eurocopter

FLIGHT MANUAL

GAZELLE

SA 341 G

TYPE CERTIFICATE NUMBER : 66 SGAC
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SERIAL N°

SGAC APPROVED :

L'Ingénieur de l'Armement

A. RICHARD

MINISTÈRE DES TRANSPORTS
Service Technique Central à l'Aviation Civile

DATE OF APPROVAL :
December 1974

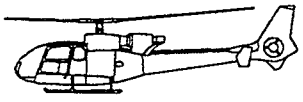
IMPORTANT NOTE

The value of the present manual depends on the care exercised in bringing it up to date. The signature of the responsible person, on the Amendment Record Sheet, guarantees that the amendment has been introduced.
The composition of the Manual at the latest amendment is given on page 03.
A certification authority identification box is included in the lower left hand corner of all pages containing material presenting particular airworthiness certification requirements. Code letter "A", placed in a square of the box, identifies specifically DGAC certification material.

*

This manual supports the helicopters delivered by both AEROSPATIALE and EUROCOPTER FRANCE.
Revisions to this manual are made by EUROCOPTER FRANCE using the same procedures as AEROSPATIALE.

THIS DOCUMENT SHALL BE CARRIED IN AIRCRAFT AT ALL TIMES.



EUROCOPTER FRANCE Etablissement de Marignane
Direction Technique Support - 13725 Marignane Cedex - France

NOTE

To reach the level of safety required, if 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 DGAC 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 DGAC 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 updatings. 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 cold 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 in the lower L.H. corner of these pages.

COMPOSITION
OF CONDITIONAL REVISIONS (RC)

This Manual assigned to the helicopter mentioned on the title page, contains the following pink pages except those cancelled when the conditions are complied with.

CAUTION

IF A NORMAL REVISION (RN) MODIFIES THE PAGE NUMBER FOR ANY INFORMATION CONCERNED BELOW. THE READER WILL HAVE TO CHANGE THE NUMBER OF THE PINK PAGE BY HAND. SO THAT THE INFORMATION REMAINS IN ACCORDANCE WITH THE PARAGRAPH CONCERNED.

Section	Page	Code	Applicable before condition is met :
	RC.A		
2	8	04.95	SB 28.06

LIST OF EFFECTIVE PAGES

All pages which form the basic section of this manual are listed below. This list is re-issued with each amendment.

PAGE	CODE	PAGE	CODE
0 Page 1*	04.95		
0 Page 2	04.95		
0 Page 3*	04.95		
0 Page 4	04.95		
SECTION 1		SECTION 2	
P Page 1	04.95	P Page 1	04.95
P Page 2	04.95	P Page 2	04.95
Page 1	12.74	Page 1	04.95
Page 2	10.75	Page 2	04.95
Page 3	04.95	Page 3	11.78
Page 4	04.95	Page 4	11.78
Page 5	04.95	Page 5	12.74
Page 6	04.95	Page 6	11.78
Page 7	04.95	Page 7	04.95
Page 8	04.95	Page 8	04.95
Page 9	04.95	Page 9	04.95
Page 10	04.95	Page 10	04.95
Page 11*	04.95	Page 11	04.95
Page 12*	04.95	Page 12	04.95
Page 13	04.95	Page 13	04.95
		Page 14	04.95
		Page 15	04.95
		Page 16	04.95
		Page 17	04.95
		Page 18	04.95
		Page 19	04.95

PAGE	CODE	PAGE	CODE
SECTION 3		SECTION 4	
P Page 1	04.95	P Page 1	12.74
Page 1	12.74	Page 1	12.74
Page 2	11.78	Page 2	12.74
Page 3	11.78	Page 2a	12.74
Page 4	12.74	Page 3	4.76
Page 5	12.74	Page 4	11.78
Page 6	11.78	Page 5	10.75
Page 7	04.95	Page 6	10.75
Page 8	04.95	Page 7	12.74
Page 9	04.95	Page 7a	12.74
Page 10	04.95	Page 8	12.74
Page 11	04.95	Page 8a	12.74
Page 12	04.95	Page 9	12.74
		Page 9a	12.74
		Page 10	12.74
		Page 10a	12.74

LIST OF SUPPLEMENTS APPROVED: Insert after The "SUPPLEMENTS" divider

The information contained in this manual is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE".

Pages identified by an asterisk contain different information depending upon the aircraft type certification.
Make sure that the code in the frame at the bottom of the page corresponds to the aircraft type certificate.

DGAC-approved 10 MAI 1996

L'Ingénieur Général

ISSUE	2
Amendment	3
Date Code	04.95

Section 1 LIMITATIONS

CONTENTS

Pages

COMPLIANCE WITH THE LIMITATIONS FORMULATED IN THIS SECTION IS IMPERATIVE

1.1. TYPES OF OPERATION APPROVED

V.F.R. - day

- night, with the appropriate instruments and in accordance with flight regulations of the country concerned.

1.2. WEIGHT LIMITATIONS

- Maximum weight : ——— 1800 kg (3970 lb)

Maximum take-off weight ——— Refer to Fig.5 of section 4 "PERFORMANCE"

1.3. C.G. LIMITS

- Longitudinal c.g.

The datum is an imaginary plane located 3 metres (118.1 in) forward of the main rotor head centroid.

- forward limit 2.80 m (110.2 in.) aft. of datum.
- rearward limit 3.14 m (123.6 in) aft.of datum.

- Lateral c.g.

The datum is the plane of symmetry of the aircraft

- L.H. limit 0.153 m (6.0 in.)
- R.H. limit 0.135 m (5.3 in.)

1.4. POWER UNIT (1 TURBOMECA - ASTAZOU III A engine)

1.4.1. Engine speed

Governed at 43500 true rpm $^{-\ 0}_{+\ 400}$ rpm.
Transient variations of ± 1500 r.p.m. are acceptable during rapid changes in collective pitch.

1.4.2. Exhaust gas temperature (t 4)

- During operation :
  - Maximum and maximum continuous ——— 550° C

NOTE : Refer to TURBOMECA maintenance manual for required action if engine speed or exhaust gas temperature limits are exceeded.

1.4.3. Power limitations

- Engine power
  - Maximum take-off power and maximum continuous power .....592 HP (440 kW) { At sea level in standard day conditions (59°F - 29.92 in.Hg)
- Transmission or helicopter limit power
  - Maximum take-off power.... 494 HP (368 kW)
  - Maximum continuous power.. 494 HP (368 kW)

The torquemeter indicates the main gear box mechanical power input limit and also enables the pilot to remain within the engine thermal load limits (see note 2 par. 2.4).
The maximum permissible torque is as shown in table below or on the torquemeter computer if installed (100 % corresponds to 368 kW).

Never exceed the specified torque limit.

Hp (m) \ OAT °C	MAXIMUM PERMISSIBLE TORQUE %										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-500	100	100	100	100	100	100	100	100	100	96	92
0	100	100	100	100	100	100	100	100	100	90	85
1000	100	100	100	100	100	100	100	97	89	80	
2000	100	100	100	100	100	98	92	85	78		
3000	100	100	100	98	93	87	81	75			
4000	99	96	91	86	82	77	72				
5000	87	84	80	76	72	67					
6000	76	72	69	66	63						

Hp (ft) \ OAT (°C)	MAXIMUM PERMISSIBLE TORQUE %										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-1500	100	100	100	100	100	100	100	100	100	95	91
0	100	100	100	100	100	100	100	100	100	90	85
3000	100	100	100	100	100	100	100	98	90	80	
6000	100	100	100	100	100	100	94	87	80		
9000	100	100	100	100	95	90	84	77			
12000	100	98	94	90	85	80	75				
15000	92	88	84	80	76	71					
18000	81	77	74	71	67						
20000	74	71	68	65							

1.4.4 - Fuel

Usable quantity: 455 litres (120.2 US. gal.)(99.6 UK. gal.)

Fuels authorized for use without restriction

TYPE OF FUEL	NATO SYMBOL	SPECIFICATIONS (To be used at the latest amendment and dash-number)			ANTI-ICE ADDITIVE
		U.S.	U.K.	FRANCE	
Kerosene-50 (AVTUR-FSII)* (JP8)	F34	MIL.T 83133 (JP.8)	D.ENG.RD 2453	AIR 3405 F-34	Incorporated
Kerosene-50 (AVTUR) (JP1)	F35	ASTM-D-1655 Jet A1	D.ENG.RD 2494	AIR 3405 F-35	Not Incorporated
Kerosene *	——	ASTM-D-1655 Jet A	——	——	Not Incorporated
Wide cut (JP4) (AVTAG-FSII)	F40		D.ENG.RD 2454	AIR 3407	Incorporated
Wide cut fuel*	——	ASTM-D-1655 Jet B	——	——	Not Incorporated
HIGH FLASH POINT (JP5) * (AVCAT)	F 43	——	D.ENG.RD 2498	AIR 3404 F-43	Not Incorporated
	F 44	MIL-T-5624 (JP5)	D.ENG.RD 2452		Incorporated (F42)

Fuel authorized for limited use

TYPE OF FUEL	NATO SYMBOL	SPECIFICATIONS (To be used at the latest amendment and dash-number)			REMARKS
		U.S.	U.K.	FRANCE	
AVIATION GASOLINE * (AVGAS)	F 12	MIL-G-5572 Grade 80/87	———	AIR 3401 80/87	Operating limits: 2000 m (6500 ft) and +30°C. Maximum operating time for gazoline between overhauls : 25 hours. 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 gasoline (1)	F 46	MIL-G-3056	DEF. 2401	DCEA/2DMT80	
Automotive Diesel oil (1)	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
Arctic Diesel oil (1)	F 56	VVF 800 DF A	———	———	Not to be used at OAT below -20°C
Fuel oil "0" (1)	F 75	MIL-F-16884	DEF. 2402	7120 STM 47/0 DIESO	Not to be used at OAT below -5°C
Fuel oil "20" (1)	F 76	———	DEF. 2402	7120 STM 47/20 DIESO	Not to be used at OAT below 0°C
Parafin (Illuminating oil)	F 58	VVK 211	DEF. 2403	DCEA/11C	Not to be used at OAT below -15°C

(1)These fuels are not authorized for R.A.I. certified aircraft.

NOTE 1: The use of an approved anti-icing additive is mandatory, if none is contained in the fuel, at OAT below 0°C (see Para. 1.4.9).

NOTE 2: For starting, when using the various diesel oils prescribed in the above chart, an approved auxiliary priming unit containing one of the fuels marked thus * is:
- recommended in all cases
- indispensable if temperature is below +20°C.

- Authorized fuel additives:

-Anti-icing: Philips PFA-55-MB, MIL-I-27686 (latest issue), AIR 3652 (latest issue) D.Eng.RD 2451,S748.
-Maximum concentration: 0.15% by volume.
These additives may be used with or without glycerine.
-Antistatic: SHELL ASA-3
Maximum concentration 0.0001% by volume.

1.4.5 - Engine oil

-Total capacity: 14.6 litres (3.8 U.S Gallons)
-Oil capacity at maximum level on the sight glass: 9.2 litres (2.4 US Gallons).

-Standard lubricants

SPECIFICATION				Remarks
FRENCH	NATO	US	UK	
AIR 3513	0.148	MIL.L.7808		Synthetic oil
AIR 3514	0.150			

- Alternative lubricants

SPECIFICATION				REMARKS
FRENCH	NATO	US	UK	
AIR 3515	0.135	AEROSHELL TURBINE Oil 3	D. Eng. RD 2490	Mineral oil
		ESSO AVIATION utility Oil F		
		CALTEX JET ENGINE Oil, medium heavy		
	0.156	MIL.L.23699	D. Eng. RD 2499	Synthetic oil
	0.149		D. Eng. RD 2487	
AIR 3517	0.159			

NOTE: Refer to current issues and amendments.
CAUTION: MINERAL AND SYNTHETIC OILS CANNOT BE MIXED TOGETHER. IF OIL TYPE IS CHANGED REFER TO MAINTENANCE MANUAL FOR THE OPERATIONS TO BE CARRIED OUT.

1.4.6 - Engine oil temperature

-Maximum in operation ..... + 85°C

-Minimum for applying power ..... + 5°C
According to the type of oil used, refer to para. 2.8 of SECTION 2.

-Minimum for flight with OAT below +5°C (anti-icing) ..... + 30°C

1.4.7 - Engine Oil Pressure

. Minimum for generator speed greater than 35000 rpm 0.8 bar (11.6 psi)
. Maximum..... 5 bar to (72.6 psi)
. Normal (in flight)..... 1.5 to 5 bar (21.7 to 72.6 psi)

1.4.8 - Protection of engine against ice

The engine air-intake must be permanently fitted with:

. TURBOMECA anti-icing shield N° 0.235.20.753.0 (or 0.235.21.768.0), or
. TURBOMECA air-intake screen N° 0.235.21.762.0, or
. Sand filter 341A82-1160-00, or
. Muffler 341A54-1004 (or 341A54-0110).

Engine oil temperature must be maintained above +30°C when the OAT in flight is below +5°C.

1.4.9 - Protection of fuel system against ice

For operation at an OAT below 0°C fuel must contain an approved anti-icing additive, minimum concentration: 0.035% - maximum concentration: 0.15% by volume.
Refer to paragraph 2.1.2. of SECTION 2 for instructions on mixing additive in the fuel and determining the concentration.

1.5 - TRANSMISSION SYSTEM ASSEMBLIES

1.5.1 - Oil specification for transmission system components

a) Normal lubricants

-TGB - IGB - MGB

CAUTION: MINERAL AND SYNTHETIC OILS CANNOT BE MIXED TOGETHER. IF OIL TYPE IS CHANGED, REFER TO MAINTENANCE MANUAL FOR THE OPERATIONS TO BE CARRIED OUT.

HUILE OIL ⇓	* SPECIFICATION				TEMP. EXT./OAT. (°C)
	NATO	U.S.	U.K.	FRANCE	-50° -40° -30° 0° +10° +30° +45°
MINERAL.	0.155	MIL-L-6086 Grade M	DTD 581 Grade OEP 70	AIR 3525	
SYNTHET.	See note 0.156	MIL-L-23699	-	-	
	0.148	MIL-L 7808	-	AIR 3513	
	0.150	-	-	AIR 3514	

Authorized operating envelope Recommended operating envelope

NOTE: 0.156 oil is not be used in the TGB and IGB unless the following modifications have been embodied :
AMS 8018 or 8521 - Magnetic plugs in TGB and IGB
AMS 0886 - Rear servo unit stop at 92% (non-optimized TRH).

-MRH

HUILE OIL ⇓	* SPECIFICATION				TEMP. EXT./OAT. (°C)
	NATO	U.S.	U.K.	FRANCE	-50° -30° 0° +10° +45°
MINERAL.	0.155	MIL-L-6086 Grade M	DTD 581 Grade OEP 70	AIR 3525	
SYNTHET.	0.156	MIL-L-23699	-	-	
AEROSHELL 14 GREASE	G.366	MIL-G-25537	DEF. STAN 91.51/1	-	

Authorized operating envelope

* The latest issue and amendment are effective for all specifications quoted.
NOTE: In cold weather conditions, VNE special limitations may apply; refer to paragraph 1.10.2.

b) Alternative lubricants for use in MGB, IGB, TGB, MRH

HUILE OIL ⇓	* SPECIFICATION				TEMP. EXT./OAT. (°C)
	NATO	U.S.	U.K.	FRANCE	-50° -20° -5° 0° +45°
MINERAL	0.226	MIL-L-2105 Grade 90	-	-	
	0.227	MIL-L-2105 Grade 80	-	-	

Authorized operating envelope

* The latest issue and amendment are effective for all specifications quoted.

1.5.2 - Main gearbox oil pressure

In flight, the warning light should not illuminate.

1.5.3 - Main gearbox oil temperature

In flight, the maximum temperature warning light should not illuminate.

1.5.4 - Clutch unit operating limitations

The clutch unit must not be engaged more than twice in less than 5 minutes.

1.6 - SERVO-CONTROLS

1.6.1 - Servo-control system hydraulic fluid

SPECIFICATION				Remarks
FRENCH	NATO	US	UK	
AIR 3520	H.515	MIL.H.5606	DTD.585	Latest issue and amendments.

1.7 - ROTOR SPEEDS

1.7.1 - Rotor speed in power-on flight

378 ± 12 rpm

1.7.2 - Rotor speed in autorotation

-Maximum ..... 430 rpm

or 415 rpm if OAT is below -15°C and pressure altitude below 3000 m (10000 ft)

or 400 rpm if OAT is below -30°C

-Minimum ..... 310 rpm up to 1000 m (3300 ft) density altitude; above this value, add 10 rpm for every 1000 m density altitude increment.

1.7.3 - Alarm system for min. rotor speed

(according to version - required by F.A.A. and R.A.I.)

-An audible and visual alarm system operates if the rotor speed drops below ..... 360 rpm.

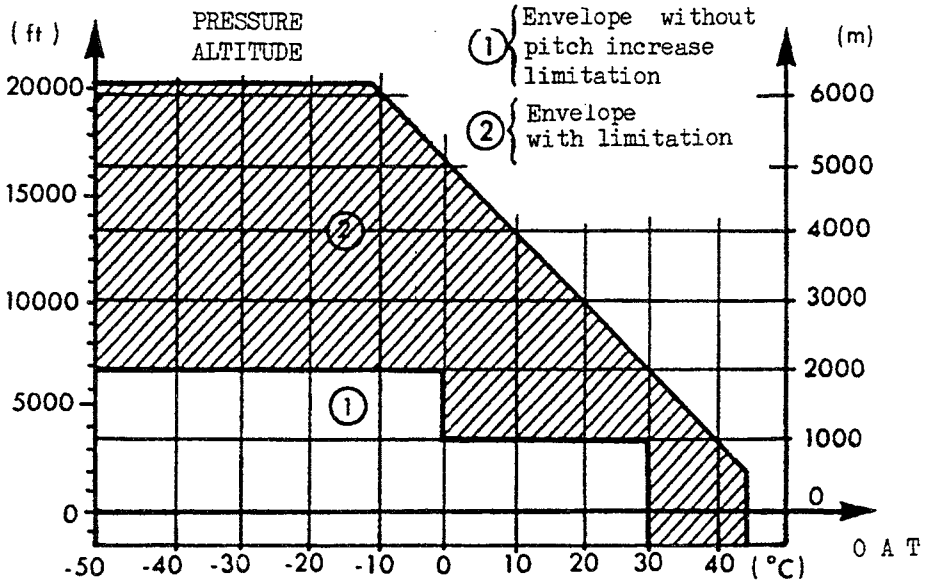
1.8 - COLLECTIVE PITCH LIMITATIONS

Prior to take-off and landing, the index at the foot of the collective pitch lever must be set in line with the mark corresponding to the OAT.

1.8.1 - Pitch increase

.On aircraft fitted with an engine not including a fuel flow limiter

In power-on flight, the collective pitch lever must not be moved from low pitch to the first detent in less than 3 seconds, to avoid engine surge, outside of the temperature-altitude envelope defined below:



. On aircraft fitted with an engine including a fuel flow limiter

In power-on flight, the collective pitch lever must not be moved from low pitch to the first detent:

- in less than one second for a pressure altitude not over 4000 m (13000 ft)
- in less than three seconds for a pressure altitude above 4000 m (13000 ft).

1.8.2 - First detent

Whereas torque limitations are not to be exceeded, the collective pitch lever must not be moved beyond the first detent in hover and in climb por at altitude lower than 3000 m (10000 ft), to avoid excessive engine temperature rise.

1.8.3 - Second detent

The collective pitch lever must never be moved beyond the second detent, except for landing in autorotation.

1.9 - ROTOR BRAKE LIMITATIONS

The rotor brake must not be applied at rotor speeds higher than 170 rpm.

1.10 - AIRSPEED LIMITATIONS

1.10.1 - VNE

Never exceed speed (Vne) is 310 km/h (168 kt) for pressure altitudes lower than or equal to "zero".

- Subtract: 25 km/h per 1000 m pressure altitude increment.
  or: 4 kt per 1000 ft pressure altitude increment.

These values are shown in the following charts:

NEVER EXCEED SPEED (VNE)											
Zp(m)	0	500	1000	1500	2000	2500	3000	3500	4000	5000	6000
VNE km/h	310	297	285	272	260	247	235	222	210	185	160
VNE kt	168	160	152	144	136	128	120	112	104	96	88
Zp(ft)	0	2000	4000	6000	8000	10000	12000	14000	16000	18000	20000

- For the various configurations without doors or small doors, airspeed must be limited to 260 km/h (140 kt).
- For flight with external load, refer to airspeed limitations given in Supplement: "Transport of external loads".

1.10.2 - Speed limitations in arctic conditions

In arctic conditions and according to the grade of lubricant used in the MRH, apply the speed limitations given in the table below:

SPEED TO BE DEDUCTED FROM VNE ACCORDING TO THE GRADE OF LUBRICANT USED IN THE MRH

OAT (°C) / lubricant	-50°	-45°	-40°	-35°	-30°	-25°	-20° t°
0.155	USE PROHIBITED				-60 kt -110 km/h	-40 kt -75 km/h	No limit ← See VNE
0.156	-60 kt -110 km/h	-40 kt -75 km/h	← No limit - see VNE				
G.366 AEROSHELL 14	← No limit - see VNE →						

1.11 - OPERATIONAL LIMITS

1.11.1 - Flight envelope

Altitude limits

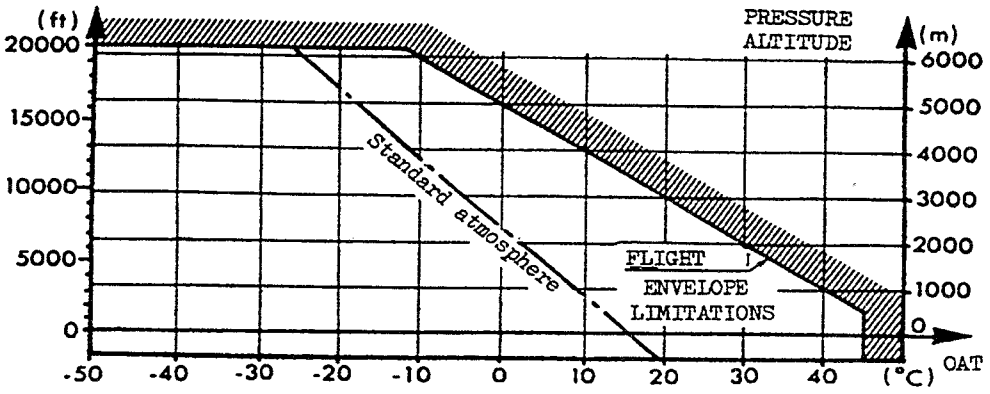
-with standard jet fuel : .....6000 m (20000 ft)
-with gasoline : .....2000 m (6500 ft)

Temperature limits

-maximum : ..... + 45°C
-minimum : .....- 50°C (See 1.5.1 and 1.10.2)

NOTE 1 : Below -40°C, embodiment of Aerospatiale modifications 341A07-1574, 341A07-6513 and TURBOMECA TU77 modifications is mandatory.

NOTE 2 : Below - 30° C compliance with SB 11.01 is mandatory.



1.11.2 - Wind limitations for spinning and stopping the rotor

Spinning and stopping the rotor are prohibited when wind velocity exceeds 75 km/h (40 kt).

1.11.3 - Transport of personnel

Maximum number of persons transported: 5 persons, crew members included.

1.11.4 - Landing on a slope

Maximum permissible slope:

-12° longitudinal, nose facing the slope
-9° side slope.

1.11.5 - Flying in snow

-Flying in falling or blowing snow is permissible when visibility is over 800 m (2500 ft).

.No limitation if the engine is fitted with the grid.
.Limited to 1 hour in continuous falling snow when the engine intake is fitted with the anti-ice shield.

-If on visual inspection after an hour's flying in snow, no accumulation of snow or ice is found near the engine air inlet, another period of flight is authorised.

1.11.6 - Operation from moving platform (with low type flexible undercarriage only).

The movements of the platform and the direction of the relative wind, given below correspond to the maximum values demonstrated up to now:

-Roll: ± 5°
-Pitch: ± 2°
-Relative wind: 35 kt along the ship's center line, headwind
30 kt at ± 30° relative to wind.

1.12 - MINIMUM CREW

One pilot in starboard seat.

1.13 - PROHIBITED MANOEUVRES

The following are forbidden:

- IMC flight
- Aerobatics
- Flight in icing atmosphere
- Prolonged rearward flight, due to the danger of exhaust gases entering the cabin.
- Intentional reduction of engine rpm in flight except for landing in autorotation (training and demonstration purposes).
- Rapid yaw movements in hover and vertical flight.
- Intentional landing in autorotation (except for training purposes).

1.14 - LIMITATION INSTRUCTION PLATES

The following instructions are displayed in clear view of the pilot:

-THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE APPROVED ROTORCRAFT FLIGHT MANUAL. THE "AIRWORTHINESS LIMITATIONS" SECTION OF THE ROTORCRAFT MAINTENANCE MANUAL MUST BE COMPLIED WITH.

-NEVER-EXCEED SPEED (Vne) (See chart, Page 1.9). AND t4 CORRECTION.

-MAXIMUM PERMISSIBLE TORQUE (See table Page 1-2). (If torquemeter computer is not installed).

A plate bonded to the floor panel specifies:

-MAXIMUM PERMISSIBLE FLOOR LOAD: 610 daN/m² (125 Pounds/Sq Foot).

1.15 - INSTRUMENT MARKINGS

Colour code for instrument dial markings:

-Red radial line: safety limits (minimum and maximum)
-Yellow arc: caution range
-Green arc: normal operating range.

			Instruments with metric system markings	Instruments with English markings
Fuel gauge		Red line	Empty	Empty
Dual Tacho-meter	Engine Tacho-meter	Green line Red lines	43500 rpm 42000 and 45000 rpm	
	Rotor Tacho-meter After SB 11.01	Green line Red lines Yellow arcs Green arc	378 rpm 310 and 430 rpm 310 to 360 rpm 400 to 430 rpm 360 to 400 rpm	
	Rotor Tacho-meter Before SB 11.01	Green line Red lines Yellow arcs Green arc	378 rpm 310 and 430 rpm 310 to 360 rpm 415 to 430 rpm 360 to 415 rpm	
Airspeed indicator		Green arc Red line	0 to 310 km/h at 310 km/h	0 to 168 kt at 168 kt
Torque indicator	With com-puter	Red cursor Red arc	Adjustable from 40 to 110% from 100 to 110%	
	Without computer	Red line Red arc	At 100 % from 100 to 110 %	
t4 temperature indi-cator		Red line Green arc	550°C 150°C to 550°C	
Engine oil temperature indicator		Red line Green arc Yellow arc	85°C 30°C to 85°C -15°C to 30°C	
Engine oil pressure gauge		Red lines Yellow arc Green arc	0.8 and 5 bar (11.6 psi and 72.6 psi) from 0.8 to 1.5 bar (11.6 psi to 21.7 psi) from 1.5 to 5 bar (21.7 psi to 72.6 psi)	
Voltmeter		Green arc	24 to 29 Volts	

Section 2
NORMAL PROCEDURES

CONTENTS

2.1 - MAINTENANCE INFORMATION

2.1.1 - System capacities

- Fuel system:
  .Usable fuel..... 455 litres (120.2 US. Gal.) (99.6 UK. Gal.)
  .Unusable fuel ..... 2 litres (0.5 US. Gal.) (0.43 UK. Gal.)

- Engine oil system:
  .Total engine oil capacity ..... 14.6 litres (3.8 US. Gal.) (3.15 UK. Gal.)
  .Non-drainable oil (approx.) ..... 1.5 litres (0.4 US. Gal.) (0.33 UK. Gal.)

- Hydraulic system:
  .Capacity of tank at max. level ..... 2.25 litres (0.6 US. Gal.) (0.5 UK. Gal.)

- Main gear box oil system:
  .Capacity at max. level...3.5 litres (0.9 US. Gal.) (0.77 UK. Gal.)

- Tail rotor gear box (max. level) ..... 0.3 litre (0.1 US. Gal.) (0.06 UK. Gal.)

- Intermediate gear box (approx.) ..... 0.1 litre (0.02 US. Gal.) (0.02 UK. Gal.)

- Main rotor head (3 units)
  .Capacity per sleeve/ spindle + reservoir 1.13 litres (0.3 US. Gal.) (0.25 UK. Gal.)

2.1.2 - Use of anti-icing additive in fuel

- An anti-icing additive must be mixed into the fuel for operation at an OAT below 0°C, in compliance with the French specification AIR 3652 (or equivalent foreign specifications).
  The following proportions should be observed:

  .Minimum concentration in a tank already filled: .035% by volume.

  .Minimum concentration in fuel which is to be used for refuelling the aircraft: .06% by volume.

- The additive conforming to French Specification AIR 3652 is intended principally for use with fuels TR4 and TR5 (JP4 and JP5). Military JP4 Fuel (AIR 3407) normally containts this additive.

- If a doubt exists as to the concentration of anti-icing additive in the fuel in the tank, the tank must be drained and refilled with fuel containing the correct proportion of additive as specified above.

- Proceed in accordance with the additive manufacturer's instructions when incorporating the product into the fuel.

2.2 - EXTERNAL CHECKS

- Position the aircraft heading into the wind (when wind velocity exceeds 30 km/h - 17 Knots)

- Ensure that the ground around the aircraft is clean, clear and free from foreign bodies (rags, paper, etc...)

CAUTION:

ENSURE THAT "INSPECTION BEFORE THE FIRST FLIGHT OF THE DAY" HAS BEEN CARRIED OUT.

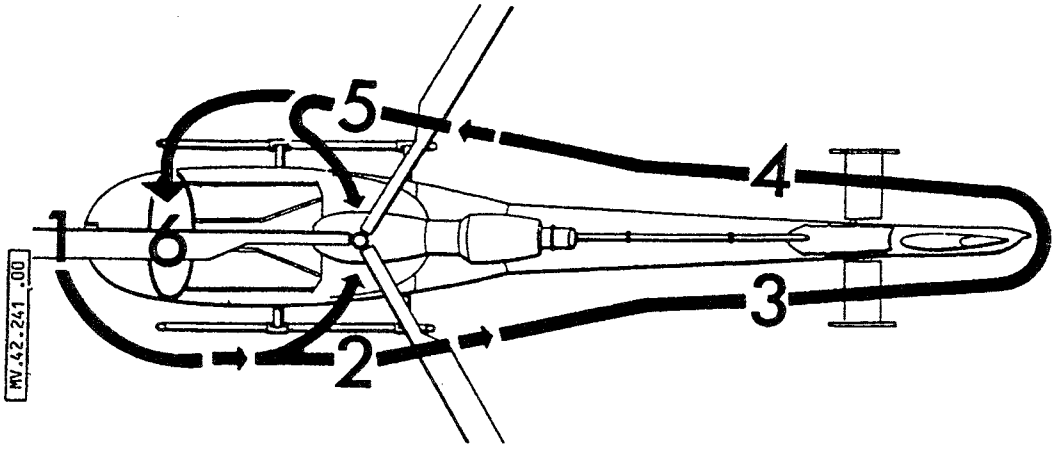


Fig 1 - External checks

To facilitate inspection, the operations/checks are grouped in the following order:

(1) - Pilot head blank removed.

- Visual inspection of intermediate gearbox for any oil leaks in scavenge tray.

- Main gear box and engine cowlings closed and latched.

- Visual inspection of blades (dents, distortion).

(2) - Rotor blades clear of exhaust pipe (1 blade centered forward).

- Main rotor head (general condition).

- Oil level in Main rotor lubricating oil reservoirs.

- Static pressure port blank, on port side, removed.

(3)
- Cooling duct (condition, attachment).
- Tail boom - Transmission shaft (general condition).
- Tail rotor blades (dents, distortion).
- Tail rotor head (general condition).

(4)
- Tail rotor gear box (oil level - general condition)
- Tail boom - Transmission shaft (general condition)

(5)
- Inspection doors : closed
- Fuel filter clogging indicator : depressed
- Visual inspection of intermediate gearbox for any oil leaks in scavenge tray.
- Engine cowling : closed and locked
- Fuel filler cap : closed and locked
- M.G.B. oil level : correct
- Engine oil level : correct
- Hydraulic fluid level : correct - Filter clogging indicator "in". (If installed)
- M.G.B. cowling : closed and locked.
- Starboard static pressure port blank : removed.

(6) See internal checks

2.3. INTERNAL CHECKS

- Cabin - general cleanliness
- Fire extinguisher - installed
- Loads - correctly tied down
- Switch the battery on
- Fuel - gauge reading, correct quantity
- Fuel shut-off lever - in forward position, snap wire - intact
- Door emergency release system - snap wire intact.
- Clock - wind and set
- Position lights, anti-collision lights and landing light - switch on and check.
- Instrument panel, main and lower , check lighting ; adjustable lamp - switch on and check.

NOTE : Before flying the aircraft without doors or small doors, or without rear passengers, remove the cushions or fold the seats back.

2.4 - CHECKS BEFORE STARTING THE ENGINE

Determine the aircraft's exact performance limits in the anticipated flight configuration and conditions (see section "PERFORMANCE") and ensure that weight and C.G. limits are observed

Carry out the following checks :

- Seats and rudder pedals → Adjusted
- Belts and harnesses if installed → Buckled
- Small doors → Closed - Unlocking levers raised
- Doors → Closed
- Fuel shut-off cock lever → Open (forward)
- Fuel flow control lever → Closed (Rear stop)

- Rotor brake → Released (FORWARD)
- Heating system → OFF
- Battery → ON
- d.c. generator → ON
- a.c. generator (if installed) → ON (except if a.c. ground power unit connected)
- Control travel → Carried out (full travel of cyclic, collective controls and rudder pedals, with rotor stopped).
- Cyclic control → Neutral, friction nut tight, or, magnetic brake to ON to prevent displacement of controls under their own weight.
- Collective control → Full low pitch - Friction tight - First detent adjusted (see note 1)
- Servo-control switch → ON (rearward)
- Landing light → OFF
- Rudder pedals → Neutral
- All other switches → OFF, except for magnetic brake if installed.
- Warning panel → Tested
- HORN switch (according to version - required by F.A.A. and R.A.I.) → OFF (or ON for checking the audible warning system after cluth engagement)
- Pitot head heating system (if installed) → OFF
- Warning lights → Lights tested and correct
- Instruments → Checked, set
- Torquemeter → Index set (See note 2)

NOTE 1 : To adjust the first collective pitch detent, rotate the knurled knob located at the foot of the pilot's collective pitch change lever to bring the adjustable index in line with the marking corresponding to the O.A.T. Set at 20 °C for O.A.T. of 20 °C and below.

NOTE 2 :

To determine the permissible limit torque, rotate the mobile sector to make the white index coincide with the O.A.T.
Then position the red index (limit torque) opposite the altitude graduation.
When the torquemeter is not fitted with a mobile sector, refer to the table in paragraph 1.4.3. and on the instrument panel to obtain the maximum permissible torque value.

2.5. STARTING THE ENGINE AND SPINNING THE ROTOR

2.5.0. General

The engine can be started either on the aircraft battery or using an external power source (28 V.d.c.). In both cases, set the "BAT." (PARC-BATT.) and "GENE" (GEN.) switches in the "ON" ("MARCHE") position.

When the engine is started on battery the following indicator lights come on.

"MGB P" ("H.BTP")
"ENG P" ("H.MOT")
"ALT.NR" ("ALTER")
"GEN" ("GENE")
"NAV" ("NAV")
"PITOT" ("PITOT")

When the engine is started on external power, the following indicator lights come on.

"MGB P" ("H.BTP")
"ENG P" ("H MOT")
"BATT" ("BAT")
"ALT.NR" ("ALTER")
"GEN" ("GENE")
"NAV" ("NAV")
"PITOT" ("PITOT")

During starting and rotor engagement the lights should go out when the following conditions are met :

on battery	on external power
- "GEN" ("GENE") : when N_g (generator speed) reaches 19000 to 30000 r.p.m.	- "BAT" ("BATT") : when the external power source is disconnected - "GEN" ("GENE") : when external power is disconnected and the generator cut-out relay is energized for a N_g from 19000 to 30000 r.p.m.

on battery or external power :

- "ENG.P" ("H.MOT") : when engine oil pressure is correct ; this may occur when N_g value is greater than idling r.p.m.
- "MGB.P" ("H.BTP") : during clutch engagement when M.G.B. oil pressure is correct.
- "ALT NR" ("ALTER") and "NAV" : after clutch engagement when the alternator supplies the aircraft network (if on).
- "PITOT" : when the "PITOT" switch is "ON" ("MARCHE").

2.5.1. Starting

CAUTION :

AFTER AN UNSUCCESSFUL START, DO NOT MAKE MORE THAN FOUR CONSECUTIVE TRIES TO START OR CRANK, TO PREVENT OVERHEATING THE STARTER GENERATOR. AFTER FOUR UNSUCCESSFUL TRIES WAIT 20 MINUTES BEFORE TRYING AGAIN.

OPERATION	CHECKS	ACTION WHERE NECESSARY
1) Set the booster pump switch - "FUEL PUMP" ("POMPE") - in the "ON" ("MARCHE") position.	The pump should be heard operating. If in doubt make sure that the ammeter indicates an increase in electrical load.	
2) About 20 seconds later, move the "START" ("DEMARR") selector switch lever to the "RUN" ("MARCHE") position	The green, "START" ("DEM") indicator light comes on The tachometer indicator pointer starts to register.	

OPERATIONS	CHECKS	ACTIONS WHERE NECESSARY
3) At approximately 2000 rpm, move the "START" ("DEMARR") switch to "IGN" ("ALLUM") and hold in this position until t4 temperature rises to 400°C. Release the selector switch.	The yellow "INJ" indicator light comes on, (electric fuel cock open). The t4 indicator pointer starts to register. The yellow "INJ" indicator light goes out (end of ignition sequence). Watch acceleration and t4 increase.	Return the "START" ("DEMARR") selector switch lever to the "OFF" ("ARRET") position if: - The red "STOP" ("BLOC"), warning light comes on. - The green "START" ("DEM") indicator light does not come on. - The yellow "INJ" indicator light does not come on. - t4 temperature has not risen 10 sec. after illumination of the yellow "INJ" indicator light. - t4 temperature exceeds 700°C for 3 seconds or reaches 750°C.

If the engine rpm tends to stabilize at about 14000 rpm (stagnation phenomenon):

- Move the selector switch to "OFF" (ARRET) position without stopping the booster pump.
- Switch booster pump off after 10 seconds approximately.
- Perform a first ventilation of 20-second duration.
- Wait for 40 seconds.
- Perform a second ventilation of 20-second duration.
- Again wait for 40 seconds.
- Carry out a new starting sequence.

NOTE: This phenomenon may happen when the residual t4 is within 60°C and 130°C.

If flame-out occurs, re-light by setting starting switch to "IGN" (ALLUM). If fuel re-injection has started before 9000 rpm, stop it at 9000 rpm. If fuel re-injection has started above 9000 rpm, stop it after 3 seconds.	Flame-out is evidenced by a fall in t4 temperature. During re-injection, carefully watch the t4 temperature which must remain below 550°C. The "INJ" warning light comes on.

OPERATIONS	CHECKS	ACTIONS WHERE NECESSARY
3) (Cont'd)	-"Pre-Mod. TU75 engines (starter cut-out controlled by fuel pressure). Above 18000 rpm, the green "START" ("DEMARR.") indicator light goes out (starter cut-out). This value increases with altitude. Rpm continue to rise with no adjustment of controls, and stabilize at idling speed, viz. 25000 ± 400 rpm. -Post-Mod. TU75 engines (starter cut-out controlled by oil pressure). Rpm continue to rise with no adjustment of controls and stabilize at idling speed, viz. 25500 ± 400 rpm. The green "START" ("DEMARR") indicator light goes out when the engine reaches idling speed." t4 falls and stabilizes at about 300°C. Check that the engine oil pressure indicator pointer has moved from zero.	If t4 exceeds 700°C, switch off the booster pump. Switch the booster pump on again when engine reaches idling speed. NOTE 1: During engine start the rotor may turn slightly. NOTE 2: The oil pressure warning light normally remains on.

RCA

Il a été constaté que sur défectuosité d'une diode, une action sur le bouton "TEST" des voyants situé en bas de la planche de bord pouvait provoquer l'extinction du moteur

Avant application du SB 28.06, le test des voyants doit être effectué avant chaque vol, après mise en route du moteur, afin de s'assurer qu'il ne provoque pas l'extinction moteur.

En conséquence, modifier comme suit le § 2.5.1 "démarrage".

- Après :

" La vitesse de rotation continue à augmenter sans intervention et se stabilise au ralenti", soit 25500 tr/mn ± 400 tr/mn.

- Ajouter :

" Appuyer sur le bouton "TEST" des voyants, vérifier l'allumage des voyants de la planche de bord et l'absence d'anomalie moteur.

It was found that following a defective diode a press of the engine start indicator lights TEST pushbutton in the lower section of the instrument panel might cause engine flame-out.

Before embodiment of SB 28.06, testing the indicator lights shall be accomplished before each flight, after starting the engine, in order to ensure that it does not cause engine flame- out.

Consequently amend paragraph 2.5.1 : STARTING as follows :

- After :

"Rpm" continue to rise with no adjustment of controls and stabilize at idling speed, i.e. 25500 ± 400 r.p.m.

- Add :

Press the indicator lights TEST pushbutton to check that the indicator lights on the instrument panel illuminate and the engine is running properly.

ATTENTION : CETTE PAGE NE DEVRA ETRE RETIREE DU MANUEL QU'APRES L'APPLICATION DU SB 28.06.

CAUTION : THIS PAGE MUST NOT BE REMOVED FROMTHE MANUAL UNTIL MODIFICATION SB 28.06 HAS BEEN EMBODIED TO THE AIRCRAFT.

2.5.2 - Clutch engagement

OPERATIONS	CHECKS	ACTIONS WHERE NECESSARY
1) Set controls to neutral and disconnect ground power unit if connected.	The torquemeter should read: 0 ± 2%	
2) Gradually move the fuel flow control lever forward up to the engine speed at which the rotor begins to rotate, then start the timing clock.		Avoid both jerky movements, which would cause harsh engagement and engine surge, and interruptions in acceleration, which would cause excessive clutch slipping and wear.

Speeds in rpm at the beginning of clutch engagement are indicated in the following table:		FORMER DEFINITION CLUTCH UNIT	STANDARDIZED CLUTCH UNIT (After mod. AMS 9215)
MINIMUM VALUES	MINIMUM VALUE ON ACCEPTANCE TESTING → (New or overhauled Clutch Unit)	29000	29000
	MINIMUM VALUE IN SERVICE (Linings unbonded)	27000	27000
MAXIMUM VALUE	VALUE REQUIRING REMOVAL → (Clutch Unit worn)	33300	34000

To spin the rotor, increase and control engine speed by means of the fuel flow control lever so that a rotor acceleration of approximately 50 rpm per 10 seconds is maintained, which corresponds to the engine speed at which the rotor begins to rotate plus 1000 to 2000 rpm. Watch out for a continuous increase in rotor speed.	Check that: - the generator indicator light goes out. - the engine oil pressure indicator light goes out. - t4 should decrease during acceleration above 35000 rpm. Synchronization should be obtained within approximately 30 to 45 seconds. MGB oil pressure warning light goes out.	Return the starting switch to "ARRET" ("OFF") if: . The "MGB.P" ("H.BTP") light remains on. (If OAT is below -20°C, refer to paragraph 2.5.4) . The "ENG.P" ("H.MOT") light on the caption panel, remains "ON" although the engine speed exceeds 37000 rpm. If it should be necessary to order an engine shutdown, proceed in accordance with § 2.13 of this section. NOTE: If the engine rpm limitation has been exceeded refer to the Maintenance Manual (MDE).

OPERATIONS	CHECKS	ACTIONS WHERE NECESSARY
2) (Cont'd) When synchronisation is obtained, do not move the fuel flow control lever for a few seconds, to allow t4 temperature to drop by 20 to 40°C, then move if forward to the "locked" position. The t4 temperature must not increase more than 50°C above t4 when clutch initially engaged.	According to version: (F.A.A. aircraft and R.A.I.) -Check that the "ROTOR LO.RPM" ("N.MINI ROTOR") warning light flashes for a rotor speed 320 to 360 rpm. The horn is heard when the switch is ON and speed is below 320 rpm. The engine speed increases and stabilizes at 43500 $^{-0}_{+400}$ rpm. The red "ALARM" warning light goes out.	

NOTE 1: Rpm values cannot be monitored with sufficient accuracy using their tachometers. They are checked periodically in the maintenance shop as follows:

-at engine idling speed viz. 25500 rpm ± 400 rpm

-at engine regulated speed viz. 43500 $^{-0}_{+400}$ rpm

NOTE 2: A practical clutch engagement method is to operate the fuel flow control lever to obtain an 18% torque value. In this case, the limitations cited in the clutch engagement procedure are to be observed.
This method is only to be applied at low altitude and when air temperatures are near standard.

CAUTION: ONCE THE ROTOR IS SPINNING AT ITS NOMINAL SPEED THE AIRFRAME OF AIRCRAFT FITTED WITH HIGH LANDING GEAR MAY VIBRATE ON THE SKIDS THESE VIBRATIONS WHICH ARE NEVER DIVERGANT, MAY BE STOPPED BY PLACING THE CYCLIC PITCH STICK IN NEUTRAL POSITION, OR SLIGHTLY REARWARDS.

2.5.3 - Clutch engagement is strong gusty wind (over 25 kt: 46 km/h)

To spin the rotor - Doors closed

1) Ensure that the collective pitch control lever is at "low pitch" travel limit position; friction lock tight.

2) Always set the cyclic stick forward.

3) Command a rapid initiation of clutch engagement (then control acceleration to obtain synchronisation in 25 - 30 seconds).

4) As soon as the rotor has started turning, if droop restrainer contact is felt, gently pull the cyclic stick rearwards (towards neutral) until contact ceases then hold the stick in the position at which the droop restrainers are at the limit of making contact.*

* Never allow the droop restrainers to hammer.

NOTE: In strong gusty wind it is dangerous to approach the front of the helicopter during spinning or stopping of the rotor as gusts may cause the blades to flap down to within 1 m (3 ft) of the ground.

2.5.4 - Clutch engagement in cold weather

- When the OAT is below -15°C, push the throttle control forward to set a torque value between 20 and 40%. When the rotor reaches 150 rpm, the clutch engagement may continue at normal rate with a torque value within 15 to 30%.

- For temperatures lower than -20°C, the MGB oil warning light may go out with some delay. Do not take-off, and stop the engine if this warning light does not go out within two minutes after the throttle control has been pushed against the forward stop.

2.6 - CRANKING

Cranking consists of turning the engine over by switching on the dynastart (starter/generator) without initiating ignition, for the purpose of clearing the combustion chambers of any accumulated fuel. This operation, to be carried out in the eventuality of an aborted start as a result of engine flame-out, may also be useful for locating the source of any abnormal noise in the engine.

To crank the engine over, all that is needed is to put the starting switch on "MARCHE" ("RUN") position.

To stop the cranking operation, return the "START" ("DEMARR") switch to "OFF" (ARRET).

CAUTION

CRANKING TIME IS LEFT AT THE DISCRETION OF THE PILOT, BUT MUST NOT EXCEED 20 SECONDS.

2.7 - CHECKS AFTER ENGINE START-UP

External power source ——→ Disconnected
Engine oil pressure and temperature ——→ Correct
"PILOT" heating (if fitted) ——→ On

Voltage (on voltmeter) → Correct
Servo-unit test → Off; Check loads, then reset to on
All warning lights → Out
Pilots and passengers → Strapped in
Navigation, Radio navigation, Radio communication → Correct operation

2.8 - CHECKS BEFORE TAKE-OFF

Collective pitch stop → Adjusted
Torquemeter → Index set (see 2.4)
Horn switch (according to version - required by F.A.A. and R.A.I.) → On
Fuel flow control lever → Forward stop
Warning lights → All out
Engine oil temperature → Correct
Engine oil pressure → Correct
Voltmeter/ammeter → Voltage, current: correct
SAS (if fitted) → Engaged. Yaw, roll and pitch modes switched on. Check (See 2.14.1)
Friction of cyclic and collective pitch controls → Adjusted as required (see NOTE 1)

NOTE 1

When the friction locks are released, the controls may move under their own weight. Release the friction lock of the cyclic stick when the SAS is in operation.

NOTE 2

The minimum oil temperature for applying power with special engine lubricants are:

-15°C for 0.148 NATO
-10°C for 0.135 NATO
0°C for 0.156 NATO
+ 5°C for 0.149 NATO
} or equivalent specification (see SECTION 1 page 1.5)

2.9 - TAKE-OFF

CAUTION

AVOID LARGE AND MOVEMENTS OF THE DIRECTIONAL CONTROL PEDALS TO THE RIGHT IN ORDER NOT TO EXCEED Ng AND t4.

2.9.1 - Take-off and hover

Take off without hesitation and maintain hover, head into wind, at a height of 1 - 1.5 m (3 - 5 ft.) above ground.

Check that maximum torque is not exceeded.
Check the engine control instruments.

2.9.2 - Hovering turns

For hovering turns it is recommended to turn in the direction of rotor rotation (i.e. to the right).

Strong winds:

If wind velocity is above 46 km/h (25 kt), it is recommended to remain head into wind.

2.9.3 - Transition to forward flight

Transition to forward flight is carried out by slightly increasing pitch, without exceeding either the maximum permissible torque or the first detent.

NOTE: If SAS including yaw channel control is fitted, a short yaw movement may be noticed at approximately 50 knots when yaw channel is automatically disengaged.

2.9.4 - Climb

Optimum climbing speed is 120 km/h (65 kt) at altitudes up to 3000 m (10000 ft) and 100 km/h (55 kt) above 3000 m (10000 ft).

Climb is carried out with the collective pitch lever on the first detent for pressure altitude (Hp) below 3000 m (10000 ft) and on the second detent for pressure altitude above 3000 m (10000 ft), without exceeding the maximum torque value corresponding to the prevailing external conditions.

2.10 - IN FLIGHT OPERATIONS

2.10.1 - Cruising

Adjust the index of the torquemeter in accordance with the altitude and temperature conditions.

Cruising flight is carried out with the collective pitch lever on the second pitch detent, except in the torque required exceeds the maximum torque; in this case, select a lower cruise pitch.

NOTE 1: In flight, from time to time check the electrical system current (momentary position of selector switch with automatic return to the "VOLT." position).

NOTE 2: For checking the condition of the engine in flight, refer to paragraph 2.14.3.

2.10.2 - Manoeuvres

Tight manoeuvres (steep turns, pull-out) near the ground are not recommended when the collective pitch lever has been moved beyond the first detent.

When manoeuvres are too tight, the pilot is warned by a feedback of loads to the right on the stick, as the servo-control reaches its efficiency limit: the pilot must then reduce the load factor immediately. To do so, reduce the bank of the aircraft and reduce, if possible, collective pitch, then take a slight nose-up attitude to reduce airspeed.

2.10.3 - High speed Flight

At speeds higher than the VNE less 110 km/h (less 60 kt), keep one hand on the cyclic pitch control stick (whether the aircraft is fitted with SAS or not).

2.10.4 - Flying at low airspeed in cold weather

At low OAT, and when flying near the ground at low airspeed, the pilot should be particularly careful, as the loss of hydraulic pressure could lead to heavy control loads.

2.11 - DESCENT AND APPROACH

2.11.1 - Descent

Descent may be accomplished at any pitch value up to the first detent, provided that maximum rotor rpm are not exceeded, and at any speed up to the VNE.

NOTE: If SAS including yaw channel monitoring is fitted, a small yaw movement may be noticed at approximately 50 kt when yaw channel is automatically engaged.

2.11.2 - Final approach

- Check adjustment of the first detent according to the OAT.

- Adjust the mobile index of the torquemeter (see NOTE of para. 2.4).

Final approach must always be made head into wind, at a low rate of descent and at a recommended speed of 120 km/h (65 kt).

In case of vertical descent, do not exceed a rate of descent of 400 ft/min.

Recommended minimum torque on approach is 10%.

Reduce speed very gradually to ensure smooth flare-out.

Hover without exceeding the maximum permitted torque. On aircraft with an engine not fitted with a fuel flow limiter, do not increase pitch roughly (see paragraph 1.8 LIMITATIONS). On aircraft with an engine fitted with a fuel flow limiter, avoid rough increase of collective pitch and rapid movements of the rudder pedals which would cause the "ALARM" warning light to come on (see paragraph 3.6.1. EMERGENCY PROCEDURES).

2.12 - LANDING

2.12.1 - Normal landing procedure

With the aircraft in hover, gently decrease collective pitch.

As soon as the two skids are resting on the ground, the following operations are to be carried out:

- Slowly reduce pitch.
- For aircraft fitted with high landing gear; if the helicopter vibrates on its skids, place cyclic stick in neutral position or slightly rearwards.

- Disengage the SAS (if fitted) by means of the pushbutton located on the cyclic pitch stick.

2.12.2 - Landing on slopes

After having made a final approach head into wind, line up the aircraft during hover, so that steepest, uphill slope, is between nine and twelve o'clock with respect to aircraft. Given the skid plane angle, these conditions are those under which tilting of the aircraft after the first touch-down will be the smallest.

When the aircraft starts leaning over after the first touch-down, balance tilting of the rotor by placing the stick slightly towards uphill, without having the droop restrainers in contact.

If vibrations appear, modify the position on the ground or take-off, depending on the magnitude of the oscillations.

When the skids are resting on the ground (the tilting of the helicopter ceases to increase), decrease pitch without hesitation and bring the cyclic stick back towards the neutral position (if this is not done the aircraft may vibrate; bringing the stick back too rapidly may make the aircraft slide backwards). When collective pitch is at low position, hold the cyclic stick in the neutral position.

To stop or start the rotor, no special precaution is necessary, other than holding the controls in the neutral position.

NOTE: If the aircraft tilts to the left, with a small quantity of fuel remaining (less than 50 litres) (13.2 US. Gal. ; 11 UK. Gal.), the engine can be starved. Therefore, it is recommended at the end of a mission to avoid landing under these conditions.

When the aircraft is resting on a sloping ground, refuelling may only be performed partially.

The following quantities have been recorded for information only:

-390 litres (103 US. Gal. ; 85.7 UK. Gal.) for an aircraft facing a 5° slope.

-335 litres (88.4 US. Gal. ; 73.6 UK. Gal.) for an aircraft inclined to the right by 5°.

2.13 - AFTER LANDING

2.13.1 - Stopping the engine

ACTION	CHECK	INSTRUCTIONS
1) Set the controls to neutral.		
2) Move the fuel flow control lever fully aft.	The "ALARM" red warning light comes on. The rpm decrease.	
3) Tighten the cyclic and collective pitch friction locks on aircraft not fitted with the SAS.		
4) Return the "START" ("DEMARR") selector switch to the "OFF" ("ARRET") position when the rpm and t4 temperature have stabilized.	The "STOP" (BLOC) red warning light comes on then goes out. The "ENG.P" (H.MOT) light on the failure warning panel comes on.	If the engine does not stop rotating when the "START" (DEMAR) selector switch is moved to "OFF" (ARRET). Stop it by closing the fuel shut-off cock lever.
5) Set the booster pump switch to "OFF" (ARRET).		
6) Wait until the "STOP" (BLOC) warning light goes out, and switch all switches OFF except for the magnetic brakes.	The failure warning panel lights and all warning lights on the instrument panel go out.	

2.13.2 - Stopping the rotor

- Apply full rotor brake when rotor speed (NR) has fallen to 170 rpm or under.

- The rotor can be stopped, without stopping the engine, by proceeding as follows:

  1) Set the fuel flow control lever in fully closed position, (See NOTE); check that the rotor rpm pointer falls below the engine rpm pointer.

  2) Fully apply the rotor brake at 170 rpm and release is slightly just before the rotor stops in such a way that one of the rotor blades comes to rest forward.

3) Check that the rotor is no longer driven when the brake is fully released; if it is still driven, shut-down the engine or re-engage the clutch.

NOTE 1: Above 2000 m (6500 ft) this procedure may cause engine flame-out.

NOTE 2: If the wind velocity is higher than 40 km/h (20 kt) do not open the doors until the rotor has stopped turning.

2.13.3 - Stopping the rotor in strong gusty wind (force greater than 25 kt)

To stop the rotor - doors closed

1) Collective pitch control lever at "low pitch travel limit"; friction clamp tightened.

2) Push the cyclic control grip forward to the limit possible without causing the droop restrainers to hammer, and hold it in this position.*

3) Close the fuel flow control lever, and shut down the engine.

4) When rotor speed is 170 rpm, apply the rotor brake fully until the blades stop turning.

5) The cabin doors may now be opened to enable the rotor to be turned by hand to set a blade forward aligned along the aircraft center-line.

* Never allow the droop restrainers to hammer.

NOTE: In strong, gusty wind it is dangerous to approach the front of the helicopter during spinning or stopping of the rotor, as gusts may cause the blades to flap down to within 1 m (3 ft) of the ground.

2.14 - OPERATIONAL CHECKS

2.14.1 - Checking the SAS (if installed)

The following checks should be carried out before take-off:

1) Checking disengagement of servo dampers

. Depress the SAS disengagement push-button (pilot's cyclic stick), the "EMBRAYAGE" ("ENGAGEMENT") switch of the control panel should trip.
. Return switch to "MARCHE" ("ON").
. Carry out the same check on the co-pilot's stick (if fitted).

2) Checking the magnetic brakes

. Momentarily depress the "magnetic brake" disengagement push-button on pilot's cyclic stick; the stick should be free.
. Release the push-button; the stick should be anchored again.
. Carry out the same check on the co-pilot's stick (if fitted).

2.14.2 - Checking the torquemeter

- Depress the "TEST" push-button.
. The pointer should stop opposite the zero mark.
. The maximum torque warning light should flash.

2.14.3 - Checking the condition of the engine

This check is to be carried out in flight.

1) Set the aircraft in stabilized level flight, with the heating system off.

2) Bring collective pitch to the first flexible detent, or, a pitch corresponding to a torque of about 80%

3) Note the following parameters: torque, t4, pressure altitude, OAT.

4) Enter torque and t4 values in the curve shown on the following page. The lines drawn from the temperature correction specific to the engine and the OAT correction should meet in the area of correct operation.

EXAMPLE:

Torque read	① = 80%
t4 read	④ = 450°C
Hp	② = 1750 m (5770 ft)
OAT	③ = 0°C

Correction specific to the engine ⑤ = -10°C

NOTE: The correction specific to the engine is given at the bottom of the "never exceed speed" name plate on the instrument panel.

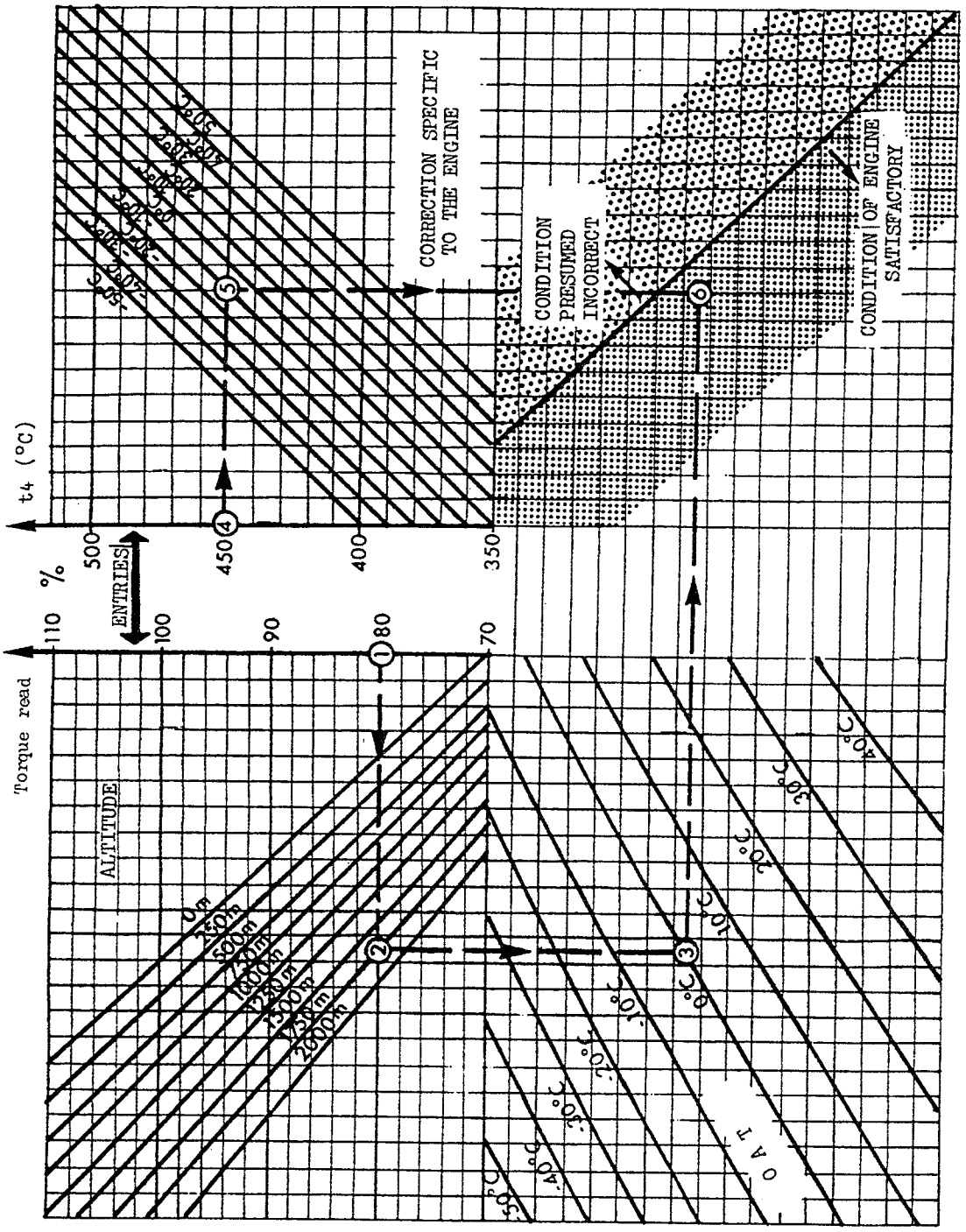
The correction is calculated on an air-intake without fitments. When an optional installation is fitted onto the air-intake, correct t4 by the value relevant to the installation.

This value is given in the appropriate supplement. If in doubt, the check is to be carried out on an air-intake without fitments.

Operation of the engine is satisfactory (intersection at point ⑥).

In case of doubt over the operation of the engine, carry out two or three checks at different altitudes.

When operation of the engine is confirmed as being faulty, refer to the Maintenance Manual for the steps to take.



Engine condition check
Figure 1

Section 3
EMERGENCY PROCEDURES

CONTENTS

3.1. LANDING IN AUTOROTATION

3.1.1. Autorotative landing procedure (except hover)

1. Autorotative landing with power off or following engine failure

   1. Apply full low collective pitch. Do not apply forward cyclic stick, unless the airspeed, when engine failure occurs, is less than 100 km/h (55 knots). If the rotor speed tends to approach 430 r.p.m., slightly increase collective pitch.
   2. Manoeuvre so that the helicopter will be nose into wind for the final approach.
   3. Establish an approach speed between 120 and 140 km/h (65 to 75 knots).
   4. At approximately 20 m (65 ft) make a moderate flare.
   5. Maintain this attitude until the aircraft is 1 to 2 metres (3 to 6 feet) above the ground, but start increasing collective pitch slightly when the aircraft is at 6 to 8 metres (20 - 25 ft) above the ground to reduce the rate of descent.
   6. At about 1 to 2 metres (3 to 6 feet) further increase collective pitch while maintaining the aircraft nose-up attitude. When airspeed is about 15 to 20 km/h (8 to 10 knots), level the aircraft and contact the ground without side slipping.
      - Do not lower the collective pitch lever rapidly on touch down,
      - Do not attempt to perform autorotation at zero speed.
   7. On touch down, take care not to pull the cyclic stick back.

2. Rapid descent in autorotation : When rapid descent in autorotation is required (case of engine fire) the pilot has to :

   1. place the aircraft in a slight left hand slipping attitude and descend as fast as possible, while complying with VNE and maximum rotor r.p.m. limitations.
   2. apply the general autorotative landing procedure given in paragraph above during final approach and landing.

3.1.2. Autorotative landing procedure from hover

1. Autorotative landing from hover I.G.E.

   1. If possible, control the aircraft in yaw.
   2. Cushion touch down with collective pitch.

2. Autorotative landing from hover O.G.E.

1. Push the cyclic stick forward, and increase airspeed according to available altitude.

2. End the autorotation according to the general procedure given in 3.1.1.

3.1.3. Autorotative landing procedure for training purposes

1. Disengage the S.A.S. (if installed)

2. Apply the general procedure described in 3.1.1.

3. Fully close the fuel flow control lever just before the flare

CAUTION ...

TRAINING AUTOROTATIONAL LANDINGS MUST BE MADE "HEAD INTO THE WIND", AVOIDING WINDS FROM THE STARBOARD SIDE.
IT IS PROHIBITED TO END THE FLARE WITH APPLICATION OF POWER.

After each autorotation apply the re-engagement procedure given in SECTION 2- NORMAL PROCEDURES, paragraph 2.5.2.

3.2. ENGINE FAILURES

3.2.1. Engine failure in flight

Complete failure of the engine is indicated by the following :

- Torquemeter indicates zero
- Generator speed moves towards zero
- Rotor speed decreases . Rotor low speed warning indicator may flash (required by FAA and RAI).
- the fuselage shows a tendency to turn to the right.

CAUTION ...

THE TENDENCY OF THE FUSELAGE TO TURN TO THE RIGHT IS VERY LOW IN CRUISING FLIGHT.

In case of engine failure in flight :

1. Apply the appropriate autorotative landing procedure (see 3.1)

2. Close the fuel flow control lever.

3. Place the starter switch in "ARRET" (OFF) position.
Then, except if the conditions are such that a re-lighting may be attempted :

- Switch the booster pump OFF
- Close the fuel shut-off cock
- Just before landing, place the battery, generator, and alternator (if installed), switches in "OFF" position.

3.2.2. Re-lighting the engine in flight

Provided a standard jet fuel is used (see 1.4.4.), re-lighting the engine can be attempted throughout the whole flight envelope if the autorotation time available is at least 45 seconds (700 m. or 2300 ft above the ground).
To re-light the engine once the "stop-start" red warning light has gone out, proceed as follows :

1. Check that the fuel shut-off cock is open and that the fuel booster pump is on "marche" ("run").
2. Check that the fuel flow control lever is in the "full idle" position.
3. Fly at an IAS of 120 Km/hr (65 Knots).
4. Set the starting selector switch to "MARCHE" ("RUN").
5. Push the starting selector switch to "ALLUM" (IGN) and hold it until t4 temperature reaches 400°C.
   If t4 temperature has still not risen after 10 seconds, release the selector switch, then, reset again to "ALLUM" (IGN).
6. Monitor t4 temperature which should normally remain between 400°C and 550 °C and in all cases below 750 °C.
7. As soon as the "DEM" ("START") green indicator light has gone out, slowly move the fuel flow control lever until it comes against the forward stop. Check that the engine speed stabilizes at 43500 $^{+400}_{-0}$ r.p.m.

   NOTE :
   Above 2000 m (6500 ft) it is advisable to accelerate the engine without waiting for the governor to take over idling speed as soon as the green DEM (START) warning light goes out.

3.2.3. Abnormal operation of engine governor

1. Hunting : Hunting is indicated by variations in rotation speed.
   - For small variations : reduce altitude
     If hunting continues :
     Isolate the governor from the circuit.
   - For large and rapid variations, isolate the governor from the circuit immediately.
2. Flight with governor isolated from the circuit. Move the fuel flow control lever to obtain 43000 rpm and continue in level flight, if possible at constant pitch (any pitch change should be accompanied by modification of the fuel flow control lever position to maintain constant engine rating), land in autorotation. (Should the engine oil pressure warning light illuminate, land as soon as possible).

   NOTE : During all these operations, the "ALARM" warning light remains on.

3.2.4. Surging

This phenomenon which may occur if the pilot has exceeded the pitch limitations (particularly in hot weather) is indicated by :

- violent noise at the exhaust pipe
- a drop in r.p.m.
- an increase in t_4 temperature

In case of surging :

1. Reduce immediately collective pitch to the greatest possible extent
2. Do not touch the fuel flow control lever
3. Check the various engine parameters
4. If surging stops, apply collective pitch gently while remaining within t_4 limitations and reduce flight time as much as possible with respect to the mission.
5. Report the incident on return from flight. Refer to checks specified in the maintenance manual.

3.3. ENGINE FIRE

3.3.1. Fire on starting

1. Close the fuel shut-off cock and, if necessary, apply the rotor brake.
2. Move the fuel flow control lever back (if it has been pushed forward).
3. Switch the booster pump off
4. Crank the engine (ventilation)
5. Fight the fire, from the ground, with fire extinguishers which should be available in the vicinity of the aircraft.

3.3.2. Fire in flight

1. Close the fuel shut-off cock and reduce collective pitch
2. Move the fuel flow control lever back
3. Switch the booster pump off.
4. Set the starting switch to "OFF"
5. Crank the engine (ventilation), if sufficient time is available
6. Land as described in paragraph 3.1.1.

3.4. SMOKE IN THE COCKPIT

Identified smoke :

- Switch the corresponding system off.

Unidentified smoke

1. Switch battery, a.c. and d.c. generators off.
2. Ventilate the cockpit by opening the sliding windows

3. Switch all electrical equipment switches off
4. As necessary, switch heating system off
5. Reset, one by one, all electrical equipment switches until the origin of the smoke is identified.
6. Leave the equipment or the generator concerned off.
7. Land as soon as possible

3.5. TAIL ROTOR FAILURE

Tail rotor failure is indicated by an uncontrollable yaw movement to the left. The rate of turn is dependent on the amount of power applied and airspeed at the time of the failure.

3.5.1. Failure in hover or at low speed and low altitude

1. Immediately establish autorotative flight by reducing collective pitch ; the fuselage rotation will stop, then reverse its direction due to friction loads in the main gear box.
   The tendency of the fuselage to rotate to the right may be overcome either by acting on the cyclic stick or by applying some power.
2. During the final approach, switch the engine off and land with an accentuated flare

In the event of failure near the ground, immediately reduce the pitch, even if a very rough landing will result.

3.5.2. Failure during climb at altitude

1. Reduce collective pitch as necessary to cancel out the side slip to the right.
2. Increase airspeed to improve the fin efficiency and be able to increase the collective pitch.
3. Control heading by the roll channel.
4. Try to find an area where landing in autorotation with an accentuated flare can be made. During final approach, switch the engine off.

3.5.3. Failure in cruising flight

The yaw movement can be very small :

1. Control heading by the roll channel
2. Try to find an area where landing in autorotation with an accentuated flare can be made. During final approach, switch off the engine.

3.6. INCIDENTS AND FAILURES IN SYSTEMS

3.6.1 - Incidents and failures shown by the warning lights.

WARNING LIGHT "ON"	FAILURE	PILOT'S ACTION
FIRE	- Engine fire	- Refer to paragraph 3.3
H.BTP or MGB.P	- Main gear box oil pressure drop	- Land as soon as possible
COMB. or FUEL	- Usable fuel level below 50 litres (13.2 US.gal)(11Imp.Gal) approximately	- Avoid significant attitude changes and particularly nosedown attitudes. - Avoid landing on slopes (falling away to the left by more than 5°) NOTE : Enough fuel remains for 15 minutes flight.
H.MOT or ENG.P	- Engine oil pressure drop (pressure below 0.8 bar = 11.6 psi)	- Check oil pressure gauge. - If trouble confirmed: - Land as soon as possible and shut down the engine.
BAT. or BATT.	- Battery is isolated from the d.c. network and is no longer charging	- Check position of switch - Monitor the voltage - Continue flight according to circumstances
"BATT. TEMP." (according to version)	- Excessive battery temperature (over 71°C)	- Set the "BATT" switch "OFF" - Land as soon as possible
T.H. BTP or MGB.T.	- Abnormal increase of the main gear box oil temperature	- Reduce power . If the warning light goes out, continue the flight . If the warning light remains "ON" ; land as soon as possible.
ALTER or ALT.NR (optional)	- A.C. power supply system defective NOTE : The "NAV" warning light will come "ON" at the same time	- Check position of switch - Attempt resetting - Continue flying or land According to circumstances.
ON AIRCRAFT WITH AN ENGINE FITTED WITH THE FUEL FLOW LIMITER SEE ALSO ILLUMINATION OF THE "ALARM" WARNING LIGHT		
PITOT (Optional)	- "PITOT" switch in "ARRET" (OFF) position or PITOT head heating system defective	- Check : "PITOT" switch set to "MARCHE" (ON). - According to ambient conditions, decide whether to continue the flight or not.

WARNING LIGHT "ON"	FAILURE	PILOT'S ACTION
GENE or GEN.	- D.C. power supply system defective.	- Check position of switch. Attempt resetting if a reset push-button is installed. - If not successful, reduce the current drain if possible and continue flight according to circumstances while monitoring voltage.
FILT or F. FILT	- Fuel filter beginning to be clogged.	- Flight may be continued. For this it is advisable to reduce pitch gradually until "FILT" warning light goes out as long as sufficient power is available.
	NOTE: The engine may be prematurely damaged in the filter by-pass is opened. After landing carry out checks specified in the Maintenance Manual (MDE).	
NAV. (optional)	- Failure of the 26 V. 400 Hz A.C. power supply system. The ADF (or VOR) is inoperative.	- Do not rely on the ADF (or VOR) readings.
ON AIRCRAFT FITTED WITH A FUEL FLOW LIMITER SEE ALSO ILLUMINATION OF THE "ALARM" WARNING LIGHT.		
ON AIRCRAFT FITTED WITH A FUEL FLOW LIMITER		
"ALARM" for a few seconds during very rapid power demand (pitch, rudder or cyclic stick)	Operation of the fuel flow limiter. The power demand is too large.	If the power demand was particularly high (rough manoeuvre), NAV and ALTER lights come on. Power demand must be reduced.
ALARM Other than a rapid power demand	If engine rpm are above the governed rpm: The governor is fully open.	Isolate the governor (See paragraph 3.2.3).
	If engine rating is below or equal to the governed rating. - The fuel flow control lever is in intermediate position. or - The fuel flow limiter has failed.	Reduce collective pitch until the light goes out. Check that fuel flow control lever is in the fully open position. If so: - Land at the nearest airfield. - Land with smooth application of the collective pitch and rudder controls.

WARNING LIGHT "ON"	INCIDENT OR FAILURE	PILOT'S ACTION
POST MOD. 07.2244 "CHIP"	- Metal particles detected on engine magnetic plug.	Begin to prepare the aircraft for a possible landing with engine shut-down. (Flight outside danger area) LAND AS SOON AS POSSIBLE <u>After Landing</u> - Remove the magnetic plug. - Check that electrical contact is positively established by one or more metal particles. Retain the particles for subsequent analysis. - Clean the magnetic plug and put it back in place. - Carry out a ground run for 5 minutes, monitoring all engine parameters. - Upon completion of the ground run: . If the CHIP warning light: illuminates again due to one or more particles: ABORT THE MISSION . If the CHIP warning light does not illuminate resume flight and prepare the aircraft for a possible landing with engine shut-down. (Flight outside danger area). In this case fly to the nearest base while monitoring the engine oil temperature. If the CHIP warning light illuminates in the meantime land as soon as the form of the ground permits. ABORT THE MISSION
N.MINI.ROTOR (ROTOR LO. RPM) (according to version - required by F.A.A. and R.A.I.).	- Dropin rotor speed	- Check rotor speed - Establish autorotative flight, if required.

<u>ROTOR ALARM SYSTEM</u> (according to version - required by F.A.A. and R.A.I.).

The rotor alarm system operates if the rotor speed drops below 360 rpm: if the audible warning is heard, refer to above table for action to take.

3.6.2 - Incidents and failures not shown by warning lights

SYMPTOM	INCIDENT OR FAILURE	PILOT'S ACTION
"t4" temperature above the values stated in Section "Limitations" para. 1.4.2.	Abnormal t4 temperature	Reduce collective pitch. If temperature remains out of tolerance: land as soon as possible.
Engine oil temperature above 85°C	Abnormal engine oil temperature	Reduce collective pitch. If temperature remains out of tolerance: land as soon as possible.
Engine oil pressure between 0.8 and 1.5 bar (11.6 - 21 psi) (Yellow arc on gauge)	Abnormal engine oil pressure	Monitor the oil pressure and temperature - Be ready to land immediately if the oil pressure warning light comes "ON"
Torquemeter indicator reading is zero or erroneous	Torquemeter indicator failure	Fly the aircraft by collective pitch, going by pitch indication read on the quadrant located at the foot of the pilot's collective pitch lever, in compliance with recommendations set out in par. 3.6.3. below.
On ENG./N.ROT dual tachometer indicator one pointer indicates zero	Failure of the dual indicator	Gen. Speed pointer: Refer to indication shown by the other pointer Rotor Speed pointer: Do not desynchronize in flight.
Sudden movement or repeated jerks in the flying controls	Failure of SAS	- Cut off SAS - In case of characteristic failure of one of the channels cut off the corresponding channel. If generalized erratic reactions set in: - Disengage (cyclic stick) - Cut off power supply to the channels. Continue flight without SAS.

SYMPTOM	INCIDENT or FAILURE	PILOT'S ACTION
- Cyclic stick moves aft and over to the right. - Collective lever moves down when pitch is above 8° and up when pitch is below 8°.	Failure of servo-controls.	Stabilize the aircraft attitude rapidly. Check that the "SERVO" switch is on. If failure is confirmed: . cut-off servo switch, SAS, and magnetic brakes (if installed). . Continue flight, as desired, while tightening the friction locks. Recommended speed is 150 km/h (80 kt). Maximum speed is 180 km/h (97 kt). Maximum bank is 30°. . Land at the end of a very flat final approach. CAUTION: 1. ON ENTERING THE HOVER A CONSIDERABLE FORCE WILL BE NECESSARY TO MOVE THE PEDALS. 2. GREATER FORCE IS NECESSARY TO MOVE THE FLYING CONTROLS. 3. ON LANDING, TIGHTEN THE COLLECTIVE PITCH FRICTION BEFORE REDUCING ENGINE SPEED.

In cold weather (temperature below -20°C) and at very low speed, a heavy load may be felt on the cyclic stick. If this condition is encountered, landing the helicopter at slow forward speed (15 to 20 kt) or (30 to 40 km/h) is strongly recommended.

3.6.3 - Torquemeter failure

1) When in hovering and in climb, do not exceed collective pitch values given below.

- When in hover, keep the aircraft heading into wind, if possible, and avoid any sudden manoeuvres of the tail rotor control pedals.

- Avoid taking off in a turn, especially to the right.

2) When in level flight, do not override the first detent. The second detent may be used when the OAT is between +10°C and +25°C and pressure altitude is between 0 and 1500 m (5000 ft).

OAT (°C) / Hp (m)	MAXIMUM COLLECTIVE PITCH										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-500	11.1	11.3	11.5	11.7	11.9	12	12.2	12.4	12.6	12.5	12.3
0	11.4	11.6	11.8	12	12.2	12.3	12.5	12.7	12.9	12.5	12.3
500	11.7	11.9	12.1	12.3	12.5	12.7	12.8	13	12.9	12.5	12.3
1000	12	12.2	12.4	12.6	12.8	13	13.1	13.1	12.9	12.5	
1500	12.3	12.5	12.7	12.9	13.1	13.1	13.1	13.1	12.9		
2000	12.5	12.8	13	13.1	13.1	13.1	13.1	13.1	12.9		
2500	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1			
3000	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1			

OAT (°C) / Hp (ft)	MAXIMUM COLLECTIVE PITCH										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-1500	11.1	11.3	11.5	11.7	11.9	12	12.2	12.4	12.6	12.5	12.3
0	11.4	11.6	11.8	12.0	12.2	12.3	12.5	12.7	12.9	12.5	12.3
1500	11.7	11.8	12.1	12.3	12.5	12.7	12.8	13.0	12.9	12.5	12.3
3000	12	12.1	12.3	12.5	12.7	12.9	13.1	13.1	12.9	12.5	
4500	12.3	12.4	12.6	12.8	13.0	13.1	13.1	13.1	12.9		
6000	12.5	12.7	12.9	13.1	13.1	13.1	13.1	13.1	12.9		
7500	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1			

3.6.4 - Damage to the freewheel bearing

Rotation of freewheel bearing in its casing or internal damage is distinguished by:

- a smell of burning
- noise
- high-frequency vibrations
- jerks in yaw.

When failure is detected:

LAND AS SOON AS POSSIBLE.

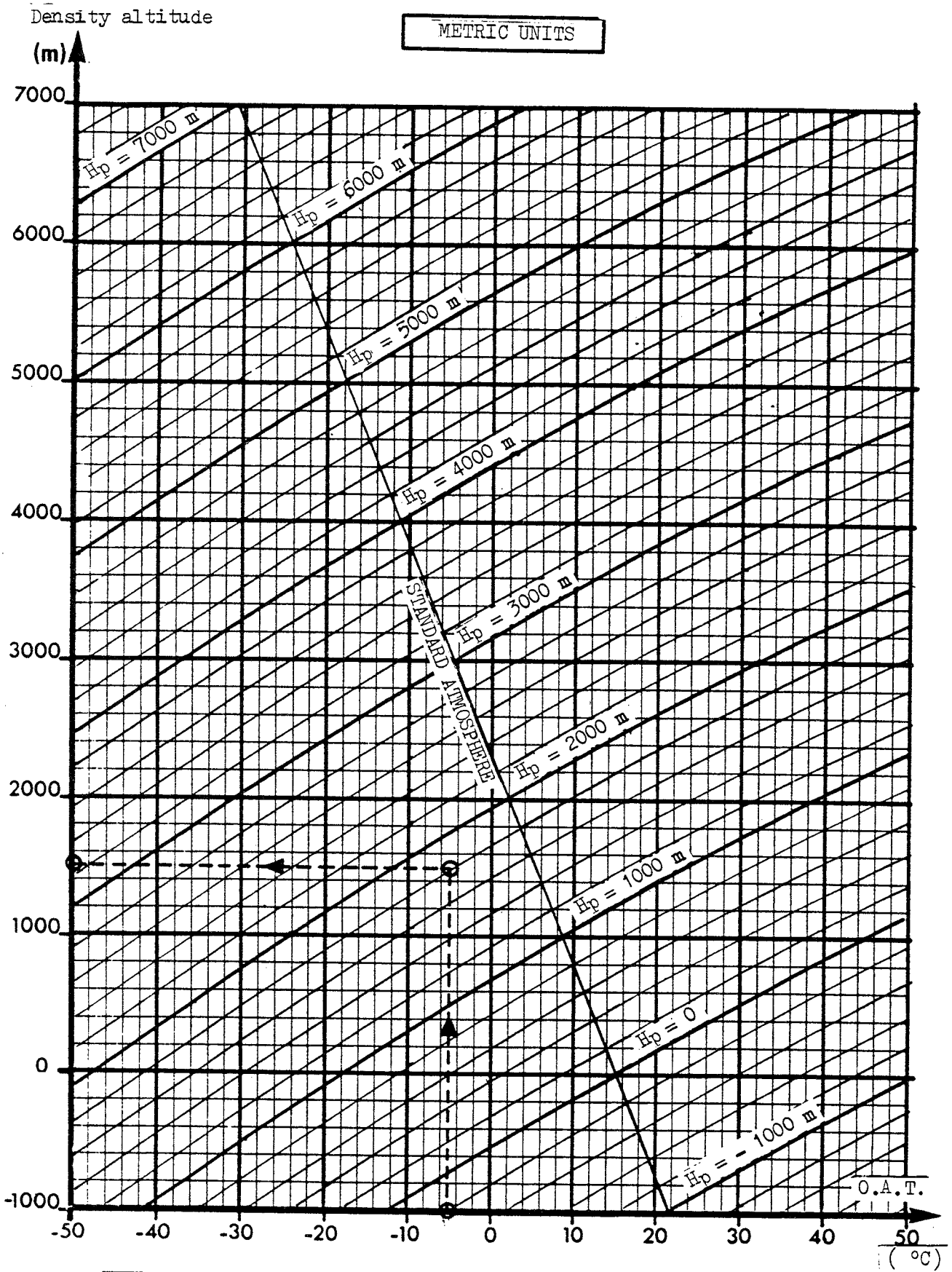
Section 4
PERFORMANCE

CONTENTS

4.1. GENERAL

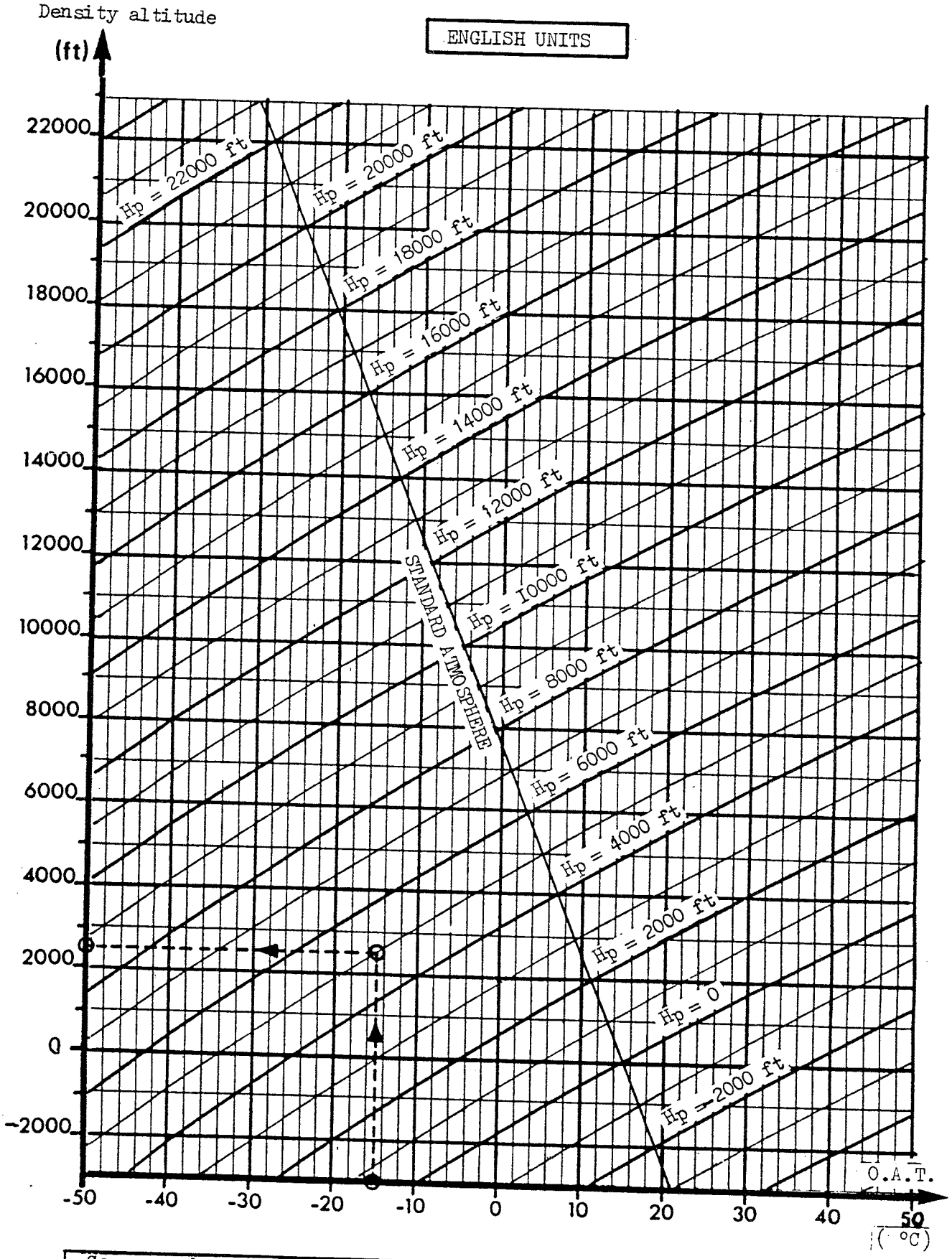
4.1.1. Relative airspeed in rearward or sideward flight

Hovering at all headings has been demonstrated within the complete flight envelope up to wind velocities of 18 knots ; however this value is not to be considered as a limit value. For example, a value of 30 knots has been demonstrated at maximum weight, at sea level with a neutral c.g. location.



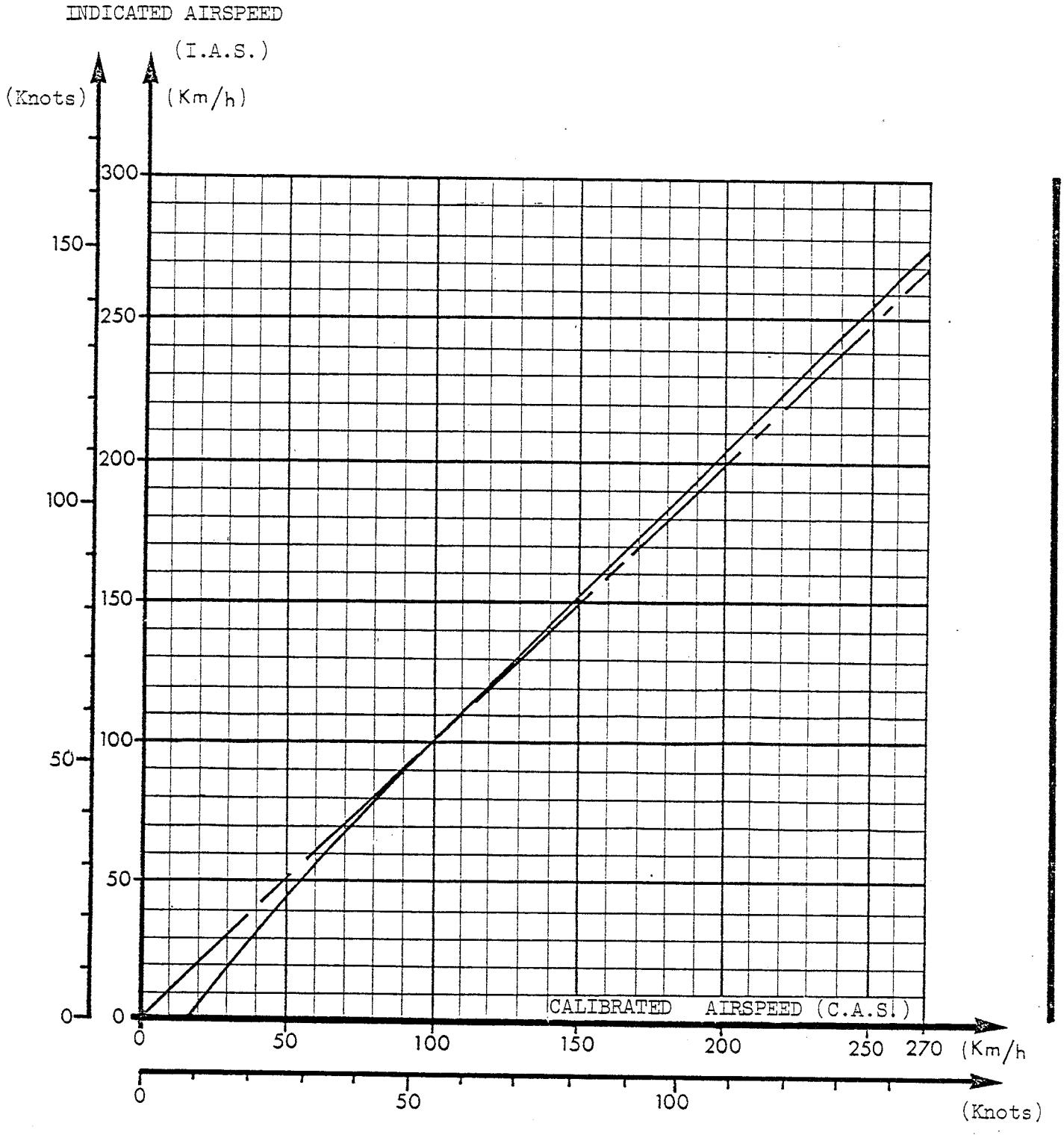
Correspondence diagram : pressure altitude versus density altitude

Figure 1



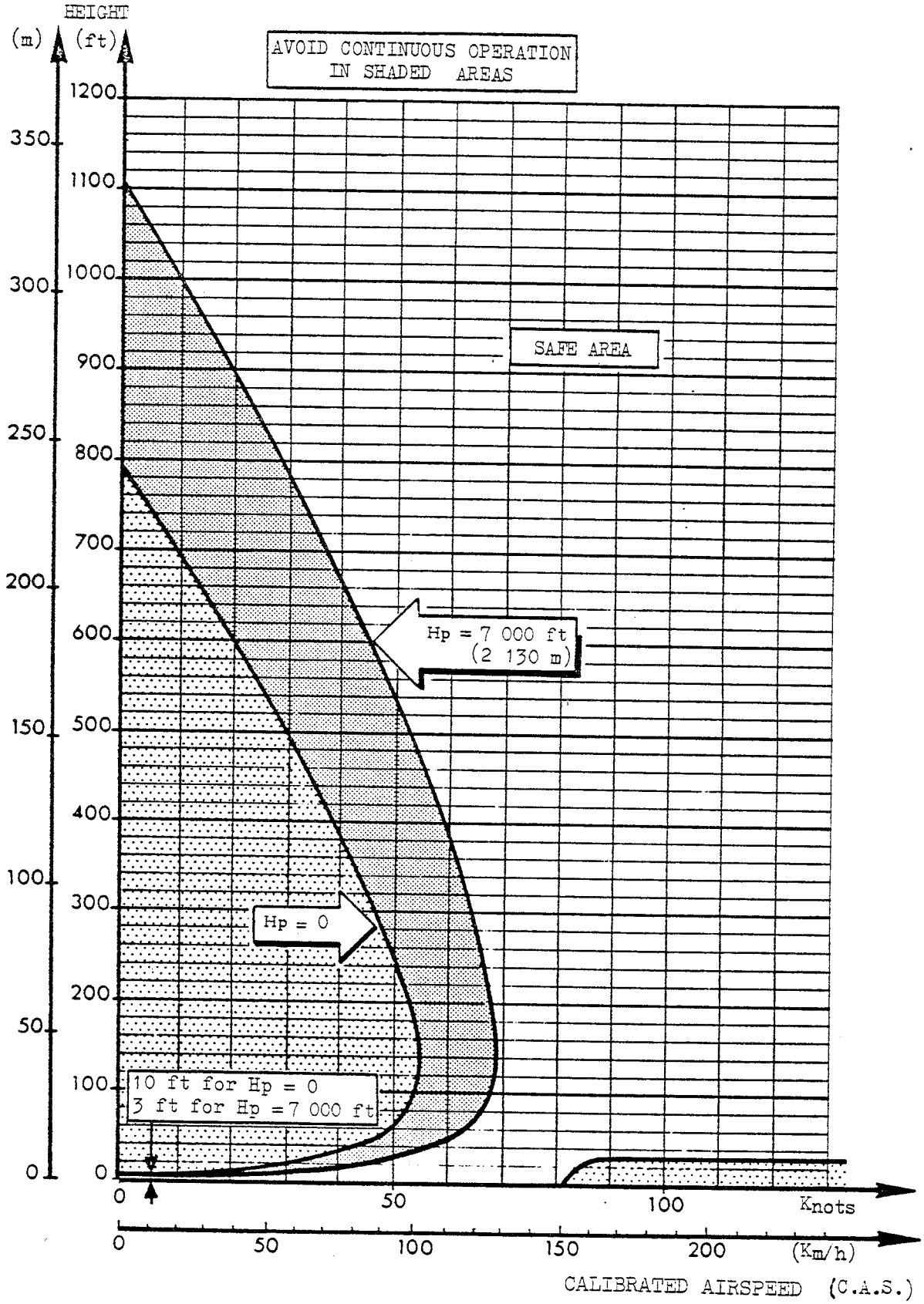
Correspondence diagram : pressure altitude versus density altitude

Figure 1a



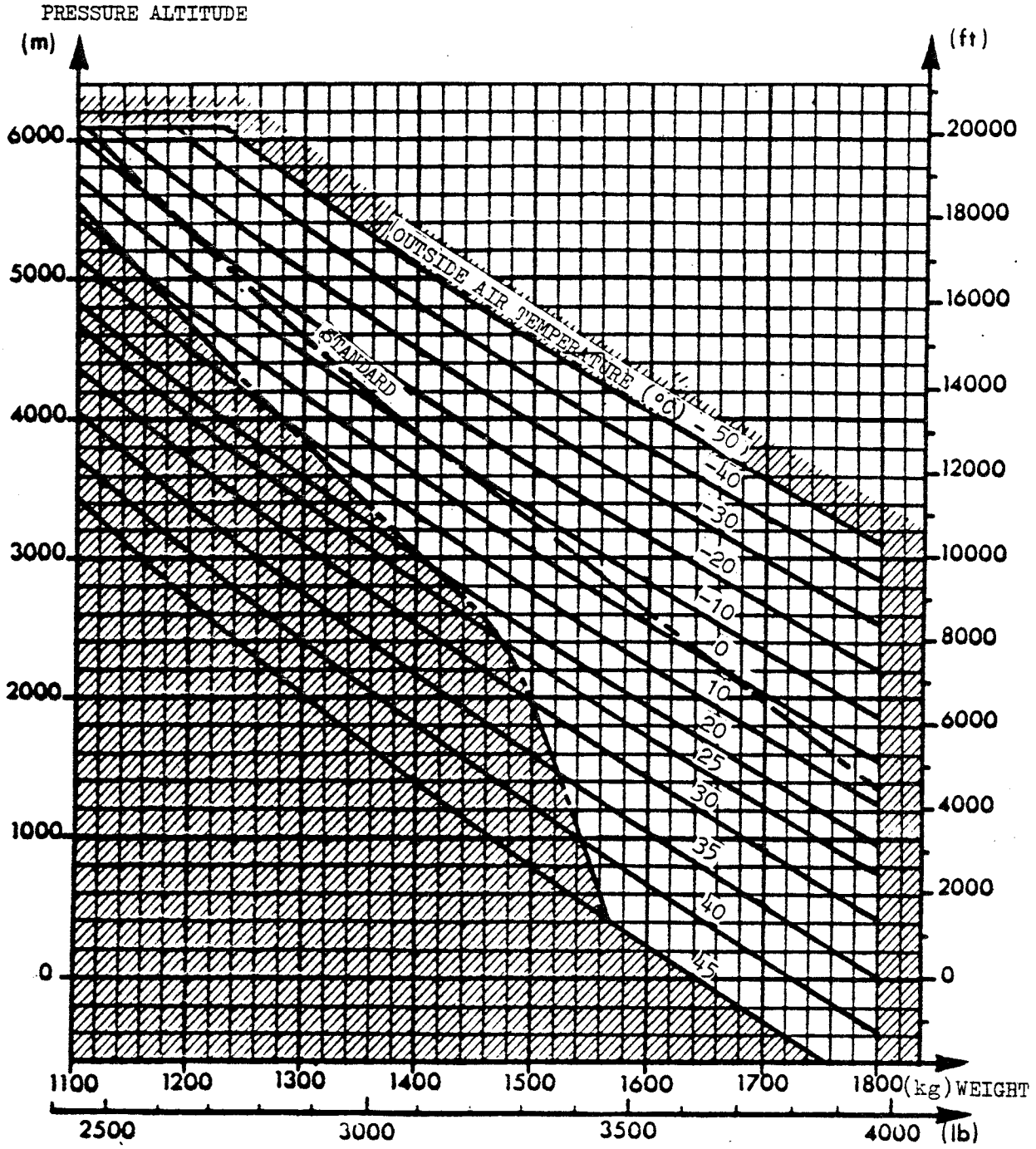
Calibration of pitot-static system

Figure 2



Height-velocity diagram at maximum weight
Standard atmosphere

Figure 3

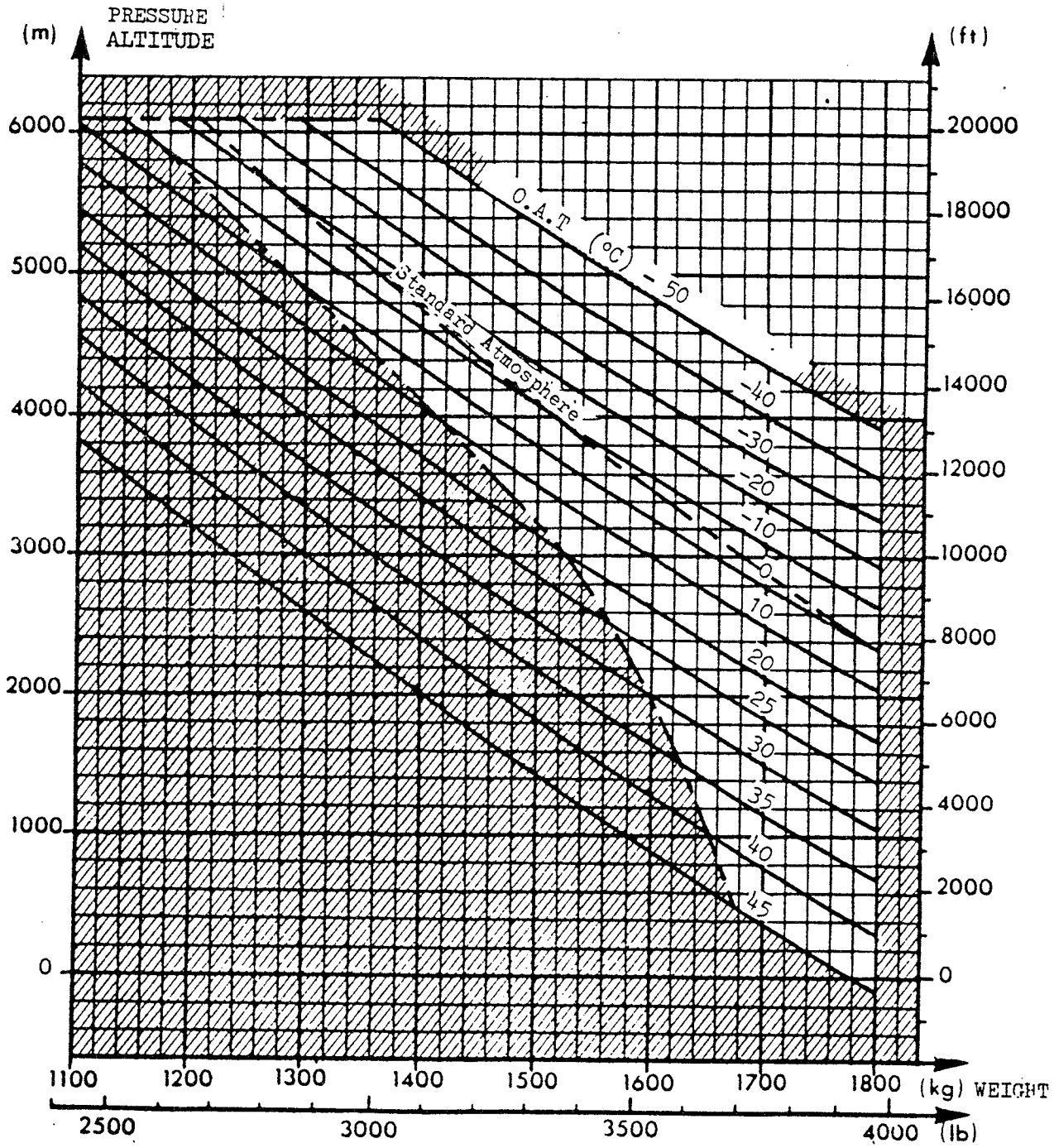


Areas outside flight envelope

Ceiling in hover O.G.E.

(Recommended take-off weight)

Figure 4

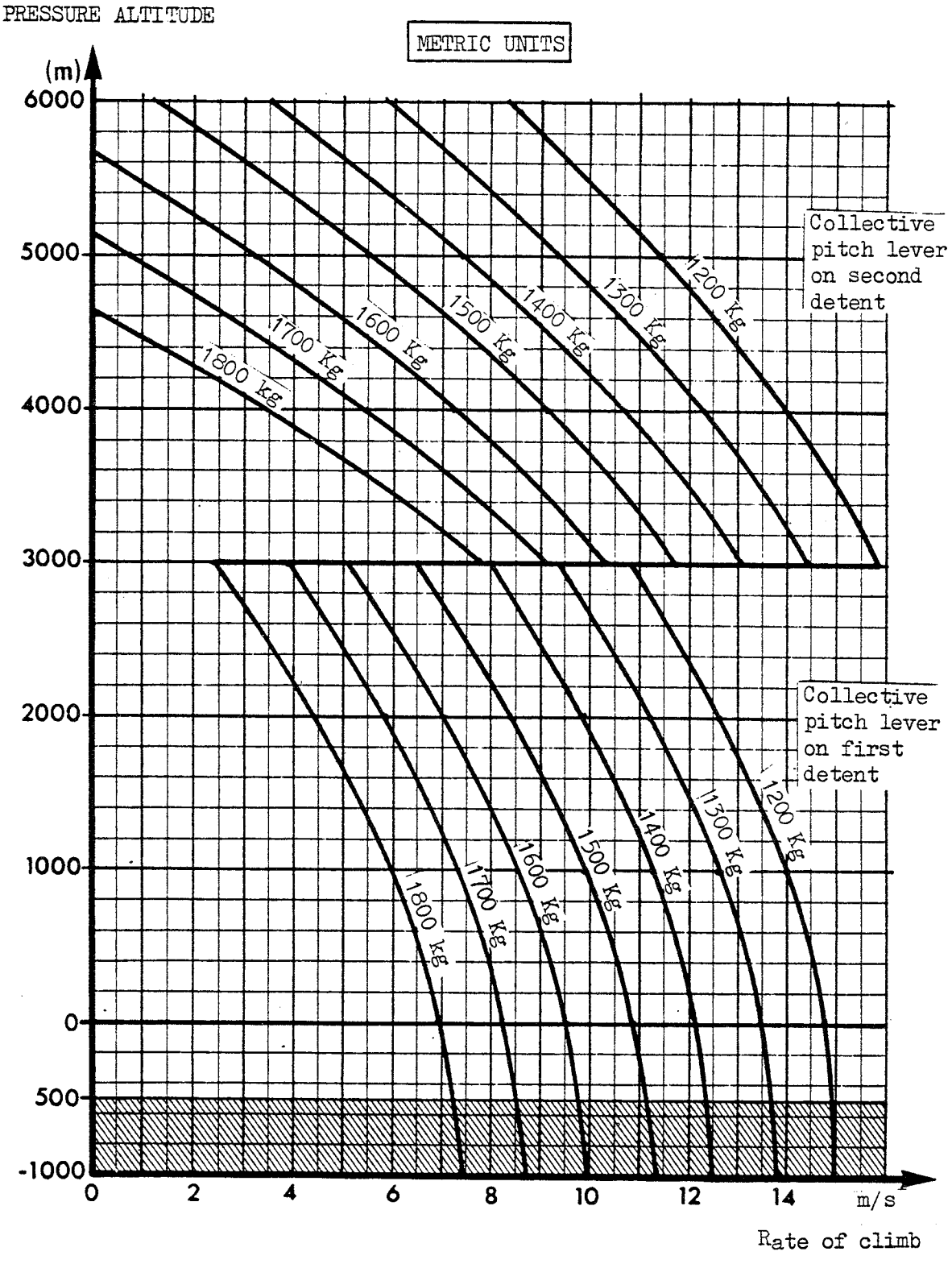


Area outside flight envelope

Note : The weight corresponding to the ceiling in hover I.G.E. given in the above graph for the field elevation and ambient temperature, is an operational limitation on take-off.

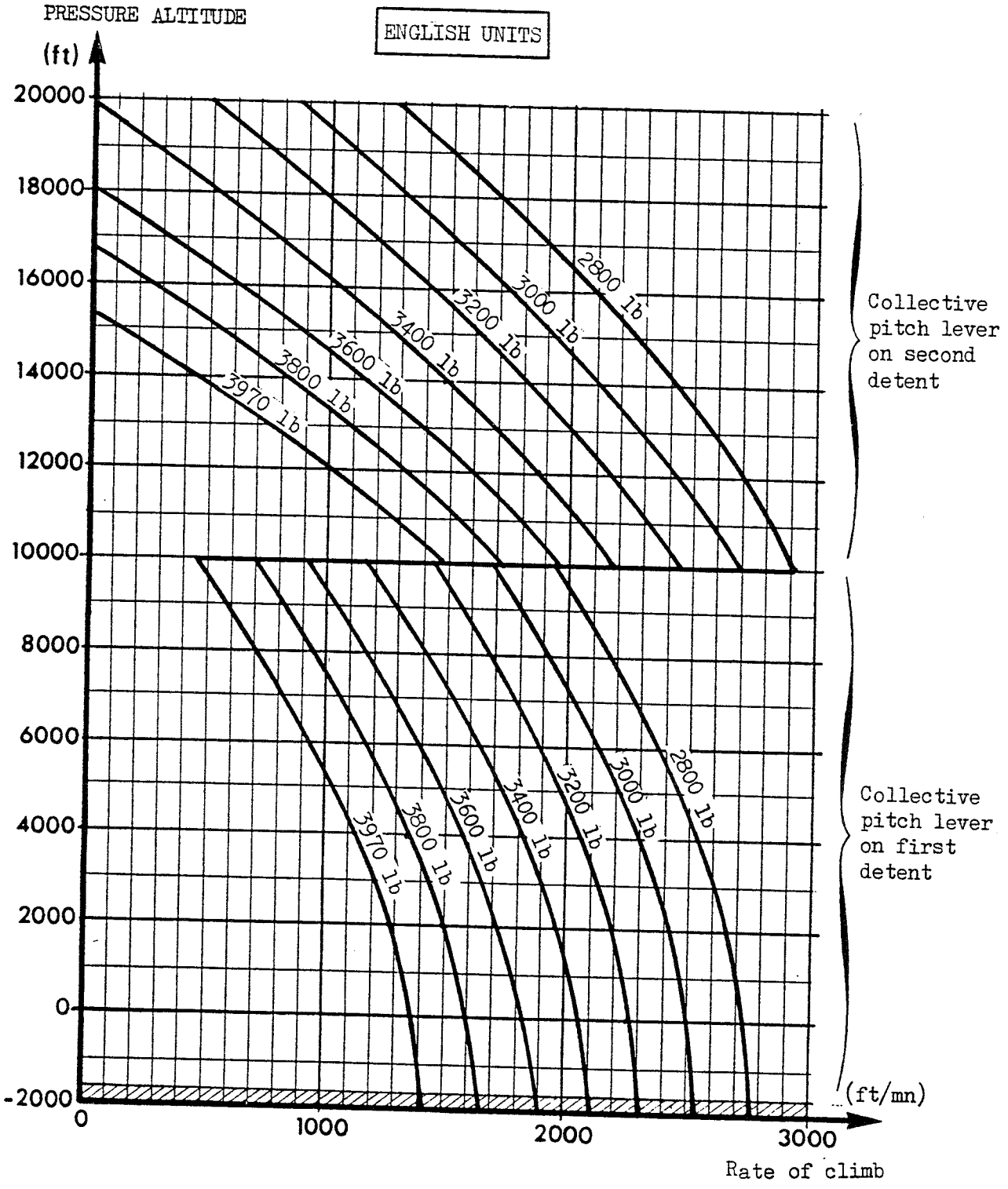
CEILING IN HOVER - I.G.E. (3ft.).

Figure 5



Rate of climb

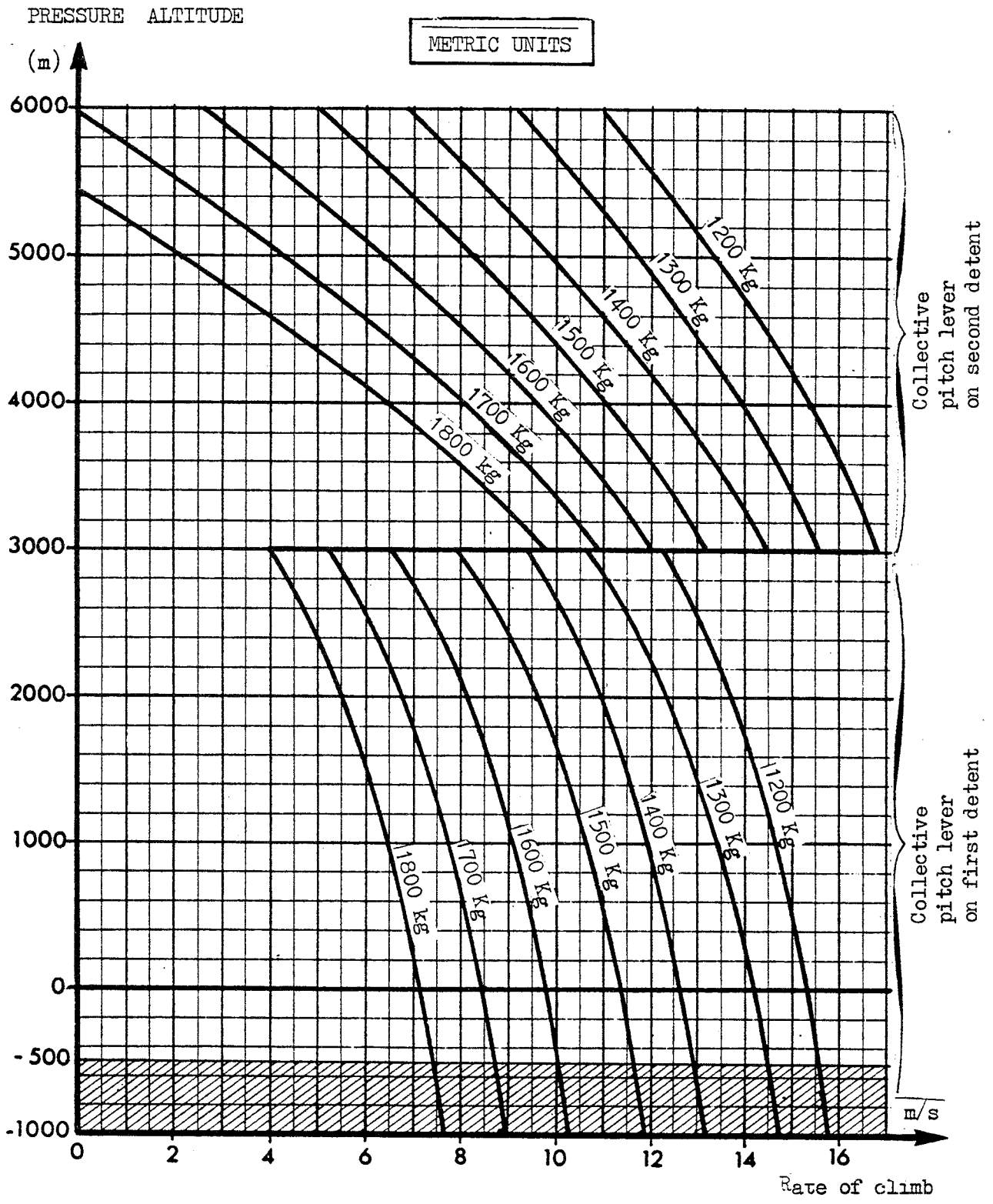
Figure 6



STANDARD ATMOSPHERE

Rate of climb

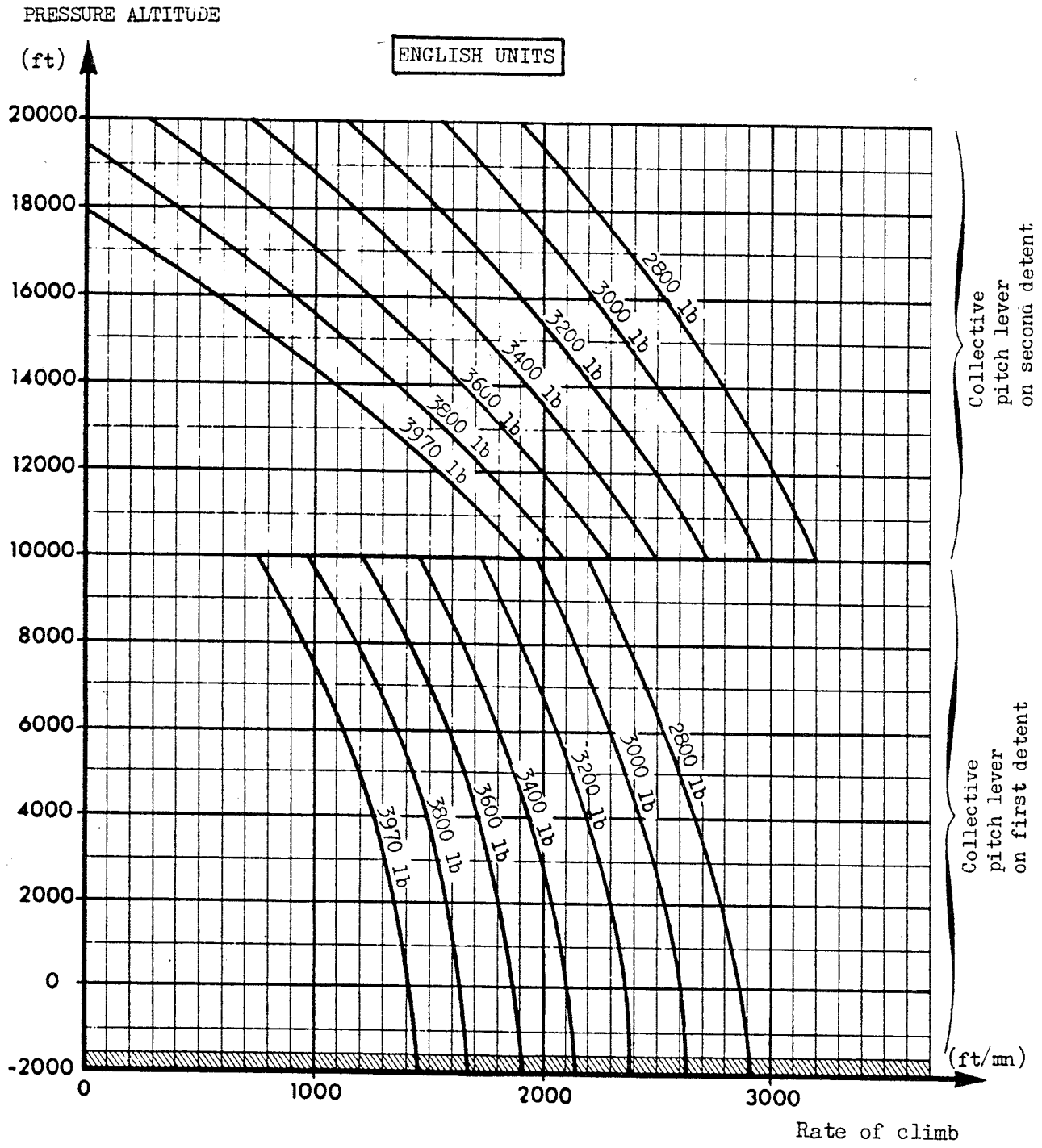
Figure 6a



20°C BELOW STANDARD ATMOSPHERE

Rate of climb

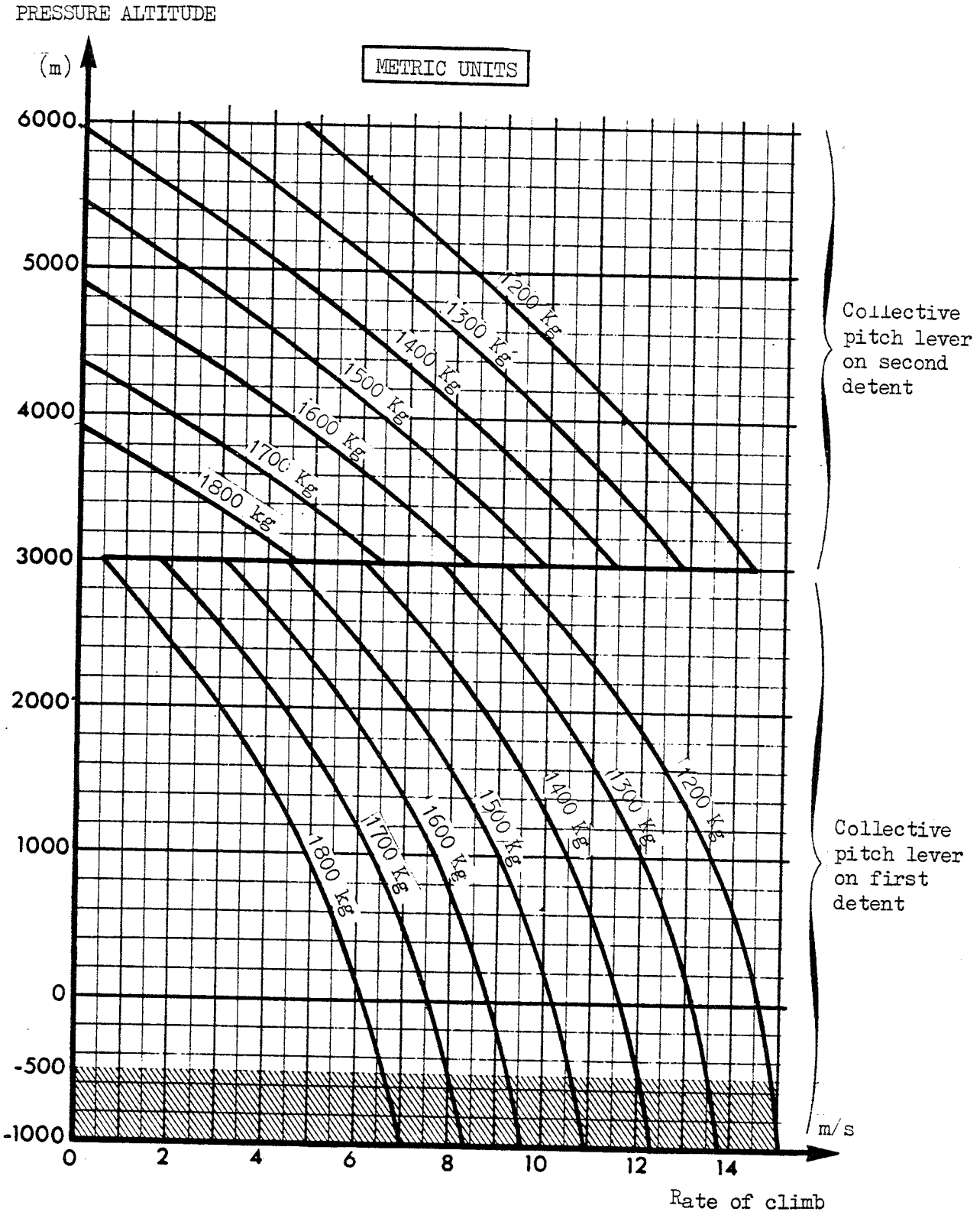
Figure 7



20°C BELOW STANDARD ATMOSPHERE

Rate of climb

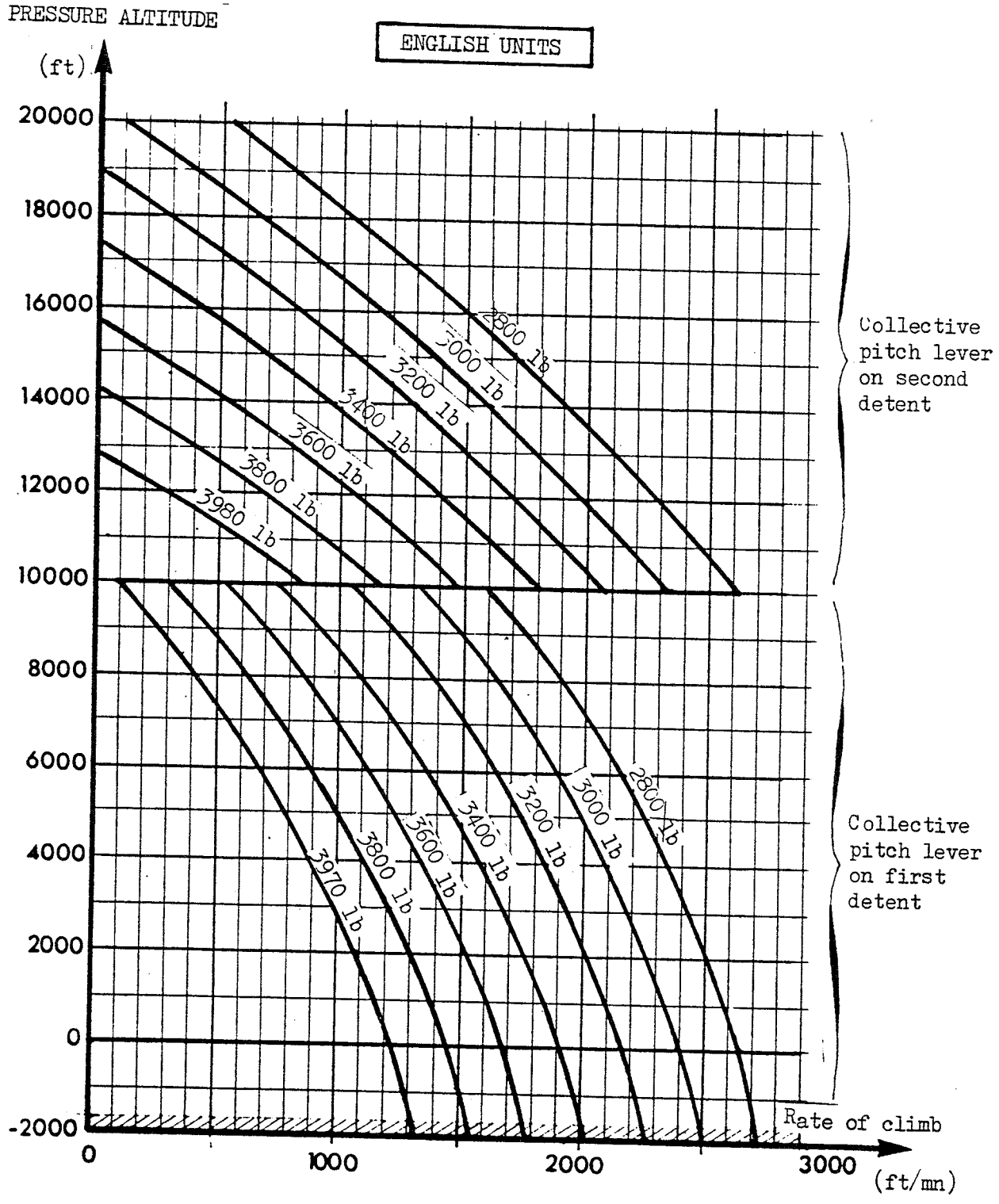
Figure 7a



20°C ABOVE STANDARD ATMOSPHERE

Rate of climb

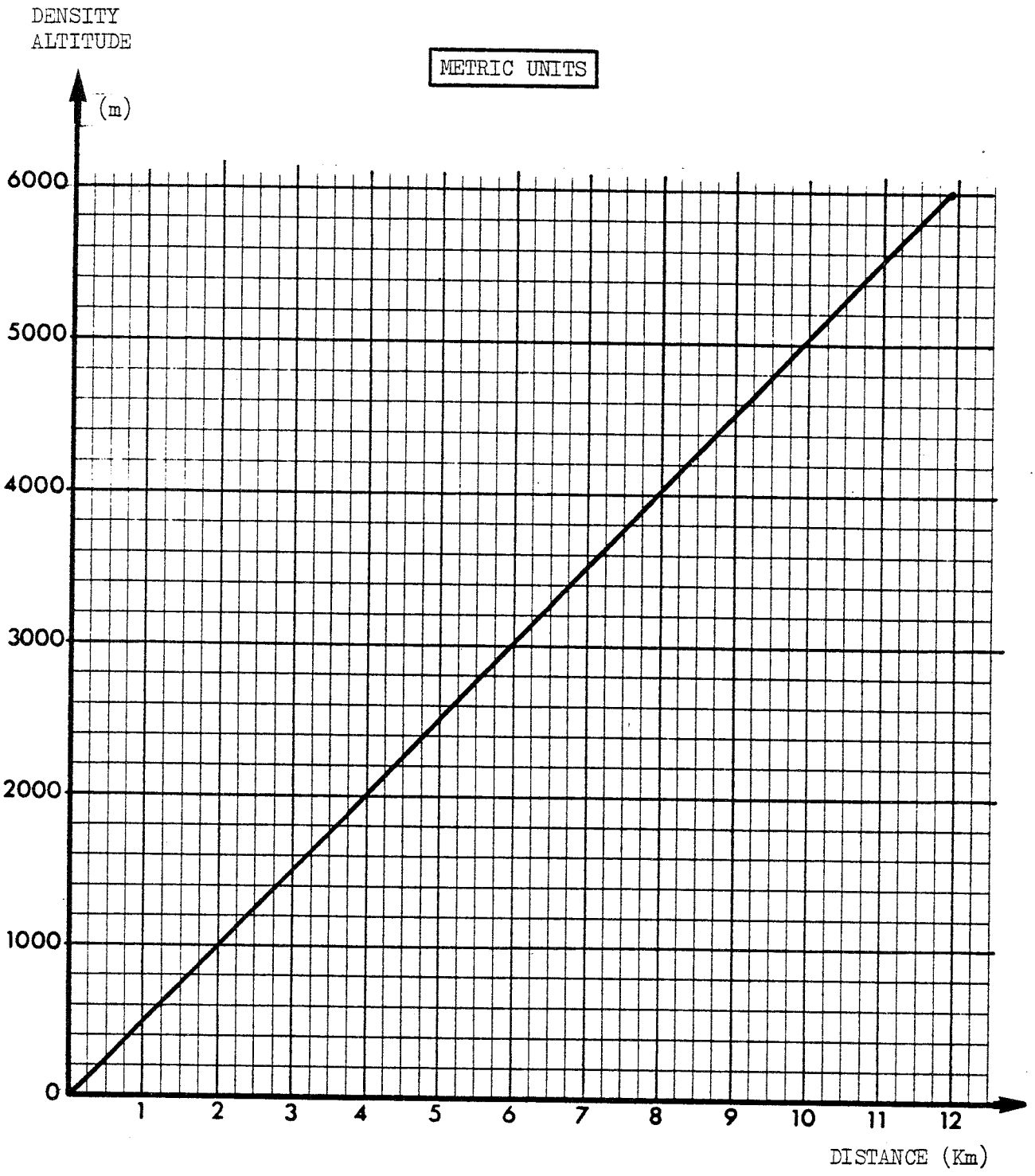
Figure 8



20°C ABOVE STANDARD ATMOSPHERE

Rate of climb

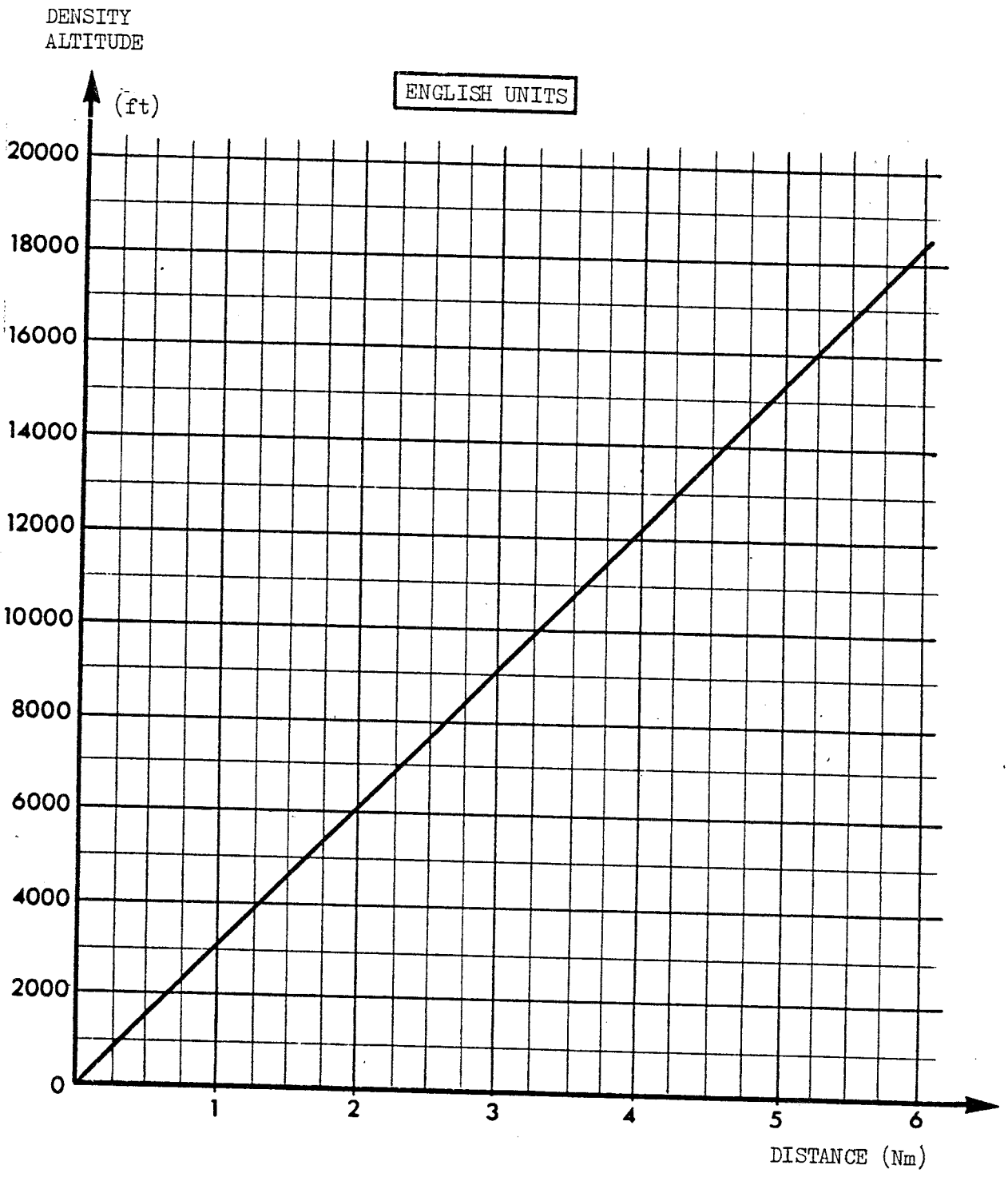
Figure 8a



Minimum horizontal distance covered in autorotation
at maximum weight and 120 Km/h (I.A.S.)

Distance covered in autorotation

Figure 9



Minimum horizontal distance covered in autorotation at maximum weight and 65 Knots (I.A.S.)

Distance covered in autorotation

Figure 9a

RECORD OF SUPPLEMENTS
(for information)

This page is to be inserted after the "SUPPLEMENTS" tab divider

N°	REVISION	TITLE	G.A APPROVAL DGAC A	FAA B	DOT C	LBA D		
1	1/11-78	EXTERNAL LOAD CARRYING INSTALLATION	A	A	A	A		
2	0/12-74	EMERGENCY FLOATATION GEAR	A	A	A	A		
3	0/04-76	AUXILIARY FUEL TANK	A	A	A	A		
4	0/12-74	RIGID TYPE LANDING GEAR	A	A	A	A		
5	2/06-82	SAND FILTER	A	A	A	A		
6	3/06-82	AIR INTAKE MUFFLER	A	A	A	A		
7	1/10-75	FLOAT TYPE UNDERCARRIAGE	A	A	A	A		
8	0/12-74	RADIO NAVIGATION EQUIPMENT	A	A	A	/		
9	1/11-78	ELECTRIC HOIST - BREEZE OR AIR EQUIPEMENT	A	A	A	A		
10	0/12-74	VERY COLD WEATHER HEATING SYSTEM	A	A	A	A		
11	0/11-78	SKI INSTALLATION	A	A	A	A		
12	1/11-78	AMBULANCE DUTY INSTALLATION	A	A	A	A		
13	0/12-76	IFR FLIGHT PACKAGE	A	/	/	/		
14	0/10-77	LENGTHENED CABIN	A	A	/	A		

KEY :

A (B,C..) : Supplement approved by the certification agency mentioned at the head of column.

/ : Supplement not yet approved at the date mentioned below.

CD 7111-4
Printed in France

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N° 1

TRANSPORT OF EXTERNAL LOADS

"CARGO AIDS" INSTAL. 341A 82_1100 & 82_1101

E.R.C. 341A 82_2960

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

All pages of this supplement are listed below.
This list is re-issued with each amendment.

PAGE	CODE	PAGE	CODE
1	11.78		
2	11.78		
3	12.74		
4	12.74		
5	12.74		

DGAC APPROVED 25-10-78

L'Ingénieur Principal de l'Armement
Bureau Certification des Aéronefs

The information contained in this supplement is approved by the
"DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 2
Amendment N° : 1
Date code : 11-78

Section 1
LIMITATIONS

1.1. Maximum load

The maximum permissible load hung from the release unit is 700 kg (1540 lb).

1.2. Maximum weight of aircraft with external load

The maximum authorized all-up weight with an external load is that enabling hover out of ground effect to be made (see Basic Manual Section 4, page 5).

1.3. Never exceed speed

Never exceed speed is limited to 165 km/h (90 knots).
NOTE : Special attention must be paid when transporting large loads.

1.4. Length of sling

The sling length should lie between the following limit values :

- minimum : 1.5 m (5 ft)
- maximum : 15 m (50 ft)

1.5. Aircraft Bank

When the length of cable is 10 m (30 ft) or more, the aircraft bank angle must not exceed :
. 20° for sling loads up to 600 kg (1320 lb)
. 10° for sling loads heavier than 600 kg (1320 lb)

1.6. Pitch attitude

Do not exceed 10° nose down with the "COMB" ("FUEL") warning light on.

1.7. Instruction plate

An instruction plate, in clear view of the pilot, states :

CARRYING EXTERNAL LOADS

CLASSES OF APPROVED AIRCRAFT/LOAD COMBINATION : A AND B.
WHEN EXTERNAL LOADS ARE CARRIED, NO PERSON MAY BE CARRIED UNLESS :
- HE IS A CREW MEMBER
- HE IS A TRAINEE CREW MEMBER
  OR
- HE PERFORMS AN ESSENTIAL FUNCTION IN CONNECTION WITH THE EXTERNAL LOAD OPERATION.

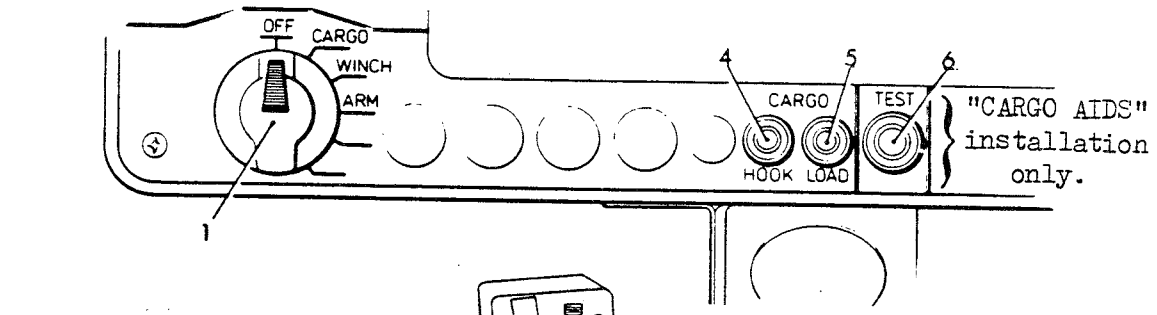
Section 2
NORMAL PROCEDURES

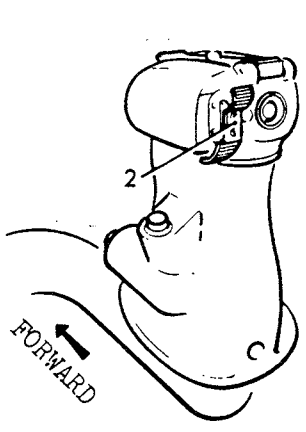
2.1. General

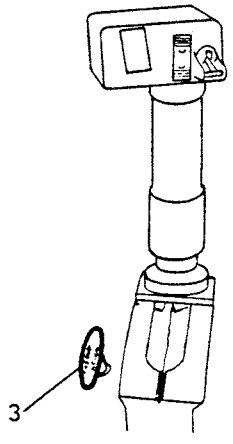
The controls available to the pilot include :

- a mission selector switch (1) which energises the network in the "ELING" (CARGO) position.
- a normal release control (2) on the cyclic stick.
- an emergency release control (3). This control is located :
  . under the collective pitch lever (CARGO AIDS installation)
  . at the bottom, on the port side of the collective pitch lever (E.R.C. installation).

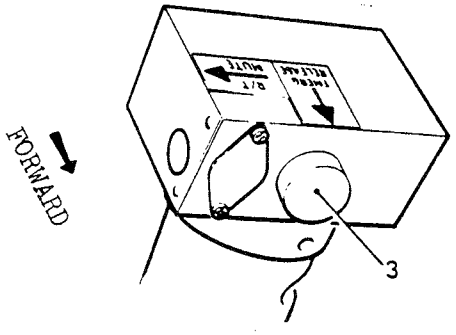
The "CARGO AIDS" installation includes two indicator lights :
. a "CHARGE" (LOAD) blue indicator light (5) which comes on when the load is suspended.
. a "CROCH" (HOOK) amber indicator light (4) indicating that the hook is unlocked.
A push button (6), nearby, is provided for testing the indicator lights.







"E.R.C." installation



"CARGO AIDS" installation

Carrying heavy loads is delicate work since the possible swinging of a load may have a certain effect on the behaviour of the aircraft. Pilots are advised to train progressively with increasing loads before attempting to carry heavy loads.

Bulky loads must be carried with care, bearing in mind the geometrical shape.

2.2. Operation

2.2.1 Test and inspection of the "CARGO AIDS" installation

- With the mission selector switch in the "ELING" (CARGO) position the blue and amber indicator lights should be out.
- Test indicator lights : on
- "Normal release" actuated (cyclic stick) : amber indicator light flashes then ceases flashing.
- "Emergency release" control actuated (collective pitch lever) : amber indicator light comes on then goes out.
  If the amber indicator light does not go out check for correct closing of the hook.

NOTE 1 : Action on both normal and emergency controls should be vigourous but not prolonged.

NOTE 2 : The blue indicator light comes on under a minimum load of about 25 kg (55 lb) and goes out normally when the load is released.

2.2.2 Test and inspection of the "E.R.C." installation

- With the mission selector switch in the "ELING" (CARGO) position (release possible by the control on the cyclic pitch stick).
- "Normal release" actuated (cyclic stick)
- "Emergency release" control actuated (at the bottom, on the port side of the collective pitch lever).
- Test the two devices on the ground, before transporting loads.

2.3. Take-off

When the load is hooked on, increase collective pitch very gradually, holding the aircraft directly above the load.

Make a short pause when the cable is taut.

Raise the load vertically then immediately set the forward climb angle.

2.4. Manoeuvres

Carry out all flight manoeuvres smoothly : very gradual acceleration and deceleration, low bank angle in turns.

2.5. Release

Release the load by actuating the rocker switch located on the cyclic control stick grip (downward movement of rocker). If the hook fails to open, actuate the emergency release control, located on the collective pitch control lever.

In wet weather, ground personnel should wear thick rubber gloves and earth the cargo hook to the ground with a cable, tube or rod, to release the electro-static charge.

2.6. Maximum recommended airspeed

The flying qualities of the helicopter may be affected by the volume and the shape of the external load. Consequently it is recommended to observe the following maximum airspeeds :
- small, high density load : 165 km/h (90 knots)
- bulky load : 90 km/h (50 knots)

Section 3
EMERGENCY PROCEDURES

In the event of engine failure, establish autorotative flight and immediately release the load by operating the emergency release control switch.

In the event of engine failure in hover while the load is being attached, move off to the right and apply collective pitch. Ground personnel must be warned that they have to move away to the left in such circumstances.

Section 4
PERFORMANCE

Not applicable

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FLIGHT MANUAL

SA 341G "GAZELLE"

SUPPLEMENT N°2

EMERGENCY FLOATATION GEAR

REF:
- 341 A 82-2601.02 and 2600.02 (high type flexible landing gear)
- 341 A 82-2601.01 and 2600.01 (low type flexible landing gear)
- 341 A 82.2601.01 and 2600.03 (low type flexible landing gear with embeded containers)
- 341 A 82.2601.00 and 2600.00 (Rigid type landing gear with shock absorbers)

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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This list is re-issued with each amendment.

PAGE	CODE	PAGE	CODE
1	12-74		
2	12-74		
3	12-74		

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L'Ingénieur de l'Armement
A. RICHARD

MINISTÈRE DES TRANSPORTS
Secrétariat Général à l'Aviation

The information contained in this supplement is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 2
Amendment N° :
Date code : 12-74

A B C D

General

This supplement is applicable when emergency floatation gear is installed.

This equipment consists essentially of :

. two floats, located one each side of the aircraft, secured to the undercarriage legs,

. a float inflation system,

. a common float inflation control.

Section 1 LIMITATIONS

In addition to the specific limitations indicated below, the limitations specified in the Basic Manual remain applicable.

1.1. Floats folded - system not armed

No specific limitations.

1.2. Floats folded - system armed

Never-exceed speed in this case is 270 km/h (145 Knots) I.A.S.

1.3. Inflation of floats

Maximum speed for inflation : 185 km/h (100 knots)

1.4. Floatation gear inflated

- Never-exceed speed : IAS (max.) = 220 km/h (120 knots).

- Limit altitude : + 1000 metres (3300 ft).

Section 2
NORMAL PROCEDURES

In addition to the procedure indicated below, the normal procedure specified in the Basic Manual remains applicable.

2.1. External checks

Check that :

. the float closure fabric is correctly laced,
. the bottle inflation pressure is correct,
viz : 200 $^{+0}_{-6}$ bars (2900 $^{+0}_{-85}$ p.s.i.) at + 15°C with a correction of ± 10 bars (± 150 p.s.i.) per ± 10°C.

2.2. Flight over water

When flying over water :

. Place the arming switch in the "MARCHE" ("ON") position.
. Always fly at a cruising height of more then 50 m (150 ft).

2.3. Flight over land

. Set the master switch to "ARRET" ("OFF").

Section 3
EMERGENCY PROCEDURES

In the event of an emergency necessitating ditching of the aircraft, carry out the emergency procedure outlined in the Basic Manual as well as that detailed below :

. Reduce airspeed to 120 km/h (65 knots).
. Inflate the floats by actuating the push-button (Inflation time = approximately 2.5 seconds from actuation of push-button).
. Avoid ramming of water at the front of floats on touch-down.
. Jettison the doors by normal jettison procedure after touch-down.

NOTE : The rotor rpm in autorotation, at low pitch, with the floatation gear inflated, is reduced by about 10 rpm, compared with that of the aircraft in the basic standard configuration.

Section 4
PERFORMANCE

With the floats folded, the performance characteristics specified in the Basic Manual are applicable.

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FLIGHT MANUAL
SA 341G GAZELLE

SUPPLEMENT N°3
AUXILIARY FUEL TANK

	WITHOUT ISOLATING VALVE		WITH ISOLATING VALVE
P/N	341A.82.1720.01 341A.82.1721.01	or	341A.82.1720.03 341A.82.1721.03

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

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2	04-76		
3	04-76		
4	04-76		

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P.D. RICHARD

MINISTÈRE DES TRANSPORTS
Direction Générale à l'Aviation Civile

The information contained in this supplement is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 3
Amendment N° :
Date code : 04-76

General

This supplement is applicable when the auxiliary fuel tank is installed.

The essential features of the installation are :

. An auxiliary fuel tank located under the baggage hold floor. This tank automatically fills up when the quantity of fuel in the main fuel tank is greater than 175 litres (42.2 US.Gal., or 38.3 Imp. Gal.).

. A fuel contents gauge, mounted in the cabin near the heating duct (above the pilot's head).

. A blue line on the main fuel gauge.

. A transfer pump, controlled by a switch located on the instrument panel, for transferring the fuel from the auxiliary tank to the main tank.

. An amber indicator light, mounted near the control switch, which flashes when the auxiliary tank is empty.

. On some versions, a manually crontrolled isolating valve on the filler line between the main and additional fuel tanks.

Section 1 LIMITATIONS

In addition to the specific limitations given below : the limitations stated in the Basic Manual remain applicable.

- Total and usable fuel capacity of the auxiliary tank is :

  90 litres (23.7 US.Gal., or 19.7 Imp. Gal.).

- The transfer pump must not be allowed to run "empty" (amber indicator light flashing) for more than one minute.

Section 2
NORMAL PROCEDURES

In addition to the specific procedure outline below : the procedure indicated in the Basic Manual remains applicable.

2.1 Filling the fuel tanks (with isolating valve).

Use of additional fuel tank :

- Open the manually controlled isolating valve mounted on the filler line between the main and additional fuel tanks (access through man-hole).
- Fill the tanks.

To isolate the additional fuel tank :

- Check that the isolating valve is closed
- Check that the additional fuel tank is empty (fuel gauge reading and confirmation by amber, transfer pump indicator light).
  Transfer fuel to the main tank if necessary.

2.2 Pre-flight check

- Check the amount of fuel effectively contained in the two tanks : main tank contents gauge and additional tank contents gauge.
- Check that the transfer pump is operatve (light out if transfer control switch "ON" ("MARCHE").

2.3 Operation

When the quantity of fuel remaining in the main fuel tank is less than 100 litres (26.4 US.Gal or 22 Imp.Gal.), corresponding to the blue line on the fuel contents gauge, transfer fuel from the auxiliary tank. Switch the pump off at the end of transfer (when the indicator light comes on).

When the quantity of fuel remaining in the main fuel tank is less than 50 litres (13.2 US.Gal. or 10.9 Imp.Gal) corresponding to the point where the fuel low level warning light comes on, make sure that the auxiliary fuel tank is empty, by switching the transfer pump on.

Section 3
EMERGENCY PROCEDURES

Not applicable

Section 4
PERFORMANCE

Not applicable

CD 7111-4
Printed in France

FLIGHT MANUAL

SA 341G "GAZELLE"

SUPPLEMENT N°4

RIGID TYPE LANDING GEAR

REF: 341A-83-2011.04

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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This list is re-issued with each amendment.

PAGE	CODE	PAGE	CODE
1	12-74		
2	12-74		
3	12-74		

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L'Ingénieur de l'Armement
A. RICHARD

MINISTÈRE DES TRANSPORTS
Secrétariat Général à l'Aviation Civile

The information contained in this supplement is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 2
Amendment N° :
Date code : 12-74

Section 1
LIMITATIONS

The limitations, dealt with in the Basic Manual, are applicable with the exception of the following paragraph which becomes :

1.13. MANOEUVRES PROHIBITED

The following are prohibited :

- I.M.C. flight
- Aerobatics
- Embarkment and disembarkment of freight and passengers if rotor speed is above 300 r.p.m.
- Flight in icing atmosphere.

- Operation from moving platforms.
- Prolonged rearward flight, due to the danger of exhaust gases entering the cabin.
- Landing and take-off with main gearbox mounting plate unlocked.
- Intentional reduction of engine r.p.m. in flight, except when intending to carry out a landing in autorotation (training, demonstration).
- Rapid yaw movements in hover and in vertical climb.
- Intentional landing in autorotation (except for training purposes)

Section 2
NORMAL PROCEDURES

The normal procedures dealt with in the Basic Manual are applicable with the exception of the following :

Paragraph 2.2 - EXTERNAL CHECKS

- After "Static pressure port blank, on port side, removed",
add : "Oil level in port undercarriage shock-absorber".

- After "Starboard static pressure port blank : removed",
add : "Oil level in starboard undercarriage shock-absorber".

Paragraph 2.4 - CHECKS BEFORE STARTING THE ENGINE

- After Fuel flow control lever ——→ Closed (rear stop)"
add : "M.G.B. mounting plate locking lever ——→ Locked (rearward)"

Paragraph 2.9.3. - Transition to forward flight

- Before NOTE, add : "After carrying out transition to forward flight :
- Unlock the M.G.B. mounting plate (lever forward)".

Paragraph 2.11.2 - Final approach

- After "Adjust the mobile index of the torquemeter"
add : "Lock the M.G.B. mounting plate (lever rearward)".

Paragraph 2.12.1. - Normal landing procedure

- After "Disengage the S.A.S..... cyclic stick",

add : "Wait for 10 to 15 seconds to make sure that there are no divergent oscillations before reducing rotor rpm. If divergent oscillations appear, take off immediately, ensure that the mounting plate is locked and try to land again".

Section 3
EMERGENCY PROCEDURES

The emergency procedures dealt with in the Basic Manual are applicable with the exception of the following:

Paragraph 3.1.1. Autorotative landing procedure (except hover)

- After "Establish an approach speed.....",
add : "Lock the M.G.B. mounting plate".

Section 4
PERFORMANCE

The installation of the rigid type undercarriage does not affect the aircraft performance dealt with in Section 4 of the Basic Manual.

Printed in France

FLIGHT MANUAL

SA 341G "GAZELLE"

SUPPLEMENT N°5

SAND FILTER

REF: 341A-82.1160.00

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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PAGE	CODE	PAGE	CODE
1	06-82		
2	12-74		
3	10-75		
4	06-82		
5	12-74		
6	10-75		
7	10-75		

DGAC APPROVED 27-07-82

MINISTERE DES TRANSPORTS - DIRECTION GÉNÉRALE DE L'AVIATION CIVILE - RÉPUBLIQUE FRANÇAISE

L'Ingénieur Principal de l'
Bureau Certification des Aéronefs

Alain RICHARD

The information contained in this supplement is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 2
Amendment N° : 2
Date code : 06-82

General

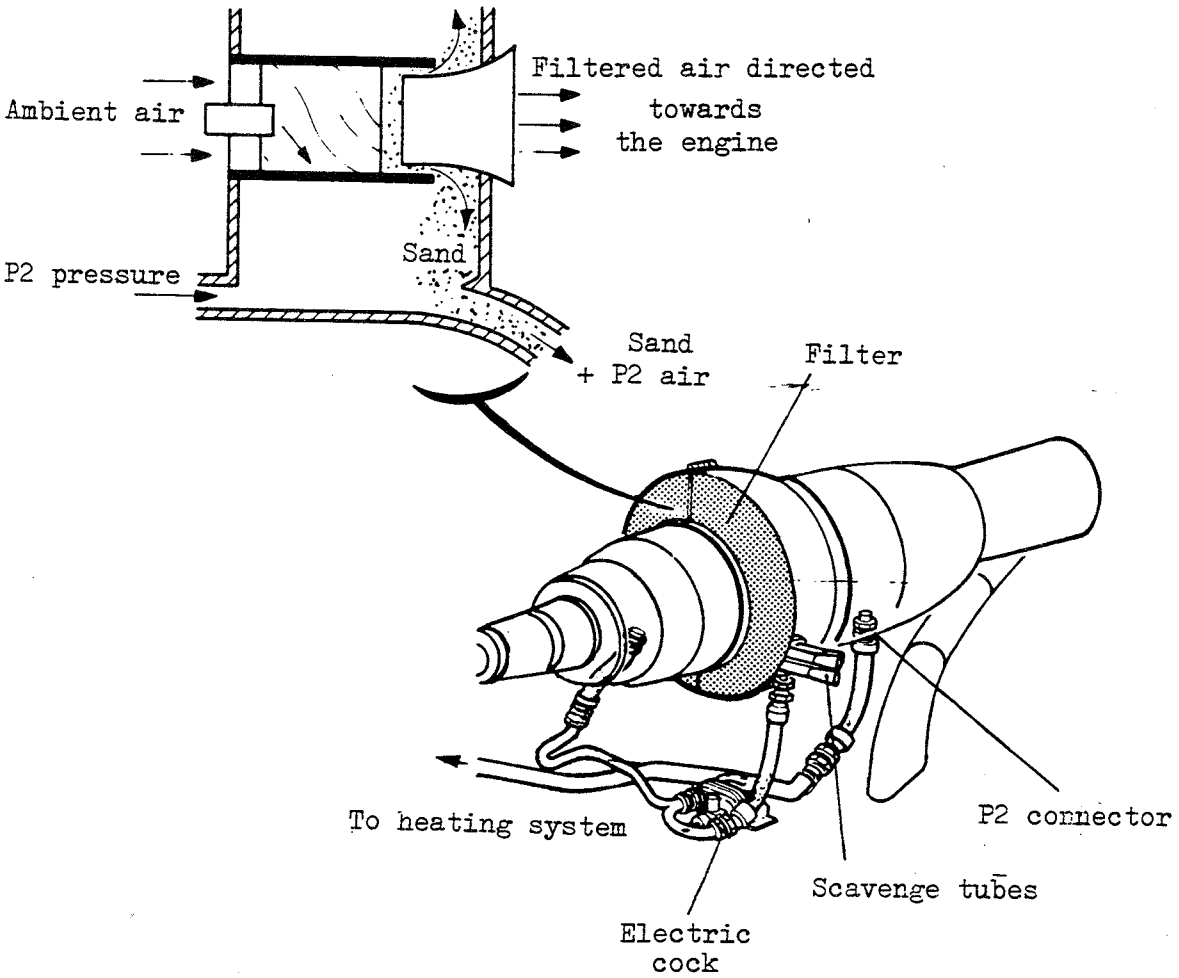
This supplement applies to SA 341 G aircraft fitted with an air intake sand filter, 341A-82.1160.00 the installation of which is not compatible with the anti-icing shield.

The purpose of this installation is to protect the engine against ingestion of sand. This system consists of the following major components :

- a filter fitted round the engine air intake
- an air supply system under P_2 pressure
- a control and monitoring electrical circuit for the complete installation.

During engine operation, the air passes through separator tubes which constitute the filter assembly.
The filtered air is directed towards the engine ~~air intake~~ and the sand is evacuated at the bottom by scavenge tubes supplied with P_2 pressure.

Detail of a separator tube



Sand filter installation and operating principle

Figure 1

Section 1
LIMITATIONS

The limitations given in Section 1 of the Basic Manual remain applicable except for the following :

- When the aircraft is fitted with a sand filter, flying in falling snow is prohibited.
- On removal of the sand-filter, the anti-icing shield or the grid is to be fitted permanently as indicated in paragraph 1.4.8 of the Basic Manual.
- During power-on flight, the collective pitch lever must not be moved from low pitch to the first detent in less than 3 secondes.
- The maximum permissible torque with a sand-filter is given in the tables below. It can also be determined by means of the computer located on the torquemeter (if installed). In this case subtract 5 % from the computer "maximum torque" reading.

O.A.T. (°C) / Hp (m)	MAXIMUM PERMISSIBLE TORQUE %										
	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+45
-500	100	100	100	100	100	100	100	100	100	91	87
0	100	100	100	100	100	100	100	100	96	85	80
1000	100	100	100	100	100	100	97	92	84	75	
2000	100	100	100	100	100	93	87	80	73		
3000	100	100	100	93	78	82	76	70			
4000	95	91	86	81	77	72	67				
5000	82	79	75	71	67	62					
6000	71	67	64	61	58						

O.A.T. (°C) / Hp (ft)	MAXIMUM PERMISSIBLE TORQUE %										
	-50	-40	-30	-20	-10	0	+10	+20	+30	+40	+45
- 1500	100	100	100	100	100	100	100	100	100	90	86
0	100	100	100	100	100	100	100	100	96	85	80
3000	100	100	100	100	100	100	100	93	85	75	
6000	100	100	100	100	100	96	89	82	75		
9000	100	100	100	96	90	85	79	72			
12000	96	93	89	85	80	75	70				
15000	86	83	79	75	71	66					
18000	75	72	69	66	62						
20000	70	66	63	60							

Section 2
NORMAL PROCEDURES

The following instructions are a supplement to the normal procedures given in Section 2 of the Basic Manual which remain fully applicable.

2.1. Before flight

Test warning light (2) installed on the instrument panel.

Note : The "TEST" push-button (1) is common to all warning lights located at the bottom of the instrument panel.

2.2. Engine condition check

When carrying out the engine condition check (see Basic Manual, para. 2.14.3) :

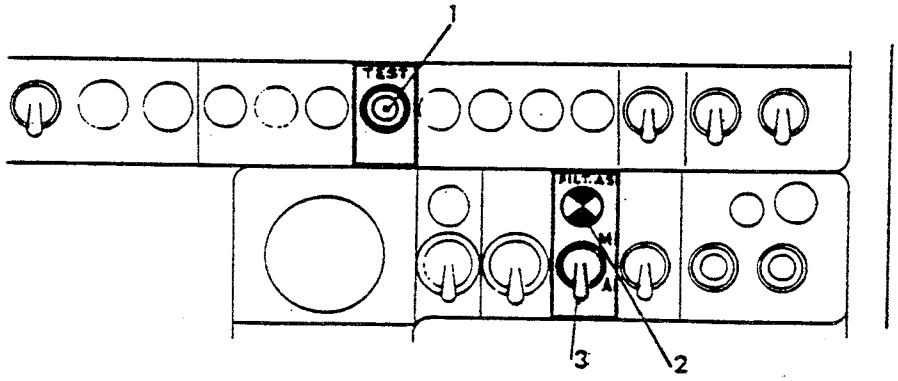
- Ensure that the sand filter switch is set to "OFF" (Arrêt) (warning light out)
- Deduct 10°C from the T4 reading before using the "engine condition check" curve

2.3. Flying in sand laden atmosphere

- Set "FILTRE A.S." (SAND. FILT.) switch (3) to "M" (ON)
- Check that warning light (2) is on, thus showing full opening of the P2 cock.

2.4. Landing

On landing, oscillations on ground (see Basic Manual, paragraph 2.12.2) may occur more frequently with the sand-filter installed. To stop oscillations reduce the collective pitch while moving the cyclic stick towards neutral.



Location of controls and monitoring components
Figure 2

Section 3
EMERGENCY PROCEDURES

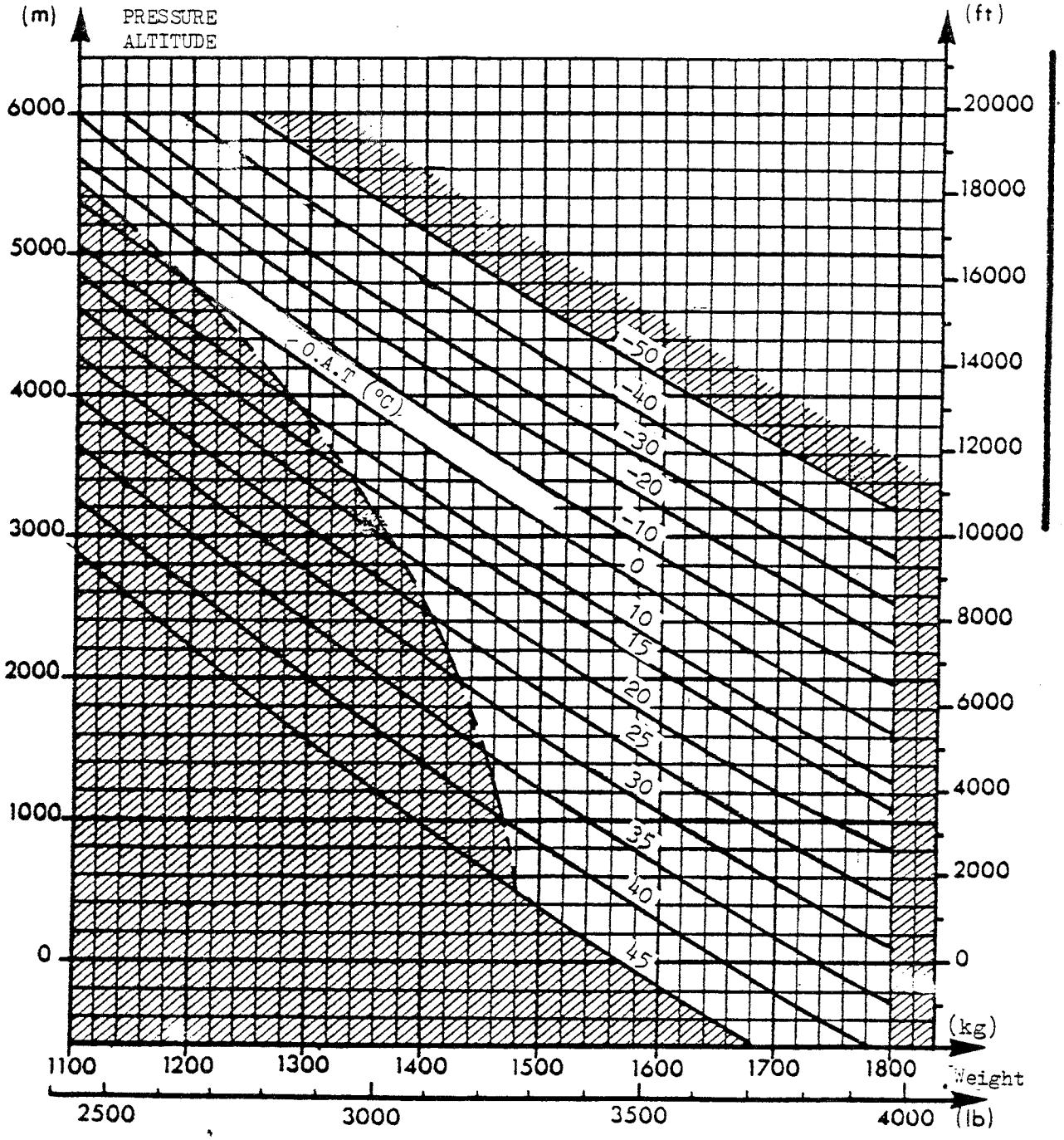
The emergency procedures given in Section 3 of the Basic Manual remain applicable for the aircraft fitted with a sand filter.

In case of malfunction, i.e. P2 cock failing to open, (warning light remains out) avoid operation in sand laden atmosphere to prevent premature damage to the engine.

If, however, the P2 cock does not close (warning light remains on) flying can be continued without consequential effects.

Section 4
PERFORMANCE

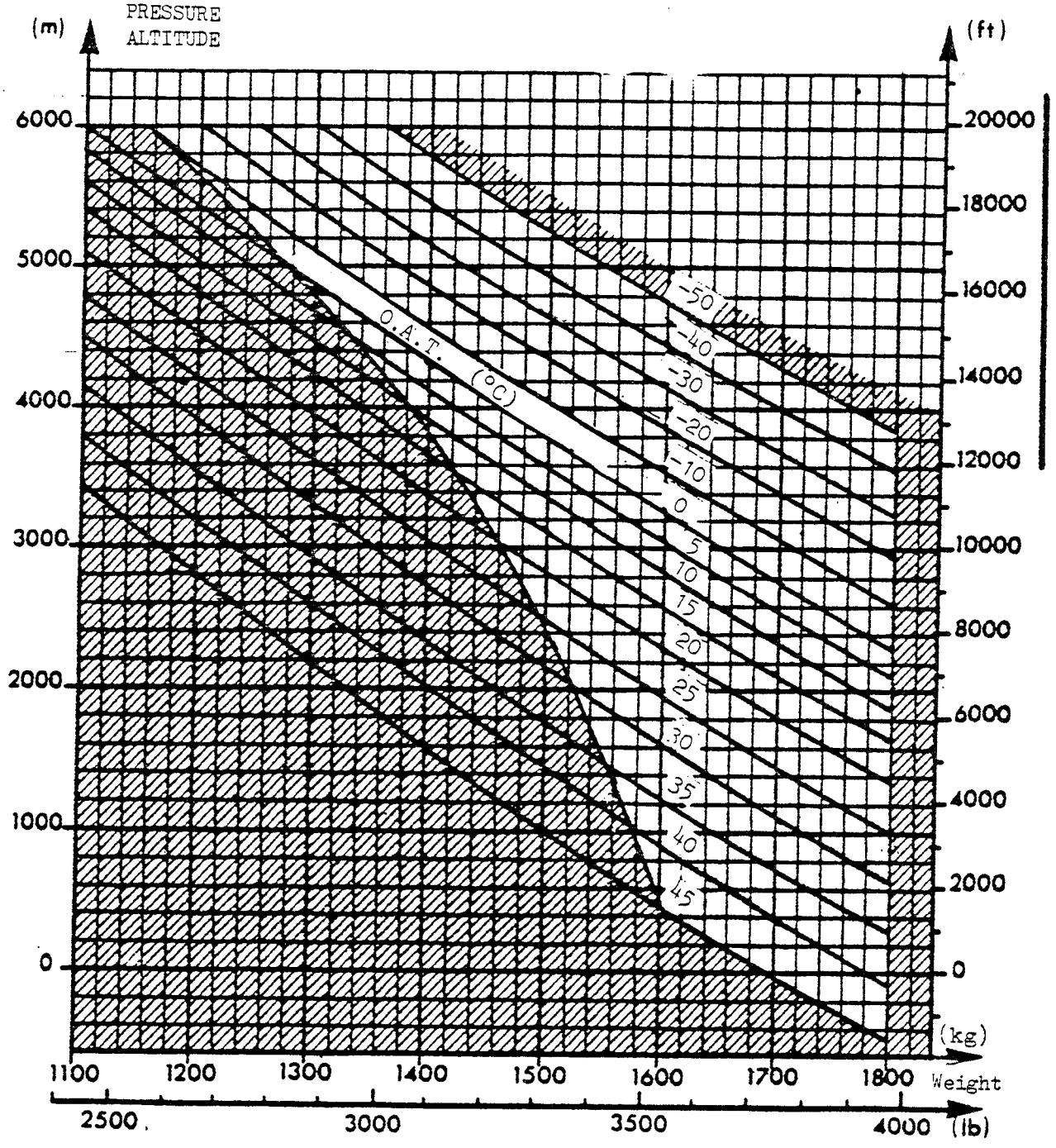
Performance given in Section 4 of the Basic Manual is applicable except for the hover flight performance. Performance curves to be used are those given hereafter for I.G.E. and O.G.E. hovering.



Areas outside the flight envelope

Ceiling in hover O.G.E. with sand-filter operative

Recommended weights on take-off
Figure 1



Areas outside the flight envelope

Ceiling in hover I.G.E. (3 ft) with sand-filter operative

Figure 2

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°6

AIR INTAKE MUFFLER

REF: 341A-54.1004 OR 341A-54.0110

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

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PAGE	CODE	PAGE	CODE
1	06-82		
2	06-82		
3	06-82		
4	06-82		
5	06-82		

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Alain RICHARD

The information contained in this supplement is approved by the
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ISSUE : 2
Amendment N° : 3
Date code : 06-82

General

This supplement concerns SA 341G aircraft fitted with an engine air-intake muffler which is designed to reduce the engine air intake noise. This muffler is installed in place of the shield or grid.

It also has a protective grid to prevent ingestion of foreign bodies by the engine.

Section 1
LIMITATIONS

The limitations specified in the Basic Manual remain applicable with the exception of the special limitations given below :

- Exhaust gas (t4) temperature

The maximum limitation changes from 550 to 565°C.

CAUTION : AS THE t4 INDICATOR WILL NOT BE MODIFIED AN INDICATION BEYOND THE 550°C RED LINE MAY EXCEPTIONALLY BE PERMITTED PROVIDING THE MAXIMUM LIMIT (565°C) IS NOT EXCEEDED.

- Muffler removal

When the muffler is removed the shield or the grid must be re-installed

- Power limitation

Maximum torque with the muffler installed is show on the following tables.
It can also be determined by use for a calculator on the torquemeter (if fitted). In that case the maximum torque is as indicated by the calculator less 4 % for OAT below + 30°C and less 5 % for OAT at or above + 30°C.

O.A.T.(°C) / Hp (m)	MAXIMUM PERMISSIBLE TORQUE (%) (altitude in m)										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-500	100	100	100	100	100	100	100	100	100	91	86
0	100	100	100	100	100	100	100	100	95	85	80
1000	100	100	100	100	100	100	100	93	84	75	
2000	100	100	100	100	100	95	89	82	74		
3000	100	100	98	92	89	83	78	72			
4000	95	91	87	82	78	73	68				
5000	83	79	76	72	68	64					
6000	72	69	66	63	60						

O.A.T.(°C) / Hp (ft)	MAXIMUM PERMISSIBLE TORQUE(%) (altitude in ft)										
	-50	-40	-30	-20	-10	0	10	20	30	40	45
1500	100	100	100	100	100	100	100	100	100	91	85
0	100	100	100	100	100	100	100	100	95	85	80
3000	100	100	100	100	100	100	100	94	85	76	
6000	100	100	100	100	100	97	91	83	75		
9000	100	100	100	95	92	86	81	74			
12000	98	91	90	85	82	76	71				
15000	88	84	81	76	72	68					
18000	78	74	71	67	64						
20000	71	68	65	62							

Section 2
NORMAL PROCEDURES

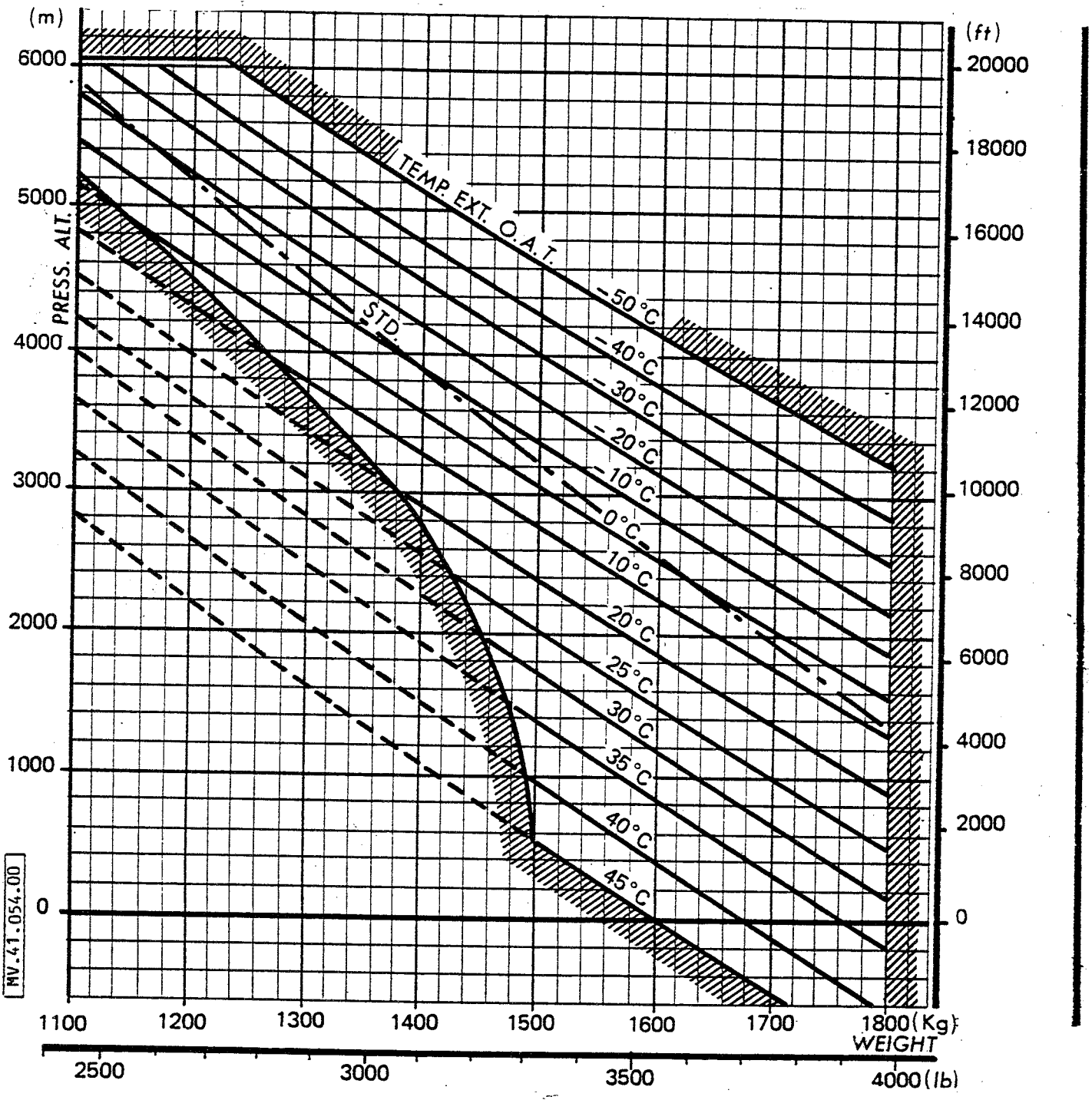
All the information given in the Basic Manual remains applicable with the exception of the following restriction :
If the special engine temperature correction plate does not bear the note "with muffler", on checking the engine condition (see Basic Manual - paragraph. 2.14.3) subtract 35°C from the t4 indicated before using the chart.

Section 3
EMERGENCY PROCEDURES

Not applicable.

Section 4
PERFORMANCE

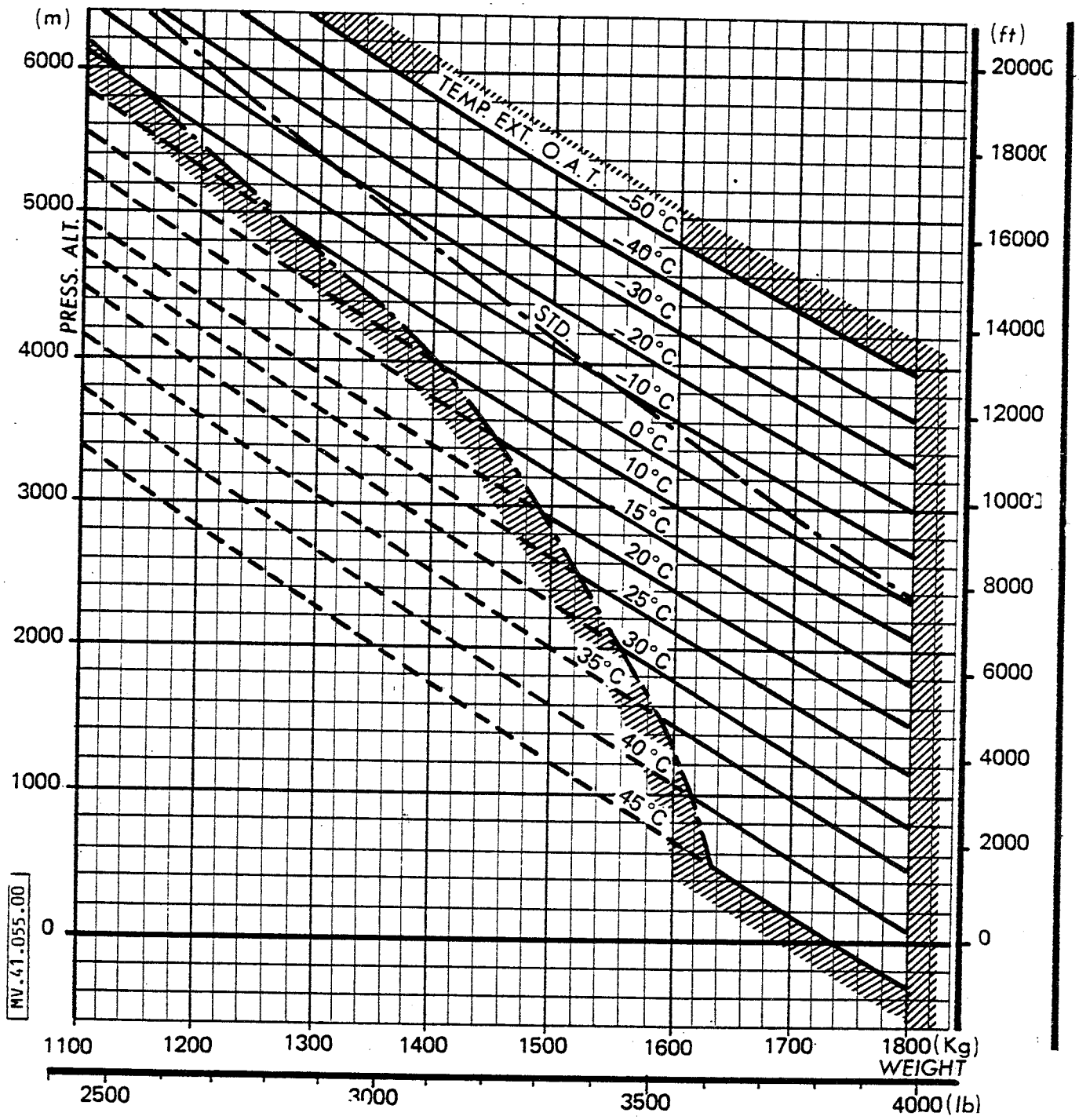
The performance figures given in Section 4 of Basic Manual are applicable except for hover. The charts on the following pages should be used to determine I.G.E. and O.G.E. hover performance.



Areas outside the flight envelope

Ceiling in hover O.G.E.
with muffler installed

(Recommended take-off weight)
Figure 1



Area outside the flight envelope

Ceiling in hover I.G.E. 1 m (3 ft) with muffler installed

Figure 2

CD 7111-4
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FLIGHT MANUAL

SA 341G "GAZELLE"

SUPPLEMENT N°7

FLOAT TYPE UNDERCARRIAGE

REF: 341A.82.2610 AND 341A.82.2611

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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PAGE	CODE	PAGE	CODE
1	10-75		
2	12-74		
3	12-74		
4	12-74		
5	10-75		
6	10-75		

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L'Ingénieur de l'Armement
A. RICHARD

MINISTERE DES TRANSPORTS
Secrétariat Général à l'Aviation Civile

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ISSUE : 2
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Date code : 10-75

General

The float type landing gear assembly consists of two floats installed by means of two cross bars on either side of the aircraft.

The floats are inflated beforehand on the ground and do not include any control at the pilot's disposal.

Section 1 LIMITATIONS

All limitations stated in Section 1 of the Basic Manual remain applicable except for the following special limitations :

- Maximum take-off weight : refer to Figure 2, Section 4 "Performance" of this supplement.

- Never exceed speed (VNE) :

V_{NE} in metric units (indicated airspeed)									
PRESSURE ALTITUDE (m)	-500 to 2000	2500	3000	3500	4000	4500	5000	5500	6000
V_{NE} (km/h)	260	247	235	222	210	197	185	172	160

V_{NE} in English units (indicated airspeed)								
PRESSURE ALTITUDE (ft)	-1500 to 6000	8000	10000	12000	14000	16000	18000	20000
V_{NE} (knots)	140	136	128	120	112	104	96	88

Section 2
NORMAL PROCEDURES

The whole normal procedure given in Section 2 of the Basic Manual remains applicable except for the particular points stated hereafter.

2.1. Inflation

- Inflation pressure : 400 mb. (5.8 p.s.i.). Avoid contact of floats with hot ground ; where it is not possible to do otherwise, keep a close watch on the pressure.
- Permissible difference of altitude with respect to inflation altitude : - 300 m (- 1000 ft)
  + 1400 m (+ 4600 ft)

2.2. Take-off from and landing on ground

The procedure given for skid type landing gear remains applicable to float type landing gear.

Take-off weight is given on the figures hereafter.

2.3. Starting and stopping the rotor on water

Before starting or stopping the rotor it is recommended to moor the aircraft to prevent the latter from rotating when the tail rotor efficiency is not sufficient. If mooring is not possible, manoeuvres must be carried out away from obstacles.

When stopping the rotor, apply the rotor brake very progressively.

2.4. Alighting on water

Alighting on water does not offer any particular difficulty. Apply the same procedure as for a normal landing.

2.5. Behaviour of aircraft on water with rotor rotating

At nominal rpm, the aircraft moves forward at a speed of 2 to 3 knots (3 to 5 km/h) at full low pitch.

Avoid building up of water at the front of the floats by applying collective pitch.

Forward motion can be cancelled by applying a torque of 35 % and maintaining the cyclic control stick in the aft position.

2.6. Sea state

Aircraft equipped with a float type landing gear can be used at a maximum wave height of 0.50 m (1.5 ft) from trough to crest.

Section 3
EMERGENCY PROCEDURES

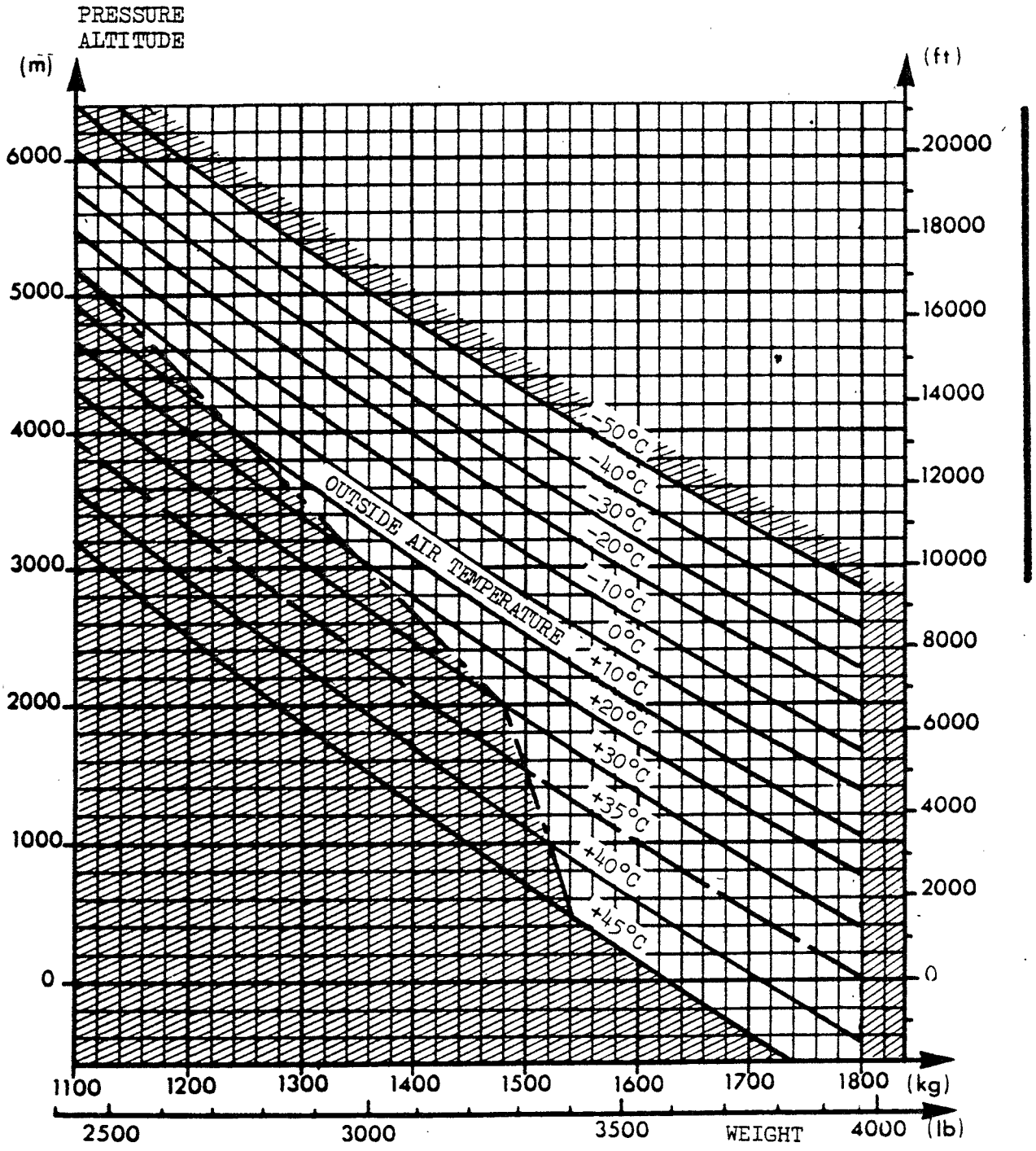
The whole emergency procedure given in Section 3 of the Basic Manual remains applicable ; however, autorotation tests have not been demonstrated on the ground,and by night on water, with float type landing gear.

In the event of alighting on water in autorotation, apply the following procedure :

- Start the flare fairly high.
- Maintain the aircraft in nose up attitude until touch-down.
- If necessary, reduce the nose up angle at touch-down (tail rotor clearance).
- Alight on water at a reduced touch-down speed to avoid building up of water at the front of floats.

Section 4
PERFORMANCE

Performance indicated in Section 4 of the Basic Manual is not affected except for hover. Curves to be used for hover in ground effect and out of ground effect are given hereafter.



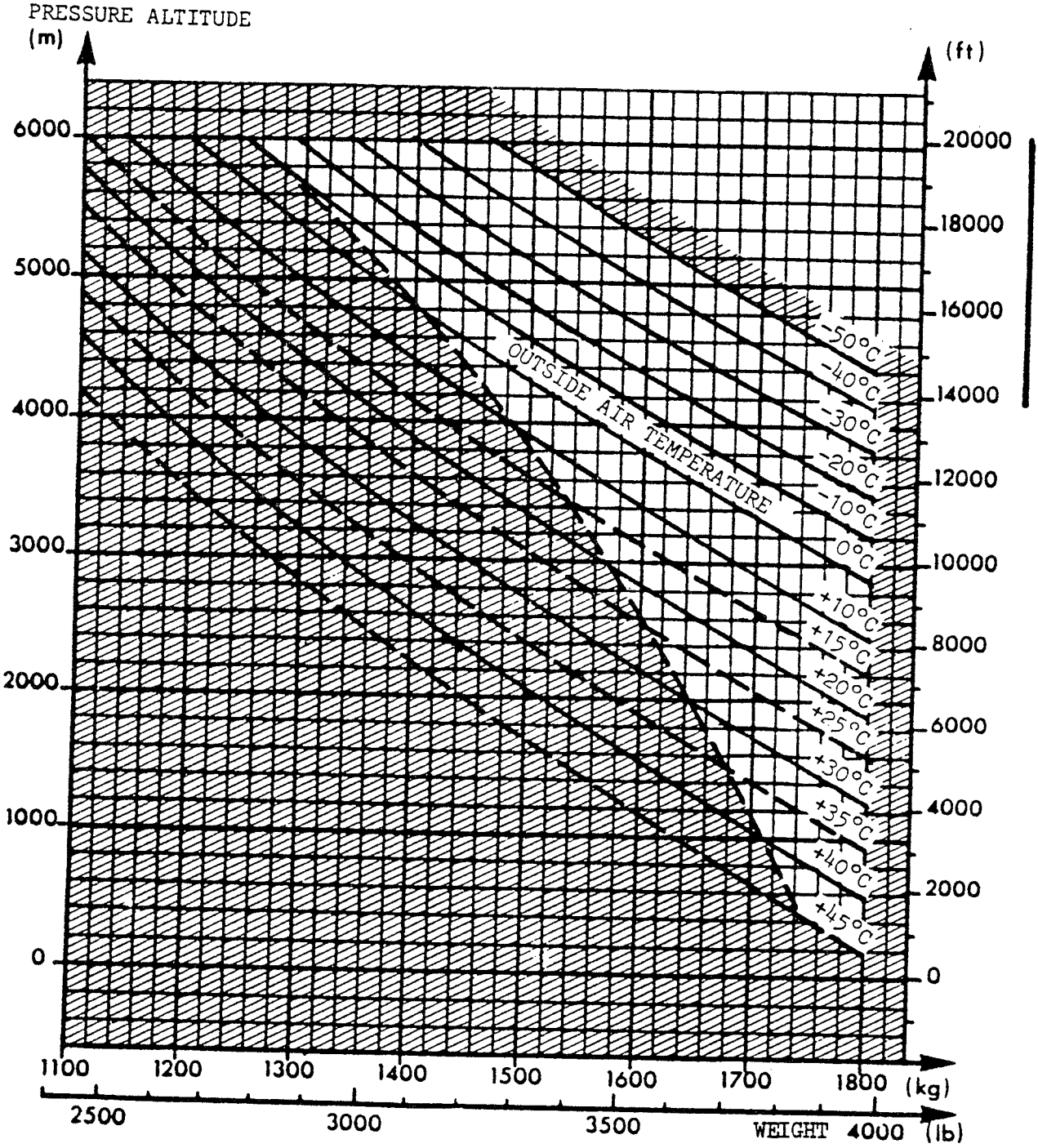
Areas outside the flight envelope

(lb)

Ceiling in hover out of ground effect with float type landing gear

(recommended take-off weight)

Figure 1



Areas outside the flight envelope

Ceiling in hover in ground effect with float type landing gear

Figure 2

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°8

RADIO NAVIGATION EQUIPMENT

REF: DRAWING H_341_78_4D_027

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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PAGE	CODE	PAGE	CODE
1	12-74		
2	12-74		

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A. RICHARD

MINISTÈRE DES TRANSPORTS
Secrétariat Général à l'Aviation Civile

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Section 1
LIMITATIONS

When the aircraft is fitted with a radio navigation installation in accordance with drawing H-341-78.4D.027 apply the following special limitations which supersede the corresponding limitations given in Section 1 of the Basic Manual.

- maximum permissible slope : 7°
  (instead of 9° as given in paragraph 1.11.4).

- left hand, lateral, centre of gravity limit : 0.135 m (5.3 in).
  (instead of 0.153 m (6.0 in.) as given in paragraph 1.3).

When flying with only one pilot on board, with one cyclic stick removed, the special limitations given above are no longer applicable.

Section 2
NORMAL PROCEDURES

Not applicable

Section 3
EMERGENCY PROCEDURES

Not applicable

Section 4
PERFORMANCE

Not applicable

CD 7111-4
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FLIGHT MANUAL
SA 341G GAZELLE

SUPPLEMENT N°9
ELECTRIC RESCUE HOISTS

	«BREEZE»	«AIR EQUIPEMENT»
P/N :	341A 82_2410	341A 82_2440
	341A 82_2411	341A 82_2441

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
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PAGE	CODE	PAGE	CODE
1	11.78		
2	11.78		
3	12.74		

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L'Ingénieur Principal de l'Armement
Bureau de Certification des Aéronefs

MINISTERE DES TRANSPORTS - DIRECTION GENERALE DE L'AVIATION CIVILE - REPUBLIQUE FRANÇAISE

The information contained in this supplement is approved by the "DIRECTION GENERALE DE L'AVIATION CIVILE"

ISSUE : 2
Amendment N° : 1
Date code : 11-78

General

This supplement applies to aircraft equipped with a "BREEZE" hoist or with an "AIR EQUIPEMENT" hoist.

The hoisting assembly mainly consists of :

- A hoist arm secured to the aircraft port side.
- An electric hoist equipped with a cable measuring:
  . 35 metres (110 ft) with a "BREEZE" hoist
  . 40 metres (130 ft) with a "AIR EQUIPEMENT" hoist
- An electrical control system placed at the crew's disposal, including :
  . a mission selector switch located on the instrument panel
  . two hoist operating controls (pilot's and hoist operator's)
  . an emergency release control

Section 1
LIMITATIONS

All limitations mentioned in the Basic Manual remain applicable except for the special following limitations :

- Minimum crew : a pilot and a hoist operator
- Maximum permissible weight at cable end : 136 kg (300 lb)

However, when the aircraft is equipped with radio-navigation installation H.341.78.4D.027 and co-pilot's stick installed (see supplement n° 8) the maximum permissible weight is 110 kg (240 lb) in order to remain within the limits of the port centre of gravity location (centre of gravity located at 0.135 m or 5.3 in).

Section 2
NORMAL PROCEDURES

The port door and the rear door must be removed.

The hoist must be controlled by the hoist operator who is attached by a belt and operates on the cabin port side. Nevertheless the pilot may operate the hoist using the rocker switch located on the cyclic stick. The hoist operator has at his disposal a grip comprising the "UP and DOWN" selector switch and connected to a box located on the rear bulkhead.

To carry out a hoisting operation :

- Hover above the hoisting point.
- Make sure that the power reserve is sufficient to perform forward flight when the load is slung.
- Set the mission selector switch (instrument panel) in the "TREUIL" (WINCH) position.

The operator can then carry out a hoisting operation.

NOTE :

1) In the present configuration it is not possible to raise an inert person, the undercarriage port skid preventing complete hoisting on board.

2) As additional safety, it is possible to wind up the cable even if a failure of the selector switch occurs (or if it is in the OFF position). However, in this event, the pyrotechnical safety device is inoperative.

After each hoist operation* at maximum load, observe a 30 second pause. After three complete cycles* with a "Breeze" hoist or six cycles with a "Air Equipement" hoist (the first wind down at maximum load, the others without load + winds up at maximum load), go over to forward flight to cool the hoist (about 5 minutes at 180 km/h or 100 kt indicated airspeed).

* NOTE : An operation consists of either a wind down or a wind up.
A cycle consists of a wind down and a wind up.

Section 3
EMERGENCY PROCEDURES

The hoist is equipped with a pyrotechnical cable cutting device controlled by a push-button located under the pilot's collective pitch lever. This control makes emergency release possible with the mission selector switch in the "TREUIL" (WINCH) position.

Section 4
PERFORMANCE

The performance of the aircraft so equipped, without external load and with the cable wound up is identical with that mentioned in the Basic Manual.

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FLIGHT MANUAL

SA 341G "GAZELLE"

SUPPLEMENT N°10

VERY COLD WEATHER HEATING SYSTEM

REF: 341A_72.0005

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

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PAGE	CODE	PAGE	CODE
1	12-74		
2	12-74		
3	12-74		

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A. RICHARD

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Amendment N° :
Date code : 12-74

General

This installation is designed to improve cabin heating when the aircraft is operated in cold countries.

It consists of a separate installation supplementary to the system fitted in the basic aircraft.

It consists mainly of :

- a P2 system supplying hot air, bled from the engine.
- a mixing chamber (P2 hot air + cold air from the cabin).
- a distribution system which directs hot air to 4 points, at the cabin floor:
  . 2 fish tails are used for de-misting the canopy and warming-up the pilot's and co-pilot's feet.
  . 2 outlets are used for warming up the passenger's feet at the rear seats.

A manually controlled cock is located on the cabin floor, on the co-pilot's side ; it makes it possible to open, shut off or adjust the hot air flow.

Section 1
LIMITATIONS

The "very cold weather" heating installation can only be used where outside air temperature is lower than -10°C. Under these conditions, the installation does not entail any special limitation. Comply with the limitations given in Section 1 of the Basic Manual and watch particularly the T4 temperature.

Section 2
NORMAL PROCEDURES

All instructions found in Section 2 of the Basic Manual remain applicable. However, the additional information given below should be taken into account.

- During the checks before starting the engine (paragraph 2.4), make sure that the control cock of the "very cold weather" heating system is set to "ARRET" (Off).
- Open the "very cold weather" heating system only after take-off and shut it off during landing approach (paragraph 2.11).
- Shut off the heating system when checking the engine for condition (paragraph 2.14.3).

Section 3
EMERGENCY PROCEDURES

Failures of the heating system are very unlikely and cannot cause any serious damage.
In case of abnormal operation, shut the heating system off.

Section 4
PERFORMANCE

Performance given in Section 4 of the Basic Manual is not affected when fitting this installation.

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Printed in France

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°11

SKI INSTALLATION

P/N: 341A 82_4220.00

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

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2	11.78		

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Bureau [illegible] Aéronefs

MINISTERE DES TRANSPORTS - DIRECTION GENERALE DE L'AVIATION CIVILE - REPUBLIQUE FRANÇAISE

The information contained in this supplement is approved by the
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Date code : 11-78

Section 1
LIMITATIONS

Except for the special limitation given below, the limitations laid down in the basic manual remain applicable.

This installation is only approved for flexible low type undercarriage.

Section 2
NORMAL PROCEDURES

Not applicable

Section 3
EMERGENCY PROCEDURES

Not applicable

Section 4
PERFORMANCE

Performance figures given in the basic manual are not affected by the installation of the skis.

CD 7111-4
Printed in France

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°12

AMBULANCE DUTY INSTALLATION

P/N : 341A 82_1090.02 (SINGLE)
341A 82_1090.03 (DOUBLE)

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

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ISSUE : 1
Amendment N° : 1
Date code : 11-78

General

This installation consists of one or two stretchers, one on top of the other, and arranged longitudinally on the L.H. side of the fuselage inside the cabin.

Section 1
LIMITATIONS

Limitations given in the Basic Manual remain applicable except for the following :

For installing the stretchers, remove the copilot's cyclic stick and collective pitch lever.

Section 2
NORMAL PROCEDURES

No change

Section 3
EMERGENCY PROCEDURES

No change

Section 4
PERFORMANCE

No change

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°13

I.F.R. FLIGHT PACKAGE
P/N 341 MR 0345

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

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PAGE	CODE	PAGE	CODE	PAGE	CODE	PAGE	CODE
1	12.76	11	12.76	21	12.76	31	12.76
2	12.76	12	12.76	22	12.76		
3	12.76	13	12.76	23	12.76		
4	12.76	14	12.76	24	12.76		
5	12.76	15	12.76	25	12.76		
6	12.76	16	12.76	26	12.76		
7	12.76	17	12.76	27	12.76		
8	12.76	18	12.76	28	12.76		
9	12.76	19	12.76	29	12.76		
10	12.76	20	12.76	30	12.76		

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APPROVED 23.2.77

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Alain RICHARD

CONTENTS

General

00. GENERAL

This supplement is applicable when items required for IFR flight are installed. The modifications necessary to qualify for IFR operation are primarily limited to the electrical system, avionics, instrumentation, flight controls, and pitot static system.

0.1 IFR Equipment

Specific items of equipment installed to permit IFR operations are :

- Automatic Pilot : (Sperry)
  - Flight Director System - HelCIS
  - Stability Augmentation System with Coupler - Helipilot
  - Tarsyn Remote Vertical/Directional Gyro - 555H
- Flight Instruments :
  - Attitude Director Indicator (ADI) - Sperry GH-14
  - Horizontal Situation Indicator (HSI) - Sperry RD044
  - Rate of climb indicator
  - Instantaneous Vertical Speed Indicator (IVSI) - Sperry VS444
  - Alternative Gyro Horizon Indicator - AIM 500
  - No. 2 Navigation Indicator - King KNI520
- Avionics :
  - Radar Altimeter - Sperry AA20
  - Dual VHF Nav/Comm Radios - King KX175B
  - Transponder - King KT 76
  - ADF Radio Receiver - King KR 85
  - Marker Beacon Receiver - King KR21
- Electrical :
  - Split Avionics Bus
  - Dual Inverters - Flite-Tronics PC15BC
  - Emergency Electrical System including marathon CA154-5 battery
- Auxiliary Static Source for Cockpit Instruments

Printed in France

0.2 Pitot-Static System

While flight into icing conditions is prohibited, care has been taken to protect the pitot-static system for clogging due to ice build-up should icing conditions be inadvertently encountered.

The pitot tube is heated and should be "ON" during flight. The original static system is used only to provide static information to the flight director's air data computer, but is not heated.
The static system vent used for the airspeed indicator(s) and altimeter(s) and co-pilot's vertical speed indicator (if installed) has been relocated to the oil cooler compartment where it should always remain free of ice.

0.3 Flight Director

The flight director (FD) is designed as an aid in reducing pilot work-load while simultaineously increasing flight path accuracy. The primary items associated with the FD are :

- Air Data Computer (ADC)
- Remote Vertical/Directional Gyro and Compass Flux Valve
- Instantaneous Vertical Speed Indicator (IVSI)
- Attitude Director Indicator (ADI)*
- Horizontal Situation Indicator (HSI)
- Radar Altimeter
- FD Mode Controller
- Airspeed "INCREASE DECREASE" Switch (on Collective Pitch Lever)
- "GO AROUND" Button (On Collective Pitch Lever)

* The ADI has pitch and roll attitude outputs that may be used as a back-up for the primary vertical gyro.

The FD presents a coherent navigation situation in the form of steering command bars which direct the pilot to perform pitch and/or roll attitude corrections and power changes. These computer commands ensure the proper maintenance of certain pre-selected navigation functions.

The FD may be flown in one of the following :
- Single Cue (pitch or roll)
- Two Cue (pitch and roll)
- Three Cue (pitch, roll and collective, only when the pitch mode is airspeed hold)

Selectable Modes of the Flight Director :
- 1st Cue (Roll)
  - . Heading Hold - Selectable
  - . Navigation :
    - VOR or Localizer
    - ILS with Glide Slope
    - ILS Reverse (Back Course ILS)

- 2nd Cue (Pitch)

  . Altitude Hold
  . Vertical Speed Hold - Selectable
  . Airspeed Hold
  . Glide Slope (2 Cue ILS Only)

- 3rd Cue (Collective Pitch or Power)

  The pitch cue must be airspeed hold when the third cue is used on one of the following :

  . Altitude
  . Vertical Speed
  . Glide Slope - ILS (3 Cue Only)

NOTE :

1. The 3rd cue is not to be used during approach.
2. It is possible to change from any two-cue mode to any three cue mode at any time. However, once in a three cue mode, it is necessary to select stand-by (SBY) on the mode controller before changing to a two cue condition.

0.4 Stability Augmentation System

The basic Stability Augmentation System (SAS) installed in the "Gazelle" for IFR operations consists of two separate and independent channels (pitch and roll) designed to aid the pilot by providing both short term and long term attitude stability. The SAS computer is both a rate and attitude sensing system which will recognize and correct for attitude changes resulting from external aircraft disturbances (gusts, turbulence, etc...).

The primary components of the SAS system are :

- Vertical Gyro - to detect attitude changes
- Computer - to determine corrections necessary
- Control Actuators - to provide actual control input through the flight controls
- Control Motion Sensor - to differentiate between pilot inputs and external disturbances

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In normal flight, if the aircraft is upset by a gust or turbulence, the motion of the aircraft is detected by the vertical gyro. Since there is little or no control motion by the pilot, a corrective action for the disturbance is computed and fed to the SAS actuator which performs the necessary correction.

0.4.1 SAS Attitude Retention

The SAS system provides an attitude hold function which is engaged whenever the auto-pilot switch is engaged and no pitch or roll cues displayed in the ADI.

The attitude held is selected by the pilot depressing the magnetic brake release switch, flying to the desired attitude, and releasing the magnetic brake switch. The aircraft will maintain this reference attitude until the magnetic brake switch is again depressed or full autopilot operations resumed.

Once the attitude held mode is engaged, automatic switching to full auto-pilot operation is accomplished by merely selecting valid flight director pitch and roll commands. Conversely, if in the auto-pilot mode, reversion to attitude hold will automatically occur (in the affected axis) at any time a pitch and/or roll cue is retracted. Should reversion from auto-pilot to attitude hold occur in one or both channels, the pilot is alerted to this fact by the illumination of the decouple (DCPL) light in the ADI.

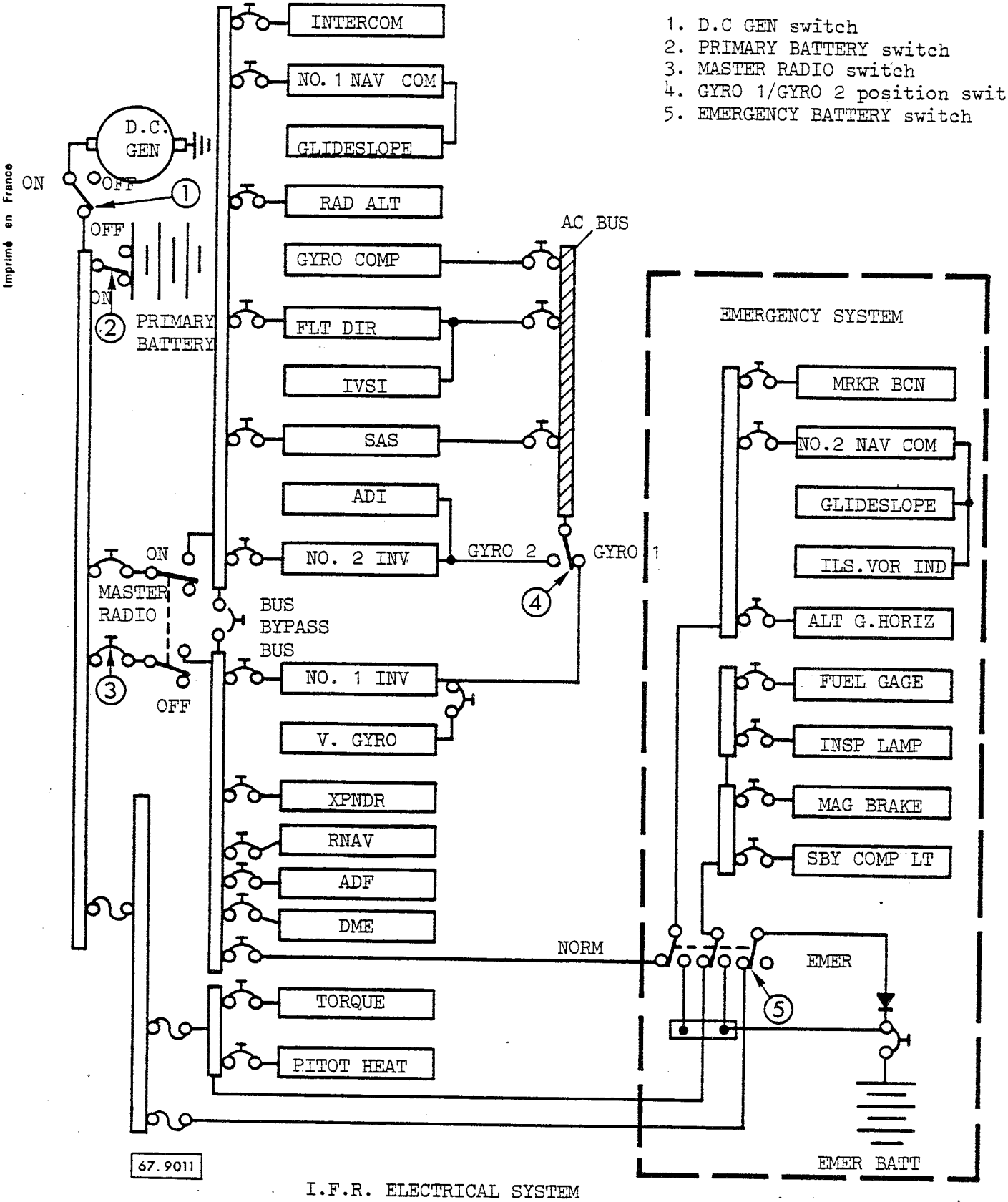
In the event of roll decoupling while in a turn, the helicopter will immediately return to a near level roll attitude and then slowly roll to the attitude at which decoupling occured.

0.5 Auto-Pilot

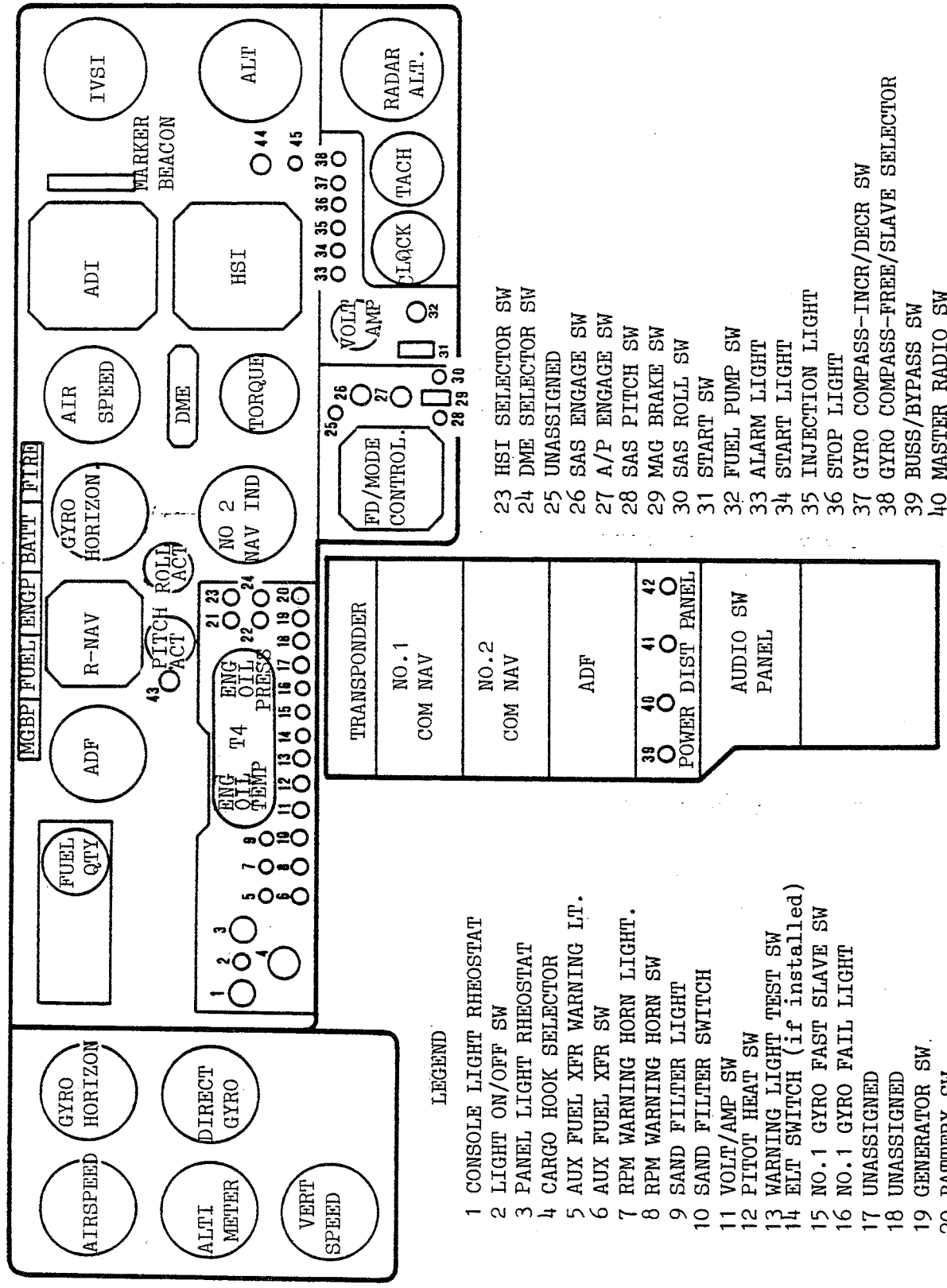
The automatic pilot consists of both the flight director and SAS which are joined together electronically with the coupler. This FD/SAS combination, once engaged, will automatically fly the helicopter with little or no effort by the pilot. Assistance from the pilot, in general, is required only in the form of minor trimming or repositioning of the cyclic following major power, airspeed or attitude changes. Since the auto-pilot functions only in cyclic (pitch and roll), the pilot must continue to operate the directional pedals and collective pitch when necessary.

0.6 DIAGRAMS

1. D.C GEN switch
2. PRIMARY BATTERY switch
3. MASTER RADIO switch
4. GYRO 1/GYRO 2 position switch
5. EMERGENCY BATTERY switch



I.F.R. ELECTRICAL SYSTEM
Fig. 1



LEGEND

1 CONSOLE LIGHT RHEOSTAT
2 LIGHT ON/OFF SW
3 PANEL LIGHT RHEOSTAT
4 CARGO HOOK SELECTOR
5 AUX FUEL XFR WARNING LT.
6 AUX FUEL XFR SW
7 RPM WARNING HORN LIGHT.
8 RPM WARNING HORN SW
9 SAND FILTER LIGHT
10 SAND FILTER SWITCH
11 VOLT/AMP SW
12 PITOT HEAT SW
13 WARNING LIGHT TEST SW
14 ELT SWITCH (if installed)
15 NO.1 GYRO FAST SLAVE SW
16 NO.1 GYRO FAIL LIGHT
17 UNASSIGNED
18 UNASSIGNED
19 GENERATOR SW
20 BATTERY SW
21 POSITION LIGHT SW
22 ANTICOLL LIGHT SW
23 HSI SELECTOR SW
24 DME SELECTOR SW
25 UNASSIGNED
26 SAS ENGAGE SW
27 A/P ENGAGE SW
28 SAS PITCH SW
29 MAG BRAKE SW
30 SAS ROLL SW
31 START SW
32 FUEL PUMP SW
33 ALARM LIGHT
34 START LIGHT
35 INJECTION LIGHT
36 STOP LIGHT
37 GYRO COMPASS-INCR/DECR SW
38 GYRO COMPASS-FREE/SLAVE SELECTOR
39 BUSS/BYPASS SW
40 MASTER RADIO SW
41 GYRO NO.1/GYRO NO.2 SELECTOR
42 EMER BATT SELECTOR
43 R NAV INVALID LIGHT
44 HYD.LOW.PRESS.LIGHT
45 HYD.LOW.PRESS TEST SWITCH.

I.F.R. INSTRUMENTS PANEL
Figure 2

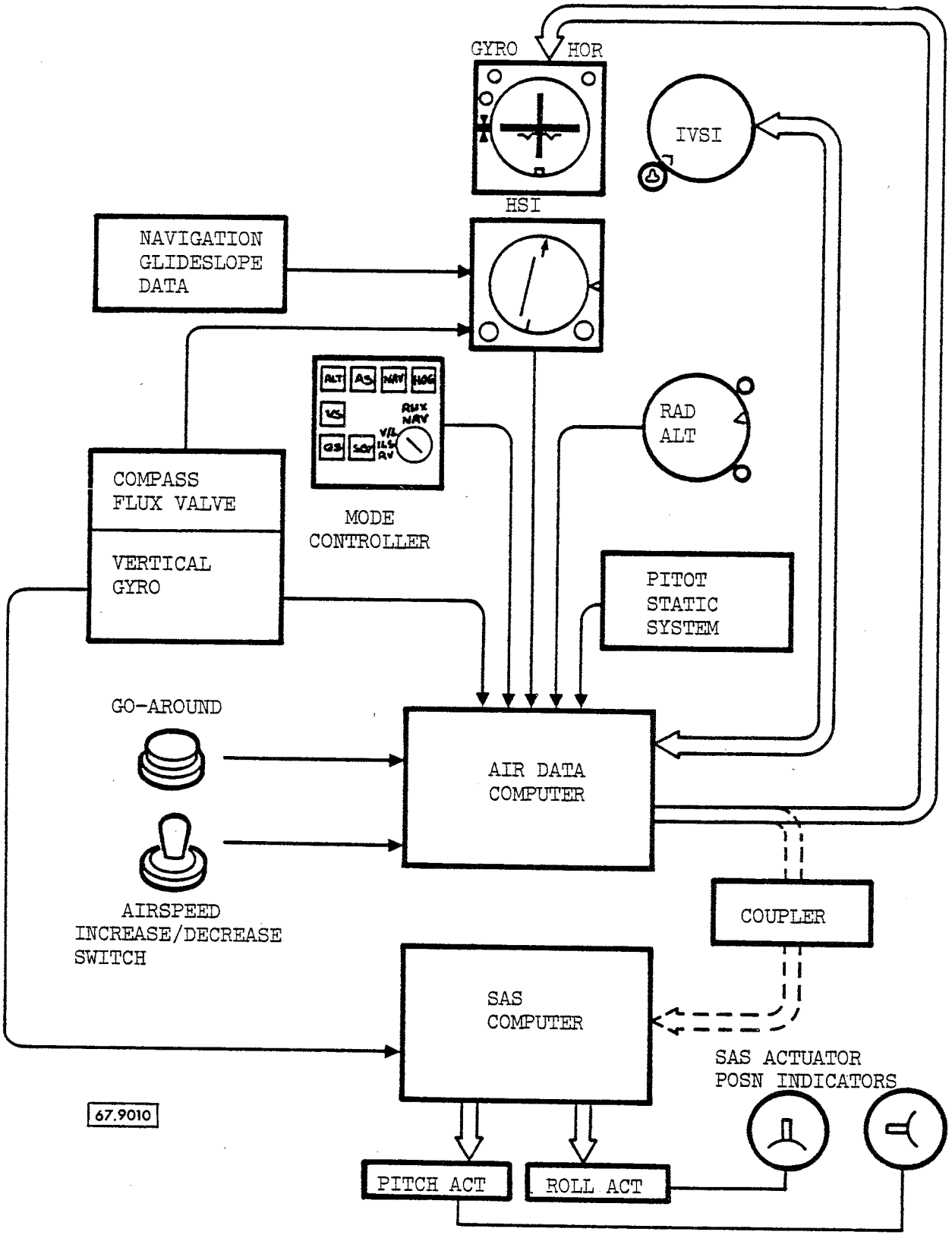


Fig. 3 AUTOMATIC PILOT FLIGHT DIRECTOR/SAS

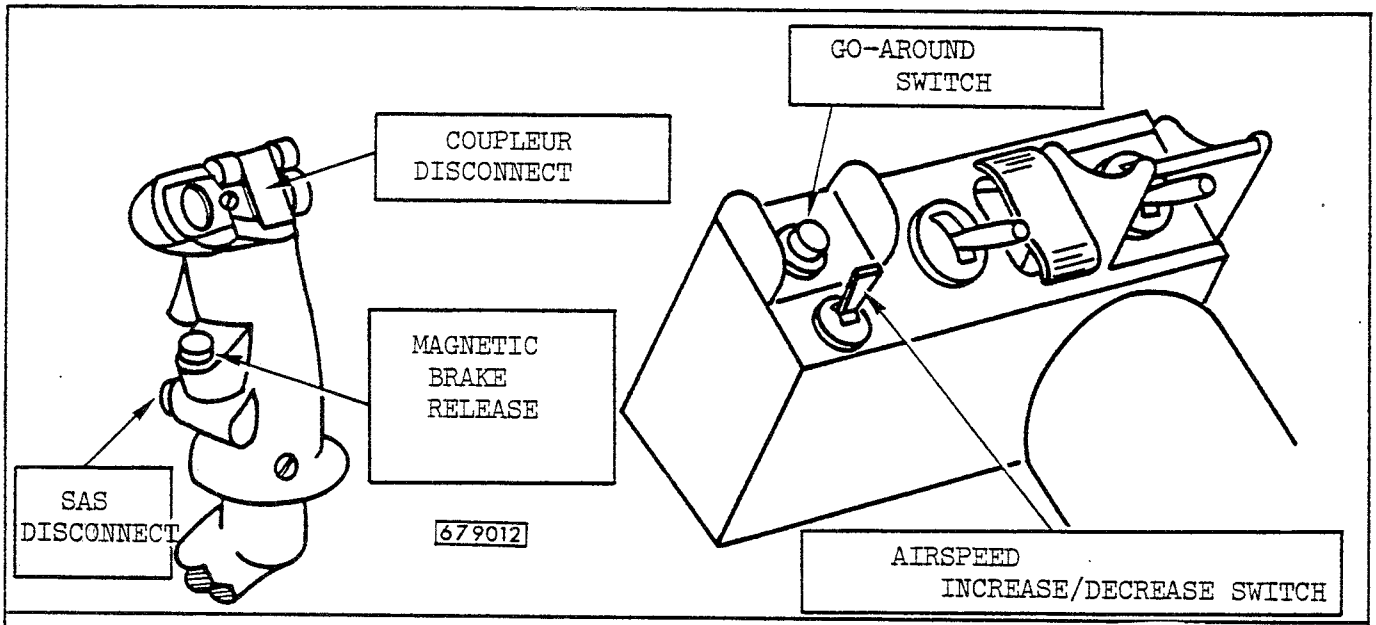
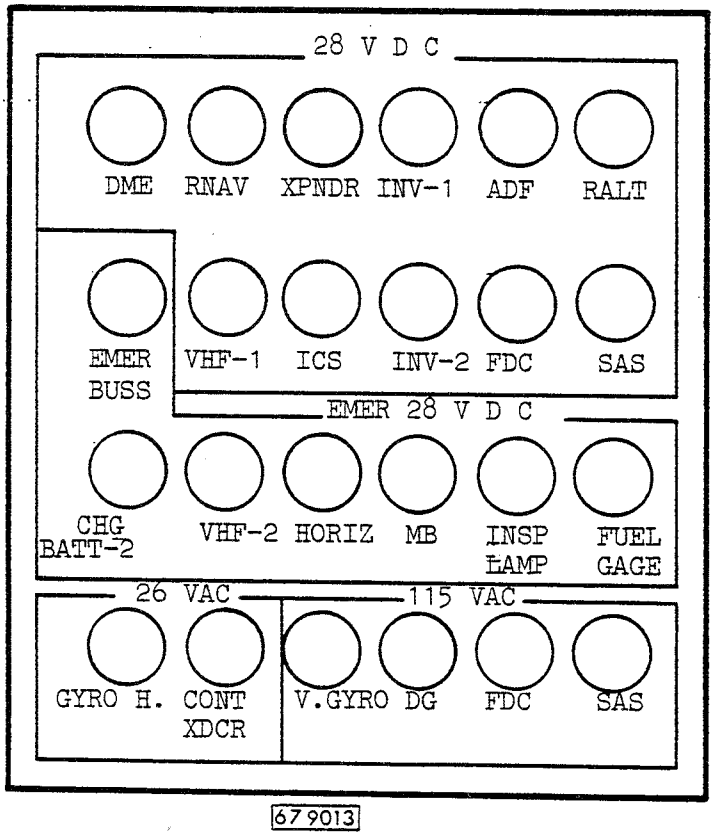
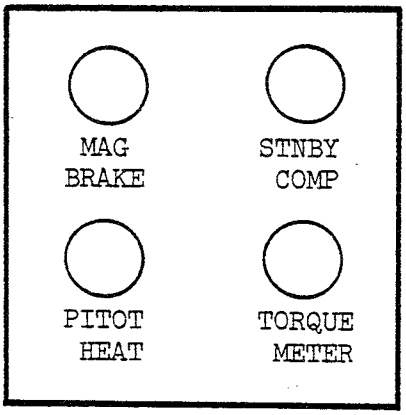


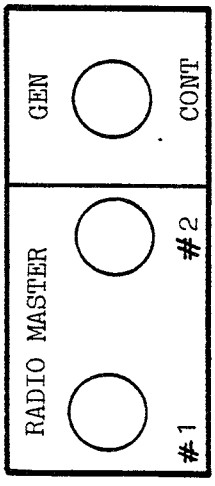
Fig. 4 CONTROL HANDLES



"A"

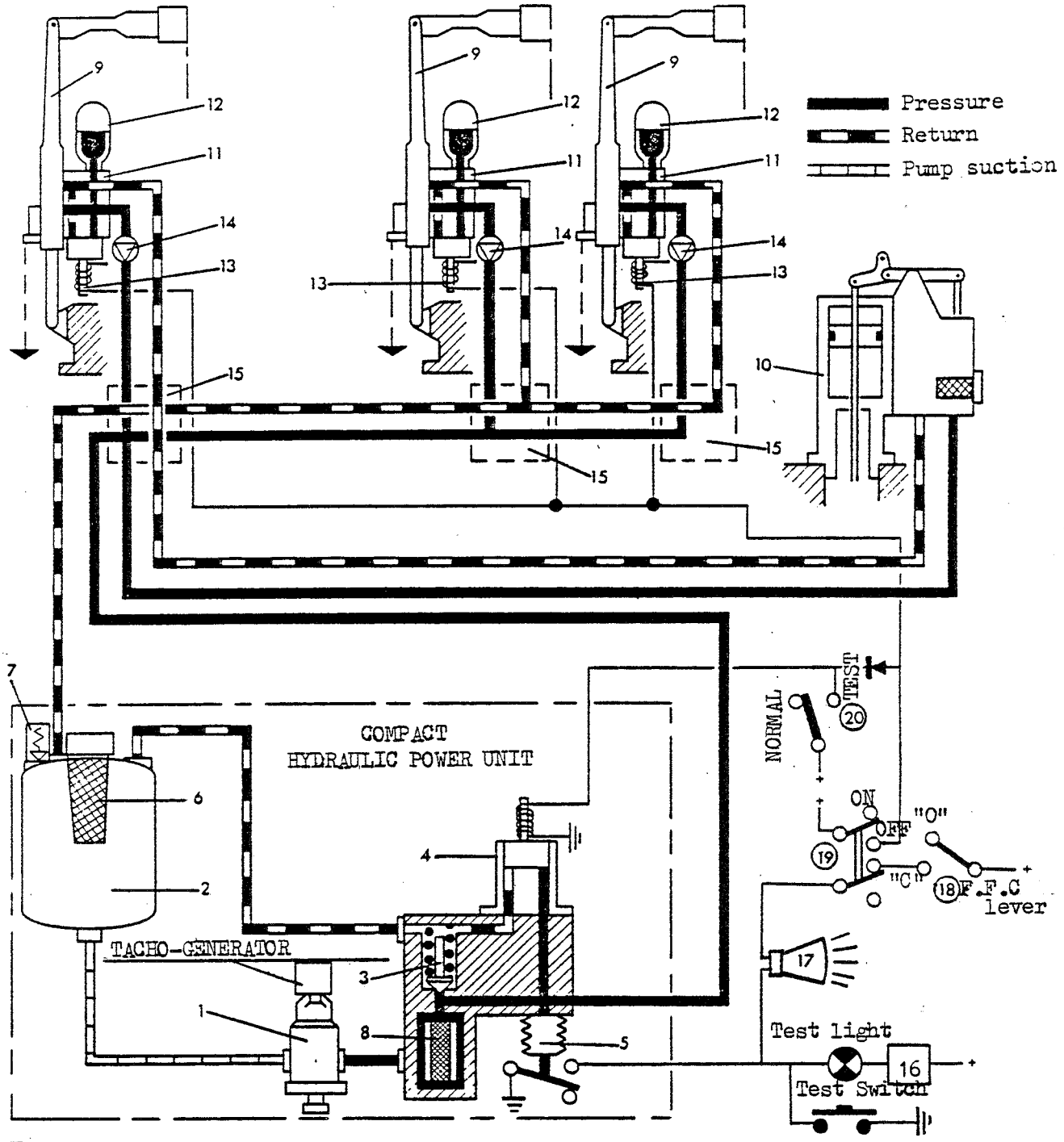


"B"



"C"

Fig. 5 CIRCUIT BREAKER PANEL



1	Hydraulic pump	13	- Electro-valve
2	Reservoir	14	- Non return valve
3	Regulator	15	- Manifold
4	Electro-valve	16	- Flasher unit
5	Pressure switch	17	- Aural alarm (if I.C.S. installed)
6	Reservoir filter	(18)	- F.F.C. lever microswitch
7	Relief valve	(19)	- Hydraulics isolating switch (pilot's collective pitch control lever)
8	Regulator filter	(20)	- Accumulators test switch (on Instrument Panel)
9	Main servo units		
10	Tail servo unit		
11	Distributor unit on servo unit including :		
12	- Accumulator		

Figure 6 - Hydraulic system - Schematic diagram

Section 1
LIMITATIONS

The basic aircraft limitations, dealt with in Part 1, are applicable with the exception of these paragraphs to which the following additions apply :

1.1 Types of Operation Approved

VFR - day ; night with appropriate systems

IFR - Category 1 - day or night - with appropriate systems (ref. Paragraph 0.1 of this supplement).

NOTE : With any of the required IFR equipment inoperative, VFR flight, as defined in the basic flight manual, is permissible.

1.2 Airspeed Limitations

Maximum airspeed is that obtained in level flight with the collective pitch control lever in the 2nd detent position.
Minimum approved IFR airspeed is 60 kts
IFR flight with doors removed is not permitted.

1.3 Altitude Limitations

The pressure-altitude limit is 11000 ft.

1.4 Center of Gravity Limitations

The rearward C.G. limit of the helicopter is reduced to 120.9" (3.7m) aft of the datum for IFR flight.

1.5 Minimum Crew

Minimum crew required for IFR flight is one pilot (Helicopter instrument rated).

1.5.1 Minimum Equipment Required for IFR Operations (Single Pilot)

In addition to the instruments and equipment defined in FAR 91.33 (b) and (c) (VFR Day and Night Flight Equipment Requirements), the minimum functioning equipment required for single pilot IFR operations must include the following :

- Automatic pilot system with essential periphera equipment (ADI, HSI, IVSI, Mode Controller, AD Computer, etc.)
- Split Avionics Bus
- Emergency Electrical System
- Dual Inverters
- Alternative Artificial Horizon Indicator
- Auxiliary Static Source for Cockpit Instruments
- Two-way Radio Communications System (appropriate to ground facilities to be used)
- Navigation Equipment (appropriate to ground facilities to be used)
- Sensitive Altimeter Adjustable for Barometric Pressure
- Clock with Sweep-Second Hand.

1.5.2 Minimum crew for Flight with SAS or F.D. inoperative

- IFR flight is permitted with the SAS or flight director inoperative provided an IFR qualified second-in-command occupies the co-pilot's station and the aircraft is not fitted with dual controls.

- Flight with FD and SAS Inoperative is not permitted.

1.6 Prohibited Manoeuvres

1.6.1 Flight in Icing Conditions

Flight in icing conditions is prohibited

WARNING : Formation of rhime ice on the main rotor blades is possible, without the presence of precipitation, when flying in clouds with an OAT of 0°C or below. Consequently a low temperature limit of 2°C is to be observed.

Refer to "Inadvertent Flight Into Icing Conditions", section 3 chap. 3.11, for this flight manual supplement.

1.6.2 Flight in storm clouds

- Flight in storm clouds and in high-climbing cumulus formations is prohibited.

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1.6.3 External Load Operations

External load operations are not permitted under IFR conditions.

1.6.4 Flight with Doors Removed

IFR flight with doors removed is prohibited.

1.7 Flight with Unapproved Equipment.

IFR flight is prohibited with the installation of any equipment not listed in Section 7 which will adversely affect the flight characteristics or electrical requirements of the helicopter.

1.8 Flight with High Intensity Strobe Lights Installed.

1.8.1 IMC Flight

Strobe lights must be off prior to day or night IMC flight.

1.8.2 Ground Operations

Strobe lights should be off during all night ground operations due to ground reflections.

1.8.3 Night Flight

Strobe lights mounted on the fuselage sides are not authorized for night flying, however a single strobe mounted on top of the vertical fin is acceptable.

1.8.4 Day-VFR Flight

During day-VFR flight, both tail and fuselage-mounted strobe lights may be used.

Section 2
NORMAL PROCEDURES

The basic aircraft operations procedures, dealt with in Part 2, are applicable with the exception of these paragraphs to which the following additions apply :

2.1 Internal Checks - IFR :

Pedals - adjust as desired
Cyclic - centered
Collective - down, friction and first detent set
Seat Belts - fastened
Landing Light - off
Hydraulic Switch - on
Circuit Breakers - in
Radio Emergency Switch - normal
Audio Panel - as desired
Bus By-Pass Switch - bus
Radio Master Switch - off
Gyro Switch - #1
Emergency Bus Switch - EMER
- Check function of emergency equipment
- Check EMER BATT voltage
Emergency Bus Switch - NORM
Radios - on - desired frequency selected
Battery Switch - on
Generator Switch - on
HSI Switch - as desired
Navigation Lights - off
Anti-Collision Switch - off
Warning Light Test - Press. Check Gyro #1 fail & start lights
Pitot Heat - off
ELT - arm
Rotor RPM Warning Horn - off, check light on
Cargo Arm Switch - off
Lighting Rheostats - as desired
Warning Light Dim Switch - as desired
Warning Light Test Switch - press check primary & secondary warning lights
Fire Warning Light - press to test
Torquemeter - set mobile index for max. torque ;

Gyro Compass Selector Switch - slave
Fuel Pump - on
Magnetic Brake - on
Engine - start (see para. 2.5 in flight manual)

Radio Master Switch - on - check ;
- Gyro # 1 fail light - on
- FD controller SBY light - on

Rotor - engage (see para. 2.5 in flight manual)

2.2 Checks Before Take-Off - IFR

R NAV Invalid Light - press to test

R NAV Selector Switch - as desired

Alternate Gyro Horizon Indicator - manually erected and flag retracted

Marker Beacon Lights - test

IVSI :
- needle near zero
- off-flag retracted
- vertical speed selector as desired

Altimeter - set and checked

Gyro Compass : (H.S.I.)

- compass flag - retracted
- compass heading - correct and null indicator neutral
- selected heading - as desired
- NAV course - as desired

Gyro # 1 Fail Light - off

Flight Director :

- "SBY" button - press and check ;
  - all mode controller lights
  - ADI GA and DH lights
  - FD flag in ADI
- "Go-Around" button : - press and check :
  - GA light in ADI - on
  - Pitch cue - visible and slightly below center
  - Roll cue - visible and centered
  - Collective cue - visible & well below center

- "HDG" button :

  - roll cue should follow movement of heading select "bug"

ADI - erect, and off-flag retracted
Radar Altimeter :

- zero altitude
- off-flag retracted
- DH set as desired

SAS - check :

- P & R channels - on
- SAS engage switch - engage
- Cyclic displace - check for movement of SAS actuators as displayed on the API's

Auto-Pilot Switch - engage :

- Cyclic displace - check for large deflection of pitch and roll cues in ADI
- Coupler Disengage Switch (on cyclic) - depress - AP engage switch should return to off.
- SAS Disengage Button (on cyclic) - depress - SAS engage switch should return to off.

Flight Director - SBY

Check the servo jacks

- Switch off the servo jacks
  (switch located on the collective pitch control lever)
  . Check control loads
  . Alarm attention light on and aural warning in I.C.S. (ifinstalled)
  . Switch on again
- Check the accumulators
  (Switch located on instrument panel)
  . Check that the servo jacks are still pressurized (no control load)
  . Alarm attention light on
  . Return to normal

2.3 Take-Off and Hover

Turn Needle - check during turns

2.4 SAS Operation

The SAS may be on during all flight operations as a means of providing additional stability to the helicopter. The engagement procedure is as follows :

- Desired Vertical Gyro Valid (light out or flag retracted)
- Pitch and Roll SAS Switches - on
- SAS Switch - engage
- Mag Brake Release Switch - press and hold until SAS actuators approximately center
- Mag Brake Switch: Imperatively, "ON" for IFR flight

2.4.1 To Engage Attitude Hold

- Mag Brake - on
- FD Mode Controller - SBY
- Auto-Pilot Switch - engage

2.4.2 Once in attitude Hold

- Mag Brake Release Switch - press and hold
- Attitude - adjust as necessary with cyclic control
- Mag Brake Release Switch - release

2.5 Automatic Pilot - Operation

For A.P. operation follow the normal procedure for A.P. operation with only one pilot on board.

To engage the automatic pilot the helicopter should be in forward flight at not less than 40 knots and with a roll angle of less than 5°. The following procedure is to be used :

- SAS - engaged in attitude hold
- On the Mode Controller, press the desired roll and pitch engage push-buttons (if only one cue is used, the other function will continue to operate in attitude hold)
- Cyclic - recenter if necessary

Once the actuator position indicators are centerd, the auto-pilot has sufficient authority to fly the helicopter through most normal maneuvers. However, once a major power, attitude, or airspeed change is made, the auto-pilot control actuators will approach the limit of their travel and the pilot must retrim or recenter the actuators with the cyclic.

Should recentering be necessary, the pilot is alerted by an abrupt deflection of the pitch and/or roll cue(s) on the ADI. This deflection occurs whenever an actuator is approximately 15% from its end of travel stop. The actuator(s) will recenter as the pilot reacts to the cue deflection in the normal sense, i.e., flying the aircraft "to" the command cue(s).

It is recommanded to recenter the actuators, without waiting for the "alert" deflection of the F.D. cue, if the rheostats show a significant off-centering.

2.6 In-Flight Operations

Normally, the auto-pilot is used for IFR flight.

I.A.S. for climb is 65 knots.

2.6.1 Climb

Climb may be accomplished using either heading hold (HDG) or navigation (NAV-V/L) for roll control and either airspeed hold (AS) or vertical speed hold (VS) for pitch control.

The procedure for initating a climb immediately following take-off is :

- SAS - on before take off
- FD - appropriate pitch and roll modes selected
- Collective - climb power
- A/P Switch - engage once command cues are centered
- Trim - as required

2.6.2 Cruising

Level-off with the auto-pilot engaged, or in directed flight may be made by selecting "Alt" at the desired altitude. This reference altitude may be changed at any time by flying to a new altitude and reselecting "Alt".

If cruising on "AS", a new airspeed may be selected by actuating the airspeed increase/decrease switch on the pilot's collective which slews the reference airspeed at approximately 2 1/2 knots per second.

2.6.3 VOR Interception and Tracking

Set the mode selector to V/L.
To intercept a preselected VOR course, the flight director features an automatic capture capability which is armed prior to approaching an on-course condition. Automatic capture is armed by pushing the NAV button which will cause both HDG and NAV buttons to illuminate if the course deviation indicator (CDI) is deflected off course by more than one dot on the HSI. The illumination of both of these buttons is an indication of "Armed for Capture". During this armed mode, the auto-pilot responds only to the heading "bug". As the helicopter approaches a point approximately one dot CDI deflection (5°) from the selected VOR course, the HDG light goes out and the auto-pilot now responds to the NAV information.

2.6.3.1 VOR Over-Station Sensor

When approaching a VOR station, the radio beam width becomes too narrow for the helicopter to follow. Once the CDI moves off-scale rapidly, the over-station sensor is activated; Once activated, over-station sensing will be maintained approximately one minute from the last major deflection of the CDI. During this time the auto-pilot will respond to the course arrow in the same manner as it does to the heading "bug" when operating in the heading hold mode.

After the over-station sensor is de-activated, the helicopter will turn to an approximate 45° course intercept angle and make a normal course interception.

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NOTE : Since over-station sensing is activated by rapid off-scale movement of the CDI, a false over-station sensing can be induced by making rapid course changes with the course selector knob while tracking on V.O.R.

2.7 Final Approach

The recommended final approach airspeed is 100 ± 20 kt. However, any airspeed from 60 knots to max. speed may by used on a two-cue approach.

2.7.1 Instrument Landing System (ILS)

Set the mode selector to "I.L.S."

The automatic capture mode described under "VOR Interception and Tracking" also applies to localizer capture except that the HDG light goes out at two dots CDI deflection (2 1/2°).

ILS approaches is made in the two cue mode.
The glide slope is captured automatically provided that the helicopter is on localizer when it approaches the glide slope. Glide slope capture is identified by the illumination of the "GS" button on the mode controller.

Collective pitch must then be reduced to a position giving approximately 50 % torque, and the attitude trimmed by recentering the stick, if necessary : the auto-pilot will hold the helicopter on the glide slope by attitude corrections.
For this torque value, airspeed will stabilize at or near 100 knots. It can be decreased by reducing the torque value slightly, and conversely.

NOTE

1) If the helicopter is not on the localizer when the helicopter intercepts the glide slope, automatic glide slope capture will not occur. Manual glide slope capture may be initiated by pressing the GS button at the appropriate point.

2) Intercepting the glide slope from above is prohibited.

2.7.2 POWER INCREASE

Decision height (Hd) is 200 ft.

At 200 ft, power must be re-applied if the ground is not visible.

Although an automatic go-around feature is provided it is recommanded to control go-around manually ; disengage the AP (mode couplings) apply collective pitch ; - lever on first detent, and accelerate to 85 knots. Check the radio altimeter before engaging "AS" and "HDG" and then the A.P.

Go-around function

This function is not to be used at speeds lower than 85 knots Go-around is programmed to command the following :

- "Wings Level"
- 85 Knot Airspeed Climb
- Climb Power (1st collective pitch detent)

Activation of the "go-around" button will over-ride all other flight director modes and may be used at any time a climb is desired.

NOTA :

Do not select "AS" while in go-around as the mode controller button will illuminate but will have no function.

2.7.3 Resuming VFR Flight at 200 ft.

If the ground is in sight at decision height, the mode coupler is to be disengaged and flight continued in VFR.

2.7.4 Automatic level

If the pilot should fail to notice that he had sunk below 200 ft, a programmed automatic minimum altitude mode operates during any two-cue approach and commands automatic levelling of the helicopter at 50 ft.

Level flight will be initiated by a reduction in airspeed and the third command bar will appear, calling for a collective pitch increase. This condition will be maintened until the pilot returns the mode controller to stand-by ("SBY") or selects go-around.

Section 3
EMERGENCY PROCEDURES

3.1 D.C. GENERATOR FAILURE IN IFR FLIGHT

Failure of the D.C. generator is recognized by the illumination of the "Gen" light on the secondary warning panel. If the D.C. generator fails, the electrical load should be reduced to the minimum practical for flight.

Should the D.C. generator fail, adequate power for the continuation of the flight can be provided by the primary battery (rated at 40 amp. hours) and the emergency battery (rated at 15 amp.hours).

By utilizing appropriate power conservation procedures, there is adequate energy in the two batteries to operate all essential electrical items at night for a sufficient time to permit completion of a normal flight. However, landing should be made as soon as practical.

In the event of D.C. generator failure :

- Gen. contactor circuit breaker - reset, if that fails ;
- Emergency bus switch - EMER
- Gyro switch - # 2
- All non-essential electrical equipment turned off or circuit breakers pulled
- If possible, fly to VFR conditions - if unable, land as soon as practical

NOTE : The following equipment list may be used as a guide in determining minimum electrical load.

*- VOR/ILS indicator
*- No. 2 Comm radio
*- No. 2 Nav radio
- No. 2 Inverter
- ADI (also used as vertical gyro for flight director) -
- Flight Director
*- Cockpit flood light (if lighting is required) * -
*- Marker beacon receiver
*- Magnetic brakes
*- Fuel gauge
- Misc. equipment that can't be turned off and have no circuit breakers.

* Denotes items powered by Emergency Battery

3.2 Primary Electrical Bus Failure

Failure of the primary electrical bus would cause immediate failure of both the primary battery and the D.C. generator. The indication would be that of complete electrical failure.

The emergency battery is protected in the event of such a failure and should be unaffected. The emergency battery, however, provides power only for the following essential equipment :

- Alternate Gyro Horizon Indicator
- #2 Nav/Comm Radio
- Magnetic Brake Release
- Marker Beacon Receiver
- Fuel Gauge
- Emergency Cockpit Light (flood)
- Stand-By Compass Light

Should complete electrical failure occur :

- Batt Norm/Emer Switch - EMER
- Radio Norm/Emer Switch - EMER
- Radio Transmit - only as necessary
- Cockpit Flood Light - as required
- Audio Panel - all monitor switches off except one
- Fly to VFR Conditions if Possible
- Land as Soon as Possible

NOTE : The warning lights would be inoperative.

3.3 SAS MALFUNCTION

3.3.1 SAS Actuator Hard-Overs

A SAS hard-over or sudden actuator travel to the limit of its authority is identified by :

- The actuator position indicator showing the actuator to be at the limit of its travel
- In flight, a sudden pitch or roll attitude change of the fuselage which was not a result of turbulence or cyclic movement.

Should a hard-over occur :

- re-establish attitude, then disengage the S.A.S.
- Gyro selector switch - "GYRO 2"
- S.A.S. - Re-engage
- If hard-over occurs again, disengage the corresponding channel.
- continue flight : fly to V.F.R. conditions, if possible.

3.3.2 SAS Failure

Failure of the SAS is detected by a general loss of stability of the axis or axes affected and lack of SAS actuator motion as evidenced by the affected actuator position indicator(s). SAS engage switch may be in "off" position.

In case of failure :

- SAS P and R Channels - on
- Gyro Switch - Gyro ≠ 2
- SAS - Re-engage
- If SAS is still inoperative - Resume flight without SAS - Select desired F.D. modes and fly to F.D. cues Fly to V.F.R. conditions, if possible

3.4 Auto-Pilot Coupler Failure

Failure of the A/P coupler is evidenced by the inability of the helicopter to automatically follow the commands of the flight director and possible illumination of the DCPL warning light.

One or both channels of the A/P will automatically decouple under any of the following conditions :

- Filght Director failure
- SAS disengagement - one or both channels
- Invalid pitch and/or roll command bar(s)
- Loss of A.C. and/or D.C. power

In the event of A/P coupler failure :

- A/P Switch - engage - if switch will not re-engage :
- SAS Pitch and Roll Switches - on
- Flight Director - check for valid pitch and roll command bar
- Gyro Switch - Gyro ≠ 2
- SAS - Re-engage
- Coupler - Re-engage
- If coupler fails to engage, resume normal flight without coupler

3.5 Master Radio Switch Failure

The master radio switch (MRS) is a double pole switch with each pole supplying power to half of the split avionics bus through a separate circuit breaker. In the event of failure of one pole or circuit breaker, power will be lost to that half of the avionics bus. Refer to schematic on page 7 of the flight manual supplement to determine items affected.

In the event of failure of either pole of the MRS, or if the contact of one pole becomes intermittent, power to both sides of the avionics bus can be supplied by the remaining side by selecting the by-pass position of the radio bus switch.

Should both MRS poles fail, all avionics power will be lost. However, power can be supplied to the emergency electrical system by selecting EMER on the NORM/EMER battery switch.

3.6 #1 Inverter and/or #1 Vertical Gyro Failure

If a failure of either the #1 inverter or #1 vertical gyro should occur, ordinarily the pilot cannot determine which. As such, each inverter-gyro system can be regarded as a single unit. The inverter/gyro failure is detected by the illumination of the "gyro fail" warning light and loss of the FD, SAS and coupler. Should an inverter/vertical gyro fail, the following procedure should be used :

- Gyro Switch - Gyro #2
- SAS - Engage (if desired)
- Flight Director - Select desired mode(s)
- A/P Switch - Engage (if desired)

NOTE : The selection of Gyro #2 switches A. C. power automatically to :

- SAS
- Flight Director
- Gyro Compass
- IVSI

3.7 # 2 Inverter and/or ADI Gyro Failure

Failure of the #2 inverter and/or ADI gyro should normally result in only the loss of gyro horizon itself and not the flight director command bars or turn needle as they have separate power sources.

The alternate gyro horizon indicator can be used as a back-up system and the turn needle and command bars utilized as before.

3.8 RADIO-ALTIMETER MALFUNCTION

In the event of a Radio-altimeter malfunction, ILS coupling mode operation is erratic. In this case it is recommended to make the I.L.S. approach with manual control input.

3.9 PITOT/STATIC MALFUNCTION

Fly a level path at 12° collective pitch, monitor attitude by the artificial horizon indicator miniature.

Hold the same attitude for climb and descent, including final approach.

3.10 HYDRAULIC SYSTEM MALFUNCTION

If hydraulic pressure is lost loads will be felt on the control pedals (according to flight conditions) accompanied by sounding of the aural warning and flashing of the "HY.PR" caption light. The pilot has 40 to 50 seconds in which to reduce collective pitch and drop to an airspeed of approximately 80 knots.

Once stabilized at this speed, isolate the hydraulic system by actuating the switch located on the collective pitch control lever.

Even at this speed, control loads are quite heavy.

However, sufficient friction is available to lock the collective pitch in the cruise position and flight may be continued with the pilot having to concentrate only on the cyclic control (the pedal forces are neutralized at cruise).

Use of the flight director can be of considerable aid with the hydraulic system off by both reducing the tendancy to over control the cyclic and reducing the thought processes required during the approach mode of the flight.

- In the event of hydraulic system failure :
  - Flight Director - as desired
  - SAS Switch - off
  - Altitude - reduce to lowest possible
  - Fly to VFR conditions as soon as possible
  - Lands as soon as possible.

3.11 Inadvertent Flight into Icing Conditions

Should inadvertent icing conditions be experienced, an attempt to fly clear of the clouds must be made immediately.

Main rotor blade icing can be considered present if any or all of the following conditions are experienced while flying in clouds at or below 0°C.

- Loss of performance (particularly airspeed)
- Rise in torque
- Rise in T4
- Ice build-up on any part of the helicopter (yaw string support etc.)
- M/R vibration

Once ice formation begins, performance degradation can become severe in a short period of time. Therefore, immediate corrective action must be taken by the pilot at the first sign of ice formation.

Imprimé en France

Section 4
PERFORMANCES

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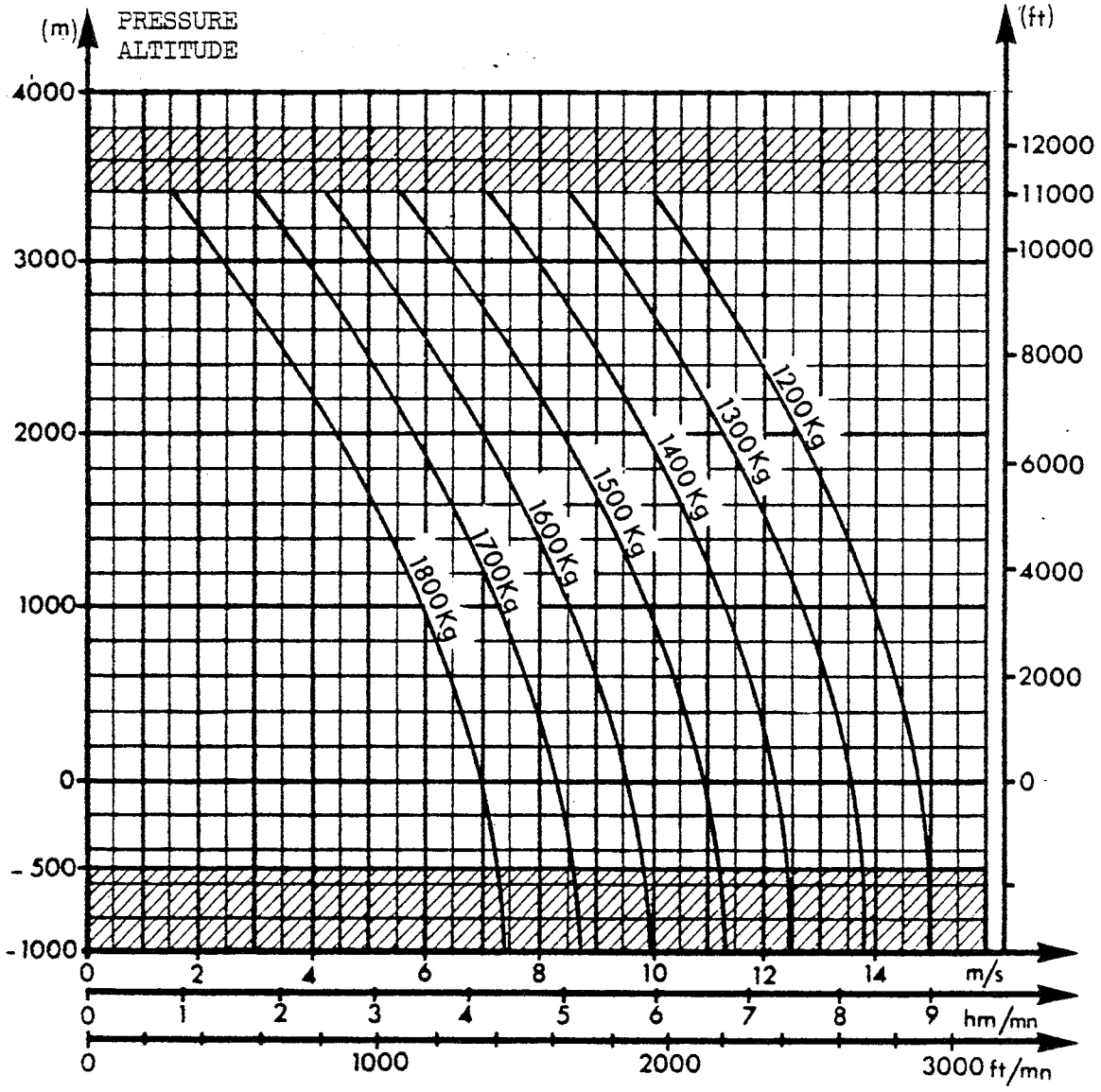
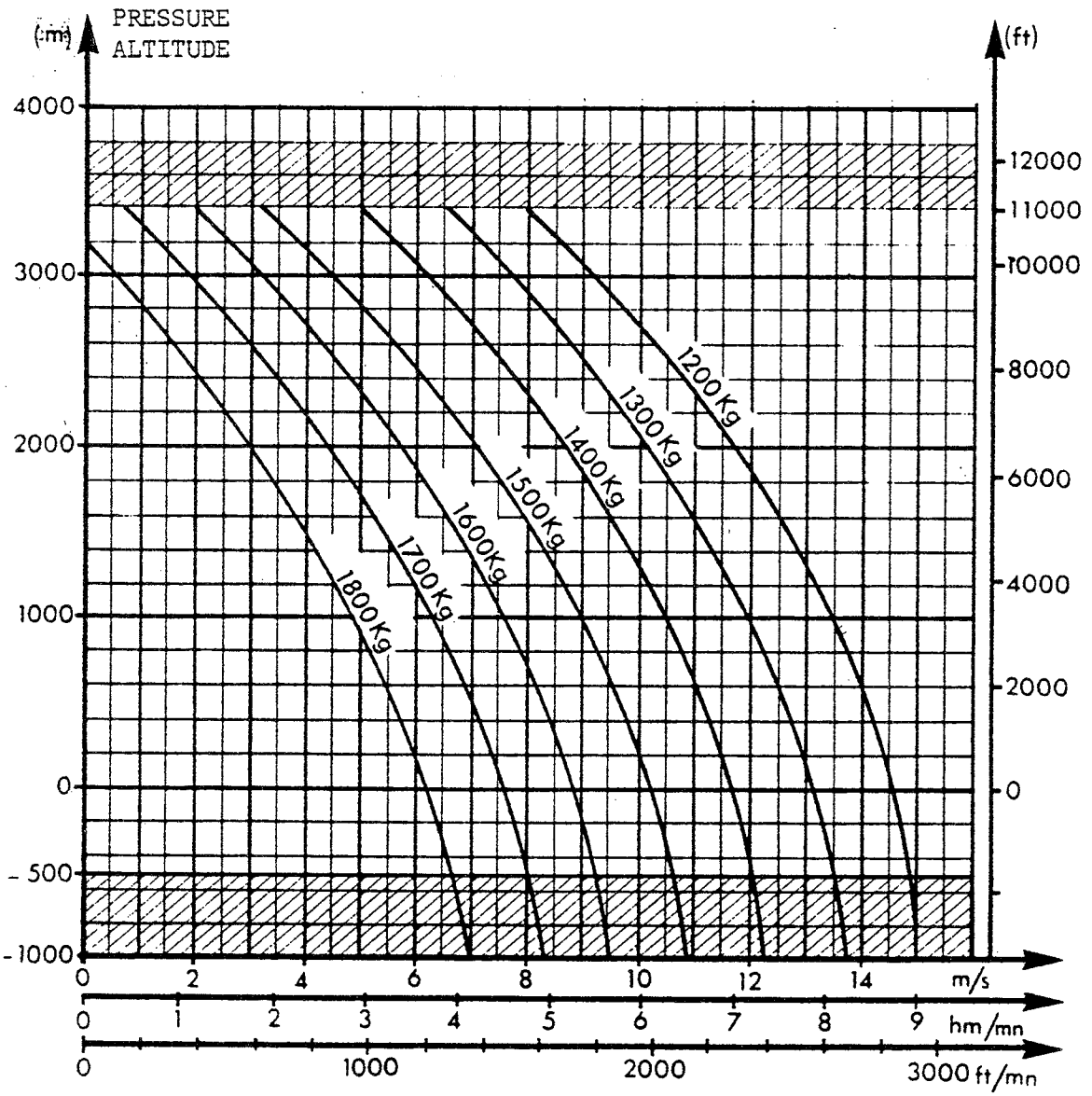
The performance data given in Section 4 of the basic Manual remain applicable. However, since climb is accomplished with the collective pitch control lever in the first detent up to the limit altitude (11000 ft), rate of climb is shown in the following charts.



Standard Atmosphere

Rate of climb 341 G
1st detent

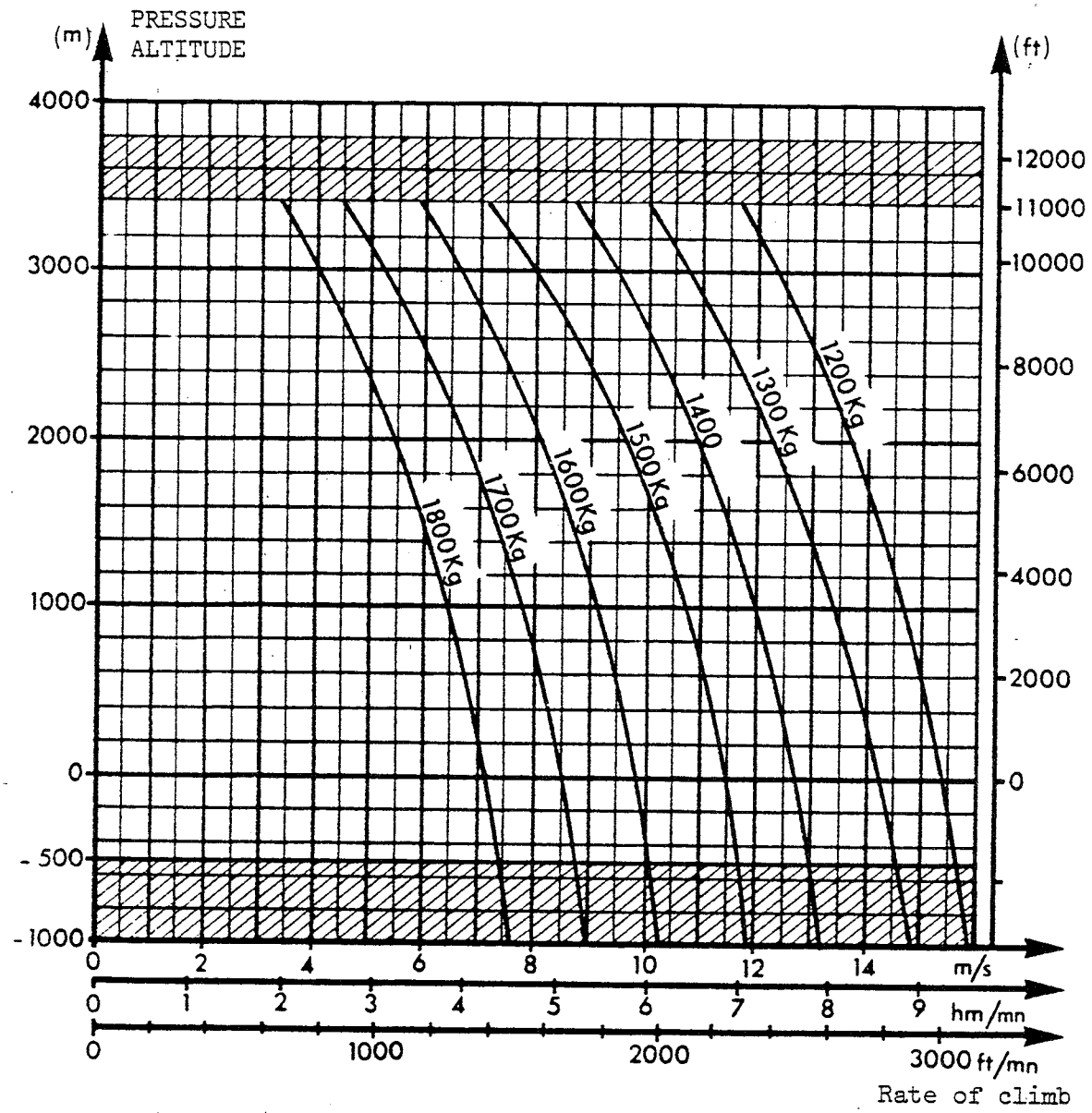


Standard Atmosphère + 20° C

Rate of climb 341 G

1st detent

Rate of climb



Standard Atmosphère - 20° C

Rate of climb 341 G

1st detent

Section 5
REQUIRED PLACARD

The following placard is displayed so that it can be seen when the right hand rear seat is folded :

RH REAR SEAT FOLD DOWN
PROHIBITED DURING IFR FLIGHT

Section 6
PERIODIC CHECK OF EMERGENCY ELECTRICAL SYSTEMS

Prior to IFR flight, an operational check of the emergency electrical system must be carried out.

This check is accomplished as follows :

- Battery Switch - off
- Generator Switch - off
- Emergency Bus Switch - EMER
- Check that the following items are operative

  Alternate gyro horizon
  #2 Nav/comm radio
  Magnetic brake release
  Marker beacon test
  Fuel gauge
  Cockpit flood light
  Stand-by compass light

- Emergency Battery Voltage - check greater than 23.5 V
- Emergency Bus Switch - Norm

NOTE : The battery volt/ammeter will not indicate emergency battery voltage accurately when the switch is in the EB (emergency battery) position unless the Norm/emer battery switch is in the EMER position.

Section 7

APPROVED OPTIONAL EQUIPMENT

The following optional equipment is approved and is compatible with the IFR system.

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7.1 Engine Related Options

- Air Intake Muffler
- Air Intake Grid
- Sand Filter

7.2 Airframe Related Options

- Tail Rotor Drive Shaft Cover
- Cargo Hook - Cargo Aids or ERC

7.3 Avionics/Electrical Options

- King KR 65 DME
- King KN 610 NAV *
- ICS
- Strobe Lights
- Training Module (co-pilot's instrument panel)

7.4 Miscellaneous

- Single litter installation with co-pilot's seat removed

* When the KING KN 610 Area Navigation System is installed, a plate is affixed to the instrument panel, specifying :

"AREA NAVIGATION USE LIMITED TO VFR ONLY"

or "UTILISATION DE LA NAVIGATION DE SURFACE LIMITEE AU VOL VFR"

Printed in France

FLIGHT MANUAL

SA 341G GAZELLE

SUPPLEMENT N°14

LENGTHENED CABIN

P/N 341 MR 0480
WITH UP_GRADED ROTOR SHAFT P/N 341A 31 0001.15
or subsequent dash Nº.

This supplement shall be included in the Flight Manual when the installation mentioned above has been completed.
The information contained herein supplements or cancels the information given in the Basic Flight Manual.

LIST OF EFFECTIVE PAGES

All pages of this supplement are listed below.
This list is re-issued with each amendment.

PAGE	CODE	PAGE	CODE
1	10.77		
2	10.77		
3	10.77		

DGAC APPROVED 28.10.77

L'Ingénieur Prin... Orient
Bureau Certifi... Français

Alain RICHARD

The information contained in this supplement is approved by the
"DIRECTION GENERALE DE L'AVIATION CIVILE"

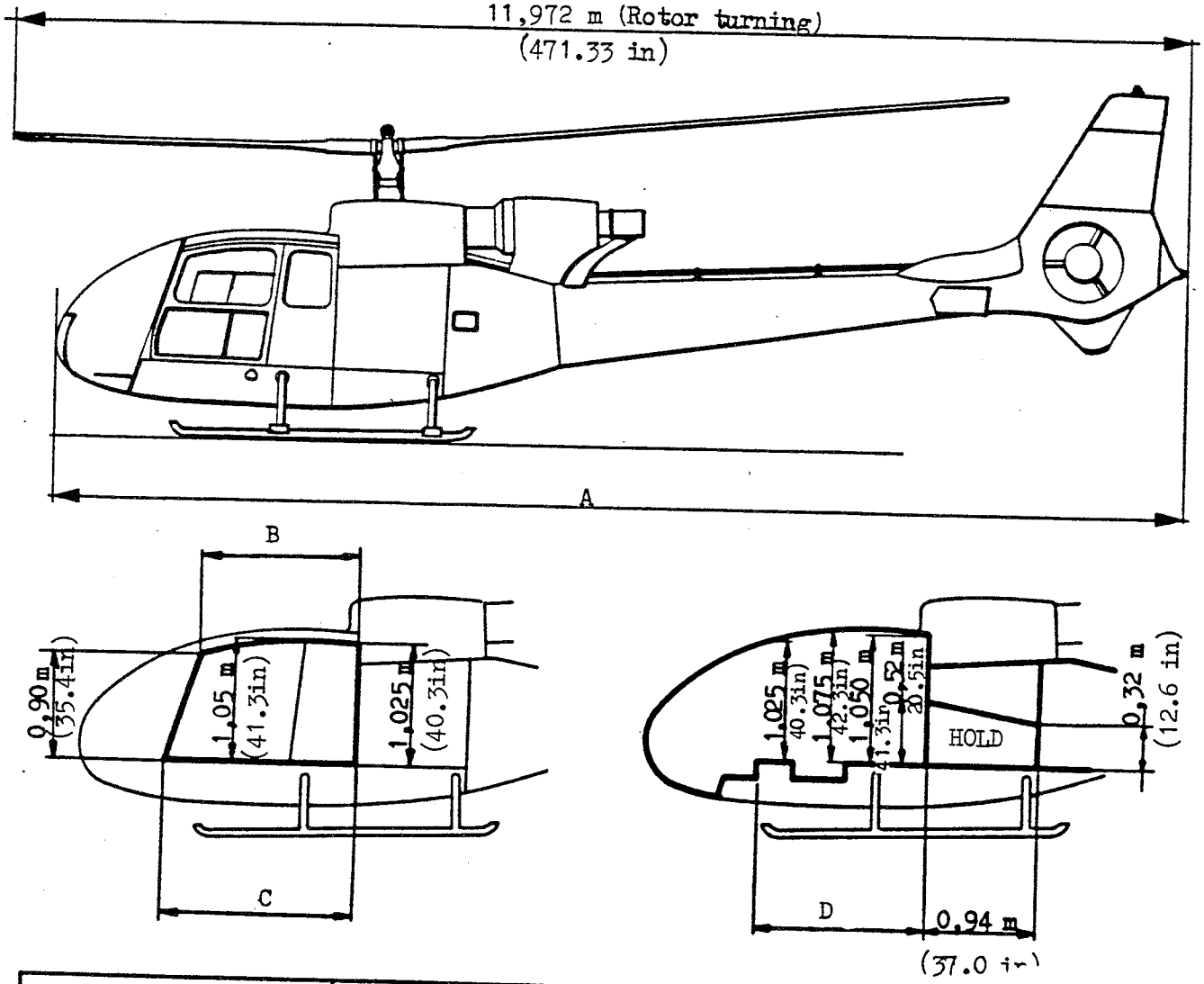
ISSUE : 1
Amendment Nº :
Date code : 10.77

General

The long cabin version of the GAZELLE helicopter has been developed to provide increased comfort for the rear seat passengers. The main dimensions affected by this modification are shewn in the illustrations below. It will be noted that the side fins are cut down.

The following optional equipment items must not be installed on this version of the helicopter :

- High, flexible landing gear.
- Rigid landing gear
- Float type landing gear.



Dimensions (metres)	A	B	C	D
Production version	9,53m(375.19in	1,28m(50.4in)	1,50m(59.0in)	1,31m(51.6in)
"Lengthened" version	9.73m(383.07in	1,48m(58.26in)	1.70m(66.92in)	1,51m(59.44in)

Fig. 1 "Lengthened" version dimensions

Printed in France

Section 1
LIMITATIONS

In addition to the Limitations laid down in the basic Flight Manual, which remain effective, the following limitations apply :

- Whenever the c.g. position is greater than 3 m (118.11 in) V.n.e. is 150 knots 278 Km/h).
- I.F.R. flight is prohibited, both with and without I.F.R. equipment per SUPP. 13.

Section 2
NORMAL PROCEDURES

The Normal Procedures detailed in the basic Flight Manual remain effective. It must be remembered that the doors must be kept closed during rotor spinning and run-down, to eliminate the risk of interference.

Section 3
EMERGENCY PROCEDURES

The Emergency Procedures as detailed in the basic Flight Manual apply.

Section 4
PERFORMANCE

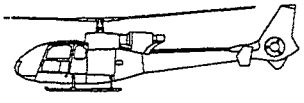
The basic Flight Manual Performance Data apply.

eurocopter

GAZELLE
SA 341 G
APPENDIX
DESCRIPTION

This document constitutes a supplement to the information given in the Flight Manual. It may be subject to specific amendments independent of those concerning the Flight Manual.

ISSUE : 1
AMENDMENT : 2
DATE CODE : 04-95



EUROCOPTER FRANCE Etablissement de Marignane
Direction Technique Support - 13725 Marignane Cedex - France

341G **APPENDIX D**

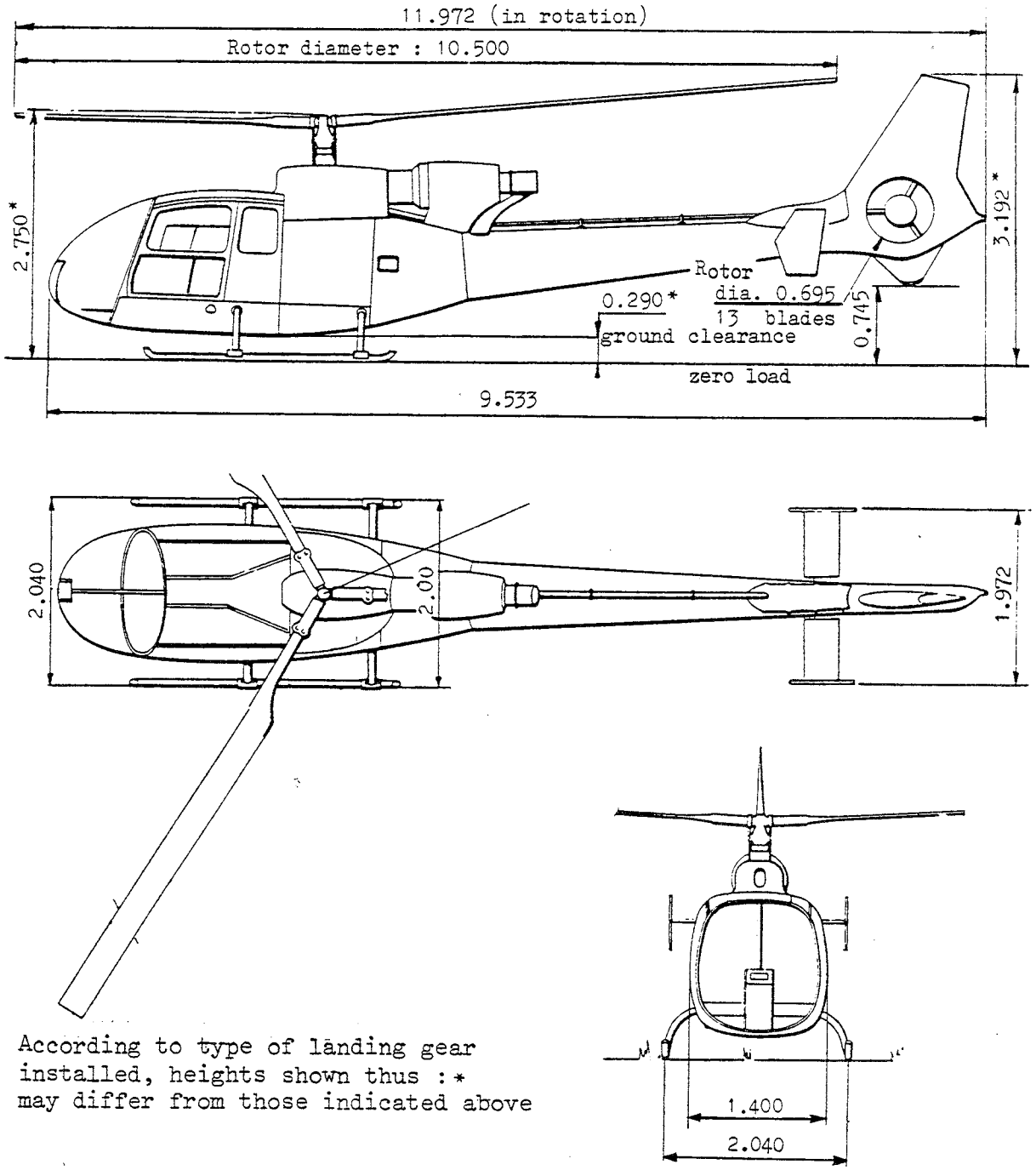
LIST OF EFFECTIVE PAGES

All the pages which constitute this document are listed below.
This list is re-issued with each amendment.

Page	Code	Page	Code	Page	Page	Page	Page
1	04.95	12	12.74	23	04.95		
2	04.95	13	12.74	24	04.95		
3	11.78	14	12.74	25	11.78		
4	11.78	15	11.78				
5	12.74	16	12.74				
6	12.74	17	12.74				
7	09.75	18	12.74				
8	12.74	19	12.74				
9	12.74	20	12.74				
10	12.74	21	12.74				
11	12.74	22	12.74				

CONTENTS

1. OVERALL DIMENSIONS OF THE HELICOPTER



* According to type of landing gear installed, heights shown thus : * may differ from those indicated above

Fig. 1 - Overall dimensions - Blades spread

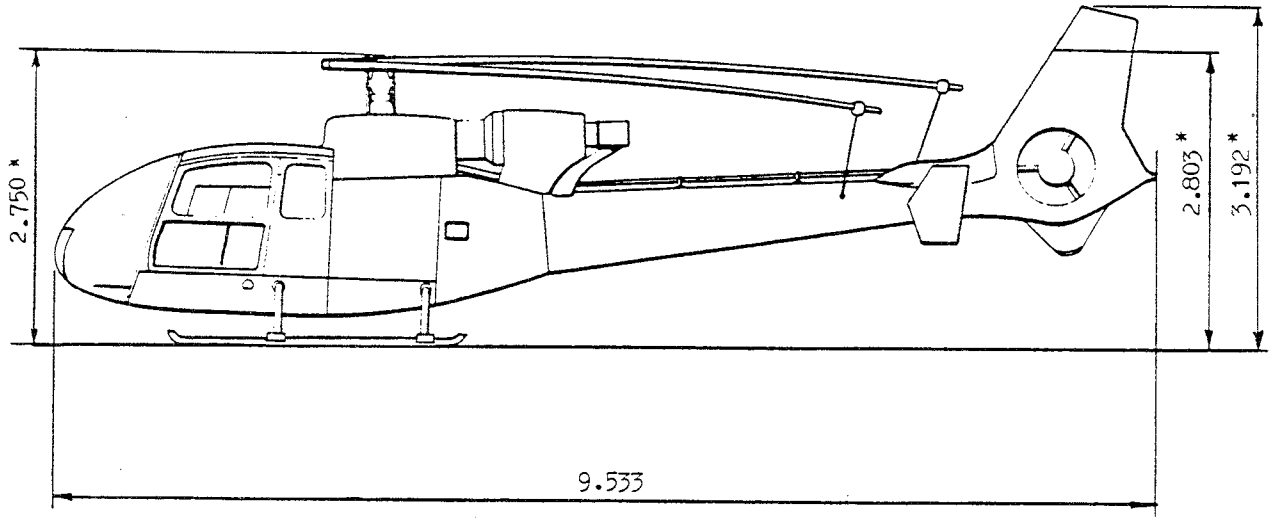


Fig.2 - Overall dimensions - Blades folded

* According to type of landing gear installed, heights shown thus : * may differ from those indicated above.

1.1. Overall dimensions with blades spread

Rotor diameter	10.500 m	(34.449 ft)
Overall length	11.972 m	(39.278 ft)
Overall height	3.192 m	(10.474 ft)

1.2. Overall dimensions with blades folded

Length	9.533 m	(31.272 ft)
Width	2.040 m	(6.693 ft)
Overall height	3.192 m	(10.474 ft)

1.3. Overall dimensions for transport

Length	9.533 m	(31.272 ft)
Width	2.040 m	(6.693 ft)
Overall height	3.192 m	(10.474 ft)
Overall height less tail fin cap	2.803 m	(9.196 ft)

1.4. Ground clearance (zero load less antenna, less equipment)

Under fuselage	0.290 m	(0.951 ft)
Under tail	0.745 m	(2.444 ft)

2. ENGINE

2.1. General

The ASTAZOU III is a single shaft turbine engine with a forward reduction gear.

It rotates at a nominal constant speed of 43500 r.p.m., or 6179 r.p.m. at the output shaft :

It consists essentially of :

- A two stage compressor, the first axial, the second centrifugal.
- A direct flow annular combustion chamber with centrifugal fuel injection
- A three-stage axial turbine
- A co-axial reduction gear of three gear trains, with two reduction stages
- A drive support casing, which also acts as the oil reservoir inner wall

2.2. Engine controls and instruments

2.2.1. General

In flight, the engine and rotor speeds are automatically stabilised by the governor, acting, by means of a metering device on the flow of fuel. The metering device opens and closes automatically as the helicopter rotor absorbs more or less power. Thus, the pilot has no need to take care of the engine handling once normal speed is attained : the governor is in control.

2.2.2. Fuel flow control : This controls the governor unit flow valve, via a "Teleflex" cable.

- The rear position corresponds to the start and slow running positions.
- The forward position corresponds to the normal flight position.

2.2.3. Instruments : Five instruments make monitoring of the engine parameters possible.

- An engine tachometer combined with a rotor tachometer. It carries two needles which must be superimposed during "power-on" flight.
- A pyrometer indicating t4 temperature.
- An oil temperature indicator
- An oil pressure gauge (according to version)
- A torquemeter

2.2.4. Operation and control of starting : this assembly consists of :

- A starter switch with 3 positions :

  The positions "ARRET" ("OFF") and "M" ("RUN") are stable.
  The position "ALLUM" ("IGN") is momentary and the switch returns automatically to "M" ("RUN") position.

In the position "M" ("RUN"), the fuel flow control being in the aft, the switch brings the starter into operation for starting cranking.

Pressing and releasing "ALLUM" ("IGN") : the switch having returned to "M", controls the time delayed ignition sequence (operation of the micropump, the ignition coil, opening of the valve).

Maintained in the position "ALLUM" ("IGN"), the ignition period is correspondingly prolonged or if considered necessary allows for re-injection as long as the green warning light "DEM" ("START") is "ON".

Setting the switch to "ARRET" ("OFF"), the fuel flow control having been previously returned against the rear stop, the electric valve closes and stops the engine.

- A green warning light "DEM" ("START") : This light is normally "ON" during the starting sequence and goes out when the engine reaches self-sustained speed.
- A yellow warning "INJ" ("INJ") : This light comes on during starting when the electric valve is open and stays on as long as the micro-pump and the ignition coil operate. It comes on also when the injection period is prolonged.
- A red warning light "BLOC" ("STOP") : This light comes on in the event of the engine stopping, either because of a faulty start or normal stopping. Re-starting is impossible until the light has gone out.

2.2.5. Warning lights : Two warning lights are located on the instrument panel :

- A warning light "H.MOT" ("ENG.P") on the warning panel. It comes on when the engine oil pressure system is less than 0.8 bar(11.6 p.s.i.).
- A red warning light "ALARM" ("ALARM") : It comes on when the flow limit is reached (max. opening of the metering device (Fig. 2) or when the fuel flow control is not in the max. forward position.

2.3. Fuel system

The fuel system consists of 2 distinct systems, located downstream of the helicopter fuel system.

- One for the ignition of the combustion chamber, the "Ignition System" which only operates during the engine starting sequence. The electrical starting system supplies : the micropump, which atomises and projects the fuel to the ignitors, and a high tension coil which, connected to the ignitors, ignites the fuel. Fuel supply is then taken over by the "Main System". The ignitor system is no longer supplied. A P2 pressure supply lifts the ball in the 4-way connector, establishes a cooling system for the ignitors, and evacuates unburnt fuel.

- The other system ensures supply of fuel to the combustion chamber from the time that the engine starts until it stops. This is the "Main System". The main fuel system conveys the fuel at the required pressure and in suitable quantity to the injection wheel, thus keeping the speed of rotation constant during operation or idling, whatever the load applied. The main component performing these operations is the governor unit.

- An electrical system is associated with the fuel system. Via the starting unit, it automatically controls the starting sequence and stopping of the engine.

2.4. Lubrication system

Lubrication is ensured by a self-contained system with a total capacity of 14.6 litres supplied by an annular tank having a capacity of 9.2 litres (maximum level).

The lubrication system consists of three separate circuits :

- The pressure circuit incorporating a pump drawing the oil from the lower part of the reservoir, and delivering it through a filter to the engine components.
- The scavenge circuit incorporating three pumps designed to return the oil to the tank through the oil cooler.
- The oil vapour return circuit connected to the oil tank.

Key to figure 3

Item	Description
1	- Supply line to speed governor/pump unit
2	- Filter by-pass valve
3	- Temperature probe
4	- Filter
5	- Oil cooler
6	- Pressure switch (min. pressure).
7	- Pressure pick-off (Optional).
8	- Non-return valve
9	- Scavenge pump
10	- Scavenge pump
11	- Scavenge pump
12	- Pressure relief valve
13	- Pressure pump
14	- Drain plug
15	- Oil non-return valve
16	- Oil tank
17	- Check valve
18	- Filler neck
19	- Tank air vent drain

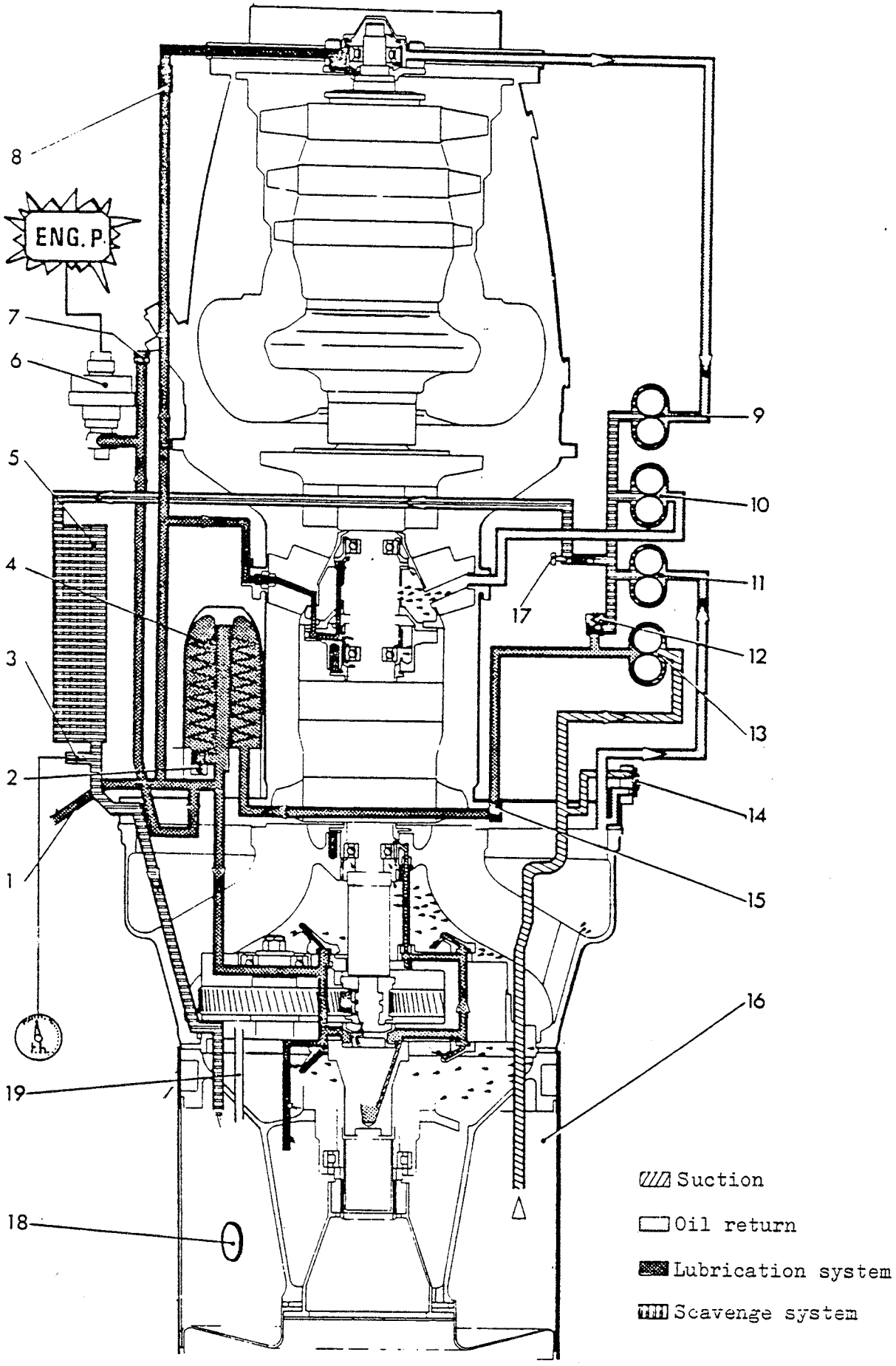


Figure 3 - Lubrication system

3. ROTORS AND TRANSMISSION SYSTEM

3.1. Rotors

3.1.1. Main rotor ; The shaft and the rotor head form a compact assembly, incorporating flapping hinges.

The three main blades of laminated glass-resin flexible construction are secured to the articulated sleeves of the rotor head. They rotate in a clockwise direction as seen from above.

The diameter of the main rotor is 10.50 m (34.449 ft).
The governed speed of rotation is 378 r.p.m.

3.1.2. Tail rotor : Shrouded in the vertical fin, it is a rotor fitted with 13 light alloy blades.

The blades rotate in a clockwise direction as seen looking left.

The diameter of the tail rotor is 0.695 m (2.280 ft).
The nominal rotation speed is 5774 r.p.m.

3.2. Transmission - (Figure 4)

The transmission assembly consists of :

- The clutch/free wheel assembly (1)
- The main gear box (2) (M.G.B.)
- The inclined drive shaft (4)
- The intermediate gear box (5) (I.G.B.)
- The horizontal drive shaft (6)
- The connecting shaft (7)
- The tail rotor gear box (8)

3.2.1. Clutch-free wheel : The dry centrifugal type clutch unit basically consists of a driving part, driven by the engine and incorporating shoes fitted with ferodo linings. Under the centrifugal force the shoes move away from their rest position and come into contact with a drum integral with the driven part.

The driven part drives the main gear box through the free wheel unit, which allows the engine to be uncoupled from the rotor during auto-rotation.

3.2.2. Main gear box : The purpose of the main gear box is :

- To transmit the power developed by the engine to the main and anti-torque rotors.
- To reduce the rotational speed transmitted to the rotors.
- To drive the accessories : main gear box oil pump (10), hydraulic pump (11) and tacho-generator.

The main gear box consists mainly of :

- A main bevel gear driven by the engine and transmitting the power to a two-stage planetary reduction gear connected to the rotor shaft.
- A rear bevel gear which transmits the power to the rear transmission system.
- A shaft (9) which drives the accessories mentioned above.

3.2.3. Intermediate Gear Box : Located at the junction of the tail boom and body structure, it consists of a simple bevel gear that does not change the speed ratio.

- The intermediate gear box is splash lubricated.

3.2.4. Tail Rotor Gear Box : Located in the vertical fin shroud, it is composed of a 90° bevel gear drive, which gives a step-up ratio between the connecting shaft and the tail rotor.

The tail rotor gear box is splash lubricated.

3.3. Rotor Brake - (Figure 4)

The rotor brake is actuated mechanically and controlled by the lever located in the cockpit :

- The position AVANT ("FRONT") corresponds to the "Brake-off" position
- The position ARRIERE ("REAR") corresponds to the "Brake-on" " position

When braking, the lever (12) causes the cam (13) to rotate; the shoes (14) then press the brake linings (15) on the disc (3).

The lever (12) can be displaced beyond the travel permitted by the play between the shoes (14) and the disc (3). The cam (13) rotation stops. The torque is then absorbed by the brake limiter (15).

A return spring brings the unit to the "brake-off" position when the lever in the cockpit is released.

3.4. Torquemeter - (Figure 4)

The torquemeter installation is designed :

- To show at all times the torque developed by the engine :
- To warn the pilot when the permissible torque has been exceeded
- To check whether the power developed by the engine is correct.

The installation incorporates an indicator, located on the instrument panel, and graduated in percentage of the torque developed from - 5% to 110 %. This instrument includes :

- A light, flashing when the limit torque is reached
- A knob, which drives an index moving between 40 and 100 % when rotated, and tests the installation when pushed in.
- An axial knob, driving a transparent sector graduated in Zp (pressure altitude), from 0 to 6 000 metres, and which is used to set the permissible limit torque.

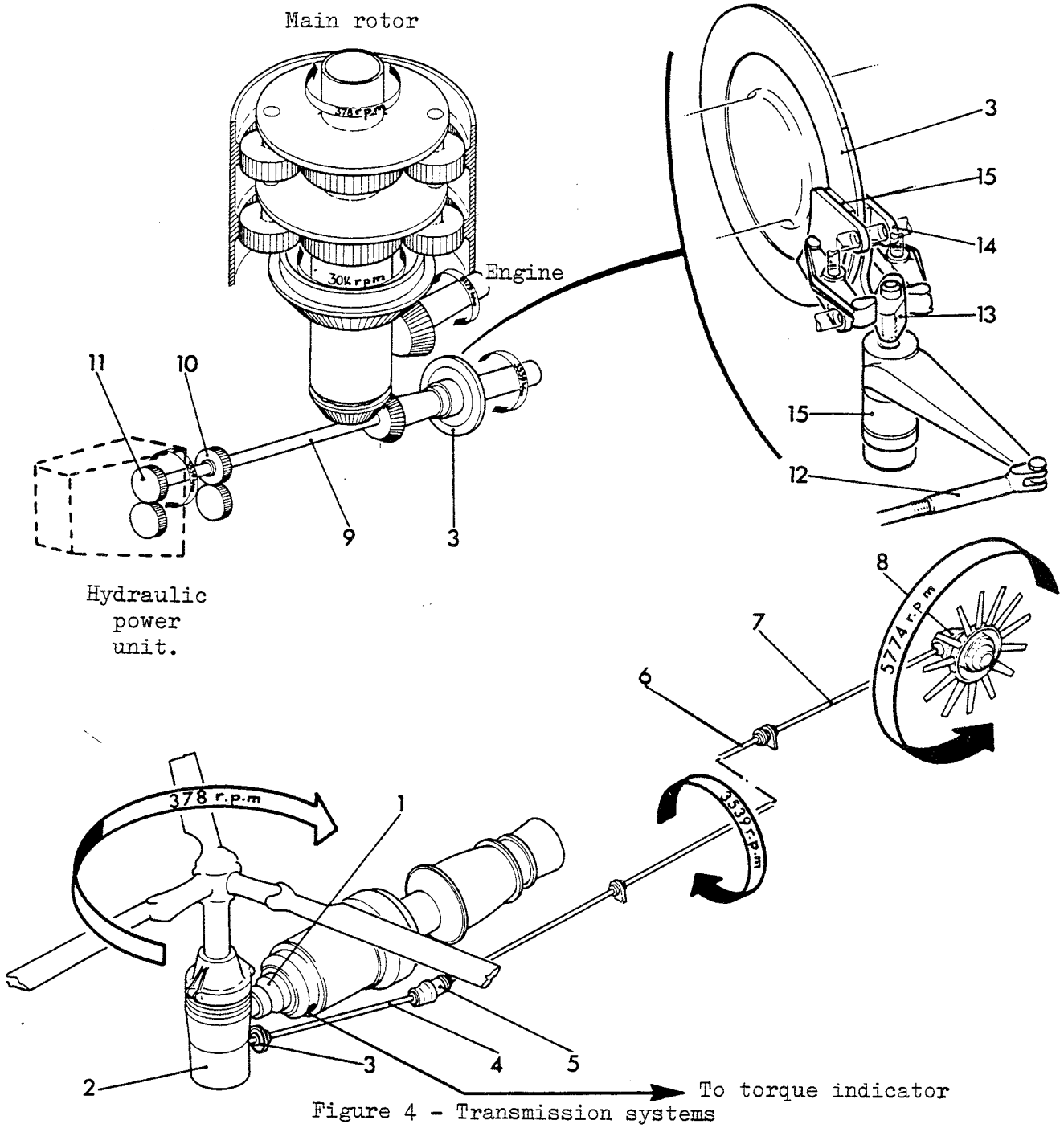


Figure 4 - Transmission systems

3.5. Main gear box lubrication system - (Figure 5)

The lower part of the casing contains the operating fluid.

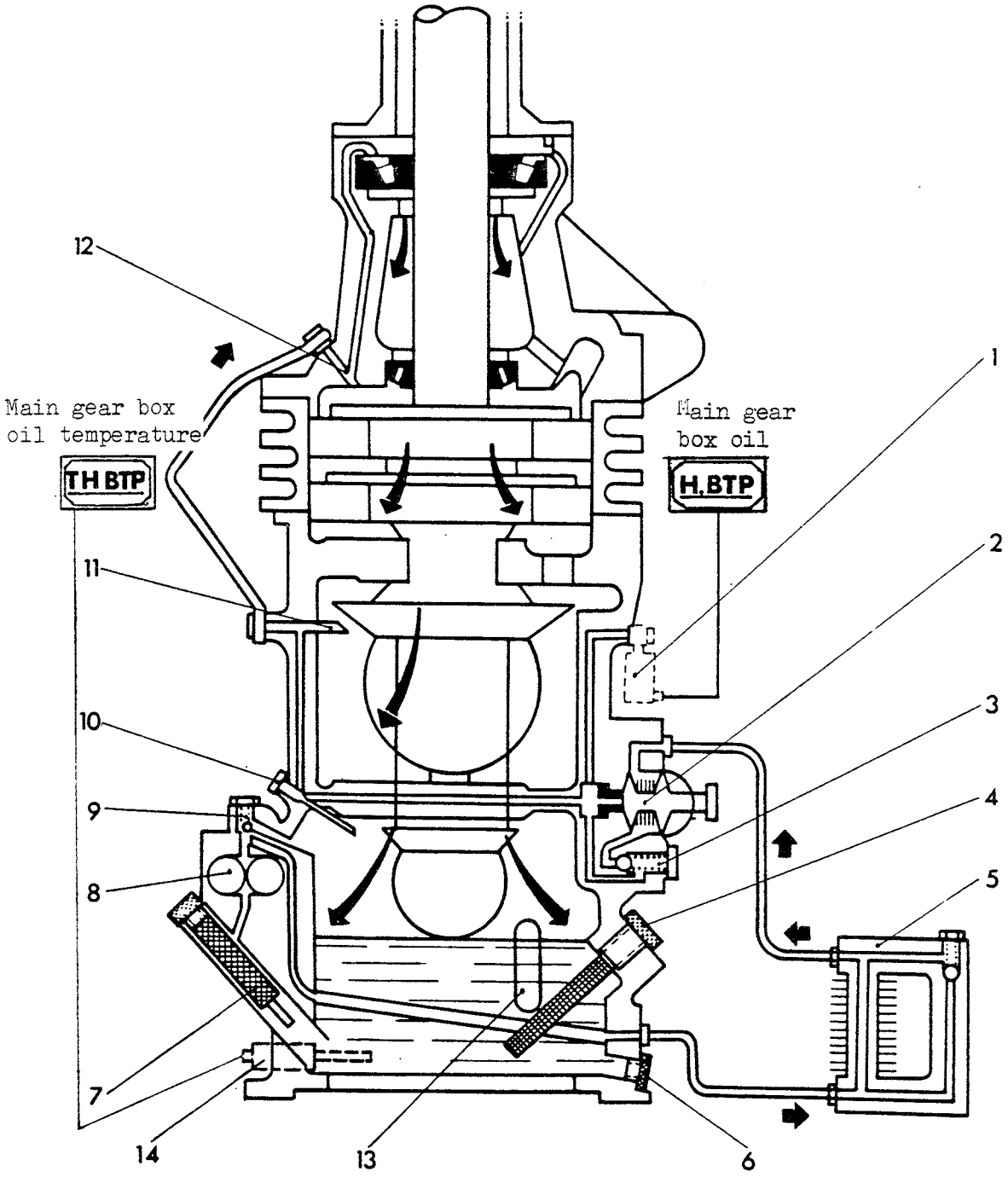
The pump (8) draws the fluid through a strainer (7) and delivers it to the cooler (5). The cooled fluid returns to the main gear box through the main filter (2). It is then fed to :

- The lower jet (10) which lubrucates the secondary bevel gear,
- The upper jet (11) which lubricates the main bevel gear.
- The feed pipe union of the jet (12) which lubricates the two stages of the reduction gear.

A by-pass valve (3), by-passing the main filter, allows the fluid to flow in case of clogging of the filter elements.

A pressure switch (1) causes the "H.B.T.P." ("M.G.B.P") warning light on the warning panel to come on when the pressure is less than 1.5 bars.

A temperature detector (14) causes warning light "TH. BTP" (MGB - T) on the warning panel to come on when the oil temperature is above 115°C.



1	Pressure switch	7	Suction Strainer
2	Oil filter	8	Gear Type Pump
3	Filter by-pass valve	9	Pressure Relief Valve
4	Filler Strainer	10	Lower Jet
5	Oil cooler	11	Upper Jet
6	Self-sealing drain valve	12	Rotor Shaft Jet
		13	Level Sight
		14	Temperature detector

Figure 5 - Main Gear Box Lubrication System

4. FLIGHT CONTROLS

4.1. General - (Figure 6)

The aircraft has dual controls (according to version) ; the first pilot's seat being on the R.H. side.

When the aircraft is flown by the pilot alone, the co-pilot controls : directional control pedals, cyclic stick and collective pitch lever,can be rapidly removed to allow the transportation of long packages, ambulance duties, etc...

The flight control consists of three channels :

- Lateral and longitudinal cyclic pitch control channels
- Collective pitch channel
- A yaw channel.

The controls are of the rigid type (control rods) for the first two channels, and mixed (rods and cables) for the directional control channel.

Three servo-controls, anchored to the main gear box, act directly on the swash plate (two laterally and one longitudinally). These servo-controls are simple sliding elements with a means of locking the input clearance that allows manual control in the case of failure of the hydraulic power supply.

A rear servo-control, installed on the tail rotor gear box, drives the control spider of the tail rotor head.

The flight controls can be provided with a stability augmentation system (S.A.S.) (Optional Equipment).

4.2. Cyclic pitch control stick - (Figure 6)

The two cyclic control stick are interlinked. On top of the stick a handgrip carries the following electrical controls.

- A toggle switch (1) with two momentary positions and automatic return to the "OFF" position (central position). It is used for Sling and Hoist operations (selection is made by means of a mission selector switch located on the instrument panel) :
  - When actuated upwards, it controls the reeling in of the hoist cable
  - When actuated downwards, it controls either normal release of the sling, or the reeling out of the hoist cable.

Note : Switch (1) is not installed on copilot's cyclic stick

- A push-button (2) used as the Armament trigger. It is actuated by a lever (6) maintained in the rest position by a small magnet stuck on top of the handgrip ; in operation, it is folded down on the push-button to allow the actuation of the latter.

- A push-button (3), which disengages the stabilization system.

- A trigger (4) controlling the I.C.S. and radio push-to-talk circuits. This trigger actuates two micro-switches (4A and 4B) in the following order :

  - 1st position : Rest position, the two micro-switches are not energized
  - 2nd position : Trigger depressed down to ball detent ; micro-switch 4A is energized(I.C.S. operation).
  - 3rd position : Trigger fully depressed beyond the ball detent ; both micro-switches are energized(radio operation).

- A push-button (5) for temporary disengagement of stabilization system magnetic brakes.

A friction device is installed at the base of the pilot's stick.

4.3. Collective pitch lever - (Figure 6)

The two collective pitch levers are interlinked. An electrical control box is fitted on top of the pilot's lever. A similar box can be fitted on the copilot's lever (optional equipment).

This box includes the following electrical controls :

- On the upper face :

  - A "SERVO" switch (7) controlling the electric valve supplying hydraulic power to the main and rear servo-controls.

  - A selector switch (8) controlling landing light extension and retraction.
  - A "PHARE" (LDG-LT) ON-OFF switch (9).

- On the lower face :
  - A "LARGAGE SECOURS" ("EMERGENCY RELEASE") push-button (10).

The pilot's collective pitch lever also carries on the lower section a pointer, which indicates the collective pitch in degrees on a graduated quadrant.

A knurled nut, at the end of the quadrant, is used to set the ambient temperature. This device moves the spring stop (first detent) which can be over-ridden in normal operation by increasing the control input effort.

A second spring detent is set at a fixed value corresponding to 15° collective pitch.

4.4. Tail Rotor Control System

Two pedal units (pilot and co-pilot) are interlinked and act on the tail rotor pitch control spider.

Pressure on the right pedals causes an increase in the rear blade incidence angle.

Pressure on the left pedals causes a decrease in rear blade incidence angle.

The pedals can be adjusted to either of two positions for pilots' leg comfort.

4.5. Servo-Controls

The servo-controls are series mounted in the flight control linkage :

- The three main servo-controls actuate directly the swash plate.
- The rear servo-control actuates the rear blades through the tail rotor gear box.

The servo-controls are powered by the aircraft hydraulic system and they can be isolated by operating the "SERVO" switch on the collective pitch lever.

The system then operates as a simple, unassisted mechanical linkage enabling the pilot to maintain full control of the helicopter in the eventuality of hydraulic power being lost.

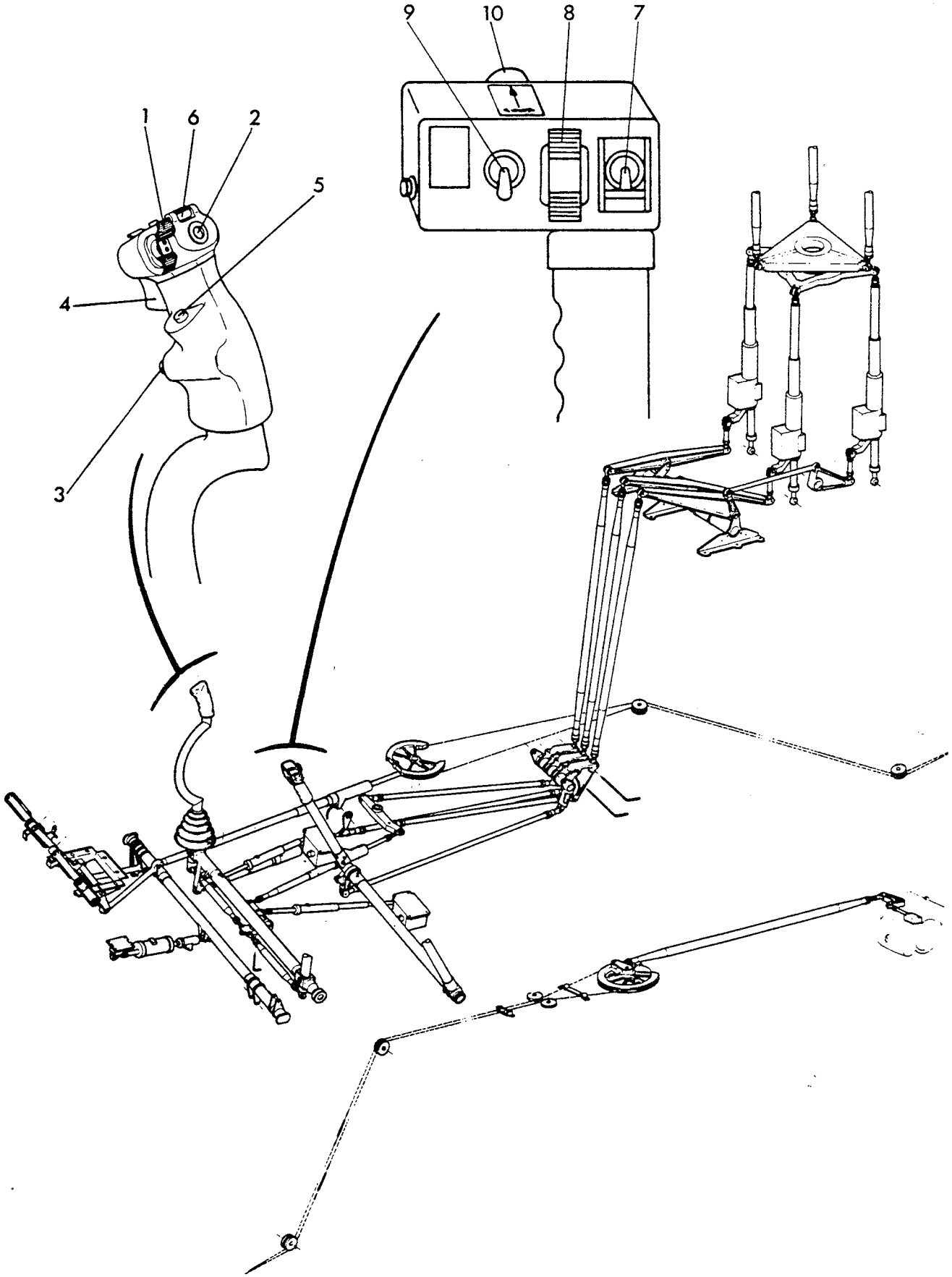


Figure 6 - Flight controls

5. FUEL SYSTEM

5.1. General

The fuel is contained in a flexible tank installed in the body structure.
A supplementary tank and a ferry flight tank can be installed to increase the range.
A booster pump delivers the fuel, through a "shut-off" cock and a filter/by-pass valve assembly, to the engine.
The "shut-off" cock is controlled from the pilot's station ; it allows the engine fuel supply to be cut off in case of emergency.

5.2. Main Tank - (Figure 7)

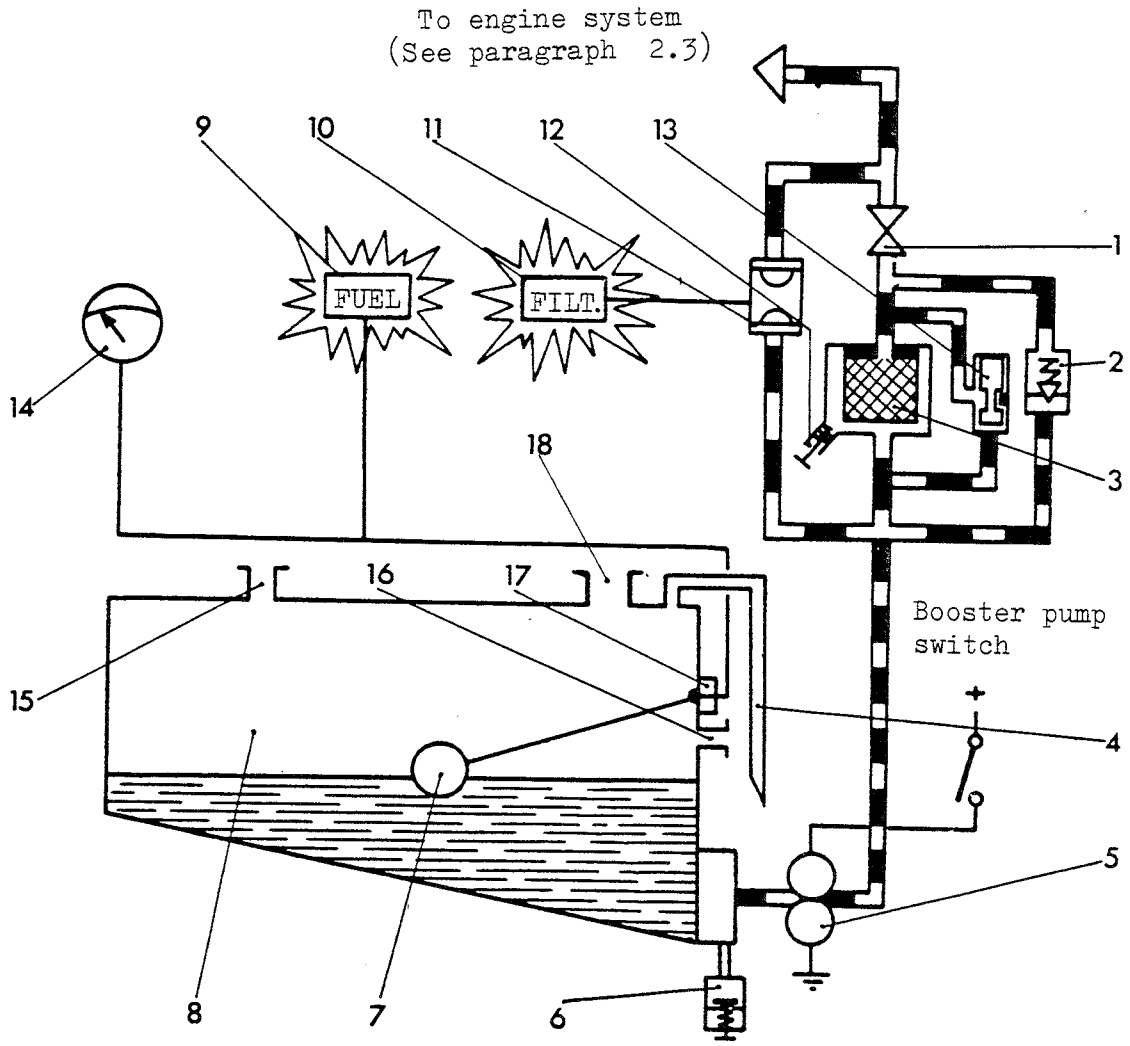
This is a flexible tank having a capacity of 455 litres (120.2 US gal). (99.6 Imp. Gal.)
It comprises :

- A filler neck (gravity feed), located on the right hand side of the aircraft.
- A float type tank unit (7) which transmits data to a gauge and causes the "COMB" ("FUEL") light, on the warning panel, to come on when the quantity of fuel available is less than 50 litres, in stabilized flight condition.
- An air vent pipe (4).
- A mounting flange on which the booster pump (5) and the drain valve (6) are fitted.

5.3. Supply System - (Figure 7)

Following the circuit in the direction of fuel flow there is :

- A motor-driven booster pump (5) controlled by the switch "POMPE" ("FUEL PUMP") on the instrument panel.
- A filter (3) with a drain valve and a clogging indicator visible from the ground. A by-pass valve (2) allows the supply to the engine in the event of the filter clogging. A pressure switch (11) causes the "FILT" ("F.FILT") light on the warning panel to come on when the filter is partially clogged. The light remains "ON" when the filter is completely clogged and the by-pass valve open.
- A shut-off cock (1) operated by a control located on the cockpit overhead panel.



K E Y

1	Fuel shut-off cock
2	Filter by-pass valve
3	Fuel filter
4	Tank air vent pipe
5	Booster pump
6	Tank drain valve
7	Float
8	Tank
9	Low level warning light (failure warning panel)
10	Filter clogging warning light (failure warning panel)
11	Pressure switch (detection of filter clogging)
12	Filter bleed valve
13	Clogging indicator
14	Fuel gauge
15	Connection for ferry-flight tank
16	Connection for additional tank
17	Transmitter
18	Filler neck (Gravity feed)

Figure 7 - Schematic diagram of Fuel System

6. HYDRAULIC POWER SYSTEM

6.1. General

The hydraulic system powers the three main servo jacks and the tail rotor servo jack.

The operating nominal pressure is 40 bars.

The hydraulic fluid used must comply with the requirements of specification AIR 3520 or DTD 585.

6.2. Description of the System - (Figure 8)

The hydraulic power supply is ensured by a hydraulic unit made up of a reservoir (5) fitted with an expansion unit (7) and a safety valve (6) for negative or positive pressures.

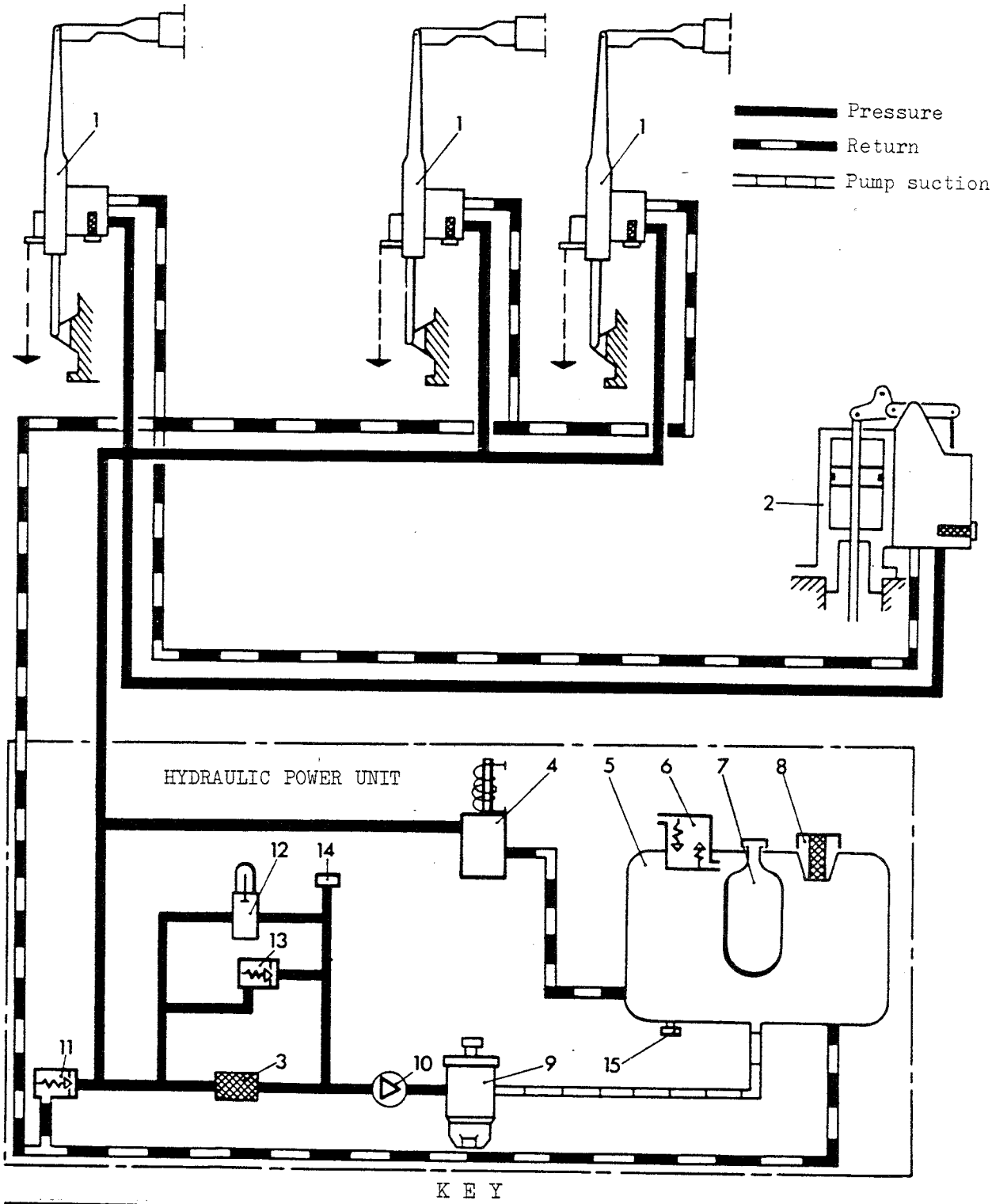
On the reservoir is fitted a casing with comprises :

- The hydraulic pump (9),
- The pressure relief valve (11)
- The filter (3) with by-pass valve (13) and a clogging indicator (12),
- The electrically operated valve (4) which, associated to the servo switch, controls pressurising of the servo-control system.

The system is filled through an opening in the reservoir. A sight allows checking for correct level. The capacity of the reservoir is 2.25 litres.

The system includes a pressure connection (14) for the possible coupling of a pressure gauge or ground hydraulic unit (pressure side).

The reservoir is drained through the orifice (15) which may also be used for the coupling of a hydraulic unit (return side).



K E Y

1	Main servo-jacks	8	Filler orifice
2	Rear servo-jack	9	Hydraulic pump
3	Filters	10	Non-return valve
4	Electrically operated valve	11	Pressure relief valve
5	Hydraulic reservoir	12	Clogging indicator
6	Safety valve (negative or positive pressure)	13	By-pass valve
7	Expansion unit	14	Pressure connection
		15	Drain cock

Figure 8 - Schematic diagram hydraulic system

7. ELECTRICAL POWER SUPPLY

7.1. Direct Current Power System - (Figure 9)

Direct current is supplied by a starter-generator driven by the engine and by a 24-Volt, 40 A/h battery, acting as buffer in the system.

An external power supply receptacle on LH side of aircraft enables supplying to be made from the ground.

The three sources of supply feed the main busbar, which in turn supplies d.c. power to the various items.

The nominal mains d.c. voltage is 28.5 Volts.

Coupling of the ground power supply to the main busbar is made through a relay which can only operate when the external receptacle is energized. Coupling is controlled by the "PARC.BAT" ("BATT") switch. The ground power supply unit overrides the generator and battery supply as the connection of this unit automatically opens the battery and generator relays.

Coupling of the battery to the main busbar is made through a contactor controlled by the "PARC.BAT" ("BATT") switch. The warning light "BAT" ("BATT") on the warning panel comes on when the battery is cut-out from the main supply.

A reverse current relay ensures coupling of the generator to the main busbar when the switch "GENE" ("GEN") is "ON" and when the external power receptacle is not energized. Opening of the reverse current relay is signalled by the indicator "GENE" ("GEN") on the warning panel which comes on. According to version, a "REARM" (RESET) push button is provided to try to re-establish coupling in case of cutting out due to overvoltage.

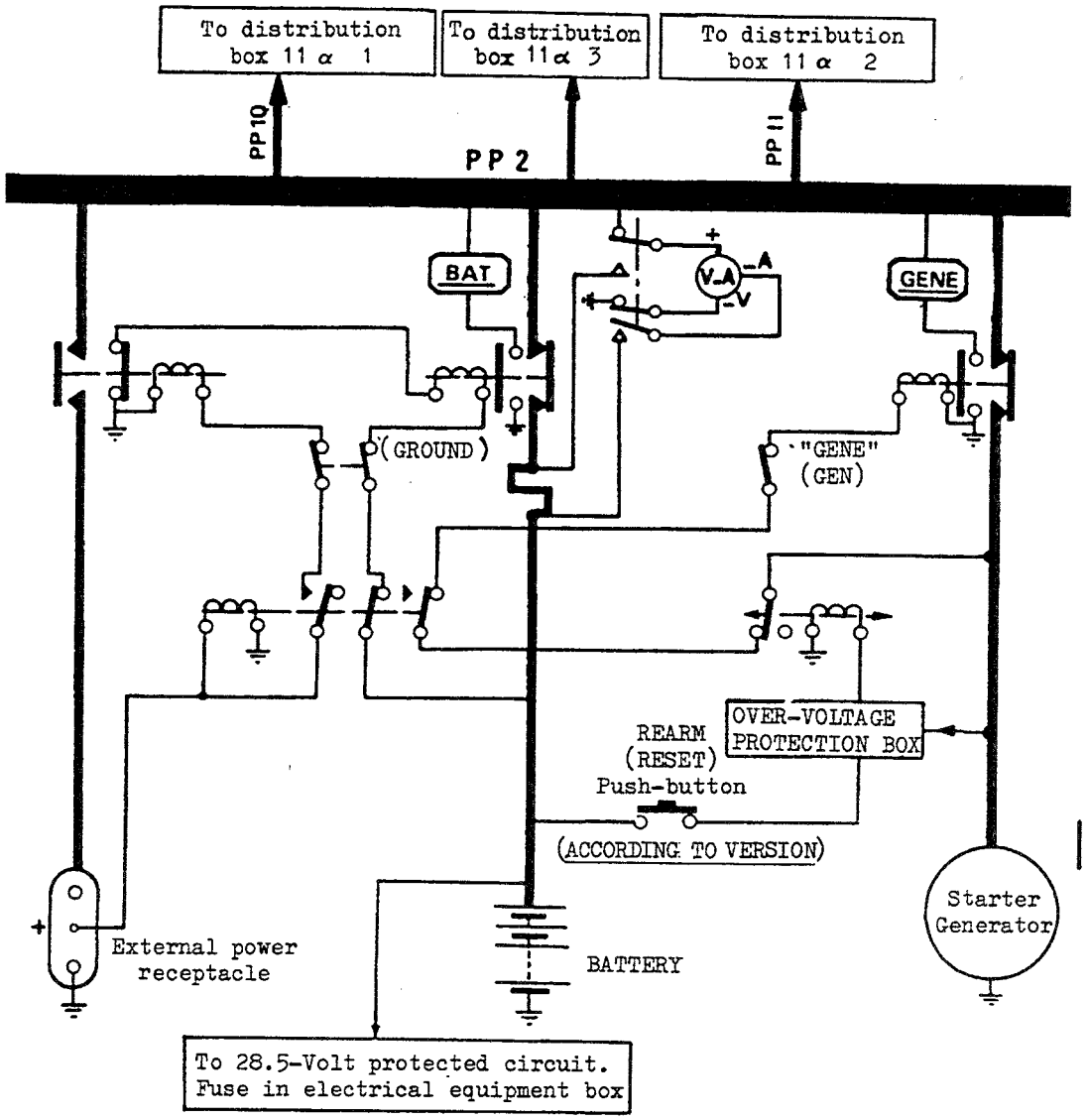
Note :

The warning light "GENE" ("GEN") on the warning panel comes on when the engine r.p.m. is between 19.000 and 26.000 RPM.

- A voltmeter indicates the voltage of :
  - The generator when cut-in
  - The battery when the generator is cut-out
  - The ground power unit when connected to the external power receptacle

The circuit is protected by fuses located in two distribution boxes 11∝1 and 11∝2, located to the left and to the right of the control pedestal respectively and a distribution box 11∝3 located on the rear wall of the cabin.
Fuses in electrical equipment box protect the power supply circuits and the cabin portable light.

A fuse (4K2) located under the pilot's floor, protects the starter circuit auxiliary relay.



NOTE: The reverse-current relay circuit is not shown.
The contacts are shown in "flight" position and the indicator lights out.

Schematic diagram - D.C. power distribution

Figure 9

7.2 - ALTERNATING CURRENT POWER SYSTEM (Figure 10)

A.C. power is supplied by a three-phase alternator driven by the engine.

NOTE: According to version, A.C. power can also be obtained from an auxiliary power unit. The connector is located in the rear compartment, on R.H. side.

The nominal supply voltage is 115/200 V - 400 Hz (200 V between phases). The installation is protected against under frequencies and under volting.

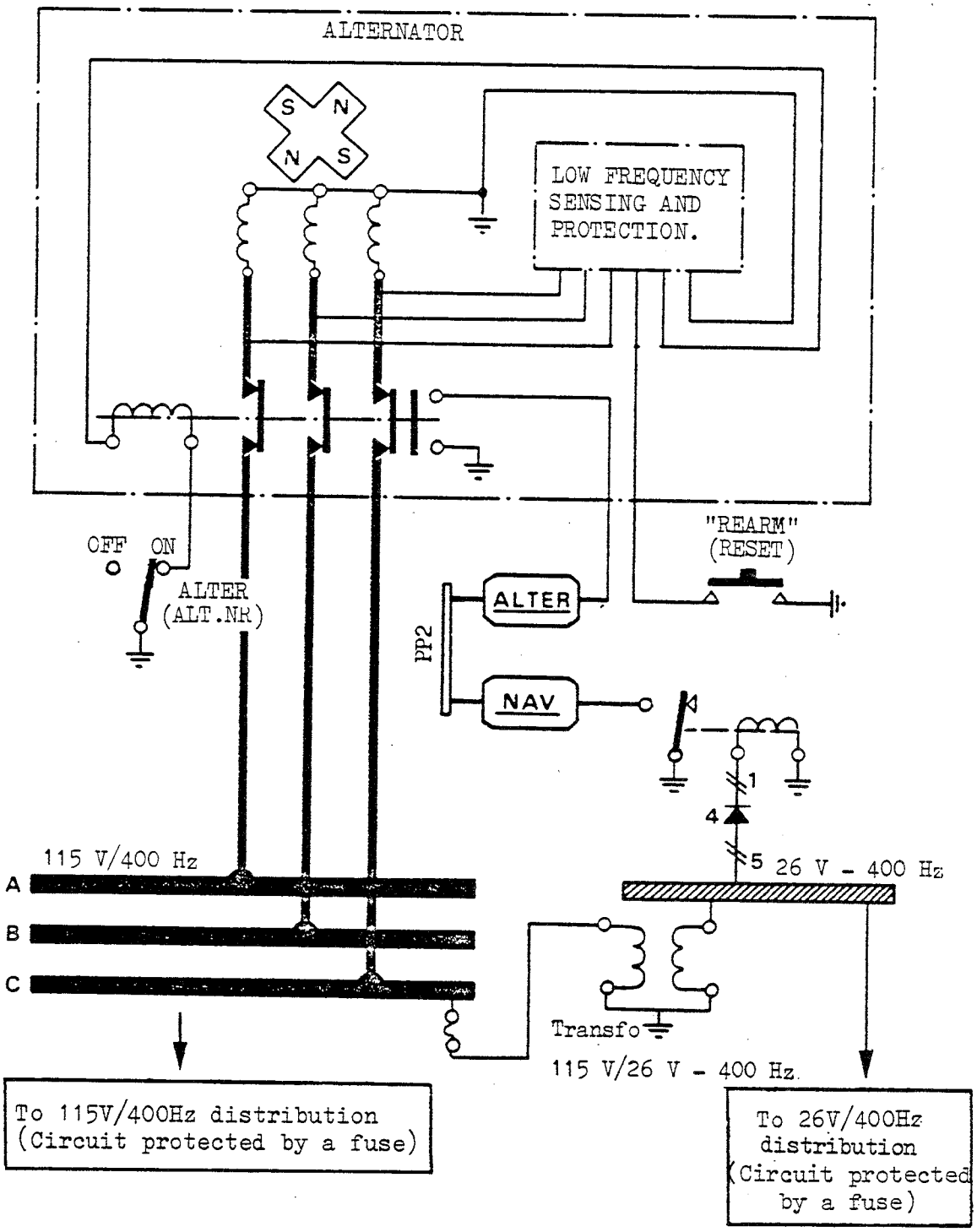
A line relay, incorporated in the alternator, couples the network when the switch "ALTER" ("ALT.NR") is "ON" and when the engine speed is about 41500 rpm. A push-button "REARM ALTER" ("RESET ALT NR") allows for re-establishing coupling in the case of cut-out due to a momentary fault (under frequency or short-circuit).

An "ALTER" ("ALT.NR") light on the warning panel indicates the opening of the line relay.

A 115 V/26 V - 400 Hz transformer connected to one phase of the three phase network, feeds the 26 V - 400 Hz single-phase busbar.

A "NAV" light on the warning panel signals that power to the busbar has failed.

NOTE: Since the 26 V - 400 Hz power is fed from the three-phase network, the coming-on of the "ALTER" ("ALT.NR") light means that the "NAV" light on the warning panel also comes on.



Note : The fuses are contained in boxes 14 α located on the LH and RH sides forward of the control pedestal.

The contacts are shown in flight position, indicator lights out.

Figure 10 - Schematic diagram of a.c. power system and distribution

GAZELLE
HELICOPTER

APPENDIX

STARTING ENVELOPE
MIXING OF FUELS
SA 341

This document consists of 5 pages numbered 1 to 5 .
It completes the information given in the Flight Manual and may be subject to specific amendments.

Note THIS APPENDIX SUPERSEDES THE "STARTING ENVELOPE" APPENDIX ISSUED PREVIOUSLY.

LIST OF EFFECTIVE PAGES

All the pages which constitute this document are listed below.

This list is re-issued with each amendment.

Page	Code	Page	Code
1	10.75		
2	10.75		
3	10.75		
4	9.75		
5	9.75		

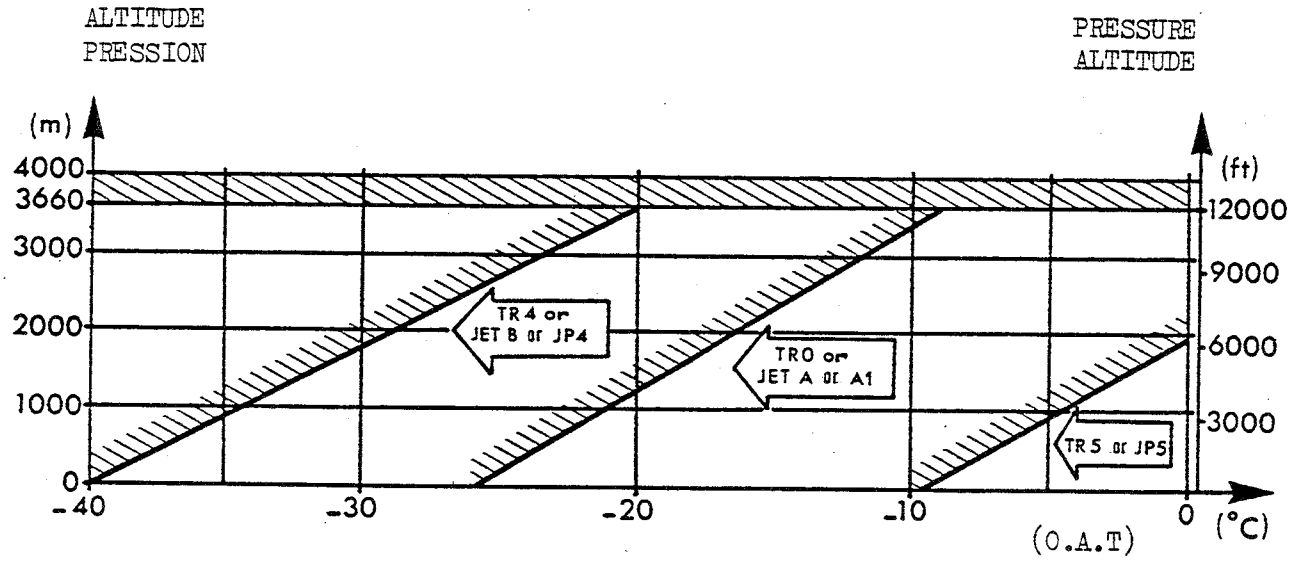
CONTENTS

1. STARTING ENVELOPE

Starting of the engine is facilitated by using a well charged battery.

However, difficulties may be encountered in cold weather, especially at altitude.

The graph below gives the temperature-altitude envelope for which the probability of a good start is high, particularly if starting is made within two hours after stopping the engine.



If the aircraft remains stationary at temperatures below - 20°C it is recommended:

- either, to ground run the engine at regular intervals (every two hours near - 20°C ; every hour near - 40°C)
- or, to store the battery in a heated room.

Should these precautions not be taken, and at O.A.T. below -30°C, it is necessary to rotate the rotor by hand, warm up the engine and the cyclic stick boot to -30°C, and use an external power unit.
For negative temperatures, when the pressure altitude exceeds 2000 m (6600 ft) it is recommended to accelerate the engine, without waiting for the governor to take over engine idling, as soon as the green "DEM" (START) indicator light goes out.

2. MIXING OF FUELS

Reference : TURBOMECA Service Bulletin N° 34

Certain operatirs using helicopters in low temperature conditions have had difficulty with engine light -up, using JP1 fuel (Kerosene).

Tests carried out using a proportion of petroleum spirit gasoline mixed with the usual fuel, have given satisfactory results

The proportions recommended are 10 % petrol (gasoline) for 90 % kerosene
The various types of authorized fuels, and applicable operating limitations, arespecified in the helicopter engine publications.

It is important that the petroleum spirit and kerosene be well mixed if this solution is adopted. It is known that the two types of fuel mix easily. Nevertheless, it is recommended to proceed as described below :

First mix approximately 10 dm^3 of petrol with an equal quantity of kerosene and pour the mixture into the fuel tank. Repeat this operation until the total quantity of petrol (gasoline) required for the full quantity of fuel has been poured into the tank. Then top up with kerosene to the full quantity of fuel required.

The chart below gives the maximum number of hours an engine may be operated with a petroleum spirit (gasoline) mixture according to the lead content of the petrol (gasoline).

Authorized use of alternative fuels	Type of petrol (gazoline) S	Aviation petrol Fr.Spec.AIR3401	Aviation petrol Fr.Spec.AIR3401	Aviation petrol Fr.Spec.AIR3401	Automobile - Armoured car petrol - DCEA	"lead-free"
	NATO Code	F 22	F 18	F 12	F 46	-
	Octane N°	115/145	100/130	80/87	80/89	(85/92)
	Lead contents % weight	0.157 max.	0.080(average)	0.017 max.	0.084 max.	0.001 max.
Maximum operating hours with alternative fuel	Pure petrol (gazoline) S	25 h	50 h	250 h	50 h	Full Overhaul life
Maximum Operating hours with fuel mixture	1/3 petrol 2/3 kerosene	75 h	150 h	750 h	150 h	Full Overhaul life
Maximum Operating hours with fuel mixture	10% petrol 90% kerosene	250 h	500 h	Full Owerhaul life	500 h	"

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GAZELLE

APPENDIX

ADDITIONAL PERFORMANCE DATA

SA 341

The appendix constitutes a supplement to the information given in the Flight Manual. It covers all performance data not requiring approval and may be subject to specific amendments, independent of those concerning the basic Flight Manual.

ISSUE : 1
AMENDMENT : 1
DATE CODE : 11-78

LIST OF EFFECTIVE PAGES

All the pages which constitute this document at amendment 1 are listed below.
This list is re-issued with each amendment.

Page	Code	Page	Code	Page	Code	Page	Code
1	11-78						
2	11-78						
3	11-78						
4	12-74						
5	11-78						
6	11-78						
7	12-74						
8	12-74						
9	10-75						
10	10-75						
11	10-75						

CONTENTS

0. GENERAL

0.1 Safety speed : (recommended speed in case of servo-control failure)

At safety speed, - following failure of the servo control system -, the hourly fuel consumption and aircraft operating range should be reduced as follows :

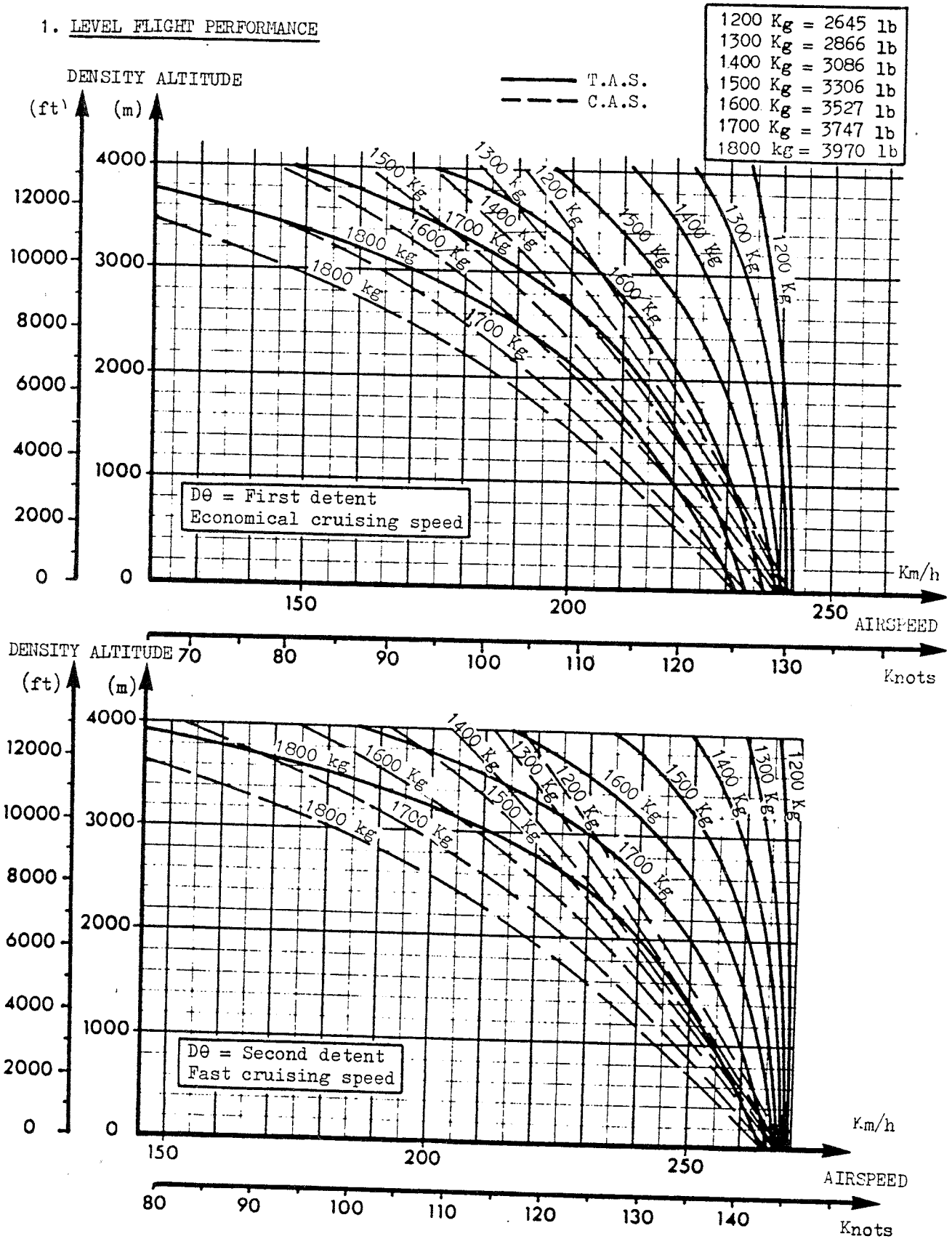
- Hourly fuel consumption : 28 kg/h
- Operating range : 6 %

} With respect to Figures 2 and 4 (DΘ = 1st detent)

0.2 Effect of equipment on level flight performance :

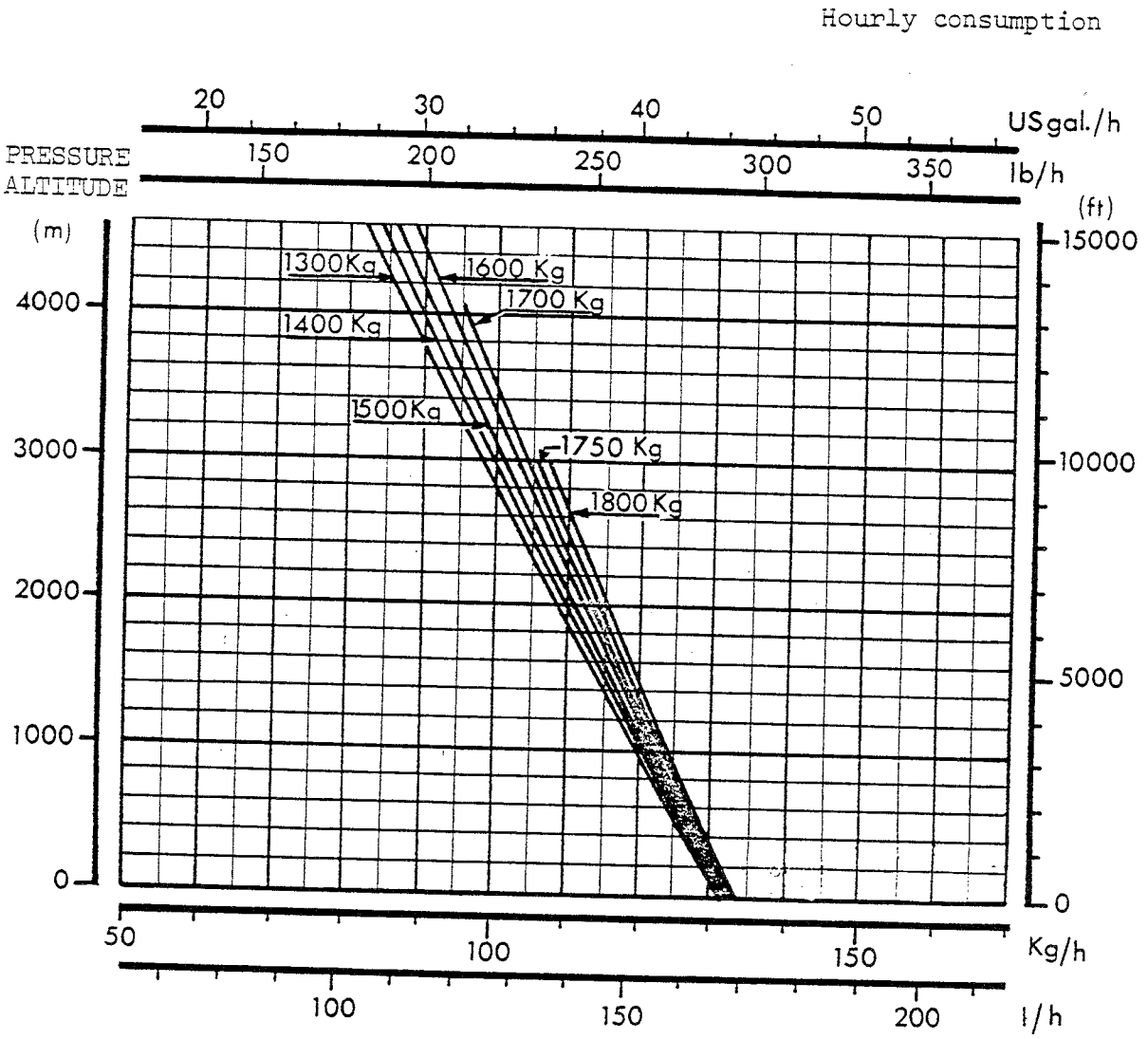
EQUIPMENT INSTALLED ON AIRCRAFT	EFFECT ON LEVEL FLIGHT PERFORMANCE		
	Penalty on fuel consumption	Average effect on range	Average effect on airspeed
Normal heating system	+ 4 l/h	- 2 %	None
Very cold weather heating system	+ 8 l/h	- 4 %	None
Muffler	+ 3 l/h	- 2 %	None
Sand-filter	+ 4 l/h	- 2 %	None
Fairings on low type landing gear	None	None	+ 2 km/h
Fairings on high type landing gear	None	None	+ 2 km/h
High flexible landing gear	None	- 2 %	- 5 km/h
Float type landing gear (Forward c.g. limit)	None	- 14 %	- 40 km/h
Hoist	None	- 3,5 %	- 10 km/h
Emergency floatation gear (folded)	None	- 3,5 %	- 10 km/h
Shrouded loud speaker low type landing gear	None	- 3 %	- 8 km/h
Shrouded loud speaker, high type landing gear	None	- 3 %	- 8 km/h
Skis	None	- 3,5 %	- 10 km/h

1. LEVEL FLIGHT PERFORMANCE



Level flight performance
Figure 1

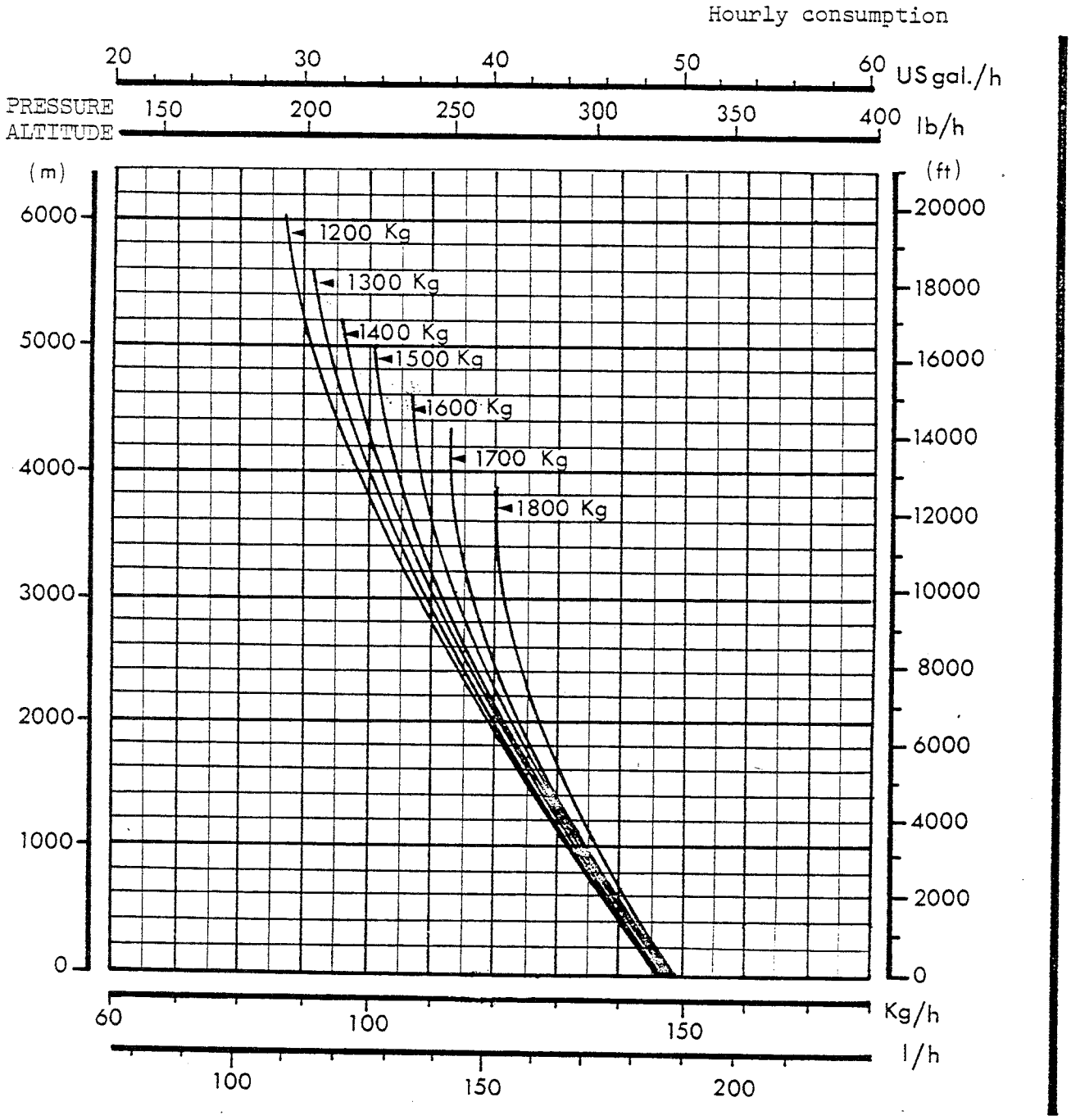
2. HOURLY FUEL CONSUMPTION



Fuel specific gravity : 0.79

1300 kg	= 2866 lb
1400 kg	= 3086 lb
1500 kg	= 3306 lb
1600 kg	= 3527 lb
1700 kg	= 3747 lb
1800 kg	= 3970 lb

Hourly fuel consumption
Standard atmosphere
Dθ = First detent
Figure 2

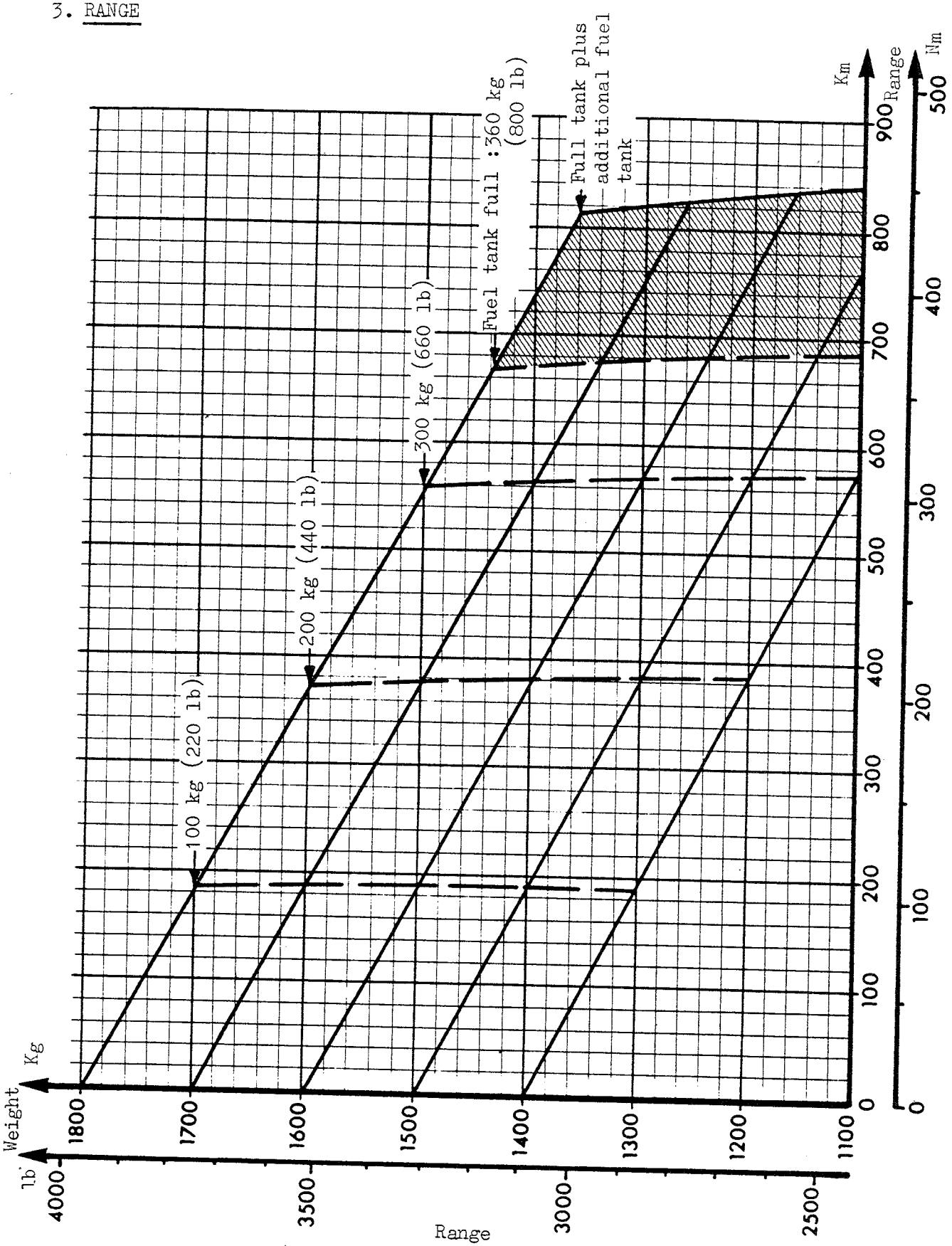


Fuel specific gravity : 0.79

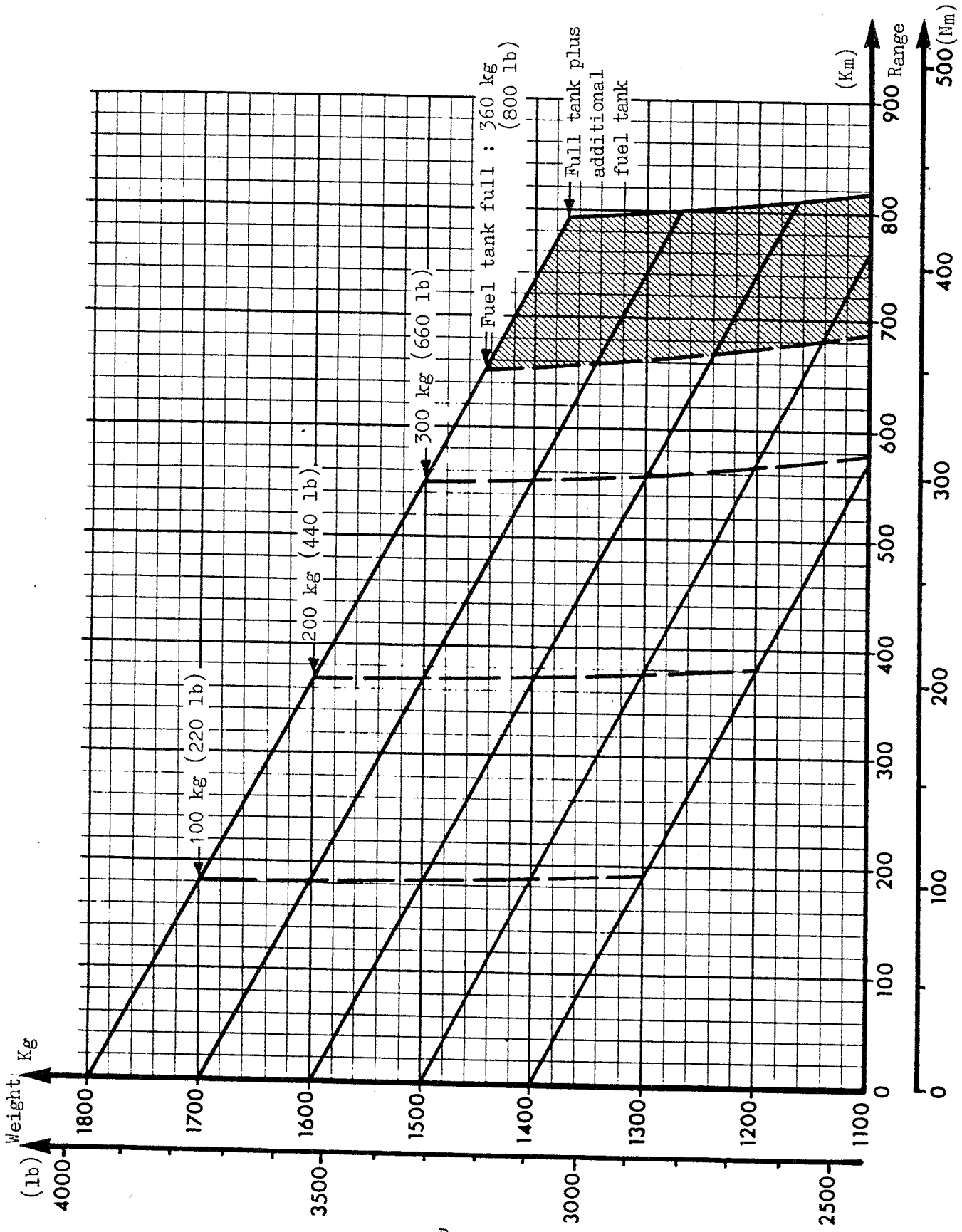
1200 Kg	= 2645 lb
1300 Kg	= 2866 lb
1400 Kg	= 3086 lb
1500 Kg	= 3306 lb
1600 Kg	= 3527 lb
1700 Kg	= 3747 lb
1800 Kg	= 3970 lb

Hourly fuel consumption
Standard atmosphere
Dθ = Second detent
Figure 3

3. RANGE



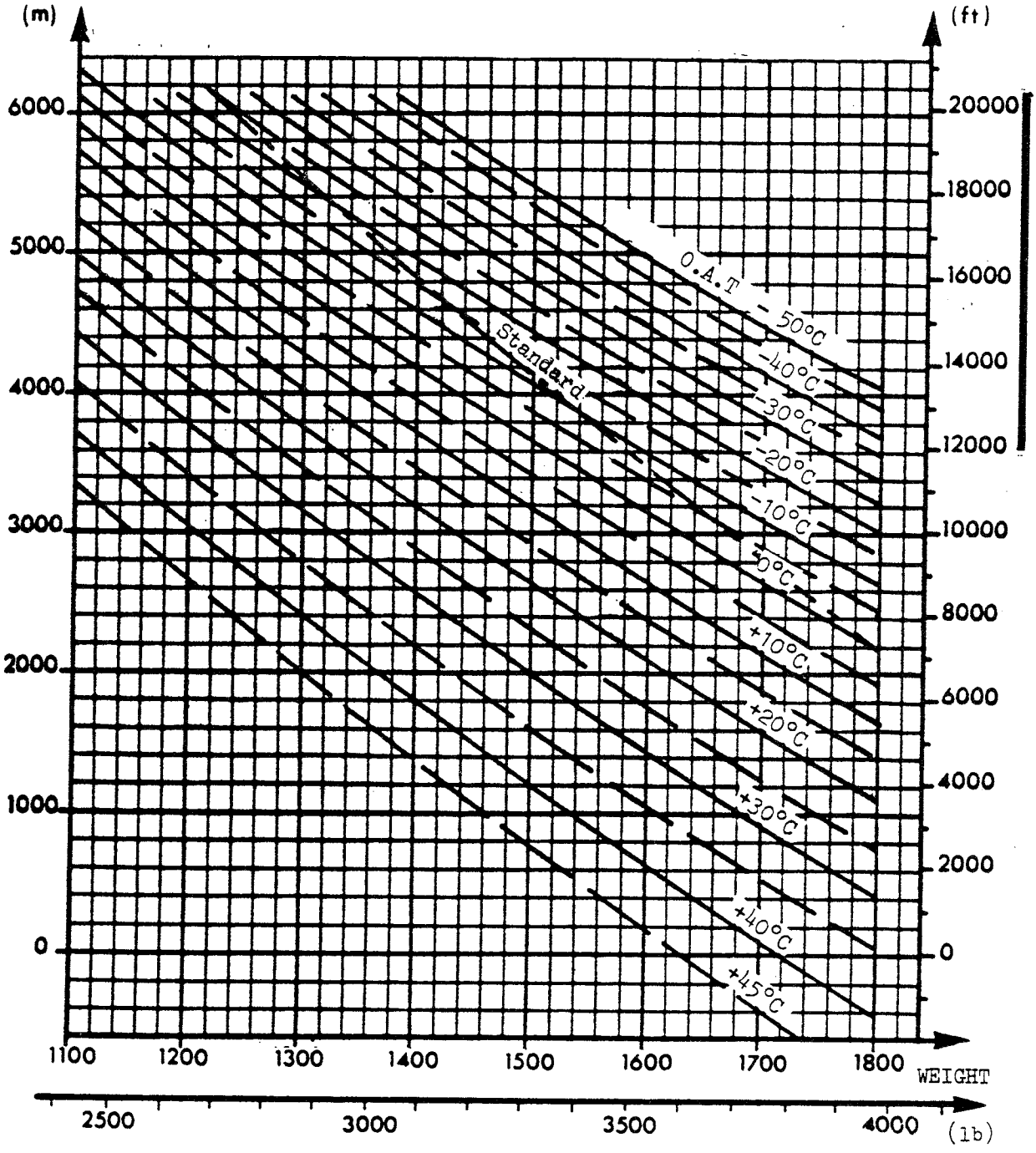
Range
at sea level in Standard atmosphere
Dθ = First detent
Figure 4



Range
at sea level in Standard atmosphere
Dθ = Second detent
Figure 5

4. CEILING IN HOVER

PRESSURE ALTITUDE

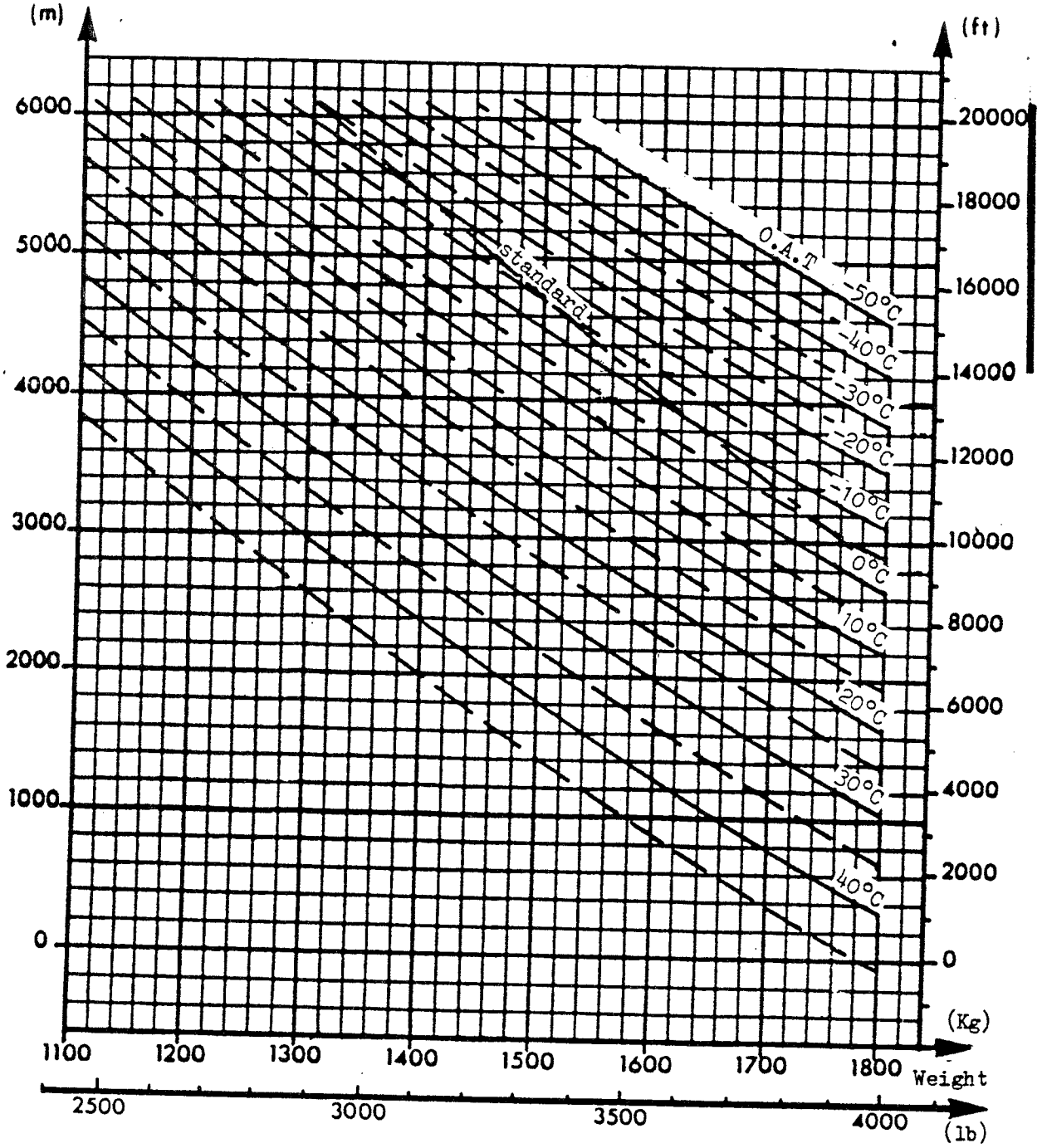


Ceiling in hover O.G.E

- Without pitch limitation
- No wind
- MGB power limitation : 368 Kw
  Engine power limitation : 422 Kw

Figure 6

PRESSURE ALTITUDE

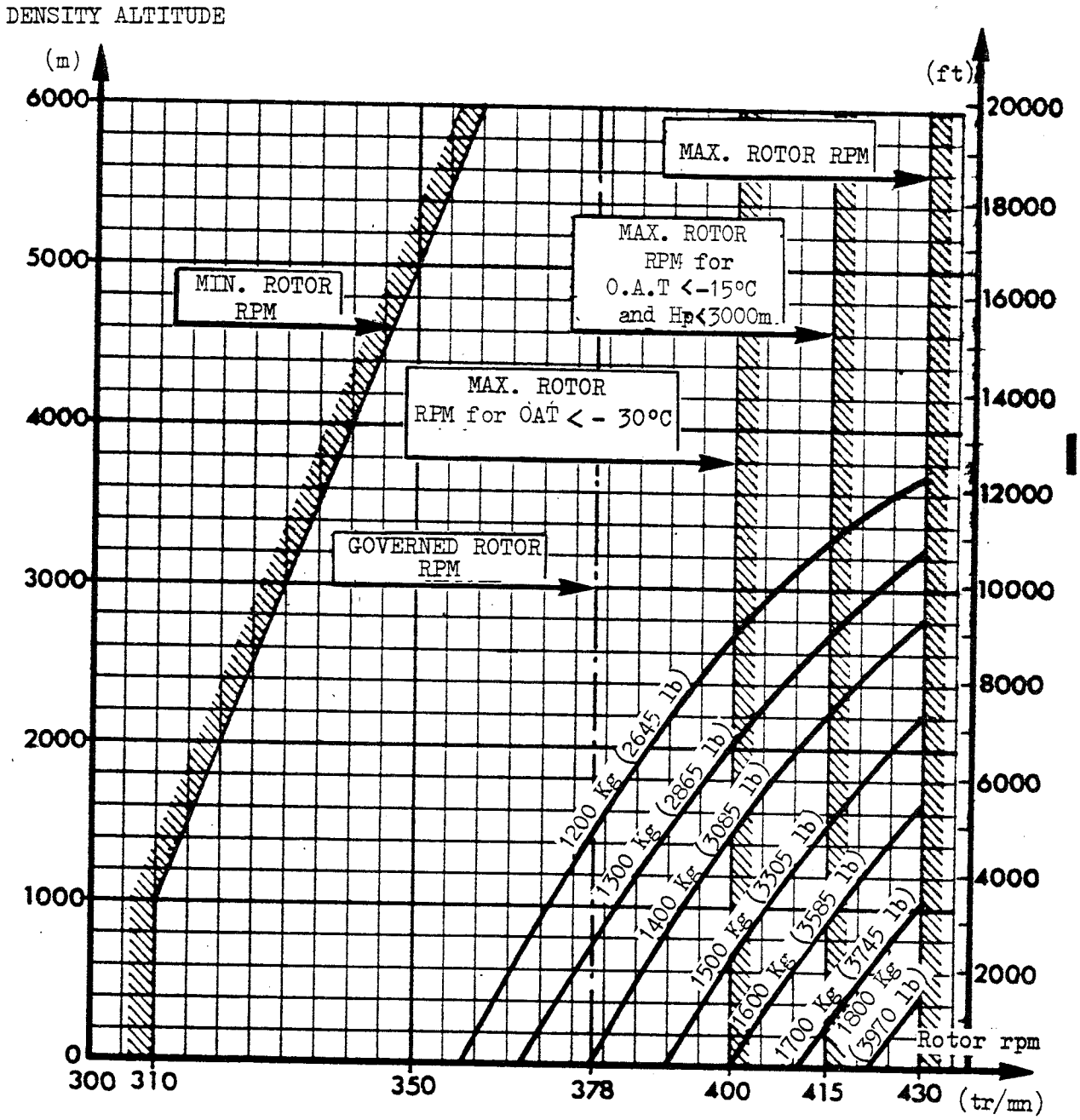


Ceiling in hover I.G.E. (3 ft)

- Without pitch limitation
- No wind
- MGB power limitation : 368 Kw - Engine power limitation:422 Kw.

Figure 7

5. AUTOROTATION



Collective pitch = 4° (low pitch)

Indicated Aispeed (IAS) = 120 km/h

Variation of rotor r.p.m. in autorotation

Figure 8

GAZELLE

APPENDIX

WEIGHT AND BALANCE

SA 341

PART 1

ISSUE : 1
AMENDMENT : 1
DATE CODE : 11-78

LIST OF EFFECTIVE PAGES

All the pages which constitute this document are listed below.
This list is re-issued with each amendment.

Page	Code	Page	Code	Page	Code	Page	Code
1	11-78	12	01-75	23	04-76		
2	11-78	13	01-75	24	04-76		
3	01-75	14	01-75	25	04-76		
4	01-75	15	01-75				
5	01-75	16	01-75				
6	01-75	17	11-78				
7	01-75	18	01-75				
8	01-75	19	01-75				
9	01-75	20	11-78				
10	01-75	21	04-76				
11	01-75	22	04-76				

CONTENTS

1. GENERAL

The purpose of this appendix is to provide data allowing the determination of the C.G. location and its variations according to the load configuration before flight and the consumption of fuel and other fluids during flight.

To this effect, this appendix states :

- the weight and balance limitations
- the location of loads specific to each mission

The forms, designed to follow the weight and balance variations of the empty aircraft are grouped at the end of this publication.

2. DATUM PLANES

A. Datum plane of longitudinal dimensions (X)

This is an imaginary plane at right angles to the helicopter centre line, and located 3 metres ahead of the main rotor centre.

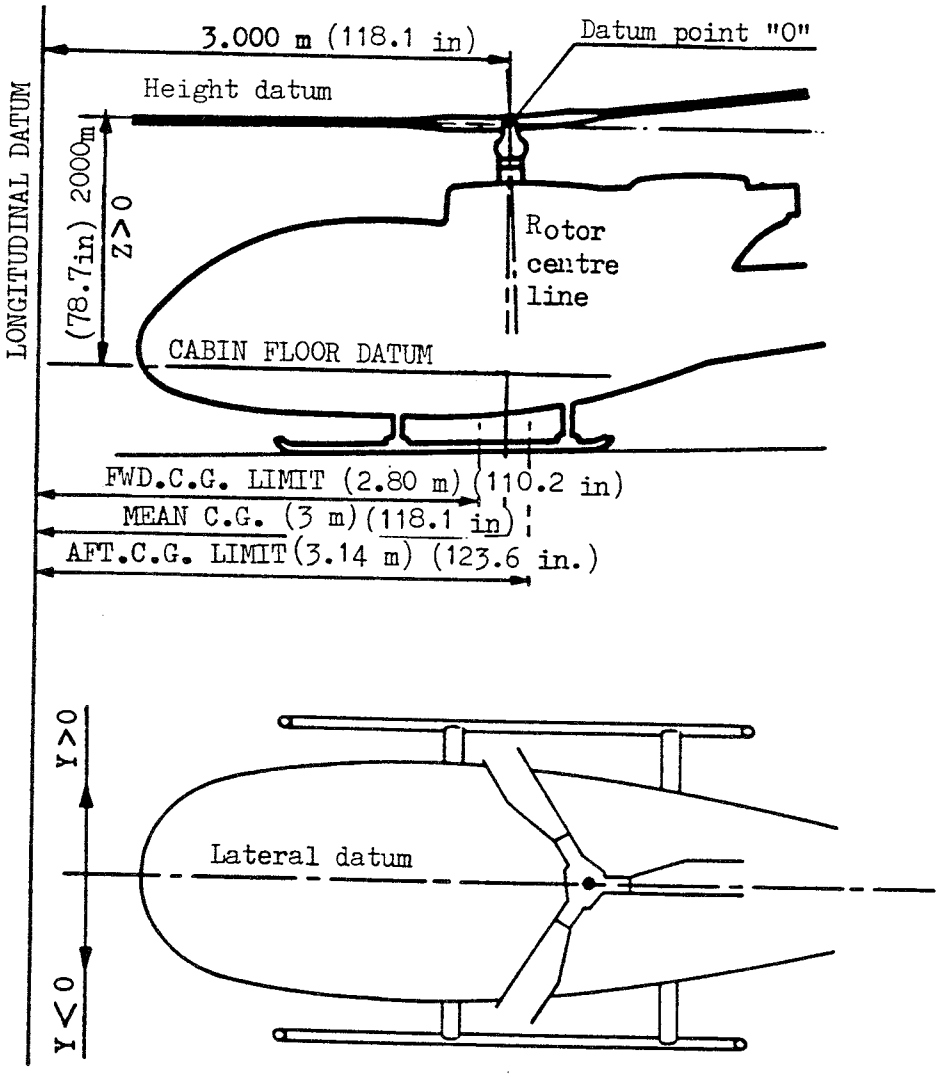
B. Datum plane for lateral dimensions (Y)

This is the aircraft's plane of symmetry

- Positive dimensions to the RIGHT
- Negative dimensions to the LEFT

C. Height datum plane (Z)

This is an imaginary plane located 2 metres above the cabin floor datum.



Datum planes

3. WEIGHTS

A. Empty weight (EW)

This is the sum of the weights of the fixed assemblies and equipment :

- of the airframe
- of the engines
- of the equipment common to all missions
- of the lubricants for the M.G.B. - I.G.B. - T.G.B. and engine
- of the hydraulic fluids
- of the non-consumable fuel

The empty weight is common to all missions of the concerned version and varies with each aircraft.

B. Equipped empty weight (EEW)

This is the sum of :

- Empty weight (EW)
- Operational equipment items

The equipped empty weight varies according to the scheduled mission.

C. All-up weight (AUW)

This is a sum of :

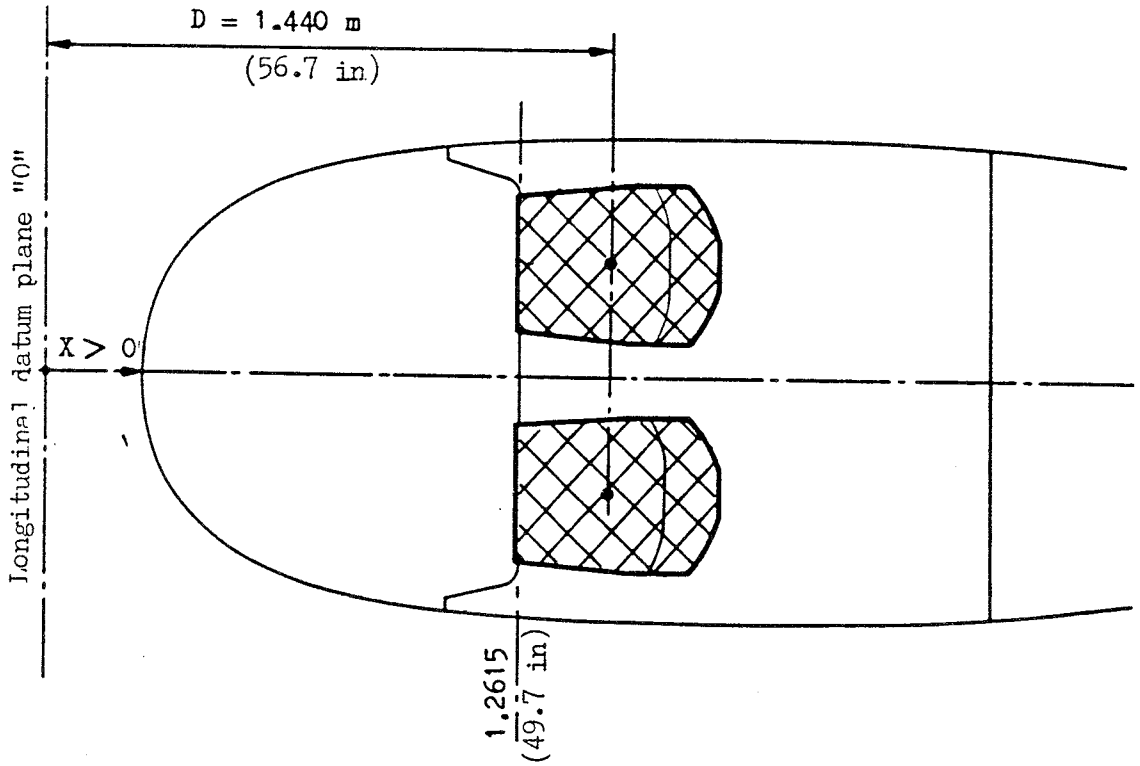
- the equipped empty weight (EEW)
- the crew
- the consumable fuel
- the payload

D. Limit weight

Maximum permissible weight on take-off : see Basic Manual.

4. LOADING DATA

A. Crew



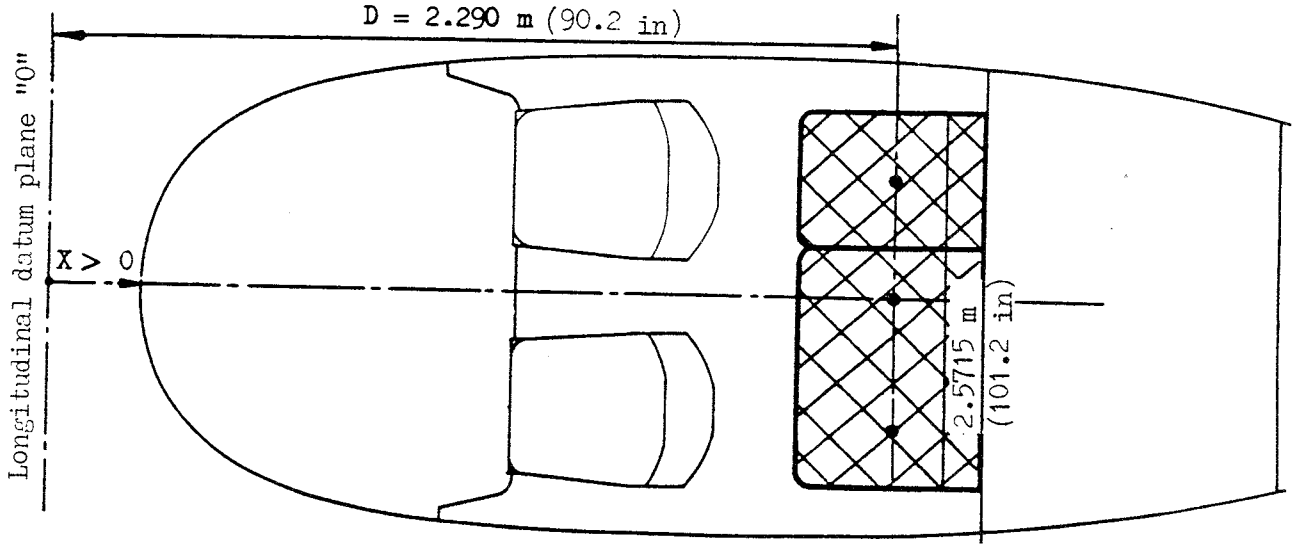
PILOT ONLY	
WEIGHT(Kg)	MOMENT(m.Kg)
50	72.000
60	86.400
70	100.800
80	115.200
90	129.600
100	144.000
110	158.400
120	172.800

PILOT ONLY	
WEIGHT(lb)	MOMENT(lb.in)
120	6803.1
140	7937.0
160	9070.8
180	10204.7
200	11338.6
220	12472.4
240	13606.2
260	14740.1

PILOT + CO-PILOT	
WEIGHT (kg)	MOMENT (m.kg)
100	144.000
110	158.400
120	172.800
130	187.200
140	201.600
150	216.000
160	230.400
170	244.800
180	259.200
190	273.600
200	288.000
210	302.400
220	316.800
230	331.200
240	345.600

PILOT + CO-PILOT	
WEIGHT(lb)	MOMENT(lb.in)
220	12472.4
240	13606.2
260	14740.1
290	16440.9
310	17574.8
330	18708.6
350	19842.5
370	20976.3
400	22677.1
420	23811.0
440	24944.5
460	26078.7
480	27212.5
500	28346.4
530	30047.2

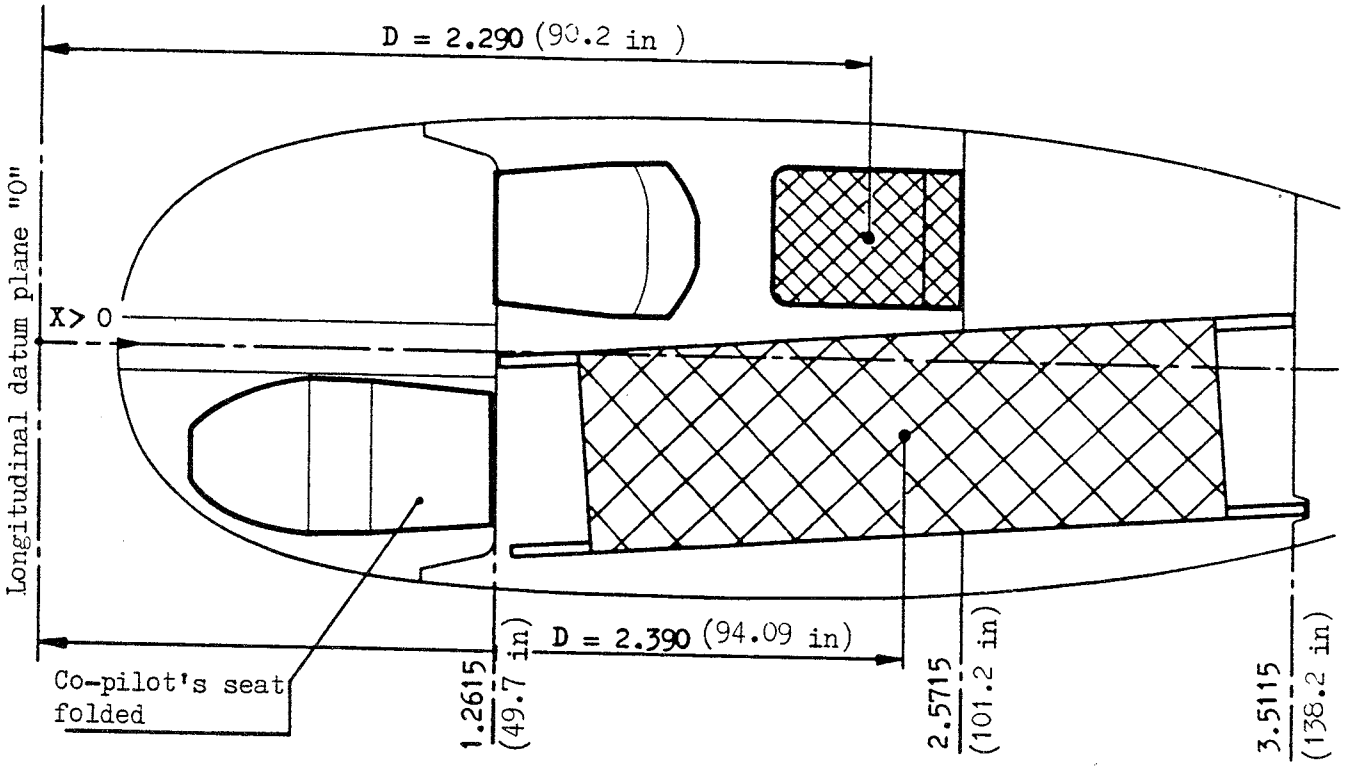
B. Passengers



1 to 3 passengers at the rear			
WEIGHT (kg)	MOMENT (m.kg)	WEIGHT (kg)	MOMENT (m.kg)
50	114.500	180	412.200
60	137.400	190	435.100
70	160.300	200	458.000
80	183.200	210	480.900
90	206.100	220	503.800
100	229.000	230	526.700
110	251.900	240	549.600
120	274.800	250	572.500
130	297.700	260	595.400
140	320.600	270	618.300
150	343.500	280	641.200
160	366.400	290	664.100
170	389.300	300	687.000

WEIGHT (lb)	MOMENT (lb.in)	WEIGHT (lb)	MOMENT (lb.in)
120	10818.9	400	36062.9
140	12622.0	420	37866.1
160	14425.2	440	39669.2
180	16228.3	460	41472.4
200	18031.5	480	43275.5
220	19834.6	500	45078.7
240	21637.8	530	47783.4
260	23440.9	550	49586.5
290	26145.6	570	51389.7
310	27948.8	600	54094.4
330	29751.9	620	55897.5
350	31555.1	640	57700.7
370	33358.2	660	59503.8

C. Transport of casualties



Stretcher patient	
Weight (kg)	Moment (m.kg)
50	119.500
60	143.400
70	167.300
80	191.200
90	215.100
100	239.000
110	262.900
120	286.800

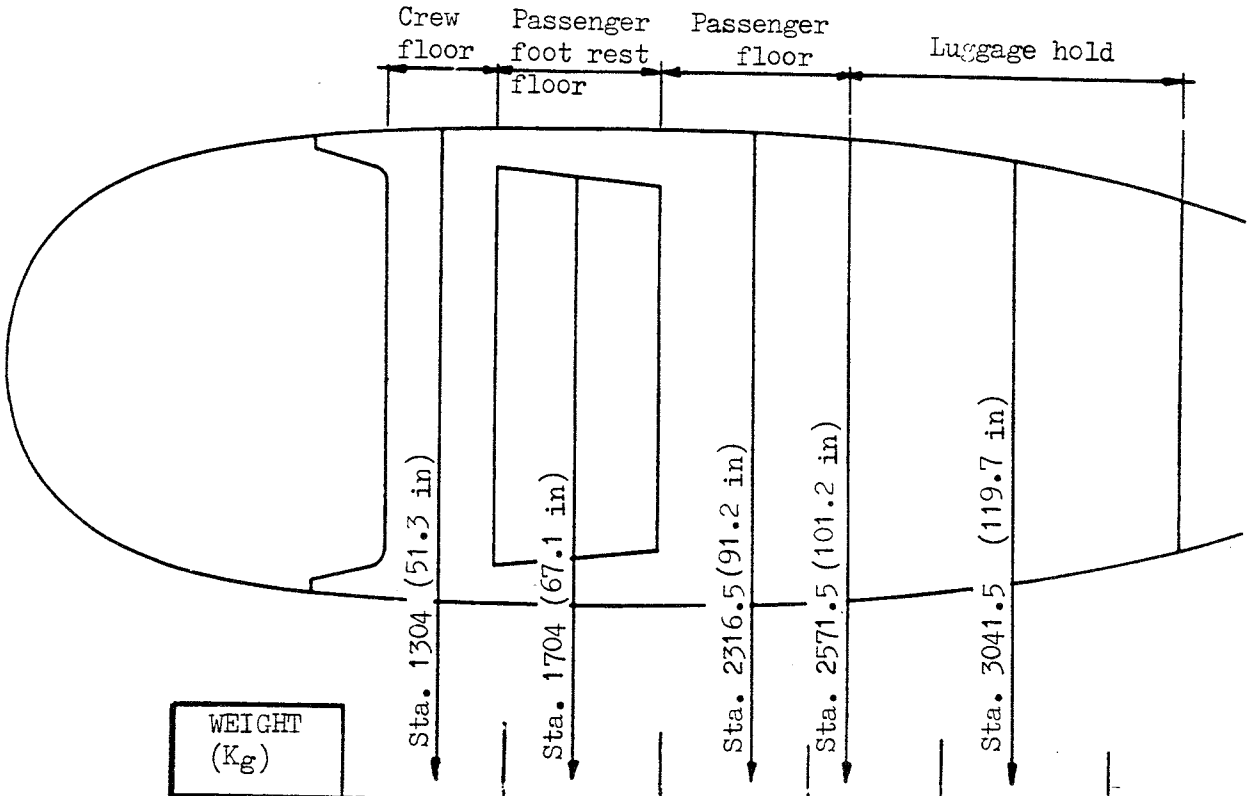
Medical attendant	
Weight (kg)	Moment (m.kg)
50	114.500
60	137.400
70	160.300
80	183.200
90	206.100
100	229.000
110	251.900
120	274.800

Weight (lb)	Moment (lb.in)
120	11291.3
140	13172.2
160	15055.1
180	16937.0
200	18818.9
220	20700.5
240	22582.6
260	24464.5

Weight (lb)	Moment (lb.in)
120	10818.6
140	12622
160	14425.2
180	16228.3
200	18031.5
220	19834.6
240	21637.8
260	23440.9

Correction for folding of co-pilot's and L.H. rear seats : subtract 6.520 m.kg (565.9 lb.in)

D. Transport of internal loads



WEIGHT (Kg)	Sta. 1304 (51.3 in)	Sta. 1704 (67.1 in)	Sta. 2316.5 (91.2 in)	Sta. 2571.5 (101.2 in)	Sta. 3041.5 (119.7 in)
25	32.6	42.7	57.8	64.2	76
50	65.2	85.4	115.7	128.4	152
75	97.8	127.8	173.2	192.6	228
100	130.4	170.4	231.6	257.1	304.1
150	195.6	256.8	346.2	385.2	456
200	260.8	340.8	463.2	514.2	608.2
250	326	427	578	642	760
300	391.2	513.6	692.4	770.4	912
350	456.4	597	809.5	900	1064
400	521.6	681.6	926.4	1028.4	1216.4

MOMENT (m.Kg)

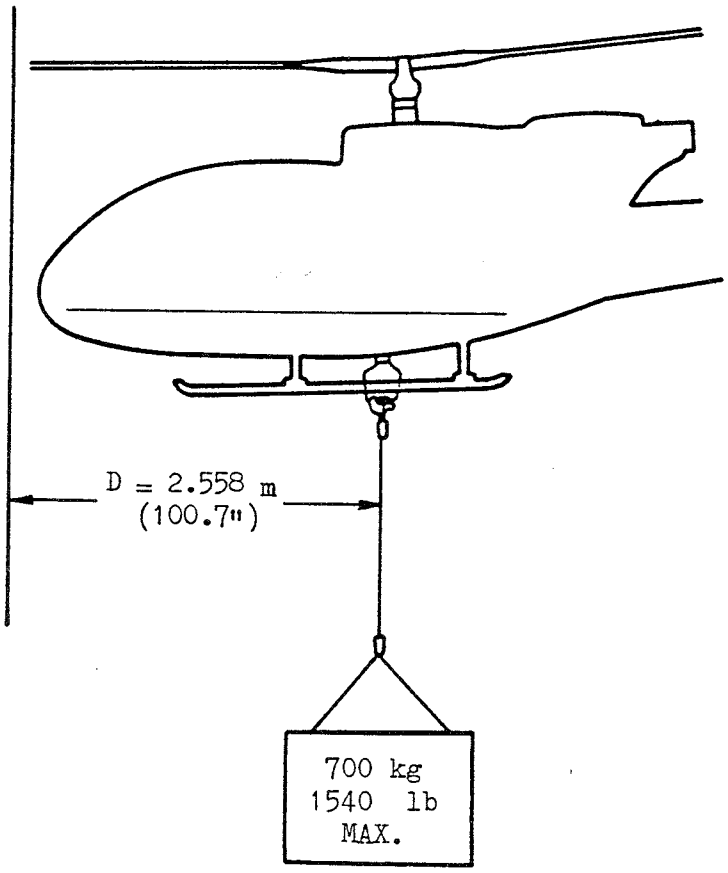
WEIGHT (lb)					
50	2566.9	3354.3	4560.0	5062.0	5987.2
100	5133.8	6708.6	9120.1	10124.0	11974.4
150	7700.8	10063.0	13680.0	15186.0	17961.6
200	10267.7	13417.3	18240.1	20248.0	23948.8
300	15401.5	20125.9	27360.2	30372.0	35923.2
400	20535.4	26834.6	36480.2	40496.0	47987.5
500	25669.2	33543.2	45600.3	50620.0	59871.9
600	30803.1	40251.9	54720.4	60744.0	71846.3
700	35936.9	46960.5	63840.4	70868.0	83820.7
800	41070.8	56669.2	72.960.5	80992.0	95795.1

MOMENT (lb.in)

Correction for rear seat folding : subtract 3.002 m.Kg (260.56 lb.in)
Correction for co-pilot's seat folding : subtract 4.902 m.Kg (425.47 lb.in)

E. Transport of external loads

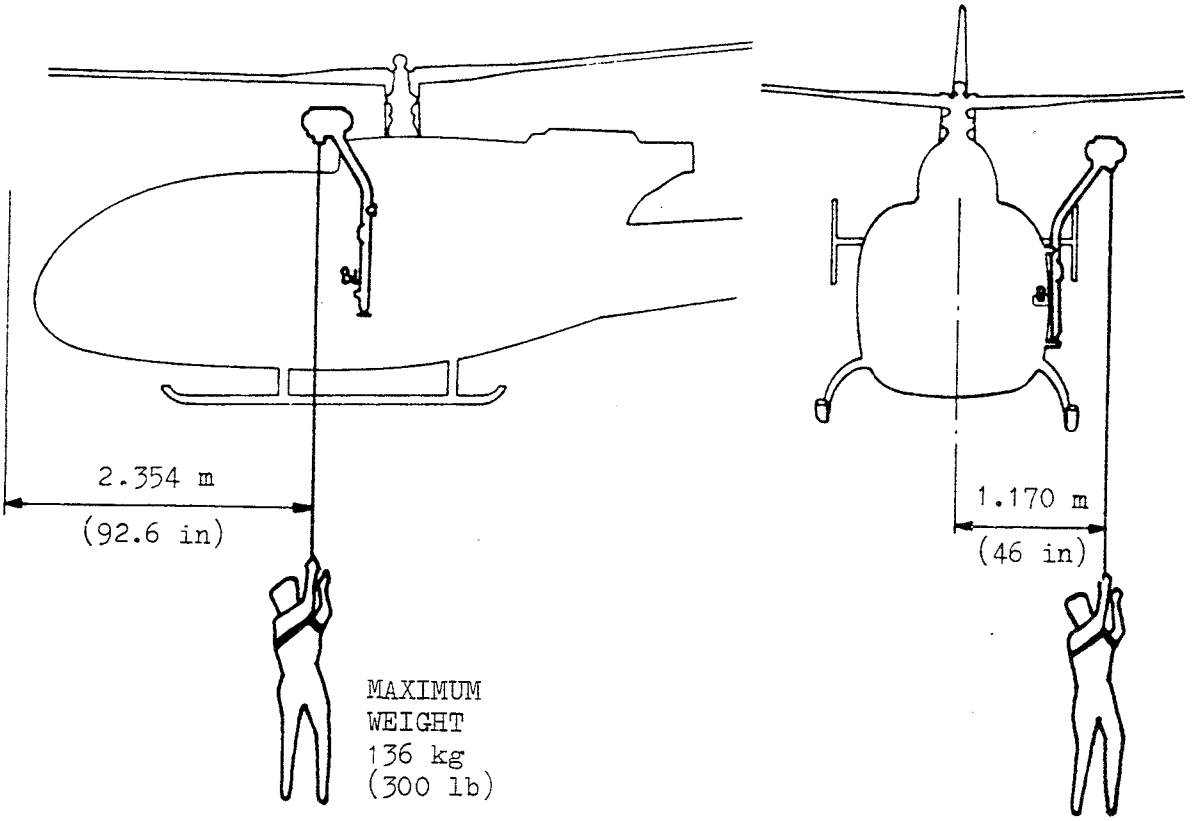
1) Sling



WEIGHT (Kg)	MOMENT (m.Kg)
50	127.90
100	255.80
150	383.70
200	511.60
250	639.50
300	767.40
350	895.30
400	1023.20
450	1151.10
500	1279.00
550	1406.90
600	1534.80
650	1662.70
700	1790.60

WEIGHT (lb)	MOMENT (lb.in)
110	11078.1
220	22156.2
330	33234.3
440	44312.4
550	55390.5
660	66468.6
770	77546.7
880	88624.8
990	99702.9
1100	110781.0
1210	121859.1
1320	132937.2
1440	145008
1540	155078

2) Breeze hoist

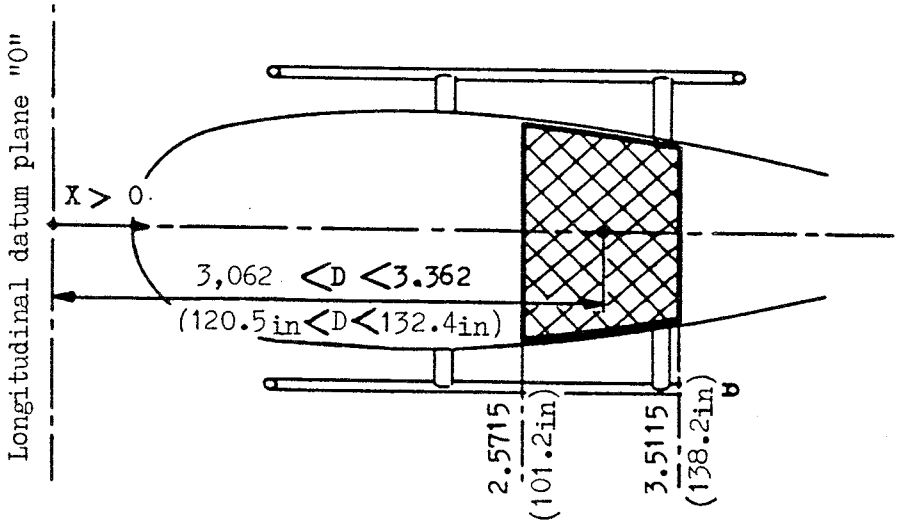


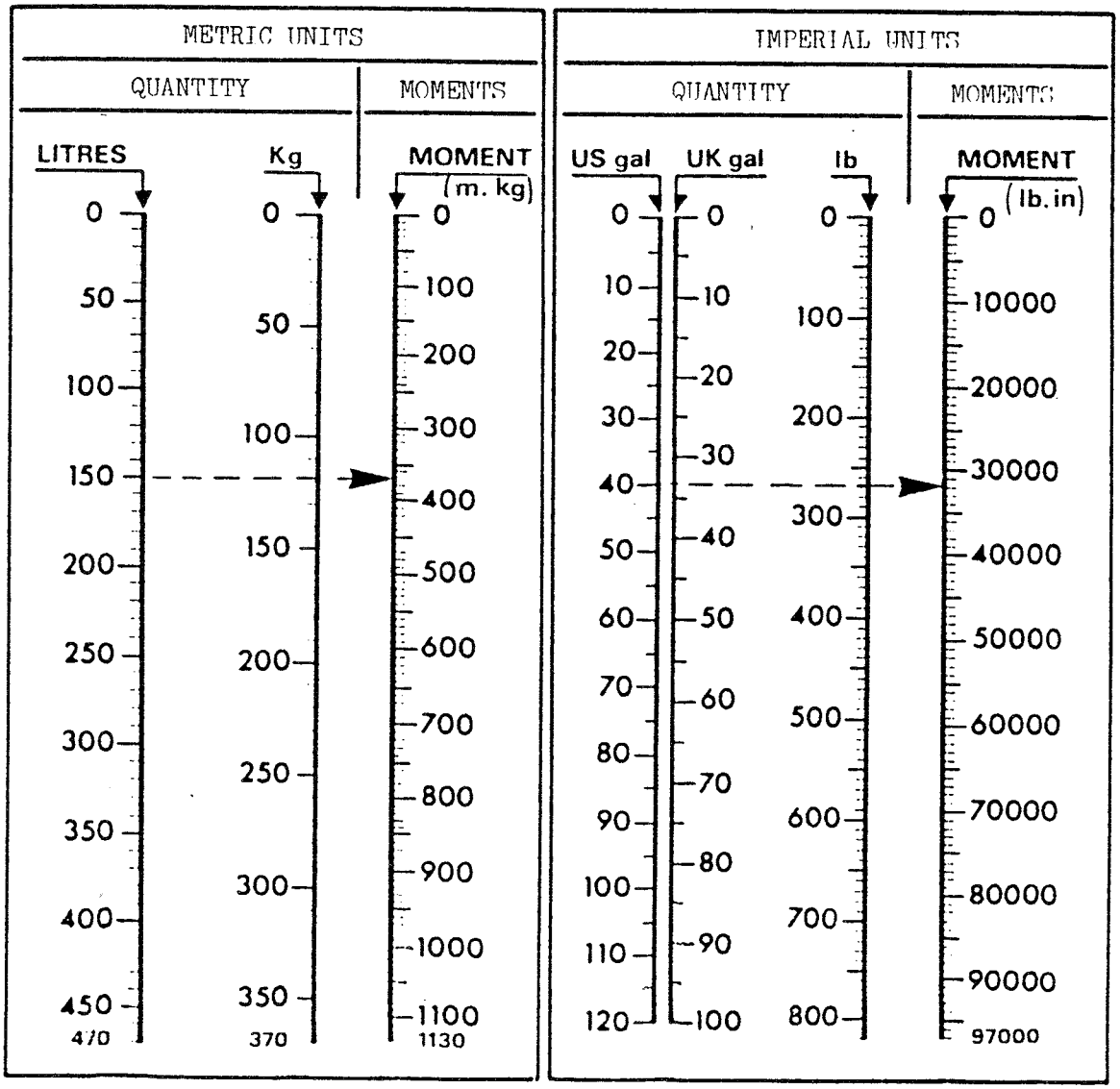
WEIGHT (kg)	MOMENT (m.kg)	
	LONGITUDINAL	LATERAL
25	58,85	29,25
50	117,70	58,50
75	176,55	87,75
100	235,40	117,00
125	294,25	146,25
136	320,14	159,12

WEIGHT (lb)	MOMENT (lb.in)	
	LONGITUDINAL	LATERAL
50	4630	2300
100	9260	4600
150	13890	6900
200	18520	9200
250	23150	11500
300	27780	13800

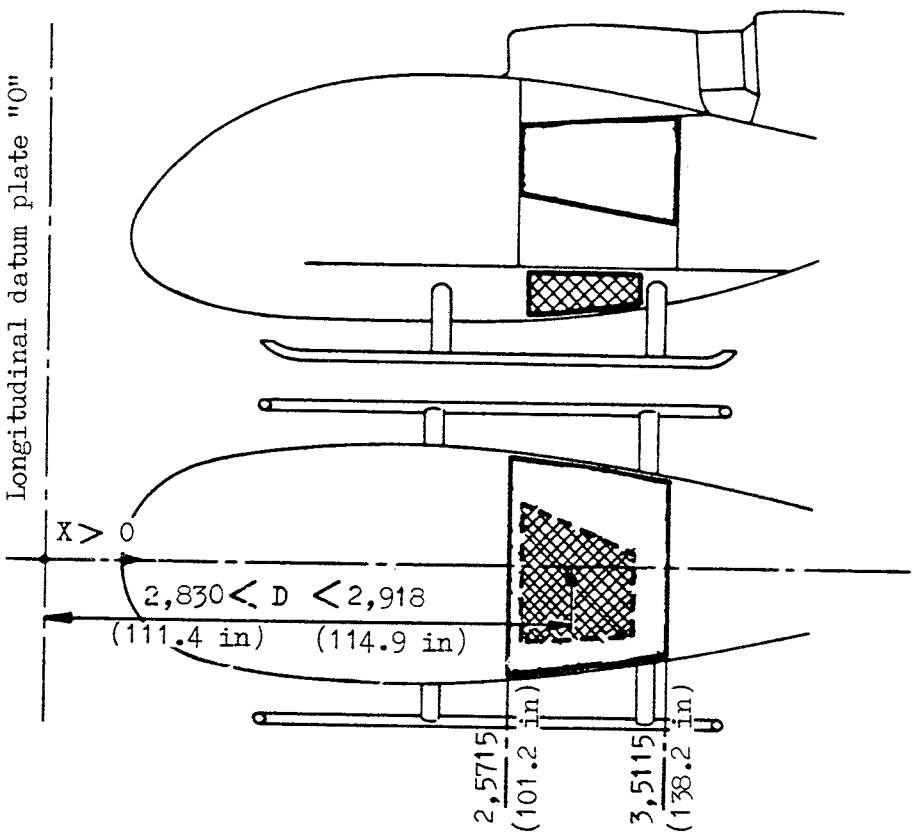
F. Fuel

1) Main fuel tank





2) Auxiliary fuel tank

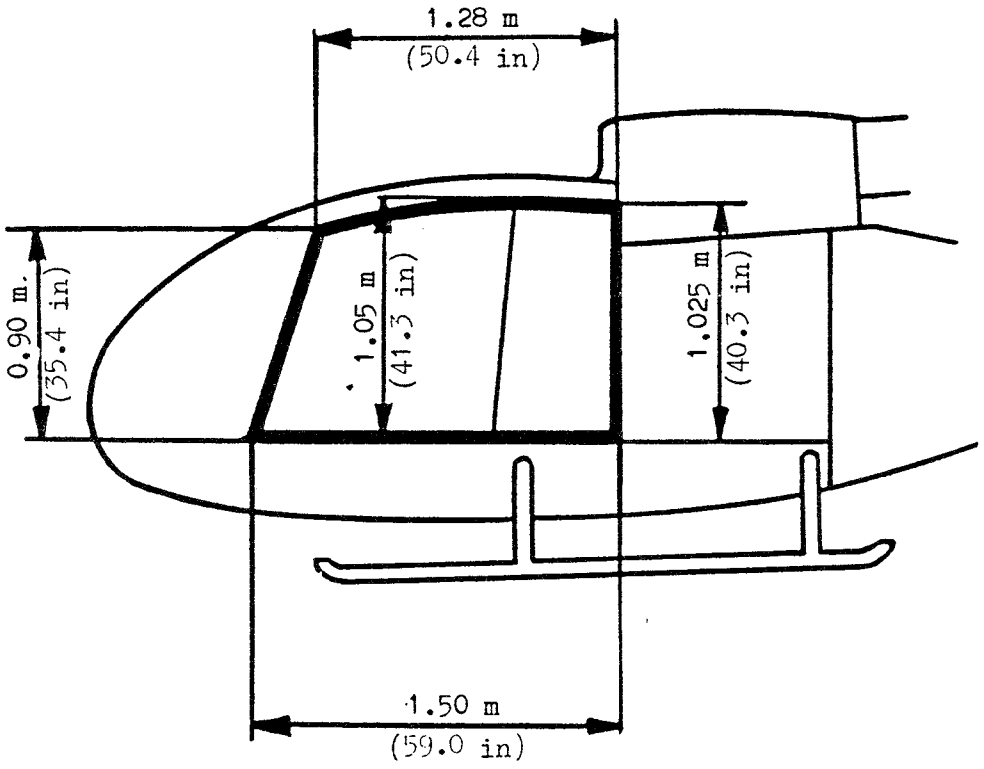


Litres (d = 0,79)	WEIGHT (Kg)	ARM (m)	MOMENT (m.kg)
20	15.8	2.830	44.714
30	23.7	2.867	67.948
40	31.6	2.886	91.198
50	39.5	2.898	114.471
60	47.4	2.905	137.697
70	55.3	2.911	160.978
80	63.2	2.915	184.228
90	71.1	2.918	207.470

Quantity US.Gal	Quantity IMP.Gal	WEIGHT (lb)	ARM (in.)	MOMENT (lb.in)
6	4.98	40.14	111.9	4491.7
8	6.64	53.52	112.9	6042.4
10	8.30	66.90	113.5	7593.1
12	9.96	80.28	113.9	9143.9
14	11.62	93.66	114.2	10696.0
16	13.28	107.04	114.4	12245.4
18	14.94	120.42	114.6	13800.1
20	16.60	133.80	114.7	15346.9
22	18.26	147.18	114.8	16896.3
23.8	19.75	159.22	114.9	18294.4

5. DIMENSIONAL DATA

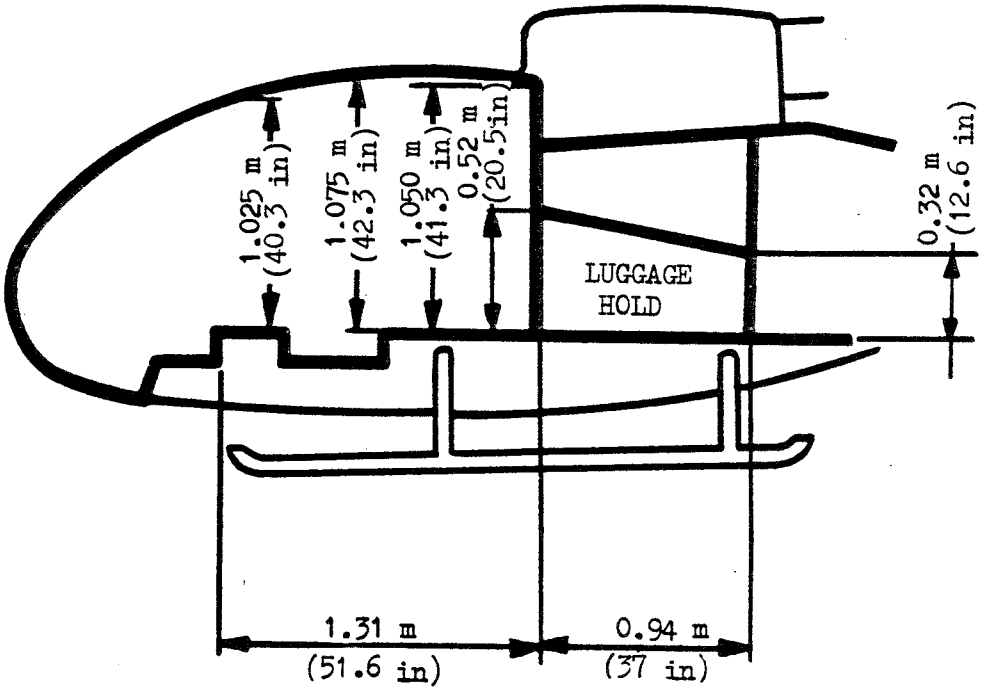
A. Dimensions of access doors

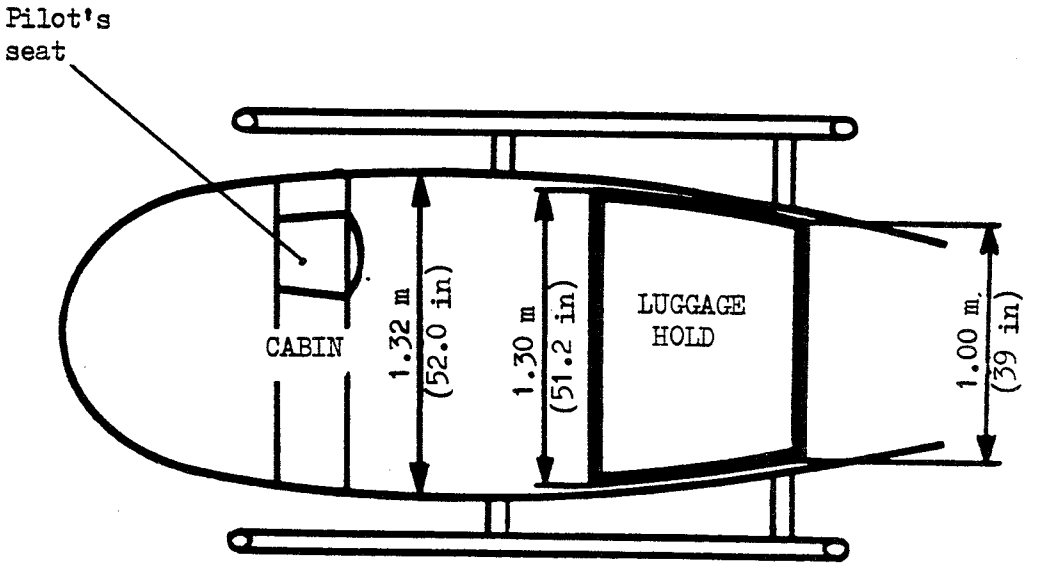


Note :
To gain access to the luggage hold, it is necessary to hook-up the passenger seat back rest and fold down the seat into the floor recess.
Also remove the passenger safety belts.

B. Capacity of compartments

The loading areas are the luggage hold and the cabin.





6. C.G. LOCATION

A. C.G. limits

1) - Longitudinal C.G. : The longitudinal C.G. location is defined by the distance from the centre of gravity to the datum plane.

FORWARD limit	: 2.80 metres (110.2 in)
REARWARD limit	: 3.14 metres (123.6 in)

2) - Lateral C.G. : The lateral C.G. location is defined by the distance from the centre of gravity to the aircraft plane of symmetry.

RH limit	: + 0.135 metre (5.3 in)
LH limit	: - 0.153 metre (6.0 in)

NOTE :
- In normal operation, only the longitudinal C.G. is taken into account.
- The lateral C.G. limits cannot be reached in normal operation.

B. Calculation

Form B specifies the weight and C.G. location of the aircraft.

Form A gives indications concerning the weight and moment of the various equipment items installed.

Tables on pages 6 to 13 give the location and moment of specific loads for each mission.

Using these data, the location of the C.G. - from the datum plane - of the considered weight can be determined by the following formula :

$$\frac{\text{Sum of moments}}{\text{Sum of weights}} = \text{C.G. location}$$

In practice, the C.G. table, below, will be used to determine if the C.G. location remains within the permissible limits.

C. Example of C.G. determination when transporting passengers

1) Before take-off

a) Determine the maximum permissible take-off weight according to the ambient conditions.

b) Note the equipped empty weight (EEW) determined on the latest weighing (Form C).

c) With reference to the tables given in paragraph 4 "LOADING DATA", add the weights and moments as shown in the following table.

d) Compute the C.G. location or use the C.G. table (pages 18 and 19) which eliminates calculation.

NOTE : The aircraft C.G. may be determined quickly by referring to the chart on page 20. When the C.G. value found is close to the limits, this value has to be confirmed by computation.

e) Check that the C.G. falls within the permissible limits.

	WEIGHT (Kg) (lb)	MOMENT (m.Kg) (lb.in)	REMARKS
Equipped empty weight (EEW)	1050 / 2315	3402 / 295298.6	Shown on form "C"
Crew (2 pilots)	140 / 310	201.600 / 17574.8	See page 6
Passengers (3)	220 / 480	503.800 / 43275.5	See page 7
Fuel (350 litres)	276 / 600	850.237 / 72660	See page 12
All-up weight (A.U.W)	1686 / 3705	4957.637 / 428808.9	

Computation gives : $\frac{4957.637}{1686} = 2.94$ m

or, in English units : $\frac{428808.9}{3705} = 115.7$ in

i.e. a C.G. location within the permissible limits (2.80 m to 3.14 m)
(110.2 to 123.6 in)

This result is confirmed by the C.G. table, by taking the nearest weight and C.G. location shown in the tables (see example given below)

2) In flight or on landing

Follow the same procedure, as described above, taking into account the remaining fuel weight and moment.

Note :
In general, the C.G. determination is made before take-off.

D. C.G. table (Metric units)

WEIGHT (kg)	MOMENT (m.kg)							
	FWD limit : 2.80 m ← Centre of gravity (m) → Aft limit : 3.14 m							
	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.14
1000	2800	2850	2900	2950	3000	3050	3100	3140
1025	2870	2921	2972	3024	3075	3126	3178	3219
1050	2940	2992	3045	3097	3150	3203	3255	3297
1075	3010	3064	3117	3171	3225	3279	3333	3376
1100	3080	3135	3190	3245	3300	3355	3410	3454
1125	3150	3206	3262	3318	3375	3431	3488	3533
1150	3220	3277	3335	3392	3450	3507	3565	3611
1175	3290	3349	3407	3466	3525	3584	3643	3690
1200	3360	3420	3480	3540	3600	3660	3720	3768
1225	3430	3491	3552	3613	3675	3736	3798	3847
1250	3500	3562	3625	3687	3750	3813	3875	3925
1275	3570	3634	3697	3761	3825	3889	3953	4004
1300	3640	3705	3770	3835	3900	3965	4030	4082
1325	3710	3776	3842	3908	3975	4041	4107	4161
1350	3780	3847	3915	3982	4050	4118	4185	4239
1375	3850	3918	3987	4056	4125	4194	4263	4318
1400	3920	3990	4060	4130	4200	4270	4340	4396
1425	3990	4061	4132	4204	4275	4346	4418	4475
1450	4060	4132	4205	4277	4350	4423	4495	4553
1475	4130	4204	4277	4351	4425	4499	4573	4632
1500	4200	4275	4350	4425	4500	4575	4650	4710
1525	4270	4346	4422	4499	4575	4651	4728	4789
1550	4340	4417	4495	4572	4650	4728	4805	4867
1575	4410	4489	4567	4646	4725	4804	4883	4946
1600	4480	4560	4640	4720	4800	4880	4960	5024
1625	4550	4631	4712	4794	4875	4956	5038	5103
1650	4620	4702	4785	4867	4950	5033	5115	5181
1675	4690	4774	4857	4941	5025	5109	5193	5260
1700	4760	4845	4930	5015	5100	5185	5270	5338
1725	4830	4916	5002	5089	5175	5261	5347	5416
1750	4900	4987	5075	5162	5250	5337	5425	5495
1775	4970	5059	5147	5236	5325	5414	5502	5573
1800	5040	5130	5220	5310	5400	5490	5580	5652

Example N° 1 : Given : a weight of 1686 kg
a moment of 4957 m.kg

C.G. is located between 2.90 and 2.95 m

Example N° 2 : Given : a weight of 1600 kg
a moment of 5040 m.Kg

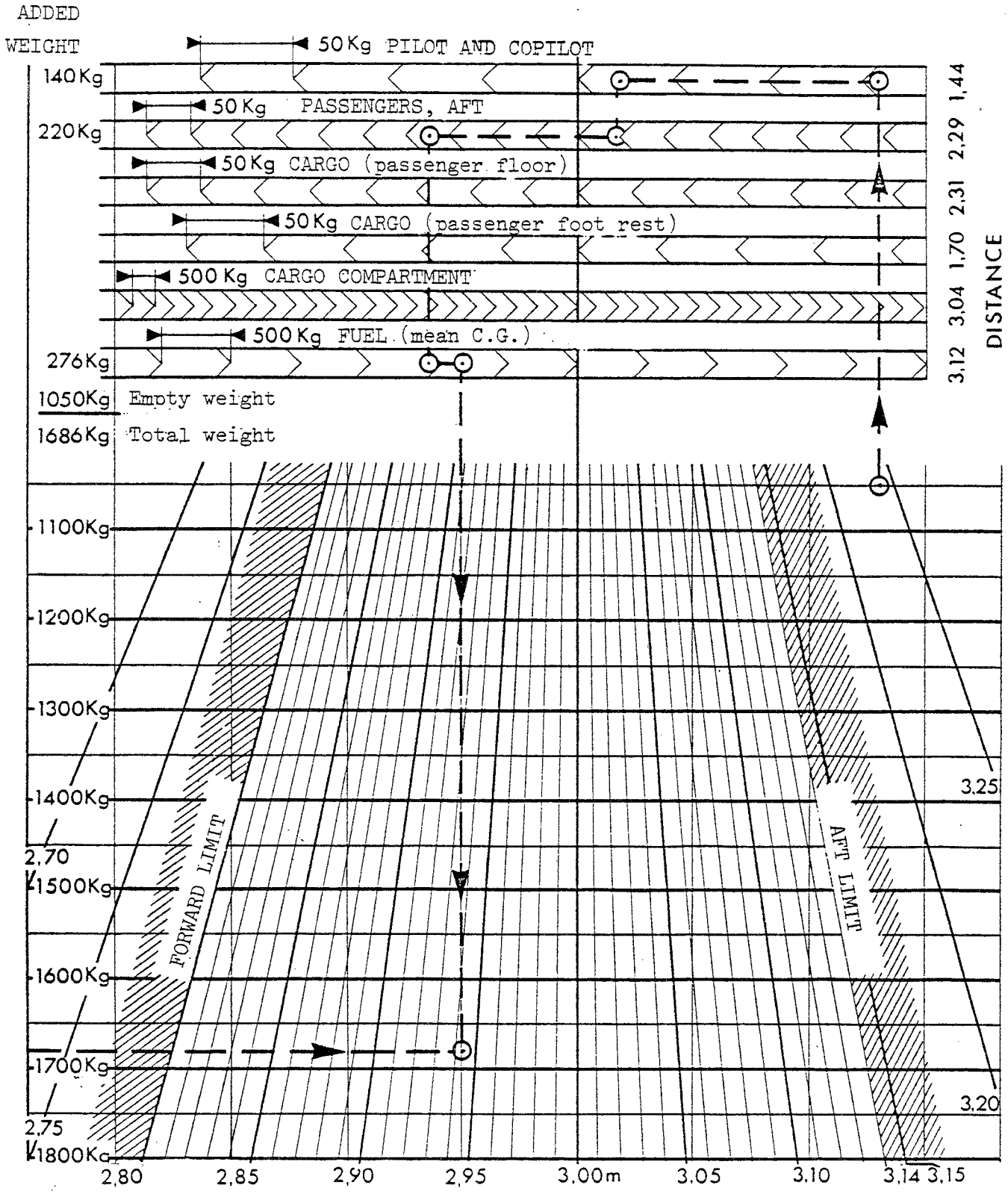
C.G. is not within the permissible limits
(aft C.G.)

C.G. table (English units)

Weight (lb)	MOMENT IN lb.in					
	← F'w'd limit 110.2 in	Centre of gravity in (inches)			Aft limit 123.6 in →	
	110.2	112.0	114.0	116.0	118.0	123.6
2200	242440	246400	250800	255200	259600	271920
2250	247950	252000	256500	261000	265500	278100
2300	253460	257600	262200	266800	271400	284280
2350	258970	263200	267900	272600	277300	290460
2400	264480	268800	273600	278400	283200	296640
2450	269990	274400	279300	284200	289100	302820
2500	275500	280000	285000	290000	295000	309000
2550	281010	285600	290700	295800	300900	315180
2600	286520	291200	296400	301600	306800	321360
2650	292030	296800	302100	307400	312700	327540
2700	297540	302400	307800	313200	318600	333720
2750	303050	308000	313500	319000	324500	339900
2800	308560	313600	319200	324800	330400	346080
2850	314070	319200	324900	330600	336300	352260
2900	319580	324800	330600	336400	342200	358440
2950	325090	330400	336300	342200	348100	364620
3000	330600	336000	342000	348000	354000	370800
3050	336110	341600	347700	353800	359900	376980
3100	341620	347200	353400	359600	365800	383160
3150	347130	352800	359100	365400	371700	389340
3200	352640	358400	364800	371200	377600	395520
3250	358150	364000	370500	377000	383500	401700
3300	363660	369600	376200	382800	389400	407880
3350	369170	375200	381900	388600	395300	414060
3400	374680	380800	387600	394400	401200	420240
3450	380190	386400	393300	400200	407100	426420
3500	385700	392000	399000	406000	413000	432600
3550	391210	397600	404700	411800	418900	438780
3600	396720	403200	410400	417600	424800	444960
3650	402330	408800	416100	423400	430700	451140
3700	407740	414400	421800	429200	436600	457320
3750	413250	420000	427500	435000	442500	463500
3800	418760	425600	433200	440800	448400	469680
3850	424270	431200	438900	446600	454300	475860
3900	429780	436800	444600	452400	460200	482040
3950	435290	442400	450300	458200	466100	488220
3970	437494	444640	452580	460520	468460	490692

Example 1 : Given : Weight = 3724 lb
Moment = 425230 lb.in
The C.G. is situated between 114.0 and 116.0 in.

Example 2 : Given : Weight = 3500 lb
Moment = 432800 lb.in
The C.G. is situated outside the authorized limits (Aft C.G.)



C.G. location chart

7. FORMS

The forms contain aircraft empty weight and balance data and provide the means for following the development of the figures obtained on successive weighings or embodiment of modifications.

There are three kinds of forms :

- A Form B, comprising :
  - A weighing sheet which gives the gross weight
  - A weight analysis sheet which indicates the net weight and c.g location values found on weighing.

- A Form C
  This form constitutes a record of changes in weight and balance :
  - determined at each weighing
  - calculated, between weighings, from equipment list data.

- A Form A
  This form is the list of the main removable equipment items which are not necessary for certain missions and have a considerable effect on weight and c.g location.
  Some small components may be grouped on a same line. The easily removable equipment items are identified separately.
  This list may be altered on the customer's initiative and is given in Appendix WB2.

Only longitudinal moments are considered.

WEIGHING SHEET

JACKING METHOD

FORM B

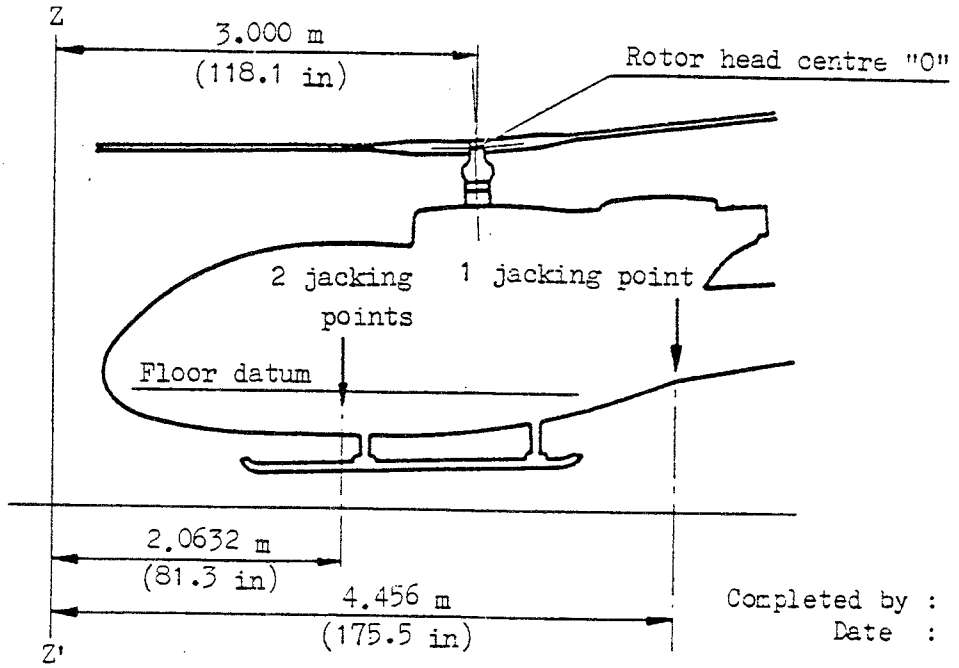
Page 1/3

Aircraft Type : Serial number : _____

Scales (type, manufacturer) : _____

WEIGHING POINTS	WEIGHT INDICATED	TARE	NETT WEIGHT	ARM	MOMENT
L.H. Forward point					
R.H. Forward point					
Total of forward points					
Aft point					
TOTAL					

ZZ' = DATUM PLANE



Completed by :

Date :

WEIGHING SHEET

Suspension method

FORM B

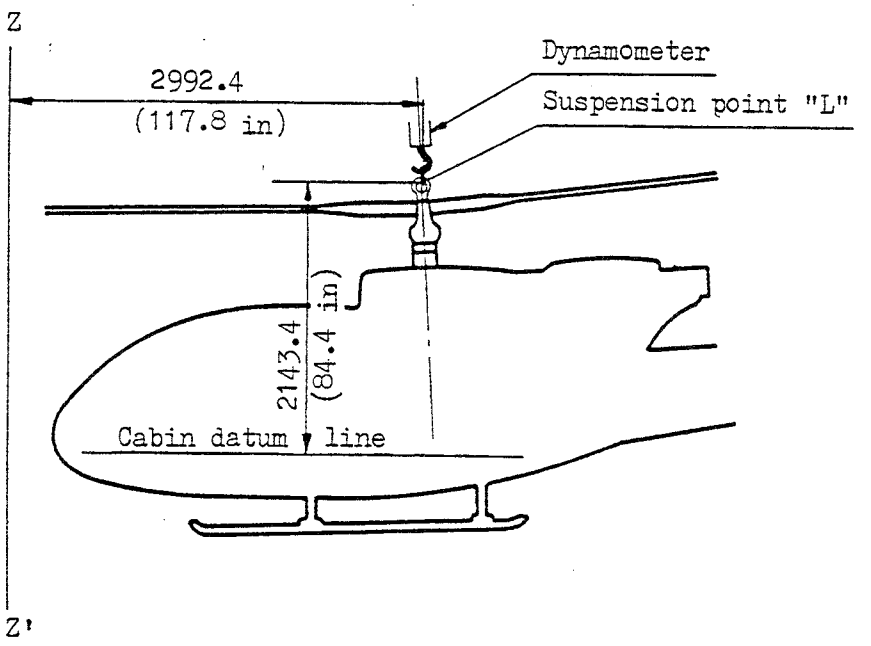
Page 2/3

Aircraft type : Serial n° : _____

Weighing means (type, manufacturer) : _____

Weight indicated	Actual weight	Arm	Moment

ZZ' = DATUM PLANE



Completed by :

Date :

WEIGHING ANALYSIS SHEET

FORM B
Page 3/3

DESCRIPTION	NETT WEIGHT	ARM	MOMENT	C.G. location
Total A/C weighed at : date :_____)				
Oil				
Fuel (to be subtracted)				
Equipment weighed, not included in the empty weight equipped (column 1).				
Equipment not weighed, included in the empty weight equipped (column 2).				
Aicraft equipped empty weight - Carry over to Form C				

C.G LOCATION:

1 - (SUBTRACT -)			
Equipment weighed, not included in the equipped empty weight	WEIGHT	ARM	MOMENT
TOTAL.....			

2 (ADD +)			
Equipment not weighed, but included in the equipped empty weight	WEIGHT	ARM	MOMENT
TOTAL.....			

Remarks:

Completed by :
Date :

BASIC WEIGHT AND BALANCE RECORD (AIRCRAFT EQUIPPED EMPTY WEIGHT)

FORM C

AIRCRAFT TYPE | SERIAL N° | Page N° /

DATE	ITEM N°		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						BASIC AIRCRAFT		
				ADDED (+)			REMOVED (-)					
	IN	OUT		WEIGHT	ARM	MOMENT	WEIGHT	ARM	MOMENT	WEIGHT	MOMENT	INDEX

GAZELLE
HELICOPTER

APPENDIX

WEIGHT AND BALANCE

SA 341 - SA 342

PART 2

This appendix consists of a list of equipment which is filled in on delivery of the aircraft.
It consists of pages numbered from 1 to with the date :

TYPE :

AIRCRAFT N° :

LIST OF EQUIPMENT

FORM A

DATES

DELIVERY

SCHEDULED ON DELIVERY — IN AIRCRAFT / FORM C — 1 2 3 4

Aircraft Type :

Serial number

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)
	Flight manual :						
	On board tool kit :						
	Air intake debris guard	2.58	5.69	3.93	154.7	10.139	880.0
	Muffler	3.49	7.69	3.97	156.3	13.855	1202.5
	Anti-icing shield	1.50	3.31	3.87	152.4	5.805	503.8
	Turbomeca clip	0.13	0.29	3.85	151.6	0.500	43.4
	Portable lamp	0.34	0.75	1.74	68.5	0.592	51.4
	Fire extinguisher			1.12	44.1		
	"AIR PRECISION" APM 1100 clock with attachment	0.20	0.44	0.90	35.4	0.180	15.6
	Ground mooring rings (3)	0.80	1.76	2.99	117.7	2.392	207.6

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

DATES

DELIVERY

SCHEDULED ON DELIVERY

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	1 IN AIRCRAFT	1 FORM C	2	3	4
	Forward door with sliding window (each)	6.90	15.21	1.61	63.4	11.109	964.2					
	Forward door with fixed window (each)	6.18	13.62	1.61	63.4	9.950	863.6					
	Aft door (each)	3.74	8.25	2.30	90.6	8.602	746.6					
	Map case on aft starboard door	0.37	0.82	2.31	90.9	0.855	74.2					
	Passengers' bench seat including	4.60	10.14	2.47	97.2	11.374	987.2					
	- 3 belt assemblies	1.14	2.51	2.42	95.3	2.759	239.5					
	- Port back rest	2.06	4.54	2.49	98.0	5.129	445.2					
	- Starboard back rest	1.40	3.09	2.49	98.0	3.486	302.6					
	Blanks for a control panel without radio or I.C.S.	0.19	0.42	1.04	40.7	0.197	17.1					
	- Lower blanking plate	0.10	2.22	1.13	44.5	0.113	9.8					
	- Upper blanking plate	0.09	0.20	0.93	36.6	0.084	7.3					

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

DELIVERY DATES

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in.)	SCHEDULED ON DELIVERY	1 IN AIRCRAFT	1 FORM C	2	3	4
	Flying controls, co-pilot's	2,59	5,71	(0,99)	(38.9)	2,561	223,3						
	Pedals (2)	1,24	2.73	0,71	28.0	0;880	76.4						
	Cyclic stick	0,95	2.09	1,18	46.5	1,121	97.3						
	Collective pitch control lever												
	Blanking plate (cyclic) (substitute item)	0,06	.13	1,17	46.1	0,070	6.1						
	Blanking plate (collective) (substitute item)	0,06	.13	1,43	56.3	0,086	7.5						

Page

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	DELIVERY / SCHEDULED ON DELIVERY	DATES 1 IN AIRCRAFT	DATES 1 FORM C	DATES 2	DATES 3	DATES 4
	Flying controls, co-pilot's	2.62	5.78	1.00	39.4	2.608	226.4						
	Pedals (2)	1.19	2.62	0.71	28.0	0.845	73.3						
	Cyclic stick	1.04	2.29	1.17	46.1	1.217	105.6						
	Collective pitch control lever	0.39	0.86	1.40	55.1	0.546	47.4						
	Blanking plate (cyclic) (substitute item)	0.06	0.13	1.17	46.1	0.070	6.1						
	Blanking plate (collective) (substitute item)	0.06	0.13	1.43	56.3	0.086	7.5						

FORM A

LIST OF EQUIPMENT

Aircraft Type :

Serial number

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	DELIVERY / SCHEDULED ON DELIVERY	DATES 1 IN AIRCRAFT	DATES 1 FORM C	DATES 2	DATES 3	DATES 4
	HOIST, "BREEZE", including :	22.36	49.29	2.45	96.5	54.825	4758.5						
	Arm and hoist assy	21.64	47.71	2.45	96.5	53.018	4601.7						
	Control handle	0.72	1.59	2.51	98.8	1.807	156.8						
	Belt, safety, hoist operators	0.74	1.63										
	Minimum rotor rpm aural warning	1.58	3.48	0.79	31.1	1.243	107.9						
	Min. rotor rpm detector unit	0.19	0.43	2.71	106.7	0.515	44.7						
	Horn, amplifier and support	1.12	2.47	0.44	17.3	0.493	42.8						
	Control panel	0.27	0.60	0.87	34.3	0.235	20.4						

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

DELIVERY DATES

SCHEDULED ON DELIVERY

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	1 IN AIRCRAFT	1 FORM C	2	3	4
	CARGO AIDS sling in folded position (release unit and fittings)	5.34	11.77	2.68	105.5	14.311	1242.1					
	CARGO AIDS sling in service position	5.34	11.77	2.56	100.8	13.670	1186.5					
	AMBULANCE installation											
	2 ambulance duty straps (service position)	0.57	1.26	1.36	53.5	0.775	67.3					
	2 ambulance duty straps (stowed position	0.57	1.26	2.73	107.5	1.556	135.1					

LIST OF EQUIPMENT

FORM A

Aircraft Type : Serial number

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	DELIVERY DATES: SCHEDULED ON DELIVERY	IN AIRCRAFT FORM C 1	2	3	4
	SFIM CG 121 GYRO-COMPASS											
	installation	3.08	6.79	2.06	81.3	6.367	552.6					
	- SPERRY 196540 flux valve	0.63	1.39	4.66	183.5	2.936	254.8					
	- SFIM 58.062 electronic box	0.80	1.76	2.70	106.3	2.160	187.5					
	- Gyro compass, type 54873.040	1.65	3.64	0.77	30.3	1.271	110.3					
	Blanking plate for CG 121 GYRO COMPASS installation	0.03	0.07	0.86	33.9	0.026	2.3					
	SFIM CG 130 GYRO COMPASS											
	installation	4.05	8.93	3.09	121.7	15.590	1353.1					
	- Gyro compass type 130	3.42	7.54	3.70	145.7	12.654	1098.3					
	- SPERRY 19654.0 flux valve	0.63	1.39	4.66	183.5	2.936	254.8					
	Main gyro horizon with attachment	2.54	5.60	0.75	29.5	1.905	165.3					
	Blanking plate for main horizon installation	0.04	0.09	0.86	33.9	0.034	2.6					
	SFENA 4295 stand-by horizon	1.68	3.70	1.23	48.4	2.061	178.9					
	- Horizon indicator, type 820	1.05	2.31	0.75	29.5	0.788	68.4					
	- Static inverter	0.63	1.39	2.02	79.5	1.273	110.5					

LIST OF EQUIPMENT

FORM A

Aircraft Type : Serial number

DELIVERY DATES

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	SCHEDULED ON DELIVERY	1 IN AIRCRAFT	1 FORM C	2	3	4
	EMERGENCY FLOATATION GEAR installation with rigid undercarriage	55.65	122.69	2.81	110.6	156.567	13589.2						
	Bottle assembly, full (2)	21.60	47.62	2.81	110.6	60.696	5268.1						
	Bottle connecting line (2)	1.80	3.97	3.11	122.4	5.598	485.9						
	Container installation (2)	31.79	70.08	2.82	111.0	89.648	7781.0						
	Cartridge assy (2)	0.10	0.22	3.30	129.9	0.330	28.6						
	Control panel	0.36	0.79	0.22	32.3	0.295	25.6						
	EMERGENCY FLOATATION GEAR installation with low flexible undercarriage	60.25	132.83	2.77	109.1	167.163	14508.9						
	Bottle assembly, full	21.81	47.08	2.75	108.3	59.978	5205.8						
	Bottle connecting line (2)	2.35	5.18	3.01	118.5	7.074	614.0						
	Container installation (2)	31.00	68.34	2.80	110.2	86.800	7533.8						
	Bottle brackets (2)	4.63	10.21	2.74	107.9	12.686	1101.1						
	Cartridge assy (2)	0.10	0.22	3.30	129.9	0.330	28.6						
	Control panel	0.36	0.79	0.82	32.3	0.295	25.6						

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

DATES

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	SCHEDULED ON DELIVERY	DELIVERY IN AIRCRAFT	DELIVERY FORM C	1	2	3	4
	EMERGENCY FLOATATION GEAR													
	installation with high flexible													
	undercarriage	60.34	133.03	2.73	107.7	165.012	14322.4							
	Bottle assembly (2)	21.81	48.08	2.71	106.7	59.105	5130.0							
	Bottle connecting line (2)	2.35	5.18	2.97	116.9	6.980	605.8							
	Container installation (2)	31.00	68.34	2.76	108.7	85.560	7426.2							
	Bottle brackets (2)	4.72	10.41	2.70	106.3	12.744	1106.1							
	Cartridge assy (2)	0.10	.22	3.28	129.1	0.328	28.5							
	Control panel	0.36	.79	0.82	32.3	0.295	25.6							
	Removable fairings on high													
	flexible undercarriage	4.31	9.50	2.93	115.4	12.612	1094.7							
	- nose gear leg fairings	1.66	3.66	2.09	82.3	3.469	301.1							
	- main gear leg fairings	2.65	5.84	3.45	135.8	9.143	793.6							

LIST OF EQUIPMENT

FORM A

Aircraft Type :

Serial number

DATES

DELIVERY

SCHEDULED ON DELIVERY

IN AIRCRAFT

FORM C

ITEM NUMBER	DESCRIPTION	WEIGHT (Kg)	WEIGHT (lb)	ARM (m)	ARM (in.)	MOMENT (m.Kg)	MOMENT (lb.in)	1	2	3	4
	ADDITIONAL FUEL TANK installation (without valve)	9.63	21.23	2.98	117.3	28.704	2491.4				
	- Tank installation	9.52	20.99	3.00	118.1	28.560	2478.9				
	- Fuel contents gauge installation	0.11	.24	1.31	51.6	0.144	12.5				
	Blanks on tank (3)	0.04	0.09	3.53	139.0	0.141	12.2				
	ADDITIONAL FUEL TANK installation (with valve)	9.97	21.98	3.00	118.1	29.921	2597.0				
	- Tank installation	9.86	21.74	3.02	118.9	29.777	2584.5				
	- Fuel contents gauge installation	0.11	.24	1.31	51.6	0.144	12.6				
	SAND FILTER installation, for SA 341	9.38	20.68	3.85	151.6	36.113	3134.4				
	SAND FILTER installation, for SA 342	10.53	23.21	3.87	152.4	40.751	3537.0				

GAZELLE HELICOPTER

APPENDIX

FLYING IN MOUNTAIN COUNTRY

SA 341 - SA 342

This document constitutes a supplement to the information given in the Flight Manual. It may be subject to specific amendments, independent of those concerning the Flight Manual.

LIST OF EFFECTIVE PAGES

All the pages which constitute this document are listed below.

This list is re-issued with each amendment.

Page	Code	Page	Code
Page 1	12.74		
Page 2	12.74		
Page 3	12.74		
Page 4	12.74		
Page 5	12.74		
Page 6	12.74		

CONTENTS

1. GENERAL

With any helicopter, flying in mountainous country presents some special aspects which derive from the following :

- presence of vertical air currents (up currents and down currents of dynamic or thermal origin)
- disappearance of visible horizon, when the helicopter flies lower than the crests facing the pilot
- lower air density.

1.1. Presence of vertical air currents

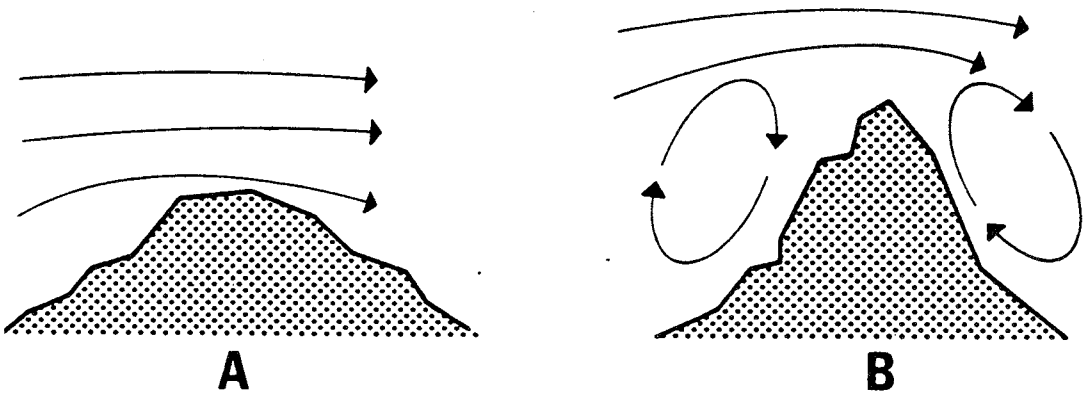
Vertical air movements in mountainous country, even out of the clouds, can be quite fast (10 hm/mn - 300 ft/min. - and even more) and cannot be countered by the helicopter's own vertical speed.
Hence, it is essential to know how theu can be anticipated and what action should be taken.

1.2. Dynamic air currents

Winds are disturbed by the shape of the terrain round which they have to travel.

- If the terrain is not too rugged and the wind is not strong, air flow over the mountains is laminar (i.e. there are no eddies) ; there is an up current on the windward side and a down current on the leeward side (A).

- If the terrain is very rugged and the wind strong, the flow is no longer laminar ; eddies are set up on both the windward and leeward sides, creating down currents on the windward face and up currents on the leeward face (B).



1.3. Thermal air currents

In low or zero wind conditions, and in sunny weather (anticyclones in the summer), the air masses are unevenly heated on the spot and, as a result, thermal vertical air currents are set up :

- up currents above rocky faces exposed to the sun and, in the evening, up currents above the forests which have stored the heat generated during the day.
- down currents above the mountain sides in the shade and above the glaciers.

1.4. Disappearance of visible horizon

The pilot who is deprived of visible horizon, has no visual reference in regard to aircraft attitude. Instead of flying at constant attitude he will have a tendency to maintain the crests at a constant height relative to the fuselage center line, hence, to lift the nose of the helicopter when approaching the mountain side.

Therefore, the airspeed indicator must be read very frequently.

1.5. Effect of decrease in air density

For a given weight, the decrease in air density has, in hovering flight, the following effects :

1) the torque required is slightly increased : e.g. in a hover O.G.E., the mechanical power is increased from 314 kW (85 % torque) at a density altitude of zero metre to 343 kW (93 % torque) at a density altitude of 2650 m (8700 ft).
2) a higher collective pitch is required in hover.
3) the thermal load is increased.
4) the clearance of the R.H. rudder pedal is reduced.

2. PARTICULAR ASPECT OF LIMITATIONS

If, at the maximum all-up weight of 1800 kg in standard atmosphere, the hovering altitude is increased progressively, in zero wind, the first limit to be reached is the thermal load.

To avoid exceeding this thermal limit (of which the pilot has no direct knowledge), it is necessary to comply with the torque limit, materialized by the first pitch detent which is displaced with temperature.
The pilot will not be led to exceed the limitations :
- If he complies with the weight limitations
- If a correct approach is made.

NOTE :
For the approach it is recommended to disengage the yaw channel of the S.A.S., or, if no separate yaw channel switch is provided, to disengage the S.A.S.

2.1. Weight limitations

To determine the maximum permissible take-off weight, the pilot will refer to the performance curves depending on pressure altitude and temperature.

These limitations correspond to the maximum permissible take-off weight given in section "PERFORMANCE" of the Flight Manual.

2.2. Flight path requirements

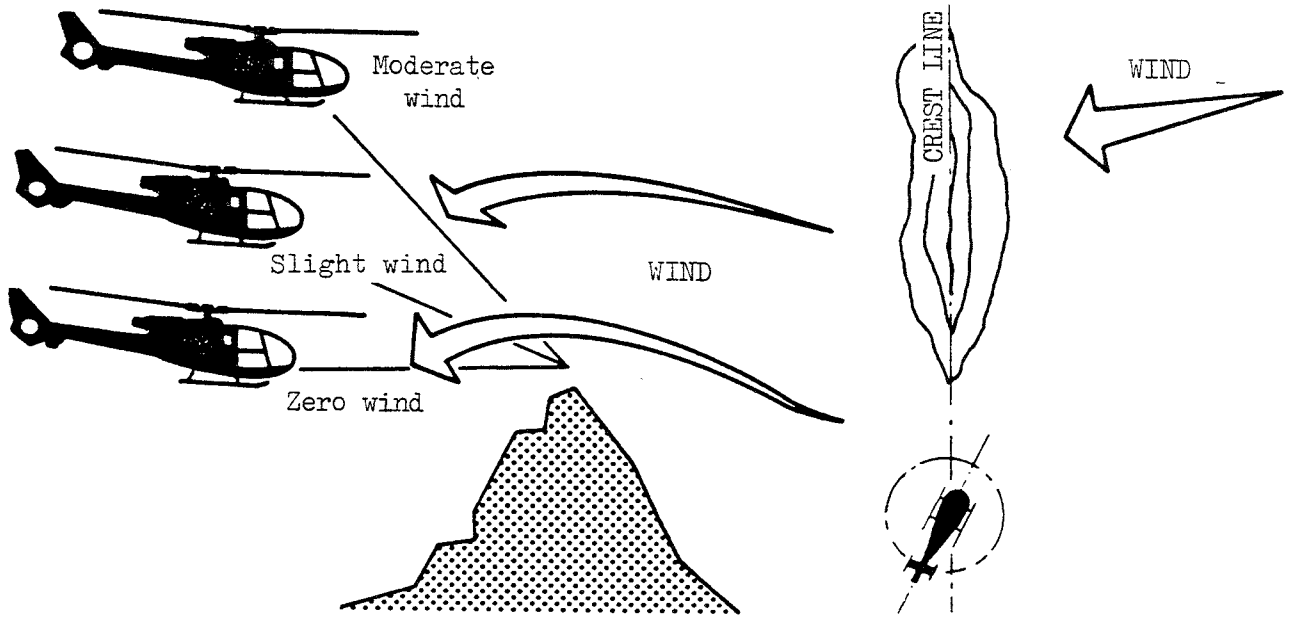
2.2.1. Landing approach or flight path after take-off

Once maximum weight has been determined, the pilot must select the approach or take-off flight path which he will be able to follow without exceeding the operating limits, allowing for any down currents he may encounter.

The best flight paths, therefore, are those requiring the smallest collective pitch angle during the manoeuvre.

Whenever possible, the pilot should land on a crest so that he can select any approach axis in azimuth and elevation, depending on the wind. Furthermore, it is easy to go round again in the event of a poor approach. Finally, he will also be able to reduce engine power immediately after take-off.

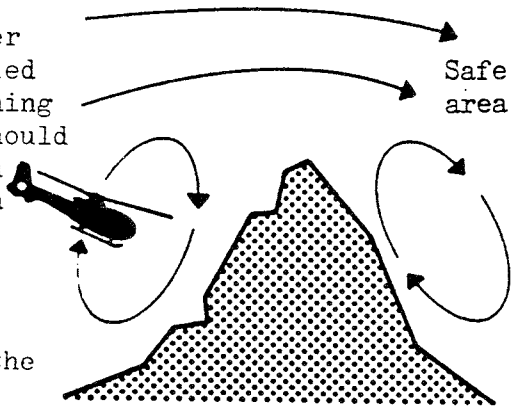
The golden rule of mountain-country flying is to increase the angle of approach in proportion to wind strength ; in fact, when down currents are not to be feared, a flat approach allows the transition to hover at minimum pitch, as there is no vertical speed to damp.



In windy conditions this advantage is offset by the presence of down currents behind the crest, a factor which becomes increasingly important as wind speed rises.

In high wind, avoid the approach leeward of the landing area as the turbulence and down currents may be strong. It is advisable to remain over the crest line while making an approach into a three quarter head wind (preferably from the R.H. sector). Increasing the drift correction, as the speed is reduced, will bring automatically the helicopter in a hover nose into wind.

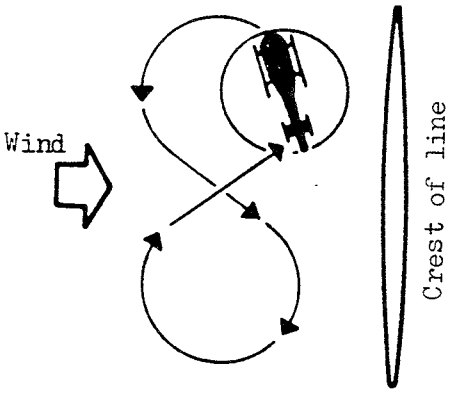
Should the aircraft be caught in a down current which forces it below the desired flight path, the pilot must immediately turn the helicopter downstream and allow it to be carried down by the current, while maintaining the airspeed along the slope. He should move away from the area of the down current before attempting to regain altitude.



2.2.2. Climb

In order to reduce climbing time, the pilot should take advantage of atmospheric up currents (flying on windward side or above sunlit faces when the wind is slight).

The pilot who gains altitude on the windward side should always be on the alert of the down current close to the mountain side. If he flies near to the mountain side to find the strongest up current he should not do so by facing the mountain side, but by placing the aircraft almost parallel to the latter so that he can at any time move away from it, back into the up current.



If he wishes to gain altitude in a specific area, he should carry out a series of 8's, always turning downstream, and should not try to climb in a spiral.

Never try to take advantage of the up current near to the rock face on the leeward side of a mountain, for the turbulence on that side can be very dangerous.

3. MOUNTAIN FLYING IN WINTER

Mountain flying in winter should be performed only by highly experienced pilots for the following reasons.

- On landing, powdery snow, thrown up by rotor downwash, may blind the pilot.
- In dull weather it is very difficult to estimate distances and speeds on snow covered surfaces.

APPENDIX

WINDSHIELD WIPERS

This appendix, issued to supplement the information given in the Flight Manual, may be modified by specific amendment indemendent of those issued against the basic Flight Manual.

LIST OF EFFECTIVE PAGES

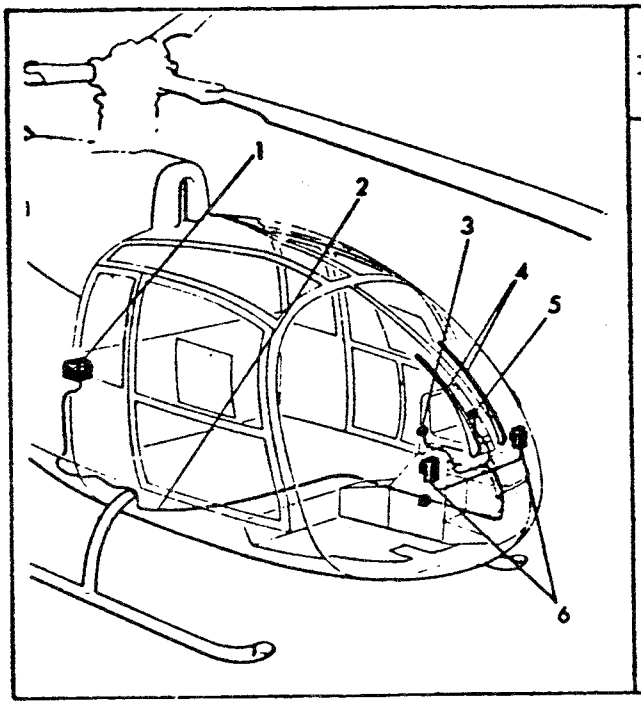
All the pages which constitute this document are listed below.
This list is re-issued with each amendment.

Page	Code	Page	Code	Page	Code	Page	Code
1	2.77						
2	2.77						

CONTENTS

1. DESCRIPTION

The installation comprises two motor-and-wiper/drive assemblies with independent controls but connected to the same electrical power supply source.
The components are mounted on brackets located on the forward canopy structure, either side of the aircraft centre-line. The electrical circuit is connected to distribution box 11 α 3 via a fuse.



Item	Component
1	28 V.d.c. electrical power distribution box
2	Electrical conductor cable
3	Pilot's control switch
4	Wiper blade assemblies
5	Co-pilot's control switch
6	Windshield wiper motors

2. OPERATION

Operation of the windshield wipers is controlled by means of two selector switches situated one either side of the main instrument panel. The modes of operation controlled are :

- Mid position, off
- Switch up, fast
- Switch down, slow

IMPORTANT : 1) NEVER OPERATE THE WIPERS ON A DRY WINDSCREEN

2) THE WINDSCREEN MUST BE THOUROUGHLY WET BEFORE STARTING A WIPER OPERATING TEST.

	N°	Date code
ISS.	2	12.76
AMDT.	1	06.82

APPENDIX

TEST PROGRAMME

This appendix, issued to supplement the information given in the Flight Manual, may be modified by specific amendments independent of those issued against the basic Flight Manual.

LIST OF EFFECTIVE PAGES

All the pages which constitute this document are listed below. This list is re-issued with each amendment.

Page	Code	Page	Code
Page 1	06.82	Page 16	12.76
Page 2	12.76	Page 17	12.76
Page 3	12.76	Page 18	12.76
Page 4	12.76	Page 19	12.76
Page 5	12.76	Page 20	12.76
Page 6	12.76	Page 21	12.76
Page 7	12.76	Page 22	06.82
Page 8	12.76		
Page 9	12.76		
Page 10	12.76		
Page 11	12.76		
Page 12	12.76		
Page 13	12.76		
Page 14	12.76		
Page 15	12.76		

This Appendix recapitulates the checks to be carried out in flight, or on ground, rotor turning, either after a periodic inspection, or after major work or replacement of main components.

The check schedules are presented in the from of reproducible sheets which can be directly completed by the crew.

To eliminate possible discrepancies with Flight Manual such as might occur if frequent amendments to this appendix are issued, values to be found in the Flight Manual are identified by an asterisk, and are not printed on the check sheets

CONTENTS

SHEET 0	**HELICOPTER:** GAZELLE **TYPE:** 341 F | 341 G | 341 H | 342 J | 342 K | 342 L

FLIGHT REPORT

DATE : CREW : FIELD :	Time of take-off : Duration : Landings : Max. alt. :	WEATHER DATA Q.F.E. : Q.M.U. : Q.A.N. Direction Strength

Empty weight : Crew : Ballast : Fuel : TOTAL WEIGHT :	Partial fuel load :

C.G. Location :

MAJOR WORK CARRIED OUT BEFORE THE FLIGHT	REMARKS REPORTED BY THE CREW AFTER THE FLIGHT

UNITS USED
Cross out where not applicable

WEIGHT : kg - lb	FUEL : l. kg. lb.	ALTITUDE : m. ft AIRSPEED : km/h - kt

SPECIFIC EQUIPMENT :	Signature of writers :

SHEET 1	HELICOPTER : GAZELLE	TEST	
	TYPE: 341 F / 341 G / 341 H	Flight	Ground

STARTING

TEST REQUIREMENTS:

Cold starting according to the procedure given in the Flight Manual

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q'ty

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
- Minimum voltage	U ≥ 24 volts	
- Booster pump	Operation	
- Starting . Selector switch to "START"	"START" indicator light comes on	
. At 2000 rpm move selector switch to "IGN" - Start timing clock	"INJ" indicator light comes on then goes out	"INJ" time :
. Hold switch until t4 temperature rises to 400°C and release the switch	"t4" increases in 10 seconds "START" indicator light goes out for engine r.p.m between * time ≤ 50 seconds	"START" light goes out at : Starting time :
- Aborted start	None	
- Idling - Check . Engine rpm. (Ng) . t4 . Oil pressure . Oil temperature	 * * * *	

* Values shown thus * are to be taken from the Flight Manual

REMARKS:

SHEET 2	HELICOPTER: GAZELLE	TEST: Flight / Ground
	TYPE: 341 F / 341 G / 341 H / 342 J / 342 K / 342 L	

CLUTCH ENGAGEMENT

TEST REQUIREMENTS:

Clutch engagement according to the procedure given in the Flight Manual.

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q't'y

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Slowly move the fuel flow control lever forwards . Start timing clock Check : . Speed at which the rotor begins to rotate . t4 max. . "MGB.P" indicator light . "GEN" indicator light . Synchronization time	 Ng between * and * * light goes out light goes out for Ng < * Between * and *	
After synchronization : - Move fuel flow control lever forwards : - Check : . "ENG.P" indicator light . "GEN" indicator light . Engine oil pressure (if indicator is installed) . Engine oil temperature . Engine r.p.m.	 light goes out light out with control fully forward Pressure > * Temp. < * Governed r.p.m. *	
Collective pitch 7° or torque at 30 %	No oscillation	
Cyclic stick forward without contacting the detents	No oscillation	

If oscillations occur : Immediately set collective pitch lever to low pitch, and set cyclic stick to neutral : oscillations cease.

REMARKS:

SHEET 3	HELICOPTER: GAZELLE						TEST	
							Flight	Ground
	TYPE: 341F	341 G	341 H	342 J	342K	342 L		

HOVER I.G.E

TEST REQUIREMENTS:

. Concrete area
. Headwind below 10 knots
. Stabilized hover

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q't'y

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Hover I.G.E . Coll. pitch indicated read on vernier scale	See figure 1 Tolerance for vernier scale = ± 2.5 %	
. Torque indicated	Below max. value according to prevailing conditions See NOTE	
Engine : Note : . r.p.m. . t4 temperature . oil pressure (if indicator is installed) . oil temperature	Governed r.p.m. * Stability of r.p.m. * * *	
M.G.B Check . Oil temperature and pressure indicator light (if installed)	Light(s) out	
Electrical power . Note voltage	28.5 volts	

* Values shown thus * are to be taken from the Flight Manual
NOTE : Figures obtained in hover are more accurate

REMARKS:

SHEET 4	HELICOPTER: GAZELLE							TEST: Flight / Ground
	TYPE:	341 F	341 G	341 H	342 J	342 K	342 L	

HOVER O.G.E

TEST REQUIREMENTS:

. Hover O.G.E head wind, less than 10 knots
. Height = 15 metres (50 ft)

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q'ty

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED	
Note collective pitch read on vernier scale . Compare pitch read with pitch shown on figure 2,	See figures 2 and 4		
Note stabilized parameters	See Flight Manual	Ng :	Oil temp.
		t4 :	Voltage :
		Oil press.	

REMARKS:

SHEET 5	HELICOPTER: GAZELLE	TEST: Flight / Ground
	TYPE: 341 F / 341 G / 341 H	

ENGINE GOVERNING

TEST REQUIREMENTS:

. Check on take-off then during climb.

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q'ty

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Increase collective pitch, from low pitch to take-off pitch in 1 second	Ng between 42000 and 43900 r.p.m	Minimum Ng : Maximum Ng :
Set collective pitch corresponding to maximum torque or to the first detent (index 30°C) . I.A.S. = 0 . Climb = height between 300 and 700 metres (1000 and 2300 ft)	Stable r.p.m Appreciate Δ Ng : Pointer stable	Ng : Ng surge : Torque Collective pitch

REMARKS:

SHEET 6	HELICOPTER: GAZELLE							TEST	
	TYPE:	341F	341 G	341 H	342 J	342K	342 L	Flight	Ground

LOW PITCH STOP

TEST REQUIREMENTS:

. Altitude = Zp = 700 metres (2300 ft)
. I.A.S = 120 km/h (65 Kt)

BAR. PRESS. or PRESS. ALT.

O.A.T.

FUEL Q'ty

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Reduce collective pitch to full low pitch . Note NR at Zp = 500 m (1650 ft)	See figure 3	

REMARKS:

SHEET 7	HELICOPTER: GAZELLE	TEST: Flight / Ground
	TYPE: 341 F | 341 G | 341H	

LEVEL FLIGHT - VNE

TEST REQUIREMENTS:

. Altitude = Zp = 500 metres (2300 ft)

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O.A.T.

FUEL Q'ty

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Set collective pitch to first detent for a/c type : . 341G or H (13.5°), index set to 20° . 341F (13.10), index set to 30° . Manoeuvre . Note airspeed and torque	See figure 4 See figure 4a	I.A.S : Torque :
Set collective pitch to second detent - Control pedals : 1 ball to the right . Manoeuvre . Note stabilized parameters . Note airspeed and torque For type 341G or H 341F	For acceptable figures refer to Flight Manual See figure 5 See figure 5a	NR : Ng : Ng : Oil press : Oil temp : Voltage : I.A.S Torque
- VNE . Evaluate the vibration level - Instruments, instrument panel	300 km/h (160 Kt) Vibration level normal	
- Radio . Two-way communications	Correct	

REMARKS:

SHEET 8	HELICOPTER: GAZELLE	TEST: Flight / Ground
	TYPE: 341F / 341G / 341H / 342J / 342K / 342L	

SERVO-UNITS

TEST REQUIREMENTS:

. Height above ground : 100 to 150 metres (330 ti 500 ft)

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FUEL Q't'y

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Fly the aircraft on a level flight path . I.A.S. 130 km/h (70kt) . Collective pitch 8 to 10° ("Refuge"index on vernier scale)		
Isolate the servo-units,check : . Load on cyclic controls . Load on coll. pitch controls If hydraulic accumulators installed,check : . "HYD PR" light on and horn sounds (if installed). . accumulator pressure reserve.	Below 5 daN Between 4 and 8 daN	
Carry out : . A level flight between 130 and 180 km/h (70-100 Kt) . A final approach . Hover O.G.E	Aircraft remains controllable	
- Start forward flight and switch servo-units on at 130 km/h (70 Kt)		

REMARKS:

SHEET 9	HELICOPTER: GAZELLE	TEST: Flight / Ground
	TYPE: 341 F | 341 G | 341 H | 342 J | 342 K | 342 L	

LANDING - STOP

TEST REQUIREMENTS:

. After landing, stopping the rotor and the engine.

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FUEL Q't'y

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Apply rotor brake (NR ≤170 rpm)	Stopping time not more than 25 seconds	
Note : . Stabilized idling rpm (30 seconds) . t4 . Oil pressure (if indicator is installed . Oil temperature . Battery voltage	25500 rpm ± 400 * * * *	

* Values shown thus * are to be taken from the Flight Manual.

REMARKS:

SHEET 10	HELICOPTER: GAZELLE							TEST: Flight / Ground
	TYPE:	341 F	341 G	341 H	342 J	342 K	342 L	

DETERMINATION OF THE T4 TEMPERATURE CORRECTION SPECIFIC TO THE ENGINE

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O.A.T.

FUEL Q't'y

GENERAL

The procedure for checking the engine condition given in the Flight Manual necessitates prior correction of the t4 temperature specific to the engine.
This check is to be carried out in flight with a clean line air intake on all new or overhauled engines when first installed on the helicopter, and must not be modified until the next overhaul.

Routine checks are to be carried out with air intake fitted with the accessory equipment normally used. The t4 correction corresponding to such equipment must then be made.

If doubt exists as to the condition of the engine a check must be made with a clean line air intake.

PROCEDURE

1°) Stabilize the aircraft.

2°) Apply collective pitch to the first detent or to a pitch corresponding to approximately 80 % torque.

3°) Note the following parameters : Torque, t4, Zp, O.A.T. (θ s).

4°) Plot torque and t4 temperature on chart given in figure 6. The point of intersection (6) of lines from points (4) and (5) gives the t4 correction specific to the engine.

5°) Carry out five measurements. Eliminate the minimum and maximum measurements. Determine the arithmetical mean of the three remaining measurements which correspond to the t4 correction.

6°) Mark the t4 correction at the location provided for this purpose on the VNE plate secured to the instrument panel.

MEASUREMENTS	Torque	t4	Zp	θ s	t4 correction (curve)
1st measurement					
2nd measurement					
3rd measurement					
4th measurement					
5th measurement					
Arithmetical mean of the three intermediate measurements → T4 CORRECTION					

SHEET 11	HELICOPTER : GAZELLE	TEST: Flight / Ground
	TYPE: 341F | 341 G | 341 H | 342 J | 342K | 342 L	

ESTIMATION OF THE VIBRATION LEVEL IN FLIGHT

TEST REQUIREMENTS :

Helicopter weight : Maximum permissible weight
Fuel : Tanks full
c.g. location : Correct
. Evaluation of the vibration level in hover O.G.E and in level flight on the second detent.

NOTE : The vibration level is evaluated by the pilot. If vibration due to the main rotor is found excessive, the procedure for measuring this level is given in the Maintenance Manual.

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O.A.T.

FUEL Q't'y

TEST OR DATA TO BE MEASURED	RESULTS TO BE OBTAINED	RESULTS OBTAINED
Hover O.G.E . Evaluate vibration level at 1 Ω (frequency 1 per revolution of main rotor)	Correct level of vibration	
Level flight on the second detent . Evaluate vibration level at 1 Ω . Note increase of vibration (if any) as airspeed increases	Correct level of vibration Negligible effect of airspeed NOTE : A minor effect of the airspeed on the vibration level can be corrected by adjusting pitch change links. Correction of a major effect requires adjustment of the tabs.	
After rework, carry out a further test flight		

REMARKS :

PLANCHE FIGURE 1	HELICOPTERE: GAZELLE HELICOPTER							
	TYPES TYPE :	341G	341H	341F				

RELATION PAS GENERAL / MASSE EN STATIONNAIRE D.E.S
. Vent nul . hauteur sol 1,5m (5ft)
COLL. PITCH VERSUS WEIGHT IN HOVER I.G.E.
. No wind . 1.5 m (5ft) above the ground

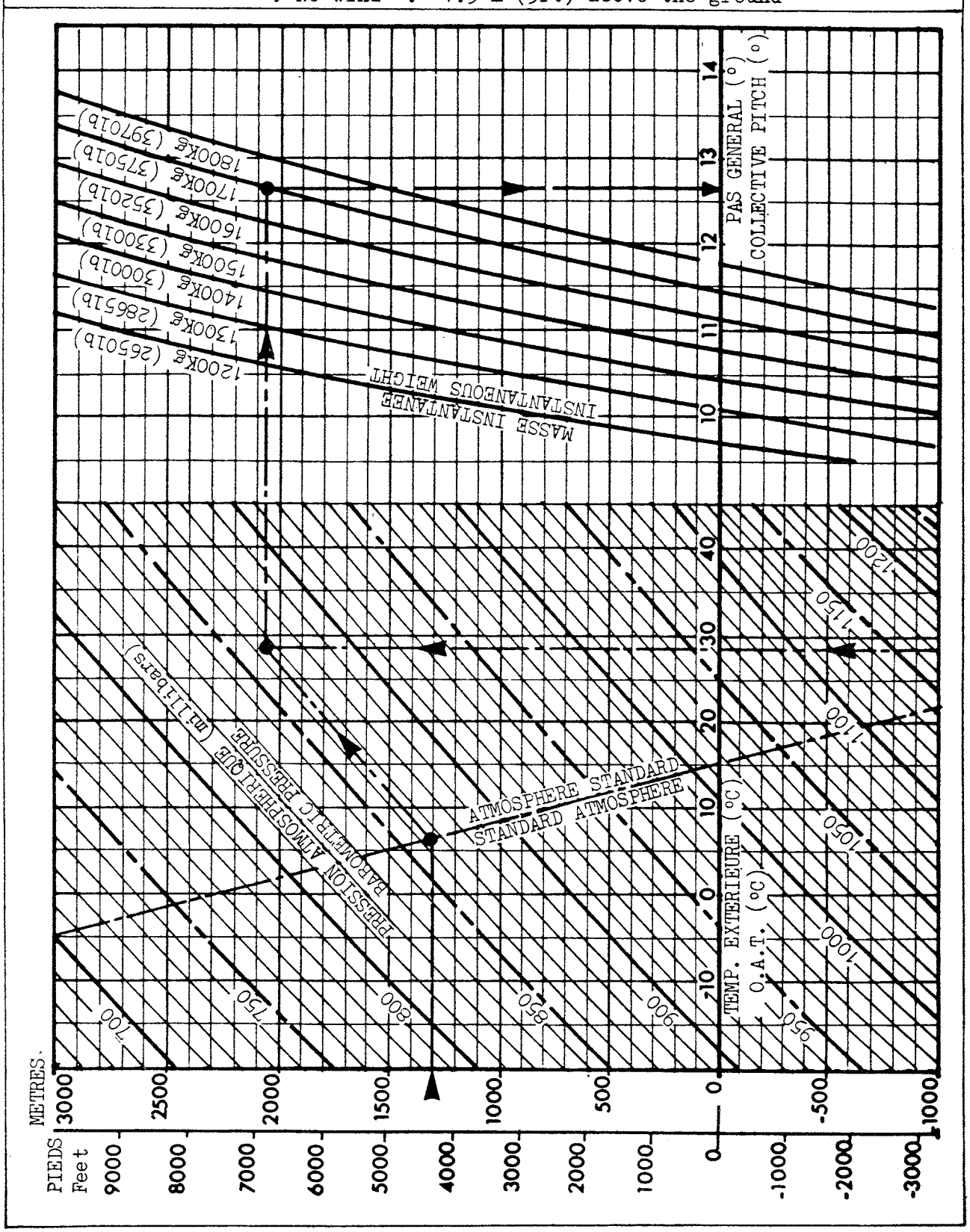


PLANCHE *FIGURE* 2	HELICOPTERE : GAZELLE *HELICOPTER*							
	TYPES *TYPE :*	341G	341H	341F				

RELATION PAS GENERAL /MASSE EN STATIONNAIRE H.E.S
. Vent nul .
COLL. PITCH VERSUS WEIGHT IN HOVER O.G.E.
. No wind

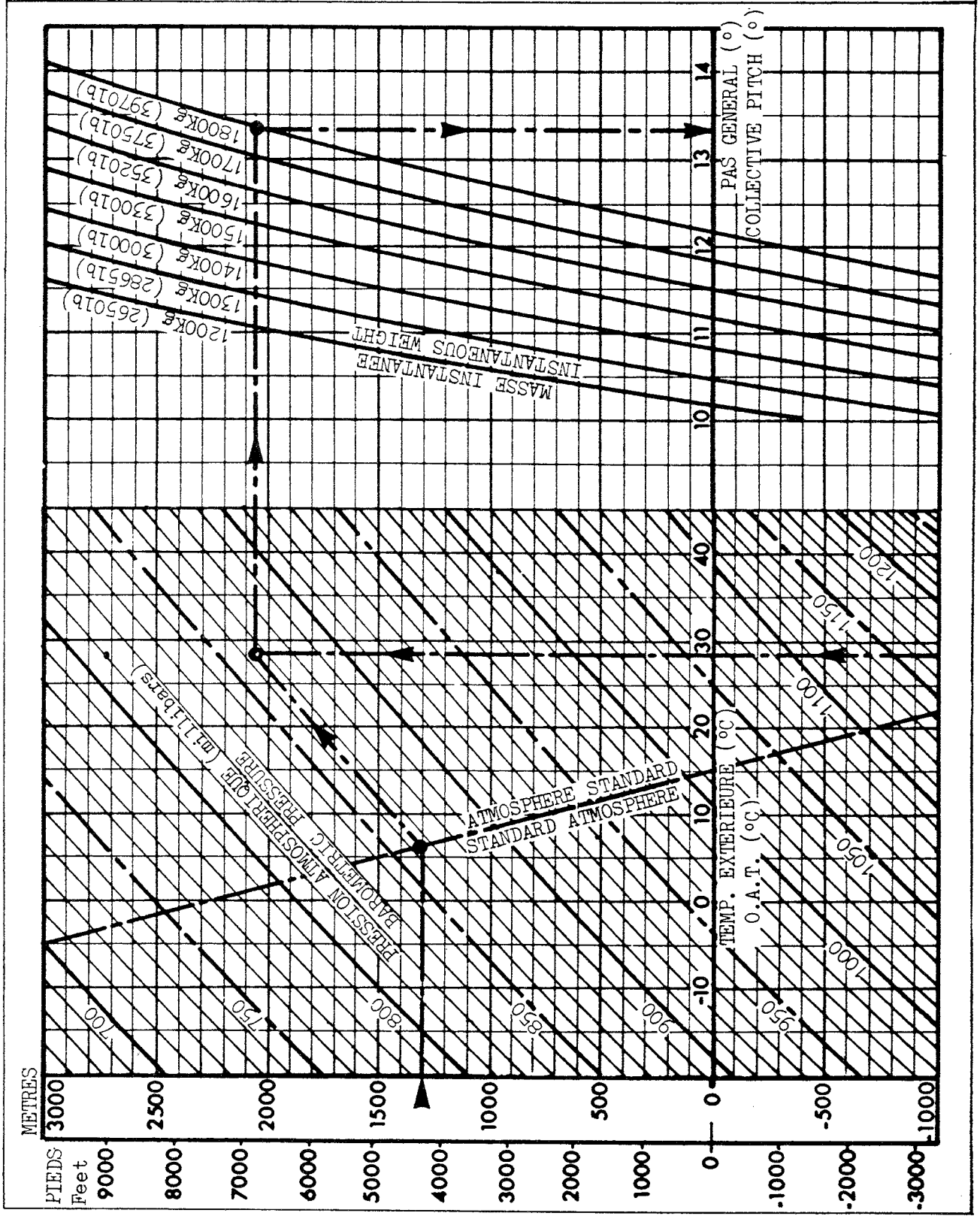


PLANCHE FIGURE 3	HELICOPTERE: GAZELLE HELICOPTER							
	TYPES TYPE:	341G	341H	341F				

EVOLUTION DU REGIME ROTOR EN AUTOROTATION
. Pas général: 4° .Vi= 120Km/h (65Kt)
ROTOR R.P.M. IN AUTOROTATION
Coll. pitch : 4° - I.A.S 120 km/h (65 knots)

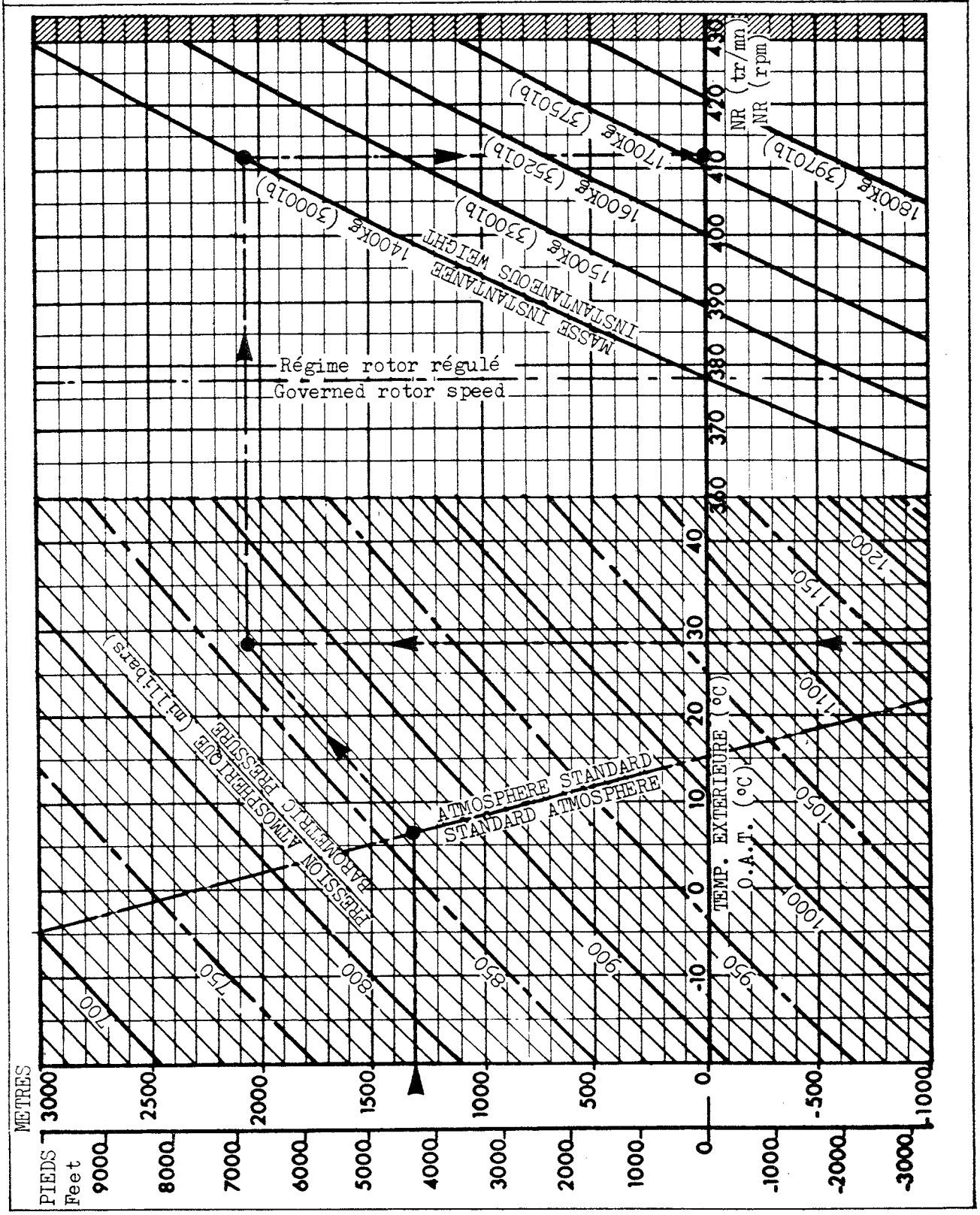
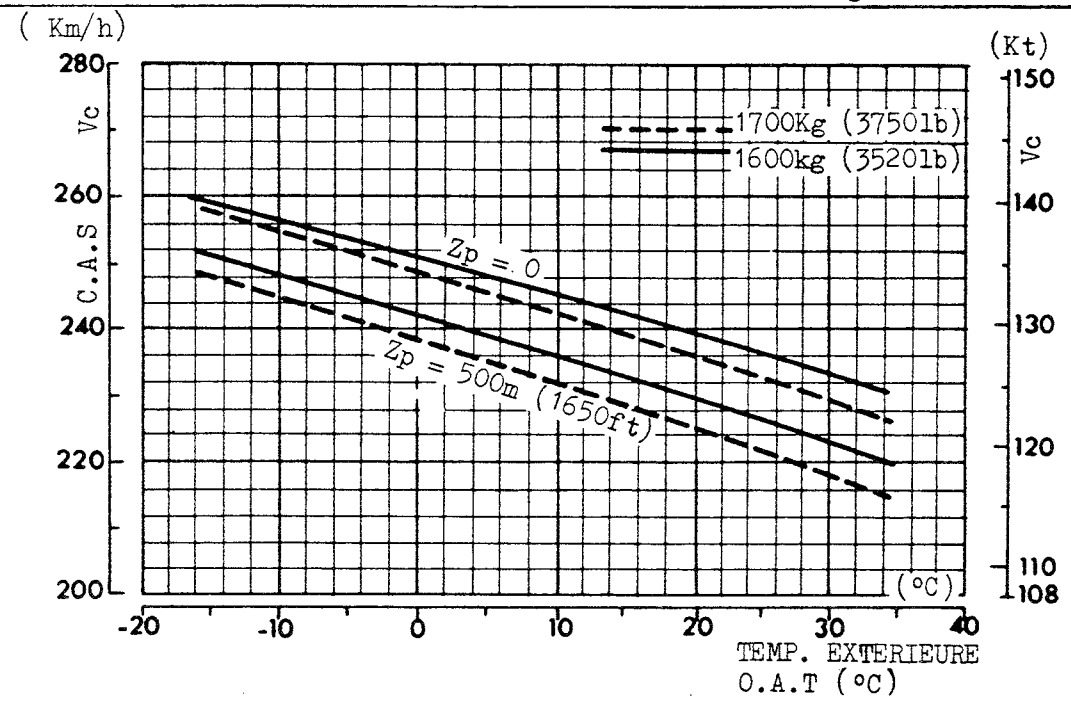


PLANCHE *FIGURE* 4

HELICOPTERE : GAZELLE
HELICOPTER

TYPES *TYPE :* 341G | 341H

PERFORMANCES EN PALIER SUR LA 1ere BUTEE
. D =13,5 (index 20°C) . Appareil lisse avec train non caréné
PERFORMANCE IN LEVEL FLIGHT ON THE FIRST DETENT
. DO = 13.5° (index 20°C) - Clean aircraft = no fairing on undercarriage



NOTA : L'influence des différents optionnels est donnée dans le manuel de vol en annexe Performances Complémentaires

NOTE : The effect of different optional equipment items is given in the Additional Performance Data appendix to the Flight Manual.

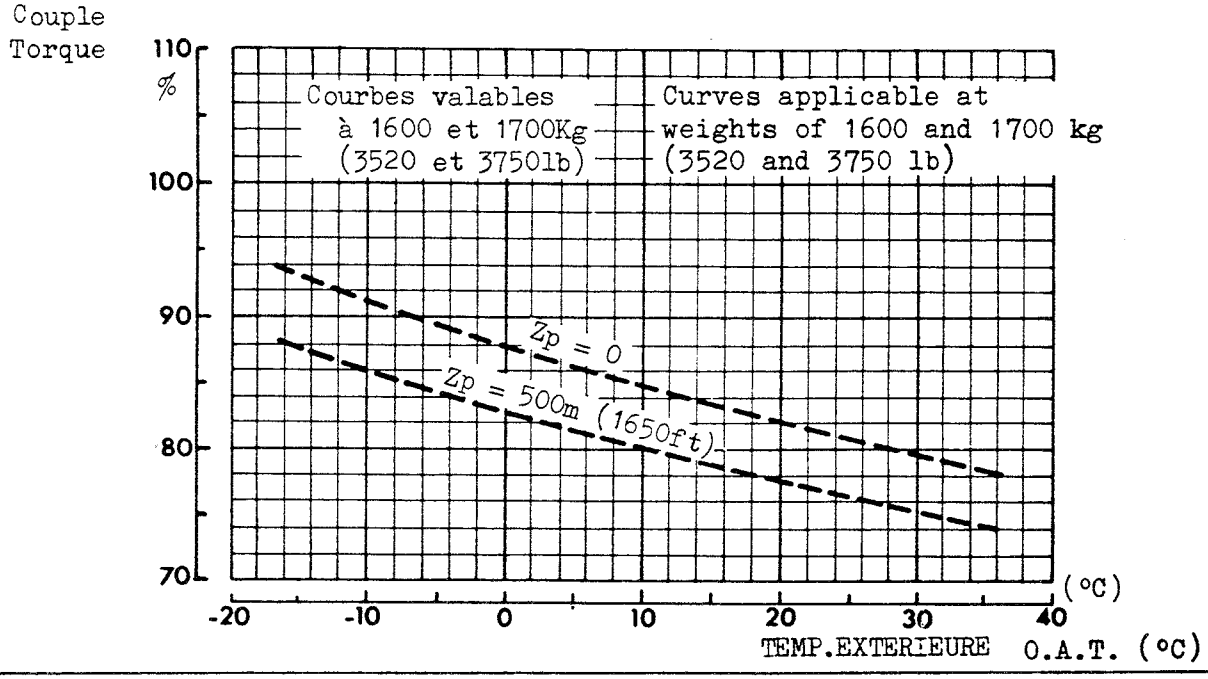
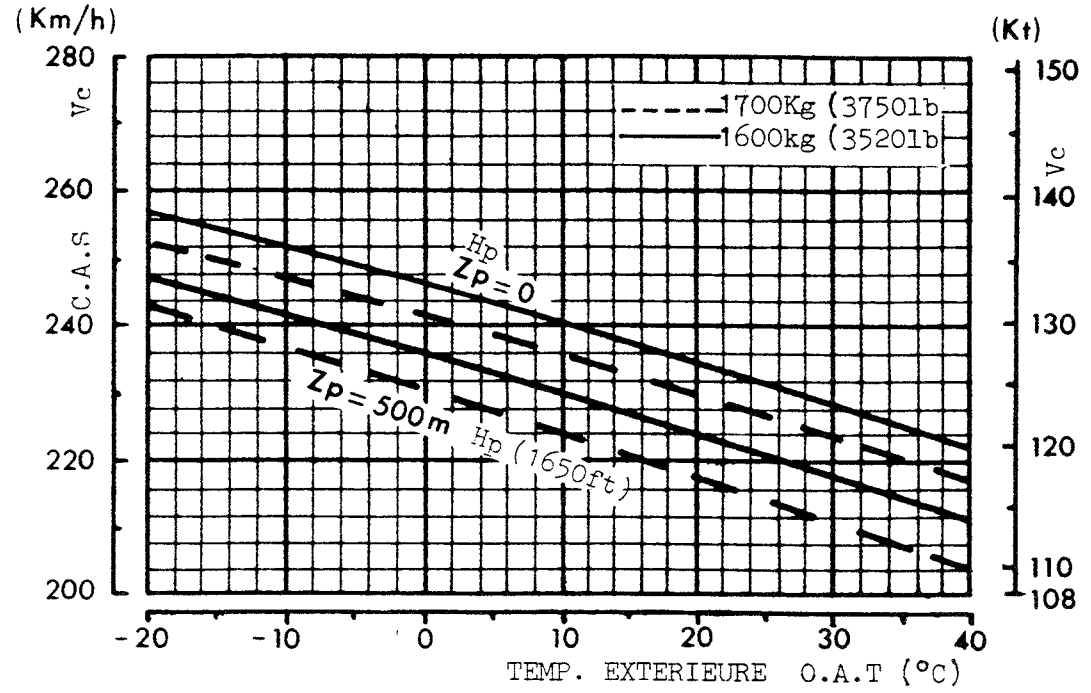


PLANCHE FIGURE	HELICOPTERE: GAZELLE HELICOPTER
4 a	TYPES TYPE : 341 F

PERFORMANCES EN PALIER SUR LA 1ère BUTEE
. D = 13,1 (index 30°C). Appareil lisse avec train non caréné
PERFORMANCE IN LEVEL FLIGHT ON THE FIRST DETENT
. DO = 13.1° (index 30°C) - Clean aircraft = no fairing on undercarriage



NOTA : L'influence des différents optionnels est donnée dans le manuel de vol en annexe Performances Complémentaires

NOTE : The effect of different optional equipment items is given in the Additional Performance Data appendix to the Flight Manual.

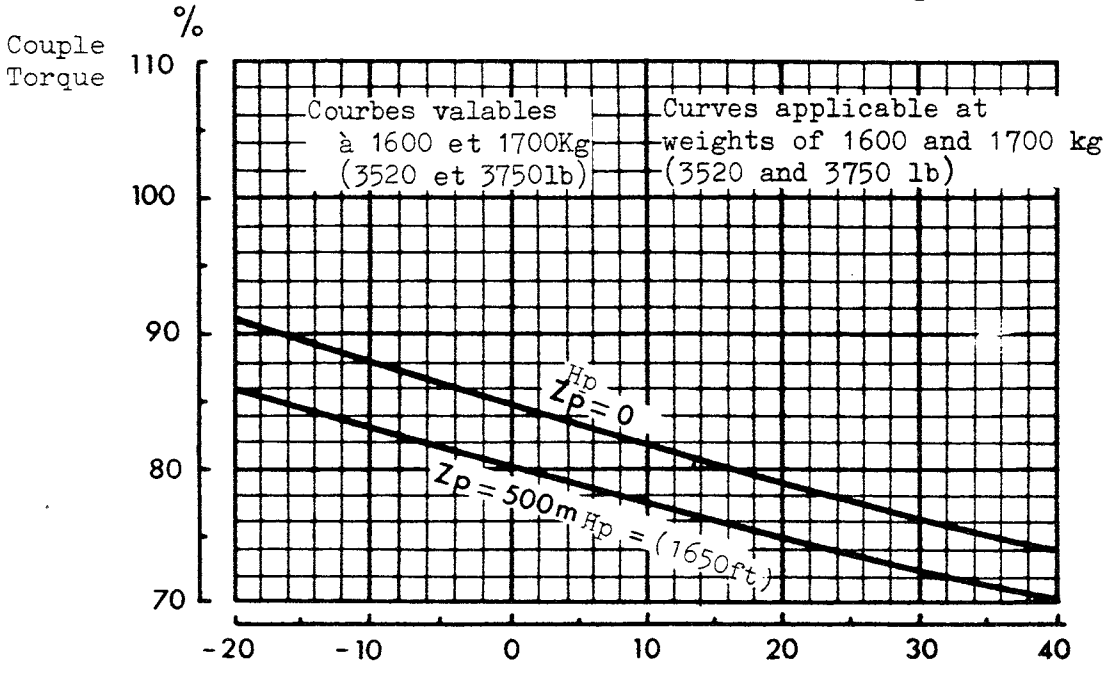
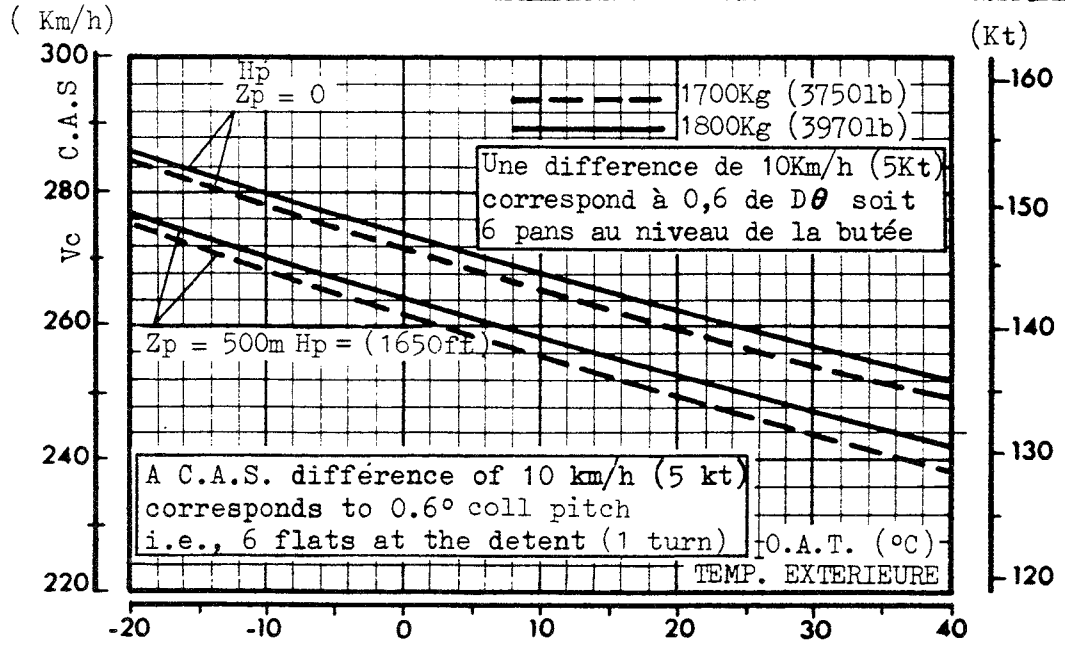


PLANCHE FIGURE 5

HELICOPTERE : GAZELLE
HELICOPTER

TYPES / TYPE : 341G | 341H

PERFORMANCES EN PALIER SUR LA DEUXIEME BUTEE
.D θ = 15° (appareil civils et export) .Appareil lisse avec train non caréné
PERFORMANCE IN LEVEL FLIGHT ON THE SECOND DETENT
.Dθ =15°(Civil and export aircraft) Clean aircraft:No fairing on undercarriage



NOTA : L'influence des différents optionnels est donnée dans le manuel de vol en annexe Performances Complémentaires.

NOTE : The effect of different optional equipment items is given in the Additional Performance Data appendix to the Flight Manual.

Couple Torque

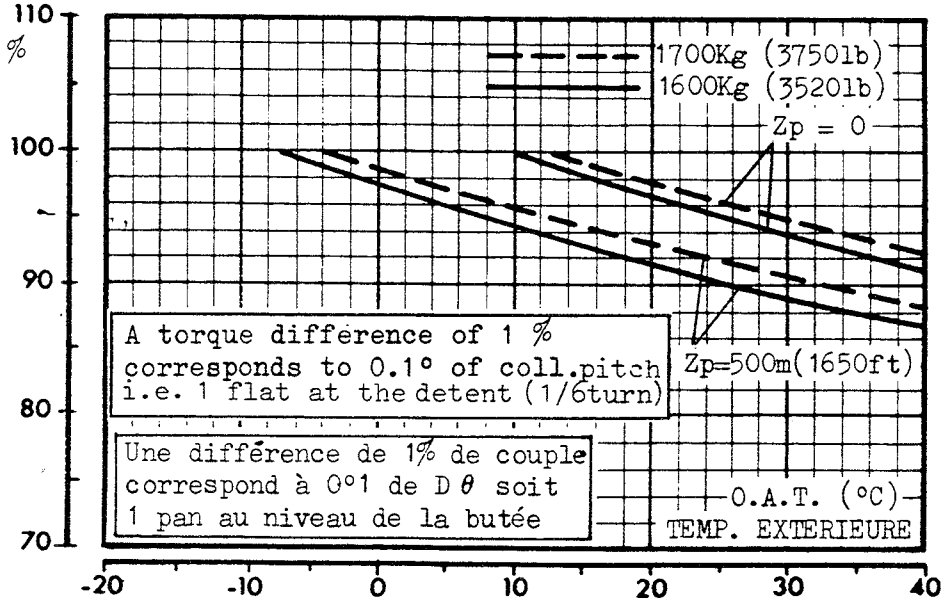
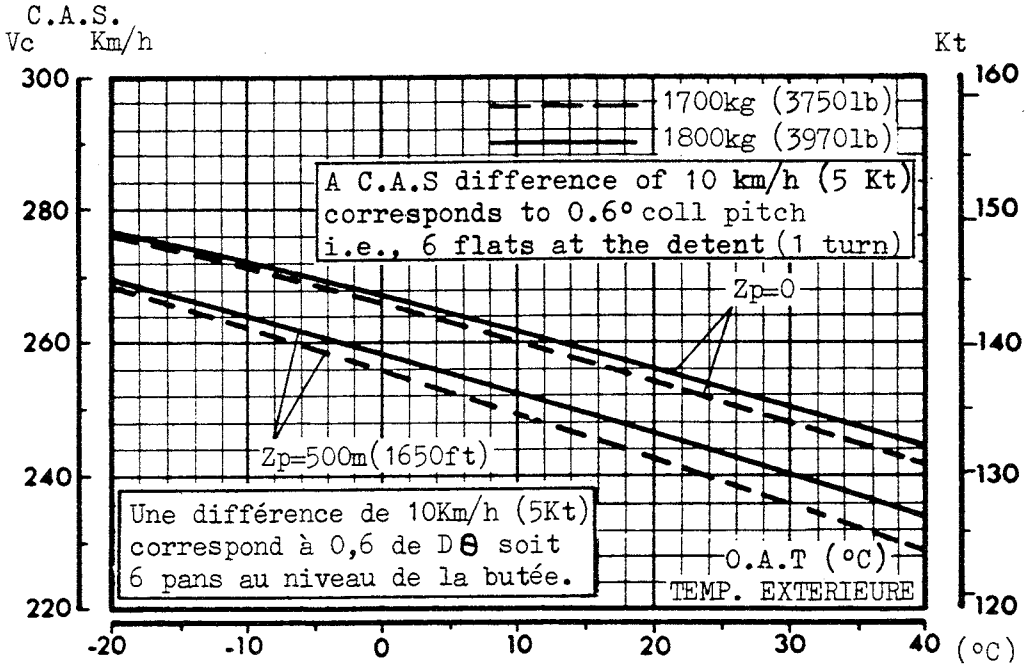


PLANCHE FIGURE	HELICOPTERE : GAZELLE HELICOPTER
5a	TYPES TYPE : 341F

PERFORMANCES EN PALIER SUR LA DEUXIEME BUTEE
. Dθ = 14°5 (Militaires français) ; Appareil avec train non caréné
PERFORMANCE IN LEVEL FLIGHT ON THE SECOND DETENT
. Dθ = 14°5 (French Services aircraft) - No fairing on undercarriage



NOTA : L'influence des différents optionnels est donnée dans le manuel de vol en annexe Performances Complémentaires.
NOTE : The effect of different optional equipment items is given in the Additional Performance Data Appendix to the Flight Manual.

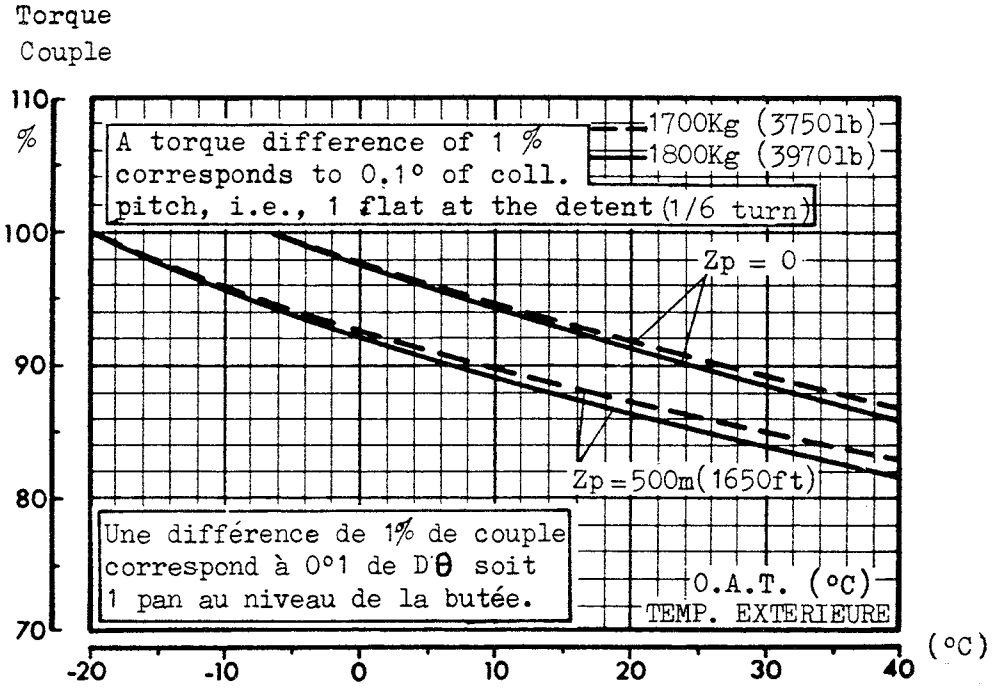
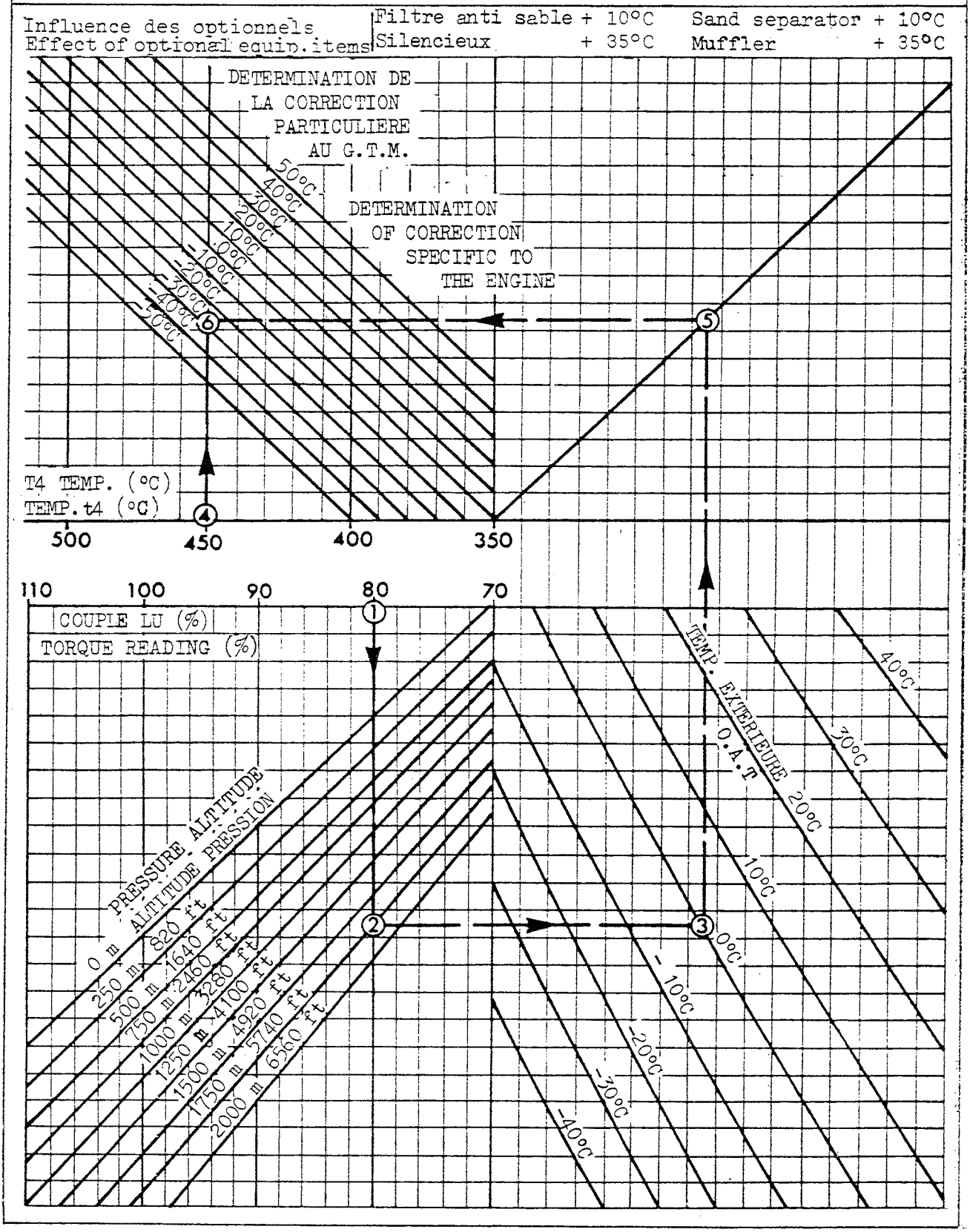


PLANCHE FIGURE 6	HELICOPTERE : GAZELLE HELICOPTER							
	TYPES TYPE :	341G	341H	341F				

DETERMINATION DE LA CORRECTION DE t4 PROPRE AU G.T.M.

DETERMINATION OF T4 TEMPERATURE CORRECTION SPECIFIC TO THE ENGINE



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