Airfilm Camera Systems
6245 Aerodrome Way, Hanger 2
Georgetown, CA

Document: AF135-006
STC Number: SR02138LA

INSTALLATION INSTRUCTIONS

STEP UTILITY MOUNT

FOR THE

AIRBUS HELICOPTERS EC135 ROTORCRAFT

RECORD OF REVISIONS

Rev.	Page	Date	Description	FAA Approval
N/C	Cvr i 1-34	2 May 2008	Initial Release	FAA APPROVED MAY 2 2008 LOS ANGELES AIRCRAFT CERTIFICATION OFFICE INITIALS: .....
A	6 8, 12 18	19 May 2009	Changed wording for bonding strap Part Number change Inserted picture for assembly	FAA APPROVED MAY 1 9 2009 LOS ANGELES AIRCRAFT CERTIFICATION OFFICE INITIALS: .....
B	1, 2 7 16 17	25 May 2010	Added Appendix A Added bushing notes Added Appendix A title Revised Fig 2	FAA APPROVED MAY 2 5 2010 LOS ANGELES AIRCRAFT CERTIFICATION OFFICE INITIALS: .....
C	6	7 Jun 2012	Removed steps for the field installation of rivets in the cross tube fitting to the step mount. Riveting procedures now completed during factory manufacturing	FAA Approved JUN 0 7 2012 Los Angeles Aircraft Certification Office
D	7, 8, 12, 15, 21	11, Sept. 2018	Added note for HLG P/N page 7. Updated DT and QDD P/N's table 5.3 & 5.7. Added note for HLG P/N page 15. Updated DT Figure 6	FAA APPROVED Los Angeles SEP 2 5 2018 Aircraft Certification Office INITIALS: DHT
E	7	27, Sept. 2018	Minor Change - Added note for bushings used in HLG configuration	See MDL Revision G (Minor Change)
F	ALL	3, May 2021	Revised numbering of installation instructions and wording. Updated wording in Section 2, 2.1, and 3. Updated W&B Tables in Section 7. Added notes for aircraft configurations with ground handling lugs, revised hardware callouts, revised Table 5.5 (component weights) and renumbered tables. Removed Configuration Weight Tables	See MDL Revision H

TABLE OF CONTENTS

SECTION	TITLE	PAGE

TABLE OF FIGURES

SECTION	TITLE	PAGE

1. LIST OF APPROVED SENSOR / CAMERA/ LIGHT / DOWNLINKS

The following sensor / camera / light have been installed and flown.

- FLIR STAR SAFIRE SERIES
- FLIR ULTRAMEDIA SERIES
- SPECTROLAB SX-16 SERIES

This STC addresses the Structural, Performance & Handling Qualities requirement for the largest configurations (2.1 sq ft & 125 lbs for the A10/A11/C10 Arms and 2.1 sq ft & 100 lbs for the C11 arm). Configurations include any combination of one, two, three or four simultaneous sensor / camera / lights or payloads.

The specific sensor/cameras/light not listed here is accepted with the follow-on test plan found in Appendix B.

1.1. FOR HELICOPTERS REGISTERED IN UNITED STATES OR OTHER COUNTRIES RECOGNIZING FAA CERTIFICATION:

Sensor / camera / lights or payloads listed above do not require further FAA flight testing.

Once the installation for a sensor/camera/payload not on the list above is completed by the Integrator/Operator and the flight test conducted by the Pilot/Operator and the FAA (certified) mechanic the sensor /camera / light payload can be added to the accepted list in this manual. The report contained herein must be completed and signed prior to the “return to service” for any sensor/ camera / light payload.

The flight will be conducted as an “Operational Check Flight”. Operational check flights do not require a special airworthiness certificate in the experimental category. The term “operational check flight” (14 CFR § 91.407(b)) includes flight tests performed to check installation and/or operation of an approved STC, amended TC, or any other FAA-approved data after installation and return to service.

Operational check flights are performed under the current airworthiness certificate.

The purpose of this test is to ensure the approved modification and/or alteration functions properly and does not adversely affect aircraft operation.

1.2. FOR HELICOPTERS REGISTERED IN AN EU-MEMBER STATE:

For a specific sensor/camera/light or downlink antenna to be added to the STC, a Minor Change is required with an EASA accepted certification program.

Once the testing is completed by the Integrator/Operator and the flight test conducted by the Pilot/Operator and EASA Engineer and the Minor Change is approved the sensor/camera/light, can be added to the accepted list in this manual. The report contained herein must be completed and signed prior to the "return to service" for sensor/camera/light.

The flights have to be conducted with a "Permit to Fly".

The purpose of this test is to ensure the approved modification and/or alteration functions properly and does not adversely affect aircraft operation.

1.3. FOR ALL HELICOPTERS:

The installation is assumed to have a self-contained power supply or connected to the aircraft through a previously approved electrical connection. If modification to the ship's system is necessary to support this installation, additional minor modifications with appropriate approval is necessary.

2. INTRODUCTION

This manual presents the installation instructions for the Airfilm Camera Systems model AFM-SM135-1 Step Mount for the Eurocopter EC-135 series Rotorcraft. The mount is designed to facilitate the attachment of equipment including (but not limited to) sensors, cameras, searchlights, microwave downlinks, etc.

The step-mount installs directly to the front and rear cross-tubes, replacing OEM step using existing bolt hole patterns. 2 bolts per cross-tube: front and rear, left or right or both.

Camera / sensor payloads are attached to various available payload arms either direct or with the use of DT-1-1 (dovetail), QDD-1 (quick disconnect) or other factory approved adaptor hardware configurations.

AFM-SM135 Features:

- Payloads can be installed on either end, both ends or no payload (step only), left or right or both.
- Payload arms can be installed and flown with or without payloads installed.
- Lower wire strike skid-tube deflectors can be removed if conflict with payload operation is encountered.
- Compatible with high, mid and low gear configurations.
- Compatible with emergency float installations.
- Compatible with hoist when installed.

NOTE:
INSTALLATION OF ARMS /PAYLOADS MUST NOT INTERFERE WITH THE AFT CARGO DOOR FUNCTION

2.1. GENERAL

The following Installation Instructions cover the Airfilm/Meeker Aviation Step Mount installation on the EC-135 series rotorcraft.

Precautions:
- All precautions will be in **bold face**

Referenced publications:
- (AC) 43.13-2 and (AC)43.13-1B

Distribution:
- Installation instructions shall accompany the maintenance manuals of aircraft on which the mount is installed.

Definitions / Abbreviations:
- FLIR: forward looking infrared
- IAW: in accordance with

Standards of measurement:
- all measurements in 100ths of an inch
- all weights in US pounds
- all torques in inch pounds

Tools Required
- ¼ Drive Ratchet Set
- Torque Wrench

3. CONTROL & OPERATIONAL INFORMATION

SPECIAL PROCEDURES / PRECAUTIONS:

- **Maximum mount payload not to exceed 125 lbs, or 2.1 square feet surface area.**
- **Maximum mount payload weight not to exceed 100 lbs when attached to the AFM-SM117-C11 arm.**
- **Installation of mount must not interfere with any existing installed equipment or aft cargo door.**

INSTALLATION VARIATIONS- *PLEASE READ BEFORE PROCEEDING:*

- ON AIRCRAFT EQUIPPED WITH ECD GROUND HANDLING LUG ON REAR CROSS TUBE:
  - INSTALL BUSHING AFM-SM135-M16A IN PLACE OF ORIGINAL ECD BUSHING, 1 PLC.
- ON AIRCRAFT ORIGINALLY EQUIPPED WITH ECD MULTIPURPOSE CARRIER STEP:
  - USE BUSHINGS AFM-SM117-M16A AND AFM-SM117-M16B, 2EA, 2 PLACES ON FORWARD CROSSTUBE. CONTACT AIRFILM FOR THESE PARTS.
- ON SOME AIRCRAFT EQUIPPED WITH OEM HIGH SKID LANDING GEAR, HAVING 60MM HOLE SPACING ON THE FRONT CROSS TUBE:
  - USE BUSHINGS AFM-SM117-M16A-2 AND AFM-SM117-M16B-2, 2 EA, 2 PLACES ON THE FORWARD CROSS TUBE. *CONTACT AIRFILM FOR THESE PARTS.*

4. INSTALLATION INSTRUCTIONS

4.1. Position aircraft on level ground.

4.2. Install procedure for step is same for either left or right side.

4.3. Remove existing entry step (retain aft cross-tube hardware).

4.4. Position AFM-SM. Step orientation (fwd and aft) is determined by cross-tube fittings. Forward cross-tube fitting is positioned (fore and aft) and held in place on the step tube by Delron step surface plates (see figure 1). The Aft cross-tube fitting can be slid fore and aft on the step tube.

4.5. Install AFM-SM135 step on forward cross-tube fitting use supplied hardware (bolt / shoulder washer / nut).
   a. 2 ea AN5-43A bolt or equivalent
   b. 2 ea MS21044-5 nut or equivalent
   c. 4 ea AN960-516L washer or equivalent
   d. 2 ea M16 shoulder bushing

4.6. Install hardware hand tight with Mastinox 6856K or equivalent.

4.7. On aircraft not equipped with ground handling lugs on the aft cross tube, install the aft cross tube fitting using the following supplied hardware:
   a. 2 ea AN5-43A bolt or equivalent
   b. 2 ea MS21044-5 nut or equivalent
   c. 4 ea AN960-516L washer or equivalent

4.8. Install hardware hand tight with Mastinox 6856K or equivalent.

4.9. On aircraft equipped with ground handling lugs, install the AFM-SM135-M16A Bushing into the center of the cross tube through the lower bolt hole. Attach aft cross-tube fitting using the original ground handling studs in the lower bolt hole location (Note: enlarge aft cross tube fitting bolt holes to accommodate the ground handling lug bolt diameter as needed). Install the following hardware into the upper bolt hole location:
   a. 1 ea AN5-43A bolt or equivalent
   b. 1 ea MS21044-5 nut or equivalent
   c. 2 ea AN960-516L washer or equivalent

4.10. Install hardware hand tight with Mastinox 6856K or equivalent.

4.11. Mark the outer edges of the aft cross-tube fitting, this will indicate location to apply mast tape / Teflon tape

4.12. Apply mast / Teflon tape on the tube surface where the aft cross-tube fitting is located. Cut tape such that it does not overlap, position the tape seam opposite to the aft cross-tube fitting “split”

4.13. Install hardware hand tight with Mastinox 6856K or equivalent.

4.14. On aft cross-tube install bonding strap, reference specification M83413/8K-A018CK or any bonding jumper meeting this specification.

On aft cross-tube fitting, tighten and final torque clamp hardware to 30 in-lbs

4.15. Torque hardware IAW (AC) 43.13-2 and (AC)43.13-1B

4.16. Recommended torque values

a.	¼ -28	50-70 inch pounds
b.	5/16-24	100-140 inch pounds

4.17. Mark torqued hardware with torque seal.

NOTE: ON AIRCRAFT EQUIPPED WITH ECD GROUND HANDLING LUG ON REAR CROSS TUBE: INSTALL BUSHING AFM-SM135-M16A IN PLACE OF ORIGINAL ECD BUSHING, 1 PLACE.

NOTE: ON AIRCRAFT ORIGINALLY EQUIPPED WITH ECD MULTIPURPOSE CARRIER STEP: USE BUSHINGS AFM-SM117-M16A AND AFM-SM117-M16B, 2EA, 2 PLACES ON FORWARD CROSSTUBE. CONTACT AIRFILM FOR THESE PARTS.

NOTE: ON SOME AIRCRAFT EQUIPPED WITH OEM HIGH SKID LANDING GEAR, HAVING 60MM HOLE SPACING ON THE FRONT CROSS TUBE: USE BUSHINGS AFM-SM117-M16A-2 AND AFM-SM117-M16B-2, 2 EA, 2 PLACES ON THE FORWARD CROSS TUBE. *CONTACT AIRFILM FOR THESE PARTS*.

5. REMOVAL

5.1. Remove fore and aft cross-tube hardware installed on the EC135 Landing Gear Cross Tube, set aside.

5.2. Remove AFM-SM135 Step Mount from the Landing Gear Cross Tube.

5.3. Reinstall OEM Skid Tube Step using original type hardware. Torque hardware IAW (AC) 43.13-2 and (AC)43.13-1B

6. INSTALLATION OF PAYLOAD ARMS

6.1. Install -A10, -A11, -A11HW, -C10, or -C11 Payload Arms using the supplied MS20004-8, MS20005-8, and AN4-6A Bolts. Install Hand Tight (See Figures 2-4)

6.2. Torque hardware IAW (AC) 43.13-2 and (AC)43.13-1B

6.3. Recommended torque values

¼ -28	50-70 inch pounds
5/16-24	100-140 inch pounds

7. WEIGHT AND BALANCE

The following section presents the weight and balance information for the AFM-SM135 Step Mount Assembly. Table 9 below is used to calculate weight and balance of the as-configured AFM-SM135 Step Mount. Figure 1 and Figure 2 present the available configurations of the AFM-SM135-1 and AFM-SM135A-1 Step Mounts. Tables 1-8 present the component weights and aircraft locations used to calculate the weight and balance for the desired configuration.

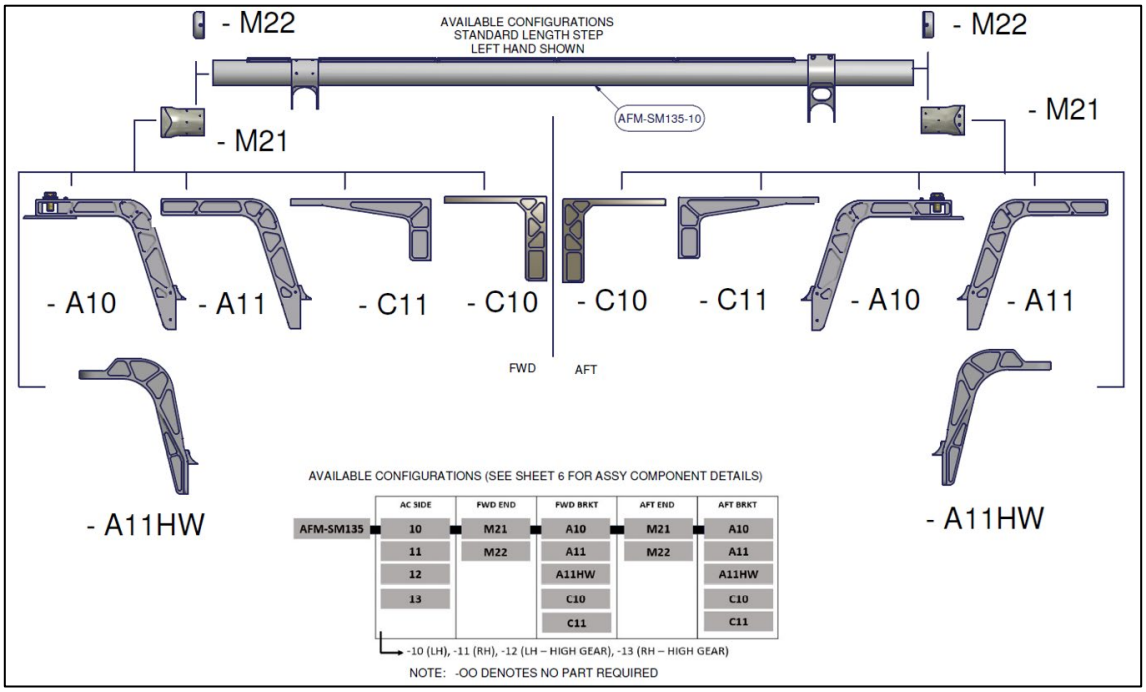

Figure 1. Available Configurations, Standard Length Step

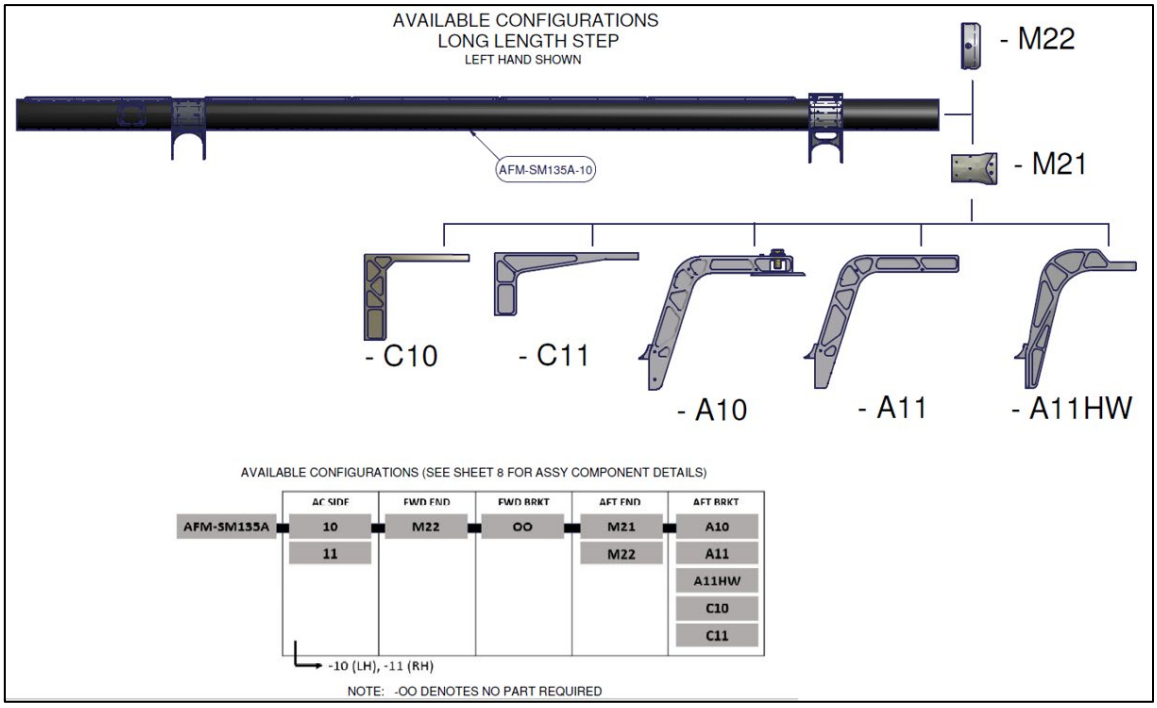

Figure 2. Available Configurations, Long Length Step

Table 1. STEP CONFIGURATION WEIGHTS (English Units)

PART NO.	DESCRIPTION	WEIGHT (LBS)	STATION (IN)	BL (IN)
AFM-SM135-10	SIDE STEP / UTILITY BRACKET EC135 SERIES LH w/ M21 Caps	25.5	141.85	-37.28L
AFM-SM135-11	SIDE STEP / UTILITY BRACKET EC135 SERIES RH w/ M21 Caps	25.5	141.85	37.28R
AFM-SM135A-10	SIDE STEP / UTILITY BRACKET EC135 SERIES LH w/ M21 Caps	26.5	137.91	-37.28L
AFM-SM135A-11	SIDE STEP / UTILITY BRACKET EC135 SERIES RH w/ M21 Caps	26.5	137.91	37.28R

NOTE: *Weights and CG locations for High Landing Gear Configurations AFM-SM135-12 & -13 are unchanged from standard gear weight and balance shown in the tables above.*

Table 2. STEP CONFIGURATION WEIGHTS (Metric Units)

PART NO.	DESCRIPTION	MASS (kg)	STATION (mm)	BL (mm)
AFM-SM135-10	SIDE STEP / UTILITY BRACKET EC135 SERIES LH w/ M21 Caps	11.6	3603	-947 L
AFM-SM135-11	SIDE STEP / UTILITY BRACKET EC135 SERIES RH w/ M21 Caps	11.6	3603	947 R
AFM-SM135A-10	SIDE STEP / UTILITY BRACKET EC135 SERIES LH w/ M21 Caps	12.01	3530	-947 L
AFM-SM135A-11	SIDE STEP / UTILITY BRACKET EC135 SERIES RH w/ M21 Caps	12.01	3530	947 R

NOTE: *Weights and CG locations for High Landing Gear Configurations AFM-SM135-12 & -13 are unchanged from standard gear weight and balance shown in the tables above.*

Table 3. ARM CONFIGURATION WEIGHTS (English Units)

PART NO.	DESCRIPTION	WEIGHT (LBS)	STATION (IN)	BL (IN)
AFM-SM117-A10	Long Arm Bracket Assy, CF Style	16.8	Front 83.5 Rear 200.9	37.28R/- 37.28L
AFM-SM117-A11	Long Arm Bracket Assy, DT Style	14.3	Front 85.5 Rear 199.0	37.28R/- 37.28L
AFM-SM117-A11HW	Heavy Weight Long Arm	13.4	Front 81.7 Rear 195.2	37.28R/- 37.28L
AFM-SM117-C10	Short Arm Utility Bracket	9.0	Front 87.3 Rear 197.2	37.28R/- 37.28L
AFM-SM117-C11	Medium Arm Utility Bracket	9.0	Front 84.2 Rear 200.2	37.28R/- 37.28L

Table 4. ARM CONFIGURATION WEIGHTS (Metric Units)

PART NO.	DESCRIPTION	MASS (kg)	STATION (mm)	BL (mm)
AFM-SM117-A10	Long Arm Bracket Assy, CF Style	7.6	Front 2121 Rear 5102	947 R -947 L
AFM-SM117-A11	Long Arm Bracket Assy, DT Style	6.5	Front 2172 Rear 5055	947 R -947 L
AFM-SM117-A11HW	Heavy Weight Long Arm Assy	6.1	Front 2075 Rear 4958	947 R -947 L
AFM-SM117-C10	Short Arm Utility Bracket	4.1	Front 2217 Rear 5009	947 R -947 L
AFM-SM117-C11	Medium Arm Utility Bracket	4.1	Front 2139 Rear 5085	947 R -947 L

Table 5. PAYLOAD LIMITATIONS AND LOCATION (English Units)

LOCATION	MAX WEIGHT (POUNDS)	MAX AREA (FT^2)	STATION (IN)	BL (IN)
Forward Payload				
A10 ARM	125	2.1	73.0	
A11 ARM	125	2.1	73.0	37.28R/-
A11HW ARM	125	2.1	69.2	37.28L
C10 ARM	125	2.1	78.5	
C11 ARM	100	2.1	73.0	
Aft Payload				
A10 ARM	125	2.1	211.4	
A11 ARM	125	2.1	211.4	37.28R/-
A11HW ARM	125	2.1	207.6	37.28L
C10 ARM	125	2.1	206.0	
C11 ARM	100	2.1	211.4	

Table 6. PAYLOAD LIMITATIONS AND LOCATION (Metric Units)

LOCATION	MAX MASS (kg)	MAX AREA (m^2)	STATION (mm)	BL (mm)
Forward Payload				
A10 ARM	56.7	0.2	1854.2	
A11 ARM	56.7	0.2	1854.2	947 R
A11HW ARM	56.7	0.2	1757.7	-947 L
C10 ARM	56.7	0.2	1994.0	
C11 ARM	45.4	0.2	1854.2	
Aft Payload				
A10 ARM	56.7	0.2	5370	
A11 ARM	56.7	0.2	5370	947 R
A11HW ARM	56.7	0.2	5273	-947 L
C10 ARM	56.7	0.2	5232	
C11 ARM	45.4	0.2	5370	

Table 7. Optional Equipment Weights (English Units)

PART NO.	DESCRIPTION	WEIGHT (LBS)
V1725-1	Vibration Reducer	17.7
DT-1-1	Dovetail	2.4
QDD-1-1	Quick Disconnect	5.0

Table 8. Optional Equipment Weights (Metric Units)

PART NO.	DESCRIPTION	MASS (kg)
V1725-1	Vibration Reducer	8.02
DT-1-1	Dovetail	1.08
QDD-1-1	Quick Disconnect	2.27

7.1 CONFIGURED STEP WEIGHT AND BALANCE CALCULATION:

The combined weight and balance of the AFM-SM135 Step Mount is calculated using the combined weights and locations of the configured step and arm sub-assemblies. Table 9 is used with the weight and location of the sub assembly parts listed in Tables 1-8 to calculate the combined weight and balance. The combined weight and balance of the Step Mount configuration is then used to update the aircraft weight and balance. An example calculation using Table 9 is shown in Figure 3 below.

Note: When multiple Step Mounts (LH and RH) are installed on the aircraft, complete the table for each step separately.

Table 9. EC135 Step Mount Weight and Balance Calculation Table

AFM-SM135 (STEP MOUNT) WEIGHT AND STATIONS					
FOR CAMERA / SENSOR SYSTEMS					
INPUT WEIGHT AND LOCATION VALUES FOR YOUR CONFIGURED STEP MOUNT	WEIGHT	LONGITUDINAL	LONGITUDINAL	LATERAL	LATERAL
ITEM DESCRIPTION	LBS/KG	ARM (IN/MM)	MOMENT	ARM (IN/MM)	MOMENT
BASE STEP (CHOOSE TYPE FROM TABLE 1 OR 2)			(1)		(1)
FORWARD ARM (CHOOSE TYPE FROM TABLE 3 OR 4)					
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 7 OR 8, USE PAYLOAD LOCATION)					
FORWARD ARM PAYLOAD* (USE STA AND BL FROM TABLE 5 OR 6)					
AFT ARM (CHOOSE TYPE FROM TABLE 3 OR 4)					
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 7 OR 8, USE PAYLOAD LOCATION)					
AFT ARM PAYLOAD* (USE STA AND BL FROM TABLE 5 OR 6)					
TOTAL	(2)		(3)		(3)
COMBINED STEP W&B	(2)	(4)		(4)	
*USE ACTUAL WEIGHT OF INSTALLED EQUIPMENT Use proper weight and balance WHEN multiple configurations installed.					
**CALCULATIONS: (1) - MULTIPLY WEIGHT AND ARM VALUES TO DETERMINE MOMENT (2) - SUM OF ALL WEIGHTS USED ON CONFIGURED STEP MOUNT (3) - SUM OF ALL INPUT MOMENT VALUES (4) - TOTAL MOMENT DIVIDED BY TOTAL WEIGHT - (3)/(2)					

Example Calculation:

Configuration: **AFM-SM135-10-M21-A10-M21-C10**

- AFM-SM135-10 Step
- AFM-SM117-A10 Forward Arm with QDD-1-1 and 95 lb (43.1 kg) payload installed.
- AFM-SM117-C10 Aft Arm with QDD-1-1 and 95 lb (43.1 kg) payload installed.

ENGLISH UNITS

AFM-SM135 (STEP MOUNT) WEIGHT AND STATIONS

FOR CAMERA / SENSOR SYSTEMS

INPUT WEIGHT AND LOCATION VALUES FOR YOUR CONFIGURED STEP MOUNT	WEIGHT	LONGITUDINAL	LONGITUDINAL	LATERAL	LATERAL
ITEM DESCRIPTION	LBS/KG	ARM (IN)	MOMENT	ARM (IN)	MOMENT
BASE STEP (CHOOSE TYPE FROM TABLE 1)	25.5	141.9	3617.2	-37.3	-950.6
FORWARD ARM (CHOOSE TYPE FROM TABLE 3)	16.8	83.5	1402.8	-37.3	-626.3
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 7 , USE PAYLOAD LOCATION)	5.0	73.0	365.0	-37.3	-186.4
FORWARD ARM PAYLOAD* (USE STA AND BL FROM TABLE 3)	95.0	73.0	6935.0	-37.3	-3541.6
AFT ARM (CHOOSE TYPE FROM TABLE 3)	9.0	197.2	1774.8	-37.3	-335.5
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 7, USE PAYLOAD LOCATION)	5.0	206.0	1030.0	-37.3	-186.4
AFT ARM PAYLOAD* (USE STA AND BL FROM TABLE 5)	95.0	206.0	19570.0	-37.3	-3541.6
TOTAL	251.3		34694.8		-9368.5
COMBINED STEP W&B	251.3	138.1		-37.3	

METRIC UNITS

AFM-SM135 (STEP MOUNT) WEIGHT AND STATIONS

FOR CAMERA / SENSOR SYSTEMS

INPUT WEIGHT AND LOCATION VALUES FOR YOUR CONFIGURED STEP MOUNT	WEIGHT	LONGITUDINAL	LONGITUDINAL	LATERAL	LATERAL
ITEM DESCRIPTION	LBS/KG	ARM (MM)	MOMENT	ARM (MM)	MOMENT
BASE STEP (CHOOSE TYPE FROM TABLE 2)	11.6	3603.0	41794.8	-947.0	-10985.2
FORWARD ARM (CHOOSE TYPE FROM TABLE 4)	7.6	2121.0	16119.6	-947.0	-7197.2
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 8, USE PAYLOAD LOCATION)	2.3	1854.2	4209.0	-947.0	-2149.7
FORWARD ARM PAYLOAD* (USE STA AND BL FROM TABLE 6)	43.1	1854.2	79916.0	-947.0	-40815.7
AFT ARM (CHOOSE TYPE FROM TABLE 4)	7.6	5009.0	38068.4	-947.0	-7197.2
QUICK DISCONNECT DEVICE/VIBRO (SELECT FROM TABLE 8, USE PAYLOAD LOCATION)	2.3	5232.0	11876.6	-947.0	-2149.7
AFT ARM PAYLOAD* (USE STA AND BL FROM TABLE 6)	43.1	5232.0	225499.2	-947.0	-40815.7
TOTAL	117.5		417483.7		-111310.4
COMBINED STEP W&B	117.5	3551.8		-947.0	

Figure 3. Example Calculation of AFM-SM135 Configuration

APPENDIX A - DRAWINGS AND REFERENCES

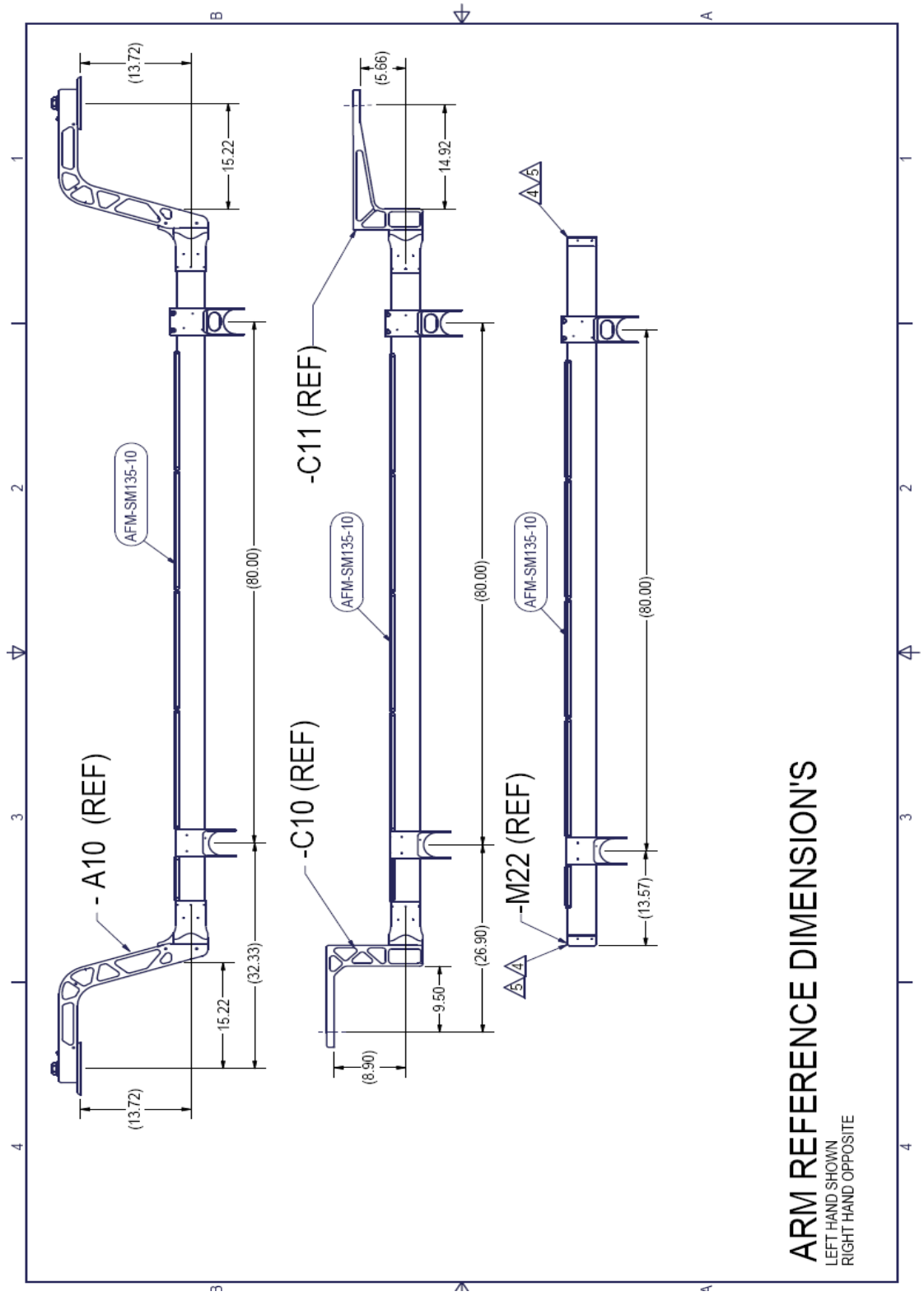

Figure 4. Arm Reference Dimensions

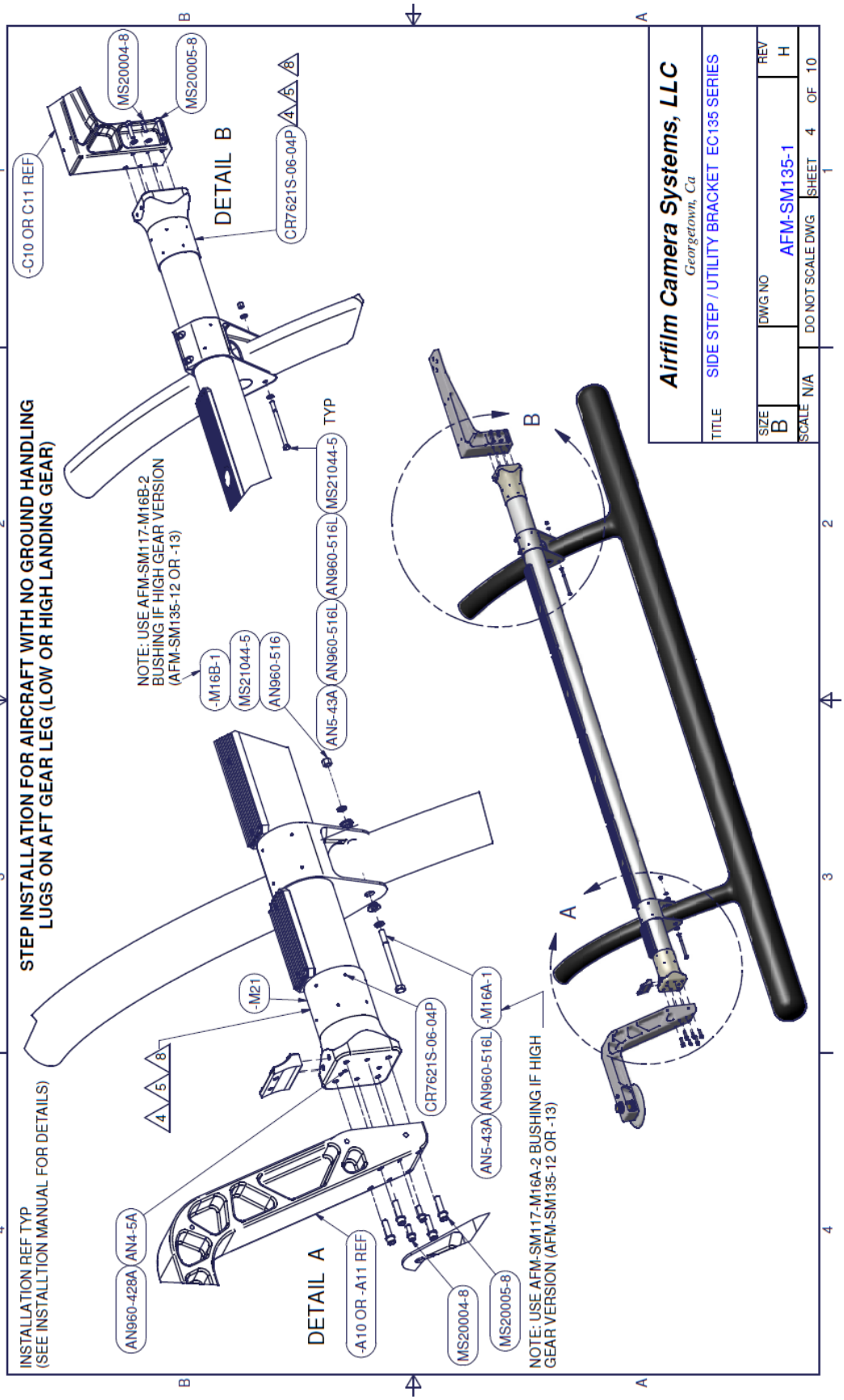

Figure 5. Installation Reference – Aircraft Without Ground Handling Lugs

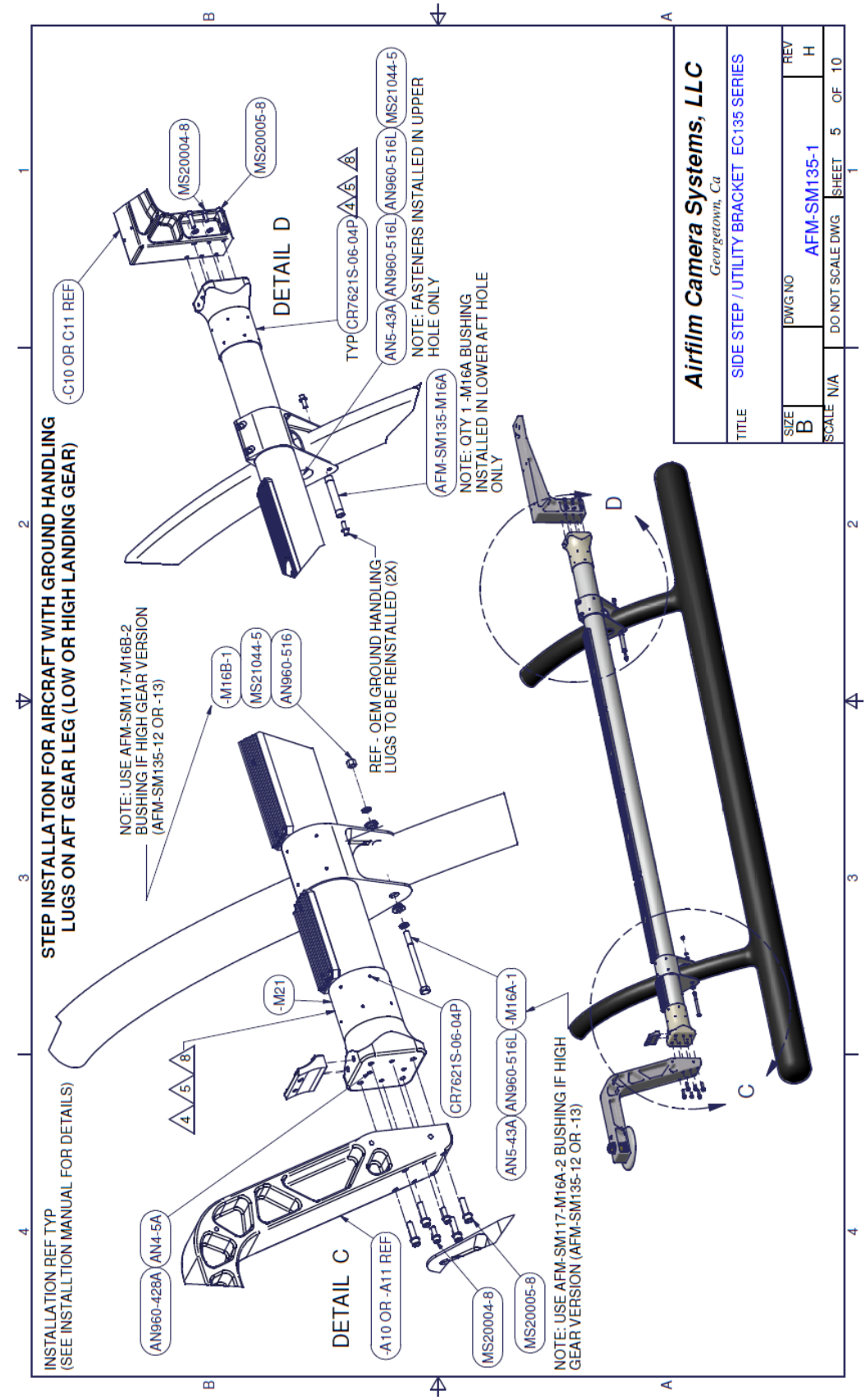

Figure 6. Installation Reference - Aircraft With Ground Handling Lugs

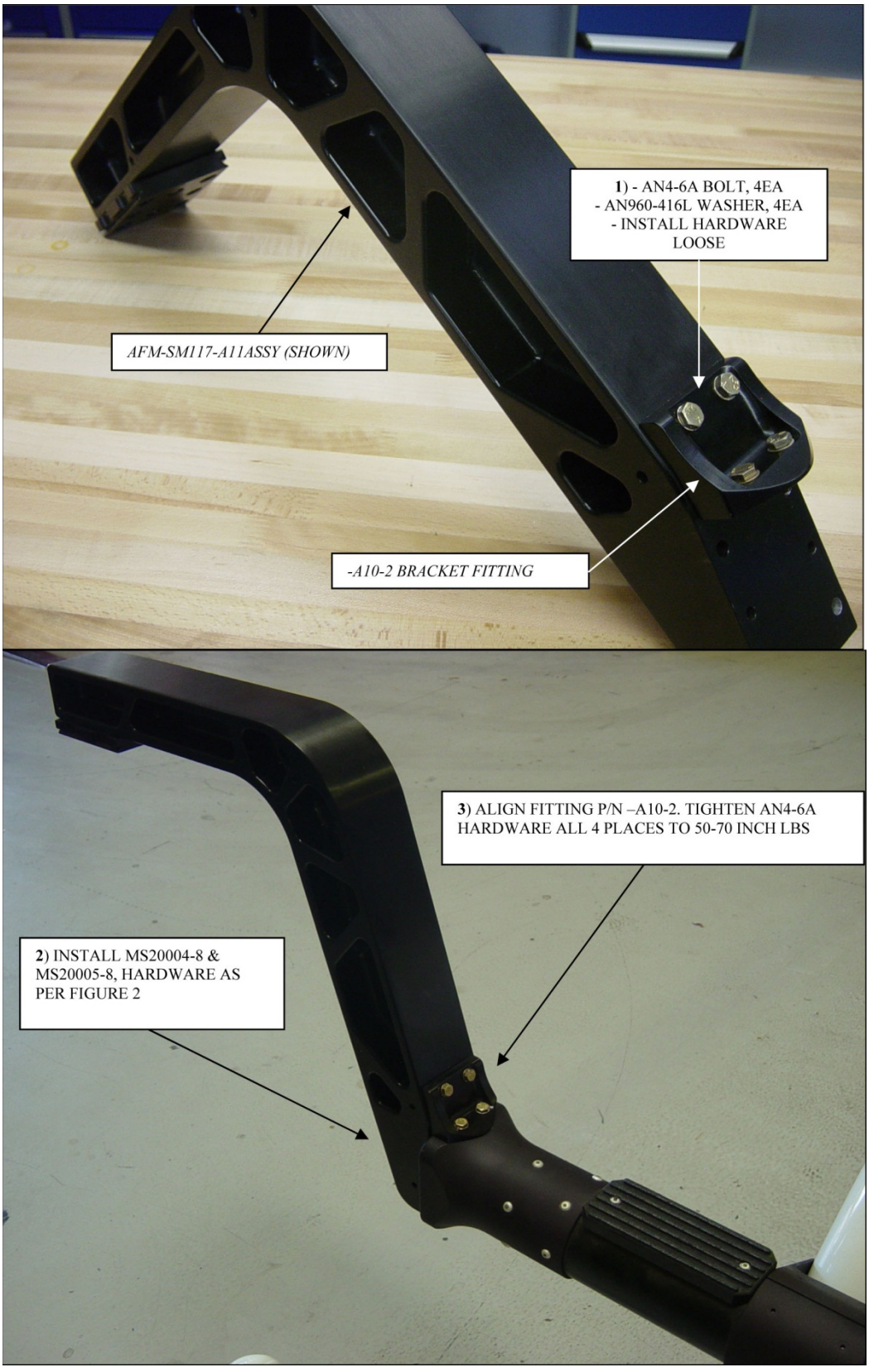

Figure 7. AFM 135-SM135-A10/-A11 Installation Assembly Detail

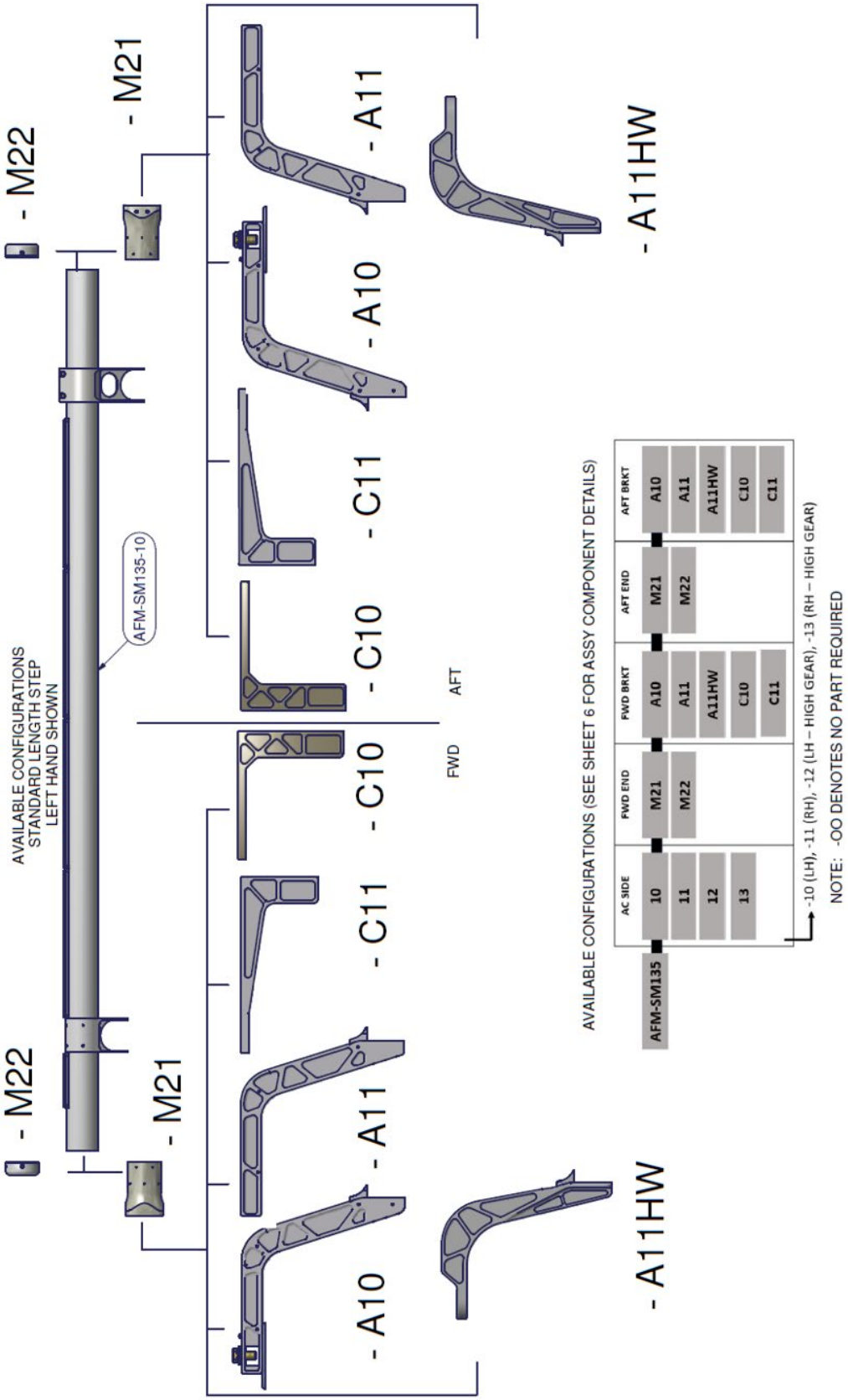

Figure 8. Available Configurations, Standard Length Step

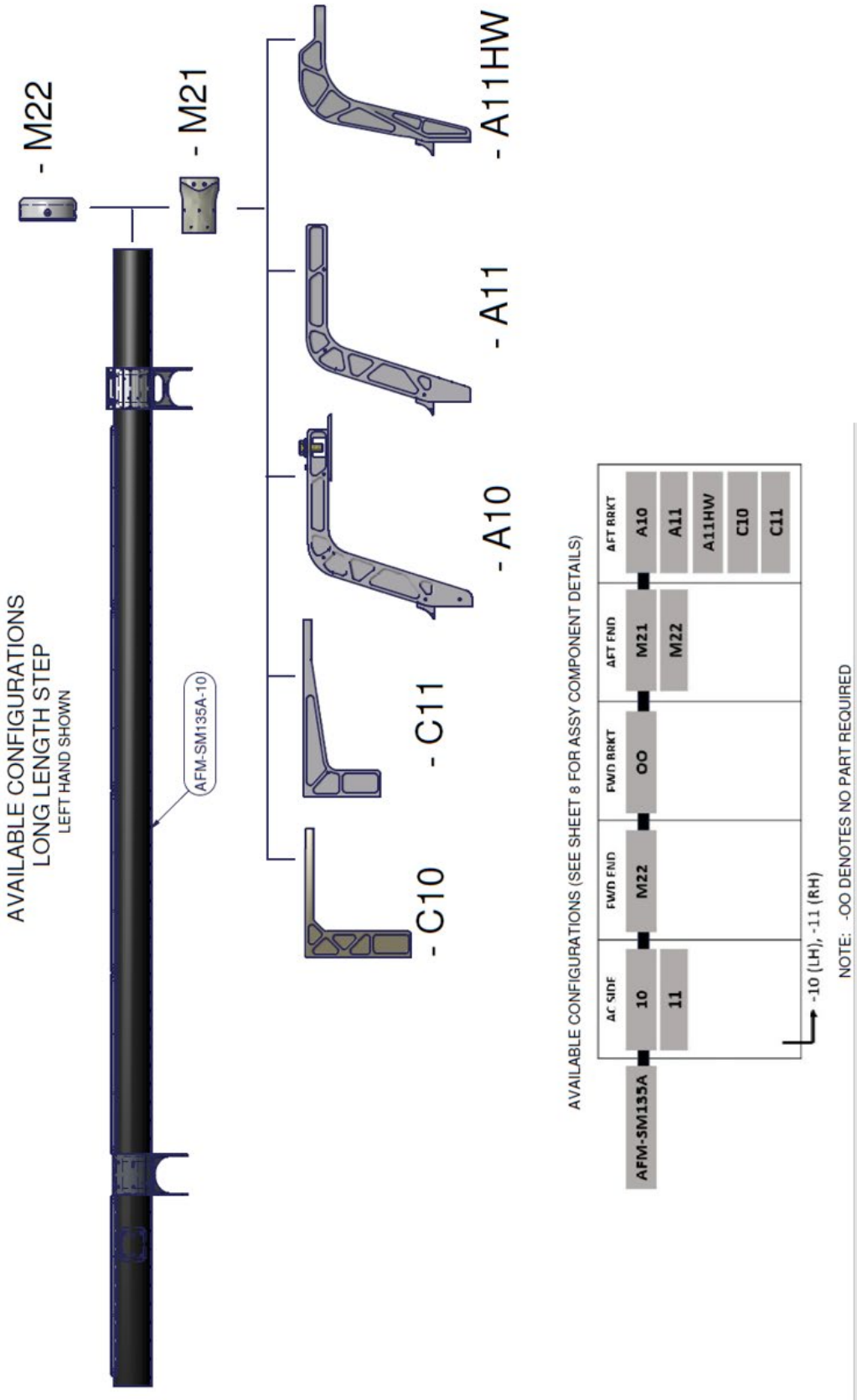

Figure 9. Available Configurations, Long Length Step

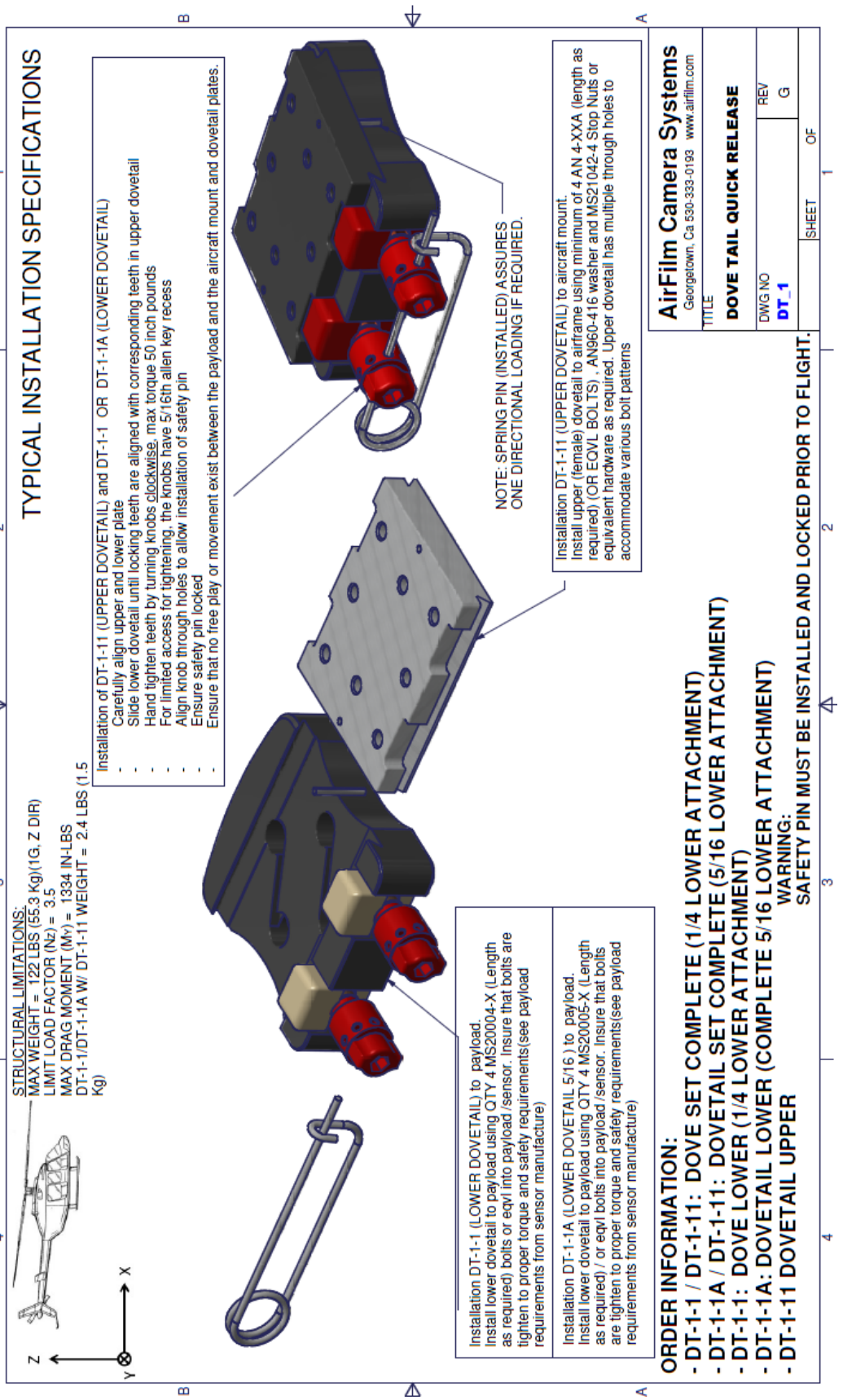

Figure 10. Dove Tail Assembly Installation

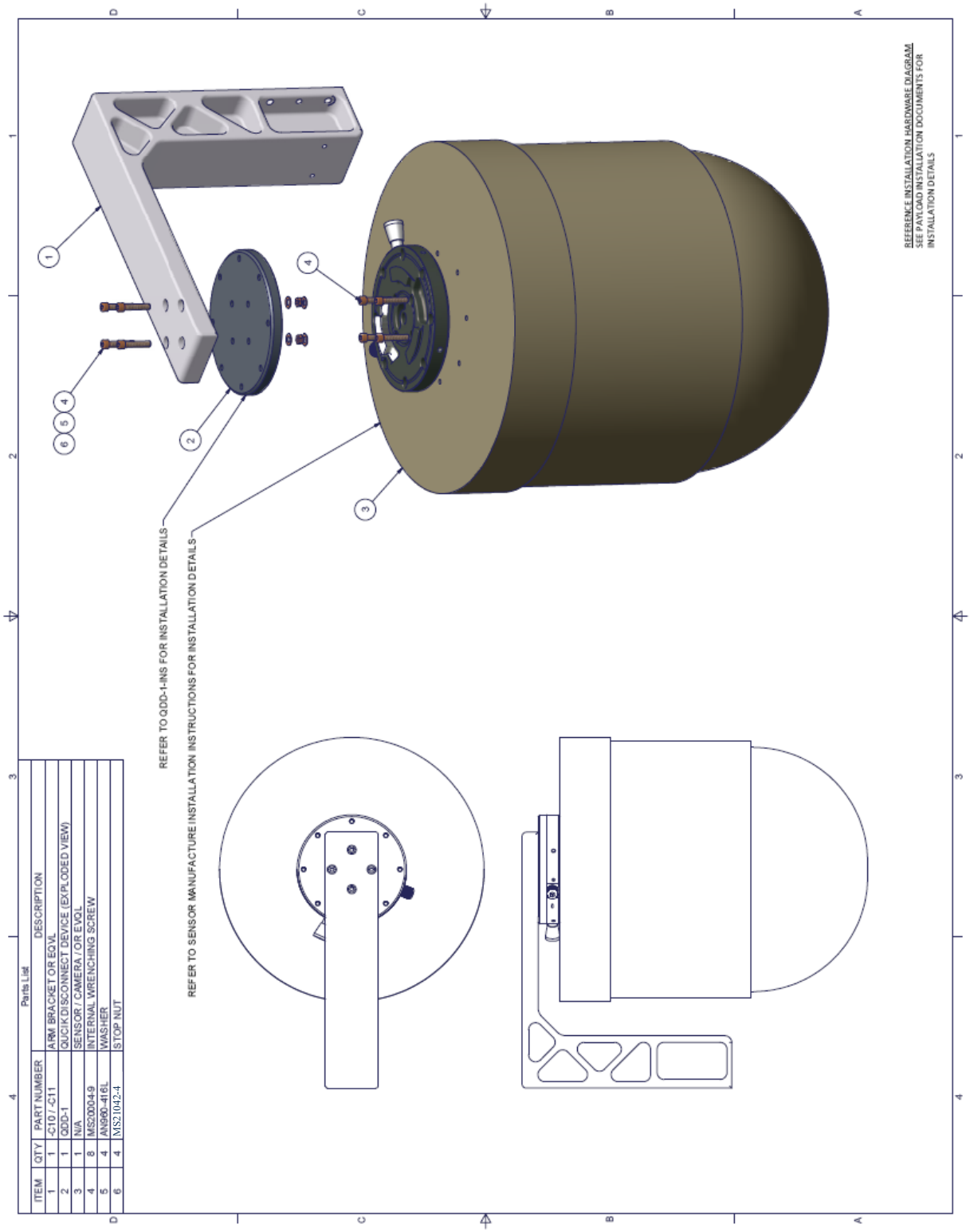

Figure 11. Sensor/Camera/Payload Installation Hardware Diagram

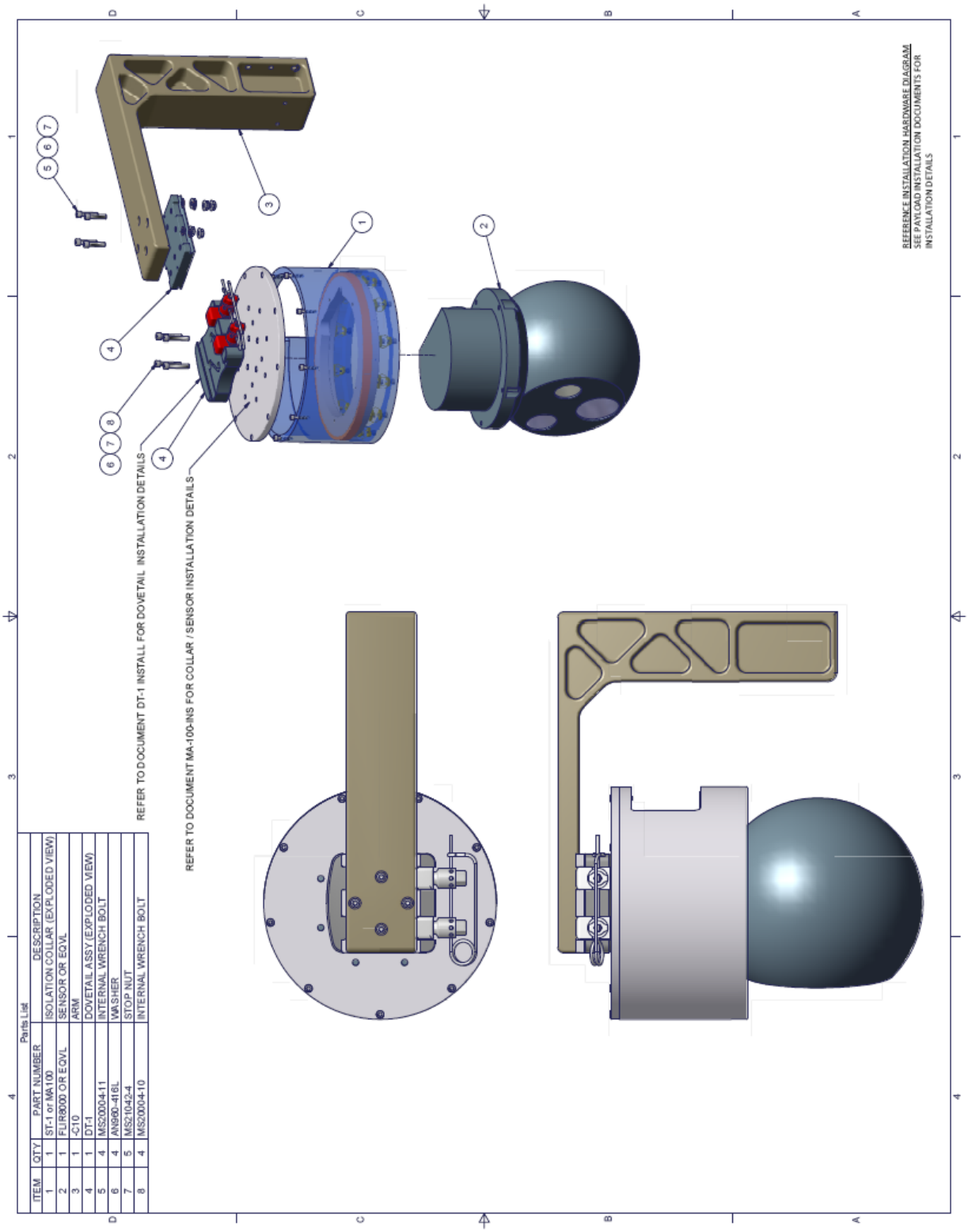

Figure 12. FLIR Reference Installation Hardware

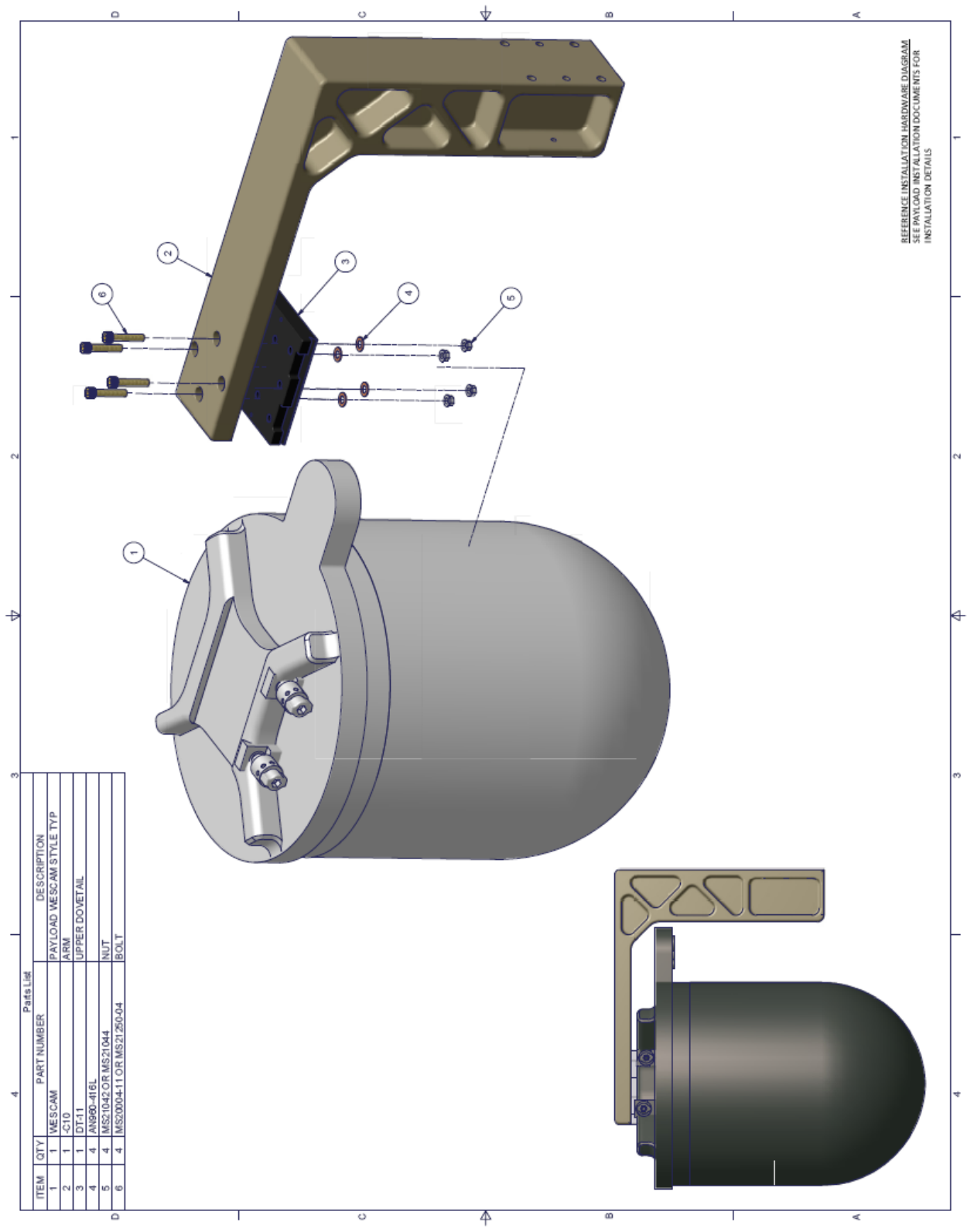

Figure 13. Wescam Reference Installation Hardware

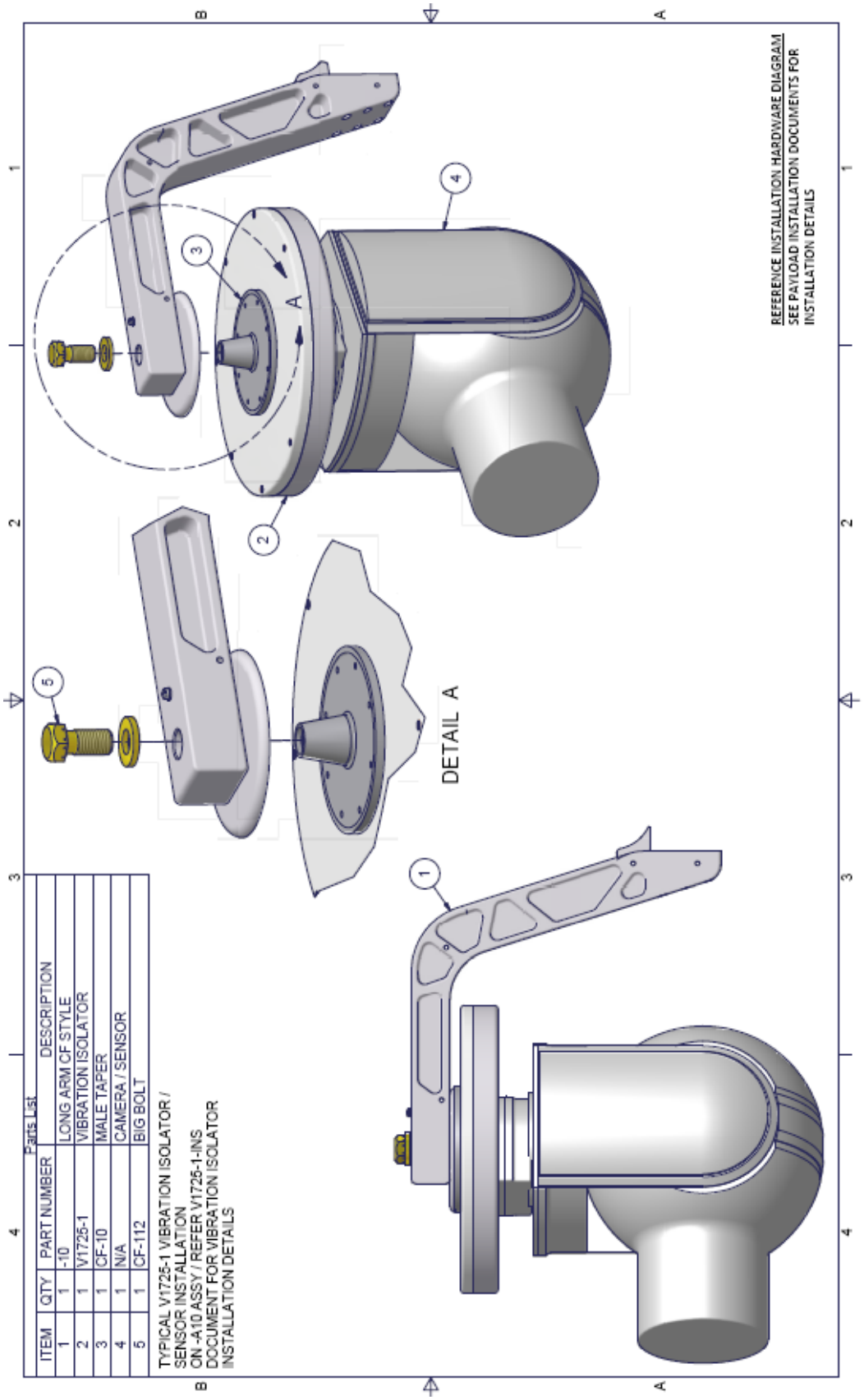

Figure 14. Vibration Isolator Reference Hardware Installation

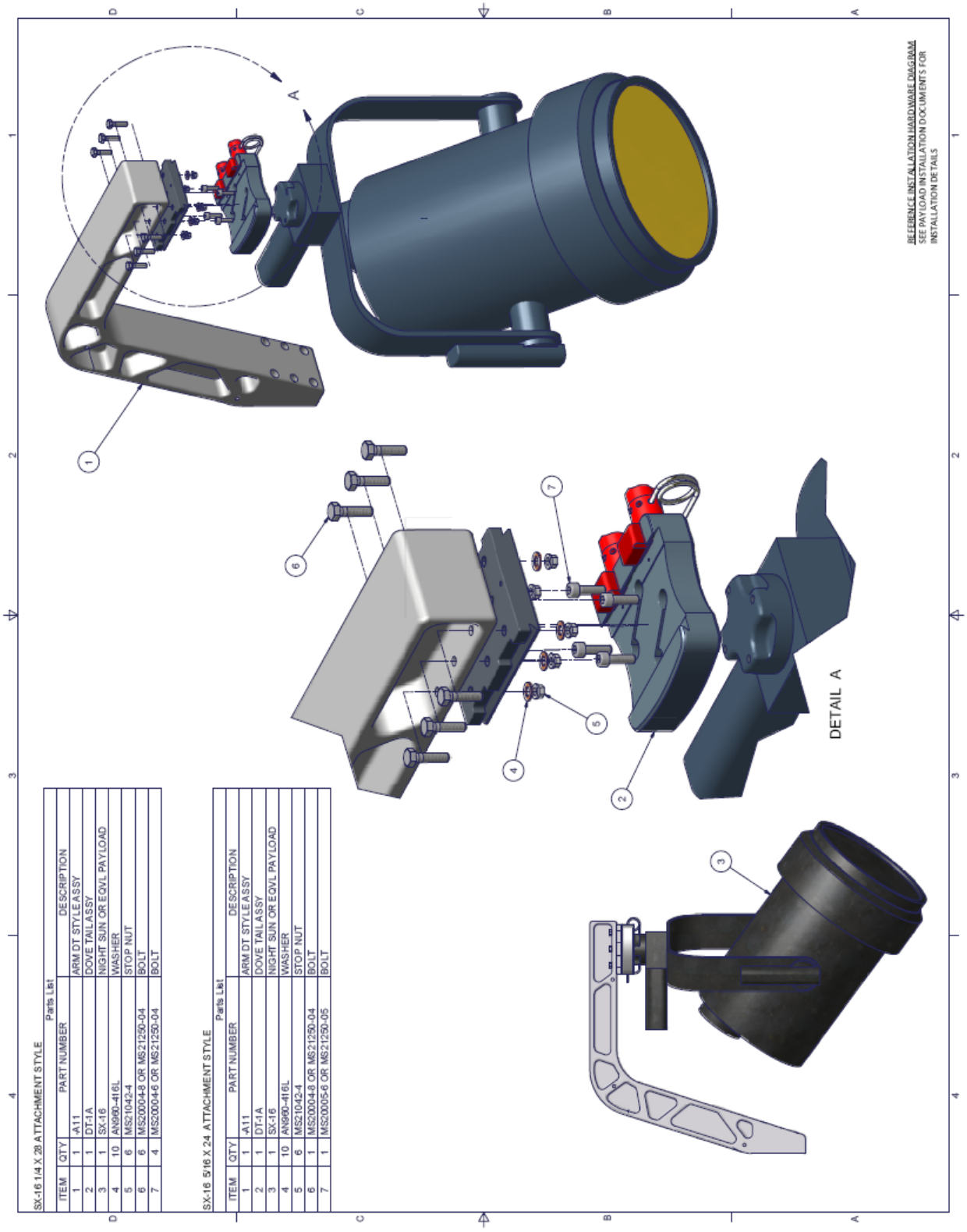

Figure 15. SX-16 Reference Installation Hardware Diagram

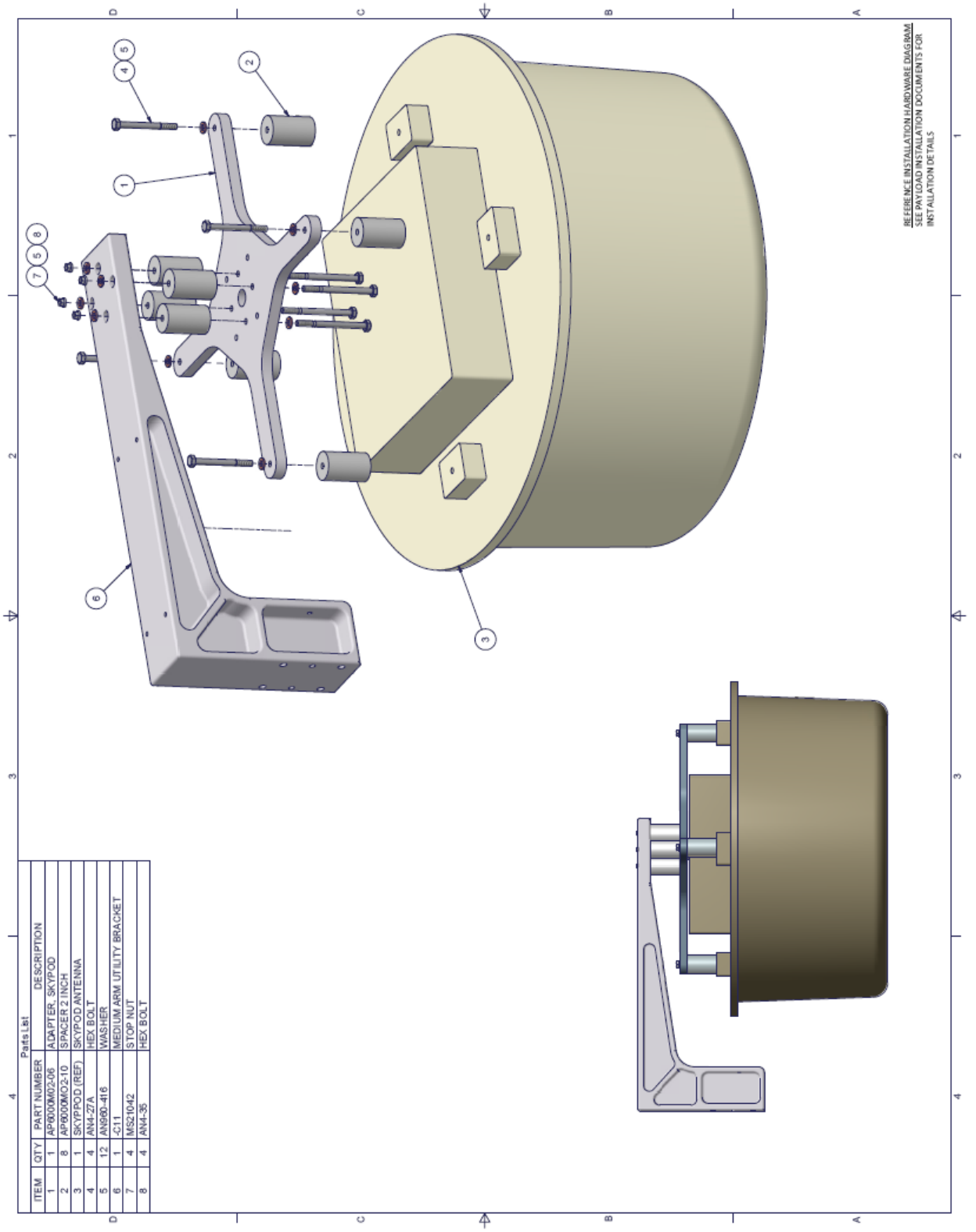

Figure 16. Sky Pod Antenna Reference Installation Hardware Diagram

APPENDIX B - METHOD OF ADDING ADDITIONAL SENSOR /CAMERA / PAYLOADS

Overview

This Appendix provides the requirements necessary to qualify additional sensor / camera / light payloads not listed in the front of this manual. It may also be used as a check list for previously approved sensor /cameras / light payloads if desired.

The STC flight testing was conducted and the STC approved with the largest and heaviest payload expected for use with this mount. The specific sensor/cameras/light not listed in the installation manual of equal or lesser than the limit case are accepted with this follow-on test plan.

Sensor/ Camera/ payload

Make & Model _____

Test Team

Pilot/s

_____ _____
Print Name

Mechanic and/or Engineer and/or Camera Operator

_____ _____
Print Name

Test Aircraft Configuration and Location

Aircraft Model, Registration & Serial Number

_____ _____ _____
Model Registration Number Serial Number

Test Configurations
Empty weight with appropriate fuel and camera system installed
Takeoff Gross weight with crew

Configuration	Gross Weight	Longitudinal CG	Lateral CG
Empty Wt			
Takeoff Wt			

Test Location

_____
Airport or Test Site

Test Conditions

Date: _____

Weather: Ceiling _____ Visibility _____ Winds _____

Altimeter _____ Field Elevation _____

Flight Time: Engine Start _____ Shut Down _____ Flt Time _____

Flight Test

Overview

Applicable regulations demonstrated for compliance are indicated with the following symbol ➔. The testing required for the compliance findings of this installation will be made by as a subject/qualitative evaluation. Although the most critical CG is considered to be at the aft limit for most tests this configuration is mounted forward of the mast should not approach the aft limits. This also depends on crew loading. The test team conducts the following tests and evaluations and mark initial the box at the end of each section if the configuration successfully passes the requirements.

FAR § 27.51 Takeoff

Applicable Regulation

➔(a) The takeoff, with takeoff power and rpm, and with the extreme forward center of gravity -
➔(1) May not require exceptional piloting skill or exceptionally favorable conditions; and
(2) Must be made in such a manner that a landing can be made safely at any point along the flight path if an engine fails.
(b) Paragraph (a) of this section must be met throughout the ranges of -
(1) Altitude, from standard sea level conditions to the maximum altitude capability of the rotorcraft, or 7,000 feet, whichever is less; and
(2) Weight, from the maximum weight (at sea level) to each lesser weight selected by the applicant for each altitude covered by paragraph (b)(1) of this section.

Method of Compliance

The recommended takeoff procedure must be demonstrated to remain clear of the HV "avoid" areas without requiring exceptional piloting skill or exceptionally favorable conditions.

A qualitative evaluation of the ability to safely land at any point along the flight path will be made using judgment and experience with the basic aircraft. No engine failure testing at low altitude will be conducted.

The normal takeoff procedures will be used for the sensor/camera/light payload and mount installation.

Findings

Satisfactory ☐

FAR § 27.71 Glide Performance

Applicable Regulation

➔For single engine helicopters and multiengine helicopters that do not meet the Category A engine isolation requirements of Part 29 of this chapter, the minimum rate of descent airspeed and the best angle of glide airspeed must be determined in autorotation at -
(a) Maximum weight; and
(b) Rotor speed(s) selected by the applicant.

Method of Compliance

(1) Performance capabilities during stabilized autorotative descent are useful tools to assist the pilot when all engines fail. This information is also useful in determining the suitability of available landing areas along a given route segment.
(2) Two speeds are of particular importance, the speed for minimum rate of descent and the speed for best angle of glide. These speeds along with glide distance information are required as flight manual entries per FAR § 27.1587.
The best angle of glide performance will be evaluated at a single speed and low power (needles joined) descent. An autorotative descent starting at least 1000 feet above the ground and at the speed published in the RFM, 100% RPM value will be demonstrated. Small turns will be conducted in the descent.
The aircraft should be easily controllable and the difference between the mount and camera/sensor/light payload and the clean configuration is the evaluation point.

Findings

Satisfactory ☐ Altitude Band H_P _____ Fuel Gage Reading _____

FAR § 27.143 Controllability and Maneuverability

Applicable Regulation

➔(a) The rotorcraft must be safely controllable and maneuverable -
➔ (1) During steady flight; and
➔(2) During any maneuver appropriate to the type, including -
➔ (i) Takeoff;
➔ (ii) Climb;
➔ (iii) Level flight;
➔ (iv) Turning flight;
(v) Glide;
➔ (vi) Landing (power on and power off); and
(vii) Recovery to power on flight from a balked autorotative approach.

➔(b) The margin of cyclic control must allow satisfactory roll and pitch control at VNE with -
(1) Critical weight;
(2) Critical center of gravity;
(3) Critical rotor rpm; and
(4) Power off (except for helicopters demonstrating compliance with paragraph (e) of this section) and power on.

(c) A wind velocity of not less than 17 knots must be established in which the rotorcraft can be operated without loss of control on or near the ground in any maneuver appropriate to the type (such as crosswind takeoffs, sideward flight, and rearward flight), with -
(1) Critical weight;
(2) Critical center of gravity;
(3) Critical rotor rpm; and
(4) Altitude, from standard sea level conditions to the maximum altitude capability of the rotorcraft or 7,000 feet, whichever is less.
(d) The rotorcraft, after failure of one engine in the case of multiengine rotorcraft that meet Transport Category A engine isolation requirements, or complete engine failure in the case of other rotorcraft, must be controllable over the range of speeds and altitudes for which certification is requested when such power failure occurs with maximum continuous power and critical weight. No corrective action time delay for any condition following power failure may be less than -
(1) For the cruise condition, one second, or normal pilot reaction time (whichever is greater); and
(2) For any other condition, normal pilot reaction time.
(e) For helicopters for which a VNE (power off) is established under § 27.1505(c), compliance must be demonstrated with the following requirements with critical weight, critical center of gravity, and critical rotor rpm:
(1) The helicopter must be safely slowed to VNE (power off), without exceptional pilot skill, after the last operating engine is made inoperative at power on VNE.
(2) At a speed of 1.1 VNE (power off), the margin of cyclic control must allow satisfactory roll and pitch control with power off.

Method of Compliance

The general requirements for control and for maneuverability are summarized in section (a), which is largely self-explanatory.

Section (b) specifies flight at V_{NE} with critical weight, center of gravity (CG), rotor RPM, and power. Adequate cyclic authority must remain at V_{NE} for nose down pitching of the rotorcraft and for adequate roll control.
The helicopter will be flown between 1000 and 3000 feet above ground. The test altitude will be dependent on traffic and terrain and conditions close to sea level pressure are desirable. V_{NE} will be the value stated in the RFM for the test density altitude.
Qualitative measurement techniques (pilot opinion) will be used. The tests will include:

Takeoff
Climbing flight
Forward flight to V_{NE} at MCP (maybe less than MCP)
Left & right 30 degree bank turns at V_{NE} and at MCP (maybe less than MCP)
Take-off & Landings (Power on only).

The aircraft should be easily controllable and adequate cyclic margins should exist throughout the flight test points. The difference between the mount and sensor / camera / light payload and the clean configuration is the evaluation point.

Findings

Satisfactory ☐ Cruise Altitude H_P _____ Fuel Gage Reading _____

FAR § 27.171 Stability: General

Applicable Regulation

➔The rotorcraft must be able to be flown, without undue pilot fatigue or strain, in any normal maneuver for a period of time as long as that expected in normal operation. At least three landings and takeoffs must be made during this demonstration.

Method of Compliance

Compliance with the requirements of this section can often be obtained for the VFR condition without any specific or designated flight testing. This test should be conducted with minimum required systems in the aircraft and with minimum flight crew.
Compliance for this requirement will be evaluated throughout the test program.

Findings

Satisfactory ☐

FAR § 27.251 Vibration

Applicable Regulation

➔Each part of the rotorcraft must be free from excessive vibration under each appropriate speed and power condition.

Method of Compliance

This flight requirement may be both a qualitative and quantitative flight evaluation. Section 27.571(a) contains the flight load survey requirement that results in accumulation of vibration quantitative data. Section 27.629 generally requires quantitative data to show freedom from flutter for each part of the rotorcraft including control or stabilizing surfaces and rotors.

The aircraft should have a good track & balance for this evaluation. The airspeed should evaluated at 20 kt increments out to the RFM V_{NE} speed. Variations in rotor RPM expected in normal flight should be evaluated. Changes in vibration are best sensed in the cyclic and pedal controls. The stability of the camera/sensor image will be a good indicator.
The pilot will make a subjective evaluation of the difference between the mount and sensor / camera/ light payload and the clean configuration is the evaluation point.
Compliance with this requirement will be evaluated during testing of FAR § 27.143 Controllability and Maneuverability.

Findings

Satisfactory ☐

FAR § 27.773 Pilot Compartment View

Applicable Regulation

(a) Each pilot compartment must be free from glare and reflections that could interfere with the pilot's view, and designed so that--
➔ (1) Each pilot's view is sufficiently extensive, clear, and undistorted for safe operation; and
(2) Each pilot is protected from the elements so that moderate rain conditions do not unduly impair his view of the flight path in normal flight and while landing.
➔ (b) If certification for night operation is requested, compliance with paragraph (a) of this section must be shown in night flight tests.

Method of Compliance

The section outlines requirements for pilot view in fairly general terms. The aircraft was approved with the installed glareshield and instrument panel that meet the rules. Any additional equipment/monitors must be positioned so as not to limit or obstruct the pilot's field of view. There will be some cases where the installation will be temporary and for a unique mission and consideration should be given for these limited cases and time.

If night operations are expected with an operational system, a "dark cockpit" or night evaluation will be necessary to insure the glare/reflection will not interfere with the pilot duties. A limitation to the use at night is an option.
Satisfactory ☐

FAR § 27.787 Cargo & Baggage Compartment

Applicable Regulation

Cargo and baggage compartments.

(a) Each cargo and baggage compartment must be designed for its placarded maximum weight of contents and for the critical load distributions at the appropriate maximum load factors corresponding to the specified flight and ground load conditions, except the emergency landing conditions of Sec. 27.561.
(b) There must be means to prevent the contents of any compartment from becoming a hazard by shifting under the loads specified in paragraph (a) of this section.
➔ **[**(c) Under the emergency landing conditions of Sec. 27.561, cargo and baggage compartments must--
(1) Be positioned so that if the contents break loose they are unlikely to cause injury to the occupants or restrict any of the escape facilities provided for use after an emergency landing; or
(2) Have sufficient strength to withstand the conditions specified in Sec. 27.561 including the means of restraint, and their attachments, required for the maximum authorized weight of cargo and baggage at the critical loading distribution.**]**
(d) If cargo compartment lamps are installed, each lamp must be installed so as to prevent contact between lamp bulb and cargo.

Method of Compliance

Amendment 27-27 adds two subparagraphs to § 27.787(c) which clarify that cargo and baggage compartments should be designed to protect occupants from injury by the compartment contents during emergency landings. This may be done by location or by retention provisions.

The sensor/camera/light controllers and power supply must be located and secured in a position that will not endanger occupants in an emergency landing impact.

Consideration should be given to stowage and egress when filming in hovering flight. In some cases this might not be possible.

Findings

Comment: _____
Satisfactory ☐

FAR § 27.1301 Function and Installation.

Applicable Regulation

Each item of installed equipment must--
➔ (a) Be of a kind and design appropriate to its intended function;
(b) Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors;
(c) Be installed according to limitations specified for that equipment; and
➔ (d) Function properly when installed.

Method of Compliance

For optional equipment, the emphasis on functioning is rather limited compared to that for required equipment. The conditions under which the optional equipment is evaluated should be recorded in the report. The major emphasis for this type of equipment should be to ensure it does not interfere with the operation of systems that are required for safe operation of the rotorcraft, and that the failure modes are acceptable and do not create any hazards.

During flight operations, operate all avionics and electrical systems. Complete the matrix below. The matrix is laid out with the newly installed equipment listed at the top of the page and all aircraft systems listed down the left side of the page. Note any EMI or RFI either TO or FROM the installed equipment. Note any anomalies or EMI/RFI interference to other instruments or indications during all testing phases of flight.
Each item must be checked. Check off each block if no interference is noted. If interference is present during the test, DO NOT CHECK THE BOX and explain in Comments section at end of section. If applicable, note relevant conditions (i.e. frequencies, OBI selection, function modes) under which the interference occurred.

Findings

Interference? ➔ / ↓	**Camera/Sensor/Light**	**Position Controller**
Camera/Sensor/Light		
Position Controller		
VHF Comm 1		
VHF Comm 2		
VHF Comm 3		
VHF NAV 1		

Interference?	Camera/Sensor/Light	Position Controller
VHF NAV 2		
ADF 1		
XPONDER 1		
Other Radios		
Audio 1		
Audio 2		
Standby Compass		
Engine Inst		
Fuel Gage		
Clock		
Voltmeter		
Ammeter		
Other		

EMI / RFI Comments:

Satisfactory ☐

Signatures

General test findings _____

Pilot Signature _____

Mechanic/ Engineer _____

Other Flt Personnel Signature & Function

_____