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315 FLIGHT MANUAL REVISION STATUS

FAA CERTIFIED

BASIC FLIGHT MANUAL		
SECTION	REVISION	DATE
1 thru 4	RN 2	Dec-93
.	RN 3	Oct-95
.	RR 4A	Jan-99
.	.	.
SUPP 1	ED 4	Sep-85
.	RN 0	.
SUPP 1A	ED 2	Sep-85
.	RN 0	.
SUPP 2	RN 0	Jul-76
.	.	.
SUPP 3	.	.
.	.	.
SUPP 4	.	.
.	.	.
SUPP 5	ED 1	Oct-81
.	RN 0	.
SUPP 6	.	.
.	.	.
SUPP 7	RN 0	Jul-76
.	.	.
SUPP 8	RN 0	Jul-76
.	.	.
SUPP 9	RN 0	Jul-76
.	.	.
SUPP 10	.	.
.	.	.
SUPP 11	RN 1	Apr-88
.	.	.
SUPP 12	ED1	Oct-77
.	RN 0	.

SUPPLEMENTS		
SECTION	REVISION	DATE
SUPP 15	RN 0	Jul-76
.	.	.
SUPP 16	RN 0	Jul-76
.	.	.

COMPLEMENTARY SECTION		
APPENDIX	REVISION	DATE
AP	ED 3	.
.	RN 0	Jul-76
A03	ED 3	.
.	RN 0	Feb-79
D	ED 3	.
.	RN 3	Oct-95
D0	ED 3	.
.	RN 3	Apr-96
FM	ED 3	.
.	RN 1	Jan-88
TC	ED 2	Mar-78
.	.	.
WB1	ED 3	.
.	RN 1	Sep-85
WB2	ED 3	.
.	RN 1	Dec-93
TEST	ED 1	.
.	RN 1	Sep-77



FLIGHT MANUAL

SA 315 B LAMA

REGISTRATION N^o

SERIAL N^o

APPROVED:

DATE OF APPROVAL:

October 10 1976

L.T.P. RICHARD



NOTE

The value of the present Manual depends on the care exercised in bringing it up to date. The signature of the responsible person on page 2 guarantees that the amendment has been introduced. The composition of the Manual at the latest amendment is given on page 3.

THIS MANUAL MUST BE CARRIED ON THE AIRCRAFT AT ALL TIMES



Société Nationale Industrielle aérospatiale

NOTE

To reach the level of safety required, it is necessary to use this manual in conjunction with the appropriate regulations (such as those of the aerial navigation legislation) ruling the operation of aircraft in the operator's country. It is important for the crew to become familiar with the contents of this manual, including its amendments and supplements, as well as possible addenda corresponding to a customized configuration.

1. This manual is divided into three parts (green dividers) :

- Basic manual
- Supplements
- Appendices

1.1. The basic manual deals with the main information which is generally common to all versions.

It consists of 4 sections separated by dividers :

- 1 - Limitations
- 2 - Normal procedure
- 3 - Emergency procedure
- 4 - Performance

NOTE : This information may be modified by "supplementary" information when specific equipment items are fitted.

The basic manual is approved at each amendment ; its contents are listed on page 03 which bears the D.G.A.C. approval stamp.

1.2. Supplements deal with information concerning modifications or operational installations. Each "supplement" is self-contained and consists of 4 sections identical with those of the basic manual. Supplements related to civil operation of the helicopter are approved by the Official Agencies. The first page of the supplement bears the D.G.A.C. approval stamp. When a new optional equipment is installed, the operator must insert the supplement which covers the specific operating instructions corresponding to the certification required (See § 4).

The SPECIAL SUPPLEMENT, printed on green paper, differs from the normal SUPPLEMENT only by its restricted distribution. It is embodied only to the manuals of equipped aircraft.

1.3. Appendices : In this part, it is possible to group various details such as : description, weight and balance, particular operation, configuration specific to customers, etc... This information is arranged into homogeneous, individual sections. These sections may be separated from the present flight manual.

2. Addendum to the manual to comply with a particular configuration of the helicopter.

The manual may be adapted without any alteration to the basic manual and its supplements, all the pages of which should be saved now and through the future updates. Such adaptation consists of additional pages, of a different colour which may be placed over the white pages ; they are listed on a special "Contents" page bearing the DGAC approval stamp. The information shown on these pages has priority over that shown on the white pages.

Application to the following cases :

- 2.1. Customized aircraft standard : where the standard manual is entirely or partially incomplete or not applicable, the applicable information is printed on green paper
- 2.2. Old and unadvisable aircraft definition : Some aircraft are presumed to remain operative without embodiment of a recommended modification whilst the information contained in the manual is superseded by a normal amendment.

The earlier, generally restrictive, information is re-stated and printed on pink paper. Such pages may not be removed, under the operator's responsibility, until the aircraft standard has been changed.

3. Amendment to the manual

3.1. "Normal amendments" are issued periodically (After agreement of the Airworthiness Authorities). They are printed on white paper and are introduced by an instruction sheet which is not inserted in the manual.

3.2. Temporary amendments may be issued before the next normal amendment. They are identified by an applicable number and issue letter. Such number is that of the next normal amendment. They are printed on yellow paper (the instruction sheet, which is used as a List of Effective Pages, is inserted in the manual).

3.3. Changes brought by the latest amendment are shown by a vertical line in the outer margin against the text modified. For minor corrections, the line is drawn opposite the date only. All pages amended bear a new coded date. This coded date consists of four digits : the first two digits show the month, the other two show the year of the amendment. Example : 11.74 for November 1974.

3.4. A new issue is made whenever a change affects a great number of pages. Each page will show the coded date figure but no vertical line in the margin. A new issue supersedes automatically any issue bearing a lower issue number. However the pages of the addendum (see par. 2) are to be inserted in the new issue.

4. The requirements as regards certification are generally similar and they are met in a common approved text. However particular features necessitate a specific drafting and adaptation for some pages. The effectivity of the certified versions covered is printed in a block in the lower L.H. corner of these pages.

REMARKS : Comments and suggestions concerning this publication may be forwarded to :

AEROSPATIALE
Division Hélicoptères - Central Documentation
Boîte Postale 13
13722 MARGNANE

We are at your disposal to supply any additional order to satisfy your requirements.

ERRATUM

An error has been found on page "2 page 11".

Please read "④ - Pending"

"⑤ - Approximate effective gross weight..."

instead of "④ - Approximate effective gross weight..."

The date code on the replacement page remain the same but is underlined.

The page issued previously must be replaced with the one enclosed.

REVISION PROVISOIRE
SPECIALESPECIAL PROVISIONAL
AMENDMENT

N° 1

Code 7.76

OBJET :Limite provisoire d'altitude d'uti-
lisationAPPLICATION :Tous appareils équipés d'amortis-
seurs de traînée réf :
3130S.13.60.000 (tous indices)DIRECTIVES :Insérer ces pages en tête des manu-
els de vol des appareils concernés.Supprimer ces pages des manuels
après remplacement des amortisseurs
précités.SUBJET :

Operating altitude - temporary limit

EFFECTIVITYAll aircraft fitted with drag dampers
P/N : 3130S.13.60.000 (any dash numbers)INSTRUCTIONSInsert these pages at the front of the
Flight Manual of all aircraft concernedRemove these pages from the manual when
dampers identified by the above mentioned
part number are replaced by a different type

RPS1

LIMITATION PROVISOIRE

- L'altitude d'utilisation est limitée provisoirement à 2500 m ou 8200 ft (altitude densité) pour les appareils équipés d'amortisseurs de traînée.

réf. 3130S.13.60.000

(Tous indices)

Les appareils concernés devront comporter sur la planche de bord, la plaquette de limitation représentée ci-dessous (photocopie par exemple)

Appareil équipé d'amortisseurs de traînée	
REF : 3130S 13.60.000 (tous indices)	
ALTITUDE LIMITE:	
ALT.DENS.	{ 2500 m ou 8200 ft

Pages du manuel de vol affectées
par cette limitation :

Page : 1.9 parag. 11

TEMPORARY LIMITATION

- The operating altitude is limited temporarily to 2500 m (or 8200 ft) (density altitude) for aircraft fitted with drag dampers :

P/N 3130S.13 60.000

(all dash numbers)

The limitations instruction plate illustrated below is to be displayed (photostat copy, for example) on the instrument panel of all aircraft affected.

Aircraft fitted with drag dampers	
P/N : 3130 S 13.60.000 (all dash numbers)	
MAXIMUM ALTITUDE :	
DENSITY ALTITUDE	{ 2500 m or 8200 ft

Flight manual pages affected by this
limitation :

Page : 1-9 paragraph 11

AIRCRAFT PUBLICATION REVISION

PUBLICATION CONCERNED : FLIGHT MANUAL 315 B

- The outline of revision is given below :
 .page affected (added or modified).
 .major points of the revision.
- Withdraw old and insert new pages affected by this revision.
- Check that the pages in each section are those specified in the
 "Contents" and "List of Effective pages".
- Return the acknowledgement card.
- This list of revised pages may be filed (apart from the manual)

OUTLINE OF THE REVISION	Section	Pages
Incorporation of RR 4A	2	9*RR* ✓

FIRST ISSUE : 3 REVISION N° : 4A

Date - Code : 01-99

Page 1/1

AIRCRAFT PUBLICATION REVISION : 315 B		
PUBLICATION CONCERNED : FLIGHT MANUAL		
EDITION : 3	REVISION N° : 3	DATE-CODE : 10-95
<ul style="list-style-type: none"> - The outline of revision is given below : <ul style="list-style-type: none"> . page affected (added or modified). . major points of the revision. - Withdraw old and insert new pages affected by this revision. - Check that the pages in each section are those specified in the "Contents" and "List of Effective pages". - Return the acknowledgement card. - This list of revised pages may be filed (apart from the manual) 		
OUTLINE OF THE REVISION	Section	Pages
<u>MAJOR POINTS OF REVISION : N° 3</u>		
To introduce , in the starting procedure, the test of the microswitch disabling the OFF (shutdown) function of the starting selector switch.		
Test of the microswitch disabling the OFF (shutdown) function of the selector switch.	2	6
Detail added to the text in par. 10	3	7
Note deleted	4	3
Revision standard updated	Appendix D	1
List of Effective Pages updated	Appendix D	2
Incorporation of Mod. 2293	Appendix D	4
Page shift	Appendix D	5
Incorporation of Mod. 2293	Appendix D	6

REVISION N° : 3

Section 1

LIMITATIONS

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COMPLIANCE WITH LIMITATIONS LAID DOWN IN THIS SECTION IS MANDATORY

1 - TYPES OF OPERATION APPROVED

VFR - Day

- Night when the appropriate equipment items are installed and provided that the operational regulations are observed (according to customer's country).

2 - WEIGHT LIMITATIONS

- Maximum permissible weight
- With non jettisonable load..... 1950 kg (4300 lb)
- With jettisonable load (at least 350 kg)..... 2300 kg (5070 lb)
- Maximum permissible load with cargo sling : Refer to the corresponding supplement.

3 - CENTRE OF GRAVITY LIMITS

A. LONGITUDINAL C.G.

The datum is located 3 metres (118.1 in) forward of the main rotor hub centre.

- Forward limit..... 2.76 m (108.6 in) aft of datum
- Rearward limit with internal load :
 - 3.00 (118.1 in) from the datum
 - 3.15 (124 in) from the datum for weights up to 1750 kg (3860 lb) with speed limitation (refer to paragraph 10).
- Rearward limit with external load - Refer to the corresponding supplement.

B. LATERAL C.G.

The datum is the aircraft centre line :

- L.H limit..... 0.135 m (5.3 in)
- R.H.limit..... 0.043 m (1.7 in)

4 - POWER UNIT (ONE TURBOMECA ARTOUSTE IIIB or III B1 ENGINE)

A. ENGINE SPEED

33500 r.p.m. true held constant by governor within ± 200 r.p.m.

Transient variation of ± 1000 r.p.m. are permissible when effecting rapid changes in collective pitch.

TYPE OF FUEL	NATO SYMBOL	SPECIFICATIONS (to be used at the latest amendment and dash number)			ANTI-ICING ADDITIVE
		U.S.A.	U.K.	FRANCE	
Kerosene - 50 (JP1) (AVTUR FS.II)	F 34	—	D.ENG.RD 2453	AIR 3405	Incorporate
	F 35	ASTM JET A1	D.ENG.RD 2494	—	Not Incorporate
Kerosene	—	ASTM JET A	—	—	Not Incorporate
AVIATION FUEL (JP4) (AVTAG FS II)	F 40	—	D.ENG.RD 2454	AIR 3407	Incorporate
AVIATION FUEL (JP4) (AVTAG)	F 45	MILT T 5624 (JP4)	D.ENG.RD 2486	—	Not Incorporate
AVIATION FUEL	—	ASTM JET.B	—	—	Not Incorporate
HIGH FLASH POINT (JP5) (AVCAT)	F 42	—	—	AIR 3404	AIR 3404 In F 42 Not In
	F 44	MILT T 5624 (JP5)	D.ENG.RD 2498	—	Not Incorporate

2) Fuels Authorized With Restrictions On Use

TYPE OF FUEL	NATO SYMBOL	SPECIFICATIONS (to be used at the latest amendment and dash number)			REMARKS
		U.S.A.	U.K.	FRANCE	
AVIATION GAZOLINE (AVGAS)	F 12	MIL G 5572 Grade 80/87	—	AIR 3401 80/87	Maximum operating time with gasoline: 25 hours between overhauls. Add 2 % of lubricating oil (mineral if possible).
	F 18	MIL G 5572 Grade 100/130	D.ENG.RD 2485	AIR 3401 100/130	
	F 22	MIL G 5572 Grade 115/145	—	AIR 3401 115/145	
AUTOMOTIVE GAZOLINE	F 46	MIL G 3056	DEF.2401	DCEA/2DMT80	
AUTOMOTIVE DIESEL OIL *	F 54	VVF 800 DF 2	TS.10.003	DCEA/21 C	Not to be used at OAT below -5° C
	—	VVF 800 DF 1	—	—	Not to be used at OAT below -15° C
ARTIC DIESEL OIL *	F 56	VVF 800 DF A	—	—	Not to be used at OAT below -20° C
DIESEL OIL "0" *	F 75	MIL.F.16884	DEF.2402	7120 STM 47/0 DIESO	Not to be used at OAT below -5° C
DIESEL OIL "20" *	F 76	—	DEF.2402	7120 STM 47/20 DIESO	Not to be used at OAT below 0°C
ILLUMINATING OIL	F 58	VVK 211	DEF.2403	DCEA/11 C	Not to be used at OAT below -15° C

3) Additivesa) Anti-Icing Additives (with or without glycerine)

For operation at OAT below + 5° C, one of the following anti-icing additives is recommended, if none is contained in the fuel.

- AIR 3652
- MIL.I. 27686
- D. eng. RD 2451
- OTAN S 748
- PHILLIPS PFA 55 MB
- Concentration to be between 0.035 % min. and 0.15 % max. by volume.

b) Anti-Static Additives

- SHELL ASA 3
- Concentration to be 0.000 1 % by volume.

Printed in France

D - ENGINE LUBRICATING OIL

	SPECIFICATION				Remarks
	French	NATO	US	British	
NORMAL	AIR 3513	0.148	MIL.L.7808		Synthetic oils
	AIR 3514	0.150			
ALTERNATIVE	AIR 3515	0.135	Aeroshell Turbine Oil 3	D. Eng. RD 2490	Mineral oils
			Esso Aviation utility Oil F		
			Caltex jet engine oil medium heavy		
		0.156	MIL.L. 23699		Synthetic oil

NOTE : To be used at the latest issue in effect including any amendments.

Quantity : 10 l (2.6 US.Gal.) (maximum capacity with the system full)

CAUTION : DO NOT MIX OILS OF DIFFERENT SPECIFICATIONS EXCEPT FOR AIR 3513 AND AIR 3514 OILS, WHICH CAN BE MIXED WITHOUT ANY RESTRICTION. FLUSH THE OIL SYSTEM WHEN CHANGING FROM ONE TYPE OF OIL TO ANOTHER.

E - ENGINE OIL TEMPERATURE

- Maximum 85°C
- Minimum for applying power ... 0°C

F - ENGINE OIL PRESSURE

	At 33500 rpm		At idling speed	
	bar	psi	bar	psi
- Maximum pressure	5	70	-	-
- Minimum pressure	1.4	20	0.8	12

5 - TRANSMISSION COMPONENTS

A. MAIN AND TAIL ROTOR GEARBOX LUBRICATING OIL

SPECIFICATIONS (To be used at the latest issue in effect including any amendments)					REMARKS
French	NATO	US	UK	SAE	Recommended for OAT :
AIR 3525	0.155	MIL.L.6086 Grade M	DTD.581		above - 15°C
	0.153	MIL.L.6086 Grade L	DTD.581		below + 5°C
		MIL.L.2105 Grade 75		SAE 75 H EP	below + 5°C
	0.227	MIL.L.2105 Grade 80		SAE 80 H EP	above - 15°C
	0.226	MIL.L.2105 Grade 90		SAE 90 H EP	above + 25°C
AIR 3515	0.135		D.ENG.RD 2490		below - 10°C

B. MAIN GEARBOX OIL TEMPERATURE AND PRESSURE

In flight neither of the two red warning lights should come on.

6 - SERVO UNITS

A. HYDRAULIC FLUID FOR SERVO UNITS

	SPECIFICATION				REMARKS
	French	NATO	US	U.K.	
NORMAL	AIR 3520	H.515	MIL.O.5606	DTD.585	To be used at the latest issue in effect including any amendments

7 - ROTOR SPEEDS

A. POWER-ON FLIGHT

The rotor speed is 353.2 r.p.m. at governed constant engine speed of 33500 r.p.m.

B. POWER-OFF FLIGHT

- Maximum rotor speed..... 420 r.p.m.
- Minimum rotor speed..... 270 r.p.m. at sea level
(+ 10 r.p.m. per 1000 m (3.300 ft) increment above sea level).

NOTE : When flying at altitude at heavy gross weight, the maximum permissible r.p.m. value is liable to be exceeded if full low collective pitch is maintained. If this occurs, slightly increase collective pitch so as not to exceed 420 r.p.m.

8. POWER-ON FLIGHT COLLECTIVE-PITCH LIMITATIONS

The collective pitch limit mentioned in the table below is the maximum collective pitch setting which may be used in power-on flight for the stated operating condition. Observance of these limitations is required to ensure that the rotorcraft's power limitations of Para. 1.7 are not exceeded.

DENSITY ALTITUDE		HOVER CLIMB AND LEVEL FLIGHT AT MAX.SPEED	ECONOMICAL CRUISE
mètres	feet		
-1000	-3300	0.75	0.75
0	0	0.80	0.80
1000	3300	0.85	0.85
2000	6600	0.90	0.85
3000	9900	0.95	0.85
4000 and above	13200 and above	1	0.85

Collective-pitch limitations for hovering flight, climb and level flight at maximum speed are marked on the collective-pitch indicator dial.

REMARKS : This is, of course, a continuous linear law : for example, at 600 m (2,000 ft), the hovering collective-pitch limitation is 0.83.

The limitations are related to density-altitudes easily determined by the pilot through the computer surrounding the collective-pitch indicator.

9. ROTOR BRAKE LIMITATION

Operating limit 175 r.p.m. max.

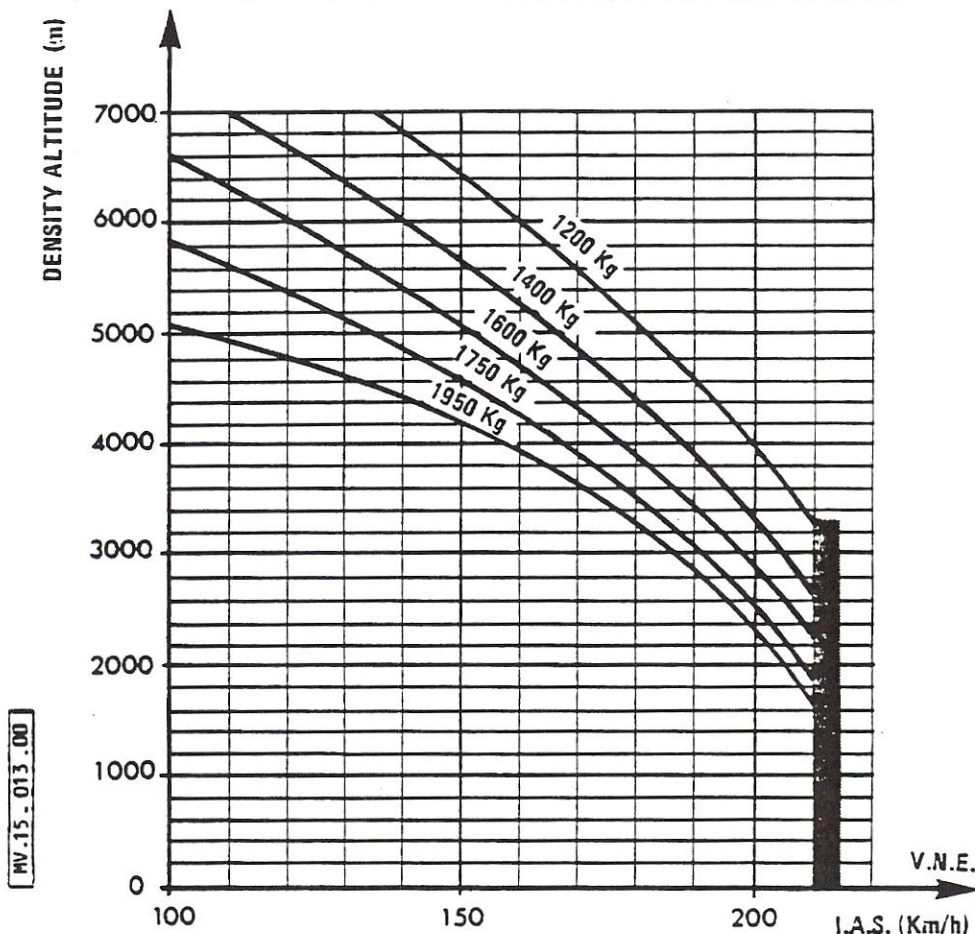
10. AIRSPEED LIMITATIONS

A. NEVER EXCEED SPEED (VNE) INSTRUMENTS IN METRIC UNITS

- with internal load

1) Centre of gravity located between 2.76 and 3.00 metres.

Printed in France



Density altitude Weight (kg)	0 to 1000	2000	3000	4000	5000	6000	7000
1950	210	205	188	156	106		
1750	210	208	192	167	135	93	
1600	210	210	197	177	152	120	88
1400	210	210	204	188	167	140	110
≤ 1200	210	210	210	200	182	160	135
Speed in km/h							
NOTE : These VNE speeds are approximately the same as cruising speed plus 25 km/h.							

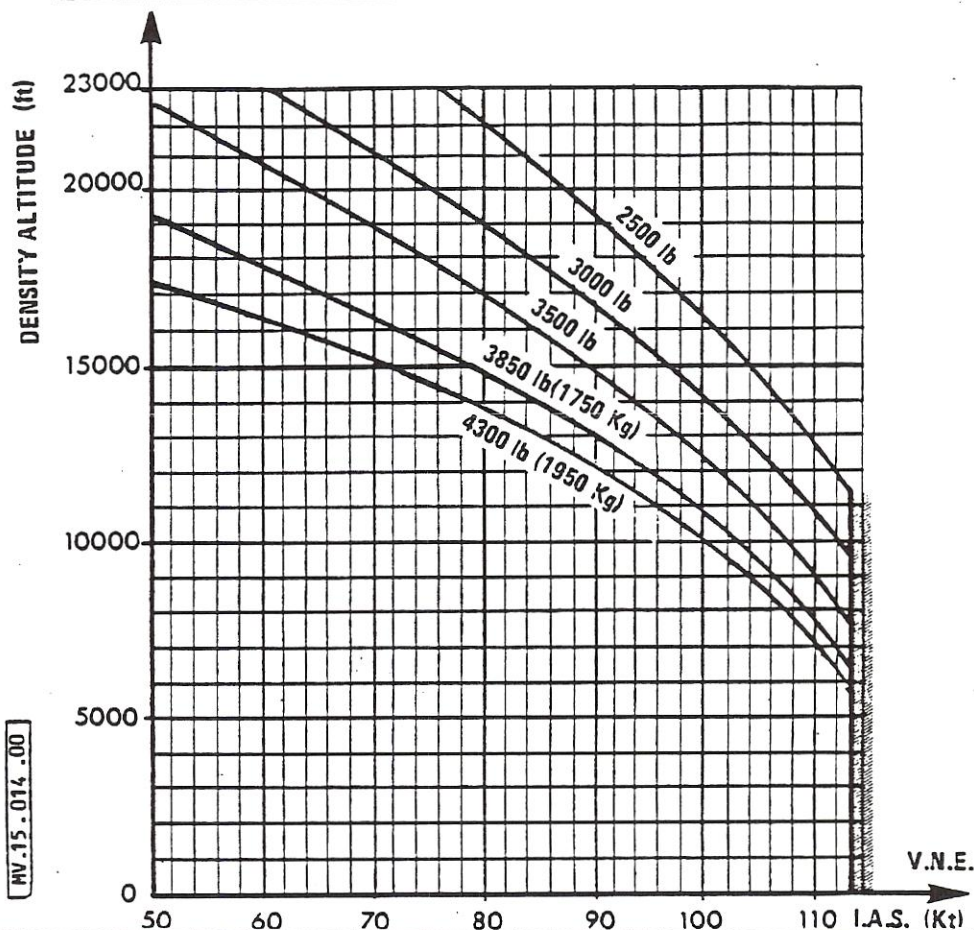
2) Centre of gravity located between 3.00 and 3.15 m
Maximum speed (VNE) is reduced to 200 km/h.

- Refer to the corresponding supplement for VNE with external load.

B. NEVER EXCEED SPEED (VNE) - INSTRUMENTS IN IMPERIAL UNITS

with or without doors, with internal loads

1) Centre of gravity located between 108.6 and 118.1 inches



Density altitude Weight (lb) \ altitude (ft)	0 to 3000	6000	9000	12000	15000	18000	21000	23000
4300	113	113	104	91	72			
3850	113	113	106	95	79	58	38	
3500	113	113	110	102	89	75	59	47
3000	113	113	113	107	97	84	70	61
2500	113	113	113	112	104	95	84	76
Speed in kt								
NOTE : These VNE speeds are approximately the same as cruising speed plus 15 knots.								

2) Centre of gravity located between 118.1 and 124 inches

Maximum speed (VNE) is reduced to 108 knots.

- Refer to the corresponding supplement for VNE with external load.

C. SIDEWARD OR REARWARD FLIGHT

Maximum permissible wind velocity (tail wind or cross wind) : 32 km/h
(18 knots)

11 - OPERATIONAL LIMITSA. FLIGHT ENVELOPE

Maximum operating altitudes :

- Flight : 7000 m (23000 ft)
- Engine starting : 5800 m (19000 ft)
- Engine relight in flight : 5800 m (19000 ft)

Temperature range : - 40° C to + 55° C

B. POSITIVE MANOEUVRING LOAD FACTORS

- With cargo sling : Refer to the corresponding supplement.
- Other configurations 2

12 - MINIMUM CREW

One pilot (on R.H. side)

13 - RESTRICTIONS

The following are prohibited :

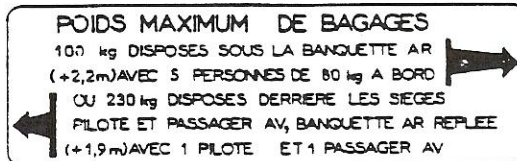
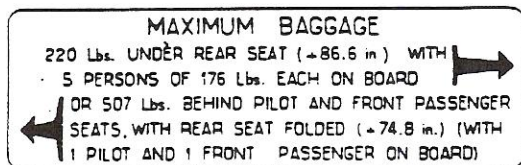
- Engine starting with a main rotor blade over the tail pipe.
- Aerobatics (in particular, never exceed a 30° nose-up attitude).
- I.F.R. (I.M.C.) flight.
- Flying in icing conditions
- Prolonged rearward flight, (due to the return of exhaust gases toward the cabin).
- Starting or stopping the rotor to leeward of any building, edifice or other obstruction when wind is in excess of 45 knots.
- Starting the rotor in all cases where wind is in excess of 60 knots
- On the ground, decreasing rotor r.p.m. by increasing collective-pitch to more than 0.20.
- Rapid yaw movements in hovering and vertical climb conditions.
- Deliberate autorotative landing (on ground), for helicopters equipped with floats.
- Harsh manoeuvres such as sharp turns and rapid manoeuvres
- Flying with friction devices not sufficiently tightened to ensure stability of the main rotor flying controls.
- Partial touch down, and more particularly on forward end of skids (steep slopes).
- Checking the flying controls for proper behaviour by rotating the cyclic stick in flight.

14 - SERVICE LIFE

Maximum service lives of fatigue critical parts are listed in chapter 5 of the Maintenance Manual.

15 - INSTRUCTIONS PLATES

- A plate, affixed to the cabin wall, rear RH side, specifies :



- A plate on the canopy structure specifies :

"THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE LIMITATIONS
PRESCRIBED IN THE FLIGHT MANUAL APPROVED BY THE DGAC".

- WNE plate (See § 10) : located on the canopy structure above the
instrument panel head.

16 - INSTRUMENT MARKINGS

Instrument marking colour code : - Red radial line : min. and max. safety limit. - Yellow arc : critical area - Green arc : normal operating area		Instrument with metric system markings	Instrument with British system markings
Fuel contents gauge (standard tank)	Red arc Red line	0 to 10 litres 10 litres	0 to 3 US gallons 3 US gallons
Fuel contents gauge (four-lobed tank)	Red line	Empty (gauge stop)	Empty (gauge stop)
Engine tachometer	Red line Red line Green line	32 500 r.p.m. 34 500 r.p.m. 33 500 r.p.m.	32 500 r.p.m. 34 500 r.p.m. 33 500 r.p.m.
Rotor tachometer	Red line Red line Green arc Yellow arc	270 r.p.m. 420 r.p.m. 350 to 420 r.p.m. 270 to 350 r.p.m.	270 r.p.m. 420 r.p.m. 350 to 420 r.p.m. 270 to 350 r.p.m.
Airspeed indicator	Red line Yellow arc Green arc Yellow arc	210 km/h 0 to 50 km/h 50 to 200 km/h 200 to 210 km/h	113 knots 0 to 27 knots 27 to 108 knots 108 to 113 knots
Collective-pitch indicator	Red line	1.0	1.0
Tail pipe temperature (T4)	Red line Yellow arc Green arc	at 550°C 500°C to 550°C 150°C to 500°C	at 550°C 500°C to 550°C 150°C to 500°C
Engine oil temperature	Red line Red line Green arc	0°C 85°C 0°C to 85°C	0°C 85°C 0°C to 85°C
Engine oil pressure	Red line Red line Green arc	1.4 bars 5 bars 1.4 to 5 bars	20 psi 70 psi 20-70 psi