



# **Nose Mounts**

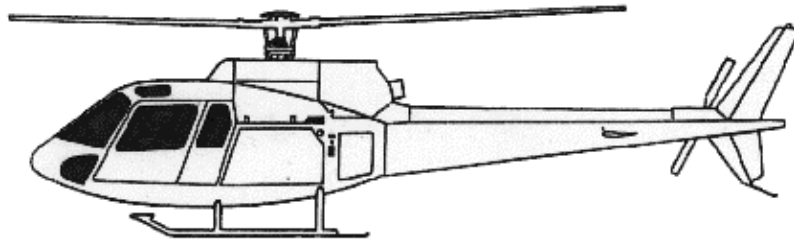
## **AStar / TwinStar**

### **Installation Manual**



Nose Mount • Super Nose Mount • Multicam Nose Mount  
National Grid • NSWC  
For *Eurocopter* AS-350 & AS-355 Series Helicopters

**FAA STC # SR00643LA**



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MODELS: NM-AS • SNM-AS • MNM-AS  
NGM-AS • NSWC-AS

REPORT #: TMX 3-98

JOB #: A-Star

DATE: 6-18-98

INSTALLATION MANUAL FOR:

NOSE MOUNT  
SUPER NOSE MOUNT  
MULTICAM NOSE MOUNT  
NATIONAL GRID NOSE MOUNT  
NSWC NOSE MOUNT

AS 350 C, D, D1, B, B1, BA, B3  
AS 355 E, F, F1, F2, N, NP  
HELICOPTERS

PREPARED BY: C. Tyler

# OF PAGES: 72

6-18-98

# OF SECTIONS: 8

CHECKED BY: G. Wood

# OF DRAWINGS: 0

6-18-98

APPROVED BY: \_\_\_\_\_



## LOG OF PAGES

Rev	Pg	Date	Description	FAA Approved
IR	All	16 Jul 1998	Initial Issue	
A	All	1 Jun 1999	Addition of Multicam and Universal Ball	
B	All	28 MAY 2003	Addition of National Grid	
C	All	24 Aug 2006	Addition of NSWC	
D	All	8 Sep 2008	Restructured installation sections by mounts and to reflect approved cameras. Defined installation procedures and processes. Added FAA EASA test procedures for new cameras. Removal of Universal Ball Mount. Updated weight & balance sections. Repaginated.	<b>FAA APPROVED</b>  SEP 0 8 2008  LOS ANGELES AIRCRAFT CERTIFICATION OFFICE INITIALS: .....



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## 1 Overview

This manual contains the installation instructions for all 5 camera/sensor mounts on the AS 350 and AS 355 series helicopters. It is divided into sections for each particular mount. The base undercarriage structure attach points are used for all mounts. Many of the mounts use the common undercarriage frame. Each Tyler Nose Mount, listed in the STC, was certified by flight or analysis with a camera or dummy load of the largest size and weight expected to be used with the mount. The actual units may or may not contain an independent power supply and control console. This section provides the requirements necessary to qualify additional sensor / camera / light payloads not listed in the front of each mount section. It may also be used as a check list for previously approved sensor/camera/light payload if desired.

### For helicopters registered in the U.S. or other countries recognizing FAA certification:

Any camera/sensor/light may be installed of equal or less size & weight specified for each mount without further testing or amending the STC or Installation Manual.

The actual installation may be accomplished by assistance of a Tyler trained technician, however it must be supervised by a qualified and appropriately certificated technician. Return to service of the aircraft must be properly documented and accomplished by an individual authorized by the appropriate regulatory authority (FAR 43.7 & 43.9).

After an FAA Form 337 has been properly completed and filed for the initial installation, subsequent removal and installation of this equipment may be returned to service using a maintenance record entry only.

Camera systems attached to this mount may be self-contained systems that are not installed to the aircraft and are considered as "carry-on" items.

Installation and removal of the payload to the mount is a simple process that can be accomplished without the use of tools and is considered to be preventive maintenance. The holder of a pilot certificate issued under Part 61 may perform this task with an appropriate maintenance record entry.

To add a camera to the "approved" list a limited test and report listed here need to be completed and provided to Tyler Camera.

Once the installation is completed by the FAA (certified) mechanic and the flight test conducted by the Pilot/Operator and the sensor/camera/light



payload can be added by the STC Holder 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.

This process is used only by the STC holder to obtain approval for additional payloads on the mount. Requests for other payload configurations must be made through the STC holder.

#### **For helicopters registered in an EU-member state:**

The specific sensor/camera/light to be added to the STC has to be introduced by a Minor Change 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.

#### **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.

All systems are to be operational and an image viewable by one of the crew displayed in the cockpit/cabin. The pilot is not expected to make this evaluation and should direct his/her attention to flying the aircraft.



## 2 Mainframe Installation



**Figure 1. Mainframe - Undercarriage**

### INSTALL MAINFRAME ON HELICOPTER

Installed for use on the Nose, *Super* Nose, Multicam and NSWC Mounts



## 2.1 Mainframe Parts List

- AIRFRAME BRACKETS  
LEFT SIDE - AIRFRAME BRACKET (two pieces)  
RIGHT SIDE - AIRFRAME BRACKET (two pieces)
- (ALTERNATE) AIRFRAME BRACKETS  
(2) AIRFRAME TABS [part #ASN-002]
- BELLY PAN  
BELLY PAN TEMPLATE  
BELLY PAN (optional)
- MAINFRAME  
(a) PRIMARY FRAME  
(b) LEFT SIDE - FRAME w/ TIE-ROD  
(c) RIGHT SIDE - FRAME w/ TIE-ROD

## 2.2 Mainframe Hardware List

<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
9/16-18	2.00	AN9-17A	2	MAIN FRAME TANG
BOLTS				
1/2-20	3.50	AN8-33A	8	FT. MAIN FRAME
7/16-20	3.50	AN7-33A	2	REAR MAIN FRAME
3/8-24	1.75	AN6-16A	4	TANG CLAMP BOLTS
3/8-24	1.125	AN6-10A	4	TIE RODS

<u>MS NYLOCK NUMBERS</u>		<u>QTY.</u>
3/8-24	MS21083N6	8
7/16-20	MS21083N7	2
1/2-20	MS21083N8	8
9/16-18	MS21083N9	2

<u>A N WASHERS</u>		
3/8	AN960-616L (.032)	16
7/16	AN960-716L (.032)	4
1/2	AN960-816L (.032)	16
9/16	AN960-916 (.062)	4

**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

## 2.3 Mainframe Installation



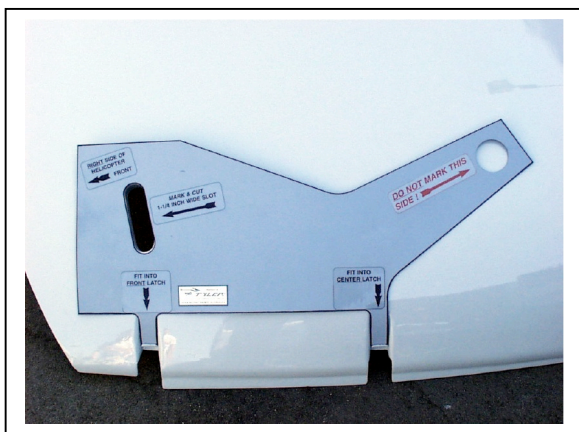
Unlatch, and lower the forward belly pan and verify whether or not there are two slots in the forward corners of the belly pan (approx. 4 x 1 inches each).

Also, check to see if there is a hole near the rear of the left side (approx. 2 inches in diameter).

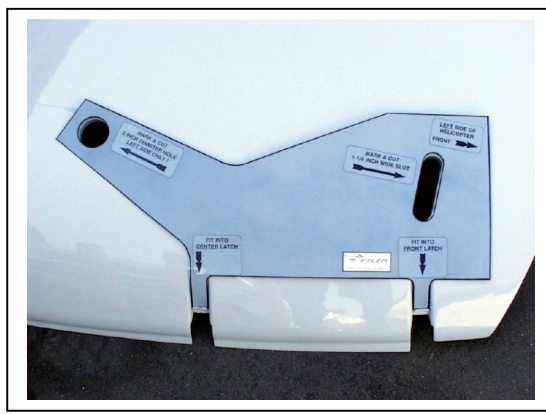
If “Yes” continue with step 03, if “No” continue with step 02.



Note: Tyler’s Astar BELLY PAN, if used, may require adjusting the latches for proper fit.



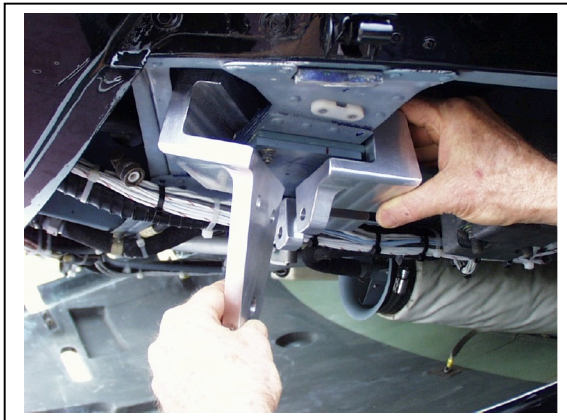
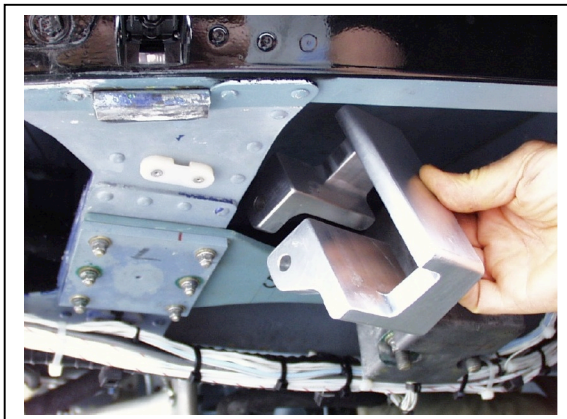
- Hand Saw
- 1-1/4" Hole Saw
- 2" Hole Saw



Use the ASTAR BELLY PAN TEMPLATE & TOOLS, and follow the instructions (ON THE TEMPLATE) to mark and cut-out one slot on either side of the BELLY PAN to allow the AIRFRAME BRACKETS to protrude.

Also, if necessary, mark and cut-out one hole (ONLY) on the left side of the BELLY PAN for routing the cables from the camera mount into the helicopter.





Hardware:  
(4) AN6-16ABOLTS  
(8) AN960-616L WASHERS  
(4) MS21083N6 NUTS



Attach and fasten each pair of AIRFRAME BRACKETS around the airframe counterweights (Two bolts on each one).

Note: The brackets are labeled “LEFT” and “RIGHT” and must be attached accordingly.

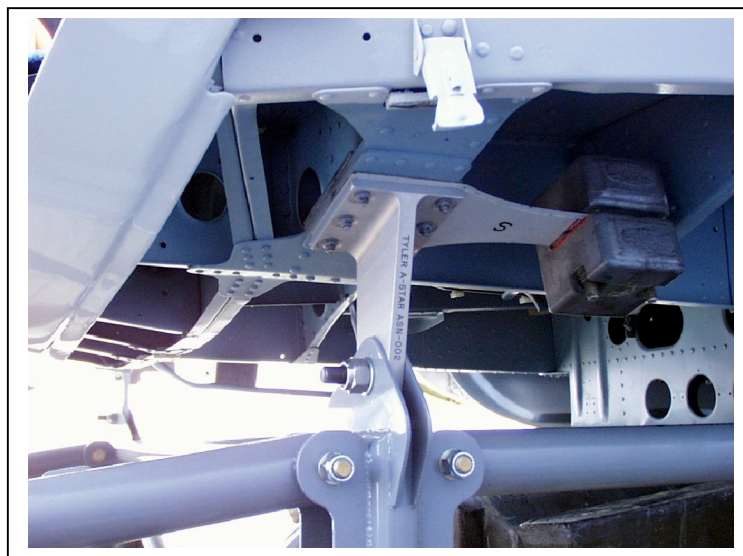
**NOTE: THE AIRFRAME TABS MAY BE USED  
INSTEAD OF THE AIRFRAME BRACKETS**

Attach and fasten each AIRFRAME TAB to the airframe counterweights (Six bolts on each TAB).

Note: The TABS should point inward (toward each other).



Hardware:  
The original bolts,  
washers and nuts.





Hardware:  
(4) AN9-17A BOLTS  
(8) AN960-916L (.062) WASHERS  
(4) MS21083N6 NUTS



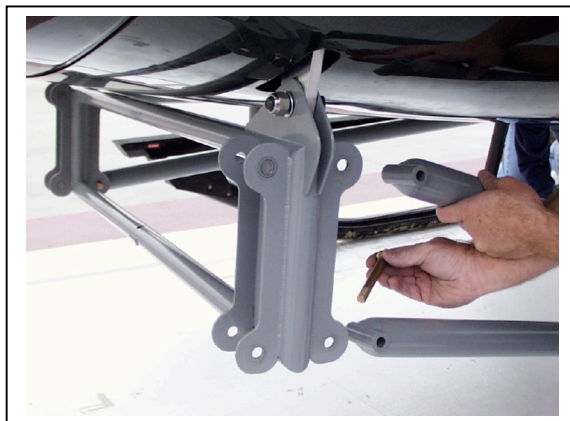
Re-attach the forward belly pan.

Note: Before locking the belly pan latches, position the belly pan fore-to-aft as necessary so the slots are centered around the AIRFRAME BRACKETS.

Attach and fasten the PRIMARY FRAME to the AIRFRAME BRACKETS (One bolt on either side).



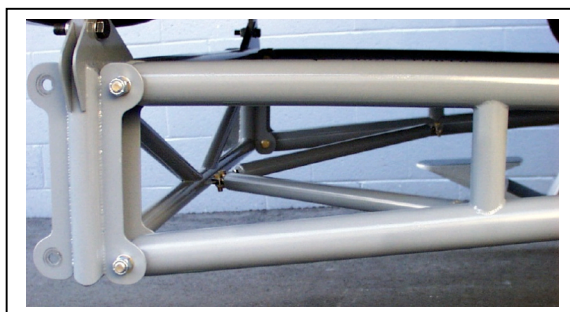
Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-616L WASHERS  
(4) MS21083N8 NUTS



Hardware:  
(2) AN7-33A BOLTS  
(4) AN960-716L WASHERS  
(2) MS21083N7 NUTS



Hardware:  
(4) AN6-10A BOLTS  
(4) MS21083N6 NUTS



Attach and fasten both the LEFT and RIGHT- SIDE FRAMES to the PRIMARY FRAME.

Note: Insert the lower bolts first, then proceed to the next step.

Attach and fasten the rear ends of the SIDE FRAMES into the “Hard-Points” (under the Forward skid-gear tube).

Fasten the upper bolts on the front ends of both SIDE FRAMES.

Attach and fasten the SIDE FRAME TIE-RODS to the center of the PRIMARY FRAME.

### 3 Nose Mount Installation



Figure 2. Nose Mount

INSTALL NOSE MOUNT ON TO MAINFRAME

**IMPORTANT**

DO NOT INSTALL SNM-AS COUNTERWEIGHT

#### **CAMERA SIZE & WEIGHT NOT TO EXCEED:**

<u>SQ. FT. / SQ. CM</u>	<u>LBS. / KGS.</u>	<u>FUS. STA. (IN.)</u>
1.8 / 1672.25	39 / 17.6	10.5



### 3.1 Nose Mount Approved Cameras

The *Tyler* Nose Mount was certified by flight test with the ARRI 3 film camera and a self-contained power supply. The following cameras have been installed and flown on this mount and using ships utility power through the OEM power outlet.

- ARRI® / Arriflex® cameras
- Panavision® cameras
- Beaumont (compact Vistavision) camera
- Aaton®
- Sony® cameras
- Panasonic®
- Ikegami® cameras
- Hitachi® cameras
- Canon® cameras
- RED® camera

### 3.2 Nose Mount Camera List

- NOSE MOUNT - ADAPTER FRAME
- Tyler NOSE MOUNT II (w/ QUICK RELEASE PLATE)
- Tyler NOSE MOUNT - CONTROL CONSOLE
- (2) CONTROL CABLES
- (2) POWER CABLES
- (2) LONG COAX CABLES
- (2) SHORT COAX CABLES
- (2) ARRI 3/SR2 CAMERA CABLES
- (2) ARRI 4/SR3 CAMERA CABLES
- (2) 24 VOLT BATTERIES

### 3.3 Nose Mount Hardware List

<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
1/2-20	3.50	AN8-33A	4	FT. MAIN FRAME

<u>MS NYLOCK</u>	<u>NUMBERS</u>	<u>QTY.</u>
1/2-20	MS21083N8	4

<u>A N WASHERS</u>		
1/2	AN960-816L (.032)	8

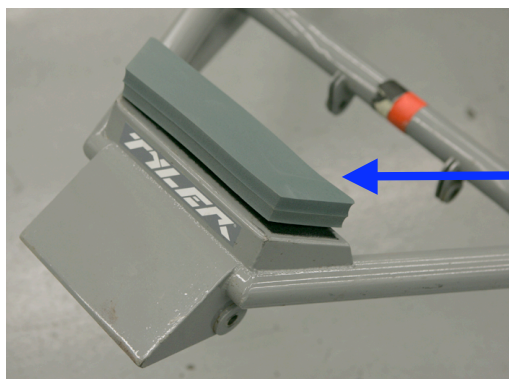


**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-816L WASHERS  
(4) MS21083N8 NUTS

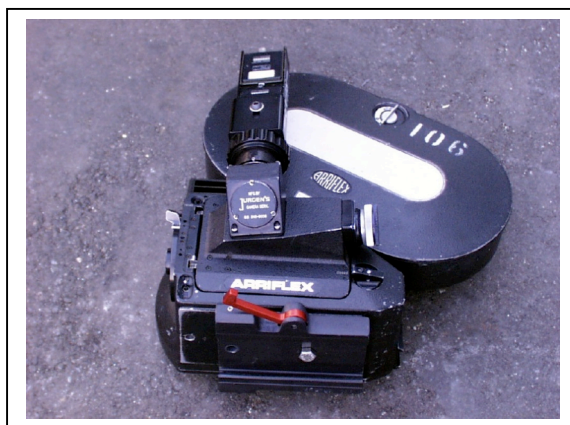
**IMPORTANT**

To ensure peak performance, the Adapter Frame should press firmly against the body of the aircraft. In most cases, utilization of one of the 3 supplied Belly Pads is required.



Insert and fasten the NOSE MOUNT - ADAPTER FRAME to the MAINFRAME  
(Two bolts on either side). Note: Insert lower bolts first.

Insert and fasten the NOSE MOUNT into the ADAPTER FRAME  
(Two Expando Pins on either side).



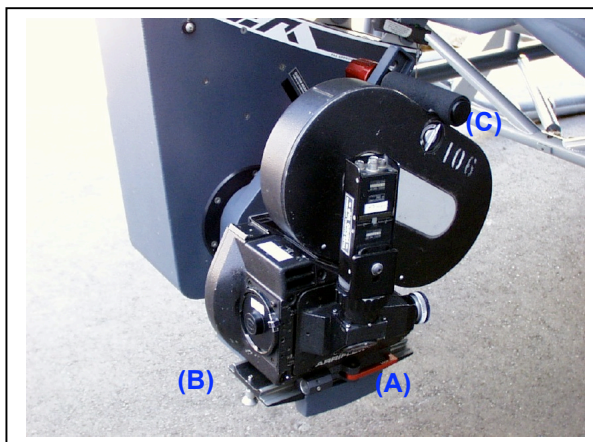
Attach and fasten the QUICK RELEASE PLATE to the bottom of the camera with one or two bolts.

**Note:**

All cameras are authorized that will accept the Tyler Quick Release Plate (part # TYL-206-007).

Weight of camera (including film magazine) film, and/or video tape, etc. not to exceed 39 lbs.

Maximum frontal area of these parts not to exceed 1.8 square feet.



Attach and secure the camera using:  
(A) Slide Lock, (B) two PI-Pins, (C) Lockdown Bar

**- NOSE MOUNT assembly complete -**



## NOTES

**THE LETTERS (F), (V) AND (F/V) INDICATE THAT THE TOPIC OR ITEM IS RELATED TO:  
FILM CAMERAS ONLY, VIDEO CAMERAS ONLY OR, BOTH FILM & VIDEO CAMERAS**

### FILM CAMERA REQUIREMENTS (F)

- Compatible cameras: *Arriflex* 235, 35-3 435, 16/SR-2 & 3 and 16/SR-2 & 3 Hi-Speed.
- Color or B/W video tap.
- 400' magazine.
- Prime lens - 35mm format, maximum recommended focal length: 50mm.
- Round filter and shade system - Suggested filter size: 4 1/2 inch round.

### BROADCAST VIDEO CAMERA NOTES (V)

- The *Tyler* Video Lens Support assembly must be used (see page 3).
- A Recorder Separation Kit is suggested as the most versatile configuration (see page 3). Placing the recorder inside the helicopter, preferably on a seat cushion allows for in-flight tape and battery changing. The minimum cable length between the video camera and video recorder is TEN (10) feet.
- When using an On-board Recorder, the tilt rotation will be limited due to the length of the camera.

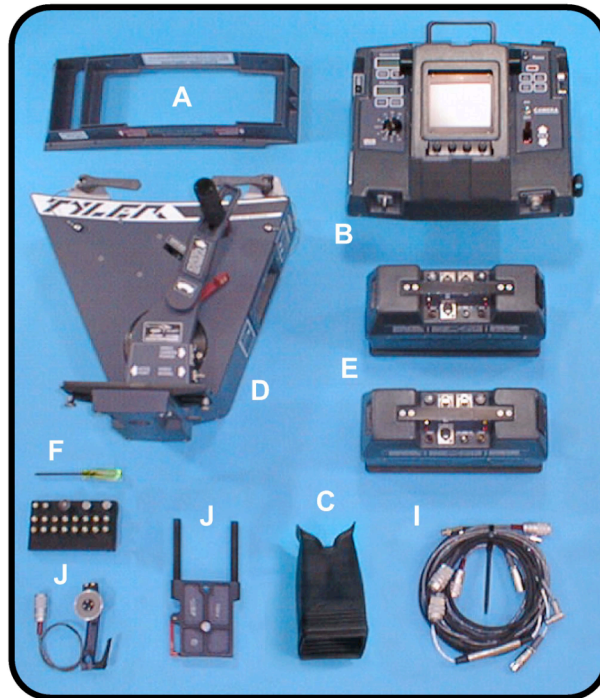
### PRECAUTIONS (F/V)

- Before turning the power on, make sure the MASTER CABLE is connected between the Console and the Mount. If power was applied before connecting this cable, disengage and re-engage the Power (15 Amp) CIRCUIT BREAKER.
- The RUN/STOP switch on all film cameras should be in the STOP position.

### POWER (F/V)

- **When utilizing the helicopter to power the Nose Mount (instead of a battery pack), the maximum current draw is not to exceed 28 volts / 400 watts (approx. 15 amps).** The average current draw of a Nose Mount is approx. 9 amps.
- Suggested power input range: 24 to 28 VDC
- When the Nose Mount is "powered-down" it will retain all information on the iris calibration, the footage counter and the camera speed.
- For a film camera this will power the color display, tilt motor, film camera, video tap and the Iris Control Unit.
- For a video camera this will power the color display and tilt motor, and if necessary it can also power the video camera from the 4-pin socket on the tilt arm, labeled "VIDEO CAMERA POWER".

## PARTS



- A ATTACH FRAME (206 JET RANGER / LONG RANGER)
- B CONTROL CONSOLE
- C VIEWING HOOD
- D NOSE MOUNT
- E BATTERIES
- F HARDWARE & WRENCHES
- G VIDEO ZOOM LENS SUPPORT & HANDLE CLAMP  
(see page 5)
- H CABLE SET
- I IRIS SERVO (FILM)
- J CAMERA PLATE



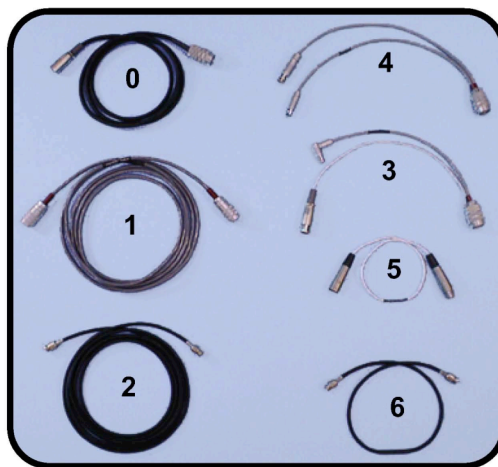
Optional Remote Control Unit (for Video or Film  
Cameras) and dual servo assembly.  
(see page 7 of 11)

## CABLES

MOUNT  
POWER CABLE

MOUNT  
CONTROL CABLE

MOUNT  
VIDEO COAX CABLE



ARRI 435 (SR 3)  
CAMERA CABLE

ARRI 3 (SR 2)  
CAMERA CABLE

VIDEO POWER  
(4-4 PIN)

CAMERA  
VIDEO COAX

#	NAME	CONNECTION	CONTACTS	F/V
0	POWER	CONSOLE TO BATTERY	5 TO 3	F/V
1	MASTER	CONSOLE TO MOUNT	12 TO 12	F/V
2	VIDEO (LONG)	CONSOLE TO MOUNT	COAXIAL	F/V
3	A-3 CAMERA (35-3 & SR TYPE)	MOUNT TO CAMERA	12 TO 4 AND 11	F
*3A	PANAVISION 24V ADAPTER	CAMERA CABLE	4 TO 2	F
4	A-4 CAMERA (435 & SR3 TYPE)	MOUNT TO CAMERA	12 TO 2 AND 9	F
5	VIDEO TAP POWER	MOUNT TO VIDEO TAP	4 TO 4	F
6	VIDEO SIGNAL (SHORT)	MOUNT TO VIDEO TAP	COAXIAL	F/V

\*SUPPLIED UPON REQUEST ONLY (NOT SHOW).



Optional Video Zoom Lens Cables, for use with RCU.  
(see page 7 of 11)

- CANON
- FUJI WITH ADAPTER

## CONTROL CONSOLE CONNECTORS



### COLOR DISPLAY CONTROLS (F/V)

There are four controls for adjusting the image on the 5 Inch Color LCD Monitor: BRIGHTNESS, TINT, COLOR, and CONTRAST (also see page 7).

### FILM CAMERA CONNECTIONS

Connect cables #: 0, 1, 2, [3, 3A or 4 (depending on camera type)], [5 (if applicable)] and 6.

**When utilizing the helicopter to power the Nose Mount (instead of a battery pack), the maximum current draw is not to exceed 28 volts / 400 watts (approx. 15 amps).** The average current draw of a Nose Mount is approx. 9 amps.

### VIDEO CAMERA CONNECTIONS

Plug in cables #: 0 and 1. The video signal may be "fed" to the CONSOLE from the camera, using cables 2 and 6. Or, using cable 2, the video "feed" may come directly from the recorder if it is placed inside the helicopter.

## VIDEO CAMERA (w/ Tripod Adapter Plate)

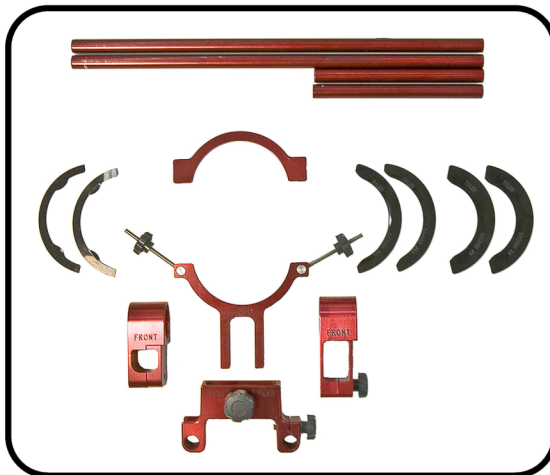


1. Attach the Camera Plate directly to the Tripod Adapter Plate.
2. Attach the Video Lens Support Assembly (and Handle Clamp, if possible).
3. Remove Microphone (and View Finder if possible).



5. After attaching the camera to the Nose Mount, connect the Video Power Cable and the Video Signal Coax Cable to the Tilt Arm.

Note: When utilizing a RECORDER SEPARATION KIT route the main control cable from the camera to the recorder along the same path as the Nose Mount Cables (as seen in the INSTALLATION MANUAL). Make a "service loop" near the camera and then check the tilt operation to ensure the cable does not get caught. Then place the recorder on a seat cushion (inside the helicopter) and fasten with a seat belt.



### Video Camera lens support system:

- Lens Support with sizing adapters
- Long and short rods
- Camera handle clamps



## ARRIFLEX 35 III (w/ "Speed Base" Removed)



1. Attach the Camera Plate directly to the camera body and align Servo Motor(s) but do not engage.

Note: Removal of the Cinematography Electronics 'Speed-Base' is essential for two reasons:

- The Control Console has a built in crystal camera speed controller of its own, and use of the 'Speed-Base' may cause an incompatibility.
- The Servo Motor(s) will not reach the lens with the 'Speed-Base' attached.



3. Connect the Camera Cable, Video Tap Power Cable and the Video Signal Coax Cable from the camera to the Tilt Arm.

Note: When utilizing a remote control unit (other than the Tyler RCU) route the RCU cable from the camera or lens to the RCU along the same path as the Nose Mount Cables (as seen in the INSTALLATION MANUAL). Make a 'service loop' near the camera and then check the tilt operation to ensure the cable does not get caught.



2. After attaching the camera to the Nose Mount, connect the Iris Servo Motor Cable to the Tilt Arm.



## REMOTE CONTROL UNIT (F/V)



This accessory is used for Video or Film cameras, providing the following functions:

### VIDEO CAMERA - Zoom control & VTR Start/Stop

Press the white button (on the top of the RCU) to Start/Stop the VTR. If necessary, flip the toggle switch (on the front of the RCU, near the cable) to change the Start/Stop triggering method (Sony or Ikegami).

### FILM CAMERA - Zoom & Focus control

Mark focus positions on the white panel of the RCU accordingly.



### VIDEO CAMERA

Connect the appropriate Lens Cable (Canon or Fuji) from the zoom lens to the tilt arm of the Nose Mount.



### FILM CAMERA

Connect the cable from the dual servos to the tilt arm of the Nose Mount. Then engage servos into a small zoom lens (on center of gear travel). If necessary, flip the zoom servo 180° to ensure correct response from the zoom lever on the RCU.

The zoom function automatically detects ends of zoom travel by sensing increased resistance - and is reset each time the Nose Mount is powered up. Therefore, zoom will not work if excessive force is required to move zoom barrel. **Do not attempt to hold or apply resistance to zoom gears as this will give a false reading to sensor, and result in insufficient travel.**

## FOOTAGE, SPEED & FORMAT (F)

### CONTROL CONSOLE (LEFT SIDE)



Note: For a video camera, the only functional control is the Battery Check.

The ACCS. 1 connector in the upper left pocket is for connecting a zoom control device. The ACCS. 1 "Console" cable must be special ordered and is not included with the standard cable set.

- For a film camera, use a MicroForce type zoom control.
- For a video camera, use a video zoom lens controller with record start/stop function.

### FILM FOOTAGE / BATTERY CHECK (F/V)

- This display gives the number of feet of film Exposed. To "zero", press and hold the FOOTAGE RESET button for approximately two (2) seconds. The footage may be reset while the camera is running. Note: This FILM FOOTAGE display will flash when the film footage exceeds 350 feet.
- This display also shows the battery voltage whenever the BATTERY VOLTAGE button is pressed. Note: The display will also flash the battery voltage if the power supply falls below 10.5 Volts. In this case the display will alternately flash the actual supply voltage and the film footage.

### CAMERA SPEED (F)

- Push UP or DOWN buttons to adjust the camera speed in 1 fps intervals.
- Push and hold the UP or DOWN button for fast scroll.
- Push both UP and DOWN buttons simultaneously to reset to 24 fps.
- All speeds are crystal, ranging from 6 to 100 fps in 1 fps increments and may be adjusted while the camera is running. An additional speed of 29.97 fps is available between 29 and 30 fps.
- This CAMERA SPEED display and the FAULT LAMP will flash if the fps is not operating within its 0.05 fps accuracy.

### 35MM/16MM FILM FORMAT SWITCH (F)

Flip this switch to the appropriate position for the type of format being used.

## POWER, FAULT, LIGHT & REVERSE (F/V)

### POWER (F/V)

- To turn the power on, push down the CIRCUIT BREAKER.

### FAULT LAMP (F/V)

This will flash for any of the following reasons:

- Inaccurate/ irregular camera speed.
- Supply voltage falls below 10.5 VDC.

### NIGHT LIGHT (F/V)

- The console can be illuminated by a press of the NIGHT LIGHT button. It may be switched On or Off by a push of the button.
- Once turned on, the lights automatically turn off, 5 minutes after the last "activity" on the console. An "activity" can be a button-press, movement of the JOYSTICK or rotation of the IRIS. If the lights go off automatically, any "activity" will turn them back on.
- To keep the lights from turning on at all, simply press the NIGHT LIGHT button once, if the lights are on, or twice if the lights are off.

### RESET SERVO & DISABLE SERVO (F) (see page 10 of 11 - IRIS SETUP)

### TILT JOYSTICK (F/V)

- Push lever farther to go faster.

Note: If tilt drifts, center JOYSTICK then push and hold TILT REVERSE button until FAULT LAMP flashes (approx. 10 sec.).

### TILT REVERSE (F/V)

- A short press of the TILT REVERSE button will reverse the direction of the joystick response (i.e.: the joystick may be made to tilt camera-up with a push forward on the joystick, or camera-down).

### CONTROL CONSOLE RIGHT SIDE)





## IRIS SETUP & SPEED APERTURE (F)

### IRIS - SETUP (F)

1. Attach the SERVO MOTOR ASSEMBLY to the camera, but do not engage the Servo Motor Gear into the lens until step 6.
2. Determine if the IRIS CONTROL KNOB will rotate the Lens Iris Gear in the correct direction. If "Yes", skip to step 5. If "No", continue with step 3.
3. Position the IRIS CONTROL KNOB to 5.6.
4. Push and hold the RESET SERVO button for approximately two (2) seconds. This will do three things: a) Reverse the operational direction of the Servo Motor Gear, b) Center the Servo Motor Gear, and c) Clear all previous calibration settings.
5. Manually position the Lens Iris Gear to the center of its travel. For Hi-Speed prime lenses this is usually between 4 and 5.6, for Standard-Speed prime lenses this is usually 5.6.
6. Engage the Servo Motor Gear into the Lens Iris Gear and check to make sure that it goes "full-travel". If not, disengage the Servo Motor Gear and manually rotate the Lens Iris Gear one notch in the appropriate direction, then re-engage the Servo Motor Gear.
7. While looking at the Lens Iris Gear, rotate the IRIS CONTROL KNOB until the Lens Iris Gear is at its first stop (ie: 1.2).
8. While holding the DISABLE SERVO button, turn the IRIS CONTROL KNOB until it lines up with 1.2 and then let go of the button; the first stop has now been calibrated. Continue with each of the following steps.

- If the last iris stop is 16 it is recommended to calibrate the IRIS CONTROL KNOB setting of 22 (at 16) to ensure that the iris stays on 16 incase the knob gets positioned beyond 16.
- If the first iris stop is 2 it is recommended to calibrate the IRIS CONTROL KNOB setting of 1.2 (at 2) to ensure that the iris stays on 2 incase the knob gets positioned beyond 2.
- If the first iris stop is 2.8, it is recommended to calibrate the IRIS CONTROL KNOB settings of 2 and 1.2 (at 2.8) to ensure that the iris stays on 2.8 incase the knob gets positioned beyond 2.8.

### SPEED APERTURE (F)

- Use the green button on the front, left side of the Control Console to activate the Speed Aperture mode (synchronizing the iris position and camera speed). The Camera Speed display will instantly adjust according to the iris position.
- The Speed Aperture may be activated or de-activated at any time whether the camera is running or not, and without affecting the iris calibration. However, upon de-activation the camera speed will remain where it was and therefore may need to be changed (i.e.: back to 24 fps).
- Use caution when "opening-up" the iris, as the camera speed will climb rapidly, doubling its speed with each stop.

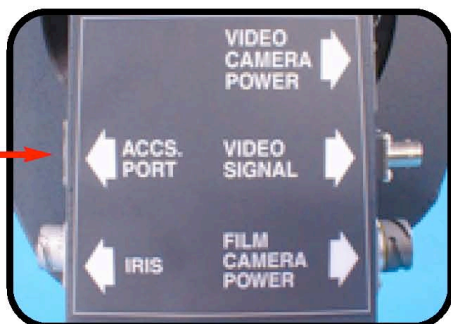


## ACCESSORY PORTS (F/V)

NOSE MOUNT (LEFT SIDE)



MOUNT TILT ARM (CLOSE UP)



Note: The ACCS. 1 connector is utilized when connecting to a video zoom lens (for zoom control and VTR Start/Stop) or, to a film zoom lens (for zoom and focus control); see page 7 of 11.

NOSE MOUNT (REAR)



Note: The ACCESSORY 2 connector is an auxiliary method of making a connection to the ACCS. 1 connector on the Tilt Arm. An ACCESSORY 2 cable is typically custom fabricated for a special application. It is not designed to connect to the Tyler RCU (page 4) and does not connect to the ACCS. 1 connector on the CONSOLE.

## 4 SNM-AS Counterweight



Figure 3. Counterweight

INSTALL SNM-AS COUNTERWEIGHT ON TO HELICOPTER

**REQUIRED FOR:**  
*SUPER NOSE MOUNT*  
*MULTICAM NOSE MOUNT*  
*NSWC NOSE MOUNT*

**DO NOT INSTALL FOR:**  
*NOSE MOUNT*  
*NATIONAL GRID MOUNT*



#### 4.1 SNM-AS Counterweight Parts

- LEFT SIDE - UPPER TIE-ROD
- RIGHT SIDE - UPPER TIE-ROD
- LEFT SIDE - LOWER SUPPORT TUBE
- RIGHT SIDE - LOWER SUPPORT TUBE
- DIAGONAL - LOWER TIE-ROD
- COUNTERWEIGHT BOX
- COUNTERWEIGHTS

#### 4.2 SNM-AS Counterweight Hardware List

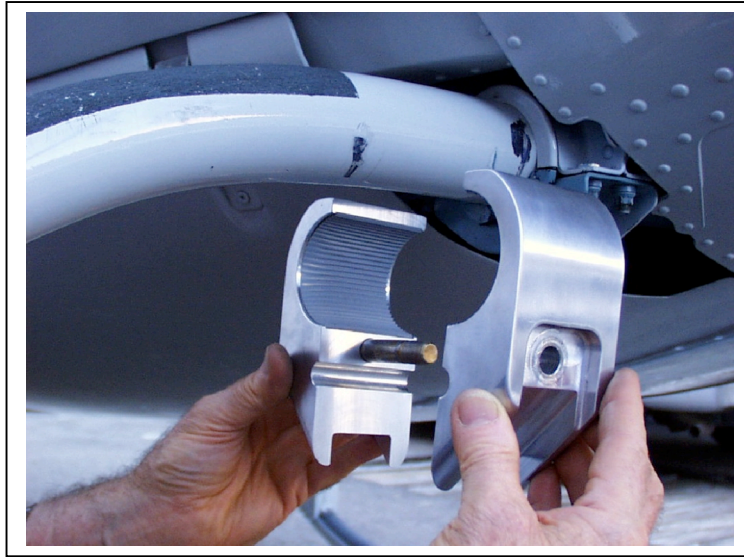
<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
1/2-20	1.50	AN8-13A	4	WT. BOX
3/8-24	1.75	AN6-16A	4	TANG CLAMP BOLT
3/8-24	1.375	AN6-12A	2	UPPER CLEVIS TIE ROD SHIP
END				
3/8-24	1.125	AN6-10A	6	TIE RODS

<u>MS NYLOCK NUMBERS</u>		<u>QTY.</u>
3/8-24	MS21083N6	16
1/2-20	MS21083N8	32

<u>A N WASHERS</u>		
3/8	AN960-616L (.032)	8
1/2	AN960-816L (.032)	16

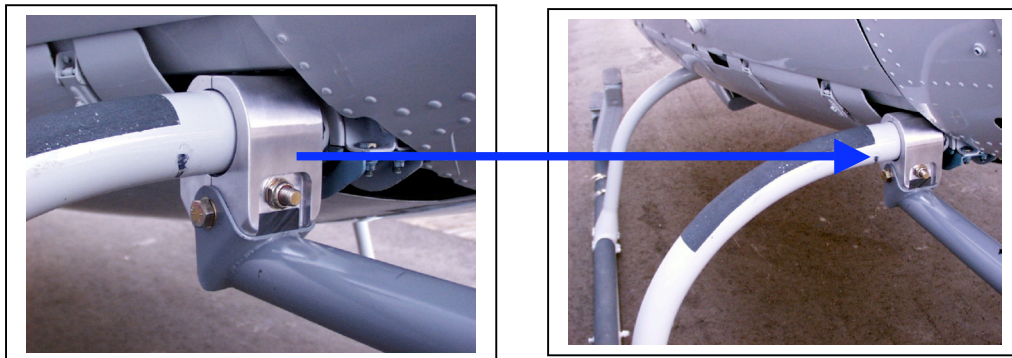
**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

### 4.3 Counterweight Installation



Attach and fasten each pair of SKID GEAR BRACKETS around the rear skid gear (Left and Right sides).

Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-816L WASHERS  
(4) MS21083N8 NUTS



Attach and fasten LOWER SUPPORT TUBES to each SKID GEAR CLAMP (Left and Right sides).



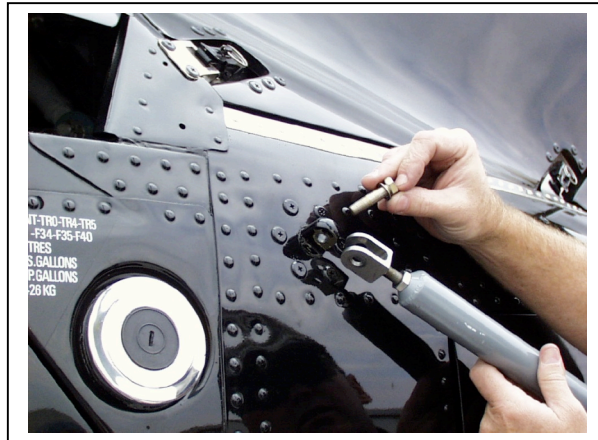


Place the COUNTERWEIGHT BOX on a stand (not supplied)  
near to the ends of the LOWER COUNTERWEIGHT TUBES.  
Attach and fasten LOWER COUNTERWEIGHT TUBES to the counterweight box.

Hardware:  
(2) AN8-13A BOLTS  
(4) AN960-816L WASHERS  
(2) MS21083N8 NUTS

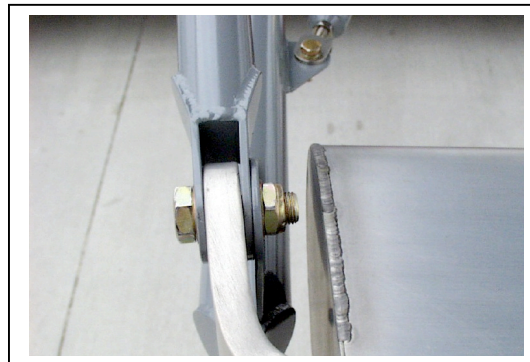
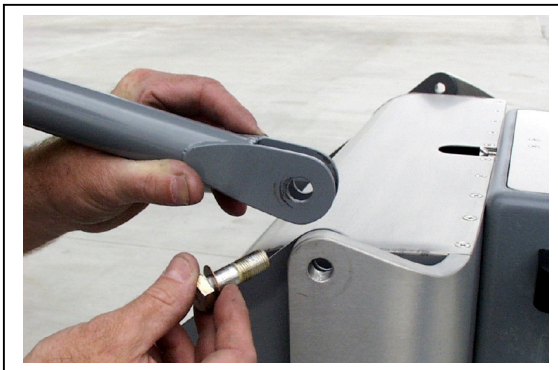


Hardware:  
(2) AN8-13A BOLTS  
(4) AN960-816L WASHERS  
(2) MS21083N8 NUTS



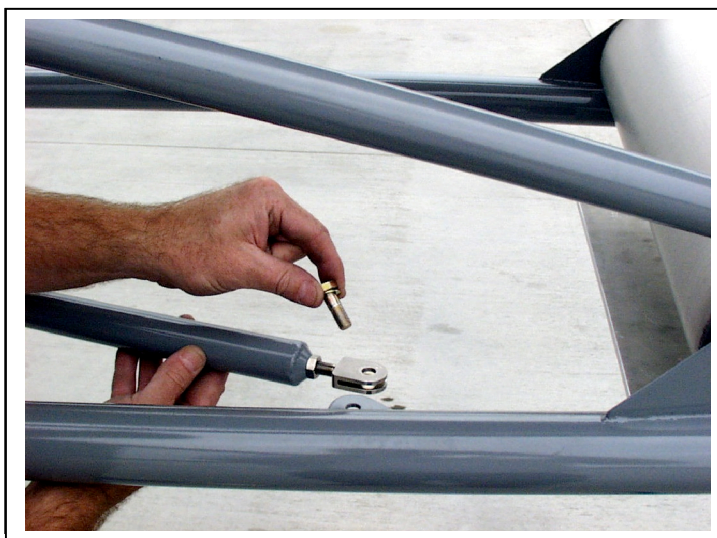
Attach and fasten UPPER TIE-RODS to the  
“Hard-Point” located near the upper-cowling  
(Left and Right sides).

Note: Attach the adjustable end here.



Attach and fasten UPPER TIE-RODS to the COUNTERWEIGHT BOX  
(Left and Right sides).

Note: Position the Rotation-Tab  
(on the LOWER COUNTERWEIGHT TUBE) so that it is in-board of the Clevis.



Hardware:  
(2) AN6-20A BOLTS  
(4) AN960-616L WASHERS  
(2) MS21083N6 NUTS

Attach and fasten DIAGONAL TIE-ROD  
to LEFT SIDE - LOWER SUPPORT TUBE.  
Note: Both ends are adjustable.



Attach and fasten DIAGONAL TIE-ROD  
to RIGHT SIDE - LOWER SUPPORT TUBE.  
Note: Both ends are adjustable.

**- COUNTERWEIGHT assembly complete -**

## 5 Super Nose Mount



INSTALL SUPER NOSE MOUNT ON TO MAINFRAME

### IMPORTANT

SNM-AS COUNTERWEIGHT (SECTION # 3) MUST ALL BE INSTALLED

### CAMERA SIZE & WEIGHT NOT TO EXCEED:

<u>SQ. FT. / SQ. CM</u>	<u>LBS. / KGS.</u>	<u>FUS. STA. (IN.)</u>
2.25 / 2090.31	120 / 54.43	7.5





## 5.1 SuperNose Mount Approved Cameras

The Tyler SuperNose Mounts was certified by flight test with the MSN Imax cameras and a self-contained power supply. The following cameras have been installed and flown on the mount at different times and using ships power.

- ARRI® / Arriflex® cameras
- Panavision® cameras
- Imax® cameras (in particular, models: MSN and IW5)
- Beaumont (compact Vistavision) camera
- Aaton®
- Éclair®
- Sony® cameras
- Panasonic®
- Ikegami® cameras
- Hitachi® cameras
- Canon® cameras
- RED® camera

## 5.2 Super Nose Mount Parts List

- Tyler SUPER NOSE MOUNT (w/ QUICK RELEASE PLATE)
- Tyler NOSE MOUNT - CONTROL CONSOLE
- (2) CONTROL CABLES
- (2) POWER CABLES
- (2) LONG COAX CABLES
- (2) SHORT COAX CABLES
- (2) 24 VOLT BATTERIES

## 5.3 Super Nose Hardware List

<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
1/2-20	3.50	AN8-33A	4	FT. MAIN FRAME
1/2-20	2.50	AN8-23A	1	CENTER BOLT S/NOSE

<u>MS NYLOCK</u>	<u>NUMBERS</u>	<u>QTY.</u>
1/2-20	MS21083N8	5

<u>A N WASHERS</u>		
1/2	AN960-816L (.032)	10



## 5.4 Super Nose Mount Installation

**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE



Insert and fasten SUPER NOSE MOUNT into MAINFRAME  
(Two bolts on either side, and one in the middle).

Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-616L WASHERS  
(4) MS21083N8 NUTS

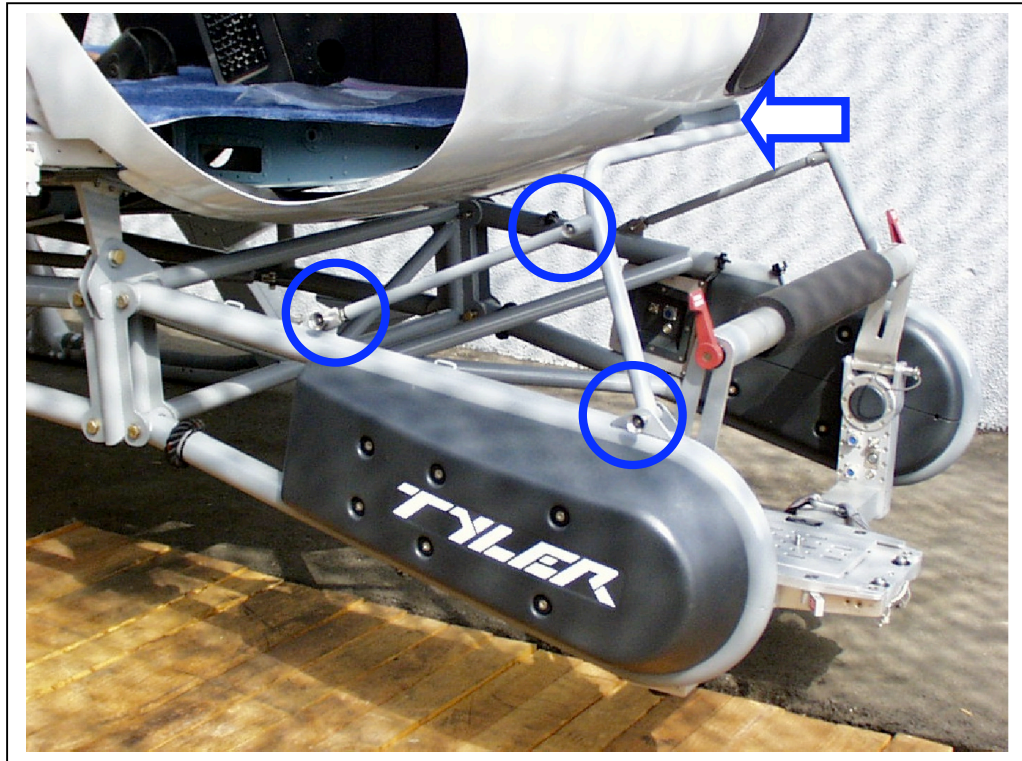


Hardware:  
(1) AN8-23A BOLT  
(2) AN960-816L WASHERS  
(1) MS21083N8 NUT



Add Counterweight(s) in consideration of the following items: Camera, Crew and Fuel  
See: Sample Weight & Balance Data in Appendix B of this manual.

Note: Secure the Lid (not shown) of the COUNTERWEIGHT BOX with two PI-Pins.



Insert and fasten the BELLY-BRACE SUPPORT TUBES into the BELLY-BRACE  
(one PI-Pin on either side)

Attach and fasten the Belly-Brace and SUPPORT TUBES into the two tabs on  
the top of either side of the Super Nose Mount (two PI-Pins on either side).

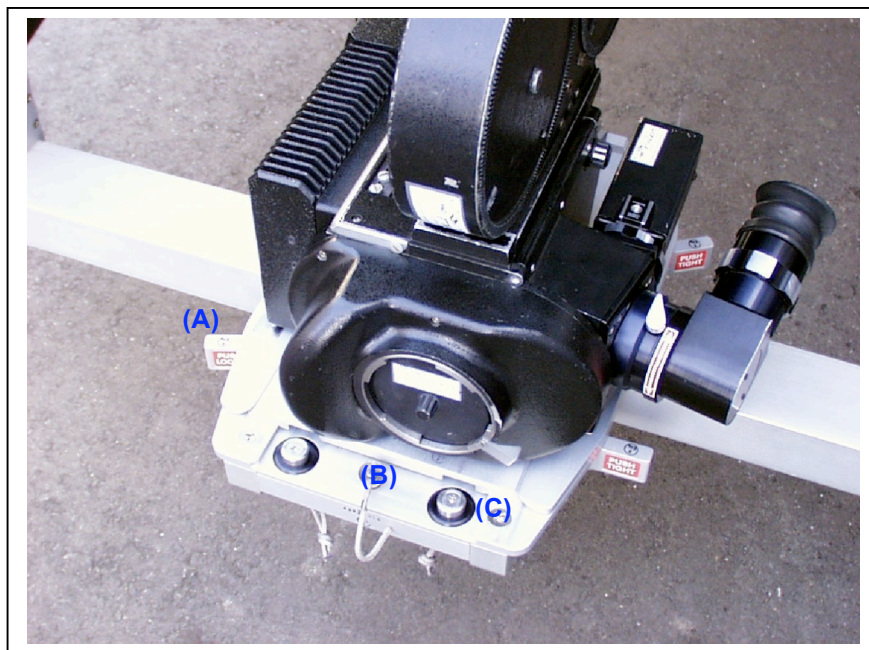
Note: Make sure the BELLY-BRACE is firmly pressed against the helicopter,  
and use a PAD which will apply moderate pressure.

Belly-Brace PAD options:

- Velcro only (no PAD)
- 1/4" PAD
- 1/2" PAD



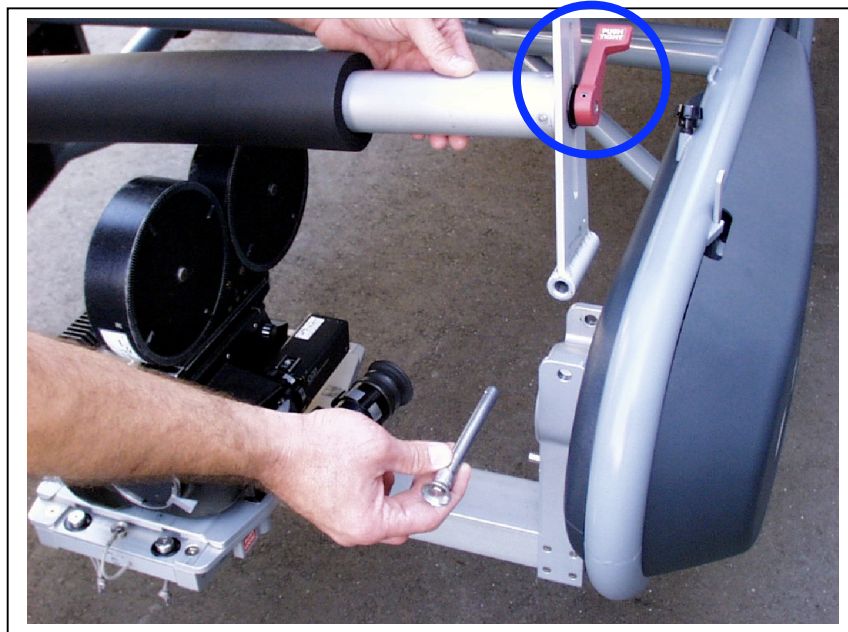
Attach and fasten the QUICK RELEASE PLATE to the bottom of the camera with two bolts.



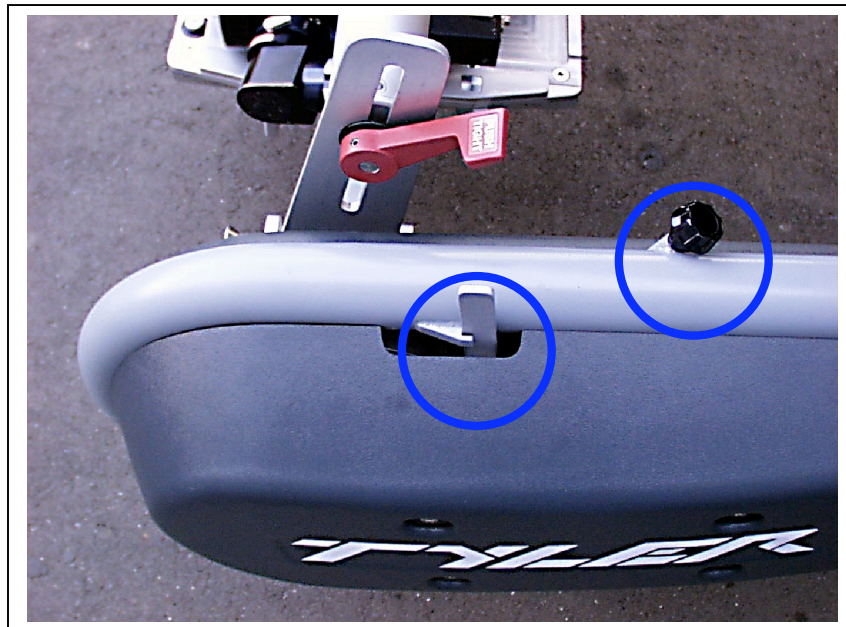
Attach and secure the camera using:  
(A) All four Slide Locks, (B) PI-Pin (not necessary)

Note: To remove the camera/QUICK RELEASE PLATE, both Safety Stops (C) must be pulled down.





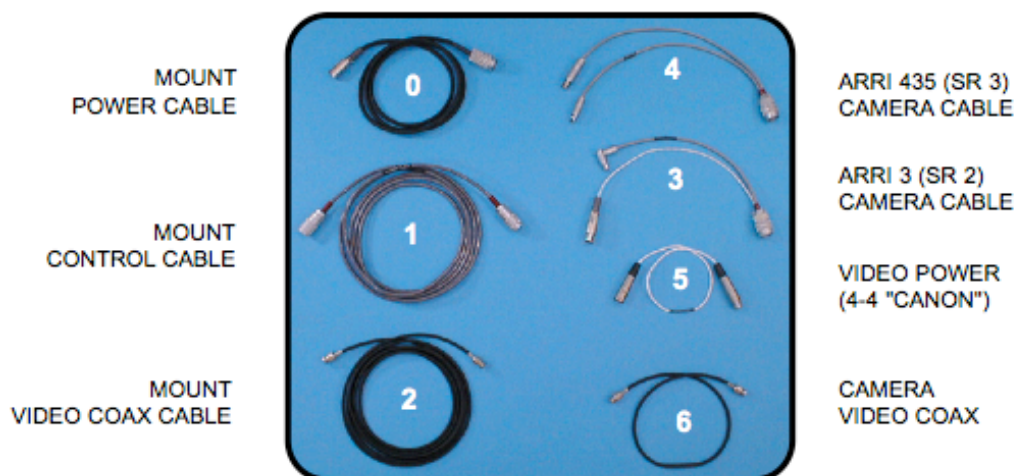
Attach and fasten the Lockdown Bar on top of the camera, then tighten the two “red” Levers.  
Note: Levers must point upward - Rotate the Lockdown Bar to adjust their position.



Unlock the Clutch Lever and loosen the Clutch Knob, shift the camera fore-to-aft until balanced, and re-engage the Clutch Lever and tighten the Clutch Knob.

**- SUPER NOSE MOUNT assembly complete -**

## CABLES



#	NAME	CONNECTION	CONTACTS	F/V
0	POWER	CONSOLE TO BATTERY	5 TO 3	F/V
1	CONTROL	CONSOLE TO MOUNT	12 TO 12	F/V
2	VIDEO (LONG)	CONSOLE TO MOUNT	COAXIAL	F/V
*3	A-3 CAMERA (35-3 & SR TYPE)	MOUNT TO CAMERA	12 TO 4 AND 11	F
**3A	PANAVISION 24V ADAPTE	CAMERA CABLE	4 TO 2	F
*4	A-4 CAMERA (435 & SR3 TYPE)	MOUNT TO CAMERA	12 TO 2 AND 9	F
5	VIDEO TAP POWER	MOUNT TO VIDEO TAP	4 TO 4	F
6	VIDEO SIGNAL (SHORT)	MOUNT TO VIDEO TAP	COAXIAL	F/V

\*SUPPLIED UPON REQUEST ONLY

\*\*SUPPLIED UPON REQUEST ONLY (NOT SHOW)

Note: Because the *Super Nose Mount* is generally used with large format film cameras, Arriflex cables are typically only supplied upon request.



## CONTROL CONSOLE



Mount  
IN  
Video  
IN

Video  
OUT  
(To Auxillary Monitor / Recorder)

Battery / Power  
IN

### COLOR DISPLAY CONTROLS

For optimum picture use viewing hood and adjust display controls while camera is running.

### FILM CAMERA CONNECTIONS

Connect cables 0, 1, 2, and 6. Then, if the camera has identical power and control input connectors as *Arriflex* cameras, connect cables 3, 3A or 4 (depending on camera type) and 5 (if applicable). Otherwise, camera power and any camera controls or displays will have to be run independently of the *Super Nose* Mount and the Control Console.

### VIDEO CAMERA CONNECTIONS

Plug in cables #: 0 and 1. The video signal may be "fed" to the CONSOLE from the camera, using cables 2 and 6. Or, using cable 2, the video "feed" may come directly from the recorder if it is placed inside the helicopter.

## 6 MultiCam Nose Mount



**Figure 4. MultiCam Nose Mount**

INSTALL MULTICAM NOSE MOUNT ON TO MAINFRAME

### **IMPORTANT**

SNM-AS COUNTERWEIGHT MUST ALL BE INSTALLED

### **CAMERA SIZE & WEIGHT NOT TO EXCEED:**

<u>SQ. FT. / SQ. CM</u>	<u>LBS. / KGS.</u>	<u>FUS. STA. (IN.)</u>
3.75 / 3483.86	140 / 63.50	23.25



## 6.1 MultiCam Approved Cameras

The Tyler MultiCam Nose Mount was certified based on size comparison of other camera packages previous flown and approved. The following cameras have been installed and flown on the mount at different times and using ships power.

- ARRI® / Arriflex® cameras
- Panavision® cameras
- Imax® cameras (in particular, models: MSN and IW5)
- Beaumont (compact Vistavision) camera
- Aaton®
- Éclair®
- Sony® cameras
- Panasonic®
- Ikegami® cameras
- Hitachi® cameras
- Canon® cameras
- RED® camera

## 6.2 Multicam Nose Mount Parts List

- Tyler *MULTICAM* NOSE MOUNT

## 6.3 MultiCam Nose Mount Hardware List

<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
1/2-20	3.50	AN8-33A	4	FT. MAIN FRAME

<u>MS NYLOCK</u>	<u>NUMBERS</u>	<u>QTY.</u>
1/2-20	MS21083N8	4

<u>A N WASHERS</u>		
1/2	AN960-816L (.032)	8

**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

## 6.4 MultiCam Nose Mount Installation



Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-616L  
WASHERS

Insert and fasten MULTICAM NOSE MOUNT into MAINFRAME  
(Two bolts on either side).



Add Counterweight(s) in consideration of the following items: Camera, Crew and Fuel  
See: Sample Weight & Balance Data  
in Appendix B of this manual.

Note: Secure the Lid (not shown) of the COUNTERWEIGHT BOX with two PI-Pins.



To adjust the Camera-Tilt Plate angle...

1. Loosen the main Camera-Tilt Plate Bolts (one on either side, at the pivot-point).
2. Remove the Tilt-Secure Bolts (one on either side, above the pivot-point).
3. Rotate the Camera-Tilt Plate to desired tilt angle.
4. Fasten the Tilt-Secure Bolts.
5. Tighten the main Camera-Tilt Plate Bolts.

Note: A flight test is suggested in order to confirm that the proper tilt angle is set.

**- MULTICAM NOSE MOUNT assembly complete -**



## 7 National Grid Nose Mount



INSTALL NATIONAL GRID NOSE MOUNT ON TO  
AIRFRAME BRACKETS OR AIRFRAME TABS

### IMPORTANT

DO NOT INSTALL MAINFRAME OR SNM-AS COUNTERWEIGHT

The National Grid System is self contained sensor unit

### CAMERA SIZE & WEIGHT NOT TO EXCEED:

<u>SQ. FT. / SQ. CM</u>	<u>LBS. / KGS.</u>	<u>FUS. STA. (IN.)</u>	<u>BUTT LINE (IN.)</u>
2.25 / 2090.32	125 / 56.70	43.2	-28.3



## 7.1 National Grid Approved Sensor

The *Tyler* National Grid Side Mount was certified based on flight test with the sensor housing and weight. There is only one sensor approved and contained in the mount.

## 7.2 National Grid Mount Parts List

- Primary Support Tube (with End Cap)
- Side Support Frame
- Support Strut – Upper
- Support Strut – Lower
- Sensor Package Assembly
- Cabin Equipment Frame (with Fastening Studs & PiPins)

## 7.3 National Grid Mount Hardware List

<b>TYPE</b>	<b>LTH.</b>	<b>A N #</b>	<b>QTY.</b>	<b>USE</b>
9/16-18	2.00	AN8-17A	2	Primary Support Tube
1/2-20	3.50	AN8-33A	2	Side Support Frame
7/16-20	3.50	AN7-33A	1	Side Support Frame
3/8-24	1.125	AN6-10A	2	Support Strut

<b>MS NYLOCK</b>	<b>NUMBERS</b>	<b>QTY.</b>
9/16-18	MS21083N9	2
1/2-20	MS21083N8	2
7/16-20	MS21083N7	1
3/8-24	MS21083N6	2

### **A N WASHERS**

9/16	AN960-916 (.062)	4
1/2	AN960-816L (.032)	4
7/16	AN960-716L (.032)	2
3/8	AN960-616L (.032)	4

**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

## 7.4 National Grid Mount Installation



Attach and fasten the PRIMARY SUPPORT TUBE (as shown)  
to the AIRFRAME BRACKETS or AIRFRAME TABS  
(One bolt on either side).



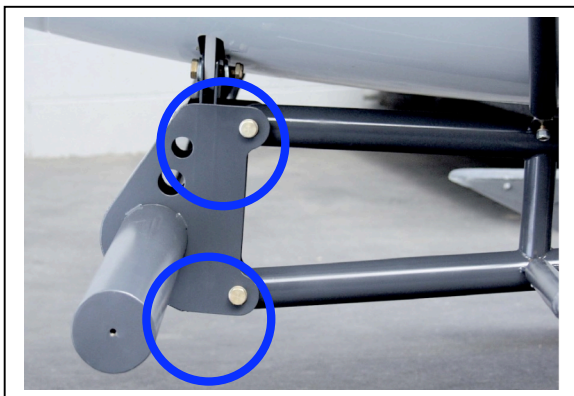
Hardware:  
(2) AN8-17A BOLTS  
(4) AN960-916 WASHERS  
(2) MS21083N9 NUTS



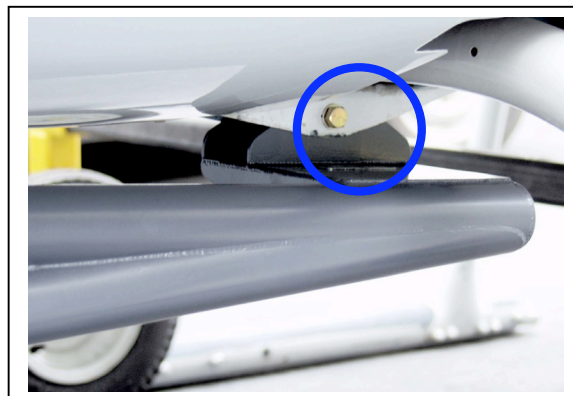
Attach and fasten the SIDE FRAME to the PRIMARY SUPPORT TUBE.  
Note: Insert the lower bolt first.

Attach and fasten the rear end of the SIDE FRAME into the “Hard-Point”  
(under the Forward skid-gear tube).

Fasten the upper bolt on the front end of the SIDE FRAME.



Hardware:  
(2) AN8-33A BOLTS  
(4) AN960-816L WASHERS  
(2) MS21083N8 NUTS



Hardware:  
(1) AN7-33A BOLT  
(2) AN960-716L WASHERS  
(1) MS21083N7 NUT





Remove End Cap from Primary Support Tube.

Loosely attach Upper and Lower Diagonal Support Rods to Side Frame.

Loosely attach Sensor Package to Primary Support Tube  
Connect Lower, then Upper Diagonal Support Rods.

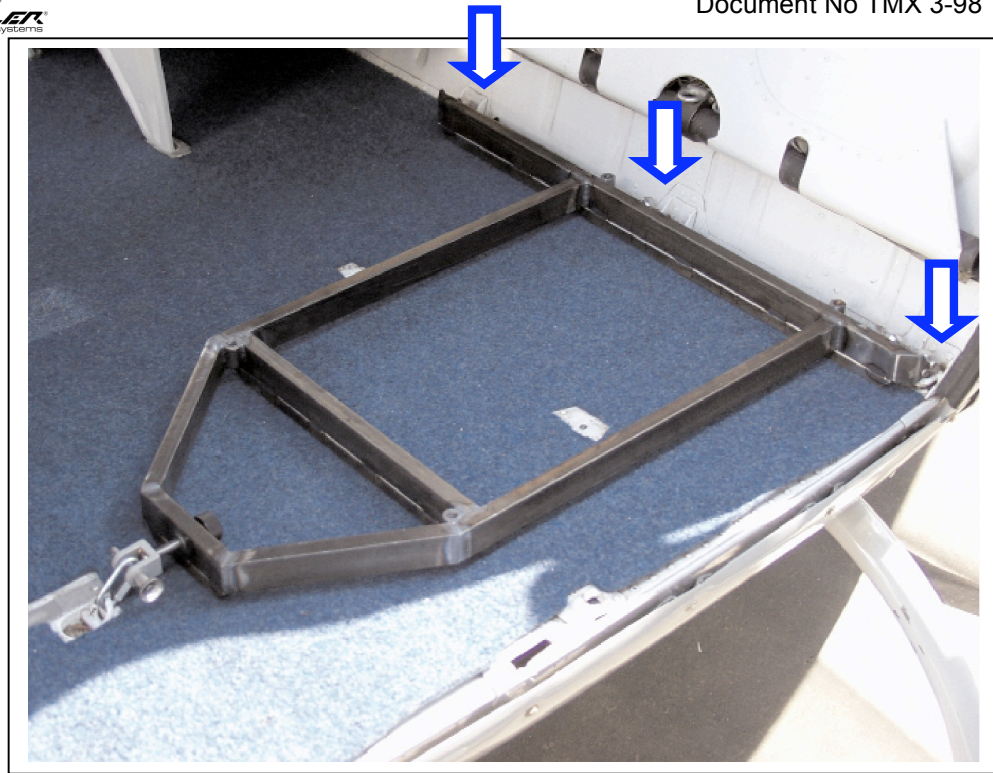
Level the Device and then tighten Clamps.

Tighten jam-nuts on Diagonal Support Rods.

Tighten Diagonal Support Rods on Side Frame.

Re-attach End Cap to Primary Support Tube.



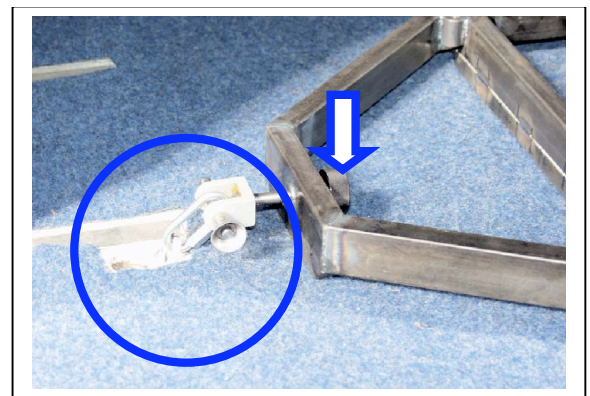
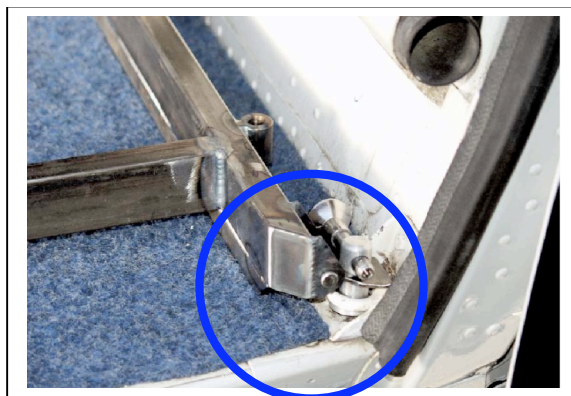


Remove left rear seat-cushions, fold up bench-seat, remove seatbelts from three attach-rings. Insert 3 Fastening Studs (one in each ring).

Place frame on floor, and position hinged tabs over Fastening Studs.

Insert 3 PiPins (one in each Fastening Stud).

Connect front of frame to attach-ring using one or two carabineers as needed, then tighten knob (pulling frame forward) until snug.



**- NATIONAL GRID NOSE MOUNT assembly complete -**

## 8 NSWC Nose Mount



**Figure 5. NSWC Nose Mount**

INSTALL NSWC NOSE MOUNT ON TO MAINFRAME (SECTION # 1)

### **IMPORTANT**

SNM-AS COUNTERWEIGHT (SECTION # 3) MUST ALL BE INSTALLED

The Nswc Nose Mount uses a self contained sensor unit

### **CAMERA SIZE & WEIGHT NOT TO EXCEED:**

<u>SQ. FT. / SQ. CM</u>	<u>LBS. / KGS.</u>	<u>FUS. STA. (IN.)</u>
2.25 / 2090.32	55 / 24.94	-8.25



## 8.1 NSWC Approved Sensor

The *Tyler* National Grid Side Mount was certified based flight test of a camera body. There is only one sensor approved and contained in the mount.

## 8.2 NSWC Nose Mount Parts List

- *Tyler* NSWC NOSE MOUNT
- Cabin Frame (with Fastening Studs & PiPins)
- Equipment Adapter Frame – Left (with PiPins)
- Equipment Adapter Frame – Right (with Locking Bar and PiPins)

## 8.3 NSWC Nose Mount Hardware List

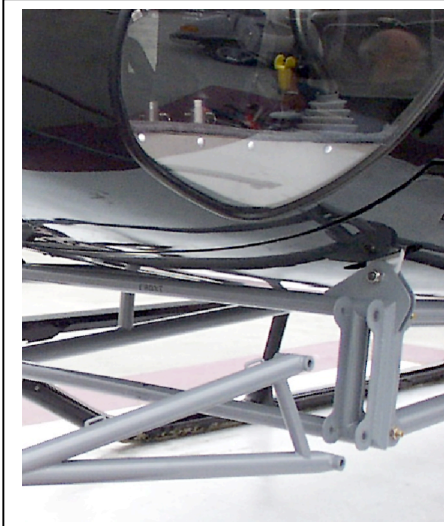
<u>TYPE</u>	<u>LTH.</u>	<u>A N #</u>	<u>QTY.</u>	<u>USE</u>
1/2-20	3.50	AN8-33A	4	FT. MAIN FRAME

<u>MS NYLOCK</u>	<u>NUMBERS</u>	<u>QTY.</u>
1/2-20	MS21083N8	4

<u>A N WASHERS</u>		
1/2	AN960-816L (.032)	8

**IMPORTANT**  
TO ENSURE OPTIMUM PERFORMANCE  
SECURELY FASTEN ALL HARDWARE

## 8.4 NSWC Installation



Insert and fasten NSWC NOSE MOUNT into  
MAINFRAME  
(Two bolts on either side).



Hardware:  
(4) AN8-33A BOLTS  
(8) AN960-616L WASHERS  
(4) MS21083N8 NUTS



Attach NSWC gimbal package  
to Adapter Frame, using 10  
bolts (specific to device).



Add Counterweight(s) in consideration of  
the following items: Camera, Crew and Fuel  
See: Sample Weight & Balance Data  
in Appendix B of this manual.

Note: Secure the Lid (not shown) of the  
COUNTERWEIGHT BOX with two PI-Pins.



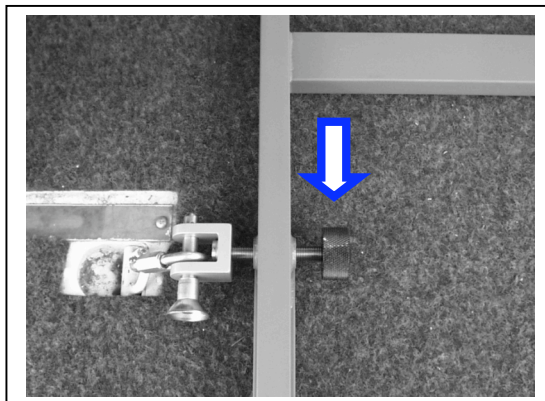


Remove rear seat-cushions, fold up bench-seats, remove seatbelts from four attach-rings. Insert 4 Fastening Studs (one in each ring).

Place Cabin Frame on floor, and position hinged tabs over Fastening Studs.

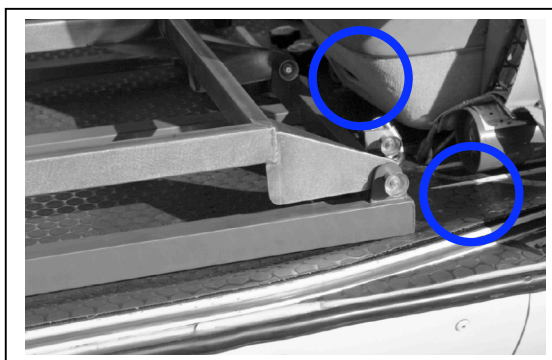
Insert 4 PiPins (one in each Fastening Stud).

Connect front of frame to attach-rings (left & right) using one or two carabineers on each as needed, then tighten knobs (pulling frame forward) until snug.





Attach Right Equipment Adapter Frame to Cabin Frame,  
using Locking Bar and 2 PiPins.





Attach Left Equipment Adapter Frame to Cabin Frame, using 2 PiPins.



Attach Left and Right Equipment Units to Equipment Adapter Frames,  
using 2 PiPins on each Unit (not shown).

## 9 Electrical Power – OEM Outlets

Some Eurocopters are equipped with “Utility” power outlets which may be available to power Camera Mounts and Cameras

When utilizing the helicopter to power any of the camera mounts and/or camera and/or accessories (instead of a battery pack), the maximum current draw is not to exceed 28 volts / 400 watts (approx. 15 amps) or as specified in the RFM.



BANANA” 2 PIN  
(also see above)



Amphenol 2 PIN

These are the two most common types of auxiliary power connectors in the helicopter.





## 1 Appendix A – Approval Procedure for New Camera/Sensors

### 2 Sensor/ Camera/ payload

Make & Model \_\_\_\_\_

### 3 Test Team

#### 3.1 Pilot/s

\_\_\_\_\_  
Print Name

#### 3.2 Mechanic and/or Engineer and/or Camera Operator

\_\_\_\_\_  
Print Name

### 4 Test Aircraft Configuration and Location

#### 4.1 Aircraft Model, Registration & Serial Number

\_\_\_\_\_  
Model                      Registration Number                      Serial Number

#### 4.2 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			

#### 4.3 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.

#### 6.2.2 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.

#### 6.2.3 FINDINGS

Satisfactory ☐



## 6.3 FAR § 27.71 Glide Performance

### 6.3.1 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.

### 6.3.2 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.

### 6.3.3 FINDINGS

Satisfactory  Altitude Band H<sub>P</sub> \_\_\_\_\_ Fuel Gage Reading \_\_\_\_\_

## 6.4 FAR § 27.143 Controllability and Maneuverability

### 6.4.1 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 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.

#### 6.4.2 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:

6.4.2.1 Takeoff

6.4.2.2 Climbing flight

6.4.2.3 Forward flight to  $V_{NE}$  at MCP (maybe less than MCP)

6.4.2.4 Left & right 30 degree bank turns at  $V_{NE}$  and at MCP (maybe less than MCP)

6.4.2.5 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.

#### 6.4.3 FINDINGS

Satisfactory ☐ Cruise Altitude H<sub>P</sub> \_\_\_\_\_ Fuel Gage Reading \_\_\_\_\_

### 6.5 **FAR § 27.171 Stability: General**

#### 6.5.1 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.

#### 6.5.2 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 with this requirement will be evaluated throughout the test program.

#### 6.5.3 FINDINGS

Satisfactory ☐





## 6.6 FAR § 27.251 Vibration

### 6.6.1 APPLICABLE REGULATION

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

### 6.6.2 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.

The difference between the mount and sensor / camera/ light payload and the clean configuration is the evaluation point.

### 6.6.3 FINDINGS

Satisfactory ☐

## 6.7 FAR § 27.773 Pilot Compartment View

### 6.7.1 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.

### 6.7.2 METHOD OF COMPLIANCE

The section outlines requirements for pilot view in fairly general terms. The aircraft was approved with the installed glare shield 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 ☐



## 6.8 FAR § 27.787 Cargo & Baggage Compartment

### 6.8.1 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.

### 6.8.2 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.

### 6.8.3 FINDINGS

Comment: \_\_\_\_\_

Satisfactory ☐

## 6.9 FAR § 27.1301 Function and Installation.

### 6.9.1 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.

### 6.9.2 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

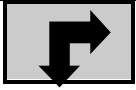


that are required for safe operation of the rotorcraft, and that the failure modes are acceptable and do not create any hazards.

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.

### 6.9.3 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 ☐



## 7 Signatures

General test findings \_\_\_\_\_

Pilot Signature \_\_\_\_\_

Mechanic/ Engineer \_\_\_\_\_

Other Flt Personnel Signature & Function

\_\_\_\_\_





## 8 References

1. *14 Code of Federal Regulations, Aeronautics and Space, Chapter I – Federal Aviation Administration, Department of Transportation, Subchapter C – Aircraft, Part 27* (Revised as of 1 January 2000.)
2. *Federal Aviation Administration, Advisory Circular, AC 27-1B Certification of Normal Category Rotorcraft* (ASW-110, September 9, 1999)





# 1 Appendix B

## 1.1 Nose Mount - AS 350 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		STD. NOSE 350				
Weight x Arm = Moment						
6/1/1998		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET		AS 350 BA	N31621	2130	N/A	
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		2885	139.07	401217	0.489	1410.765
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (143 GALS MAX) X 6.8 GALS:	100	680	136.81	93030.8	0	0
SUBTOTAL:		3965	130.81	518655.8	0.36	1410.77
CAMERA EQUIPMENT	39#	39	10.5	409.5	0	0
FRONT FRAMEWORK	19#	19	26	494	0	0
FRAMEWORK (FACE PLATE)	19#	19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
TAIL CONE 20# MAX		0	398	0	0	0
TAIL BOOM 20# MAX.		0	0	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
		0	0	0	0	0
EQUIPMENT SUBTOTAL:		125		610.2		-141.7
TOTAL AIRCRAFT WEIGHT:		4090	126.96	519265.95	0.31	1269.07
AIRCRAFT MAX GROSS WEIGHT:		4630		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		540				
NEW CENTER OF GRAVITY (LONGITUDINAL)		126.96		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.31		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
Note:		LONGITUDINAL C.G. LIMITS:				
STANDARD NOSE MOUNT SYSTEM w/Camera:						
		FORWARD LIMIT:				
Maximum Camera Wt. = 39lbs.		124.8 IN. (3.17M) @ 4410 LBS. (2000 KG)				
		125.3 IN. (3.185M) @ 4630 LBS. (2100 KG)				
		REARWARD LIMIT:				
		135.5 IN. (3.445M) @ 4360 LBS. (2100KG)				
		137.4 IN. (3.49M) @ 3858 LBS. (1750 KG)				



		137.8 IN. (3.50M) @ 2646 LBS. (1200 KG)	
--	--	-----------------------------------------	--





## 1.2 SuperNose Mount / AS-350 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		SUPER NOSE 350				
Weight x Arm = Moment						
5/29/1998		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET		AS 350 BA	N31621	2130	N/A	
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		2885	139.07	401216.95	0.489	1410.77
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		100	61.02	6102	-14.17	-1417
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		100	99.99	9999	24.45	2445
PAX (C-) OUTSIDE LEFT REAR		170	99.99	16998.3	-24.45	-4156.5
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (143 GALS MAX) X 6.8 GALS:	110	748	136.81	102333.88	0	0
SUBTOTAL:		4203	130.5862788	548854.13	0.2655877	1116.27
CAMERA SYSTEM 120 max	0	120	7.5	900	0	0
CAMERA FRONT FRAME		98	17	1666	0	0
FRAMEWORK (FACE PLATE)		19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK (COUNTERWEIGHT ARMS 4EA.)	51#	51	231	11781	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS	20EA	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		414		38925.7		-141.7
TOTAL AIRCRAFT WEIGHT:		4617	127.3077388	587779.83	0.2110819	974.565
AIRCRAFT MAX GROSS WEIGHT:		4630		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		13				
NEW CENTER OF GRAVITY (LONGITUDINAL)		127.3077388		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.211081871		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FORWARD LIMIT:				
		124.8 IN. (3.17M) @ 4410 LBS. (2000 KG)				



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		125.3 IN. (3.185M) @ 4630 LBS. (2100 KG)				
		REARWARD LIMIT:				
		135.5 IN. (3.445M) @ 4360 LBS. (2100KG)				
		137.4 IN. (3.49M) @ 3858 LBS. (1750 KG)				
		137.8 IN. (3.50M) @ 2646 LBS. (1200 KG)				



### 1.3 Multicam Nose Mount / AS-350 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST			Multicam 350			
Weight x Arm = Moment						
5/29/1998		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET		AS 350 BA	N31621	2130	N/A	
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		2885	139.1	401303.50	0.489	1410.8
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (143 GALS MAX) X 6.8 GALS:	100	680	136.81	93030.8	0	0
SUBTOTAL:		3965	130.83034	518742.30	0.3558	1410.8
Camera Package not to exceed 140#						
CAMERA SYSTEM CENTER	0	35	23.25	813.75	0	0
CAMERA RIGHT SIDE	0	35	23.25	813.75	8	280
CAMERA LEFT SIDE	0	35	23.25	813.75	-8	-280
CAMERA FRONT FRAME	64#	64	29	1856	0	0
FRAMEWORK (FACE PLATE)	19#	19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK COUNTERWEIGHT ARMS	51#	97	231	22407	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS	20EA	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		411		51282.95		-141.7
TOTAL AIRCRAFT WEIGHT:		4376	130.2617	570025.25	0.29	1269.1
AIRCRAFT MAX GROSS WEIGHT:		4630		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		254				
NEW CENTER OF GRAVITY (LONGITUDINAL)		130.26		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.29		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FORWARD LIMIT:				



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		124.8 IN. (3.17M) @ 4410 LBS. (2000 KG)	
		125.3 IN. (3.185M) @ 4630 LBS. (2100 KG)	
		REARWARD LIMIT:	
		135.5 IN. (3.445M) @ 4360 LBS. (2100KG)	
		137.4 IN. (3.49M) @ 3858 LBS. (1750 KG)	
		137.8 IN. (3.50M) @ 2646 LBS. (1200 KG)	





#### 1.4 NSWC Nose Mount / AS-350 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		NSWC 350				
Weight x Arm = Moment						
5/29/1998		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET		AS 350 BA	N31621	2130	N/A	
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		2885	139.07	401216.95	0.489	1410.765
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
ELECT BOX (A-) FORWARD LEFT		100	61.02	6102	-14.17	-1417
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
ELECT BOX (C+) OUTSIDE RIGHT REAR		100	99.99	9999	24.45	2445
OPERATOR (C-) OUTSIDE LEFT REAR		200	99.99	19998	-24.45	-4890
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (143 GALS MAX) X 6.8 GALS:	110	748	136.81	102333.88	0	0
SUBTOTAL:		4233	130.3694378	551853.83	0.09042	382.765
NSWC GIMBAL	55#	55	-8.25	448.8	0	-1556.5
NSWC FRONT FRAME		60	17.9	1074	0	0
FRAMEWORK (FACE PLATE)		19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK COUNTERWEIGHT ARMS	51#	51	231	11781	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS EA	20#	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		311		37882.5		-1698.2
TOTAL AIRCRAFT WEIGHT:		4544	129.7835233	589736.33	0.28949	-1315.44
AIRCRAFT MAX GROSS WEIGHT:		4630		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		86				
NEW CENTER OF GRAVITY (LONGITUDINAL)		129.7835233		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.289488336		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FORWARD LIMIT:				
		124.8 IN. (3.17M) @ 4410 LBS. (2000 KG)				



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		125.3 IN. (3.185M) @ 4630 LBS. (2100 KG)		
		REARWARD LIMIT:		
		135.5 IN. (3.445M) @ 4360 LBS. (2100KG)		
		137.4 IN. (3.49M) @ 3858 LBS. (1750 KG)		
		137.8 IN. (3.50M) @ 2646 LBS. (1200 KG)		



### 1.5 National Grid Nose Mount / AS-350 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		NG 350				
Weight x Arm = Moment						
5/29/1998		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET		AS 350 BA	N31621	2130	N/A	
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		2885	139.07	401216.95	0.489	1410.77
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
ELECT BOX (A-) FORWARD LEFT		100	61.02	6102	-14.17	-1417
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
ELECT BOX (C+) OUTSIDE RIGHT REAR		100	99.99	9999	24.45	2445
OPERATOR (C-) OUTSIDE LEFT REAR		200	99.99	19998	-24.45	-4890
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (143 GALS MAX) X 6.8 GALS:	110	748	136.81	102333.88	0	0
SUBTOTAL:		4233	130.3694378	551853.83	0.09042	382.765
LASER FRAMEWORK	125#	125	43.2	5400	-28.3	3537.5
LATERAL TUBE	22#	22	41.5	913	0	0
FRAMEWORK TRAILING ARMS (X) 1	19#	19	64	1216	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
EQUIPMENT SUBTOTAL:		166		7529		3537.5
TOTAL AIRCRAFT WEIGHT:		4399	127.1613617	559382.83	0.89117	3920.27
AIRCRAFT MAX GROSS WEIGHT:		4630		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		231				
NEW CENTER OF GRAVITY (LONGITUDINAL)		127.1613617		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.891171857		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FDW LIMIT:				
		124.8 IN. (3.17M) @ 4410 LBS. (2000 KG)				
		125.3 IN. (3.185M) @ 4630 LBS. (2100 KG)				
		REARWARD LIMIT:				
		135.5 IN. (3.445M) @ 4360 LBS. (2100KG)				
		137.4 IN. (3.49M) @ 3858 LBS. (1750 KG)				
		137.8 IN. (3.50M) @ 2646 LBS. (1200 KG)				



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## 1.6 SuperNose Mount / AS-355 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		SUPER NOSE 355				
Weight x Arm = Moment						
		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET						
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		3195.89	138.88	443845.2	0.489	1562.79
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
SUBTOTAL:		4683.89	129.6	607027.6	0.333652	1562.79
3195.89						
CAMERA SYSTEM	120#	120	7.5	900	0	0
CAMERA FRONT FRAME	98#	98	17	1666	0	0
FRAMEWORK (FACE PLATE)	19#	19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK COUNTERWEIGHT ARMS	51#	97	231	22407	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS	20EA	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		20	398	7960	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		480		57511.7		-141.7
TOTAL AIRCRAFT WEIGHT:		5163.89	128.69	664539.3	0.275198	1421.09
AIRCRAFT MAX GROSS WEIGHT:		5291		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		127.11				
NEW CENTER OF GRAVITY (LONGITUDINAL)		128.6896706		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.275197615		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
LONGITUDINAL C.G. LIMITS:						



		FORWARD LIMIT:				
		124.8 IN. (3.17M) @ 4000 LBS. (2000 KG)				
		126.5 IN. (3.185M) @ 5000 LBS. (2100 KG)				
		REARWARD LIMIT:				
		139.3 IN. (3.49M) @ 4000 LBS. (1750KG)				
		137.9 IN. (3.445M) @ 5000 LBS. (2100 KG)				



## 1.7 Nose Mount / AS-355 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		STD. NOSE 355				
Weight x Arm = Moment						
		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET						
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		3195.89	138.9	443845.2	0.489	1562.79
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	126	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	126	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	60	408	127.6	52040.4	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	60	408	127.6	52040.4	0	0
SUBTOTAL:		4411.89	129.73	572334	0.35	1562.79
CAMERA	39#	39	10.5	409.5	0	0
STANDARD FRONT FRAME	19#	19	26	494	0	0
NOSE MOUNT	26#	26	10.5	273	0	0
STANDARD CENTER FRAME	19#	19	41.5	788.5	0	0
STANDARD NOSE TRAILING ARMS (2)	19EA	38	64	2432	0	0
TAIL CONE 20# MAX		0	398	0	0	0
TAIL BOOM 20# MAX.		0	0	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
		0	0	0	0	0
EQUIPMENT SUBTOTAL:		151		3042.2		-141.7
TOTAL AIRCRAFT WEIGHT:		4562.89	126.10	575376.20	0.31	1421.09
AIRCRAFT MAX GROSS WEIGHT:		5291		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		728.11				
NEW CENTER OF GRAVITY (LONGITUDINAL)		126.10		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.31		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
Note:		LONGITUDINAL C.G. LIMITS:				
STANDARD NOSE MOUNT SYSTEM w/Camera:						
		FORWARD LIMIT:				
Maximum Camera Wt. = 39lbs.		124.8 IN. (3.17M) @ 4000 LBS. (2000 KG)				
		126.5 IN. (3.185M) @ 5000 LBS. (2100 KG)				
		REARWARD LIMIT:				
		139.3 IN. (3.49M) @ 4000 LBS. (1750KG)				



		137.9 IN. (3.445M) @ 5000 LBS. (2100 KG)	
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## 1.8 Multicam Nose Mount / AS-355 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		Multicam 355				
Weight x Arm = Moment						
		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET						
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		3195.9	138.9	443845.2	0.489	1562.79
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	126	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	126	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.6	69387.2	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.6	69387.2	0	0
SUBTOTAL:		4683.9	129.6	607027.6	0.33365	1562.79
3195.89						
Camera Package not to exceed 140#						
CAMERA SYSTEM CENTER	0	35	23.25	813.75	0	0
CAMERA RIGHT SIDE	0	35	23.25	813.75	8	280
CAMERA LEFT SIDE	0	35	23.25	813.75	-8	-280
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK COUNTERWEIGHT ARMS	51#	97	231	22407	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS	20EA	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		328		48638.45		-141.7
TOTAL AIRCRAFT WEIGHT:		5011.9	130.8	655666.1	0.28354	1421.09
AIRCRAFT MAX GROSS WEIGHT:		5291		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		279.11				
NEW CENTER OF GRAVITY (LONGITUDINAL)		130.82		L/H LIMIT: 7.08 IN. (0.18M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.2835		R/H LIMIT: 5.51 IN. (0.14M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FORWARD LIMIT:				
		124.8 IN. (3.17M) @ 4000 LBS. (2000 KG)				
		126.5 IN. (3.185M) @ 5000 LBS. (2100 KG)				
		REARWARD LIMIT:				
		139.3 IN. (3.49M) @ 4000 LBS. (1750KG)				





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		137.9 IN. (3.445M) @ 5000 LBS. (2100 KG)
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## 1.9 NSWC Nose Mount / AS-355 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		NSWC 355				
Weight x Arm = Moment						
		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET						
		LONGITUDINAL		LATERAL		
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		3195.89	138.88	443845.2	0.489	1562.79
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.17	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.45	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.89	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
SUBTOTAL:		4683.89	129.5990305	607027.6	0.33365	1562.79
CAMERA SYSTEM	55#	55	-8.25	448.8	0	0
CAMERA FRONT FRAME	60#	60	17.9	1074	0	0
FRAMEWORK (FACE PLATE)	19#	19	41.5	788.5	0	0
FRAMEWORK TRAILING ARMS (X) 2	19#	38	64	2432	0	0
FRAMEWORK COUNTERWEIGHT ARMS	51#	97	231	22407	0	0
COUNTER WEIGHT BOX EMPTY	38#	38	266	10108	0	0
COUNTER WEIGHTS	20EA	40	266	10640	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
LAP CONTROLLER		10	61.02	610.2	-14.17	-141.7
EQUIPMENT SUBTOTAL:		357		48508.5		-141.7
TOTAL AIRCRAFT WEIGHT:		5040.89	130.0437231	655536.1	0.28191	1421.09
AIRCRAFT MAX GROSS WEIGHT:		5291		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		250.11				
NEW CENTER OF GRAVITY (LONGITUDINAL)		130.0437231		L/H LIMIT: 6.30 IN. (0.16M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.281912561		R/H LIMIT: 3.54 IN. (0.09M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FWD LIMIT:				
		124.8 IN. (3.17M) @ 4000 LBS. (2000 KG)				
		126.5 IN. (3.185M) @ 5000 LBS. (2100 KG)				



		REARWARD LIMIT:			
		139.3 IN. (3.49M) @ 4000 LBS. (1750KG)			
		137.9 IN. (3.445M) @ 5000 LBS. (2100 KG)			

## 1.10



### 1.11 National Grid - Nose Mount / AS-355 Sample

WEIGHT & BALANCE DATA AND EQUIPMENT LIST		NG 355				
Weight x Arm = Moment						
		AIRCRAFT MODEL	REGISTRATION	AIRCRAFT S/N	PILOT	
SAMPLE SHEET						
		LONGITUDINAL			LATERAL	
ITEM:		WEIGHT	ARM	MOMENT	ARM	MOMENT
AIRCRAFT EMPTY WEIGHT & C.G.		3195.89	138.88	443845.2	0.489	1562.79
PILOT (A+) FORWARD RIGHT		200	61.02	12204	14.17	2834
CO-PILOT (A-) FORWARD LEFT		200	61.02	12204	-14.2	-2834
PAX (B+) INSIDE RIGHT REAR		0	99.99	0	8.15	0
PAX (B-) INSIDE LEFT REAR		0	99.99	0	-8.15	0
PAX (C+) OUTSIDE RIGHT REAR		0	99.99	0	24.45	0
PAX (C-) OUTSIDE LEFT REAR		0	99.99	0	-24.5	0
STARBOARD BAGGAGE (R) MAX 220 LBS		0	125.98	0	21.89	0
PORT BAGGAGE (L) MAX 264 LBS		0	125.98	0	-21.9	0
REAR BAGGAGE MAX 170 LBS		0	181.1	0	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
FUEL (194.6 GALS MAX) X 6.8 GALS:	80	544	127.55	69387.2	0	0
SUBTOTAL:		4683.89	129.5990305	607027.6	0.334	1562.79
LASER FRAMEWORK	125#	125	43.2	5400	-28.3	0
LATERAL TUBE	22#	22	41.5	913	0	0
FRAMEWORK TRAILING ARMS (X) 1	19#	19	64	1216	0	0
COUNTER WEIGHT TAIL CONE 20# MAX.		0	398	0	0	0
COUNTER WEIGHT TAIL BOOM 20# MAX.		0	390	0	0	0
EQUIPMENT SUBTOTAL:		166		7529		0
TOTAL AIRCRAFT WEIGHT:		4849.89	126.7155757	614556.6	0.322	1562.79
AIRCRAFT MAX GROSS WEIGHT:		5291		LATERAL C.G. LIMITS:		
NEW USEFUL LOAD:		441.11				
NEW CENTER OF GRAVITY (LONGITUDINAL)		126.7155757		L/H LIMIT: 6.30 IN. (0.16M) MINUS		
NEW CENTER OF GRAVITY (LATERAL)		0.322232094		R/H LIMIT: 3.54 IN. (0.09M) PLUS		
		LONGITUDINAL C.G. LIMITS:				
		FWD LIMIT:				
		124.8 IN. (3.17M) @ 4000 LBS. (2000 KG)				
		126.5 IN. (3.185M) @ 5000 LBS. (2100 KG)				
		REARWARD LIMIT:				



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		139.3 IN. (3.49M) @ 4000 LBS. (1750KG)		
		137.9 IN. (3.445M) @ 5000 LBS. (2100 KG)		