

STC GROUP LLC
480 RUDDIMAN DRIVE
NORTH MUSKEGON, MICHIGAN 49445-2783

REPORT NO: 1195001
REVISION C
FAA STC SA04230CH

TRIO AUTO PILOT INSTALLATION INSTRUCTIONS
CESSNA MODEL 190, 195, 195A, 195B, LC-126A, LC-126B

DATE:	Original Issue 3 October, 2018
WRITTEN BY:	Jeffrey Odum
APPROVED BY:	AJ Abdulshafi



Rev.	Date:	By:	Approved By:
-	3 October 2018	John Heintz	Paul C. Odum
A	29 January 2019	Paul Odum	AJ Abdushafi
B	14 February 2021	Jeffrey Odum	AJ Abdulshafi
C	01 November 2021	AJ Abdulshafi	Jeffrey Odum
ER No: 1006			
Section:	Description		
All	Initial Release		
REV A	-		
REV B	Section 2.0, 3.0, 4.0, & Appendix B		
REV C	Added Appendix I, Revised Section 3 & Appendix B & H		



<u>TABLE OF CONTENTS</u>	2
<u>LIST OF TABLES</u>	3
<u>LIST OF FIGURES</u>	4
<u>LIST OF IMAGES</u>	5
<u>REFERENCES</u>	6
<u>Tools</u>	7
<u>ACRONYMS, ABBREVIATIONS, AND SYMBOLS</u>	8
1.0 Trio Pro Pilot Autopilot Installation.....	9
2.0 General	10
3.0 Roll Servo Installation.....	11
4.0 Pitch Servo INSTALLATION	22
Appendix A - Trio Pro Pilot Autopilot Installation.....	34
APPENDIX B - Trio Pro Pilot Wiring Diagram.....	38
APPENDIX C - DWG 1195701-7 – Doubler Plate Assembly	40
APPENDIX D - DWG 1195701-9 – Inspection Panel.....	41
APPENDIX E – Trio Servo Preperation	42
APPENDIX F – Clickbond Installation Instructions	43
APPENDIX G – Roll Servo Installation	44
APPENDIX H – Verify Servo Arm Position	45
APPENDIX I – Alternate Pitch Installtion Bracket	49



None



FIGURE 3-1 WING ACCESS COVER LOCATIONS

FIGURE 3-2 SERVO ARM TO ROD ASSEMBLY

FIGURE 3-3 ROLL ROD TO AILERON BELLCRANK ASSEMBLY

FIGURE 3-4 CESSNA AILERON BELL CRANK AND PUSHROD ASSEMBLY

FIGURE 4-1 CESSNA PITCH CONTROL ASSEMBLY

FIGURE 4-2 PITCH SERVO LOCATION ON PART 38

FIGURE 4-3 TRIO PITCH SERVO ASSEMBLY

FIGURE 4-4 PITCH SERVO BRACKET

FIGURE 4-5 SERVO AND MOUNT ASSEMBLY ON PART 38

FIGURE 4-6 CESSNA BELLCRANK ATTACHMENT

FIGURE 4-7 CLAMP INSTALLATION ON BELLCRANK

FIGURE 4-8 PITCH SERVO ARM ASSEMBLY

FIGURE C-5 ROLL INSPECTION PLATE DOUBLER

FIGURE D-1 INSPECTION HOLE COVER

FIGURE G-1 ROLL SERVO ASSEMBLY

FIGURE G-2 ROLL SERVO BRACKET ASSEMBLY



IMAGE 1-1 CESSNA 195 AUTOPILOT INSTALLATION

IMAGE 3-1 ROLL SERVO ACCESS HOLE LOCATION

IMAGE 3-2 ROLL SERVO BRACKET INSTALLATION

IMAGE 3-3 ROLL SERVO BRACKET INSTALLATION

IMAGE 3-4 ROLL SERVO BRACKET INSTALLATION

IMAGE 3-5 ROLL SERVO ROD BELLCRANK ASSEMBLY

IMAGE 3-6 ROLL SERVO ARM INSTALLATION

IMAGE 3-7 ROLL SERVO BASEPLATE

IMAGE 4-2 TRIO PITCH SERVO INSTALLATION

IMAGE 4-3 PITCH SERVO TO BELLCRANK CONNECTION

IMAGE 4-4 PITCH SERVO BRACKET INSTALLATION

IMAGE 4-5 SERVO ARM POSITION

IMAGE 4-6 SERVO ARM POSITION ELEVATORS IN NEUTRAL

IMAGE 4-7 ELEVATOR FULL DOWN

IMAGE 4-8 ELEVATOR FULL UP

IMAGE E-1 TRIO SERVO P/N 3100000

IMAGE E-2 CLICKBOND NUTPLATE INSTALLED

IMAGE H-1 MAINTENANCE SETTINGS

IMAGE H-2 FIRST SCREEN IN MAINTENANCE MENUS

IMAGE H-3 ELEVATOR POSITIONED IN NEUTRAL (EXAMPLE)

IMAGE H-4 ELEVATOR FULL UP

IMAGE H-5 ELEVATOR FULL DOWN



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.

Cessna 195 Illustrated Parts Catalog

LC126 Maintenance Manual

Industry Specifications and Standards:

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

Other Data:

ER1006 – STC GROUP LLC Program Engineering Record.



- Cordless drill
- 90-degree air drill
- 45-degree air drill
- #40 (0.098") HSS drill bits
- #30 (0.1285") HSS drill bits
- #18 (0.1695") HSS drill bits
- #17 (0.173") HSS drill bits
- #40 ¼ x 28 threaded drill bits (HSS)
- #30 ¼ x 28 threaded drill bits (HSS)
- #18 ¼ x 28 threaded drill bits (HSS)
- #17 ¼ x 28 threaded drill bits (HSS)
- Silver Cleco P Series Temporary Fasteners
- Copper P Series Temporary Fasteners
- Side grip Cleco clamps
- Cleco pliers
- 24" ruler or tape measure
- 6" ruler
- Light
- Foam knee pad
- 4 inch bi-metal hole saw
- Dimple Dies for AD3 rivets
- Hand rivet squeezer



ACRONYMS, ABBREVIATIONS, AND SYMBOLS

Autopilot	Trio Pro Pilot Autopilot
Clip	Part Number 1006237
C.G.	Center of Gravity
ER	Engineering Record
FAA	Federal Aviation Administration
ICA	Instructions for Continued Airworthiness
LH	Left Hand
OEM	Original Equipment Manufacturer
OTBD	Outboard
PCS	Pilot Controller Steering (Red) Button
Recover	Recover Button
RH	Right Hand
Servo	Trio Pro Pilot Gold Standard Servo
STC	Supplemental Type Certificate
WS	Wing Station
Autopilot	Trio Pro Pilot Autopilot



1.0 TRIO PRO PILOT AUTOPILOT INSTALLATION

These installation instructions provide information and data necessary to professionally install the Trio Pro Pilot Autopilot.

The following models are addressed in Installation Instructions 1195001 Cessna Models: 190, 195, 195A, 195B, LC126A, and LC126B.

Read these instructions completely before beginning the installation.

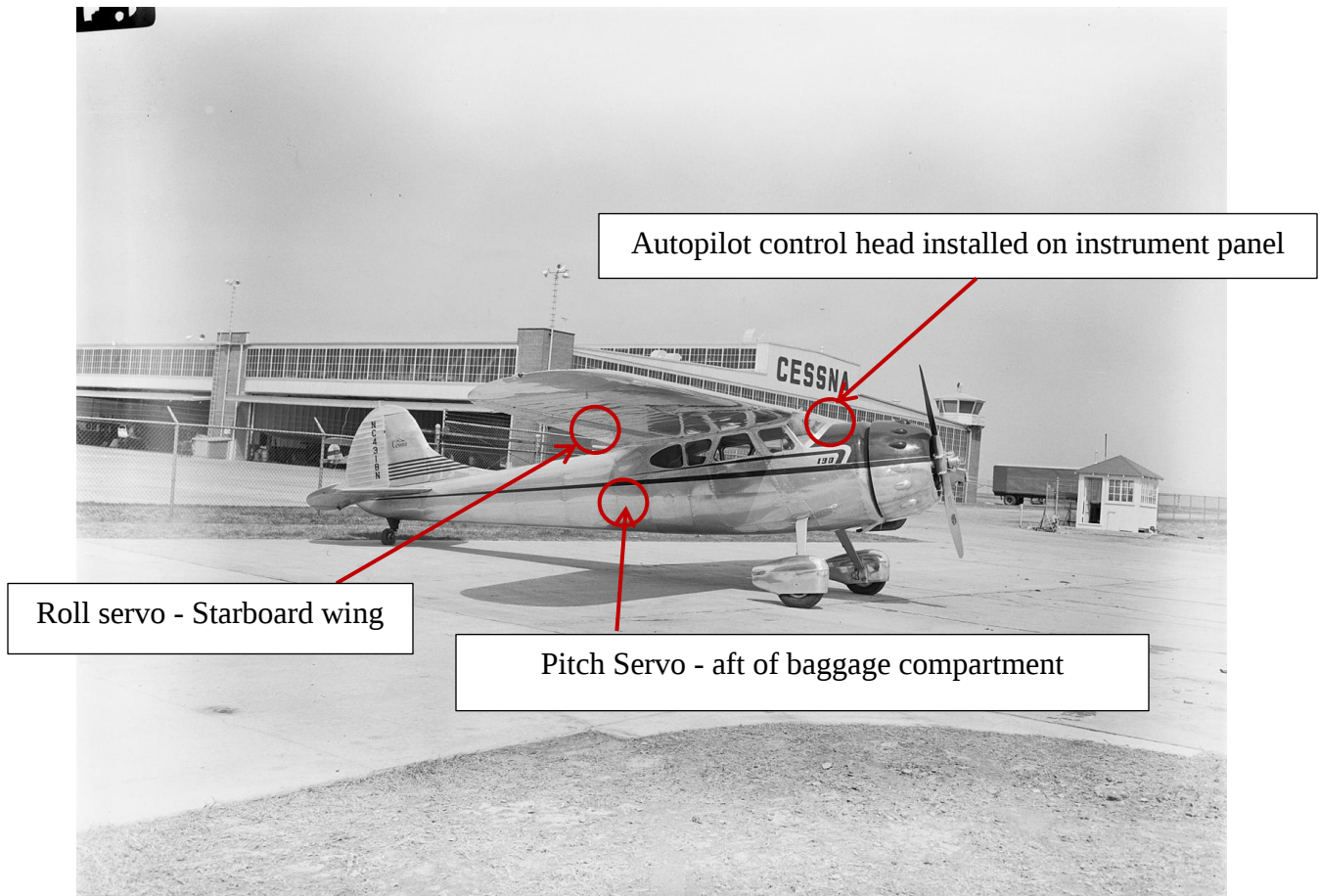


IMAGE 1-1 CESSNA 195 AUTOPILOT INSTALLATION



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 Cessna 190/195/LC-126(A)(B) aircraft.

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.



3.0 ROLL SERVO INSTALLATION

Note:

The Cessna 195 roll servo installation is shown in STG Group Dwg 1195400 and Appendix G.

1. Record the location, remove, and weigh any previously installed autopilot, associated wiring harnesses, and hardware.
 - a. Record this information when updating the Weight and Balance data.
2. Remove the RH wing aileron bell crank inspection panel located on the underside of the starboard wing between ribs 51 and 52. Refer to Figure 3-1 and Image 3-1.

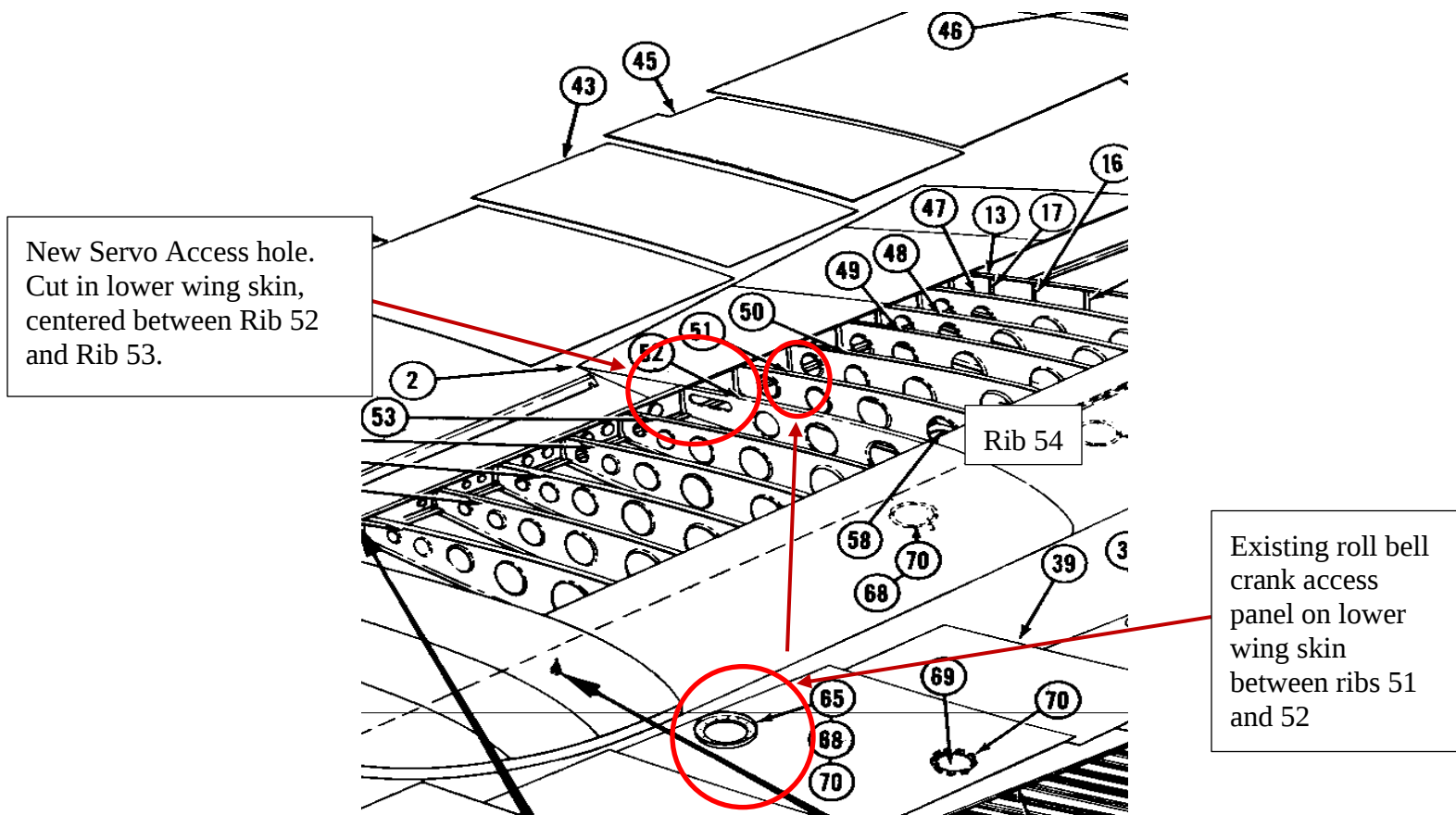


FIGURE 3-1 WING ACCESS COVER LOCATIONS

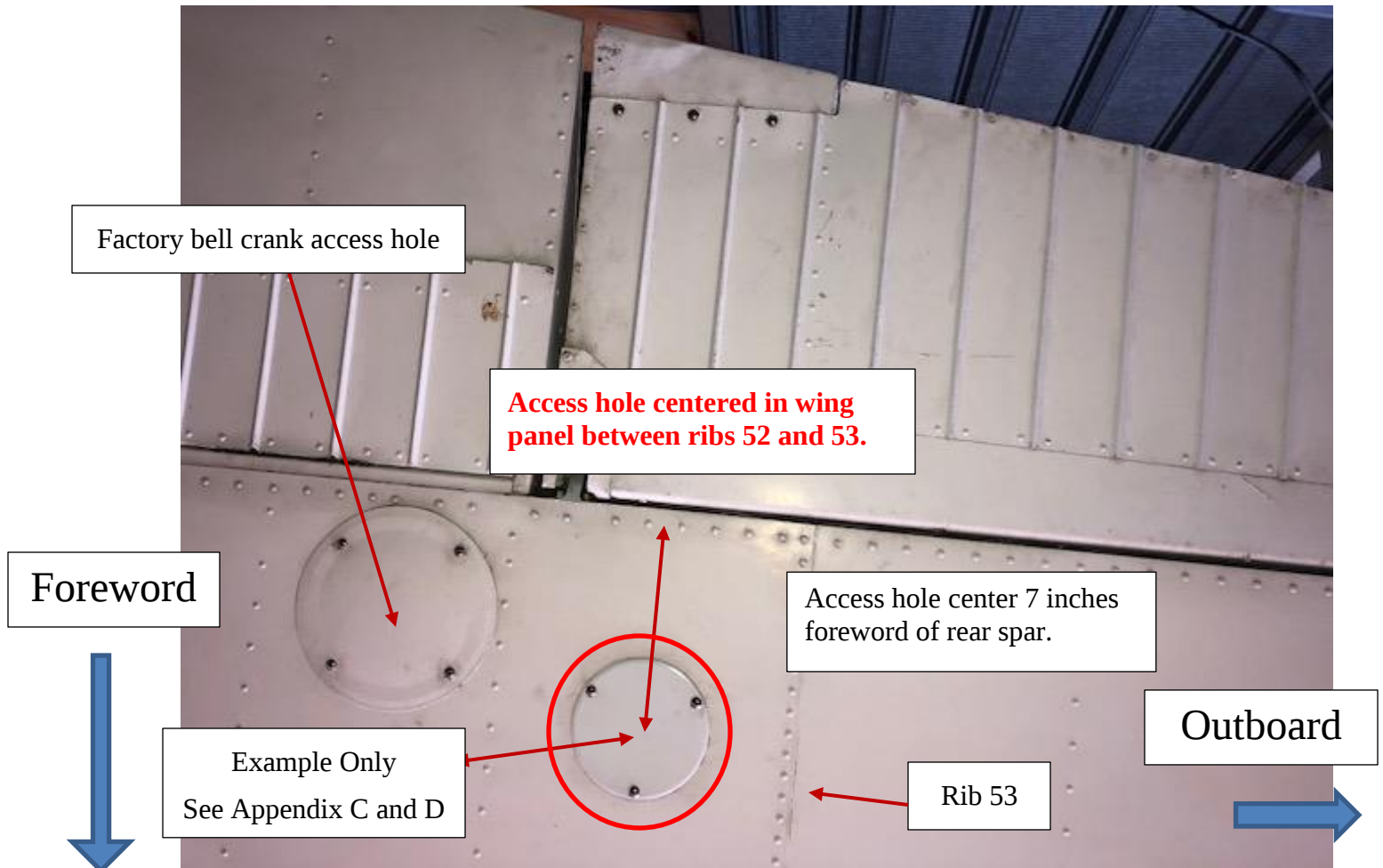


IMAGE 3-1 ROLL SERVO ACCESS HOLE LOCATION

Note:

An access hole and inspection plate are required to allow installation of the Trio Pro Pilot servo in the RH wing. A pilot hole is required before cutting an inspection hole. Refer to Image 3-1 for the following steps.

3. Mark the pilot hole location 7.0" inches forward of rear spar.
4. Center the pilot hole in the lower wing panel between ribs 52 and 53.
5. Drill a pilot hole using a #30 drill bit.
6. Cut 5-inch access hole with a sharp bi-metal hole saw being careful to not insert the rotating hole saw into wing after the hole is cut.



Note:

Refer to Appendix C and D for the following steps.

7. Clamp the doubler supplied in the hardware kit to the lower wing skin with the counter sunk holes facing downward and centered on the new access hole cut above.
8. Use the clamped doubler as a drill template and drill eight (9) rivet holes using a #40 drill bit, or equivalent,
 - a. MS20426AD3-3 (AN426) rivets will be used to secure the doubler to the wing skin.
9. Using the doubler as a template drill four (4) holes using a #17 drill bit, or equivalent.
10. Unclamp the doubler and remove.
11. Deburr all holes and clean debris from the area.
12. Dimple the wing lower skin at the AD3 rivet locations.
13. Insert the doubler into the wing through the Cessna factory access hole between ribs 51 and 52. Refer to Image 3-1.
14. Pass doubler through large lightening hole in rib 52 and position centered on new access hole between ribs 52 and 53.
15. Clamp the doubler in place and set the AD3 rivets.
16. Insert the roll servo bracket through factory bell crank inspection hole.
17. Insert the roll servo bracket through one of the large lightening holes in the at Rib 52.
18. Position the roll servo bracket with angle tabs facing outboard.
19. Center the bracket on the first lightening hole in rib 52 that is forward of the slot in the rib that the aileron bell crank moves in.
20. The bottom of the bracket should clear in lower skin by approximately 0.032”.
21. Clamp the bracket in place. Refer to Image 3-2.
22. Using the roll servo bracket as a template mark the four outer hole locations shown in Image 3-2 using a center punch or equivalent.

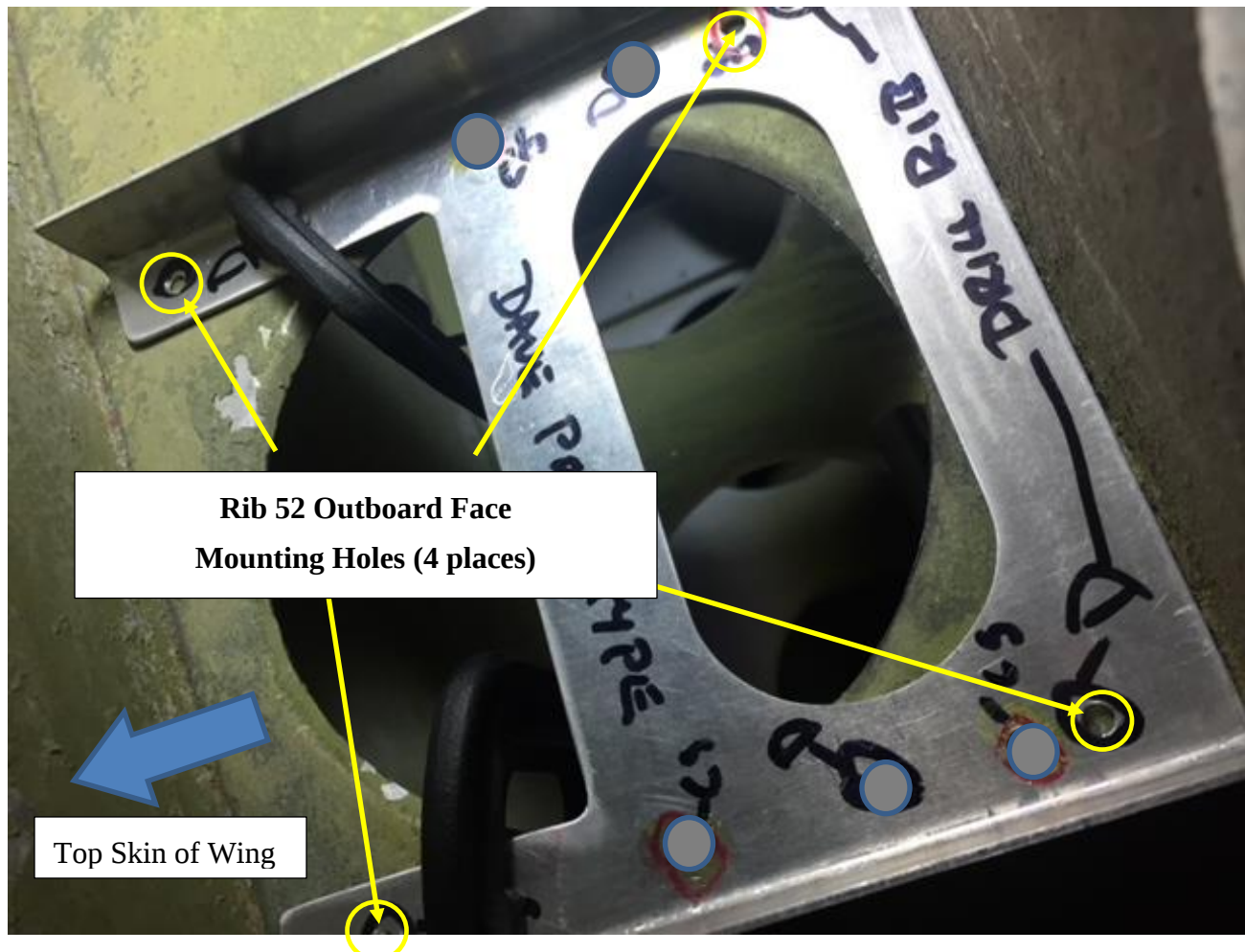


IMAGE 3-2 ROLL SERVO BRACKET INSTALLATION

23. Remove the roll servo bracket from the wing.
24. Use an angle drill with a #17-bit to drill four (4) clearance holes in Rib 52. Refer to Image 3-2 at the center punched locations.
25. Using a #16 drill bit enlarge the four outer holes on the servo baseplate. Refer to Appendix E.
26. Install four (4) Clickbond nutplates included in the hardware kit onto the servo baseplate. Refer to Appendix E and Appendix F. The (4) Clickbond nutplates have been superseded by a PN: 901-115 baseplate that comes installed on the roll servo (Refer to Image 3-7).
27. Install the servo arm onto roll servo using the M3 screws supplied in the hardware kit.



Note:

The M3 screws have been coated with Loctite. Do not apply additional Loctite to the M3 screws.

28. Place the servo safety washer over the screws and install the servo safety cotter pin through the shaft hole.
29. The servo arm should be straight up with the servo sitting on a bench. Refer to Image 3-5.
30. Install the roll servo onto the bracket using the MS24693-S48 screws supplied in the hardware kit. Refer to Image 3-3.



IMAGE 3-3 ROLL SERVO BRACKET INSTALLATION

31. Install the servo push rod assembly onto roll servo arm with the hardware supplied. Refer to Figure 3-2.

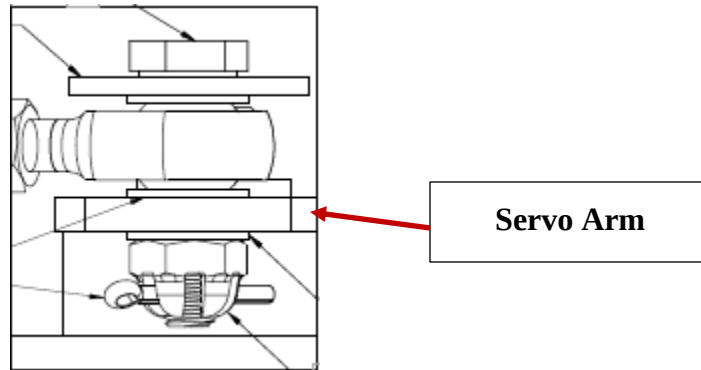


FIGURE 3-2 SERVO ARM TO ROD ASSEMBLY

32. Torque the castle nut to spec. The cotter pin cotter pin will be inserted in a later step.
33. Pass assembled servo with push rod up through Cessna bell crank inspection hole, and into bay between ribs 52 and 53 through large lightening hole in rib 52.

Note:

This operation requires successive rotation of the servo assembly to pass through each hole.

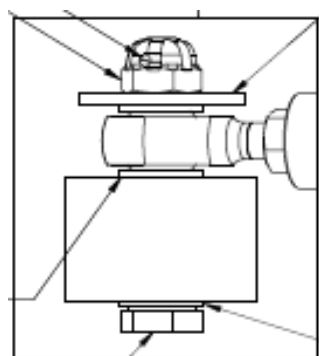
34. Install the servo bracket to Rib 52 using four (4) AN525 screws and AN970 washers supplied in the hardware kit. Refer to Image 3-4.



AN525 & AN970. Four (4) places

IMAGE 3-4 ROLL SERVO BRACKET INSTALLATION

35. Remove Cessna AN-3 bolt from aileron bell crank arm and aileron push rod (record washer and spacer positions).
36. Install the servo rod to the bell crank arm and the existing aileron push rod arm. Refer to Figures 3-3 & 3-4, Image 3-4, and The STC Group LLC Illustrated Parts Catalog.



Cessna bellcrank control rod

FIGURE 3-3 ROLL ROD TO AILERON BELLCRANK ASSEMBLY



ILLUSTRATED PARTS CATALOG

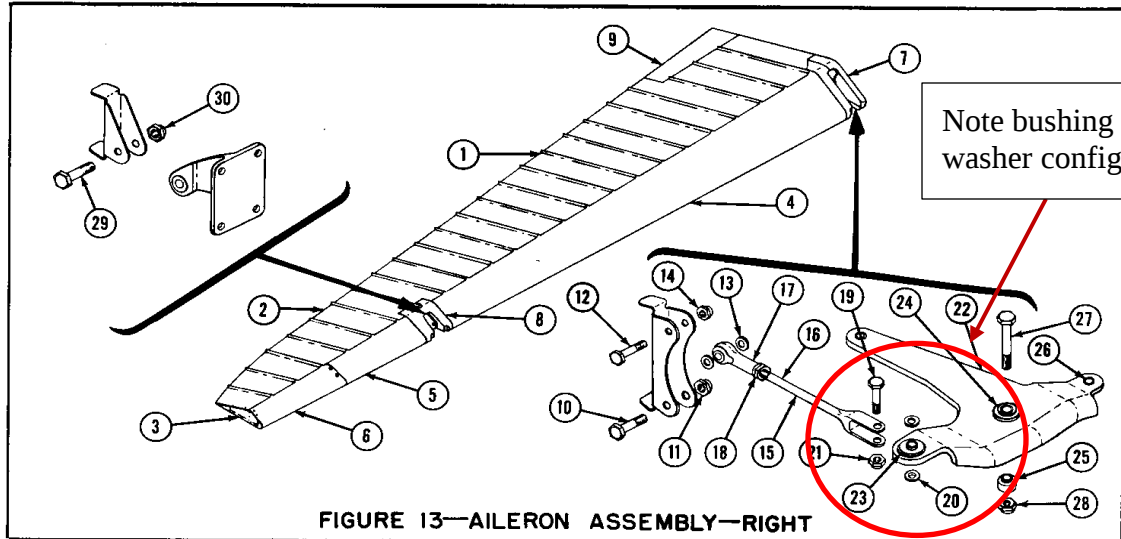


FIGURE 13—AILERON ASSEMBLY—RIGHT

FIGURE AND REF. NO.	PART NUMBER	PART NAME	UNITS REQUIRED ON MODELS	
			190	195
13-1	0324000-1	Aileron Assembly - Right wing (see figure 9 for NHA)	Ref	Ref
-2	0324000-3	Skit - Aileron upper	1	1
-3	0324000-5	Skit - Aileron lower	1	1
-4	0324108-1	Skit - Aileron leading edge (Sta. 121.5 to 169.625)	1	1
-5	0324129-1	Skit - Aileron leading edge (Sta. 171.875 to 181.5)	1	1
-6	0324130-1	Skit - Aileron leading edge (Sta. 181.5 to 191.0)	1	1
-7	0324110-1	Cover Assembly - Inboard aileron hinge	1	1
	PK76X2-8-6	Screw - (Attach cover)	4	4
	NAS444-5	Nut - (Attach cover)	4	4
-8	0324111-1	Plate - Outboard aileron hinge cover	1	1
	PK76X2-8-6	Screw - (Attach plate)	4	4
	NAS444-5	Nut - (Attach plate)	4	4
-9	0324115	Tab - Aileron trim	1	1
	PK76X2-8-6	Screw - (Attach tab)	6	6
	NAS395-17-3	Nut - (Finnerman A1348-8Z-3)	6	6
-10	AN4-11A	Bolt - (Attach inboard aileron hinge to bracket)	1	1
-11	AN365-428	Nut	1	1
-12	AN3-11A	Bolt - (Attach aileron push-pull tube to aileron)	1	1
-13	AN960-10	Washer	2	2
-14	AN365-1032	Nut	1	1
-15	0320121	Rod Assembly - Aileron push-pull	1	1
-16	0320121-2	Rod - Aileron push-pull	1	1
-17	NAS-36	Rod End - Aileron push-pull	1	1
-18	AN316-4R	Nut - Lock	1	1
-19	AN3-10A	Bolt - (Attach aileron push-pull tube to bellcrank)	1	1
-20	AN960-10	Washer	2	2
-21	AN365-1032	Nut	1	1
-22	0320106-1	Bellcrank Assembly - Aileron (ser 7003 thru 16083)	1	1
-23	0320106-3	Bellcrank Assembly - Aileron (less bearing) (ser 7003 thru 16083)	1	1
	0320110	Bushing - Aileron bellcrank cable	2	2
	0320107-1	Bellcrank Assembly - Aileron (ser 16084 & on)	1	1
	0320108	Bellcrank Assembly - Aileron (less bearing) (ser 16084 & on)	1	1
	0320109	Bushing - Aileron bellcrank cable (ser 16084 & on)	1	1
	0320109	Bushing - Aileron bellcrank cable (ser 16084 & on)	1	1
-24	AN200-KS3	Bearing - (faftit)	1	1
-25	NAS296-4A	Bearing - (Torington AR4-1)	2	2
-26	0320140	Spacer - Aileron bellcrank bearing	1	1
-27	AN4-20A	Bolt - (Attach aileron bellcrank to bracket)	1	1
-28	AN365-428	Nut	1	1
-29	AN4-11A	Bolt - (Attach outboard aileron hinge to bracket)	1	1
-30	AN365-428	Nut	1	1

ORDER BY PART NUMBER AND NAME

SERIAL NUMBER AND COLOR IF APPLICABLE

FIGURE 3-4 CESSNA AILERON BELL CRANK AND PUSHROD ASSEMBLY



IMAGE 3-5 ROLL SERVO ROD BELLCRANK ASSEMBLY

Note:

It is important to maintain the Cessna spacers and assembly order on either side of the bell crank bearing. Refer to Figure 3-4 and Image 3-5.

37. Install the MS24665-134 cotter key in the aileron assembly. Refer to Figure 3-3.
38. Lock the ailerons in the neutral position.
39. Verify that the roll servo arm is perpendicular to the top of the servo when the aileron is locked in the neutral position. Refer to Image 3-6.



40. If the servo arm is not perpendicular to the top of the servo case, adjust the length of the push rod by screwing the servo arm rod end in or out to achieve the desired alignment. This will be checked electrically after the autopilot is installed. Refer to Appendix H.



IMAGE 3-6 ROLL SERVO ARM INSTALLATION

41. Unlock the ailerons.
42. Have an assistant move the ailerons through their full travel.
43. Verify that there is no interference at either end of the roll servo push rod.
44. Verify that the travel is stopped by the aircraft aileron stops and not the servo stops.



45. The angle of travel of the servo arm should not exceed **plus or minus 44.9 degrees**. This will be checked electrically after the autopilot is installed. Refer to Appendix H.

Note:

The STC Group LLC prototype Cessna 195 servo arm measurements:

Neutral position = +1.4 degrees

Right aileron full UP = +38.5 degrees

Left aileron full UP = -35.2

Aircraft roll servo arm positions will vary due to manufacturing differences.

46. Tighten the jam nuts and mark with tamper proof torque seal or equivalent.
47. Install the MS24665-134 cotter pins into the castle nuts.
48. If the angle measurements do not meet the criteria in Step 45 contact The STC Group LLC.
49. Prior to calling for assistance email the following information:
- Complete photos of the installation
 - The Trio LNAV servo Set servo arm angle information
 - The measured length of the push rod
 - The servo arm part number. Part number is stamped on the servo arm.



IMAGE 3-7 ROLL SERVO BASEPLATE

END



4.0 PITCH SERVO INSTALLATION

1. **Clamp the elevator into the neutral position with padded blocks.**
2. Access the aft area of the aircraft by removing the baggage compartment cover.
3. The pitch bellcrank assembly is located aft of the baggage compartment. Refer to Images 4-1 and 4-2.
4. The Trio Pro Pilot pitch servo assembly is depicted in Figure 4-3.
5. Details of the servo mount assembly are depicted in Image 4-1.
6. Details of the pitch servo push rod attachment to the Cessna bellcrank are depicted in Figure 4-3 and Images 4-1 and 4-2.

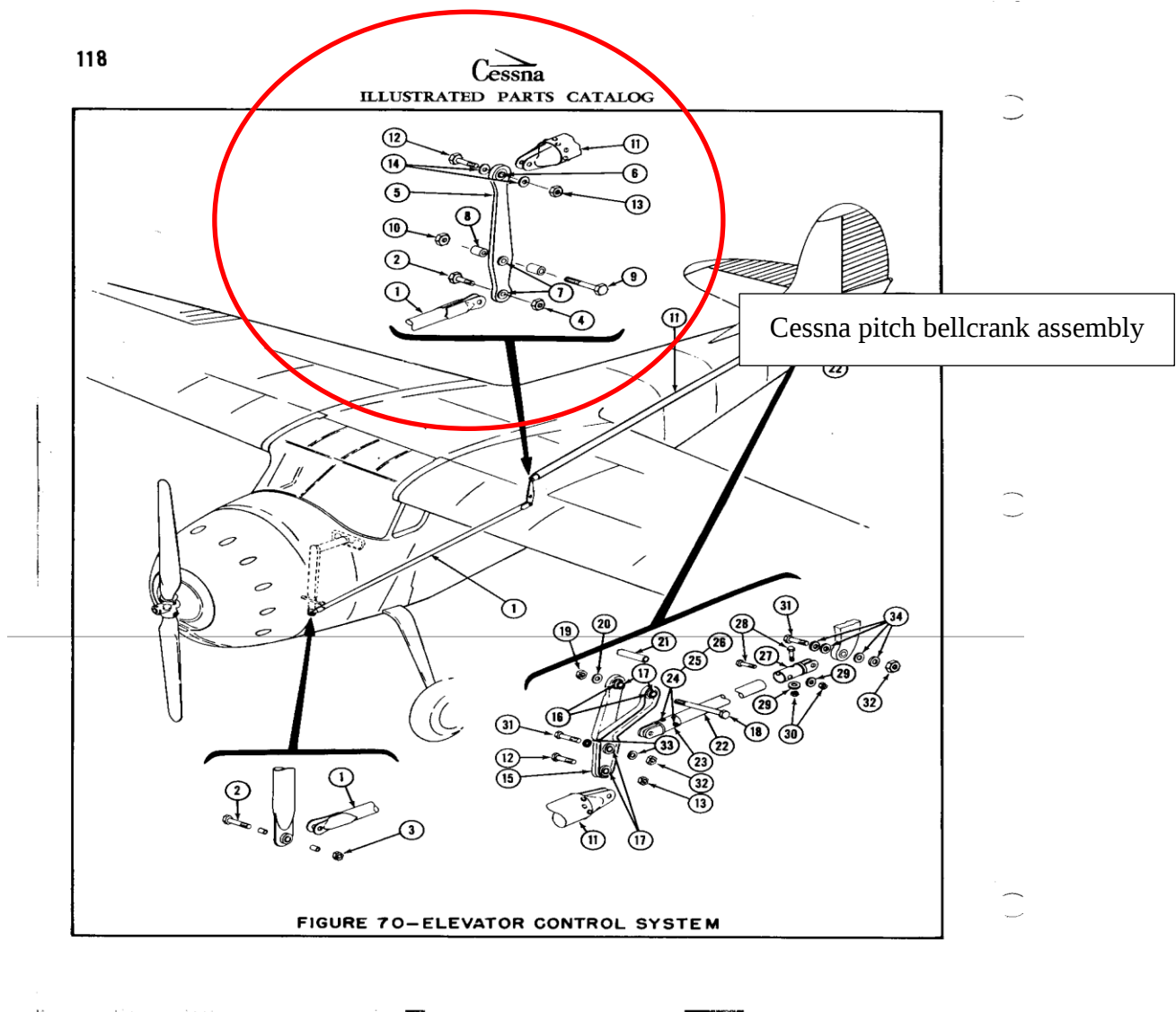


FIGURE 4-1 CESSNA PITCH CONTROL ASSEMBLY



32

Cessna

ILLUSTRATED PARTS CATALOG

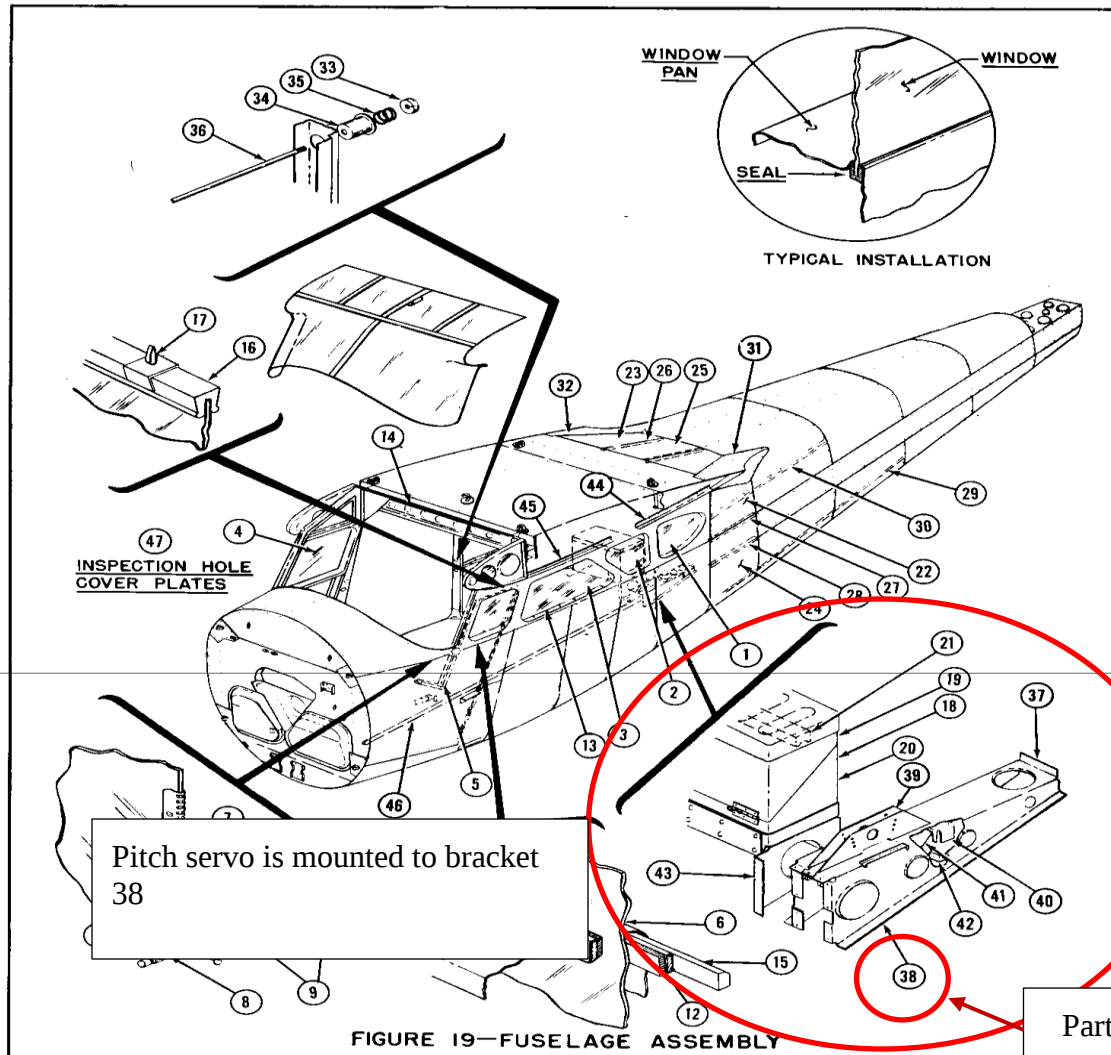


FIGURE 4-2 PITCH SERVO LOCATION ON PART 38

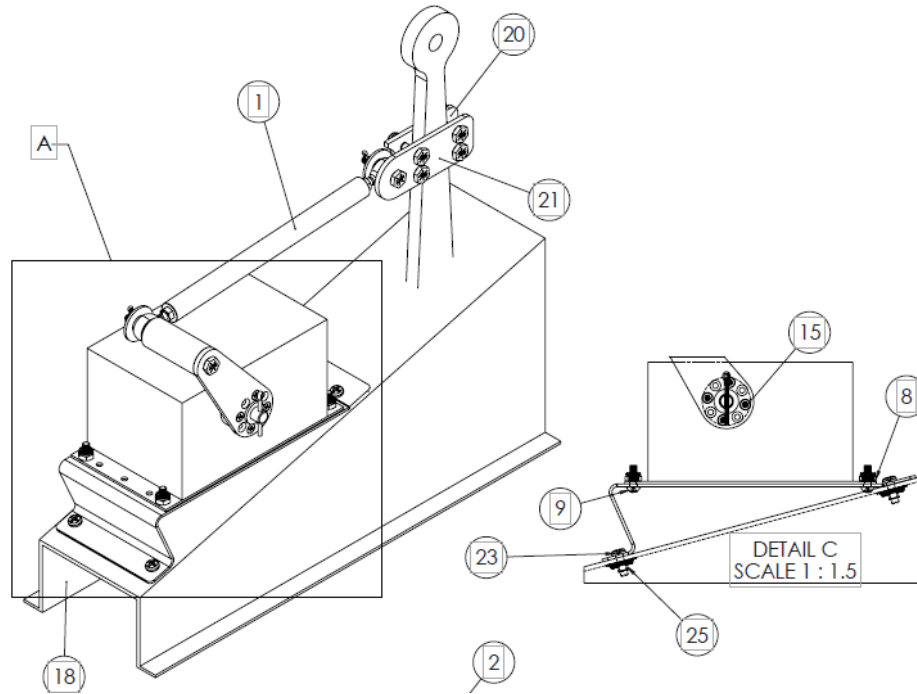


FIGURE 4-3 TRIO PITCH SERVO ASSEMBLY



IMAGE 4-1 TRIO PITCH SERVO INSTALLATION



IMAGE 4-2 PITCH SERVO TO BELLCRANK CONNECTION



IMAGE 4-3 PITCH SERVO BRACKET INSTALLATION



7. Position the pitch servo bracket full aft and centered on the Cessna hat section - Part 38. Refer to Figure 4-2.
8. Use the servo bracket mounting hole feet as a locating holes to drill four #17 holes. Center punch before drilling for accuracy. Refer to Figure 4-4.

Note:

Use cleco temporary fasteners or clamps after each hole is drilled to hold the servo mount in position and prevent movement. See Note below.

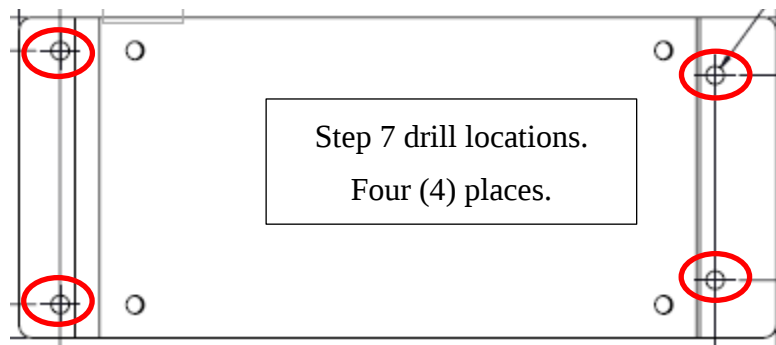


FIGURE 4-4 PITCH SERVO BRACKET

Note:

Part 38 may have holes from previous autopilot installations. Carefully check the alignment of the servo bracket to avoid drilling off center into previous holes. The bracket may be moved forward up to 0.20 inch to avoid previous holes.

9. Deburr holes drilled above.
10. Clean the underside of each hole drilled into Part 38 with acetone and scotch bright pads in preparation for ClickBond nutplate installation. Refer to Appendix F. Alternatively, the supplied nutplates and rivets can be used instead of ClickBonds.
11. Install Clickbond nutplates supplied in the hardware kit on the underside of Part 38. Refer to Appendix F. Allow adhesive to harden for 24 hours.
12. Attach the pitch servo arm to servo with the supplied hardware.



Note:

The M3 screws have been coated with Loctite. Do not apply additional Loctite to the M3 screws.

13. The servo arm should be positioned straight up at the center of travel when attaching the servo arm to the servo bushing. Refer to Image 4-4.

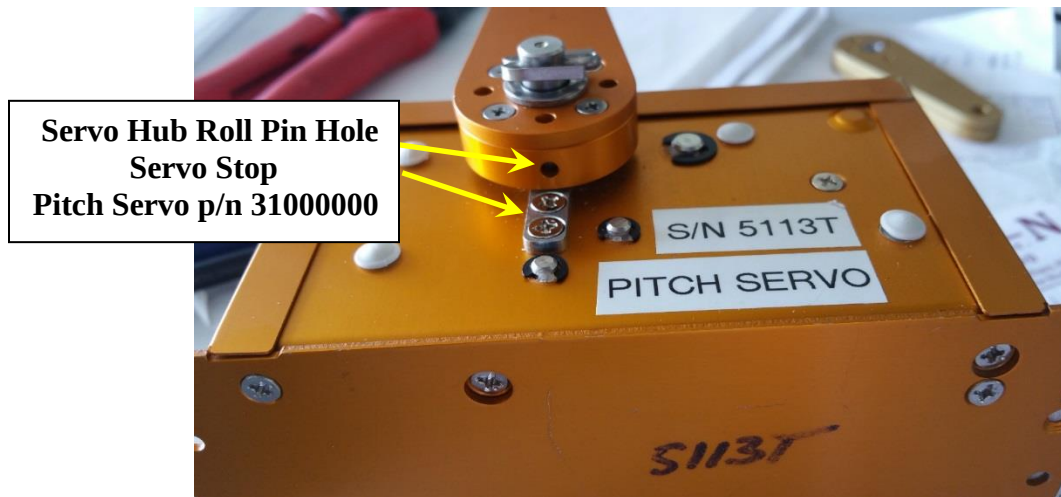


IMAGE 4-4 SERVO ARM POSITION

Note:

Observe in Image 4-4 that the roll pin hole is positioned above the servo stop.

14. Install the pitch servo onto the servo bracket with the AN525 screws and MS21044 nuts supplied in the hardware kit. Refer to Figure 4-5.
15. Mount the servo bracket onto Part 38 using the MS27039 screws supplied in the hardware kit. Refer to Figure 4-5.

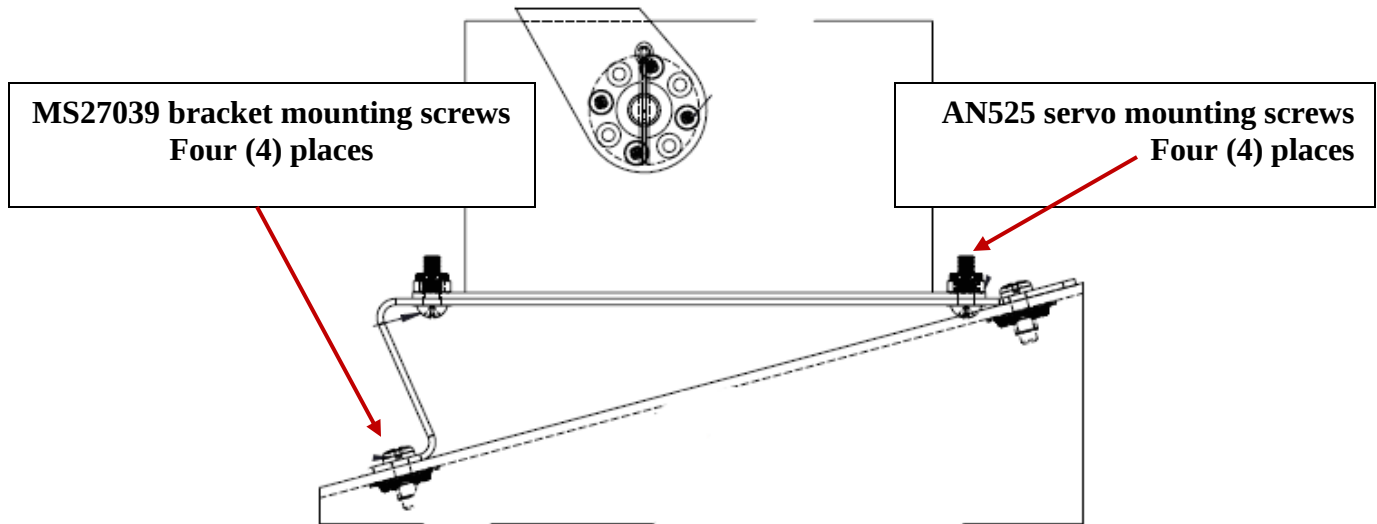


FIGURE 4-5 SERVO AND MOUNT ASSEMBLY ON PART 38

16. Attach the servo push rod attach bracket to the Cessna bellcrank. Refer to Figure 4-2 and 4-6, and Image 4-2.

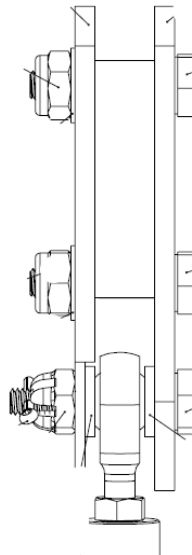


FIGURE 4-6 CESSNA BELLCRANK ATTACHMENT

17. Measure the height of the clamp down from the top bellcrank bearing centerline and position the clamp centerline at 3.0 inches per the installation diagram. Refer to Figure 4-7.

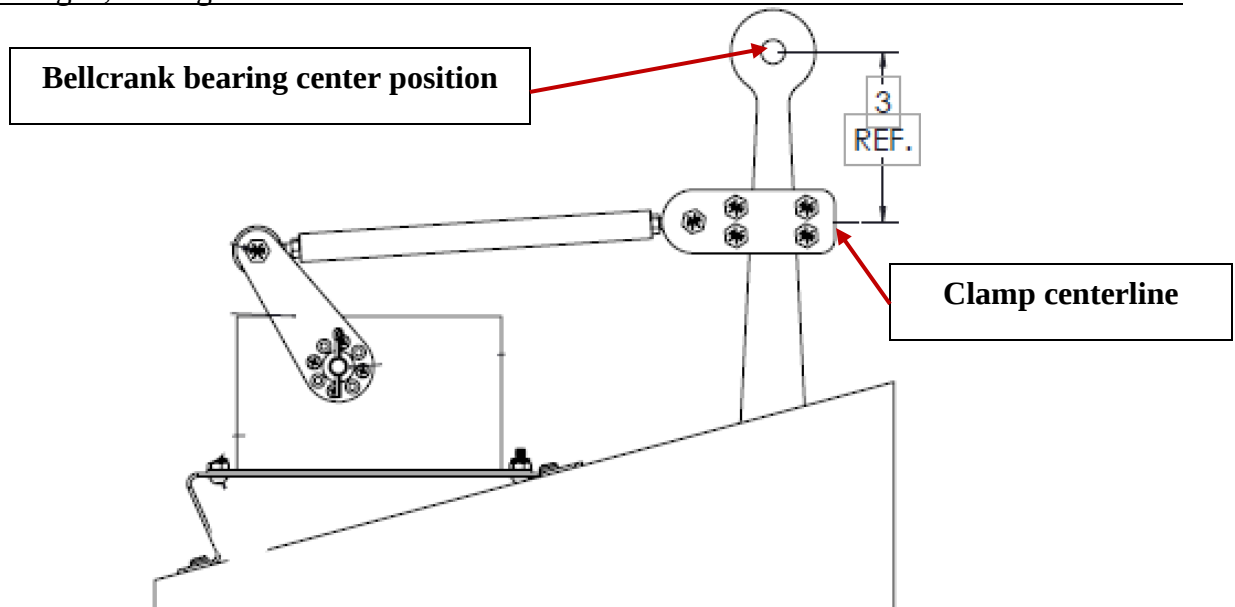


FIGURE 4-7 CLAMP INSTALLATION ON BELLCRANK

18. Attach the bellcrank clamp halves to the bellcrank using the AN3-7A bolts, Belleville washers, and nuts supplied in the hardware kit.
19. Torque the bolt, washer, and nut assembly to 20 lb. in. to 25 lb. in.

Note:

Ensure that the Belleville washers are flattened. The Belleville washers will maintain the installed compression of the clamp halves independent of thermal expansion and relaxation over time.

20. Attach the pitch push rod to the servo arm. Refer to Figure 4-8.
21. Torque to AN310 nut to spec. Do not insert cotter pin at this time.
22. Attach the pitch rod to the bellcrank clamp. Refer to Figure 4-6.
23. Torque to AN310 nut to spec. Do not insert cotter pin at this time.

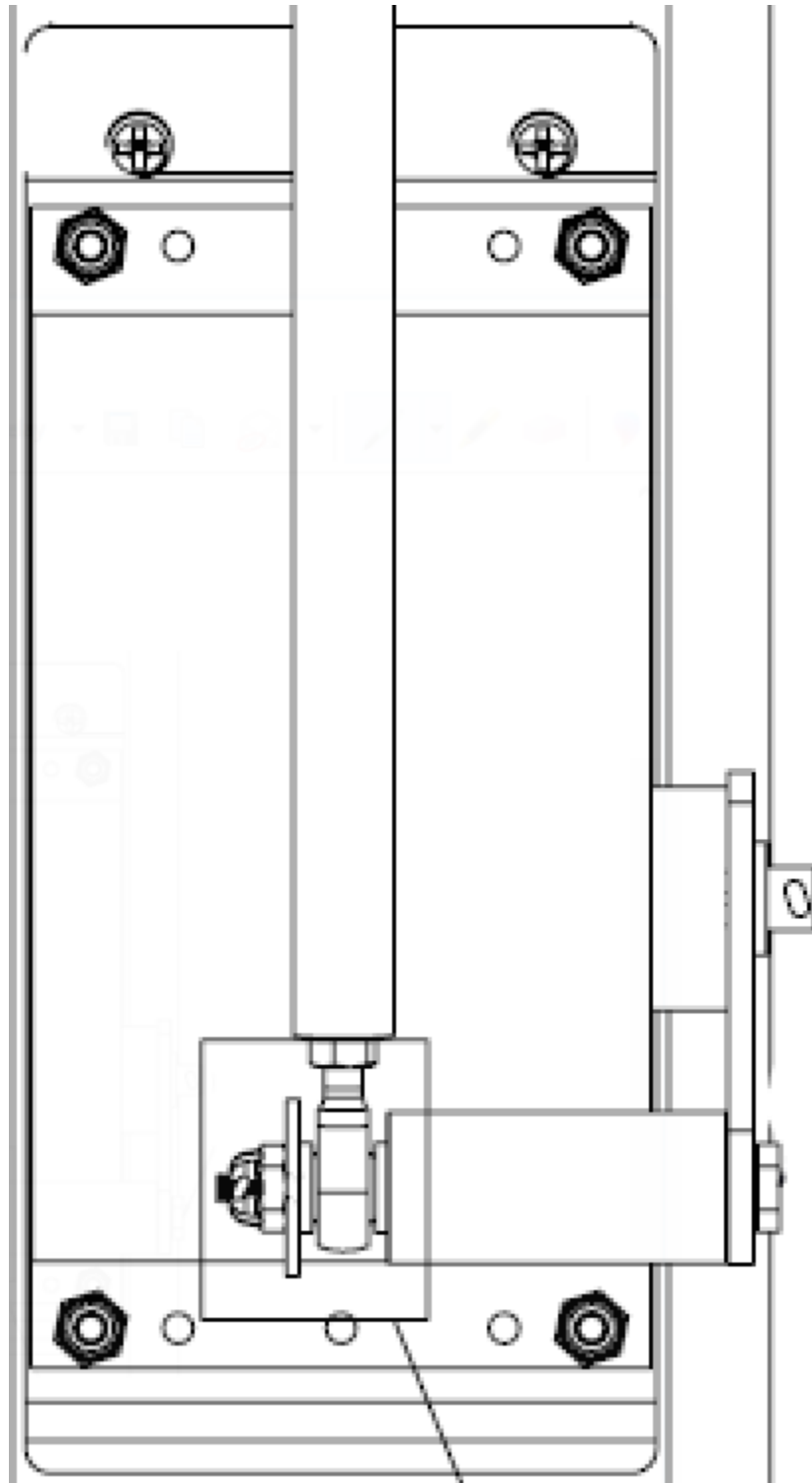


FIGURE 4-8 PITCH SERVO ARM ASSEMBLY



Note:

With the elevators locked in neutral the servo arm should be positioned as depicted in Image



IMAGE 4-5 SERVO ARM POSITION ELEVATORS IN NEUTRAL

24. Unlock the elevators.
25. Have an assistant move the elevators through their full up and full down motion. Refer to Images 4-6 and 4-7.
26. Verify that there is no interference at either end of the pitch servo push rod.
27. Verify that the elevator travel is stopped by the Cessna pitch stops and not the servo stops.



Note:

The Trio Pro Pilot autopilot controller and electrical installation must be completed before accurate servo arm measurements may be taken and recorded.

28. At the aircraft nose up mechanical stop, with the control yoke in the full aft position, the Trio VNAV Servo Set reading for the servo arm angle **must read between +44.9 degrees and + 35 degrees**. Refer to Image 4-7.
29. At the aircraft nose down mechanical stop, with the control yoke full forward, the Trio VNAV Servo Set reading for the servo arm angle **must read between -35 degrees and -44.9 degrees**. Refer to Note below Image 4-6.
30. Verify the servo arm travel positions **and record them** after the autopilot electrical installation is complete. Refer to Appendix H.



IMAGE 4-6 ELEVATOR FULL DOWN

Note:

The STC Group LLC Cessna 195 prototype aircraft pitch servo arm positions.
Individual aircraft will vary.

Elevator locked in neutral = -3.8 degrees

Elevator full up = +42.6 degrees

Elevators full down = -38.0 degrees



IMAGE 4-7 ELEVATOR FULL UP

31. Install the MS24665-134 cotter pins into the castle nuts after the servo arm position has been verified within the limits specified in Steps 28 and 29.
32. Tighten the jam nuts and mark with tamper proof torque seal or equivalent.
33. If the angle measurements do not meet the above criteria contact The STC Group LLC.
34. Prior to calling for assistance email the following information:
 - a. Complete photos of the installation
 - b. The Trio VNAV servo Set servo arm angle information
 - c. The measured length of the push rod
 - d. The distance from the top bearing on the pitch bellcrank and the horizontal centerline of the push rod clamp half on the bellcrank
 - e. The servo arm part number. Part number is stamped on the servo arm.

END



APPENDIX A - TRIO PRO PILOT AUTOPILOT INSTALLATION

NOTE

Prior to plugging harness DB9 or DB37 into servos or autopilot control perform a full power, ground, and data test on the harness by ringing the wires from plug to plug using PRO PILOT WIRING HARNESS DWG 41300010 or latest approved version. Refer to Appendix B.

Call Trio Avionics at +1 619-448-4619 if you have additional questions or need assistance.

The Trio Pro Pilot autopilot controller must be integrated with the aircraft pitot and static system. A pitot and static system test must be performed prior to opening the pitot and static system.

Roll Servo Harness Installation

1. Remove interior trim panels on cockpit passenger side
2. Route Trio Harness Roll servo wiring along starboard of aircraft following wing landing light harness path.

Note:

Enlarge the opening into the wing area to route the roll harness.

3. Take care to protect harness pins at end of harness.
4. Terminate supplied DB9 connector per Trio diagram. Refer to Appendix B.
5. Attach the DB 9 connector to Trio roll servo.
6. Secure the harness at the servo end with the clamp supplied in the hardware kit or equivalent.

Pitch Servo Harness Installation

1. Remove port side interior panels.
2. Route the Trio pitch harness along the port side following the Cessna factory harness path to aft of the baggage compartment.
3. Route the harness to the Trio pitch servo installation location.
4. Take care to protect the harness pins at the end of the harness.



5. Terminate the supplied DB9 connector per Trio wiring diagram. Refer to Appendix B.
6. Attach DB 9 connector to the Trio pitch servo.
7. Secure the harness at the servo end with the clamp supplied in the hardware kit or equivalent.

Trio Autopilot Controller

1. The Trio autopilot controller may be ordered in Panel Mount or Instrument Mount versions.
2. The Trio autopilot controller will support 12 to 30 volts.
3. The Trio controller is provisioned with Pitot and Static ports.
4. A pitot static system leak check must be performed before, and after, the installation to verify the pitot static system operation and integrity.
5. The controller pitot and static ports must be integrated into the aircraft pitot and static systems.
6. Every aircraft Pitot and Static system is different.

Note:

The following are for example only as the aircraft systems will vary.

7. The following components, or equivalent, will be used in most installations.:
 - a. Tygon tubing. 2 each x 24" pieces. Aircraft Spruce P/N 05-00944, or equivalent.
 - b. Nylo Seal fittings. 2 each. Aircraft Spruce P/N 264-N04.
 - c. Nylo Seal Inserts. 8 each. Aircraft Spruce P/N 259-N04.
 - d. Groen 1/4" constant pressure clamp or equivalent. 2 each. Refer to Image 5-1.
8. Extend the pitot & static hoses & cable connector through the tray and out through the front of the instrument panel to allow for ease of servicing.
9. Mate the pitot and static hoses to the control head.
10. Use constant pressure clamps, or equivalent, to secure the pitot and static connections at the rear of the autopilot controller.
11. Mate the 37 pin D connector to the control head using the screws provided.
12. If using an Instrument mount control head secure the control head using #6 brass instrument screws.



- 13.If using a Panel mount control head slide the control head into the tray, then tighten the securing screw. Do not over tighten control head in the tray.
- 14.Install the controller using best practices in either panel or hole locations. Refer to AC 43-13 for this step and all following steps.
- 15.Utilize the Trio wiring diagram in Appendix B for the following steps.
- 16.Install the supplied 5 ampere circuit breaker within easy reach of the pilot and label per Illustrated Parts Catalog.
- 17.If a Panel Mount unit is ordered install the supplied power switch and label.
- 18.Terminate the supplied DB37 connector.
- 19.Terminate the wiring with the aircraft GPS or handheld.
- 20.If ARINC 429 is available from GPS terminate ARINC 429 connections.
- 21.Install the supplied PCS button on the left side of the pilots control yoke and label PCS.
- 22.Install the Recover button, supplied, in an available convenient location within easy reach of the pilot and label AP Recover.
- 23.Ensure that the analog alarm out is connected to the un-switched audio input on the Audio Panel.
- 24.Install the Limitation Placard, P/N 1006450-1, supplied, in plain view of Pilot.

Trio Autopilot Data Connections

1. For the RS-232 connection set the output at the GPS unit to "Aviation w/no altitude" or NMEA 0183 OUT.
2. If your aircraft is equipped with a GPS that has ARINC 429, set unit to output "GAMA" Low Speed.
3. Prior to making the connections to the GPS unit in the aircraft determine what else is connected.
4. It may be necessary to parallel the connections.
 - a. If parallel connections are required, verify that the lines you are connecting to use, or can use, the same data format that is required.
5. Both the RS-232 and the ARINC 429 can be paralleled with like connections.



Trio Initial Setup and Checks

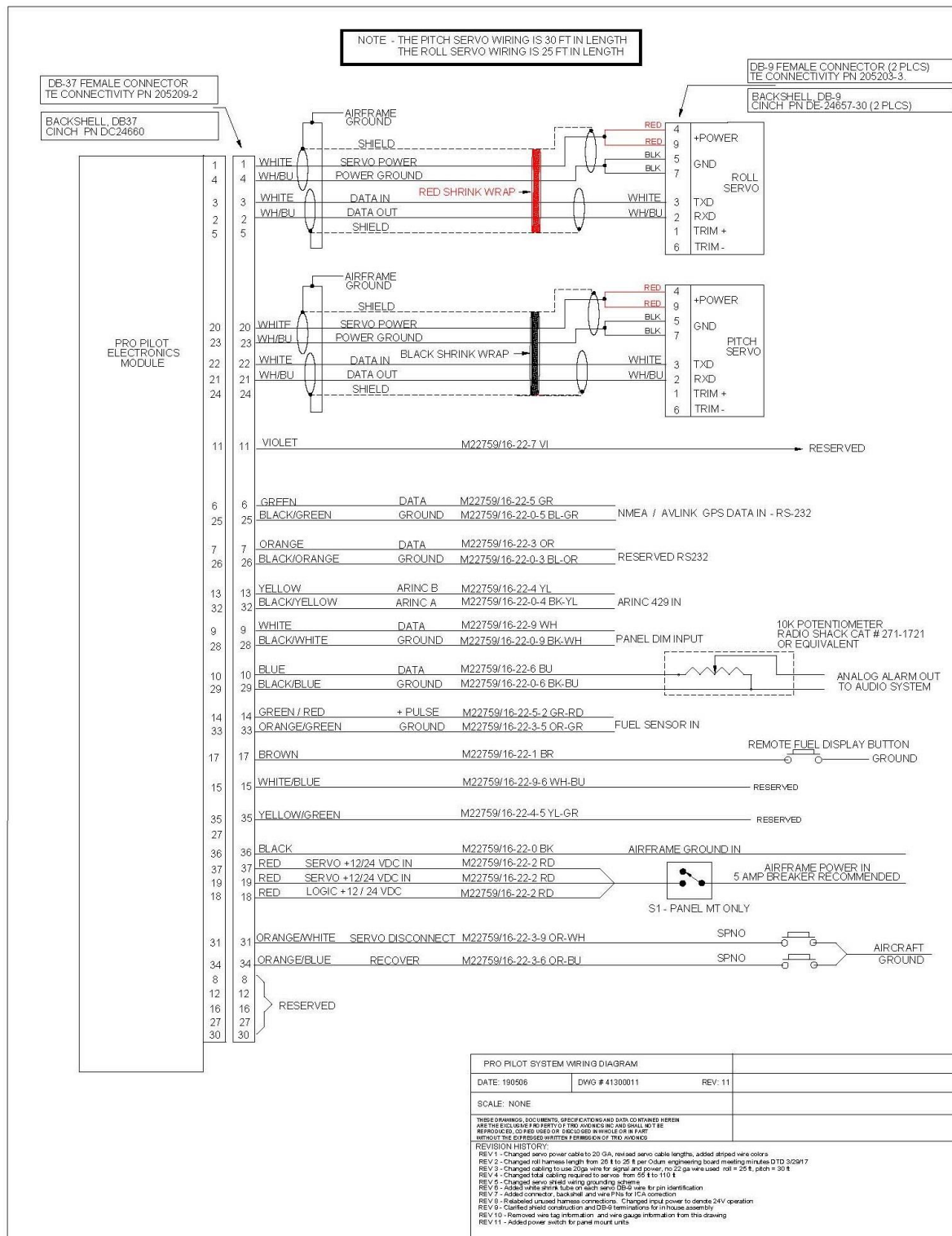
1. Refer to The Avionics Addendum Section 10 for initial checks and setup of the autopilot installation.
2. Autopilot gain settings have been programmed before shipment.
3. Individual aircraft may require fine tuning of servo gains on the first few test flights.
4. The Avionics Addendum may be downloaded at www.thestcgroupllc.com

END



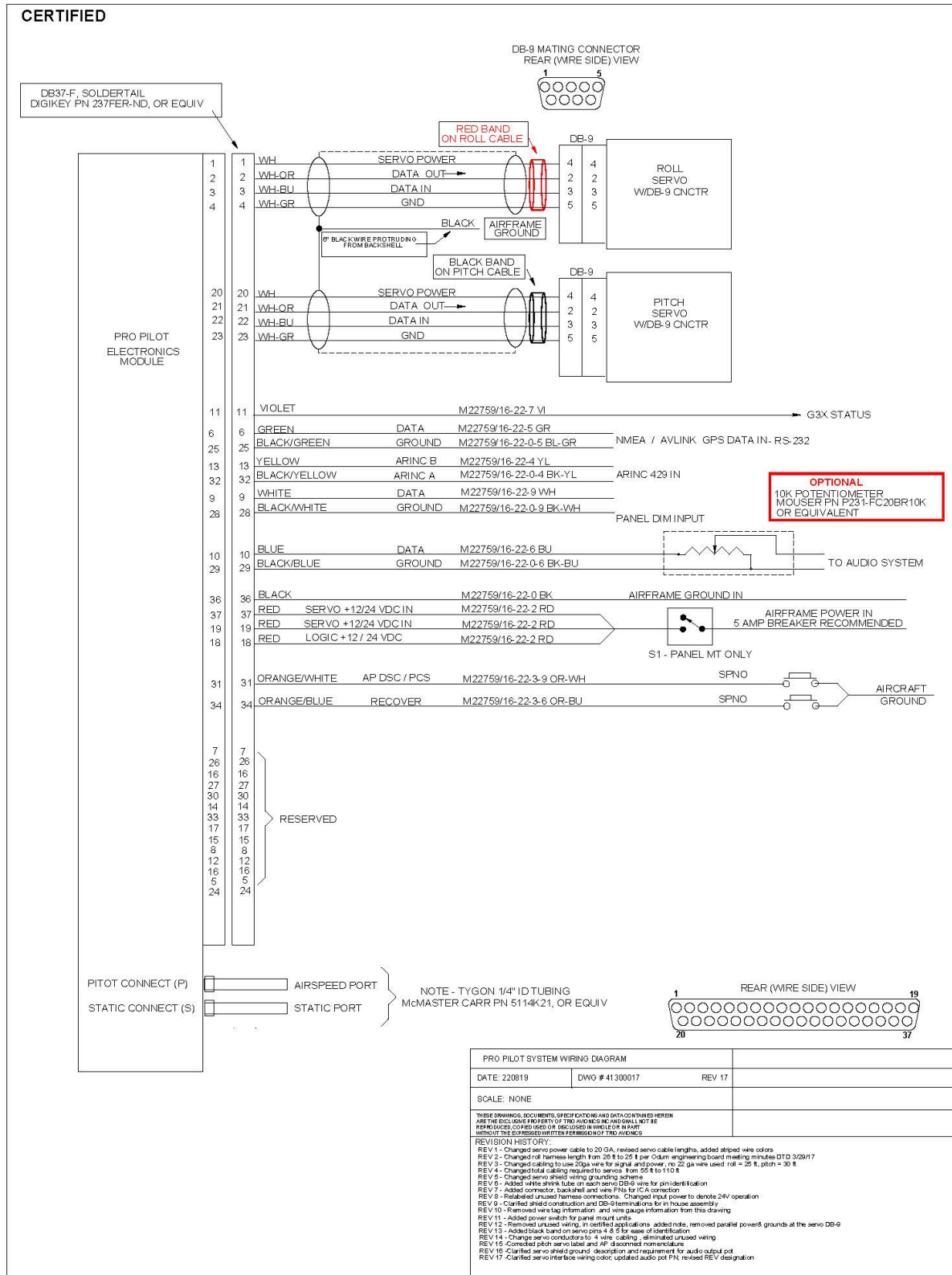
APPENDIX B - TRIO PRO PILOT WIRING DIAGRAM

ORIGINAL WIRING DIAGRAM





NEW WIRING DIAGRAM



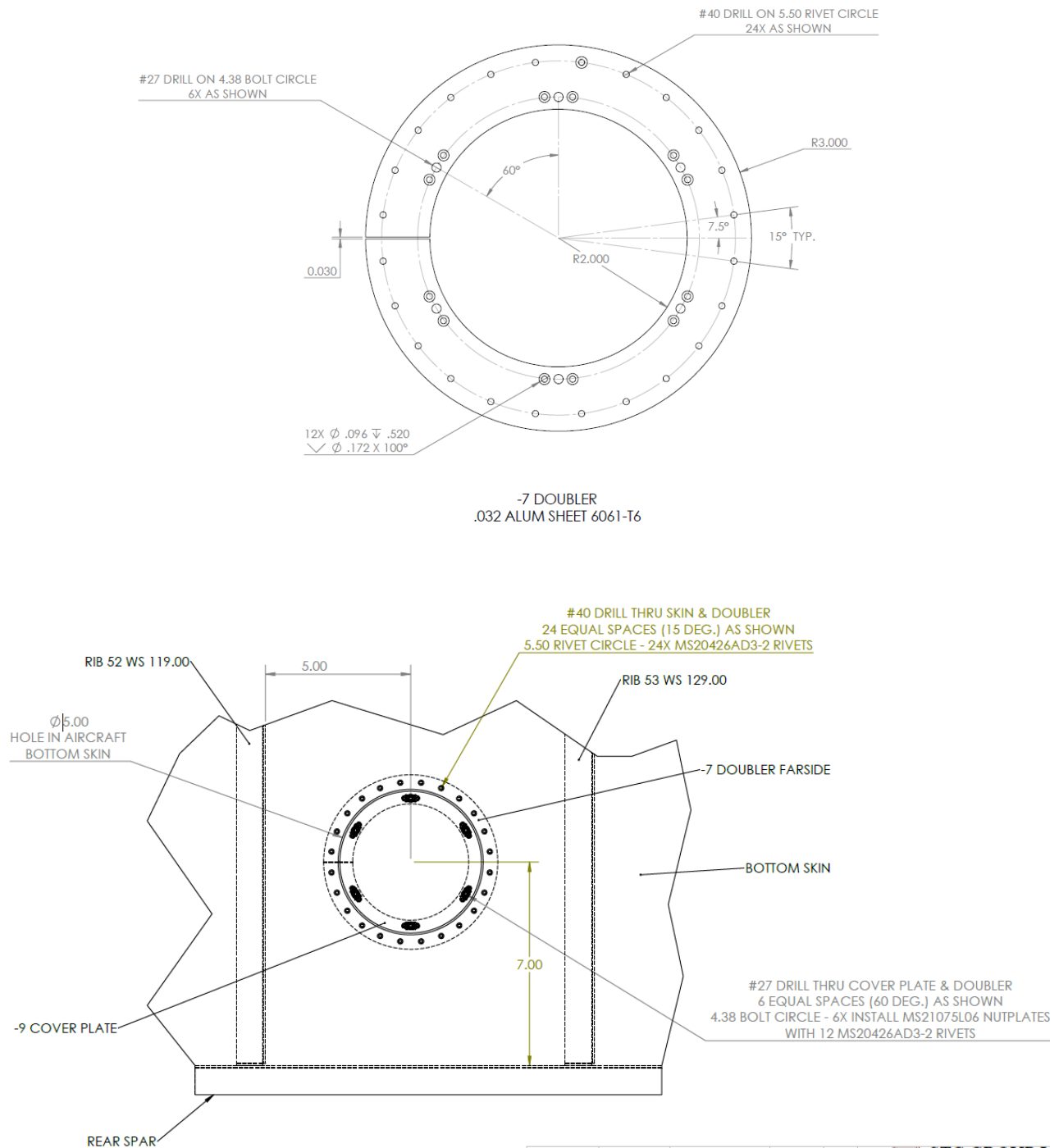


FIGURE C-5 ROLL INSPECTION PLATE DOUBLER

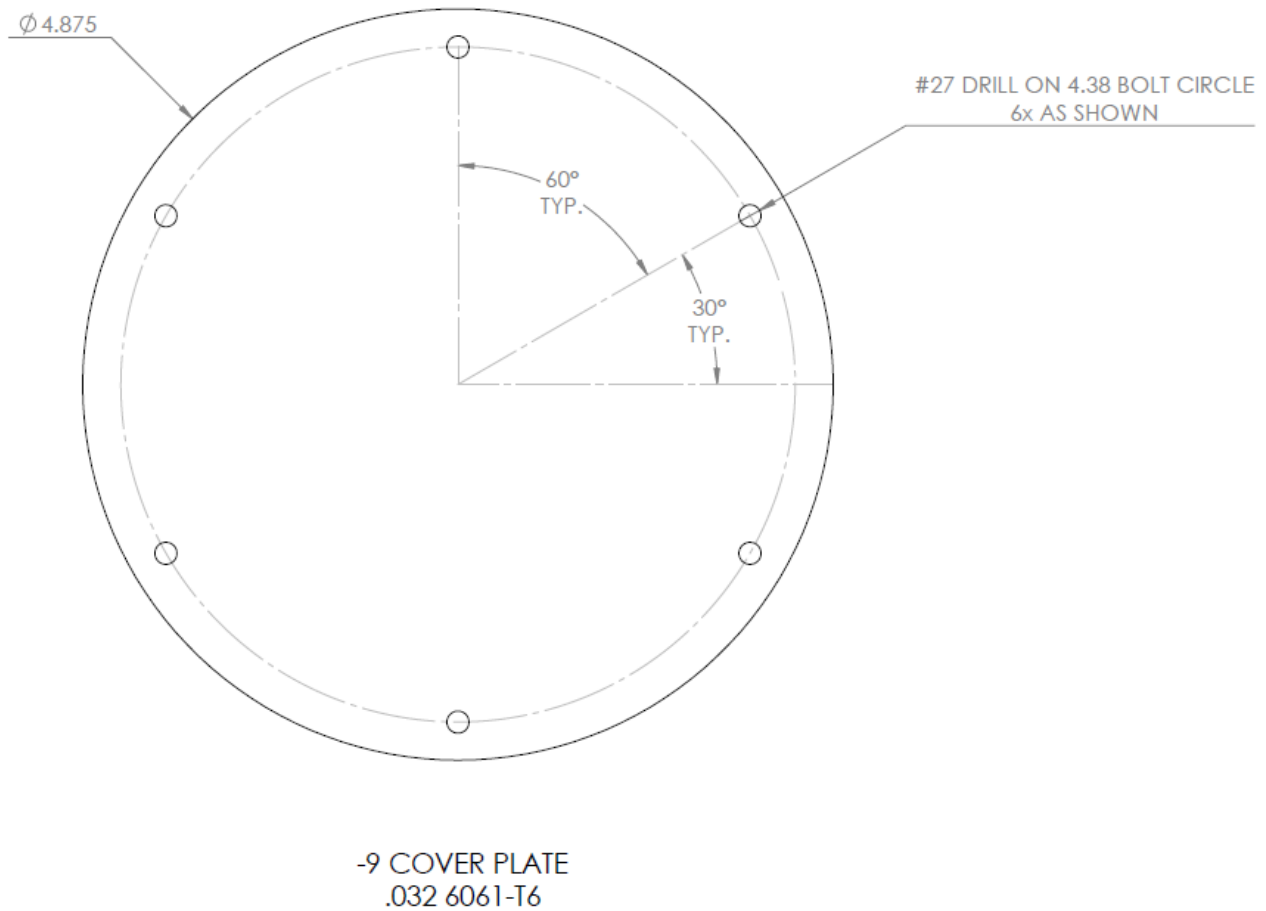


FIGURE D-1 INSPECTION HOLE COVER

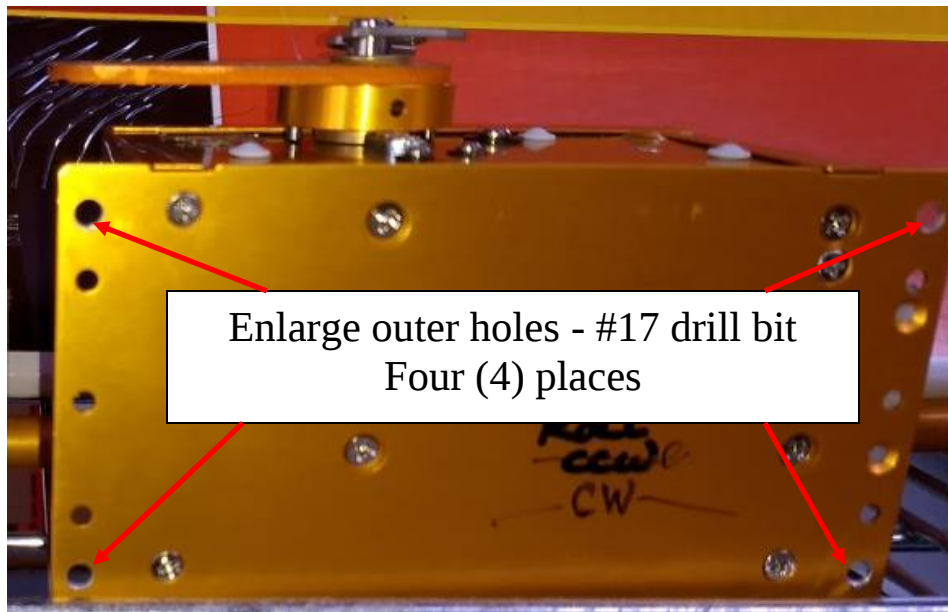


IMAGE E-1 TRIO SERVO P/N 3100000

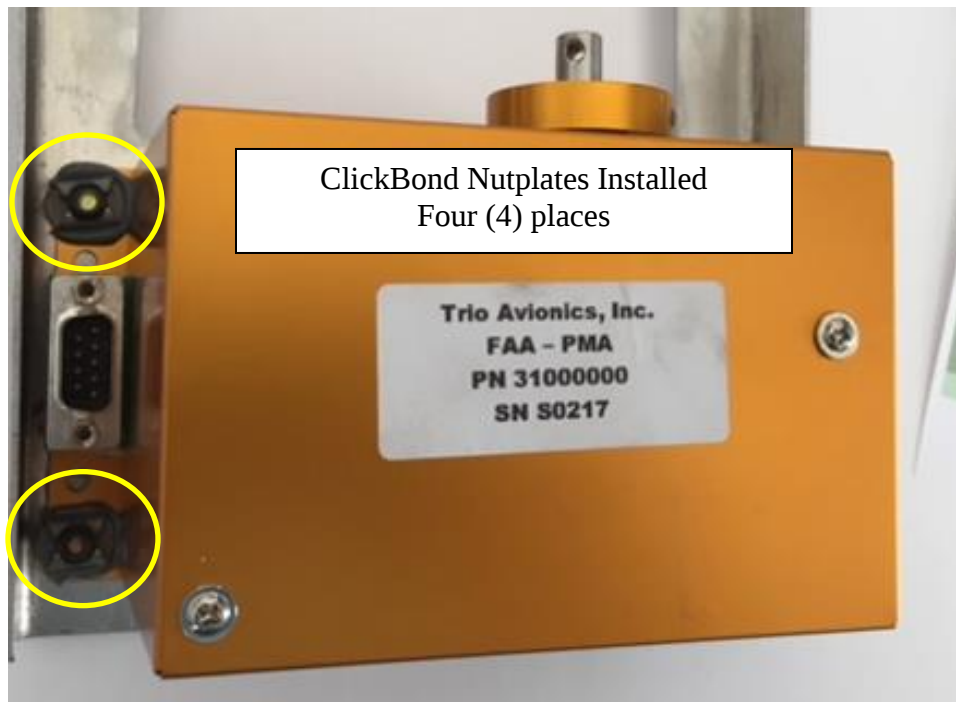


IMAGE E-2 CLICKBOND NUTPLATE INSTALLED



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.

Wipe using a single rolling motion.

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.

Wipe using a single rolling motion.

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.

CB7200150-A
© 2015 Click Bond, Inc. All rights reserved. Click Bond and the stylized logo are trademarks or registered trademarks of Click Bond, Inc. Registered U.S. Patent and Trademark Office

www.clickbond.com

PIONEERING > ADVANCED > SOLUTIONS

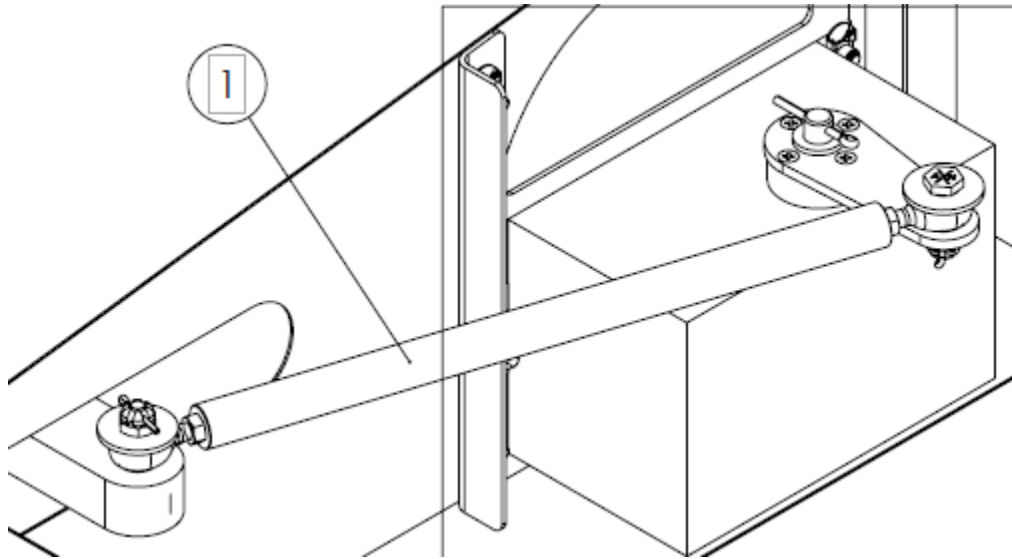


FIGURE G-1 ROLL SERVO ASSEMBLY

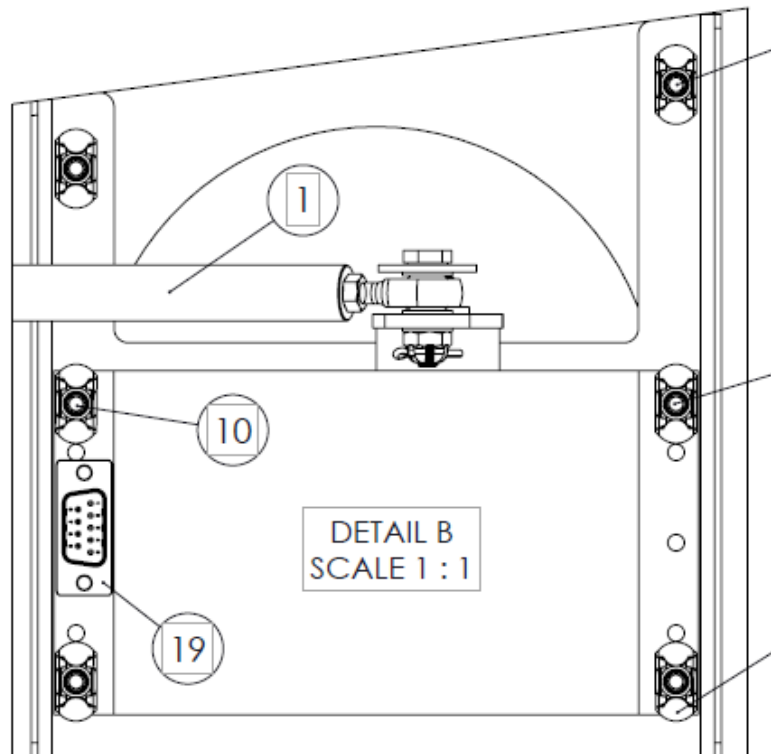


FIGURE G-2 ROLL SERVO BRACKET ASSEMBLY



ROLL SERVO

1. Attach the harness DB9 connector to the servo DB9 connector after completing the Wiring harness installation. Refer to Appendix A and B.
2. Ensure that the control yoke is centered, and the ailerons are locked in neutral.
3. Power on the Trio Pro Pilot autopilot and enter the Maintenance menu by pressing the Encoder knob and VMODE button simultaneously.
4. Turn, or Press, the Encoder knob until the LNAV SERVO SET screen is displayed.
5. Adjust the roll rod ends until the LNAV SERVO SET reading is 0.00 degrees.
6. Tolerance is + / -3°.
7. Tighten the jam nuts on the rod ends and mark both ends with tamper proof torque seal or equivalent.

PITCH SERVO

1. Attach the harness DB9 connector to the servo DB9 connector after completing the Wiring harness installation in Appendix A.
2. Ensure that the elevators are neutral.
3. Power on the Trio Pro Pilot autopilot and enter the Maintenance menu by pressing the Encoder knob and VMODE button simultaneously.
4. Turn, or Press, the Encoder knob until the VNAV SERVO SET screen is displayed.
5. Adjust the rod ends until the VNAV SERVO SET reading is approximately 3.8 degrees. Refer to the Note at the bottom of page 32.
6. Tighten the jam nuts on the rod ends and mark both ends with tamper proof torque seal or equivalent.
7. Power off the autopilot.



RECORD SERVO ARM POSITIONS

Note:

A notepad will be required for the following steps.

In these steps the Pitch Servo Arm position will be recorded in three (3) locations: neutral, full up elevator, full down elevator.

1. Lock the Elevator in the Neutral position. Refer to the Maintenance Manual for the specific model you are working on.
2. Power ON the Pro Pilot autopilot.
3. Press the Encoder knob.
4. When Elevation is displayed PRESS the Encoder knob.
5. Simultaneously Press and Hold the Encoder knob and V MODE button. Refer to Image H-1.
6. After approximately three (3) seconds the Maintenance Setting screen will appear. Refer to Image H-1.
7. Advance through the Maintenance Settings by either pressing or turning the Encoder knob until VNAV Servo Set screen is displayed. Refer to Images H-2 and H-3.
8. The reading should be approximately 3.80 degrees, + / -3°. The Image shown is an example only.
9. If the reading is not in this range adjust the rod ends equally until the VNAV Servo Set screen displays 3.80, + / - 3°.

Note:

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

10. Lock the rod ends into position and mark them with tamper proof torque seal.
11. Record the reading shown on the VNAV Servo Set screen.
12. Remove the blocks locking the elevator.
13. Move the control yoke fully aft until the elevator reaches the mechanical stops.
14. Record the reading on the VNAV Servo Set screen. Refer to Image H-4.
15. The reading must not exceed 44.9 degrees.



IMAGE H-1 MAINTENANCE SETTINGS



IMAGE H-2 FIRST SCREEN IN MAINTENANCE MENUS



IMAGE H-3 ELEVATOR POSITIONED IN NEUTRAL (EXAMPLE)



IMAGE H-4 ELEVATOR FULL UP



IMAGE H-5 ELEVATOR FULL DOWN

16. Move the control yoke fully forward until the elevator reaches the mechanical stops.
17. Record the reading on the VNAV Servo Set screen. Refer to Image H-5.
18. The reading should not exceed 44.9 degrees.
19. The elevator travel tests and readings are complete.
20. Each aircraft may require adjustments to the servo gains.
21. The average servo gain settings, derived from flight tests, for The STC Group LLC prototype Cessna 195 series aircraft are as follows:

“SET SERVO GAINS”

HNAV=25 VNAV=25

Note:

Individual aircraft gains will vary by aircraft. Use The STC Group LLC document number F-1006-43 to perform a complete flight check after autopilot installation.

22. Power OFF the autopilot.
23. Turn off the aircraft radio master, if so equipped.
24. Turn off the aircraft power.



APPENDIX I – ALTERNATE PITCH INSTALLTION BRACKET

1. Some aircraft are equipped with an additional rudder bellcrank associated with float installations.
2. If your aircraft has the bellcrank shown in Figure I-2 or I-3 then it may be necessary to fabricate the alternate pitch servo mounting bracket in accordance with Figure I-1.
3. The bracket must be fabricated from 0.063" or thicker 6061-T6 aluminum.
4. See Figure I-4 for installation image.

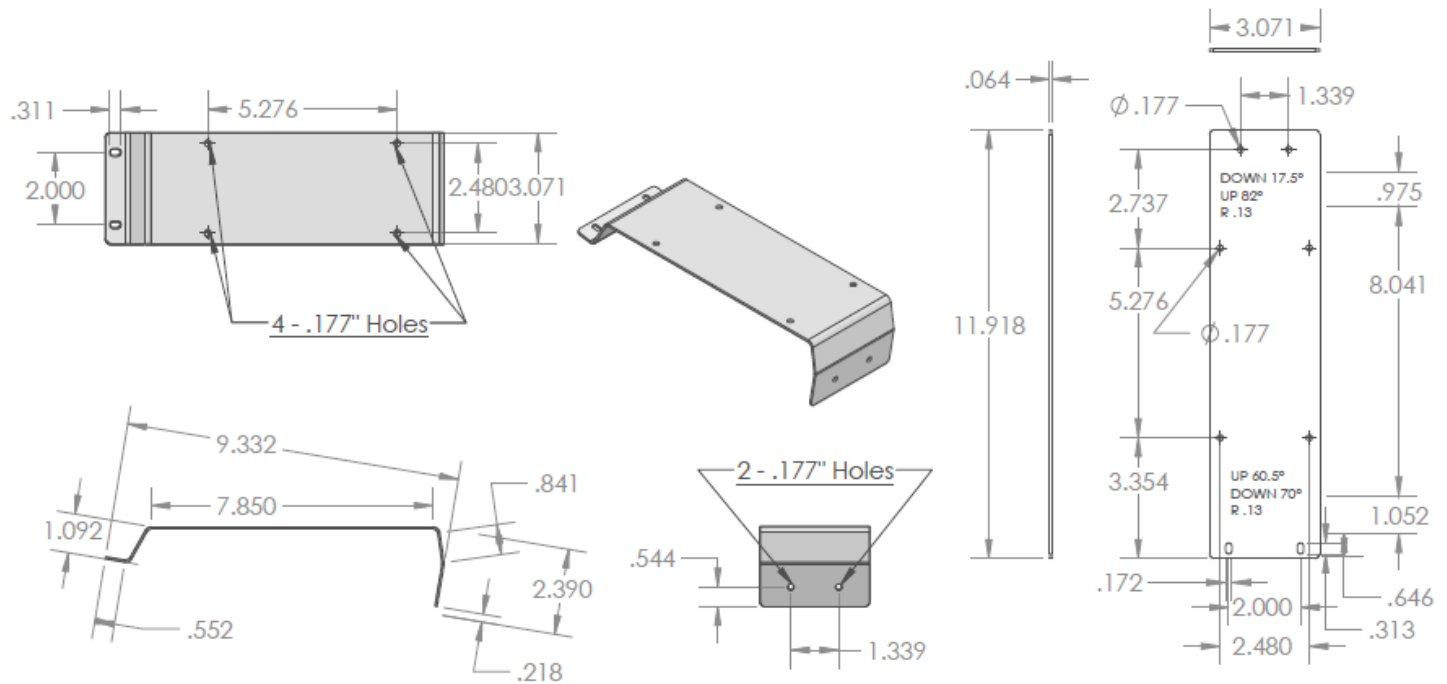


FIGURE I-1



FIGURE I-2

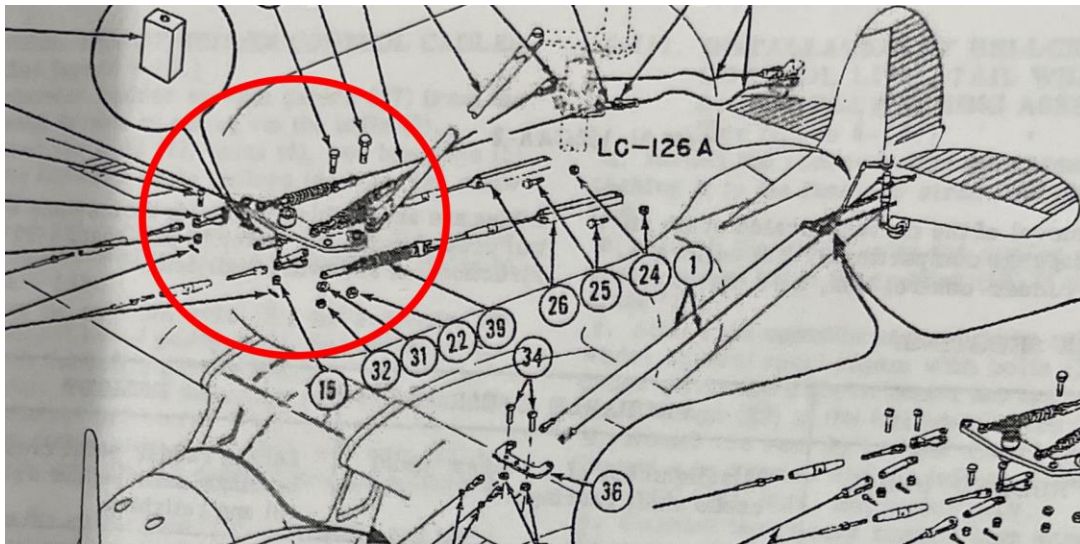


FIGURE I-3

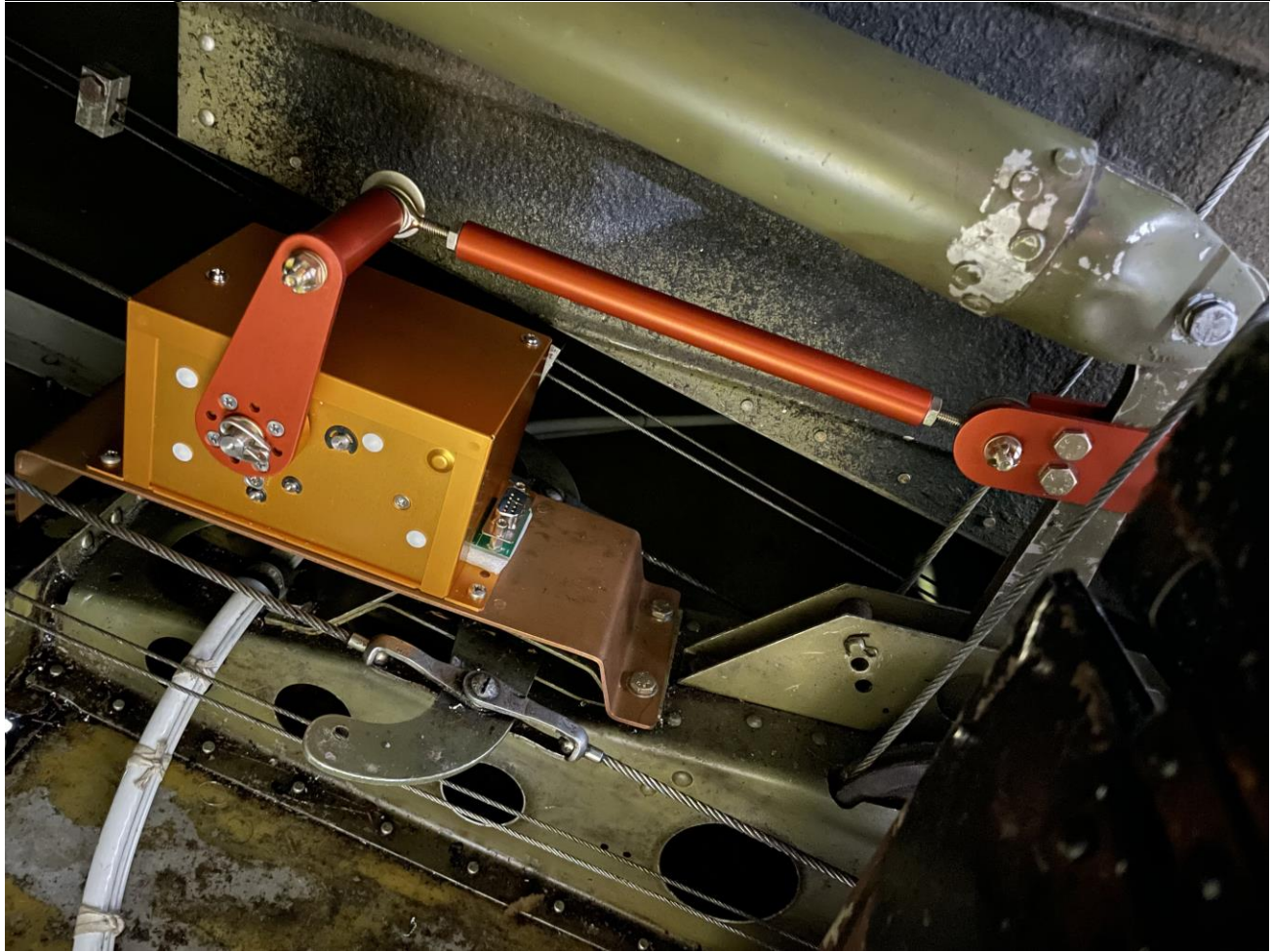


FIGURE I-4