DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

H1IN
Revision 6
AEROSPATIALE
SE.3160 Alouette III
SA.316B Alouette III
SA.315B Alouette III
SA.319B Alouette III
SA.316C Alouette III

May 24, 2004

TYPE CERTIFICATE DATA SHEET NO. H1IN

This data sheet which is a part of Type Certificate No. H1IN prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Civil Air Regulations/Federal Aviation Regulations.

Type Certificate Holder

Eurocopter France
Aeroport International Marseille Provence
13725 - Marignane - Cedex
France

I - Model SE.3160 Alouette III, approved 27 March 1962

Engine	One - Turbomeca Artouste III B.	
Fuel and Engine Oil	See data pertinent to all models.	
Engine limits	Maximum speed: 33,500 r.p.m. true held constant by governor within ± 200 r.p.m. (transient variations of ± 1000 r.p.m. are permissible).	
	Rating takeoff: 858 hp - 33,500 r.p.m. (5 min.) (limited to 562 hp by engine gear box)	) at sea level) standard) conditions of) 59° F., 29.92 in.Hg
	Rating maximum continuous: 690 hp - 33,500 r.p.m.) (limited to 542 hp by engine gear box)	
	Maximum tailpipe temperature	
	Takeoff power (5 min.)	: 550°C
	Maximum continuous power	: 500°C
Transmission Limits	Maximum takeoff power	: 542 hp
	Maximum continuous power	: 444 hp
Helicopter Limits	Maximum takeoff power	: 542 hp
	Maximum continuous power	: 444 hp
Rotor Limits	Maximum speed	: 420 r.p.m.
	Minimum speed	: 270 r.p.m.
	Constant speed, power-on flight	: 353.2 r.p.m.
Airspeed Limits	For CG location between (109.45) and (121.25) : 113 knots For CG location between (121.25) and (124.0) : 103 knots See Helicopter Flight Manual for variation of VNE with weight and altitude.	

I - Model SE.3160 Alouette III (cont'd)

C.G. Range	Longitudinal	(109.45) to (121.25) (121.25) to (124.0) with airspeed restriction per "Airspeed Limits" above.
	Lateral	LH Limit (5.51) RH Limit (4.72)
Maximum Weight	4630 lb.	
Number of Seats	7 - Pilot and two front passengers (54.55), plus four rear passengers (86.45)	
Maximum Baggage	See Helicopter Flight Manual.	
Fuel Capacity	149 U.S. Gal. (123.2) - Usable 146 U.S. Gal. Total tank capacity : 157 U.S. Gal. (See NOTE 1 for data on unusable fuel).	
Oil Capacity	Total capacity 2.6 U.S. Gal. at 143 inches (See NOTE 1 for data on undrainable oil).	
NOTE A	The "Siren" cargo swing, cargo sling and "Air Equipment" rescues hoist to Aerospatiale Drawing Nos. 3160-73.06.500 (cargo swing) 3160-73.06.000 (cargo sling) and 3160-73.38.000 (rescue hoist) are approved for special-purpose operation in accordance with limitations contained in the Helicopter Flight Manual.	

II. Model SA.316B Alouette III, approved 25 March 1971

(SA.316B may be obtained by conversion of SE.3160 in accordance with NOTE B)

Engine	One - Turbomeca Artouste III B.	
Fuel and Engine Oil	See data pertinent to all models.	
Engine Limits	Maximum speed: 33,500 r.p.m. true held constant by governor within ± 200 r.p.m. (transient variations of ± 1000 r.p.m. are permissible). Rating takeoff: 858 hp - 33,500 r.p.m. (5 min.)) (limited to 562 hp by engine gear box)) at sea level) standard Rating maximum continuous: 690 hp - 33,500 r.p.m.) conditions of (limited to 542 hp by engine gear box)) 59° F., 29.92 in.Hg Maximum tailpipe temperature Takeoff power (5 min.) : 550°C Maximum continuous power : 500°C	
Transmission Limits	Maximum takeoff power : 592 hp Maximum continuous power : 444 hp	
Helicopter Limits	Maximum takeoff power : 562 hp Maximum continuous power : 444 hp	
Rotor Limits	Maximum speed : 420 r.p.m. Minimum speed : 270 r.p.m. Constant speed, power-on flight : 353.2 r.p.m.	
Airspeed Limits	For CG location between (109.45) and (121.25): 113 knots For CG location between (121.25) and (124.0) : 103 knots See Helicopter Flight Manual for variation of VNE with weight and altitude.	

II. Model SA.316B Alouette III (cont'd)

C.G. Range	Longitudinal	(109.45) to (121.25) (121.25) to (124.0) with airspeed restriction per "Airspeed Limits" above.
	Lateral	LH limit (5.51) RH limit (4.72)
Maximum Weight	4850 lb.	
Number of Seats	7 - Pilot and two front passengers (54.55), plus four rear passengers (86.45).	
Maximum Baggage	See Helicopter Flight Manual.	
Fuel Capacity	149 U.S. Gal. (123.2) - Usable 146 U.S. Gal. Total tank capacity: 157 U.S. Gal. (See NOTE 1 for data in unusable fuel).	
Oil Capacity	Total capacity 2.6 U.S. Gal. at 143. (See NOTE 1 for data on undrainable oil).	
NOTE A	The "Siren" cargo swing, cargo sling and "Air Equipment" rescue hoist to Aerospatiale Drawing Nos. 3160-73.06.500 (cargo swing) 3160-73.06.000 (cargo sling) and 3160-73.38.000 (rescue hoist) are approved for special-purpose operation in accordance with limitations contained in the Helicopter Flight Manual.	
NOTE B	To convert the Model SE.3160 Alouette III to the Model SA.316B Alouette III the following assemblies, or those which bear a higher group number or dot number, must be installed. (See SGAC-approved Alouette Service Bulletin 01.20).	
	- Blade spacing cables reinforced	P/N 3160S.14.60.000
	- Main landing gear reinforced	P/N 3160S.42.10.000.1
	- Body structure reinforced	P/N 3160S.22.11.000.1
	- Improvement of tail boom service life	P/N 3160S.23.11.000.9
	- Instruction placards	(See NOTE 2)
	- Main gear box	P/N 3160S.62.00.000.13 or P/N 3160S.62.00.000.10 to 12 embodying modification AM.1212 in addition (See log card)
	- Main rotor shaft	P/N 3160S.68.10.000.1
	- Main rotor head	P/N 3160S.12.20.000.3
	- Freewheel	P/N 3160S.60.10.000.1
	- Tube and universal joint assy	P/N 3160S.67.11.000
	- Tail rotor gear box	P/N 3160S.66.10.000.3
	- Tail rotor head	P/N 3160S.33.30.000.6
	- Main rotor blades	P/N 3160S.11.10.000.16 to 31 .42 to 51 .62 to 71
	- Tail rotor blades	P/N 3160S.34.10.000.10

III. - Model SA.315B Alouette III, approved 25 February 1972

Engine	One - Turbomeca Artouste III B.
Fuel and Engine Oil	See data pertinent to all models.
Engine Limits	Maximum speed: 33,500 r.p.m. true held constant by governor within ± 200 r.p.m. (transient variations of ± 1000 r.p.m. are permissible). Rating takeoff: 858 hp - 33,500 r.p.m. (5 min.) (limited to 562 hp by engine gear box) Rating maximum continuous: 690 hp - 33,500 r.p.m. (limited to 542 hp by engine gear box)) at sea level standard conditions of) 59° F., 29.92 in.Hg Maximum tailpipe temperature Takeoff power (5 min.) : 550°C Maximum continuous power : 500°C
Transmission Limits	Maximum takeoff power : 592 hp Maximum continuous power : 494 hp
Helicopter Limits	Maximum takeoff power : 562 hp Maximum continuous power : 494 hp
Rotor Limits	Maximum speed : 420 r.p.m. Minimum speed : 270 r.p.m. Constant speed, power-on flight : 353.2 r.p.m.
Airspeed Limits	For CG location between (108.6) and (118.1): 113 knots For CG location between (118.1) and (124.0): 108 knots See Helicopter Flight Manual for variation of VNE with weight and altitude.
C.G. Range	Longitudinal (108.6) to (118.1) (118.1) to (124.0) with airspeed restriction per "Airspeed Limits" above and for weights below 3860 lb. Lateral LH limit (5.3) RH limit (1.7)
Maximum Weight	4300 lb. with internal load. 5070 lb. with external load. Maximum permissible weight on sling: 2200 lb.
Number of Seats	5 - Pilot and one front passenger (52.80), plus three rear passengers (84.10).
Maximum Baggage	See Helicopter Flight Manual.
Fuel Capacity	149 U.S. Gal. (120) - Usable 146 U.S. Gal. Total tank capacity: 157 U.S. Gal. (See NOTE 1 for data on unusable fuel).
Oil Capacity	Total capacity 2.6 U.S. Gal. at 141.5. (See NOTE 1 for data on undrainable oil).
NOTE A	The "Siren" cargo swing and "Air Equipment" rescue hoist to Aerospatiale Drawing Nos. 315A73.10.100 (cargo swing) and 315A73-02.100 (rescue hoist) are approved for special-purpose operation in accordance with limitations contained in the Helicopter Flight Manual.

IV. - Model SA319B Alouette III, approved 20 November 1972.

Engine	One - Turbomeca Astazou XIVB.
Fuel and Engine Oil	See data pertinent to all models.
Engine Limits	Maximum speed: 43,000 r.p.m. true held constant by governor within ± 200 r.p.m. (transient variation of ± 1500 r.p.m. are permissible). Rating takeoff: 858 hp - 43,000 r.p.m. (5 min.)) (limited to 592 hp by engine gear box)) at sea level) standard Rating maximum continuous: 770 hp - 43,000 r.p.m.) conditions of (limited to 542 hp by engine gear box)) 59° F., 29.92 in.Hg Maximum tailpipe temperature Maximum takeoff (5 min.) : 520°C Maximum continuous power : 470°C
Transmission Limits	Maximum takeoff power : 592 hp Maximum continuous power : 494 hp
Helicopter Limits	Maximum takeoff power : 592 hp Maximum continuous power : 494 hp
Rotor Limits	Maximum speed : 420 r.p.m. Minimum speed : 270 r.p.m. Constant speed, power on flight : 358 r.p.m.
Airspeed Limits	For CG location between (109.4) and (121.2): 118 knots For CG location between (121.2) and (124.0): 108 knots See Helicopter Flight Manual for variation of V_{NE} with weight and altitude.
C.G. Range	Longitudinal (109.4) to (121.2) (121.2) to (124.0) with airspeed restriction (See above "Airspeed Limits") Lateral LH limit (5.5) RH limit (4.7)
Maximum Weight	4,960 lb.
Number of Seats	7 - Pilot and two front passengers (54.5), plus four rear passengers (86.4).
Maximum Baggage	See Helicopter Flight Manual.
Total Fuel Capacity	149 U.S. Gal. (123.2) - Usable 146 U.S. Gal. (See NOTE 1 for data on unusable fuel).
Oil Capacity	Total capacity 2.6 U.S. Gal. at 153. (See NOTE 1 for data on undrainable oil).
Rotor Blade Movements	For rigging information, refer to the Alouette III SA319B Maintenance Manual.
NOTE A	The "Siren" cargo swing, cargo sling and "Air Equipment" rescue hoist to "Aerospatiale" Drawings. 319A-73.06.500 and 319A-73.06.510 (cargo swing) 319A-73.06.000 and 319A-73.06.010 (cargo sling) and 319A-73.38.005 and 319A-73.38.000 (rescue hoist) are approved for operation in accordance with limitations contained in the Helicopter Flight Manual.
NOTE B	To convert the Model SA316B Alouette III to the Model SA319B Alouette III the appropriate modifications listed in the Aerospatiale Technical Note SA319A.04.00.025 must be applied.

V. - Model SA316C Alouette III, approved 20 November 1972.

Engine	One - Turbomeca Artouste IIID.
Fuel and Engine Oil	See data pertinent to all models.
Engine Limits	Maximum speed: 33,500 r.p.m. true held constant by governor within ± 200 r.p.m. (transient variations of ± 1000 r.p.m. are permissible). Rating takeoff: 858 hp - 33,500 r.p.m. (5 min.)) (limited to 592 hp by engine gear box)) at sea level) standard Rating maximum continuous: 690 hp - 33,500 r.p.m.) conditions of (limited to 542 hp by engine gear box)) 29.92 in.Hg Maximum tailpipe temperature Maximum takeoff (5 min.) : 550°C Maximum continuous tsail : 500°C
Transmission Limits	Maximum takeoff power : 592 hp Maximum continuous power : 494 hp
Helicopter Limits	Maximum takeoff power : 592 hp Maximum continuous power : 494 hp
Rotor Limits	Maximum speed : 420 r.p.m. Minimum speed : 270 r.p.m. Constant speed, power-on flight : 358 r.p.m.
Airspeed Limits	For CG location between (109.4) and (121.2): 118 knots For CG location between (121.2) and (124.0): 108 knots See Helicopter Flight Manual for variation of VNE with weight and altitude.
C.G. Range	Longitudinal (109.4) to (121.2) (121.2) to (124.0) with airspeed restriction (See above "Airspeed Limits") Lateral LH limit (5.5) RH limit (4.7)
Maximum Weight	4,960 lb.
Number of Seats	7 - Pilot and two passengers (54.5), four rear passengers (86.4).
Maximum Baggage	See Helicopter Flight Manual.
Total Fuel Capacity	149 U.S. Gal. (123.2) - Usable 146 U.S. Gal. (See NOTE 1 for data on unusable fuel)
Oil Capacity	Total capacity 2.6 U.S. Gal. at 128. (See NOTE 1 for data on undrainable oil).
Rotor Blade Movements	For rigging information, refer to the SA316C Alouette III Maintenance Manual.
NOTE A	The "Siren" cargo swing, cargo sling and "Air Equipment" rescue hoist to "Aerospatiale" Drawings. 319A-73.06.500 and 319A-73.06.510 (cargo swing) 319A-73.06.000 and 319A-73.06.010 (cargo sling) and 319A-73.38.005 and 319A-73.38.010 (rescue hoist) are approved for operation in accordance with limitations contained in the Helicopter Flight Manual.

NOTE B To convert the Model SA316B Alouette III to the Model SA316C Alouette III the appropriate modifications listed in the Aerospatiale Technical Note SA319A.04.00.025 must be applied.

DATA PERTINENT TO ALL MODELS.

Fuel

Normal Fuels, Unrestricted

SPECIFICATIONS				REMARKS
French	U.S.A.	British	NATO	
Aviation Fuels AIR 3405 (TRO)		D. Eng. RD 2453 AVTUR FS II	F34	
	ASTMJet A			
	ASTMJet A1	D.Eng. RD 2494 AVTUR	F35	
Aviation Fuels AIR 3407 (TR4)	MIL-T-5624 (JP.4)	D.Eng. RD 2454 AVTAG FS II	F40	
	ASTMJet B	D.Eng. RD 2486 AVTAG	F45	
			F42	
Aviation Fuels AIR 3404 (TR5)	MIL-T-5624 (JP.5)	D.Eng. RD 2498 AVCAT	F44	

Note a: Refer to current issues and amendments.

Note b: The use of an approved anti-icing additive is recommended, if none is contained in the fuel, at OAT below O°C.

Note c: The following fuel additives are approved for use:
Anti-icing additive: AIR 3652, NATO.S.748, MIL.I.27686,
D.Eng. RD 2451 (each is eligible up to .15% in volume, with or without glycerine).
Anti-static additive: SHELL ASA.3, (up to .0001% in volume).

Fuels Subjected to Restrictions on Use.

SPECIFICATIONS				RESTRICTIONS
French	U.S.A.	British	NATO	
Gasoline	MIL-G-5572 (Grade 80/87) (Grade 100/130)		F12	Maximum operation time on gasoline during any period between overhauls: 25 hrs.
		D.Eng. RD 2485	F18	
AIR 3401	(Grade 115/145)		F22	Add 1 to 2% of lubricating oil by volume (mineral oil if possible)
Automotive Gasoline DCEA/2D MT 80	MIL-G-3056	DEF 2401	F46	
Automotive Diesel Oil DCEA/21 C	VVF 800 DF2	TS.10.003	F54	Not to be used at OAT below -5° C
	VVF 800 DF1			Not to be used at OAT below - 15°C
	VVF 800 DFA		F56	
Gasoil O 7120 STM	MIL-F-16884	DEF 2402 (47/0 DIESO)	F75	Not to be used at OAT below -5°C
Gasoil 20 7120STM		DEF 2402 (47/20 DIESO)	F76	Not to be used at OAT below 0°C
Illuminating Oil DCEA/11C	VV-K211	DEF 2403	F58	Not to be used at OAT below - 15°C

Engine Lubricating Oil

SPECIFICATIONS (Latest Amendment)					Remarks
	French	NATO	U.S.A.	British	
Normal	AIR 3513	0.148	MIL.l.7808		Synthetic Oil
	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		Synthetic oil

CAUTION: The mixing of oils AIR 3513 and 3515 is not permitted. The system should be flushed when changing from one type to the other.

Datum

Longitudinal: 118.1 in. forward of rotor hub center
Lateral: Plane of symmetry of rotorcraft.

Leveling Means

Four leveling lugs, vertical tubes of body structure, two at the front and two at the rear.

Rotor Blade Movements

For rigging information, refer to the Alouette III Maintenance Manual.

Serial Nos. Eligible

The French Government "Certificat de Navigabilite pour Exportation" endorsed as noted under "Import Requirements" must be submitted for each individual helicopter for which application for certification is made. For applications for Standard Airworthiness Certificates made after May1, 2004, a review of historical records is needed to determine if the helicopter was delivered to and operated by the military. If the helicopter has military history, the helicopter is not eligible for a Standard Airworthiness Certificate unless a copy of a Standard Airworthiness Certificate issued at the time of delivery to the military is submitted.

Import Requirements

A U.S. Airworthiness Certificate may be issued on the basis of a "Certificat de Navigabilite pour Exportation" signed by a representative of the Secretariat General a l'Aviation Civile and containing the following statement:

"The helicopter covered by this certificate has been examined, tested, and found to conform to the type design approved under FAA Type Certificate No. H1IN, and to be in a condition for safe operation."

Certification Basis

CAR I0 (FAR 21.29) CAR 6, 20 December 1956, plus Amendments 6.1 through 6.4 and Special Requirements notified to the French Government by the U.S. Government, in letters dated 3 May 1960 and 13 September 1961.
Type Certificate No. H1IN issued 27 March 1962 for the SE.3160 Alouette III.
Type Certificate No. H1IN, amended 25 March 1971 to add the SA.316B Alouette III.
Type Certificate No. H1IN, amended 25 February 1972 to add the SA.315B Alouette III.
Type Certificate No. H1IN, amended 20 November 1972 to add the SA.319B Alouette III and the SA.316C Alouette III.
Date of Application for Type Certificate: 28 July 1961.

Service Information

Aerospatiale Service Bulletins are approved by SGAC and include a statement to that effect.

Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (See Certification Basis) must be installed in the aircraft for certification. In addition, the following items of equipment are required:

SGAC-approved Helicopter Flight Manual (English language version).
Ambient air temperature gauge.

NOTES

NOTE I Current weight and balance report, including loading instructions and list of equipment included in the certificated empty weight, must be provided for each helicopter at the time of original certification. In order to obtain the most consistent weight and balance results, all helicopters should be weighed on jackpoints rather than on wheels and floats. When changes are made to the helicopter which affect the weight and balance, refer to the Flight Manual for instructions.

The certificated empty weight and corresponding center of gravity locations must include unusable fuel of 18 lb. (120.8), and undrainable oil of 1.5 lb. (138.6).

NOTE 2 The following placard must be displayed in clear view of the pilot:

"THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE APPROVED FLIGHT MANUAL"

The other placards as indicated in the Helicopter Flight Manual must be installed in the appropriate location.

NOTE 3 Information essential to the proper maintenance of the helicopter is contained in the Manufacturer's Maintenance Manual provided with each helicopter. The retirement times of critical parts are listed in Chapter 5, approved by SGAC.

...END...

ISSUE 3a

FLIGHT MANUAL

FOR SE 3160 AND SA 316 B

ALOUETTE III HELICOPTERS

Printed in France

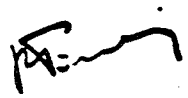
REGISTRATION N°

SERIAL N°

APPROVED BY M. TIERCELIN

DATE OF APPROVAL
SE 3160 : June 17, 1963
SA 316 B : March 17, 1970

DIRECTION DES TRANSPORTS AÉRIENS
SECRÉTARIAT GÉNÉRAL A L'AVIATION
CIVILE SGAC



This issue 3a supersedes all previous issues

THIS DOCUMENT MUST BE CARRIED ON BOARD AT ALL TIMES

Page amended March 17, 1970

S U D A V I A T I O N

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SE. 3160 / S.A. 316 B ALOUETTE III

MANUEL DE VOL
FLIGHT MANUAL

REVISION PROVISOIRE SPECIALE

SPECIAL PROVISIONAL AMENDMENT

N° 1
code : 1.76

OBJET :

Limitation de pas collectif et de masse décollable sur appareils SE 3160 et SA 316B

APPLICATION :

Tous appareils SE 3160 et SA 316B comportant une BTP type 3160 n'ayant pas reçu l'une des modifications AM 1749 ou AM 2017.

NOTA : L'application de ces modifications sera identifiée en accord avec le Service Bulletin Alouette n° 01.40

DIRECTIVES :

. Insérer ces pages en tête des manuels de vol des appareils concernés

. Supprimer ces pages des manuels après application sur l'appareil des modifications précitées.

SUBJECT:

Collective pitch and take off-weight limitation on SE3160 and SA 316B aircraft

EFFECTIVITY:

All SE 3160 and SA 316B aircraft fitted with 3160 type M.G.B's not embodying modification AM 1749 or AM 2017

NOTE : The embodiment of these modifications will be identified in accordance with Alouette Service Bulletin N° 01-40

INSTRUCTIONS :

Insert these pages at the front of the Flight Manuals of the aircraft concerned

Remove these pages from the manuals after embodiment on aircraft of the above mentioned modifications.

LIMITATIONS PARTICULIERES

Respecter impérativement les limitations données ci-après .

Afficher dans l'appareil bien en vue des pilotes les nouvelles limitations (photocopie des tableaux par exemple)

A. Limitations de pas

En vol stationnaire, en manoeuvres transitoires et en palier à vitesse maxi, respecter les valeurs de pas données ci-dessous.

SPECIAL LIMITATIONS

Observance of the following limitations is imperative.

Display the new limitations (photostat copy of charts, for example) in the aircraft, in a place where they can be easily seen by the pilots:

A. Pitch limitations

In hover, in transient manoeuvres, and in level flight at maximum speed, the following collective pitch values are not to be exceeded.

LIMITATIONS DE PAS EN VOL AVEC PUISSANCE
PITCH LIMIT IN POWER-ON FLIGHT

ALTITUDE-DENSITE DENSITY-ALTITUDE		MONTEE CLIMB	VOL STATIONNAIRE HOVER	MANOEUVRES TRANSITOIRES OU PALIERS A VITESSE MAXI. TRANSIENT MANOEUVRES OR LEVEL FLIGHT AT MAX. SPEED
Mètres	Feet			
-1000	-3300	0,70	0,67	0,72
0	0	0,75	0,72	0,77
1000	3300	0,80	0,77	0,82
2000	6600	0,85	0,82	0,87
3000	9900	0,90	0,87	0,92
4000	13200	0,95	0,92	0,97
5000	16500	1	0,97	1,02
ET/AND +				

Les pas de montée et de croisière restent inchangés

Pages du manuel de vol affectées par ces nouvelles limitations :

Page 1 - 7
ANNEXE 1 - Page 1 - 5

The climb and cruising flight pitch values remain unchanged.

Flight manual pages affected by these new limitations

Page 1 - 7
APPENDIX 1 - Page 1 - 5

B. Limitations de masse

Réduire les masses décollables dans l'effet de sol (D.E.S.) et hors effet de sol (H.E.S.) des valeurs suivantes, en fonction de l'altitude densité

B. Weight limitations

The permissibls take-of weight, both in ground effect (I.G.E.) and out of ground effect (O.G.E.) is reduced by an amount depending on density altitude as specified in the chart below :

DIMINUTION DES MASSES DECOLLABLES (D.E.S.) et (H.E.S.)
T.O.W. penalty I.G.E. and O.G.E.

Altitude-densité Density-Altitude		Diminution masses T.O.W. penalty	
Mètres	Feet	kg	Lb
0	0	105	231
1000	3300	95	209
2000	6600	86	190
3000	9900	78	172
4000	13200	70	154
5000	16500	63	139
6000	19800	0	0

Pages du manuel de vol affectées par ces nouvelles limitations :

Page : 3-16

Page : 3-17

Page : 3-18

Page : 3-19

NOTA : Il est rappelé que les appareils SA 316B non modifiés AM 1749 ou 2017 doivent être utilisés dans le domaine de masse du SE 3160 affecté de ces nouvelles limitations.

Pages of flight manuals affected by these new limitations :

Page : 3-16

Page : 3-17

Page : 3-18

Page : 3-19

NOTE : It is reminded that SA 316B aircraft not embodying AM 1749 and AM 2017 modifications must be operated within the SE 3160 weight envelope as modified by these new limitations

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SE. 3160 / S.A. 316 B ALOUETTE III

MANUEL DE VOL
FLIGHT MANUAL

REVISION PROVISOIRE SPECIALE

SPECIAL PROVISIONAL AMENDMENT

N° 2
Code 1.76

OBJET :

Limite provisoire d'altitude d'utilisation

APPLICATION :

Tous appareils SE 3160 et SA 316B équipés d'amortisseurs de trainée réf : 3130S.13.60.000 (tous indices)

DIRECTIVES :

Insérer ces pages en tête des manuels de vol des appareils concernés.

Supprimer ces pages des manuels après remplacement des amortisseurs précités.

SUBJET :

Operating altitude - temporary limit

EFFECTIVITY

All SE 3160 and SA 316B aircraft fitted with drag dampers.
P/N : 3130S-13-000 (any dash numbers)

INSTRUCTIONS

Insert these pages at the front of the Flight Manual of all aircraft concerned

Remove these pages from the manual when dampers identified by the above mentioned part number are replaced by a differnt type.

LIMITATION PROVISOIRE

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

  réf. 3130S.13.60.000 -

  (Tous indices)

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

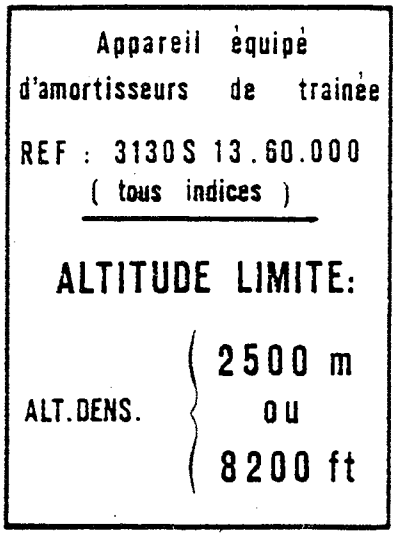
TEMPORARY LIMITATION

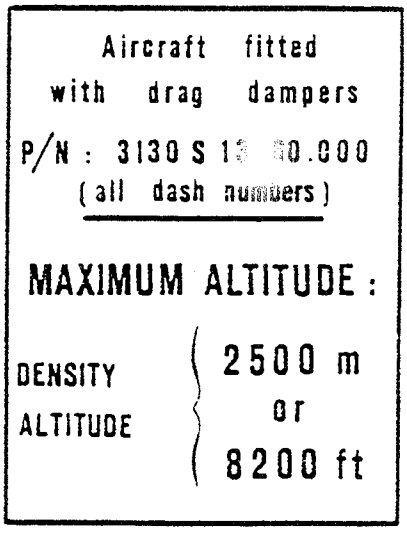
- The operating altitude is limited temporarily to 2500 m (or 8200 ft) (density altitude) for aircraft fitted with drag dampers :

P/N 3130S.13 60.000

(all dash numbers)

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





Pages du manuel de vol affectées par cette limitation :

Page : 1.11 parag. 1.9.1

Flight manual pages affected by this limitation :

Page : 1-11 paragraph 1-9-1

eurocopter

AIRCRAFT PUBLICATION REVISION

PUBLICATION CONCERNED : FLIGHT MANUAL 3160 - 316 B

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

OUTLINE OF THE REVISION	Section Pages
Incorporation of RR 22B	2 - 2.10 *RR*

EUROCOPTER

SE. 3160 ALOUETTE III

FLIGHT MANUAL

After incorporation of revision 21 this publication should contain the following pages (For pages affected by revision 21, refer to page ie)

Title page		March 17,	1970	Page	2-1.13	March 16,	1965
Page	A1	Oct.	1995	"	2-1.14	March 8,	1973
"	A2	Oct.	1995	"	2-1.15	Sept.	1980
"	A3	Oct.	1995	"	2-1.16	March 8,	1973
"	A4	Dec.	1993	"	2-1.16a	Dec.	1993
Page	i	Dec. 1,	1967	"	2-1.17	March 8,	1973
"	ia	May 6,	1969	"	2-1.18	March 8,	1973
"	ib	March 24,	1972	"	2-1.19	March 16,	1965
"	ic	Jan.	1976	"	2-1.20	Dec.	1993
"	id	Oct.	1981	"	2-1.21	March 16,	1965
"	ie	Oct.	1995	"	2-1.22a	Sept.	1980
"	ii	June 17,	1963	"	2-1.22b	March 24,	1972
Page	01	Nov. 24,	1970	"	2-1.22c	March 24,	1972
"	02	Nov. 24,	1970	"	2-1.23	July 26,	1968
"	1-1	Sept.	1980	"	2-1.25	March 16,	1965
"	1-2	Oct.	1981	"	2-1.26	March 16,	1965
"	1-3	Dec.	1993	"	2-1.27	March 16,	1965
"	1-4	March 8,	1973	"	2-1.28	March 16,	1965
"	1-5	Sept.	1980	"	2-1.29	March 16,	1965
"	1-6	Sept.	1980	"	2-1.30	July 26,	1968
"	1-6a	March 8,	1973	"	2-1.31	March 16,	1965
"	1-7	March 16,	1965	"	2-1.32	March 16,	1965
"	1-8	March 24,	1972	"	2-1.33	July 26,	1968
"	1-9	March 8,	1973	"	2-1.34	July 26,	1968
"	1-10	March 8,	1973	"	2-1.35	May 6,	1969
"	1-11	Jan.	1976	"	2-1.36	July 26,	1968
"	1-12	March 8,	1973	"	2-1.37	July 26,	1968
"	1-13	Feb. 28,	1974	"	2-1.38	July 26,	1968
"	1-14	March 8,	1973	"	2-1.39	July 26,	1968
"	1-14a	March 8,	1973	"	2-1.40	July 26,	1968
"	1-15	Oct.	1981	"	2-2.1	Dec.	1993
"	1-16	Oct.	1995	"	2-2.3	July 26,	1968
"	1-17	Oct.	1995	"	2-2.4	Nov. 24,	1970
"	2-1	July 26,	1968	"	2-2.5	Nov. 24,	1970
"	2-1.1	Oct.	1995	"	2-2.6	July 26,	1968
"	2-1.2	March 24,	1972	"	2-2.7	Sept.	1980
"	2-1.3	June 17,	1963	"	2-2.8	March 24,	1972
"	2-1.4	July 26,	1968	"	2-2.9	March 24,	1972
"	2-1.5	July 26,	1968	"	2-2.10	Oct.	1995
"	2-1.6	July 26,	1968	"	2-2.11	Oct.	1995
"	2-1.7	Dec.	1993	"	2-2.12	Oct.	1995
"	2-1.8	July 26,	1968	"	2-2.13	Dec.	1993
"	2-1.9	Oct.	1995	"	2-2.14	Dec.	1993
"	2-1.10	Sept.	1980	"	2-2.15	Dec.	1993
"	2-1.11a	Sept.	1980	"	2-2.16	Dec.	1993
"	2-1.11b	Sept.	1980	"	2-2.17	March 8,	1973
"	2-1.11c	Sept.	1980	"	2-2.18	March 8,	1973
"	2-1.12	Oct.	1995	"	2-2.19	Dec.	1993
"	2-1.12a	Oct.	1995				

Page	2-3.1	July 26, 1968	Page	2-4.1	March 17, 1970
"	2-3.2	Dec. 1993	"	2-4.3	June 17, 1963
"	2-3.3	June 17, 1963	"	2-4.4	June 17, 1963
"	2-3.4	June 17, 1963	"	2-4.5	June 17, 1963
"	2-3.5	June 17, 1963	"	2-4.6	June 17, 1963
"	2-3.6	June 17, 1963	"	2-4.7	July 26, 1968
"	2-3.7	March 16, 1965	"	2-4.8	July 26, 1968
"	2-3.8	June 17, 1963	"	2-4.9	March 17, 1970
"	2-3.9	June 17, 1963	"	2-5.1	Sept. 1980
"	2-3.10	June 17, 1963	"	2-5.2	Oct. 1995
"	2-3.11	June 17, 1963	"	2-5.3	Feb. 28, 1974
"	2-3.12	March 16, 1965	"	2-5.4	Feb. 28, 1974
"	2-3.13	June 17, 1963	"	2-5.5	Feb. 28, 1974
"	2-3.14	March 16, 1965	"	2-5.6	Feb. 28, 1974
"	2-3.15	July 26, 1968	"	2-5.7	June 17, 1963
"	2-3.16	May 6, 1969	"	2-5.8	June 17, 1963
"	2-3.17	July 26, 1968	"	2-5.9	June 17, 1963
"	2-3.18	June 17, 1963	"	2-5.10	June 17, 1963
"	2-3.19	July 26, 1968	"	2-5.11	March 16, 1965
"	2-3.20	March 16, 1965	"	2-5.12	June 17, 1963
"	2-3.21	March 16, 1965	"	2-5.13	July 26, 1968
"	2-3.22	July 26, 1968	"	2-5.14	Sept. 1980
"	2-3.23	July 26, 1968	"	2-5.15	Sept. 1980
"	2-3.24	Feb. 28, 1974	"	2-5.16	Dec. 1993
"	2-3.25	July 26, 1968	"	2-5.17	Oct. 1995
"	2-3.26	July 26, 1968	"	2-5.18	Oct. 1995
"	2-3.27	July 26, 1968	"	2-5.19	Oct. 1995
"	2-3.28	July 26, 1968	"	2-5.20	Oct. 1995
"	2-3.29	July 26, 1968	"	2-5.21	Oct. 1995
"	2-3.30	July 26, 1968	"	2-5.22	Oct. 1995
"	2-3.31	July 26, 1968	"	2-5.23	Oct. 1995
"	2-3.32	Sept. 1980	"	2-5.24	Oct. 1995
"	2-3.33	Sept. 1980	"	2-6.1	July 26, 1968
"	2-3.34	July 26, 1968	"	2-6.3	March 8 1973
"	2-3.35	Feb. 28, 1974	"	2-6.4	July 26, 1968
"	2-3.36	July 26, 1968	"	2-6.5	Feb. 28, 1974
"	2-3.37	Dec. 1, 1967	"	2-6.6	July 26, 1968
"	2-3.38	Dec. 1, 1967	"	2-6.7	March 8, 1973
"	2-3.39	Dec. 1, 1967	"	2-6.8	July 26, 1968
"	2-3.40	Dec. 1, 1967	"	2-6.9	July 26, 1968
"	2-3.41	July 26, 1968	"	2-6.10	July 26, 1968
"	2-3.42	May 6, 1969	"	2-6.11	Feb. 28, 1974
"	2-3.43	May 6, 1969	"	2-6.12	March 8, 1973
"	2-3.44	Oct. 1981	"	2-6.13	July 26, 1968
"	2-3.45	Oct. 1981	"	2-6.14	July 26, 1968
"	2-3.46	March 24, 1972	"	2-6.15	March 8, 1973
"	2-3.47	March 24, 1972	"	2-6.16	March 17, 1970
"	2-3.48	March 24, 1972	"	2-6.17	July 26, 1968
"	2-3.49	Feb. 28, 1974			
"	2-3.50	Sept. 1980			

Page	3-1	Dec.	1993	Page	4-17a	March 17,	1970
"	3-2	Oct.	1995	"	4-17b	March 17,	1970
"	3-3	Oct.	1995	"	4-18a	May 6,	1969
"	3-3a	Oct.	1981	"	4-18b	May 6,	1969
"	3-4	Dec. 1,	1967	"	4-19a	Sept.	1980
"	3-5	June 17,	1963	"	4-19b	May 6,	1969
"	3-6	Sept.	1980	"	4-20a	March 17,	1970
"	3-7	Sept.	1980	"	4-20b	March 17,	1970
"	3-8	July 4,	1963	"	4-21a	March 17,	1970
"	3-9	Dec. 1,	1967	"	4-21b	March 17,	1970
"	3-10	June 17,	1963	"	4-22a	May 6,	1969
"	3-11	Dec. 1,	1967	"	4-22b	May 6,	1969
"	3-12	Dec. 1,	1967	"	4-23a	March 17,	1970
"	3-13	June 17,	1963	"	4-23a1	March 17,	1970
	3-14	June 17,	1963	"	4-23b	March 17,	1970
	3-15	June 17,	1963	"	4-23b1	March 17,	1970
"	3-16	Feb. 28,	1974	"	4-24a	May 6,	1969
"	3-17	Feb. 28,	1974	"	4-24b	May 6,	1969
"	3-18	Feb. 28,	1974	"	4-25a	March 17,	1970
"	3-19	Feb. 28,	1974	"	4-25b	March 17,	1970
"	3-20	June 17,	1963	"	4-26a	March 17,	1970
"	3-21	June 17,	1963	"	4-26b	March 17,	1970
"	3-22	June 17,	1963	"	4-27a	March 17,	1970
"	3-23	June 17,	1963	"	4-27b	March 17,	1970
"	3-24	Dec. 1,	1967	"	4-28a	March 17,	1970
"	3-25	July 4,	1963	"	4-28b	March 17,	1970
"	4-1	May 6,	1969	"	4-29a	Feb. 28,	1974
"	4-3	Feb. 28,	1974	"	4-29b	Feb. 28,	1974
"	4-4	June 17,	1963	"	4-29c	Sept.	1980
"	4-5	July 26,	1968	"	4-29d	Sept.	1980
"	4-6	July 26,	1968	"	4-30a	May 6,	1969
"	4-7	July 26,	1968	"	4-30b	May 6,	1969
"	4-8a	July 26,	1968	"	4-31a	Oct.	1981
"	4-8b	July 26,	1968	"	4-31b	Oct.	1981
"	4-9a	July 26,	1968	"	4-31c	Feb. 28,	1974
"	4-9b	July 26,	1968	"	4-31d	Feb. 28,	1974
"	4-10a	July 26,	1968	"	4-31e	Sept.	1980
"	4-10a1	Oct.	1981	"	4-31f	Sept.	1980
"	4-10b	July 26,	1968	"	4-32a	May 6,	1969
"	4-10b1	Oct.	1981	"	4-32b	May 6,	1969
"	4-11a	July 26,	1968	"	4-33a	May 6,	1969
"	4-11b	Feb. 28,	1974	"	4-33b	May 6,	1969
"	4-12a	Sept.	1980	"	4-34a	May 6,	1969
"	4-12b	Sept.	1980	"	4-34b	May 6,	1969
"	4-13a	May 6,	1969	"	4-35a	May 6,	1969
"	4-13b	May 6,	1969	"	4-35b	May 6,	1969
"	4-14a	Oct.	1981	"	4-36a	May 6,	1969
"	4-14b	Oct.	1981	"	4-36b	May 6,	1969
"	4-15a	May 6,	1969	"	4-37a	Sept.	1980
"	4-15b	May 6,	1969	"	4-37b	Sept.	1980
"	4-16a	March 17,	1970	"	4-38a	Sept.	1980
"	4-16a1	March 17,	1970	"	4-38b	Sept.	1980
"	4-16b	March 17,	1970				
"	4-16b1	March 17,	1970				

APPENDIX 1

Page	0.1	Jan.	1976
"	1.1	March 24,	1972
"	1.2	Dec.	1993
"	1.3	March 8,	1973
"	1.4	March 8,	1973
"	1.5	March 8,	1973
"	1.6	March 24,	1972
"	1.7	March 24,	1972
"	1.8	Oct.	1981
"	2.1	Nov. 24,	1970
"	2.2	March 8,	1973
"	2.3	Feb. 28,	1974
"	2.4	Nov. 24,	1970
"	3.1	Dec.	1993
"	3.2	March 17,	1970
"	3.3	March 17,	1970
"	3.4	Sept.	1980
"	3.5	Sept.	1980
"	3.6	March 17,	1970
"	3.7	March 17,	1970
"	3.8	March 17,	1970
"	3.9	March 17,	1970
"	3.10	March 17,	1970
"	3.11	March 17,	1970
"	3.12	March 17,	1970
"	3.13	March 17,	1970
"	3.14	Oct.	1981
"	3.15	Oct.	1981
"	3.16	Oct.	1981
"	3.17	Oct.	1981
"	3.18	Oct.	1981
"	3.19	Oct.	1981
"	3.20	Oct.	1981
"	3.21	Oct.	1981
"	3.22	Oct.	1981
"	3.23	Oct.	1981
"	3.24	Oct.	1981
"	3.25	Oct.	1981
"	3.26	Oct.	1981
"	3.27	Oct.	1981
"	3.28	Oct.	1981
"	3.29	Oct.	1981
"	3.30	Oct.	1981
"	3.31	Oct.	1981
"	3.32	Oct.	1981
"	3.33	Oct.	1981

SUD AVIATION

SE. 3160 ALOUETTE III

FLIGHT MANUAL

NOTE : 1. All revised pages show a revision date, and a vertical bar is placed along the margin to indicate the latest revised portion of each page.

2. This manual will, if necessary, be supplemented by instructions issued in the form of SUD SERVICE bulletins no less mandatory than the manual itself.

Révision N°	Revised page numbers	Date	SGAC approved
1	i, 1-2, 1-8, 1-11, 1-15, 2-1.1, 2-1.4a (new), 2-1.9, 2-1.10, 2-1.14, 2-1.15, 2-1.16, 2-1.22, 2-1.23, 2-1.24, 2-1.24a (new), 2-2.1, 2-2.8, 2-2.10, 2-2.16 (new), 2-3.2, 2-3.27, 2-3.28 (new), 2-5.1, 2-5.4, 2-5.6, 3-3, 3-8 3-9, 3-24 through 3-25 (new), 4-12, 4-13.	July 4, 1963	
2	i, 1-2, 1-7, 1-10, 1-11. 1-12, 1-15, 2-1.1, 2-1.2, 2-1.4, 2-1.4a (cancelled), 2-1.5, 2-1.6, 2-1.7, 2-1.8, 2-1.9, 2-1.10, 2-1.11, 2-1.12, 2-1.12a (new), 2-1.13, 2-1.14, 2-1.15, 2-1.16, 2-1.17, 2-1.18, 2-1.19, 2-1.20, 2-1.21, 2-1.22, 2-1.23, 2-1.24, 2-1.25, 2-1.26, 2-1.27, 2-1.28, 2-1.29, 2-1.30, 2-1.31, 2-1.32, 2-1.33, 2-1.34 through 2-1.39 (new), 2-2.1, 2-2.4, 2-2.6, 2-2.7 2-2.8, 2-2.9, 2-2.10, 2-2.11, 2-2.12, 2-2.13, 2-2.14, 2-2.15, 2-2.16, 2-2.17 and 2-2.18 (new), 2-3.2, 2-3.7, 2-3.12, 2-3.14, 2-3.15, 2-3.19, 2-3.20, 2-3.21, 2-3.22, 2-3.23, 2-3.24, 2-3.25, 2-3.26, 2-3.27, 2-3.28, 2-3.29 through 2-3.34 (new), 2-4.8, 2-5.4, 2-5.6, 2-5.11, 2-5.14, 2-5.16, 4-5, 4-6, 4-7, 4-12, 4-13, 4-14, 4-15, 4-16, 4-17, 4-18, 4-19, 4-20 and 4-21 (new).	March 16, 1965	
6	Revision 2 of this manual corresponds to Revision 5 of the Alouette III Flight Manual in French. i, A1 and A2 new, 1-8, 1-11, 1-15, 2-2.7, 2-2.12, 2-2.13, 2-3.22, 2-3.24, 2-3.25, 2-5.15, 2-5.16, 3-3. (This revision cancels temporary revision 6 dated May 6, 1965).	October 25, 1965	
7	**Temporary revision A incorporated :** i temporary, 1-8a, 1-9a, 1-10a, 2-2.14a, 2-4.8a, 3-4a, 3-6a, 3-11a, 3-12a, 3-24a, cancelled. **Temporary revision B incorporated :** ii temporary, 2-1.5a, 2-1.14a, 2-1.20a, 2-2.4a, 2-2.10a, 2-2.12a, 2-2.14a, 2-5.5a, 2-5.6a, 3-9a cancelled.	December 1 1967	

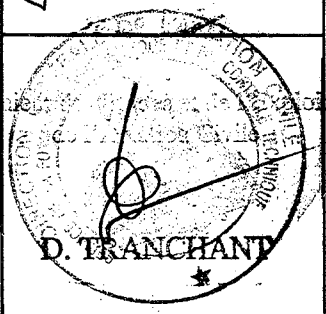
Printed in France

Revision N°	Revised page numbers	Date	SGAC approved
7 (cont.)	i, ia new, A1, A2, A3 new, 1-2, 1-8, 1-9, 1-10, 1-11, 1-14, 1-15, 1-16 new, 2-1.5, 2-1.14, 2-1.20, 2-2.4, 2-2.5, 2-2.10, 2-2.12, 2-2.14, 2-3.2, 2-3.35 to 2-3.41 new, 2-4.8, 2-5.1, 2-5.6, 2-5.17 to 2-5.19 new, 3-4, 3-6, 3-9, 3-11, 3-12, 3-24, 4-1, 4-3, 4-6, 4-8 to 4-21, 4-22 to 4-41 new.	December 1, 1967	
8	ia, A1, A2, A3, 1-1, 1-2, 1-9, 1-11, 1-13 to 1-16, 2-1, 2-1.4 to 2-1.9, 2-1.15, 2-1.20 2-1.23, 2-1.24, 2-1.30, 2-1.33 to 2-1.39, 2-1.40 new, 2-2.1, 2-2.3, 2-2.4, 2-2.5, 2-2.6, 2-2.9 to 2-2.14, 2-3.1, 2-3.2, 2-3.15 to 2-3.17, 2-3.19, 2-3.22 to 2-3.34, 2-3.36, 2-3.41, 2-4.7, 2-4.8, 2-4.9, 2-5.1, 2-5.2 new, 2-5.5, 2-5.13, 2-5.16, 2-5.17, 2-5.18, 2-6.1 new, 2-6.3 to 2-6.17 new, 3-3, 4-1, 4-3, 4-5, 4-6, 4-7, 4-8 to 4-35 cancelled, 4-8a and 4-8b new, 4-9a and 4-9b new, 4-10a and 4-10b new, 4-11a and 4-11b new, 4-12a to 4-12f new, 4-13a to 4-13h new, 4-14a to 4-14n new, 4-15a and 4-15b new, 4-16a to 4-16f new, 4-17a to 4-17f new, 4-37, 4-39, 4-41.	July 26, 1968	
9	Temporary revision 9A incorporated : Pages : i temporary, 2-2.15a cancelled. ia, A1 to A3, 2-1.35, 2-2.15, 2-3.2, 2-3.16, 2-3.42 to 2-3.44 new, 4-1, 4-12c to 4-12f cancelled, 4-13a, 4-13b, 4-13c to 4-13h cancelled, 4-14a, 4-14b, 4-14c to 4-14n cancelled, 4-15a, 4-15b, 4-16a, 4-16b, 4-16c to 4-16f cancelled, 4-17a, 4-17b, 4-17c to 4-17f cancelled, 4-18a and 4-18b new, 4-19a and 4-19b new, 4-20a and 4-20b new, 4-21a and 4-21b new, 4-22a and 4-22b new, 4-23a and 4-23b new, 4-24a and 4-24b new, 4-25a and 4-25b new, 4-26a and 4-26b new, 4-27a and 4-27b new, 4-28a and 4-28b new, 4-29a and 4-29b new, 4-30a and 4-30b new, 4-31a and 4-31b new, 4-32a and 4-32b new, 4-33a and 4-33b new, 4-34a and 4-34b new, 4-35a and 4-35b new, 4-36 cancelled, 4-36a and 4-36b new, 4-37 cancelled, 4-37a and 4-37b new, 4-38 to 4-41 cancelled.		L'Ingénieur en Chef de l'Armement B. LATREILLE

Revision N°	Revised page numbers	Date	SGAC approved
10	Temporary revision 10A incorporated Page i temporary, 2-6.16a cancelled Title page Pages A1, A2, A3, A4 new, ib new, 01 and 02 (new) 1.1, 1.3, 1.4, 2.1.20, 2.2.15, 2.2.16, 2.3.2, 2.3.44, 2.3.45 (new), 2.4.1, 2.4.9, 2.5.2, 2.5.20 (new), 2.6.16 - 4.16a, 4.16b, 4.16a1 and 4.16b1 (new) 4.17a, 4.17b, 4.20a, 4.20b, 4.21a, 4.21b, 4.23a, 4.23b, 4.23a1 and 4.23b1 (new), - 4.25a, 4.25b, 4.26a, 4.26b, 4.27a, 4.27b 4.28a, 4.28b.- Incorporation of appendix 1 (316B Al. III (4850 lb) including : APPENDIX 1 : pages 0.1, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8 - 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19.	March 17, 1970	This revision is identical with revision 10 of Al. III Flight Manual (French issue approved by the SGAC on April 21,1970)
11	A1, A2, A3, ib, 1-1, 1-10, 3-1, 3-2 (new), APPENDIX 1 : pages 0-1, 1-1, 1-8, 3-1	Le Technicien Chef de Travaux TRANSPORT 13, 1970 J. MASCARD	
12	A1, A3, ib, 0.1, 0.2, 1.3 to 1.6, 1.12, 1.13, 1.14, 1.16, 2-2.4, 2-2.5, 2-2.11 APPENDIX 1 pages 0.1, 1.2, 1.3, 1.4 to 1.8, 2.1 (new), 2.2 (new), 2.3 (new), 2.4 (new).	Le Technicien Chef de Travaux November 24, 1970 J. MASCARD	
13	A1, A2, A3, ib, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-8, 1-9, 1-11, 1-13, 1-14, 1-15, 1-16, 2-1.1, 2-1.2, 2-1.11(cancelled), 2-1.11a(new), 2-1.11b(new), 2-1.11c(new), 2-1.20, 2-1.22a (new), 2-1.22b(new), 2-1.22c(new), 2-1.24 (cancelled), 2-2.7, 2-2.8, 2-2.9, 2-2.10, 2-2.13, 2-2.15, 2-3.2, 2-3.32, 2-3.35, 2-3.46 (new), 2-3.47(new), 2-3.48 (new), 2-5.17, 2-5.18, 2-5.20, 4-31a, 4-31b, 4-31c (new), 4-31d (new). APPENDIX 1 : Pages 0-1, 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8.	March 24 1972	

Revision N°	Revised page numbers	Date	SGAC Approved
14	Not applicable, does not affect this manual.		
15	A1, A2, A3, ic (new), 1-1, 1-3, 1-4, 1-5, 1-6, 1-6a, 1-9, 1-10, 1-12, 1-13, 1-14, 1-14a (new), 2-1.1, 2-1.14, 2-1.16, 2-1.16a (new), 2-1.17, 2-1.18, 2-2.10, 2-2.11, 2-2.12, 2-2.13, 2-2.14, 2-2.15, 2-2.16, 2-2.17, 2-2.18, 2-5.2, 2-5.20, 2-6.3, 2-6.7, 2-6.12, 2-6.15, APPENDIX 1 : 0-1, 1-3, 1-4, 1-5, 1-8, 2-2 2-3, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25	March 8, 1973	L'Ingenieur de l'Armement A. RICHARD
16	A1, A2, A3, A4, ic, 1-2, 1-13, 1-16, 1-17 (new), 2-1.10, 2-1.11a, 2-1.11b, 2-1.11c, 2-1.12, 2-2.10, 2-3.2, 2-3.24, 2-3.35, 2-3.49 (new), 2-3.50 (new), 2-5.3, 2-5.4, 2-5.5, 2-5.6, 2-6.5, 2-6.11, 3-16, 3-17, 3-18, 3-19, 4-3, 4-11b, 4-29a, 4-29b, 4-29c (new), 4-29d (new) 4-31a, 4-31b, 4-31c, 4-31d, 4-31e (new), 4-31f (new). APPENDIX 1 : 2-3, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25.	Feb. 28, 1974	L'Ingenieur de l'Armement A. RICHARD
17	A1, A3, ic 1.11 APPENDIX 1 0-1 Remove the yellow pages introduced by temporary amendments 17A, 17B and 17C. Insert the pink pages relevant to Special temporary amendments N°1 and N°2 in the Flight Manual of aircraft affected	Jan. 1976	L'Ingenieur de l'Armement A. RICHARD

Revision N°	Revised page numbers	Date	DGAC Approved.
18	A1, A2, A3, A4, id, 1-1, 1-5, 1-6, 2-1.10 2-1.11a, 2-1.11b, 2-1.11c, 2-1.15, 2-1.16a, 2-1.22a, 2-2.7, 2-2.10, 2-3.32, 2-3.33, 2-3.50, 2-5.1, 2-5.2, 2-5.14, 2-5.15, 2-5.17, 2-5.17, 2-5.19, 2-5.21, 3-6, 3-7, 4-12a, 4-12b, 4-19a, 4-29c, 4-29d, 4-31e, 4-31f, 4-37a, 4-37b, 4-38a, 4-38b, APPENDIX 1 3-4, 3-5. - Remove the yellow pages introduced by temporary amendments 18 A and 18 B Insert the pink pages relevant to Special temporary amendments N° 1 and N° 2 in the Flight Manual of aircraft affected.	18 AOUT	1980 L'I.P.E.T.A. A
19	A1, A2, A3, A4, 1d, 1-2, 1-15, 2-2.15 2-3.44, 2-3.45, 3-1, 3-3, 3-3a, 4.10a1, 4.10b1, 4.14a, 4.14b, 4.31a, 4.31b, APPENDIX 2 1-8, 3-1, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 3.21, 3.22, 3.23, 3.24, 3.25, 3.26, 3.27, 3.28, 3.29, 3.30, 3.31, 3.32, 3.33. Insert the pink pages relevant to special temporary revisions N° 1 and N° 2 in the Flight Manual of aircraft affected.	Oct. 1981	

Revision N°	Revised page numbers	Date	DGAC Approved
20	A1, A2, A3, A4, ie (new), 1-3, 2-1.7, 2-1.16a, 2-1.20, 2-2.1, 2-2.10, 2-2.11, 2-2.12, 2-2.13, 2-2.14, 2-2.15, 2-2-16, 2-2.19 (new), 2-3.2, 2-5.2, 2-5.16, 2-5.20, 2-5.21, 2-5.22 (new), 3-1, 3-2, APPENDIX 1 : 1-2, 3-1. - **Remove the yellow pages introduced by temporary amendments 20 A and 20 B**	May 1994	
21	A1, A2, A3, ie, 1-16, 1-17, 2-1.1, 2-1.9, 2-1.12, 2-1.12a, 2-2.10, 2-2.11, 2-2.12, 2-5.2, 2-5.17, 2-5.18, 2-5.19, 2-5.20, 2-5.21, 2-5.22, 2-5.23 (new) 2-5.24 (new), 3-2, 3-3	October 1995	

CONTENTS

SGAC Approved
June 17, 1963

IMPORTANT NOTES

1 - AMENDMENT PROCEDURE

This manual will be brought up to date by incorporation of :

- normal periodic amendments (white sheets)
- provisional (urgent) amendments (yellow sheets)
- instructions issued in the form of SUD SERVICE bulletins

which must be closely followed by operators.

Printed in France

2 - HOW TO USE THE MANUAL

There are two versions of the ALOUETTE III helicopter.

SE 3160 - Flight at maximum weight of 2100 kg (4630 lb)
SA 316B - Flight at maximum weight of 2200 kg (4850 lb)

Appendix 1 includes sections 1, 2 and 3 as applicable to SA 316 B helicopters.

CONTENTS

CONTENTS OF

APPENDIX 1

SECTION 1 - LIMITATIONS

THE LIMITATIONS LAID DOWN IN THIS SECTION ARE IMPERATIVE.
THEY CONCERN ONLY SE 3160 HELICOPTERS.
FOR SA 316B HELICOPTERS, SEE "APPENDIX 1".

CONTENTS

Printed in France

COMPLIANCE WITH THESE LIMITATIONS IS MANDATORY

1.1. WEIGHT LIMITATIONS

- Maximum permissible weight : 2100 kg (4,630 lb)
- Minimum permissible weight : 1200 kg (2,645 lb)

1.2. CENTER OF GRAVITY LIMITS

- Longitudinal c.g.

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

- most forward : 2.78 m (109.45 in.) aft of datum
- most rearward : 3.08 m (121.25 in.) aft of datum
- most rearward* : 3.15 m (124.0 in.) aft of datum : permissible restriction (see para. 1.7)

* With the basic aircraft, this limit is attained only when the pilot is alone on board.

- Latéral c.g.

The datum is the aircraft center line.

- L.H. limit : 0.14 m (5.51 in.)
- R.H. limit : 0.12 m (4.72 in.)

1.3. POWER UNIT ("TURBOMECA" ARTOUSTE III-B or III B1 TURBO-SHAFT ENGINE)

NOTE : Installation of a TURBOMECA ARTOUSTE III B1 engine is autorized under the same conditions as those for the ARTOUSTE III B engine.

1.3.1. Engine speed

33,500 r.p.m. true held constant by governor within ± 200 r.p.m.
Transient variations of ± 1,000 r.p.m. are permissible when effecting rapid changes in collective-pitch.

1.3.2. Tail pipe temperature

MAXIMUM ON TAKE-OFF (5 minutes) : 550° C after application of AMS 1422
: 500° C before application of AMS 1422
MAXIMUM continuous : 500° C

1.3.3. Fuel

- With standard fuel tank (3160.S 51.20. 000.3)
  - Total capacity : 565 litres (149 US.gal.)
  - Usable fuel : 555 litres (146 US.gal.)

  When the fuel gauge pointer is below the red line, the fuel remaining in the tank cannot be used in flight.
- With four-lobe tank (3160.S 51.13. 000)
  - Total capacity : 575 litres (151.9 US.gal.)
  - Usable fuel : 573 litres (151.3 US.gal.)

- Normal fuels, unrestricted

FRENCH	SPECIFICATIONS US	BRITISH	NATO	REMARKS
* Aviation fuels AIR 3405 (TRO)		D.eng. RD 2453 AVTUR FS II	F34	
	ASTM Jet A			
	ASTM Jet A1	D.eng. 2494 AVTUR	F35	
* Aviation Fuels AIR 3407 (TR4)	MIL-T-5624 (JP. 4)	D.eng. RD 2454 AVTAG FS II	F40	
	ASTM Jet B	D.eng. RD 2486 AVTAG	F45	
* Aviation Fuels AIR 3404 (TR5)			F42	
	MIL-T-5624 (JP. 5)	D.eng. RD 2498 AVCAT	F44	

- Fuels subjected to restrictions on use

FRENCH	SPECIFICATIONS US	BRITISH	NATO	Restrictions
Gasoline	MIL-G-5572 (Grade 80/87)		F12	Between any two overhauls of the engine, operation on petroleum spirit (gasoline) may not exceed 25 hours Add 1 to 2% of lubricating oil by volume (mineral if possible
* AIR 3401	(Grade 100/130) (Grade 115/145)	D.eng. RD 2485	F18	
			F22	
Automotive Gasoline DCEA/2D MT 80	MIL-G-3056	DEF 2401	F46	
Automotive Diesel oil DCEA/21C	VVF 800 DF2	TS.10.003	F54	Not to be used at OAT below -5°C
	VVF 800 DF1			Not to be used at OAT below -15°C
	VVF 800 DFA		F56	
Gasoil 0 7120 STM	MIL-F-16884	DEF 2402 (47/0 DIESO)	F75	Not to be used at OAT below -5°C
Gasoil 20 7120 STM		DEF 2402 (47/20 DIESO)	F76	Not to be used at OAT below -0°C
Illuminating Oil DCEA/11C	VV-K 211	DEF 2403	F58	Not to be used at OAT below -15°C

NOTE 1 : Refer to current issues and amendments.

NOTE 2 : The use of an approved anti-icing additive is recommended, if none is contained in the fuel, at OAT below + 5°C.

NOTE 3 : Approved additives :

- Anti-icing :
  AIR 3652, NATO S.748, MIL-I-27 686, D.Eng. RD 2451, (with or without glycerine). Any of these additives may be used up to 0.15 % by volume.
- Anti-static : SHELL ASA-3 up to 0.0001 % by volume.

NOTE 4 : When starting the engine on the various "gasoils" (Diesel Oil) listed in the table, the use of an auxiliary starting unit (See Section 2, paragraph 2.3.22) containing one of the fuels marked thus * is :

- recommended in all cases,
- indispensable if t° is below + 10° C.

1.3.4. Engine lubricating oil

1.3.4.1. Normal use lubricants (See NOTE 1)

DESIGNATION	OTAN NATO	SPECIFICATIONS			APPROVED OIL TRADE MARKS
		FRENCH	AMERICAN	BRITISH	
SYNTHETIC OIL 3.0 cSt at 98.90°C (thin)	0.148	AIR 3513 (lapsed standard)	MIL.L 7808		BP TURBINE OIL 15 CASTROL 3C ESSO TURBO OIL 15 ESSO TURBO OIL 2389 MOBIL-OIL AVREX 256 CASTROL 325
	0.150	AIR 3514			ELF JET SYNTHETIQUE OIL 15 TURBONYCOIL 13 B
SYNTHETIC OIL 3.9 cSt at 98.9°C					AEROSHELL TURBINE OIL 390 (Not to standard but approved for this engine)

1.3.4.2. Alternative oils (See NOTE 2)

1) Approved oils with restrictions on use

SYNTHETIC OIL 5.0 cSt at 98.9°C (medium)	0.156		MIL-L 23699		BP ENERJET 51 et 52 CASTROL 5000 ELF JET SYNT. OIL 25 ESSO TURBO OIL 2380 MOBIL JET OIL TEXACO STARJET 5 TURBONYCOIL 525/2A	UTILIZATION to - 20°C
MINERAL OIL 3.0 cSt at 98.9°C (thin)	0.135	AIR 3515		D.ENG. RD 2490	AEROSHELL TURBINE OIL 3 BP TURBINE OIL 3 CALTEX JET ENGINE OIL MEDIUM HEAVY ELF JET ENGINE OIL 15 ESSO AVIATION UTILITY OIL F TOTAL AIR 3515 B	

2) Oils approved for exceptional uses

SYNTHETIC OIL 7.5 cSt at 98.9°C (thick)	0.149			D.ENG. RD 2487	AEROSHELL TURBINE OIL 750 CASTROL 98 ESSO TURBO OIL 274	UTILIZATION to -10°C
	0.159	AIR 3517			TURBONYCOIL 35A TURBONYCOIL 35M	

NOTE 1 : Current issues and amendments are to be complied with.
NOTE 2 : Oils to be used as an alternative with possible restrictions.

Quantity : 10 litres (2.6 U.S. gal.) (Maximum capacity with the system full).

CAUTION : SHOULD THE SPECIFICATION OR THE TRADE MARK CHANGE, REFER TO THE OPERATIONS GIVEN IN THE MAINTENANCE DOCUMENTS.

1.3.5. Engine oil temperatures

- Maximum ..... 85° C
- Minimum ..... 0° C

1.3.6. Engine oil pressure

	At 33.500 r.p.m			At idling speed		
	Hpz	bars	psi	Hpz	bars	psi
- Maximum	5	5	70	-	-	-
- Minimum	1.5	1.5	20	0.8	0.8	10

1.4. GEARBOXES AND SERVO-UNITS

1.4.1. Main and tail rotor gearbox lubricating oil

- Standard lubricating oils without restriction on use

SPECIFICATION (Refer to current issues and amendments)					REMARKS
FRENCH	NATO	AMERICAN	BRITISH	SAE	Recommended for OAT :
AIR 3525	0.155	MIL-L-6086 Grade M	DTD 581		Above - 15°C
	0.153	MIL-L-6086 Grade L	DTD 581		Below + 5°C
		MIL-L-2105 Grade 75		SAE 75 H EP	Below + 5°C
	0.227	MIL-L-2105 Grade 80		SAE 80 H EP	Above - 15°C
	0.226	MIL-L-2105 Grade 90		SAE 90 H EP	Above + 25°C
AIR 3515	0.135		D.ENG.RD 2490		Below - 10°C

1.4.2. Main gearbox oil temperature and pressure

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

1.4.3. Servo-unit hydraulic fluid

	SPECIFICATION				REMARKS
	FRENCH	NATO	AMERICAN	BRITISH	
NORMAL	AIR 3520	H.515	MIL-O-5606	DTD.585	Refer to current issues and amendments

1.5. ROTOR SPEEDS

1.5.1. Power-on-flight

For reference, rotor speed is 353.2 rpm at governed constant engine speed of 33.500 rpm

1.5.2. Power-off-flight

- Maximum rotor speed : 420 r.p.m.
- Minimum rotor speed : 270 r.p.m. at sea level (+ 10 r.p.m. per 1000-m (3 300 ft) increment above sea level)

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

1.6 POWER-ON FLIGHT COLLECTIVE-PITCH LIMITATIONS (1)

DENSITY ALTITUDE		HOVER AND CLIMB	TRANSITION MANEUVERS (2) OR LEVEL FLIGHT AT MAX. SPEED (3)
mètres	pieds		
-1000	-3300	0.70	0.75
0	0	0.75	0.80
1000	3300	0.80	0.85
2000	6600	0.85	0.90
3000	9900	0.90	0.95
4000	13200	0.95	1
5000 and above	16500 and above	1	1.05 (4)

1. Collective-pitch limitations for hovering flight and in climb are marked on the collective-pitch indicator dial.

2. In particular, transition to forward flight and end of approach.

3. Recommended cruise collective-pitch is 0.80 (see para. 2.2.7)

4. In level flight at full speed, maximum permissible collective pitch is "1" (Ref. paras. 2.2.1 and 2.2.8).

REMARKS : This is, of course, a continuous law : for example, at 600 m (2,000 ft), the hovering collective-pitch limitation is 0.78.

The limitations are related to density-altitudes easily determined by the pilot through the computer surrounding the collective-pitch indicator. However, as long as the outside air temperature is not exceedingly low (O.A.T. higher than standard temperature - 20° C), pressure and density altitudes may be assumed to be equal.

SPECIAL INSTRUCTIONS FOR OPERATION IN COLD WEATHER.

It is still possible to refer to pressure-altitude, but the values shown in the above chart as well as the cruise value must then be reduced by 0.05.

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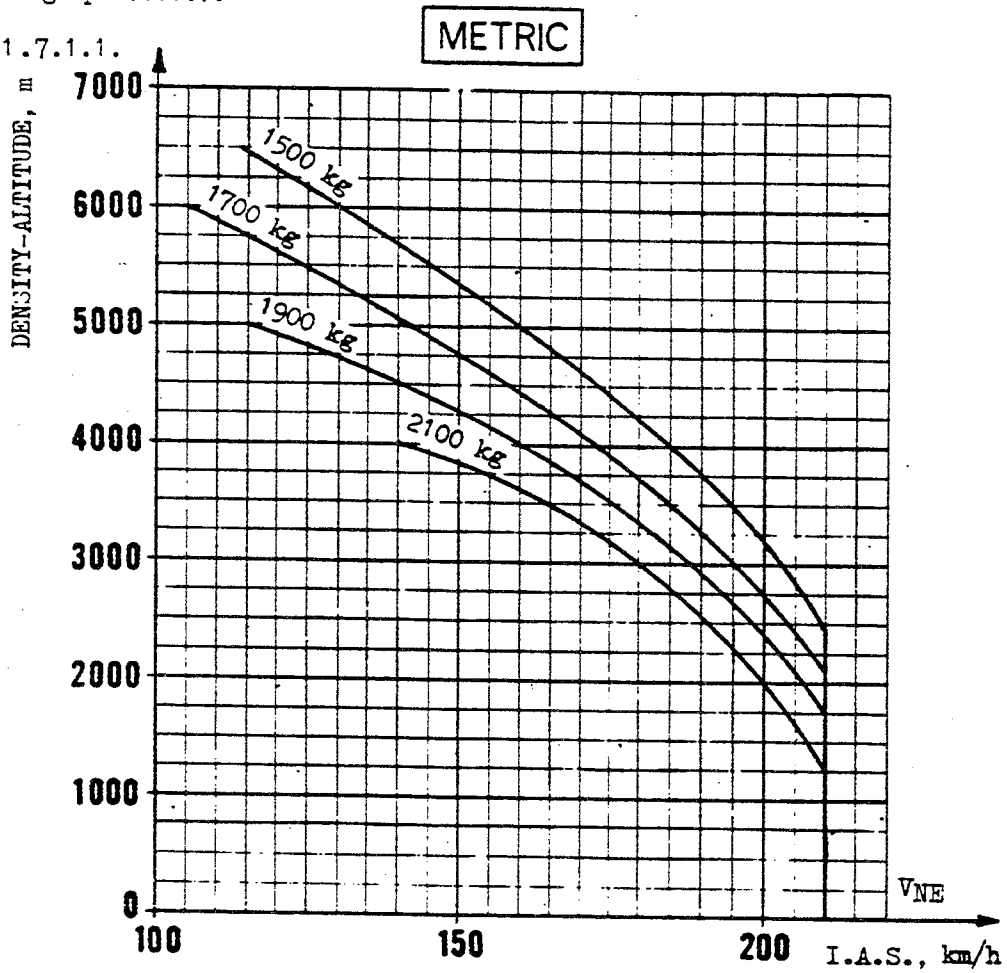
1.7. AIRSPEED LIMITATIONS

1.7.1 Never exceed speed Vne (with or without doors) with internal loads

When c.g. is located between 2.78 m and 3.08 m from datum.
For helicopters equipped with float type landing gear refer to para. 1.11.5
For helicopters equipped with sand filters installed, refer to paragraph 1.11.7.

1.7.1.1.



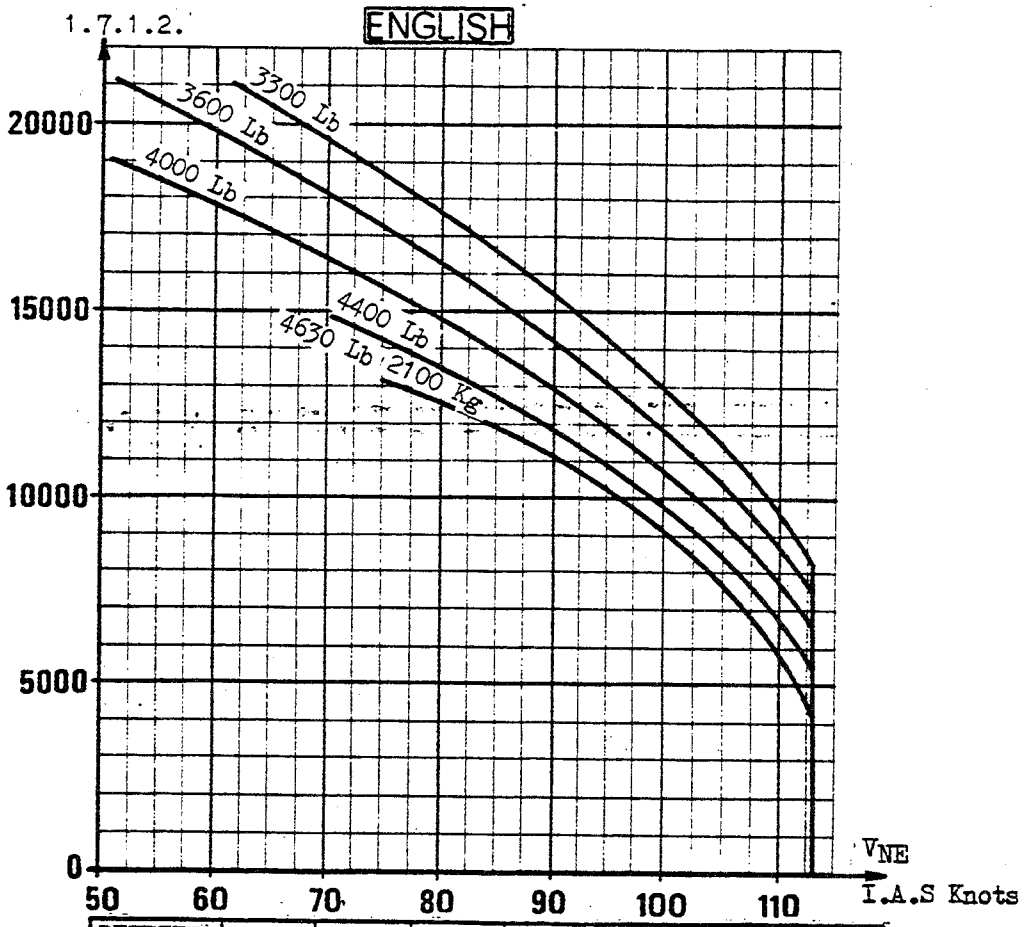
DENSITY ALTITUDE (mètres)	0 to 1000	2000	3000	4000	5000	6000
WEIGHT (kg)	SPEED (Km/h)					
2100	210	200	180	140		
1900	210	207	188	160	115	
1700	210	210	195	173	143	105
≤ 1500	210	210	203	185	160	130

NOTE : The above Vne values are substantially equivalent to level flight speed at 0.8 collective-pitch plus 25 Km/h.

SGAC approved
March 24, 1972

Never exceed speed (Vne) with or without doors, with internal loads. When c.g. is located between 109.45 and 121.25 inches from datum.

1.7.1.2.



DENSITY ALTITUDE (Feet)	0 à 3000	6000	9000	12000	15000	18000	21000
WEIGHT (lb)	SPEED (kt)						
4630	113	109	101	85			
4400	113	110	103	89			
4000	113	112	106	94	79	58	
3600	113	113	108	99	86	72	51
3300 or less	113	113	110	102	92	78	62

NOTE : The above Vne values are substantially equivalent to level flight speed at 0.8 collective-pitch plus 15 knots

1.7.1.2. C.G location between 3.08 and 3,15 m (121.25 and 124 in.) from datum (pilot alone on board).

Same limitations as above but with maximum permissible airspeed of 103 knots

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1.7.2. Sideward and rearward flight

Maximum permissible wind velocity (tail wind or cross wind) : 33 Km/h (18 knots).

1.8. RESERVED

1.9 MANOEUVRING LIMITS

1.9.1 Maximum operating altitude

Operating altitude is limited to 6500 m (21,300 ft) for flight and to 5800 m 19,000 ft for starting (for starting at altitude, refer to para.2.4.6)
For limiting operational altitudes for helicopters equipped with floats refer to para. 1.11.5.

1.9.2 Restrictions

The following are prohibited :

- Engine starting with a main rotor blade over the tail pipe.
- Aerobatics (in particular never exceed a 45° nose-up attitude).
- IMC flight
- Flying in icing conditions.
- Prolonged rearward flight,(due to the return of exhaust gases toward the cabin).
- Starting or stopping the rotor to leeward of any building, edifice or other obstruction when wind is in excess of 45 knots
- Starting the rotor in all cases where wind is in excess of 60 knots.
- On the ground, decreasing rotor r.p.m by increasing collective-pitch to more than 0.20.
- Rapid yaw movements in hovering and vertical climb conditions.
- Operation of sliding doors in flight on helicopters not incorporating modifications 245 and 382 (these doors must be closed or removed).
- Deliberate autorotative landing (on ground) of helicopters equipped with floats
- manoeuvre of the L.H. sliding door which must be open and locked at all times when the floor hatch is down.
- Flying with friction devices not sufficiently tightened to ensure stability of the main rotor flying controls.
- Checking flying controls for behaviour by moving the cyclic stick in circles during flight.

1.9.3 Positive manoeuvring load factors

- With cargo sling 1.5
- Other configurations 2

NOTE : The load factor of 2 would be exceeded only in the event of a definitely acrobatic and violent manoeuver.

1.10 PLACARDS AND INSTRUMENT MARKINGS

1.10.1 Placards

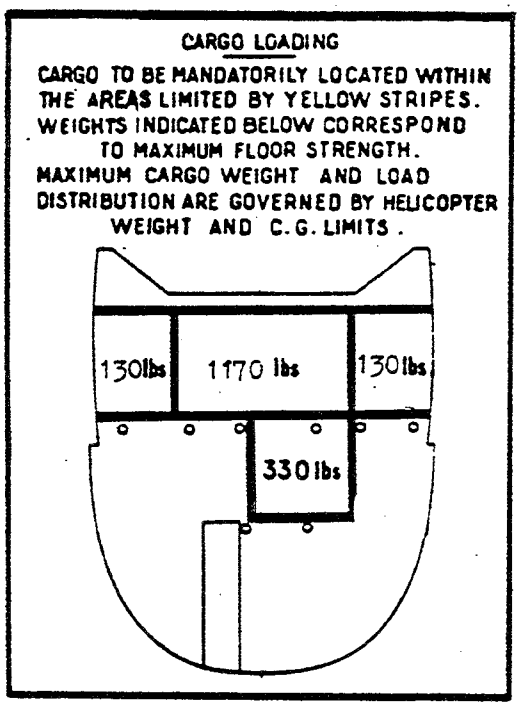
1. Placard secured to the canopy horizontal former, on the right of the pilot :

This placard recalls weight, rotor r.p.m., c.g and Vne limitations, and stipulates the following :

THIS HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS SPECIFIED IN THE APPROVED ROTORCRAFT FLIGHT MANUAL.

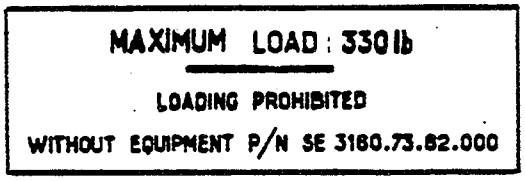
1.10.1 Placards (continued)

2. Placard secured in lower RH corner of cabin rear wall panel.



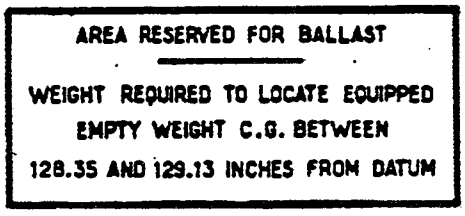
130 lbs = 60 kg
1170 lbs = 530 kg
330 lbs = 150 kg

3. Placard secured to floor in each lateral baggage hold



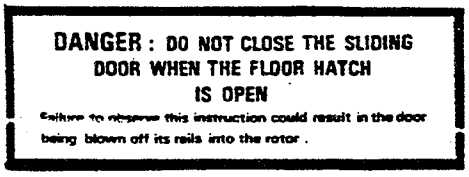
330 lbs = 150 kg

4. Placard secured adjacent to ballast :



128.35 in = 3.26 m
129.13 in = 3.28 m

5. Plate affixed to cabin rear wall panel, port side.



1.10.2 Instrument markings (figure 1-1)

Colour code of markings on instruments
- Red radial line Minimum and maximum safety limitations
- Yellow arc : critical area
- Green arc : normal operating area.

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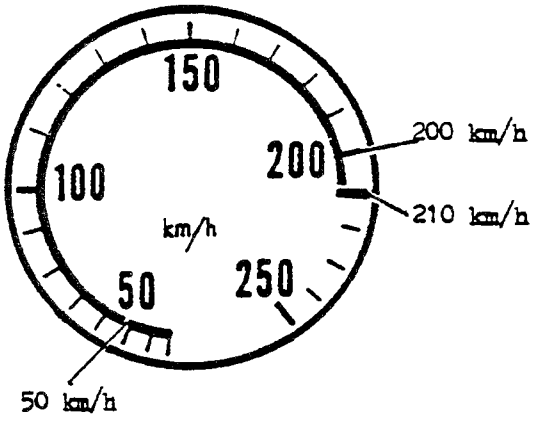
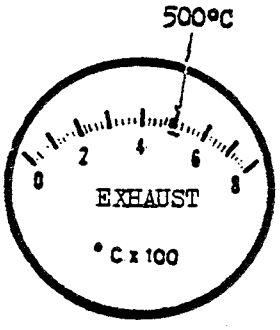
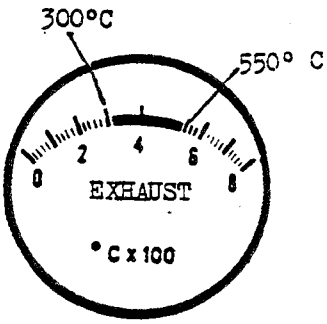
		Instrument panel with metric system markings	Instrument panels with Anglo-American system markings
Fuel contents gauge (standard tank)	Red arc Red line	0 to 10 litres 10 litres	0 to 3 U.S gall. 3 U.S. gall
Fuel contents gauge (four-lobe tank)	Red line	Empty (gauge on stop)	Empty (gauge on stop)
Engine oil temperature	Red line Red line Green arc Yellow arc	0° C 85° C 0° C to 75° C 75° C to 85° C	0° C 85° C 0° C to 75° C 75° C to 85° C
Engine oil pressure	Red line Red line Green arc	1.5 bar 5 bar 1.5 to 5 bar	20 p.s.i 70 p.s.i 20-70 p.s.i
Tail pipe temperature Before AMS 1422	Red line	500°C	500°C
After AMS 1422	Red line Yellow arc Green arc	550° C 500 to 550° C 300 to 500° C	550° C 500 to 550° C 300 to 500° C
Engine tachometer	Red line Red line Green line	32 500 r.p.m 34 500 r.p.m 33 500 r.p.m	32 500 r.p.m 34 500 r.p.m 33 500 r.p.m
Rotor tachometer	Red line Red line Green arc Yellow arc	270 r.p.m 420 r.p.m 350 to 420 r.p.m 270 to 350 r.p.m	270 r.p.m 420 r.p.m 350 to 420 r.p.m 270 to 350 r.p.m
Airspeed indicator	Red line Yellow arc Green arc Yellow arc	210 km/h 0 to 50 km/h 50 to 200 km/h 200 to 210 km/h	113 knots 0 to 27 knots 27 to 108 knots 108 to 113 knots
Collective-pitch indicator	Arrow Red line	0.80 1.05	0.80 1.05



Airspeed indicator

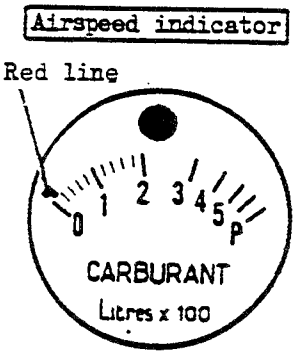


Before AMS 1422

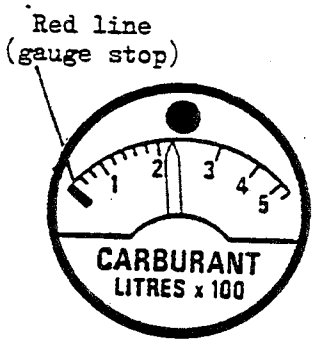


After AMS 1422

Tail pipe temp. indicator

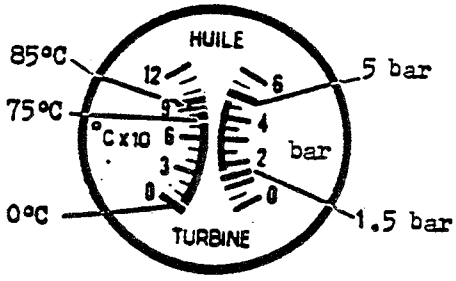


with standard tank

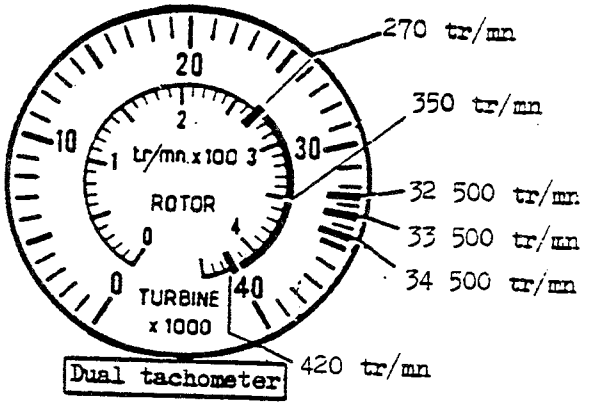


with four-lobe tank

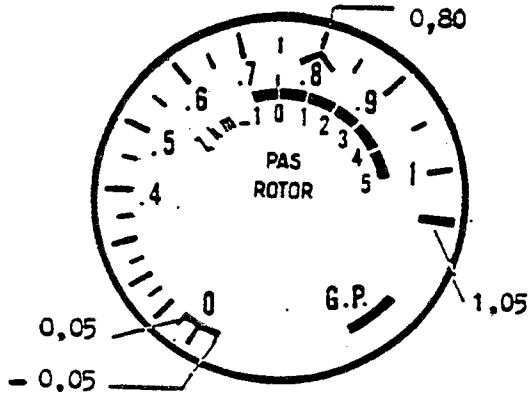
Fuel contents gauge



Engine oil temp. and pressure indicator



Dual tachometer



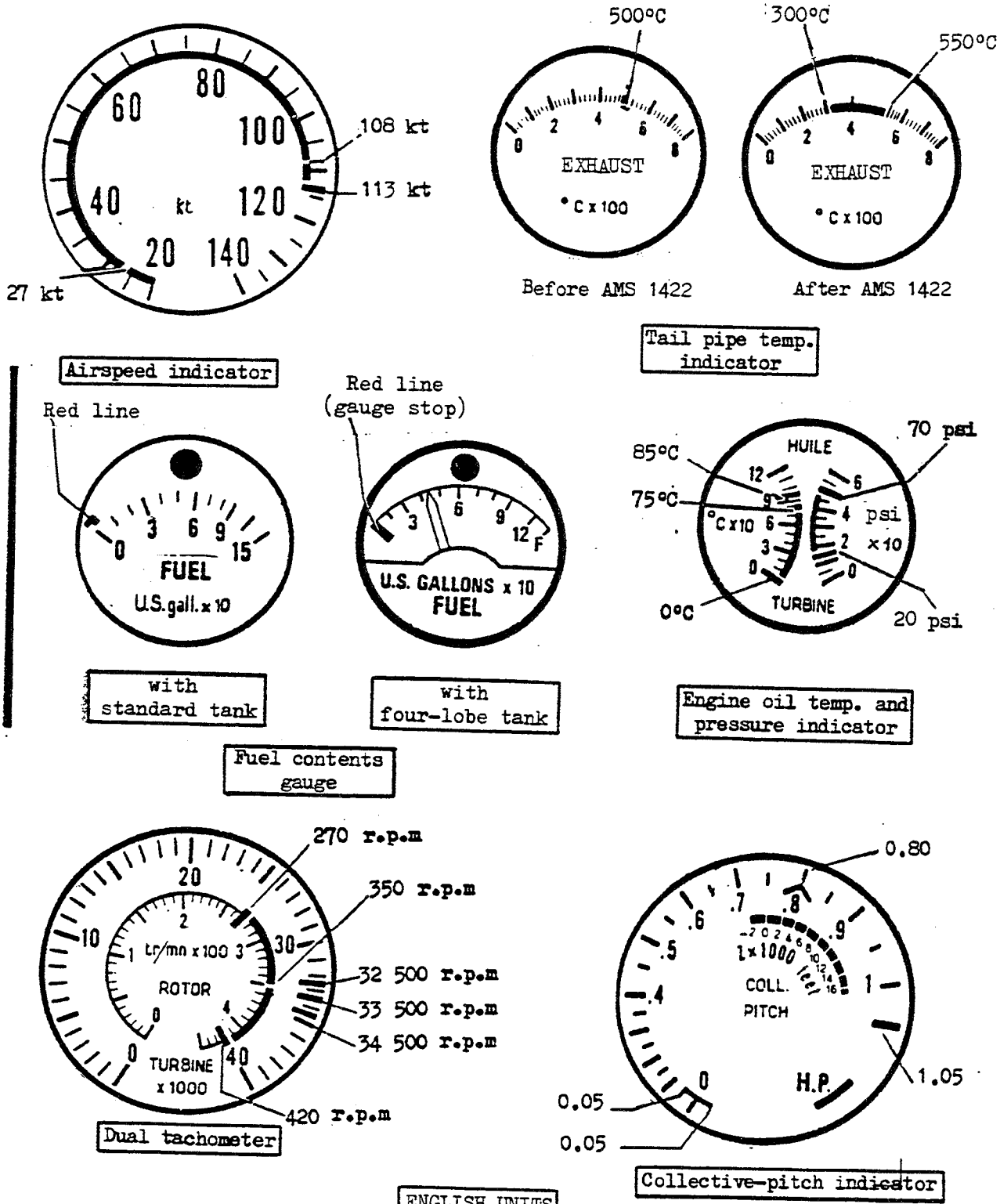
Collective-pitch indicator

METRIC UNITS

Instrument markings

Figure 1-1

SGAC Approved
March 8, 1973



ENGLISH UNITS

Instrument markings

Figure 1-1

Printed in France

1.11 OPTIONAL EQUIPMENT LIMITATIONS

1.11.1. Cargo sling

Maximum load : 750 kg (1,650 1b)
Distance of load c.g. relative to hook : greater than 3 m (10 ft)

1.11.2. Main rotor brake

Operating limitation : 175 r.p.m. maximum

1.11.3. Rescue hoist

Maximum load on hook 175 kg (385 1b) with AIR EQUIPMENT 76.300-100 hoist
225 kg with AIR EQUIPMENT 76.300-200 hoist

1.11.4. Internal cargo

- Cabin floor : maximum permissible concentrated load is 1000 kg/m² (1,700 p.s.i.) to be distributed in loading areas specified in fig. 2-3.9 and in accordance with c.g. limitations laid down in para. 1.10.1

1.11.5. Limitations on use of float type landing gear

- Deliberate autorotative landings are prohibited
- Inflation pressure depends on total all up weight (refer to para. 2.3.13.7 and table hereunder).
- Limiting altitudes in flight depend on inflation pressure.
  They are indicated in the table below with respect to the altitude at which the floats were inflated.

Inflation pressure	Operating limitations with respect to inflation altitude
0.250 bar (Weight equal to or less than 2100 kg)	- 500 m (1600 ft) + 1800 m (6000 ft)
0.390 bar (Weight greater than 2100 kg)	- 300 m (1000 ft) + 600 m (2000 ft)

- Never exceed speed (Vne) : Vne speed versus configuration is the same as that defined in para. 1.7.1., but is limited to 170 km/h (92 kt)
- C.G. limit : when total weight is greater than 2100 kg ; C.G. must be located (imperatively) between 2.78 and 3 m.

1.11.6. Fuel jettison

An indicator plate, on the right hand side of the cabin displays the following warning :

FUEL JETTISON - Not to be used during descent

1.11.7. Barrier type sand filters

When barrier type sand filters are installed, dynamic stability is slightly affected in conditions of rearward c.g. location. Consequently it is recommended to limit speed to 150 km/h (81 knots) in the following cases :
- c.g. location between 3.08 m and 3.15 m (10.10 ft and 10.33 ft) pilot alone on board.
- Bad visibility (earth's horizon not visible)
- Helicopter not fitted with SFENA stabilizer

1.11.8. Emergency floatation gear

1.11.8.1. VNE

a) With emergency floats folded

The VNE is that stated in para. 1.7.1.

b) With emergency floats inflated

- If the collective pitch is higher than 0.5, the VNE is 148 km/h (80 kt)
- If the collective pitch is lower than 0.5, the VNE is 135 km/h (73 kt)

1.11.8.2. Altitude and temperature limits

a) The altitude is limited to 1000 m (3280 ft) above the inflation altitude
b) The temperature is limited to -35° C and + 50° C.

1.11.9. Hydraulic harpoon

- Holding capability : roll 12° to 14°.
- Deck landing : Permissible simultaneous platform movements — Roll : 9°, Pitch : 4°
- Mooring : Maximum angle between grid and aircraft centerlines = 45°

NOTE : These values are given for the mooring grids now in service and are liable to modification.

1.11.10. Differential brakes

- Differential brakes must not be used at taxiing speed exceeding 18.5 km/h (10 knots).
- Continuous operation not to exceed 10 seconds.

1.11.11. Additional Fuel Tanks

- Fuel capacity with standard (square) tank (3160S-51-20.000.3)

	Main tank + 1 additional fuel tank	Main tank + 2 additional fuel tanks
Total capacity	695 litres (183.6 U.S. gal.)	825 litres (217.9 U.S. gal.)
Usable fuel	684 litres (180.7 U.S. gal.)	813 litres (214.8 U.S. gal.)

- Capacity with four-lobe (rounded) tank (3160S-51-13.000)

	Main tank + 1 additional fuel tank	Main tank + 2 additional fuel tanks
Total capacity	705 litres (186.2 U.S. gal.)	835 litres (220.5 U.S. gal.)
Usable fuel	702 litres (185.5. U.S. gal.)	831 litres (219.5 U.S. gal.)

A plate, situated below the fuel contents gauge, gives the correspondance between the gauge reading and the actual fuel quantity in the two possible optional configurations (using either one or two additional fuel tanks) with the type of main tank installed.

1.12. MINIMUM CREW

One pilot (on R.H. side)

If crew is limited to one pilot it is recommended to remove the co-pilot's cyclic pitch stick by unscrewing the knurled ringnut at the base of the stick.

1.13. RETIREMENT LIVES

Maximum retirement lives of fatigue critical parts are listed in chapter 5 of the ALOUETTE III Maintenance Manual.

1.14. TYPES OF OPERATION APPROVED

Day. (V.M.C.)

Night (V.F.R. only) when appropriate equipment items are installed and provided that the operational regulations of the country concerned are observed.

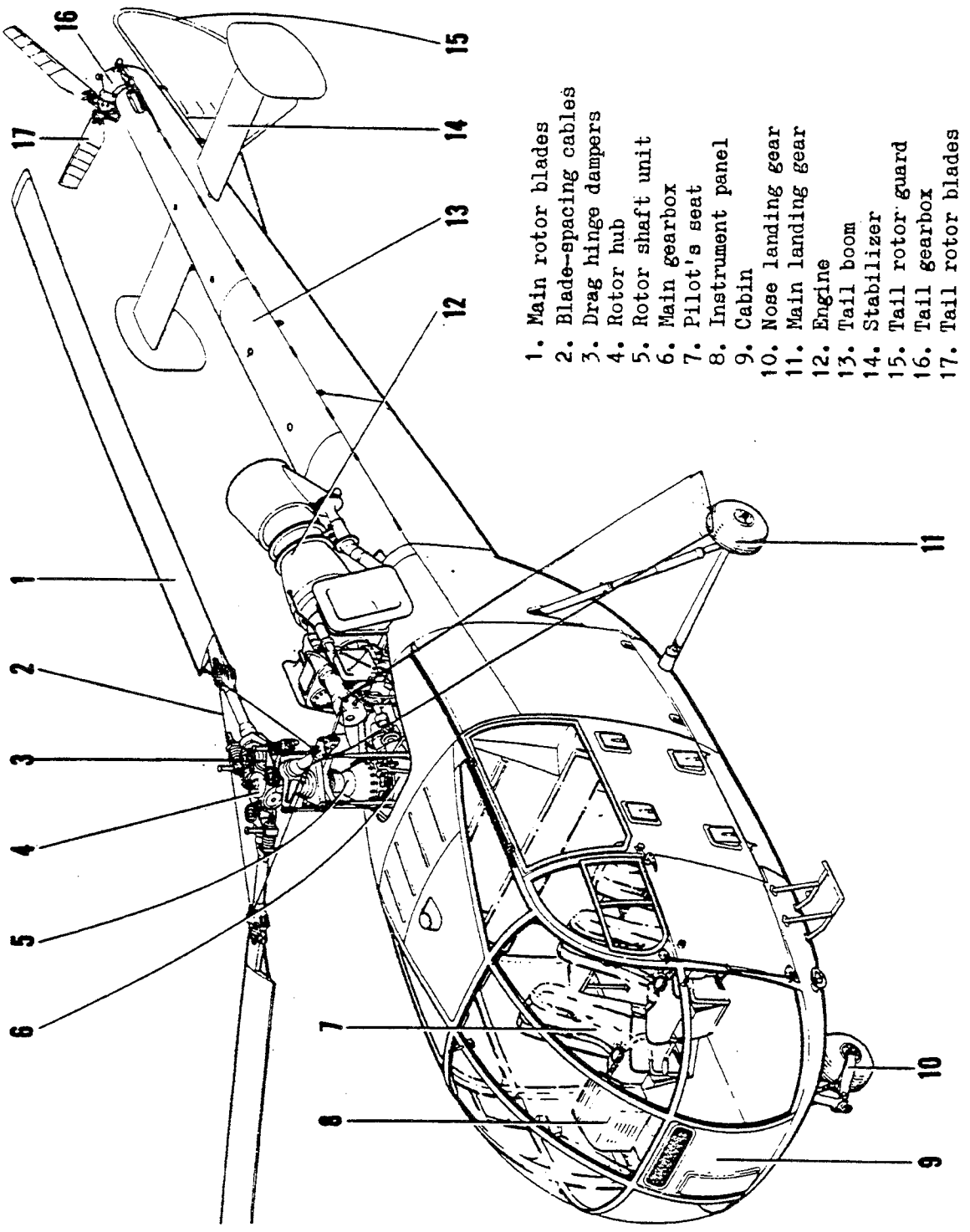
SECTION 2 - OPERATING PROCEDURES

CONTENTS

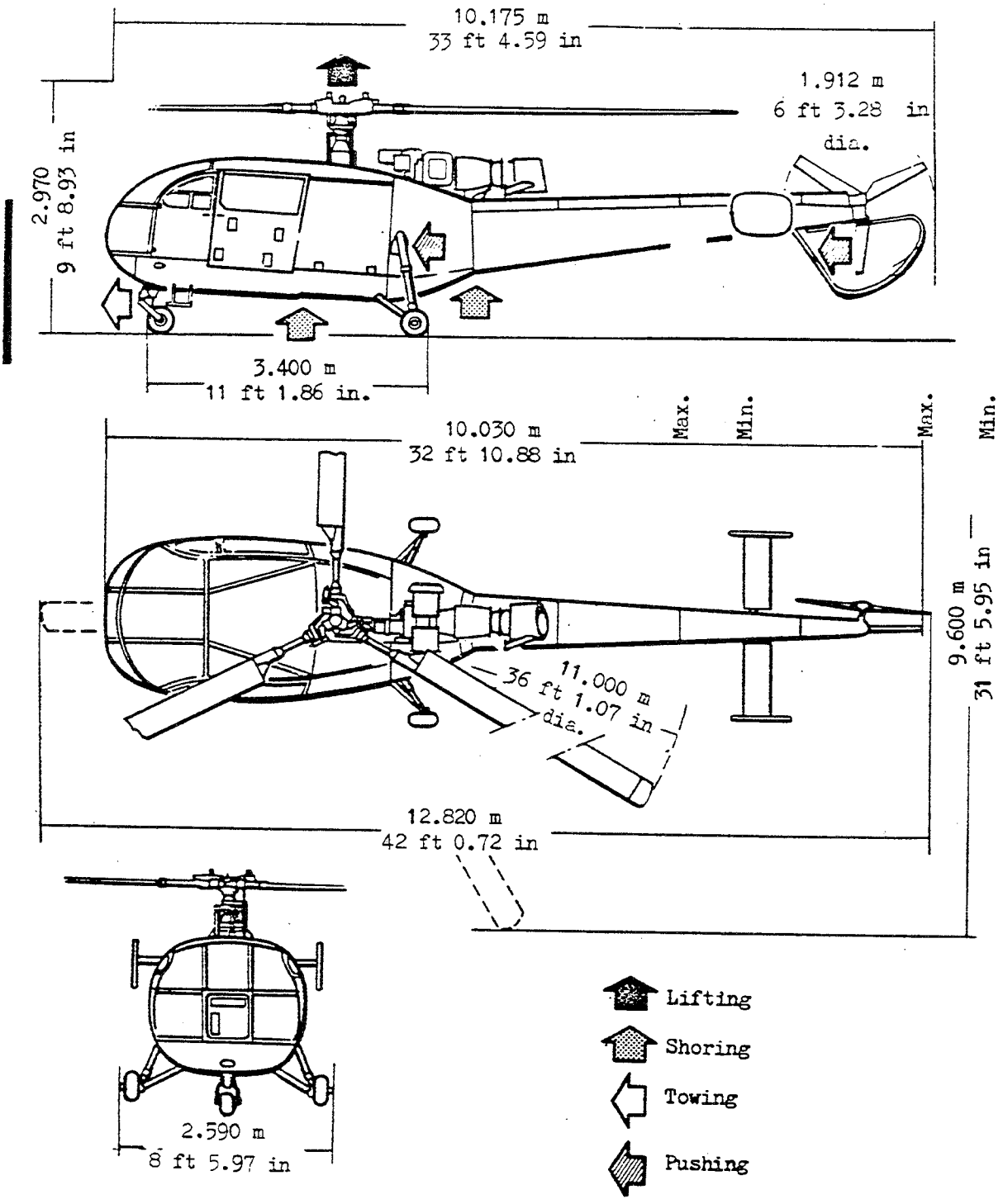
SECTION 2

2.1. DESCRIPTION

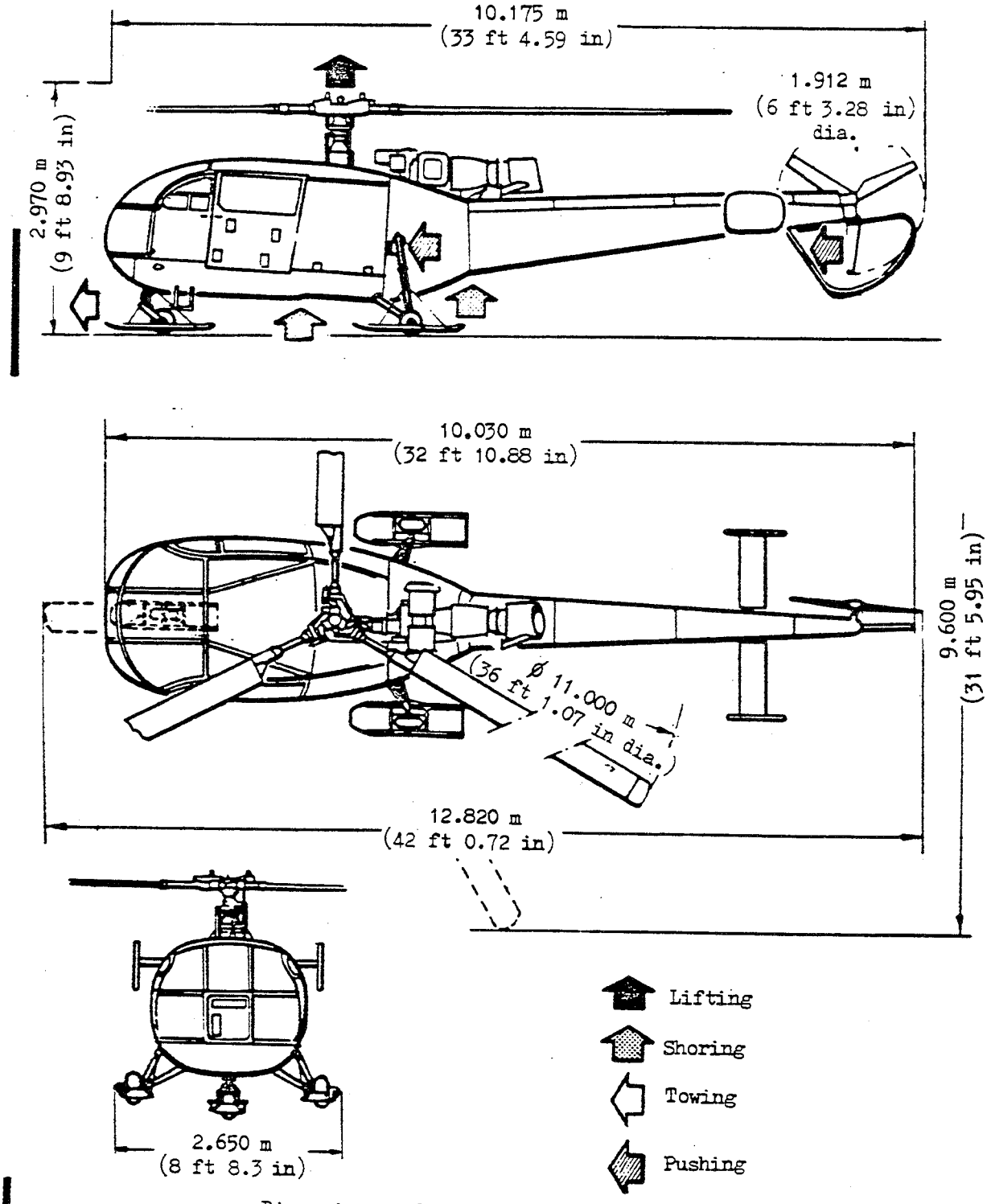
CONTENTS



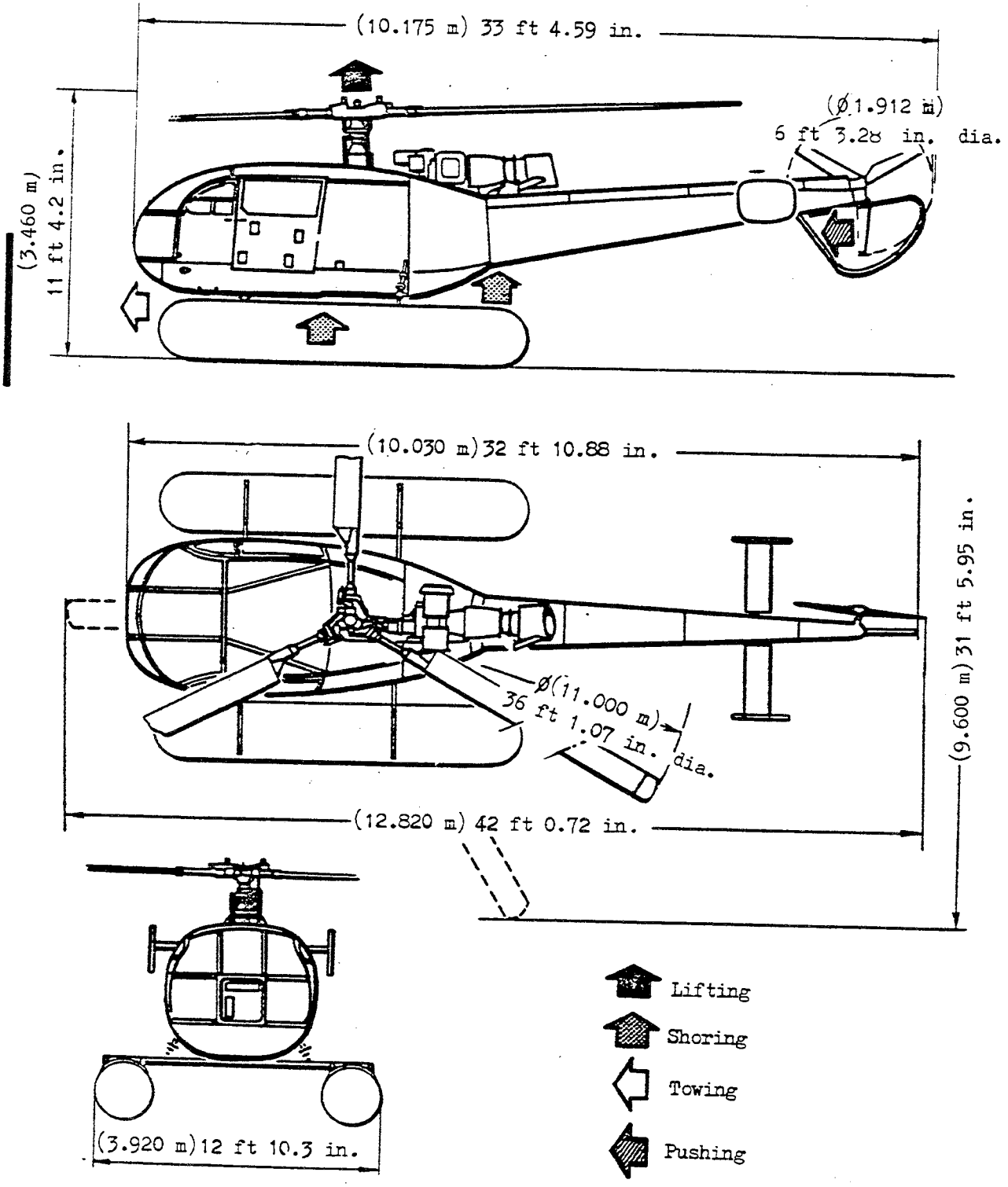
Main components
Figure 2-1.1



Dimensions and ground handling points
Wheel type landing gear
Figure 2-1-2



Dimensions and ground handling points
Wheel type landing gear with skis
Figure 2-1.2a



Dimensions and ground handling points
Float type landing gear
Figure 2.1.2b

SGAC Approved
July 26, 1968

2.1. DESCRIPTION

The SE 3160 "ALOUETTE III" helicopter has a three-bladed lifting rotor and an anti-torque tail rotor. It is powered by a TURBOMECA "Artouste III B or III B1" turbine engine.

2.1.1. Helicopter dimensions (figure 2-1.2)

- Maximum length : (one main rotor blade facing forward along the aircraft center line)..... 12.820 m (42 ft 0.72 in.)
- Minimum length : (main rotor blades folded)..... 12.820 m (42 ft 0.72 in)
- Maximum width : (main rotor blades at 60 degrees relative to the aircraft center line)..... 9.600 m (31 ft 9.95 in)
- Minimum width : (main rotor blades folded)..... 2.590 m (8 ft 5.97 in)
- Maximum height : (to top of main rotor lifting eye ; at empty weight)..... 3.090 m (10 ft 1.6 in)

2.1.2. Weights

- Empty weight (see Section 4).
- Minimum operating weight)
- Maximum operating weight) See para. 1.1

For further details on weights, refer to Section 4 "Loading information".

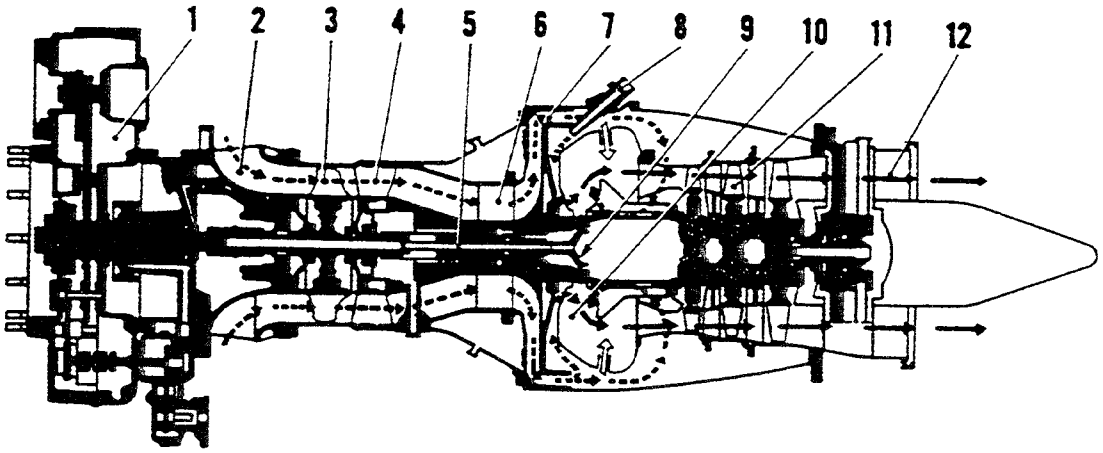
2.1.3. Power unit

2.1.3.0. General

The TURBOMECA "Artouste III B or III B1 installed on the Alouette III is a single-shaft gas turbine wherein the turbine disc and compressor rotor are mounted on a common shaft and rotate at the same speed. It is provided with a governor, a starting box, a starter-generator, a tachometer generator and with fuel and oil pumps. The twin air intakes open laterally ; they can be fitted with protective grids or, for operation in sandy conditions, with special sand filters.

2.1.3.1. Operating principle (figure 2-1.3)

Atmospheric air is compressed by an axial compressor and a centrigugal compressor at a ratio of 5.2 : 1, which causes the air temperature to rise approximately 230° C. After passing throught the diffuser, the air divides into two streems : a primary airflow and a secondary airflow.



1. Reduction gear
2. Air intake
3. Axial compressor
4. Axial compressor diffusers
5. Fuel supply tube
6. Centrifugal compressor
7. Centrifugal compressor diffusers
8. Torch igniter
9. Injection wheel
10. Combustion chamber
11. Three-stage turbine
12. Exhaust diffuser

Engine operating diagram
Figure 2-1.3

2.1.3.1. Operating principle (continued)

The primary airflow is used to ensure the combustion of the fuel. It is admitted into the forward section of the combustion chamber on either side of the atomized fuel.
The secondary airflow, introduced in the middle section of the combustion chamber is used to dilute the burned gas to reduce the temperature to a value consistent with mechanical limitations.
The burned gas flows through the turbine, in which it expands thus converting the kinetic and potential energy into mechanical energy which is transmitted t the clutch unit inpout shaft through the reduction gear.

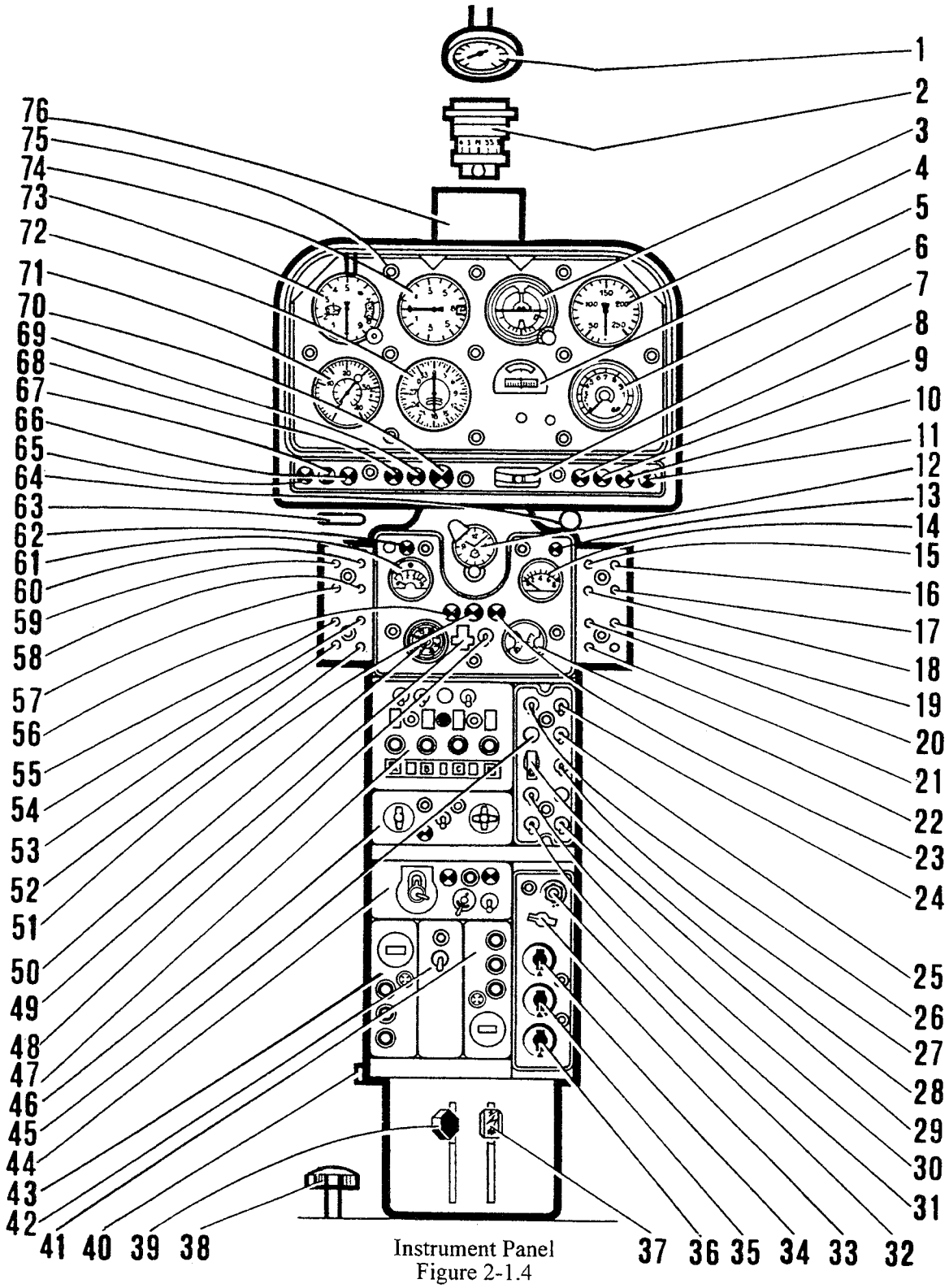
After passing through the turbine, the gas flows through the exhaust diffuser where it slows down before entering the tail pipe.

2.1.3.2. Engine controls (figure 2-1.4)

Two engine control levers are located ont the control quadrant at the bottom of the control pedestral :

- The fuel flow control lever.
  The fuel flow control (R.H.) lever operates the fuel supply cock through a mechanical linkage. It opens the cock when it is pushed forward and closes the cock when it is pulled back.
  To avoid engine overheating, a micorswitch, located on the fuel cock, prevents operation of the automatic starting unit if the lever is not in the rear, "idle" position.
  A microswitch located under the cabin floor causes a red warning light on the instrument panel to come on if the lever is not fully forward ; another microswitch disables the "off" position of the switch when the fuel flow control lever is in the "fuel cock open" half of the control quadrant. Post Mod. 2293, a misadjustment of the latter microswitch is indicated by the illumination of the fuel flow control lever warning light.

- The fuel shut-off cock control lever, on the left, which operates, through mechanical linkage, the fuel shut-off cock located on the fuel supply line, upstream of the engine. This lever should always be lockwired in the forward, or open, position, and shoukd be operated only in an emergency.



Instrument Panel
Figure 2-1.4

KEY TO FIGURE 2-1.4
(Pre-mod. AMS)

1 Outside air temp. indicator
2 Magnetic compass
3 Artificial horizon
4 Airspeed indicator
5 Directional gyro
6 Collective pitch indicator
7 Bank indicator
8 Generator warning light (red)
9 Booster pump warning light
10 Main gearbox oil pressure warning light (red)
11 Main gearbox oil temperature thermoswitch
12 Clock
13 Low engine oil pressure warning light (Post mod.AMS 1326)
14 Tail pipe temp. indicator (t4)
15 Instrument panel lighting circuit-breaker
16 Landing light circuit-breaker
17 VHF radio circuit-breaker
18 Fuel contents gauge circuit-breaker
19 I.C.S. circuit-breaker
20 Pitot tube heating circuit-breaker
21 Emergency jettison circuit-breaker
22 Engine oil temp. and pressure indicator
23 Starting relay warning light (red)
24 Generation switch
25 Pitot tube heating switch
26 Battery switch
27 Position and anti-collision lights selector switch
28 Mission master switch
29 HF radio homing switch
30 I.C.S. master switch
31 HF radio squelch switch
32 Radio compass volume control potentiometer
33 Six-position switch
34 Instrument panel lighting rheostat
35 Control panel lighting rheostat
36 Cabin lighting rheostat or inscription rheostat
37 Fuel flow control lever
38 Servo-unit cock
39 Fuel shut-off lever
40 24-Volt receptacle (10 amps max)
41 Pilot's I.C.S. control panel
42 Windshield wiper switch
43 Copilot's I.C.S. control panel
44 HF radio control panel
45 Fuel jettison switch
46 V.H.F. radio control panel
47 Radio compass control panel
48 Booster pump switch
49 Engine "Start-Crank" selector switch
50 Voltmeter
51 Micro-pump indicator light (amber)
52 Mission equipment circuit-breaker
53 24-Volt receptacle circuit-breaker
54 HF radio circuit-breaker or fuel jettison circuit-breaker
55 Radio compass circuit-breaker
56 Starter indicator light (green)
57 Position lights circuit-breaker
58 Instruments circuit-breaker
59 Starter circuit-breaker
60 Cabin lighting circuit-breaker
61 Fuel contents gauge
62 "FUEL TANK EMPTY" flashing warning light
63 Main rotor brake control handle
64 Nose wheel caster lock control handle
65 Battery temp. warning light (Post mod. AMS 1764)
66 Cargo sling indicator light (green)
67 Filter-clogging warning light
68 Pitot tube heating warning light (red)
69 Gyro instruments warning light (red)
70 Fuel flow control lever position warning light
71 Dual tachometer
72 Radio compass indicator
73 Altimeter
74 Rate-of-climb indicator
75 Panel light
76 Power-check chart

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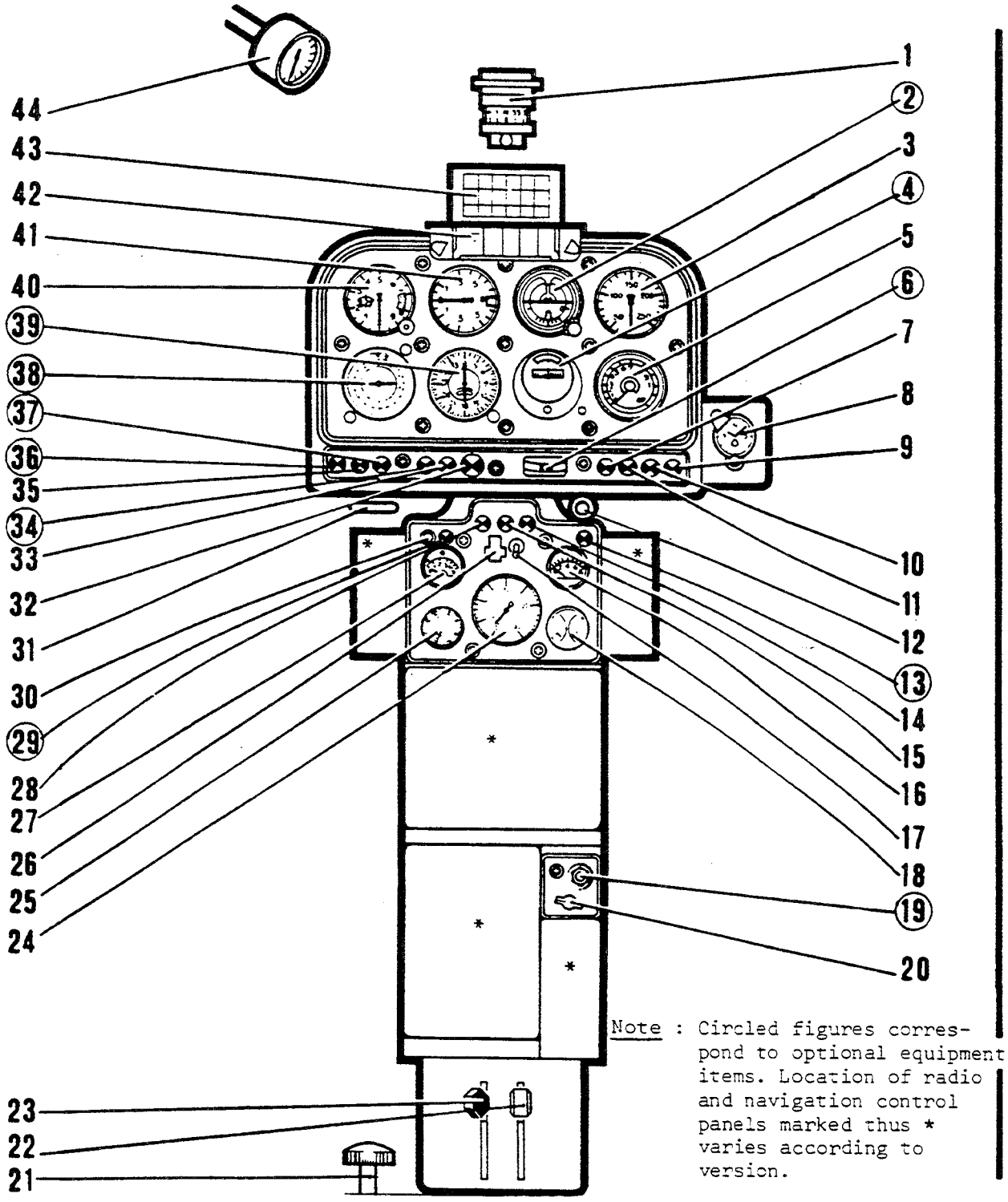


Note : Circled figures correspond to optional equipment items. Location of radio and navigation control panels marked thus * varies according to version.

Instrument panel and control pedestal
(After AM 1065 or 1237, 1084, 1095, 1096)
Figure 2-1.4a

KEY TO FIGURE 2-1.4a

1 Magnetic compass
2 Artificial horizon
3 Airspeed indicator
4 Directional gyro
5 Collective pitch indicator
6 Bank indicator
7 Generator warning light
8 Clock
9 Main gear box oil temperature warning light
10 Main gear box oil pressure warning light
11 Booster pump warning light
12 Nose wheel lock control handle
(13) Low engine oil pressure warning light (Post mod. AMS 1326)
14 Starting relay warning light
15 Micro-pump warning light
16 Tail pipe (t4) temperature indicator
17 Booster pump switch
18 Engine oil pressure and temperature dual indicator
(19) Radio-compass A.D.F. volume control potentiometer
20 Mission selector switch
21 Servo-units cock
22 Fuel flow control lever
23 Fuel shut-off lever
24 Engine/rotor dual tachometer
25 Volmeter
26 Engine "Start-Crank" selector switch
27 Fuel contents gauge
28 Starter indicator light
(29) "FUEL TANK EMPTY" flashing warning light
30 Fuel contents gauge warning light test button
31 Rotor brake control handle
32 Fuel flow control lever position warning light
33 I.F.R. warning light
(34) Pitot-tube heating warning light
35 Fuel filter clogging warning light
(36) Battery temp. warning light (after AMS 1764)
37 Cargo sling pilot light
(38) Radio-altimeter indicator
(39) Radio-compass A.D.F. indicator
40 Altimeter
41 Rate-of climb indicator
42 Radio frequency chart
43 Power-check chart
44 Outside air temperature indicator

The top of the pedestal carries :

- The booster pump ON-OFF switch which controls the submerged motor-operated booster pump. This pump supplies fuel under pressure to the engine fuel system.

  When the switch is in the OFF position, the booster pump is automatically cut in by the automatic starting unit during the combustion chamber light-up sequence. When in the ON position, it controls booster pump starting directly without any possibility of interference by the automatic starting unit.

  This switch must be moved to ON prior to engine starting and be left in this position throughout the flight.

- The engine selector switch.
  This is a dual 3-position switch. It can be left in the OFF or ON position, but from the VENTILATION position it automatically returns to OFF when released..

  The automatic starting sequence is initiated by moving the switch to the ON position. When the engine is running the switch must be left in the ON position at all times.

  Engine shutdown is accomplished by moving the selector switch to the OFF position after fully retarding the fuel flow control lever.

  When the fuel flow control lever is fully retarded, moving the switch to VENTILATION, and holding it in that position, causes motoring action which ceases automatically immediately the switch is released.

2.1.4 Transmission system (figure 2-1.5)

2.1.4.0. General

The transmission system transmits engine power to the main and tail rotors and reduces rotational speeds.

It comprises the following components :

2.1.4.1. Main drive shaft and freewheel assembly (1)

This shaft is attached at one end to the clutch (2) and at the other end to the main gearbox (3) so as to transmit engine power to the latter. A freewhell unit incorporated in the shaft assembly permits autorotative flight.

2.1.4.2. Clutch unit (2)

The centrifugal type dry clutch unit is designed to synchronize rotor speed with engine speed through the main drive shaft, which ; at the moment of synchronization rotates at approx. 4,300 r.p.m.

The driving assembly is constituted essentially of a set of shoes lined with friction material. The shoes, sliding in a radially bored support ring, are pressed against the driven assembly surface by the effect of centrifugal force, opposed by clutch shoe retaining springs, the support ring being driven by the engine output reduction gear shaft.

The shoes slip on the driven assembly during acceleration, and seize when normal operating speed is reached (there is no machanical lock). The driven assembly of the clutch unit drives the main gearbox, through the main drive shaft and freewheel assembly which allows the rotor to turn independently of the engine in autorotational flight.

The clutch must fulfil a threefold requirement :

(a) Protect the engine against the application of excessive torque loads at low engine speeds, and consequently agains engagement of rotor drive below a predetermined engine speed.

(b) Dissipate the heat generated by friction during acceleration of the rotor up to synchronization.

(c) Transmit the required torque in flight at nominal engine speed, without slipping.

Clutch engagement is a delicate operation which demands gentle control throughout on the part of the pilot with strict observance of the instructions contained in para. 2.2.5.

- An over-high rate of rotor acceleration may produce cracks due to local overheating.

- An insufficient rate of acceleration will cause general overheating due to prolonged friction, resulting in transformation of the metal grain structure.

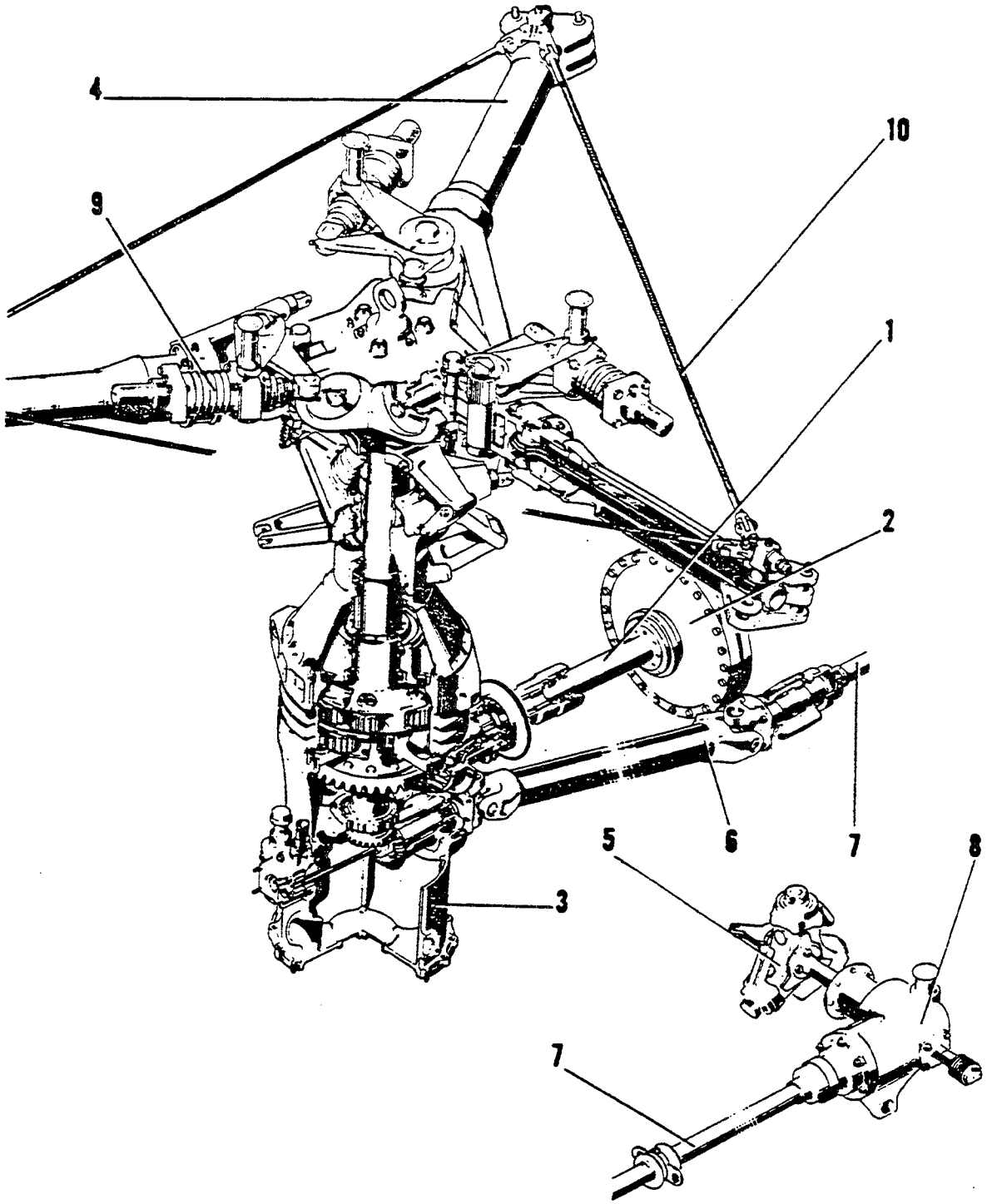
2.1.4.3. Main gearbox (3)

The main gearbox drives the main rotor (4) and transmits power to the tail rotor drive, stepping down engine speed from 33,500 r.p.m. to 353.2 r.p.m. and 2001 r.p.m. respectively.
It comprises :

- an input bevel gear assembly which is connected to the main drive shaft and drives the two-stage planetary gear situated above.

- a two stage planetary reduction gear which drives the main rotor shaft.

- a bevel gear power take-off which connects up with the inclined shaft of the tail rotor drive system.



Transmission
Figure 2-1.5

2.1.4.4. Tail rotor drive (6) and (7)

The tail rotor drive consists of the inclined drive shaft, the coupling shaft and the tail drive shaft, the latter being connected to the tail gearbox.

2.1.4.5. Tail gearbox (8)

The tail rotor gearbox changes the angle of drive by 95 degrees toward the tail rotor.

2.1.4.6. Main rotor

The 11 m (36 ft 1 in.) diameter main rotor rotates clockwise when viewed from the pilot's seat. It comprises the main rotor head and three blades.

a. Main rotor head. The main rotor head is splined onto the top of the main rotor shaft. It comprises :

- a hub
- three blade sleeves (4)
- three blade dampers (9)
- the blade-spacing cables (10)
- the droop restrainers which prevent excessive blade droop at rest and at low r.p.m.

b. Blades. The main rotor blades are attached to the outboard end of the blade sleeves. They consist essentially of a light alloy spar and an aluminium skin packed with synthetic resin foam filler material. They have a 6°30' built-in twist and carry balance weights under a removable tip fairing.

They may be folded rearwards.

2.1.4.7. Tail (anti-torque) rotor.

The 1.912 m (6 ft 3.28 in) diameter variable pitch tail rotor comprises three metal blades individually hinged in the flapping plane only.

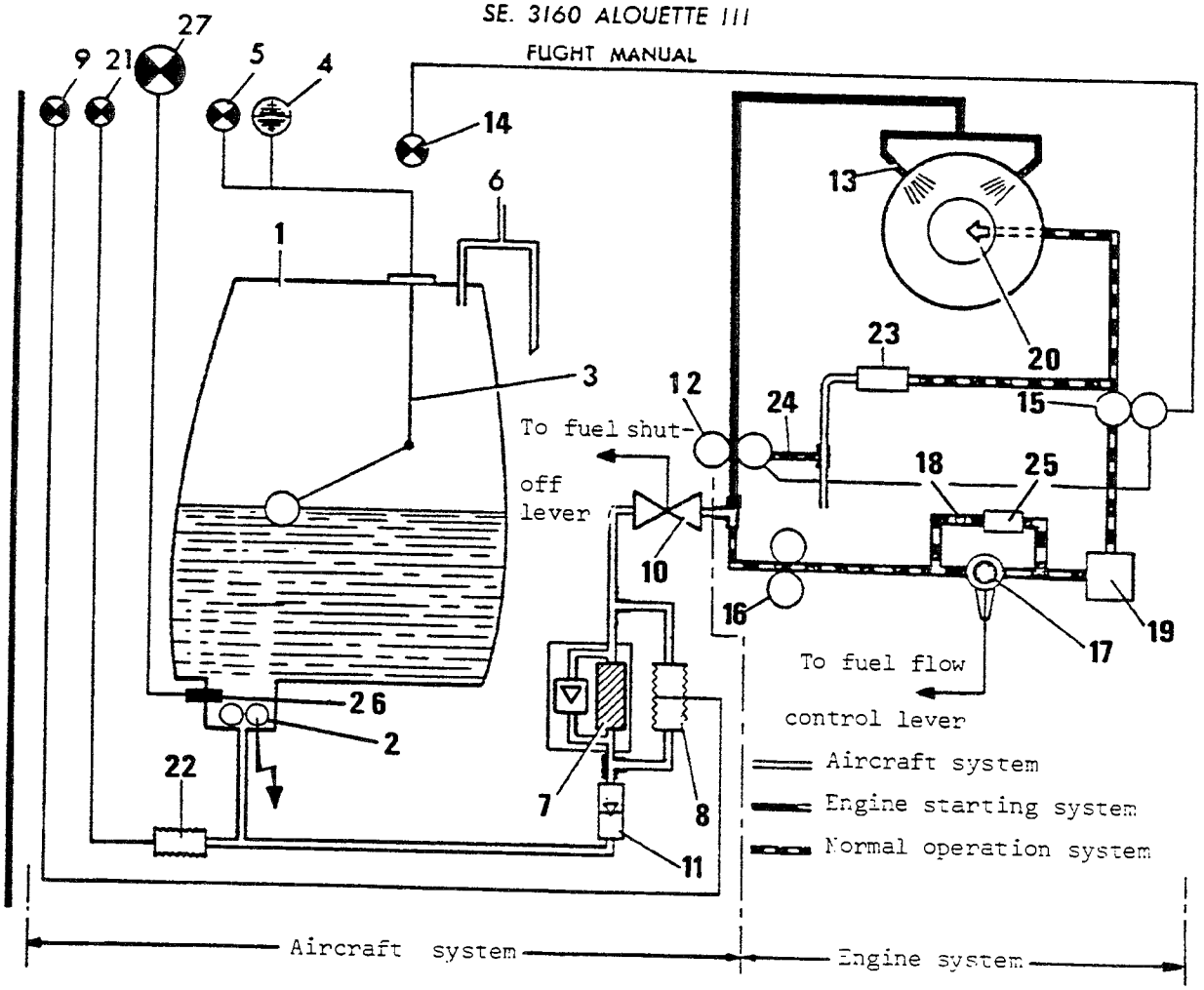
2.1.5 Fuel system (figure 2-1.6

2.1.5.0. Fuel tank

The fuel is carried in a tank housed in the fuselage body structure.

The helicopter may be fitted with :

- either a standard tank, having a capacity of 565 litres (555 litres usable fuel).
- or a four-lobe tank, with a capacity of 575 litres (573 litres usable fuel).



1. Fuel tank
2. Booster pump
3. Fuel contents transmitter
4. Fuel contents gauge
5. Low fuel warning light
6. Vent
7. Filter with incorporated by pass valve
8. Filter-clogging pressure switch
9. Filter-clogging warning light
10. Fuel shut off cock
11. Check valve
12. Micropump
13. Ventilated torch igniters
14. Motor-operated cock warning light (micropump)
15. Motor-operated cock
16. Fuel pump
17. Fuel supply cock
18. Idling jet
19. Governor
20. Injection wheel
21. Fuel booster pump pressure warning light
22. Fuel booster pump pressure switch
23. Starting valve
24. Micro pump drain
25. Barostatic cock
26. Low level warning switch
27. "FUEL TANK EMPTY" flashing warning light

Fuel system operating diagram
Figure 2-1.6

2.1.5.1. Fuel specifications

(Refer to Section 1, para. 1.3.3)

2.1.5.2. Fuel system operation

Fuel drawn from the tank by the booster pump passes through a filter provided with a by-pass valve, and then through a shut-off cock to a fitting where the fuel system branches out into two lines :

- the torch igniter supply line (engine starting)
- the normal supply line

A pressure switch on the filter delivery line is connected to a warning light on the instrument panel, whereby the pilot is informed of excessive fuel pressure in the event the filter is clogged. Another warning light comes on when the fuel booster pump delivery pressure drops below a predetermined value.

a. Torch igniter supply line

The torch igniter supply line comprises :

- A micropump complete with cut-off valve and pressure switch. This pressure switch controls an amber warning light mounted on the control pedestal in the cockpit.

  The warning light comes on to indicate that the fuel pressure is sufficiently high to open the cut-off valve, and that the "open" coil of the motor-operated cock is energized.

- Two ventilated torch igniters which atomize and ignite the fuel supplied by the micropump.

b. Normal supply line.

The normal supply line comprises :

- a fuel pump with relief valve, adjustable idling jet, fuel supply cock and starting valve.

2.1.5.2. Fuel system operation (continued)

- a governor which maintains constant engine r.p.m. irrespective of power demand. The governing speed (33,500 r.p.m.) is set at the factory.

- a motor-operated cock controlled by the automatic starting unit. The position of the cock is indicated by an index visible through a window.

From the motor-operated cock, the fuel enters the engine through a dual inlet fitting and, through internal drillings in the engine casings and then the fuel supply tube, is conveyed to the injection wheel whence it is sprayed into the combustor.
On starting, excess fuel is drained through a valve installed on the outlet of the motor-operated cock.

2.1.5.3. Fuel contents indicating and safety

A fuel contents gauge, located on the control pedestal indicates the quantity of fuel in the tank.
On helicopters equipped with a cubic tank, a red line on the gauge dial indicates that the last 10 litres are unusable.

On helicopters equipped with a four lobe tank, the red line on the gauge dial corresponds to the pointer end of travel stop.

a) Fuel low level indication

Whatever the type of tank installed, a red warning light fitted on the gauge comes on to warn the pilot when only about 60 litres (15.85 U.S. gal.) of fuel are left in the tank.

If this light comes on :

. Pronouneed nose-up and nose-down attitudes of the helicopter should be avoided.

. Flight time should be limited to approximately 10 min.

This flight time allows a safety margin for unpredictable flight manoeuvres (steep angle attitude).

A test push-button is provided above the gauge to check correct operation of the warning light.

b) Fuel tank empty, indication

On aircraft fitted with a four-lobe tank incorporating modification AMS 2062, an additional "Push-to-test" type warning light (red), located above the gauge, flashes when the quantity of fuel remaining in the tank corresponds to 2 or 3 minutes flight.

Should this warning light flash :

LAND IMMEDIATELY

2.1.6 Lubrication (Refer to para. 1.3.4. for engine and to para. 1.4. for gearboxes)

2.1.6.1. Engine lubrication system (figures 2-1.7, 2-1.8)

The pressure pump (2, figure 2-1.8) draws the oil contained in the aircraft oil tank (20) connected to the banjo union (1) located at the bottom L.H corner of the accessory drive casing. From the outlet of pressure pump (2), the oil flows in front of the pressure relief valve (3) and, through a rigid pipe (4), enclosed between the accessory drive casing and the reduction gear cover, is conveyed to an oil filter (5) fitted with a valve (6) which provides for continued lubrication of the engine in the event of clogging up of the filter element.

From the filter, the oil is directed :

- through a rigid pipe (7), enclosed between the accessory drive casing and the reduction gear cover, to the bottom of the accessory drive casing whence it is conveyed, through ducts drilled in the casing walls, to the reduction gear, the accessory drives and the axial compressor front bearing,

- through an external pipe (8) to a tee-fitting (9) whence it is delivered through pipe (10) to the fuel pump drive housing and through pipe (11) to the dual banjo union (12) from where it is sent to the axial compressor rear bearing, the rotor assembly front bearing and the rotor assembly rear bearing.

After it has lubricated the various parts, the oil falls by gravity to the bottom of the casings, where it is collected by :

- scavenge pump (13) which takes care of the oil used for lubricating the reduction gear, the accessory drive gear and the axial compressor front bearing,

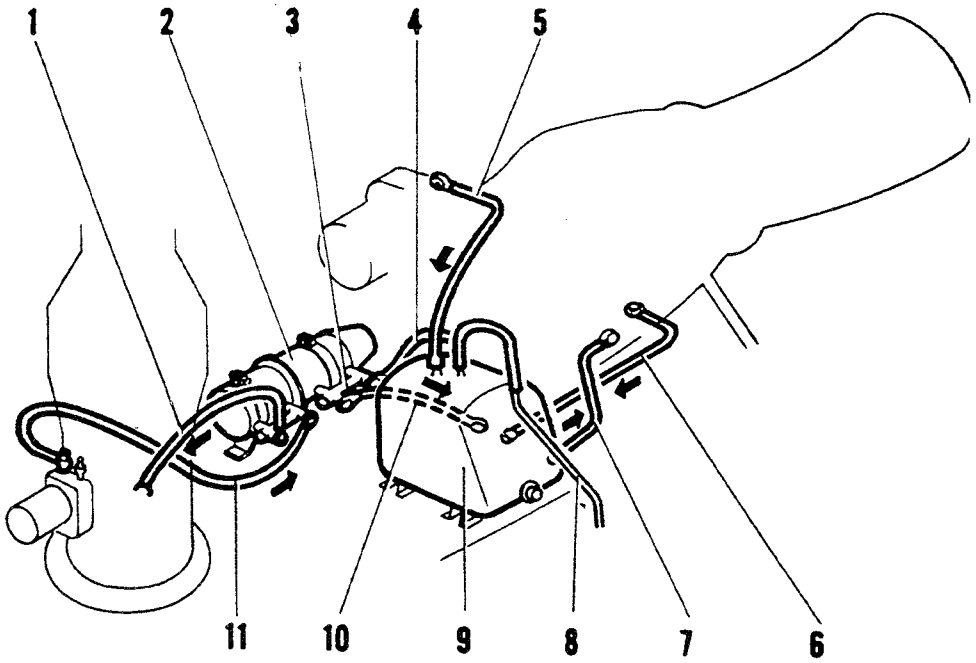
- scavenge pump (14) which takes care of the oil used for lubricating the rotor assembly rear bearing,

- scavenge pump (15) which takes care of the oil used for lubricating the gears and bearings contained in the fuel pump and governor drive housings,

- scavenge pump (16) which takes care of the oil used for lubrication of the axial compressor rear bearing and the rotor assembly front bearing.

NOTE : Scavenge pumps (13) and (14) which form with pressure pump (2) a unit mounted on the front face of the accessory drive casing, return the oil through line (23) to the cooler (21) fitted with a by pass valve (22).

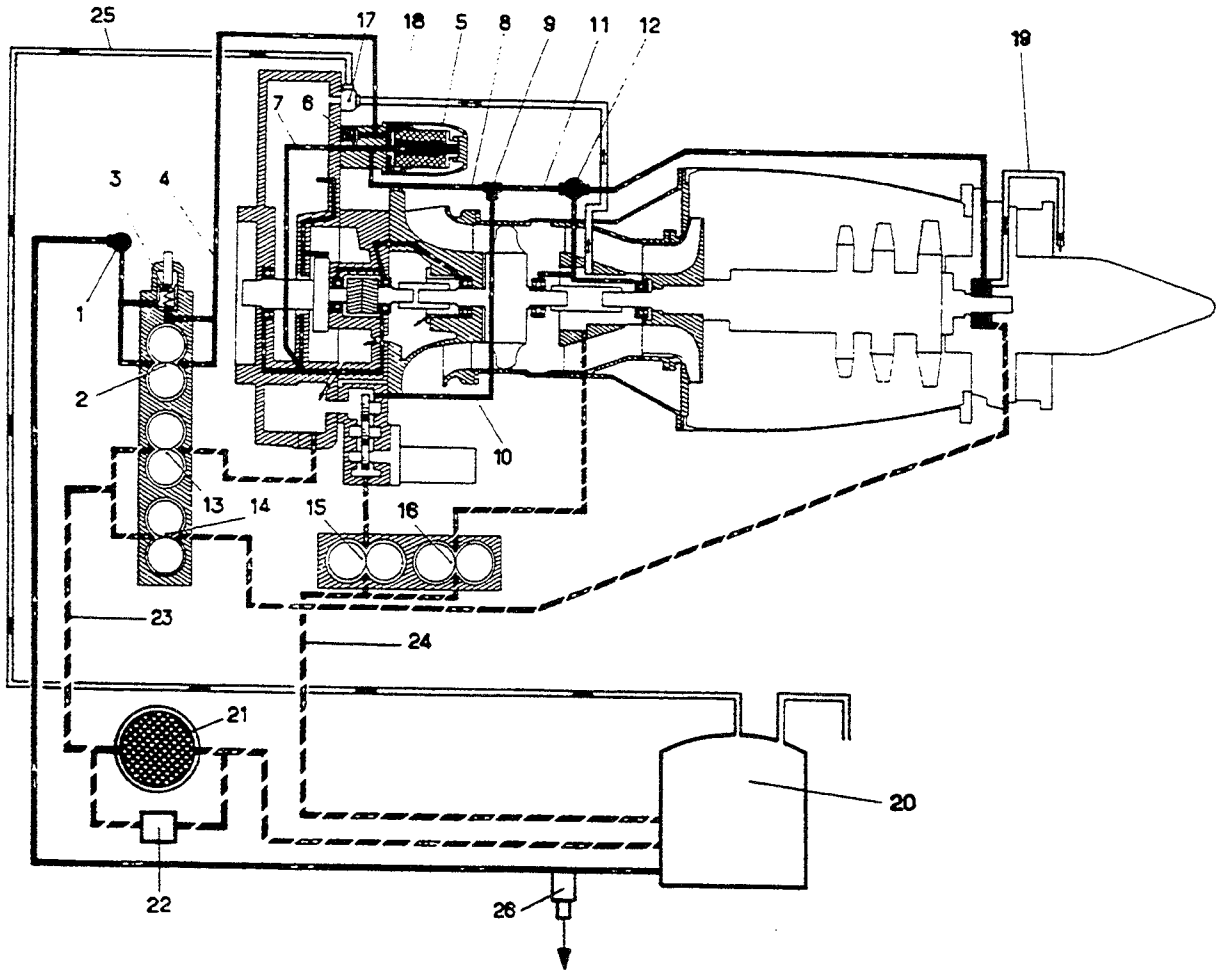
(continued on page 2-1.19)



1. Return to main gearbox
2. Oil coolers (main gearbox and engine)
3. By-pass valve
4. Return to oil cooler
5. Breather
6. Return to tank from centrifugal compressor casing bearings
7. Pressure pump delivery line
8. Vent
9. Oil tank
10. Return to oil tank
11. Return to oil cooler

Engine and main gear box lubrication system layout

Figure 2-1.7



1. Banjo union
2. Pressure pump
3. Relief valve
4. Oil line
5. Oil Filter
6. Valve
7. Oil line
8. Oil line
9. Tee fitting
10. Oil line
11. Oil line
12. Dual banjo union
13. Scavenge pump
14. Scavenge pump
15. Scavenge pump
16. Scavenge pump
17. Special QUINSON union
18. Oil line
19. Rear bearing vent line
20. Oil tank
21. Oil cooler
22. By pass valve
23. Oil line
24. Oil line
25. Oil line
26. Temperature bulb

Engine oil system diagram
Figure 2-1.8

2.1.6.1 Engine lubrification system (continued)

Scavenge pumps (15) and (16) are mounted on the fuel pump drive housing, between the fuel pump and the housing. They return the oil through line (24) to the tank (20).

The reduction gear casings are vented through a special Quinson type union (17) to which is also connected the centrifugal compressor casing vent line (18). Oil vapours are returned to the tank (20) through line (25) connected to the union (17).

Venting of the rotor assembly rear bearing is effected through a vent line (19).

Oil system operation is checked by means of :

- a pressure transmitter connected to a special fitting provided at the top of the engine oil filter.

- a temperature bulb (26) mounted at the oil tank outlet.

A low-pressure switch (Post MOD 1326) causes a red warning light on the instrument panel to come on in case of a pressure drop (< 1.1 bar) in the engine oil system.

2.1.6.2. Main gear box lubrification system (fig. 2-1.9)

The lower housing of the main gearbox is an oil sump ; its capacity is approximately 4.5 l (1.2 U.S. gallons). It is provided with an oil level window. A gear-type oil pump delivers oil at a pressure of 5 ± 1 bars (73 ± 15 p.s.i.) through the oil cooler to the pressure filter from where it is distributed to :

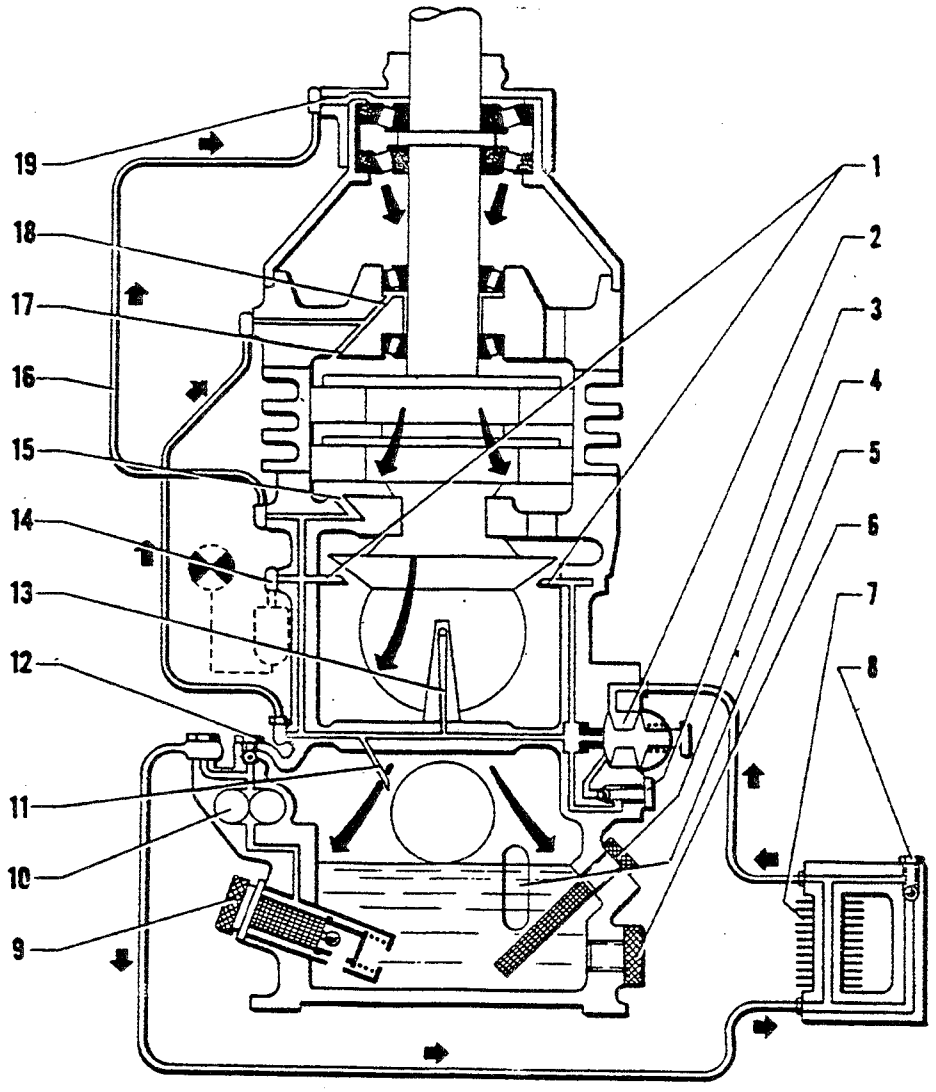
- the input bevel gears
- the freewheel oil jet
- the 1st stage planetary gear
- the pressure-switch connection
- the rotor shaft bearings, through an external hose
- the 2nd stage planetary gear, also through an external hose.

The oil returns by gravity to the lower housing.

A pressure switch causes a warning light, on the instrument panel, to come on immediately the oil pressure falls below 1.5 bars (22 p.s.i.) and a thermalswitch causes a second warning light to come on whenever the temperature exceeds 110°C

2.1.6.3. Tail rotor bear box lubrification.

The tail rotor gear box has an oil capacity of 0.50 l (0.13 U.S. gallons) usable, and is provided with an oil lever window. The gears, bearings and other internal components are splash-lubricated.



Main gearbox lubrication diagram
Figure 12-1.9

KEY TO FIGURE 2-1.11

1. Main bevel gear oil jets
2. Pressure filter
3. Pressure filter by-pass valve
4. filler plug
5. Oil level sight gauge
6. Drain plug
7. Dual oil cooler (main gearbox and engine respectively)
8. Cooler by-pass valve
9. Suction filter with magnetic plug
10. Gear-type pump
11. Tail rotor power take-off bevel gear oil jet
12. Pump relief valve
13. Main drive shaft oil jet
14. Pressure connection
15. 1st stage reduction gear oil jet
16. External hose
17. 2nd stage reduction gear oil jet
18. Upper bearing oil jet
19. Main rotor shaft bearing oil jet

SGAC approved
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2.1.7. Miscellaneous installations

2.1.7.0. Electrical installation

Electrical power is fed :

- For starting: either by the aircraft battery or by an auxiliary starting unit connected to the external power receptacle (located aft in the lower port side of the fuselage).
- In flight : by a 4000-W starter-generator.

The generator delivers power via a circuit-breaker to a busbar located in the electrical equipment box.

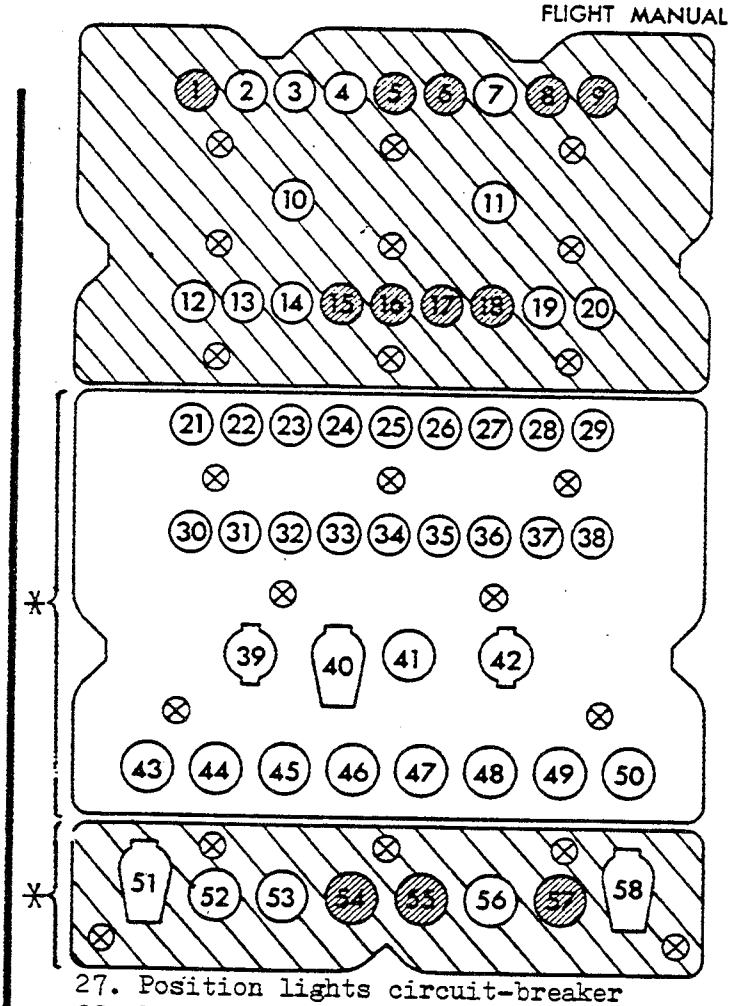
Located on the instrument panel is a red warning light which comes on when the engine is inoperative or the relay trips, and goes out when the engine reaches a speed of 21 000 r.p.m. A voltmeter indicates the network voltage at all times. A generator switch located on the overhead panel enables the generator to be stopped or operated.

The network voltage is stabilized by means of a regulator which maintains a rated voltage of 28.5 volts.

According to version, the aircraft comprizes an a.c. power supply system.

- A d.c. - fed inverter delivers 115-200 V/400 Hz, three-phase current to the network.
- From the overhead panel :
  - a "GENE. " (a.c. GENERATOR) switch enables the power supply to be switched on or off.
  - a circuit-breaker ensures protection of the installation.

28-Volt power is fed to the inverter via a fuse located in the electrical equipment box.



K E Y

1. Circuit-breaker not used
2. Missile circuit-breaker
3. Rocket circuit-breaker
4. Smoke rocket circuit-breaker
5. Circuit-breaker not used
6. Circuit-breaker not used
7. APX sight circuit-breaker
8. Circuit-breaker not used
9. Circuit-breaker not used
10. Servo-damper three-pole circuit-breaker
11. APX sight three-pole circuit-breaker
12. Fuel jettison circuit-breaker
13. Magnetic brakes circuit-breaker
14. Servo-damper circuit-breaker

15 to 18. Circuit-breakers not used

19. Harpoon circuit-breaker
20. Emergency floatation gear circuit-breaker
21. I.C.S. circuit-breaker
22. H.F. circuit-breaker
23. V.H.F. circuit-breaker
24. U.H.F. circuit-breaker
25. a.c. power supply circuit-breaker
26. Landing light circuit-breaker
27. Position lights circuit-breaker
28. Instrument panel lighting circuit-breaker
29. Cabin lighting circuit-breaker
30. Radio-altimeter circuit-breaker
31. Radio-compass circuit-breaker
32. Emergency release circuit-breaker
33. Mission circuit-breaker
34. Pitot-tube heating circuit-breaker
35. Starting circuit-breaker
36. Fuel check circuit-breaker
37. Instruments circuit-breaker
38. 24-Volt socket circuit-breaker
39. Instrument panel lighting rheostat
40. Mission power supply circuit-breaker
41. Position lights selector switch. External lighting
42. Overhead panel and pedestal lighting rheostat.
43. I.C.S. switch
44. H.F. homing switch
45. H.F. squelch switch
46. Pitot-tube heating switch
47. a.c. power supply switch
48. Windscreen wiper switch
49. Generator switch
50. Battery switch
51. Fuel jettison switch
52. Magnetic brakes switch
53. Servo-damper switch
54. Not used
55. Not used
56. APX sight switch
57. Not used
58. Emergency floatation gear switch

Note : According to version and optional equipment items installed panels marked thus * may be replaced by blanking plates; circuit-breaker and switch positions not used are blanked.

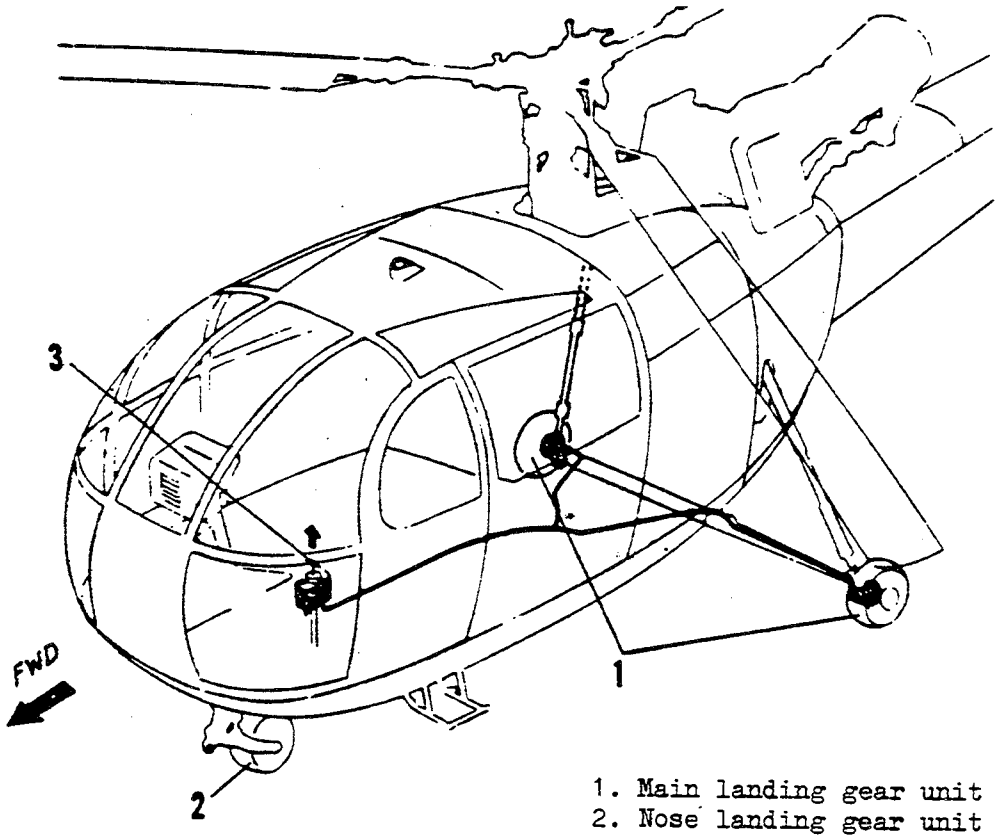
Overhead panel
Figure 2-1.9 a

2.1.7.1. Wheel type landing gear (Figure 2.1.10)

The aircraft is fitted with a tricycle landing gear consisting of a main gear unit and a nose gear unit providedwith a centering cam which acts for angles of up to ± 45° relative to the centre line of the aircraft.

The main wheels are fitted whith hydraulic brakes controlled by means of a handle (3) located on the cabin floor to the left of the pilot's seat. For braking action, turn the handle 90° anti-clockwise, then pull the handle up.

To release the brakes, press the handle down in such a position that the dowel enters the slot and rotate it 90° clockwise. (See § 2.3.19 for differential brakes).



1. Main landing gear unit
2. Nose landing gear unit
3. Parking brake control

Wheel type landing gear and parking brake
Figure 2-1.10

2.1.7.1 Wheel type landing gear (Fig. 2.1.10) (cont d)

Inflations pressures:

Shock struts :

- Rear shock strut : 6.03 bar (87 p.s.i.)
- Front shock strut : 29.5 bar (427 p.s.i.)

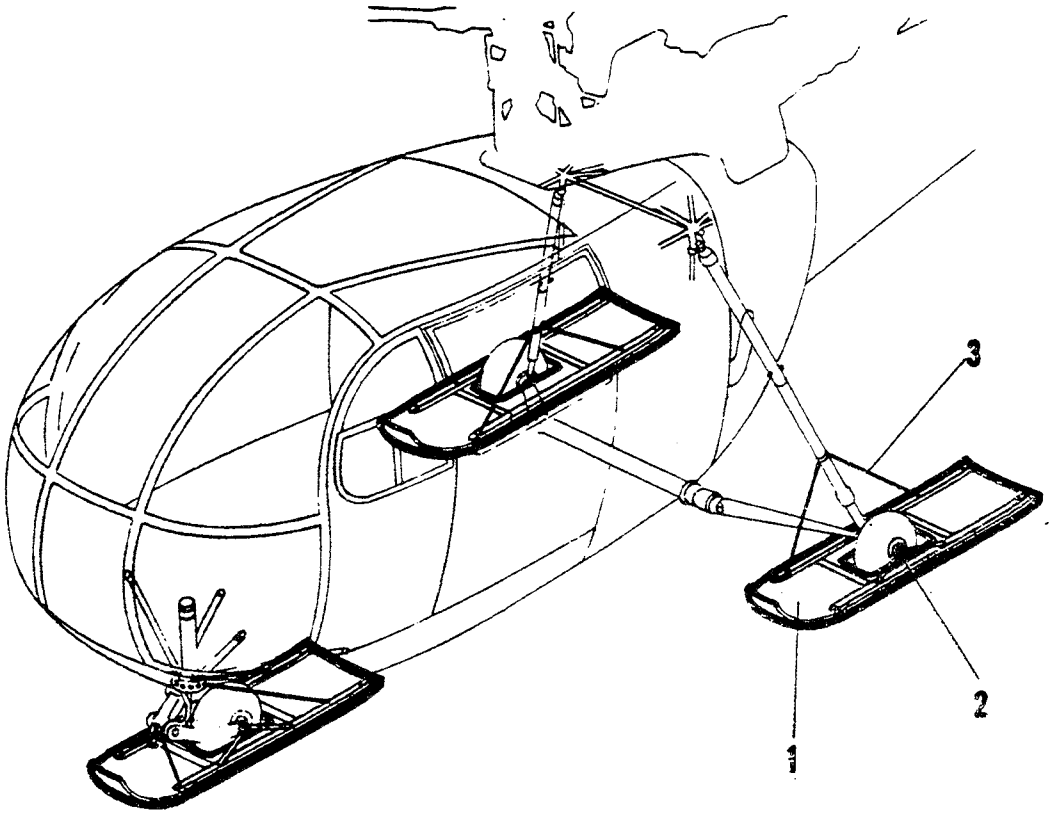
Tyres :

- Main L.G. wheels : 5 bars (72.5 p.s.i.)
- Nose L.G. wheels : 5 bars (72.5 p.s.i.)

Certain helicopters incorporate a "Nose L.G. wheel centering and locking device", which is operated by the pilot. Unlocking is accomplished by exerting a pull on the handle.

2.1.7.2 Ski type landing gear (ref. fig. 2-1.10a)

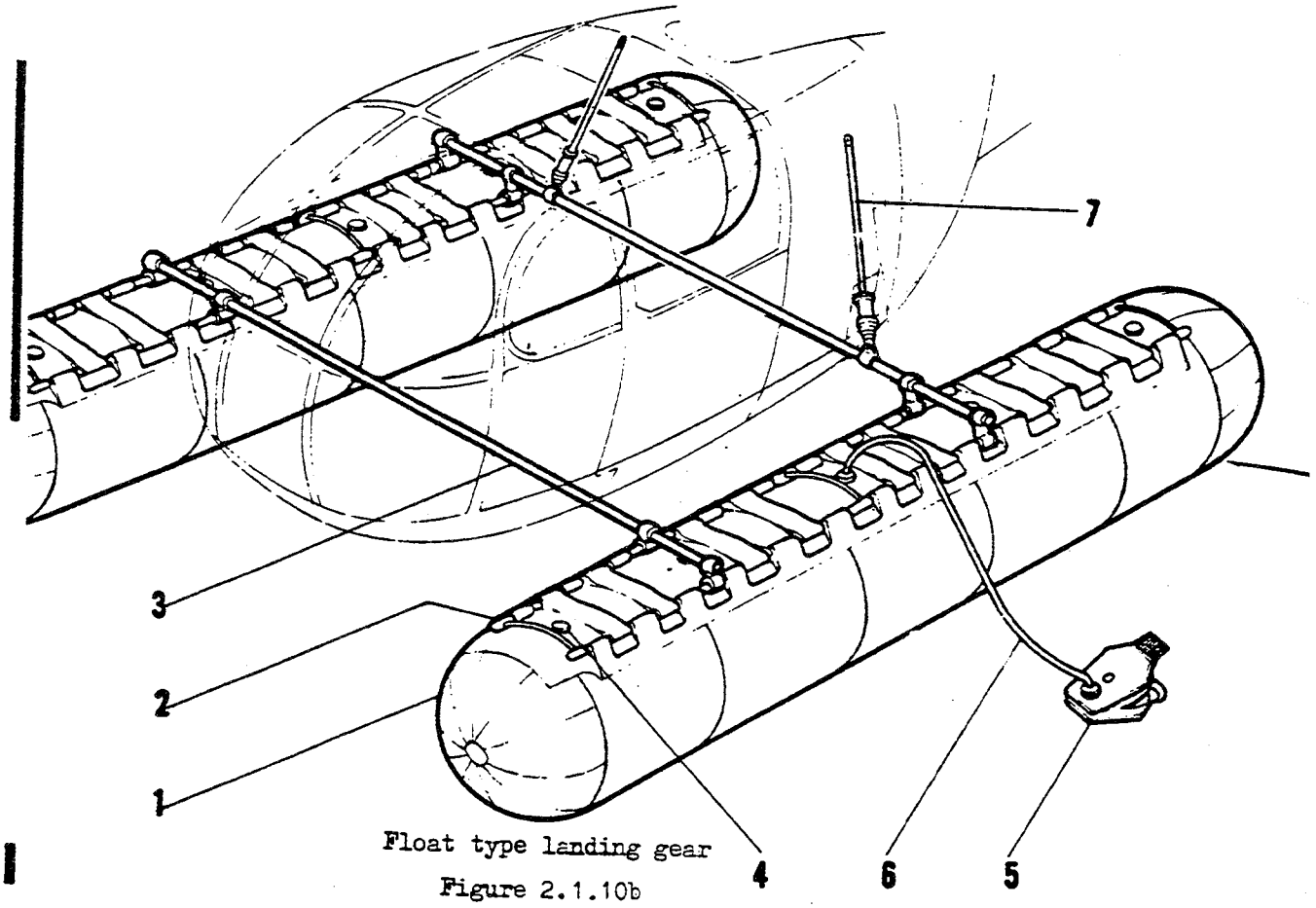
Installation of ski type landing gear is recommended whenever the aircraft is to be landed on a snow covered ground. This installation is absolutely necessary when the aircraft is intended for operation on soft snow.
The ski equipment does not preclude taxiing of the aircraft on its wheels.
The ski equipment has no significant effect on the performance nor on the flying qualities of the aircraft.
The skis (1) are attached to the wheel landing gear by a centrally located bolt (2) and they are held longitudinally by cables (3) which are secured to the shock absorbers.



Ski type landing gear
Figure 2-1.10a

2.1.7.3 Float type landing gear (Fig. 2.1.10b)

The aircraft fitted with float type landing gear can operate both from normal ground and water surfaces. This landing gear consists of two "Aerazur" rubberized fabric floats (1) each made up of five water-tight cells. The floats are supported by two side-frames (2) which are interconnected by two steel cross-tubes (3), secured by clamps to the aircraft structure. Shock struts (7) are mounted between the rear cross-tube and the body structure. An inflation cap (4), incorporating a check valve is provided on each cell. A foot operated bellows (5) and a hose (6) enable fast inflation of floats. A removable cap, fitted with a pressure gauge, is provided for checking inflation pressure. A special dolly is provided to facilitate ground handling of the helicopter.



Float type landing gear
Figure 2.1.10b

2.1.8. Flying controls.

2.1.8.0. General.

The flying controls include :

1. The main rotor controls comprising :
   A. The cyclic-pitch control system (pilot's stick)
   B. The collective-pitch control system (pilot's pitch lever)

   These systems consist of control rods and bellcranks and include hydraulic servo units.

2.1.8.0. General (continued)

b. The rudder control (anti-torque tail rotor) :

This system consists of bellcranks and control rods which run below the structure and actuate the tail rotor through control cables and music wires.

2.1.8.1. Cyclic-pitch control (fig. 2-1.11)

Cyclic-pitch variation is controlled through a swash-plate assembly consisting of a rotating star (1) connected to the pitch change rods (4), and a non-rotating star (2) connected to the cyclic control stick.

The cyclic-stick control tilts the swash-plate assembly to move the pitch-change rods vertically.

Three control tubes are connected to the non-rotating star. The two diametrically opposed tubes (6) and (7) provide lateral control by differential action while the third tube (5), which lies in a plane at right angles to that of the lateral control tubes, transmits longitudinal control movements.

A nut, located at the base of the cyclic control stick, within the pilot's reach, is used to adjust the friction provided by the clamping of a steel cup on a ball secured to the floor. An adjusting collar located above the nut, limits loosening of the latter by the pilot, thus providing the required residual friction (refer to paragraph 2.2.7).

2.1.8.2. Collective-pitch control (fig. 2-1.12)

The three mixing unit bell-cranks are pivoted on a common hinge pin (17) carried by the collective bell-crank (18) connected to the collective-pitch control lever (10). The substantially vertical movement of this hinge pin (17) is, therefore, transmitted simultaneously to the three swash-plate control tubes (19) causing the swash-plate assembly to move vertically on the rotor shaft, thereby varying the pitch of the three blades by the same amount.

Collective-pitch friction is adjusted by the pilot by means of a large knob at the base of the pitch lever.

The high pitch stop enables the pilot to increase collective-pitch to a value greater than 1, which is permissible only when accomplishing an autorotative landing. An adjustable low pitch stop determines rotor r.p.m. in autorotative flight conditions. Collective-pitch values are transmitted by an electrical transmitter, connected by a link to the collective-pitch lever torque shaft, to an indicator on the instrument panel of which the graduations correspond to the pitch angles shown on the following diagram, for blades marked "12° 40'" (design incidence angle) :

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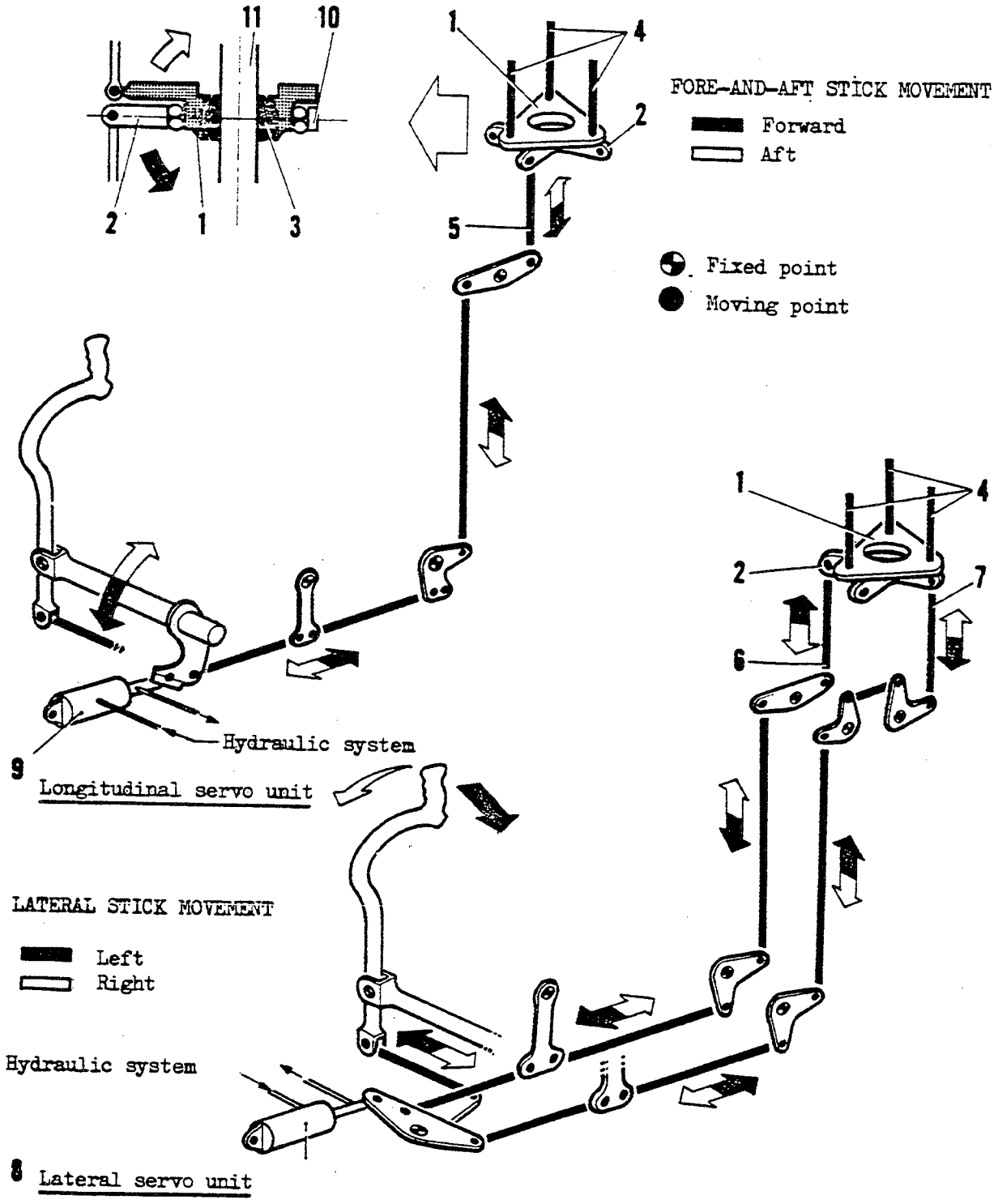

Cyclic-pitch control system operating diagram
Figure 2-1.11

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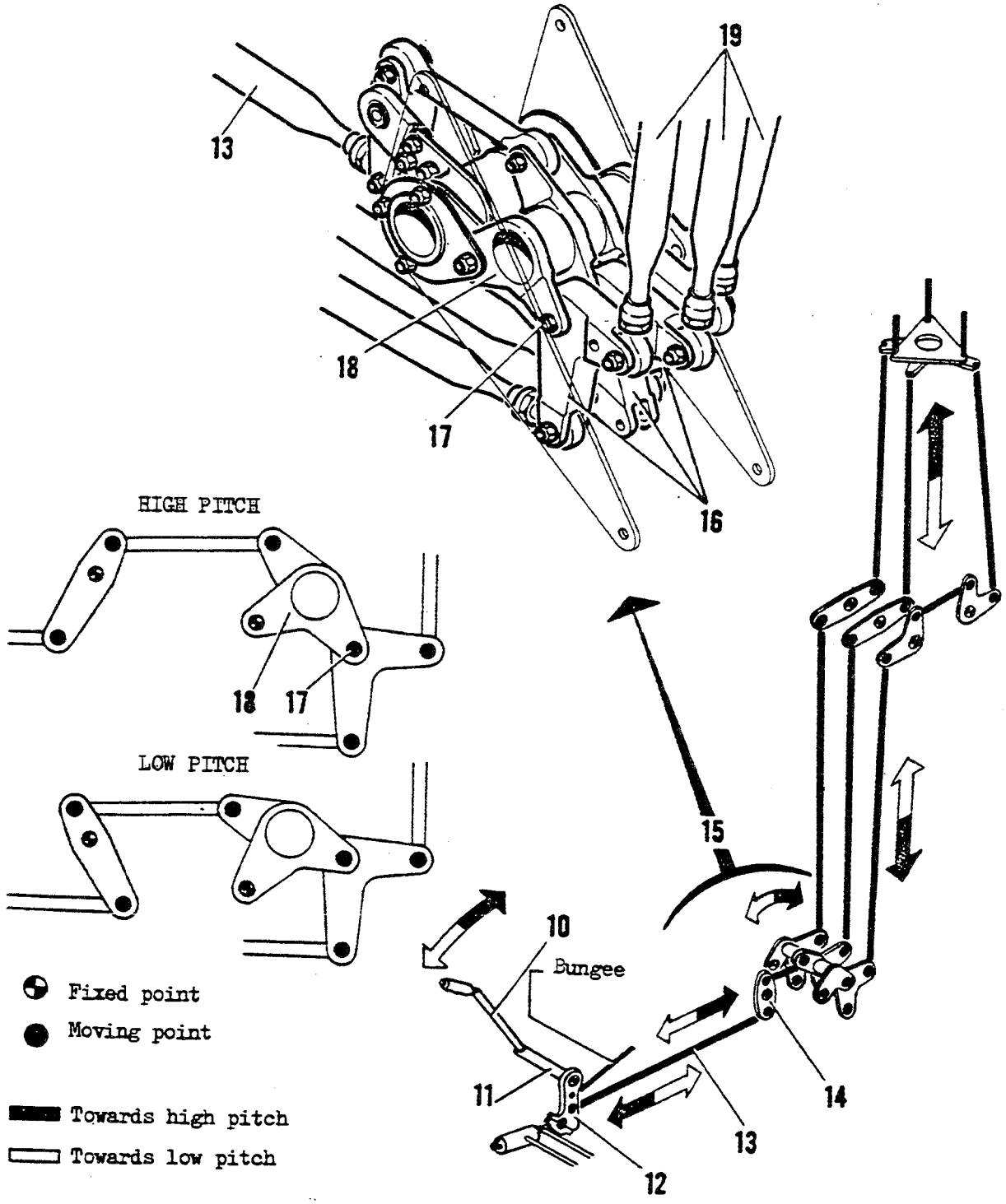
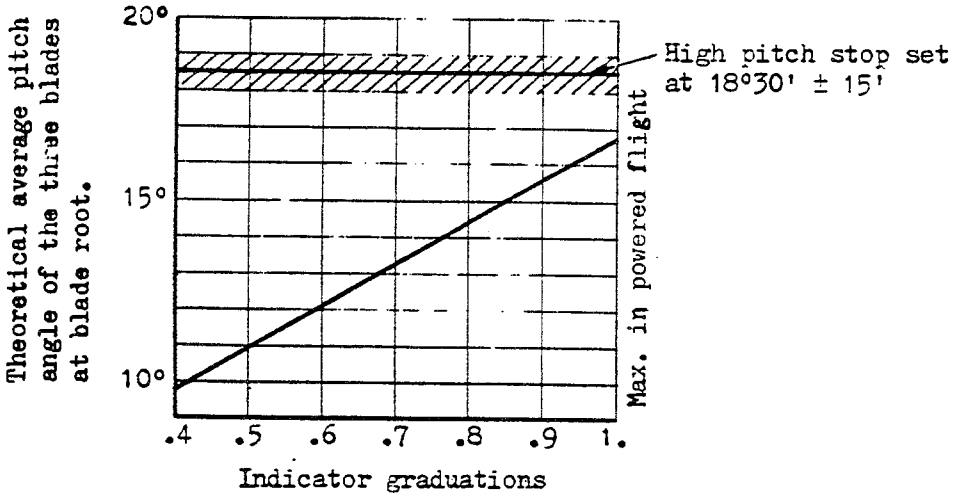


Collective-pitch control system operating diagram
Figure 2-1.12

2.1.8.2. Collective-pitch control (continued)

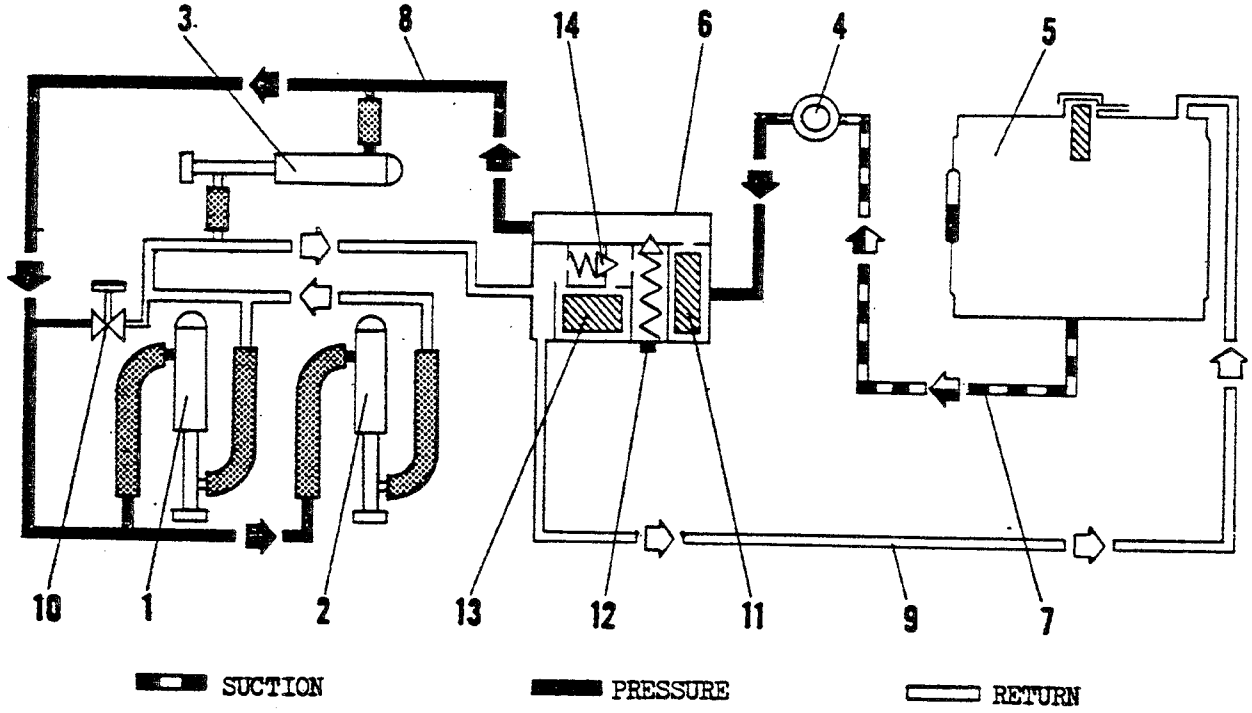


2.1.8.3. Servo units (fig. 2-1.13)

Collective-pitch lever and cyclic-stick forces are eliminated by hydraulic servo units which also dampen out control system vibrations and prevent control force feedback. In the event of servo unit failure, the aircraft remains flyable for the servo units can then be cut out through a cock located near the pilot.

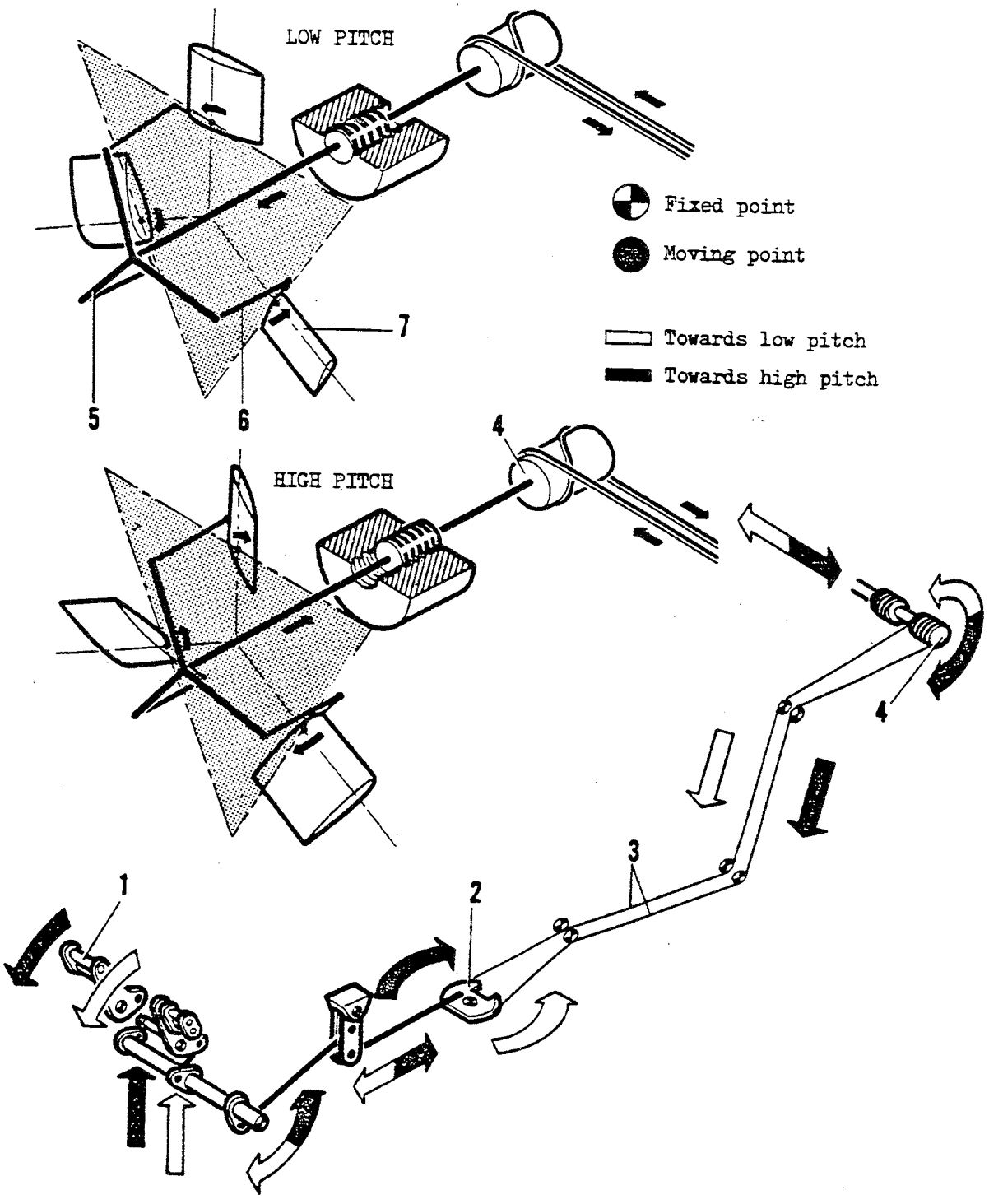
2.1.8.4. Tail rotor control (fig. 2-1.14)

Directional control consists in varying the pitch angle of the tail rotor blades (7) by action on rudder pedals (1). As the tail rotor is located below the main rotor plane, the aircraft exhibits a slight tendency to bank towards the right in power-on flight.



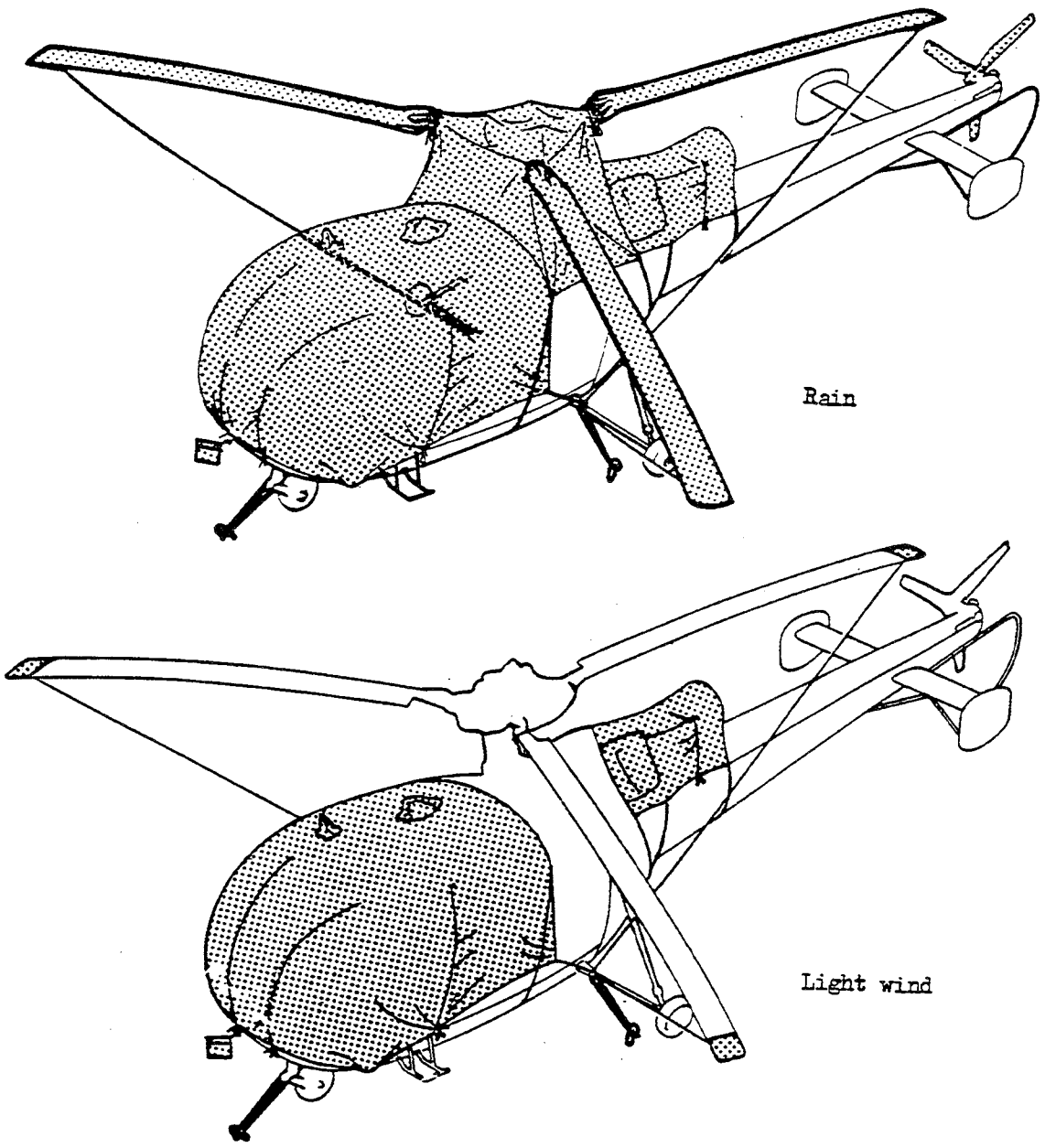
1. Longitudinal servo unit
2. Lateral servo unit
3. Collective-pitch servo unit
4. Pump
5. Reservoir
6. Filter unit
7. Suction line
8. Pressure line
9. Return line
10. Cock
11. 50-micron pressure filter
12. Safety valve 28 Hpz (406 p.s.i.)
13. 20-micron return line filter
14. 20-micron filter valve

Servo controls-Operating diagram
Figure 2-1.13

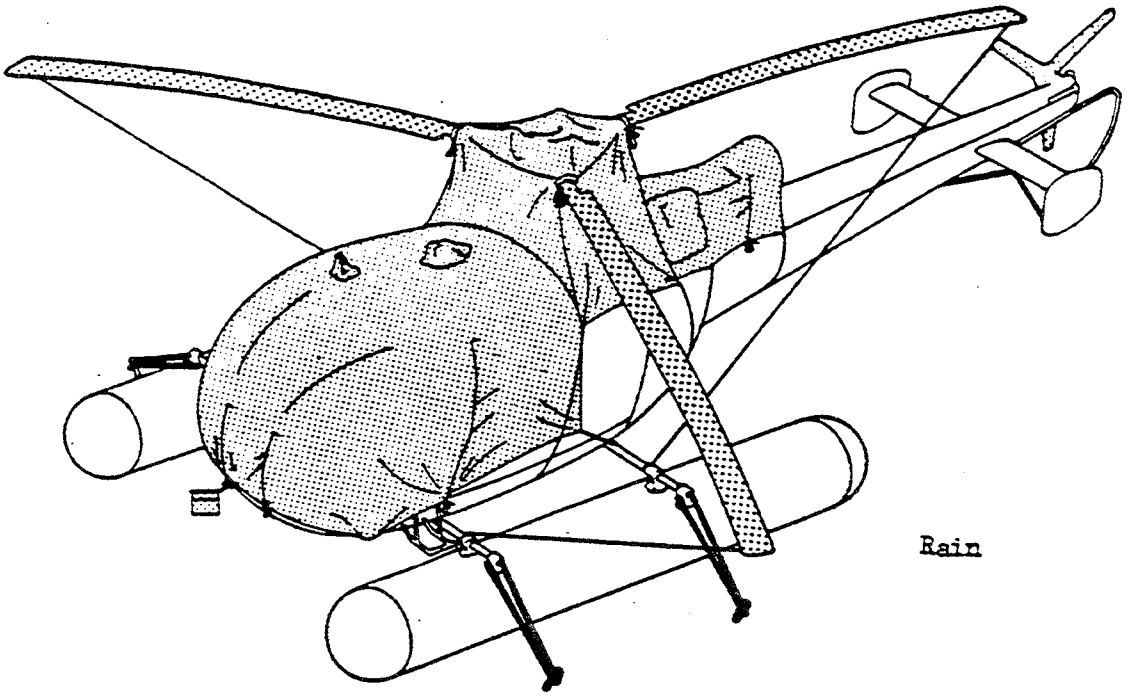


Tail rotor control system operating diagram
Figure 2-1.14

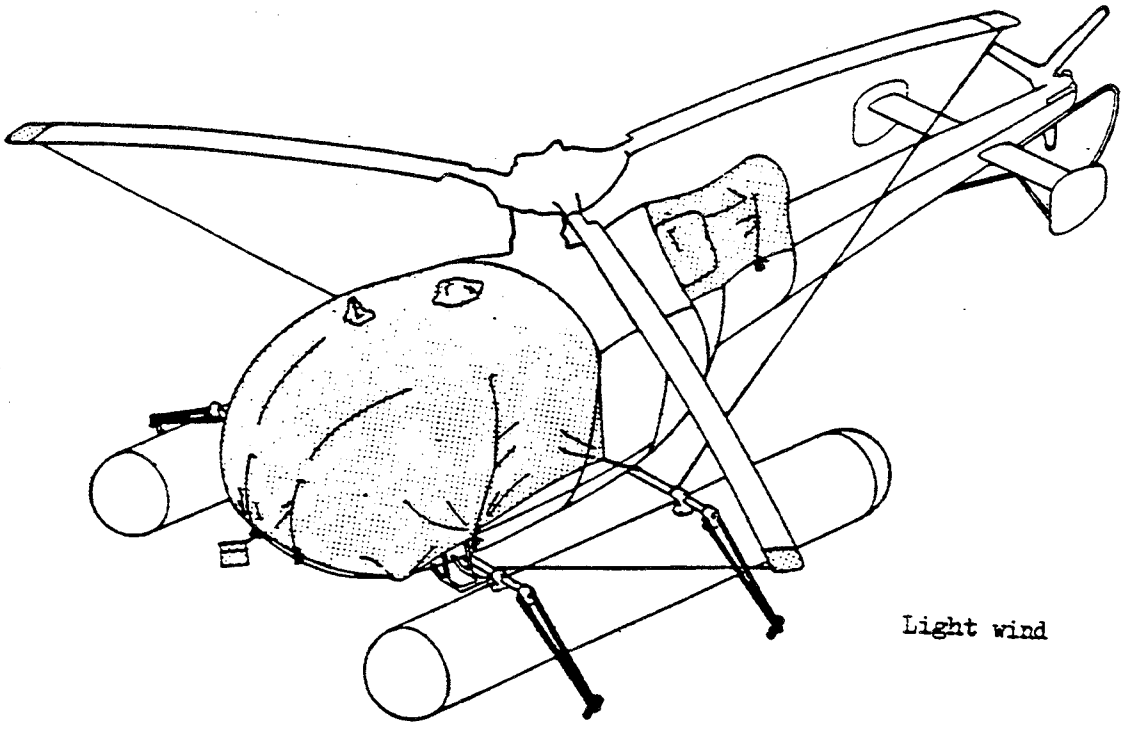
2.1.9. PARKING (Figures 2-1.15, 2-1.15a and 2-1.15b)



Parking in the open and mooring
Figure 2-1.15

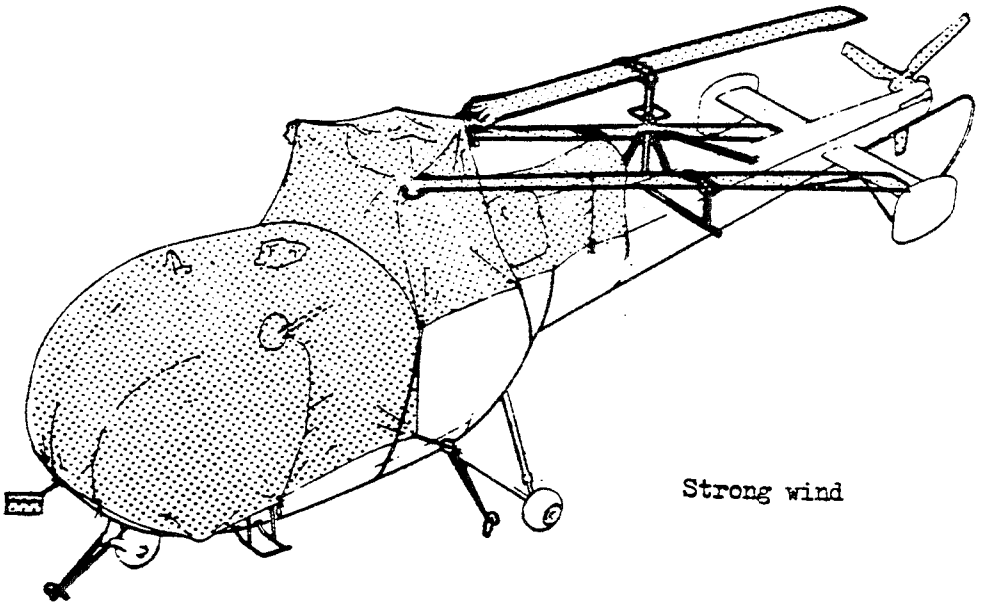


Rain

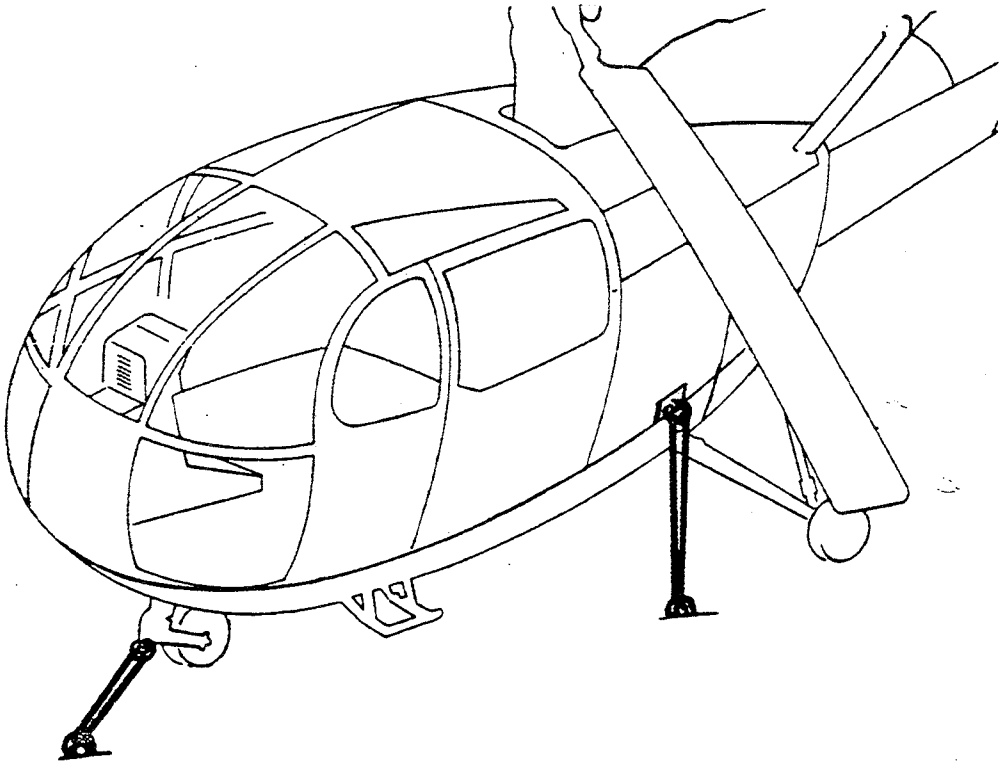


Light wind

Parking in the open and mooring
Figure 2-1.15a



Parking in the open and mooring
Figure 2-1.15b



Mooring for ship-based aircraft
Figure 2.1.15c

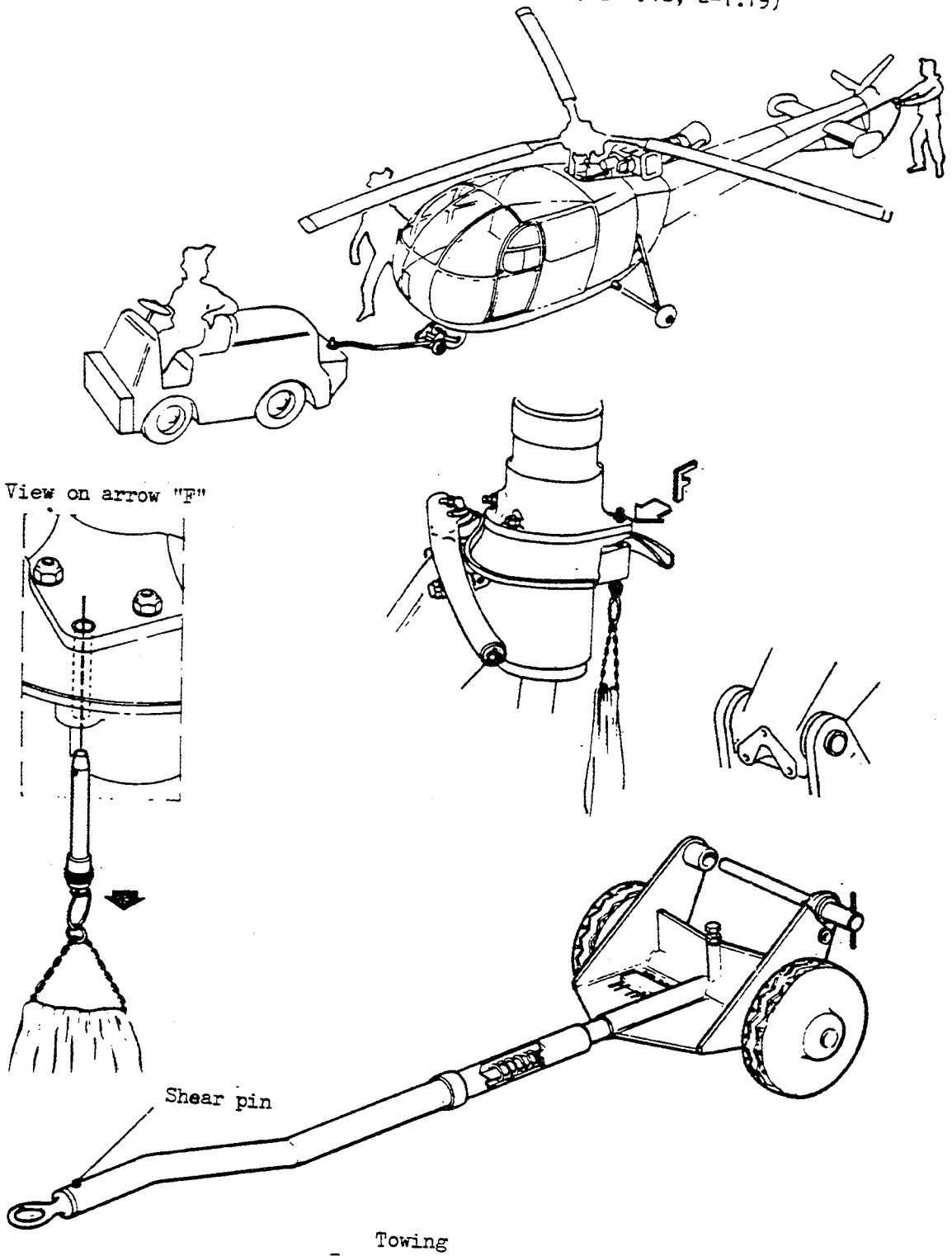
PARKING REQUIREMENTS

	OPERATIONS	Tool number	Under shelter	In the open		
				Light wind	High wind	Rain
1	A/c. headed into wind					
2	Battery switch : OFF					
3	Air intake blanks	3160-93-56-030 or 3160-93-56-040-1				
4	Tail pipe blank	3160-93-56-020-1				
5	Pitot tube (Std.) cover Pitot tube (heated)cover	3160-93-76-000 3160-93-73-000				
6	Cabin doors closed(note a)					
7	Cabin cover (Do not over-tighten straps)(note d)	3160-93-25-010-2				
8	Tie-down pegs	3160-95-00-102				
9	Tie-down cables	3160-95-00-101				
10	Rotor brake applied					
11	M.R. blades tied down (cables moderately taut)	3160-93-11-110				
12	M.R. blade covers (note f)	3160-93-11-080				
13	Tail rotor cover	3160-93-33-010-1				
14	Tail rotor locked (elastic cords)	3160-93-34-020-1 or 3160-93-34-040-1				
15	Main rotor blades folded	3160-93-11-120-1				
16	Transmission cover(note e)	3160-93-12-000-3				
17	Parking brake applied					
18	N.L.G. castor (locked)					
19	Engine cover (note c)	3160-93-50-000-1				
20	Sand filter cover	3160-93-73-030				
21	Hoist cover	3130-95-70-020 or 3130-95-73-020-1				

NOTES : a. In hot sun, open the sliding doors.
b. In icing conditions, coat the blades with glycerine.
c. Install the engine cover for short periods of parking in rain.
d. Before installing the cabin cover, ascertain that the side-slip indicator is engaged in the slot provided.
e. Install the oil reservoir shields 3130-95-13-200
f. Install the static discharge wick shields 3160-93-11-090

SGAC Approved
July 26, 1968

2-1.10 Ground Handling (Figures 2-1.16, 2-1.17, 2-1.18, 2-1.19)



Towing
Figure 2-1.16

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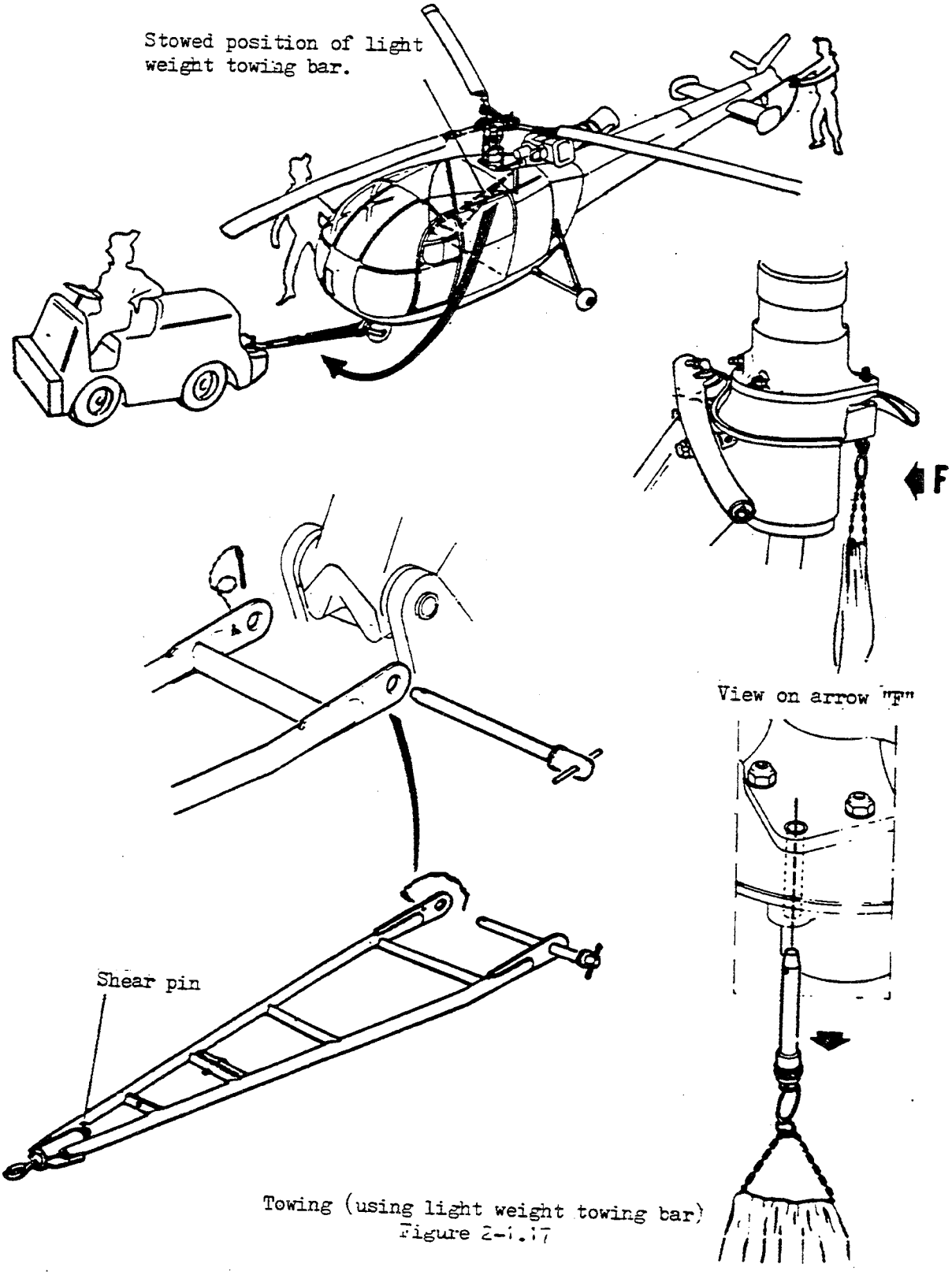
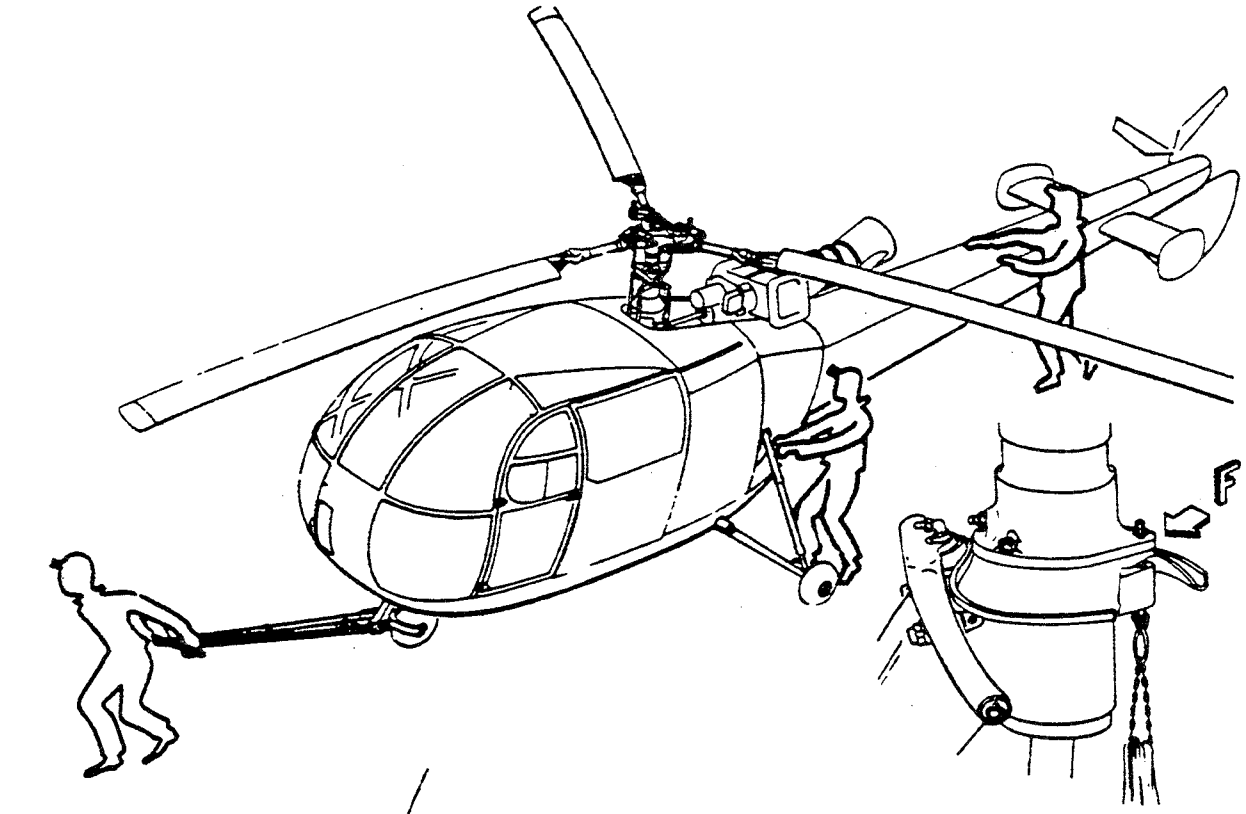
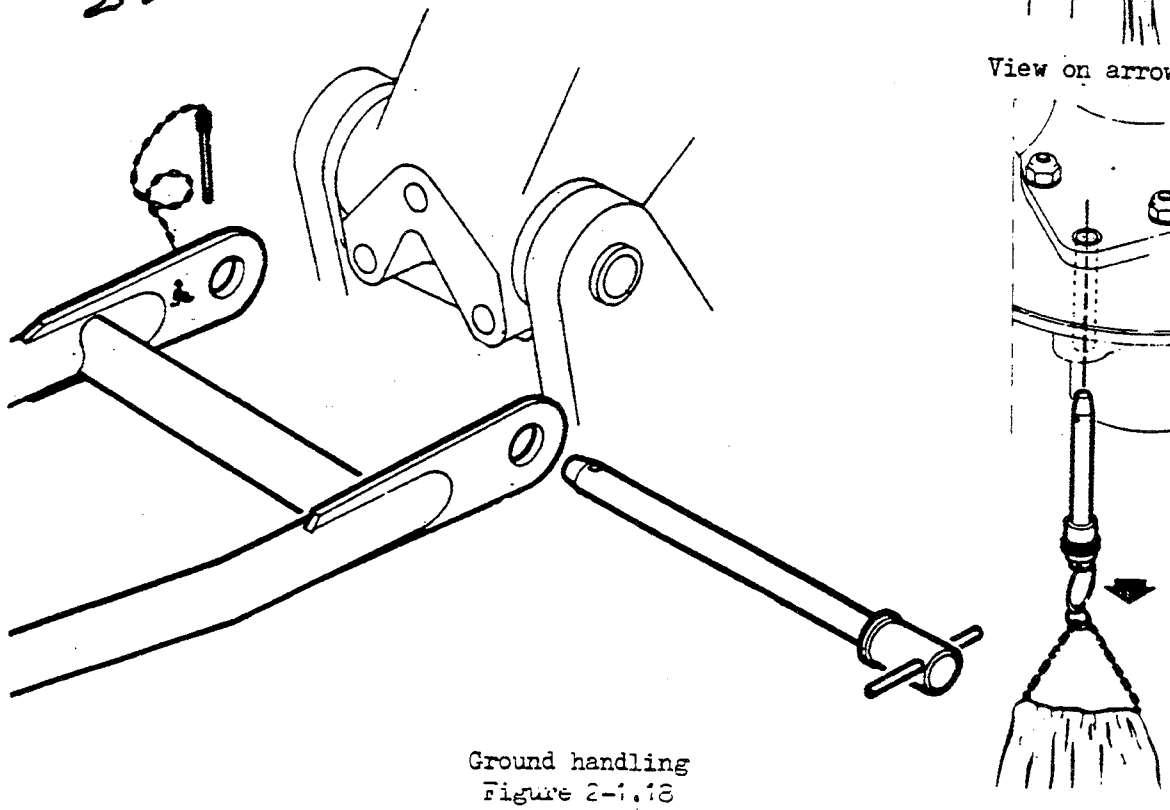


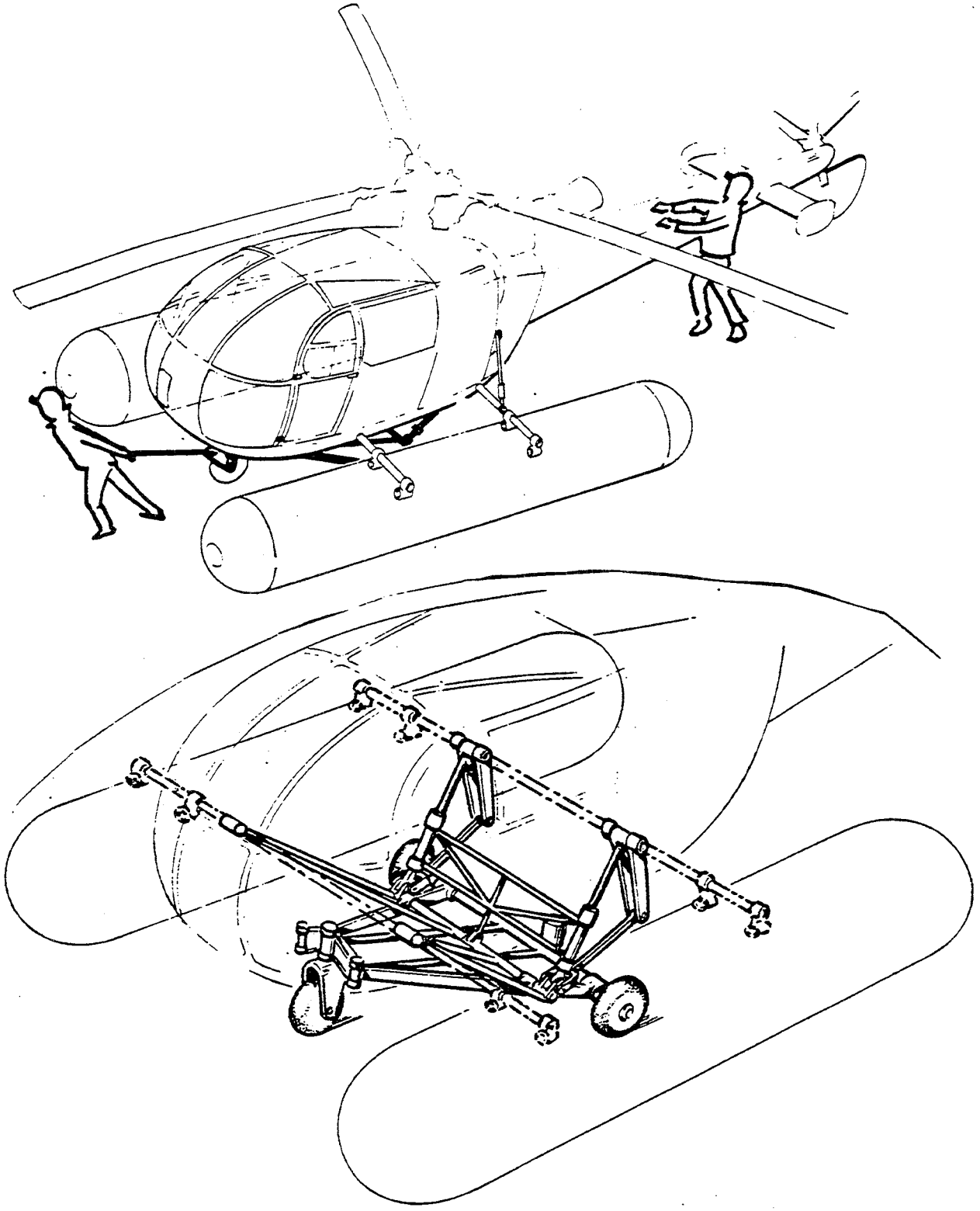
Towing (using light weight towing bar)
Figure 2-1.17



View on arrow "F"



Ground handling
Figure 2-1.18



Ground handling (Float type landing gear)
Figure 2-1.19

SECTION 2

2.2. NORMAL OPERATING PROCEDURES

CONTENTS

2.2 NORMAL OPERATING PROCEDURES

2.2.1 Foreword

The Alouette III is a high-performance machine designed for operation over a very wide range of weight, c.g. and altitude conditions. In view of its excess power capability close to the ground, and considering the high altitude up to which the aircraft may be flown at maximum gross weight, it is not recommended to check out a pilot until he has completed 5 flying hours at the controls of the Alouette III with an instructor who will have stressed the following points :

- collective-pitch limitations versus altitude and temperature conditions.
- need to watch autorotative r.p.m. at maximum gross weight, when flying close to ceiling of aircraft.

Peculiarities of helicopters powered by single shaft turbine engines are as follows :

The Alouette III, as the Alouette II, is powered by a constant speed single-shaft turbine engine which means that power changes merely entail a variation in torque.

The pilot has no means of acting directly on engine power. Power demand is altered by acting on the collective-pitch angle, and an automatic device renders engine power output equal to the power demand, thereby maintaining a constant r.p.m. value.

The advantages of the single-shaft turbine (wherein the compressor and all the turbine stages are mounted on the output shaft) over the free turbine (wherein one shaft carries the compressor and the gas generating turbine, while another shaft - the output shaft- carries the power output turbine) are as follows :

1. More simple machine (a single shaft mounted on bearings) and more convenient layout : the burned gases are ejected rearwards (which gives extra power) while the output shaft emerges directly in front, whereas in a free turbine the output shaft is on the side where ejection of the gases takes place.

2. Faster response since there is no inertia to be overcome, due to the fact that power changes take place at constant r.p.m.

3. As a result of the above, governing is more readily accomplished.

4. No risk of flame out at reduced power, for engine speed is high even at zero power output, which is not the case with free turbines.

   The only advantage to the credit of the free turbine is that it requires no clutch.

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2-2.1 Foreword (continued)

Since the pilot has no direct control over power output, he is not given any engine parameter to abide by (such as manifold pressure in the case of piston-engined helicopters). He is told what collective-pitch value should be adopted. The prime instrument for the Alouette pilot is the collective-pitch indicator. This indicator serves a dual purpose :

a. It enables determining the weight of the helicopter in hovering flight.

Since, for a given incidence angle, lift is proportional to the density of the air, the ratio $\frac{\text{Weight}}{\text{Density}} = \frac{W}{\sigma}$, in hovering flight, is always the same for the same pitch angle. Consequently, instead of reading degrees, the collective pitch indicator has been graduated in values of $\frac{W}{\sigma}$ relative to the value of $\frac{W}{\sigma}$ at maximum collective pitch.

This maximum collective pitch value is defined as the incidence angle limit not to be exceeded; the polar curve of the airfoil tends to flatten out and, at a certain moment, an increase in incidence angle very rapidly amplifies the power demand on the engine although the gain in lift is practically nil. Experience proves that the incidence angle at which this occurs corresponds to the blade pitch obtained in hovering flight with a $\frac{W}{\sigma}$ value of 3000 kg (6 600 lb)

Therefore :

$\frac{W}{\sigma}$ max. = 3000 kg (6,600 lb)

and :

$$\theta = \frac{\frac{W}{\sigma}}{3000 \text{ kg } (6{,}600 \text{ lb})}$$

$$W = 3000 \text{ kg } (6\,600 \text{lb}) \times \theta \times \sigma = 3000 \text{ kg } (6\,600 \text{lb}) \times \theta \times \frac{Pa}{1013} \times \frac{288}{T}$$

Pa = atmospheric pressure T = absolute air temperature

this calculation being performed instantly by means of a circular computer surrounding the collective-pitch indicator.

b. It is used for setting a given power value and for checking that maximum permissible power is not exceeded.

Permissible power in the various flight conditions is as follows :

The engine is an 870 h.p. turbine of which only 542 h.p. is used as mechanical power (the reduction gear is designed for 592 h.p.)

The transmission is designed for the following power ratings :

444 HP (331 kW) at maximum continuous power
542 HP (405 kW) at take-off power

Flying rules are such that :

- in hovering flight in or out of ground effect, the maximum required power output is 493 h.p.

- even when the required power output is 493 h.p. when hovering I.G.E., the pilot can climb vertically during a short period by using 532 HP.
- the power required for climb is about 444 h.p.
- the power required for cruising is less than 444 h.p.

Hovering flight

For a given pitch value, power output decreases with air density and, therefore, the pitch value giving 493 h.p. in hovering conditions increases with altitude.

The collective-pitch indicator is graduated in altitude values ; thus, when the needle is opposite the altitude at which the aircraft is hovering, the power output is 493 h.p.

It follows that if the needle moves beyond the figure corresponding to his altitude, the pilot knows that the aircraft is overloaded. Theoretically, it is density-altitude that is involved, but the pilot may consider that density-altitude and his altimeter reading are one and the same. If he really wants to fly the aircraft in maximum performance conditions, the pilot should reckon out his density-altitude and then take as collective-pitch limitation the figure opposite this density-altitude value.

Climb :

For a given pitch value, the power requirement depends not only on air density but also on airspeed ; the higher the speed, the lower the power.

For the same pitch angle, the difference in power between zero airspeed and climb airspeed is about 50 h.p. Thus, if at climb speed, the pilot sets collective-pitch at the value corresponding to his altitude figure, the power output will be 444 h.p. It follows that the altitude figures on the dial give both :

- maximum collective-pitch in hover
- collective-pitch to be adopted for climb

Cruise :

If, in cruising flight, the same power output is maintained by increasing collective-pitch, true airspeed will increase with altitude as a result of the decrease in fuselage drag. On the other hand, blade stalling speed decreases as altitude increases. If, therefore, power is held constant while altitude increases, there will very soon be no margin between level flight speed and stalling speed. For this reason, power will not be held constant in level flight. Furthermore, it is found that minimum fuel consumption per nautical mile is always obtained with the same collective-pitch value (0.80), irrespective of weight and altitude. Therefore, this constant pitch setting should be maintained at all times in normal cruising flight conditions.

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2.2.2 Pre-flight external checks

In order to facilitate pre-flight checks, the various operations have been grouped under "work stations" as shown on figure 2-2.1.

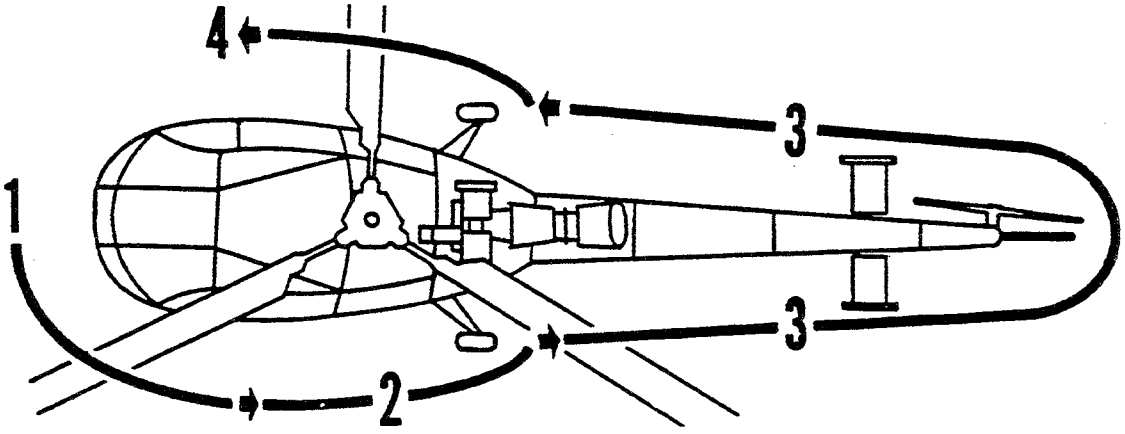

Figure 2-2.1

ASCERTAIN THAT FIRST DAILY PRE-FLIGHT INSPECTION HAS BEEN COMPLETED.

1
- Nose landing gear
- Radio antenna
- Pitot tube
- Side-slip indicator released

Turn one main rotor blade forward and directly above the aircraft center line

2
- Door jettison system, doors closed and locked (belts secured)
- Rotor head : blade damper oil level, blades
- Main wheel tire : tears, inflation
- Open baggage hold door
- Fuel tank : security, leaks, cables
- Transmission support platform : no rags or papers, leaks
- Oil level in engine oil tank and hydraulic reservoir (leaks)
- Close baggage hold door (check the latch)
- Air intake (check that grid or sand filter is clean) and visible part of engine.
- Fuel jet barrel : correct adjustment (ref. para. 2.4.6. as applicable).
- Tail pipe blank removed
- Fairings : general condition and security
- Skin panels for condition

3
- Upper tail boom fairings for security
- Stabilizer for condition and security of fin
- Tail rotor guard for security
- Tail gearbox oil level
- Tail rotor blades : condition and travel range ; clearance relative to fuselage (greater than 80 mm. (3.2 in.)
- Visible tail rotor control cables for condition
- Stabilizer for condition and security of fin
- Skin panels for condition

2.2.2 Pre-flight external checks (continued)

Air intake (check that grid or sand filter is clean) and visible portion of engine.

Open baggage hold door

Fuel tank for security, cables and leaks

4 Bleed fuel filter (if required)

Transmission support platform : no rags or papers, leaks, main gearbox oil level

Oil cooler pipes for condition, leaks

Close baggage hold door (check the latch)

Main wheel tire : tears, inflation

Door jettison system, doors closed and locked (belts secured)

2.2.3 Before entering the helicopter

A. Operating limitations. Refer to limitations and restrictions specified in Section 1.

B. Performance information. Refer to performance values specified in Section 3 for the desired flight conditions.

C. Loading information. Determine weight of aircraft prior to take-off (See Section 4). Also refer to Section 4, paragraphs 4.1 and 4.2, as regards c.g. location requirements.

2.2.4 Internal checks before starting engine. - (Figure 2-2.2)

1. Seat : ADJUST position and CHECK locking.
2. Check range and control direction of :
   - collective-pitch lever then place lever in full low pitch position and apply desired friction
   - Cyclic stick move stick to neutral position and apply maximum friction
   - rudder pedals then adjust pedals as required .
3. MIC.TEL. (I.C.S. mike) plug CONNECTED
4. Safety harness BUCKLED
5. Doors CLOSED and locked
6. Fuel flow control lever in CLOSED POSITION (against rear stop)
7. Fuel shut-off control lever lockwired in FORWARD POSITION
8. Servo units control cock OPEN (Check for correct operation)
9. Gyro instruments caged
10. Have ground power unit or battery connected.
11. 24-volt supply circuit breaker OUT
12. Radio master switch OFF
13. Circuit breakers IN except landing light, cabin lighting and position lights circuit breakers which should be engaged only in the event of night flying, and 24-volt supply circuit breaker.
14. Check that one rotor blade is pointing forward.
15. Battery master switch and generator ON-OFF switch ON.
16. Engine selector switch OFF.
17. Rotor brake RELEASED.

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2.2.4. Internal checks before starting engine (continued)

18. Wheel brakes APPLIED : check by pulling handle upward ; a strong resistance will be felt if the brake is effectively applied. Push the handle down, leaving it parallel to the aircraft centre line.
19. Check voltmeter (minimum : 25 volts) and electrical instruments (fuel contents gauge, etc...)
20. Check:warning lights.
    Check and adjust : altimeter, compass and clock.
    In the event of night flying, check : interior and exterior lighting.

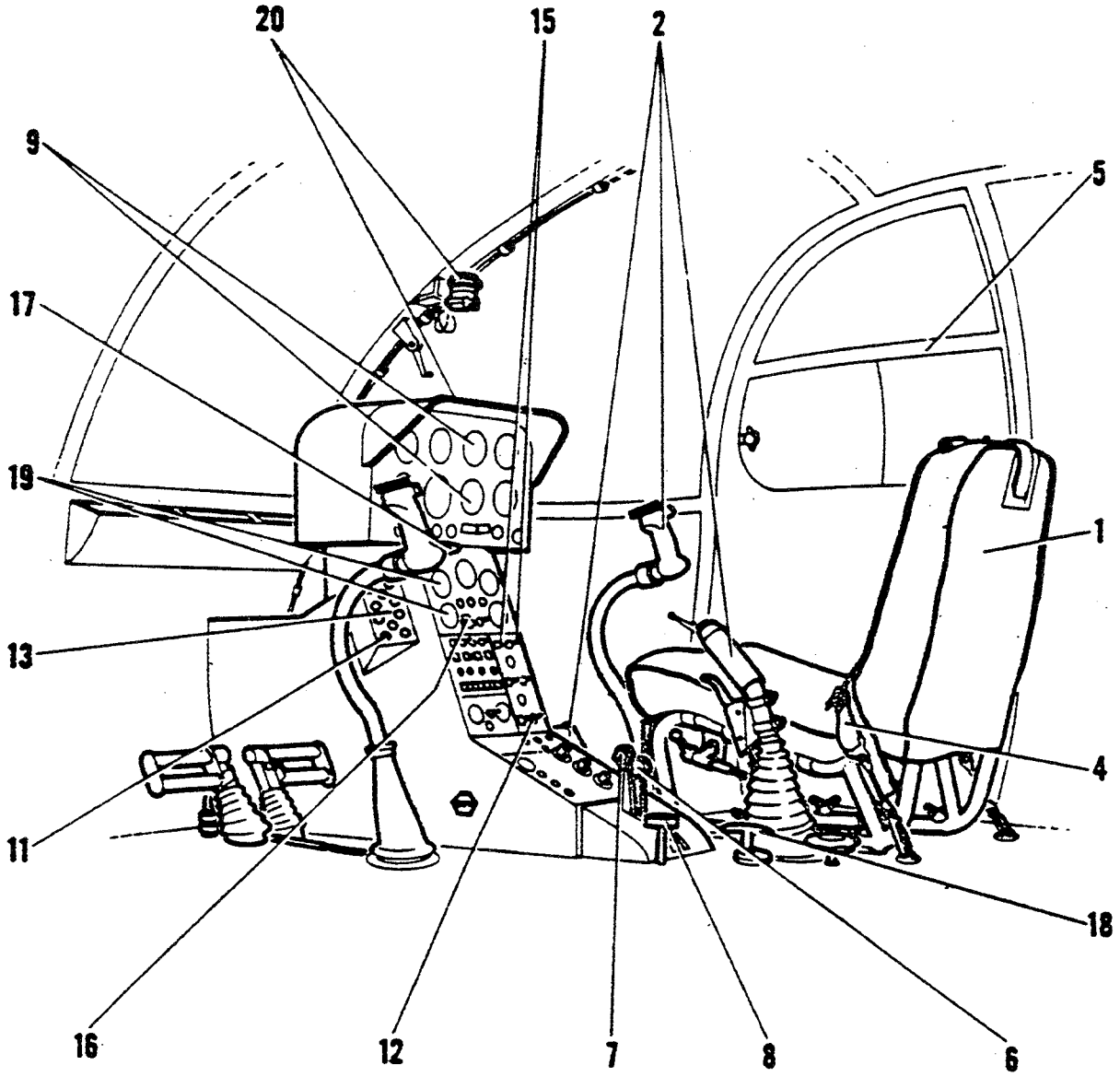


Figure 2-2.2

2.2.5 Starting engine

Operations	Checks and comments
1. Booster pump switch ON	– The pump pressure warning light should go out. – If engine has been stopped for less than five minutes, "ventilate" by cranking for five seconds. Wait until fuel flows regularly from the micro-pump drain ; this should normally be within 5 - 15 seconds (this time may be longer if the circuit has been drained.
2. Move the engine selector switch to ON, and simultaneously start the stopwatch.	– Starter (green) indicator light should come on. – Micropump (amber) indicator light should come on. – <u>Move engine selector switch to OFF if</u> : • either of the indicator lights fails to come on. • the STARTING RELAY warning light comes on • Tail pipe temperature (t4) exceeds maximum t4 starting temperature (550°C) by approx. 80°C • Tail pipe temperature (t4) has not risen within 8 seconds of the amber indicator light coming on.
– When the starter indicator light goes out, switch on the radio warm-up circuit.	– Within 5 - 15 seconds (approx. 6000 r.p.m. the amber indicator light should go out, and engine speed should continue to rise. – <u>Move the engine selector switch to "OFF" if</u> : • the amber indicator light has not gone out within 15 seconds of switching "ON". • the STARTING RELAY warning light comes on. – When engine speed is approximately 13000 r.p.m. the green pilot light should go out and engine speed should continue to rise. – <u>Move the engine selector switch to "OFF" if</u> : • the green pilot light has not gone out, within 60 seconds of switching on. • oil pressure fails to rise.
3. The engine stabilizes at idling adjustment speed (16 000 - 19 000 r.p.m.)	– For engine idling speed adjustment refer to Maintenance Manual Ch. 73.10.3 – Generator indicator light and gyro instrument (red) warning light should go out above 21 000 engine r.p.m.
– Gradually advance the fuel flow control lever until the main rotor just starts to turn and start the stopwatch.	

<u>NOTE</u> : On engine starting, a residual friction inside the clutch may cause a slow of the rotor, without noticeable acceleration. This stabilized rotation shall not exceed 10 r.p.m.

The engine speed at the start of clutch engagement may be different according to the type of clutch fitted ; see table, below :

2.2.5. Starting engine (continued)

	NORMAL CLUTCH	UNIFIED CLUTCH (After AMS 1722)
Minimum engagement speed (New clutch)	19 500 r.p.m.	23 000 r.p.m.
Maximum engagement speed (Clutch worn ; to be renewed)	24 000 r.p.m.	27 000 r.p.m.

– To spin the rotor, increase engine speed sufficiently to maintain a constant rotor acceleration rate of 5 - 10 r.p.m. per second, monitoring engine speed by suitably adjusting the fuel flow control lever position which corresponds to an engine speed of approximately 1000 - 2000 r.p.m. above the initial r.p.m. ; this figure is given purely as a rough guide	– If the droop restrainers strike the droop restrainer ring, re-position the cylic pitch stick.
4. Gradually advance the fuel flow control lever to the travel limit stop – Set the starting selector switch to OFF – Set the switch back to ON – Adjust the friction devices (on cyclic stick and collective lever) – Uncage artificial horizon and adjust the image to the correct height. – Adjust, then uncage the directional gyro. – Fully open or close the cabin sliding doors.	– Tail pipe temperature should not rise more than 50°C during acceleration. (otherwise surging may occur). – Fuel flow control lever warning light out. – Engine speed 33 500 ± 200 r.p.m. – The engine does not stop – Residual friction (on stick and lever) is not nil. – Ref. paragraph 2-3.7.2, B.4

NOTES : 1. Allow at least 5 minutes between two successive starts or clutch engagements (for cooling of starter and clutch).
2. In the event of re-starting shortly after engine shutdown, "ventilation" (cranking) is required to cool the tail pipe to less than 150°C.
3. Starting with external power supply. Adjust power to 800 amp., 24 V.
Proceed as described above. When the starter (green) indicator light goes out have external disconnected.power disconnected.
4. Never release the cyclic stick without first locking it either between the knees or tightening the friction knob.
5. In turbulent strong wind reduce rotor-engine synchronisation time to 20-30 seconds, event to the detriment of the clutch.

RR 22 B

Add the following note above the "REMARKS" paragraph:

NOTE: After a battery start, it may be necessary to reset the GRIMES anti-collision light (if it is installed) once the engine is started.

6. If during starting, tail pipe temperature exceeds :
   - 630°C, but remains below 680°C, the engine should be kept in service after setting
   - 680°C, only one overshoot not exceeding 2 seconds max. is permissible.
     This overshoot is to be recorded in the engine log book. Should another overshoot above 680° occur or should the duration exceeds 2 seconds, remove the engine from the aircraft.

2.2.6 Take-off

Operations	Checks
1. Release the wheel brakes by turning the handle 90 degrees clockwise. Immediately restore handle to its ini- tial position (parallel to aircraft center line). If necessary, roll forward about 1 meter (3 feet) (pitch 0.1 - 0.3) to center the front wheel.	
2. Take off without hesitation and maintain hovering flight at 1 m (3 ft) above the ground.	Check collective pitch and tail pipe temp. which should remain below 550°C and be in accordance with the chart at the top of the instrument panel. (See para. 2.2.14). Collective-pitch should not exceed the graduation corresponding to local altitude.
3. Slowly establish forward flight by increasing collective pitch by 0,05 then apply the collective-pitch value specified for climb. As soon as the transition speed (35 km/h or 20 kt) has been exceeded, it is recommended to gain altitude progressively so that a power-off landing, if required, can be accomplished in the best possible conditions 5 to 10m (15 to 30 ft) at 50 km/h (30 kt) 15 to 20 m (50 to 60 ft) at 65 km/h (40 kt) Climb speed is 100 km/h (55 kt).	Tail pipe temp. not to exceed 500°C.

REMARKS : (1) During climb, the collective pitch indicator needle should normally be opposite the density-altitude indication. However, as long as O.A.T. is not more than 20° C below standard, pressure and density altitudes may be assumed to be the same ; otherwise, it is still possible to refer to pressure-altitude after reducing by 0.05 the collective pitch indicated for standard temperature conditions. When maximum performance is hot weather conditions is desired, it should be borne in mind that an additional 20°C above standard temperature implies that density altitude is approximately 500 m (1 600 ft) higher than pressure altitude.

(2) When rate of climb drops below 200m/mn (650 ft/min) establish a climb speed of 80 km/h (45 kt) instead of 100 km/h (55 kt).

2.2.7 Cruising

Collective pitch for cruising is 0.80 irrespective of weight, altitude and temperature conditions. However, in cruising conditions, do not exceed 210 km/h (113 kt) i.e. slightly reduce collective-pitch at small gross weights and low altitudes.

For level flight close to service ceiling, maintain climb collective pitch value specified for the prevailing flight altitude (see para. 1.6.).

For cold weather cruising conditions, refer to the "LIMITATIONS" section.

The speeds obtained in these conditions, and the corresponding fuel consumption versus gross weight and density altitude, are shown in figures 3-1 and 3-2, Section 3.

NOTES : 1. In straight, steady flight, (with no side-slip) the helicopter lists to the right. The amount of list depends on the amount of power being used.

2. When the friction nut is backed right off the remaining friction should be strong enough to hold the cyclic control stick and collective pitch control lever steady in any position. Adjustable stops are provided to permit this condition to be met. If necessary, request adjustment of the stops upon landing, after setting the friction nuts as required (Ref. Maintenance Manual, Chapter 27).

   – The force required to move the controls, with the friction nuts backed right off, should be :
   Cyclic stick : in and near neutral position : 0.5 to 1 daN (1.1 to 2.2 lb.)
   Collective lever : on the ground near 0.2, or in flight near
   0.5 measured by means of a dynamometer and normal tooling :
   0.5 to 1 daN (1.1 to 2.2 lb) forwards
   2 to 3 daN (4.4 to 6.6 lb) rearwards

2.2.8 Level flight at maximum speed

Should the pilot desire to fly as fast as possible, without any consideration for fuel consumption, he is allowed to apply the climb collective pitch value plus 0.05 (without, however, exceeding a value of 1) but he is required not to exceed the specified Vne, which is liable to occur at altitude at low aircraft gross weights and without external equipment.

2.2.9 Descent

Descent may be accomplished with any collective pitch value provided a rotor speed of 420 r.p.m. is not exceeded (need to maintain collective pitch margin when flying at altitude with heavily loaded aircraft). Recommended approach speed is 110 km/h
(60 kt) for clear landing areas. A lower approach speed should be adopted in the event of a confined landing area being used.

Autorotative r.p.m. values, versus density altitude and gross weight are specified in Section 2-5, para. 2.5.1.3.

RR 22 A

Add the following text at the beginning of the paragraph 2.2.12 :

2.2.12 Stopping

CAUTION : DURING AND IMMEDIATELY AFTER THE ENGINE SHUTDOWN, MAKE SURE THAT NO SMOKE COMES OUT OF THE TAIL PIPE, THE AIR INTAKE OR THE ENGINE CASING DRAIN.
IF YOU DO SEE SMOKE, DO NOT RESTART THE ENGINE.

IF YOU HAVE NO OUTSIDE HELP, STOP THE ROTOR BEFORE SHUTTING DOWN THE ENGINE, IN ORDER TO PERFORM THIS CHECK.

2.2.10 Landing

From a hovering attitude, land without hesitation and apply full low collective pitch.

2.2.10a Quick-stop

A "Quick Stop" is performed by applying full low collective pitch, and maintaining constant height above the ground ; this will never result in an excessive nose-up attitude (maximum authorized nose-up attitude = 45 degrees).

2.2.11 Taxiing

Taxiing should be accomplished at 33 500 r.p.m. with 0.1 to 0.3 collective pitch, depending on surface condition, and with the cyclic-stick always pushed forward (from 1/4 to 1/2 of its travel in that direction).

To slow down, first reduce collective pitch then gradually apply the wheel brakes while keeping the stick forward. The stick must on no account be pulled back while the aircraft is on the ground.

2.2.12 Stopping

Fully retard the fuel flow control lever.
Apply the friction control.
Shut down the engine by moving engine selector switch to OFF.
At 175 r.p.m., apply the main rotor brake.
Wait until the "starting relay" warning light goes out before switching off the radio, booster pump, battery and generator. Cage the Gyro Horizon : pull out the caging knob and rotate clockwise until the red caging flag appears. Cage the Directional Gyro by pushing in its caging knob.

Stopping the rotor with engine running

The rotor can be stopped without stopping the engine, provided that there is no clutch drag ; proceed as follows :

a. Fully retard the fuel flow control lever and wait for rotor speed to fall below engine speed (check the indicator pointers).
b. Apply the rotor brake at 175 rotor r.p.m. ; partially release the brake just before the rotor stops, in such a way that one of the rotor blades comes to rest in forward position.
c. Release the brake completely and check that the clutch has no tendency to drag. If the rotor should start to rotate or creep, either :
   - switch off the engine
   - or accelerate the engine to ensure full clutch engagement.

NOTE 1 : After a flight in high turbulences, have the main and tail rotor blades and the stabilizer checked for condition.

NOTE 2 : A very slight rotation of the rotor is permissible in the same conditions as for engine starting (paragraph 2.2.5 operation 3). If required, immobilize the rotor by a brief action on the rotor brake handle, in such a way that one of the blades comes to rest forward.

2.2.13. **Re-starting**

If immediate re-starting, just following shutdown, is desired, do not switch on the booster pump but first carry out a ventilation in order to reduce the residual tail pipe temperature down to no more than 150° C. Switch on the booster pump immediately after engine start up.

2.2.14. **Use of computer**

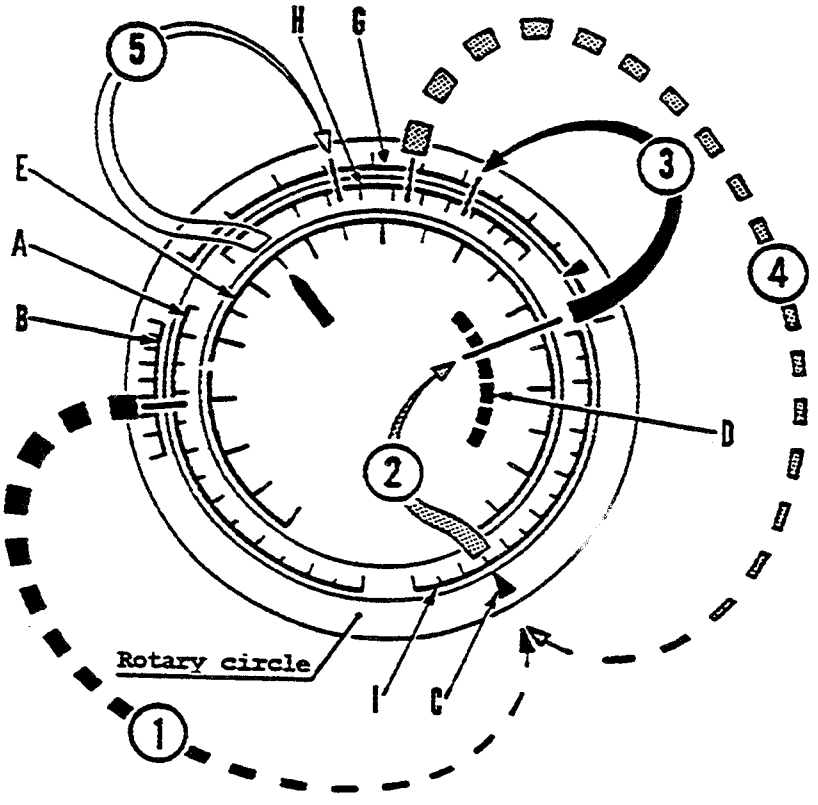
The computer surrounding the collective-pitch indicator is used to determine various parameters, as follows :

① - Density-altitude :

1.1. By means of the rotating circle, line up :

- The O.A.T. value (scale B) transferred from the O.A.T. indicator.
- The pressure altitude (scale A) transferred from the altimeter set at 1,013 mb.

1.2. Read the corresponding density altitude value on scale I opposite arrow C.



2.2.14. Use of computer (Continued)

② Maximum permissible collective pitch for hovering in ground effect.

2.1. Determine density altitude as specified in para. (1) above.
2.2. Convert the density altitude figure into thousands of feet, transfer the result to scale D, then read opposite, on scale E, the maximum permissible collective pitch for this density altitude.

③ Maximum hovering take-off weight :

3.1. In ground effect :

Determine maximum permissible collective pitch as specified in para. (2) above.
Transfer the maximum permissible collective pitch figure to scale G and read opposite, on scale H, the maximum permissible weight.

3.2. Sustained flight out of ground effect :

Reduce by 5 per cent the weight determined in step 3.1 above.

④ Best cruising altitude for a given gross weight :

4.1. By means of the rotating circle, line up the gross weight to be transferred to scale H with the recommended cruising collective pitch angle.
4.2. Read opposite arrow C the best altitude for cruising.

⑤ Current gross weight during hover in ground effect :

5.1. Carry out step (1).
5.2. Read on scale E the pitch angle indicated by the needle.
5.3. Transfer the above pitch angle to scale G and read on scale H the weight corresponding to this pitch angle.

2.2.15. Hovering flight power check (fig. 2-2.3)

When it is desired to check available power, establish hovering flight at 1,5 m (5 ft) above the ground, shut off the P2 air supply and note the following parameters collective pitch, tail pipe temperature and outside air temperature (in the shade), then land and perform the following check :

1. Apply to indicated tail pipe temperature the correction value specified for the installed engine (as shown on chart provided at top of instrument panel).

NOTE : 1) The correction value to be entered in the "correction" block of the chart in the difference between the indicated tail pipe temperature, recorded during the inspection hovering flight effected after installing the engine, and the tail pipe temperature determined from the chart for the collective-pitch and outside temperature values recorded during that same flight. The correction value is preceded by a plus sign (+) in the actual indicated tail pipe temperature is lower than the tail pipe temperature shown on the chart ; in the opposite case, the correction value is preceded by a minus sign (-).
2) With dynamic sand filters, add 10°C to the tail pipe temperature given by the chart.

2.2.15. Hovering flight power check (continued)

2. Read applicable tail pipe temperature on chart in cockpit.

3. Check that the difference between indicated and corrected tail pipe temperature and tail pipe temperature read on chart is less than 40°C.

If the difference exceeds 40° C, discontinue flying and conduct the following checks :

- O.A.T. indicator check
- tail pipe temperature indicator calibration check
- collective-pitch indicator calibration check by checking the hovering collective-pitch value (see para. 2-5-3).

If calibrations are correct, tail pipe temperature is abnormal and the engine should be returned for overhaul.

EXAMPLE (fig. 2-2.3)

A. Values recorded in hovering flight at 1.5 m (5 ft) above the ground :

(a) on O.A.T. indicator + 19° C
(b) on collective-pitch indicator 0.7
(c) on tail pipe temp. indicator 380° C

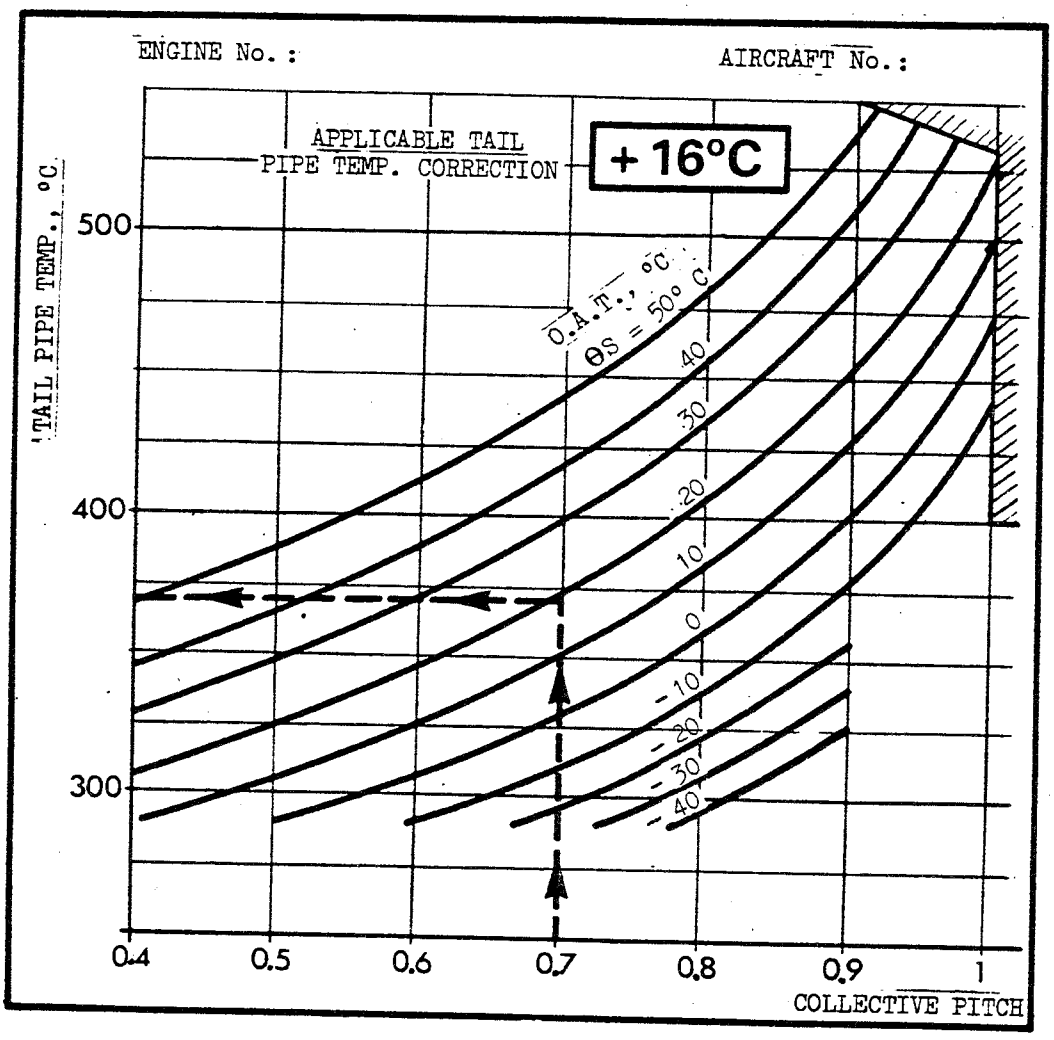
B. After landing the aircraft, immediately following the above hover :

(a) Apply to the tail pipe temp. recorded in A (c) above the applicable correction specified on the chart at the top of the instrument panel, e.g..... 380 + 16 = 396° C

(b) Read on the chart the tail pipe temp. corresponding to the collective-pitch and O.A.T. values recorder in hovering flight, i.e. for 0.7 collective pitch and 19° C O.A.T. 370° C

c. Determine the difference ..... 26° C

The difference being less than 40° C, engine power is correct.



Hovering flight power check
Figure 2-2.3

2.2.16. Rotor starting in high wind

In high wind it is important to avoid starting or stopping the rotor to the leeward of hangars, buildings etc... due to the hazard of erratic blade flapping in eddying air currents.

Nevertheless, in cases where rotor starting/stopping in zones of eddying air currents cannot be avoided (e.g. on aircraft carriers), the rotor may be started in relative wind up to a force of 45 knots (83 km/h) if the following exceptional procedure is adopted :

(a) Rotor starting

Head the helicopter into the wind, cyclic pitch stick in neutral position ; proceed as follows, to engage the clutch :

- Engine speed 20 000 r.p.m.
- Release rotor brake

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2.2.16 Rotor starting in high wind (continued)

- Gradually push the fuel flow control lever forward.

When the rotor starts to turn, slightly increase the speed of fuel flow control lever displacement to ensure a fairly fast rate of rotor acceleration up to 80 - 100 rotor r.p.m.

Fuel flow rate may then be slightly reduced to provide normal acceleration up to operating speed. In this manner, synchronization can be attained in 20 to 25 seconds.

(b)-Rotor stopping

With collective pitch lever on low pitch limit stop and cyclic pitch stick in neutral position, promptly reduce fuel flow. At 175 rotor r.p.m. apply the rotor brake, holding collective pitch on the low pitch limit stop.

In exposed areas, where no eddying air currents are encountered, the rotor may be started and stopped in winds of up to 60 knots (111 km/h). The procedure to be adopted is as follows :

(a) Rotor starting :

With the helicopter headed into the wind, push the cyclic pitch stick forward (1 to 2 cm) (0.4 to 0.8 in.). Rotor spinning should be accomplished faster than in normal condition ; (synchronization being attained in 20-25 seconds).

Pay particular attention to the height of the blades as they pass over the nose of the helicopter and, if necessary, adjust cyclic pitch stick position until they track at normal height (as in no-wind conditions with cyclic pitch stick in neutral position).

(b) Rotor stopping

With the helicopter headed into the wind, the cyclic stick just forward (1 to 2 cm) (0.4 to 0.8 in.) of neutral position, and collective pitch lever on low pitch limit stop, promptly reduce fuel flow.

At 175 rotor r.p.m. apply the rotor brake, still holding collective on the low pitch limit stop.

At approximately 160 - 170 rotor r.p.m. the droop restrainers come into operation ; if the cyclic pitch stick has been positioned correctly there will be little or no jerking during droop restrainer engagement. If necessary, to attenuate jerkiness or correct blade tracking, gently adjust cyclic stick position.

NOTE : If, at low rotor speed (below 100 r.p.m.), one blade is seen to be tracking much lower than the others (droop restrainer not engaged), increase the forward displacement of the cyclic pitch stick.

2.2.17. **Refuelling with rotors turning ***

WARNING : REFUELLING WITH ROTORS TURNING * SHALL BE PERFORMED ONLY AFTER PRIOR AGREEMENT IS GIVEN BY THE COMPETENT AUTHORITY IN COMPLIANCE WITH OPERATIONAL REGULATIONS

- Strictly comply with the instructions defined below.
- Head aircraft into forward wind sector ± 45° if wind above 10 kt.
- Collective pitch lever in full low pitch position.
- Check main rotor is at nominal speed with fuel flow control in flight detent*.
- Limit refuelling at 95 % in order to prevent any fuel spillage.
- The pilot must have someone well in sight to signal the mechanic to stop refuelling.
- After refuelling give the filler plug key to the pilot.

* or rotors stopped, engine running, fuel flow control lever in ground idle detent (fully aft).

SECTION 2

2.3 EQUIPMENT OPERATING PROCEDURES

CONTENTS

Page

2.3 EQUIPMENT OPERATING PROCEDURES

2.3.1 Interphone (fig. 2-3.1)

2.3.1.0. Characteristics

The interphone (INT) is a TF AP6 unit which permits :

- intercommunication between the various crew members through a "conference" type system.
- output level adjustment of the radio receivers installed in the aircraft.
- control and separate or simultaneous modulation of the HF and VHF transmitters.

Number of receiving channels : 4 (VHF, HF, INT, RC)

Number of microphone channels : 3 (VHF, HF, INT)

2.3.1.1. Operation (fig. 2-3.1)

Depress circuit breaker INT (1).

Move the INT ON-OFF switch (2) to ON.

Move one of the "N" positions of selector switch (6) opposite the triangular-shape index. The interphone is then in service. Receiving is simultaneous on all four channels. The output level of each channel is adjusted separately by means of a potentiometer (3, 4, 5) except for the radio compass channel of which the gain is fixed.

2.3.1.2. Procedure in the event of failure (fig. 2-3.1)

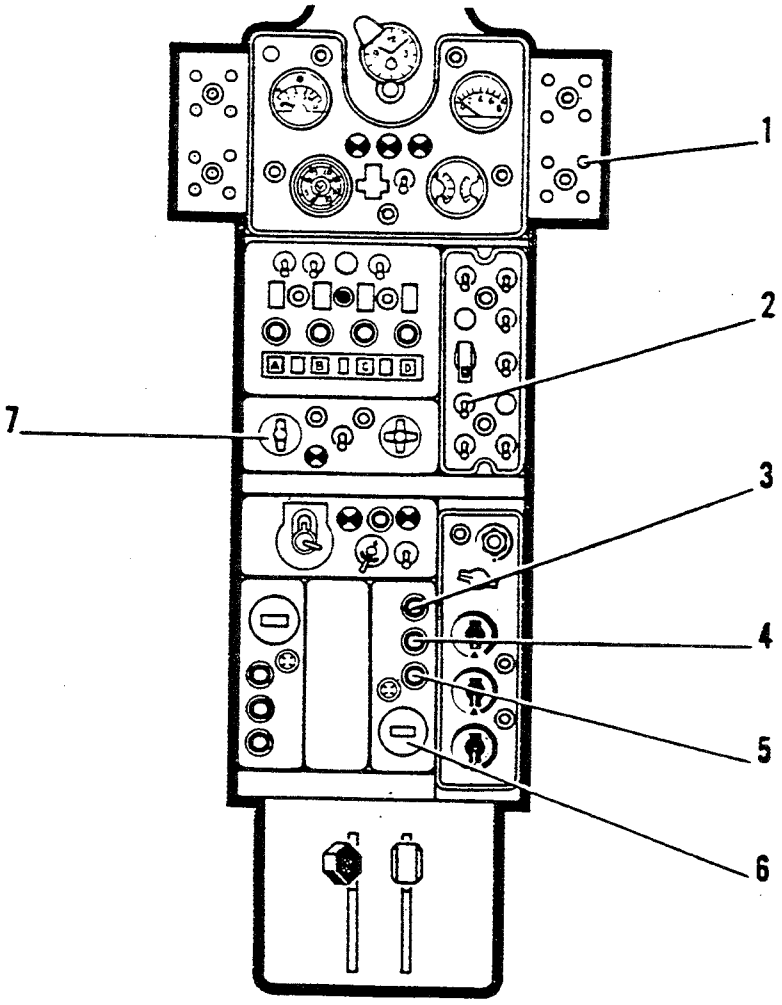
a. Failure of an anti-flutter amplifier.

In the event of such failure, reception is eliminated at only one of the crew stations, and the rest of the system continues to operate normally.

In an emergency, communication may be established by moving one of the "S" positions of selector switch (6) opposite the triangular index. Transmission and reception are then switched on simultaneously and only the selected set can be operated. Simultaneous receiving on all four channels is no longer possible. Output level is adjusted through the potentiometer of the corresponding channel.

b. Failure of complete interphone system

In the event of failure of the complete interphone system, communication between the various crew members may be established as follows :



1. INT circuit breaker
2. INT switch
3. HF potentiometer
4. VHF potentiometer
5. INT potentiometer
6. selector switch
7. VHF control box selector

Interphone
Figure 2-3.1

- Move, to the VHF "S" position the four selector switches (6).
- Move to the INT + REC position, selector (7) of the VHF control box.
- Speak while depressing the stick-mounted "Press-to-transmit" switch.
- For VHF transmission, return, to COMMUNICATION, the VHF control box selector (7).

NOTE : In the event of failure of the complete interphone system (burnt fuse for example) the HF set is no longer operative.

The chart overleaf sums up the possibilities afforded by the interphone system in the various selector positions.

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SELECTOR POSITION		TRANSMISSION	RECEPTION
N	VHF	VHF transmission by depressing "press-to-transmit" switch. INT. modulation without depressing "press-to-transmit" switch.	Simultaneous VHF, HF and INT. receptions volume-regulated by a potentiometer. RC volume-control by external potentiometer.
	HF	HF transmission by depressing "press-to-transmit" switch. INT. modulation without depressing "press-to-transmit" switch.	Simultaneous VHF, HF and INT. receptions volume-regulated by a potentiometer. RC volume-control by external potentiometer.
	H + V	Simultaneous HF and VHF transmission by depressing the "press-to-transmit" switch. INT. modulation without depressing "press-to-transmit" switch.	Simultaneous VHF, HF and INT. receptions volume-regulated by a potentiometer. RC volume-control by external potentiometer.
S	TB (INT)	INT. modulation only without depressing "press-to-transmit" switch.	INT. reception only.
	VHF	VHF control box selector on "Communications" (traffic) position	
		VHF transmission by depressing "press-to-transmit" switch.	VHF reception only.
		VHF control box selector on "REC + INT" position	
		INT modulation by depressing "press-to-transmit" switch but no VHF transmission.	INT reception through VHF. VHF reception when no one depresses "press-to-transmit" switch.
	HF	In the event of total failure of interphone, the HF becomes inoperative.	
		In the event of failure of an anti-flutter amplifier (one set only is inoperative).	
		HF transmission by depressing "press-to-transmit" switch.	HF reception only.
	RC	No transmission.	RC reception.

2.3.2 VHF transceiver (Fig. 2-3.2)

2.3.2.0. Characteristics

The VHF fitted to the SE 3160 is type TRAP 8A or 8D or 30D.

It provides 20 crystal-controlled frequencies (one per channel) within the 100-156 Mc frequency range.

VHF power at the antenna is 1 watt.

Tuning on each frequency is performed automatically by an electronic system.

2.3.2.1. Operation

The control box is mounted in the cockpit control pedestal.

To obtain a given frequency :

- depress the VHF (1) and INT (2) circuit breakers.
- move to ON the interphone ON-OFF switch (3).
- move to WARM-UP the "OFF-WARM UP-COMMUNICATION - REC + INT" selector (8) on the control box.
- select the desired channel by means of the channel selector (6).
- wait 15 seconds.
- Move to COMMUNICATION the OFF - WARM UP-COMMUNICATION - REC + INT selector (8).

When the 1000 hz (1,000 c.p.s.) tone ceases, and the green light (7) on the control box comes on, the set is ready to operate.

To transmit, move to VHF, the selector switch (5) of the TEAM mixing box and depress the stick-mounted "press-to-transmit" switch.
A switch (9) marked "O" - "SIL", when moved to the "O" position, cuts out the receiver squelch

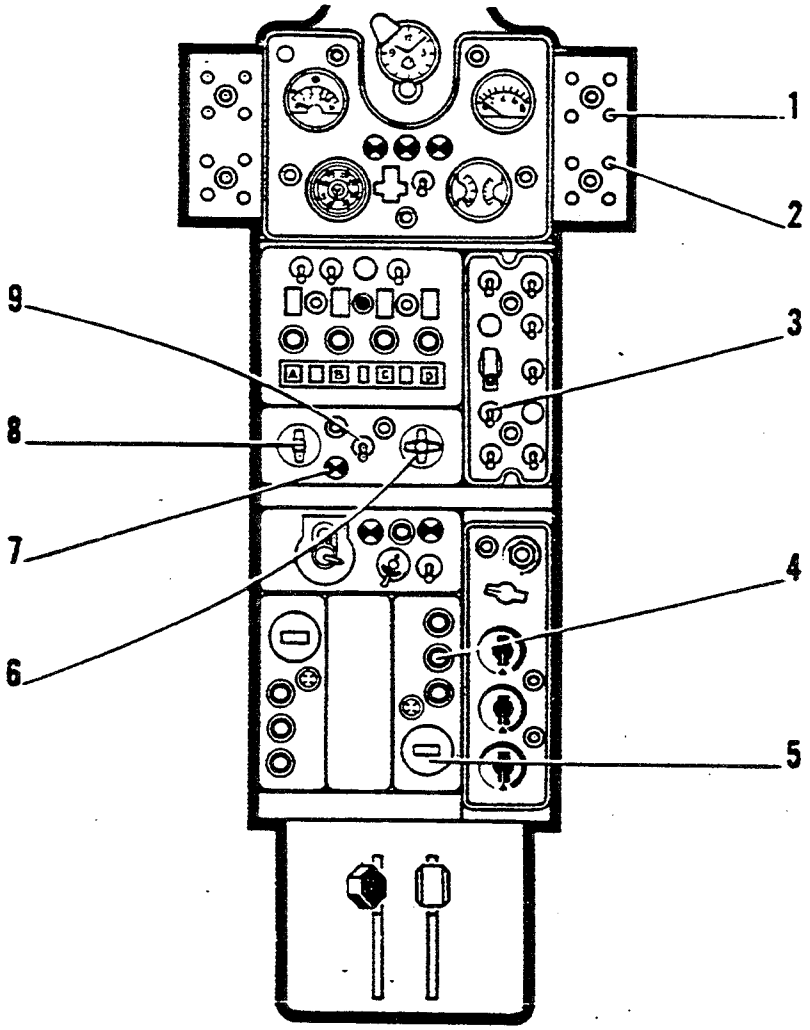
Reception volume-control is effected through the VHF potentiometer (4) of the TEAM mixing box.

To change the frequency, selection of the desired channel is all that is required.

As soon as the 1000 hz (1,000 c.p.s.) tone ceases and the green light comes on, the set is ready to operate.

2.3.2.2. No crystal on selected channel

Tuning-in, in these conditions, is not possible ; during one minute, the tuning system attempts to tune in then it cuts off the HT supply to the set.



1. VHF radio circuit breaker
2. INT circuit breaker
3. INT switch
4. VHF potentiometer
5. Selector switch
6. Channel selector
7. Green light
8. ON-WARM UP-COMMUNICATION-INT selector
9. O-SQUELCH Switch (O.SIL)

VHF Transceiver
Figure 2-3.2

To restore normal operation :

- select another channel.
- move, to WARM UP and then to COMMUNICATION, the OFF-WARM UP - COMMUNICATION - REC + INT selector.

Tuning in is again attempted and is obtained as soon as the 1000 hz (1,000 c.p.s.) hiss ceases and the green light comes on.

2.3.3 HF transceiver

2.3.3.0. Characteristics

The installed HF set is type TRAP 18.

It enables :

a. frequency modulation communication in the 25-51.9 Mc/s frequency range, in 100 kc/s increments per frequency standard.

b. homing (based on audio signals) in conjunction with a transmitter operating in this range.

HF power at the antenna is 8 W minimum.

Tuning is entirely automatic.

2.3.3.1. Communication function (fig. 2-3.3)

Ascertain that the ON-OFF switch (7) on the control box is in the OFF position, and that the "homing" switch (3) is in the OFF position.

Ascertain that the REM-LOCAL selector (8) is in the LOCAL position.

Depress the HF (13) and INT (1) circuit breakers.

Move, to ON, the INT ON-OFF switch (2).

Move, to ON, the ON-OFF switch (7).

Wait one minute.

Select the desired frequency by means of the knurled knob (10) for megacycles, and by means of the lever (9) for tenths of megacycles ; the frequency figures are displayed in window (11) of the control box.

This operation may be performed while the set is warming up.

Adjustment is completed when the 400 hz (400 c.p.s.) signal has ceased.

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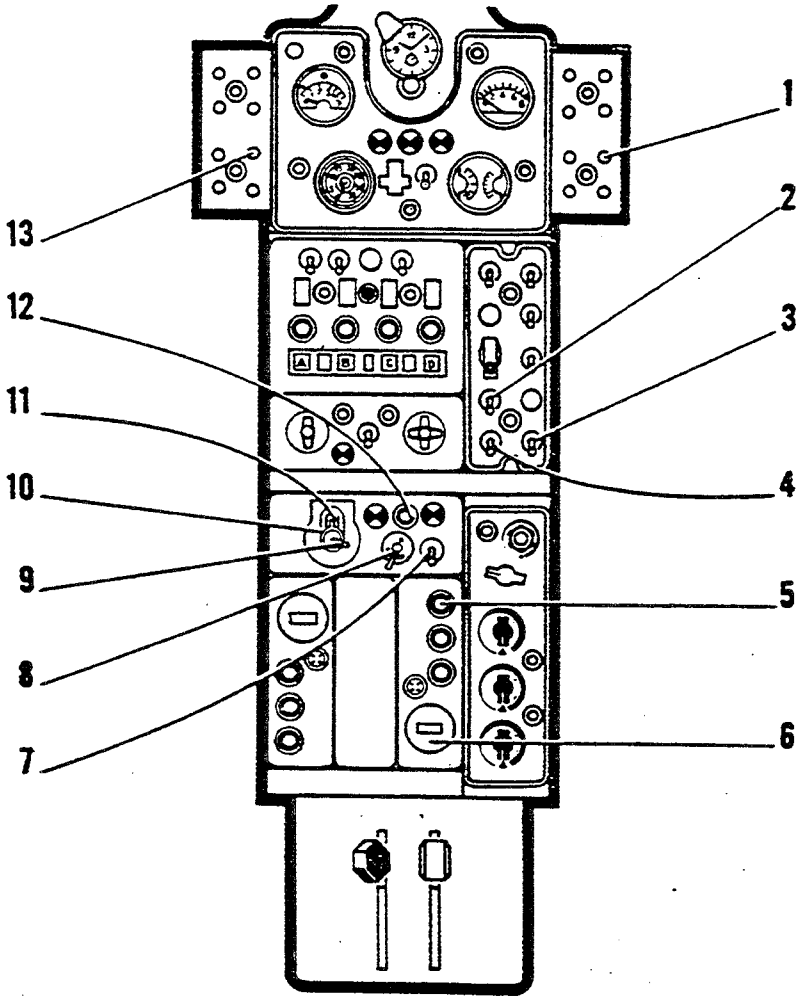


1. INT circuit breaker
2. INT switch
3. Homing switch
4. ON-OFF Squelch switch
5. HF potentiometer
6. Selector
7. ON-OFF switch
8. REM-LOCAL selector
9. Lever for tenths of Mc/s
10. Knurled knob
11. Frequency window
12. VOL potentiometer
13. HF circuit breaker

HF Transceiver
Figure 2-3.3

IMPORTANT : NEVER MOVE TO "REM" THE "REM-LOCAL" SWITCH WHILE THE SET IS SWITCHED ON, FOR THIS IS LIABLE TO CAUSE DAMAGE TO THE REMOTE CONTROL SYSTEM. THE "REM" POSITION SHOULD NEVER BE USED IN THE ALOUETTE III HF INSTALLATION.

To transmit, move, to HF, the selector switch (6) on the TEAM mixing box and depress the stick-mounted "press-to-transmit" switch.

Reception volume is controlled through the HF potentiometer (5) of the TEAM mixing box. The "VOL" potentiometer (12) of the control box is not connected and is, therefore, inoperative.

An ON-OFF squelch switch (4) enables to cut out the receiver's squelch control. This switch is located at the bottom of the control pedestal, adjacent to the pilot's TEAM mixing box.

2.3.3.2. Homing function (fig. 2-3.3)

Once the set is tuned in to a frequency for communications purposes, moving the ON-OFF homing switch (3) to the ON position is all that is required to establish the homing function.

The ON-OFF homing switch is located at the bottom of the control pedestal, adjacent to the SQUELCH-OFF-ON switch (4).

During homing reception, transmission is not possible, for the control circuit is open.

Listening-in of the indications transmitted by the marker is possible, although distortion is very severe.

Should the crew desire to communicate with the marker, all that is required is to move to OFF the HOMING-OFF-ON switch ; the set is then ready to operate.

Interpretation of signals received

Depending on the position of the aircraft relative to the marker, the signals received are as follows :

- Marker to the right-letter U (--———)
- Marker to the left-letter D (———--)
- Marker straight ahead - continuous signal.

To fly in direction of a marker, turn the aircraft to the right if the signal received is letter U (--———), or to the left if the signal received is letter D (———--), until a continuous signal is received. The relative bearing of the station is then zero and its true bearing is equal to the heading indicated at that moment.

If there is no cross wind, the pilot simply needs to follow this heading in order to get to the station. If necessary, he should make some slight corrections en route so as to maintain a continuous signal.

If there is a cross wind, and if the pilot takes the necessary action to maintain a continuous signal at all times, he will get to the station by following a curved flight path along which the heading will vary constantly. To get to the station along a straight line, it would be necessary to correct the heading for drift.

IMPORTANT : IF THE SET IS BEING USED FOR HOMING WHEN ABOUT TO BE SWITCHED OFF, MOVE THE HOMING SWITCH TO OFF PRIOR TO MOVING THE ON-OFF SWITCH TO OFF.

2.3.4 Radio compass receiver unit

2.3.4.0. Characteristics

The radio compass receiver installed in the aircraft is type NR AN 11.

It operates in the 200 to 800 KHZ (kc/s) frequency range.

Four frequencies are pre-tuned independently of each other by means of individual tuning knobs.

Type of waves received : A1, A2, A3.

2.3.4.1. Operation (fig. 2-3.4)

Depress the RC (13) and INT (1) circuit breakers.

Move to ON the INT ON-OFF switch (6).

Move to ON the ON-OFF switch (11) on the front panel.

Turn the AF adjustment potentiometer knob (12) as far as it will go in a clockwise direction.

Check that the tuning indicator (16) on the radio compass is at its maximum position to the right.

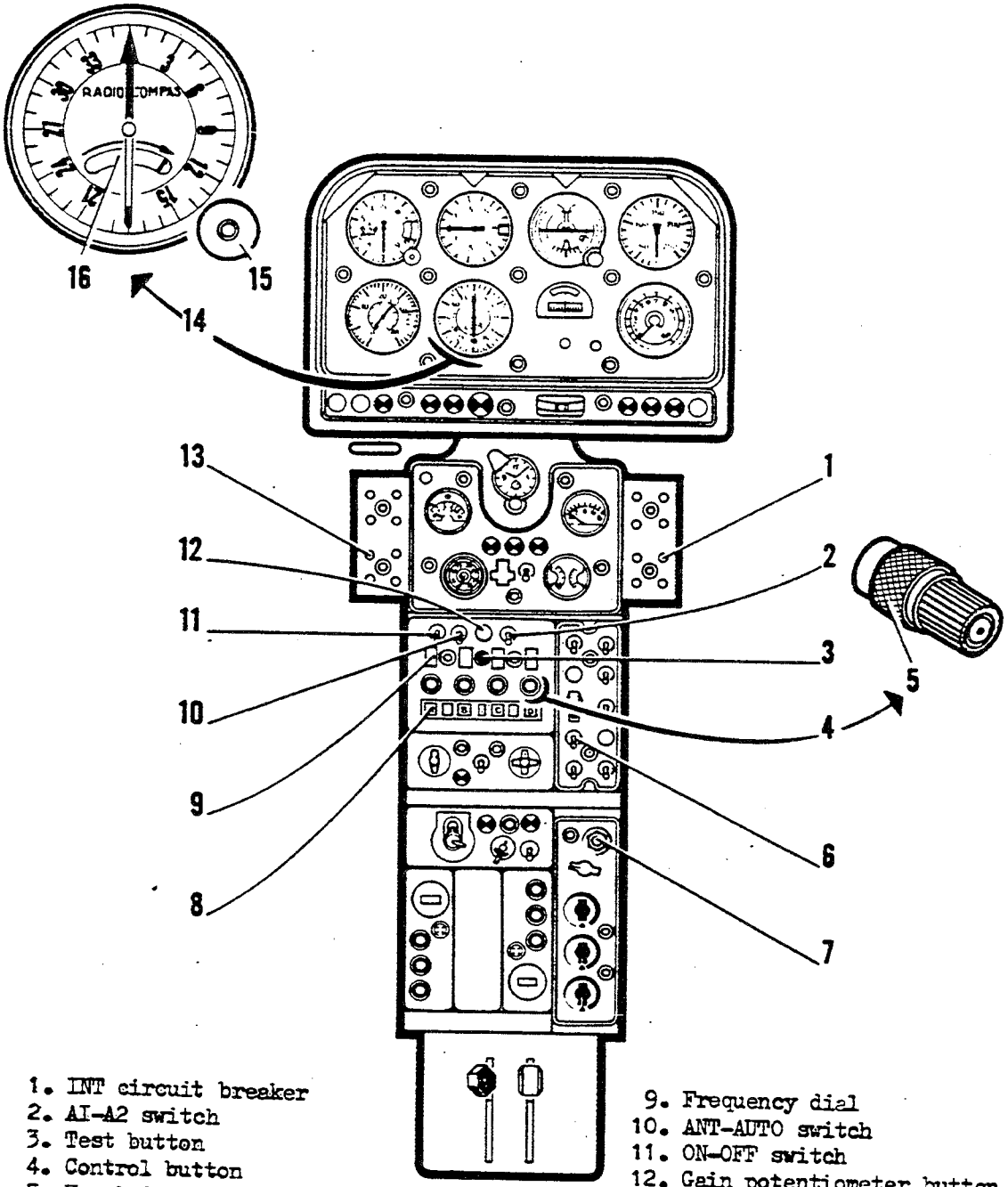
If the desired station is not modulated, move the A1-A2 switch (2) to A1.

If the desired station is modulated, move this switch to A2.

Move the ANT-AUTO switch (10) to ANT.

Depress and engage the selected push button (8).

Engage by pushing the sleeve of the corresponding tuning control knob (4) and find the station by selecting the frequency on the dial (9) (reading within ± 1 % KHZ kc/s) located above the push button and control knob in service.



1. INT circuit breaker
2. AI-A2 switch
3. Test button
4. Control button
5. Knurled sleeve
6. INT switch
7. Volume potentiometer
8. Push-button
9. Frequency dial
10. ANT-AUTO switch
11. ON-OFF switch
12. Gain potentiometer button
13. Radio-compass circuit breaker
14. Radio-compass indicator
15. Compass card control knob
16. Tuning indicator

Radio compass
Figure 2-3.4

Tune the receiver to maximum needle deflection of the tuning indicator (16) located on the radio compass indicator.

Identify the station by checking its call signal.

Adjust the AF volume by means of the "VOL.RC" potentiometer (7).

By means of knob (15) adjust the indicator's compass card so that the zero mark lies vertical and at the top (in line with the fixed index).

Move the ANT-AUTO switch (10) to AUTO. The needle then indicates the relative bearing of the station, that is its bearing relative to the aircraft centre line.

When the radio compass is being used for homing, it is possible to check its operation by shifting the indicator needle through action on the TEST button (3).

As soon as the button is released, the indicator needle should return to the relative bearing value previously shown and which is 0 in the homing function.

As in HF homing, if the pilot maintains zero relative bearing, he will, in cross wind conditions, get to the station by following a curved flight path. To get there in a straight line, the pilot should not select zero relative bearing but a relative bearing value equal to the drift ; this value, found by trial and error, is that which can be maintained a certain time without causing a variation in heading.

2.3.4.2. Pre-tuning the stations

It is possible to pre-tune different stations on each of the four push button and frequency dial combinations (8 and 9).

Once pre-tuning is accomplished on one of these combinations, the adjustment may be locked by pulling the knurled sleeve (5) fitted to the dial control knob.

Change-over from one frequency to another is obtained instantly by depressing the push button located below the selected button-and-dial combination.

2.3.5 Air conditioning

2.3.5.1. Ventilation

The central ventilation shutter may be adjusted to any intermediate position between the open and closed positions, by means of a manual control located below the compass.

In rain conditions, it is recommended to use only the sliding windows of the doors, the ventilation thus obtained being sufficient, in particular, to prevent formation of mist on the windscreen.

2.3.5.2. Heating-demisting (fig. 2-3.5)

Moving the control handle (8), located overhead within the reach of the pilot, adjusts the flow of warm air from both ducts (1) simultaneously.

NOTE : The pre - AM.1152 installation can be used with the hoist operating.
The post-AM.1152 installation cannot be used with the hoist operating since P2 pressure is not sufficient to operate both the hoist and the heating system together.

2.3.6 Night flying equipment

1. Engage the following circuit breakers:
   On R.H. side : landing light and instrument panel and control panel lighting circuit breakers.
   On L.H. side : position lights and cabin lighting circuit breakers.

2. Switch on the battery.

3. Adjust light intensity by actuating the rheostats located at the bottom of the control panel :

   Top rheostat : instrument panel lighting
   Middle rheostat : control panel lighting

   Lower rheostat : cabin lighting, or inscription lighting (in which case cabin lighting is controlled by a rheostat incorporated in the lamp).

   Left rheostat : position lights, anti-collision lights and cabin lighting.

4. To operate the position lights, actuate the switch on the control panel, on the R.H. side of the HF radio set. This is a two-position switch. A fixed light is obtained whether the switch is up or down. In the down position, both the fixed light and the anti collision lights are on.

5. To extend the landing light, move the three-position switch to the right. This switch is located at the top of the pilot's collective pitch lever (the extension circuit is de-energized by action of a microswitch when the light is fully extended).

   Turn the light on or off by means of the dual switch located on the side of the collective pitch lever handle.

   NOTE : The landing light can be switched off only by the pilot who has switched it on.

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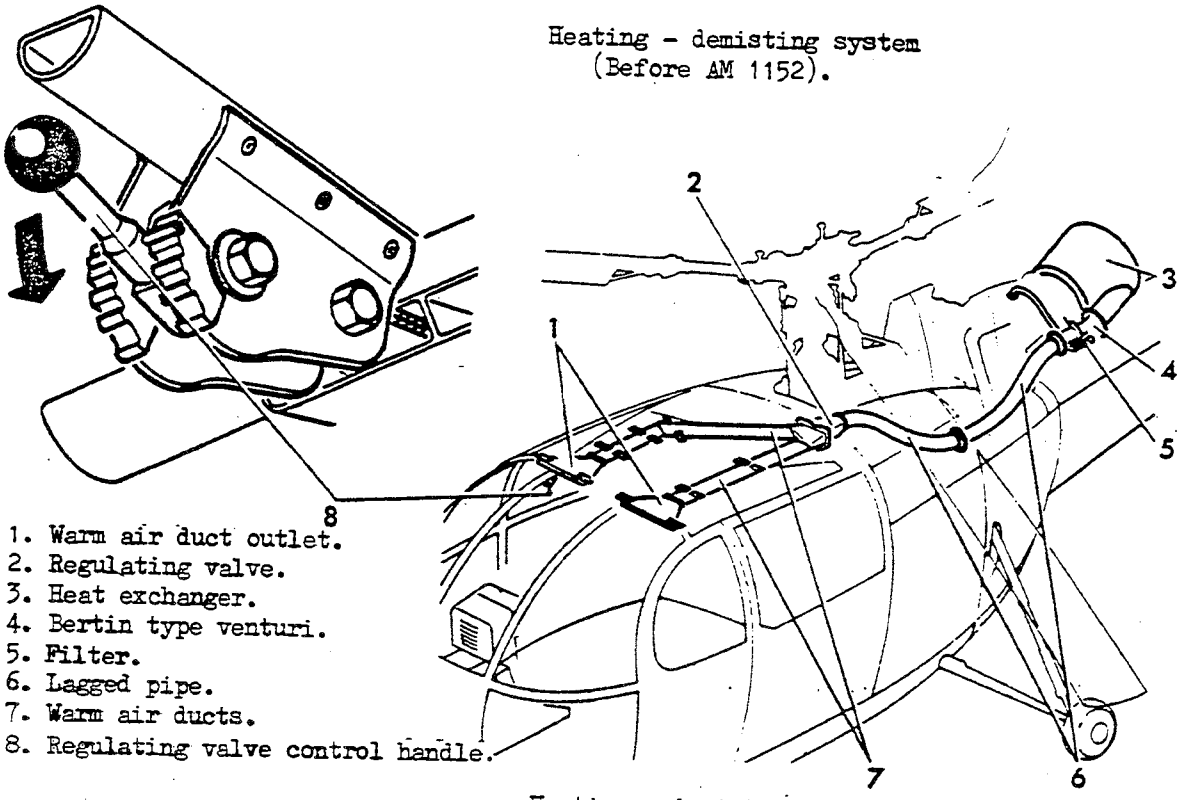
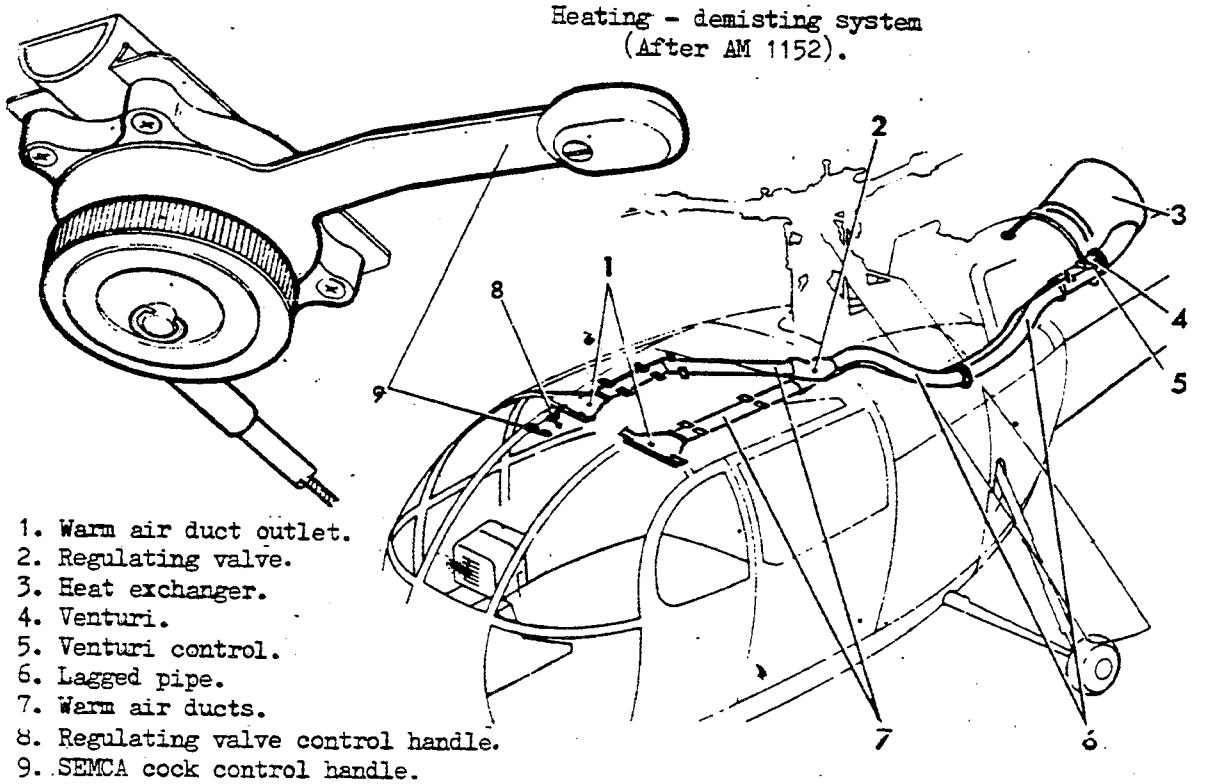
Heating - demisting system
(Before AM 1152).



1. Warm air duct outlet.
2. Regulating valve.
3. Heat exchanger.
4. Bertin type venturi.
5. Filter.
6. Lagged pipe.
7. Warm air ducts.
8. Regulating valve control handle.

Heating - demisting system
(After AM 1152).



1. Warm air duct outlet.
2. Regulating valve.
3. Heat exchanger.
4. Venturi.
5. Venturi control.
6. Lagged pipe.
7. Warm air ducts.
8. Regulating valve control handle.
9. SEMCA cock control handle.

Figure 2-3.5

The light beam may be set at any height between the two extreme positions, by means of the three-position switch (move switch to the right for adjustments in the downward direction, and to the left for adjustments in the upward direction).

The SEALED BEAM lamp is designed for 25 hours operation, with the light remaining OFF for 45 minutes after each 15-minute period of operation.

CAUTION : RETRACT THE LIGHT WHEN OPERATING ON STONY OR BUMPY SURFACES OR ON WET GRASS.

NOTE : During daylight flight the circuit breaker must be disengaged to preclude accidental operation through inadvertent actuation of the dual push-buttons located on the collective pitch lever.

2.3.7 Gyro instruments

2.3.7.0. Description

The installation includes :

-a Bertin type suction fitting mounted on one of the engine air-bleed connections, which provides suction for operation of the artificial horizon and the directional gyro through a line with a bleed valve located at the rear cabin wall.

-on the main instrument panel :

- an artificial horizon : Badin type 851.
- a directional gyro : Badin type 830 or 831 (type 831 differs from type 830 in that it has no course-setting compass card).
- a bank indicator
- a filter and regulating valve
- a suction warning light, controlled by a pressure switch

NOTE : The gyroscopic instruments operate throughout the whole duration of flight.
The gyroscopic instrument system is connected to a heated pitot head. The pitot head heating element is controlled by a switch mounted on the control pedestal (réf. fig. 2.1.4, index 24). When the pitot heating switch is in ON position , and only in this case , a warning light (index 66) comes on if the heating element is not operating.

2.3.7.1. Purpose

The purpose of the directional gyro is to provide the pilot with a stable directional reference, whereas the artificial

horizon provides a stable reference to the natural horizon and makes up for lack of fixed landmarks.

2.3.7.2. Operating procedures

A. Pre-flight

1. Check that lines have been bled (daily).
2. Check condition of dial glasses. Do not use instruments with a broken or split dial glass.
3. Caging and uncaging of the gyroscope should be done gently, and caging should be effected only if the gyroscopes are at rest. Uncaging should be accomplished immediately the gyroscopes have been spun up, that is just prior to take-off (see para. 2.2.4.)

B. In flight

1. IFR instrument flying is prohibited
2. In a sustained turn, the artificial horizon must be used in conjunction with the A.S.I. and the rate-of-climb indicator. When the turn has been completed, continue to observe the instruments for a while.
3. Directional gyro

   Alignment of the directional gyro compass card with that of the magnetic compass should be checked at the beginning of the flight and then approximately every quarter of an hour.
4. Artificial horizon

   At the beginning of the flight, align the image with the horizon bar by turning the button.

   When the gyroscope is disturbed by movements of the aircraft, reset the horizon by pulling the button. The needle is then re-positioned relative to the reference index. Releasing the button is all that is required to free the gyroscope.

   Caging and uncaging the gyroscope

   At the end of the re-setting procedure, a slight additional pull on the button, combined with a 60 degree rotation clockwise, will cause caging marker [X] to be displayed. The reverse procedure will free the gyroscope and eliminate marker [X] from the dial.
5. Pitot head heating

   Place pitot heating control switch in ON position whenever any risk of icing exists (melted snow ; unavoidable passage through cloudbank ; ice-forming mist or fog ; snow).

C. After landing

After engine shutdown, cage the gyros.

2.3.7.3. Trouble shooting

Trouble	Cause	Remedy
Not enough suction (the warning light comes on)	Leaks in system	Check lines and connections
	Weak spring in regulating valve	Change regulating valve
	Partially clogged suction fitting	Clean the suction fitting
Non-operation	Clogged lines	Disconnect the gyro instruments and pressure switch, and bleed the suction lines.
	Clogged suction fitting	Clean the suction fitting
	Damaged pressure switch diaphragm	Change the pressure switch

NOTE 1 : After 200 flying hours, or at least every six months, or after prolonged storage, check operation of artificial horizon and directional gyro.

NOTE 2 : Efficiency and accuracy of the gyro instruments are maintained two minutes after engine shutdown.

2.3.8 SIREN cargo sling (fig. 2-3.6a and 2-3.6b)

Maximum load

Aircraft gross weight, including cargo-sling load, must be consistent with requirements governing hovering flight in ground effect (See Section 3).

Maximum load to be carried with cargo sling is 750 kg (1,650 lb). The load must be slung in such a way that the c.g. of the load is not less than 3m(10ft) and, as far as practicable, not more than 8m(26ft) from the cargo sling hook (risk of swinging in flight).

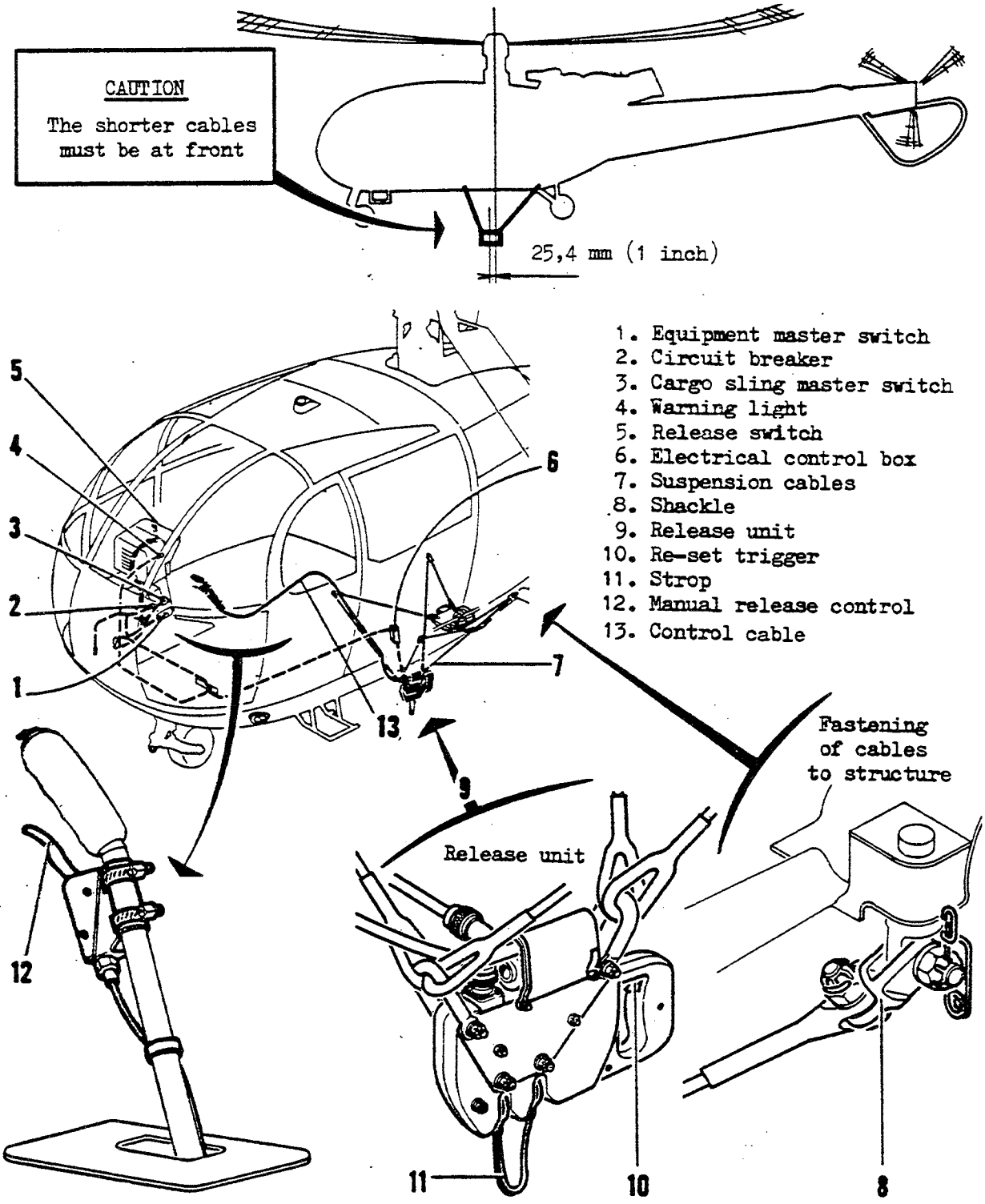
The carrying of heavy loads(500 to 750 kg -1,100 to 1,650 lb-) is a delicate operation in view of the fact that swinging of the load might adversely affect aircraft behaviour. Pilots, therefore, are advised to train progressively with increasing loads before attempting heavy-load operations.

NOTE : With "CARGO SWING" type equipment (Ref. Fig.2.3.6b) the influence of load swinging on the helicopter's behaviour is considerably less than with the standard cargo sling. This makes the carrying of heavy loads less exacting, and the load-to-hook distance limits of 3m-8m(10ft-26ft) specified above may be relaxed if necessary.

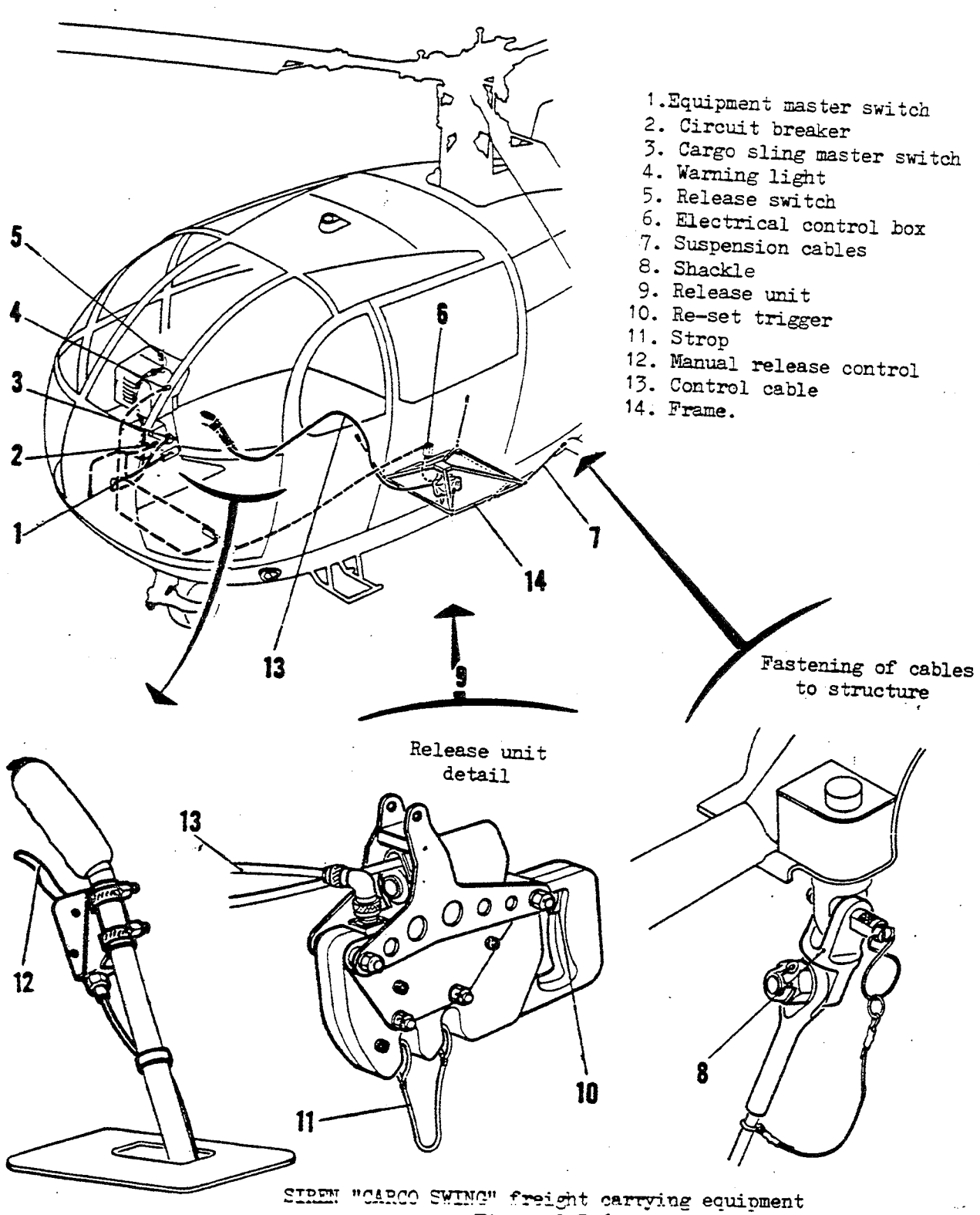
Operation

Before attaching the load, check that circuit breaker (2) is engaged, then move the 6-position switch (1) to "sling" and the master equipment switch (3) to ON. See that stick friction is more than zero.
Hook up the load before take-off or during hover.

WARNING : IN RAIN, THE OPERATOR ON THE GROUND SHOULD WEAR THICK RUBBER GLOVES AND DISCHARGE ANY STATIC CHARGE FROM THE HOOK BY CONNECTING A CONDUCTOR (CABLE OR TUBE) BETWEEN THE CARGO HOOK AND THE GROUND.



Cargo sling
Figure 2-3.6a



SIREN "CARGO SWING" freight carrying equipment
Figure 2-3.6b

2.3.8 SIREN cargo sling (continued)

Once the load is secured to the cargo sling, apply collective-pitch very smoothly while maintaining the aircraft above the load. Observe a short pause when the support cables are fully stretched.

Lift the load vertically, then establish forward flight and start climbing immediately.

Handle the aircraft gently : increase and decrease speed slowly, do not bank more than 30 degrees, considering that the load factor is 1.5 with a load of 750 kg (1,650 lb) attached to the cargo sling.

Establish zero forward speed sufficiently high to ensure that the load will not be dragged on the ground, then descend vertically until the load contacts the ground.

Release the load by operating the switch (5) on the cyclic-stick (if this switch fails to operate, use the manual control (12) on the collective-pitch lever).

Wait until the warning light, or ground personnel, signals that the load has been effectively released. If there is no one at the release point, resume forward flight, taking the same precautions as when carrying the load, until the release point is visible.

Engine failure

In the event of engine failure in flight, establish autorotative flight and immediately release the load.

In the event of engine failure in hovering flight while the load is being attached to the sling, move off to the right and apply collective-pitch. Ground personnel should be warned that they are to move away to the left in such circumstances.

2.3.9 Hoist (fig. 2-3.7b)

Pilot's hoist controls are :

- a circuit breaker (13)
- a 6-position switch (12) on the R.H. side of the instrument panel.
- a master switch (14)
- a cable cutter emergency control (11) mounted on the cyclic stick.

The hoist can be operated only by the winchman, strapped with a safety belt (15), who operates on the L.H. side of the cabin. His controls include :
- an electrical control switch (7) on the winchman's control grip (6)
- an emergency, mechanical control handle (1 fig.2-3.7a).
  This can be used as necessary to complete or carry out an operation in the eventuality of an electrical failure.

Prior to the mission :

On the ground :

- Remove the fairing corresponding to the hatch (19).
- Install the special foot-rest.
- Turn the front L.H. seat to face aft.
- It is recommended to remove the co-pilot's collective-pitch lever.
- If possible, lock the L.H. aft sliding door in open position, (if modifications AM 245 and 382 have not been embodied, remove the L.H. aft sliding door), lower the hatch and lock in open position.

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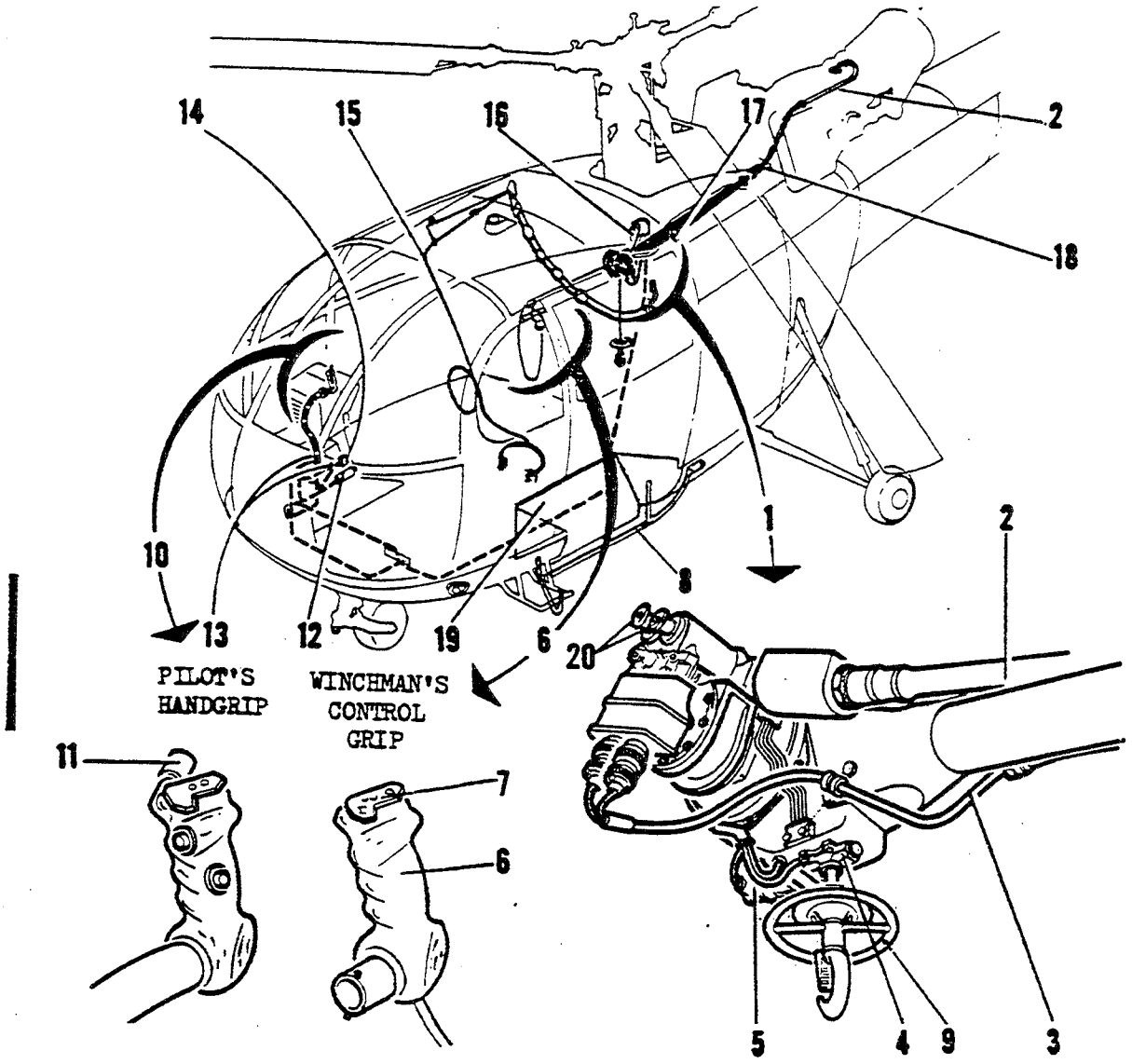
July 26, 1968



1. Hoist
2. Air line
3. Electrical wiring
4. Cable cutter
5. Squib
6. Winchman's control grip
7. UP/DOWN control switch
8. Special foot rest
9. Rescue ring
10. Pilot's cyclic-stick handgrip
11. Cable cutter control
12. 6-position switch
13. Circuit breakers
14. Master switch
15. Winchman's safety belt
16. Junction box
17. Hoist arm support
18. Filter
19. Hatch
20. Priming push-buttons.

Rescue hoist
Figure 2-3.7b

2.3.9. Hoist (Continued)

- prime the hoist by actuating the push-buttons (20) or the emergency control handle (1, Fig 2-3.7a).

NOTE : Simultaneous operation of heating system and hoist :
- AM 1152 not embodied. The heating system (vertical-displacement control lever) can be used without affecting operation of the hoist.
- AM 1152 embodied. The heating system (horizontal displacement control lever) should not be used when the hoist is being operated.

In flight:
- Lock the L.H. aft sliding door in open position.
- Lower the floor hatch and allow to lock in open position.

CAUTION : DO NOT ATTEMPT TO CLOSE THE DOOR WITH THE FLOOR HATCH OPEN.

Operation :

Rescue operations are possible from heights up to 25 m (80 ft) maximum.

It is advisable to hoist up the load prior to establishing forward flight.

As the load leaves the ground or the water, the pilot should maintain altitude by applying collective-pitch (increase of 0.05 to 0.1).

Consequently, before using the hoist it is necessary to ascertain that the collective-pitch margin available when the load is carried by the hoist will be such that the pilot does not have to exceed maximum permissible collective-pitch, considering that, in hovering flight, a collective-pitch variation of 0.05 corresponds to a change in weight of approximately 150 kg (330 lb).

For rescue purposes, it is recommended to hoist one person only at a time and to carry out the second rescue operation, if required, after the first rescued person has been placed behind the pilot, preferably on the R.H. side of the cabin.

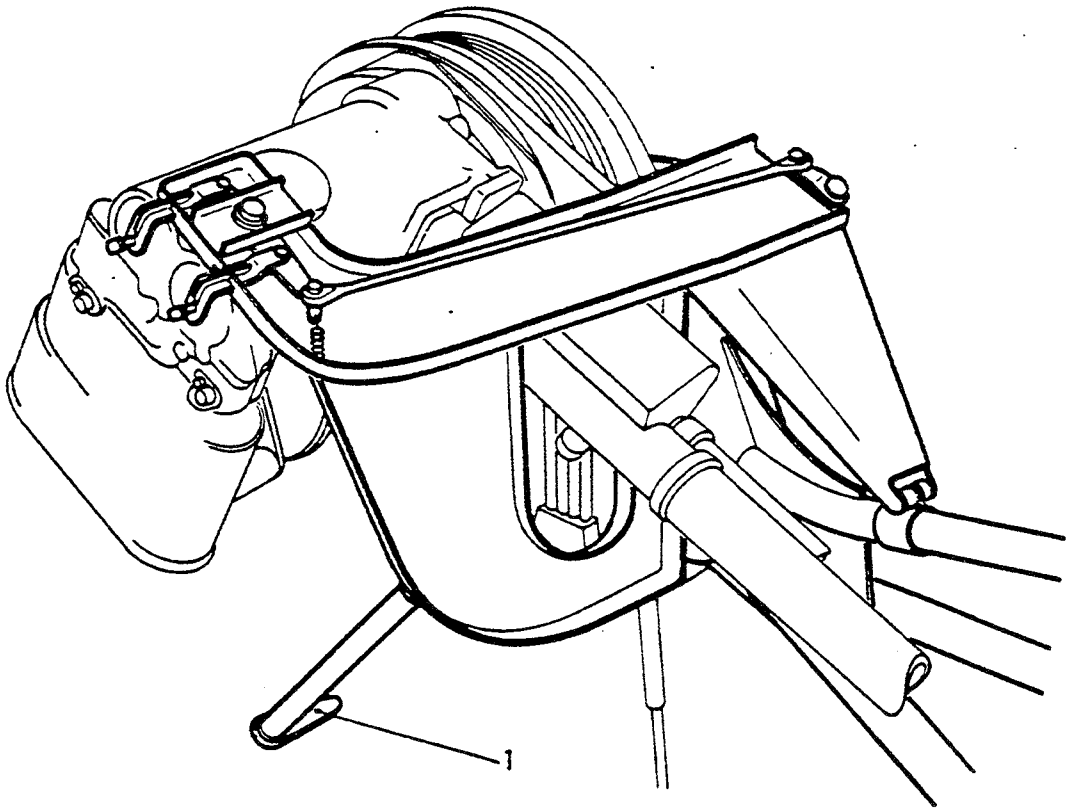
NOTE : The most unfavourable lateral c.g. location is encountered in the following conditions :
- 20 kt (37 km/h) wind.
- small tankage 60 l. (16 U.S. gallons)
- lightweight pilot and heavyweight hoist operator

These conditions, however, still permit hoisting the maximum permissible load 175 kg (385 lb) or 225 kg (496 lb) according to the equipment installed).

Operation IN EMERGENCY ONLY using manual control (1, Fig. 2-3.7a) (AM.866)

Actuating the emergency control handle (1), installed on certain aircraft, cancels the operation of all safety devices. Consequently :
- in raising : harsh stop at end of travel may cause jamming, or damage the hoist.
- in lowering : there is no travel-limit stop; the cable, with the load, is released from the drum.

CAUTION : IN RAISING; WIND ON JUST ENOUGH CABLE TO RAISE THE LOAD. IN LOWERING; STOP THE HOIST IMMEDIATELY THE RED-PAINTED SECTION OF THE CABLE STARTS TO UNWIND.



Manual control handle
Figure 2-3.7a

2.3.10. Ambulance Installation (Ref. Fig. 2.3.8 and 2.3.8a

Helicopters in the ambulance configuration can carry two stretcher cases ; the litter support installation can take the following types of litter :

- French type, modified 1957, light alloy.
- French type, modified to NATO dimensions.
- U.S.A. type, steel
- U.S.A. type, 3-piece, folding

The ambulance installation includes :

- 1 Front support (1)
- 2 Lower straps (2)
- 4 Rings (3) on cabin rear wall panel
- 2 Rear clamps (4)
- 2 Elastic cords (5)
- 2 Upper straps (6)
- 2 Supports (9) and elastic cords (8) for securing the rear passenger seat in stowed position.
- 2 Swivel snap-hooks (10) for hanging emergency medical treatment equipment
- 1 First aid kit support (7)

2.3.10 Ambulance installation (continued)

For the present purposes the helicopter is considered as being fully equipped with the ambulance installation fixtures. So equipped, it can be used either in standard configuration (front and rear passenger seats in normal position) or in ambulance configuration by installing the appropriate items of removable ambulance equipment.

1. Potential ambulance configuration

The removable ambulance equipment items may be carried in "stowed" position, ready for quick conversion for litter carrying. In this configuration the litters are not carried in the helicopter.

A. Preparation

(1) Remove the rear passenger seat.

(2) Stow the rear passenger seat on the supports (9), securing it with the elastic cords (8).

(3) Remove the front passenger seat, or install it facing rearward.

(4) Place the front support (1) in "stowed" position.

(a) Secure the hooks (11) to the bars (12) in the cabin floor panel.

(b) Secure the elastic cords (5) to the rings (13).

(5) Hook both ends of the lower strap (2) to rings (3) and (14).

2. Ambulance configuration

A. Preparation

(1) Perform operations 1 (1), 1 (2) and 1 (3).

(2) Bring the forward support into normal position if stowed.

(3) Rest the front support lower hooks (15) on the bars in the cabin floor panel (12).

(4) Incline the support rearward to engage the hooks. Hook the elastic cords (5) to the rings (14).

(5) Hook both ends of the lower straps (2) to rings (3) and (14), if operation 1 (5) has not been performed.

(6) Hook the upper straps (6) to the rings (3) on the rear panel.

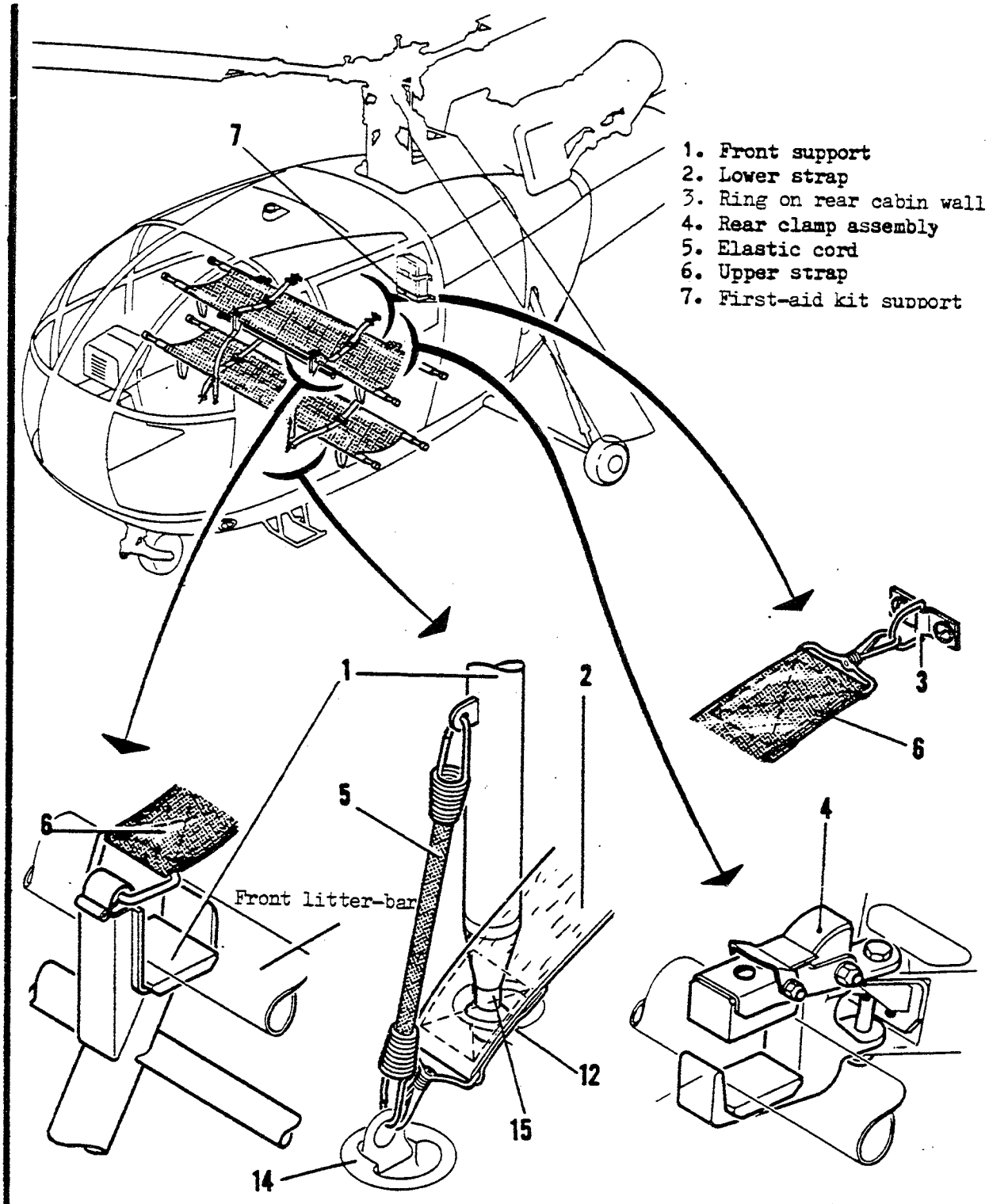
(7) Open the rear clamps (4) ready to engage the litter bar, and release the strap centre buckles.

B. Loading the litters

(1) Present the upper litter on the floor panel slide rails.

(2) Raise the litter and engage the rear bar in the rear clamps.

(3) Holding the litter by the forward handles, position the upper part of the front support.



Ambulance installation
Figure 2-3.8

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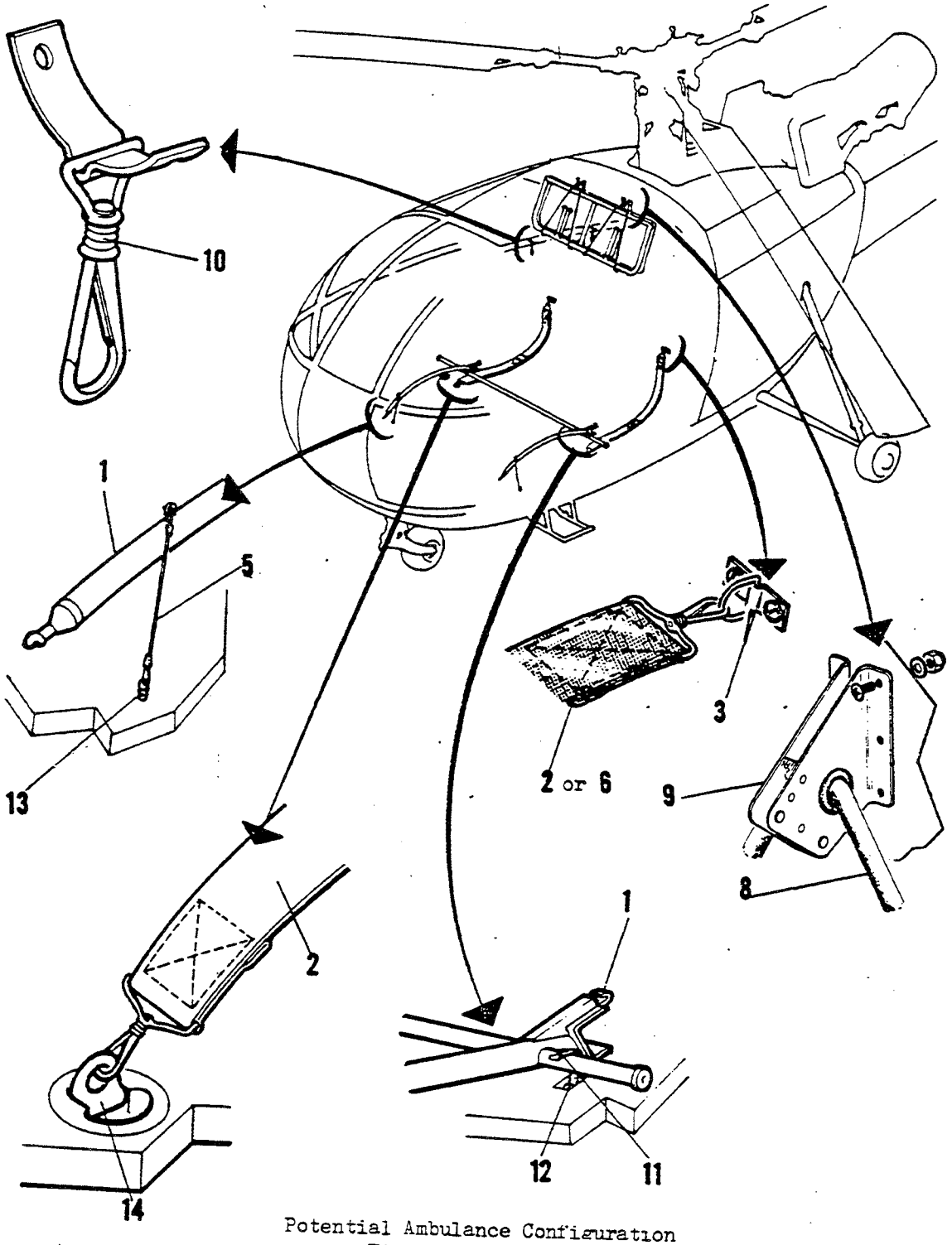

Potential Ambulance Configuration
Figure 2-3.8a

2.3.10 Ambulance installation (continued)

(4) Engage the forward bar of the litter in the front support saddle fittings (1).

(5) Close the rear clamps (4).

(6) Slide the lower litter along the guide rail, below the upper litter, until it engages in the locating plates.

NOTE : Whenever possible, the lower litter patient should be placed "head to the port (left hand) side of the helicopter".

(7) Buckle the straps over the patients, and tighten moderately.

(8) Hang such emergency medical treatment equipment as may be required on the swivel snap-hooks (10)

(9) Release the rear door lower catches and hinge the doors upward ; slide them forward, finally lowering them so that the litter handles fit into the recesses provided in the door panels.

(10) Lock the rear doors. After closing and locking the rear doors the mechanic must ascertain that the knurled guide pins of the lower catches are fully engaged in their holes

NOTE : A safety device makes it impossible to open the doors upward. It is necessary to open the doors upward only when the helicopter is used in the ambulance configuration with litters whose length is greater than the width of the helicopter. The safety device includes a screw (1) (Ref. Fig. 2-3.8b), which must be removed when it is required to open the doors upward ; but in this case the mechanic must check, after closing the doors, that the knurled pin of the lower catches is correctly positioned.

After using the helicopter for ambulance duties the safety screw(1) must be re-installed.

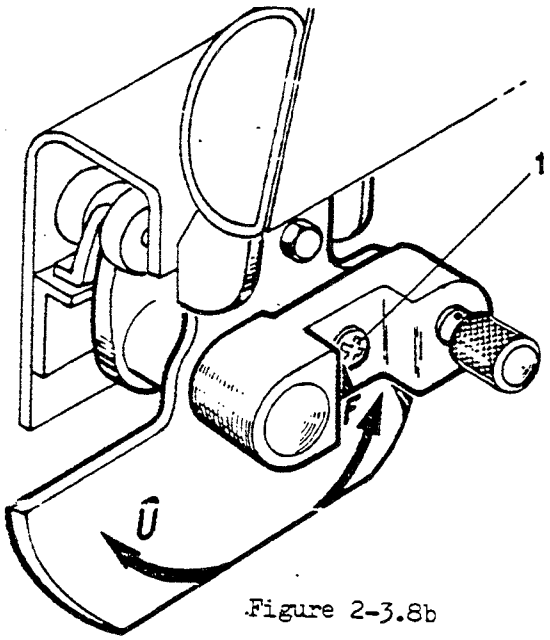

Figure 2-3.8b

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2.3.11 **Internal cargo carrying**

Requirements (fig. 2-3.9)

Loading limitations are stated on the "cargo loading" placard (Section 1, para. 1.10.1).

Compliance with the following loading instructions is recommended :

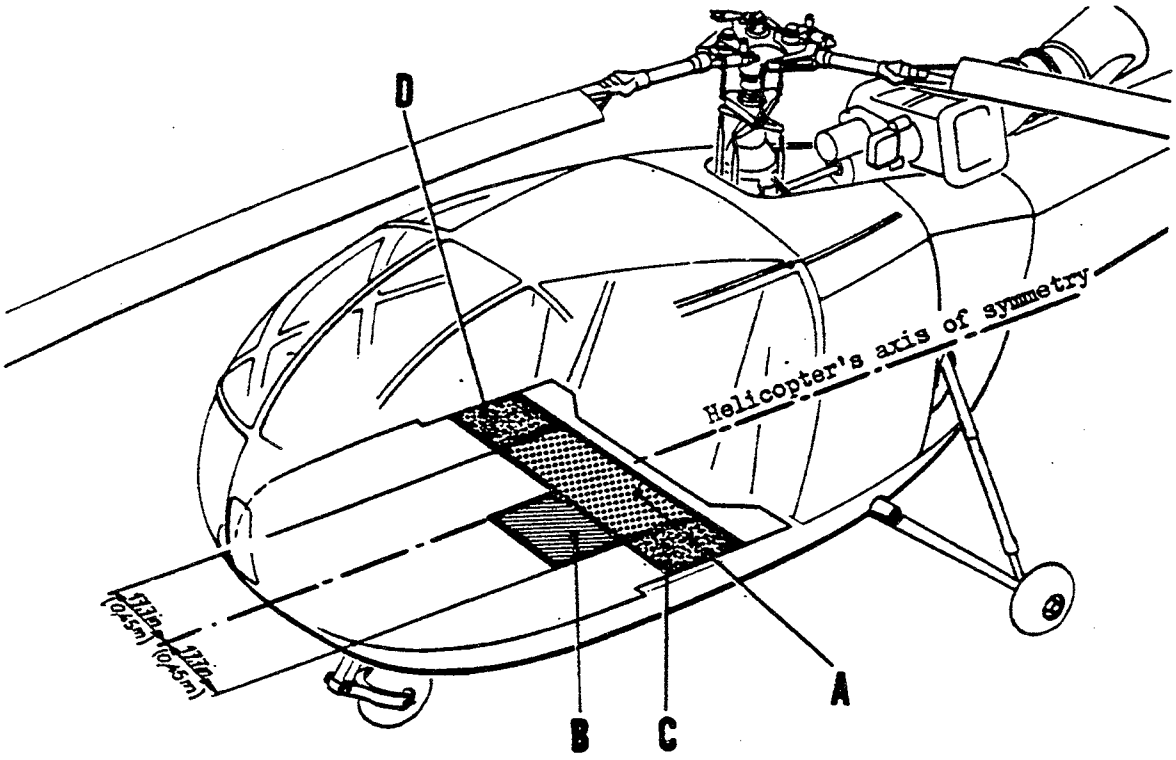
PREFERENTIAL LOADING AREAS AND LIMITATIONS

A. Area to be loaded first : 530 kgs (1170 lbs)

B. Area to be loaded after A : 150 kgs (330 lbs)

C. Load limited to 60 kg (130 lbs), except for rigid load centered on area A.

D. Load limited to 60 kg (130 lbs), except for rigid load centered on area A.



Loading areas
Figure 2-3.9

In the case of a rigid load, the limits specified for areas C and D may be disregarded provided that the load is centered on area A.

Load distribution however must be consistent with weight and c.g. limits and the load must be tied down to preclude vibration in flight.

Maximum permissible load concentration on the cabin floor is 1000 kg/m2 (205 lb/sq.ft.).

If the forward area (area B) is used, the co-pilot's seat and collective pitch control lever, and the forward passenger seat, must be removed. In addition it may be necessary to add ballast (ref. 4.1.1. and chart D).

After loading the cargo, check flying controls for freedom of movement.

Carrying of loads in the baggage holds is prohibited unless they are equipped for the purpose.

2.3.12 Ski type landing gear

Normal landing (from hover) :

Hold the stick in the hovering attitude position. No attempt should be made to oppose, by action on the cyclic stick, the slight nose down attitude resulting from the deeper sinking of the forward ski. This effect tends to increase tail rotor clearance.

On soft snow

1. Take-off : Do not allow the aircraft to slide but raise the aircraft forward in a steep climb, with no hovering flight.

2. Landing : Perform a sliding landing : clouds or snow will only develop after touch down. Collective-pitch should be completely reduced only after the aircraft has come to a complete stop.

Normal take-off and landing are possible provided that the pilot looks at the ground immediately in front and not straight ahead, through the windshield. Irregularities of the snow surface can be easily detected by the pilot and be used as a reference for hovering. Final approach can be facilitated by landing the aircraft near a clearly visible reference point (rock, tree, etc..)

On dry snow

1. On particularly dry snow : There is no objection to the nose of the aircraft sinking down to the lower skin in the snow, when landing.

2. On either hard snow or slush (partly melted) : the landing will be conducted by gradually reducing collective-pitch, step by step, in order to avoid rough sinking of one of the skis.

2.3.13 Float type landing gear

With floats installed, caution should be exercised in using the main rotor brake, particularly on water, because of the tendency of the aircraft to swing to the right about its vertical axis.

2.3.13.1 Ground take-off and landing

Ground take-off and landing instructions given for the wheel type landing gear are also applicable for the float type landing gear.
NOTE : Applicable hovering take-off weights are those specified in fig. 3.8.

2.3.13.2 Engagement of the main rotor on water

The main rotor may be engaged when the aircraft is on the water if the area is clear of any obstacle. Due to the main rotor torque reaction, the aircraft will turn (up to 180 degrees) when the main rotor is engaged.

2.3.13.3 Standing still on water with rotor engaged.

At 33,500 r.p.m, the aircraft may tend to move forward and to the left. This tendency is easily overcome by displacing the cyclic stick and slightly increasing collective pitch. A collective-pitch of 0.10 is generally sufficient to avoid producing excessive rotor downwash.

2.3.13.4 Taxiing on water

No special difficulty is associated with this manoeuver. It is recommended to limit forward speed and slightly apply collective pitch to avoid ramming of water at front of floats.

2.3.13.5 Normal alighting on water

Instructions are the same as for normal landing with wheel type landing gear.

2.3.13.6 Autorotative alighting on water

Touch-down on water from autorotative flight should be accomplished at low speed to avoid ramming of water at front of floats.
- Initiate flare-out at a reasonable height.
- Hold nose-up attitude down to zero altitude.
- Reduce nose-up angle as necessary at the moment of touch-down to maintain tail rotor clearance.

2.3.13.7 Inflation requirements

The normal inflation pressure per cell is governed by the gross weight of the aircraft :

0.250 bar for gross weight up to 2100 kg
0.390 bar for gross weight greater than 2100 kg (SA 315 B)

The altitude limitations specified in paragraph 1-11.5 should be observed ; particularly when the floats are inflated to 0.390 bar.

2.3.14 Windshield wiper (ref. Figure 2-3.10)

The windshield wiper assembly is installed on the vertical members of the cabin structure and is made up of one unit or two separately controlled units each including a motor, a control linkage and a blade.

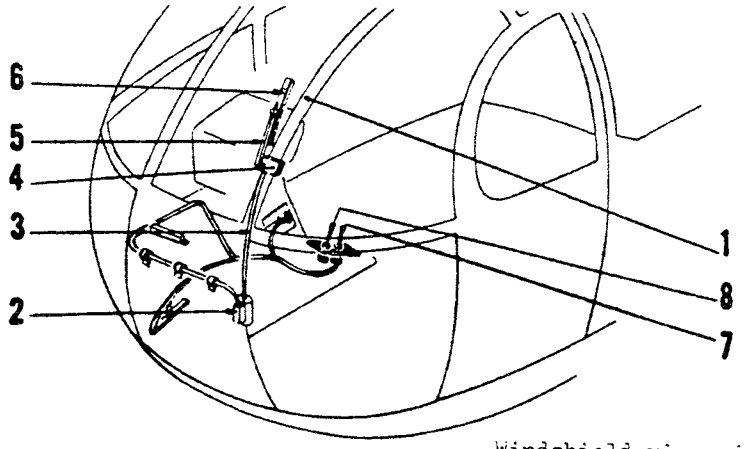
The blade sweeps the aircraft windshield, providing better visibility in rain.

The wipers are supplied with power from the overhead panel, via a fuse.

Each unit comprises :
- an electric motor (2) with a sheathed flexible cable (3)
- a crank unit (4)
- a wiper arm (5) and blade (6)
- a control switch (7) and pilot light (8).

1) It is most advisable to delay starting the wiper until the windshield is thoroughly wet.
2) NEVER OPERATE WIPER ON DRY WINDSHIELD.

NOTE : Operation of the wiper installation affects the standby compass by 5°.



Windshield wiper installation
Figure 2.3.10

2.3.15. Fuel jettison (Ref. Fig. 2.3.11)

The fuel jettison valve provides a means of quickly exhausting any excess fuel, if it becomes necessary to lighten the helicopter for a rescue operation requiring the hoist.
Two hundred litres (53 U.S.gallons) of fuel can be jettisoned in 1 minute 30 seconds ; the amount of non-jettisonable fuel is 200 litres (53 U.S. Gallons).

Opening of the fuel jettison valve is controled by a 2-position (open-closed) switch, located on the switch panel and protected by a safety guard (Ref. Fig. 2-1.4).

JETTISONING OF FUEL DURING DESCENT IS PROHIBITED

It is recommended to fly the helicopter at a speed of 20 to 55 knots (40 to 100 km/h) when jettisoning fuel.

2.3.16. Nose wheel lock

A special handle can be installed on the control pedestal, permitting the pilot to engage or release the nose landing gear wheel lock (Ref. Fig. 2-1.4)

PULL THE HANDLE TO RELEASE THE LOCK

On helicopters incorporating this installation, the lock is engaged only prior to a deck-landing at sea, or landing on a slope. In all other circumstances the wheel must be free to castor (handle pulled out).

A (normally retracted) warning flag protrudes from the nose landing gear leg when the lock is engaged.

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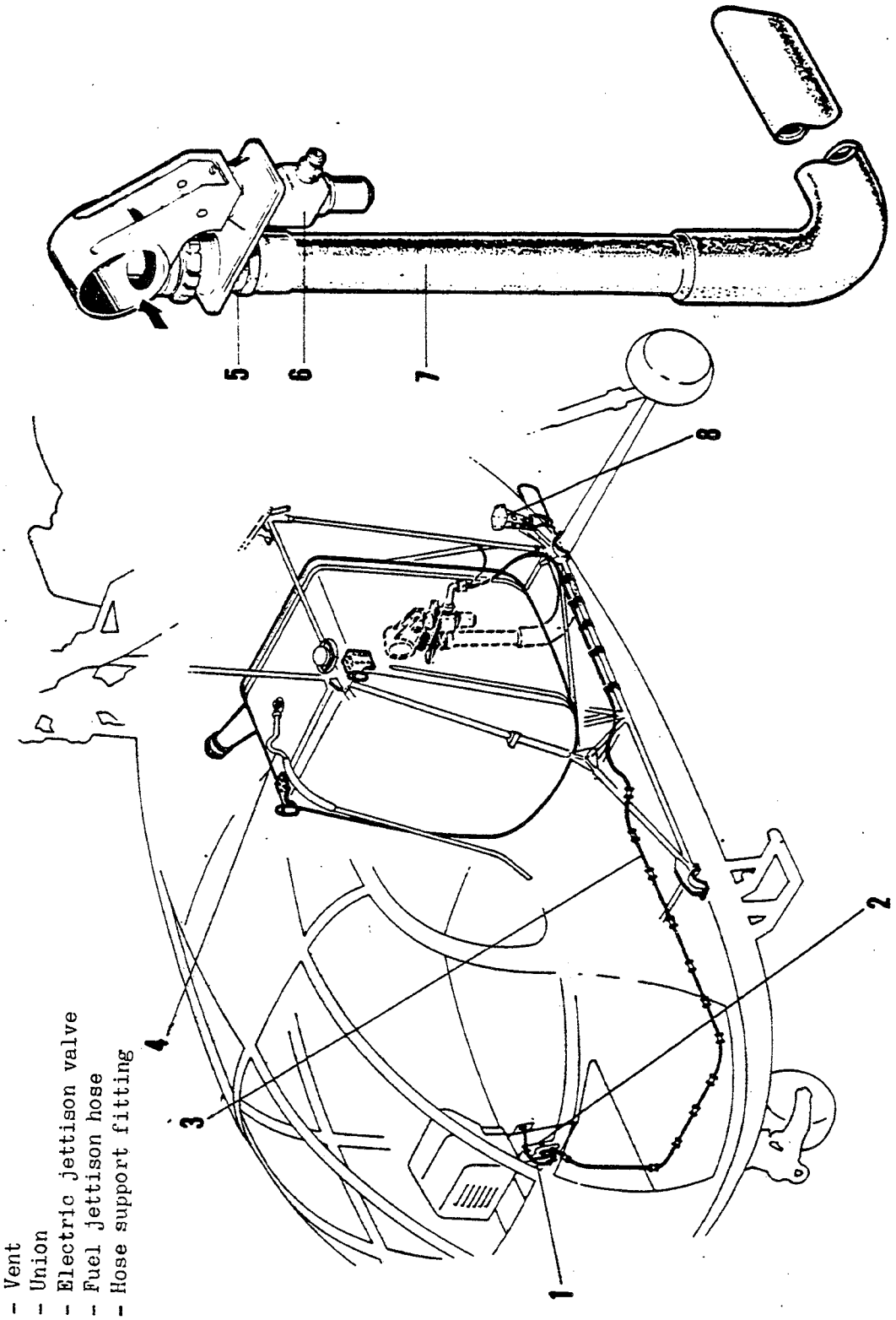

1 - Cable
2 - Switch
3 - Cable
4 - Vent
5 - Union
6 - Electric jettison valve
7 - Fuel jettison hose
8 - Hose support fitting

Fuel Jettison
Figure 2-3.11

2.3.17. Emergency floatation gear See para. 2.5.15

2.3.18. Hydraulic harpoon

2.3.18.1. Purpose (Fig. 2-3.12)

NOTE : Helicopters using the landing harpoon must be fitted with a nose wheel castor lock.

The hydraulic harpoon assembly has been designed for installation on helicopters fitted with a wheel type landing gear.

The hydraulic harpoon installation makes deck landing possible on ships having the helicopter landing platform equipped with a grid provided for provisional mooring before tie-down. Before take-off, the harpoon holds down the aircraft on the platform after the ropes have been released.

NOTE : It is recommended to tie down the aircraft within 1/4 hour of the rotor being stopped to reinforce the hold down action of the harpoon on the grid.

2.3.18.2. Description (Fig. 2-3.12)

The installation consists of :

- harpoon,
- connection with aircraft structure,
- hydraulic equipment for harpoon operation,
- control and monitoring electrical equipment.

The harpoon consists essentially of a jack (8) and a hook (9)(also serving as release unit) fixed at its end.
The attachment of the harpoon to the aircraft has been so designed that the reactions of mooring grid (10) on the hook are transmitted to very strong weld clusters of the aircraft structure. The hydraulic equipment is controlled electrically and is used to operate the harpoon during the three phases of operation : engagement, locking and release.
The installation is designed to be incorporated in the helicopter electrical power supply and control systems ; the function controls, disposed within the reach of the pilot are :

- a mission circuit breaker (5),
- a mission switch (3),
- a six position selector switch (4),
- a control panel (6),
- a "MOORING-RELEASE" control switch (7).

2.3.18.3. Operation (Fig. 2-3.13)

1. Operations before deck landing

(1) Check that the Mission circuit breaker (9) is engaged.

(2) Check that the Harpoon circuit breaker (3) is engaged.

(3) Place the Mission switch (8) in "MARCHE"(ON) position.

(4) Place the Mission selector switch (7) in "HARPOON" position.

NOTE : The installation is supplied with power, the electric cock is energized, the harpoon hydraulic system is pressurized.

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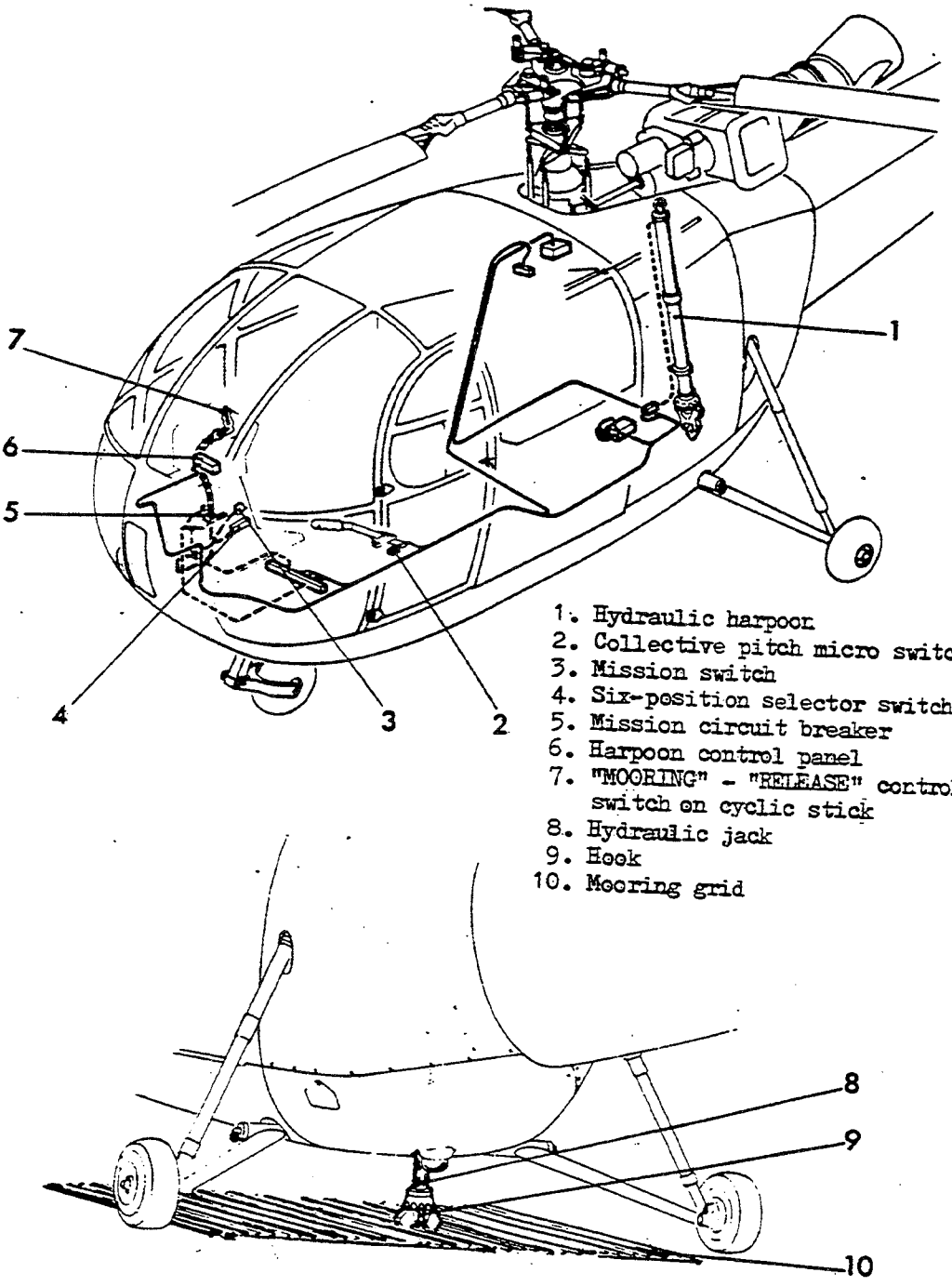
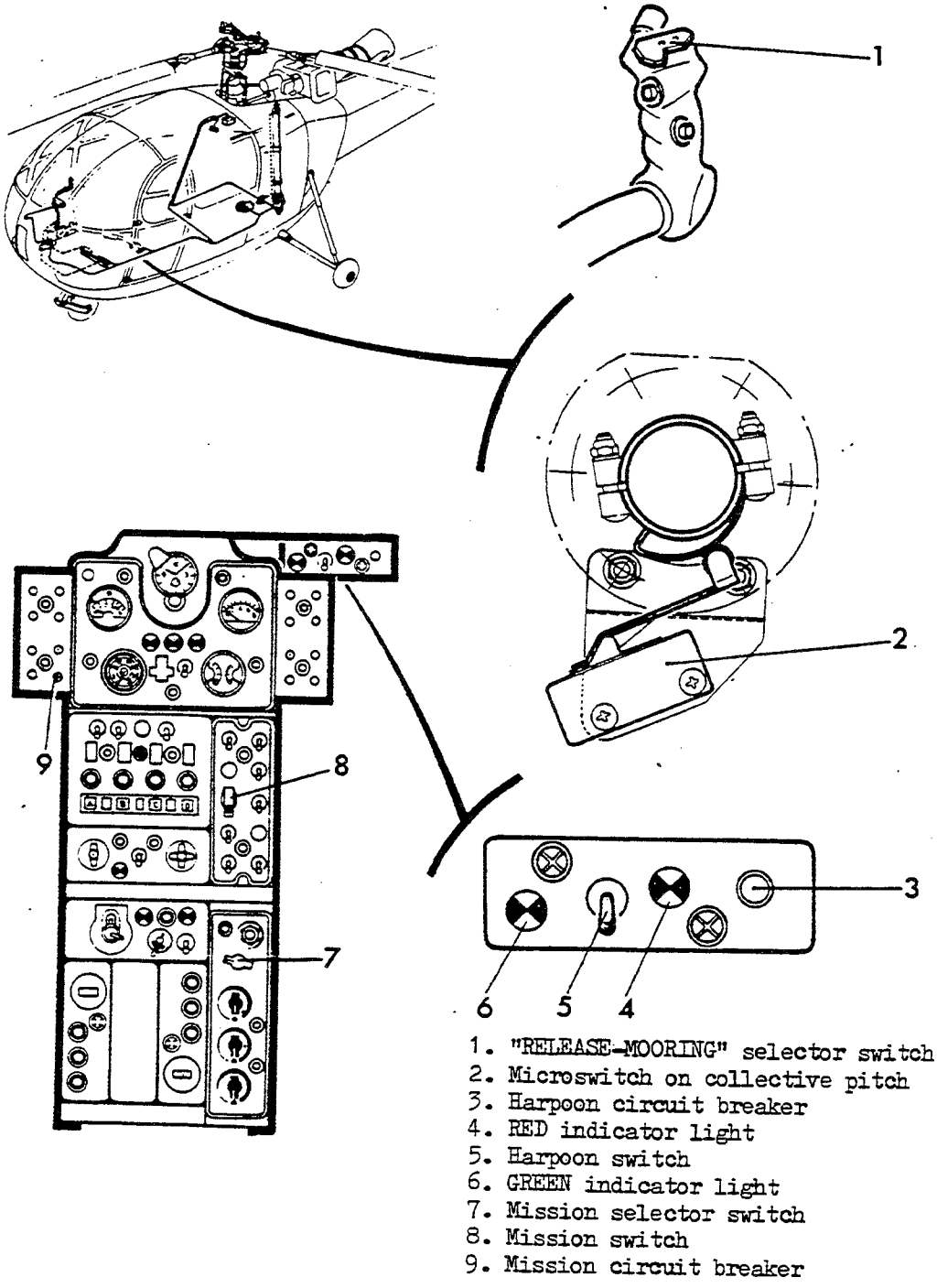


1. Hydraulic harpoon
2. Collective pitch micro switch
3. Mission switch
4. Six-position selector switch
5. Mission circuit breaker
6. Harpoon control panel
7. "MOORING" - "RELEASE" control switch on cyclic stick
8. Hydraulic jack
9. Hook
10. Mooring grid

Hydraulic harpoon
Figure 2-3.12



1. "RELEASE-MOORING" selector switch
2. Microswitch on collective pitch
3. Harpoon circuit breaker
4. RED indicator light
5. Harpoon switch
6. GREEN indicator light
7. Mission selector switch
8. Mission switch
9. Mission circuit breaker

Hydraulic harpoon (Cont.)
Figure 2-3.13

2. Procedure for deck landing using the harpoon

CAUTION : DECK LANDINGS SHOULD BE CARRIED OUT WITH THE WHEEL BRAKES APPLIED AND THE NOSE WHEEL LOCKED IN CENTRAL POSITION.

A. Approach

The ship must be headed into the wind ; two cases may be encountered :

(1) Low amplitude platform movements ($V_w \leq 30$ knots)
Steady relative wind blowing from 30° port to 30° starboard of the center line of the ship.

Carry out an accurate approach on the grid taking into account the ship's superstructures.

Hover and wait for signals from the signal officer.

(2) High amplitude platform movements (Vw between 30 and 45 knots)

Maximum roll : 9°
Maximum pitch : 4°

Landing on the grid can be carried out up to 45° each side of the grid axis. Hover in the axis and over the rear part of the platform at a height sufficient to estimate the possibilities of landing.

NOTE : It is possible that control accuracy may not be sufficient to enable the batman to give the "Cut" signal. Do not hesitate to lift off and make a new approach.

In all cases, the "Cut" signal can be given only for instanteneous roll and pitch values nearing zero.

B. Deck landing using harpoon

Deck landing can be automatically or manually controlled. In case of high amplitude platform movements (A(2)), it is recommended to carry out an "AUTOMATIC" deck landing.

(1) "AUTOMATIC" deck landing procedure

(a) Place the harpoon switch (5) in _____"AUTOMATIC" position.

(b) The green indicator light (6) is _____"ON", the harpoon is retracted.

(c) Make final approach against the wind (in no case should the angle between path of approach and direction of wind be greater than 45 degrees).

(d) Immediately the "Cut" signal is received, completely reduce pitch, operating smoothly : as soon as pitch reaches 0.12, the microswitch (2) closes ; the harpoon extends.

NOTE : During this operation, hold the heading closely.

(e) The "GREEN" indicator light (6)_____"GOES OUT".

(f) The harpoon is locked onto the grid.

(g) The "RED" indicator light (4)_____"COMES ON". The helicopter is moored on the grid and held down on the platform.

(h) If the "RED" indicator light (4) does not come on, apply the permissible take off pitch (0.6). If the helicopter does not take off, it is locked on the grid correctly and the "RED" indicator light (4) is faulty.

(i) Secure the tie-down ropes.

(2) "MANUAL" deck landing

(a) Place the harpoon switch (5) in_____"MANUAL" position.

(b) The "GREEN" indicator light (6) is_____"ON" ; the harpoon is retracted.

(c) Check that the "RED" indicator light (4) is_____ "OUT" to make sure that the harpoon hook is not locked; if the hook is locked, unlock by depressing the selector switch (1) forward in_____"RELEASE" position.

(d) Make final approach against the wind.

(e) Immediately the "Cut" signal is received, completely reduce pitch, operating smoothly, and depress the selector switch (1) rearward to _____ "MOORING" position.

NOTE : During this operation, hold the heading closely.

(f) The "GREEN" indicator light (6)_____"GOES OUT".

(g) The harpoon is locked onto the grid.

(h) The "RED" indicator light (4) _____"COMES ON".

(i) Release the selector switch (1), the helicopter is then moored on the grid and held down on the platform.

(j) If the "RED" indicator light (4) does not come on, apply the permissible take off pitch (0.6). If the helicopter does not take off, it is locked on the grid correctly and the "RED" indicator light (4) is faulty.

(k) Secure the tie-down ropes.

(3) Releasing the harpoon and shutting down

The harpoon can only be unlocked manually :

(a) Place the harpoon switch (5) in_____"MANUAL" position.

(b) Depress the selector switch (1) forward to_____"RELEASE" position.

(c) The "RED" indicator light (4)_____"GOES OUT".

(d) The jack retracts, the "GREEN" indicator light (6) "COMES ON".

(e) Place the Mission switch (8) in "OFF" position.

3. Take-off procedure for aircraft moored by harpoon

A. Operations before take off

Before releasing the ropes :

(1) Check that the Mission circuit breaker (9) is engaged.

(2) Check that the Harpoon circuit breaker (3) is engaged.

(3) Place the Mission switch (8) in "ON" position.

(4) Make sure that the Mission selector switch (7) is in "HARPOON" position. The installation is supplied with power, the electric cock is energized, the harpoon hydraulic system is supplied.

(5) Place the "HARPOON" switch (5) in "MANUAL" position.

(6) The "GREEN" indicator light (6) is "ON", the harpoon is retracted.

(7) Check that the "RED" indicator light (4) is "OUT" to make sure that the harpoon hook is not locked ; if the hook is locked, unlock it by depressing the selector switch forward (1) to "RELEASE" position.

(8) Depress the selector switch (1) rearward to "MOORING" position.

(9) The "GREEN" indicator light (6) "GOES OUT".

(10) The harpoon is locked onto the grid.

(11) The "RED" indicator light (4) "COMES ON"

(12) Release the selector switch (1), the helicopter is then moored onto the grid by the harpoon.

B. Taking off an aircraft hooked by harpoon

(1) Release the ropes

(2) Set the pitch to 0.6

(3) Following the orders from the signal officer, release the hook and - at the same time - increase pitch to 0.70 or 0.75 by depressing the selector switch (1) forward to "RELEASE" position.
In no case, should this operation be performed before receiving the order or being quite sure that all ropes are away.

NOTE : During this operation, the pilot should keep the cyclic stick essentially in neutral position and be ready to apply rapid correction - as soon as the hook is released - to bring the control back to "free" flight position.

(4) The "RED" indicator light (4) _____ "GOES OUT".
(5) The harpoon retracts ; the "GREEN" indicator light (6) _____ "COMES ON".
(6) Place the Mission switch (8) in _____ "OFF" position.
(7) The "GREEN" indicator light (6) _____ "GOES OUT".

2.3.19 Differential brakes (Figure 2.3.14)

Description

The differential brake equipment consists of :

- Two brake control pedals (1) mounted on the respective directional control pedals.
- A hydraulic control unit with a control handle (2) for the parking brake.
- A dual master cylinder brake pressure transmitter.
- Hydraulic lines.

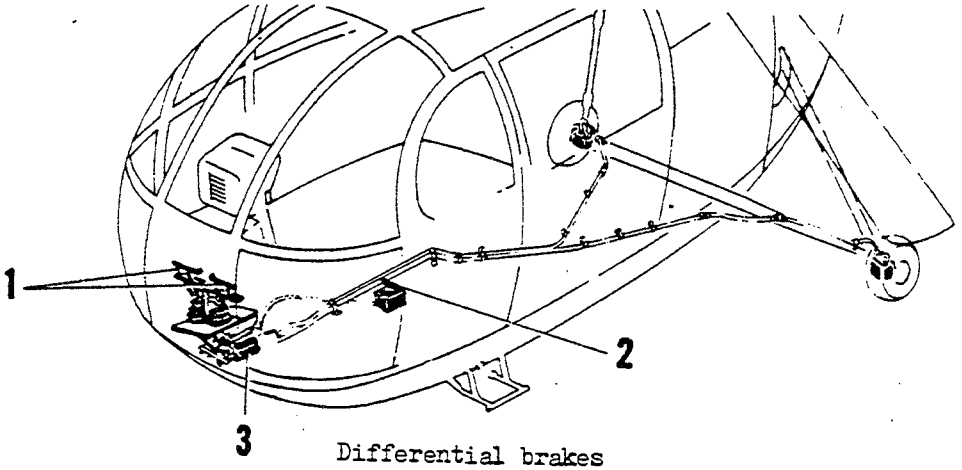
Individual or simultaneous control of the R.H. and L.H. wheel brakes is possible with this equipment by co-ordinated pressure on the pedals (1).
On aircraft fitted with this equipment, the parking brake hydraulic system is connected to the dual master cylinder of the differential brake system (see paragraph 2.1.7.2)

Operation

No particular problem is involved in the operation of the differential brakes. Take-off and landing may be carried out with pressure applied on the brakes.

The use of the differential brakes facilitates deck landings and makes for better manoeuvrability of the aircraft during taxiing; see limitations, paragraph 1.11.10.

During ground manoeuvres avoid immobilization of the inside wheel in a turn, as this would cause rapid wear of the tyre.



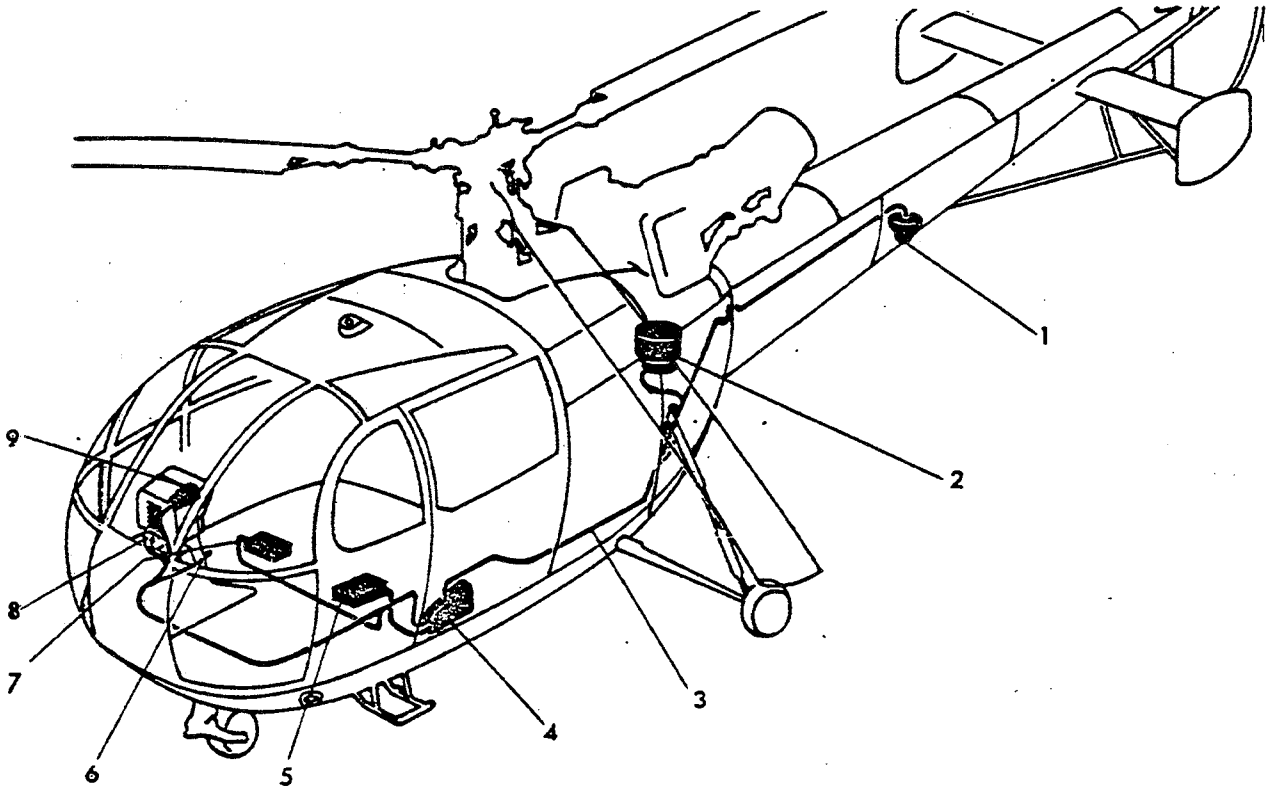
Differential brakes
Figure 2.3.14

2.3.20 GYROMAGNETIC COMPASS

Description (Figure 2.3.15)

The J2 gyromagnetic compass is installed on the ALOUETTE III to provide the pilot with a visual indication of the magnetic heading followed by the helicopter. The J2 gyromagnetic compass assembly consists of :

- A C2 type, flux valve (1) (15F)
- An S3 type, gyroscopic directional control (2) (16F)
- An A2 type, amplifier (5) (17F)
- A V8 type, indicator (9) (18F)
- A J2 relay box (4) (29F)
- A 20F switch (6); 22F, 23F, 24F fuses (8); and a cable bundle (3)
- An a.c. generating system (7).



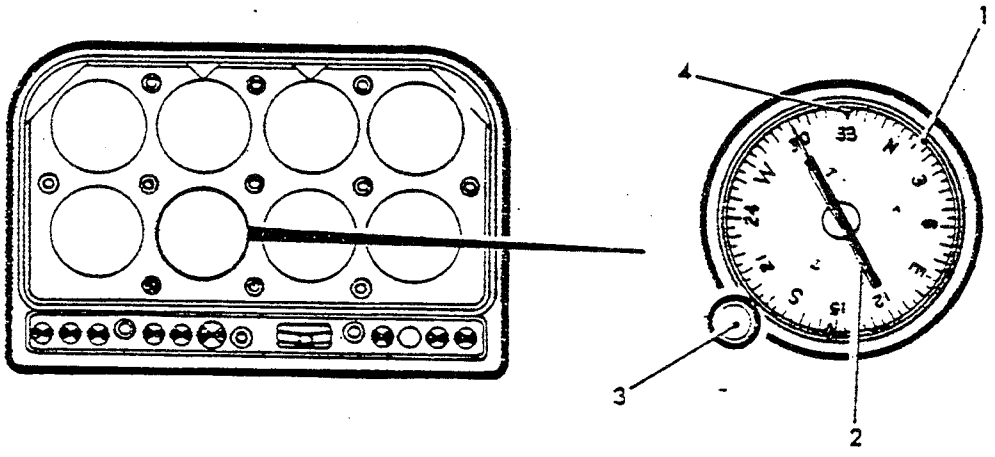
J2 gyromagnetic compass installation
Figure 2.3.15

SGAC Approved
May 6, 1969

Normal operation (Figure 2-3.16)

- On ground

As soon as the engine is running, engage the a.c. generating system and switch the gyromagnetic compass installation on ; wait 3 minutes for the gyro of the gyroscopic directional control to reach its operating speed.
Using the control knob (3) located on the L.H side of the indicator, set the QFU of the runway, read on the heading compass card (1) opposite pointer (2).
When aligning the helicopter on the runway before taking-off, check that the heading pointer (2) coincides approximately with the fixed index (4) of the gyroscopic instrument (heading identical with QFU within the residual deviation error).
Also check the stand-by magnetic compass indication.



V8 type indicator (18F)
Figure 2.3.16

- In flight

Operation of the J2 gyroscopic installation offers no particular difficulties. Heading to be maintained is set by means of knob (3) located on the L.H side of the indicator ; heading maintained is read on compass card (1) opposite the upper fixed index (4).

2.3.21. Sand filters

2.3.21.1 Barrier type sand filters

Description

The power plant may be equipped with sand-filters when flying under conditions requiring their installation.
These filters are installed in place of the air intakes.
However, their installation is possible only on engines equipped with special mounts.

Operation in aft c.g. limit configuration

When the aircraft is equipped with sand-filters and flies in aft limit configuration (i.e. with only the pilot on board) it is recommended to reduce the airspeed if the mission permits.

In this configuration, slight roll engagements between 150 and 190 km/h I.A.S. (80 and 100 knots) are encountered.

It is also noted that, from 170-175 km/h I.A.S. (92-95 knots) the cyclic stick moves laterally and then return to neutral at 190 km/h I.A.S. (100 knots).

Effect on performance

See section 3 "PERFORMANCE INFORMATION", paragraphs 3.1, 3.2 and 3.3.

DGAC approved
10-81

2.3.21.2 Dynamic sand filters

Description

The purpose of this installation is to protect the engine against ingress of sand ; it consists of :

- a filter fitted round the engine air intake
- a pressurized air supply system (P2)
- an electrical control and monitoring circuit.

Controls and monitoring components available to the pilot consist of :

- a protective circuit-breaker on overhead panel
- a switch and a "FILTRE ANTI SABLE" (SAND FILTER) indicator light at the lower L.H. side of the instrument panel. This switch operates the P2 system by opening and electro-valve.

When the indicator light comes on, it indicates that the electro-valves is fully open.

Operation

- Before flight
  - Check the filter for security to the engine and pipes for condition
  - Check the electro-valve for correct operation : switch on and ensure that the warning light comes on.

- Flight in sand-laden atmosphere
  - Set the "FILTRE ANTI SABLE" (SAND FILTER) switch to "ON"
  - Ensure that the warning light comes on.

If the P2 electro-valve fails to open (indicator light does not come on), avoid to fly in sand-laden atmosphere which could damage the engine prematuraly.
If the P2 electro-valve fails to close (indicator light remains on), the flight can be continued with no detrimental effect (the filter remains effective).

2.3.22. Auxiliary priming unit for starting an engine running on automotive diesel oil.

2.3.22.0. General

- The auxiliary priming unit (or booster) enables satisfactory engine starts to be made in cold weather when automotive diesel oil is being used (See Fuel Chart on page 1.4). The purpose of this unit is to fill the engine fuel lines with petroleum spirit in place of TR4 or TRO, while forcing the automotive diesel oil back through the lines and accessories (governor, fuel flow control cock, barostatic valve, motor pump), into the main tank. On starting, the torch igniters are fed first with auxiliary fuel and then with automotive diesel oil after ignition of the combustion chamber.

  CAUTION : THIS INSTALLATION DOES NOT ALTER THE RESTRICTIONS ON THE USE OF AUTOMOTIVE DIESEL OIL.

2.3.22.1. Description - (Figures 2.3.18 and 2.3.19).

- The booster unit consists of :
  - A micro-pump
  - An auxiliary fuel tank
  - A set of fuel lines
  - An electrical power supply system

- The tank and the micro-pump are attached to a single support mounted on the rear part of the structure, inside the battery compartment.

- The tank can be filled from the left-hand side of the aircraft (This operation requires the L.H. lateral panel to be opened)

- Tank characteristics :
  - Total capacity ..... 4 litres (1.05 U.S. gallons)
  - Usable capacity ..... 3.350 litres (0.88 U.S. gallons)

- The electrical installation ensures operation and monitoring of the auxiliary priming unit.

  It consists of the following :
  - A push-button with guard (9)
  - A "push-to-test" type pilot light (8)
  - A relay with base, mounted inside the instrument panel pedestal.

2.3.22.2. Operation

- Pre-flight operations.

  . Check fuel level in the tank ; top up as required.

  CAUTION : DO NOT DRAIN FUEL CANS TO THE LAST DROPS, BUT ALWAYS USE CLEAN RECEPTACLES, TO AVOID UNNECESSARY SOILING OF THE FILTER.

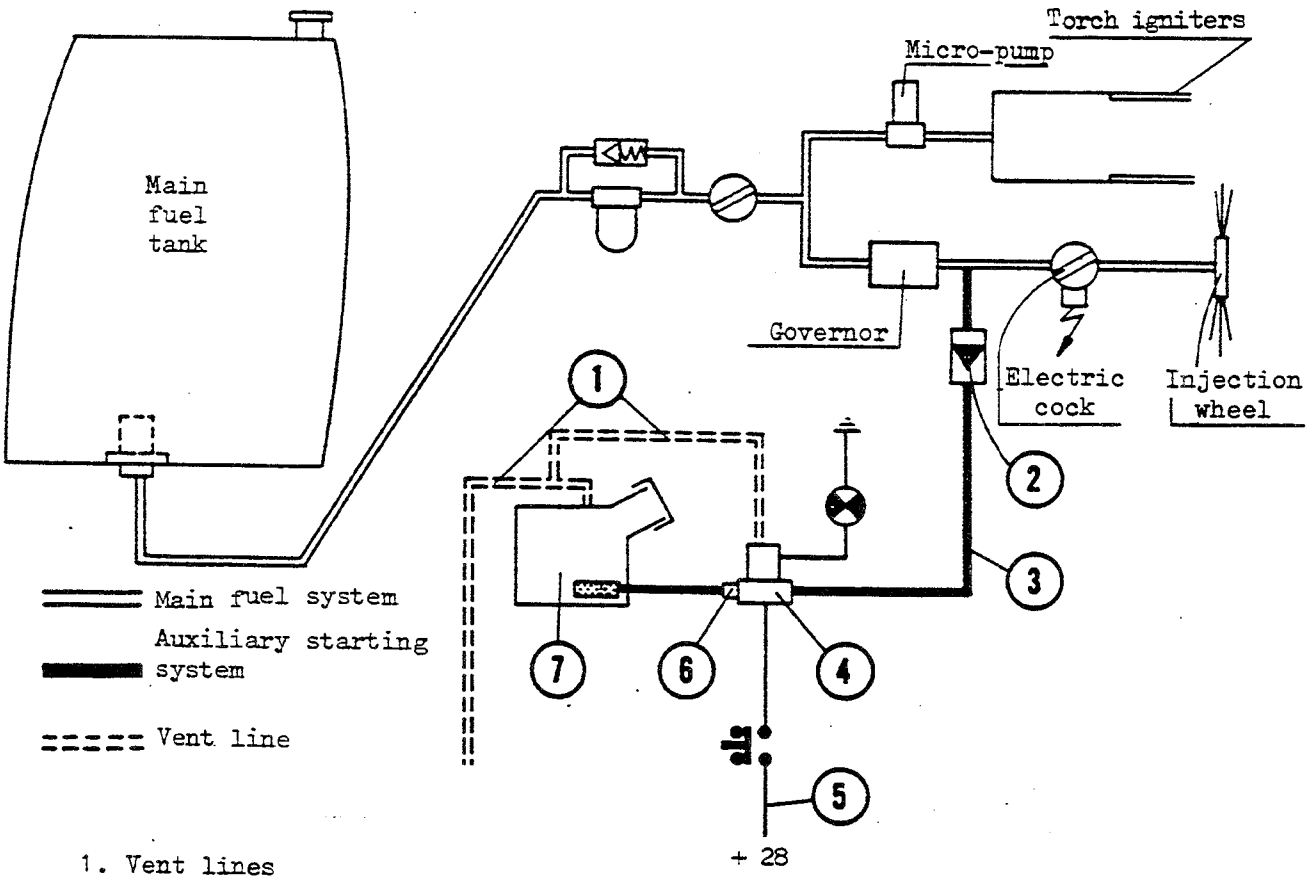
  . If the warning light does not come on, check :

  - that the micro-pump filter is not clogged
  - that the micro-pump operates correctly.

- Engine starting procedure.

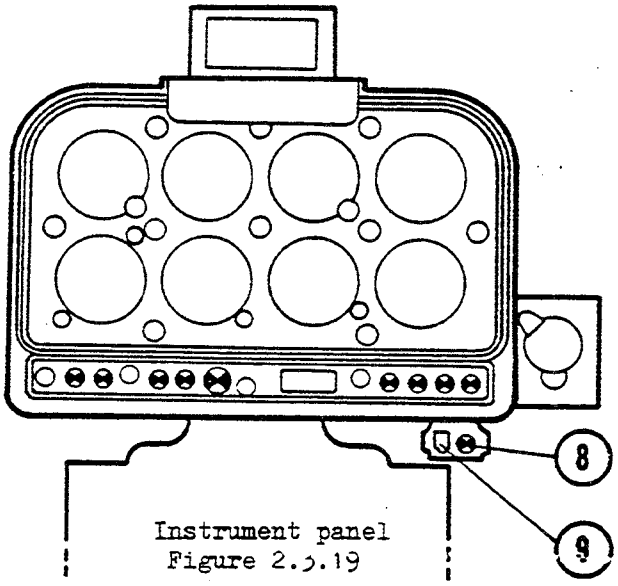
  . Priming the fuel system requires that the normal engine starting procedure as described in Section 2, paragraph 2.2.5. be modified. as follows :

Operation	Check
- Ventilate the engine, if necessary, by cranking	- Fuel flow control lever in "closed" position. - Starting selector switch "OFF"
a) Depress the push-button and hold for 30 seconds	- "Operating" indicator light-on
b) Switch the priming (booster) pump "ON"	- Auxiliary priming unit "Operating" indicator light-out.
c) Continue with normal engine starting procedure, operation 2 in paragraph 2.2.5., and subsequent operations.	



1. Vent lines
2. Non-return valve
3. Hoses
4. Micro-pump
5. Electrical power supply system
6. Micro-pump filter
7. Auxiliary fuel tank
8. "Push-to-test" type pilot light
9. Push-button with guard

Auxiliary starting system
Figure 2.3.18



Instrument panel
Figure 2.3.19

2.3.23. Additional fuel tanks 3160S.73.75.280

2.3.23.0. General

- Two additional fuel tanks can be installed in the cargo compartments to increase the helicopter's endurance. The installation can be used with both types of main fuel tank (standard (square), or fourlobe (rounded).
- The two additional fuel tanks are in direct communication with the bottom of the main tank. Transfer is effected by gravity and filling is carried out through the main tank filler neck.
- According to the requirements of the mission, one additional fuel tank may be installed without the other.

2.3.23.1. Use

All information given in paragraph 2.1.5 remains applicable.

- In flight : the fuel quantity readings are to be corrected by reference to the correction plate. Information relative to the low fuel level (60 litres) warning light-paragraph 2.5.17 - remains effective as the additional fuel tank (s) are then empty.
- On the ground : Filling of the fuel tanks is to be carried out at a reduced rate of flow or with pauses to allow stabilization of the fuel level in the tanks.

2.3.24. Battery temperature warning light

2.3.24.0. General

According to version (AMS 07.1764) a battery temperature warning system is installed to warn the pilot in the event of overheating of the battery.

The system is composed essentially of a temperature probe mounted inside the battery and electrically connected to a warning light on the instrument panel.

2.3.24.1. Use

Before starting the engine : During the indicator/warning light check, if the "BAT. TEMP" warning light does not come on, check the circuit.

If the "BAT. TEMP" warning light comes on during operation (Battery temperature above 71 °C).

- Switch OFF the battery by the overhead panel "BAT" switch and continue flight.
- If the battery is needed again during the flight, wait 15 minutes before re-setting the "BATT" switch to "ON" (MARCHE), and ensure that the light does not come on.

2.3.25. Small air intakes

A gain in weight and level flight performance can be obtained by installing smaller air intakes on the SA 316B (Mod. AMS 1628).

Operating limitations are unaffected.

Speed in level flight is increased by 2 %.

SECTION 2

2.4. MOUNTAIN COUNTRY OPERATION

- C O N T E N T S -

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2.4 MOUNTAIN COUNTRY OPERATION

2.4.1 General

With a turbine engine, power fall off with altitude is slower than with a piston engine. Furthermore, as we will see later on, there is a convenient means of ensuring that the limit load condition is not exceeded and, at limit load, the available power reserve is considerable.

With any helicopter, flying in mountain-country presents some special aspects which derive from the following :

- presence of vertical air currents (updrafts and downdrafts of dynamic or thermal origin).
- disappearance of visible horizon, when the helicopter flies lower than the crests facing the pilot.
- lower air density.

As regards the first two points, there is nothing special to say on the Alouette (except that with its fast climb capabilities, it is well preserved against downdrafts) and the considerations briefly outlined hereafter are applicable to all type helicopters.

However, the lower air density is the source of some special aspects in regard of a turbine-powered helicopter.

A. Presence of vertical air currents

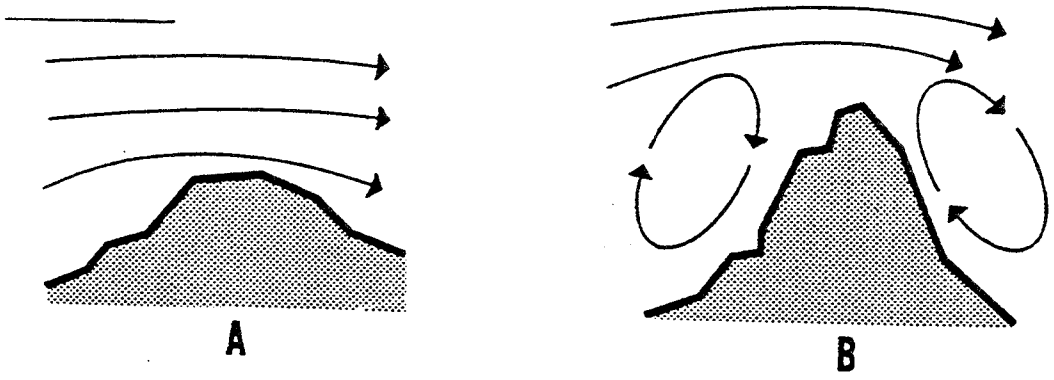
Vertical air velocities in mountain-country, even out of the clouds, can attain considerable levels (15 m/sec. and more) quite imposible to offset by the vertical speed of the aircraft itself. Hence, it is essential to know how they should be anticipated and what action should be taken.

B. Dynamic air currents

Winds are disturbed by topographical features since they are compelled to get around them.

- If the topography is relatively flat, and the wind is slight, the mass of air will flow over the mountains in laminar fashion (i.e. no turbulence) : rising current or updraft on the near side relative to the wind direction and a downward current or downdraft on the far side (view A).

2.4.1 General (continued)



- When the topography is abrupt, and in strong wind conditions, the air flow is no longer laminar : turbulence occurs on both the near side and the far side relative to the wind direction and as a result, there is a downdraft close to the near side of the mountain and an updraft close to the far side (view B).

C. 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 :

- updrafts above the mountain sides exposed to the sun and, in the evening, updrafts above the forests in which is stored the heat generated during the day.

- downdrafts above the mountain sides in the shade and above the glaciers.

2.4.2 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.

In view of the above, the airspeed indicator must be read very frequently.

2.4.3 Effect of decrease in air density

When hovering in ground effect, the decrease in air density, for a given weight, has the following effects :

- higher collective-pitch requirements
- higher tail rotor blade angle entailing smaller rudder pedal margin
- less reserve power

2.4.3 Effect of decrease in air density (continued)

As a result, the maximum operating weight (taken as the maximum weight sustainable in hovering flight with ground effect) is reached when any one of the following limits is attained :

- maximum collective-pitch
- maximum rudder pedal position (allowing for a minimum margin)
- maximum engine power

In the particular case of the Alouette, the limit collective-pitch angle is always reached before attaining the rudder pedal limit and, in most cases, before attaining the maximum tail pipe temperature, which, in fact is never reached before the limit collective-pitch angle unless the prevailing O.A.T. is extremely high, namely 55° C at S.L, 32° C at 2000 m (6,500 ft) and 8° C at 4000 m (13,000 ft) (see figs. 3-7 and 3-8).

Maximum hovering weight in zero wind conditions, which is shown on fig. 3-6, enables to predetermine limit landing or take off weight in relation to altitude and temperature.

In practice, the pilot who wishes to take-off at altitude with a given load is permitted to load the aircraft until the hovering collective-pitch angle attains one of the values shown on the chart in para. 1.6. (without, however, exceeding maximum permissible gross weight).

This rule is an extremely convenient one : the collective-pitch indicator actually serves the same purpose as a spring balance, the pilot no longer has to worry about weight estimation errors, which cannot be ruled out, and the wind, a favourable factor, can be taken into consideration. In addition, this collective-pitch limitation always leaves a considerable power reserve, which, in itself, is an important safety factor.

In the case of an altitude take-off, the pilot will be well advised to accomplish a preliminary trial with a gross weight slightly below the limit shown in the hovering take-off weight charts (fig. 3-6).

By hovering in ground effect prior to landing, he will know from the collective-pitch angle, the load he can add on at the next journey. A difference of 0.05 in collective-pitch angle corresponds to :

- 150 kg (330 lb) at 0 m (0 ft), density altitude
- 120 kg (265 lb) at 2000 m (6,000 ft), density altitude
- 100 kg (220 lb) at 4000 m (13,000 ft), density altitude

2.4.4 Flight path requirements

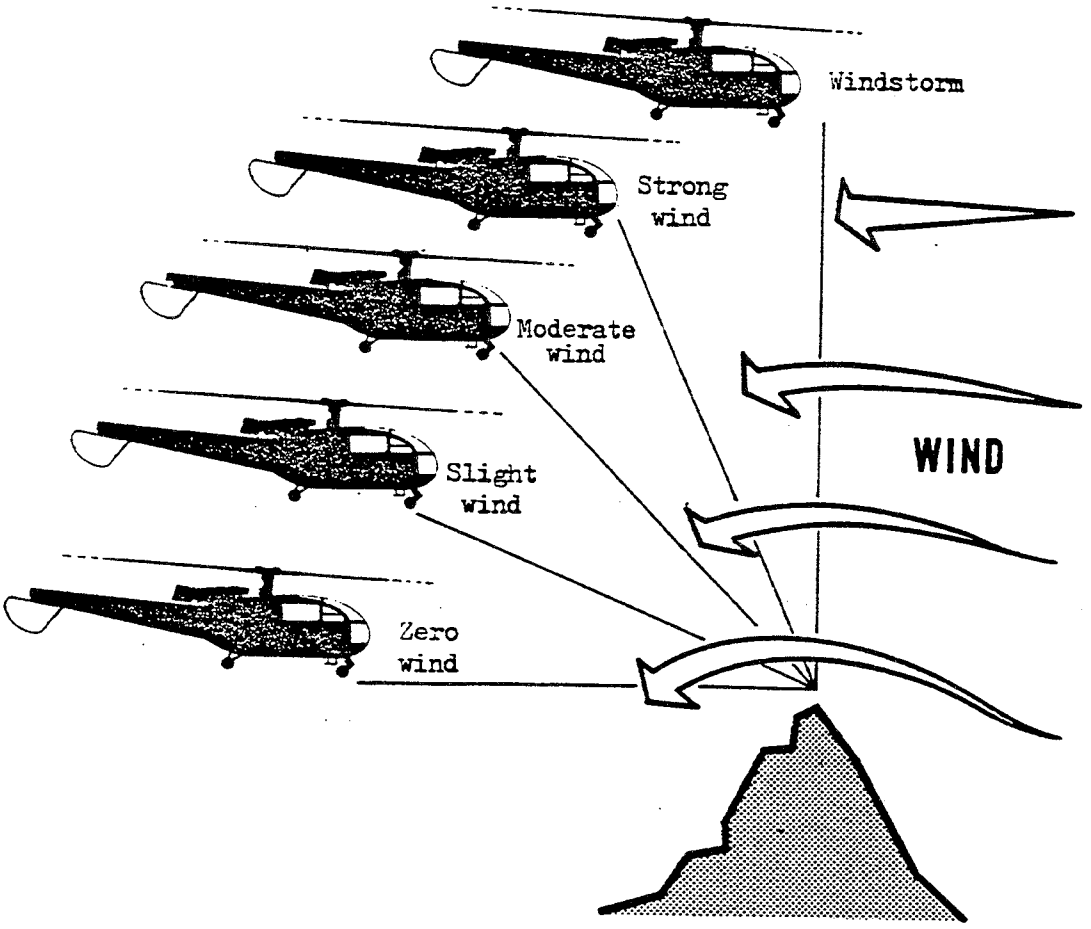
A. Landing approach or post take-off flight path

The weight limitation being determined, the pilot must choose an approach flight path or a post take-off flight path that he will be able to follow without having to exceed operating limitations, due consideration being given to the downdrafts liable to be encountered. Optimum flight paths, therefore, are those requiring the smallest collective-pitch angle during the manoeuver.

2.4.4 Flight path requirements (continued)

Whenever possible, the pilot should elect to land on a bump or crest, so as to be able to choose any approach axis in azimuth and elevation, depending on the wind. Furthermore, this will enable him to easily accomplish another circuit in the event of a faulty approach. Finally, he will also be able to reduce engine power immediately the helicopter is airborne.

The golden rule of mountain-country flying is to select an approach angle all the more steep that the wind is stronger, up to vertical approach in a windstorm.



When there are no downdrafts to be feared, flat approach is the form which authorizes minimum collective-pitch to establish hovering flight, as there is no vertical speed to be cushioned. In windy conditions this advantage is offset by the presence of downdrafts behind the crest, a factor which grows in importance as the wind increases.

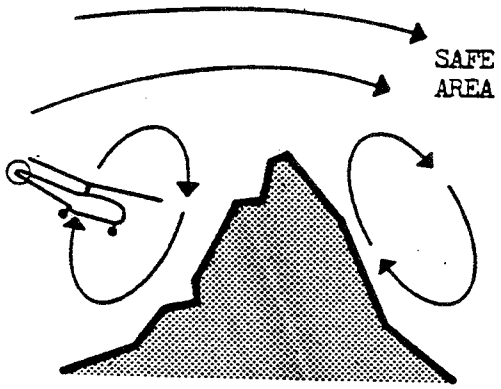
2.4.4 Flight path requirements (continued)

Gathering of speed after take-off should, of course, be accomplished into wind ; so should deceleration prior to landing but the slow down must be very gradual. During final approach, the airspeed indicator should be watched very carefully, especially in slight or zero wind conditions, in order to make sure that the airspeed does not fall off completely before the helicopter is over an area possible to land on.

To determine wind direction, in the absence of a flag, smoke or other such means, proceed as follows : make a run at low I.A.S.with no side-slip, at about 50 m (160 ft) above the landing point, and then another run at the same I.A.S. in the opposite direction. Drift, on the one hand, and the difference in ground speed between the two runs, on the other, will give a fairly accurate idea of the wind direction. If the wind is only slight, the first two-way run may not be sufficient to establish its direction ; in that case, accomplish a second two-way run at a lower altitude (a few feet above the ground).

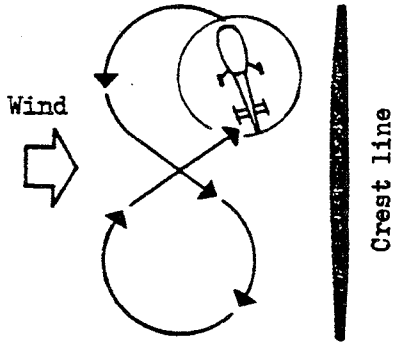
These runs will also permit checking the condition of the ground on the selected landing area.

Should the aircraft be caught in a downdraft which forces it below the desired flight path, the pilot should immediately turn the helicopter in the downwind direction and allow it to be carried by the downdraft, while maintaining the airspeed along the slope. He should move out of the downdraft before attempting to regain altitude.



B. Climb

In order to reduce climb time, the pilot should attempt to take advantage of atmosphere updrafts (flight on the near side relative to the wind or, in slight wind conditions, flight above the mountain sides exposed to the sun).



The pilot who gains altitude on the near side relative to the wind should always beware of the downdraft close to the mountain side. If he approaches the mountain side in search of the maximum updraft, he should not do so by facing the mountain side, but by placing the aircraft almost parallel to the latter so as to be ready at all times to move away from it and re-enter the rising current.

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2.4.4 Flight path requirements (continued)

If he wishes to gain altitude in a given zone, he should accomplish a series of 8's, always turning in the downwind direction, and not a spiral climb.

Never attempt to take advantage of the updraft on the leeward side of a mountain, for the turbulence on that side can be very dangerous.

The chart, figure 3-9, gives the rate of climb of the Alouette III, in relation to pressure-altitude and outside air temperature. This chart gives an idea of climb time in the absence of vertical currents.

2.4.5 Winter operations in mountain-country

Winter operations in mountain-country should be performed only by highly experienced pilots, in view of the following considerations :

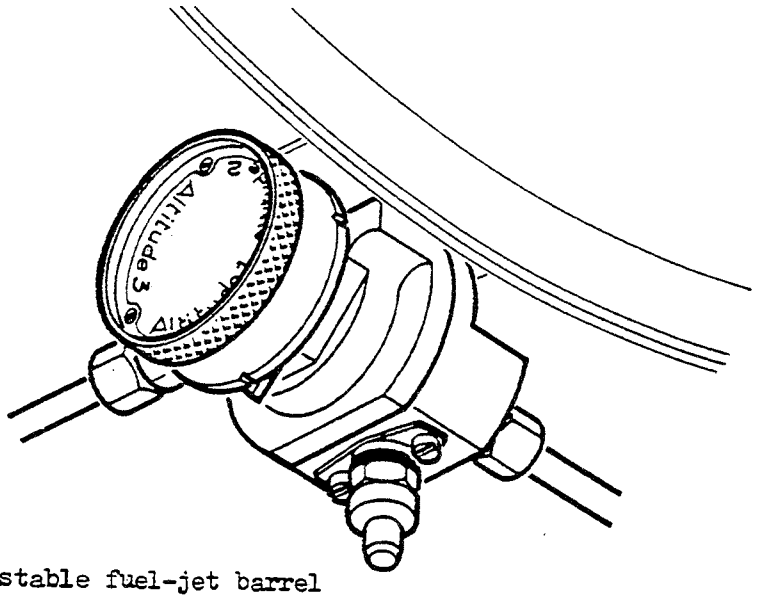
1. On landing in flaky snow, the pilot is liable to be deprived of visibility by snow dust thrown up by rotor downwash.

2. In dull weather it is difficult to estimate distances and speeds on snow covered surfaces.

3. It is essential to assume flight paths that will not compell the pilot to exceed specified collective-pitch limitation nor cause him to apply full right rudder (during turns on the spot or very low speed flight, always turn in the direction of rotor rotation, in view of the fact that much power is absorbed in resuming straight flight on completion of a left hand turn).

2.4.6 Engine starting at altitude

- The engine is normally provided with a barostatic cock which automatically adjusts fuel mixture during the starting cycle for the altitude of operation.
- Some engines are provided with a fuel-jet barrel, adjustable on the ground, for starting at the following altitudes :
  - n° 1 for engine starting up to Zp = 1500m. (5000 ft)
  - n° 2 for engine starting from 1500 to 3000m. (5000 to 10 000 ft)
  - n° 3 for engine starting from 3000 to 5000 m. (10 000 to 16 500 ft)
- For these two types of cock, and for engine starting between 5000 and 5800m (16 500 to 19 000 ft) a slow-running check must be performed before stopping the engine : Engine idling speed should be 20 000 rpm.
  Correct, if necessary, by re-setting the idling adjustment screw.



Adjustable fuel-jet barrel

2.4.7. Landing on a slope

Before landing, apply the parking brake.

After a final approach head into wind, turn the aircraft during the hover so that the steepest gradient, in the upward direction, lies between 9 o'clock and 12 o'clock relative to the helicopter. Allowing for the slope of the plane containing the three wheels during the hover (aft and starboard) this will produce the smallest tilt when the aircraft first touches down.

As the helicopter starts to tilt when the first wheel touches down, counteract rotor tilt by moving the stick towards the top of the slope. When all three wheels haye touched down, fully reduce collective pitch while returning the stick to neutral.

The maximum permissible gradient is 10 degrees.
In case of necessity, the aircraft may be landed in a direction outside the limits defined above provided that the slope does not exceed 6 degrees.

SECTION 2

2.5 EMERGENCY PROCEDURES

CONTENTS

2.5 EMERGENCY PROCEDURES

2.5.1 Autorotative flight

In autorotative flight, engine speed should never be decreased by action on the fuel flow control lever. This procedure, however, is permissible when, for pilot training purposes, an autorotative landing is desired, but it is not recommended above 2000 m (6,500 ft.)

Rotor speed should be maintained as high as the low pitch stop will permit without, however, exceeding 420 r.p.m.

Pilots who fail to avoid overspeeding of the rotor, must enter in the record sheets of the blades and of the rotor hub, the duration of the overspeeding condition and the maximum r.p.m. attained.

In view of the severe stresses liable to be set up by overspeeding, main rotor speeds in excess of 420 r.p.m. shall in every case entail general overhaul or inspection as detailed in chapter 5.4 of the Alouette III Maintenance Manual.

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2.5.1.1 Power-off autorotative landing following engine failure in flight (also see para. 2.5.8)

a. Apply full low collective-pitch ; do not apply forward cyclic, unless the airspeed, when engine failure occurs, is less than 48 kt. If rotor speed tends to approach 420 r.p.m, slightly increase collective-pitch.

b. Manoeuver so that the helicopter will be approximately facing into wind for the final approach.

c. Establish an approach speed of 48 kt minimum ; 54 to 59 kt if aircraft gross weight is close to maximum) and maintain this airspeed up to the flare-out.

d. At approximately 20 m (65 ft) accomplish a partial flare so as to bring the canopy horizontal former substantially in line with the horizon for a pilot of medium height.

e. Maintain this attitude until the aircraft is 2 to 3 m (6 to 10 feet) from the ground, but start increasing collective-pitch slightly when the aircraft is at 6 to 8 m (20 to 25 feet) in order to reduce the rate of descent.

f. At 2 to 3 m (6 to 10 feet), further increase collective-pitch. Leveling off is not necessary ; touch down may be accomplished in a slight nose up attitude consistent with tail rotor guard ground clearance.

The landing should normally be accomplished with an airspeed of 5 to 10 kt. If however, ground surface condition is such as to rule out a running landing (brush, ruts, etc...), initiate the flare at a slightly higher altitude and make it more pronounced so as to have zero airspeed upon contactiong the ground.

g. At touch down, take care not to pull the cyclic stick backwards.

NOTE : At 110 km/h (60 kt) I.A.S. the loss of altitude resulting from a 180 degree turn to the left in autorotation is 160 m (530 ft). The loss of altitude for a 360 degree turn is 300 m (1 000 ft).

2.5.1.2. Autorotative landings for training purposes.

If roll-on landings are made on stony ground there is a risk of damage to tail rotor blades from the projection of stones by the landing gear tyres. Consequenthy, it is recommended that grassland or concrete tracks be selected for autorotative landing training.

a. Apply full low collective-pitch.

b. Fully close the fuel flow control lever.

c. e.) d. f.) Proceed as in steps 3, 4, 5, 6 of para. 2.5.1.1.

g. Two to three seconds after touch down and, in any event, not later than when freewheel re-engagement is perceived, decrease the collective-pitch steadily - in one or two seconds - and at the same time, push the cyclic stick forward.

h. Once the aircraft has come to a complete standstill, the fuel flow control lever may be opened slowly to engage the clutch and increase engine speed to 33,500 r.p.m. in order to take off again if necessary.

2.5.1.3. Autorotative r.p.m. check. (fig. 2-5.1)

This check is required after replacement of main rotor blades and, also, if unsatisfactory operation is suspected.

A. Prior to flight.

- Take-off weight : known (allow 3 Kg (6.6 lb) of fuel per minute of flight prior to actual check).
- Altimeter setting : 1,013 mb.

B. Actual check conditions

- Collective-pitch : full low pitch
- Straight autorotative flight with constant trim (autorotation is established by retarding fuel flow control lever)
- Speed : 65 kt (120 km/h) (steady).

C. Readings to be recorded simultaneously

- Outside air temperature
- Pressure-altitude
- Rotor r.p.m.

The rotor speed should correspond, within ± 5 r.p.m., to the values shown in the chart, below. If necessary, request adjustment of the low pitch stop ; one complete turn of the screw corresponds approximately to a rotor speed of 7 r.p.m.

TEMPERATURE CORRECTION :
For temperatures below - 10 °C, reduce rotor speed by 5 r.p.m. per 2 °C lower temperature.

Example : Weight 1500 kg, Density altitude : 4000 m (12 500 ft)
O.A.T. : - 10 °C → Rotor speed = 388 r.p.m.
O.A.T. : - 14 °C → Rotor speed = 378 r.p.m.

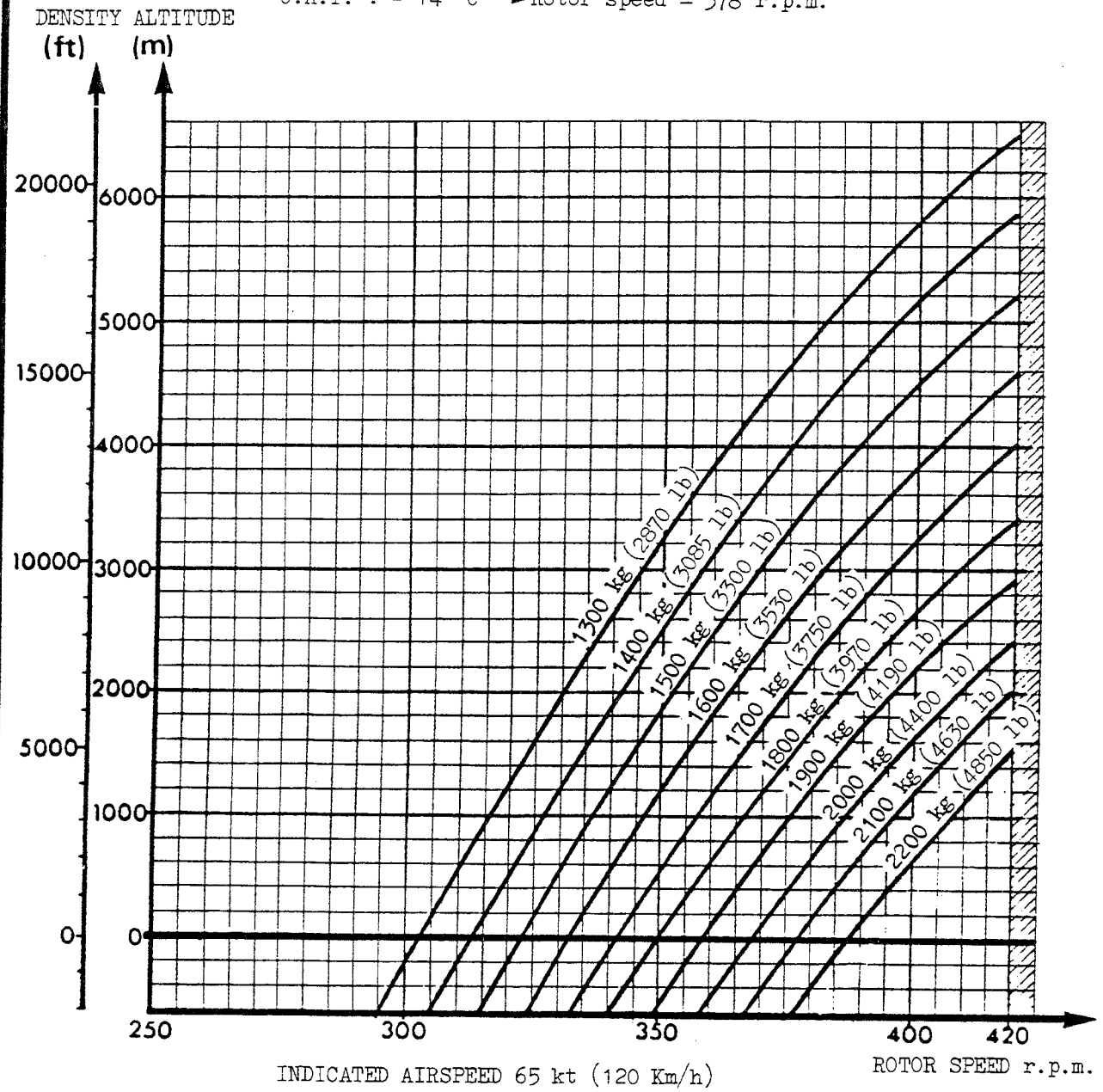


Figure 2-5.1

2.5.1.4. Autorotative landing (on ground) with float type landing gear

Autorotative landing on ground should be resorted to only as an emergency procedure, in view of the risk of a rotor blade hitting the tail boom as a result of the bouncing that inevitably follows initial contact with the ground.

Should autorotative landing prove to be an absolute necessity, flare out should be initiated at a sufficient height and should be sufficiently sharp to establish zero forward speed. The pilot should also endeavour to land the floats flat down. No attempt should be made to limit bouncing by reducing collective-pitch and, more important still, the cyclic stick should not be pulled back, irrespective of the aircraft attitude following initial contact.

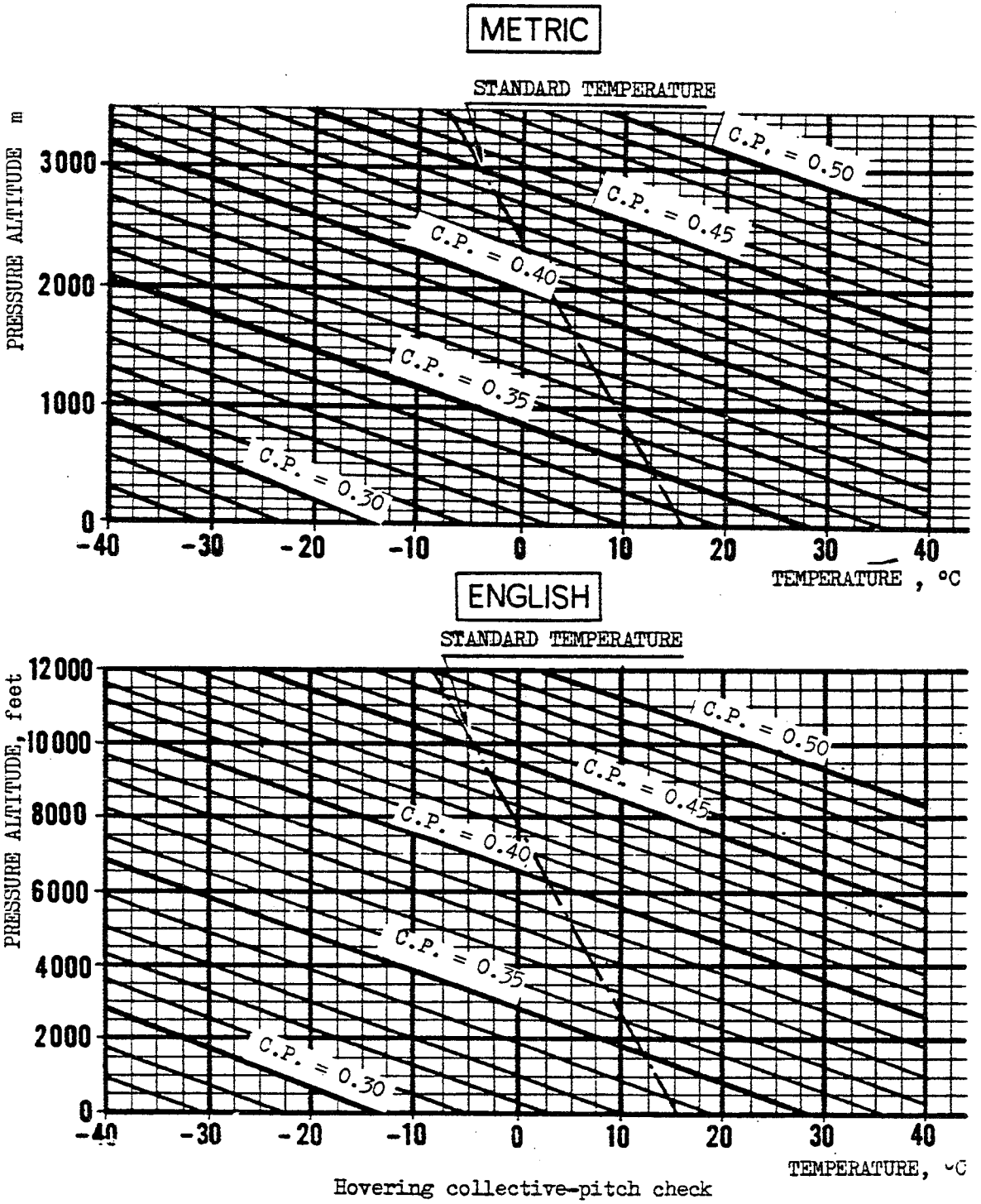
2.5.2 Filter-clogging warning light

Land as soon as possible reducing to the power to the minimum to prevent operation of the by-pass valve.
If the filter is clogged, return the engine to the TURBOMECA company for flushing of the fuel system. If the filter is not clogged, the flight may be continued but the pressure switch must be checked after landing.

2.5.3 Collective-pitch check in hovering flight (fig. 2-5.2)

This check is required following replacement of rotor blades or rigging of flight controls, or if abnormal tail pipe temperatures are experienced. If the hovering collective-pitch variation exceeds 0.02, first thoroughly check the weight by actually weighing the aircraft. If the variation is confirmed, jack up the aircraft and check the collective-pitch indicator readings against actual blade angles ; there is certainly an error.

Collective-pitch value (C.P.) is for 1000 kg (2,200 lb) gross weight. To determine collective-pitch for a given gross weight W, multiply collective-pitch read on diagram by $\frac{W\ kg}{1000}$ $\frac{(W\ lb)}{2,200}$



Hovering collective-pitch check
Figure 2-5.2

2.5.4 Failure to start (see page 2-5.10, key of warning light abbreviations)

Ventilate engine after each failure to start

○ = light ON ● = light OUT

SYMPTOMS	Warning light SW	MP	SR	CAUSES	REMEDIES
Engine selector switch ON, starter does not operate	●	●	○	Engine has been shut down for less than 10 seconds.	- Move selector switch to OFF.
- ditto -	●	●	○	Fuel flow control lever is not in the closed position.	- Close flow control lever - Attempt to start.
- ditto -	●	○	●	The bleed air pressure-switch, which cuts out the starter at 13,500 r.p.m., is jammed in open position.	- Check pressure switch
Engine selector switch ON. Starter operates. Engine fails to light up.	○	●	●	a. Faulty micropump b. Micropump relay incorrectly set	- Check micropump unit - Adjust relay in starting box.
- ditto -	○	○	●	a. Faulty torch igniter or booster coil operation. b. Air leak at micropump. c. Motor-operated cock fails to open.	a - Check torch igniters (ignition and atomizing). - Check booster coil b - Check micropomp fuel system and make certain that fuel is expelled through the micropump drain tube. c - Check motor-operated cock.
Engine selector switch ON. Starter operates. Engine lights up then stops	○	○	○	Fuel flow control lever has been advanced before starter green warning has gone out.	- Cause extinction of max. fuel flow warning light by closing fuel flow control lever. - Move selector switch to OFF - Ventilate - Attempt to start

2.5.4 Failure to start (continued).

SYMPTOMS	Warning light SW	MP	SR	CAUSES	REMEDIES
Engine selector switch ON. Starter operates. Engine lights up then stops.	○	○	○		- Ventilate - Attempt to start
ditto	○	○ ↓ ●	○	Starting cycle too long ; starting relay T.30 cuts out too soon.	- Move selector switch to OFF. - Ventilate - Attempt to start - Check operating time of relay T.30
ditto	○	○ ↓ ●	●	Air leak on suction side of fuel pump	- Move selector switch to OFF. - Check fuel system for air leaks.
ditto	○	○ ↓ ●	●	a. Micropump and torch igniters did not operate long enough. b. Insufficient fuel delivery through idling jet	- Move selector switch to OFF. - Wait until tail pipe temperature (t4) is less than 100° C. - Move selector switch to VENTILATION. - Attempt to start - If extinction occurs, check idling jet.
Micropump warning light flashes	○	✳	○	Air leak at micropump.	- Check fuel system (air leak).
Ignition lag, irregular rise of r.p.m. and tail-pipe-temperature which attains upper limit for starting	○	○ ↓ ●	●	Faulty torch igniter operation.	- Check torch igniters (ignition and atomizing). - Change torch igniters if necessary.

2.5.4 Failure to start (continued).

SYMPTOMS	Warning light SW	MP	SR	CAUSES	REMEDIES
Micropump operates immediately selector switch is moved to ON. Tail pipe temp. attains upper limit.	○	○	●	Faulty micropump microswitch operates the motor-operated cock.	- Check the micro-pump.
Abnormally slow acceleration with normal battery.	○	○ ↓ ●	●	a. Faulty starter connectionn. b. Faulty starter.	- Check connection. - Check starter commutator and brushes.
Fast engine acceleration. Tail pipe temperature rises to upper limit.	○	○ ↓ ●	●	Clogged by pass jet in fuel pump.	- Clear by pass jet.

Key of warning light abbreviations :

- SW : Starter green warning light
- MP : Micropump orange warning light
- SR : Starting relay red warning light

CAUTION : No attempt to start should be made in the minute following extinction of the starter relay warning light. Ventilation may be accomplished during this lapse of time.

After three consecutive starter operating periods, allow the starter to cool during 5 minutes before any further attempt.

2.5.5 Aircraft vibration in flight and on the ground.

2.5.5.1. Blade stall.

Blade stall is evidenced by an increase in the overall vibration level. To overcome blade stall, reduce collective-pitch immediately, then airspeed without increasing the load factor. In order to avoid premature ageing of the aircraft, avoid flight in the area of incipient blade stall.

2.5.5.2. Vibration.

Vibrations in the SE 3160 helicopter can have many causes. Types of vibration, however, may be classified according to the respective frequencies.

a. Very low frequency vibration of the aircraft.

Frequency considerably lower than rotor r.p.m. frequency. This type of vibration is usually evidenced by oscillations about the yawing axis combined with fluctuating engine r.p.m. There are two possible causes :

- faulty adjustment of the drag hinge dampers.
- faulty engine governor. If such is the case, the governor should be replaced.

b. Vibration of the whole aircraft at rotor r.p.m. frequency.

Possible causes : Faulty balancing of main rotor blades resulting in rotor unbalance (circular vibration in the horizontal plane).

Remedy : Replace or re-balance the blades (the blades are balanced at the Manufacturers works and subsequent unbalance is unlikely).

- Uneven lift of blades.

Cabin vibration mainly in the vertical plane.

Remedy : Track the rotor blades (see Maintenance Manual)

- Faulty adjustment of drag hinge dampers.

The effect of uneven adjustment of the drag hinge dampers is small.

Remedy : Change the dampers.

c. Vibration in cabin (3/rev.)

Vibration is experienced at the airspeed known as the "Transitional speed" (16 - 22 kt)(30 - 40 km/h) when assuming forward flight and also at the conclusion of the landing flare out. This vibration, which results from a change in the aero-dynamic flow through the rotor, cannot be avoided, as is the case with any helicopter.

d. High-frequency vibrations

High frequency vibrations, which originate in the rear section of the helicopter, are generally felt through the rudder pedals. They may be due to one of several causes :

- Tail rotor guard or HF antenna attachment points ; check that these components are installed without stress.
- Tail rotor drive ; lubrication and free movement of floating bearings ; lubrication and condition of intermediate bearing.
- Tail rotor head ; free movement of links ; condition of blade pitch-change, and flapping hinges.
- Tail rotor blades ; unbalance ; distortion of blade profile due to skin separation ; air-leak (other than through designed vent hole) ; difference in incidence angle of blades.

2.5.5.3. Oscillations on the ground

In certain conditions, oscillations may be observed when the Alouette III is on the ground with the main rotor turning at operating r.p.m.

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2.5.5.3. Oscillations on the ground (continued)

There is no danger as long as these oscillations are of small amplitude.

In view, however, of the risk that might exist in the event of an excessive increase in amplitude, Alouette III pilots must be familiar with the conditions that are liable to bring on such oscillations.

The major factor is the collective-pitch value applied by the pilot while the aircraft is in contact with the ground. In general, the onset of oscillations occurs with collective-pitch settings in excess of 0.40. The only practical case requiring the application of such collective-pitch values is the necessity to keep the aircraft resting on two wheels only when touching down on a steep slope.

Strong oscillations should not be experienced as long as full low collective is applied. There are, however, a number of secondary factors which may affect the pitch setting at which the onset of oscillations is liable to occur.

Adverse factors are :

- hard ground : when the aircraft is resting on a concrete surface the onset of oscillations occurs at a lower pitch value than when the aircraft is standing on grass.

- high gross weight

- nosewheel askew (tight turn accomplished while taxiing)

- strong 90-degree cross wind.

If the oscillations on the ground reach a high amplitude or if they tend to diverge (that is to increase more and more), the pilot must take off.

With the Alouette III, available power is such that this will always be possible irrespective of gross weight.

2.5.6 Engine failure

2.5.6.1. Symptoms and remedies.

Engine failure is evidenced by :

1. A tendency of the aircraft to swing to the right.

2. A drop in rotor r.p.m.

Take the following steps immediately :

2.5.6.1. Symptoms and remedies (continued)

A. If aircraft is not near the ground (above 50 m -160 ft-).

1. Apply full low collective-pitch as quickly as possible. If rotor speed tends to approach 420 r.p.m, slightly increase collective-pitch.

2. Close the fuel flow control lever and move engine selector switch to the OFF position to discontinue delivery from the fuel pump.

3. Close the fuel shut-off cock.

4. Switch OFF the fuel booster pump.

5. Select a landing area and maintain a suitable approach speed (airspeed corresponding to best gliding angle : 65 kt (120 km/h)

6. If the landing area is not flat, or if it is very confined, ground contact must be effected with zero forward speed. The flare should be commenced very high and should be so proportioned as to obtain zero forward speed when close to the ground.

B. If aircraft is near the ground.

1. If the aircraft is near the ground when the engine fails (below 3 m -10 ft-), at zero or low airspeed (less than 27 kt) do not reduce collective-pitch as this would result in a hard landing ; on the contrary, increase collective-pitch steadily to cushion the landing.

2. If the aircraft is at a height between 3 and 50 m (10 and 160 ft), first reduce collective-pitch to the minimum consistent with the drop in altitude, and then increase it to cushion the landing. At the same time a flare should be accomplished. The greater the airspeed, and the closer the aircraft is to the ground, the sharper must be the flare in order to :

- round off the glide-path
- maintain high rotor r.p.m.
- reduce the landing speed.

NOTE : To increase rotor r.p.m., always reduce collective-pitch rather than apply forward cyclic.

2.5.6.2. Relighting engine in flight.

Besides fuel supply failure, engine flame out in flight can only result from mishandling of the controls by the pilot : closing of fuel shut-off cock, actuation of engine selector switch when fuel flow control lever is in closed position.

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2.5.6.2. Relighting engine in flight. (continued)

In the event of engine flame-out due to mishandling, the engine may be relighted provided the aircraft is at a sufficient height.

Checks :

1. Fuel shut-off cock lever OPEN
2. Fuel flow control lever CLOSED
3. Engine selector switch OFF

With the starting relay warning light OUT, move the engine selector switch to the VENTILATION position. up to 4.000 r.p.m. (in order to clear the combustion chamber of any residual fuel), and then move the engine selector switch to the STARTING position.

2.5.6.3. Governor malfunction

Note : This type of fault is most improbable owing to the high reliability of the governor.

A. Unstable engine speed
- Keep flying while possibly adjusting the fuel flow by means of the fuel flow control lever
- Watch the r.p.m. indicator

B. R.P.M. value lower than normal
- Check the position of the fuel flow control lever ; if it is in full forward position, reduce pitch and attempt to land as soon as possible.
  According to the weight of the aircraft, the remaining power may not be sufficient to sustain hover flight.

C. R.P.M. value higher than normal
- Throttle down until the normal r.p.m. value is obtained and continue in level flight, if possible at constant pitch (any change in pitch has to be accompanied by a change in the fuel flow control lever position so as to ensure constant r.p.m.)
- Accomplish an autorotative landing

As a general rule, land as soon as possible should the engine low oil pressure warning light come on.

2.5.7. Engine fire

2.5.7.1. Engine fire while starting

Fire may occur during engine starting if a start is attempted without "ventilating" the engine to clear the residual fuel following several failures to start. The accumulated kerosene ignites, a long flame is emitted from the tail pipe and burning kerosene is likely to spread under the aircraft.
The fire should be fought by the ground crew attending starting operations.
The pilot should close the fuel shut-off cock and move the engine selector switch to the VENTILATION position.

2.5.7.2. Engine fire in flight

Proceed as described in para 2.5.6.1.

2.5.8. Bailing out

For certain duties, the occupants of the aircraft are equipped with parachutes.

2.5.8 **Bailing out** (continued)

Owing to the nature of the mission to be accomplished, the occupants of the aircraft may have to bail out.
The following procedure should be adhered to :

1. Reduce airspeed as much as possible
2. Jettison the cabin doors.
3. Order the occupants of the rear seat to bail out, from the L.H. side if possible ; they should bail out head first.
   FOR THE PILOT : Lock the flying controls (especially the cyclic pitch stick).
4. If altitude permits, do not open the parachute until 3 seconds have elapsed.

2.5.9 **Tail rotor failure**

Tail rotor failure is indicated by a sudden and uncontrollable turn to the left. The rate of turn will be dependent on the amount of power that was applied, and the weight of the aircraft, at the time of the failure.

2.5.9.1 Flying over a terrain where autorotative landing is possible

Establish autorotative flight immediately by calmly applying full low collective pitch, (up to the low pitch stop).

- If de-synchronization of the main rotor occurs (heavily loaded aircraft) the helicopter will cease rotating to the left, and will even start to rotate to the right. Determine the appropriate speed which, by weathervane effect on the fuselage, will stop this rotation. If necessary, apply left hand cyclic.
- If de-synchronization of the main rotor does not occur (lightly loaded aircraft) the helicopter may :
  - either cease rotating. In this case, maintain the flight control trim unchanged.
  - or continue to rotate to the left : slowly decrease the engine speed by adjusting the fuel flow control lever until rotation ceases.

2.5.9.2 Flying over terrain where immediate autorotative landing is impossible

Reduce collective pitch just sufficiently to achieve the best compromise between the rate of rotation to the left, the flight path speed and the rate of descent.

In all cases, at the end of the landing approach, it is imperative to shut down the engine by closing the fuel shut-off cock, and accomplish flare-out, maintaining a constant height above the ground until forward airspeed is zero.
Apply collective pitch as necessary upon touching the ground.

NOTE : If tail rotor failure occurs close to the ground (e.g. blades damaged by hitting an obstacle) full low collective pitch must be applied, even if this is to cause a very hard landing, and the engine shut down by closing the fuel shut off-cock, if possible, before touching the ground.

2.5.10. **Servo unit failure**

In the event of servo unit failure, move the servo control cock to the CLOSED position and tighten the cyclic-stick friction knob. The flight may be continued with control forces being alleviated by reducing airspeed to approximately 65 kt. There will also be a dead travel of approximately 0.2 inches at the cyclic stick due to servo-unit piston-valve end play.

2.5.11. **Ditching without floats or emergency floatation gear**

If ditching becomes necessary due to engine failure, proceed as prescribed in paragraphs 2-5.1.1 and 2-5.6.1.

If the cause is tail rotor failure, proceed in accordance with para. 2.5.9.

In every case, the water should be contacted with as little forward speed as possible and, in addition to the afore-mentioned requirements, the following instructions are to be complied with :

1. Warn the passengers as soon as possible.
2. Jettison the cabin doors.
3. Check that safety belts are buckled.
4. Order passengers to assume following attitudes :
   - front passenger : fore-arms braced on knees
   - rear passengers : fore-arms on top of back portion of front seat, with forehead resting on fore-arms.
5. Begin flare-out high enough to reduce forward speed to zero on touch-down. Hold the helicopter in level altitude on touch-down. Dampen force of impact by applying collective pitch as for autorotative landing.
6. After touch-down, do not reduce collective pitch ; use cyclic control to hold the helicopter in level attitude as long as possible.
7. Close the fuel shut off cock.
8. Apply rotor brake as soon as the helicopter begins to sink.
9. Release safety belts. Give the order to abandon the aircraft. Passengers and crew must swim away from the helicopter, remaining under water for about ten seconds before breaking surface.

NOTE : A helicopter should not be flown over water if its rotor brake is unserviceable.

2.5.12. **Main gear box oil pressure warning light**

If this light comes on, land as soon as possible and check the main gearbox oil system.

2.5.13. **Main gear box oil temperature warning light**

If this light comes on, following sustained hovering, land the aircraft or establish forward flight. This should cause the light to go out fairly quickly ; however if it is still on 3 minutes after forward flight has been established, land as soon as possible.

2.5.14. Low fuel pressure warning light on

(1) If TRO or TR4 fuel is being used :
Flight may be continued and mission carried through at altitudes up to 5 000 m (16 400 ft).
If operating altitude is above 5 000 m (16 400 ft), it is recommended to discontinue the mission and return to base.

(2) All other fuels :
As above (1), but with ceiling of 3 000 m (9 800 ft) instead of 5 000 m (16 400 ft).

2.5.15. Ditching with emergency floatation gear

The purpose of the emergency float installation is essentially to prevent the helicopter from sinking in the event of an engine failure occurring during flight over water.

NOTE :

The emergency floatation gear cannot be installed on aircraft fitted with the following installations : SS11, AS12, rocket launchers, M44 torpedos or commando containers.

- There are three types of emergency floatation gear, covered by the following mods :

Mod.	1153	1333	8010
Number of bottles Position	4 Rear bulkhead	4 Rear bulkhead	2 1 on each float
Gas	CO_2	CO_2 Post mod. 1534 : nitrogen	Nitrogen
Inflation time	12 sec.	4 sec.	2 sec.
Submersion switches	No	No	Yes
	Figure 2-5.3		Figure 2-5.4

Controls of the installation

- MOD. 1153 or 1333
  - An On-Off switch, provided with a guard.
  - A pushbutton, provided with a guard, on the pilot's collective pitch lever.
- MOD. 8010
  - A control unit incorporating :
    - An On-Off switch.
    - An indicating light.

- A percussion pushbutton provided with a guard.
- A pushbutton, provided with a guard, on the pilot's collective pitch lever.

Protection of the installation

The installation is protected with a 5 - Amp. Circuit breaker located on the overhead panel.

Recommendations

When flying over the water, it is recommended :

- to engage the circuit breaker and switch so that the push button on the collective pitch lever is ready to operate in case of ditching.
- to fly at a height above the water of not less than :
  - 200 metres (with AMS 1153, inflation time = 12 sec.) or
  - 50 metres (with AMS 1333, inflation time = 4 sec.), to allow for use of the floatation gear in the event of an emergency.

OPERATION IN CASE OF DITCHING

1) Ditching without the need to make a complete autorotation.

- Establish descent at a recommended airspeed of 120 km/h (65 kt).
- Fire the emergency float bottles before reaching the minimum altitude and as soon as the airspeed is less than 135 km/h (73 kt).
- Land without assuming forward flight.

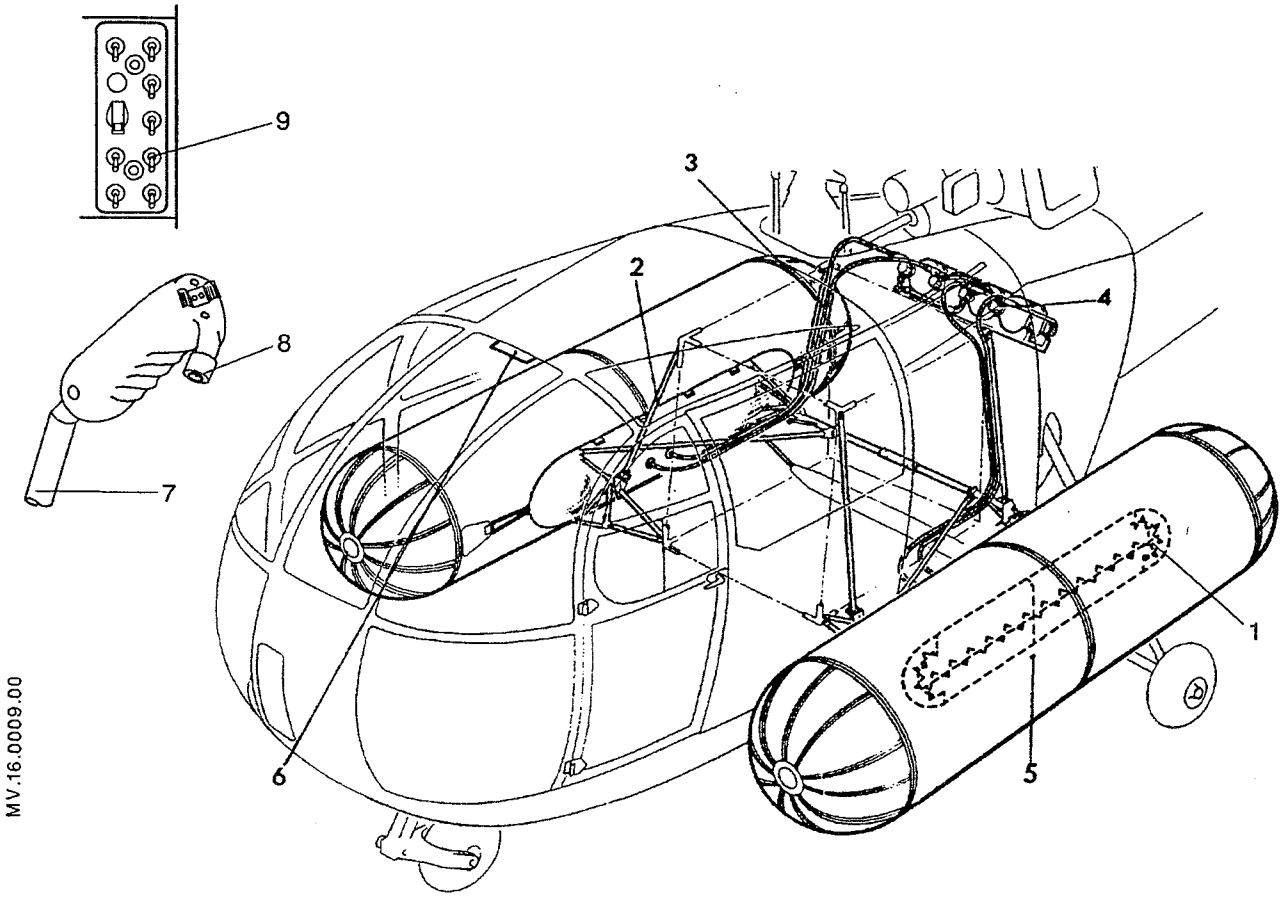
2) Ditching in complete autorotation

- Enter autorotation as prescribed in the Emergency Procedures at a recommended airspeed of 120 km/h (65 kt).
- Fire the emergency float bottles as soon as the airspeed is less than 135 km/h (73 kt).
- Reduce the horizontal speed to the minimum before touching down on the water.
- Do not evacuate the aircraft before the rotor stops.

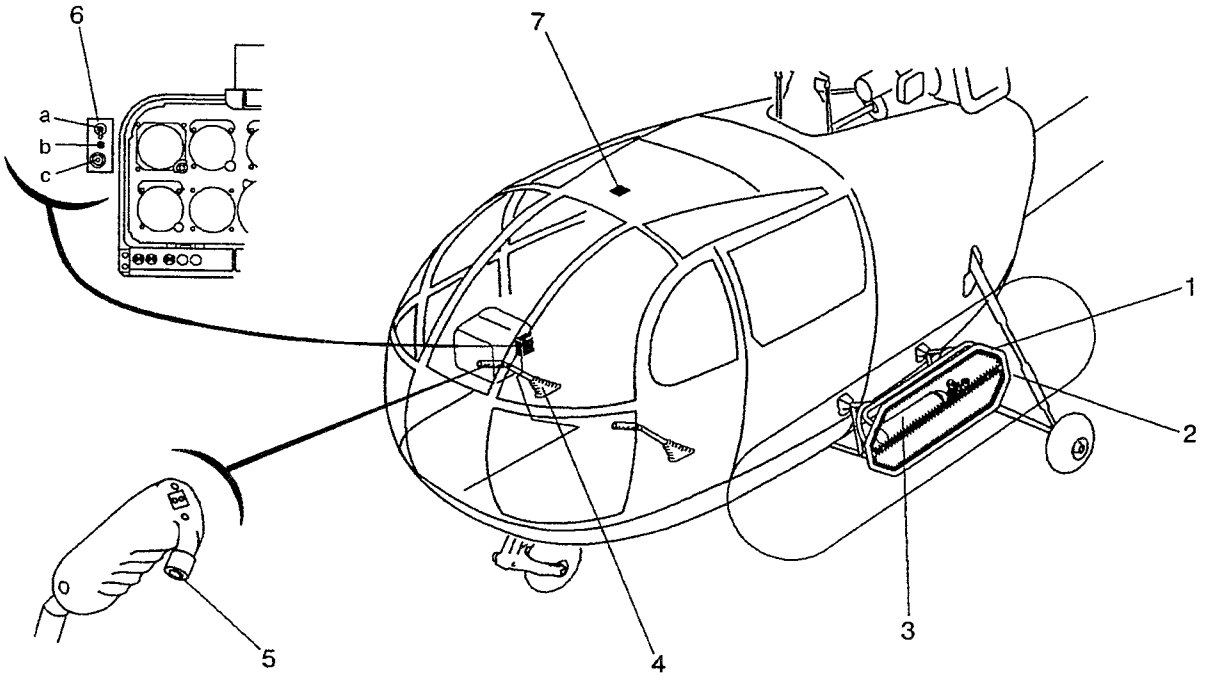
OPERATION IN CASE OF ACCIDENTAL INFLATION

- Reduce the airspeed to less than 135 km/h (73 kt) without reducing the collective pitch.
  If the collective pitch is less than 0.5 when inflation occurs, the helicopter will have a marked tendency to fly nose up, particularly at high speed.
  Return to the base at an airspeed not exceeding 135 km/h (73 kt), particularly if the inflation of the floats is not symmetrical.
  Do not perform taxiing with either one or two floats inflated.

1. Containers with breakable laces
2. Support
3. Lines
4. Carbon dioxide or nitrogen bottles
5. Inflated floats (2 x 1.6 m3)
6. Circuit breaker
7. Collective pitch lever
8. Push button
9. Switch



Emergency floatation gear
AMS 1153 or AMS 1333
Figure 2-5.3



Item.	Description	Item	Description
1	Container	6	Control unit
2	Submersion switch		a - On-Off switch
3	Bottle		b - Indicating light
4	Pilot's collective pitch lever		c - Percussion pushbutton
5	Percussion pushbutton	7	Protection circuit breaker

Emergency Floatation Gear
Post MOD. 8010
Figure 2-5.4

2.5.16. Rupture of the tail rotor control cable

In case of rupture of the tail rotor control cable in hover, the fuselage will have a tendency to turn to the left, but not suddenly due to the irreversibility (incomplete) of the control.

This rotational movement can be stopped by initiating forward flight with RH side slip : the action of the lateral drag on the fuselage will balance the torque of the tail rotor which will have decreased due to the decreased power required for flight.

- If the failure occurs in hover in ground effect, land immediately.
- If the failure occurs in hover out of ground effect, initiate a forward flight and proceed as for failure occuring in forward flight.
- If the failure occurs in forward flight, proceed as described hereunder :
  . Above 55 km/h (30 knots) a slight side slip to the left will be necessary to maintain a constant heading on the landing axis.
  (i.e. helicopter nose slightly to the right of the approach axis). When reducing airspeed, the aircraft shows a tendency to turn slowly to the left ; the pilot should try to touch down just when the aircraft centerline is lined up with the runway.
  (This is easily carried out by a slight reduction of pitch at the right time). Thus skidding over the runway is avoided.

  . At speeds between 100 and 150 km/h (53 and 80 knots) side slip will be stabilized at a low value. Return to a suitable field for landing is to be carried out within this range of speeds.

Landing is to be made on a hard surface, after a very flat approach, slowly decelerated.

On touch down, reduce the collective pitch and apply the wheel brakes :
the braking action will counteract any rotation of the aircraft on the ground.

2.5.17. Fuel "Low level" warning light

The fuel low-level warning light comes on when there is approximately 60 litres (15.85 US gal.) of fuel left in the tank.

If the light comes on, therefore :

- avoid steep nose-up or nose-down attitudes

- limit subsequent flight time to approximately 10 minutes.

2.5.18. "FUEL TANK EMPTY" Warning light

(Optional equipment defined by MOD. 2062)

The "FUEL TANK EMPTY" warning light starts flashing when the quantity of fuel remaining in the tank corresponds to 2 or 3 minutes flight.

Should it flash :

LAND IMMEDIATELY

2.5.19a. Low Engine Oil Pressure

- Reduce power.
- Land as soon as possible.

Post MOD. 1326, a red warnig light illuminates to indicate that the oil pressure is less than 1.1 bar.

2.5.19b. Abnormal Engine Oil Temperature Rise

- Check the engine oil pressure.
  . Follow the above procedure if required.
- During a low-speed flight or a hover flight :
  . Land if possible, or change to forward flight at low power. If temperature does not decrease :
    Land as soon as possible.
- During a cruise flight :
  . Reduce power.
  . Land as soon as possible.

2.5.20. Illumination of the red "CHIP" warning light

(After AMS 07.2230)

Illumination of the "CHIP" warning light indicates that metal particles are detected on the engine magnetic plug.
Should the warning light illuminate, place the aircraft in flying conditions permitting landing with engine shut down, if required (fly out of the danger zone)

LAND AS SOON AS POSSIBLE

2.5.20. Illumination of the red "CHIP" warning light (Continued)

After landing

- Remove the magnetic plug. Check that electric contact is positively established by one or more metal particles. Retain particles for subsequent analysis.
- Clean the magnetic plug and put it back in place.
- Carry out 5 minutes ground run, monitoring all engine parameters.
- Upon completion of the ground run :
  . If the "CHIP" warning light illuminates again, due to one or more particules :

INTERRUPT THE MISSION

  . If the "CHIP" warning light does not illuminate, resume flight and place the aircraft in flying conditions permitting landing with engine shut down, if required (fly out of the danger zone).
  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 terrain configuration permits.

INTERRUPT THE MISSION

2.5.21. Illumination of the red "GENERATOR" warning light

In flight, the red "Generator" warning light should remain off.
Should the warning light illuminate, the battery is no longer charging, check the "GENERATOR" switch setting, the failure is confirmed, switch the generator off.
. Switch off all consumers which are not indispensable.
. Continue the flight according to the current circumstances.

2.5.22. Illumination of the fuel flow control lever warning light

If the warning light comes on, ensure that the fuel flow control lever is at forward travel limit.

If the light remains on, give instructions for repair or replacement of the faulty micro-switch after the flight.

SECTION 2

2.6. TESTS

CONTENTS

SECTION 2

2.6. TESTS

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2.6.0. GENERAL

Before or after certain periodic inspections as indicated in chapter 5.3 of the Maintenance Manual, the operator should carry out tests.

These tests are defined as follows (see also chapter 5.7 of the Maintenance Manual) :

- Ground run (before and after periodic inspections).
- Check flight (before major inspection).
- Test flight (after major or special inspection).

The tests to be carried out for each of these 3 cases are covered in the following pages and presented as a report form which the crew should fill in.

It is recommended to use form 2.6.0.0. as a title page for any report.

In case of any incorrect test result see the corresponding chapter of the Flight or Maintenance Manual.

2.6.0.0. INSPECTION AND TEST REPORT

- ON GROUND
- DURING CHECK FLIGHT
- DURING TEST FLIGHT

HELICOPTER
Type : ______ Version : ______
Serial N° ______

Empty weight : ______
Crew weight : ______
Ballast weight : ______
Fuel : ______

Meteo
QFE : ______
Wind : ______
Temp.Θs : ______

Total m : ______ c.g. ______

Special installations

Time, beginning of test : ______
Duration : ______

Number of landings : ______

Date : ______
Airfield : ______
Max.alt.(Z) : ______

Brief data

Main rotor blade nos. ______
Engine N° ______ Hours : ______

Aircraft hours : ______ number landings : ______
Last overhaul : ______ at : ______

Principal modifications before test

Remarks and rework adjustments after test

Units used

Weight : m : ______
Fuel : TK : ______
Pressure : p : ______
Temperature : t,Θs : ______
Altitude : Z : ______
Speed (IAS) : ______

Crew :	Forms attached	Signature
1st pilot ______	______	______
Flight engineer ______	______	______
Radio operator ______	______	______

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2.6.1. GROUND TEST AND TEST CONDITIONS	REQUIRED	ACTUAL
2.6.1.1. STARTING AND ROTOR ENGAGEMENT		
1. BEFORE GROUND RUN Preflight inspection (Maint.Man. § 5.1)	Carried out	
Inspection of outside of A/C before flight and checks before starting (ref. sect. 2.2)	Carried out	
Outside conditions	Bar. press. on ground, wind, temperature	QFE :__Wind :__/__ θs :____
2. STARTING - With 800A/24 V ground power unit - On battery charged to 24 V min. Engine switch on "MARCHE" (ON) and start chronometer t = 0	Micropump purge : operative residual t4 : (t4r) ≤ 150°C min. starting voltage : (UD) ≥ 14V max. t4 : (t4D) ≤ 630°C micropump warn. light out (tMP) ≤ 15s starter warn. light out : (tP2) ≤ 60s Oil pressure : increases	with GPU / On batt. Before start.purge: " " (t4r): Starting (UD) : Starting (t4D) : light out (tMP) : turbine takes over (tP2) : oil pressure (pH) :
(Ref. section 2.2)		
Idle (cold) read parameters	No tolerance (cold)	NTf:__t4f:__tHf:__pHf:____
3. CLUTCH UNIT Advance fuel flow control lever	Normal clutch, new ⩽19 500 eng. r.p.m. Normal clutch, worn ⩽24 000 eng. r.p.m. Unified clutch, new ⩽23 000 eng. r.p.m. Unified clutch, worn ⩽27 000 eng. r.p.m.	Blade starts to move at (NTE) : t4 on engagement (t4E) : Synchronization time(tSE):____ Synchronization appreciation :
Start chronometer when the blade starts to move (Ref. section 2.2) Adjust engine speed to obtain smooth acceleration and synchronization in 35 to 45 sec.	Refer to section 2.2.5. Smooth synchronization	

2.6.1. GROUND TEST AND TEST CONDITIONS (cont.)	REQUIRED	ACTUAL
2.6.1.2. BLADES, ROTORS AND FLYING CONTROLS 1. MAIN ROTOR AND CONTROLS - Record N° and incidence angles marked. - If necessary track with flag, Pitch = low pitch + 0.10 Rotor rpm : above engagement speed and at nominal speed. If colour inversion occurs confirm with pitch = 0.30	-If marks less than 15 mm apart, fly as is and correct if necessary after flight. -If marks more than 15 mm apart, see "Adjustment", Maint. Man. Chap. 57 -If colour inversion occurs: replace the blades	N° / Incidence / Marks at 240/360/.. Red Yellow Blue
- Rotor vibrations Disengage servo-controls.	On actuating cut off : no jerks	Servo-controls : _____
Slow, circular displacement of cyclic stick in forward zone only(CAUTION TAIL BOOM)(ref.sec. 2.5)	Rotor disc follows movement Flexibility of drag dampers and blade spacing cables should dampen out jerks. Vibration level correct.	Rotor disc : _____ Drag dampers : _____ Blade spacing cables : _____
Re-engage servo-controls.	If incorrect : Maint. Man. Chap. 57	Main rotor vibration level: _____
Check pressure;pressure gauge installation	Servo. contr. press: 28±1bar (406 ± 14.5 psi) If incorrect : Maint. Man. Chap. 27	Servo. Contr. press: _____
2. TAIL ROTOR AND TAIL ROTOR CONTROLS Move tail rotor control pedal slowly in L.H. zone only.	Directional control damper : correct Pedal displacement : smooth -Vibration level : correct If incorrect see : Sect. 2.5, and Maint. Man. chapter 27.	Damper : _____ Displacement : _____ Tail rotor vibration level : _____

2.6.1. GROUND TEST AND TEST CONDITIONS (cont)	REQUIRED	ACTUAL
2.6.1.3. ENGINE AND ENGINE CONTROLS, FUEL SYSTEM, ELECTRIC POWER GENERATION		
1. ENGINE AND ASSOCIATED ITEMS		
- Operate fuel shut off cock control lever at nominal rpm.	Break wire, flexibility engine stop.	Fuel shut off/cock/control lever : _____
- Bleed system, start		
- Fuel flow control lever fwd. (fully)	Fuel flow ind. light out	Fuel flow ind. light : _____
- Engine instruments : nominal rpm ZIVY ; or standard tachometer ; or electronic frequency meter if available	Indicated rpm 33500 ± 300 Actual rpm :7917 to 8012 (Zivy) Actual rpm 33500 ± 200	Indicated rpm : _____ Actual rpm : _____
Oil temperature and pressure	1.5(21.7) ≤ pH ≤ 5 bars (72.5 psi) If incorrect : adjust - ref. Maint. Man. Chap.73	tH : _____ pH : _____
- Fuel system : cut out booster pump for 5 minutes (conjointly with 2.6.1.4.1.)	Sealing of suction system no air leaks : engine should run normally without hunting. If incorrect : seal - ref. Maint. Man. Chap.28	Fuel system : _____
- Flight safety:nominal rpm engine switch to "ARRET"(off).		Fuel flow ind. light : _____
Partly close fuel flow control lever.	Fuel flow ind. light:on.	Safety stop, rpm : _____
Re-set engine switch to "MARCHE" (on). Restart if necessary.	Engine should not stop rpm ≥ 30000. If incorrect : adjust, ref. Maint. Man. Chap.76.	
- Idling(hot)(Oil temp. not below 30°C)fuel flow control lever pulled back (fully).	(check preferably after flight). Between 16000 & 19000 rpm (NTR)	NTR: ____ t4R: ____ tHR: ____ pHR: ____
Stabilized rpm for 1 mn 30 sec.	Oil pressure:(pHR) not less than 0.8 bar (10 psi)	NTR after 2 mn for inform: _____

2.6.1. GROUND TEST AND TEST CONDITIONS (cont)	REQUIRED	ACTUAL
Engine run-down : selector switch on "ARRET" (off) and start chronometer.	Closure of cock: warning light flashes. starting relay : warning light comes on then goes out Engine run-down not less than 45 sec.	Cock : _____ Starting relay : _____ Run-down : _____
2. ELECTRIC POWER GENERATION Start		
- Generator cut-in	Between 16000 and 22000 rpm (NT)	Cut-in rpm (NT) : _____
- Cut-out (to be noted during stopping of engine)		Cut-out rpm (NT): _____
- Voltage. Nominal rpm without any current draw, standard voltmeter.	Actual voltage: 28^{0}_{-1} volt If incorrect : adjust - (Maint. Man. Chap. 24)	Indicated voltage (U ind.): _____ Actual voltage (U actual): _____

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2.6.1. GROUND TEST AND TEST CONDITIONS (cont)	REQUIRED	ACTUAL
2.6.1.4. TRANSMISSION SYSTEM-INSTRUMENTS AND EQUIPMENT		
1. TRANSMISSION SYSTEM		
- Free wheel : From nominal speed, suddenly decrease fuel flow several times.	Engine speed, decreases more quickly than rotor speed;rotor tachometer pointer appears.	Free wheel : _____
- Main gear box Slowly decrease fuel flow down to engine idle,check warn.lights.	Oil press. warn.light remains out down to 250 rotor rpm	Main gear box Oil pressure : _____
- Automatic stops:During engagement and stopping of main rotor,cyclic stick in neutral, check:	Smooth engagement and disengagement for rotor speed(NR) between 175 and 200 rpm.	Stops:disengaged: _____ Stops:engaged: _____
- Rotor brake:after stopping engine,or during idle,apply rotor brake at 175 rotor rpm and start chronometer.	From 175 to 0 rpm:tFR = between 10 and 15 sec. If incorrect,adjust, (Maint.Man. Chap. 40)	Rotor brake stopping time(tFR): _____
2. INSTRUMENTS Check instrument indications,with standard instruments where necessary.	Instruments should be within permissible range: engine tachometer $\pm$200 rpm rotor rpm pointer : synchronized $\pm$ 3 rpm voltmeter : $\pm$ 1 volt altimeter(setting)$\pm$3mbar. If incorrect : refer to Maint.Man.Chap.31 and 34.	
3. EQUIPMENT		
- Heating on("ouvert")and off ("fermé").	On : efficient diffusion off : no leaks.	Heating : _____
- Lighting:internal,external,landing and anti collision lights.	Operation : correct	Lighting: _____
- Gyro instruments:Low engine speed Nominal engine speed Vacuum gauge, if necessary	Warning light on Warning light out 150^{+0}_{-10}mbars($2.17^{+0}_{-0.1}$psi) stable horizon	Warning light: _____ Vacuum : _____ Horizon: _____

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2.6.1. GROUND TEST AND TEST CONDITIONS (cont)	REQUIRED	ACTUAL
CAUTION : Directional gyro compensation range.	Directional gyro : precession ≤ 3°/10 min.	Directional gyro : _____
- Rescue hoist: lower and raise hoist (2m(7 feet) with no load.	Operation in required direction, slowing down and automatic stop: correct.	Hoist : _____
- Sand filters (engine at nominal speed) - Pressure gauge installation, if necessary	Pressure drop ≤ 7 mbar	Sand filters : _____
2.6.1.5. RADIO AND NAVIGATION		
- I.C.S.		
All stations, normal and emergency.	Correct communication.	I.C.S. : _____
Interference and crosstalk.	Level (appreciation).	
Switching.	Correct.	
- VHF transmitter receiver		
Channeling time.	Not over 10 sec.	
Receive/transmit communication with ground station.	Correct.	VHF : _____
Squelch and interference.	Efficiency, level (appreciation of noise).	
- HF transmitter receiver		
Receive/transmit communication with ground station	Correct	HF : _____
Interference	Level (appreciation of noise).	
- HF homing		
Position of D and O signals	Left and right	HF homing: _____
- Radio compass		
Search for local stations.		
Frequency display accuracy.	Correct.	Radio compass: _____
Bearing - interference.	no 180° error.	

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2.6.2. CHECK FLIGHT REPORT

	REQUIRED	ACTUAL	With GPU	On batt.
1. STARTING - With 800A/24V ground power unit - On battery charged to 24V min. Engine switch to "MARCHE" (on) and start chronometer t = 0	Micropump purge:operative Residual t4: (t4r) ≤ 150°C Min. start.volt.(UD) ≥ 14V Max. t4:(t4D) ≤ 630°C Micropump warn.light out: (tMP) ≤ 15s Starter warn.light out : tP2 ≤ 60 sec. Oil pressure : increases No tolerance (cold)	Before start.purge:		
		" " (t4r):		
		Starting (UD) :		
		" (t4D):		
(Flight Manual, Section 2.2)		Light out (tMP):		
		Turbine takes over(tP2):		
		Oil pressure (pH) :		
Idle(cold) : read parameters		NTf:__t4f:__tHf:__pHf:_____		
2. CLUTCH ENGAGEMENT Advance fuel flow control lever; start chronometer when the blade starts to move (Ref. Sect. 2.2) Adjust engine speed to obtain smooth acceleration and synchronization in 35 to 45 sec.	Normal clutch, worn ≤ 24 000 eng. r.p.m. Unified clutch, worn ≤ 27 000 eng. r.p.m. (Refer to section 2.2.5.) Smooth synchronization.	Blade starts to move at(NTE):_____ t4 on engagement(t4E):_____ Synchronization time(tSe):_____ Appreciation of synchronization: _____		
3. GROUND RUN,TAXIING,TAKE-OFF Nominal engine speed.	Instruments : within range	NT:__t4:__tH:__pH:_____ Voltage (U) :_____		
	Warning lights : out	Warning lights:_____		
Taxiing and brakes : Taxiing with pitch DΘ ≤ 0.2, turns	Ground control : correct Manoeuvres:without oscillations	Taxiing : _____		
Check of brakes.	Brakes : correct	Brakes : _____		
Take-off : Headed into wind,and nose wheel centered.	No divergent oscillations, and if wind below 15knots: oscillations dampened in less than 30 sec. with DΘ = 0.30	Resonance,wind:_____ Without impulses:_____		
Increase limit pitch to ⟶ 0.30				
Apply impulses to cycl.stick and if wind greater than 15knots,decrease pitch to ⟶ low pitch.	If wind exceeds 15knots:oscillations dampened in less than 30 sec.with DΘ = low pitch.	After impulses: _____		
	If incorrect see section 2.5			

2.6.2. CHECK FLIGHT REPORT (cont)	REQUIRED	ACTUAL
4. HOVER IN GROUND EFFECT Stabilized for 5 min.headed into wind at 1.5m(5ft) from ground:preferably over concrete. Record parameters	Determine theoretical values Collective pitch (DΘ) : figure 2.5.2. Temp. (t4) : fig. 2.2.3. Theoret.DΘ:___theoret t4:___ DΘ=theoret.DΘ ± 0.02 If incorrect:see weight and temp.,then sect.2.5.3. t4=theoret.t4 + 40°C If incorrect:see weight and temp.then, § 2.2.15.	Indicated DΘ : _____ Indicated t4 : _____
Examination of instruments	Readings within range. Pointers steady. Warning lights out.	Eng.oil temp.:___ Press.:_____ Instruments: _____ Warn.lights:fuel:_____ MGB press:___temp.:___
5. ENGINE Take-off:apply collective pitch, taking 1 sec. to increase from low pitch to the coll.pitch(DΘ)value recorded above in hover.	RPM fall-off(Δ NT) not greater then 1000 rpm.	Regulation Δ NT:_____
6. MANOEUVERABILITY Level flight rearwards and sideways. Estimated speed 15 knots(20 km/h)	Flying control clearances: sufficient Aircraft control:satisfactory. If incorrect:see Maint.Man. Chap. 27	Manoeuvres: _____
7. VIBRATION LEVEL During normal manoeuvres(climb,any altitude descent,autorotation,VNE): appreciate vibration level.	Appreciation. If incorrect see § 2.5.5.	Vibration level: _____
8. INSTRUMENTS-EQUIPMENT During the various manoeuvres given above,appreciate instrum.readings.	Appreciation:sensitivity and accuracy.	Eng.instrs:_____ Rate of climb airsp.ind.:_____ Altimeter: _____
- Heating syst.=open and closed	Efficiency,distribution, freedom from leaks.	Heating : _____

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2.6.2. CHECK FLIGHT REPORT (cont)	REQUIRED	ACTUAL
9. MAIN ROTOR CONTROLS		
- Loads: Disengage servo-controls at low IAS Hover; collective pitch loads Level flight at VNE; stick loads.	Loads ≤ 4daN (9Pb) IAS=210 km/h(113 knots) Load ≤ 15 daN (34 lb)	Coll.pitch loads: _____ IAS _____ Cycl.pitch loads: _____
- Servo-controls; re-engage servo-controls in hover; displacement of cyclic stick and collective pitch lever.	Force required; symmetrical	Lateral servo-control: _____ Longitudinal" " : _____ Coll.pitch " " : _____
- Minimum friction ; IAS: 110 km/h (60 knots) Friction knobs backed off against stops.	Cyclic stick and collective lever ; steady. See section 2.2.	Frictions: _____ - Cyclic stick : _____ - Collective lever: _____
10. TAIL ROTOR CONTROL		
- R.H.clearance: in vertical climb with coll.pitch=max.(computer)	Sharp turn possible without touching stop.	R.H.clearance: _____
- L.H.clearance: in vertical descent with coll.pitch=low pitch	Sharp turn possible hard against stop.	L.H.clearance: _____
11. RADIO AND NAVIGATION		
I.C.S VHF HF HF Homing Radio compass Gyro instruments Compass	Appreciation covering power, range, interference etc...	ICS : _____ VHF : _____ HF : _____ Homing : _____ RC : _____ Gyro instr.: _____ Compass: _____

2.6.3. TEST FLIGHT REPORT		
2.6.3.1. WEIGHT = 2100 kg; C.G. = NEUTRAL - TAKE-OFF ; HOVER ; ENGINE		
1. STARTING	For tolerances see 2.6.1.1. " " " " " " "	UD:__t4D:__tMP:__tP2:__ NTE:__t4E:__TSE:__
2. CLUTCH ENGAGEMENT		
3. GROUND RUN, TAXIING, TAKE-OFF	Instruments: within range.	NT:__t4:__tH:__pH:__ Voltage(U):__
	Warning lights:out	Warn.lights:__
Taxiing and brakes:Taxiing with pitch DΘ ≤ 0.2, turns	Ground control = correct	Taxiing:__
Check of brakes	Manoeuv.=without oscillat.	
Take-off=Headed into wind and nose wheel centered	Brakes = correct	Brakes :__
Increase limit pitch to → 0.30	No divergent oscillations, and if wind below 15 knots: oscillations dampened in less than 30 sec. with DΘ = 0.30	Resonance wind:__ Without impulses:__
Apply impulses to cyclic stick, and if wind is greater than 15 knots,decrease pitch to → low pitch.	If wind exceeds 15 knots: oscillations dampened in less than 30sec. with DΘ = low pitch.	After impulses:__
	If incorrect:see sec. 2.5	
4. HOVER IN GROUND EFFECT		
Stabilized for 5 min.head into wind at 1.5m(5ft) from ground ; preferably over concrete.	Determine theoretical values Coll.pitch DΘ : fig. 2.5.2. Temp. t4 : fig. 2.2.3	
Record parameters.	Theor.DΘ=____theor.t4=____	
	Indicated DΘ=theor.DΘ±0°20	Indicated DΘ :__
	If incorrect:see weight and temp.then § 2.5.3.	
	Indicated t4=theor.t4±30°C.	Indicated t4 :__
	If incorrect:see weight and temp.then § 2.2.15.	
Examination of instruments.	Readings within range. Pointers steady. Warning lights out.	Eng.oil temp.:__Press:__ Instruments :____ Warn.lights: Fuel:__ MGB press:__temp:__
5. ENGINE		
Take-off:apply coll.pitch,taking 1 sec.to increase from low pitch to the coll.pitch DΘ value recorded above in hover.	RPM drop(ΔNT)not greater than 1000 rpm - If incorrect:Main.Man.§ 73.	Regulation (ΔNT) :__

2.6.3. TEST FLIGHT REPORT (cont)	REQUIRED	ACTUAL
2.6.3.2. WEIGHT 1900 TO 2000 kg, C.G.=NEUTRAL HANDLING IN FLIGHT - PERFORMANCE - INSTRUMENTS		
1. MANOEUVRABILITY Level flight rearwards and sideways	Flying controls, clearance: sufficient. Aircraft control : satisfactory.	Manoeuvres: _____
Estimated speed: 20 km/h (15 knots)		
2. PERFORMANCE AT LOW ALTITUDE Level flight at Zσ: 500m (1650 ft) Coll. pitch: Dθ = 0.80 conjointly with booster pump=off (Ref. chap. 3)	Eng. rpm=33500±300 (NT) rpm variation ΔNT $\leq$ 100 rpm t4 $\leq$ 500°C. IAS in accordance with curves in chapter 3. If incorrect: ref. Maint. Man., Chapters 27 and 34	NT : _____ Δ NT : _____ t4 : _____ tH : _____ pH : _____ IAS: _____ θs : _____ Gauge: _____ m : _____
Max. speed (in descent)	VNE = 210 km/h (113 knots)	VNE : _____
3. VIBRATION LEVEL During normal manoeuvres : (climb, any altitude, descent, autorotation, VNE): appreciate vibration level.	Appreciation If incorrect, see § 2.5.5.	Vibration level: _____
4. INSTRUMENTS - EQUIPMENT During the various manoeuvres given above - appreciate instrument readings.	Appreciation: sensitivity and accuracy.	Eng. instrs.: _____ Airsp.ind., rate of climb: _____ Altimeter: _____
- Heating system: Open and closed.	Efficiency, distribution freedom from leaks.	Heating : _____

2.6.3. TEST FLIGHT REPORT (cont)	REQUIRED	ACTUAL
2.6.3.3. WEIGHT 1900 TO 2000 kg;C.G.=NEUTRAL FLYING CONTROLS		
1. MAIN ROTOR CONTROLS		
- Rotor rpm:climb until 500m(1650 ft) above ground. In level flight.	Record temp. (Θs)	Zp:____ weight:____ Θs:____
Climb another 200m (700 ft) Go over to autorotation;control on low pitch stop.	Determine theor. rpm according to fig.2.5.1.	
Low engine rpm IAS =120 km/h (65 knots)	Theoretical rpm	
At selected altitude record rotor rpm	Indicated rotor rpm =theoretical rotor rpm ± 5.	Indicated rotor rpm:____ Correction necessary based on 1 turn of stop screw=8rotor rpm:____
- Loads:disengage servo-controls at low IAS. Hover:collective pitch loads.	Loads ≦ 4daN (9lb) If incorrect:adjust;refer to Maint.Man.,Chap.27	Coll.pitch loads:____
Level flight at VNE:stick loads	Load ≦ 15daN (34 lb) - If incorrect:replace blades.	Cyclic pitch loads:____
- Servo-controls : Re-engage servo-controls in hover, displacement of cyclic stick and collective lever.	Force required:symmetrical. If incorrect:adjust;Maint. Man. Chap. 27	Lateral servo-control:____ Longitudinal" " :____ Coll.pitch " " :____
- Minimum friction : IAS 110 km/h (60 knots) Friction knobs backed off against stops.	Cyclic stick and collective lever : steady See Sec. 2.2 -If incorrect: adjust; ref. Maint.Man.ch.27	Friction:____ - Cyclic stick:____ - Coll. lever :____
2. TAIL ROTOR CONTROL		
- R.H.clearance:in vertical climb with coll.pitch:max.(computer)	Sharp turn possible without touching stop.	R.H.clearance:____
- L.H.clearance:in vertical descent with coll.pitch:full low pitch.	Sharp turn possible hard against stop. If incorrect in both cases: adjust;ref.Maint. Man.Ch. 27.	L.H.clearance:____

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2.6.3. TEST FLIGHT REPORT (cont)	REQUIRED	ACTUAL
2.6.3.4. RADIO-INSTRUMENTS AND NAVIGATION		
1. I.C.S. Check each channel at each station.	Correct operation.	I.C.S: _____
2. V.H.F. Communication with ground station - 360° turn at 500m(1650 ft) above ground. - descent at unfavourable bearing.	No noticeable fading. No loss of station at less than 30 km(20 miles) from station and over 100m(350ft)	VHF : _____
3. HF Communication with ground station - 360° turn at 500m(1650 ft) above ground. - descent at unfavourable bearing.	No noticeable fading. No loss of station at less than 30 km(20 miles) from station and over 100m(350ft)	HF : _____
4. HF HOMING On return to base.	Sector angle ≤ 20° Sector centre line offset ≤ 10°	Homing: _____
5. RADIO COMPASS Bearing of distant stations at widely different frequencies, - QDM to be obtained - QDM " " " - QDM " " " Pass vertically over beacon.	Reversal time ≤ 20 sec.	RC : _____
6. GYRO INSTRUMENTS During the various manoeuvres given above.	Vacuum:warn.light out Artificial horizon:stable and accurate. Directional gyro: precession ≤ 3°/10 mn.	Gyro instrs.: _____
7. COMPASS On known true heading.	Stand-by compass error ≤5°	Headings / Compass / Compass error

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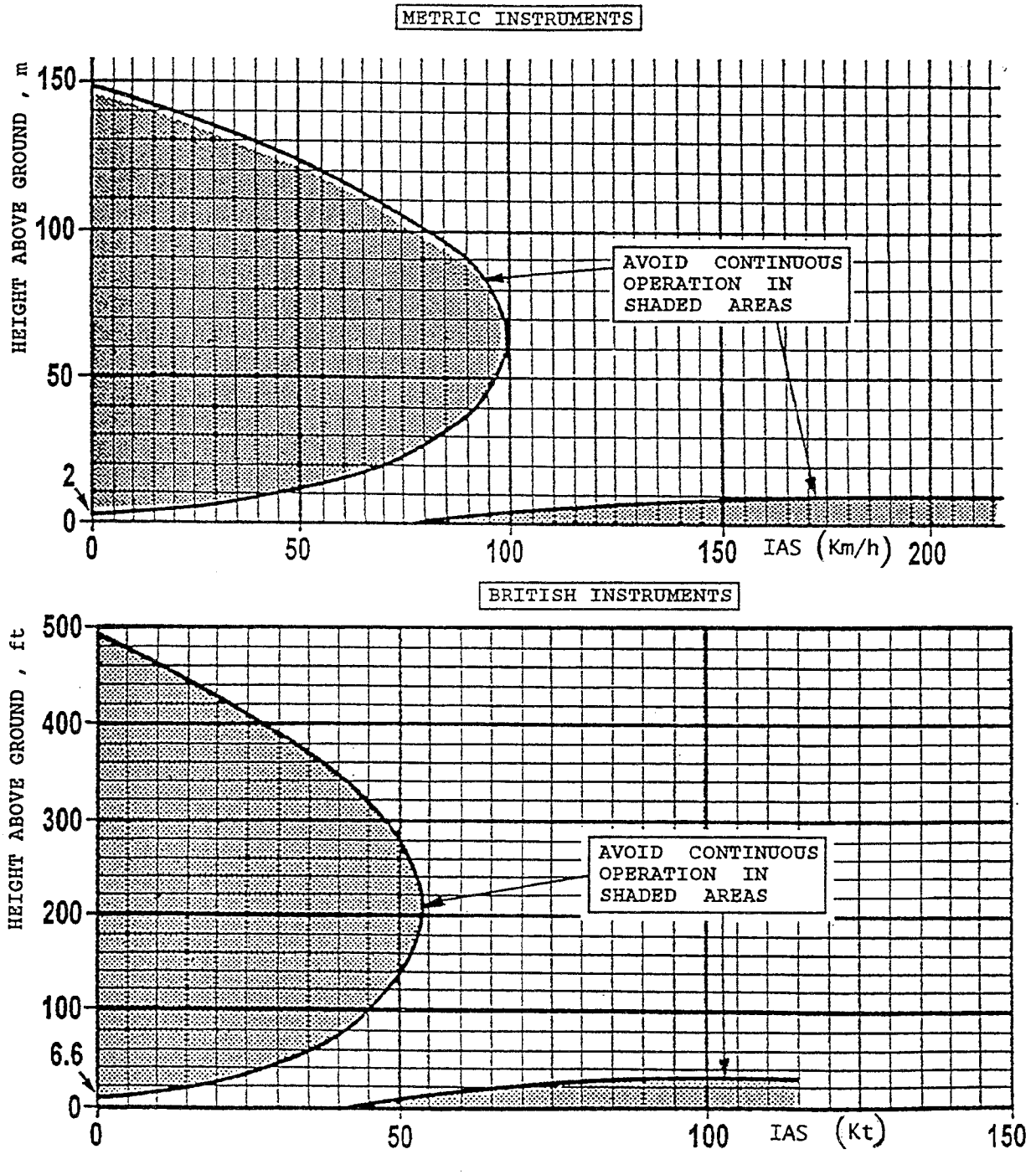
SECTION 3 - PERFORMANCE INFORMATION

CONTENTS

Aircraft in flight headed into wind



3.1. AIRSPEED

Indicated airspeed equals calibrated airspeed throughout the speed range.
For aircraft equipped with float landing gear, refer to figure 3.11
For aicraft equipped with sand filters, cruising speed at 0.8 collective pitch, is approximately 7 percent lower.
Sea level cruising speed is between 100 and 110 kt (190 and 210 km/h), depending on gross weight.
Cruising C.A.S., versus altitude and gross weight is given by figure 3-1.

- Aircraft equipped with float type langing gear
  Floats induce an error to the airspeed indicator as a function of the C.G. location (see Figure 3.11).
  The true airspeed also depends on the C.G. location

- Aircraft equipped with "barrier" type sand filters.
  The airspeed loss at 0.8 pitch is 8,5 %

- Aircraft equipped with dynamic sand filters
  The airspeed is not affected.

- Aircraft equipped with the emergency floatation gear
  With the floats folded, the airspeed loss is 4 %

3.2. FUEL CONSUMPTION

Figure 3-3 gives fuel consumption-per-nautical mile versus density-altitude.

Aircraft equipped with float type landing gear
The specific fuel consumption depends on the C.G. location. It is increased by about 0.10 l/km. This value can reach 0.15 l/km with extreme forward C.G.

Aircraft equipped with "barrier" type sand filters
The hourly fuel consumption is not affected.
The specific fuel consumption is increased by 8,5 %.

Aircraft equipped with dynamic sand filters
The hourly and specific fuel consumptions are increased by + 4 % with P2 air bleed.

Aircraft equipped with the emergency floatation gear
The hourly fuel consumption is not affected.
The specific fuel consumption is increased by 4 %

3.3. RANGE

The following table gives range (in nautical miles) with full tankage and no reserve.

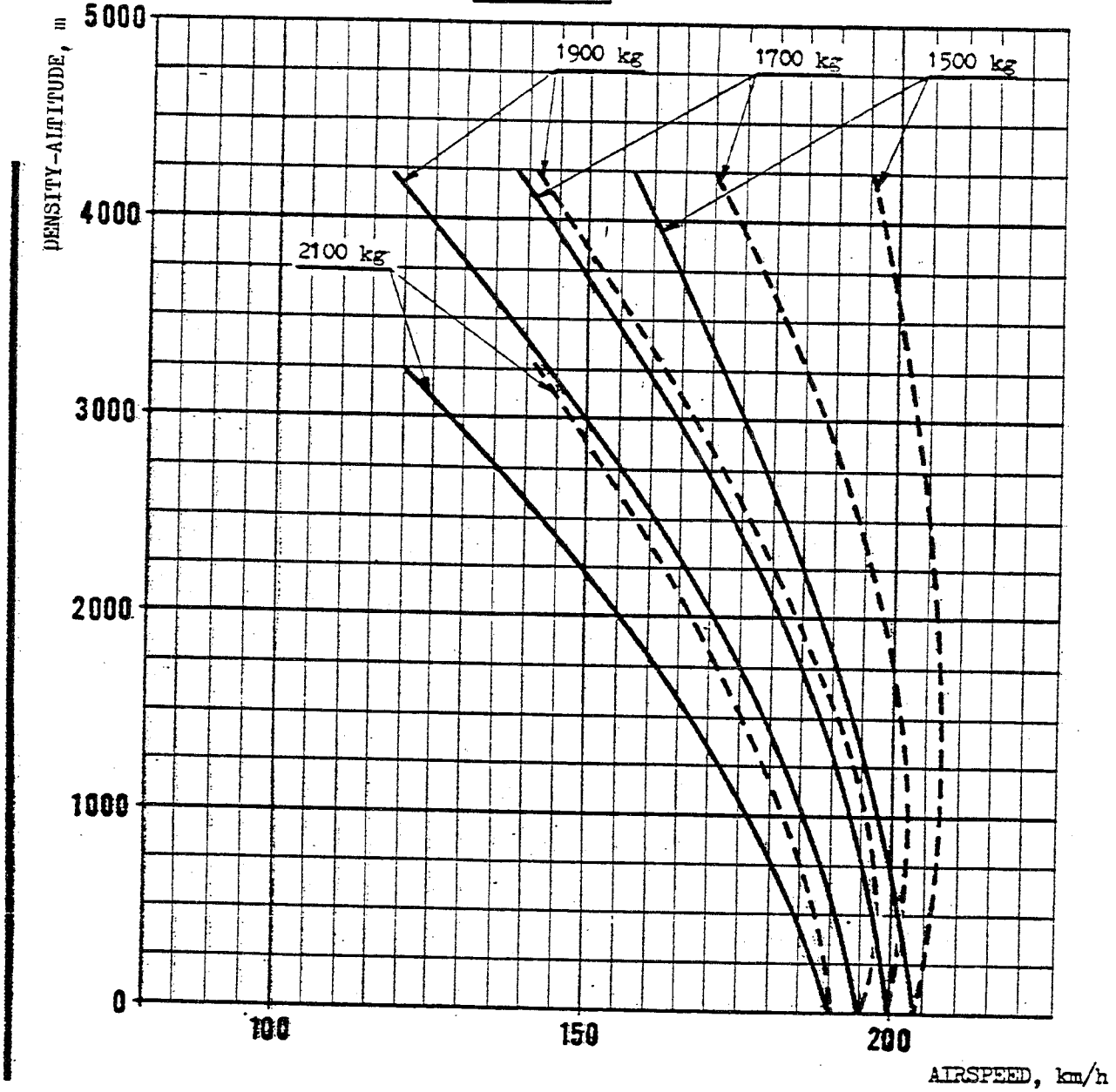
METRIC			ENGLISH		
T.O. Weight	2100 kg	1700 kg	T.O. Weight	4,630 lb	3,750 lb
Z = 0 m	495 km	565 km	S.L.	270 n.m.	300 n.m.
Z = 2000 m	550 km	650 km	6,500 ft	295 n.m.	350 n.m.
Z = 3000 m		680 km	10,000 ft		370 n.m.

NOTE : When determining the range, take into account the influence of optional equipment on fuel consumption and speed

3.4. CEILING

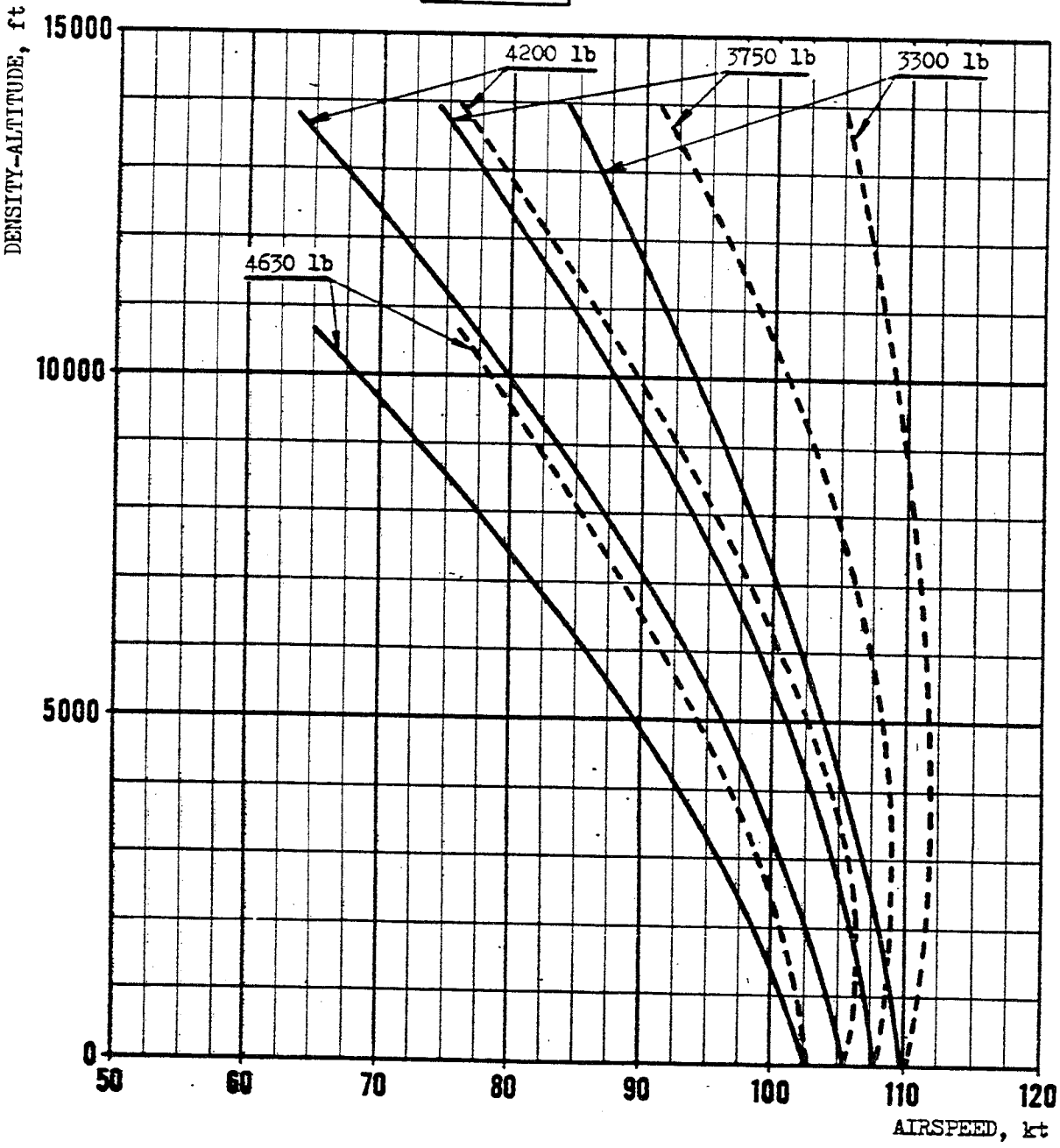
Service ceiling as well as hovering ceilings, versus gross weight, are given by figure 3-6, from which have been derived figures 3-7 and 3-8 giving hovering ceilings versus cutside air temperature, respectively in and out of ground effect.

METRIC



Cruising speed versus altitude
Figure 3-1

ENGLISH



Cruising speed versus altitude
Figure 3-1

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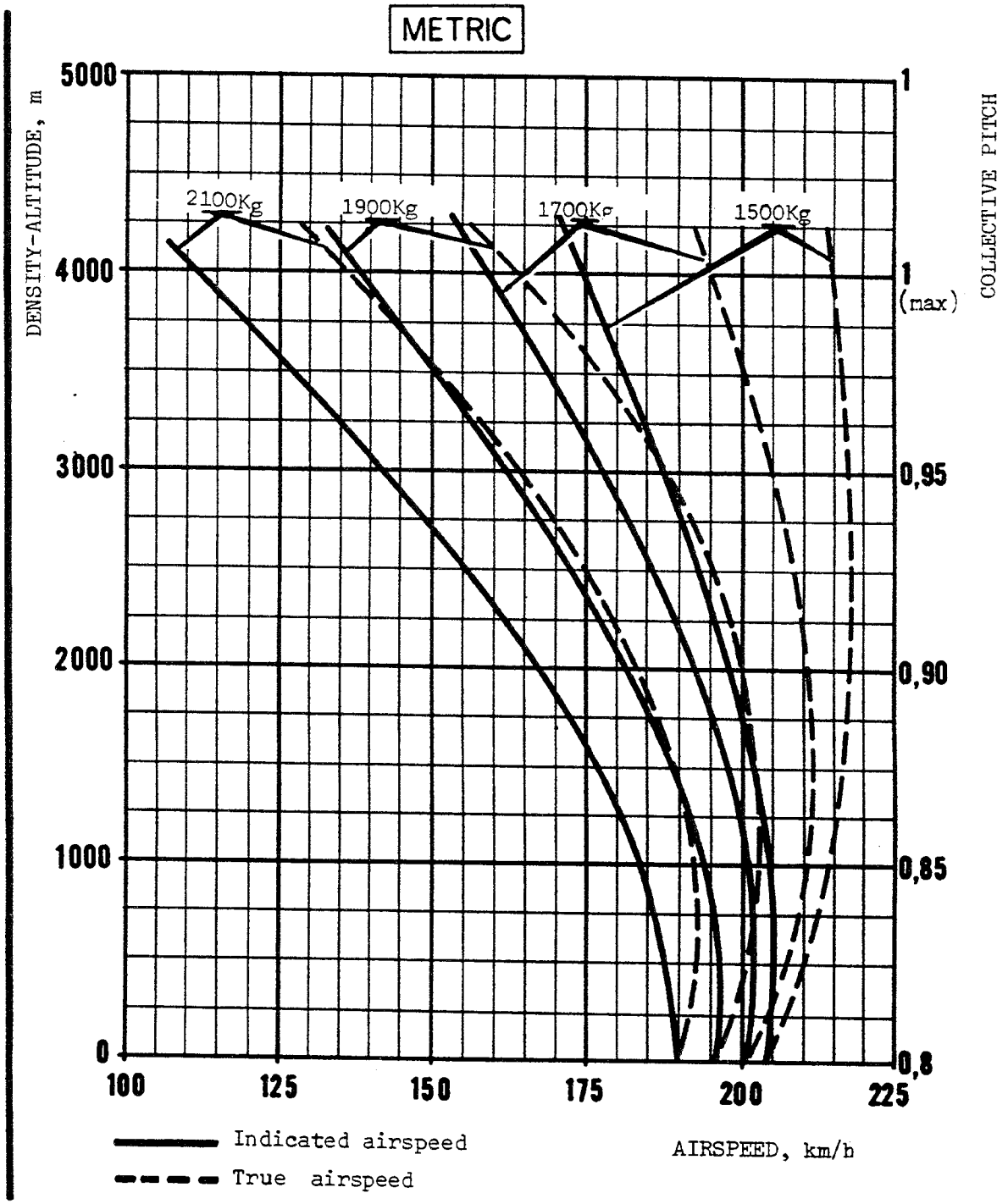

Maximum speed in level flight
Figure 3-2

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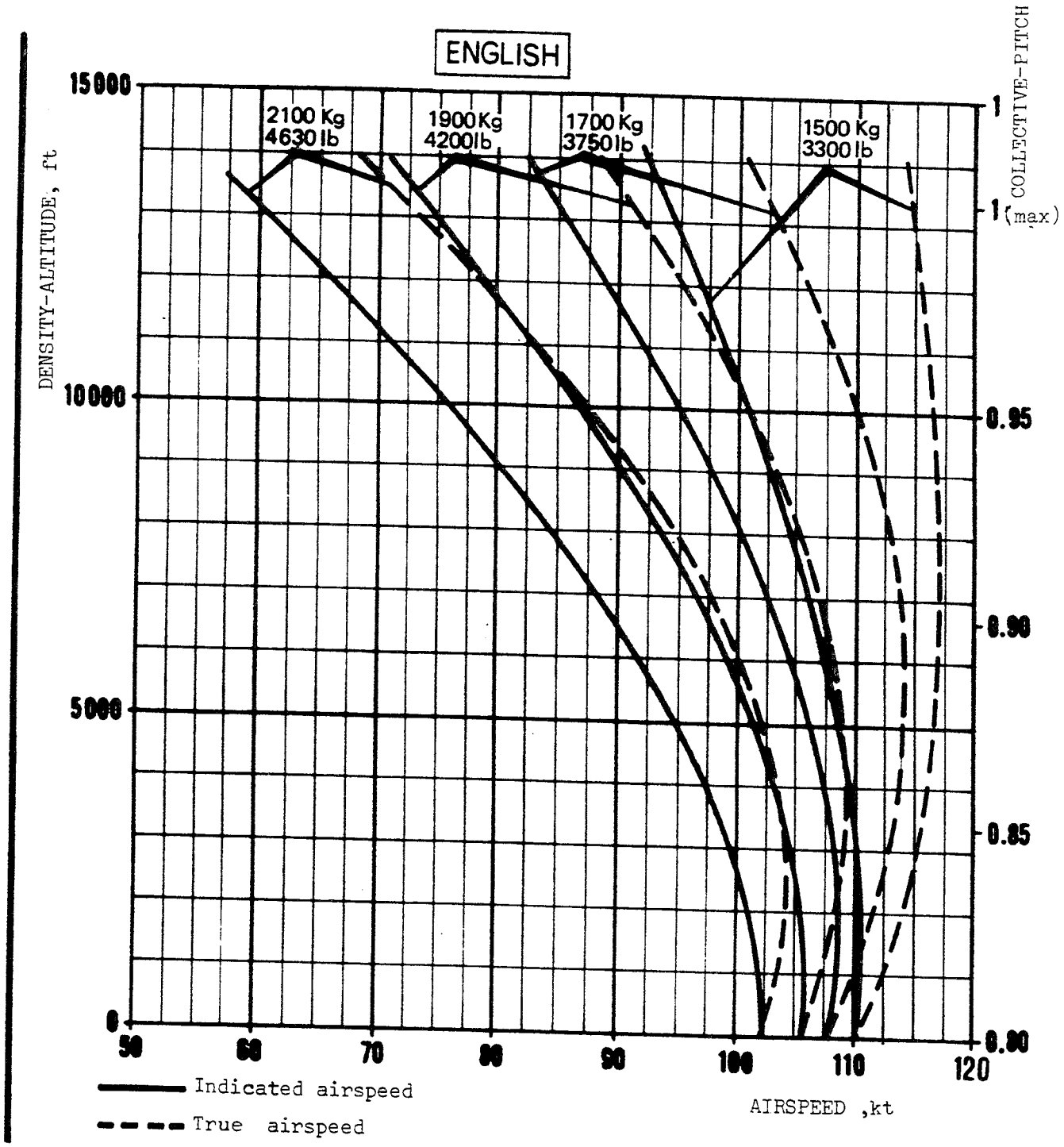
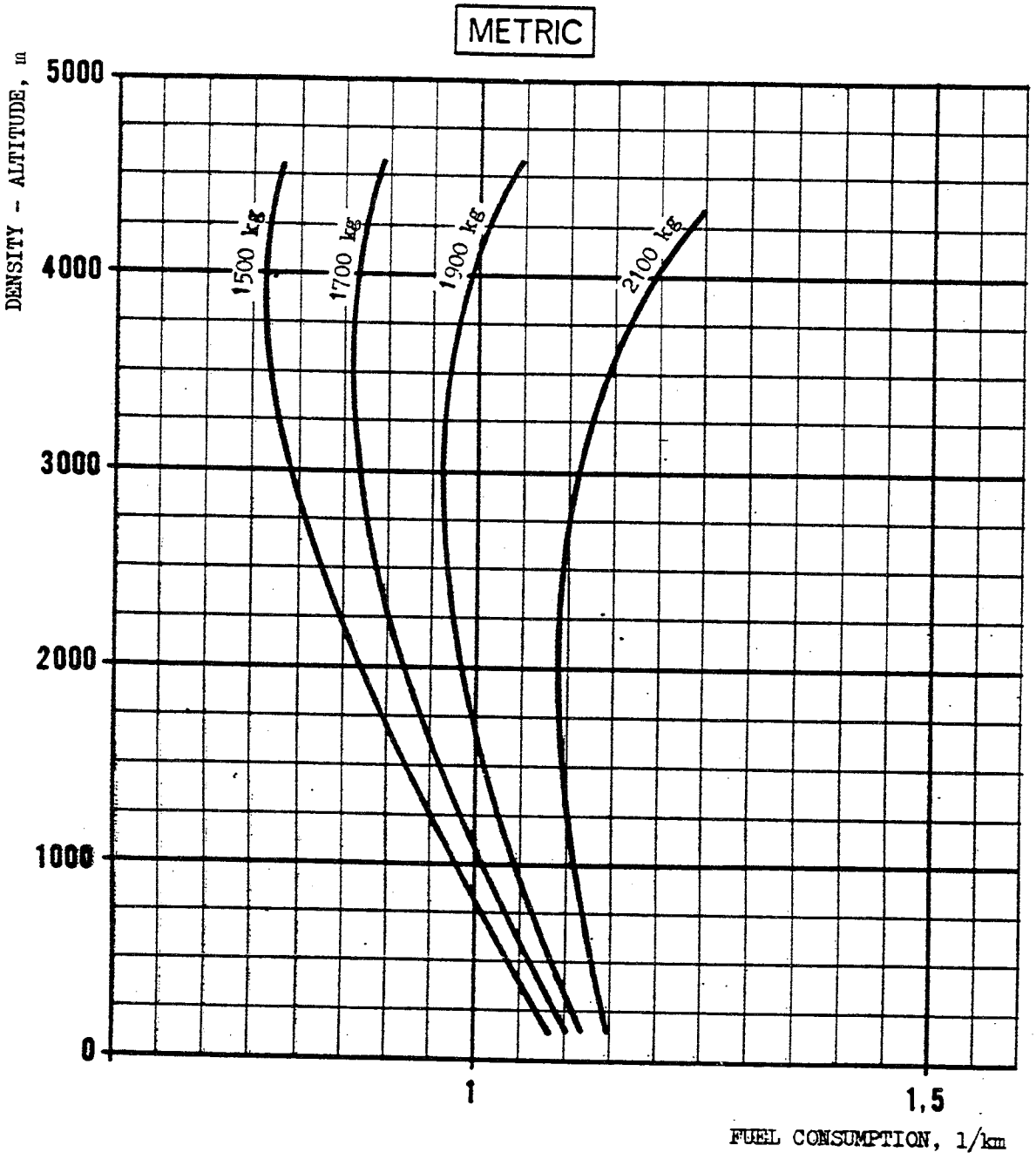


Maximum speed in level flight
Figure 3-2

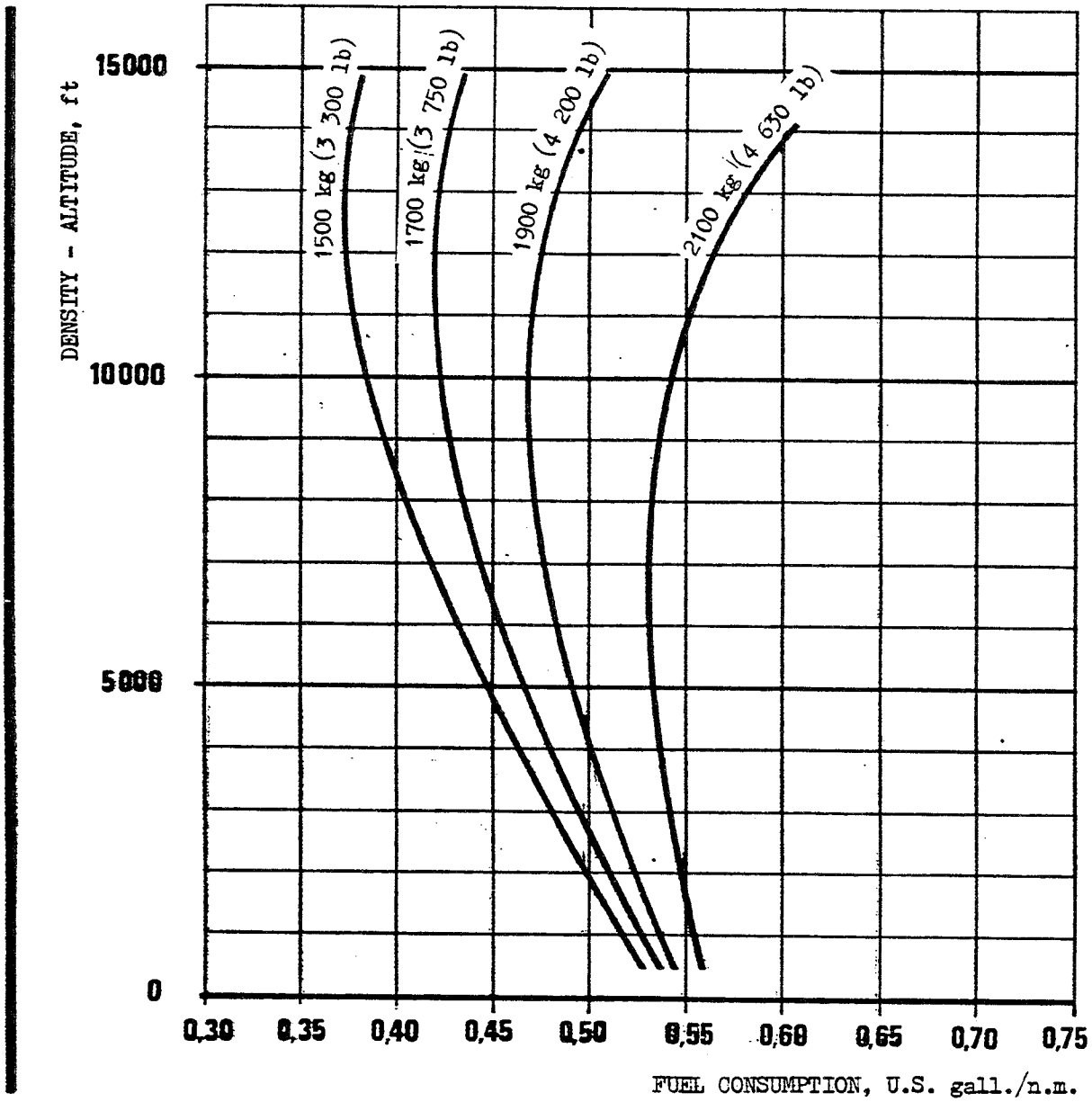


Collective-pitch = 0.80

Fuel consumption per kilometre in cruising flight
Figure 3-3

For helicopters equipped with float landing gear, refer to para. 3.2.

ENGLISH



Collective-pitch = 0.80

Fuel consumption per nautical mile in cruising flight
Figure 3-3

For helicopters equipped with float landing gear, refer to para. 3.2.

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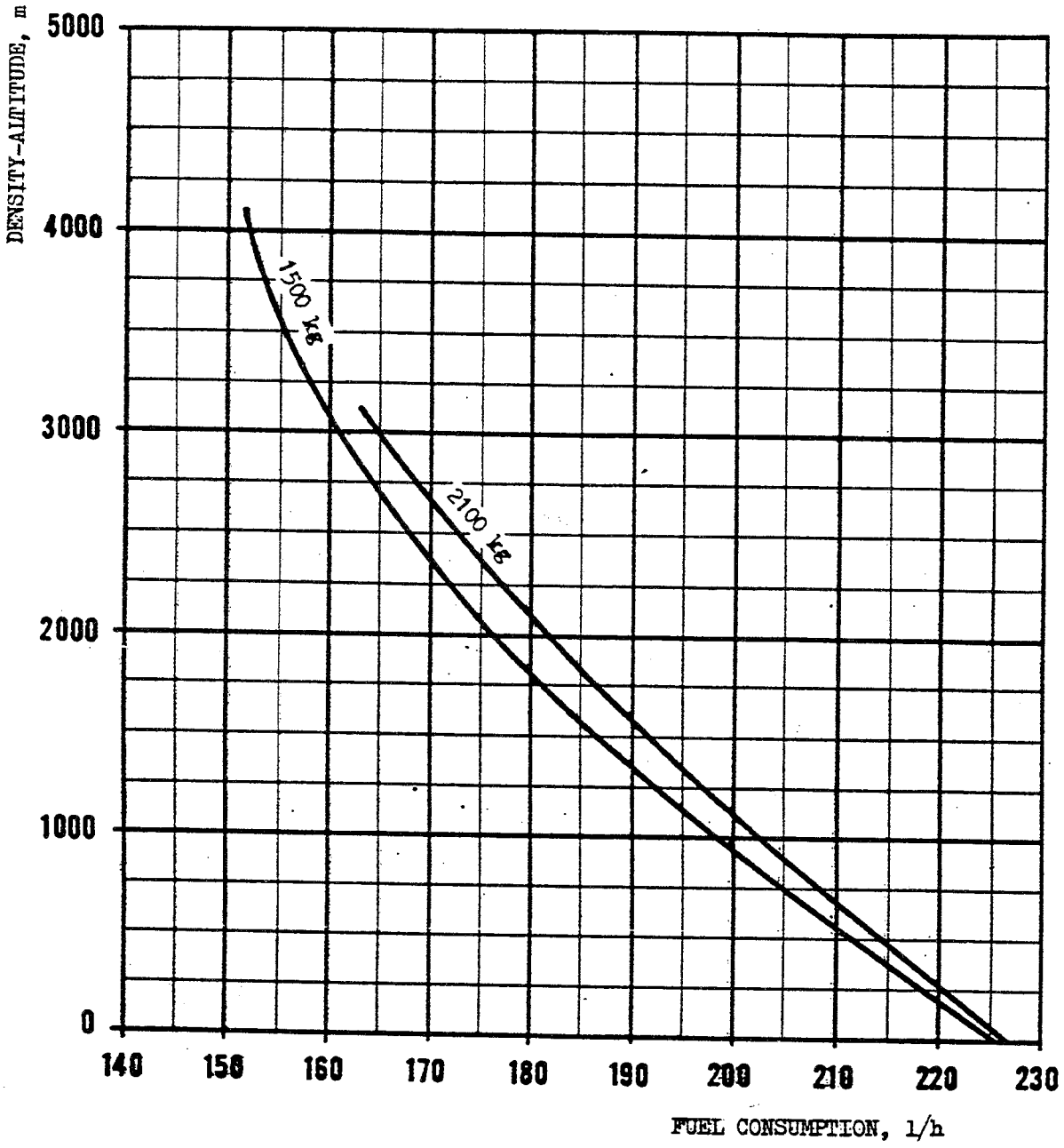
METRIC



Collective-pitch = 0.80

Fuel consumption per hour in level flight
Figure 3-4

ENGLISH

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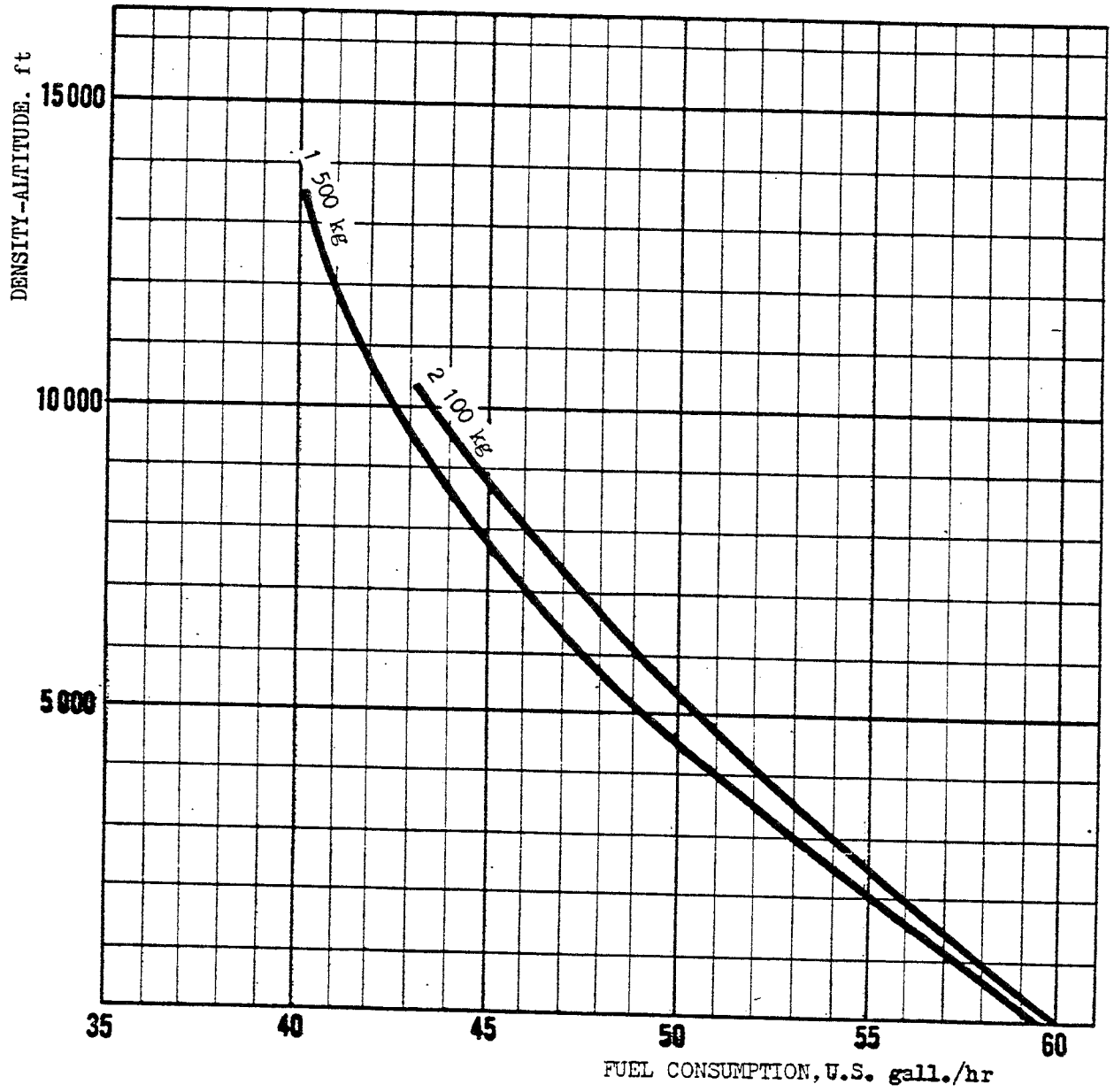
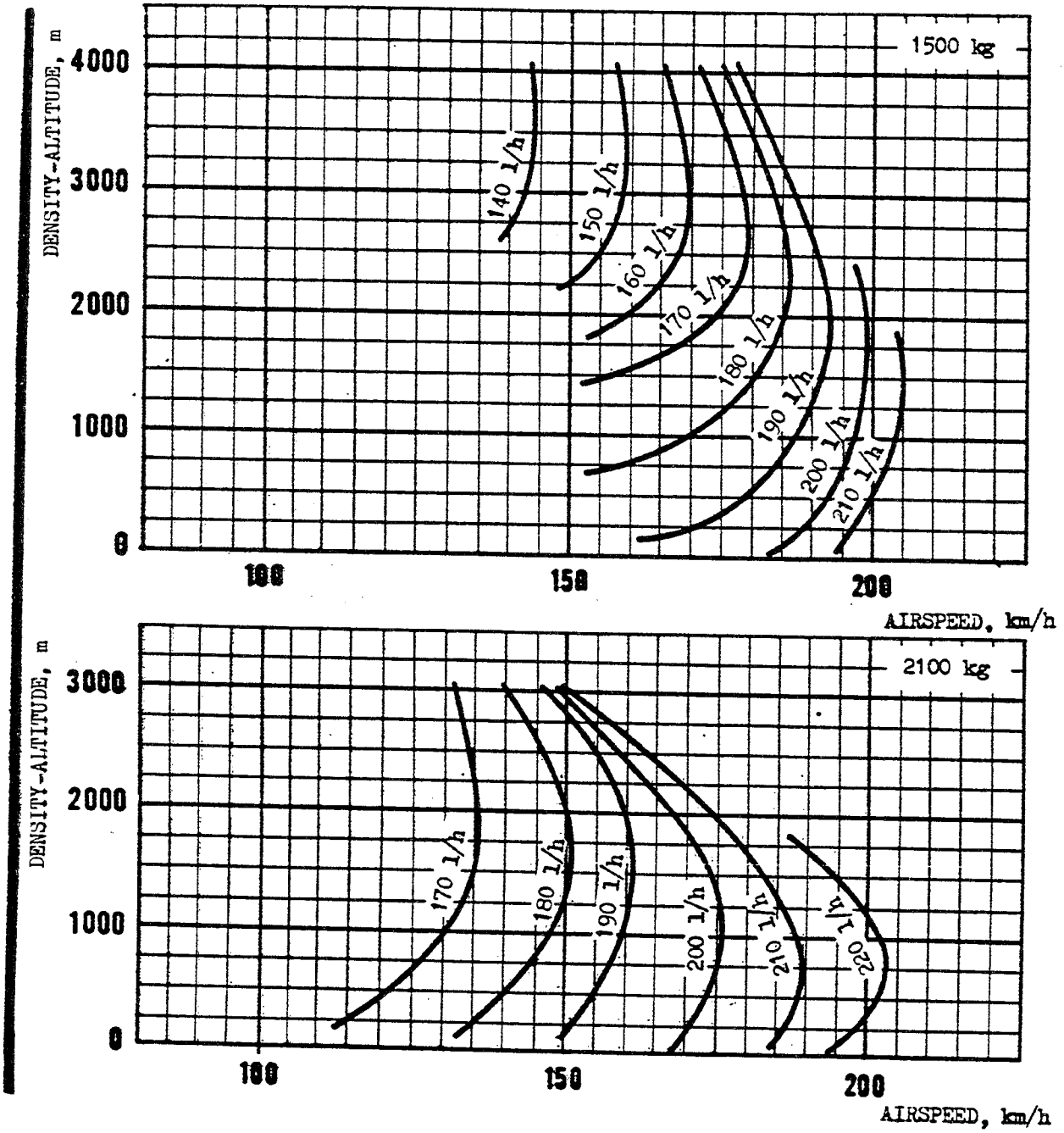


Collective-pitch = 0.80

Fuel consumption per hour in level flight
Figure 3-4

METRIC



Fuel consumption per hour versus density-altitude and I.A.S.
Figure 3-5

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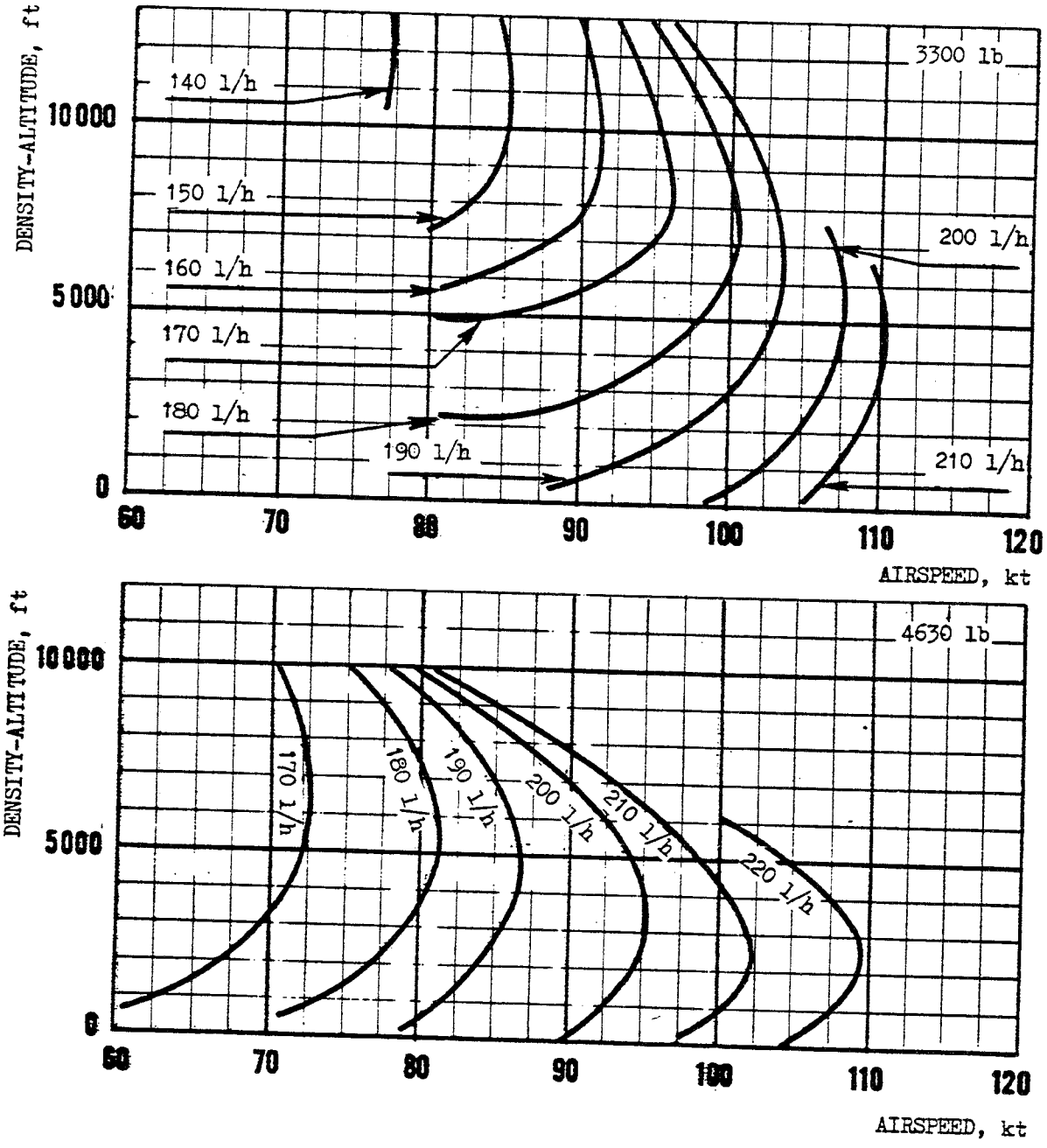
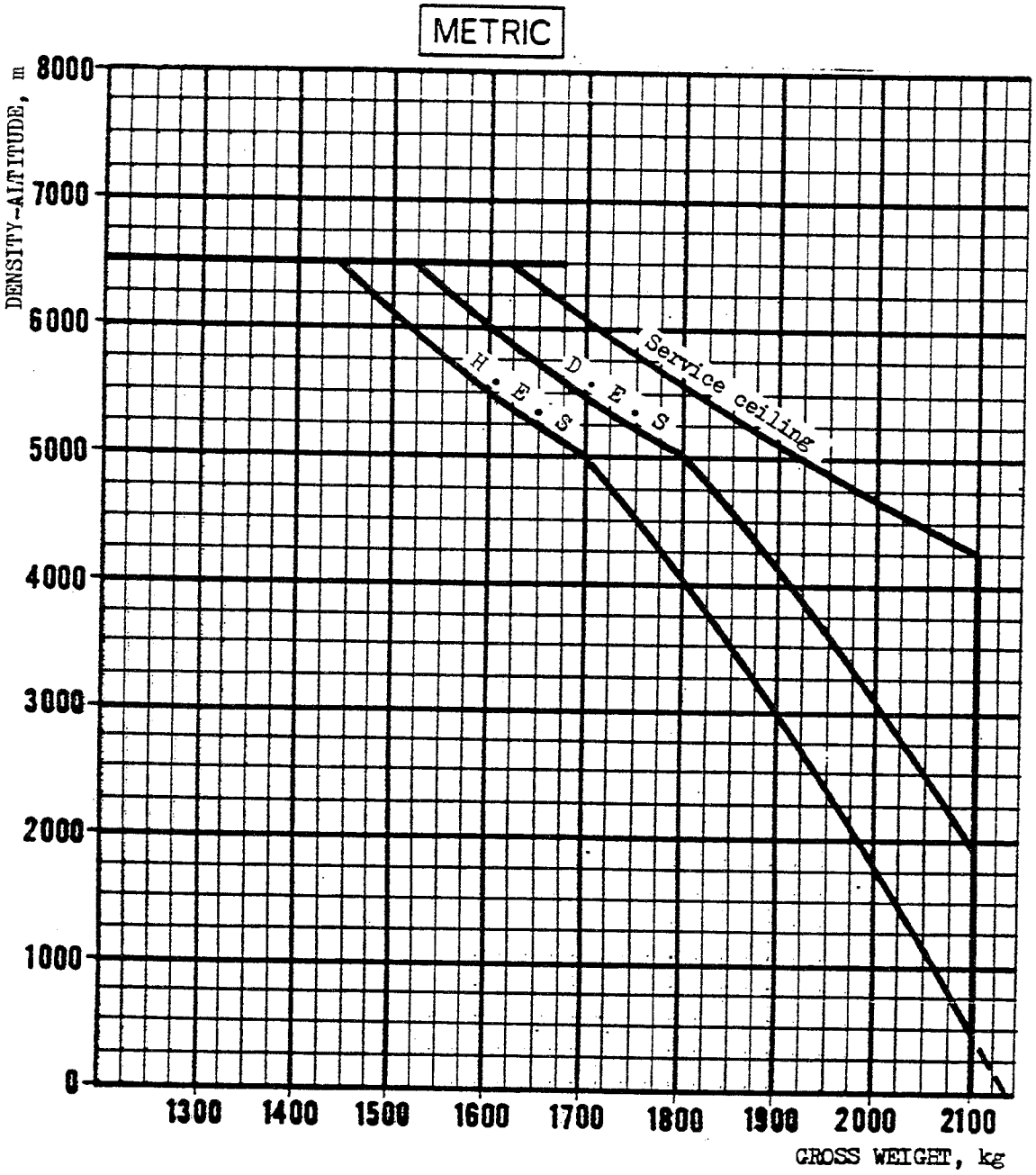
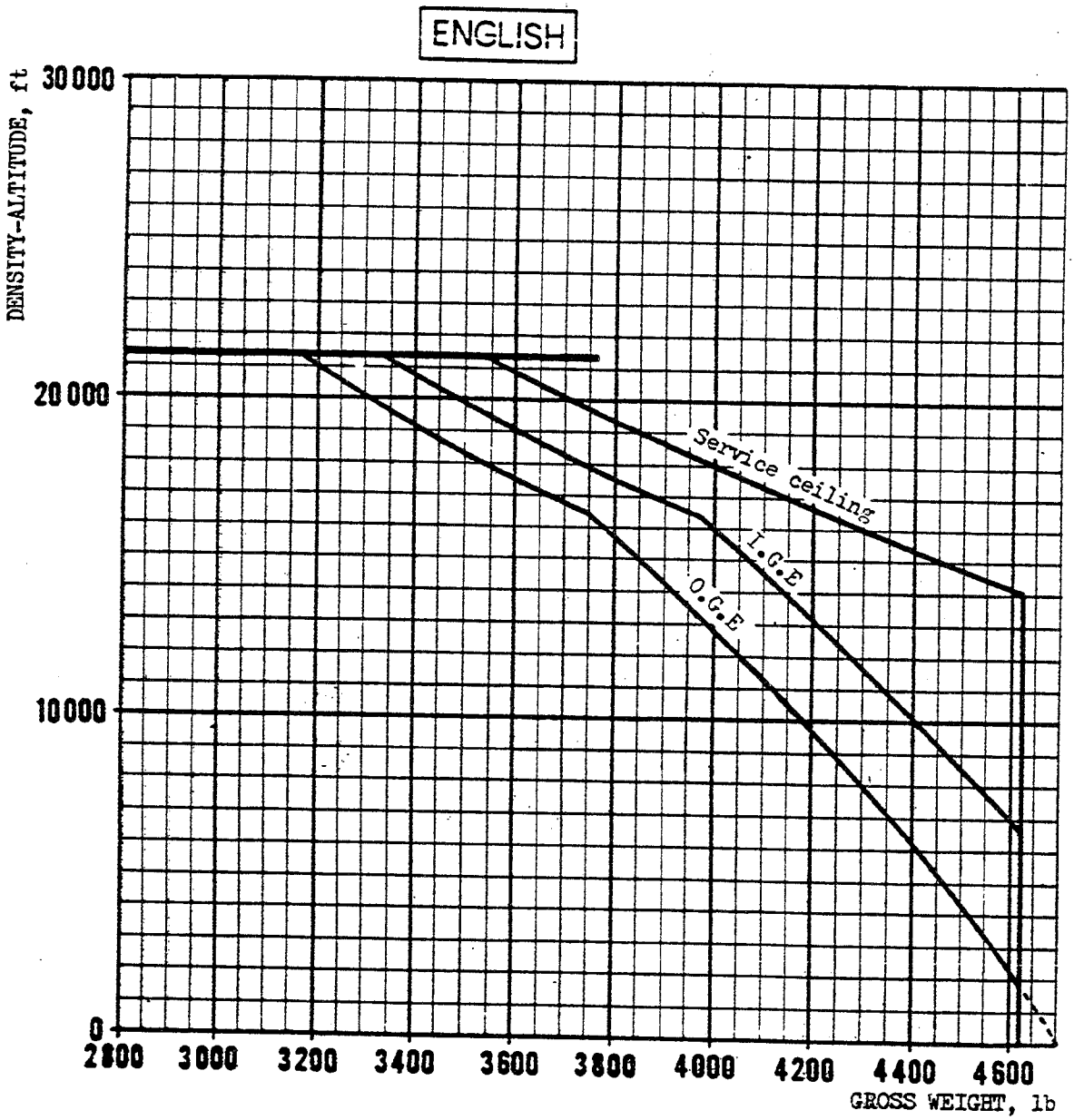


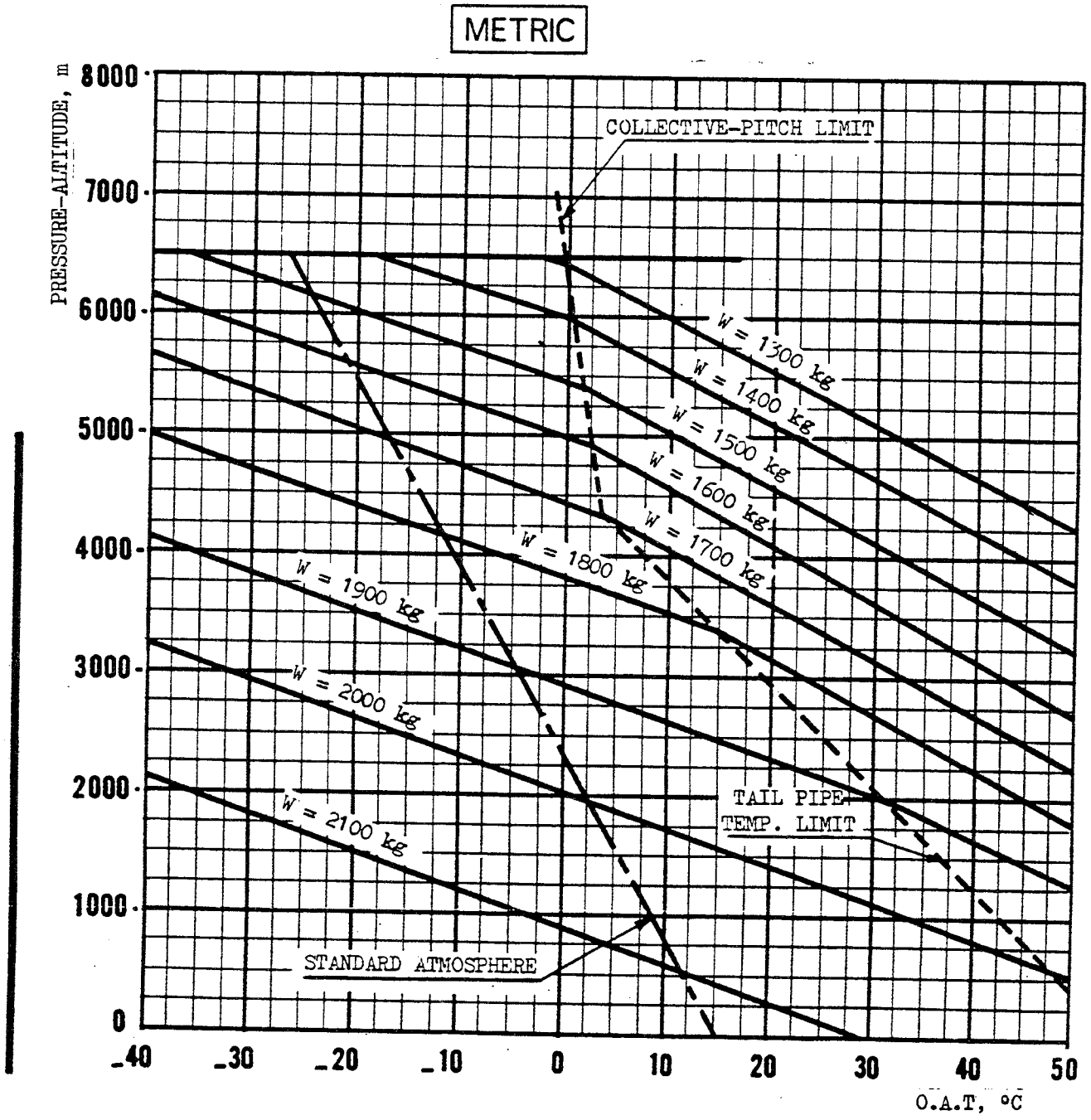
Fuel consumption per hour versus
density_altitude and I.A.S.
Figure 3-5



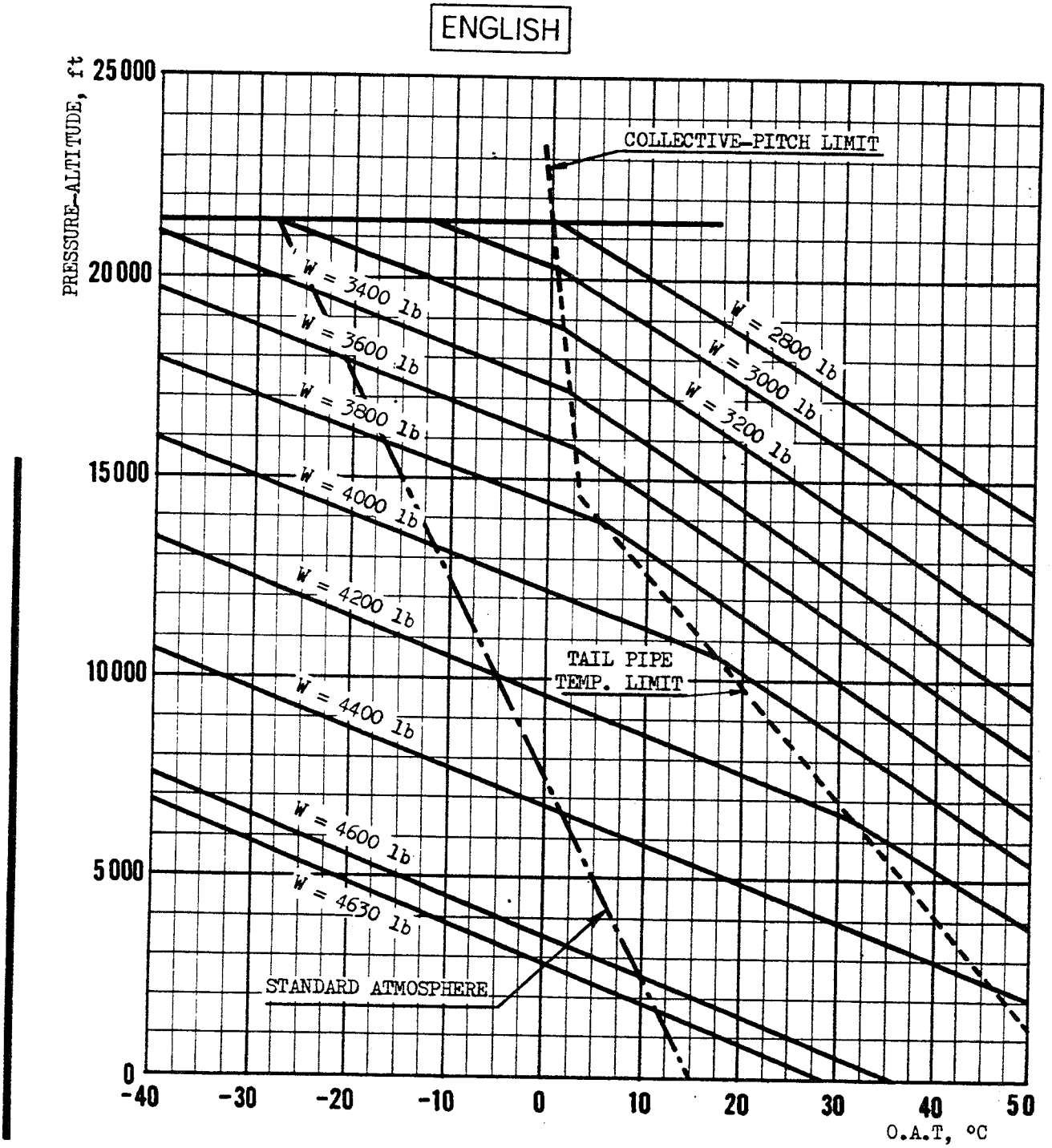
Service ceiling - Hovering ceiling O.G.E.
Hovering ceiling I.G.E., versus gross weight
Figure 3-6



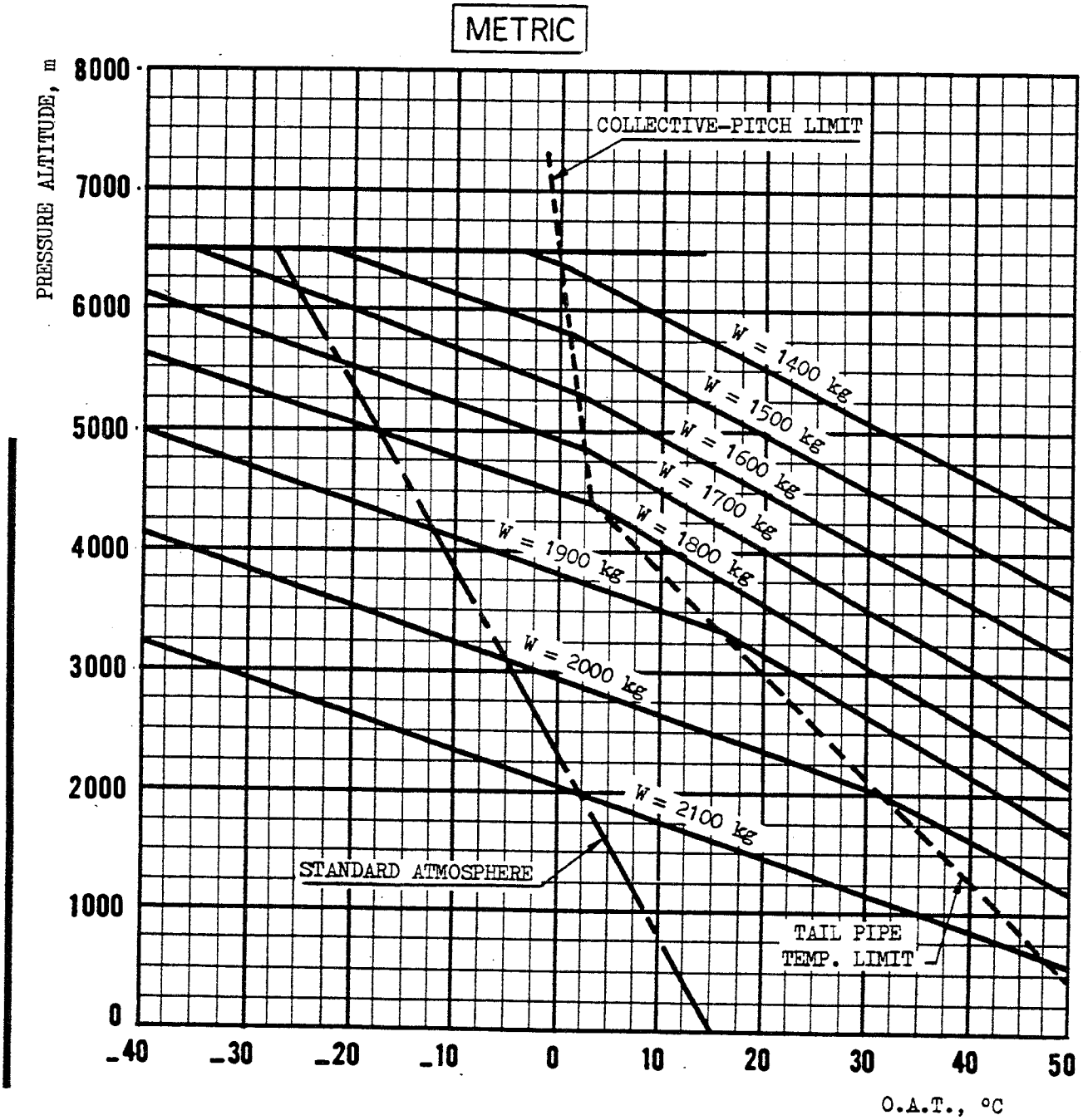
Service ceiling - Hovering ceiling O.G.E.
Hovering ceiling I.G.E., versus gross weight
Figure 3-6



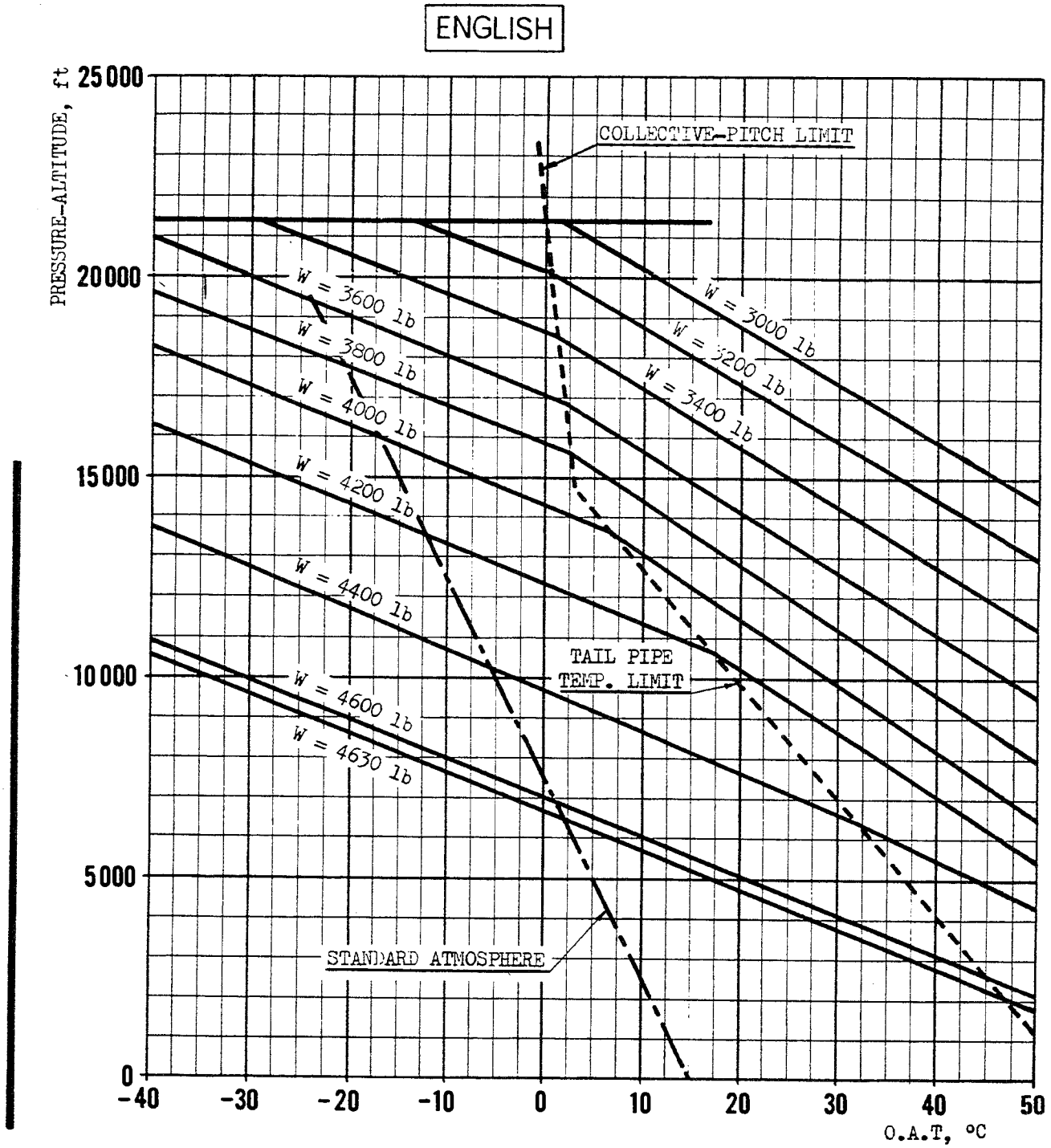
Hovering ceiling O.G.E. versus outside air temperature
Figure 3-7



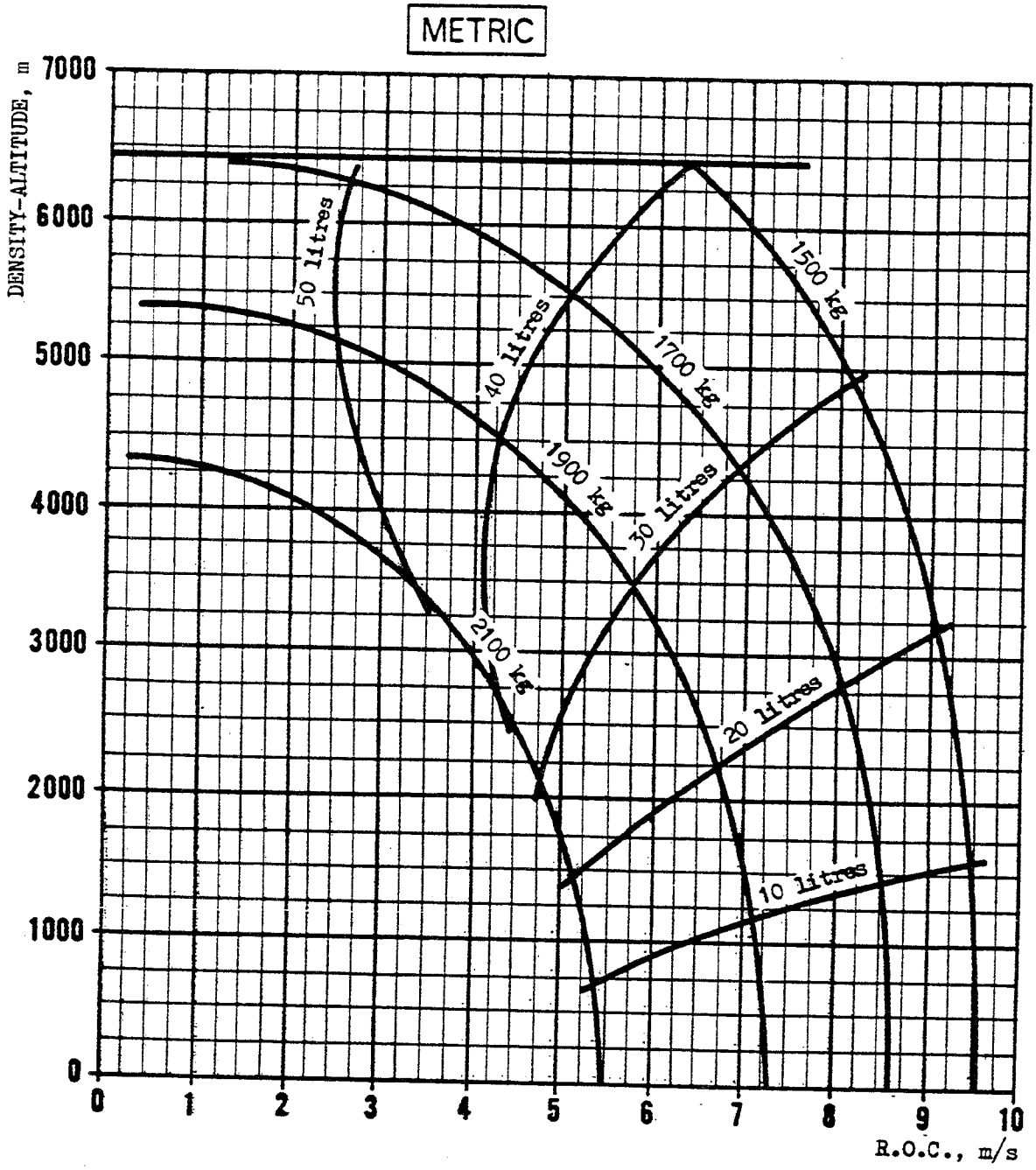
Hovering ceiling O.G.E. versus outside air temperature
Figure 3-7



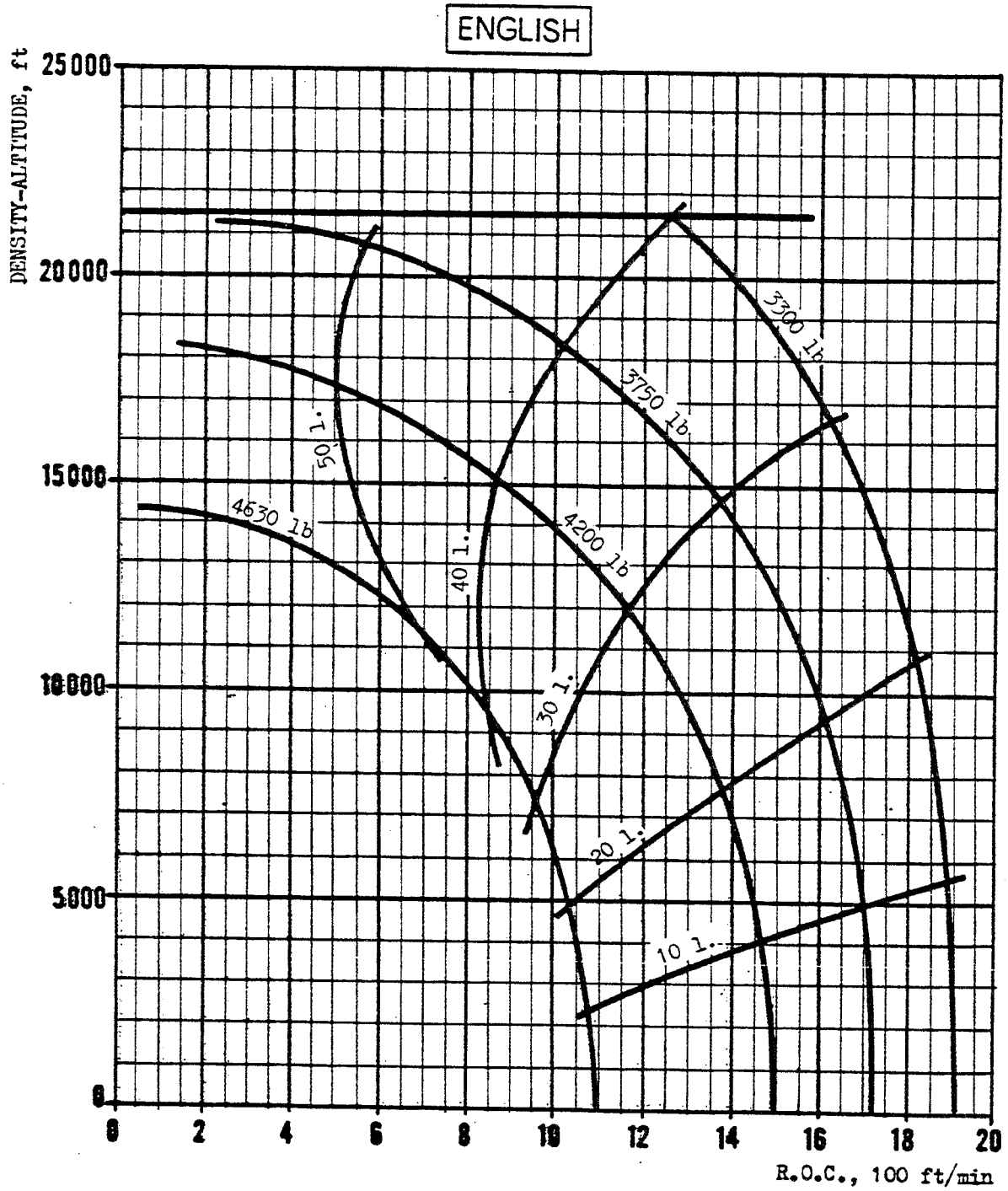
Hovering ceiling I.G.E. versus outside air temperature
Figure 3-8



Hovering ceiling I.G.E. versus outside air temperature
Figure 3-8



Rate of climb versus altitude and gross weight
Figure 3-9



Rate of climb versus altitude and gross weight
Figure 3-9

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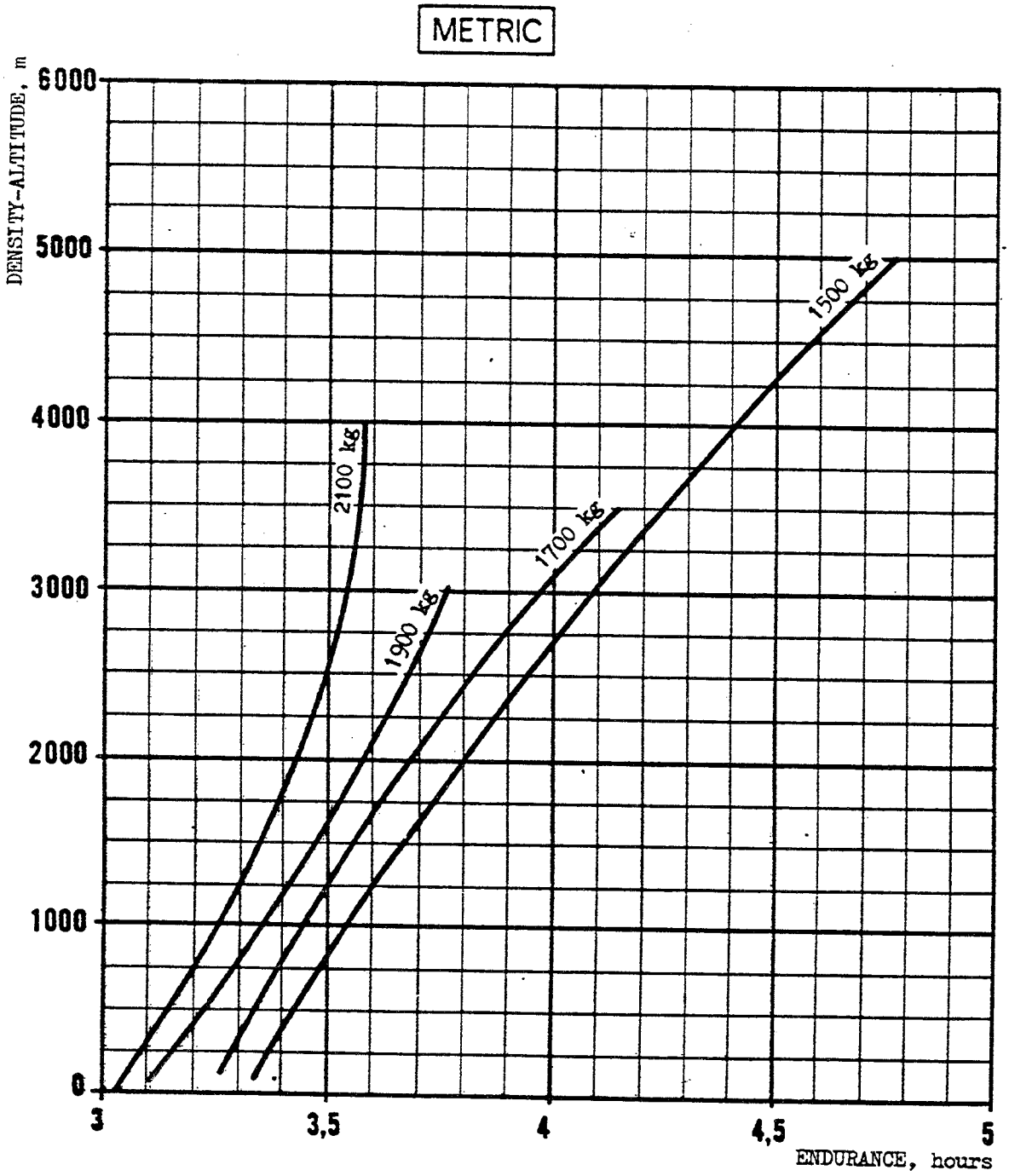
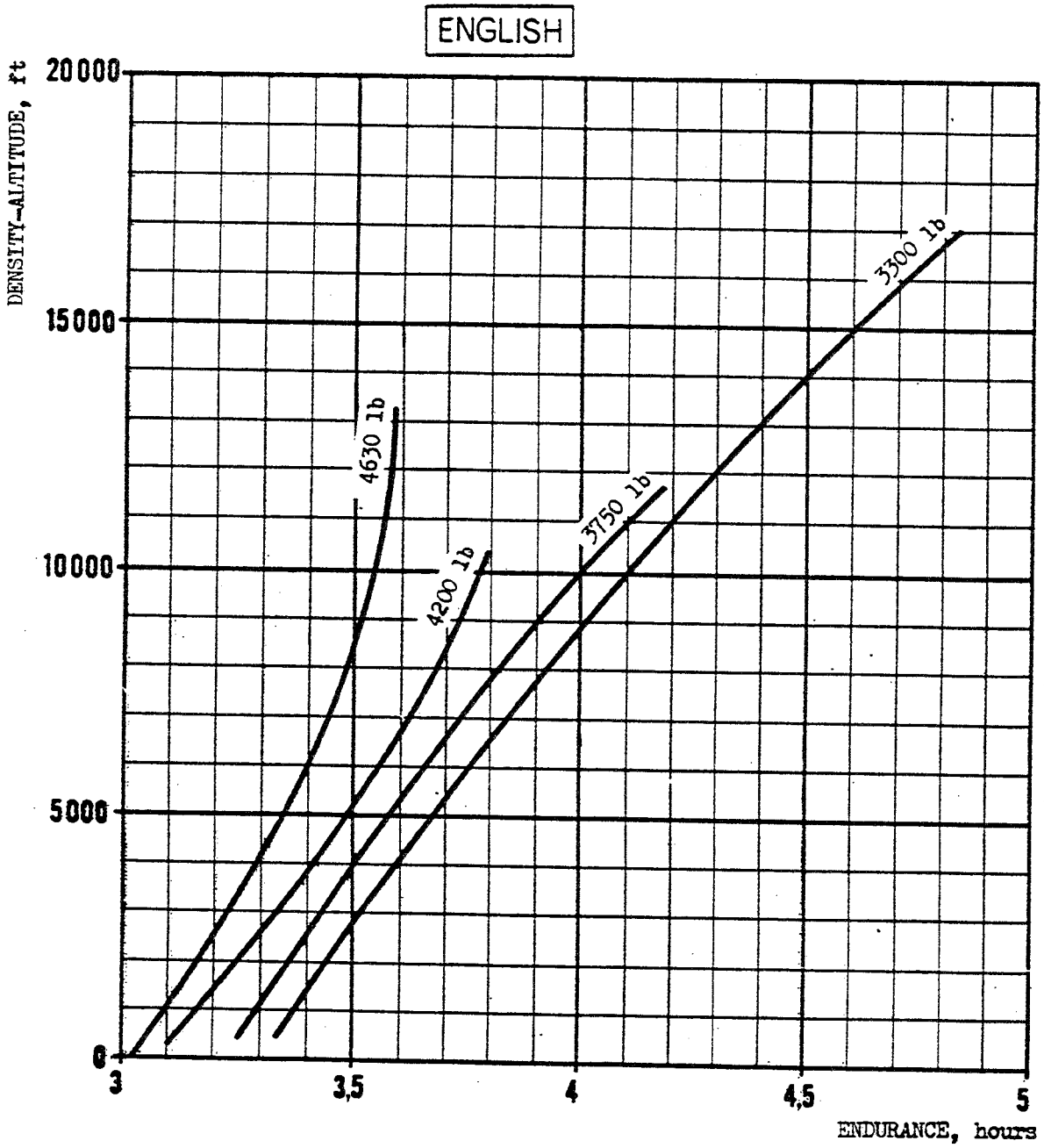


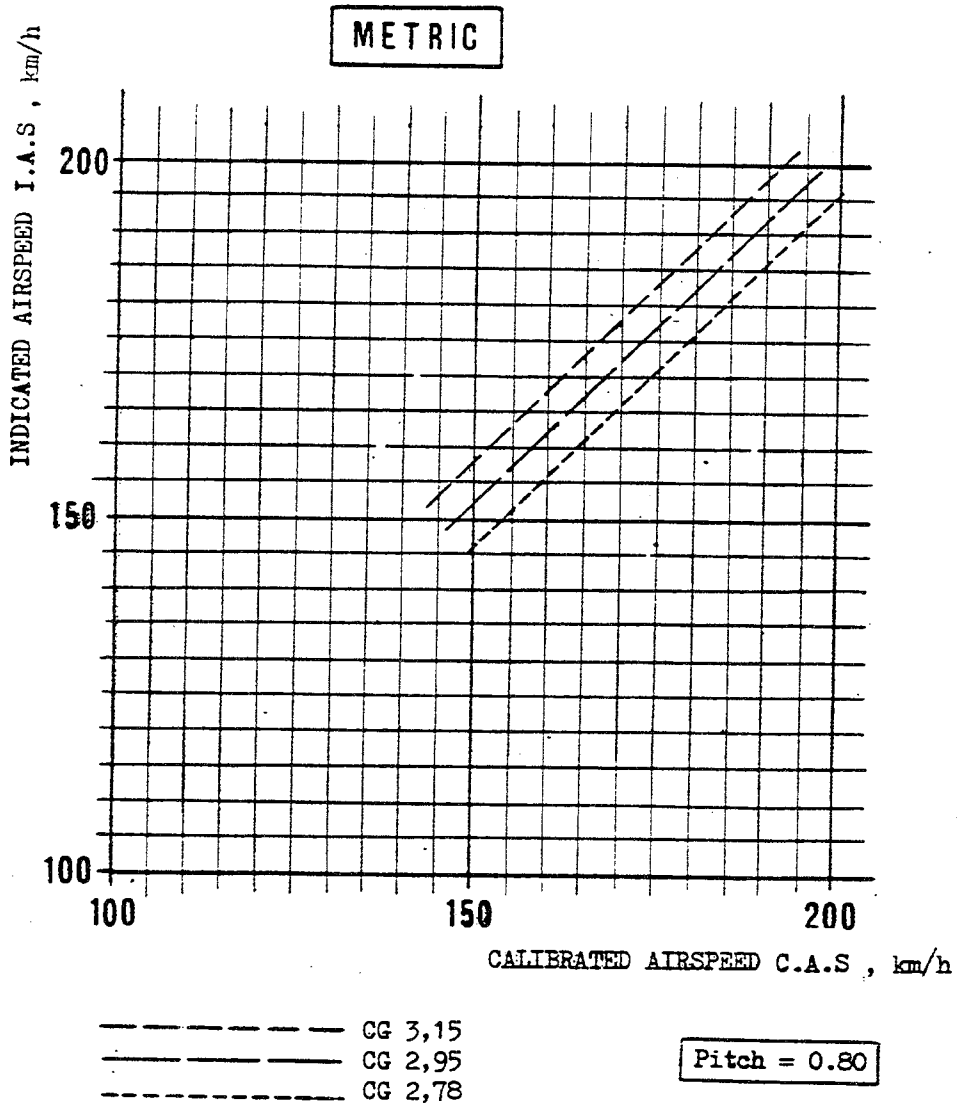
I.A.S. : 45 to 55 kt

Endurance versus gross weight and density altitude
Figure 3-10



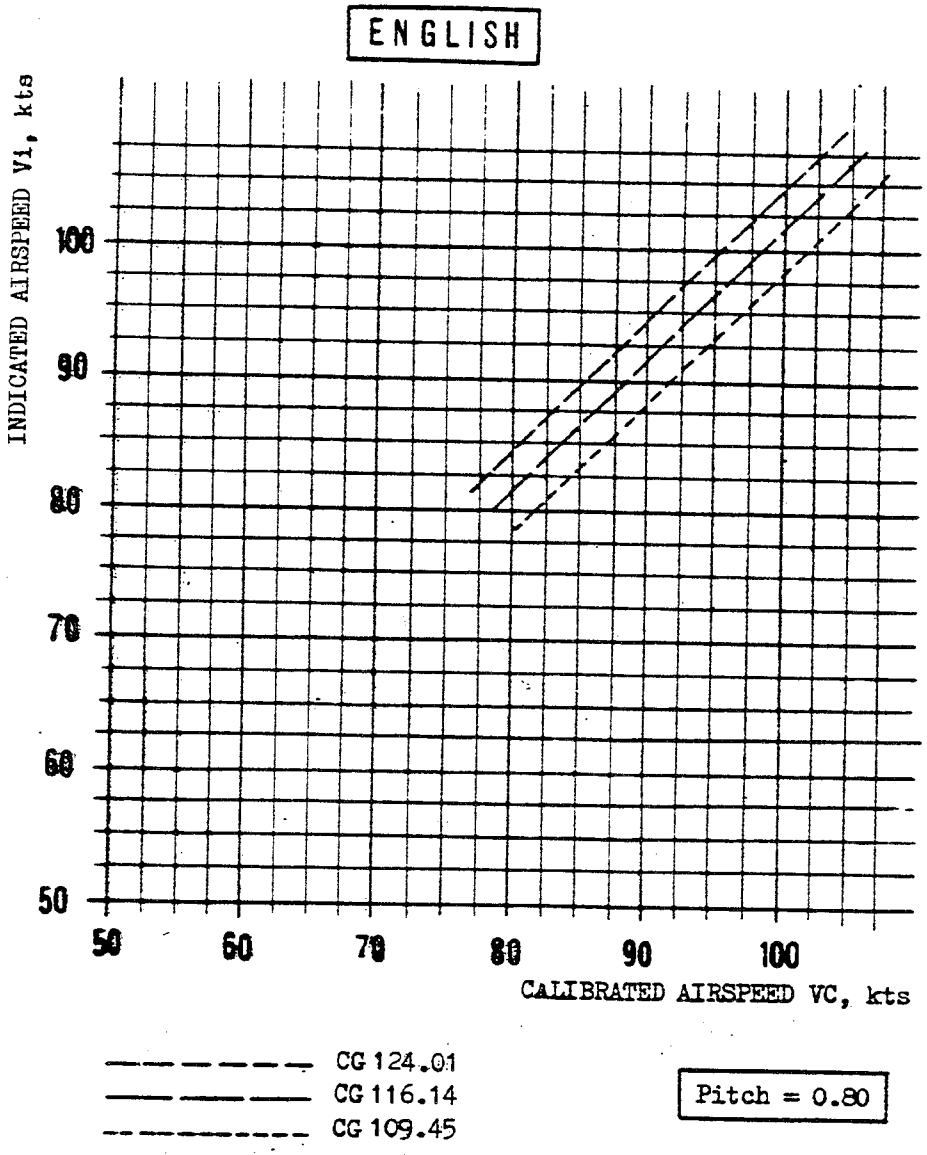
I.A.S. : 45 to 55 kt

Endurance versus gross weight and density altitude
Figure 3-10



CALIBRATED AIRSPEED VS.
INDICATED AIRSPEED AND C.G POSITION

For helicopters equipped with float type landing gear
Figure 3-11



CALIBRATED AIRSPEED VS.
INDICATED AIRSPEED AND C.G POSITION

For helicopters equipped with float type landing gear
Figure 3-11