700 Monday through Friday Pacific Time:

+1 (231) 220-9296

+1 (888) 350-2998

Trio Avionics may be reached Monday through Saturday at +1 (619) 448-4619

NOTE:

Care should always be taken to avoid marring or scratching of any surfaces of autopilot assemblies including anodized surfaces. Painters tape may be used to prevent damaging hardware surfaces. Remove any previously installed autopilot and related servos, and harnesses. Record the station position of each component removed and weigh each component. This information will be used to update Weight & Balance data.

The STC Group LLC recommends that a flight test of the subject aircraft be conducted to assess aircraft rigging and handling characteristics prior to autopilot installation. Use Test 4 of The STC Group LLC Flight Test Cards, document F-1006-43. Documents can be found at The STC Group LLC website at www.thestcgroupllc.com/documents.



2.0 PREPARE THE SERVOS

- 2.1 Remove the Pitch and Roll servos from the shipping boxes.
- 2.2 Enlarge the 4 corner mounting holes on only the roll servo baseplate using a #16 drill bit and deburr.
- 2.3 Remove the pitch servo baseplate screws from the pitch servo and install the new pitch servo baseplate which has PEM nuts installed on it. Refer to Figure 2-1. The pitch servo may come from the factory with the 901-115 baseplate already installed.
- 2.4 Attach the pitch servo arm and associated hardware per applicable STC Group Illustrated Parts Catalog.
- 2.5 Attach the roll servo arm and associated hardware per applicable STC Group Illustrated Parts Catalog.

NOTE:

The Installation kits are shipped with all servo arm screws pre-coated with Loctite. Do NOT apply additional Loctite to any screws. The screws may be reinstalled and torqued up to three (3) times.

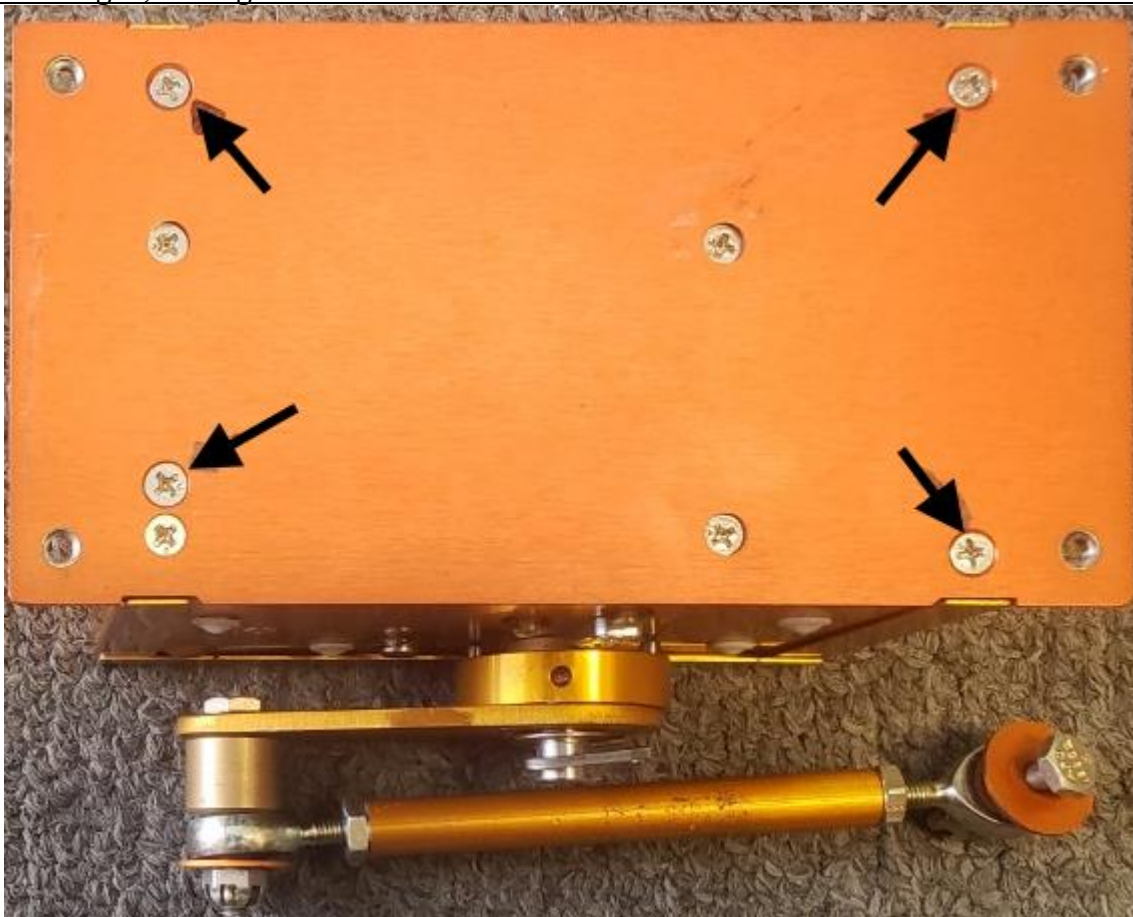


FIGURE 2-1 PITCH SERVO BASEPLATE



3.0 PREPARE THE AIRCRAFT FOR THE INSTALLATION

- 3.1 Pitot and static system leak checks are recommended be performed on the aircraft before any work begins. {i.e. FAR §43 Appendix E, Paragraph (a)}
- 3.2 Remove seats and interior as needed for wiring installation.
- 3.3 Remove interior and exterior panels to gain access to F.S. 255 for pitch installation. Reference Figure 3-1 and Item #4 in Figure 3-2.
- 3.4 Remove right hand wing access panel between W.S. 106 & W.S. 125.45. Reference Item #6 (RH Wing) in Figure 3-2.
- 3.5 Verify pitch, roll, and yaw control system rigging and cable tensions are correct in accordance with the applicable Type Certificate Data Sheet and Maintenance/Service Manual.
Left Aileron Deflection: _____ up _____ down ☐ Within Tolerance
Right Aileron Deflection: _____ up _____ down ☐ Within Tolerance
Stabilator Deflection: _____ up _____ down ☐ Within Tolerance
- 3.6 Record pitch and roll control system cable tensions for reference later.
Pitch Cable Tension: _____
Roll Cable Tension: _____
- 3.7 Remove safety wire/clips from the roll control balance cable turnbuckle (Item #24, Figure 3-3) and loosen for ease of roll servo pushrod installation.
- 3.8 Remove the clevis bolt from the RH forward (primary/forward) cable at the bellcrank.
- 3.9 The RH aileron cable attach clevis bushing (Piper PN's: 63882-08, 63900-31, & 63900-73) will be replaced with the provided oil imbedded bushing to obtain the correct height and clearance for final assembly. Refer to Figure 3-3 and applicable STC Group Illustrated Parts Catalog.
- 3.10 Attach the roll servo pushrod and associated hardware to the RH aileron bellcrank. Refer to applicable STC Group Illustrated Parts Catalog.
- 3.11 Temporarily re-tension the balance cable that was loosened in step 3.7 but do not safety at this point.
- 3.12 Remove safety wire/clips from the upper pitch cable turnbuckle (Item #16, Figure 3-5) and loosen for ease of pitch servo installation.

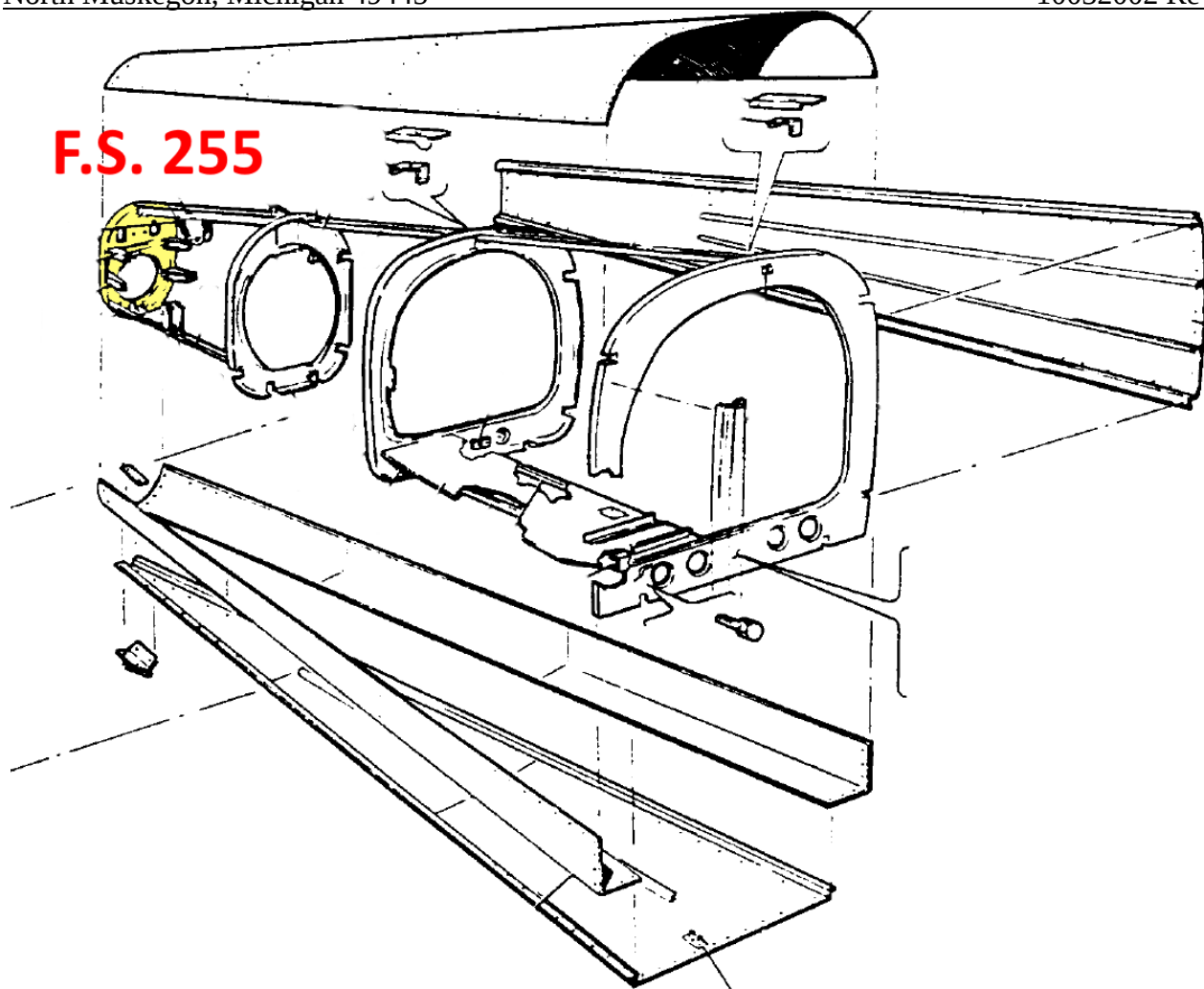


FIGURE 3-1 PITCH INSTALLATION LOCATION F.S. 255

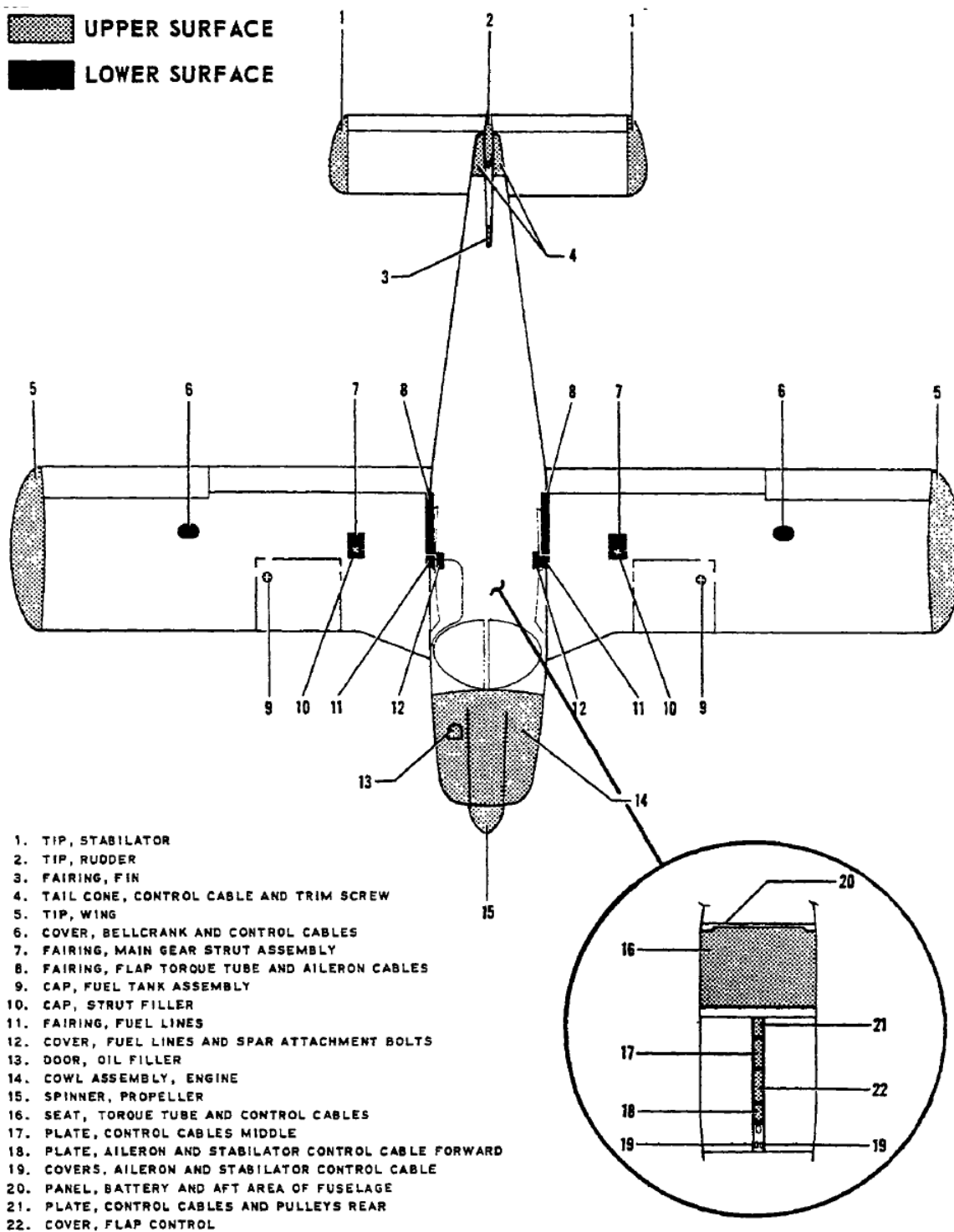
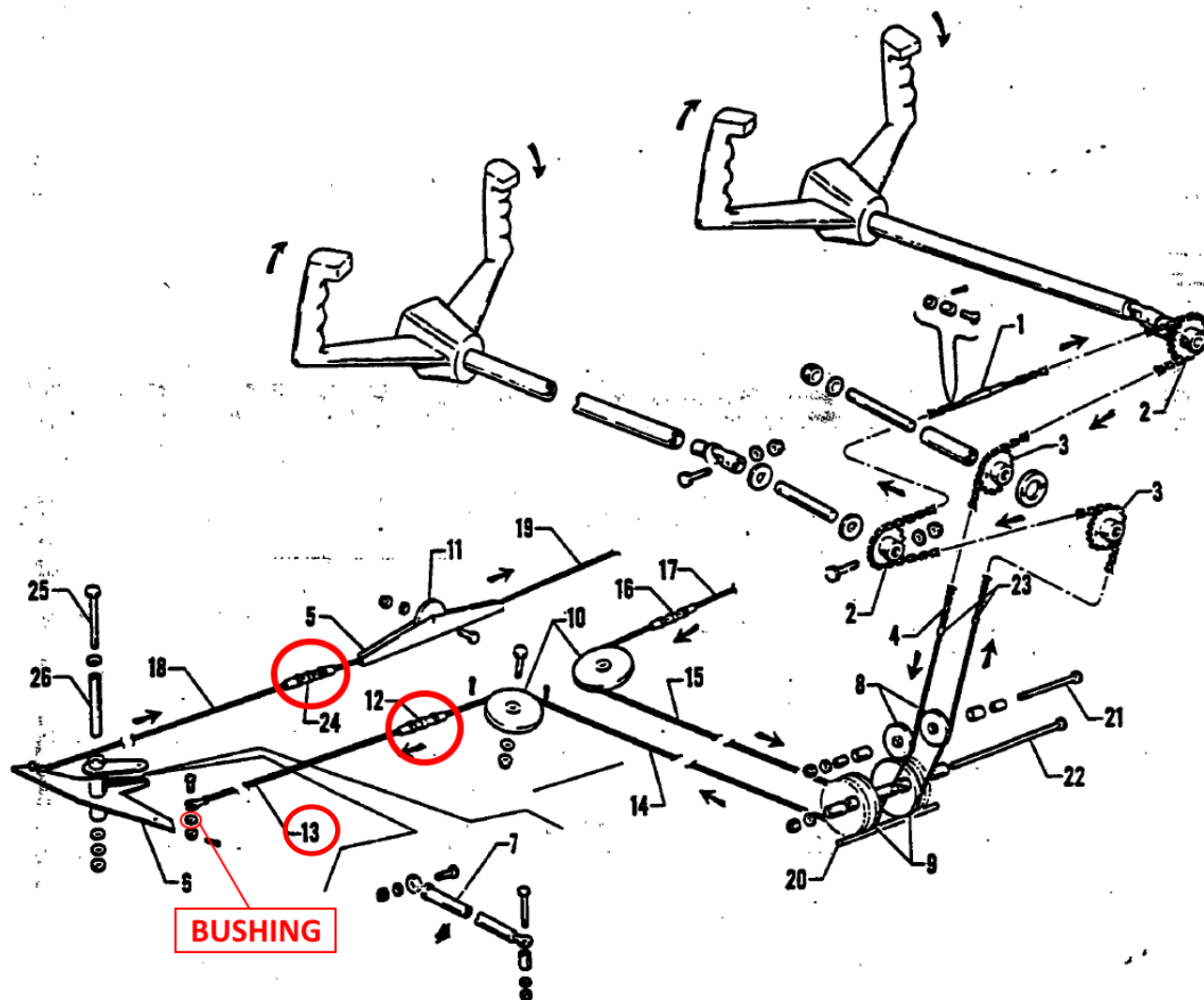


FIGURE 3-2 REMOVEABLE PANELS



- | | |
|-----------------------------------|-------------------------------------|
| 1. TURNBUCKLE, CONTROL CHAINS | 14. CABLE, RIGHT FUSELAGE PRIMARY |
| 2. SPROCKET, CONTROL WHEEL | 15. CABLE, LEFT FUSELAGE PRIMARY |
| 3. SPROCKET, IDLER | 16. TURNBUCKLE, LEFT PRIMARY |
| 4. CHAIN, AILERON CONTROL | 17. CABLE, LEFT WING PRIMARY |
| 5. BRACKET, PULLEY | 18. CALBE, RIGHT BALANCE |
| 6. BELLCRANK, AILERON | 19. CABLE, LEFT BALANCE |
| 7. ROD, AILERON CONTROL | 20. ROD, CABLE GUARD |
| 8. PULLEY, TEE BAR | 21. BOLT, WASHER & NUT |
| 9. PULLEY, FORWARD CLUSTER | 22. BOLT, WASHER & NUT |
| 10. PULLEY, PRIMARY CONTROL CABLE | 23. BOLT, NUT, BUSHING & COTTER PIN |
| 11. PULLEY, BALANCE CABLE | 24. TURNBUCKLE, BALANCE CABLE |
| 12. TURNBUCKLE, RIGHT PRIMARY | 25. BOLT, BELLCRANK PIVOT |
| 13. CABLE, RIGHT WING PRIMARY | 26. BUSHING, BELLCRANK |

FIGURE 3-3 AILERON CONTROL SYSTEM



FIGURE 3-4 TAIL CONE FAIRINGS REMOVED

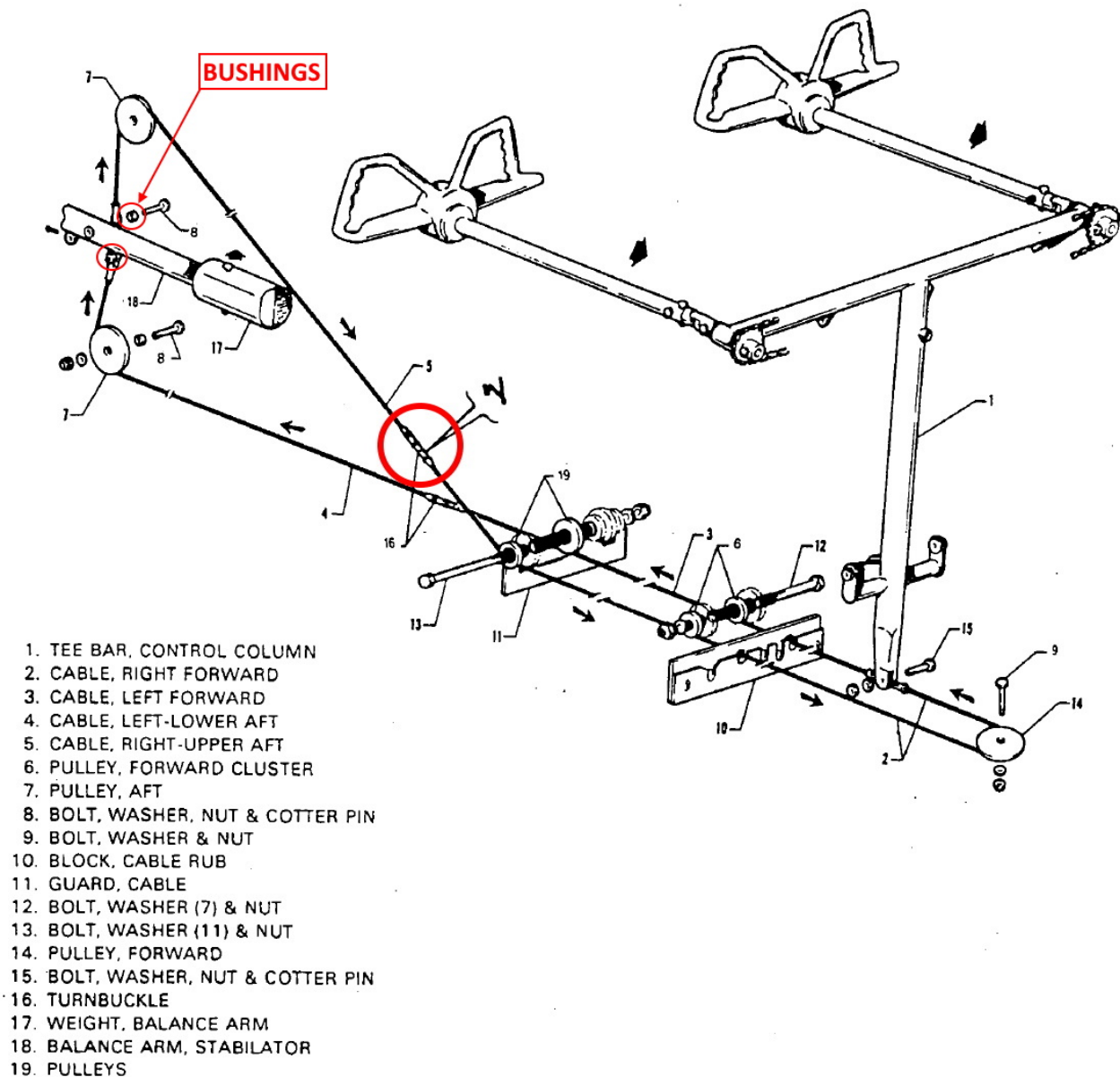


FIGURE 3-5 PITCH CONTROL SYSTEM



4.0 SERVO INSTALLATIONS

4.1 ROLL SERVO INSTALLATION

NOTES:

1. The orientation of the servo and servo arm will depend on the aircraft landing gear configuration.
2. The images in this section depict a fixed gear installation. When installing the roll servo in a retractable gear aircraft the roll servo will be mounted with the servo bushing and servo arm facing the upper skin of the wing.
3. Standoff spacers are supplied in the roll servo hardware kit. Spacers are required to allow the servo bracket to clear lightening hole flanges.
4. Due to manufacturing differences between aircraft, the servo bracket must be aligned in a manner that assures clearance of all moving parts from wing/rib structures and the bracket itself.

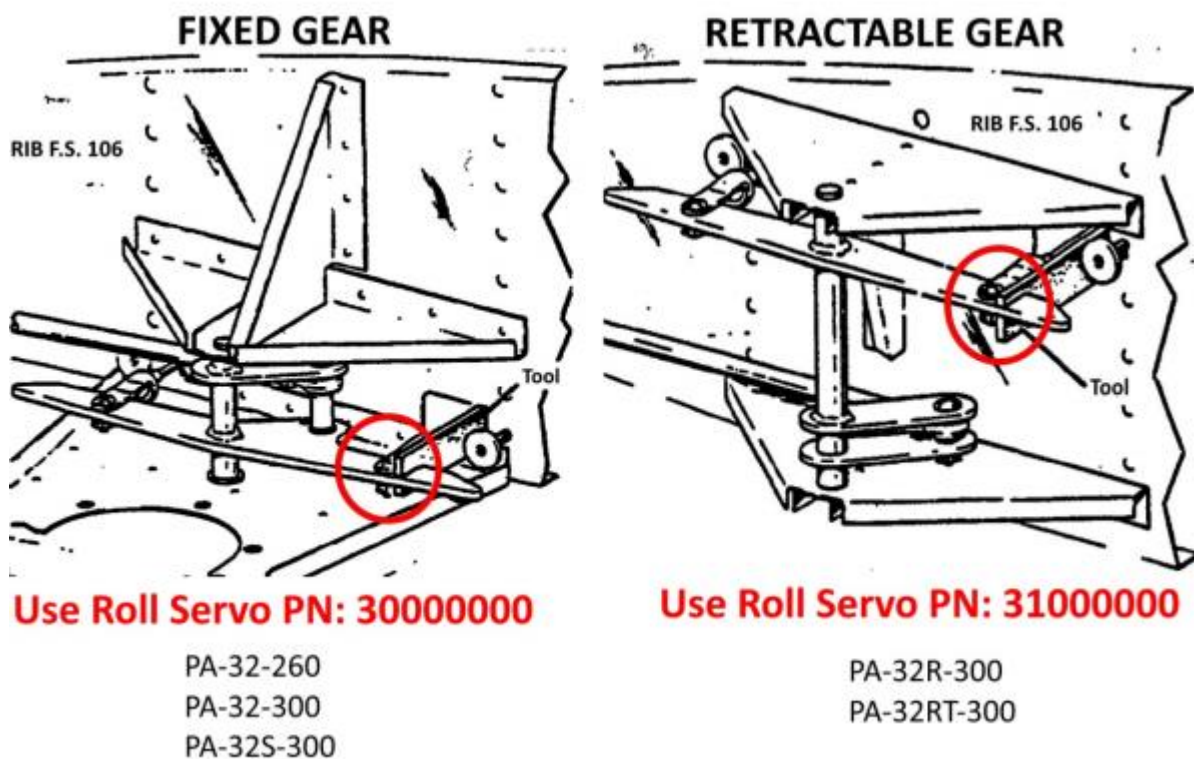


FIGURE 4-1 ROLL SERVO BELLCRANK CONFIGURATIONS

- 4.1.1 Temporarily mount the roll servo to the roll servo adapter bracket.
- 4.1.2 If your aircraft has wing tip fuel tanks it may be necessary to trim the roll servo bracket to ensure proper clearance from the fuel line. See Figure 4-2.

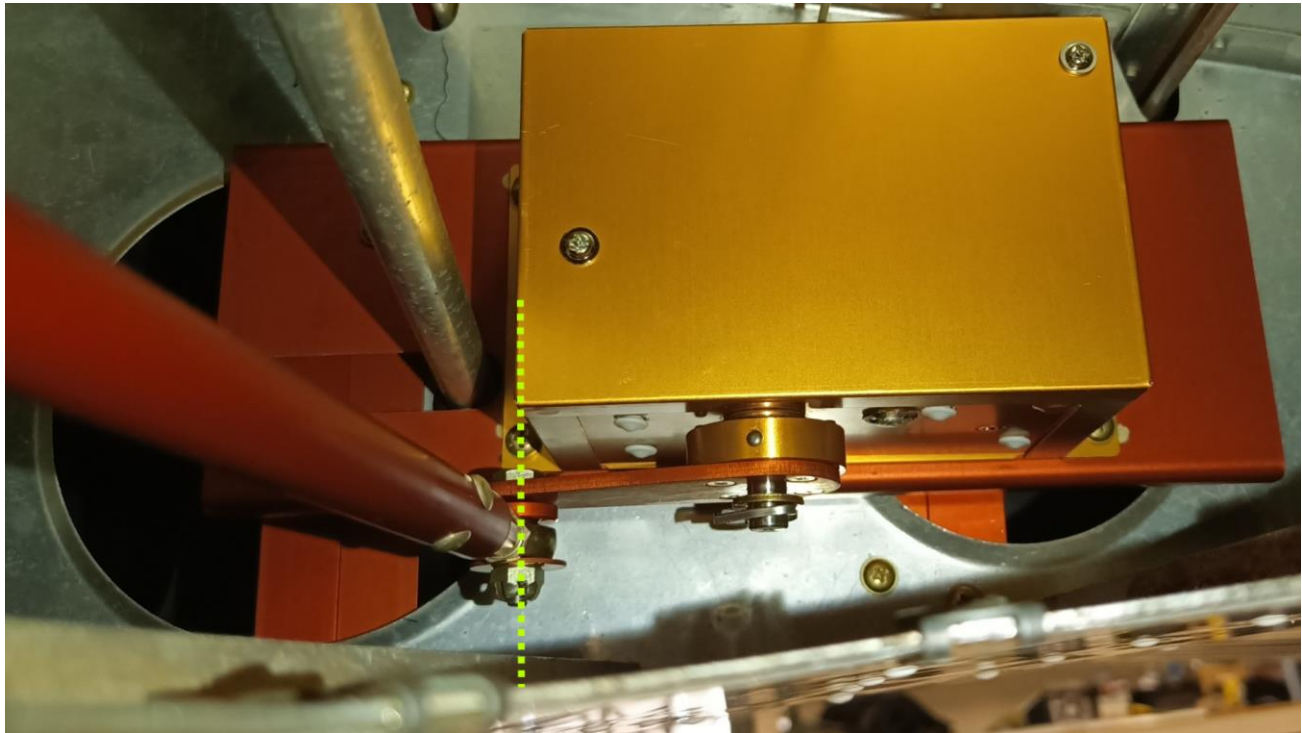


FIGURE 4-2 ROLL SERVO INSTALLATION WITH FUEL LINE

- 4.1.3 Dry fit the roll servo assembly in the wing so the pushrod travel will be in line (parallel) with the RH primary (forward) aileron cable (Item #13, Figure 3-3). Refer to applicable STC Group Illustrated Parts Catalog for hardware configuration.
- 4.1.4 In the neutral position (LNAV = 0.0) the servo arm push/pull tube bolt must be at or forward (No more than 0.5") of the bottom forward reinforcement angle. See Figure 4-2.

WARNING:

IT IS CRUCIAL THAT WHEN THE ROLL SERVO ARM AND PUSH/PULL TUBE ARE AT THE FULL INBOARD POSITION; THE SERVO ARM DOES NOT GO OVER CENTER. IF UNCERTAIN, THEN CONTACT THE STC GROUP BEFORE PROCEEDING.

NOTE:

When fitting the roll servo pay close attention to, and mark, where the mounting spacers and mounting screws will go. The spacers must be located clear of lightening hole flanges and other holes.

The servo must also be positioned on the bracket so that the assembled servo arm and hardware will not interfere with the bracket.

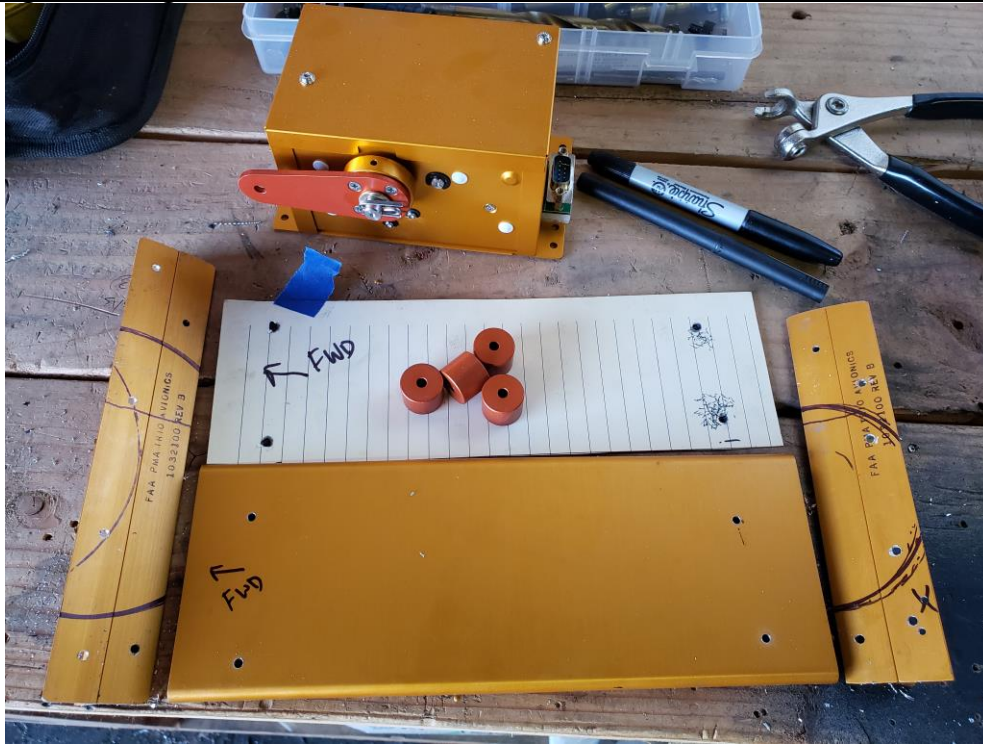


FIGURE 4-3 LOCATING BRACKET PLACEMENT



FIGURE 4-4 RIB STIFFENERS FIT



FIGURE 4-5 FINAL FIT CHECK

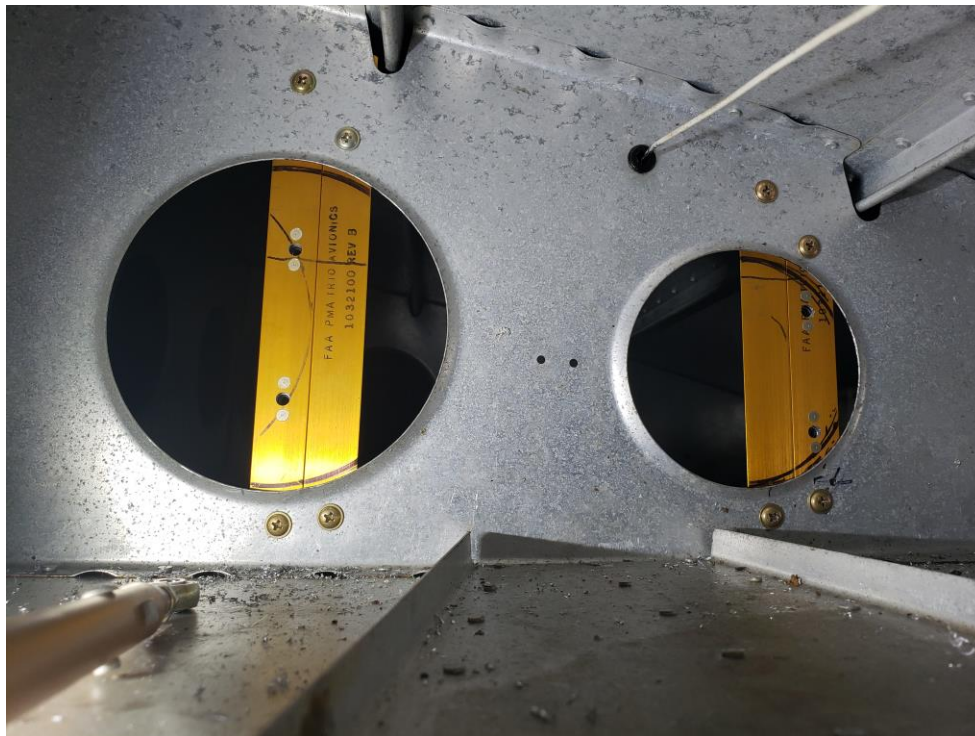


FIGURE 4-6 RIB STIFFENERS INSTALLED



- 4.1.5 Ensure clearance between the assembled servo arm hardware and wing section stiffening stringers. Refer to Figure 4-4.
- 4.1.6 Ensure that the servo arm (at pushrod attach end) is no less than, one inch (1") from the top or bottom wing skin depending on configuration. The pushrod shall be as parallel to the RH primary control cable as possible.

NOTE:

Improper positioning of the servo may cause interference between the push/pull tube and the servo output shaft/hardware.

- 4.1.7 In all configurations, the servo arm will be pointing **forward** when in the neutral position. Contact The STC Group if installation of the servo needs to be reversed or mounted forward of the control cable.

NOTE:

Ensure there will be no interference by moving the ailerons through their full motion while observing the temporarily assembled roll servo and attach hardware.

NOTE:

In some instances, the location of the spacers may interfere with the servo mounting holes or may be behind the servo itself. Two countersunk screws are provided if the spacer holes must be behind where the servo mounts. If you cannot establish the correct roll servo mounting location with the provided hardware, please contact The STC Group for assistance.

- 4.1.8 After dry fitting the roll servo bracket in the wing, drill the four (4) holes in the bracket for the spacers with a #30 drill.

NOTE:

To aid in the next step it is recommended that you temporarily attach the spacers to the bracket with adhesive. An alternative to this would be to use spare material as a template (not provided).

- 4.1.9 Locate and drill the four (4) primary bracket mounting holes in the RH wing rib W.S. 125.45.
- 4.1.10 Temporarily attach the two (2) sets of angle stiffeners together and trim for fit on the back side (outboard) of the wing rib. The stiffeners must be trimmed as close to, but not touching, the wing upper and lower skins.
- 4.1.11 Using best practices, and the solid rivets provided, assemble the sets of angle stiffeners together.
- 4.1.12 Locate and drill the four (4) primary bracket mounting holes in the stiffeners with a #30 drill bit and deburr.
- 4.1.13 Enlarge the four (4) primary mounting holes in the bracket, rib, and stiffeners with a #16 drill bit and deburr.
- 4.1.14 Attach any necessary nutplates (provided) to the bracket and/or angle stiffeners depending on configuration. Refer to Figure 4-2 for standard configuration.
- 4.1.15 Temporarily install only the angle stiffeners with the short screws provided.



- 4.1.16 Predrill angle stiffener attaching hardware holes through the wing rib and angle stiffeners with a #30 drill bit. The top and bottom of each angle stiffener must utilize screws and nutplates that are provided with the kit.
- 4.1.17 Enlarge the holes in the rib and stiffeners for the angle stiffener attach screws with a #16 drill bit.
- 4.1.18 Remove angle stiffeners and deburr all holes.
- 4.1.19 Install nutplates for angle stiffener mounting at this point.
- 4.1.20 Install the angle stiffeners to the rib with the screws provided.
- 4.1.21 Install the roll servo to the bracket then install the assembly, including spacers, to the rib.

NOTE:

In some configurations it may be necessary to install the bracket, with spacers, first then the servo to the bracket.



FIGURE 4-7 ROLL SERVO BRACKET

- 4.1.22 Attach the pushrod with associated hardware to the servo arm (This step may be completed before installing the bracket and/or servo).
- 4.1.23 An exploded view of a typical roll servo installation can be found in Figure 4-2.
- 4.1.24 With correct aileron cable tension and ailerons in the neutral position the servo arm will have an LNAV Servo Set reading of 0 ± 1 degrees in the Trio "MAINTENANCE SETTINGS".
- 4.1.25 Adjustments can be made to the pushrod by screwing the rod ends in or out from either end.

WARNING:

IT IS CRUCIAL THAT WHEN THE ROLL SERVO ARM AND PUSH/PULL TUBE ARE AT THE FULL INBOARD POSITION; THE SERVO ARM DOES NOT GO OVER CENTER. IF UNCERTAIN, THEN CONTACT THE STC GROUP BEFORE PROCEEDING.

NOTE:

The Aurora Bearing Company recommends a minimum of 1.5 x thread diameter for rod end engagement in the push pull rods.

- 4.1.26 After torquing the castle nuts on each end of the pushrod; install cotter pins.



RIGHT HAND WING STATION 125.45

FIXED GEAR

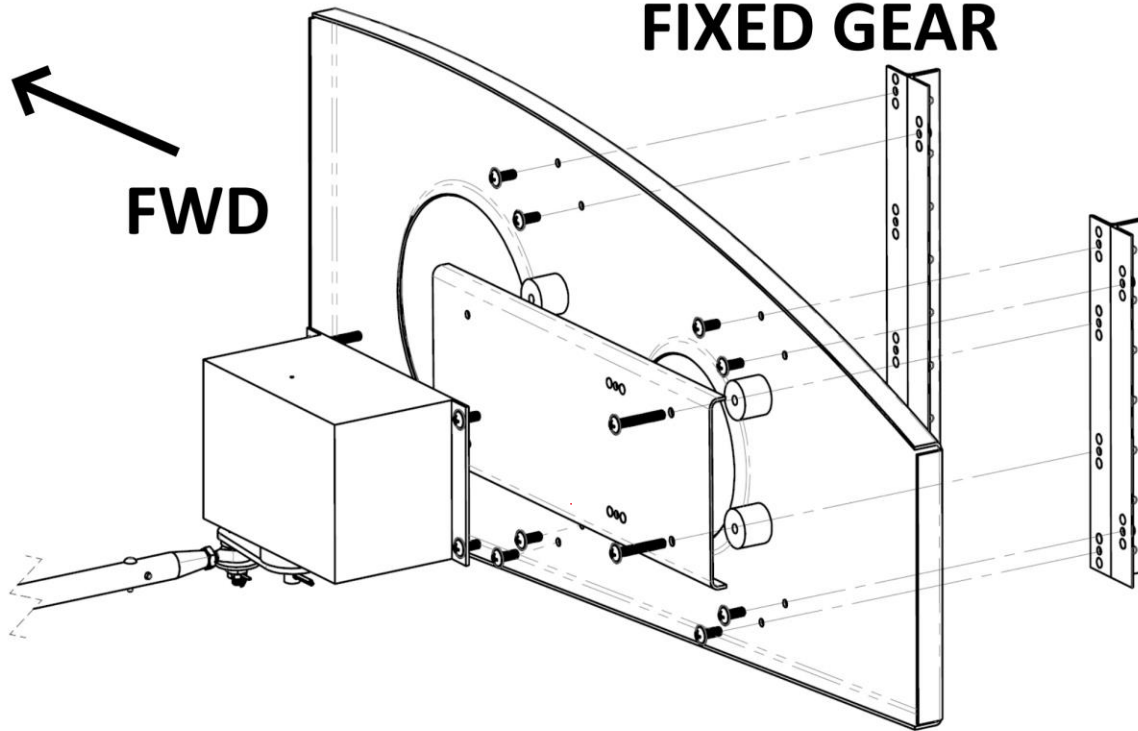


FIGURE 4-8 COMMON ROLL SERVO INSTALLATION (EXPLODED VIEW)



4.2 PITCH SERVO INSTALLATION

- 4.2.1 The Pitch Servo Bracket Assembly is mounted on the forward edge of the tail cone bulkhead gussets located just forward of and butted up against F.S. 255 and is accessed through the fuselage ELT inspection panel, from the rear of the aircraft, and/or climbing through the aft fuselage.
- 4.2.2 Remove both pitch cable clevis's that attach to the stabilator.
- 4.2.3 Place the pitch servo bracket as far aft as possible on top of the (2) lower steel airframe gussets and clamp in place. Refer to Figure 4-9 and 4-10.
- 4.2.4 Use a #40 drill bit and 90-degree air drill to drill the 4 pilot holes through the gussets. Cleco each hole after drilling.
- 4.2.5 Enlarge the holes through the bracket and gussets with a # 19 drill bit.
- 4.2.6 Deburr all drilled holes.
- 4.2.7 Steps 4.2.8 through 4.2.10 can be skipped if four (4) locknuts (MS21044N08) are used to install the pitch tray.
- 4.2.8 Prepare all surfaces for ClickBond nutplate installation. Refer to Appendix B and the Clickbond Nutplate Installation Instructions on the ClickBond website. ***This is a critical operation.***

NOTE:

Clickbond nutplate installation requires clean hands, a clean environment, properly prepared surfaces, and careful adherence to Clickbond installation instructions for successful nutplate installation.

The STC Group LLC takes no responsibility if ClickBond installation instructions are not followed.

- 4.2.9 Install the four (4) Clickbond nutplates on the underside of the gussets using the ClickBond adhesive supplied.
- 4.2.10 Allow the Clickbond adhesive to dry before proceeding.
- 4.2.11 Position the pitch servo on the pitch servo bracket (mounting of the pitch servo to pitch bracket can be accomplished later if necessary). Refer to Figure 4-9 and 4-10.
- 4.2.12 Attach the pitch servo using the four (4) screws and lock washers supplied.
- 4.2.13 Install the pitch servo bracket assembly onto the steel gussets, using the four (4) screws supplied.
- 4.2.14 Fasten the pitch adapter to the stabilator clevises. Refer to Figure 4-9, 4-10 and the applicable STC Group Illustrated Parts Catalog.

NOTE:

Ensure that the new supplied oil imbedded bushings are installed in the stabilator clevis attach tabs.

- 4.2.15 Secure the pitch adapter using the hardware supplied. ***Do not overtighten clevis attach hardware.*** Once installation is complete ensure that clevis's can still move freely forward and aft.
- 4.2.16 Attach the pitch servo push pull rod to the servo arm using the hardware supplied. Refer to Figure 4-9, 4-10 and applicable STC Group Illustrated Parts Catalog.



4.2.17 Attach the upper end of the push pull rod to the pitch adapter using the hardware supplied.
Refer to Figure 4-9, 4-10 and applicable STC Group Illustrated Parts Catalog.

NOTE:

On some installations it may be necessary to shorten the push pull rod to achieve equal throw in both directions. The maximum allowed length reduction is 1/4" (0.25") from each side of the rod.

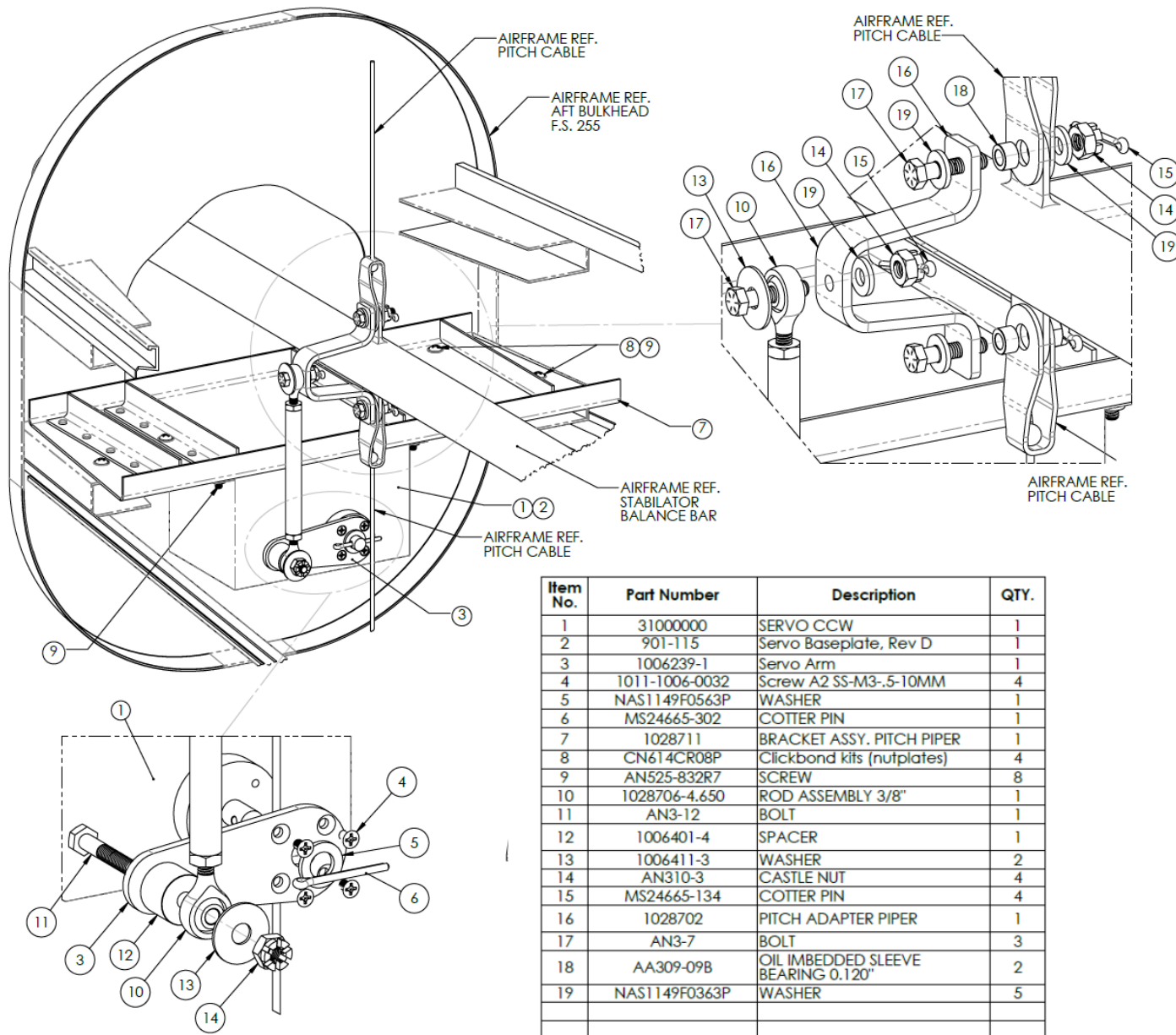


FIGURE 4-9 PITCH ASSEMBLY EXPLODED VIEW

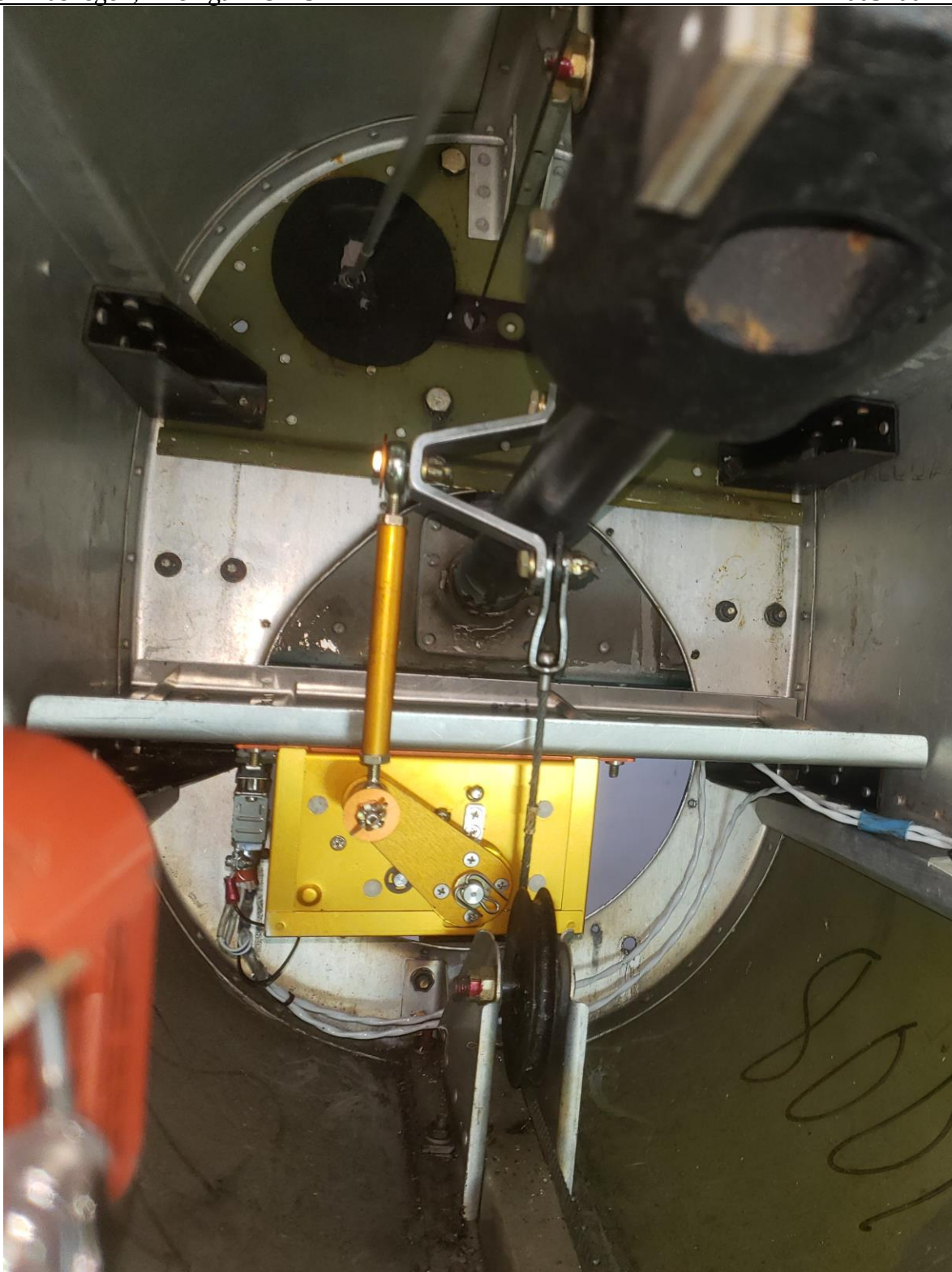


FIGURE 4-10 PITCH INSTALLATION



5.0 PRO PILOT INSTALLATION & WIRING

NOTE:

Prior to connecting the wiring harness DB9 or DB37 connectors into the servos or autopilot control head perform complete power, ground, and data pinout tests on the harness.

Reference the STC Group LLC Avionics Addendum for information not mentioned here.

5.1 SERVO WIRE HARNESES INSTALLATION

- 5.1.1 Remove existing factory autopilot wiring and set aside for weighing (if installed).
- 5.1.2 Route Trio servo wire harnesses along same path and using the same clamps as factory autopilot wiring. If there was no previously installed autopilot then use best practices for routing wires.
- 5.1.3 Take care to protect harness pins at the end of the harnesses.
- 5.1.4 Terminate supplied DB9 connectors per latest revision Trio Wiring Diagram.
- 5.1.5 Attach DB 9 connectors to Trio Servos.
- 5.1.6 Secure the harnesses as necessary.

5.2 TRIO AUTOPILOT CONTROLLER

- 5.2.1 The Trio autopilot controller is ordered in Panel Mount or Instrument Mount versions. Refer to Figure 5-3.
- 5.2.2 The Trio autopilot controller will support 12 to 30 volt inputs.
- 5.2.3 Install the autopilot controller using best practices in either panel or instrument hole locations. Refer to AC 43-13 for this step and all following steps.
- 5.2.4 Utilize Trio Wiring Diagram for the following steps (Appendix A).
- 5.2.5 Install supplied 5 ampere circuit breaker within easy reach of the pilot and label.
- 5.2.6 If a Panel Mount unit is ordered install the supplied power switch and label.
- 5.2.7 Install the supplied Red Disconnect button on the left side of the pilots control yoke and label "AP DSC" "PCS" or "Autopilot Disconnect."
- 5.2.8 Install the Recover button, supplied, in an available convenient location within easy reach of the pilot and label AP Recover.
- 5.2.9 Install Limitation Placard in plain view of Pilot.

5.3 PITOT AND STATIC PORTS

- 5.3.1 The Trio Pro Pilot autopilot controller is provisioned with Pitot and Static ports on the rear of the controller.
- 5.3.2 The controller pitot and static ports must be integrated (plumbed) into the aircraft pitot and static systems.
- 5.3.3 Every aircrafts pitot and static system is different. The following are for example only as the aircraft systems will vary.
- 5.3.4 The following components, or equivalent, will be used in most installations:



- Tygon tubing. 2 each x 24" pieces. Aircraft Spruce P/N: 05-00944.
- Nylo Seal tubing. 2 each x 6" pieces. Aircraft Spruce P/N: 44-P
- Nylo Seal "T" fittings. 2 each. Aircraft Spruce P/N: 264-N04.
- Nylo Seal Inserts. 8 each. Aircraft Spruce P/N: 259-N04.
- 5.3.5 Extend the pitot & static hoses & cable connector through the tray (if applicable) and out through the front of the instrument panel or radio rack to allow for ease of servicing.
- 5.3.6 Mate the pitot and static hoses to the control head.
- 5.3.7 Secure pitot and static connections at the rear of the autopilot controller.
- 5.3.8 Mate the 37 pin D connector to the control head using the screws provided.
- 5.3.9 If using an Instrument mount control head secure the control head using #6 brass instrument screws.
- 5.3.10 If using a Panel mount control head slide the control head into the tray, then tighten the securing allen screw. Do not over tighten control head in the tray.
- 5.3.11 It is required that pitot and static system leak tests and inspections be performed after autopilot installation. Refer to your local authorities' regulations. {i.e. FAR §43 Appendix E, Paragraph (a)}

5.4 TRIO AUTOPILOT DATA CONNECTIONS

- 5.4.1 For most RS-232 connections, set the output of the GPS unit to "Aviation w/ no altitude" or NMEA 0183 OUT.

NOTE:

For Avidyne IFD Series GPS Navigators it may be necessary to use "Aviation" format.

- 5.4.2 If your aircraft is equipped with a GPS that has ARINC 429, set unit to output "GAMA" Low or High Speed.
- 5.4.3 Prior to making the connections to the GPS unit in the aircraft determine what else is connected.
- 5.4.4 It may be necessary to parallel the connections.
- 5.4.5 If parallel connections are required, verify that the lines you are paralleling use, or can use, the same data format that is required.
- 5.4.6 Both the RS-232 and the ARINC 429 can be paralleled with like connections.
- 5.4.7 Ensure that the analog alarm output is connected to the un-switched audio input on the Audio Panel.

5.5 POSITION THE SERVO ARMS

NOTE:

A notepad will be required for the following steps.

- 5.5.1 In the following steps the servo arm positions will be recorded in three (3) locations: neutral, full up elevator, full down elevator.
- 5.5.2 Power ON the Pro Pilot autopilot.
- 5.5.3 Press the Encoder knob when Elevation is displayed (field elevation is not required).
- 5.5.4 Simultaneously Press and Hold the Encoder knob and V MODE button. Refer to Figure 5-1.



- 5.5.5 After approximately three (3) seconds the “MAINTENANCE SETTINGS” screen will appear. Refer to Figure 5-1.
- 5.5.6 Advance through the Maintenance Settings by either pressing or turning the Encoder knob until VNAV Servo Set screen is displayed.
- 5.5.7 The **pitch** zero (center) setting may vary between aircraft but the servo arm throw in either direction must be equal to each other $\pm 1^\circ$. (i.e. -44.2° & $+44.2^\circ$). Refer to Figure 5-2.
- 5.5.8 If the reading is not in this range adjust the rod ends equally until the VNAV Servo Set screen displays equal throw in both directions, $\pm 1^\circ$.

NOTE:

The Aurora Bearing Company recommends a minimum of 1.5 x thread diameter for rod end engagement in the push pull rods.

- 5.5.9 Lock the rod ends into position and mark them with tamper proof torque seal.
- 5.5.10 Record the reading shown on the VNAV Servo Set screen.
- 5.5.11 Move the control yoke fully aft until the elevator reaches the mechanical stops.
- 5.5.12 Record the reading on the VNAV Servo Set screen.
- 5.5.13 The reading cannot not exceed 45 degrees. The electrical limit is approximately 44.7° .
- 5.5.14 Move the control yoke fully forward until the elevator reaches the mechanical stops.
- 5.5.15 Record the reading on the VNAV Servo Set screen.
- 5.5.16 The reading should not exceed 45 degrees.
- 5.5.17 The stabilator travel tests and readings are complete.
- 5.5.18 Advance through the Maintenance Settings by either pressing or turning the Encoder knob until LNAV Servo Set screen is displayed.
- 5.5.19 With the ailerons locked in the neutral position the **roll** (LNAV) servo center setting must be equal $0^\circ \pm 1^\circ$.
- 5.5.20 If the reading is not in this range adjust the rod ends equally until the LNAV Servo Set screen displays $0^\circ \pm 1^\circ$.

NOTE:

The Aurora Bearing Company recommends a minimum of 1.5 x thread diameter for rod end engagement in the push pull rods.

- 5.5.21 Lock the rod ends into position and mark them with tamper proof torque seal.
- 5.5.22 Record the reading shown on the LNAV Servo Set screen.
- 5.5.23 Move the control yoke fully left until the aileron reaches the mechanical stops.
- 5.5.24 Record the reading on the LNAV Servo Set screen.
- 5.5.25 The reading cannot not exceed 45 degrees. The electrical limit is approximately 44.7° .
- 5.5.26 Move the control yoke fully right until the aileron reaches the mechanical stops.
- 5.5.27 Record the reading on the LNAV Servo Set screen.
- 5.5.28 The reading should not exceed 45 degrees.
- 5.5.29 The aileron travel tests and readings are complete.
- 5.5.30 Power OFF the autopilot.
- 5.5.31 Turn off the aircraft radio master, if so equipped.
- 5.5.32 Turn off the aircraft power.



FIGURE 5-1 MAINTENANCE SETTINGS



FIGURE 5-2 PITCH POSITIONED IN NEUTRAL (EXAMPLE)

5.6 TRIO INITIAL SETUP AND CHECKS

- 5.6.1 Refer to the STC Group Avionics Addendum for initial checks and setup of the autopilot installation.
- 5.6.2 Complete applicable portions of the STC Group Post Installation Flight Checks Document No. F-1006-43.
- 5.6.3 Autopilot gain settings have been programmed before shipment.
- 5.6.4 Individual aircraft may require fine tuning of servo gains on the first few flights. The following rough gain sets are a common starting point for Piper straight wing aircraft:

SET SERVO GAINS
HNAV=24 VNAV=24

NOTE:

Gains are not to be changed by the aircraft owner / operator / pilot without contacting Trio Avionics or The STC Group LLC in advance for guidance.
The procedures for “fine tuning” gains are located in the Avionics Addendum available on The STC Group LLC website: www.thestcgroupllc.com/documents.



- NOTES:
1. SEE FILE 1006103.SLDASM FOR SOLID MODEL.
2. ROUTE WIRE HARNESS WITH EXISTING WIRE BUNDLES & SECURE PER AC43.13-18.
3. POSITION INSTR PANEL MOUNTED COMPONENTS APPROXIMATELY AS SHOWN.
4. IF YOKE IS NOT PROVIDED FOR SWITCH INSTL, FABRICATE BRACKET & ATTACH TO YOKE FOR MOUNTING SWITCH AS REGD.

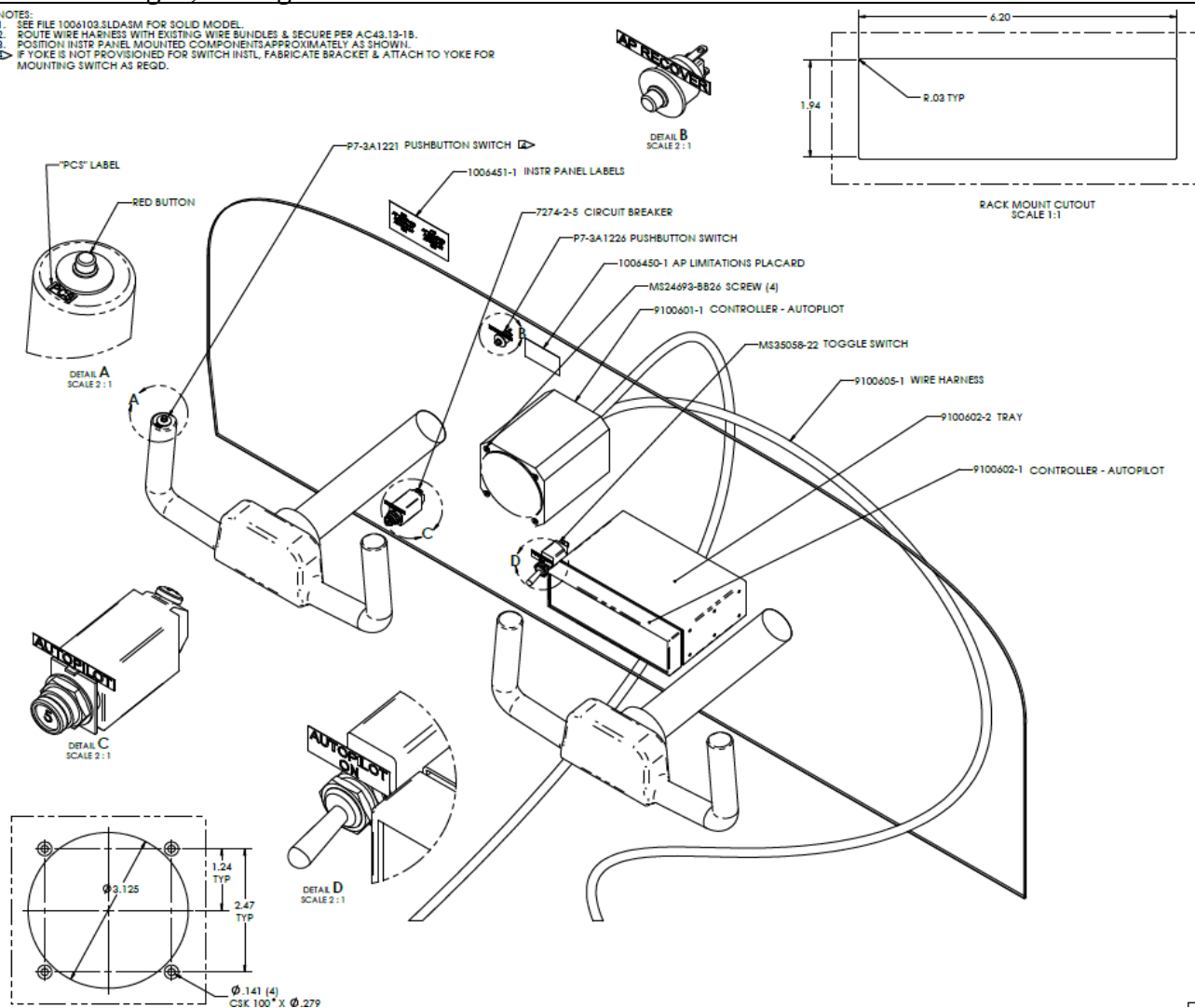


FIGURE 5-3 TYPICAL COCKPIT INSTALLATION



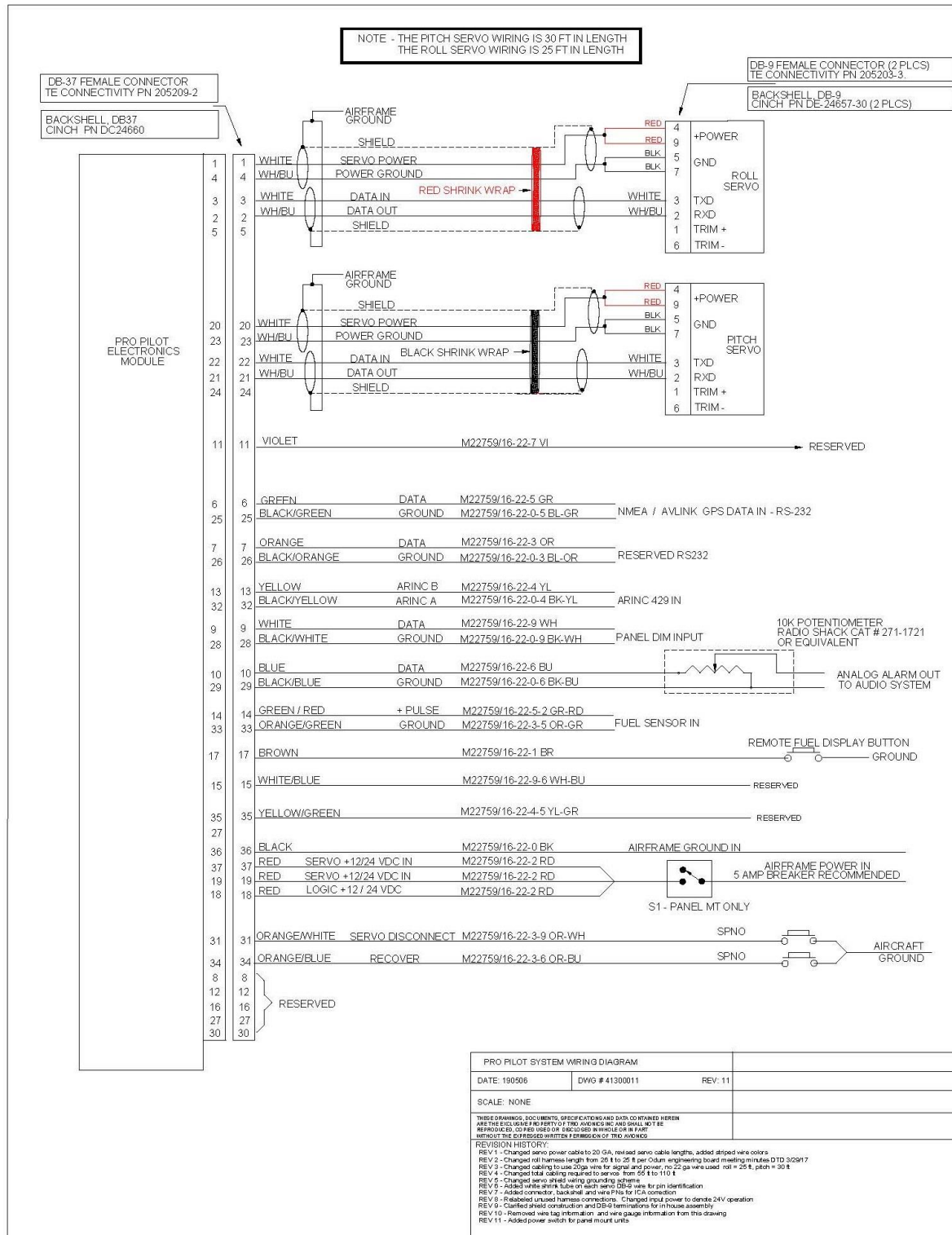
6.0 CLOSEUP

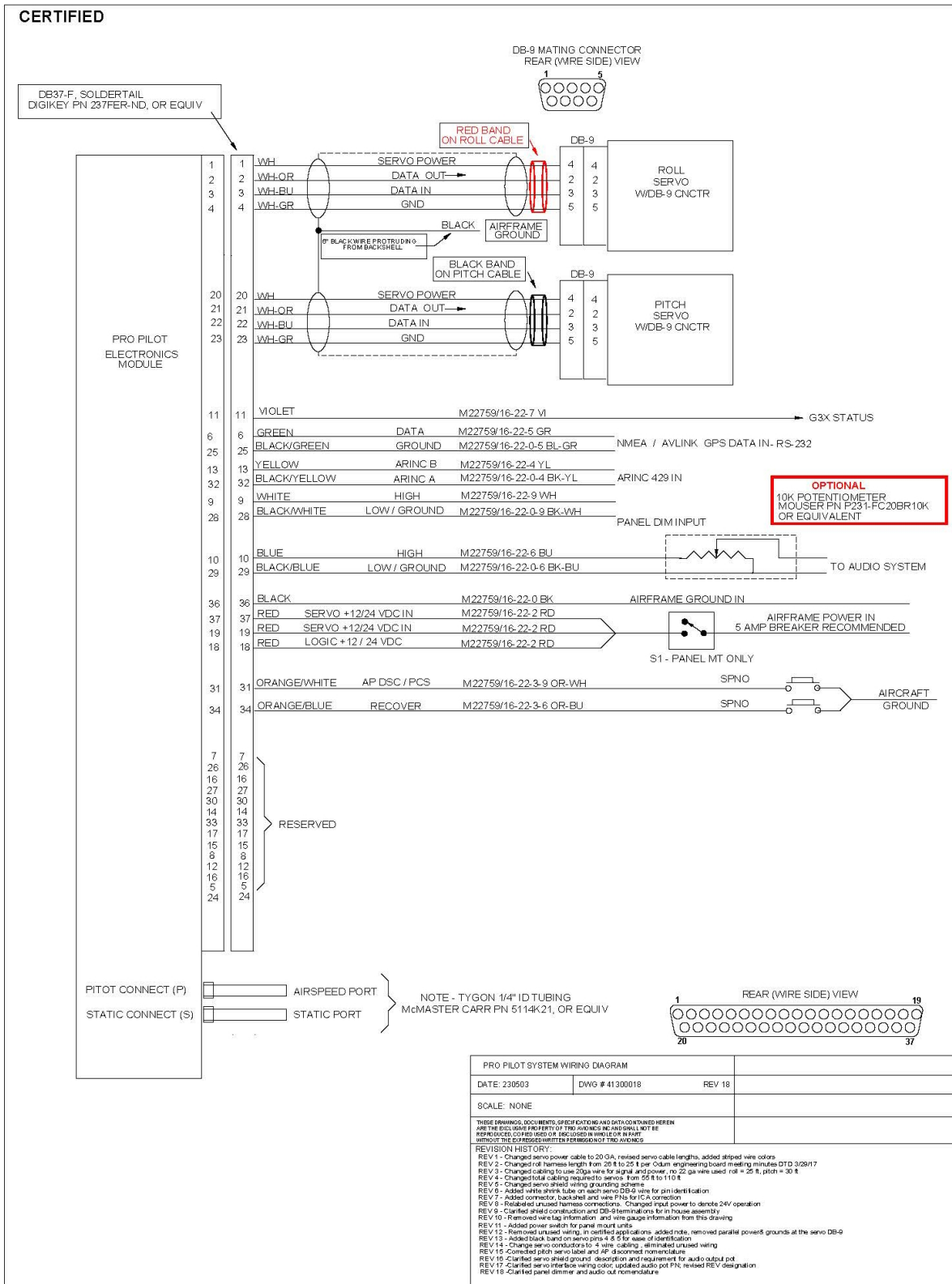
- 6.1** Re-tension and safety aileron balance cable/turnbuckle.
- 6.2** Re-tension and safety pitch cable/turnbuckle.
- 6.3** Install all items removed in Section 3 of this document.
- 6.4** It is required that pitot and static system leak tests and inspections be performed after autopilot installation. Refer to your local authorities' regulations. {i.e. FAR §43 Appendix E, Paragraph (a)}
- 6.5** Amend the Weight & Balance and Equipment List.
- 6.6** Install FAA Approved Aircraft Flight Manual Supplement into the AFM, POH, or applicable flight manual for the aircraft.
- 6.7** Complete all logbook entries as required to return the aircraft to service.
- 6.8** Submit applicable paperwork in accordance with local authority regulations. (i.e. FAA Form 337)



APPENDIX A PRO PILOT SYSTEM WIRING DIAGRAM

ORIGINAL WIRING DIAGRAM







APPENDIX B CLICKBOND NUTPLATE INSTALLATION INSTRUCTIONS

CLICK BOND

Nutplate Installation Instructions
Applicable Parts: All standard and sealed nutplates

Safety First
When using solvents and adhesives, follow appropriate safety precautions. These include use of personal protection equipment (gloves & protective eye wear) and adequate ventilation. Refer to SDS for complete information. Read all instructions before starting work.

Step 1 Prepare Substrate
Clean
Clean substrate to remove all surface contaminants:

- Use a clean, lint-free cloth and fresh cleaning solvent (CB911 or acetone is recommended). Saturate cloth with solvent and wipe substrate with a single rolling motion.
- Check cloth for residue. If present, fold cloth over to use a clean side, or use a fresh clean cloth and repeat wipe.

Tip: Always use clean side of cloth for each wipe. Never use same side more than once.

- If necessary, use clean dry cloth to remove any solvent left on substrate.

Abrade
Abrade substrate where part is to be installed:

- Use appropriate abrasive, and method. (Metallic 120-180 grit, Composite 160-180 grit)

Caution: If installing on composite substrate, do not damage fibers during abrading.

- Remove surface oxides, top coat, and primer to expose bare material.

Tip: Use random motion to abrade substrate.

Clean
Repeat cleaning process to remove abrasion residue:

- Solvent wipe the substrate with a single rolling motion.

Tip: Solvent clean progressively smaller areas to avoid introducing contamination.

- Check cloth for residue. If present, fold cloth over to use a clean side, or use a fresh clean cloth and repeat wipe.

Tip: Always use clean side of cloth for each wipe. Never use same side more than once.

- If necessary, use clean dry cloth to remove any solvent left on substrate.

Step 2 Prepare Part

- Solvent wipe nutplate base with single rolling motion to remove residue.

Note: Unprimed parts should be abraded prior to solvent wipe.

- Apply adhesive evenly to nutplate base as shown.

Tip: Use enough adhesive to give a small, uniform amount of "squeeze-out" when nutplate is pulled into place.

Step 3 Locate & Bond

- Align nutplate and use installation fixture to gently pull nutplate into place.

Caution: Take care not to pull too hard on installation fixture. It is important for installation fixture to remain with nutplate while adhesive cures.

- Make sure nutplate is seated securely against surface, and adhesive squeeze out is visible all the way around base of part.

Step 4 Cure & Complete

- Allow adhesive to cure. Do not wipe away adhesive squeeze out. Do not disturb part or fixture during cure. Refer to appropriate adhesive data sheet for cure times.
- Once adhesive is cured, remove installation fixture and discard.
- If necessary, touch up coatings.

CB720H159-A
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APPENDIX C TORQUE VALUES - A2 STAINLESS STEEL SCREWS



Torque Values for A2 or A4 Metric Stainless Steel Fasteners

Bolt Dia (mm)	Torque (N-m)		Torque (in-lbs. through M10; M12 & over ft-lbs.)	
	Dry	Lubricated	Dry	Lubricated
3	1.0	0.9	8.9 in-lbs.	8.0 in-lbs.
4	2.6	2.3	23.0	20.7
5	5.1	4.6	45.1	40.6
6	8.7	7.8	77.0	69.3
8	21.2	19.1	188	169
10	42	38	372	335
12	73	66	54 ft-lbs.	48 ft-lbs.
14	118	106	87	78
16	180	162	133	119
18	258	232	190	171
20	370	333	273	246
22	485	437	358	322
24	603	543	445	400

Suggested Maximum Torquing Values - a guide based upon actual lab testing on dry or near dry fasteners wiped clean. The lubricated values were calculated at 90% of the dry condition test results. Values listed in N-m; in-lbs. up through M10, and foot-pounds for M12 and over.

Note: Stainless steel fasteners tend to gall while being tightened. The risk of galling or thread seizing can be reduced by:

- Using lubrication
- Tighten fasteners with low rpm's; without interruptions
- Apply only light pressure
- Avoid prevailing torque lock nuts when possible



APPENDIX D RECOMMENDED INSTALLATION TOOLS

Cleco P Series Temporary Fasteners



QTY	PART NUMBER	DIAMETER	COLOR CODE	GRIP	DRILL SIZE	PRICE EACH
☐	20-101	3/32	Zinc	0-1/4	#40	\$0.50
☐	20-102	1/8	Copper	0-1/4	#30	\$0.50
☐	20-103	5/32	Black	0-1/4	#21	\$0.50

45-Degree Air Drills & Threaded Bits



90-Degree Air Drills



Hex-Nut and Wing-Nut Draw Clecros

