

INSTALLATION INSTRUCTIONS
REPORT NO. AFM-NM429-006
AFM-NM429-1 NOSE UTILITY MOUNT
FOR THE
BELL 429 SERIES ROTORCRAFT



RECORD OF REVISIONS



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1. NOSE MOUNT INSTALLATION INTRODUCTION

This manual presents the installation instructions for the Airfilm Camera Systems model AFM-NM429-1 Nose mount for the Bell 429 rotorcraft. The mount is designed to facilitate the attachment of equipment such as searchlights, FLIR cameras, video cameras, microwave downlinks, etc.



Figure 1. Typical Payload Installed onto the AFM-NM429 Nose Mount

The AFM-NM429-1 Nose Utility mount attaches to the forward fuselage, overlapping existing front landing light cover, P/N: 429-706-017-119 or 429-706-017-101, located at FS80.80-106.25. See Figure 2.

There are two individual and separate mounting locations, one fore and one aft on the mount. Searchlight/camera/sensor payloads are attached either directly or with the use of DT-1 (dovetail), QDD-1 (quick disconnect) or other factory approved adaptor hardware configurations. See Figures 13 and 14.

The nose mount has cut out for the landing light to allow standard landing light operations. When payloads are installed on the forward mounting location, the light is not to be used for standard flight operations. Flight operations for which a landing light is required and a payload is installed on the forward mounting location, the AFM-NM429LK-1 light kit needs to be installed.

1.1. GENERAL

These instructions cover the AFM-NM429-1 Nose Mount Assembly installation:

Precautions:

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

Reference publications:

- (AC) 43.13-2 and (AC)43.13-1B
- BHTI-429-MM-1 maintenance manual

Distribution:

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

Definitions/Abbreviations:

- FLIR: Forward Looking Infrared Radar
- BHTI: BELL HELICOPTER TEXTRON INC.

Standards of Measurement:

- All measurements in 100ths of an inch
- All weights in US pounds
- All torques in inch-pounds

Special Tools Required:

- ¼ Drive ratchet set
- # 10 drill
- # 5 drill
- # 10 wedge lock clecos

2. NOSE MOUNT CONTROL & OPERATIONAL INFORMATION

Special procedures/precautions:

2.1 Maximum Payload Limitations:

AFM-NM429-1 Forward mounting location

- Weight = 135lbs.
- Frontal area = 2.64 square feet

AFM-NM429-1 Aft mounting location

- Weight= 135 lbs
- Frontal area= 2.64 square feet

AFM-NM429-1 Combined mounting locations (two simultaneous payloads installed).

- Combined maximum weight = 135lbs
- Combined maximum frontal area = 2.64 square feet

2.2 Ground Clearance:

- Minimum ground clearance of installed payload = 6 inches
- Installation of mount must not interfere with any existing installed equipment.

3. NOSE MOUNT INSTALLATION INFORMATION

- 3.1. Reference Figures 2, 3 and 4.
- 3.2. Remove front landing light cover panel, P/N: 429-706-017-119 or 429-706-017-101. Retain original hardware for use when AFM-NM429-1 Nose Mount is not installed. See Figure 3.
- 3.3. Using front landing light cover panel (P/N: 429-706-017-119 or 429-706-017-101) as a drill template, lay panel over AFM-NM429-1. Carefully align front landing light cover panel such that all sides are flush and even with AFM-NM429-1 Nose Mount. Mark all 22 screw through the landing light cover panel, onto the Nose Mount. See Figure 4. ***Do not drill the 5 fasteners on the front forward edge of the panel through the mount. These 5 fasteners will be installed as per original in the landing light cover only and covered by the mount.***
- 3.4. Carefully open all marked hole locations with a #10 drill, use wedge lock clecos as each hole is opened to size to insure proper alignment of the front landing light cover panel and the AFM-NM429-1 Nose Mount. A smaller diameter drill bushing can also be used to make pilot holes first. Final hole size to be drilled with #5 drill.
- 3.5. For each newly drilled hole in the AFM-NM429-1 Nose Mount, deburr, etch and Alodine all exposed unfinished surfaces.
- 3.6. Install original front landing light cover and AFM-NM429-1 Nose Mount together. Between the front landing light cover and the AFM-NM429-1 Nose Mount, apply 3M tape (P/N: 2000-00015-00) or A2008 protective cloth tape on all mating surfaces. Replace the existing front landing light cover fasteners with same type and size of the appropriate length (Bell P/N 120-225C3T-15).
- 3.7. See Figure 6. The AFM-NM429-1 Nose Mount can overlap some existing rivets on the landing light cover “window” Lexan. For the rivets that interfere with the nose mount, remove those rivets, replace with NAS1097AD4 rivets, install rivets with 140-001-1 washers as well.
- 3.8. See Figure 5, there are 4 ea. fasteners that are installed through the AFM-NM429-1 Nose Mount and panel. These fasteners need to 120-225C3T-26 in length, due to the extra thickness of the nose mount. The fasteners are to be installed with NAS1149F0363P washers.



Figure 2. Forward Fuselage Installation Location (View Looking Aft

Remove front landing light cover, P/N: 429-706-017-119 or 429-706-017-101.

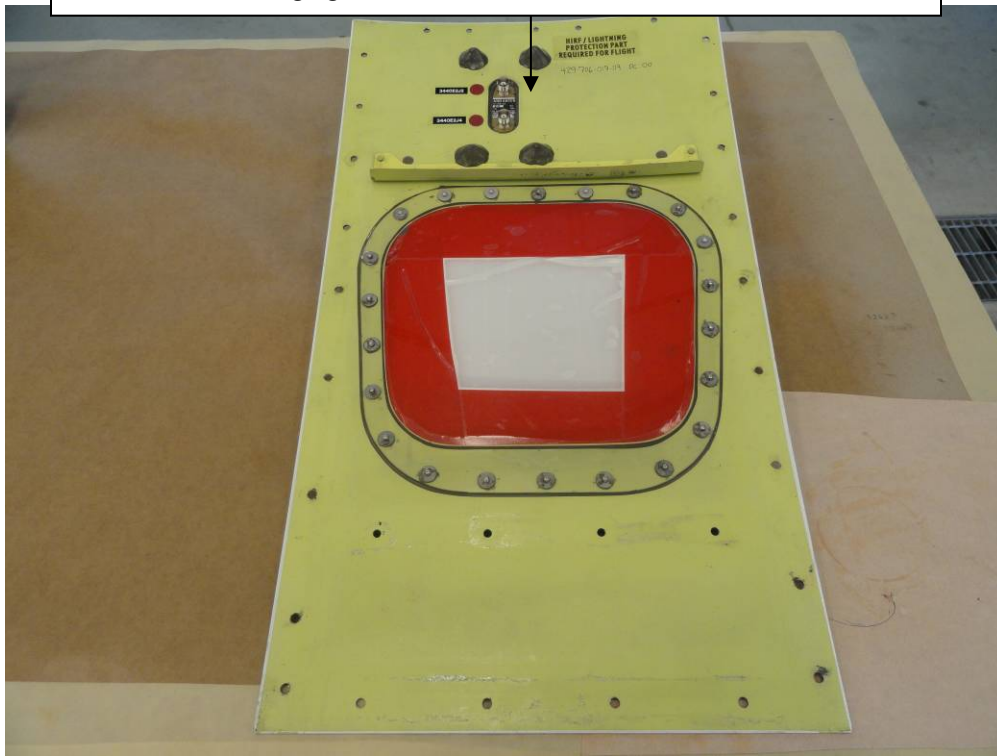


Figure 3. Forward Landing Light Panel

Refer to Note 3.7, remove any rivets that interfere with the nose mount in this area. Replace with NAS1097AD4 rivets, install with 140-001-1 washers

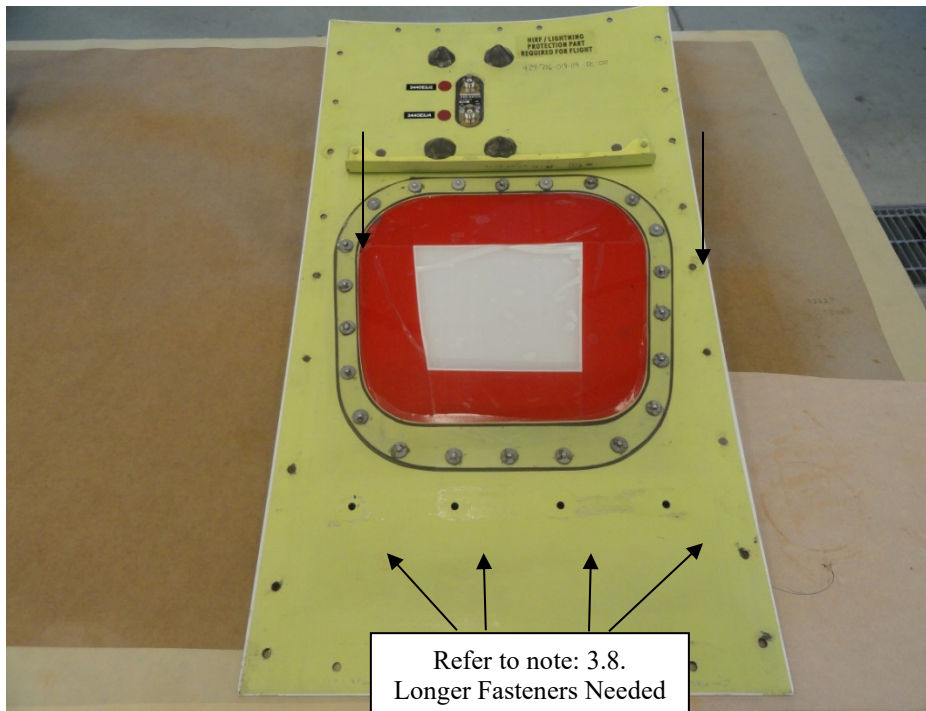


Figure 4. Forward Landing Light Panel

4. NOSE MOUNT FINAL INSTALLATION INSTRUCTIONS:

- 4.1. Check entire mount for security and proper screw torque settings.
- 4.2. Calculate weight and balance.
- 4.3. Make log book entries as required.
- 4.4. Return aircraft to service.

5. NOSE MOUNT REMOVAL INSTRUCTIONS:

To remove the AFM-NM429-1 Nose Mount from the Rotorcraft:

- 5.1. Remove all screws through AFM-NM429-1 and forward landing light cover panel.
- 5.2. Re-install forward landing light cover with original hardware as removed in step 4.2.
- 5.3. Calculate weight and balance.
- 5.4. Make appropriate log book entry.
- 5.5. Return Aircraft to service.

6. OPTIONAL LIGHT KIT INSTALLATION

The Light Kit is intended to be used when payloads are mounted on the forward mounting hard point location and the OEM landing light is effectively “blanked out” by the payload.

The AFM-NM429LK-1, Light Kit consists of two mounting brackets and two landing light assemblies. The landing light bulbs are available in LED white and LED IR (infrared) bulbs. See Figure 5.

CAUTION: ENSURE THAT BULBS INSTALLED IN P/N G3-10 HOUSING ARE COMPATIBLE WITH AIRCRAFT POWER REQUIREMENTS.

PAR36 (ALPHABEAM) ARE APPROVED FOR INSTALLATION INTO THE G3-10 HOUSING



Figure 5. Optional Landing Lights Installed on Nose Mount

Special Tools Required:

- ¼ Drive ratchet set
- Phillips no. 2 screw driver
- Wire cutters
- Wire strippers

7. CONTROL & OPERATIONAL INFORMATION

Special Procedures/Precautions:

- 7.1. Adjust the light beam for optimum path as viewed by the flight crew.
- 7.2. Installation of mount must not interfere with any existing installed equipment.

8. INSTALLATION INFORMATION

- 8.1. Gain access to the existing landing light, p/n: 01-0790528.
- 8.2. Remove the left and right inputs: 3340A1J1 AND 1J2. See Figure 6.
- 8.3. New harness(s) will need to be manufactured to run from the Nose Mounted Light Kit, back along the side of the mount to the existing landing light output panel. See Figure 5. Wiring shall be made in accordance with Bell Helicopter standard practices and AC43.13-1B, Chapter 11, Sections 5, 6, 7, and 8.
- 8.4. Route the new cable either through the Lexan panel for the original landing light or through the panel immediately aft of the mount.
- 8.5. Cap and tie off the original connectors to the landing light output panel.
- 8.6. Install nose mount as per Sections 4 and 5.
- 8.7. Install the Light Kit Brackets, AFM-NM429LK-10 to the forward face of the mount. The -10 bracket is used on both left hand and right hand sides. The notch on the side of the bracket will always face outboard. See Figure 7.
- 8.8. Using hardware supplied, tighten the MS24694 screws, 3 places EACH SIDE to 30 inch lbs or torque. Mark with torque seal.
- 8.9. Connect new wire harnesses to the respective right and left light housings, G3-10.
- 8.10. Install landing light bulb as required.
- 8.11. Install the light housing in the light housing brackets with AN3-22A hardware, 2 places EACH SIDE, install loose.
- 8.12. Adjust the light beam for optimum path as viewed by the flight crew. See Figure 8.
- 8.13. Tighten AN3-22A hardware for light housings to 30 inch lbs of torque. Mark with torque seal.



Figure 6. Bell Helicopters Electrical Box

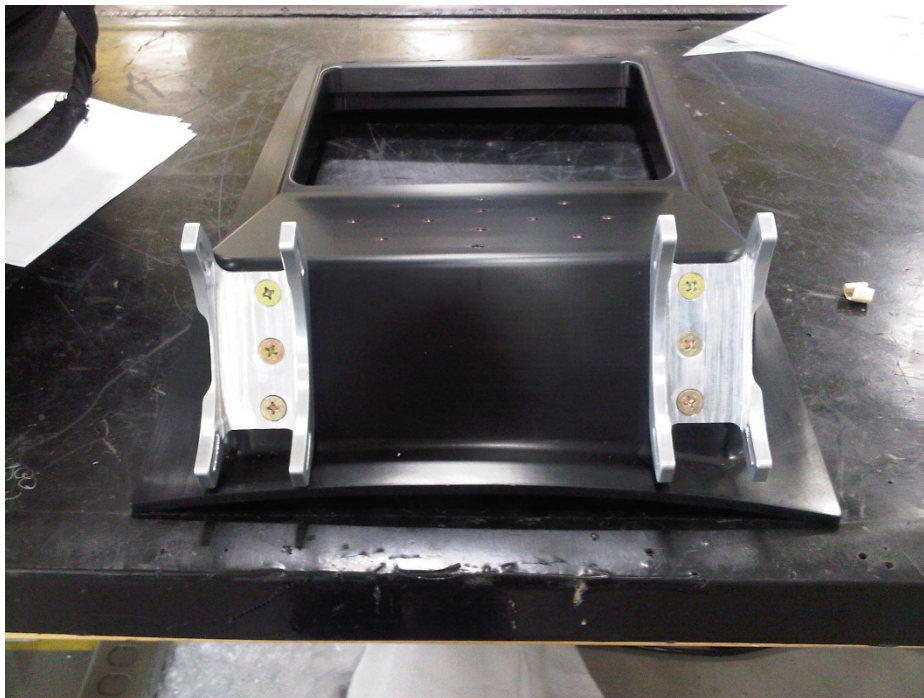


Figure 7. Light Kit Brackets Installed



Figure 8. Light Beam Adjustment

9. OPTIONAL LIGHT KIT FINAL INSTALLATION INSTRUCTIONS:

- 9.1. Check entire mount for security and proper screw torque settings.
- 9.2. Calculate weight and balance.
- 9.3. Make the appropriate log book entries as required.
- 9.4. Return aircraft to service.

10. Optional Light Kit Removal Instructions:

To remove AFM-NM429-LK mount from the rotor craft:

- 10.1. Remove light housings, remove light housing brackets. Remove light wire harness from mount.
- 10.2. Remove AFM-NM429-1 Nose Mount, gain access to existing OEM landing light, reconnect original connectors.
- 10.3. Calculate weight and balance.
- 10.4. Make the appropriate log book entry.
- 10.5. Return Aircraft to Service.

11. Weight & Balance

The following table presents the location of the weight and center of gravity of the mount and payload sensor/camera for adjustment of the aircraft weight and center of gravity with the mount installed.

Table 1: Weight & Center of Gravity Locations (US)

DESCRIPTION	WEIGHT (lbs)	STATION (in)	BL (in)
AFM-NM429-1 Mount	13.0	93.53	0.0
PAYLOAD (forward location)	AS INSTALLED	86.80	0.0
PAYLOAD (aft location)	AS INSTALLED	102.25	0.0
AFM-NM429LK-1 Light Kit (2X LIGHTS)	3.5	82.00	0.0

Table 2: Weight & Center of Gravity Locations (Metric)

DESCRIPTION	WEIGHT (KG)	STATION (mm)	BL (mm)
AFM-NM429-1 Mount	5.89	2375.66	0.0
PAYLOAD (forward location)	AS INSTALLED	2204.72	0.0
PAYLOAD (aft location)	AS INSTALLED	2597.15	0.0
AFM-NM429LK Light Kit (2X LIGHTS)	1.59	2082.80	0.0

Table 3: Miscellaneous Weights (US)

PART NO.	DESCRIPTION	WEIGHT (LBS)
DT-11	Dovetail	2.0
QDD	Quick Disconnect	3.5

Table 4: Miscellaneous Weights (Metric)

PART NO.	DESCRIPTION	WEIGHT (KG)
DT-11	Dovetail	1.0
QDD	Quick Disconnect	1.6

APPENDIX A - DRAWINGS AND REFERENCES

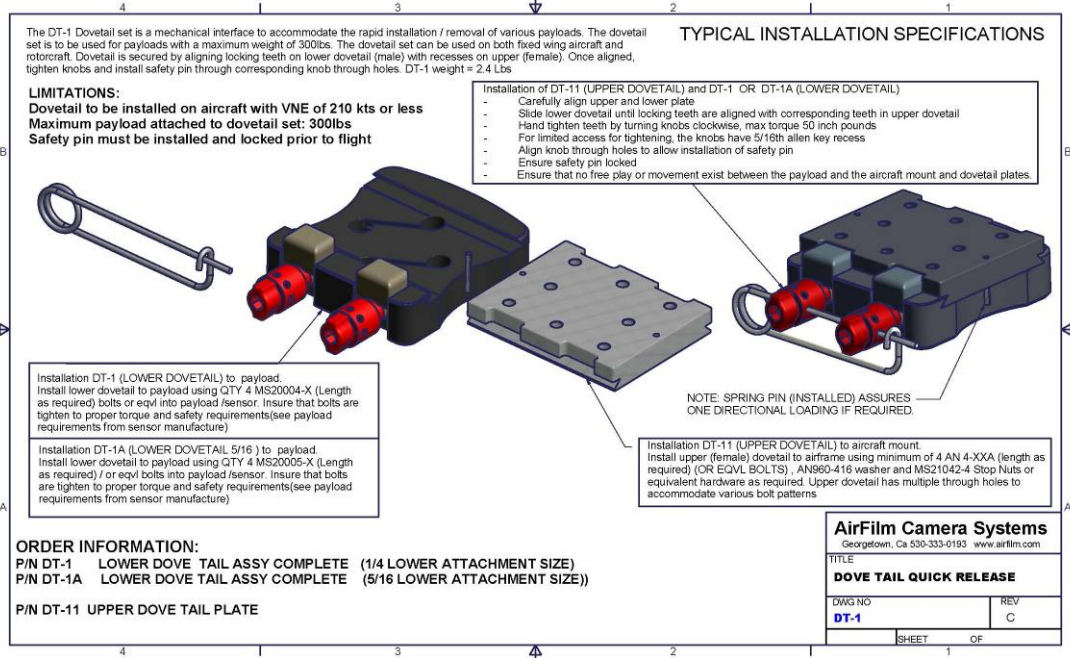


Figure 9. DT-1 Dovetail Quick Release General Information

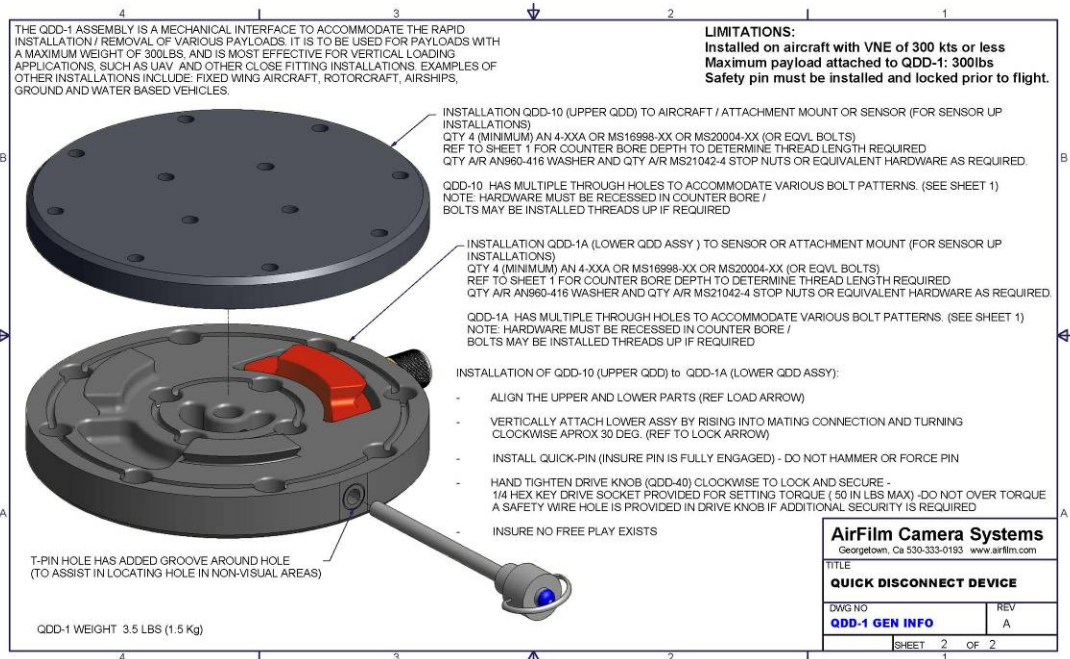


Figure 10. QDD-1 Quick Disconnect Device General Information

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

1. 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.

2. Sensor/Camera/Payload

Make & Model _____

3. Test Team

Pilot/s

Print Name

Mechanic and/or Engineer and/or Camera Operator

Print Name

4. 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

5. Test Conditions

Date: _____

Weather: Ceiling _____ Visibility _____ Winds _____
Altimeter _____ Field Elevation _____

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

6. Flight Test

6.1. 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.

6.2 FAR § 27.51 Takeoff

6.2.1 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.

6.2.1 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.

6.2.2 Findings

Satisfactory

6.3 FAR § 27.143 Controllability and Maneuverability

6.3.1 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 bailed 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.

6.3.2 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.

6.3.3 Findings

Satisfactory Cruise Altitude H_p _____ Fuel Gage Reading _____

6.4 FAR § 27.171 Stability: General

6.4.1 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.

6.4.2 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.

6.4.3 Findings

Satisfactory

6.5 FAR § 27.251 Vibration

6.5.1 Applicable Regulation

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

6.5.2 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 be 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.

6.5.3 Findings

Satisfactory

6.6 FAR § 27.773 Pilot Compartment View

6.6.1 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.

6.6.2 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.

6.6.3 Findings

Satisfactory

6.7 FAR § 27.787 Cargo & Baggage Compartment

6.7.1 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.

6.7.2 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.

6.7.3 Findings

Comment: _____

Satisfactory

6.8 FAR § 27.1301 Function and Installation.

6.8.1 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.


6.8.2 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.

6.8.3 Findings

Interference?		Camera/Sensor/Light	Position Controller
Camera/Sensor/Light			
Position Controller			
VHF Comm 1			
VHF Comm 2			
VHF Comm 3			
VHF NAV 1			
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 _____