




# CAA APPROVED FLIGHT MANUAL SUPPLEMENT (FMS)

### MD HELICOPTERS INC 369 MODELS:

AND

## 369HS, 369D

CAA REFERENCE 13/21E/23

SIGN 

DATE 13 MAR 2015

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### **RECORD OF ISSUES**

Issue	Date	Reason for re-issue
1	6-Mar-15	Initial Issue

### **LIST OF EFFECTIVE PAGES**

Pages	Issue	Date
1 to 22	1	6-Mar-15

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## **1. GENERAL**

The design of the spray system STC 13/21E/23 consists of two interconnected side-mounted GRP spray tanks, two stainless steel spray booms, a standard petrol-powered pump and connections for the pneumatically operated actuators.

High skid landing gear must be installed and an approved cargo mirror system must be installed on the right hand side.

## **2. LIMITATIONS**

### **2.1 KINDS OF OPERATIONS**

#### **2.1.1 General**

Installation of the spray system places this rotorcraft into the **RESTRICTED** Category for Agricultural Operations only under CAR 137. Operations in **RESTRICTED** Category are for Day/Night VFR and only mission essential personnel may be carried in-flight.

#### **NOTE:**

When the rotorcraft is placed into the **RESTRICTED** Category, this should be so noted in the aircraft logbook. Removal of the spray system places the rotorcraft back into the **STANDARD** Category and that also must be noted in the rotorcraft logbook.

#### **2.1.2 Minimum Flight Crew / Crew Restrictions:**

The minimum crew is one (1) pilot. During spray operations, no person may be carried unless:

- a. The person is a crewmember trainee, or.
- b. The person performs an essential function in conjunction with spray operations.

#### **NOTE:**

When a crewmember is being trained, the PIC must be qualified to instruct as defined in NZCAR 91.311

### 2.1.3 Approved configurations

The following configurations are approved for flight. A tick (✓) indicates that the referenced item is installed. All configurations include the system fixed provisions.

Config	Tanks	Pump	Booms
1	✓	✓	
2	✓	✓	✓

Table 1 Approved configurations

## 2.2 FLIGHT LIMITATIONS

### 2.2.1 Airspeed Limitations

VNE for configuration 1 is 100 kts.

VNE for configuration 2 is 80 kts.

Spraying at airspeeds below 20 KIAS is prohibited.

Spraying is prohibited while hovering or in sideward or rearward flight.

### 2.3 WEIGHT LIMITATIONS

No change to the weight limitations specified in the rotorcraft flight manual.

## 2.4 SYSTEM LIMITATIONS

### 2.4.1 Rotorcraft Configuration Requirements:

The Rotorcraft is required to have the following equipment installed:

- An approved cargo hook
- An approved cargo mirror system installed on the right hand side
- High skid landing gear

### 2.4.2 Spray Tank Contents - Weight

The spray tank structural limitation for both tanks combined is 448 kg.

Tank contents must be limited to stay within the weight and cg limitations of the rotorcraft. See also section 6.

**WARNING**

IT IS POSSIBLE TO EXCEED THE MAXIMUM PERMITTED WEIGHT OF THE ROTORCRAFT IF THE TANK IS FILLED COMPLETELY. THE PILOT IS RESPONSIBLE FOR ENSURING THAT THE TANK LOAD IS LIMITED SUCH THAT ANY WEIGHT OR CG LIMITATION IS NOT EXCEEDED.

#### 2.4.3 Spray Tank Contents – Flash Point

**WARNING**

USE OF SPRAY LIQUIDS HAVING A FLASH POINT LOWER THAN KEROSENE IS PROHIBITED

### 2.5 PLACARDS

#### 2.5.1 VNE Placard

Attached to the instrument panel in full view of pilot

VNE = 80 KIAS with spray system deployed  
VNE = 100 KIAS with empty tank and pump/motor only

#### 2.5.2 Restricted Category Placard

Attached to the instrument panel in full view of pilot

**RESTRICTED CATEGORY**

Operation of the helicopter with the spray system installed must be in accordance with the approved rotorcraft flight manual supplement.

### 2.5.3 Tank loading placard

Located near the spray tank filler lids

Maximum contents of both tanks combined  
(structural limit) is 448 kg.

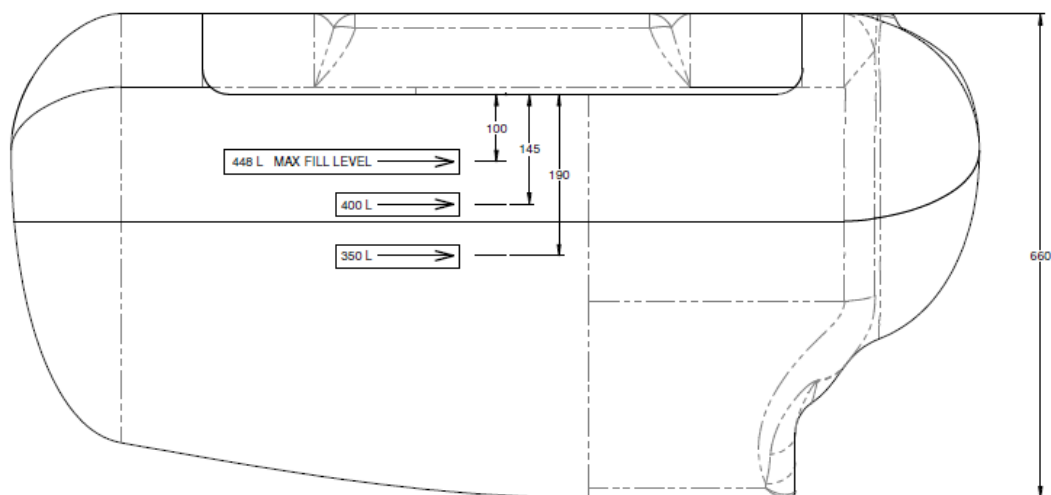
Tank must be loaded such that no weight or cg  
limitation is exceeded.

Use of spray liquids having a flash point lower than  
kerosene is prohibited.

Only fill tank with helicopter in level attitude to  
ensure proper fluid level.

### 2.5.4 Fill level placards

Located on the outside of each tank



FILL LEVEL PLACARDS ON THE OUTSIDE OF EACH TANK

### 2.5.4 Labels

The following labels are located on the cyclic grip  
mounted switch box:



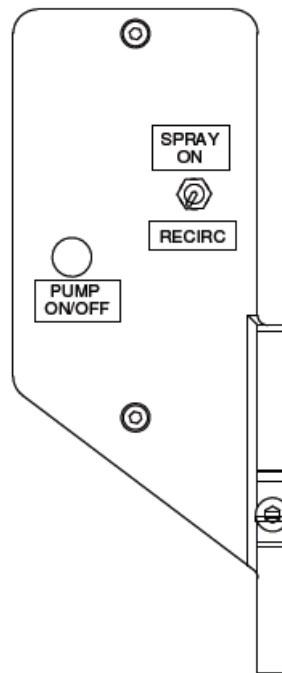


Figure 1 spray system switches

Located adjacent to the Spray system circuit breaker:

**SPRAY**

### **3. EMERGENCY PROCEDURES**

#### **2.6 STANDARD JETTISON**

In the event of a rotorcraft emergency or if difficulty is experienced in controlling the helicopter, the load should be dumped immediately by pressing the **CARGO RELEASE** switch for the installed cargo hook.

#### **WARNING!**

Due to the weight of the water and spray solution, be aware of any personnel or equipment in the vicinity prior to jettisoning the spray tank contents.

#### **3.1. EMERGENCY JETTISON**

In the event that the standard jettison fails to function, the load should be dumped immediately by operating the **BACKUP CARGO RELEASE** system of the installed cargo hook.

#### **3.2. PUMP FIRE**

In the event of a fire in the petrol pump, stop the motor using the **PUMP ON/OFF** (Engine kill) push button on the pilot's cyclic mounted control box. Land the rotorcraft as soon as possible. Evacuate the rotorcraft. If it is safe to do so use the rotorcraft's on-board fire extinguisher to extinguish the fire. If it is not considered safe, maintain a safe distance from the rotorcraft until the fire is extinguished.

### **4. NORMAL PROCEDURES**

The procedures in the aircraft flight manual remain valid and are supplemented only as detailed below.

#### **4.1 PRE-FLIGHT CHECKS**

The following checks should be carried out each time the spray system is installed and at the start of each day of operation. In the event that any check reveals

a fault, use of the system must be discontinued until the fault has been rectified.

### **CHECK:**

- Tank securely attached to the hard points
- Quick release pins securely fastened in their proper locations.
- Spray booms securely attached to the boom centre section.
- Spray nozzles for condition and security.
- Booms for indications of damage.
- Tank structure, booms and plumbing for cracks or holes, general condition, leaks and security.
- Pump motor securely attached to the motor mount.
- Motor has sufficient oil and petrol.
- Pump motor platform is securely attached to the skid.
- No leakages or accumulated fuel from the pump motor
- Mounting fittings for corrosion and/or cracking.
- Electrical and pneumatic connections for general condition and security.
- Dump doors for security, general condition and leakage.
- Operate and reset main dump system.
- Pump motor can be seen in the cargo mirror from the pilot's seat. Adjust if necessary

### **NOTE:**

If the tank has not been used for more than 2 days the system checks below must be performed before use.

## **4.2 SYSTEM CHECKS**

Refer to Figure 1 for switch location.

### **4.2.1 Electrical power**

Switch the rotorcraft battery switch **ON**.

#### 4.2.2 Spray Valve

Cycle the pilot's **SPRAY** switch to **ON**. Listen for spray valve movement. Cycle the switch to **RECIRC** and listen for valve movement.

#### 4.3 BEFORE TAKE-OFF CHECKS

- 1) Start the pump motor.
- 2) Check that the circuit breakers are engaged.

#### 4.4 SYSTEM OPERATION

- 1) Use the spray switch to control spraying.
- 2) Check the pump motor in the cargo mirror periodically for evidence of fire (Ref section 3.3).
- 3) Avoid manoeuvring close to ground obstacles.

#### 4.5 POST OPERATION INSPECTION

The following checks should be carried out each time the spray system is removed and at the end of each day of operation. In the event that any check reveals a fault, use of the system must be discontinued until the fault has been rectified.

- 1) Stop the pump motor.
- 2) Thoroughly clean the tank, booms and rotorcraft underbelly and fuselage with water to remove residual chemicals.
- 3) Check the tank, fittings, plumbing and boom attachments for damage and security.
- 4) Check the complete installation for signs of misalignment, bending or other defects.

### 5. PERFORMANCE

There may be a rate of climb reduction of up to 600 feet per minute with a fully-loaded spray tank and booms installed.

## 6. WEIGHT AND BALANCE

The installation affects the weight and balance of the aircraft as follows:

### 6.1 TANK INSTALLATION

#### Metric Units

Item	Weight	Long. Arm	Long. Mom.	Lat. Arm	Lat. Mom.
	(kg)	(m)	(kg.m)	(m)	(kg.m)
Fixed provisions	2.6	2.695	7.1	0.000	0
Spray tank, pump	67.2	2.383	160.0	0.345	23.2
Booms, stays	12.3	2.695	2864.7	0.000	0
<b>Total</b>	<b>82.0</b>	<b>36.958</b>	<b>3031.8</b>	<b>0.283</b>	<b>23.2</b>

#### Imperial Units

Item	Weight	Long. Arm	Long. Mom.	Lat. Arm	Lat. Mom.
	(lb)	(in)	(lb.in)	(in)	(lb.in)
Fixed provisions	5.8	106.1	615.4	0.0	0.0
Spray tank, pump	148.0	93.8	13882.4	13.6	2013.0
Booms, stays	27.0	106.1	2864.7	0.0	0.0
<b>Total</b>	<b>180.8</b>	<b>96.0</b>	<b>17362</b>	<b>11.1</b>	<b>2013.0</b>

## 6.2 CONTENTS MASS

Metric Units

<b>SPRAY TANK CONTENTS</b>							
<b>Tank Contents (litres)</b>	<b>Mass (kg) @ Specific Gravity</b>						
	<b>0.8</b>	<b>1.0</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.8</b>	<b>2.0</b>
<b>0</b>	0	0	0	0	0	0	0
<b>50</b>	40	50	60	70	80	90	100
<b>100</b>	80	100	120	140	160	180	200
<b>150</b>	120	150	180	210	240	270	300
<b>200</b>	160	200	240	280	320	360	400
<b>250</b>	200	250	300	350	400		
<b>300</b>	240	300	360	420			
<b>350</b>	280	350	420				
<b>400</b>	320	400					

Metric/Imperial Units

<b>SPRAY TANK CONTENTS</b>							
<b>Tank Contents (litres)</b>	<b>Mass (lb) @ Specific Gravity</b>						
	<b>0.8</b>	<b>1</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.8</b>	<b>2</b>
<b>0</b>	0	0	0	0	0	0	0
<b>50</b>	88	110	132	154	176	198	220
<b>100</b>	176	220	264	309	353	397	441
<b>150</b>	264	331	397	463	529	595	661
<b>200</b>	353	441	529	617	705	793	882
<b>250</b>	441	551	661	771	882		
<b>300</b>	529	661	793	926			
<b>350</b>	617	771	926				
<b>400</b>	705	882					

## 6.3 CONTENTS MOMENT

Metric units

<b>SPRAY TANK CONTENTS</b>							
<b>Tank Contents (litres)</b>	<b>Moment (kg.m) @ Specific Gravity</b>						
	<b>0.8</b>	<b>1.0</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.8</b>	<b>2.0</b>
<b>0</b>	0	0	0	0	0	0	0
<b>50</b>	99	124	148	173	198	223	247
<b>100</b>	198	247	297	346	396	445	495
<b>150</b>	297	371	445	520	594	668	742
<b>200</b>	396	495	594	693	792	891	990
<b>250</b>	495	618	742	866	990		
<b>300</b>	594	742	891	1039			
<b>350</b>	693	866	1039				
<b>400</b>	792	990					

Metric/Imperial Units

<b>SPRAY TANK CONTENTS</b>							
<b>Tank Content (litres)</b>	<b>Moment (lb.in) @ Specific Gravity</b>						
	<b>0.8</b>	<b>1</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.8</b>	<b>2</b>
<b>0</b>	0	0	0	0	0	0	0
<b>50</b>	8587	10733	12880	15027	17174	19320	21467
<b>100</b>	17174	21467	25760	30054	34347	38641	42934
<b>150</b>	25760	32200	38641	45081	51521	57961	64401
<b>200</b>	34347	42934	51521	60107	68694	77281	85868
<b>250</b>	42934	53667	64401	75134	85868		
<b>300</b>	51521	64401	77281	90161			
<b>350</b>	60107	75134	90161				
<b>400</b>	68694	85868					

## **7. SYSTEMS**

### **7.1 SPRAY SYSTEM OVERVIEW**

The design consists of two interconnected side-mounted GRP spray tanks, two stainless steel spray booms, a standard petrol-powered pump and connections for the pneumatically operated actuators.

Two GRP tanks are each attached to the jacking hard points on either side of the fuselage, immediately below the rear doors. The tanks are joined by an aluminium cross-tube assembly that feeds into the pump.

Each tank has a dump door and both are operated simultaneously by releasing a dead weight attached to the cargo hook.

A commercial standard petrol-powered pump is mounted on the front of the right landing gear skid tube by a two-piece mounting plate assembly. After releasing the plumbing connections, two quick release pins allow the pump to be lifted off, with the top half of the mounting assembly bolted to the pump. The bottom half of the mounting assembly remains mounted on the skid tube.

The spray system requires pneumatic connections for the spray/recirculation valves. Two flexible hoses with cam lock fittings connect the cross-tube assembly and pump. There is a recirculation system controlled by the spray valve forming part of the cross tube assembly.

When spraying, the spray valve closes off the recirculation system and directs fluid through plumbing to a T-section then out through the booms and spray nozzles.



## 7.2 PILOT CYCLIC CONTROLS

The spray system controls are located on the pilot's cyclic mounted control box. These controls are:

- Spray: On/recirc
- Pump: On/Off (Engine kill)

The layout and labelling of these switches is shown in Figure 3 below.

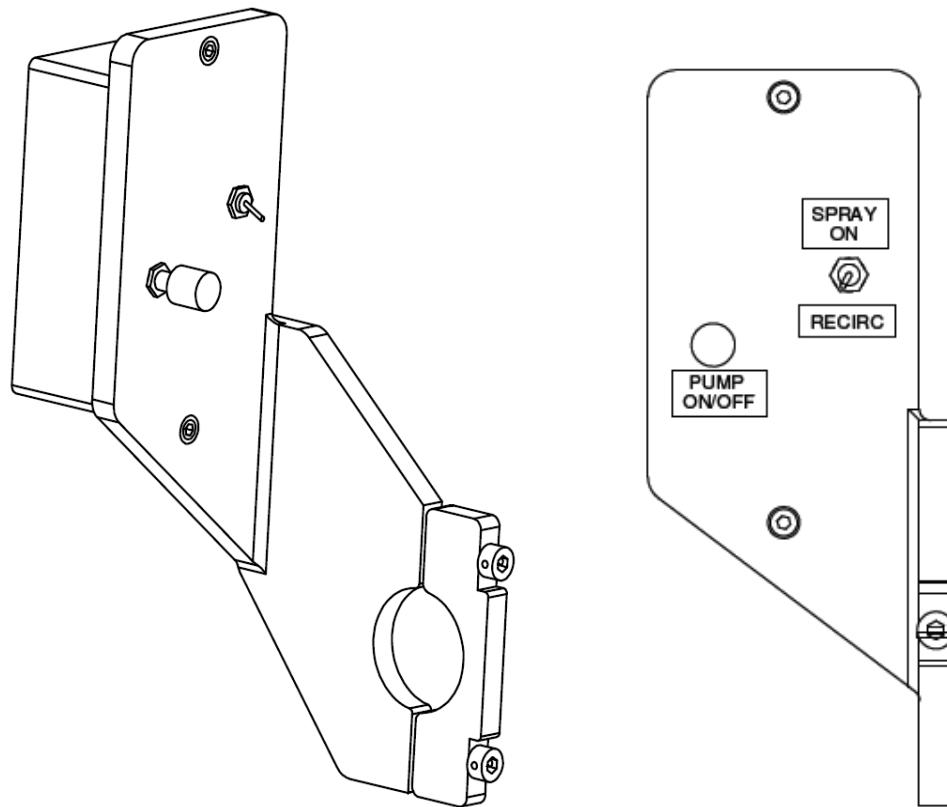


Figure 3 Cyclic mounted control switches

## **8. SYSTEM INSTALLATION AND REMOVAL**

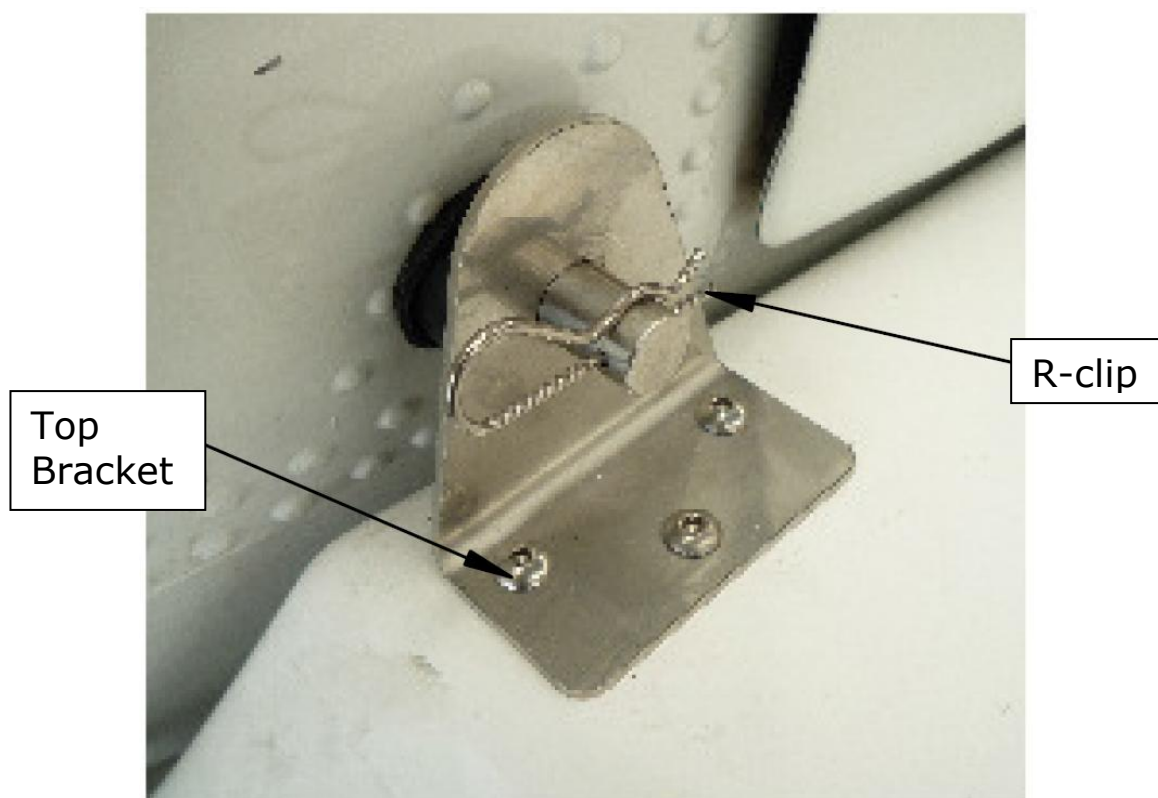
### **8.1 GENERAL**

The system may only be installed by a licenced engineer or a person authorised under NZCAR 43.51 (a)(1).

The appropriate log book entry must be made each time the system is installed or removed IAW NZCAR 43.69.

### **8.2 TANKS**

- 1) Lift tank and fit to aircraft with the Main Tank Pin through the rear steps fuselage hole. Ensure top bracket fits over locating pin.

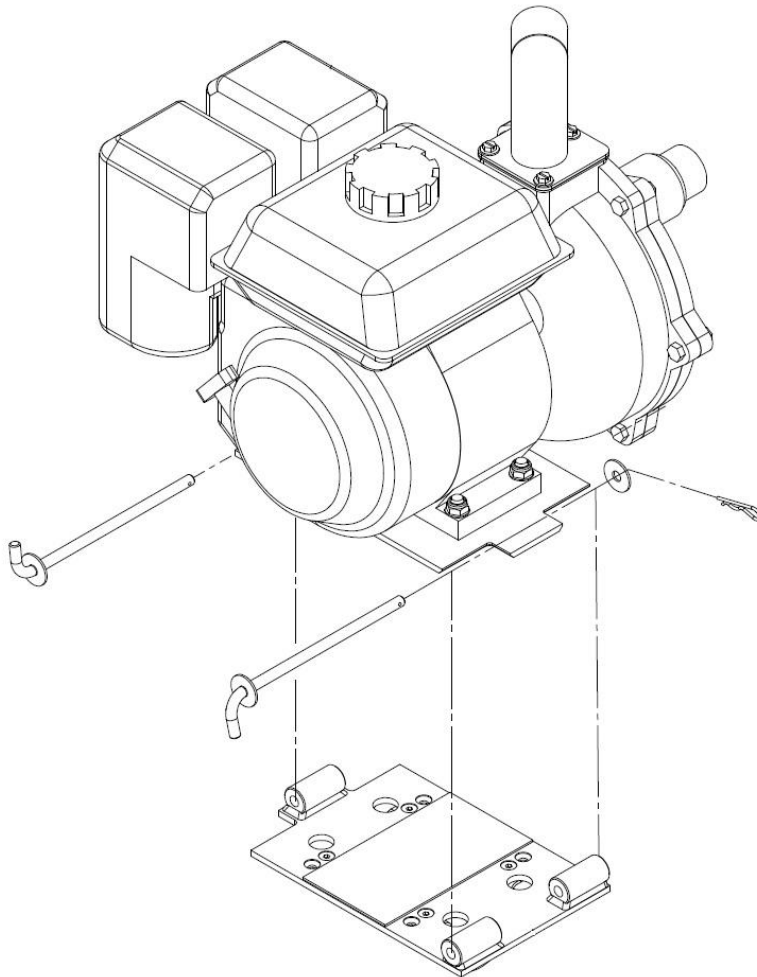


- 2) Fit R-clip to locating pin.
- 3) Insert Pip pin through hole in floor to secure tank.
- 4) Repeat for opposite side.
- 5) Fit centre section between the two tanks and secure with the fitted camlock fasteners.

### **8.3 PUMP MOTOR**

- 1) Secure the pump / motor to the rotorcraft skid:
- 2) Remove and retain R-clips and retaining washers

- 3) Remove and retain securing pins
- 4) Place pump / motor on skid plate
- 5) Slide retaining pins through - ensure correct engagement
- 6) Secure retaining pins with washers and R-clips.



#### 8.4 KEEL SUPPORT ASSEMBLY

- 1) Secure Keel support with Y splitter to rotorcraft fuselage hardpoint underside by engine bay doors.
- 2) Remove and retain R-clip from rear securing pin.
- 3) Remove and retain rear securing pin.
- 4) Offer up keel mounting block, engage front slot with bolt on fuselage plate.
- 5) Rotate keel mounting block so rear hole lines up.
- 6) Replace rear securing pin.
- 7) Secure rear retaining pin with R-clip.

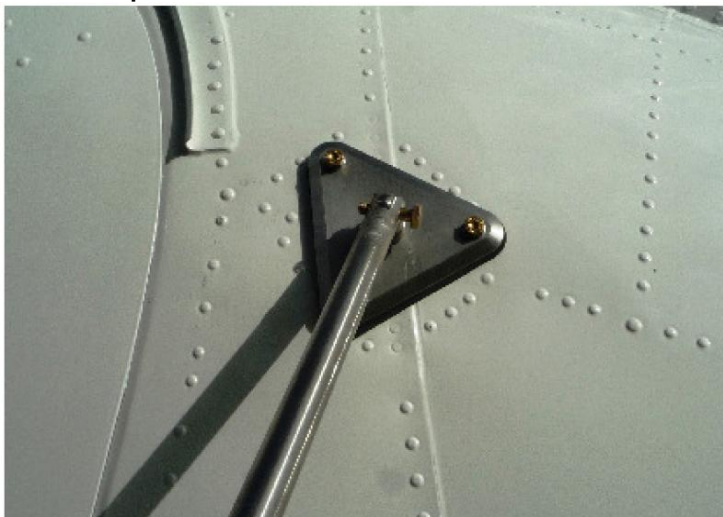
- 8) Visually and physically ensure keel support is secure.

## 8.5 BOOMS

- 1) Insert boom into camlock on Y splitter and secure camlock.
- 2) Remove and retain safety retaining pin and clevis pin from forward stay.
- 3) Line up forward stay with hardpoint under tank (shown below). Secure with items removed in step 2.

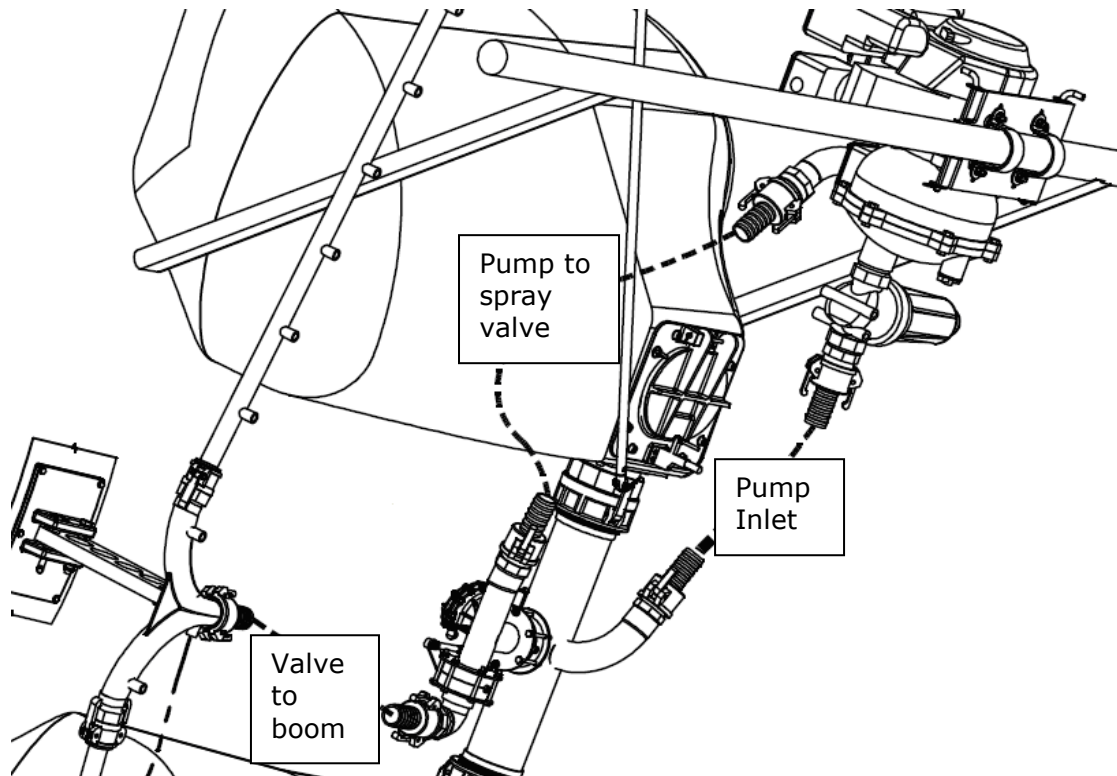


- 4) Remove and retain safety retaining pin and clevis pin from upper stay.
- 5) Line up upper stay with hardpoint on fuselage (shown below). Secure with items removed in step 4



## 8.6 HOSES

- 1) Route and connect hoses as shown below



## 8.7 DUMP WEIGHT

- 1) Hang the applicable dump weight (on the hook. Use the smaller 1.45kg dump weight on zero release keeperless hooks and the 3.4kg dump weight on 3kg release keeper hooks.

## 8.8 REMOVAL

Removal is the reverse of installation.

## 8.9 COMPLETE INSTALLED SYSTEM

