

REVISIONS

<u>Rev</u>	<u>Description of Changes</u>	<u>Date</u>
IR	Initial Release	2/25/08 (FAA date)
A	Added Ladybug 3 camera details	2/10/2011 (Prepared)

Changes are denoted by a line in the margin like this line.

Vibration Isolation Box (Installed with IMC Camera)

The Camera Base Unit is housed in a Vibration Isolation Box, designed to mitigate vibration and shock and provide restraint and occupant protection from this item of mass in the cabin. The Camera Base Unit slides into the box and fits over a lip on the inner box. Two ¼ turn retaining latches prevent the Base Unit from coming out during a crash landing. Restraint of the box is provided by the available seatbelt run through loops on each side of the box. The top of the box is padded for the protection of an adjacent occupant. Attached to the front of the box may be a small, 1 lb. monitor.

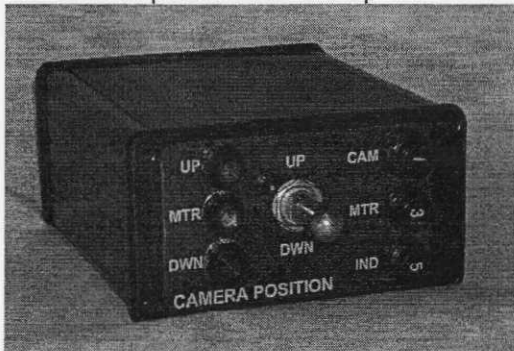
Stowage Box (Installed with Ladybug 3 Camera)

The ladybug camera system is controlled by a laptop which is stowed in the Stowage Box during takeoff and landing. Three ¼ turn latches secure a hinged door and prevent contents from coming out during a crash landing. Restraint of the box is provided by the available seatbelt run through loops on each side of the box. The top of the box is padded for the protection of an adjacent occupant.

anti-rotational leverage. It has several locations for adjustment including length adjustment, location on skid tray, and a turnbuckle that can adjust its inboard position. The torque arm is secured against the landing gear cross tube with zip ties.

Position Control Box

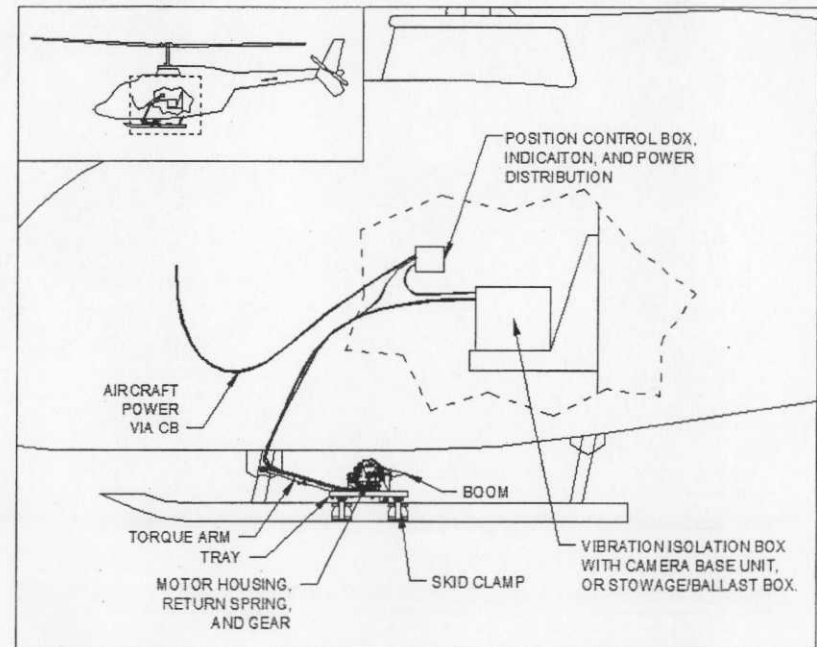
A small box with up-down switch and boom/camera position indicating lights is provided for control of the tilt mechanism. This box also contains the circuit breakers for the motor (MTR), indication (IND), and camera control unit (CAM). The control box, connected electrically to the tilt motor, can be located within reach of the pilot or camera operator.



The indication shows three things – the camera boom is UP – safe for landing, DOWN – operational; and MTR – the motor is running. It takes 15-30 seconds to raise or lower the boom. In the fully up and down positions micro switches mounted to the skid tray close and shut off power to the motor. If the MTR light stays illuminated for longer than 30 seconds a failure condition likely exists. If the MTR light is on and either the UP or DWN lights are on a failure condition exists – such as a bad limit switch or motor. If no lights are on, and the switch is in the UP or DWN position, a failure condition exists – such as no power.

GENERAL INFORMATION

The Retractable Camera System, Kit Part # IMC407-100, is a skid-mounted retractable boom that allows a camera to be extended below the skids. The Position Control Box lowers and raises the camera/boom and provides indication for camera position, motor on, and has system circuit breakers. For IMC Camera use the Camera Base Unit is contained by the Vibration Isolation Box, which is attached to a passenger seat using the lap belt. For Ladybug 3 Camera use the Stowage Box is attached to a passenger seat using a lap belt.



Retractable Camera Mount System Diagram
(Rear Seat install shown, may be installed in any pax seat)

The system is thoroughly described in and is to be installed per FW-IMC407-13, "Retractable Camera Mount ICA & Component Maintenance Manual", latest revision.

PART I

1. LIMITATIONS

V_{NE} is 110 knots with the camera system installed.

Stowage Box is limited to 120 lbs.

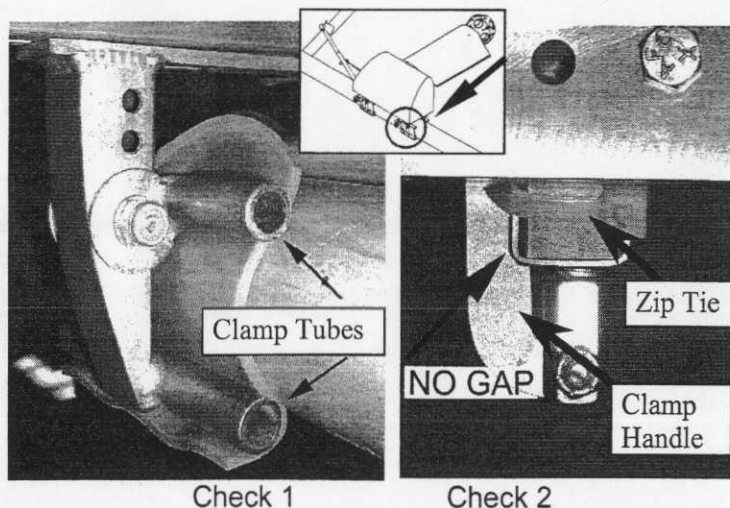
2. NORMAL PROCEDURES

This system is not complex and does not require special tools for installation. It may be installed by the pilot or a mechanic. Install the retractable camera mount per FW-IMC407-13, "Retractable Camera Mount ICA & Component Maintenance Manual", latest revision.

Pre Flight Exterior Check

Add the following:

- 1) Verify the skid clamps contact the skid at both locations shown.



Check 1

Check 2

Motor Housing

The Motor Housing has a tilt mechanism that is a motor driven worm acting on a gear all contained in this housing. The boom is attached to the inboard end of the shear bracket on the motor housing. A set of pillow blocks are bolted to the skid tray and allow the motor housing, axel and worm gear segment to rotate. Under normal conditions the axel and worm gear are fixed to the tray via a rivet that can shear under abnormal conditions. A motor attached to the motor housing drives a worm that "walks" the motor housing up or down the normally fixed gear segment.

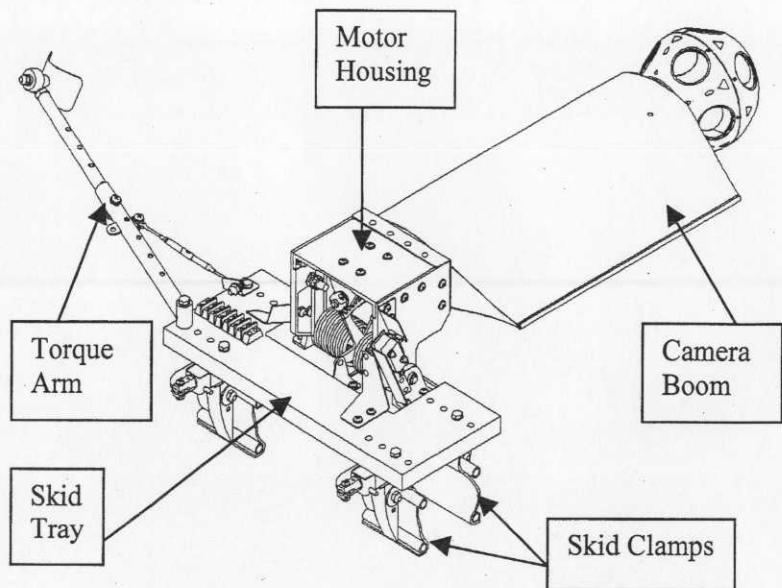
Under abnormal conditions, the gear rivet will shear and allow the gear and motor housing to rotate. A pair of torsion springs sit over the axel and bear against the motor housing and skid tray, providing enough force to return the boom to the up position. The rivet will allow boom retraction if a lateral force of 48 lbs. or a pure vertical force of 348 lb. is applied at the camera. The boom also has a shear bracket, (where the boom is attached,) that fails when a longitudinal force of 134 lb. is applied. All of these shearing forces are higher than the flight loads.

Skid Clamps

Two Skid Clamps are bolted to the skid tray, which has multiple holes to allow the clamps to be adjusted to clear fittings on the skids. The clamps have an integral handle that tightens the clamps and shows when they are adequately tightened. (The handles tighten the clamp counter-clockwise, which is counter-intuitive.) The handles are secured with zip ties. The clamps have one fixed tube and one that can be relocated for different size skid tubes.

Torque Arm

An integral torque arm, one end of which rests against the lower end of a landing gear cross tube, provides



Retractable Camera Mount – Skid Mounted Equip.

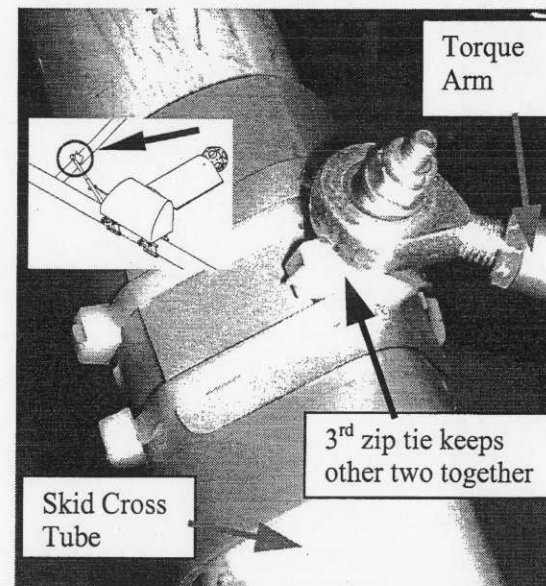
Camera boom

The camera boom is rigid structure, of aerodynamic shape, 14" long for the IMC camera and 7.5" long for Ladybug 3 camera. Attached at one end is the camera; to the other, the Motor Housing. The Motor Housing has a tilt mechanism that allows the camera to be lowered to a vertical position for camera operation, or retracted to a horizontal position for landing or when not being used. When lowered, the camera boom extends approximately 16 inches below the skids with the IMC camera option, or 9.5" with the Ladybug camera option.

Skid Tray

The skid tray is a plate that all the components bolt to. The tray has multiple holes for the clamps and torque arm as well as hard up and down stops. The electrical connections are rigidly attached to the skid tray.

- 2) Verify the two clamp handles have no gap between the handle and body. Check that each handle is securely zip tied to its body.
- 3) Verify the torque arm bracket on the cross tube is secured with 3 zip ties as shown, and the turnbuckle has one (1) MS21256-1 clip or is safety wired.
- 4) Check the security of the clamps and torque arm by attempting to roll unit about skid.



Check 3

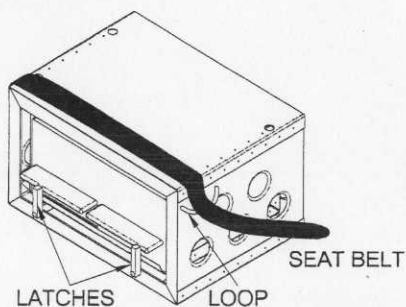
- 5) Check the security of the camera head harness, and make sure one (1) MS21256-1 clip or is safety wired.
- 6) Verify the electrical cables from the camera to the cabin are secure. Use zip ties and tape as necessary.
- 7) Check that the fairing is secure.

Pre Flight Interior Check

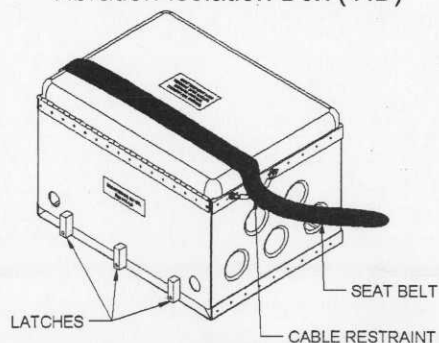
Add the following:

FAA Approved: _____
Dated: MAR 18 2011

- 1) For IMC camera use, verify the Camera Base Unit, (black box,) is installed in the Vibration Isolation Box and that the two retaining latches at the base are up. For Ladybug 3 camera use, verify hinged door on Stowage/Ballast Box is fully closed and 3 retaining latches at the base are rotated up.
- 2) Verify the seat belt goes through the loops on each side of the Vibration Isolation Box or Stowage Box and that the belt is snug.



Vibration Isolation Box (VIB)



Stowage/Ballast Box

- 3) Verify the electrical wiring from the VIB or Stowage Box to the Position Control Box is routed and restrained so as to not interfere with flight controls nor egress.

7. SYSTEM DESCRIPTION

Retractable Camera System Description

The installation includes three main components, a Retractable Camera Mount with attached immersive camera, (360° field of view); option for a Vibration Isolation Box which contains the camera base unit, (camera control and recording device) if used, or a Stowage Box; and a Position Control Box which operates the retractable camera mount and has indication. The design allows the quick attachment of the camera mount to the left or right skid between fore and aft cross-tubes and restraint of support equipment in a passenger seat. The power is taken from the auxiliary power system, and must be inline with a breaker of between 7-20 amps. No airframe modifications are required for the attachment of this camera system.

System Components

Camera Mount

The camera mount is attached to the skid and includes the following sub-assemblies: Camera Boom, Skid Tray, Motor Housing, Skid Clamps, and Torque Arm.

PART II; MANUFACTURER'S DATA

6. WEIGHT AND BALANCE

Weight and Balance:

The Retractable Camera Mount may be installed in various locations. The component CGs are marked on the units. Measure the distance from the lateral and longitudinal datum to the skid mounted unit. For the Vibration Isolation Box or Stowage Box, use the corresponding passenger CG. Use the following weights:

Part Number	Item	Weight (lb)
IMC407-150-01	Retractable Camera Mount Assembly, IMC Camera Option	16.0
IMC407-150-02	Retractable Camera Mount Assembly, Ladybug 3 Option	18.8
IMC407-700	Vibration Isolation Box	20.3 lb
IMC407-702	Stowage/Ballast Box	5.2 lb
Misc.	Cables & Control Box	4.7

- 4) Verify that the camera operator has stowed any carry on equipment, for example a laptop computer, in the Stowage Box.
- 5) If VIB or Stowage/Ballast Box is installed in a front seat, verify cyclic stick is removed.

Takeoff

After Takeoff, the camera may be extended or retracted at any time.

NOTE: The camera boom, when lowered, extends approximately 16 inches below the helicopter skids with IMC camera installed, or 9.5 inches with the Ladybug 3 Installed.

Climb

No change

Cruise

No Change

Landing

Prior to landing, confirm with Camera Operator that camera boom has been retracted.

CAUTION – Do not land with camera boom extended.

3. EMERGENCY AND MALFUNCTION PROCEDURES

Emergency

No Change

Malfunction: Camera Boom Does Not Retract

Check Circuit Breaker

- 1) Instruct camera operator to put Camera Position Switch UP and pull CAM breaker.
- 2) Reset breaker once and try again.
- 3) If camera mount still does not retract land with unit down.

Land With Unit Down:

- 1) Land normally - straight ahead with slight forward motion at touchdown.

NOTE: The retractable mount will break at the motor housing allowing the helicopter to land normally on the skids. The Boom and camera head will remain loosely attached to the skid tray only by electrical wiring.

Malfunction: MTR light stays on for more than 30 seconds

Likely jam or motor failure.

- 1) Visually check boom position if possible, cycle up/down to unbind.
- 2) Raise boom to up position, land when possible.

Malfunction: MTR Light on and Either UP/DWN Light On

Bad limit switch or motor if motor is in proper position

- 1) Raise boom and turn off. Land when possible.

Malfunction: Switch Out of Center Posn & No Lights Are On:

- (a) No power, check circuit breaker
- (b) Indication failure. Visually check position of boom. Put in up position and land.

4. PERFORMANCE

No Change

-----END FAA Approved Manual-----