Autopilot Servo Installation Guide

RV9 Roll

This product is not approved for installation in type certificated aircraft

Document 101046-004, Revision I

July, 2017

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SERVO MOUNTING INSTRUCTIONS – RV-9 RIGHT WING ROLL KIT

Kit Contents		
Dynon Part #	**QTY**	**Part Description**
100836-000	1	Standard Male Rod End
100836-001	1	Thin Male Rod End
100870-001	1	RV7,8,9,10 Right Roll Servo Mounting Bracket
100872-001	1	RV7,8,9,10 Support Bracket
100966-008	1	Aluminum Pushrod Tube - 3.0"
100972-001	1	RV9 Roll Plate
100975-002	2	AN315-4R Jam Nut
100976-011	3	AN365-1032A Nylon Insert Locknut
100977-000	3	AN970-3 Large Flat Washer
100978-003	9	AN960-10 Small Flat Washer
100979-002	3	MS35333-39 #10 Internal Star Washer
100981-000	3	AN3H-3A Bolt - 3/8"
100981-003	1	AN3H-6A Bolt – 3/4”
100981-006	1	AN3H-11A Bolt – 1 1/8”
100981-008	1	AN3H-13A Bolt – 1 3/8”
100981-019	1	AN3H-26A Bolt – 2 3/4”
100982-001	1	Aluminum Spacer - 0.485"
100982-008	1	Aluminum Spacer – 0.3125"
101843-001	1	AN364-1032A Nylon Insert Locknut

The RV-9 right wing roll servo mounting kit includes a right wing mounting bracket, right wing support bracket, linkage attach plate, pushrod linkage, and most of the required fasteners to mount the servo and properly link it to the aircraft control system. All Dynon-supplied parts are illustrated in dark grey to distinguish them from existing aircraft hardware. The lower bell crank support bracket must be removed to install the supplied servo mounting bracket. Fasteners used to secure the existing brackets will be re-used to install the new Dynon brackets. It is up to the installer to determine if these fasteners are suitable for re-use (these fasteners are not available from Dynon).

The brackets that will replace the existing aircraft brackets are made of 4130 steel and plated per QQP416 CAD - Type II Class II Yellow. They have been designed to meet or exceed the original brackets in strength and corrosion resistance. Install the Dynon-supplied lower servo mounting bracket in place of the existing one, using the previously removed original fasteners.

With the bracket in place, install the 2 AN3H-3A bolts, MS35333-39 star washers, and AN960-10 flat washers to secure the servo to the bracket per the drawing, noting the orientation of the servo output arm. All AN bolts supplied by Dynon have drilled heads for use with safety wire.

Install the support bracket on the other side of the servo using the same bolt stack-up. Verify the wires on the side of the servo pass through the gap in the support bracket and are not pinched between it and the servo. Secure it to the upper bell crank support bracket using the existing fastener. Remove the necessary hardware in order to add the included linkage attach plate and 0.485" spacer using a combination of Dynon-supplied hardware, and existing hardware. With the servo and bell crank additions in place, torque all fasteners back to original installation specifications and add safety wire throughout.

With the servo installed, the linkage needs to be assembled. Refer to the illustration and follow proper rod end installation techniques. Screw at least half of the threads on each rod end into the push rod. To prevent the possibility of the servo arm going over-center, the servo arm must **not** travel more than a total of +/-60º from neutral throughout the control system's range of travel. The linkage geometry should be installed as close to the Dynon recommendation drawing as possible. Dynon suggests installing the linkage at the middle hole of the servo arm. Changing this location will affect servo torque output, servo arm travel, control surface resolution, and the amount of force required to shear the safety screw, and should only be changed if the installer has an understanding of these implications. See the diagram on the following page which illustrates the linear travel and available force for each mount point on standard-arm servos.

Thread both large rod ends with jam nuts into the supplied 3.0" tube. Standard mounting of the linkage to the servo arm will include the AN3H-6A bolt, AN970-3 large diameter flat washer (for capturing the rod end bearing), AN960-10 flat washer, and the AN364-1032A lock nut. The other end of the linkage will require the same type of stack-up, with the addition of the 0.313" spacer, 2 AN970-3 washers and longer AN3H-13A bolt to secure to the roll plate.

The distance between the servo arm and the control system attachment point must allow for the angle between the servo arm and the push rod to be at approximately 90º when the controls are at neutral. Use the adjustability in the rod ends to achieve this, and then tighten the jam nuts to lock the rod ends in place. Installers should always keep in mind the range of motion of the servo. Total servo arm travel is limited, but verify that the arm and linkage do not interfere with anything during the full motion of the control stick. The built-in control stops of the aircraft will limit the servo arm travel when installed correctly. We recommend the use of the optional Range of Motion Limiting Bracket, supplied with the servo to eliminate the chance of the servo arm going over-center. This bracket should not be used as a normal stop; the aircraft's built-in stops should always be the primary range limit.

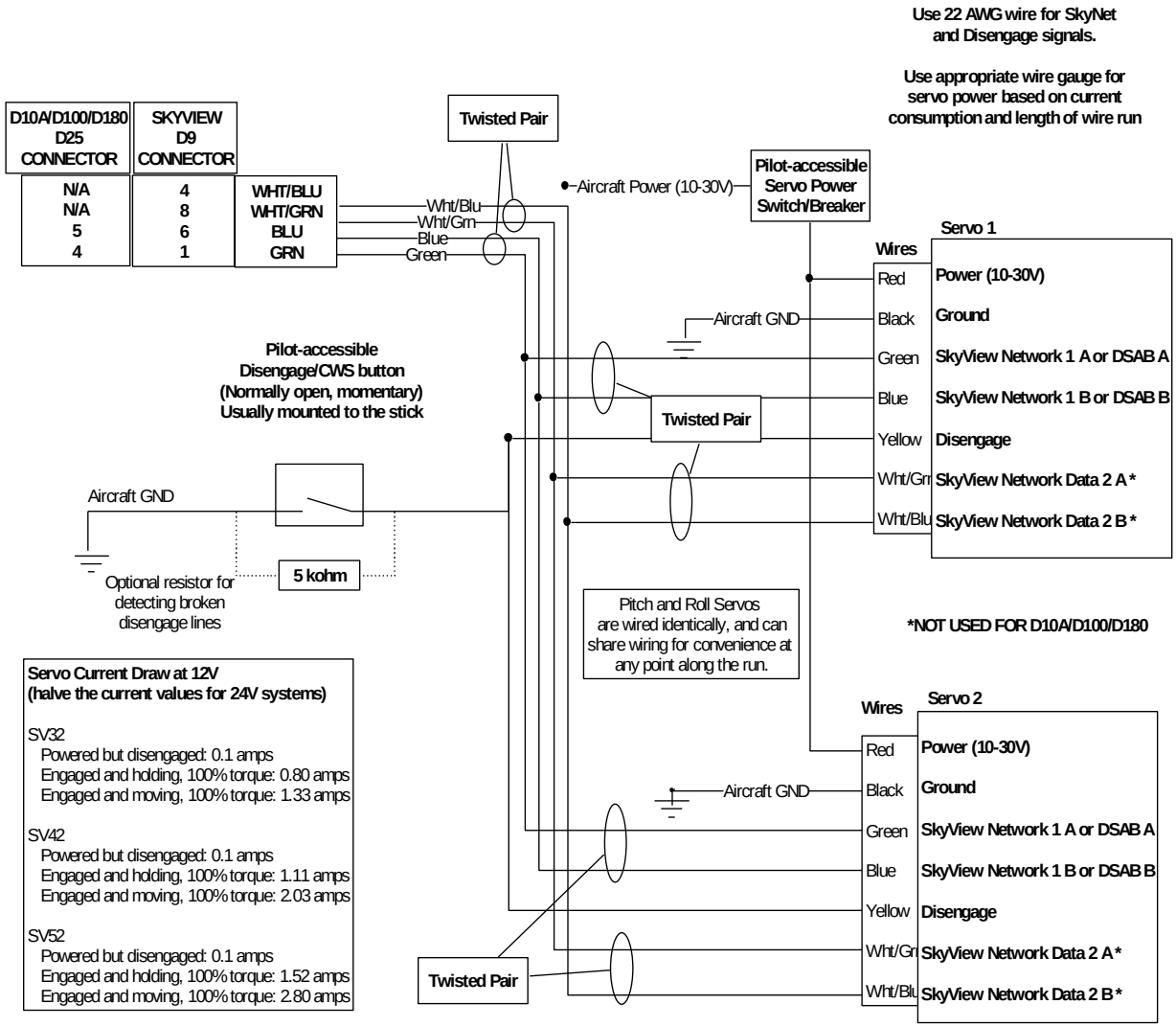
The latest documentation for all Dynon products available at dynonavionics.com. Please read through that documentation to understand the wiring and configuration process for your Autopilot system. We also maintain a collaborative set of this documentation, which is often updated with new information by both Dynon and fellow builders. Visit wiki.dynonavionics.com to view and contribute to the latest version of these documents.

You can also visit forum.dynonavionics.com to discuss and share installation notes, pictures, and suggestions with other builders.

Neglecting to properly install and/or use Dynon autopilot hardware may result in failures which could cause loss of aircraft control resulting in aircraft damage, personal injury or death.

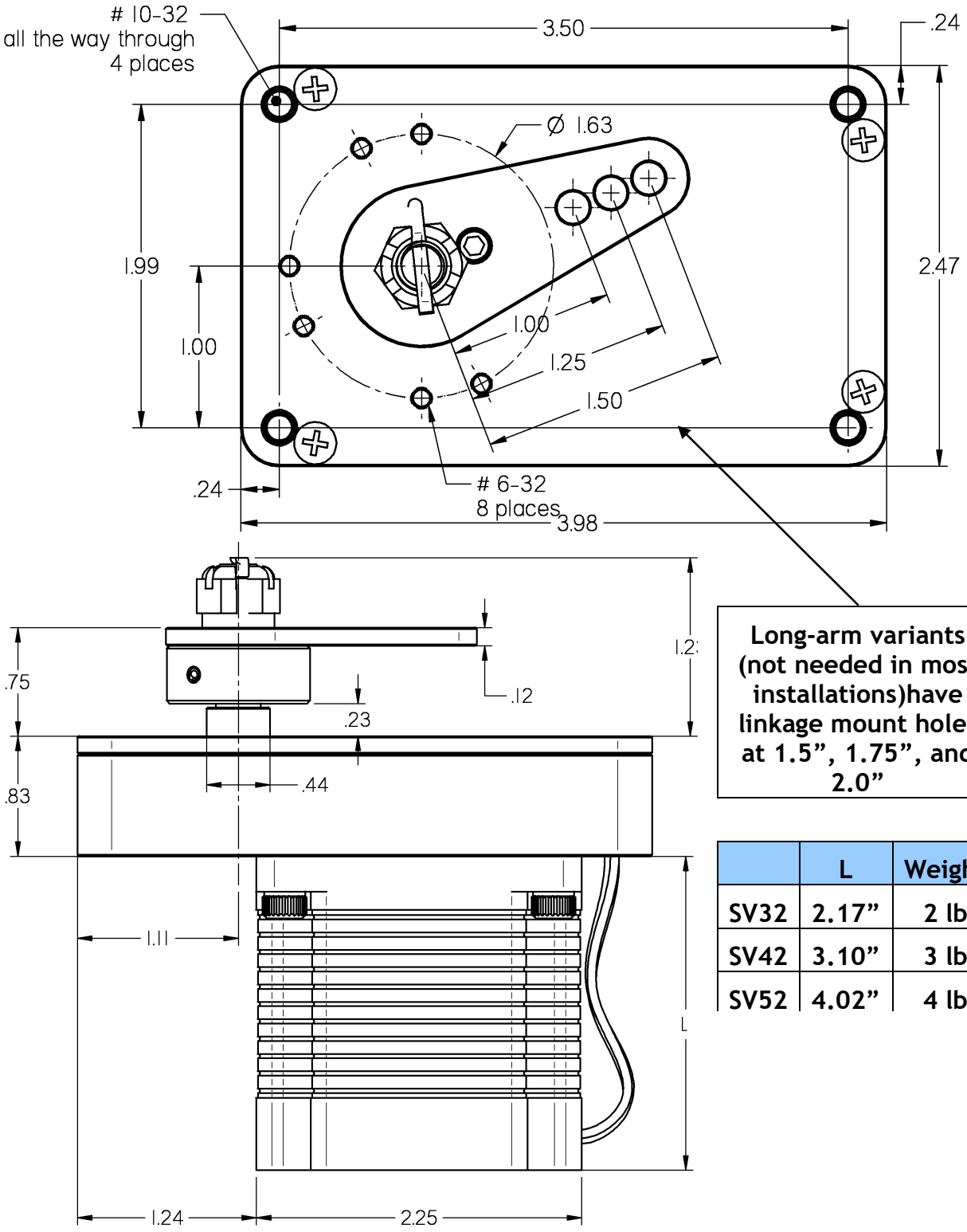
Wiring Overview

The following diagram provides an overview of the autopilot-specific wiring installation. For the complete set of wiring and configuration instructions, please see the latest Installation Guide for your Dynon EFIS product. For a SkyView system please reference the **Autopilot Servo Installation, Configuration, and Calibration** chapter of your SkyView System Installation guide. For EFIS-D10A, EFIS-D100 or FlightDEK-D180 please reference the **Autopilot Installation and Configuration** chapter of each respective Installation Guide.



Servo Dimensions

Use the following dimensions (in inches) for reference when planning and implementing your installation.



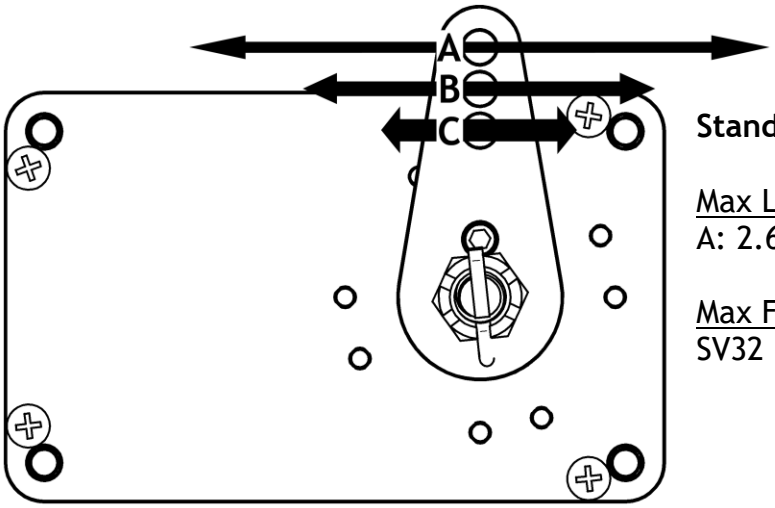
Long-arm variants (not needed in most installations)have linkage mount holes at 1.5”, 1.75”, and 2.0”

	L	Weight
SV32	2.17”	2 lb
SV42	3.10”	3 lb
SV52	4.02”	4 lb

Linkage mount position force and travel

The diagram below illustrates the maximum travel and force available at each linkage mounting point. As can be seen, the closer you mount the linkage to the shaft, the more force the servo can deliver. However, this also means the travel of the arm is shorter. Again, ensure that the servo arm is nowhere near going over-center throughout the entire range of the control system.

Position B should be used in most RV-9 roll installations. Modify mount position with caution and take all precautions to ensure that a near over center condition cannot occur

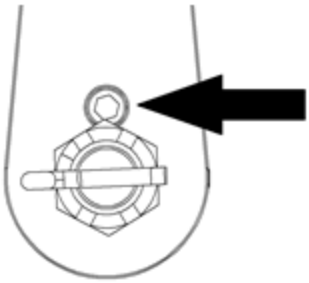


Standard Arm

Max Linear Travel
A: 2.6”, B: 2.2”, C: 1.8”

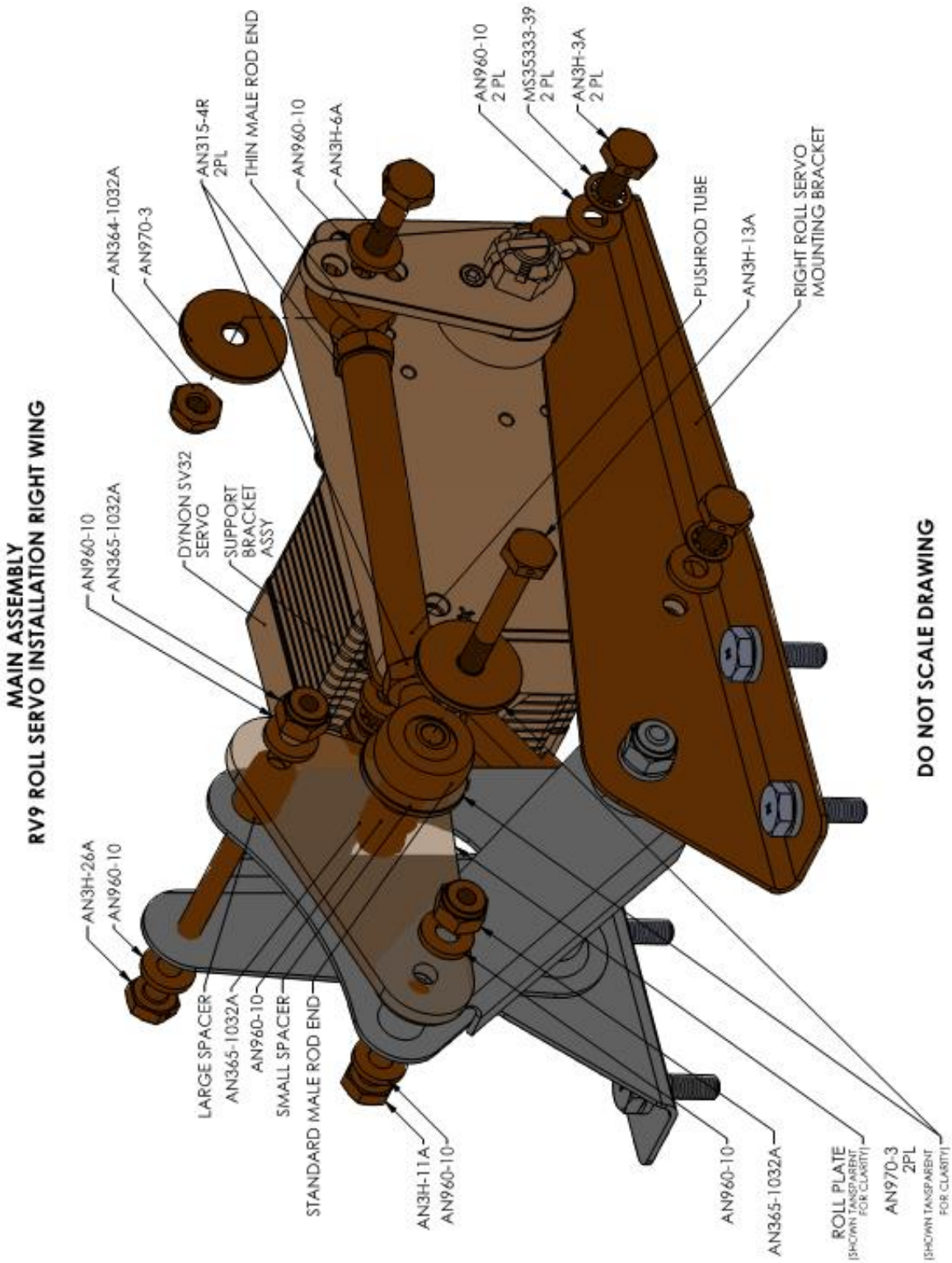
Max Force @ 100% Torque
SV32 - A: 24lb, B: 29lb, C: 36lb

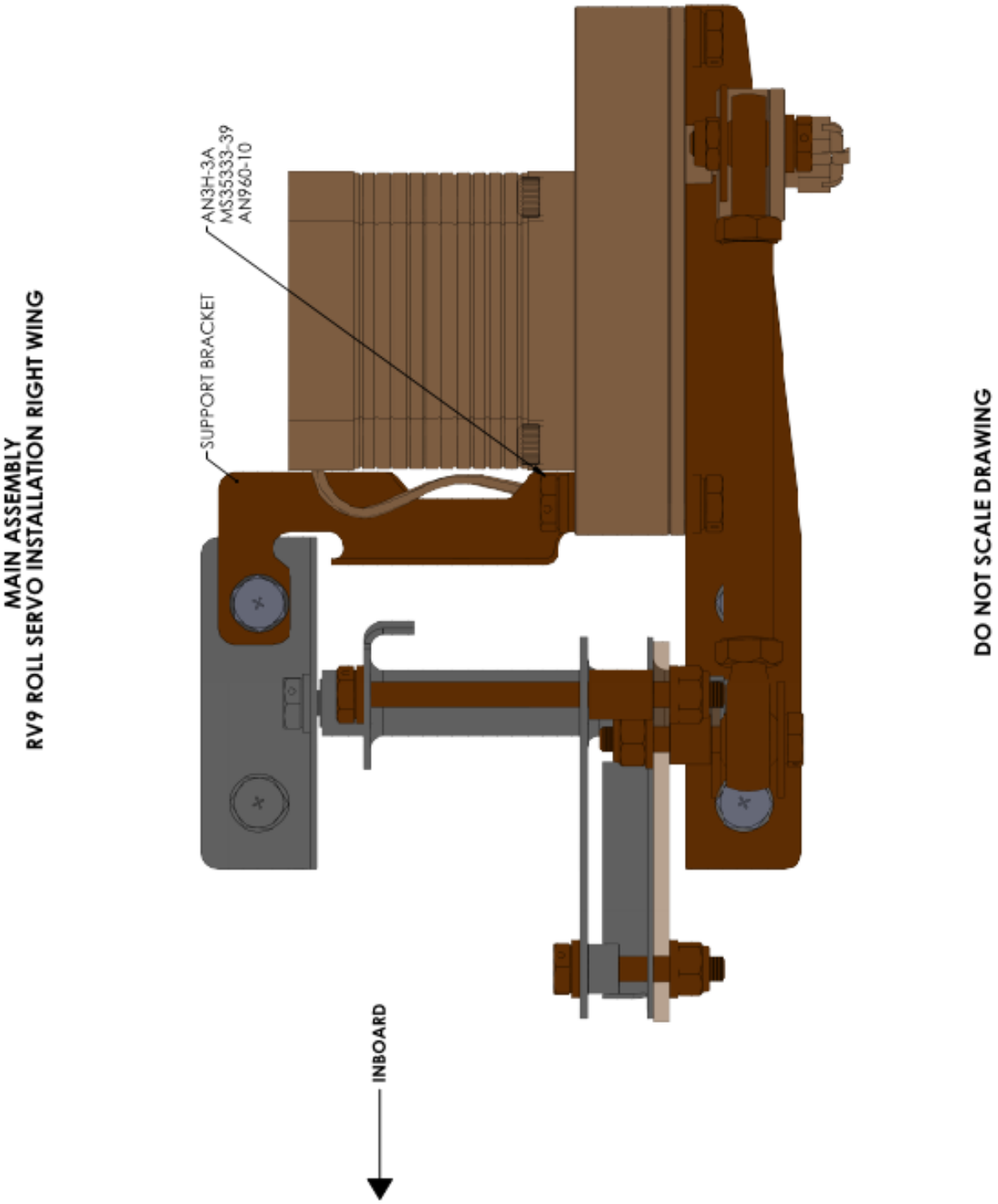
The autopilot safety shear screw should NEVER be removed or adjusted during this operation. If the shear screw has broken and needs replacement, there is specific documentation available for this purpose at http://docs.dynonavionics.com.

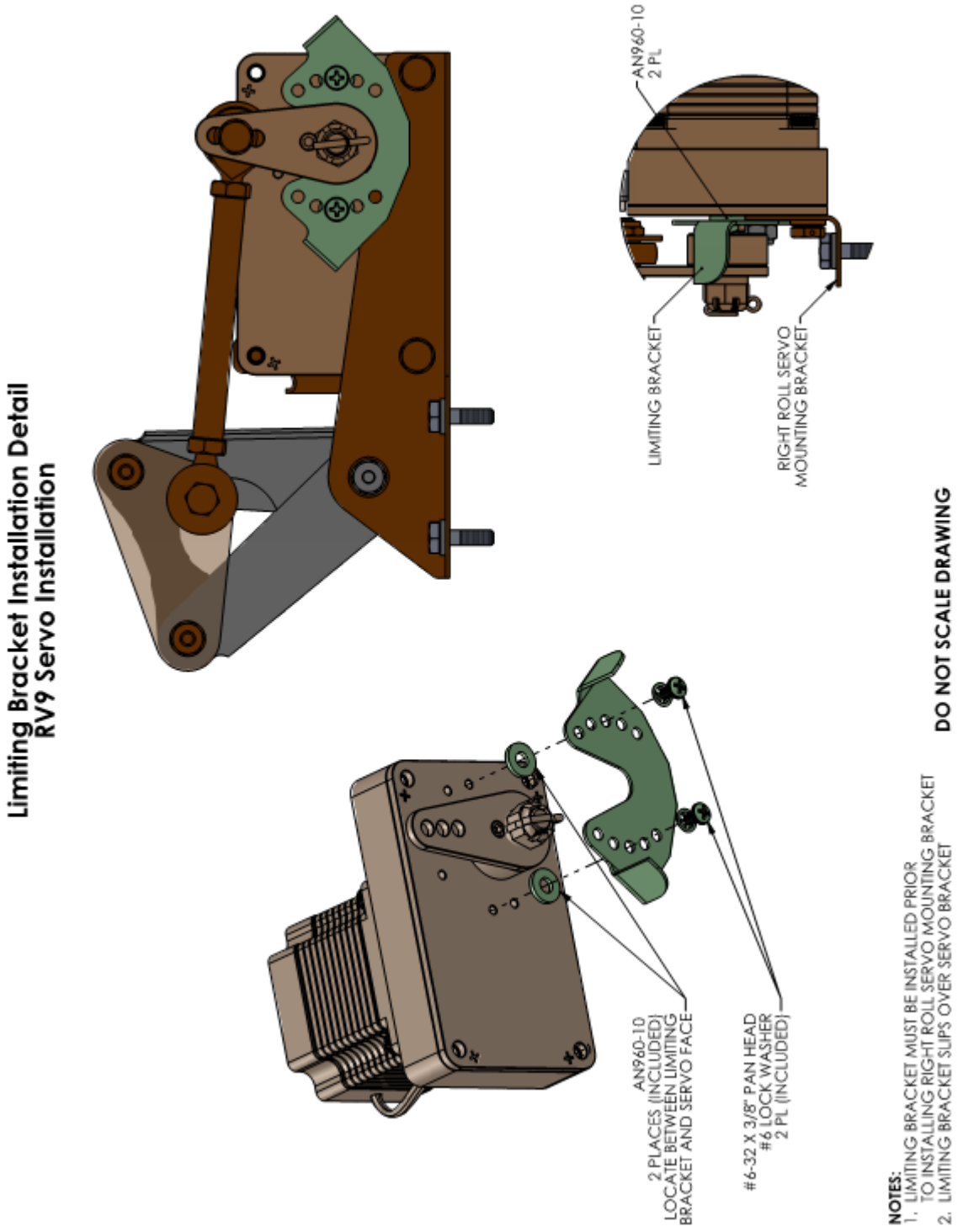


Mounting Drawings

The following pages provide detailed views of the mounting and assembly of the servo and this kit.


MAIN ASSEMBLY
RV9 ROLL SERVO INSTALLATION RIGHT WING
DO NOT SCALE DRAWING
AN3H-26A
AN960-10
LARGE SPACER
AN365-1032A
AN960-10
SMALL SPACER
STANDARD MALE ROD END
AN3H-11A
AN960-10
AN960-10
AN365-1032A
ROLL PLATE
(SHOWN TANSPARENT FOR CLARITY)
AN970-3
2PL
(SHOWN TANSPARENT FOR CLARITY)
AN960-10
AN365-1032A
DYNON SV32 SERVO
SUPPORT BRACKET ASSY
AN364-1032A
AN970-3
AN315-4R
2PL
THIN MALE ROD END
AN960-10
AN3H-6A
AN960-10
2 PL
MS35333-39
2 PL
AN3H-3A
2 PL
PUSHROD TUBE
AN3H-13A
RIGHT ROLL SERVO MOUNTING BRACKET


MAIN ASSEMBLY
RV9 ROLL SERVO INSTALLATION RIGHT WING
AN3H-3A
MS35333-39
AN960-10
SUPPORT BRACKET
INBOARD
DO NOT SCALE DRAWING


Limiting Bracket Installation Detail
RV9 Servo Installation
AN960-10
2 PL
LIMITING BRACKET
RIGHT ROLL SERVO
MOUNTING BRACKET
AN960-10
2 PLACES (INCLUDED)
LOCATE BETWEEN LIMITING
BRACKET AND SERVO FACE
#6-32 X 3/8" PAN HEAD
#6 LOCK WASHER
2 PL (INCLUDED)
DO NOT SCALE DRAWING
NOTES:
1. LIMITING BRACKET MUST BE INSTALLED PRIOR
TO INSTALLING RIGHT ROLL SERVO MOUNTING BRACKET
2. LIMITING BRACKET SLIPS OVER SERVO BRACKET