	<b>LAA/MOD 3 MODIFICATION APPLICATION</b> Issue 2	Mod No. (Office use only)	10507
		Page : 1 of 9	
		Compiled :	
		Issue : 2 28/10/08	

## 1. AIRCRAFT DETAILS

Registration	Type	Serial Number
	All Europa variants	Standard Mod

## 2. APPLICANT DETAILS

Owner's Name	I. F. Rickard	Membership No.	031450
Name and address of person to be contacted regarding this modification:			
I. F. Rickard 37 Willowmead Close Woking, Surrey GU21 3DN Daytime Telephone Number:01483 714096 e-mail: g-iani@ntlworld.com			

## 3. MODIFICATION DETAILS

TITLE :	Autopilot Fitment (Navaid, Trio, TruTrak)
---------	---

The addition of an autopilot to the aircraft provides the benefits of:-

- 1) Allowing the pilot to concentrate on airmanship and lookout.
- 2) Preventing unintended deviation from course while undertaking in cockpit tasks such as map reading.


This Modification is specific to the single axis (roll) wing leveller/autopilot. This is connected to the aileron torque tube beneath the starboard seat. General instructions are given below. A separate appendix is provided for each type highlighting issues specific to that type.

Before commencing work obtain a current copy of the LAA Inspection Checks LA/IC-APWL.

Each of these autopilots uses a dedicated controller which will continue to function if other aircraft systems fail. If you wish to use other EFIS systems, to control the autopilot servo, you must consult LAA.

## 4. PARTS LIST

Qty	Part No.	Description	Source
1	Controller	See appendix	
1	Servo	See appendix	
1	Mounting kit	See appendix	
1	CS03	bush	Europa (2004)
1	Actuating arm		See drawing 10507/2
1	GPS unit	With NMEA output	Better than 1 output per second
4	AN3-7A	Bolt	

	<b>LAA/MOD 3 MODIFICATION APPLICATION Issue 2</b>	Mod No. (Office use only)	10507
		Page : 2 of 9	
		Compiled :	
		Issue : 2 28/10/08	

4	AN970	washer	
4	MS10242-3	Nuts	
6	TLPD440BS	Pop Rivets	
3	TLPD424BS	Pop Rivets	
1	AGS1661G	Bonding clip	Or Jubilee Clip
		Araldite 420+ Flox	

See the manufacturer's documentation for recommended GPS units and connection details.

### LIST OF RELATED DRAWINGS / PHOTOS

Drawing No.	Title / Description	Issue
10507/1A & B	Access hole location	1
10507/2A& B	Actuator arm installation	1
10507/3A & B	Servo installation	1
Picture 1	General view (TruTrak)	1
Picture 2	Servo and connector (TruTrak)	1
	Manufacturer's installation instructions	


## 5. ACTION

5.1) Servo Installation Overview. This makes use of the inboard passenger thigh locker. The servo control crank is linked to a crank sleeved onto the aileron torque tube with a link rod working through a hole in the thigh support rib of the locker. The analogue servos require the arm to be repositioned (See appendix 2 & 3). For general layout see picture 1 and drawings.

5.2) Access Openings. The access openings are made as per the drawing in the appropriate appendix. Position the inboard access hole relative to actual position of the seat rib. The outboard hole should be centred over the torque tube. Cut the servo access first and ensure the servo will fit in the position indicated. Remove the foam core around the access holes and fill with epoxy/Flox to reinforce the edges. Covers MUST be made and fitted to these access holes.

5.3) Actuator Arm. The arm is attached to the aileron torque tube by a CS3 bush. First glue and rivet the arm to the CS3 bush, using TLPD440BS rivets. If fitted during construction the unit can be slid onto the torque tube complete. After completion the unit must be split horizontally to allow fitting to the aileron torque tube. Split the assembly horizontally on the centre line of the torque tube. Make the cut as fine as possible. Trial fit the assembly to the torque tube with the Bonding/Jubilee clip.

5.4) Servo Installation. The servo (and bracket if TruTrak) is bolted to the Rib with the AN3-7A bolt. Cut the hole in the rib to allow the actuator rod to pass through. Cut the rod to length and trial fit the servo to ensure the rod is horizontal and at right angles to the torque tube. Adjust the position of the components as required. When correct install the AN3A-10A bolts, AN970-3

	<b>LAA/MOD 3 MODIFICATION APPLICATION Issue 2</b>	Mod No. (Office use only)	<b>10507</b>
		Page : 3 of 9	
		Compiled :	
		Issue : 2 28/10/08	

washer and MS10242-3 nuts. (For Trutrak see Appendix 1)

5.5) Actuator Arm fixing. Finalise and check the position of all components. Mark the intended position of the TLPD424BS rivets. Check that these positions are accessible for both drilling and riveting. This may require the use of a long drill and/or a "long nose" rivet puller. Remove the arm assembly and drill the rivet holes. Remove all coating and roughen the torque tube. Glue the assembly in position with 420 and flox. Install the Jubilee clip to hold in position. When cured, drill the torque tube and insert three rivets to hold the assembly on the torque tube. The clip may be removed to aid riveting but should be replaced.

5.6) Control Rod. The control rod must be cut to length and assembled with the rod-end bearings. The method varies by type (see appendix 1 and 3).

5.7) Controller Instrument Installation. The instrument may replace the turn co-ordinator, attitude indicator or be installed separately in a new position on the panel. Check that your intended installation meets the requirements of LAA/IC-APWL. (see Appendix 1 and 3)

5.8) Disconnect switch. A disconnect switch is required to be fitted which is easily accessible from either seat. This may be incorporated in joystick-mounted switches or on the panel. Check that you meet the requirements of LAA/IC-APWL.

5.9) Wiring. See the wiring diagram in the manufacturer's documentation. All wiring must be properly insulated and supported. (For Trutrak see Appendix 1)

## 6. FLIGHT TEST AND SPECIAL INSTRUCTIONS

6.1 Ensure all the requirements of Inspection Checklist (LAA/IC-APWL) have been met.

6.2 PFA inspector to inspect completed jobs and raise log-book entry, update weight schedule and issue flight test authorisation.

6.3 Specific ground and flight test instructions are given in the manufactures documentation. These MUST be carried out fully. In particular:-

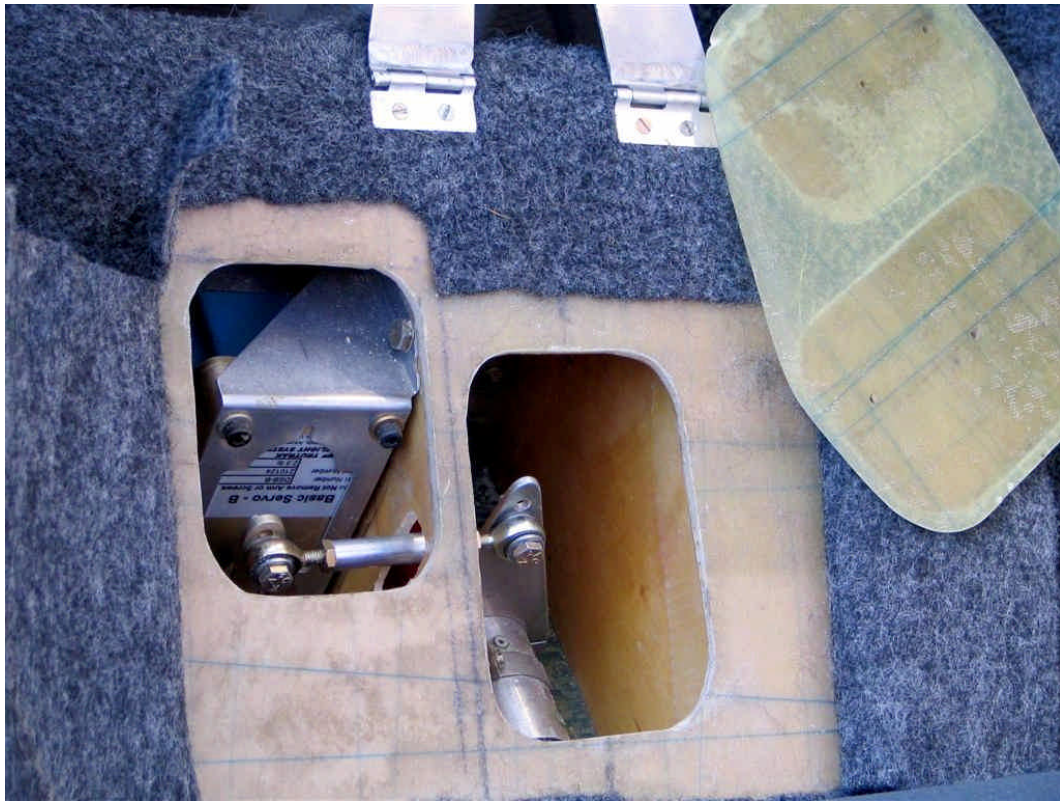
- 1) Make sure the servo is operating in the correct sense.
- 2) Make sure the servo can be overridden manually.

## 7. LIST OF RELATED ANALYSIS OR TEST REPORTS

Report No.	Title / Description	Issue
	<b>None</b>	

## 8. WEIGHT AND BALANCE EFFECT


	Weight (lb/kg)	CG (in/mm)	Moment
Existing A/C			
+/- Weight Change	2lb	52in	
Post Mod A/C			



Picture 1 Example TruTrak installation



Picture 2 Example TruTrak installation

	<b>LAA/MOD 3 MODIFICATION APPLICATION Issue 2</b>	Mod No. (Office use only)	10507
		Page : 5 of 9	
		Compiled :	
		Issue : 2 28/10/08	

## 9. APPLICANT'S DECLARATION

I declare that the foregoing information is correct and I agree to abide by any conditions pertaining to this modification. I agree that this modification and all ideas contained within are the property of PFA (Ulair) Ltd and can be used in any way for the benefit of the LAA and its members.

Signed *Ian F. Rickard* Print I. F. Rickard Date 28/10/2008

## Appendix 1 TruTrak

This Modification is specific to the single axis (roll) TruTrak digital Servomotor driven by one of the following TruTrak controllers:-

- a) TruTrak EFIS
- b) Digitrak (digital display of ground track)
- c) Pictorial Pilot (replaces turn co-ordinator)
- d) ADI Pilot 1 (replaces attitude indicator)

The TruTrak servo is a slow speed digital stepper motor and is inherently safer than the analogue motor and clutch use by other designs. Unlike the analogue servos the centre (Null) is not fixed any can be anywhere.

## 1. ADDITIONAL PARTS LIST


Qty	Part No.	Description	Source
1	Controller	See list above	TruTrak Flight Systems 1500 S Old Missouri Road Springdale Arizona, AR 72764-1157
1	DSB B	Digital Servo	
1	EUR-R	Mounting kit & Arm	

5.4) The servo needs to be bolted to the TruTrak bracket with the bolts supplied.

5.6) Control Rod. The control rod must be cut to length and assembled with the rod-end bearings. A new thread will need to be cut in the control rod with a No 10 x32 UNF tap. The rod-end bearings can then be assembled.

5.7) Controller Instrument Installation. The Pictorial Pilot and ADI Pilot 1 replace the turn co-ordinator or attitude indicator respectively. The Digitrak will require a new position on the panel. Check that your intended installation meets the requirements of LAA/IC-APWL.

5.9) Wiring. To avoid accidental damage, The supplied "D" type connector shell should be modified to keep the wiring within the seat base (see picture 2).

	<b>LAA/MOD 3 MODIFICATION APPLICATION</b> Issue 2	Mod No. (Office use only)	10507
		Page : 6 of 9	
		Compiled :	
		Issue : 2 28/10/08	

## Appendix 2 Navaid devices

### 1. PARTS LIST

Qty	Part No.	Description	Source
1	AP1	Controller	Navaid Devices Inc. 641 North Market Street Chattanooga, Tennessee 37405
1	S2	Servo	
1		Mounting kit & Arm	
?	Smart Coupler II	Converter	

In July 2008 Navaid devices ceased trading. New systems and parts may be unobtainable. If unit replacement is required the Trio system is largely compatible.

The S2 servomotor is driven by the AP1 controller. The Smart Coupler II digital to analogue converter may be required with some GPS units.

5.1 This analogue servo has a fixed centre (Null) and the actuator arm must be repositioned through 90 degrees in this installation.

## Appendix 3 Trio

### 1. PARTS LIST

Qty	Part No.	Description	Source
1	Controller	EZ Pilot	Trio Avionics 1840 Joe Crosson Drive, Ste. A1 El Cajon California 92020
1	Gold ServoB	Servo	
1		Mounting kit & Arm	

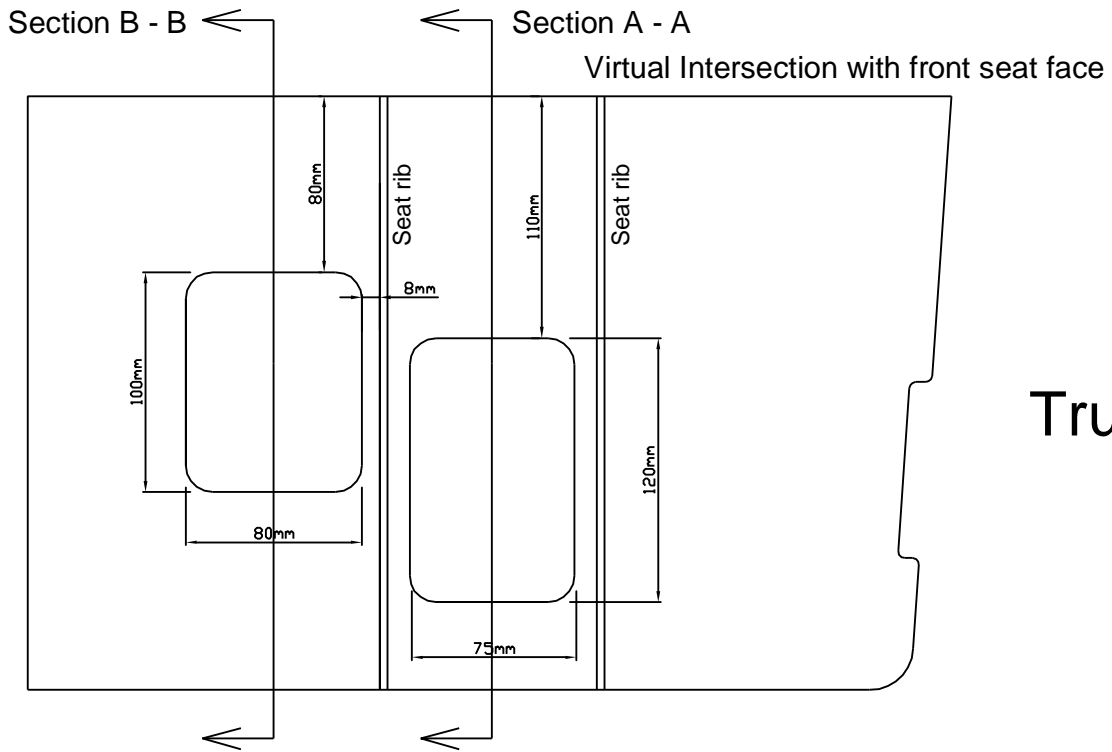
The Trio "Gold ServoB" is an improved design that can be used as a direct replacement for the Navaid S2 servo. It can be supplied with a mounting base identical to the S2 or a Trio version which is slightly larger. The EZ Pilot controller can be used to control the Gold ServoB or the original Navaid S2 servo.

5.1 This analogue servo has a fixed centre (Null) and the actuator arm must be repositioned through 90 degrees in this installation.

5.6 Control Rod. The control rod must be cut to length and the tapped insert riveted in place. The rod-end bearings can then be assembled.

5.7) Controller Instrument Installation. The EZ Pilot may replace the turn coordinator or be installed as an additional instrument. Check that your intended installation meets the requirements of LAA/IC-APWL.

REV	Drawn By	Date	Description

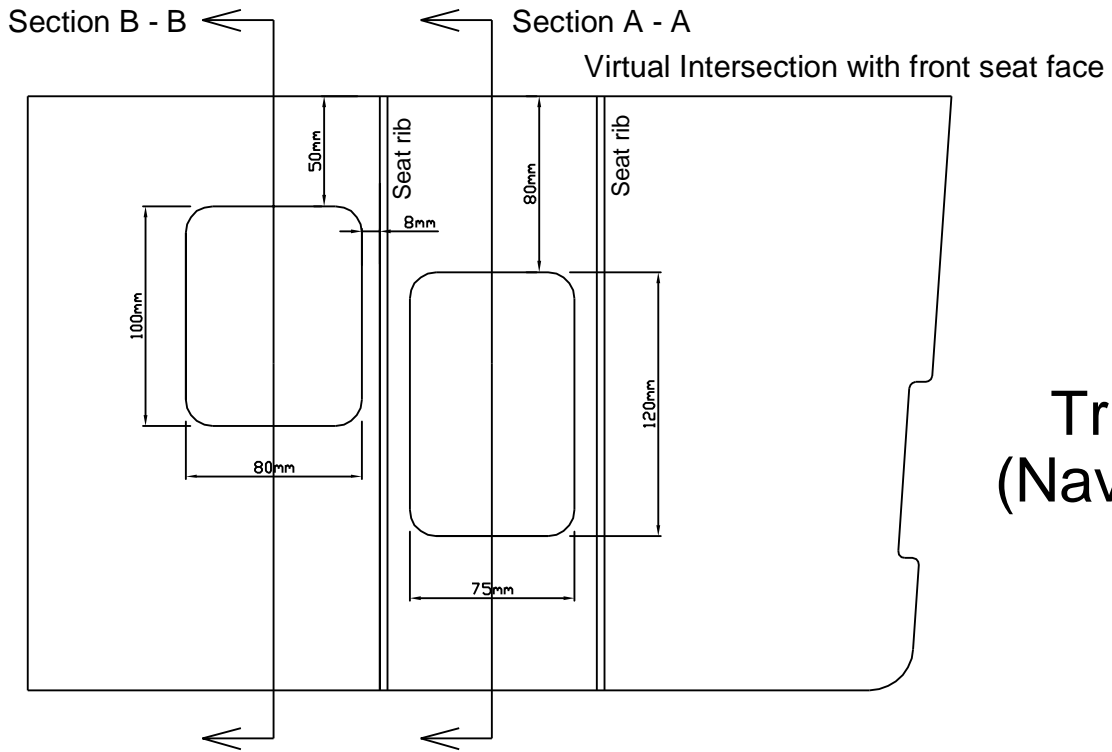


**Notes**

- 1) This view is perpendicular to the slope face of the seat
- 2) Position the inboard access hole relative to actual position of the seat rib.  
It needs to be need to be <8mm from the rib to allow access the bolt head.
- 3) The outboard hole should be centred over the torque tube.
- 4) Covers MUST be made and fitted to these access holes.
- 5) Remove the foam core around the access holes and fill with epoxy/Flox.

LAA MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono TruTrak Autopilot - Cutouts			
Date: 27/05/2008	Checked by:	PFA A/C Type: Europa XS	Serial No: 247-13714	Drawing No: 10507/1A
Date:	Scale: 1:2.5	A/C Regn: G-IANI	Drawing Sheet: 1 of 1	Rev: 1

REV	Drawn By	Date	Description



**Notes**

- 1) This view is perpendicular to the slope face of the seat
- 2) Position the inboard access hole relative to actual position of the seat rib.  
It needs to be need to be <8mm from the rib to allow access the bolt head.
- 3) The outboard hole should be centred over the torque tube.
- 4) Covers MUST be made and fitted to these access holes.
- 5) Remove the foam core around the access holes and fill with epoxy/Flox.

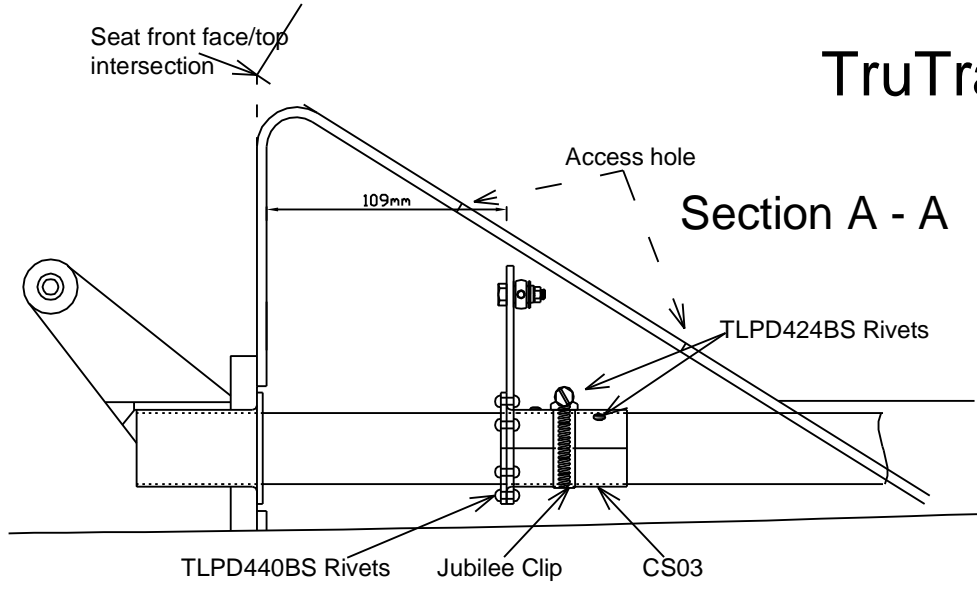
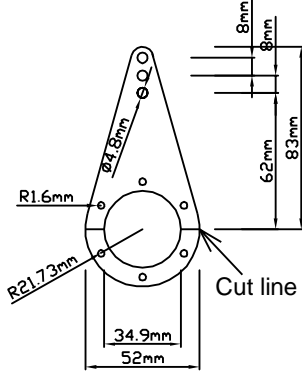
LAA MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono Trio Autopilot - Cutouts			
Date: 27/05/2008	Checked by:	PFA A/C Type: Europa XS	Serial No: 247-13714	Drawing No: 10507/1B
Date:	Scale:	A/C Regn:	Drawing Sheet:	Rev: 1

REV	Drawn By	Date	Description

# TruTrak

## Actuator Arm

3.20mm thick



### Notes

- 1) Glue and rivet (TLPD440BS) the actuator arm to the CS3
- 2) Split the assembly horizontally on the centre line of the torque tube. Make the cut as fine as possible
- 3) Clean and roughen the torque tube and glue the assembly in position with 420 and flox. Install the jubilee clip to hold in position.
- 4) When cured, drill and insert four rivets (TLPD424BS) to hold the assembly on the torque tube. The clip may be removed to aid riveting but should be replaced.

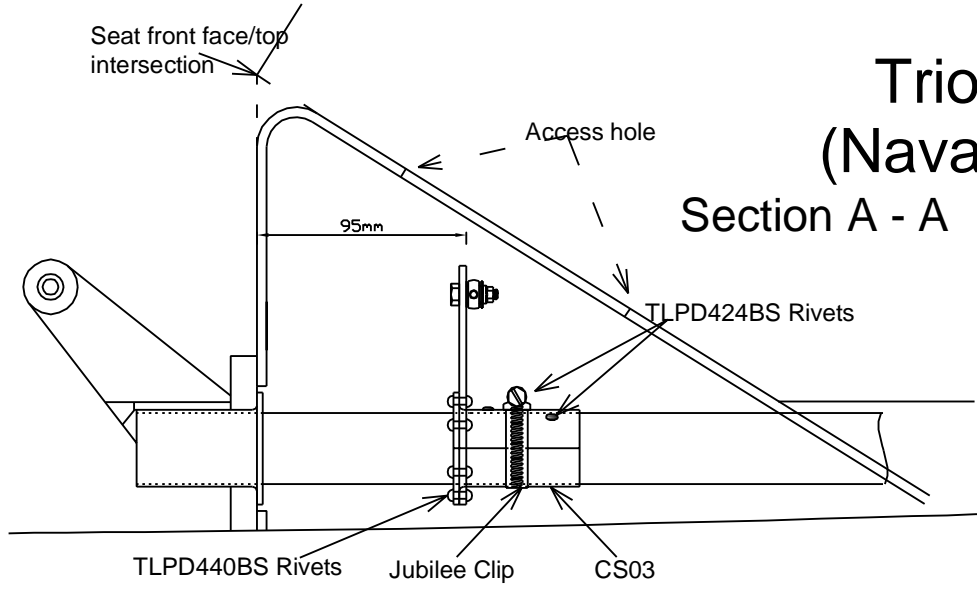
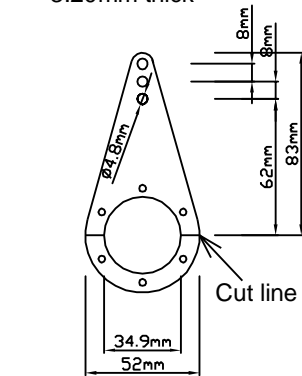
MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono TruTrack Autopilot - Actuator arm			
Date: 27/05/2008	PFA A/C Type: Europa XS	Serial No: 247-13714	Drawing No: 10507/2A	Rev: 1
Checked by:	Scale: 1:2.5	A/C Regn: G-IANI	Drawing Sheet: 1 of 1	

REV	Drawn By	Date	Description

# Trio (Navaid)

## Actuator Arm

3.20mm thick



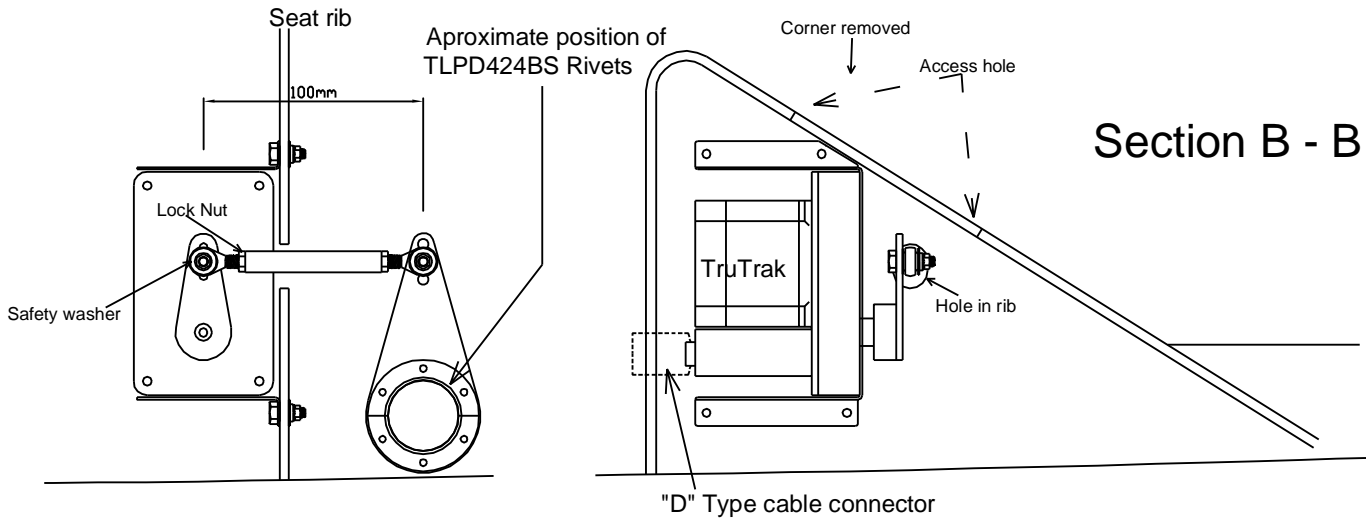
### Notes

- 1) Glue and rivet (TLPD440BS) the actuator arm to the CS3
- 2) Split the assembly horizontally on the centre line of the torque tube. Make the cut as fine as possible
- 3) Clean and roughen the torque tube and glue the assembly in position with 420 and flox. Install the jubilee clip to hold in position.
- 4) When cured, drill and insert four rivets (TLPD424BS) to hold the assembly on the torque tube. The clip may be removed to aid riveting but should be replaced.

MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono Trio Autopilot - Actuator arm			
Date: 27/05/2008	PFA A/C Type: Europa XS	Serial No: 247-13714	Drawing No: 10507/2B	Rev: 1
Checked by:	Scale: 1:2.5	A/C Regn: G-IANI	Drawing Sheet: 1 of 1	

REV	Drawn By	Date	Description

# TruTrak



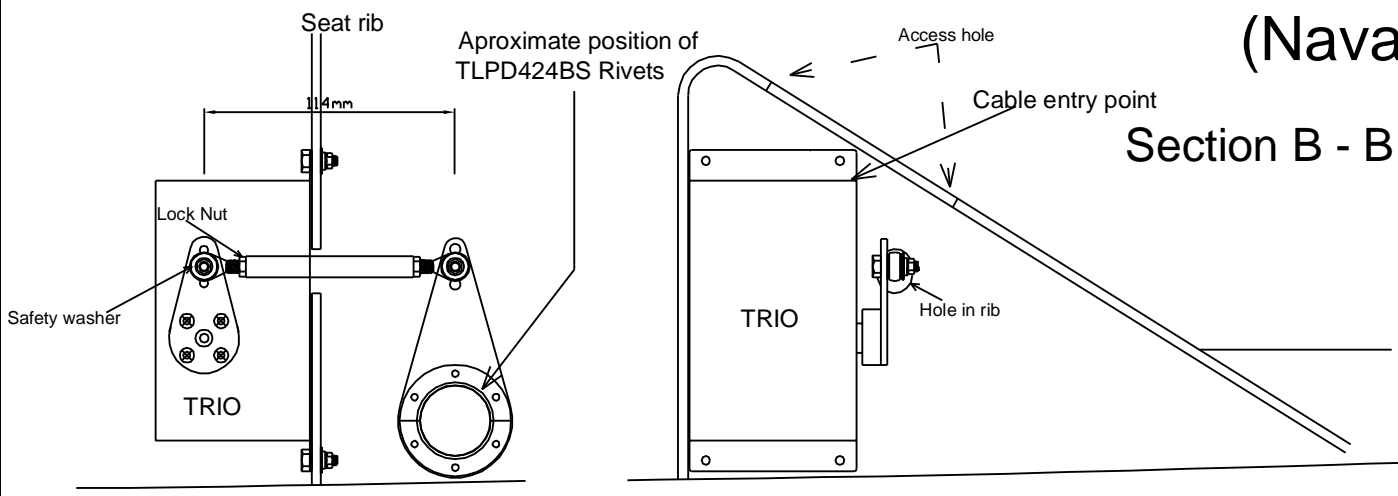
## Notes

- 1) Cut aft corner of mounting bracket to match seat angle. This will remove existing hole. Drill new mounting hole.
- 2) Ensure safty washer is used on ball ends
- 3) Ensure lock nut is installed on the drive rod ends.
- 4) When installed it MUST NOT be possible for the arms to go "over centre".
- 5) Cut the "D" type connector shell to prevent it projecting beyond the face of the seat

MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono TruTrack Autopilot - Servo			
Date: 27/05/2008	Checked by:	PFA A/C Type: Europa XS	Serial No: 247-13714	Drwing No: 10507/3A
Date:	Date:	Scale: 1:2.5	A/C Regn: G-IANI	Drwing Sheet: 1 of 1
				Rev: 1

REV	Drawn By	Date	Description

# Trio (Navaid)



## Notes

- 1) Ensure safty washer is used on ball ends
- 2) Ensure lock nut is installed on the drive rod ends.
- 3) When installed it MUST NOT be possible for the arms to go "over centre".

MODIFICATION APPLICATION				
Drawn By: I. F. Rickard	Title: Europa XS & Mono Trio Autopilot - Servo			
Date: 27/05/2008	Checked by:	PFA A/C Type: Europa XS	Serial No: 247-13714	Drwing No: 10507/3B
Date:	Date:	Scale:	A/C Regn:	Drwing Sheet:
				Rev: 1