



CAA APPROVED FLIGHT MANUAL SUPPLEMENT (FMS)

EUROCOPTER AS350B, BA, B1, B2, B3 & D

HIGH SKID LANDING GEAR.

EUROCOPTER AMS 07-2225 (IMPROVED LANDING GEAR DAMPERS) EMBODIED

SIGN

DATE _____



Techair Reference 1104-01-03

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RECORD OF ISSUES

Issue	Date	Reason for re-issue
1	21-Oct-13	Initial Issue
2	14-Oct-14	Correction of system weights

LIST OF EFFECTIVE PAGES

Pages	Issue	Date
1 to 24	2	14-Oct-14

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J. D. Aplin

1. GENERAL

The referenced modification installs a complete spray system on to the above mentioned rotorcraft. The system consists of:

- 1) 1070 litre carbon fibre tank
- 2) Petrol powered pump
- 3) Carbon Fibre Cantilevered Booms
- 4) Piping and fittings to connect all the components
- 5) Cyclic mounted Control Box
- 6) Belly mounted Bleed Air Outlet
- 7) Belly Mounted Connector Plug

The tank is fitted to the underside of the rotorcraft and attached using the hard points that the cargo hook swing uses. The pump is installed onto the port skid using a mounting plate assembly. The booms are attached to the tank by the centre boom section that is manufactured as part of the tank. The dump doors, switching valves and motor are controlled by the installed wiring and bleed air system.

The dump doors are operated by three pneumatic actuators. The outer two of these are supplied with engine bleed air. The third (central) actuator is supplied with air from a pneumatic charged accumulator.

A composite fibre housing is mounted on the forward LH arm of the spray tank, which contains the pneumatic charged accumulator, pressure gauge, charging valve, relief valve, and control valves. The pneumatic system interfaces with the existing spray tank dump system and the additional dump door actuator. An electrical operating switch, reset switch, latching relay and associated wiring is installed on the helicopter.

The third actuator, accumulator and control circuitry are completely independent of the main actuators and this subsystem is capable of opening the dump doors against the load of non-functioning main actuators. As a consequence, the dump system exhibits true jettison

capability allowing the tank contents to be considered as jettisonable payload when determining the maximum permitted take-off weight.

NOTE:

Eurocopter AMS 07-2225 (improved landing gear dampers) must be installed if the maximum permitted take-off weight includes jettisonable payload.

Issue 2 corrects an error in the system weights.

2. LIMITATIONS

2.1 KINDS OF OPERATIONS

2.1.1 General

Refer to the approved configurations in Table 1 of section 2.1.3 Installation of the spray system in accordance with configurations 2 and 3 places this rotorcraft into the **RESTRICTED** Category. Operations in **RESTRICTED** Category are for Day/Night VFR and only mission essential personnel may be carried in-flight. When only the tank is fitted the rotorcraft is classified as being in the **STANDARD** Category.

NOTE:

When the chosen configuration places this rotorcraft 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.
- 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	Tank	Pump	Booms	Category
1	✓			Standard
2	✓	✓		Restricted
3	✓	✓	✓	Restricted

Table 1 Approved configurations

Note: In configuration 1 the tank must remain empty to be operated in the Standard category.

2.2 FLIGHT LIMITATIONS

2.2.1 Airspeed Limitations

VNE for configuration 1 is 125 kts, VNE for all the other configurations defined above is 110kts.

2.3 WEIGHT LIMITATIONS

2.3.1 Maximum Permissible Weight with True Jettison Capability

When the spray system is installed, AND the emergency dump system is operative (see checks in 4.2), the rotorcraft has true jettison capability.

When the rotorcraft is in this configuration AND Eurocopter AMS 07-2225 is installed, the weight limit is the lesser of the value in Table 2 below and the weight at which aircraft performance permits an out-of-ground-effect (OGE) hover.

Rotorcraft	Maximum Gross Weight
AS350B	2100kg (4630lb)
AS350D	2100kg (4630lb)
AS350BA	2250kg (4961lb)
AS350B1	2450kg (5402lb)
AS350B2	2500kg (5512lb)
AS350B3	2800kg (5512lb)

Table 2 MGW with true jettison capability

2.3.2 Maximum Permissible Weight without True Jettison Capability

If the emergency dump system is NOT operative the rotorcraft DOES NOT have true jettison capability.

When the rotorcraft is in this configuration OR Eurocopter AMS 07-2225 is NOT installed, the weight limit is the maximum permissible weight without external load of the rotorcraft as defined in its Flight Manual.

This is the lesser of the value in Table 3 below and the weight at which aircraft performance permits an out-of-ground-effect (OGE) hover.

Rotorcraft	Maximum Gross Weight
AS350B	1950kg (4300lb)
AS350D	1950kg (4300lb)
AS350BA	2100kg (4630lb)
AS350B1	2200kg (4850lb)
AS350B2	2250kg (4961lb)
AS350B3	2250kg (4961lb)

Table 3 MGW without true jettison capability

NOTE:

Spray operations with the emergency dump system not operative are permitted provided that:

- a. The standard **DUMP RELEASE** system is operating normally, and

- b. Maximum permissible weight is limited to that defined above.

2.3.3 Centre of Gravity Limitations:

The cg limitations provided in the basic Flight Manual (with and without external loads) remain unchanged.

2.4 SYSTEM LIMITATIONS

2.4.1 Rotorcraft Configuration Requirements:

The rotorcraft requires approved high skid landing gear (Eurocopter part number 350A82-4010-03).

For operation above Maximum internal loading, the rotorcraft requires improved landing gear dampers (Eurocopter Ref AMS 07-2225) prior to installing and operating the tank and spray system.

2.4.2 Spray Tank Contents Limitation

The spray tank structural limitation is 1100kg.
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.

2.5 PLACARDS

2.5.1 VNE Placard

Attached to the instrument panel in full view of pilot

VNE = 110 KIAS with spray system deployed or 125 KIAS with empty tank only or Basic RFM.

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.

When only the tank is installed (with no contents) the rotorcraft can be operated in the STANDARD category.

2.5.3 Tank loading placard

Located near the spray tank filler lids

MAXIMUM TANK CONTENTS (STRUCTURAL LIMIT) IS
1100KG.

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.

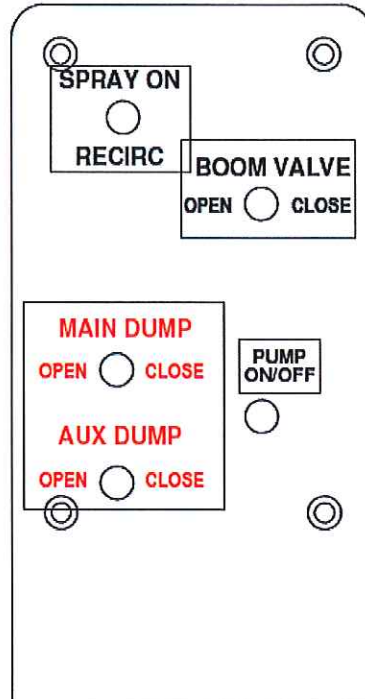
2.5.3 Accumulator pressure limits

Located on the exterior of the control box cover,
adjacent to the pressure gauge:

MAXIMUM PRESSURE 150 PSI
MINIMUM PRESSURE 120 PSI

2.5.4 Labels

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



Located adjacent to the Spray system circuit breaker:

SPRAY

Located adjacent to the auxiliary dump circuit breaker:

**AUXILIARY
DUMP**

3. EMERGENCY PROCEDURES

3.1. 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 selecting **OPEN** on the **MAIN DUMP** switch, on the pilot's cyclic

mounted control box (See Section 7 of this supplement for location and functionality of switch).

The doors can be closed in flight by selecting **CLOSE** on the **MAIN DUMP** switch, on the pilot's cyclic mounted control box

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.

3.2. EMERGENCY JETTISON

In the event that the standard jettison fails to function, the load should be dumped immediately by selecting **OPEN** on the **AUX DUMP** switch, on the pilot's cyclic mounted control box (See Section 7 of this supplement for location and functionality of switches).

NOTE:

The emergency dump system is single-use, and must be re-charged on the ground before re-use. Furthermore, the emergency system must be reset in order to close the dump doors.

If the emergency system cannot be re-charged immediately after use, spray operations may continue provided that:

- a.The standard DUMP RELEASE system is operating normally, and
- b.Maximum permissible weight is limited to that defined by Section 2.3.2 of this supplement.

3.3. PUMP FIRE

In the event of a fire in the petrol pump, stop the motor using the **PUMP OFF** (Engine kill) switch 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 OPERATING PRESSURES

The emergency dump system operates within the following pressure range, as read from the pressure gauge in the control system box:

Maximum Operating Pressure 150psi (10.3bar)

Minimum Operating Pressure 120psi (8.3bar)

4.2 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.

NOTE: If failures of the emergency dump system are not rectified, the system may be operated, but it will not have true jettison capability (see 2.3 above).

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 booms threaded fittings safety pinned.
- Spray nozzles for condition and security.
- Boom outboard ends 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.
- Mounting fittings for corrosion and/or cracking.
- Electrical and pneumatic connections for general condition and security.
- Pressure gauge shows emergency dump system operating pressure is within acceptable range (120 - 150psi).
- Emergency dump system control box cover in place and secure.
- Emergency dump system electrical connector in place and secure.
- Dump doors for security, general condition and leakage.
- **AUX DUMP** circuit operational.
- Operate, reset and recharge emergency dump system.
- Operate and reset main dump system.

NOTE:

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

4.3 SYSTEM CHECKS

Refer to Figure 3 for switch location.

4.3.1 Electrical power

Switch the rotorcraft battery switch **ON**.

4.3.2 Spray Valve

Cycle the pilot's **SPRAY** switch to **ON**. Listen for spray valve movement. Cycle the switch to **OFF** and listen for valve movement. Repeat procedure for the **BOOM VALVE** switch.

4.4 TANK LOADING

1. Insert tank loading assembly into slot on rear of tank (see Figure 1 below).



Figure 1 Tank loading assembly

2. Connect filling assembly inlet to pump (see Figure 2 below).



Figure 2 Connection to pump

3. When loading, use flow meter to ensure correct quantity of fluid is loaded into tank.
4. Remove tank loading assembly.

4.5 BEFORE TAKE-OFF CHECKS

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

4.6 SYSTEM OPERATION

4.6.1 General

- 1) Use the spray switch to control spraying.
- 2) Avoid manoeuvring close to ground obstacles.

After the emergency system has been discharged by the pilot:

- After the emergency system has been discharged by the pilot:

- 1) Reset the emergency dump system as above.
- 2) Using a compressor or foot pump connected to the air inlet on the right hand boom support, charge the emergency backup dump door system to 120psi min & 150 psi max.

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) Functionally check the jettison release system.
- 4) Check the tank, fittings, plumbing and boom attachments for damage and security.
- 5) 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 400 feet per minute with the 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

Item	Weight	Long. Arm	Long. Mom.	Lat. Arm	Lat. Mom.
	(kg)	(m)	(kg*m)	(m)	(kg*m)
Fixed provisions	1.00	1.50	1.50	0.00	0.00
Spray tank	133.10	2.74	364.87	0.00	0.00
Booms	7.60	1.16	8.82	0.00	0.00
Motor/ pump	22.90	2.50	57.25	1.00 Left	22.90
Total	164.60	2.63	432.43	0.14	22.90

6.2 SPRAY TANK LOAD

SPRAY TANK LOAD							
Tank Contents (litres)	Tank Load (kg) @ Specific Gravity						
	0.8	1.0	1.2	1.4	1.6	1.8	2.0
0	0	0	0	0	0	0	0
100	80	100	120	140	160	180	200
200	160	200	240	280	320	360	400
300	240	300	360	420	480	540	600
400	320	400	480	560	640	720	800
500	400	500	600	700	800	900	1000
600	480	600	720	840	960	1080	
700	560	700	840	980	1120		
800	640	800	960	1120			
900	720	900	1080				
1000	800	1000					
1100	880	1100					

6.3 SPRAY TANK LOADED C OF G

SPRAY TANK LOADED C OF G								
Tank Contents (litres)	Long. Arm (m)	Longitudinal Moment (kg.m) @ Specific Gravity						
		0.8	1.0	1.2	1.4	1.6	1.8	2.0
0	3.24	0	0	0	0	0	0	0
100	3.19	257	321	385	449	514	578	642
200	3.22	515	644	773	902	1030	1159	1288
300	3.25	780	975	1170	1365	1560	1755	1950
400	3.29	1053	1316	1579	1842	2106	2369	2632
500	3.32	1328	1660	1992	2324	2656	2988	3320
600	3.38	1622	2028	2434	2839	3245	3650	
700	3.44	1926	2408	2890	3371	3853		
800	3.51	2246	2808	3370	3931			
900	3.59	2585	3231	3877				
1000	3.66	2928	3660					
1100	3.70	3256	4070					

6.4 LOAD LIMITATIONS

The limitations of section 2.4 correspond to the following typical examples. These are based on the spray system weights above, a pilot weight of 80 kg and the rotorcraft Equipped Empty Weight (EEW) listed.

NOTE:

These values are an indication only. It remains the responsibility of the pilot to perform weight and balance calculations before each flight based on the actual rotorcraft configuration.

6.4.1 With true jettison capability

	EEW	Maximum spray tank load (kg)			
Rotorcraft		25% fuel	50% fuel	75% fuel	100% fuel
AS350B	1195	554	447	340	233
AS350D	1220	529	422	315	208
AS350BA	1262	637	530	423	316
AS350B1	1272	827	720	613	506
AS350B2	1322	827	720	613	506
AS350B3	1335	1114	1007	900	793

6.4.2 Without true jettison capability

	EEW	Maximum spray tank load (kg)			
Rotorcraft		25% fuel	50% fuel	75% fuel	100% fuel
AS350B	1195	404	297	190	83
AS350D	1220	379	272	165	58
AS350BA	1262	487	380	273	166
AS350B1	1272	577	470	363	256
AS350B2	1322	577	470	363	256
AS350B3	1335	564	457	350	243

7. SYSTEMS

7.1 SPRAY SYSTEM OVERVIEW

The spray system is a recirculating design where the fluid is pumped continuously and routed either to the booms or back to the tank. A petrol-driven motor drives the pump that is started on the ground and runs continuously in flight. One pneumatic valve controls spray/recirculation and a second controls spray to the left hand boom giving the option of both booms or right boom only.

The tank is fitted with dump doors operated by three pneumatic actuators. The outer two of these are supplied with engine bleed air and are part of the normal dump system. The third (central) actuator is supplied with air from a pneumatic charged accumulator. This actuator, accumulator and control circuitry is completely independent of the main actuators and this subsystem is capable of opening the dump doors against the load of non-functioning main actuators. This system creates an emergency dump system.

7.2 PILOT CYCLIC CONTROLS

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

- Spray on
- Boom valve (Isolate)
- Main dump
- Auxiliary dump
- Pump Off (Engine kill)

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

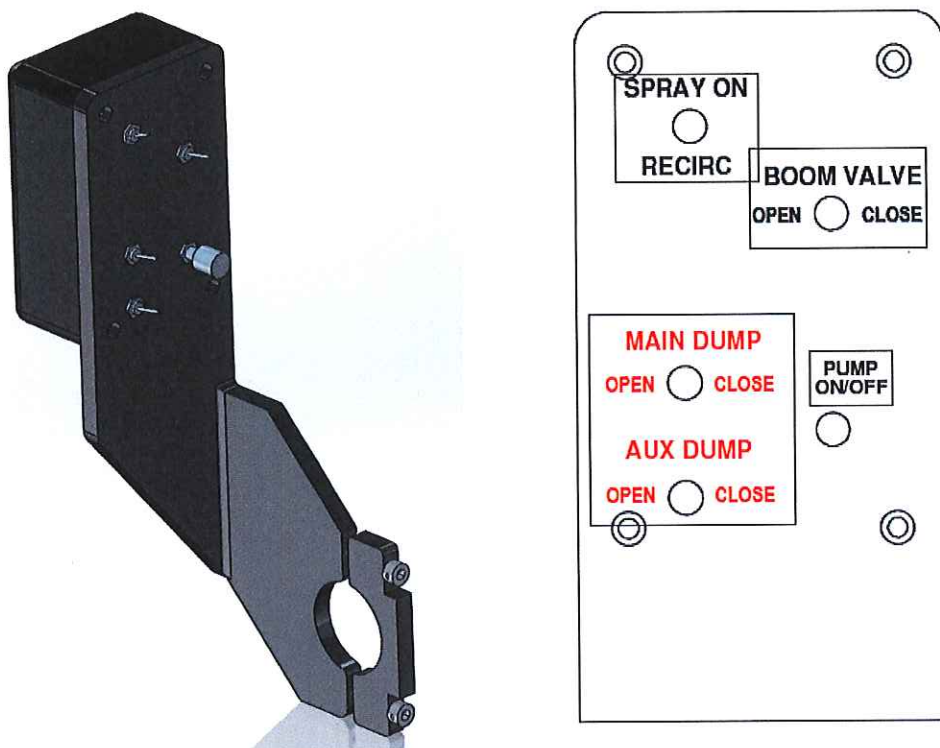


Figure 3 Cyclic mounted control switches

8. SYSTEM INSTALLATION AND REMOVAL

8.1 TANK

- 1) Attach the ground handling wheels to the tank.
- 2) Wheel the tank and align with the rotorcraft approaching from the rear.
- 3) Adjust the rear jacking wheel up and down to avoid any antennas and carefully push the tank under the belly of the rotorcraft.
- 4) Once the cargo hook mounts are aligned, adjust the rear wheels up and insert the locking pins P/No; CLM-12-BLPT-80 into the rear mounts.
- 5) Once secure, lift the front of the tank to engage front mounts and insert locking pins.
- 6) Once all mount pins are in place remove ground handling wheels.

Note: Make sure locking pins are completely home & locked.

- 7) Connect pneumatic line from the main tank to the rotorcraft using the supplied hose.
- 8) Mate electrical connector.
- 9) Removal is the reverse of installation.

8.2 PUMP/MOTOR

- 1) Install pump assembly mounting plate using 2 saddle clamps onto the left hand skid tube, locating the plate centred about station 3100.
- 2) Install the pump using the pins and R-clips.
- 3) Attach the pump assembly bonding strap to the forward crosstube saddle where it attaches to the skid tube.
- 4) Remove one of the nuts and install the short end of the bonding strap to the crosstube mounting bolt.
- 5) Connect the longer end to one of the pump mounting bolts.

Note: When you need to remove the pump, the bonding strap has a knife connector, leaving the short end on the rotorcraft.

- 6) Removal is the reverse of installation.

8.3 BOOMS

- 1) Insert carbon booms into the centre section making sure the flanges are aligned, then screw the mating flanges together.
- 2) Making sure the spray nozzles are pointing down, hand-tighten until firm.
- 3) Further tighten flanges until you have aligned the locking holes in both flanges and insert safety pins.

Removal is the reverse of installation.