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SCHWEIZER

PILOT'S FLIGHT MANUAL

CONTAINING THE FAA APPROVED ROTOCRAFT FLIGHT MANUAL FOR

SCHWEIZER S330/333™ HELICOPTER MODEL 269D

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SECTION 1

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Section I

GENERAL

INTRODUCTION

- The Pilot's Flight Manual has been prepared with one fundamental goal; to provide the pilot with information necessary to accomplish the intended mission with maximum safety and economy possible.

SCOPE

- The manual meets all FAA requirements for APPROVED DATA and that data is so designated.

- Schweizer has included additional supplemental data which is intended to provide the pilot with information that expands, enhances and eases his task.

ORGANIZATION

- The contents of this manual is organized in the following manner:

- **SECTION I GENERAL**

  Information of general interest to the pilot, owner or operator of the aircraft

- **SECTION II LIMITATIONS (FAA APPROVED)**

  Specifically defines the limiting factors, procedures and regime within which the aircraft may be operated. FAA regulations require that limitations not be exceeded.

- **SECTION III EMERGENCY AND MALFUNCTION PROCEDURES (FAA APPROVED)**

  Each type of problem normally encountered in flight is defined and the procedures necessary to cope with or alleviate the situation are given. The data is recommended by the manufacturer and the FAA as appropriate.

- **SECTION IV NORMAL PROCEDURES (FAA APPROVED)**

  Normal operation from engine start onward. As with emergency procedures, the data given is that recommended by the manufacturer and the FAA as appropriate.

- **SECTION V PERFORMANCE DATA (FAA APPROVED)**

  Aircraft performance is defined within certain conditions; some of these are airspeed, weight, altitude, temperature, humidity and wind velocity. The data is given in tabular or graph form and allows the pilot to determine the aircraft's capabilities related to the intended mission and the conditions which are current.

- **SECTION VI WEIGHT AND BALANCE DATA**

  Aircraft weight and balance are major operational factors. Data is provided by chart, graph and examples which allow the pilot to accurately determine the aircraft's gross weight and if the load is distributed within the fore and aft, and lateral center of gravity.

  The original weight and balance report, and equipment list (required and optional equipment installed on the aircraft at the time of licensing) are also contained in this section.

- **SECTION VII AIRCRAFT HANDLING, SERVICING AND MAINTENANCE**

  Information contained in this section is extracted from the Handbook of Maintenance Instructions and is highly selective. The subjects chosen are those with which the pilot will have direct involvement, either while at his normal base of operation or in the field.

- **SECTION VIII ADDITIONAL OPERATIONS AND PERFORMANCE DATA**

  Section V provides all basic data required and approved by the FAA. The information in Section VIII is given by the manufacturer to further inform the pilot of the aircraft's capabilities and allow him, by the use of graphs and tables, to utilize his aircraft to the maximum degree.

- **SECTION IX OPTIONAL EQUIPMENT SUPPLEMENTS**

  A number of pieces of optional equipment are available for the performance of specific tasks. In many cases the equipment is readily removable and may be used in combination(s) with other optional items. Whenever the installation of an option affects FAA Approved Limitations, Procedures or Performance (Sections II through V), an FAA approved supplement is required.

  The supplements are filed in publication number sequence in the section. In addition, there is tabular listing of all options and modification kits in part number sequence. Notation is made as to whether an FAA approved supplement is required. A second table shows the compatibility of the various options with one another.

- Each section is provided with an INDEX, listing the data by paragraph number, title, and the page number.

- A page number and date summary lists the numbers and date of the most recent change. The summary for non-FAA approved data is in the front matter (preceding this section); a similar summary is provided for FAA approved data in Section II, for all information in Sections II through V.

- FAA Approved Option Supplements have their own indexes and summaries.

METHOD OF PRESENTATION

- The initial paragraph of each topic or subject is identified by a single bullet (●).

- ● Subparagraph(s) of the same topic or subject (when required) are identified by double bullets (● ●).

- ● ● ● Paragraph(s) that are subsequent to a subparagraph (when required) are identified by triple bullets (● ● ●).

- General information in the various sections is presented in narrative form. Other information is given in step by step procedures, graphs, charts or tabular form.

- ● The information in the step by step procedure is presented in the imperative mode; each statement describes a particular operation to be accomplished. Expansion of the steps is accomplished as follows:

NOTE: Notes are used to expand and explain the preceding/following step and provide fuller understanding of the reason for the particular operation.

CAUTION

Cautions are used to alert the individual that damage to equipment may result if the procedural step is not followed to the letter.

WARNING

WARNINGS ARE USED TO BRING TO THE PILOT'S IMMEDIATE ATTENTION THAT NOT ONLY DAMAGE TO THE EQUIPMENT BUT PERSONAL INJURY AND/OR LOSS OF LIFE MAY OCCUR IF THE INSTRUCTION IS DISREGARDED.

- New or changed information is designated by a heavy black change bar in the margin (▌).

HELICOPTER DESCRIPTION

- The Schweizer 330 is a lightweight turbine powered multipurpose helicopter.

- Advanced and proven technology has been used in the design and construction of the aircraft resulting in high payload to empty weight ratio, passenger and crew safety, handling and superior performance capabilities when operating during adverse density altitude conditions. Low maintenance requirements are another bonus feature.

HELICOPTER CERTIFICATION

- The helicopter is Federal Aviation Administration certified under FAA Type Certificate Number 4H12.

- The FAA model designation is Model 269D.

- The Flight Plan designator is S330.

- The Schweizer commercial designation is 330.

- Certification for the airframe has been accomplished in accordance with all applicable United States Department of Transportation, Federal Aviation Administration Regulations in the normal helicopter category.

DESIGN AND CONSTRUCTION

- The Schweizer 330 Helicopter is a turbine powered rotary wing aircraft constructed primarily of aluminum alloy. The main rotor is a fully articulated three blade system while the tail rotor is a two bladed semi-rigid type. Power from the turboshaft engine is transmitted through eight drive belts and two drive shafts to the main rotor and tail rotor transmissions. An overrunning (one-way) clutch placed between the engine and main rotor transmission permits free wheeling of the rotor system during autorotation.

- The fuselage (with a central framework consisting of a mast support structure, one bulkhead and a lateral roll beam) is a semi-monocoque structure that is divided into three main sections. The forward section comprises a pilot and passenger compartment and directly aft, separated by a bulkhead is a faired housing enclosing the fuel cell, mast, engine air inlet, accessories and drive system. Aft of this structure is the aft fuselage combining both semi-monocoque and monocoque construction. The pilot compartment may be equipped with two or three passenger seats plus the pilot. A canopy of transparent acrylic panels provides excellent visibility.

- The standard 330 requires a minimum crew of one pilot-in-command seated right side. Dual controls are available as an option. Left side pilot-in-command is available as an option. The passengers sit abreast of the pilot with the center seat slightly aft. A bench type center seat is available to accommodate two passengers (for a total of three). This option is available only with the left side pilot-in-command configuration. Seat belts are provided for all positions. The special trainer version is equipped with three seats and three sets of controls, with a right seat pilot-in-command.

- The instrument panel is located forward of the seats at the aircraft centerline. The panel incorporates standard flight and engine instruments in addition to warning and caution lights. The panel also contains adequate space provisions for various arrangements of communications and navigation equipment.

- Stowage area is provided behind the outboard seats and in front of the bulkhead.

- Access to the engine compartment located beneath and to the rear of the cockpit is provided by removable panels on each side of the aircraft and also hinged access doors on each side contoured to the fuselage shape.

- The cockpit floor contains keel beams and also houses the anti-torque (tail rotor pedal) controls. The engine and main rotor transmission are supported by a tubular structure that is mounted on the front and rear lateral cross beams. The cross beams are in turn supported by the landing gear.

- The power plant is the Rolls Royce Model 250-C20W gas turbine engine with a maximum takeoff power rating of 235 SHP (five minute limit). Only 220 SHP is used for maximum continuous power.

- Normal engine output speed is 91% N_2 = 5475 RPM.

- Use of less than maximum available power provides a higher engine critical altitude. The power turbine governor provides automatic constant speed control of N_2/rotor RPM.

- The main rotor static mast is non-rotating and is rigidly attached to the basic airframe structure. The rotor hub is supported by the rotor mast.

- Torque is transmitted independently to the rotor through the main rotor drive shaft, thus lifting loads are prevented from being imposed onto the main transmission with resultant thrust loading of transmission parts.

- The aft fuselage is a semi-monocoque and monocoque structure of aluminum alloy frames and skin. The aft fuselage is the supporting attachment structure for the stabilizers, tail rotor transmission and tail rotor.

- The overrunning clutch transmits power from the engine to the drive shafts. The clutch needs no external controls and disengages automatically during autorotation and engine shutdown. A short drive shaft connects the engine to the lower drive pulley. Eight flexible belts connect the lower pulley to the larger upper pulley which houses the overrunning clutch.

- The oil cooler blower is driven by the short engine drive shaft and draws air in from the engine compartment. Air is then ducted and forced through the engine/transmission oil cooler and exhausted overboard.

- The main transmission has an integral lubrication and oil supply/cooling system.

- Two doors are installed on the helicopter, one on each side for entry and egress of personnel. Transparent windows with rotational air vents are contained in the doors. Additional air vents are located on each side of the instrument panel and overhead in front of the cockpit bulkhead.

- The tail rotor transmission is mounted on the aft end of the aft fuselage and has a self-contained lubricant system. The tail rotor is mounted on the output shaft of the transmission and consists of two variable pitch blades.

- The main rotor group consists of three main rotor blades, a fully articulated main rotor hub assembly, and a swashplate and associated mixer control mechanisms. The helicopter is equipped with either (3) 269A1185-1 (23.75 in. trailing edge tab) or (3) 269A1185-5 (74.25 in. trailing edge tab) main rotor blades.

- The pilot’s cyclic control stick and adjustable tail rotor control pedals are directly in front of the pilot’s seat. The collective pitch control stick is located on the left of the pilot’s seat. The entire control system is a mechanically linked type. The copilot’s controls are similar for the optional dual control installation.

- The non-retractable landing gear is a horizontal, skid type gear, attached to the front and rear cross beams. Aerodynamic fairing’s cover the struts, from the fuselage to the skids. Nitrogen charged landing gear dampers, between the struts and cross beams, act as shock absorbers to cushion landings and provide ground stability. Provisions for ground handling wheels are incorporated on the skid tubes.

- A 150 amp starter generator is supplied as standard equipment. There are no limitations on use of generator output.

GENERAL DIMENSIONAL DATA

- This summary covers pertinent information on areas, dimensions and airfoil data.

Rotor Characteristics*	Main	Tail
Number of Blades	3	2
Rotor Diameter, Feet	26.83	4.25
Rotor Disc Area, square feet	565.49	14.19
Blade Cord (constant), inches	6.75	4.81
Blade Twist, degrees	-8°39’	-8°00’
Blade Area (total blades x C x R), square feet (tabs not included)	22.64	1.69
Solidity (thrust weighted)	.04	.116
Airfoil Section, NACA	0015	0014 (modified)
δ_3, degrees	0	30°

* Rotor Dimensions do not take into account blade tab area. The above characteristics are valid for the 269A1185-1 (23.75 in. tab) and 269A1185-5 (74.25 in. tab) main rotor blades.

	ENGINE N_2 %	ROTOR SPEED			
		MAIN		TAIL	
		RPM	Tip Speed ft/sec	RPM	Tip Speed ft/sec
Maximum Redline - Power Off	NA	504	708	3314	737.37
Minimum Redline - Power Off	NA	410	576	2696	599.86
Maximum - Power On	91	471	662	3097	689.08
Minimum - Power On	90	466	655	3066	682.18

Horizontal Stabilizer:

Span	80.0 in.
Chord (constant)	19.5 in.
Area	128.0 $in.^2$
Airfoil	INVERTED NACA 64_2A015 (Modified section)
Incidence (relative to hub plane)	+13.5°
Trailing edge incidence (relative to leading edge incidence)	- 15°

Upper Vertical Stabilizer-
Portion Above Boom Centerline:

Span	49.0 in.
Sweep	21°
Root Chord	18.0 truncated to 13.0 in.
Area	624.79 $in.^2$ (Flat area)
Airfoil Root	NACA 64_3A018
Incidence	2° (L. E. Left)

Lower Vertical Stabilizer-
Portion Below Boom Centerline

Span	27.0 in.
Sweep	25°
Root Chord	18.0 truncated to 13.0 in.
Area	256.11 $in.^2$ (Flat area)
Airfoil Root	NACA 64_3A018
Incidence	2° (L. E. Left)

Control Rigging

Main Rotor

Collective Pitch, Full Travel, Minimum	12° ± 1° (up to down)
Collective Pitch at Down Stop	0.75R 2.5° ± 1.5° (ground adjustable)
Range of Cyclic Pitch Blade Angle from Neutral Rigging Position, Minimum	Forward 8.5° to 9.5° Aft 9.5° to 10.0° Left 6.5° to 7.5° Right 6.0° to 7.0°

Tail Rotor

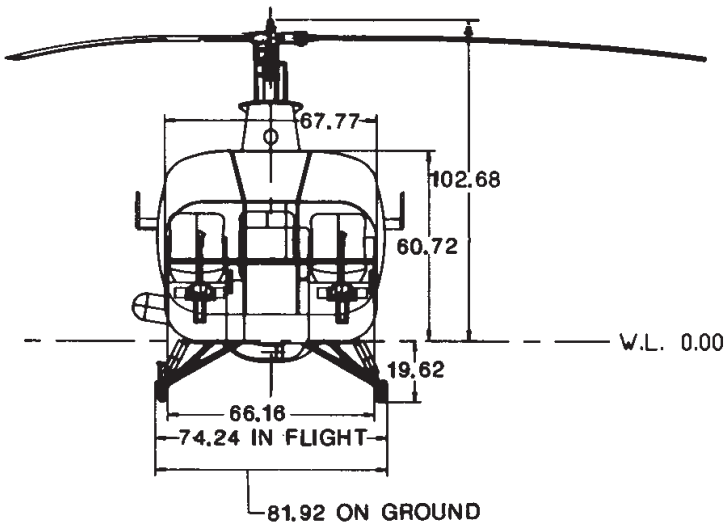
Range of Blade Pitch Angles (3/4 radius), Minimum	Right Pedal 11° to 13° (thrust to left) Left Pedal 27° to 29° (thrust to right)

Engine

Rolls Royce 250-C20W Gas Turbine Max Rated Power = 420 SHP

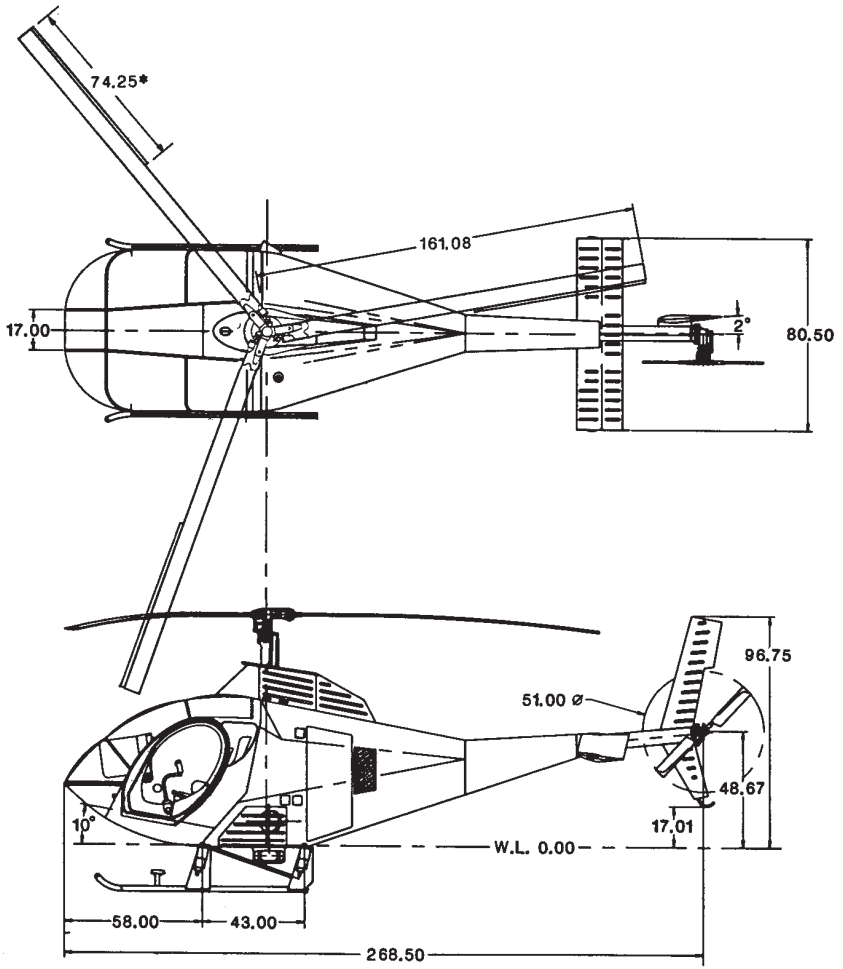
INSTALLED LIMITS:

Max. Continuous Power =	220 HP (57.8 PSI Torque)
Max.Take-off Power (5 min. limit) =	235 HP (61.7 PSI Torque)
Max. Gas Generator =	6,317 RPM (105% N_1)
Max. Power Turbine =	30,294 (91% N_2)
Max. Power Output Shaft =	5,475 RPM (@91% N_2)



Dimensions: (Not Shown):	
Main Rotor Diameter	26 ft. 10 in.
Overall Length (with main rotor blade forward and tail rotor blade aft.)	30 ft. 11 in.
Weights:	
Design Gross Weight	2,230 lbs.
External Load Gross Weight	2,230 lbs.
Empty Weight (approximate)	1,100 lbs.
Useful Load (approximate)	1,130 lbs.
Powerplant:	
Make	Rolls Royce
Type	Gas Turbine
Designation	250-C20W
Power Rating	220 HP 235 HP 5 MIN LIMIT
Std Fuel Capacity	60.8 U.S. Gal.
Useable Fuel Capacity	60.0 U.S. Gal.
Generator Capacity	150 Amps

Figure 1-1. Principle Dimensions (Sheet 1 of 2)



* 269A1185-1 main rotor blade (23.75 trailing edge tab),
269A1185-5 main rotor blade (74.25 trailing edge tab) shown.

Figure 1-1. Principle Dimensions (Sheet 2 of 2)

CONVERSION TABLES - MPH/K/KmH

Table 1-1 - Velocity:

- The speeds are straight mathematical conversions of U.S. miles per hour (MPH) to International knots (K) to kilometers per hour (Km/H) calculated to 0.00 accuracy. For practical application the number may be rounded as desired.

Table 1-1. Velocity

MPH	K	KmH	MPH	K	KmH
1	0.87	1.61	70	60.83	112.65
2	1.74	3.22	80	69.52	128.75
3	2.61	4.82	90	78.21	144.84
4	3.48	6.44	100	86.90	160.93
5	4.34	8.05	110	95.59	177.03
6	5.21	9.66	120	104.28	193.12
7	6.08	11.28	130	112.97	209.21
8	6.95	12.87	140	121.66	225.31
9	7.82	14.48	150	130.35	241.40
10	8.69	16.09	160	139.04	257.50
20	17.38	32.19	170	147.73	273.59
30	26.07	48.28	180	156.42	289.68
40	34.76	64.37	190	165.10	305.78
50	43.45	80.47	200	173.80	321.87
60	52.14	96.56			

Table 1-2. Temperature - F/C

F = 9/5 C + 32 = 1.8 (C + 17.8)

C = 5/9 (F - 32)

°C	°F °C	°F	°C	°F °C	°F
-62.2	-80	-112.0	10.0	50	122.0
-56.7	-70	-94.0	12.8	55	131.0
-51.1	-60	-76.0	15.6	60	140.0
-45.6	-50	-58.0	18.3	65	149.9
-40.0	-40	-40.0	21.1	70	158.0
-34.4	-30	-22.0	23.9	75	167.0
-31.7	-25	-13.0	26.7	80	176.0
-28.9	-20	-4.0	29.4	85	185.0
-26.1	-15	5.0	32.2	90	194.0
-23.3	-10	14.0	35.0	95	203.0
-20.6	-5	23.0	37.8	100**	212.0**
-17.8	0*	32.0*	40.6	105	221.0
-15.0	5	41.0	43.3	110	230.0
-12.2	10	50.0	46.1	115	239.0
-9.4	**15**	**59.0**	48.9	120	248.0
-6.7	20	68.0	51.7	125	257.0
-3.9	25	77.0	54.4	130	266.0
-1.1	30	86.0	57.2	135	275.0
1.1	35	95.0	60.0	140	284.0
4.4	40	104.0	62.8	145	293.0
7.2	45	113.0	65.6	150	302.0
NOTE: The center column is used to convert °C to °F **OR** °F to °C					
EXAMPLE: 15°C = 59.0°F OR 15°F = -9.4°C					

*Water Freezes
**Water Boils

Table 1-2. Temperature - F/C (con't.)

°C	°F °C	°F	°C	°F °C	°F
68.3	155	311.0	137.8	280	536.0
71.1	160	320.0	143.3	290	554.0
73.9	165	329.0	148.9	300	572.0
76.7	170	338.0	154.4	310	590.0
79.4	175	347.0	160.0	320	608.0
82.2	180	356.0	165.6	330	626.0
85.0	185	365.0	171.1	340	644.0
87.8	190	374.0	176.7	350	662.0
90.6	195	383.0	182.2	360	680.0
93.3	200	392.0	187.8	370	698.0
96.1	205	401.0	193.3	380	716.0
98.9	210	410.0	198.9	390	734.0
101.7	215	419.0	204.4	400	752.0
104.4	220	428.0	210.0	410	770.0
107.2	225	437.0	215.6	420	788.0
110.0	230	446.0	221.1	430	806.0
112.8	235	455.0	226.7	440	824.0
115.6	240	464.0	232.2	450	842.0
118.3	245	473.0	237.8	460	860.0
121.1	250	482.0	243.3	470	878.0
126.7	260	500.0	248.9	480	896.0
132.2	270	518.0	254.4	490	914.0

Table 1-2. Temperature - F/C (con't.)

°C	°F	°C	°F	°C	°F	°C	°F
260.0	500		932.0	426.7	800		1472.0
265.6	510		950.0	437.8	820		1508.0
271.1	520		968.0	474.4	850		1562.0
276.7	530		986.0	482.2	900		1652.0
282.2	540		1004.0	510.0	950		1742.0
287.8	550		1022.0	537.7	1000		1832.0
293.3	560		1040.0	565.5	1050		1922.0
298.9	570		1058.0	593.3	1100		2012.0
204.4	580		1076.0	621.1	1150		2102.0
310.0	590		1094.0	648.8	1200		2192.0
315.6	600		1112.0	676.6	1250		2282.0
326.7	620		1148.0	704.4	1300		2372.0
337.8	640		1184.0	732.2	1350		2462.0
348.9	660		1220.0	760.0	1400		2552.0
360.0	680		1256.0	787.7	1450		2642.0
371.1	700		1292.0	815.5	1500		2732.0
382.2	720		1328.0	843.3	1550		2822.0
393.3	740		1364.0	871.1	1600		2912.0
404.4	760		1400.0	898.8	1650		3002.0
415.6	780		1436.0	926.6	1700		3092.0

Table 1-3. Liquid Measure - Gal/L

U.S. Gallons into Liters

Gals → / ↓	0	1	2	3	4	5	6	7	8	9
	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters
0	-	3.785	7.571	11.356	15.142	18.927	22.713	26.498	30.283	34.069
10	37.854	41.640	45.425	49.211	52.996	56.781	60.567	64.352	68.138	71.923
20	75.709	79.494	83.280	87.065	90.850	94.636	98.421	102.21	105.99	109.78
30	113.56	117.35	121.13	124.92	128.70	132.49	136.28	140.06	143.85	147.63
40	151.42	155.20	158.99	162.77	166.56	**170.34**	174.13	177.92	181.70	185.49
50	189.27	193.06	196.84	200.63	204.41	208.20	211.98	215.77	219.56	223.34
60	227.13	230.91	234.70	238.48	242.27	246.05	249.84	253.62	257.41	261.19
70	264.98	268.77	272.55	276.34	280.12	283.91	287.69	291.48	295.26	299.05
80	302.83	306.62	310.41	314.19	317.98	321.76	325.55	329.33	333.12	336.90
90	340.69	344.47	348.26	352.05	355.83	359.62	363.40	367.19	370.97	374.76
100	378.54	382.33	386.11	389.90	393.69	397.47	401.26	405.04	408.83	412.61

NOTE: The horizontal "Gals." column represents 1 through 9 Gallons; the vertical "Gals." column represents 10 through 100 Gallons.

EXAMPLE: 45 Gallons = 170.34 Liters (Follow 40 Gals. column to right to intersect with 5 Gals. column.)

Table 1-4. Linear Measure - In./CM

Inches into Centimeters

Inch → / ↓	0	1	2	3	4	5	6	7	8	9
	Cm.	Cm.	Cm.	Cm.	Cm.	Cm.	Cm.	Cm.	Cm.	Cm.
0	-	2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
10	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
20	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
30	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
40	101.60	104.14	106.68	109.22	111.76	**114.30**	116.84	119.38	121.92	124.46
50	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
60	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
70	177.80	180.34	182.86	185.42	187.96	190.50	193.04	195.58	198.12	200.66
80	203.20	205.74	208.28	210.82	213.36	215.90	218.44	220.98	223.52	226.06
90	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46
100	254.00	256.54	259.08	261.62	264.16	266.70	269.24	271.78	274.32	276.86

NOTE: The horizontal "Inches" column represents 1 through 9 Inches; the vertical "Inches" column represents 10 through 100 Inches.

EXAMPLE: 45 Inches = 114.30 Centimeters (Follow 40 Inches column to right to intersect with 5 Inches column.)

Table 1-5. Linear Measure - Ft/M

Feet into Meters

Feet → / ↓	0	1	2	3	4	5	6	7	8	9
	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓	Meters ↓
0	-	0.305	0.610	0.914	1.219	1.524	1.829	2.134	2.438	2.743
10	3.048	3.353	3.658	3.962	4.267	4.572	4.877	5.182	5.466	5.791
20	6.096	6.401	6.706	7.010	7.315	7.620	7.925	8.229	8.534	8.839
30	9.144	9.449	9.753	10.058	10.363	10.668	10.972	11.277	11.582	11.887
40	12.192	12.496	12.801	13.106	13.411	**13.716**	14.020	14.325	14.630	14.935
50	15.239	15.544	15.849	16.154	16.459	16.763	17.068	17.373	17.678	17.983
60	18.287	18.592	18.897	19.202	19.507	19.811	20.116	20.421	20.726	21.031
70	21.335	21.640	21.945	22.250	22.555	22.859	23.164	23.469	23.774	24.070
80	24.383	24.688	24.993	25.298	25.602	25.907	26.212	26.517	26.822	27.126
90	27.431	27.736	28.041	28.346	28.651	28.955	29.260	29.565	29.870	30.174
100	30.479	30.784	31.089	31.394	31.698	32.003	32.308	32.613	32.918	33.222

NOTE: The horizontal “Feet” column represents 1 through 9 Feet; the vertical “Feet” column represents 10 through 100 Feet.

EXAMPLE: 45 Feet = 13.716 Meters (Follow 40 Feet column to right to intersect with 5 Feet column.)

Table 1-6. Weight - Lb/Kg

Pounds into Kilograms

Lbs → / ↓	0	1	2	3	4	5	6	7	8	9
	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓	Kilo-grams ↓
0	-	0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082
10	4.536	4.990	5.443	5.897	6.350	6.804	7.257	7.711	8.165	8.618
20	9.072	9.525	9.979	10.433	10.886	11.340	11.793	12.247	12.701	13.154
30	13.608	14.061	14.515	14.969	15.422	15.876	16.329	16.783	17.237	17.690
40	18.144	18.597	19.051	19.504	19.958	**20.412**	20.865	21.319	21.772	22.226
50	22.680	23.133	23.587	24.040	24.494	24.948	25.401	25.855	26.308	26.762
60	27.216	27.699	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298
70	31.751	32.305	32.659	33.112	33.566	34.019	34.473	34.927	35.380	35.834
80	36.287	36.741	37.195	37.648	38.102	38.555	39.009	39.463	39.916	40.370
90	40.823	41.277	41.730	42.184	42.638	43.091	43.545	43.998	44.453	44.906
100	45.359	45.813	46.266	46.720	47.174	47.627	48.081	48.534	48.988	49.442

NOTE: The horizontal “Lbs.” column represents 1 through 9 Pounds; the vertical “Lbs.” column represents 10 through 100 Pounds.

EXAMPLE: 45 Pounds = 20.412 Kilograms (Follow 40 Lbs. column to right to intersect with 5 Lbs. column.)

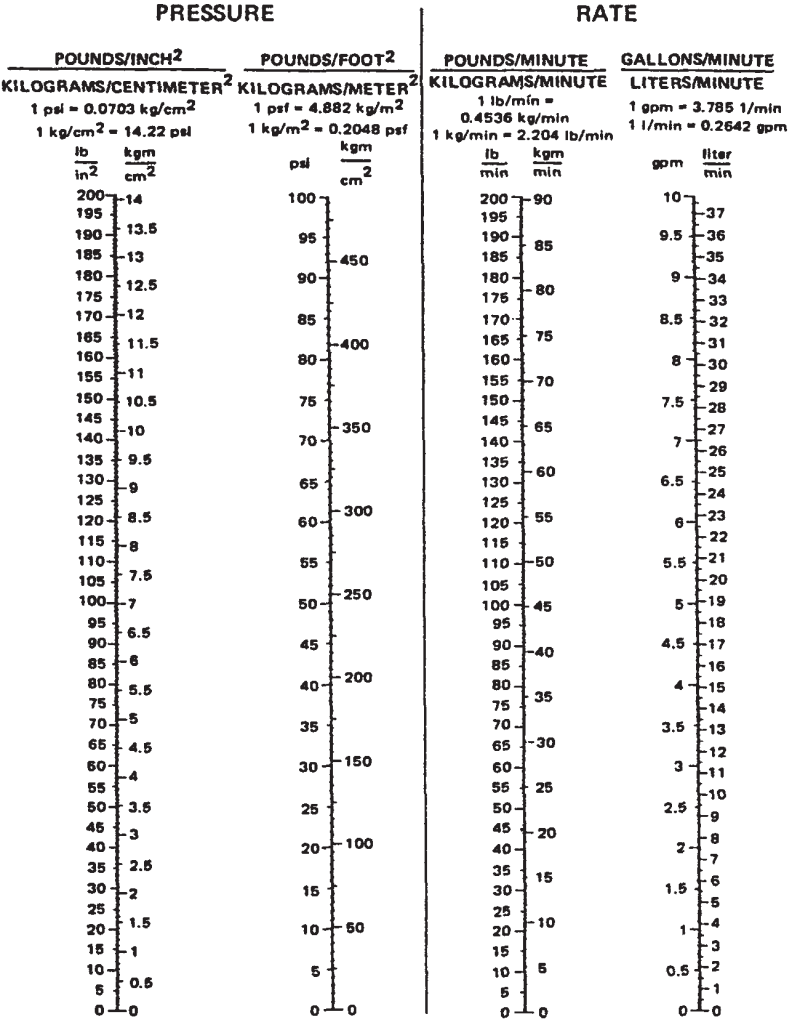


Figure 1-2. Pressure and Weight

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330 HELICOPTER

FAA APPROVED ROTORCRAFT FLIGHT MANUAL FOR SCHWEIZER MODEL 269D

Type Certificate No. **4H12**

Registration No. _____

Serial No. _____

Date of Original Approval: 14 Sep 1992

Date of Reissue #1 Approval: 28 Jul 1993

Date of Reissue #2: 16 Jan 2019

Approved By: RYAN BRUCE NELSON
Digitally signed by RYAN BRUCE NELSON
Date: 2019.03.19 11:56:41 -05'00'

Acting Manager, Southwest Flight Test Section
Federal Aviation Administration
Fort Worth, TX

Date of Approval: 19 March 2019

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PILOTS AND OPERATORS OF SCHWEIZER HELICOPTERS -
HAVE YOU BRIEFED YOUR PASSENGERS?

BE ALERT ... DON'T FORGET THE BASIC RULES OF SAFETY!

REMIND YOUR PASSENGERS OF THE FOLLOWING, ESPECIALLY IF THEY ARE NOT FAMILIAR WITH HELICOPTERS.

- Always approach the aircraft from the front, where the pilot can see you. Beware of slopes. The main rotor is closer to you as you walk down a hill toward the helicopter.
- Keep loose belongings (purses, coats, briefcases) clear of all the control sticks and pedals.
- Keep seat belts and harnesses tight and securely fastened.
- If you are in the center seat, keep clear of items on the instrument panel.
- No smoking on the ground within 50 feet of the helicopter. No smoking in flight unless an ashtray is provided and permission is granted by pilot.
- Depart the helicopter to the front and beware of turning rotors. Keep hands and arms low.
- Stay clear of exhaust vent on right side of helicopter.
- Stay clear of tail rotor.

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IMPORTANT

THE FAA APPROVED ROTORCRAFT FLIGHT MANUAL CONTAINED IN SECTIONS II - LIMITATIONS, III - EMERGENCY AND MALFUNCTION PROCEDURES, IV - NORMAL PROCEDURES, AND V -PERFORMANCE DATA MUST BE KEPT IN THE HELICOPTER AT ALL TIMES.

THE HELICOPTER MUST BE OPERATED IN COMPLIANCE WITH THE OPERATING LIMITATIONS AS SET FORTH IN SECTION II OF THIS DATA. SECTIONS III, IV AND V ARE RECOMMENDED DATA.

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SUMMARY OF REVISIONS
To FAA Approved
ROTORCRAFT FLIGHT MANUAL
For Model 269D

- The Model 269D is certificated in compliance with all applicable Department of Transportation - Federal Aviation Administration rules and regulations in the normal category. The basic helicopter was type certificated by amendment to Type Certificate, 4H12.
- The initial issue of the FAA Approved Rotorcraft Flight Manual for Model 269D was approved and dated 14 Sep 1992.
- Subsequent revisions are listed below by date with appropriate remarks.

Revision Date	Remarks
28 Jul 1993	Reissued to include change in gross weight, removal of bifilar and miscellaneous changes.
Revision #1 22 Dec 1993	Sections 2, 3, 4, 5, and 6 revised to include changed and omitted data, new instruments and markings, new pilot-in-command position, revised walk around inspection, incorporate new weight and balance forms, and delete redundant data.
Revision #2 25 Jan 1994	Section 2 revised to remove flight into blowing snow restrictions.
Revision #3 13 Apr 1994	Section 2 revised to clarify operational requirements.
Revision #4 24 Jun 1994	Section 2 and Section 4 revised to clarify pilot rating and the use of three sets of controls.
Revision #5 15 Jul 1994	Sections 4 and 7 revised to clarify fuel shutoff valve usage.

Revision Date	Remarks
Revision #6 28 Nov 1994	Revised for doors off flight, internal plenum inlet screen and miscellaneous changes.
Revision #7 29 Mar 1995	Revised description for determining PIC position.
Revision #8 22 May 1995	Revised to incorporate baggage compartment data.
Revision #9 15 Feb 1996	Revised to incorporate data for new trailing edge tab on main rotor blades and miscellaneous changes.
Revision #10 20 Mar 1997	Revised to incorporate information for ground handling wheel data and oil cap security check.
Revision #11 15 May 1997	Revised to incorporate information for Canadian certification requirements and other misc. changes.
Revision #12 21 Aug 2002	Added additional information on fuel filler cap assembly and other misc. changes.
Revision #13 05 Sep 2003	Added to include proper emergency procedures for fire, and misc. other changes.
Revision #14 14 Aug 2007	Inspection of aft fuselage for paint film cracks to detect cracks in the support structure.
Revision #15 13 Dec 2007	Added inspection of aft fuselage to Handling, Servicing & Maintenance section.
Revision #16 26 Aug 2010	Added belt drive lower H-frame tie bar bracket check to preflight checklist.
Reissue 17 Jan 2019	Reissued to include Schweizer RSG name change and the incorporation of the (Qty 5) 2 Mar 2017 Temporary Revisions.

LOG OF PAGES
To FAA Approved
ROTORCRAFT FLIGHT MANUAL
For Model 269D

- The Log of Pages lists individual pages by section, page number or title, and date; and carries an FAA Approval signature.
- New, changed or deleted information is designated by a change bar (▌) in the margin of individual pages.

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viii	Summary of Revisions (con't)	17 Jan 2019
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xi	Log of Pages (con't)	17 Jan 2019
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SECTION II

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Section II

LIMITATIONS

2-1. ROTORCRAFT CERTIFICATION

- Certification is based on an Engine Failure Warning System (including both visual and audio indications), Low Rotor Warning System, Outside Air Temperature Gauge, and Fuel Low Caution Light being installed and operable.

2-2. FLIGHT LIMITATIONS

- The following are **PROHIBITED:**

- Operation under Instrument Flight Rules (IFR).

- Flight into known icing conditions.

- Flight exceeding maximum operating pressure altitude of 10,000 feet.

- Solo flight from other than the PIC position. (Refer to Section 4 for identification of PIC position.)

  NOTE: When three sets of controls are installed in the aircraft, one of the occupants must possess a helicopter CFI rating. In non-training operations, it is recommended that the center set of controls be removed. (Control set includes: cyclic stick, collective stick, and tail rotor pedals.) Controls may be removed by pilot. Refer to Paragraph 7-12 for collective stick installation and removal.

- Flight following a battery overtemperature of 160°F or above until the battery has been inspected. (Optional Ni-Cad)

- Flight with door(s) off unless equipped with air dams (P/N's 269D3109-3/-4) beside left and right seats.

CAUTION

Damage to the main rotor blade and aft fuselage can result due to the reduction in clearance between the two with the tracking reflectors installed. The condition is amplified by the flexing of the blades that occur during an autorotation touchdown.

- Intentional full touchdown autorotations with blade tracking reflectors installed on blade tips.

NOTE: Main rotor blade tracking reflectors are installed for maintenance flights only as dictated in the Handbook of Maintenance Instructions.

2-3. FLIGHT RESTRICTIONS

- Alternate air door (if equipped) must be open and engine anti-ice must be ON for all operations in visible moisture and temperatures at or below 5°C.

- After alternate air door is selected for operations in visible moisture at or below 5°C, the door must remain open until after landing and the primary air inlet and the forward and aft bulkheads located at the rear station of the engine bellmouth are inspected and cleared of ice accumulation.

- Minimum Operating Temperature

- The operation of the Model 269D has been demonstrated after prolonged exposure to -17.8°C (0°F) ground ambient temperature, which was the minimum temperature achieved in cold weather testing.

- Whenever the helicopter has been parked outside or has been exposed to blowing or falling snow, determine that the engine inlet area and all helicopter exterior surfaces are completely free of accumulation of ice and snow.

- Flight operation is permitted at night only when landing, navigation, instrument and anticollision lights are installed and operable.

CAUTION

Turn off flashing anticollision lights during prolonged hover or ground operation over concrete or water to avoid possible pilot disorientation. At pilot's discretion, turn off anticollision and landing light when entering fog, or haze to preclude optical illusions or spatial disorientation.

- Flight operation at night is limited to VFR conditions.
- Orientation shall be maintained by utilizing visual reference to surface objects illuminated by ground lights or prevailing celestial illumination.
- Further flight is prohibited until fuel system is purged (refer to HMI) after any of the following conditions have occurred:
- Engine flameout caused by fuel exhaustion.
- Engine shutdown using emergency fuel shutoff valve.
- Motoring the helicopter engine without fuel in the fuel cell.

CAUTION

Ground restarts are prohibited following illumination of FUEL FILTER caution light.

- Upon completion of flight in progress, further flight is prohibited until fuel filter has been serviced following illumination of FUEL FILTER caution light.
- Door(s) off operation:

WARNING

ANY OBJECT NOT PROPERLY SECURED COULD EXIT AIRCRAFT DURING FLIGHT. ITEMS SECURED WITH VELCRO TAPE ONLY, ARE NOT CONSIDERED PROPERLY SECURED.

- All loose items properly secured or stowed
- Unoccupied seat cushions and seat backs properly secured or stowed.

2-4. MULTIPURPOSE UTILITY OPERATIONS

- The installation and use of certain optional equipment is approved by the FAA and requires supplemental flight data when limitations, performance or procedures are affected. Refer to Section IX for Options Supplemental Flight Data.

2-5. AIRSPEED LIMITS

- Limit V_{NE} to 108 KIAS (Para 2-13 or 2-14).
- Limit V_{NE} to 94 KIAS during autorotation (Fig. 2-1).
- Limit V_{NE} to 94 KIAS with less than 5 gallons (19 liters or 34 lbs.) of fuel.

2-6. ROTOR SPEED LIMITS

CAUTION

Avoid engine N_2 steady-state operation 71% to 88%. Operation within the speed avoidance range is permitted for the preflight checks specified in this flight manual. Transient operation through the speed range is to be accomplished as expediently as possible.

NOTE: Transient operation is defined as not dwelling at any N_2 speed for more than 1 second.

Normal Operating Range: 466 RPM to 471 RPM (90 - 91% N_2)

Maximum RPM: **Power on** - 471 RPM (91% N_2)

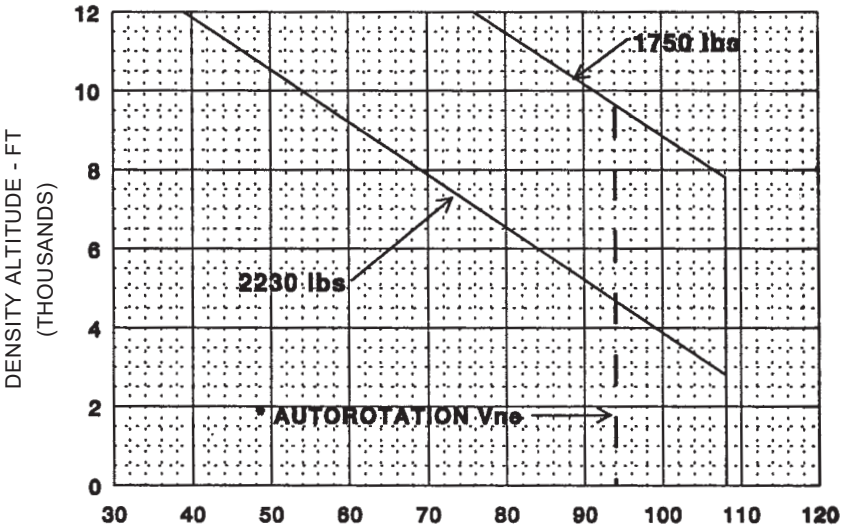
Minimum RPM: **Power on** - 466 RPM (90% N_2)

Maximum RPM: **Power off** - 504 RPM (Ref: 97% N_2)

Minimum RPM: **Power off** - 410 RPM (79% N_2)

2-7. WEIGHT LIMITATIONS

Maximum gross weight 2230 pounds.



*AUTOROTATION VNE LIMITED TO 94 KTS OR POWER-ON LIMIT, WHICHEVER IS LESS

Figure 2-1. V_{NE} Limitations

- A weight and balance computation must be accomplished prior to flight. Ballast, if required, must be carried.

  NOTE: Ballast may be carried in the stowage area behind the seats. Ballast may consist of lead shot, sand bags or similar material adequately contained and secured.

- Maximum weight in the stowage area behind each outboard seat is 50 pounds each side.

- This helicopter is limited to operation in accordance with this section and the approved loading information given in Section VI, Weight and Balance Data.

2-8. CENTER OF GRAVITY (CG ENVELOPE)

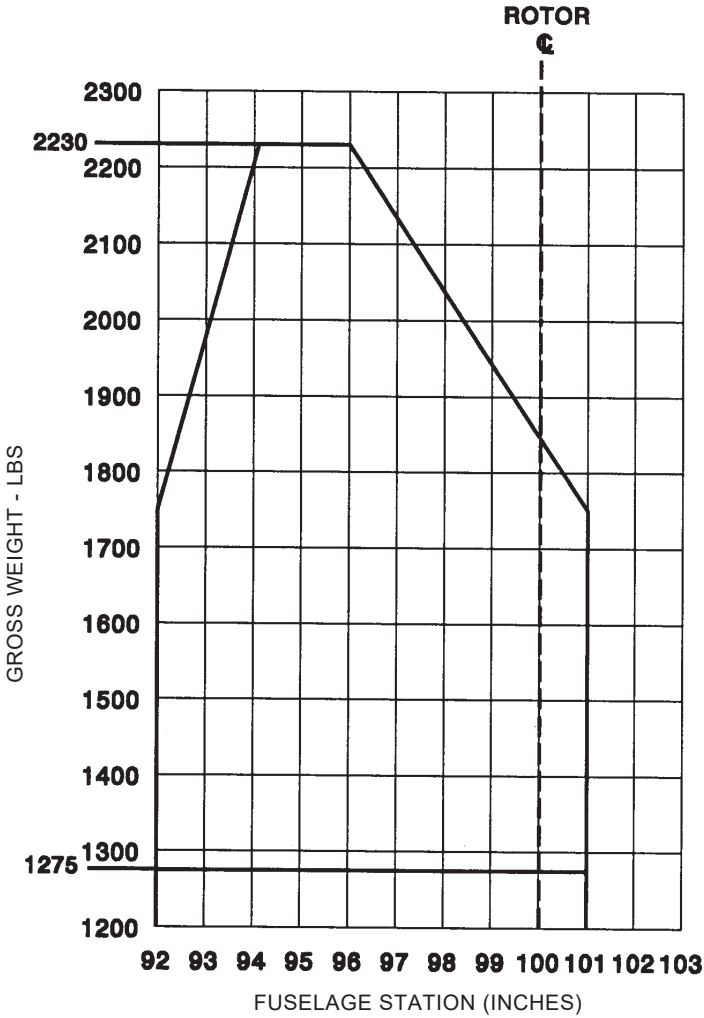
- The datum line is 100.0 inches forward of the main rotor hub centerline.

- Forward CG limit is 94.1 inches at 2230 pounds varying linearly to 92.0 inches at 1750 pounds and below. Aft CG limit is 96.0 inches at 2230 pounds varying linearly to 101.0 inches at 1750 pounds & below (Fig. 2-2, Sheet 1).

- Lateral "+" CG is right of the aircraft centerline; lateral "-" CG is left of the aircraft centerline when looking forward (Fig. 2-2, Sheet 2).

- - The right lateral CG limit varies linearly from a gross weight of 2230 lbs at buttline 2.4 inches to 1750 pounds & below at buttline 4.5 inches.

- - The left lateral CG limit varies linearly from a gross weight of 2230 lbs at buttline -.9 inches to 1750 lbs & below at buttline -3.0 inches.



LONGITUDINAL C.G. ENVELOPE

Figure 2-2. Center of Gravity Envelope. (Sheet 1 of 2)

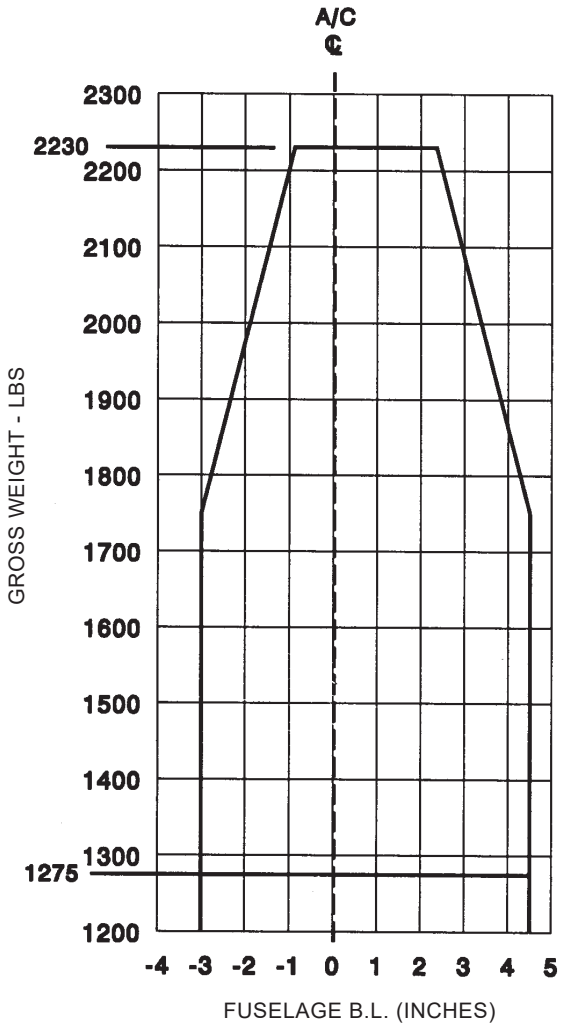


Figure 2-2. Center of Gravity Envelope. (Sheet 2 of 2)

2-9. POWER PLANT LIMITS - ROLLS ROYCE MODEL 250-C20W

- Takeoff power (5-minute limit): 61.7 psi torque; 810°C maximum TOT.
- Maximum continuous operation: 57.8 psi torque; 738°C maximum TOT.
- Maximum continuous N_1 RPM: 105%.
- Maximum N_1 RPM during transient: 106% for 15 seconds.
- N_1 idle speed: 59 to 65%

CAUTION

Avoid engine N_2 steady-state operation 71% to 88%. Operation within the speed avoidance range is permitted for the preflight checks specified in this flight manual. Transient operation through the speed range is to be accomplished as expediently as possible. In autorotation, with N_2 split from N_R and the throttle in the GROUND IDLE position, unrestricted operation within the speed avoidance range is permitted. Transient operation in the speed avoidance range during recovery from autorotation is permitted.

NOTE: Transient operation is defined as not dwelling at any N_2 speed for more than 1 second.

- a imum N2 RP 97. % transient o erspeed seconds
- a imum continuous N2 RP

- TOT limits:
- During start and shutdown: 810°C to 927°C for ten seconds.
- During start and shutdown: 927°C for a max. of one second.
- Consecutive starter cranking time limits are:

  60 Seconds - ON 60 seconds - OFF

  30 Seconds - ON 60 Seconds - OFF

  30 Seconds - ON 30 Minutes - OFF

- The above sequence (60 seconds ON through 30 minutes OFF) may be attempted two (2) times. (Corrective action is required prior to any additional start attempts.)
- Engine oil temperature limits:
- Continuous operation must be accomplished between 0°C and 107°C.

NOTE: Operation between 0°C and 107°C is acceptable providing engine oil pressure is within specified limits.

- Engine oil pressure limits: 50 - 130 psi with the following minimums:
- 90 psi at or above 79% N_1
- 50 psi below 79% N_1
- Generator limit: 150 amps maximum continuous
- From sea level to 6000 feet pressure altitude, the maximum engine air inlet ambient temperature is 54°C (130°F); from 6000 feet to 10,000 feet pressure altitude, the maximum temperature varies linearly from 54°C to 27°C (130°F to 80°F) respectively. It is to be assumed that the air inlet temperature is the same as ambient (free air) temperature.

2-10. FUELS

- For additional information on fuels, refer to Rolls Royce Operation and Maintenance Manual.
- Primary:
- - Jet A, A-1, or B
- - JP-4, JP-5, JP-8

  NOTE: Fuels must meet anti-icing capability of JP-4 when operating at 4°C (40°F) or less.

- Alternate:
- - Refer to Rolls Royce Operation and Maintenance Manual Publication No. 10W2 for detailed AVGAS mix, cold weather fuel, and blending instructions. Blending instructions pertain to turbine fuels and AVGAS, and include field service anti-icing additive blending procedures.

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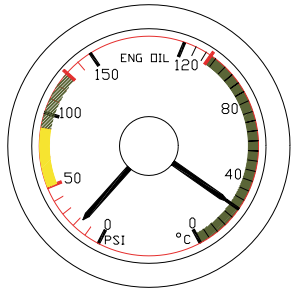
2-11. INSTRUMENT MARKINGS (Fig. 2-4)

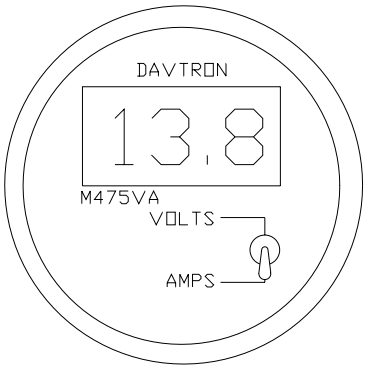
ENGINE OIL TEMP/PRESS



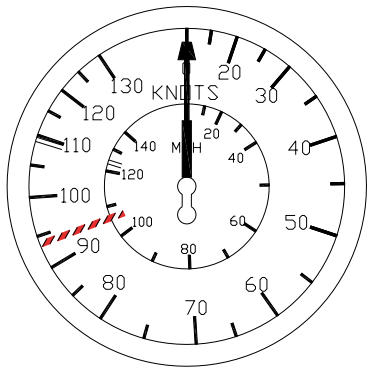
ENGINE OIL TEMP:
RED LINE AT 107°C
GREEN ARC - 0 TO 107°C

ENGINE OIL PRESS:
RED LINE AT 50 AND 130 PSI
YELLOW ARC - 50 TO 90 PSI
GREEN ARC - 90 TO 130 PSI

VOLTS/AMPS



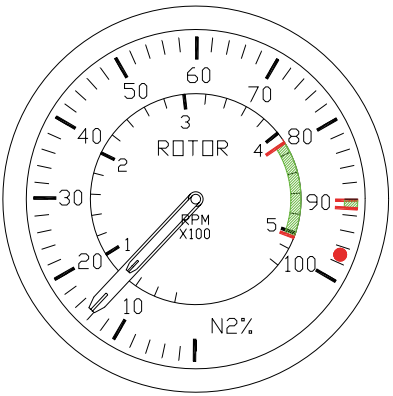
AIRSPEED INDICATOR



AIRSPEED:
RED LINE AT 108 KNOTS (124 MPH) AND
RED & WHITE (BARBER POLE) AT 94 KNOTS
(108 MPH)

Figure 2-4. Instrument Markings (Sheet 1 of 2).

ENGINE/ROTOR TACHOMETER



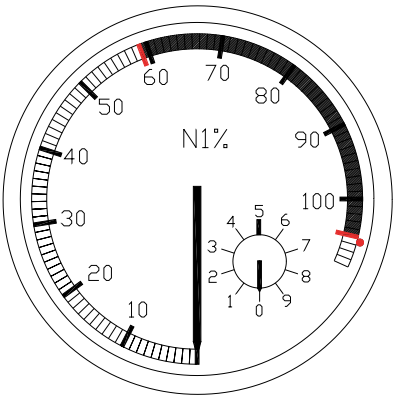
ROTOR N_R:

RED LINE AT 410 AND 504 RPM
GREEN ARC - 410 TO 504 RPM

ENGINE N_2 RPM:

RED DOT AT 97.4% (TRANSIENT OVERSPEED, 3 SEC)
RED LINE AT 90% AND 91%
GREEN ARC - 90% TO 91%

N_1TACHOMETER



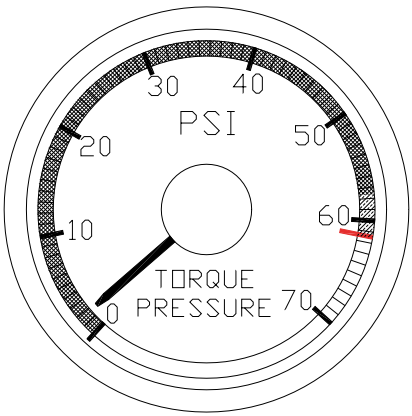
N_1% RPM:

RED LINE AT 59% AND 105%
GREEN ARC - 59% TO 105%
RED DOT AT 106%

Figure 2-4. Instrument Markings (Sheet 2 of 2).

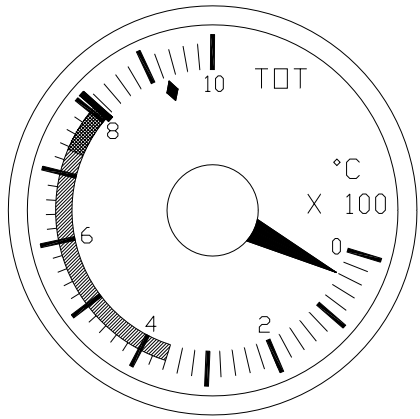
2-12. INSTRUMENT MARKINGS - 250-C20W (Fig. 2-5)

TORQUEMETER



TORQUE:
RED LINE AT 61.7 PSI
YELLOW ARC - 57.8 TO 61.7 PSI (5 MIN LIMIT)
GREEN ARC - 0 TO 57.8 PSI

TURBINE OUTLET TEMP



TOT:
RED LINE AT 810°C
RED DIAMOND AT 927°C (START MAX)
YELLOW ARC - 738°C TO 810°C
GREEN ARC - 360°C TO 738°C

Figure 2-5. Instrument Markings - 250-C20W

2-13. LIMITATIONS PLACARDS, V_{NE} (250-C20W)

- The "NO FLIGHT" portion of the V_{NE} placards have been imposed to comply with Rolls Royce Model 250-C20W operating and starting limit temperatures and/or with Figure 2-1 V_{NE} density altitude limits.

OAT		VNE IAS KNOTS (1750 LBS & BELOW, TOGW) 1000 FT PRESS ALT					
°C	°F	0	2	4	6	8	10
-18	0	108	108	108	108	108	103
-7	20	108	108	108	108	108	93
4	40	108	108	108	108	102	83
16	60	108	108	108	108	92	NO FLIGHT
27	80	108	108	108	101	83	
38	100	108	108	108	93	NO FLIGHT	
43	110	108	108	107	88		

OAT		VNE IAS KNOTS (1751 LBS & ABOVE, TOGW) 1000 FT PRESS ALT					
°C	°F	0	2	4	6	8	10
-18	0	108	108	108	104	85	66
-7	20	108	108	108	93	74	56
4	40	108	108	101	83	64	46
16	60	108	108	92	73	55	NO FLIGHT
27	80	108	101	82	64	46	
38	100	108	91	73	55	NO FLIGHT	
43	110	105	87	69	51		

2-14. LIMITATIONS PLACARDS

ALTERNATE AIR DOOR MUST BE OPEN FOR ALL OPERATIONS IN VISIBLE MOISTURE AND TEMP. AT OR BELOW 5°C

NOTE: If equipped with alternate air door, above placard located on instrument panel in clear view of pilot

FLIGHT INTO KNOWN ICING CONDITIONS IS PROHIBITED

NOTE: Above placard located on instrument panel in clear view of pilot.

Minimum N_1 Speed Starting Recommendations			
OAT, °C	-18 AND BELOW	-18 TO 7	7 AND ABOVE
N_1%	12	13	15

AVOID ENGINE N2 STEADY-STATE (>1 SEC) OPERATION 71% TO 88%

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

NOTE: Above placards located on instrument panel.

50 POUNDS MAXIMUM LOAD UNIFORMLY DISTRIBUTED

NOTE: Above placard located behind each outboard seat, above stowage area.

FUEL
JET A/A-1
USABLE CAPACITY: 60 U.S. GALLONS
SEE PFM FOR OTHER FUELS

NOTE: Above placard located at fuel filler.

FUEL
JET A/A-1
USABLE CAPACITY: 60 U.S. GALLONS
227.1 LITERS
SEE PFM FOR OTHER FUELS

NOTE: Alternate to above placard, located at fuel filler (required for all Canadian aircraft).

LIMIT VNE TO
94 KIAS WITH
LESS THAN
5 GALLONS
(19 LITERS
OR 34 LBS.)
OF FUEL

NOTE: placard located on instrument panel in clear view of pilot.

BAGGAGE CAPACITY
60 LBS MAXIMUM

FLOOR LOADING
1 LB/SQ. IN. MAXIMUM

CARGO MUST BE SECURED IN ACCORDANCE WITH FLIGHT MANUAL INSTRUCTIONS

NOTE: If equipped with optional baggage compartment, the above placards must be located on the inside forward panel of baggage compartment.

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SECTION III

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Section III

EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCIES

This section contains fault conditions considered to constitute an emergency or malfunction condition. Red warning lights and amber caution lights are located on the instrument panel and provide the pilot with a visual indication of a condition, fault, or system malfunction by means of an indication that a problem has occurred which, unless treated properly, could affect flight safety. In addition, certain emergency conditions are made known by audio signals. Remedial action as described below should be taken with the urgency each situation warrants.

All corrective action procedures listed herein assume the pilot gives first priority to helicopter control and a safe flight path.

The helicopter should not be operated following any emergency landing or shutdown until the cause of the malfunction has been determined and corrective maintenance action taken.

DEFINITION

The following terms indicated the degree of urgency in landing the helicopter.

Land as soon as possible - Land without delay at nearest suitable area (i.e. open field) at which a safe approach and landing is reasonably assured.

Land as soon as practicable - The landing site and duration of the flight are at the discretion of the pilot. Extended flight beyond the nearest approved landing site is not recommended.

3-1. ENGINE FAILURE

NOTE: The indication of an engine malfunction, either a partial or complete power loss are:

— A change in engine noise

— Left yaw

— Drop in engine RPM

— Drop in rotor RPM

— Low RPM audio alarm

— Illumination of the ENG OUT warning light

- The failure indicators are actuated when N_1 falls below 55%. Operation of the system may be checked when the engine is inoperative with the battery and generator switch ON.
- A proper air start may be attempted at the pilot's discretion. (Refer to Para 3-13.)
- Reduce airspeed to 94 KIAS or lower after entering autorotation (see Vne placard). Maintain rotor speed between 410 and 504 RPM by use of collective control.
- Proceed with autorotational descent and landing (Para 3-2, 3-3, 3-4 and 4-10.)

3-2. ENGINE FAILURE - CRUISING AT ALTITUDES 450 FEET AND ABOVE

- Enter normal autorotation by lowering collective pitch.

  NOTE: At airspeeds above maximum autorotational V_{NE} (94 knots), use aft cyclic to maintain aircraft's attitude and to slow to desired airspeed as collective pitch is lowered. Increase collective as necessary after entering autorotation to prevent rotor overspeed. Operate at minimum rotor RPM to reduce rate of descent or to extend glide distance. Restore rotor RPM by lowering collective prior to flare.

- Select landing spot and maneuver as required.

- - Maximum gliding distance is obtained at 77 knots/410 rotor RPM.

- - Minimum rate of descent is obtained at 46 knots/410 rotor RPM.

  NOTE: Glide distances attained during an actual engine out autorotation may be less than the glide distances achieved during practice autorotations when operating at reduced RPM (N_2/N_R needles joined).

- A restart may be attempted at the discretion of the pilot.

- If unable to restart, turn off unnecessary switches and shut off fuel.

- Flare as required for the terrain; level aircraft before ground contact.

- Touch down in a level attitude.

- Avoid the use of aft cyclic stick or rapid lowering of the collective pitch during initial ground contact or during ground slide.

- - In the event of an engine failure at night, do not turn on the landing light at more than 1000 feet above terrain; this conserves battery power.

3-3. ENGINE FAILURE - ALTITUDE ABOVE 8 FEET AND BELOW 450 FEET

- Takeoff operation should be conducted in accordance with the Height Velocity Diagram (Fig. 5-4).
- In the event of power failure during takeoff, the collective pitch should be initially lowered in order that the rotor speed may be maintained. The amount and duration of collective reduction depends upon the height above the ground at which the engine failure occurs.
- As the ground is approached, aft cyclic and collective controls should be used as needed to decrease forward and vertical velocity.
- Ground contact should be established in a level attitude.

3-4. ENGINE FAILURE - ALTITUDE BELOW 8 FEET

- A power failure is indicated by a yawing of the ship to the left and a loss of rotor RPM.
- Do not reduce collective pitch.
- Apply right pedal to prevent yawing.
- Apply collective pitch as necessary, in order to cushion landing.

3-5. ENGINE/FUSELAGE/ELECTRICAL FIRE ON THE GROUND

- Set fuel shutoff valve in CLOSED position.
- Set battery switch in OFF position.
- Set generator switch in OFF position.

WARNING

REMAIN CLEAR OF ROTOR BLADES DURING AND AFTER EVACUATION.

- Exit aircraft with fire extinguisher.

3-6. ENGINE/FUSELAGE FIRE, OR FIRE OF UNDETERMINED ORIGIN, IN FLIGHT - LOW/CRUISE ALTITUDE

Note: If a fire is observed during flight, prevailing conditions such as day/night, altitude, and available landing areas must be considered in order to determine whether to execute a power-on or power-off landing.

- Power-on landing:
  - Maintain airspeed and rotor RPM; be prepared to perform a full autorotation at any point in the approach.
  - Immediately perform power-on landing to suitable area.
  - If time permits:
    - Set battery switch in OFF position.
    - Set generator switch in OFF position.
  - Upon landing:
    - Close throttle.
    - Set fuel shutoff valve in CLOSED position.
    - Exit aircraft with fire extinguisher.
- Power-off landing:
    - Close throttle.
    - Immediately enter autorotation.
  - If time permits:
    - Set fuel shutoff valve in CLOSED position.
    - Set battery switch in OFF position.
    - Set generator switch in OFF position.

3-6. ENGINE/FUSELAGE FIRE, OR FIRE OF UNDETERMINED ORIGIN, IN FLIGHT - LOW/CRUISE ALTITUDE (cont)

- Upon landing, exit aircraft with fire extinguisher.

3-7. ELECTRICAL FIRE - IN FLIGHT

- Set battery switch in OFF position.
- Set generator switch in OFF position.
- Immediately perform power-on landing to suitable area.
- Upon landing:
- Close throttle.
- Set fuel shutoff valve in CLOSED position.
- Exit aircraft with fire extinguisher.

3-8. DITCHING - POWER OFF

- Turn battery switch OFF.
- Make autorotational approach and landing.
- Level helicopter and apply full collective pitch as contact is made with water.
- When aircraft begins to roll, reduce collective to full down.
- This minimizes blades skipping off the water.
- Release seat belt and shoulder harness.
- When rotor blades have stopped turning, clear aircraft as quickly as possible.

3-9. DITCHING - POWER ON

- Descend to hovering attitude over water.
- Unlatch door.
- Passengers and copilot exit aircraft.
- Fly a safe distance away from all personnel in the water to avoid injury.
- Close twistgrip to CUTOFF position.
- Turn battery and generator switches OFF.
- Allow aircraft to settle in a level attitude, apply full collective.
- When aircraft begins to roll, reduce collective to full down.
- - This minimizes blades skipping off the water.
- Release seat belt and shoulder harness.
- When rotor blades have stopped turning, clear aircraft as quickly as possible.

3-10. FUEL CONTROL OR POWER TURBINE GOVERNOR FAILURE

- Failure is indicated by an instrument needle fluctuation.

A rise or drop of:

- - N_1
- - N_2
- - TOT
- - Torque

3-10. FUEL CONTROL OR POWER TURBINE GOVERNOR FAILURE (cont)

- Failure producing an overspeed:
  - Attempt to control RPM by use of the twistgrip.
- Uncontrollable overspeed:

CAUTION

Immediate pilot action is necessary because engine torque, TOT, N_2 and rotor RPM may suddenly increase beyond approved limits. When shutting down the engine, do not reduce collective pitch until the rotor RPM has decreased to within the normal operating range.

  - Shut down the engine (normal engine shutdown).
  - Make an autorotational landing.
- Failure producing an underspeed:
  - Check twistgrip full open; beep to max.
  - Level flight is possible if sufficient power is available.
  - When power is insufficient for level flight, make an autorotational landing.
- Power turbine governor surge:

NOTE: The following action takes the governor out of the system and should eliminate the surge.

  - Beep N_2 to full high and reduce twistgrip to 91% N_2.

3-11. TAIL ROTOR FAILURE

- Different types of failure may require slightly different techniques for optimum success in recovery.

- General Corrective Action:
  - Complete loss of tail rotor thrust:
    - Failure is normally indicated by an uncontrollable (by pedal) yawing to the right.
    - Reduce power by lowering collective.
    - Adjust airspeed to 50 to 60 knots.
    - Use left lateral cyclic in combination with collective pitch to limit left sideslip to a reasonable angle.
    - If conditions permit, place the twistgrip in the GROUND IDLE position once a landing area is selected, and perform a normal autorotation. Plan to touch down with little or no forward speed.

WARNING

WHEN HOVERING AT ALTITUDES WITHIN OR ABOVE THE CROSS-HATCHED AREAS DEPICTED ON THE HEIGHT VELOCITY DIAGRAM (FIG. 5-4), IT IS NECESSARY TO REDUCE ALTITUDE TO 8 FEET OR LESS PRIOR TO PLACING THE TWISTGRIP IN THE GROUND IDLE POSITION AND PERFORMING A HOVERING AUTOROTATION.

  - While at a hover: Place the twistgrip in the GROUND IDLE position and perform a hovering autorotation.
  - Tail rotor control failure - Fixed pitch setting:
    - Adjust power to maintain 50 to 60 knots airspeed.
    - Perform a shallow approach and running landing to a suitable area, touching down into wind at a speed between effective translational lift and 30 knots. Directional control may be accomplished by small adjustments in throttle and/or collective control.

3-12. CYCLIC TRIM FAILURE

- Failure is indicated by an inability to reduce cyclic forces with cyclic trim switch. Failure may be either a frozen or uncontrollable runaway of the trim actuator in either the longitudinal or lateral direction. Runaway to full travel can produce stick forces of approximately 10 pounds in the direction of the runaway.
- Avoid rapid and/or abrupt maneuvers.
- Establish flight conditions that produce the least cyclic control force.
- Land as soon as practicable.

3-13. AIR RESTART - ENGINE

CAUTION

Do not attempt restart if malfunction is suspected.

- At low altitude or where time is critical:
  - Twistgrip in CUTOFF position.
  - Immediately actuate starter.

  NOTE: Depressing the starter button actuates the igniter. If N_1 is 18% or above, open twistgrip immediately to GROUND IDLE. N_1 speeds of 25 to 40% are preferred for coolest and fastest relights. Maintain safe autorotational airspeed.

- When altitude and time permit:
  - Proceed with normal engine start, if N_1 has decayed below 18%. Refer to Section IV, Engine Starting.
  - Recommended airspeed is approximately 60 KIAS.
  - Recommended pressure altitude is 10,000 feet or below.
  - Set generator switch and all engine bleeds (heater, filter bleed and anti-ice) OFF.

- Twistgrip in CUTOFF position.
- Actuate starter.
- After N_1 reaches steady level (18 to 22%) and TOT is 150°C or below, advance twistgrip to GROUND IDLE.
- Open throttle to 91% N_2

MALFUNCTIONS

3-14. CAUTION AND WARNING LIGHTS

- The light panel is located at the top of the instrument panel (Fig. 3-1).
- The lights will illuminate when a condition other than normal exists.
- The lights will also illuminate when the PUSH TO TEST switch button is depressed, to test the individual bulbs.
- The fire detection system is automatically tested when the PUSH TO TEST switch button is depressed.

RED WARNING LIGHTS

- ENG OUT/LO ROTOR:
  - Refer to Para 3-1 and Fig. 3-1.
  - Red light.
  - Pulsating sound from warning horn and in headset, if installed.
- ENG FIRE (Engine Fire):
  - Refer to Fig. 3-1.
  - Red light.
  - Land as soon as possible.

					OPTIONAL
FUEL LOW	T/R CHIPS	ENG CHIPS	ENG OUT LO ROTOR	ENG FIRE	**
FUEL FIL-TER	EXT POWER	ALT AIR*	GEN OUT	M/R OIL PR/TEMP	**

** MAY CONTAIN M/R CHIP, BATT HOT, OR PITOT HEAT DEPENDING ON INSTALLED EQUIP.

* IF EQUIPPED WITH OPTIONAL CENTRISEP PARTICLE SEPARATOR

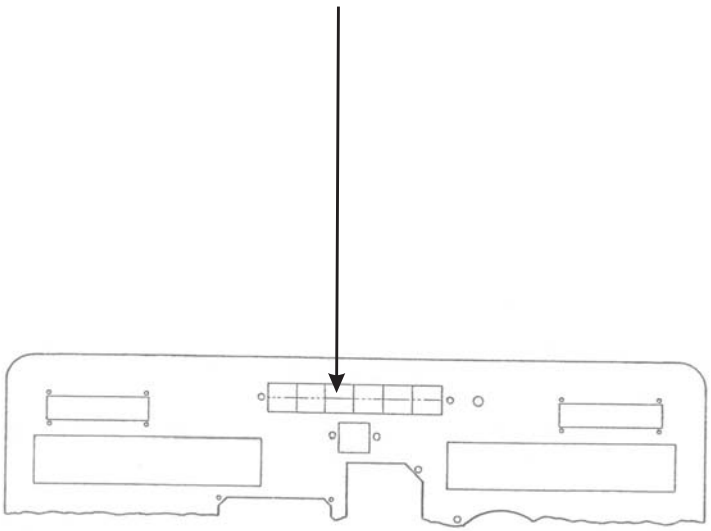

Figure 3-1. Caution and Warning Lights

RED WARNING LIGHTS (cont)

- Transmission Oil Pressure/Temperature:
  - Refer to Fig. 3-1.
  - Red light/lights.
  - Land as soon as possible.
    - Temperature has exceeded the maximum limit.
    - Pressure has dropped below minimum limit.
- Battery Overtemperature, 160°F and above: (Optional Ni-Cad Battery)
  - Refer to Fig. 3-1.
  - Red light illuminated.
  - Turn battery switch OFF.
  - Land as soon as possible.

NOTE: Inspect battery in accordance with the manufacturer's instructions upon landing. No further flights are authorized until battery is inspected, and necessary corrective action has been accomplished.

WARNING

AN OVERHEATED BATTERY CAN CAUSE BURNS TO PERSONNEL UNLESS PROTECTIVE CLOTHING AND ADEQUATE TOOLS ARE UTILIZED. IN SOME INSTANCES THE BATTERY MAY CAUSE A SECONDARY FIRE, OR MAY RUPTURE ADDING TO FURTHER DANGER OF ELECTROLYTE BURNS. EXERCISE CAUTION IN DEALING WITH AN OVERHEATED BATTERY. MAINTAIN FIRE EXTINGUISHER READY FOR USE. THE USE OF THE FIRE EXTINGUISHER TO COOL THE BATTERY IS NOT RECOMMENDED.

- If proper equipment exists, disconnect and remove battery from aircraft.

AMBER CAUTION LIGHTS

- Generator:
  - Refer to Fig. 3-1.
  - Amber GEN OUT indicator will light.
  - Ammeter indicating zero.
  - Turn generator switch to OFF, then set to ON to reset.
  - If GEN OUT indicator stays on or comes back on, pull out generator circuit breaker. Keep generator (GEN) switch ON.

NOTE: With generator (GEN) switch ON, the low rotor and engine power-out warning system remains operational.

  - Reduce electrical load to a minimum.

- Chip Detectors:
- - Amber ENG CHIPS, M/R CHIPS or T/R CHIPS indicator will illuminate.
- - Land as soon as possible.
- - - Lighted indicators indicate possible internal deterioration of engine or tail rotor transmission (or main rotor transmission, if equipped).
- Fuel low:
- - Refer to Fig. 3-1.

CAUTION

Never use the FUEL LOW light as a working indication of fuel quantity.

- - Amber FUEL LOW indicator illuminates when approximately 6.0 to 7.0 gallons (40.4 to 47.1 pounds) of useable fuel remain in fuel cell in level flight, (7 to 8 gallons including unuseable).
- - Land as soon as possible.

AMBER CAUTION LIGHTS (cont)

- Fuel filter:

- - Refer to Fig. 3-1.

CAUTION

If any unusual engine indications or conditions occur, land as soon as possible.

- - Amber FUEL FILTER indicator illuminated indicates clogged filter.

- - - The lighted indicator indicates that a predetermined pressure differential across the filter has been reached and an impending bypass condition exists.

- - - Land as soon as practicable.

WARNING

AFTER THE FUEL FILTER INDICATOR HAS LIGHTED, AND FOLLOWING THE COMPLETION OF THE FLIGHT IN PROGRESS, ADDITIONAL FLIGHT IS PROHIBITED UNTIL THE FUEL FILTER HAS BEEN SERVICED.

- - - Service the airframe & ENG fuel filters prior to the next flight. (Refer to HMI and the Rolls Royce Engine Operation and Maintenance Manual.)

- Alternate air (for aircraft equipped with alternate air door):

- - Refer to Para 2-3 and Fig. 3-1.

- - Amber ALT AIR light flashes while alternate air door is opening; ALT AIR light is illuminated continuously with alternate air door full open.

CAUTION

If ALT AIR light continues to flash, it indicates that alternate air door is obstructed in a partially open position. If this condition occurs in flight, monitor TOT and take corrective action as soon as possible.

- - If ALT AIR light begins flashing after it has been on steady, cycle ALT AIR switch to OPEN position, this will cycle door to FULL OPEN position, with light on continuously.

- - If ALT AIR light begins flashing without switch actuation, cycle switch to CLOSED position, if light goes out system is acceptable.

- - - If light continues to flash or goes out and begins flashing again, select ALT AIR door open.

- - - Land as soon as practicable.

3-15. SMOKE AND FUME ELIMINATION - IN FLIGHT

- Smoke and/or toxic fumes entering the cockpit can be exhausted as follows:

- - Open vents.

- - Adjust cabin heat and defog handle, as required.

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Section IV

List of Figures

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Section IV

NORMAL PROCEDURES

4-1. PREFLIGHT REQUIREMENTS

- Have a thorough understanding of operating limitations. Refer to Section II.

- Service helicopter as required. Refer to Handbook of Maintenance Instructions (HMI).

- Determine that helicopter loading is within limits. Refer to Section II and VI.

- Check helicopter performance data. Refer to Sections V and VI.

- Determine that the Daily Inspection (in accordance with the HMI or Section VII of this manual) has been accomplished within 24 hours prior to the first flight of each day.

- Perform pilot's preflight inspection prior to each flight.

  NOTE: Refer to the applicable Rolls Royce Operation and Maintenance Manual listed in Related Publications and Directives table, Section II, Basic HMI for detailed requirements on daily inspection of the engine.

  It is the prerogative and responsibility of the helicopter operator or owner to increase the extent and/or frequency of inspection to promote safe operation when unusual local conditions (environment, utilization, etc.) dictate.

- Brief passengers and non-flight crew members on precautions and procedures necessary to avoid undue hazard when approaching or departing the helicopter.

4-2. PILOT'S PREFLIGHT INSPECTION

- Visually check the following items for obvious damage. Damage is defined as any condition that is not normal or not within limits. Examples of conditions to look for are: inoperable equipment, excessive leakage, discoloration caused by heat, loose attachments, dents, cracks, punctures, abrasion, chaffing, galling, nicks, scratches and evidence of corrosion. These are the most common types of damage; however, inspection should not be limited to the above conditions.

- - Perform further inspection prior to the next flight if discrepancies are noted, to determine if the aircraft is airworthy.

- - Flight is prohibited when unrepaired damage exists which makes the aircraft unairworthy.

- Preflight inspections are grouped and numbered by location (Fig. 4-1) so they can be performed on an area-by-area basis. Inspection of the entire helicopter may be accomplished by starting at the front and working in clockwise progression to completion.

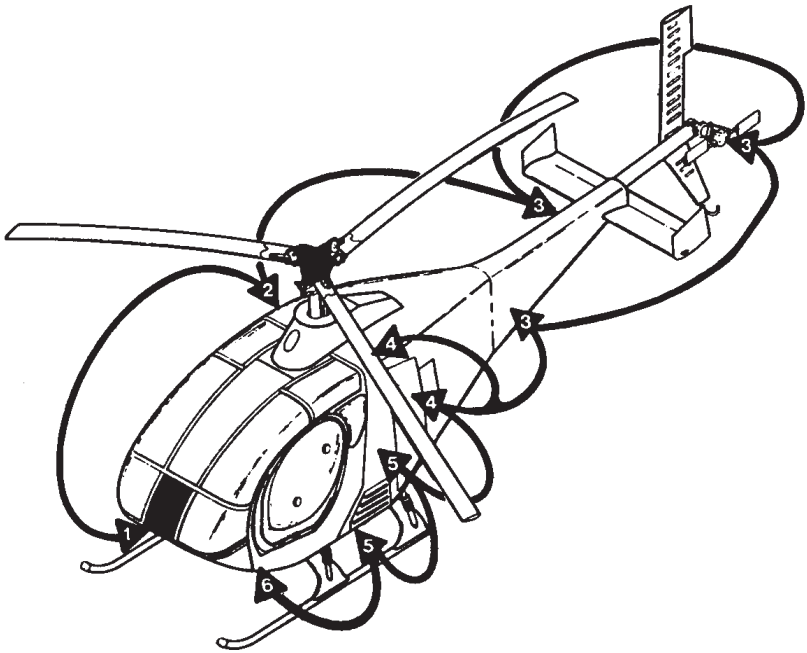


Figure 4-1. Pilot's Preflight Guide

PRELIMINARY CHECKS

• Fuel drain valves, take samples	CHECK FOR CONTAMINANTS

EXTERIOR

FUSELAGE - FORWARD END ①

• Aircraft tiedowns and covers	REMOVED
• Aircraft attitude for weak or damaged dampers	CHECK
• Canopy for condition and cleanliness	CHECK
• OAT thermometer	NO OBSTRUCTIONS
• Fresh air vents	NO OBSTRUCTIONS
• Pitot tube	NO OBSTRUCTIONS
• Tail rotor pedals for condition and security of quick-release pins	CHECK
• Landing light	CHECK
• All inspection panels	SECURED

FUSELAGE - RIGHT SIDE ②

• Cabin door, condition and latching	CHECK
• Fuselage skin	CHECK
• Overhead canopy	CHECK
• Static port	CHECK, NO OBSTRUCTIONS
• Oil filter bypass indicator	CHECK
• Tail rotor trim spring assy	CHECK

• Transmission oil level	CHECK
• Tail rotor shaft, set alignment marks	CHECK
• Exhaust duct	CHECK
• All inspection panels/doors	SECURED
• Skid, strut fairing's	CHECK
• Ground handling wheel (if installed) in up position with quick-release pin installed	CHECK
• Landing gear attach points, dampers (leaks and inflation)	CHECK

AFT FUSELAGE/TAIL ROTOR ③

• Aft fuselage skin, right side	CHECK, NO DAMAGE ALLOWED
• If equipped, internal plenum inlet screen for obstructions (use inspection light in tailcone)	CHECK
• Battery/Battery vent (optional location)	CHECK
• All inspection panels/doors	SECURED
• Antenna (if installed)	CHECK
• Position and anticollision lights right side	CHECK

CAUTION

The following special check applies to 269D3300-1 Aft Fuselage Assemblies only. S/N 63 & subsequent are factory equipped with the 269D3300-35 aft fuselage assembly and do not require that the following check be conducted. Cracks in the paint film alone may indicate internal structure damage and this requires further maintenance action before further flight.

AFT FUSELAGE/TAIL ROTOR (cont) ③

• Fuselage area above horizontal stabilizer for cracks in paint film. Pay particular attention to flange bend radius and vertical face of aft bulkhead and entire adjacent aft fuselage skin. Any signs of cracks requires further inspection before next flight.	CHECK
• Stabilizers right hand side (vertical, horizontal and end plates)	CHECK, NO DAMAGE ALLOWED
• Tail skid	CHECK
• Tail rotor alignment marks	CHECK
• Tail rotor gearbox to aft fuselage attachment for security and condition	CHECK
• Chip detector and wiring	CHECK
• Control push-pull rod and bellcrank	CHECK
• Tail rotor transmission oil level	CHECK
• Output shaft dust cover, retainer nut, tang washer, and rubber bumper	CHECK
• Tail rotor blades and pitch links	CHECK
• Tail rotor abrasion strip	CHECK

CAUTION

IF POOR ABRASION STRIP BOND IS SUSPECTED, BUT NOT CONFIRMED, INSPECT BLADE IN ACCORDANCE WITH HMI APPENDIX C, PRIOR TO FURTHER OPERATION.

- • Visually check each tail rotor blade abrasion strip for any evidence of paint cracking or chipping along the abrasion strip/airfoil bond line.

- If paint cracking or chipping is observed, use a 10X magnifying glass to examine the abrasion strip/airfoil bond line and tip for any bond separation between epoxy adhesive and abrasion strip.

CAUTION

IF TAIL ROTOR BLADE ATTACHMENT BUSHING HOLE CRACKING IS SUSPECTED, PERFORM DYE PENETRANT INSPECTION IN ACCORDANCE WITH BASIC HMI SECTION 9.

• Tail rotor blade attachment bushing hole for evidence of cracks	CHECK
• Rock tail rotor with teetering motion to determine condition of bearings	CHECK
• Main rotor blades for condition and abrasion strip for condition and bond separation (Do not handle trim tabs.)	CHECK
• Overrunning clutch (Turn main rotor blade forward then reverse.)	CHECK
• Stabilizers left hand side (vertical, horizontal and end plates)	CHECK, NO DAMAGE ALLOWED
• Position and anticollision lights left side	CHECK
• Antenna (if installed)	CHECK
• Static Port	CHECK, NO OBSTRUCTIONS
• Aft fuselage skin, left side	CHECK, NO DAMAGE ALLOWED

INTERMEDIATE FUSELAGE /MAIN ROTOR ④

• Fuselage skin	CHECK
• If equipped, external plenum inlet screen (alternate air door)	CHECK

INTERMEDIATE FUSELAGE /MAIN ROTOR (cont) ④

• Engine mounts, mounting pads, and firewalls	CHECK
• Engine oil and fuel lines	CHECK
• Engine electrical connections	CHECK
• Fuel control, N_2 governor, and associated linkage	CHECK
• Engine oil level	CHECK
• Drive belts	CHECK
• Belt drive lower H-frame tie bar bracket and strut for cracks and security.	CHECK
• Ground handling wheel handle (if installed); quick-release pin installed	CHECK
• Mixer controls and pushrods	CHECK
• Fuel cell	CHECK
• Supporting structure and bulk heads	CHECK
• Cooling fan and ducting	CHECK
• Oil coolers	CHECK
• Battery/Battery vent	CHECK
• Main rotor transmission and mast	CHECK
• Baggage compartment secure	CHECK
• Baggage compartment cargo secure	CHECK
• Access door for condition and security	CHECK

• Blades and rotor head	CHECK
• Main rotor dampers	CHECK
• Main rotor swashplate, pitch links, upper and lower bearings	CHECK
• Main rotor control rod bellcranks	CHECK
• Main rotor control rods	CHECK
• Fuel cell vent	NO OBSTRUCTIONS
• Fuel level	CHECK
• Fuel Filler Cap	SECURED
• Oil cap security	CHECK
• All inspection panels/doors	SECURED
• Rear crossbeam	CHECK

FUSELAGE - LH SIDE ⑤

• Skid, strut fairing's	CHECK
• Ground handling wheel (if installed) in up position with quick-release pin installed	CHECK
• Landing gear attach points, dampers (leaks and inflation)	CHECK
• Engine compartment inlet screen	CHECK
• Cabin door, condition and latching	CHECK
• Fuselage skin	CHECK
• Overhead canopy	CHECK

FUSELAGE - UNDERSIDE ⑥

- Fuselage skin — CHECK
- Antennas — CHECK

INTERIOR

PILOT/PASSENGER COMPARTMENT ⑦

- Fire extinguisher and first aid kit — CHECK
- Loose equipment or cargo — STOWED
- Seats, seat belts, and shoulder harness — CHECK
- ● Stow or secure unused belts — CHECK
- Interior and exterior lights (All switches OFF after check.) — CHECK

4-3. ENGINE PRE-START COCKPIT CHECK (Fig. 4-2 & 4-3)

- Pilot-in-command (PIC) position is determined by the configuration of the instrument panel, and can be easily identified by the orientation of the basic flight and engine instruments in the instrument panel. For right PIC position see Figure 4-2, Sheet 1; for left PIC see Figure 4-2, Sheet 2.

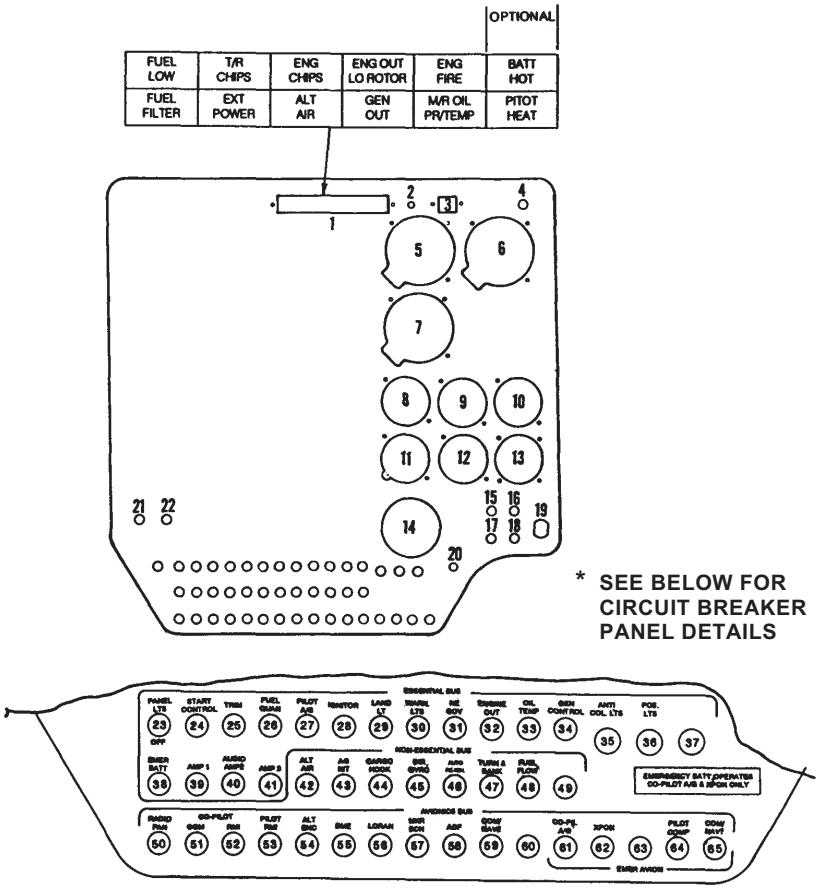
NOTE: When three sets of controls are installed in the aircraft, one of the occupants must possess a helicopter CFI rating. In non-training operations, it is recommended that the center set of controls be removed. (Control set includes: cyclic stick, collective stick, and tail rotor pedals.) Controls may be removed by pilot. Refer to Paragraph 7-12 for collective stick installation and removal.

ELECTRICAL POWER - OFF (Battery only)

- Both cabin doors CLOSED, LATCHED — CHECK
- Tail rotor pedals — CHECK/ADJUST
- Tail rotor pedal lock pins — SECURED
- Seat belt and shoulder harness for proper fit and engagement of buckle — FASTEN

ELECTRICAL POWER-OFF (continued on page 4-15)

RIGHT SEAT PILOT-IN-COMMAND



NOTES:
1. SEE SHEET 3 OF 3 FOR LEGEND.
2. THE ALTERNATE AIR DOOR CONTROL SWITCH AND THE ANTI-ICE CONTROL ARE LOCATED TO THE LEFT OF THE RIGHT PILOT'S SEAT, BELOW THE COLLECTIVE STICK .

Figure 4-2. Instrument Panel (Sheet 1 of 3)

LEFT SEAT PILOT-IN-COMMAND

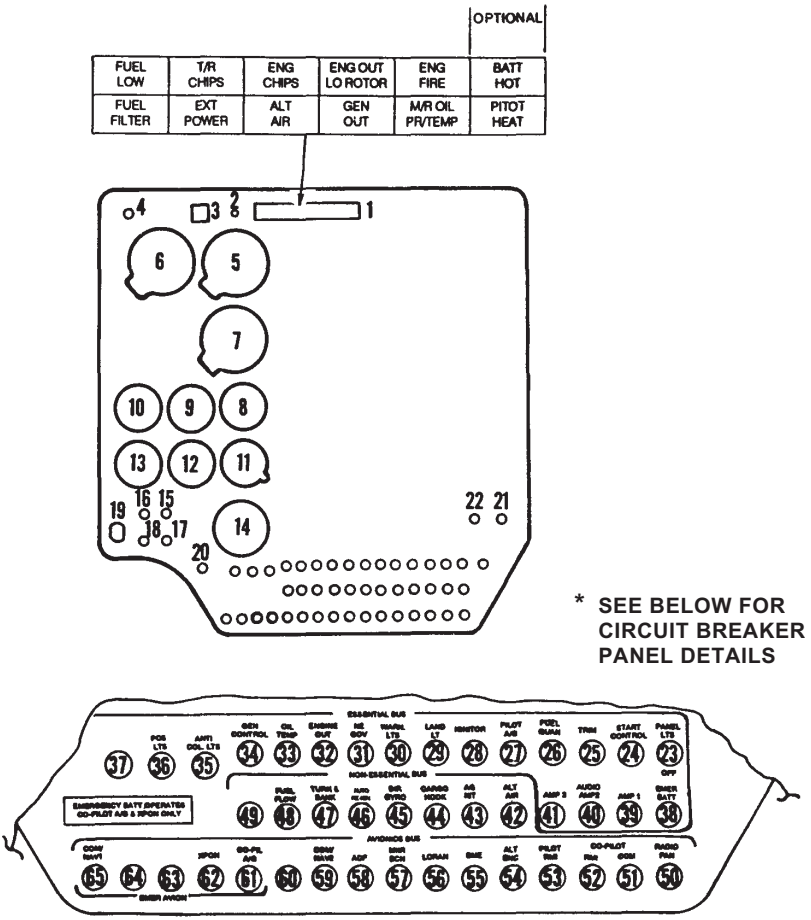
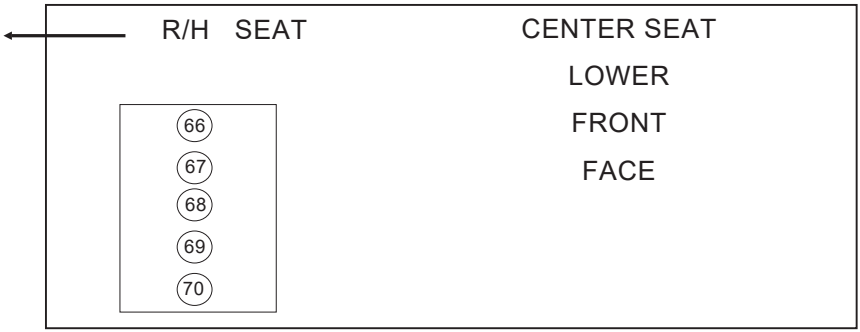


Figure 4-2. Instrument Panel (Sheet 2 of 3)



1. ANNUNCIATOR
2. PUSH TO TEST SWITCH
3. O.A.T.
4. TRIM SWITCH
5. AIRSPEED IND.
6. ALTIMETER
7. DUAL TACH. N_2/N_R
8. TORQUE GAUGE
9. T.O.T.
10. OIL PRESS./TEMP.
11. CLOCK
12. N_1
13. VOLT/AMMETER
14. FUEL QUAN.
15. AVIONICS SWITCH
16. IGNITOR SWITCH
17. GENERATOR SWITCH
18. BATTERY SWITCH
19. KEYED START SWITCH
20. FUEL SHUTOFF CONTROL
21. DIMMER
22. DIMMER
23. PANEL LIGHTS
24. START CONTROL
25. TRIM
26. FUEL QUAN.
27. PILOT ATTITUDE GYRO (OPT)
28. IGNITOR
29. LANDING LIGHTS
30. WARNING LIGHTS
31. N_2 GOVERNOR
32. ENGINE OUT
33. OIL TEMP
34. GEN CONTROL
35. ANTI COLLISION LIGHTS
36. POSITION LIGHTS
37. EMER. AVNS/PITOT HEAT (OPT)
38. EMERGENCY BATTERY (OPT)
39. AUDIO AMP 1 (OPT)
40. AUDIO AMP 2 (OPT)
41. AUDIO AMP 3 (OPT)
42. ALT. AIR
43. AG KIT (OPT)
44. CARGO HOOK (OPT)
45. DIRECTIONAL GYRO (OPT)
46. BLANK
47. TURN & BANK (OPT)
48. FUEL FLOW (OPT)
49. BLANK
50. RADIO FAN (OPT)
51. CO-PILOT COMM (OPT)
52. CO-PILOT RMI (OPT)
53. PILOT RMI (OPT)
54. ALT. ENC. (OPT)
55. D.M.E. (OPT)
56. LORAN (OPT)
57. MKR BCN (MARKER BEACON) (OPT)
58. ADF (OPT)
59. COM/NAV 2 (OPT)
60. BLANK
61. CO-PILOT ATTITUDE GYRO (OPT)
62. XPON (OPT)
63. BLANK
64. PILOT COMP. (OPT)
65. COM/NAV 1 (OPT)
66. GENERATOR
67. NON-ESSENTIAL
68. AVIONICS
69. ESSENTIAL
70. BATTERY

Figure 4-2. Instrument Panel (Sheet 3 of 3)

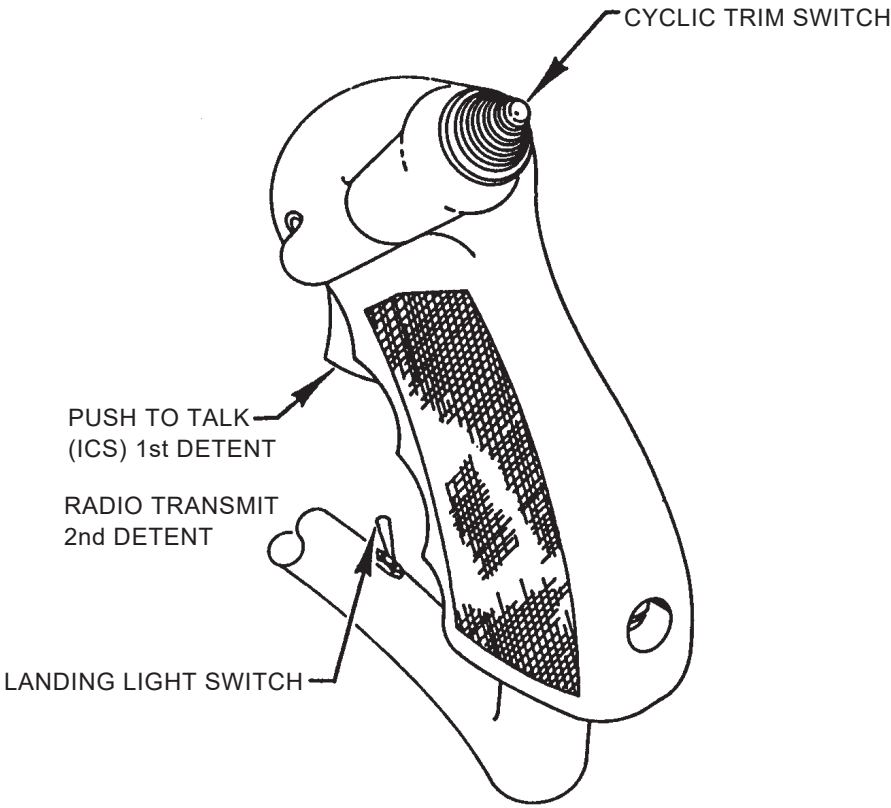


Figure 4-3. Cyclic Stick Grip

4-3. ENGINE PRE-START COCKPIT CHECK (cont)

ELECTRICAL POWER - OFF (cont)

• Operation of shoulder harness inertia lock	CHECK
• Cyclic, collective (friction off) and pedals	FULL TRAVEL
• Cyclic stick	NEUTRAL FRICTION ON
• Tail rotor pedals	CENTERED
• Collective stick	FULL DOWN FRICTION ON
• All electrical switches	OFF
• ELT Armed	CHECK
• Radio switches	OFF
• Circuit breakers	IN
• Fuel shutoff valve open	IN
• Static position of all instruments	CHECK
• Altimeter	SET

CAUTION

With the optional Davtron indicator installed, note that pressure altitude is not related to local barometric pressure and therefore pressure altitude should not be used for in-flight altitude guidance. Only the aircraft altimeter that has been adjusted for local barometric pressure should be used for in-flight altitude guidance.

• Magnetic compass heading	CHECK
• V_{NE} card	SELECT
• Cabin heat and anti-ice	OFF

4-3. ENGINE PRE-START COCKPIT CHECK (cont)

ELECTRICAL POWER - ON

NOTE: If external power is used, connect and operate Ground Power Unit (GPU) in accordance with GPU manufactures instructions.

- Amber EXT PWR light illuminated (Refer to Fig. 4-2) when GPU is connected to external power receptacle. — CHECK
- BATTERY switch — ON

NOTE: Minimum battery power required 20V dc with 500 amp load. Maximum power allowed 28.5V dc with 500 amp load.

NOTE: Battery switch will remain in ON position during GPU start.

- Lights — AS REQUIRED
- Ignition key — ON

NOTE: A properly operating engine-out warning system is indicated by flashing indicator lights in caution and warning light panel, a beeping warning horn in cockpit and an audio signal in head set. Horn and audio signal will be disabled if generator (GEN) switch is set to OFF.

- ENGINE OUT warning system check — GEN SWITCH ON THEN OFF
- Fuel gauge — CHECK READING
- All other instruments — CHECK
- Transmission; engine-out warning lights — ON
- Press-to-test caution and warning lights — CHECK

- Twistgrip to FULL OPEN, return to GROUND IDLE STOP, push engine idle release, close twistgrip to CUTOFF position — CHECK

4-4. ENGINE START

CAUTION

Do not attempt engine start with cyclic stick in positions other than neutral. Damage to rotor head and controls may result.

NOTE

Do not use trim controls to move cyclic stick into position; this practice induces strain on the trim control system and may burn out the trim motors.

- Manually center cyclic stick; use longitudinal and lateral trim as necessary to stabilize stick in center position, then lock friction — RECHECK
- Cyclic stick - trimmed neutral; friction ON — RECHECK
- Fuel shutoff valve open — RECHECK
- Collective stick - full down; friction on — RECHECK
- Twistgrip - CUTOFF position — RECHECK
- Rotors — CLEARED

NOTE: Consecutive starter cranking time limits are:

60 Seconds - ON	60 Seconds - OFF
30 Seconds - ON	60 Seconds - OFF
30 Seconds - ON	30 Minutes - OFF

4-4. ENGINE START (cont)

The above sequence (60 seconds ON through 30 minutes OFF) may be attempted two (2) times. (Corrective action is required prior to any additional start attempts.)

- Start/ignition button PRESS AND HOLD

- Rotate twistgrip to GROUND IDLE for ignition when N_1 indicates 12 to 15% with Turbine Outlet Temperature (TOT) at or below 150°C. (See Section II, Minimum N_1 Speed Starting Recommendations Placard.)

NOTE: Do not wait for N_1 to peak out. Introduce fuel immediately upon reaching minimum recommended N_1 speed. Delay in moving the throttle to the idle detent may diminish battery capacity early in the start cycle.

NOTE: A start should not be attempted at N_1 speeds below 12% . GPU starts are recommended when normal cranking speed cannot be obtained by using the battery.

- Observe TOT indicator for immediate temperature rise. If no TOT rise is noted, abort engine start.

CAUTION

During starts, overtemperatures between 810°C and 927°C are permitted for up to ten seconds with a momentary peak at 927°C for not more than one second. Consult Rolls Royce Engine Operation and Maintenance Manual if these limits are exceeded.

CAUTION

If main rotor is not rotating by 25% N_1, abort start. (Refer to Rolls Royce Operation Maintenance Manual.)

- If an engine fire (may be indicated by flames emanating from exhaust duct) occurs, pull out fuel valve and abort start.

- - If start is aborted proceed as follows:

- • • Engine idle release - Push

- • • Close twistgrip to the CUTOFF position.

- • • Use starter to continue motoring engine for at least ten seconds or until TOT is no more than 150°C. (N_1 may exceed normal ignite speed of 12 to 15%.)

- Start/ignition button - release at 58 to 60% N_1 — RELEASE

- Engine oil pressure - 50 to 130 psi — CHECK

- All caution and warning indicators out — CHECK

NOTE: Transmission oil pressure warning (XMSN OIL PRESS) indicator will go out within 30 seconds from engine light-off. GEN OUT indicator will remain on until the generator switch is moved to the GEN position.

- Engine idle speed - 59 to 65% N_1 — CHECK

- All other instruments: — CHECK

CAUTION

Malfunctions are indicated if rotor and engine RPM indicator needles are not superimposed. Shut down engine if this condition exists.

- N_2 engine and rotor RPM indicators for coincidental reading — CHECK

NOTE: In order to allow for manufacturing tolerances, "superimposed" means within 1/2 a needle width. The relative positions of the superimposed needles should remain constant during powered flight.

4-5. ENGINE RUN-UP

- Electric power — SELECT
- External start: After removing external power source, set BATTERY switch to ON. — CHECK

NOTE: Monitor N_1 when turning generator switch ON. If N_1 decays below 59%, turn generator OFF and increase N_1 speed with throttle to 70%, then reset generator to ON.

- Set generator (GEN) to ON (GEN OUT caution light out; ammeter will show charge) — OPERATE AND CHECK
- Avionics (as required) — ON AND CHECK

CAUTION

Avoid rapid acceleration when parked on slippery surface.

Avoid engine N_2 steady-state operation 71% to 88%. Operation within the speed avoidance range is permitted for the preflight checks specified in this flight manual. Transient operation through the speed range is to be accomplished as expediently as possible.

NOTE: Transient operation is defined as not dwelling at any N_2 speed for more than 1 second.

- Twistgrip — CHECK

NOTE: If the engine has been shut down for more that 15 minutes, stabilize at idle for 1 minute before increasing power.

- Engine controls:

NOTE: If malfunction is noted, shut down engine.

- - N_2 high beep range - 94% (3 sec. limit) CHECK

CAUTION

Do not dwell at any N_2 speed less than 89% for more than 1 second during the low beep range and low rotor warning check.

- - N_2 low beep range - 86% or less CHECK
- - Low rotor warning - on at 86 ± 1% (For Cold weather operations; in event above procedure does not yield a low rotor warning indication, continue engine run-up and repeat check in 3 minutes) CHECK

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- Increase RPM to 91% N_2 using beep or twistgrip.

- Throttle rigging check:

- N_2 90% — RECHECK

- Pilot's twistgrip — SNAP TO IDLE

CAUTION

If engine flames out, do not try to recover by opening twistgrip. Close twistgrip to CUTOFF and monitor TOT.

NOTE: If engine flames out, refer to the Handbook of Maintenance Instruction (HMI) for proper throttle control rigging.

- If multiple controls are installed, repeat procedure using copilot's twistgrip. — RECHECK

- Twistgrip — FULL OPEN

- N_2 90% — CHECK

- Engine oil pressure - above 90 psi — RECHECK

- Ammeter — CHECK READING

NOTE: Ammeter reading will fluctuate slightly when anticollision lights are on.

- Alternate air door operation (if equipped) — CHECK (when operating in conditions of visible moisture and temperatures at or below 5°C are likely)

NOTE: If alternate air is required, place alternate air door switch in OPEN position and verify that ALT AIR caution light is blinking while door is in transit. ALT AIR light should remain on when door is in alternate air (full open) position. (Additional data on alternate air operation is provided in Paragraphs 2-3 and 3-11.)

4-5. ENGINE RUN-UP (cont)

• • ALT AIR caution light flashes when door is in transit; remains on when door is full open.	CHECK
• • Close alternate air door	CHECK
• All caution and warning lights out.	RECHECK

4-6. BEFORE TAKEOFF

• Flight control friction	RELEASE AND SET AS DESIRED
• Cyclic trim controls	TRIM TO NEUTRAL
• With collective pitch full down, gently move cyclic stick and observe rotor tip for correct movement and track.	CHECK
• All instruments	CHECK
• Position and anticollision lights	AS REQUIRED
• Pitot Heat (if installed)	AS REQUIRED
• Use alternate air and engine anti-ice for all operations in visible moisture and temperatures at or below 5°C. Operation of anti-ice will result in a TOT increase.	AS REQUIRED
• Both cabin doors closed	RECHECK

4-7. TAKEOFF

NOTE: For takeoff in noise sensitive areas, refer to Para 4-17 for noise impact reduction procedures.

- Determine that hover area and takeoff path are clear.
- Follow normal helicopter takeoff procedure with engine speed at 90 to 91% N_2.
- Governed N_2 RPM should increase 1/2 to 1% on takeoff - adjust as necessary to maintain N_2 at 91%.

WARNING

IF SUDDEN, UNUSUAL OR EXCESSIVE VIBRATIONS SHOULD OCCUR DURING FLIGHT, A PRECAUTIONARY LANDING SHOULD BE MADE. NO FURTHER FLIGHT SHOULD BE ATTEMPTED UNTIL THE CAUSE OF THE VIBRATION HAS BEEN IDENTIFIED AND CORRECTED.

- Follow recommended takeoff profile shown in Height Velocity Diagram (Fig. 5-4).
- Use cyclic trim as desired.

NOTE: Proper longitudinal trim is established when small fore and aft cyclic movements require the same force.

4-8. CRUISE

- Trim - use proper trimming procedures described for climbout.

- Above 50 knots, and 50 foot altitude above terrain, select N_2 between 90 and 91% for best comfort level.

- Use alternate air and engine anti-ice for all operations in visible moisture and temperatures at or below 5°C. Operation of anti-ice will result in a TOT increase.

4-9. LOW SPEED MANEUVERING

- Avoid maneuvers that exceed thrust capabilities of the tail rotor.

  NOTE: Conditions where thrust limits may be approached are: High density altitude, high gross weight, rapid pedal turns, and placing the helicopter in a down wind condition. These conditions may exceed the thrust capabilities of the tail rotor.

- Avoid any maneuvers that require full pedal.

- Avoid extreme aircraft attitudes and maneuvers at low speed.

- When hovering in a left crosswind of 10 knots or more, expect random yaw oscillations; with a right crosswind, expect random pitch and roll oscillations.

- Observe altitude recommendations of Height Velocity Diagram (Fig. 5-4).

4-10. PRACTICE AUTOROTATIONS

CAUTION

Perform throttle rigging check prior to attempting practice autorotations (Para 4-5).

- Do not practice autorotations if LOW FUEL warning indicator light is illuminated. If, while in practice autorotation, LOW FUEL warning indicator lights, return to powered flight.

NOTE: Increase collective pitch after establishing autorotation to prevent rotor overspeed if flight is being conducted at high gross weight or high density altitude. To reduce rate of descent or to extend gliding distance, operate at minimum rotor RPM. Restore rotor RPM by lowering collective prior to flareout.

- Make practice autorotation landings as follows:

WARNING

IMPROPER RIGGING OF THE THROTTLE CONTROL MAY RESULT IN INADVERTENT FLAMEOUT DURING RAPID CLOSING OF THE TWISTGRIP TO THE GROUND IDLE POSITION.

CAUTION

With the twistgrip in GROUND IDLE position, the low rotor warning system is inoperative and rotor rpm must be monitored using the N_R gauge during practice autorotations.

- For autorotation descent, the twistgrip should be in the FULL OPEN or GROUND IDLE position. However, if a practice autorotation landing (minimum engine power) is desired, rotate the twistgrip to the GROUND IDLE position.

- If a power recovery is desired, rotate the twistgrip to the FULL OPEN position to make full engine power available upon demand.

4-10. PRACTICE AUTOROTATIONS (cont)

- Conduct practice autorotation at 94KIAS or below (see V_{NE} placards). Maintain rotor between 410 and 504 by use of the collective control.

- Maximum gliding distance is obtained at 77 KIAS and 410 rotor RPM.

- Minimum rate of descent is obtained at 46 KIAS and 410 rotor RPM.

NOTE: Glide distances attained during an actual engine-out autorotation may be less than the glide distances achieved during practice autorotations when operating at reduced RPM (N_2/N_R needles joined).

- At a height of approximately 65 FT above the ground flare to a nose-up attitude.

- At approximately 10 feet, coordinate collective pitch with forward movement of cyclic stick to level A/C and cushion landing make ground contact with ship level.

WARNING

DURING POWER RECOVERY FROM PRACTICE AUTOROTATIONS, AVOID AIRSPEED AND ALTITUDE COMBINATIONS THAT ARE INSIDE THE HEIGHT VELOCITY CURVE. HIGH RATES OF DESCENT MAY DEVELOP THAT ARE NOT CONTROLLABLE.

- Touchdown in a level attitude.

- Avoid use of aft cyclic control or rapid lowering of collective pitch during initial ground contact or during ground slide.

NOTE: Normal rotor RPM (collective fully down) is 485 ± 5 RPM at 1900 pounds gross weight at sea level, 60 knots. Rotor speed will decrease approximately 10 RPM for each 100 pound reduction in gross weight and increase approximately 6.5 RPM for each 1000 foot increase in density altitude. For gross weight greater than 1900 pounds, increase collective control as required to maintain approximately 485 RPM.

4-11. LANDING APPROACH

CAUTION

Fire can result from a landing in tall dry grass due to exhaust heat; exercise care in selecting landing site. In case of a grass fire move aircraft to a clear area.

- Set N_2 at 91%.

4-12. RUNNING LANDING

CAUTION

Any running landing with new skid shoes will result in a more noticeable nose down tendency during ground slide.

- Maximum recommended ground contact speed is 30 knots for smooth hard surface.
- Avoid rapid lowering of the collective control after ground contact.
- Avoid the use of aft cyclic after ground contact.

4-13. ENGINE/AIRCRAFT SHUTDOWN

CAUTION

Care should be taken when rotating twistgrip to GROUND IDLE and from IDLE to CUTOFF position if the helicopter is parked on an icy or slippery surface (helicopter may spin in direction of main rotor blade rotation).

NOTE: Shut down the engine before exiting the helicopter unless safety considerations dictate otherwise.

- Pilot's twistgrip — PERFORM DECELERATION CHECK

NOTE: To ensure proper engine performance, perform the deceleration check during shutdown after the last flight of the day (Para 4-15).

- Twistgrip to GROUND IDLE detent - hold for 2 minutes. — SET
- Collective stick — FULL DOWN
FRICTION ON
- Cyclic stick (neutral position) — TRIM TO NEUTRAL
APPLY FRICTION
- All unnecessary bleed air and electrical equipment — OFF
- Pedals (maintain until rotor has stopped) — CENTERED
- Twistgrip from GROUND IDLE to CUTOFF position — CUTOFF

CAUTION

An after-fire (recognized by a rapid increase in TOT) can occur during shutdown if fuel cutoff is not complete. If an after-fire occurs, immediately engage starter and motor the engine to minimize the temperature encountered. To extinguish the fire, continue motoring the engine with the twistgrip in CUTOFF position and pull out the fuel shutoff valve. Observe TOT limits. After assuring fire is extinguished, within 15 minutes re-open fuel shutoff valve (to relieve fuel pressure build-up in fuel system).

NOTE: Immediately after closing twistgrip to CUTOFF position, a dual tachometer needle split should occur with N_R lagging behind N_2. If no needle split occurs, check overrunning clutch for proper operation in accordance with HMI. To ensure throttle cutoff, hold twistgrip in CUTOFF position until N_1 decelerates to zero and TOT is stabilized. Check for TOT decrease.

- Engine out warning at 55% N_1 — CHECK

CAUTION

Do not use collective pitch to slow rotor.

- Generator switch — OFF
- Fuel shutoff valve — OPEN

NOTE: Fuel shutoff valve is for emergency use, storage, and maintenance procedures, see HMI. Under normal conditions, avoid closing valve after engine shutdown until engine compartment has cooled to near ambient temperature.

- NAV/COM switches — OFF
- All other switches — OFF
- BATT SWITCH — OFF

4-14. POST FLIGHT

- Aircraft - investigate any suspected damage — CHECK
- Fuel and oil leaks — CHECK
- Logbook entries — COMPLETE
- Flight manual and equipment — STOWED
- Aircraft tiedowns, covers — SECURED

4-15. DECELERATION CHECK

- Generator (GEN) switch — OFF
- Pilot's twistgrip — FULL OPEN
- Pilot's collective control — FULL DOWN, FRICTION ON
- Stabilize N_2 at exactly 91% (BEEP as required) — SET
- Pilot's twistgrip — SNAP TO IDLE
- Begin time check with stopwatch. Stop time as N_1 passes through 65%. Observe elapsed time. Minimum allowable lapsed time is 2 seconds.

NOTE: Practice or retakes may be required before proficiency can be obtained in deceleration timing.

- If deceleration time is less than 2 seconds, make 2 more checks to confirm time. If confirmed time is less than the allowable minimum, refer to rigging check in Rolls Royce Operation and Maintenance Manual.

CAUTION

If engine flames out, do not try to recover by opening twistgrip. Close twistgrip to the CUTOFF position and monitor TOT.

- If engine flames out or if N_1 speed drops below 59%, do not repeat deceleration check. Refer to Rolls Royce Operation and Maintenance Manual for engine rigging check and refer to HMI for airframe rigging check.

- If multiple controls are installed, repeat procedure using copilot's twistgrip.

- Generator switch ON

4-16. NORMAL ENGINE RESTART

- Do not exceed 150°C residual TOT when ignition is attempted.

- Reduce TOT by motoring engine with starter. Speed in excess of 15% N_1 may be experienced.

4-17. NOISE IMPACT REDUCTION PROCEDURES

- Certain flight procedures are recommended to minimize noise impact on surrounding areas. It is imperative that every pilot subject the public to the least possible noise while operating the helicopter.

- Takeoff:

- - Takeoff using maximum takeoff power at the speed for best rate of climb (Fig. 5-1).

- - Proceed away from noise sensitive areas.

- - - If takeoff must be made over noise sensitive area, distance (altitude) is the best form of noise suppression.

- Cruise:

- - Maintain 1000 feet minimum altitude (AGL) where possible.

- - Maintain speed of no more than 80 knots over populated areas.

- - Keep noise sensitive areas to left side of helicopter.

- - - Coordinated turns at around the speed for best rate of climb cause no appreciable change in noise.

- - - Sharper turns reduce area exposed to noise.

- Approach:

- - Use steepest glideslope consistent with passenger comfort and safety.

- - Keep noise sensitive areas to left side of helicopter.

Table of Contents

SECTION V

List of Figures

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Section V

PERFORMANCE DATA

5-1. PERFORMANCE DATA

- This section contains helicopter performance information as defined within certain conditions such as airspeed, weight, altitude, temperature, wind velocity, and engine power available.
- See Fig. 5-1 for speed for best rate of climb.
- See Fig. 5-2 for hover ceiling in ground effect.
- Controllability during downwind hovering, sideward and rearward flight has been demonstrated to be adequate in winds up to 17 knots.
- Indicated airspeed (IAS) corrected for position and instrument error equals calibrated airspeed (CAS). (See Fig. 5-3, Airspeed Calibration Curve.)
- See Fig. 5-4 for height velocity diagram at sea level.
- See Fig. 5-5 for gross weight limitations for height velocity diagram.
- See Fig. 5-6 for density altitude chart.
- Performance data defined in this section is valid for Model 269D Helicopter equipped with either 269A1185-1 or 269A1185-5 main rotor blades.

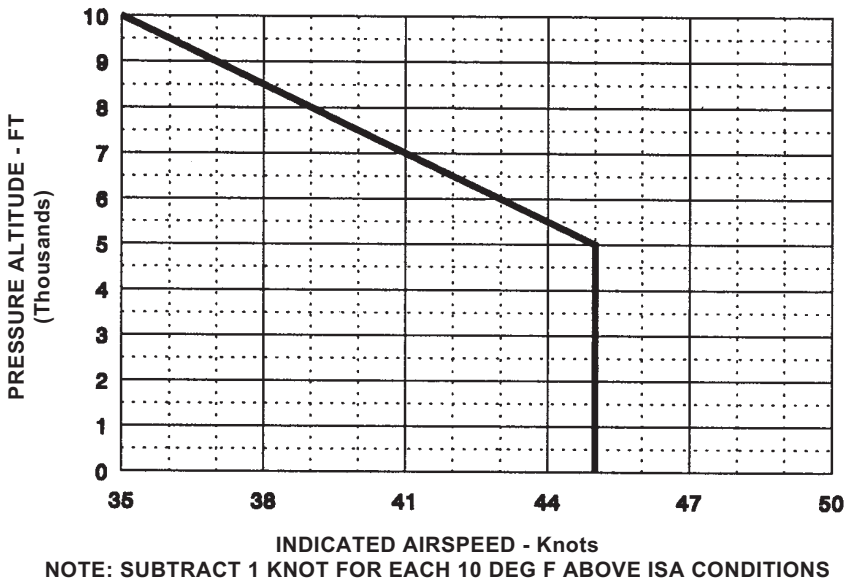


Figure 5-1. Best Rate of Climb Speed vs. Altitude

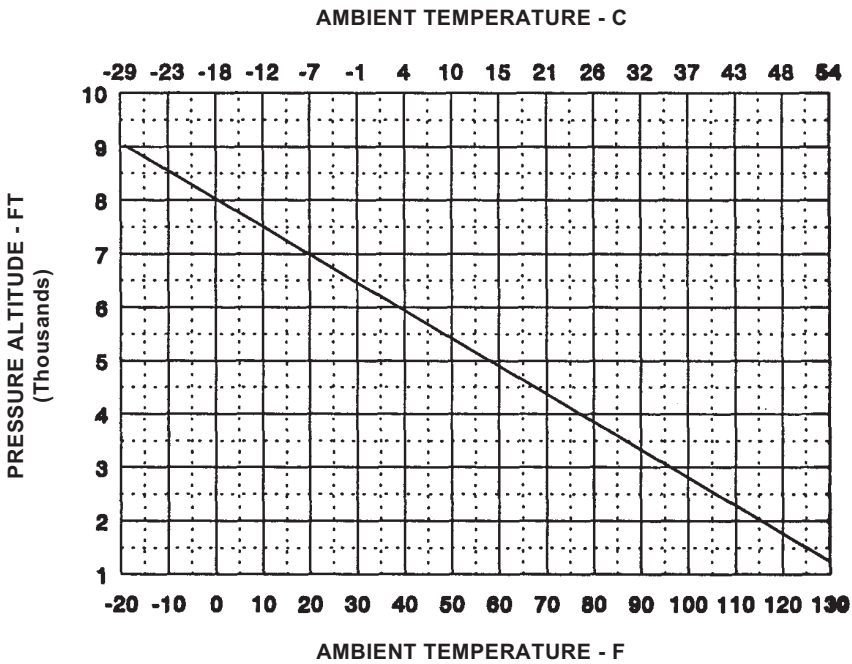


Figure 5-2. Hover Ceiling In Ground Effect - Two Foot Skid Height, at Max. Gross Weight (2230 lbs) or below

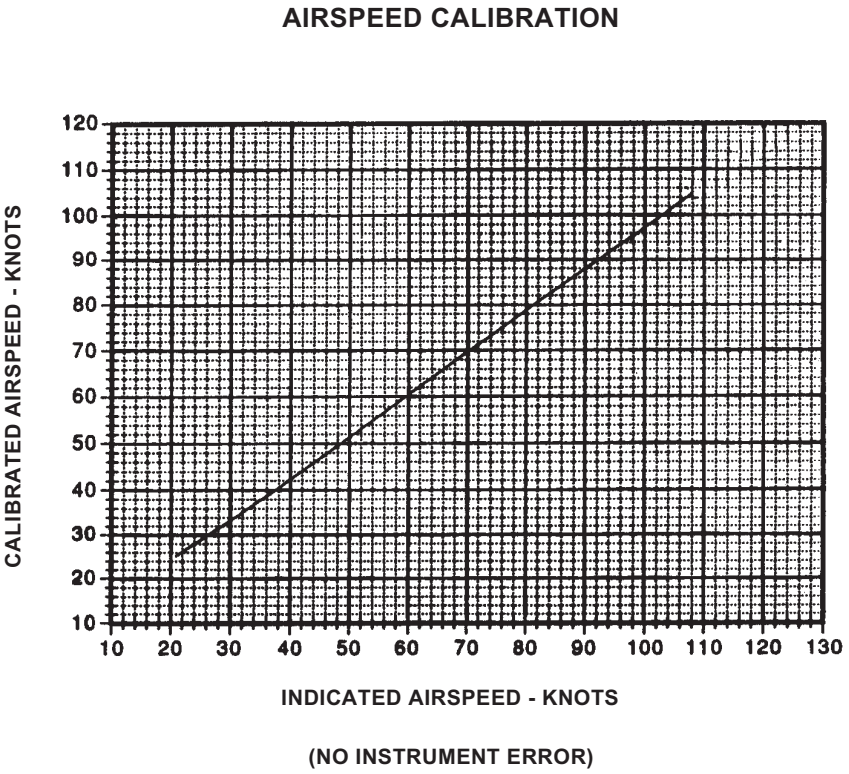


Figure 5-3. Airspeed Calibration Curve

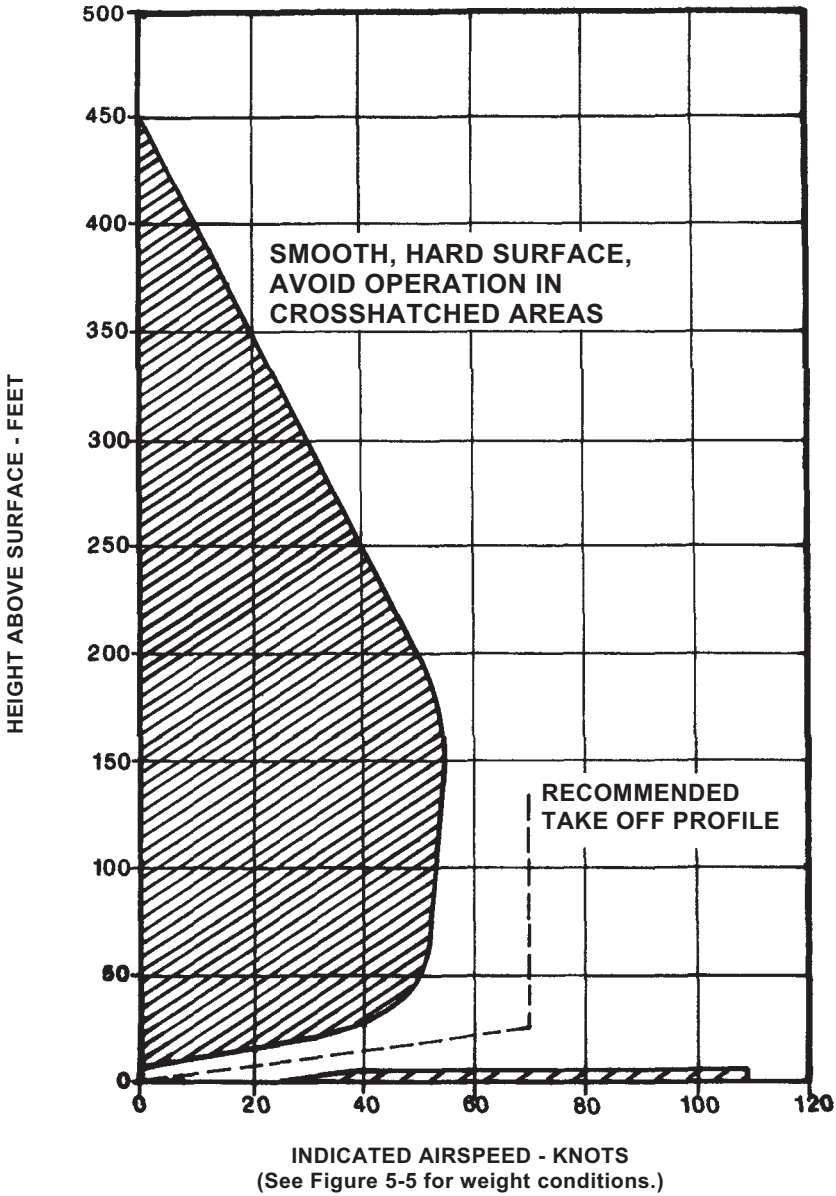
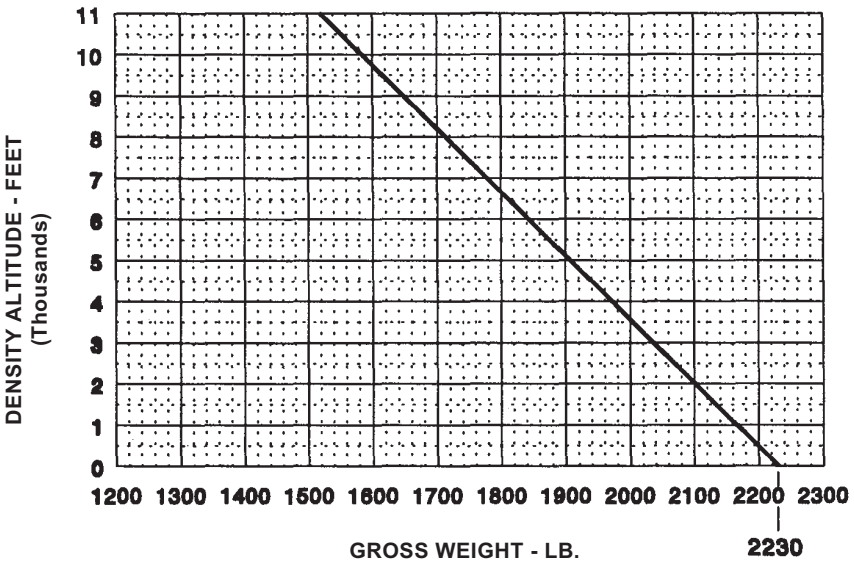


Figure 5-4. Height Velocity Diagram at Sea Level



NOTE:
To maintain conditions shown in Figure 5-4 at altitude.
Recommended gross weights are shown.

Figure 5-5. Gross Weight Limitations for Height Velocity Diagram

EXAMPLE:

CONDITIONS: 6,000 FT PRESSURE ALTITUDE, -15°C OAT, 100 IAS
– FIND DENSITY ALTITUDE –
FOLLOW -15°C LINE TO 6,000 FT PRESSURE ALTITUDE
LINE: READ DENSITY ALTITUDE (3780 FT)
– FIND $1/\sqrt{\sigma}$ (SIGMA) FACTOR –
READ DIRECTLY ACROSS FROM DENSITY ALTITUDE, (3780) = 1.058 = $1/\sqrt{\sigma}$ (SIGMA)

100 IAS = 98.5 CAS
98.5 CAS X 1.058 = 104.2; ROUND TO 104.0 TRUE AIRSPEED

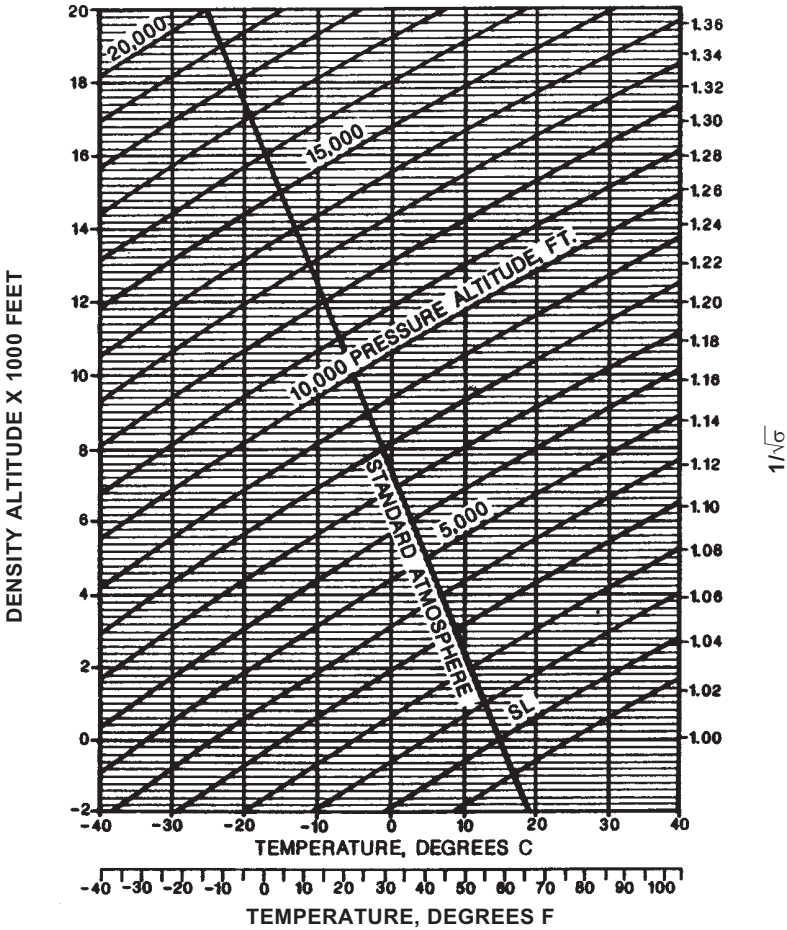


Figure 5-6. Density Altitude Chart

5-2. POWER CHECK CHART - ROLLS ROYCE 250-C20W ENGINE

- The power check chart (Fig. 5-7) shows the relationship of engine torque and turbine outlet temperature, at various conditions of pressure altitude and OAT for a Rolls Royce 250-C20W engine producing specification power as installed in the 330 helicopter. The primary purpose of this chart is for use as an engine performance trending tool to aid in determining if the engine is producing specification power, or if engine power deterioration has occurred.

  NOTE: Power check data taken at regular intervals should be plotted to monitor trends in engine condition. See Rolls Royce Operation and Maintenance Manual for additional information on trend analysis.

- The power check chart is based on the following conditions:

- - 91% N_2

- - Cabin heat , defrost and engine anti-ice OFF.

- - Aircraft in cruise attitude.

- - 10 amperes electrical load

  NOTE: Operation of alternate air door does not affect this data

- Use of chart:

- - The primary use of the chart is illustrated by the EXAMPLE (page 5-11) and by the sample arrows shown on the power check chart. To determine power check values, it is necessary to read and record engine TORQUE PRESSURE, TURBINE OUTLET TEMPERATURE, PRESSURE ALTITUDE, and OAT while the helicopter is flown in level flight at 91% N_2.

- - Figure 5-7, Power Check Chart valid for external plenum inlet screen only.

- - For aircraft configured with internal plenum inlet screen see Figure 5-8.

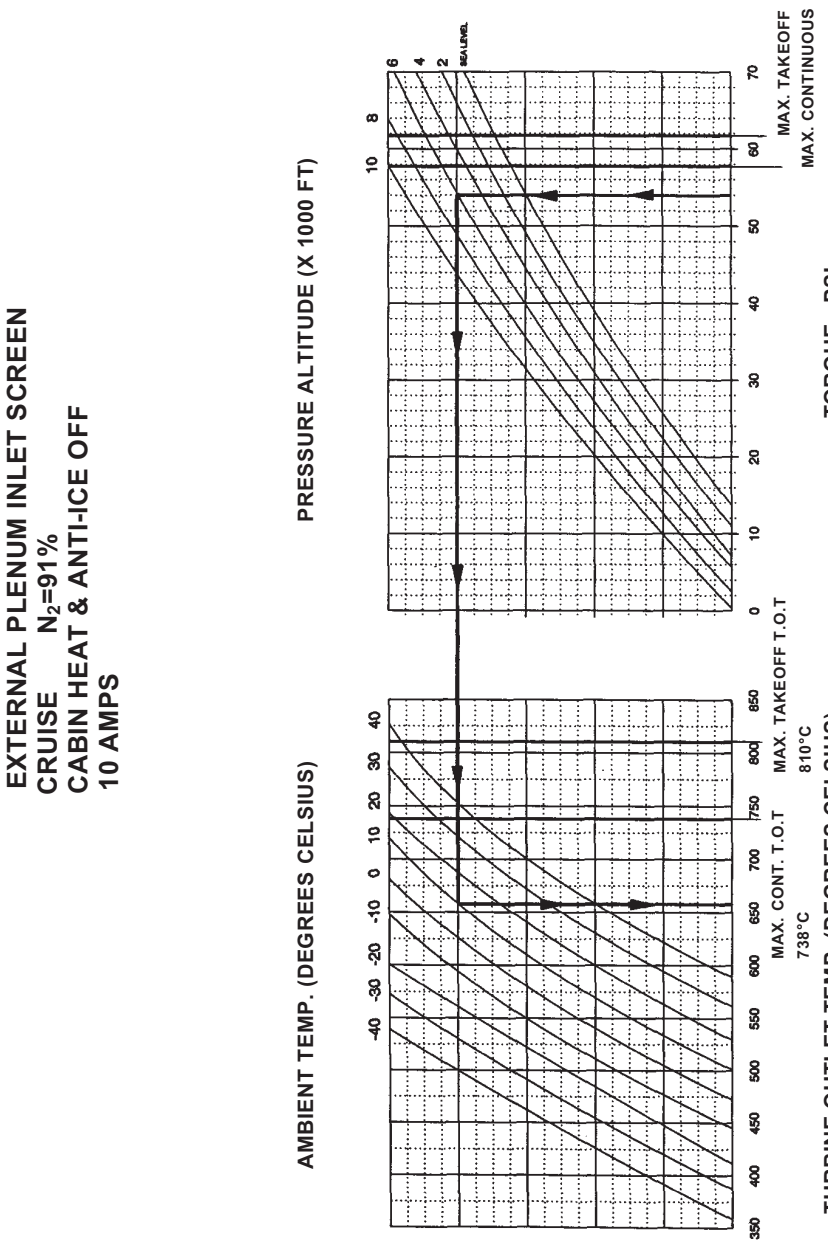


Figure 5-7. Power Check Chart - Rolls Royce 250-C20W Engine

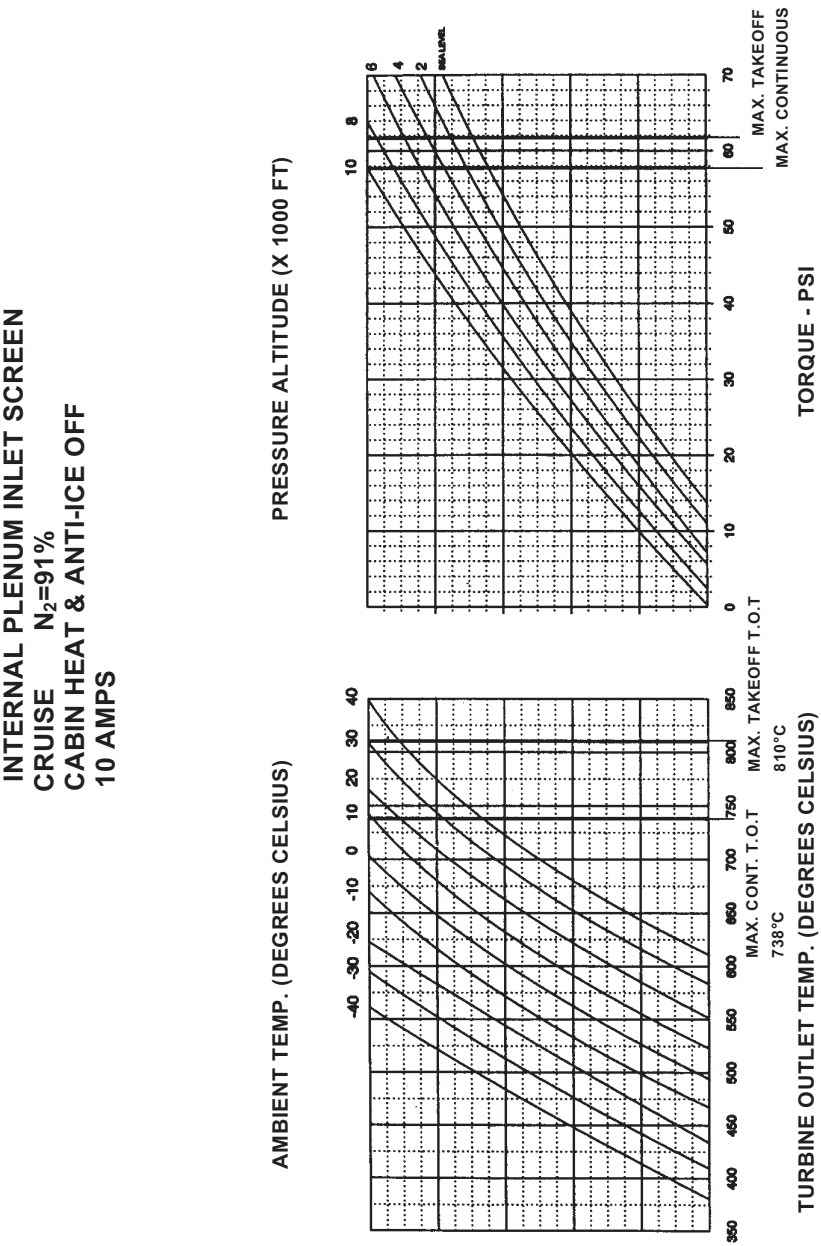


Figure 5-8. Power Check Chart - Rolls Royce 250-C20W Engine

WARNING

DO NOT EXCEED ENGINE/AIRCRAFT LIMITS.

- Accessories required for safe flight should be operated during each check.

WARNING

MAINTAIN SEPARATION FROM OBJECTS IN AIR OR ON THE GROUND.

- Reset altimeter if required after obtaining pressure altitude (or read pressure from Davtron Indicator).

NOTE: Best power check data is obtained at 61.7 psi torque or 810°C TOT. Allow engine to stabilize at least one minute at the test power setting before recording data.

- EXAMPLE:

WANTED - Check engine performance;

DATA OBTAINED DURING FLIGHT:

Torque = 54 psig

TOT = 650°C

PA = 6000 feet

OAT = 10°C

METHOD:

1. Enter bottom right of chart (Fig. 5-7) at 54 psi torque. Move up along 54 psi torque line to 6000 foot pressure altitude curve, move left to 10°C OAT curve, then move down and read specification TOT of 660°C.

2. Compare the specification TOT of 660°C with TOT observed during flight (650°C for this example). The TOT that was observed is lower than the specification TOT. If the TOT observed had been higher than the specification TOT read from the chart, some power deterioration will have occurred and the performance given in this manual may not be obtained.

3. When trend check procedures indicate engine power deterioration, refer to the Rolls Royce Operation and Maintenance Manual for corrective action.

5-3. NOISE

- At maximum gross weight, the helicopter produces 79.4 dBA SEL.

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SECTION VI

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Section VI

WEIGHT AND BALANCE DATA

6-1. WEIGHT AND BALANCE CHARACTERISTICS

- The weight and balance characteristics of the Schweizer 330 Helicopter are as follows:
  - Maximum Certified Gross Weight — 2230 pounds
  - Longitudinal Reference Datum — 100 inches forward of rotor centerline (Rotor hub centerline is located at Station 100 (Fig. 6-1 and 6-2).
- Center of Gravity Limits:
  - Lateral "+" is right of centerline; lateral "-" is left of centerline, when seated in the crew compartment looking forward.
  - See Fig. 6-3 for longitudinal center of gravity limits.
  - See Fig. 6-4 for lateral center of gravity limits.
  - Stowage Area Behind Seats — Limited to 50 pounds each side (Fig. 6-1)
- Center of Gravity Locations (Fig. 6-1 and 6-2):

	Longitudinal (Sta. - in.)	Lateral (B.L.- in.)
Fuel	*104.20	See Fig. 6-7
LH Seat	68.60	-21.50
Center Seat	78.60	+1.25
Right Seat	68.60	+23.75
Baggage Compartment**	125.00	-13.23

*For any fuel quantity.

**CG for centered load. See Fig. 6-1 for any non-centered load.

NOTE

OPTIONAL BAGGAGE COMPARTMENT LOADING. The baggage compartment is accessible through the main access door on the left side of the aircraft. It contains approximately 4.2 cubic feet of space. The baggage compartment has a load limit of 60 pounds (one (1) pound per square inch), which is a structural limitation only, and does not infer that C.G. will remain within approved limits. The load shall be secured to tiedown fittings, shifting of the load in flight could result in structural damage to the baggage compartment or in gross weight center of gravity limits being exceeded. The C.G. shall be computed with the load in the most adverse position.

Table 6-1. Center of Gravity Limits

Gross Weight (lb)	Longitudinal C.G. Limit (Sta.-in.)		Lateral C.G. Limit (B.L.-in.)
	Forward	Aft	(+) Right, (-) Left
2230	94.1	96.0	+2.4 - .9
1950	92.8	98.8	+ 3.7 - 2.2
1750 & below	92.0	101.0	+ 4.5 - 3.0

NOTE: Forward C.G. limit is 94.1 in. at 2230 lbs varying linearly to 92.0 in. at 1750 lbs and below. Aft C.G. limit is 96.0 in. at 2230 lbs varying linearly to 101.0 in. at 1750 lbs & below. (Fig. 2-2, Sheet 1)

NOTE: The right lateral C.G. limit varies linearly from a gross weight of 2230 lbs at buttline 2.4 in. to 1750 lbs & below at buttline 4.5 in.

NOTE: The left lateral C.G. limit varies linearly from a gross weight of 2230 lbs at buttline -.9 in. to 1750 lbs & below at buttline -3.0 in.

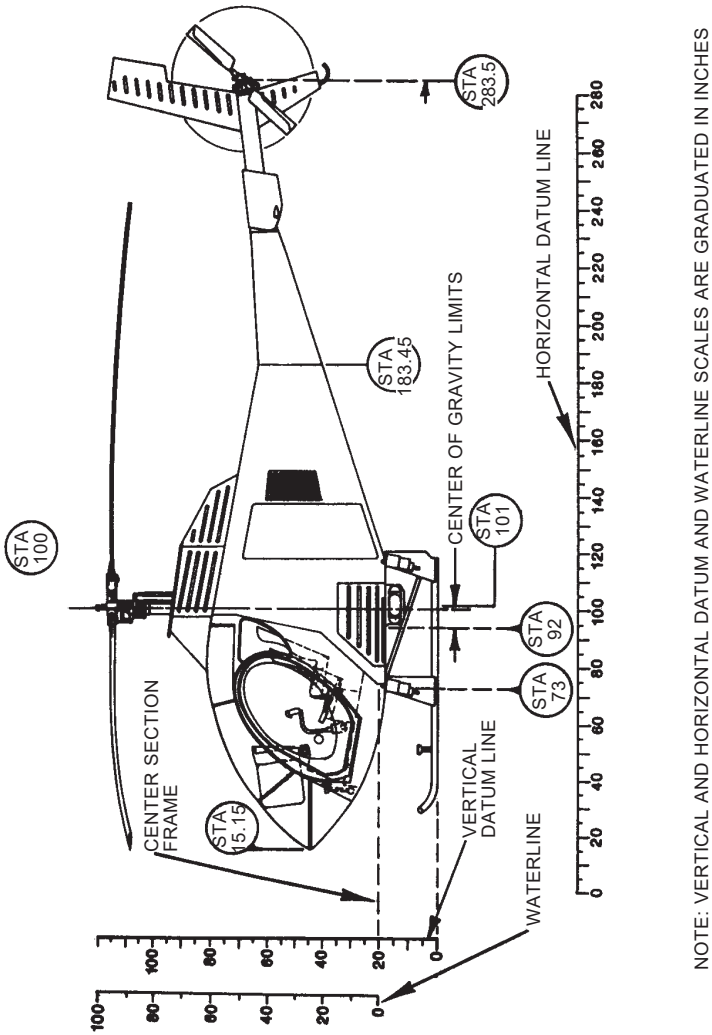

Figure 6-1. Balance Diagram (Sheet 1 of 2)

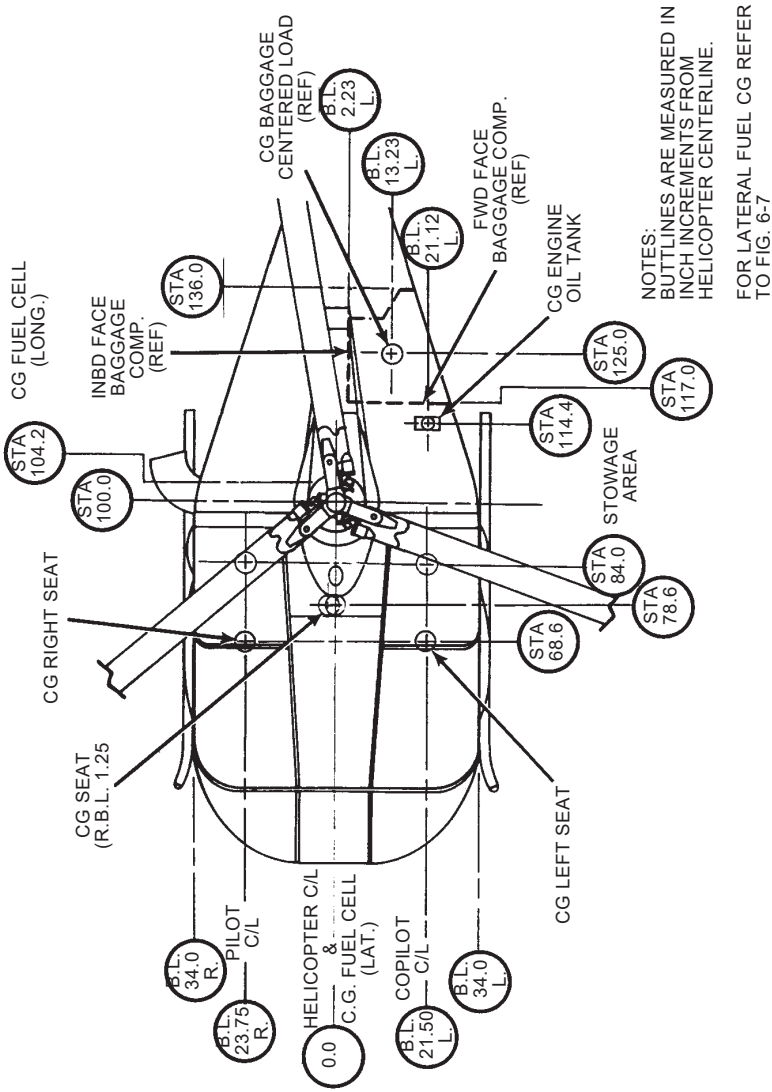

Figure 6-1. Balance Diagram (Sheet 2 of 2)

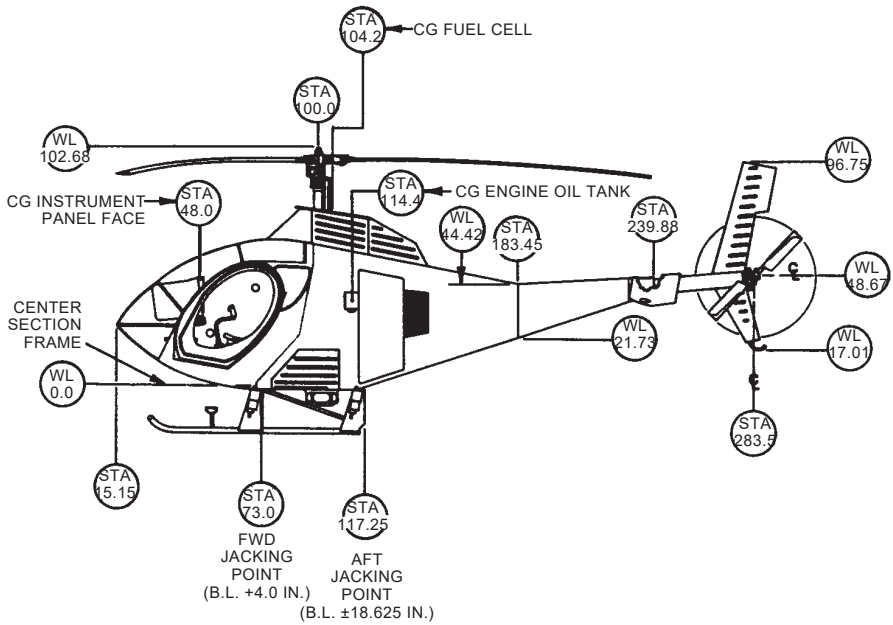

Figure 6-2. Station Diagram

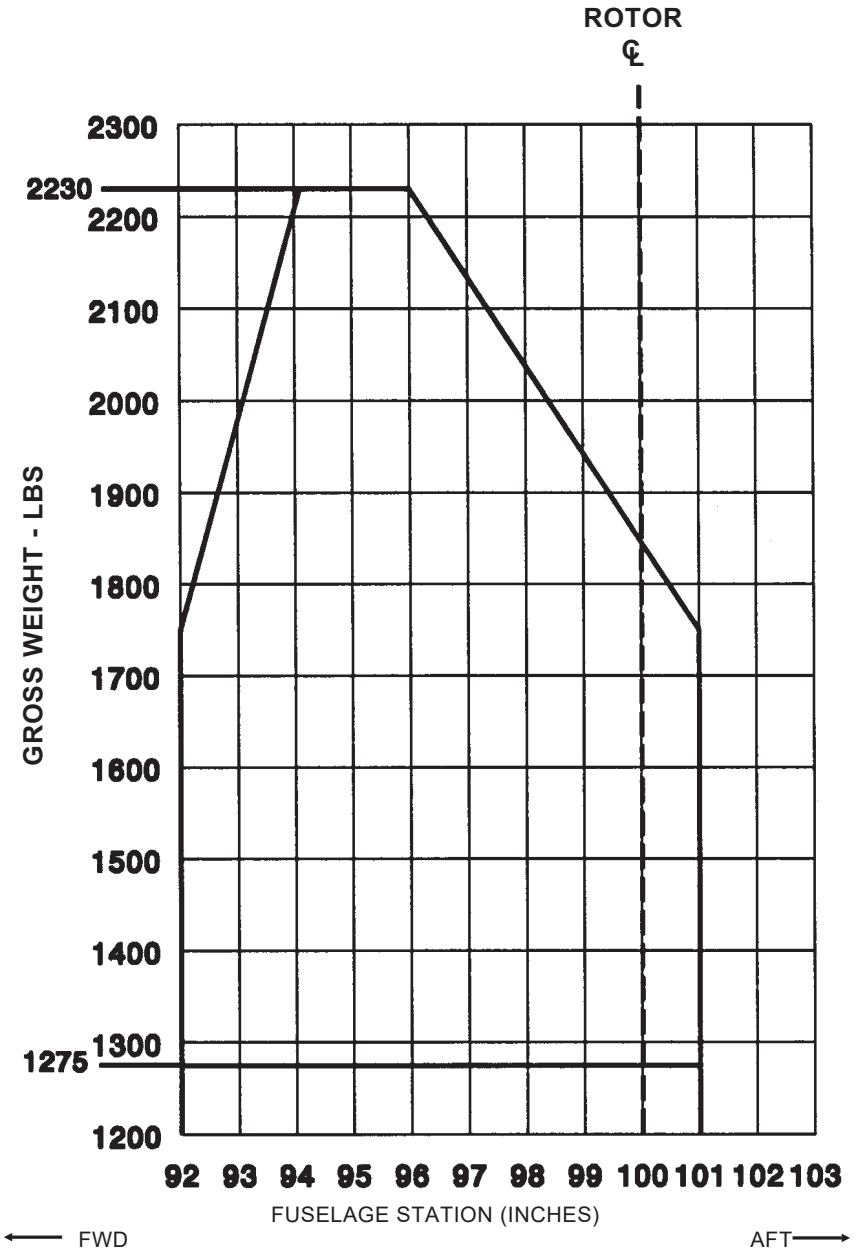

Figure 6-3. Longitudinal Center of Gravity Limits

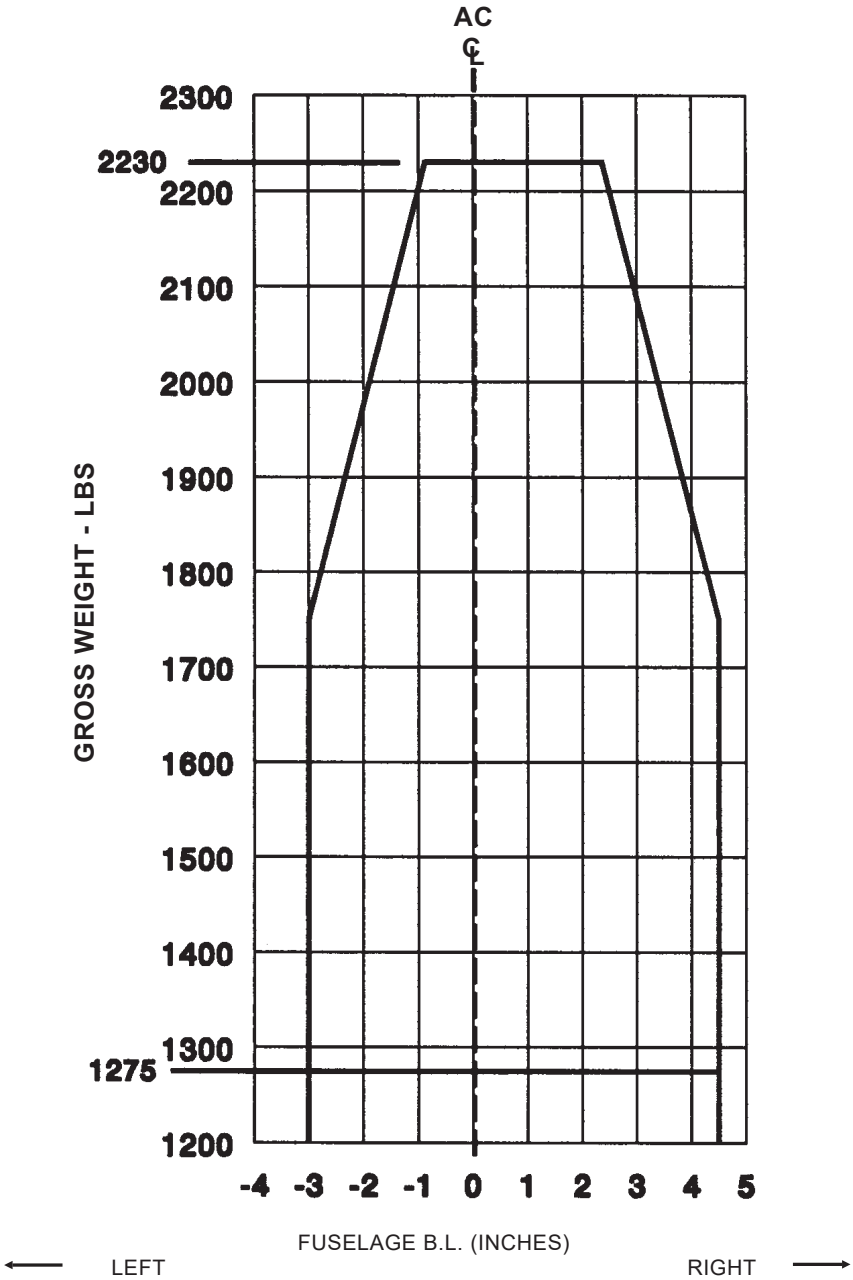

Figure 6-4. Lateral Center of Gravity Limits

6-2. WEIGHT LIMITS AND BALANCE CRITERIA

- The Schweizer 330 (Model 269D) Helicopter has the weight limits and balance conditions noted in Table 6-1.
- Do not exceed these limitations at any time during flight.
- Use the delivered weight as recorded in the Weight and Balance Record inserted in this section to perform all weight and balance computations (Fig. 6-5 and 6-6). Delivered weight includes oil and unusable fuel.

6-3. EQUIPMENT REMOVAL OR INSTALLATION

- Removal or addition of equipment must be entered on the Repair and Alteration Report Form, FAA 337, in accordance with Federal Aviation Regulations; which shall then become part of the Helicopter Records file.
- Record the weight and balance effects of these changes in the Weight and Balance Record inserted in this section. (Fig. 6-6)
- Use the Balance and Station Diagrams shown in Fig. 6-1 and 6-2 as an aid for weight and balance changes.

EXAMPLE WEIGHT AND BALANCE REPORT

MODEL 269D

WEIGHED BY: J. DOE DATE: 9-20-92

REGISTRATION NO.: N330T SERIAL NO.: 001 MODEL: 269D

WEIGHING POINTS	SCALE READING (LBS)	TARE OR CALIBRATION CORRECTION (LBS)	NET WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
LEFT MAIN	448	8	440	117.25	51590	-18.625	-8195
RIGHT MAIN	408	5	403	117.25	47252	+18.625	+7506
NOSE	306	1	305	73.0	22265	+4.0	+1220
TOTAL UNADJUSTED NET WEIGHT			1148	105.5	121107	+.46	+531

LONGITUDINAL MOMENT ARM OF MAIN REACTION	117.25
LONGITUDINAL MOMENT ARM OF NOSE REACTION	73.0
LATERAL MOMENT ARM OF MAIN REACTION	± 18.625 IN.
LATERAL MOMENT ARM OF NOSE REACTION	+ 4.0 IN.

FUEL/OIL ABOARD AT TIME OF WEIGHING	EMPTY	FULL
FUEL		
ENGINE OIL	X	
MAIN GEAR BOX		X
TAIL GEAR BOX		X
		X

MISSING EQUIPMENT AT TIME OF WEIGHING					
ITEM	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
ELT	3.0	84.0	+252	+25	+75
UNUSABLE FUEL	5.4	+104.2	+563	+24	+130
TOTAL	8.4	97.0	+815	+24.4	+205

SURPLUS EQUIPMENT AT TIME OF WEIGHING					
ITEM	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
VIBREX	-8	+65	-520	-7	+56
TOTAL	-8	+65	-520	-7	+56

Figure 6-5. Sample Weight and Balance Report (Sheet 1of 2)

WEIGHT AND C.G. CALCULATIONS

	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
Total Unadjusted Net Weight	1148	105.5	121107	+ .46	+ 531
Total Weight Of Missing Equipment	8.4	97.0	+815	+24.4	+205
Total Weight of Surplus Equipment	- 8	65	-520	- 7	+ 56
Total Delivered Weight	1148	105.8	121402	+ .69	+ 792

EXAMPLE OF LOADING TOWARDS FORWARD C.G.

	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
Total Delivery Weight	1148	105.8	121402	+ .69	+792
Right Seat	170	68.6	11662	+ 23.75	+ 4038
Center Seat	170	78.6	13362	+ 1.25	+ 213
Left Seat	170	68.6	11662	- 21.50	- 3655
Fuel Quantity	100	104.2	10420	+ 17.0	+ 1700
Gross Weight	1758	95.8	168508	+ 1.76	+ 3088

EXAMPLE OF LOADING TOWARDS AFT C.G.

	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)	LAT. ARM (IN.)	LAT. MOMENT (IN.-LB.)
Total Delivery Weight	1148	105.8	121402	+ .69	+ 792
Right Seat	140	68.6	9604	+ 23.75	+ 3325
Center Seat	NONE	-	-	-	-
Left Seat	120	68.6	8232	- 21.50	- 2580
Fuel Quantity	390	104.2	40638	+ 4.4	+ 1716
Gross Weight	1798	100.0	179876	+ 1.81	+ 3253

Figure 6-5. Sample Weight and Balance Report (Sheet 2 of 2)

BASIC WEIGHT AND BALANCE RECORD - LONGITUDINAL (LONG.) AND LATERAL (LAT.)
(CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE)

AIRCRAFT MODEL 269C or 269D	SERIAL NUMBER	REGISTRATION NUMBER	PAGE OF

	ITEM NO.				WEIGHT CHANGE, LONG.				RUNNING TOTAL			WEIGHT CHANGE, LAT.				RUNNING TOTAL		
					ADDED (+)		REMOVED (-)		BASIC AIRCRAFT, LONG			ADDED (+)		REMOVED (-)		BASIC AIRCRAFT, LAT.		
DATE	IN	OUT	DECRIPTION OF ARTICLE OR MODIFICATION	WT. + OR -	LONG. ARM	MO.[1] IN/LB	LONG. ARM	MO.[1] IN/LB	WT.	LONG. ARM	MO.[1] IN/LB	LAT. ARM	MO.[1] IN/LB	LAT. ARM	MO.[1] IN/LB	WT.	LAT. ARM	MO.[1] IN/LB
			TOTAL DELIVERED WEIGHT															

[1] ENTER CONSTANT USED BELOW LINE MO. - MOMENT WT. - WEIGHT

Figure 6-6. Basic Weight and Balance Record

6-4. LONGITUDINAL WEIGHT AND BALANCE DETERMINATION

- To determine that the gross weight and longitudinal center of gravity (fore and aft) for a given flight are within limits, proceed as follows

- Obtain aircraft delivered weight and moment from the Weight and Balance Record inserted in this section.

- Determine weights and moments of useful load items (see Example I, Fig. 6-3, and Table 6-1).

EXAMPLE I			
Items	Weight (lb)	Long. Arm (in)	Long. Moment (in.-lb.)
Delivered Weight	1148	105.8	121402
Pilot	170	68.6	11662
Passenger - Outboard	170	68.6	11662
Passenger - Center	170	78.6	13362
Stowage Area (Station 84.0)	50	84.0	4200
1. Zero Fuel Weight	1708	95.0	162,288
Add: Fuel	390	104.2	40638
2. Gross Weight	2098	96.7	202926

- Calculation of Lateral CG

- - - CG (Zero Fuel Weight):

$$\frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{162288}{1708} = 95.0 \text{ in.}$$

- - - CG (Gross Weight):

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{202926}{2098} = 96.7 \text{ in.}$$

NOTE

The CG's fall within the limits specified in Para 6-1; therefore, the loading meets the longitudinal CG requirements.

- Determine corresponding center of gravity for gross weight by dividing total moment by gross weight. This computation must be done with zero fuel gross weight and with mission fuel gross weight (see Example I).

NOTE

Lateral C.G. must be controlled. Refer to Para 6-5.

CAUTION

Do not exceed 2230 pounds gross weight.

NOTE

Ballast may be carried in the stowage area behind seats or stowed and secured by seat belt and shoulder harness in opposite front seat. Ballast may consist of shot, sandbags, or similar material, adequately contained and secured.

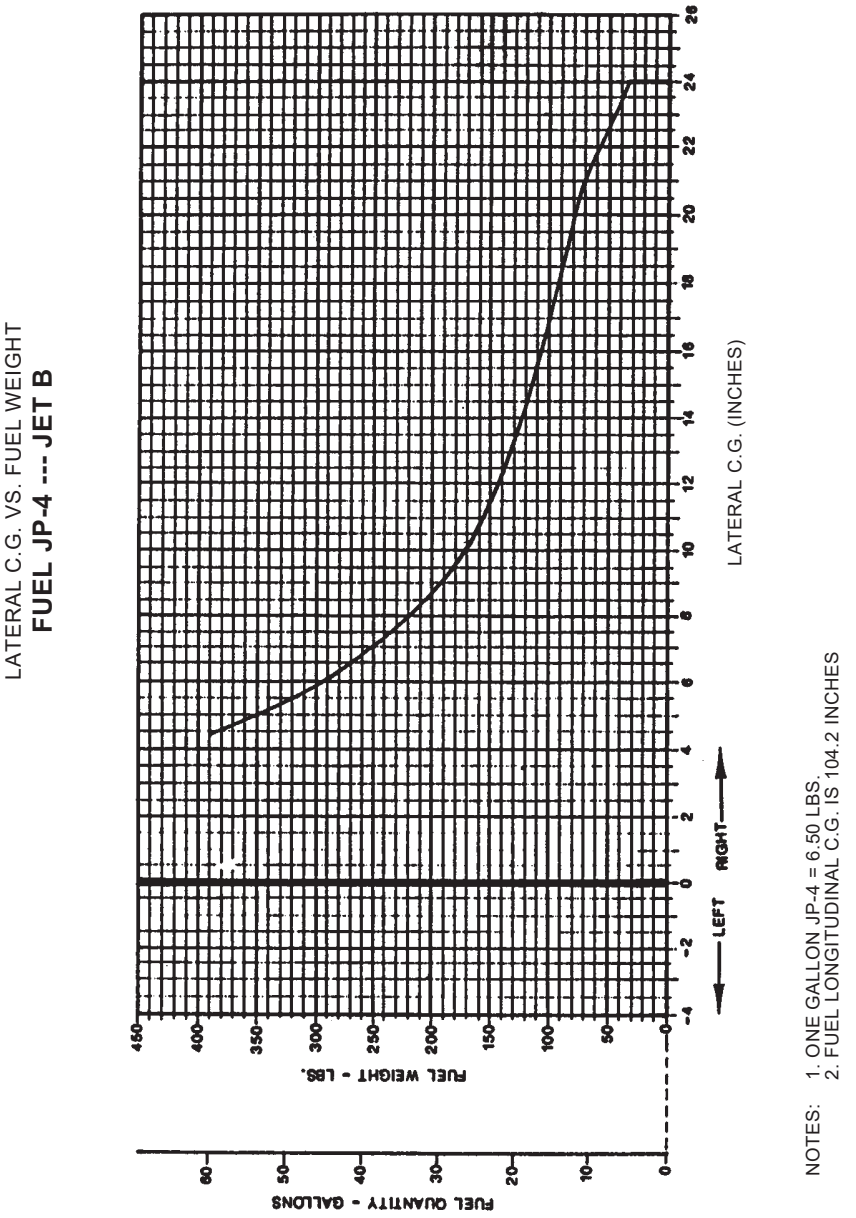

Figure 6-7. Fuel Buttline (Sheet 1 of 2).

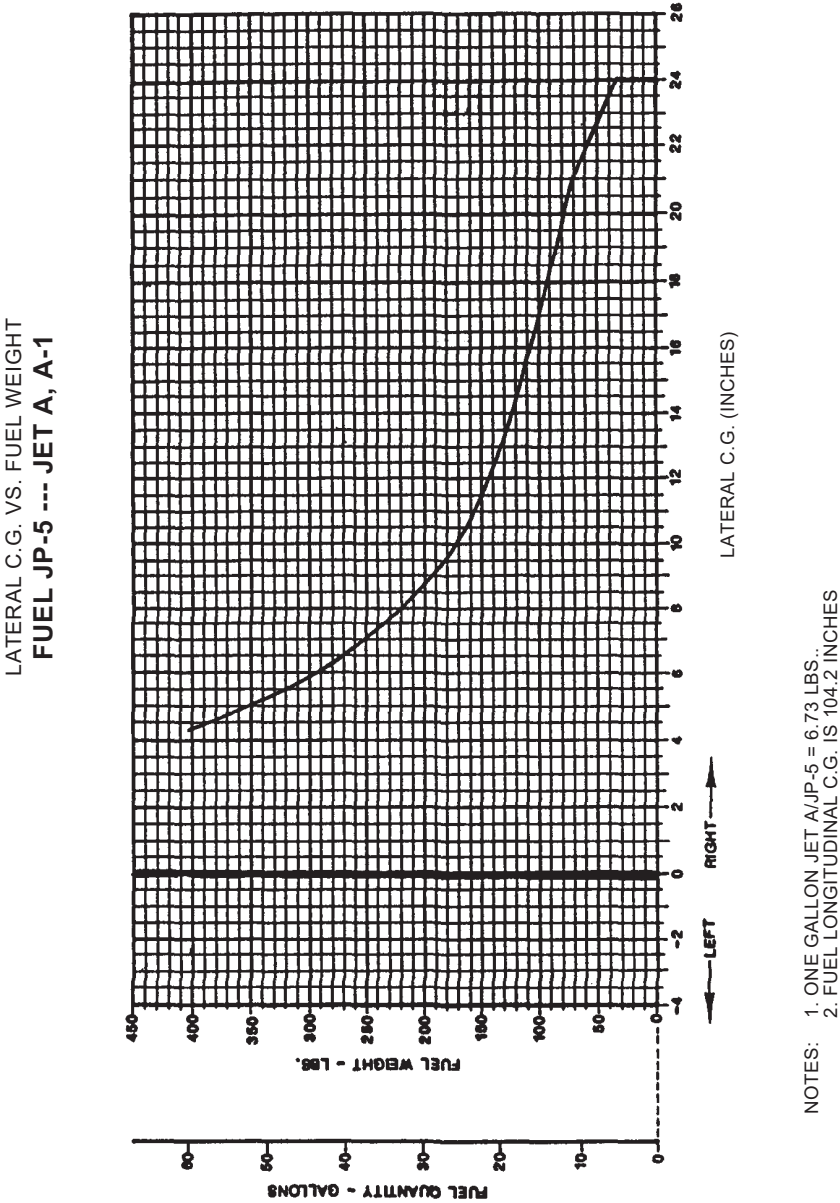

Figure 6-7. Fuel Buttline (Sheet 2 of 2).

Table 6-2. Weights and Longitudinal Moments - Pilots, Passenger, Baggage

Pilot and Passenger Weights and Longitudinal Moments			
Pilot/Passenger Weight (lb.)	Moment (in.-lbs.) R H Seat Station 68.6	Moment (in.-lbs.) Center Seat Station 78.6	Moment (in.-lbs.) LH Seat Station 68.6
90	6174	7074	6174
100	6860	7860	6860
110	7546	8646	7546
120	8232	9432	8232
140	9604	11004	9604
160	10976	12576	10976
170	11662	13362	11662
180	12348	14148	12348
190	13034	14934	13034
200	13720	15720	13720
220	15092	17292	15092
240	16464	18864	16464

Baggage Weights and Longitudinal Moments	
Baggage Weight (lb)	Moment (in.-lbs.) Behind Seat Station 84.0
10	840
20	1680
30	2520
40	3360
*50	4200
60	5040
70	5880
80	6720
90	7560
100	8400
*Maximum Capacity Each Location	

Note: For all quantities of fuel, longitudinal CG is 104.2".

6-5. LATERAL WEIGHT AND BALANCE DETERMINATION

- The safe operation of this helicopter requires that it be flown within the established lateral as well as longitudinal center of gravity limits.
- It is therefore imperative that lateral center of gravity control be exercised.
- All combinations of passenger loadings are permissible if gross weight, -longitudinal, and lateral center of gravity considerations permit.
- For passenger lateral center of gravity, refer to Fig. 6-4 and Table 6-1.

EXAMPLE II			
Items	Weight (lb)	Lateral Arm (in.)	Lateral Moment (in.-lb.)
Delivered Weight	1148	+.69	+792
Pilot	170	+23.75	+4038
Passenger - Outboard	170	-21.50	-3655
Passenger - Center	170	+1.25	+213
Stowage Area	50	-21.50	-1075
1. Zero Fuel Weight	1708	+.18	+313
Add: Fuel	390	+4.4	+1716
2. Gross Weight	2098	+.96	+2029

- Calculation of Lateral CG
- CG (Zero Fuel Weight):

$$\frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{+313}{1708} = +.18 \text{ in.}$$

- CG (Gross Weight):

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{+2029}{2098} = +.96 \text{ in.}$$

NOTE

The determined lateral CG's of +.18 inch at 1708 pounds and +.96 inch at 2098 pounds fall within the lateral limits.

CAUTION

Gross weight must not exceed 2230 lbs.

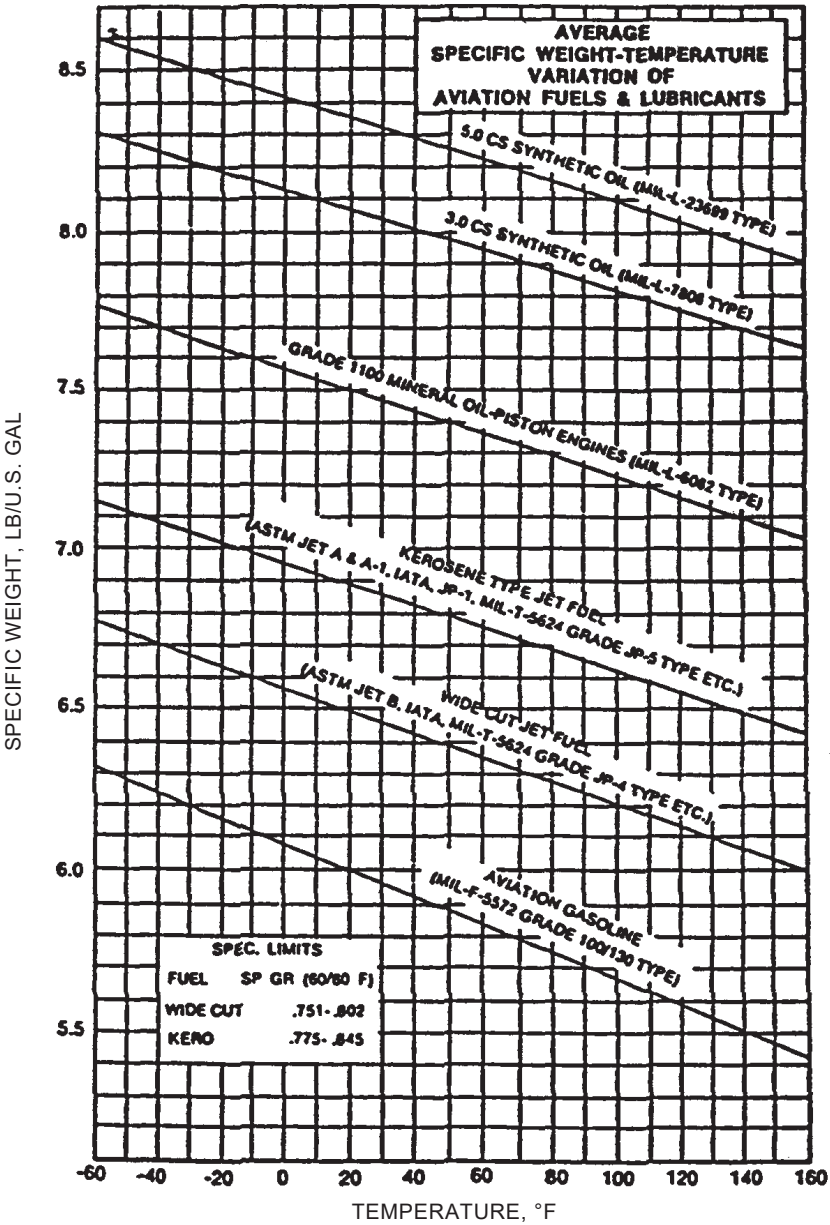

Figure 6-8. Specific Weight of Fuels and Lubricants

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Section VII

AIRCRAFT HANDLING, SERVICING AND MAINTENANCE

7-1. MAINTENANCE AND OPERATIONAL CHECK REQUIREMENTS AND PRECAUTIONS

- All maintenance on the helicopter is to be accomplished in compliance with the following requirements and precautions:

- - Instructions in Schweizer 330 HMI.

- - - All maintenance and operational checks that require operation of the helicopter must be performed in accordance with requirements and limitations specified in the Pilot's Flight Manual and any applicable Optional Equipment Supplements.

- - Operational checks.

- - - After performance of maintenance or modification, the affected parts are to be inspected for discrepancies and an operational check is to be performed.

- - **CAUTIONS and WARNINGS.**

- - - Caution and warning statements throughout the HMI and this manual are provided to promote safe maintenance of the helicopter.

- - General Information -Inspections.

- - - All inspections include visual inspection of the specified system equipment or component for cracks, corrosion, distortion, security, or any other obvious defects or damage.

- - - Inspections for fuel and oil systems, equipment, or components containing or using fuel or oil include checks for leakage, distortion, and clogging; including hoses, lines, tubing, and fittings, as applicable.

- Before the first flight of the day - or more frequently if service conditions are severe - the inspections described below should be performed by a qualified pilot or mechanic. In addition, daily inspection of the engine should be performed in accordance with the Rolls Royce Operation and Maintenance Manual, Publication No. 10W2.

- Refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2 for detailed requirements on daily inspection of the engine.

- When unusual local conditions (environment, utilization, etc.) dictate, it is the responsibility of the helicopter operator or owner to increase the extent and/or frequency of inspections to promote safe operation.

- Inspections are grouped by location so that they can be performed on an area-by-area basis. Thus, inspection of the entire helicopter may be accomplished by starting at the front and working in clockwise progression to completion.

- The following inspections may be performed by a helicopter qualified pilot or mechanic.

WHAT TO INSPECT (POWER OFF):

FRONT - CANOPY AND PILOT'S COMPARTMENT

- Canopy and front exterior for obvious damage; windshield for cleanliness.

- Landing light for security and obvious damage.

- Pitot tube cover removed, and pitot tube for obstruction. Drain hole clear.

- Outside air temperature probe for security and obvious damage. Cabin air inlets clear.

- Lower forward fuselage for general condition of skin, structure and optional equipment.

- Area forward of instrument panel clean and free from obvious damage.
- Tail rotor controls and supports secure.
- Antenna secure and free from damage.
- First aid kit; contents and security of attachment.
- Seat base structure for evidence of deformation.
- Fire extinguisher for charge pressure and security of attachment.
- Seat belts, shoulder harnesses and inertia reels for general condition and security; proper operation of buckles and inertia reels; all belts securely fastened or stored when not in use.
- Instrument covers and trim panels for secure closure.
- Cyclic, collective and tail rotor controls; visible push rods for excessive bearing looseness and free movement. Check tail rotor pedal quick-release locking pins for condition and security. Check for minimum cyclic friction adjustment (resistance to turning of spring with fingers).

  NOTE: With main rotor blades stationary, some friction drag is felt in the cyclic. The collective also has some drag, plus resistance of the collective bungee spring.

- Collective stick(s) and cyclic stick(s) for condition, secure closure and free movement throughout stick travel. Refer to Paragraph 7-12 for correct collective stick installation and rigging alignment.
- Magnetic compass correction and V_{NE} cards in place and legible; helicopter checklist and Pilot's Flight Manual in helicopter.
- Airworthiness, registration and related certification in aircraft.
- All loose equipment for proper stowage.

RIGHT SIDE - FUSELAGE AND LANDING GEAR

- Cabin doors for general condition, and proper operation of vent and door latching and locking mechanism.
- Door hinge pins properly installed and secured.
- Exterior of fuselage skin, rivets, fasteners and structure for damage and security. No evidence of buckling noted.
- Landing gear for condition of skid tubes and fairings.
- Forward and rear landing gear damper for condition, by observing stance of helicopter. Visually check damper for leakage; replace damper if leakage is obvious, or if extension is unusual.
- Passenger steps secure and free from damage.
- Pylon clean and free from damage.
- No evidence of oil leakage around fuselage drain hole.
- Engine exhaust duct secure, free from cracks or distortion.
- Scavenge oil filter for extended bypass indicator.
- Right hand static port free of obstruction.
- Access, inspection and compartment panels/covers for secure closure.

AFT FUSELAGE

CAUTION

The following special check applies to 269D3300-1 Aft Fuselage Assemblies only. S/N 63 & subsequent are factory equipped with the 269D3300-35 aft fusealage assembly, and do not require that the following check be conducted. Cracks in the paint film alone may indicate internal structure damage and this requires further maintenance action before further flight.

- Fuselage area above horizontal stabilizer for cracks in paint film. Pay particular attention to flange bend radius and vertical face of aft bulkhead and entire adjacent aft fuselage skin. Any signs of cracks requires further inspection before next flight.

- Exterior skin for obvious damage and loose rivets. Check for no gap between fuselage attach points. Check skin around stabilizer fittings for cracks. Check stabilizer attach bolts for security.

- Anticollision light and related wiring for obvious damage and security.

STABILIZERS, TAIL ROTOR TRANSMISSION AND TAIL ROTOR

- Tail skid for security and damage.

- Position lights for security and obvious damage.

- Tail rotor output shaft protective dust boot for condition.

- Tail rotor transmission for security of mounting. Check torque stripes for movement of the transmission (cracks in the torque paint), fretting and gaps between the faying surfaces and/or rotation of nuts and studs.

- Tail rotor transmission for excessive oil leakage and correct oil level; replenish if low.

- Tail rotor blade abrasion strips free of damage; no excessive erosion noted. No separation in bond around edges or at tip end of blade.

- Tail rotor blades, fork assembly, and hub and pitch control linkage for free movement, obvious damage, wear and security.

NOTE

Disregard a snapping noise sometimes heard in tail rotor strap pack when pitch is changed without centrifugal load being applied.

- Retaining nut and lockwasher secure. No broken locking tangs noted; retaining nut has not rotated.

- Tail rotor control rod at gearbox and pitch control links at rotor for excessive bearing play, free movement and security. Pitch control for evidence of seal rotation or loss of grease.

- Tail rotor teeter bearings for axial or radial play.

- Overrunning clutch for proper operation; turn rotor in forward direction, by hand - engine must decouple; turn rotor in reverse direction - engine must rotate (listen for turbine noise during reverse rotation).

  NOTE: Normal seal drag may be sufficient to rotate engine at low RPM.

- Drive fork for failure between metal cones and elastomeric elements in bearing assembly. Apply teetering force by hand (stop-to-stop) to rotate blades. Inspect elastomers for radial molded ridges on each bearing face as teetering takes place. Discontinuity in molded ridges indicates bearing failure.

  NOTE: Light swelling, pock marks and crumbs are surface conditions and do not indicate bearing failure.

ENGINE COMPARTMENT

- Rear cross beams for yielding (evidence of hard landing).

- Fuel cell for leakage and security.

- Drain fuel sample from fuel cell sump drain valve into suitable container. Check for water and/or contaminants in fuel sample. If fuel is contaminated, refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2 for corrective action, prior to flight.

- Check fuel cell sump drain valve and bottom of fuselage for evidence of leakage.

- Check engine oil level; replenish if low.

- Battery clean and secure.

- Engine air inlet plenum and screen secure and free from obstructions.
- Entire engine for; loose bolts, loose or broken connections, accessories for secure and broken or missing lockwire, accessible areas for obvious damage, evidence of fuel and oil leaks.
- Fuel and oil lines for chafing, kinking and evidence of leakage; fuel line drain valve for leakage. Oil cooler and cooler fan for security and obvious damage.
- Engine mounts for distortion. Check attaching and support fitting bolts for security. Check that adjustable mounts are secure and that slippage marks are not disturbed.
- N_1 and N_2 control linkage for free operation, full travel, security and obvious damage.
- Pilot's and copilot's throttle rigging checks at FULL OPEN, GROUND IDLE and CUTOFF positions.
- Fuel controls and compressor exterior for condition and security.
- Firewall insulator panels for security and obvious damage.
- Engine wiring harness leads for: burning, chafing, cracking; connectors for looseness and broken or missing lockwire.
- Main rotor transmission for secure, clean, and correct oil level; replenish if low.
- Check mast support bolts for security. Mast and mast base area clean and free of debris. No obvious damage to mast base and mixer bellcranks.

LEFT SIDE - FUSELAGE, MAIN ROTOR AND LANDING GEAR

- Cabin doors for general condition, and proper operation vents and door latching and locking mechanism.
- Front compartment door hinge pins properly installed and secured.
- Left hand static port free from obstruction.
- Access, inspection and compartment doors/covers for secure closure.
- Landing gear for condition of skid tubes and fairings; abrasion strips secure.
- Forward and rear landing gear dampers for condition, by observing stance of helicopter. Visually check dampers for leakage. Replace damper if leakage is obvious or if extension is unusual.
- Passenger step secure and free from damage.
- Upper canopy clean and free from damage.
- Pylon clean and free from damage.
- Main rotor hub, pitch housing and swashplate for obvious damage.
- Blade pitch links lockwire for security. Visually inspect main rotor blade damper attach fitting for cracks, wear and corrosion. Damper for obvious damage and for security. Scissors for any evidence of damage or deformation of crank or link.
- All main rotor blades for scratches, dents, cracks, corrosion, security and bond separation at root fittings and doublers.
- Main rotor blade leading edge abrasion strip bonding for bonding separation. Any blisters, bubbling or lifting of edge of abrasion strip indicates a void.

- Rotate main rotor blades by hand in direction of rotation and check blades for obvious damage, condition of trailing edge and tip, and cleanliness.

- Visible portion of flight control linkage for damage.

- Fuel cap secure and fuel level correct.

- Engine oil cooler free from obstructions.

- Exterior of fuselage skin, rivets, fasteners and structure for damage and security. No evidence of buckling noted.

- Access doors/panels secure.

WHAT TO INSPECT (POWER ON): PILOT'S COMPARTMENT

NOTE: When possible, use auxiliary power source during POWER ON inspection, not battery.

- Push PRESS TO TEST switch: All caution and warning lights ON; adjust instrument light rheostat knob; verify CAUTION lights dim.

- Check ENGINE OUT audio by manually positioning GEN switch to ON.

- Operate pilot's and copilot's cyclic trim switch briefly in all four directions. Check for trim motor operation/noise.

- Operate pilot's and copilot's N_2 beep switch up and down. Check for motor operation. Return N_2 beep to minimum.

- Interior lighting (compass, panel, map/utility lights, etc.) for proper operation; all switches OFF after check.

CAUTION

Do not leave landing light ON for more than one minute during next check; lamp will overheat and lamp life will be shortened.

- Exterior lighting (landing, position and anticollision lights) for proper operation; all switches OFF after check.

WARNING

DO NOT LEAVE PITOT HEAT ON DURING NEXT CHECK FOR MORE THAN ONE MINUTE; SEVERE BURNS MAY RESULT IF PITOT TUBE IS TOUCHED.

- PITOT HTR switch ON for a few seconds. Heated pitot tube will feel warm to the touch; turn switch OFF after check.

- Communication, navigation and intercom equipment for proper operation; turn switches OFF after check.

- All installed auxiliary or optional systems and equipment for proper function.

7-2. RELATED PUBLICATIONS

- Refer to Basic HMI Section 2 for a listing of related publications and directives.

7-3. MAINTENANCE INFORMATION REQUESTS

- Questions that may arise during maintenance of the helicopter or it's components should, when possible, be referred to the Authorized Field Service Representative or Schweizer Customer Service Department.

7-4. INSPECTION PRACTICES AND TECHNICAL DEFINITIONS

- Inspection procedures and serviceability (wear) tolerances for maintenance of the helicopter are provided either as part of the instructions for reassembly and installation of components or in inspection and repair paragraphs of the HMI.

- Any damage or wear of a part that exceeds given tolerances or that affects function and/or integrity of a part requires replacement with a new or serviceable part.

- Throughout the HMI, where detailed inspection procedures are not specifically furnished, visual inspection for integrity, damage and serviceability applies for these items, components and equipment.

7-5. MALFUNCTION/INFORMATION REPORT

This form may be used to report to Schweizer RSG in detail any service difficulties encountered with any Schweizer helicopter. Use of this form is encouraged and recommended to enable Schweizer RSG to provide owners and operators with improved service, support and product improvement.

- This form also serves as a convenient detailed record for owners and operators.

- This form may be procured from Schweizer Customer Service Department.

7-6. HELICOPTER FUNDAMENTALS

- The major components of the helicopter are shown in Fig. 7-1.
- Principle dimensions are shown in Fig. 7-2.
- Reference is occasionally made to “station” and “waterline” throughout this manual. To assist in locating the components being discussed, refer to the station diagram in Section VI.
- The maximum weights for large components that may require hoisting are listed in Table 7-1.

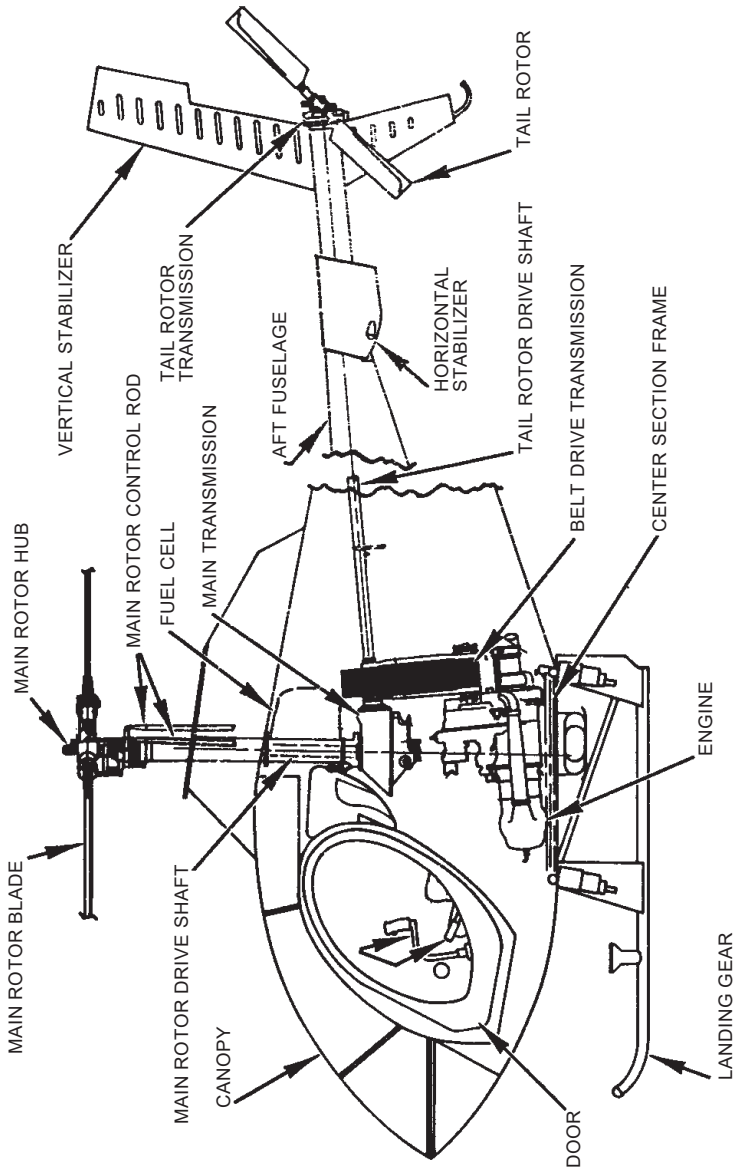
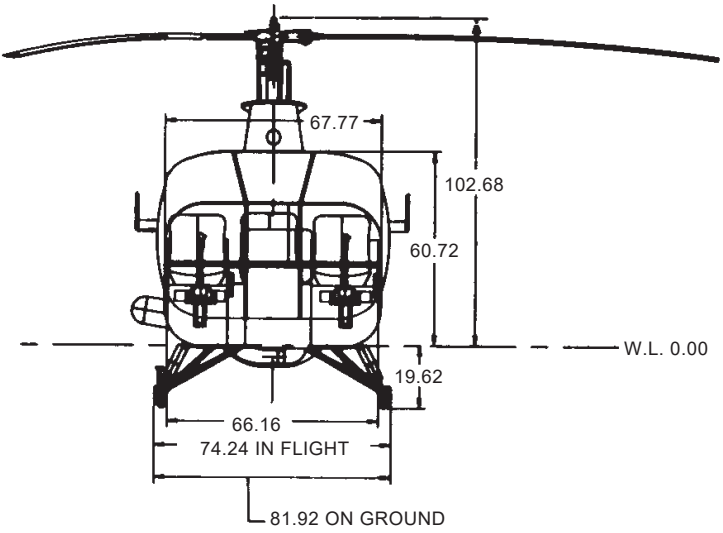
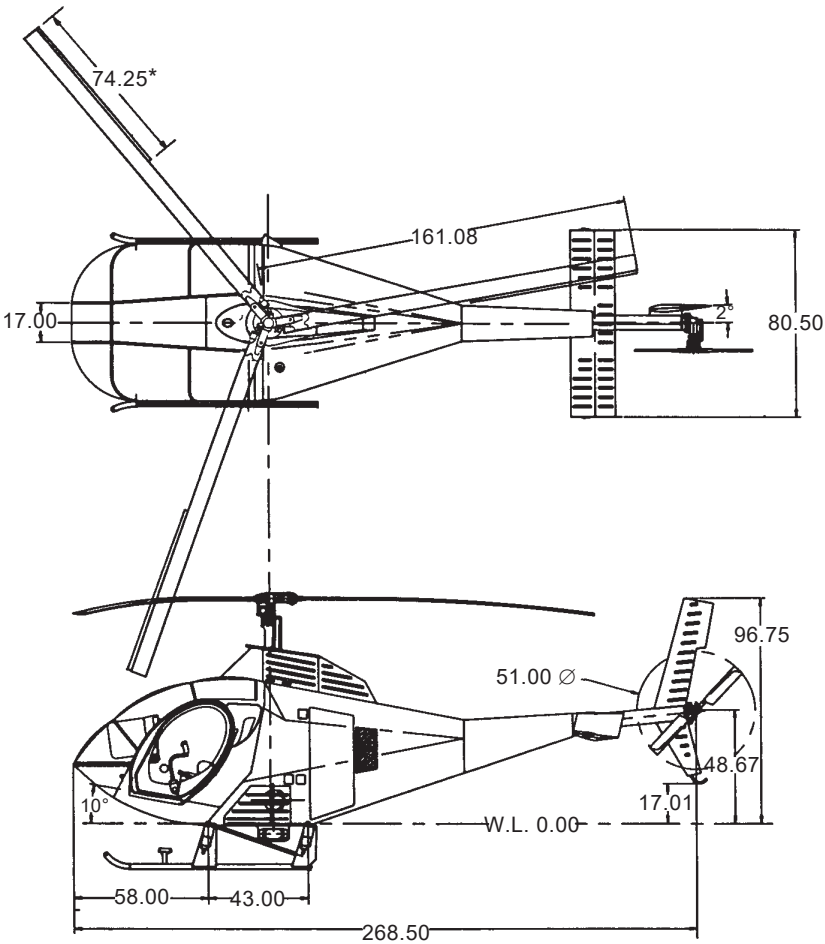


Figure 7-1. Major Components



Dimensions: (Not Shown):	
Main Rotor Diameter	26 ft. 10 in.
Overall Length (with main rotor blade forward and tail rotor blade aft.)	30 ft. 11 in.
Weights:	
Design Gross Weight	2,230 lbs.
External Load Gross Weight	2,230 lbs.
Empty Weight (approximate)	1,100 lbs.
Useful Load (approximate)	1,130 lbs.
Powerplant:	
Make	Rolls Royce
Type	Gas Turbine
Designation	250-C20W
Power Rating	220 HP 235 HP 5 MIN LIMIT
Std Capacity Fuel	60.8 U.S. Gal.
Useable Fuel Capacity	60.0 U.S. Gal.
Generator Capacity	150 Amps

Figure 7-2. Principle Dimensions (Sheet 1 of 2)



* 269A1185-1 main rotor blade (23.75 trailing edge tab),
269A1185-5 main rotor blade (74.25 trailing edge tab) shown.

Figure 7-2. Principle Dimensions (Sheet 2 of 2)

Table 7-1. Approximate Maximum Hoisting Weights of Components

ITEM	WEIGHT (LBS)
Aft fuselage	22.2
Main rotor hub	53
Main transmission (wet)	65
Engine (dry)	155
Main rotor hub, swashplate, scissors, and rotor blades	135
Helicopter (complete)	1562*

*Includes 404 lbs. of fuel

7-7. HELICOPTER GROUND HANDLING

- Ground handling of helicopter includes hoisting, jacking, leveling, parking and mooring. The following paragraphs present instructions and precautions for all ground handling functions.

7-8. USE OF EXTERNAL POWER

- The external receptacle is located on the lower right side (L/H side optional) of the helicopter. Any source of external 28-volt, direct-current power with sufficient amperage rating may be used. (Engine starting requirements are approximately 375 amperes.)

- Before connecting external power, be sure that helicopter BATTERY switch is OFF.

7-9. HOISTING

- Hoist helicopter in accordance with Basic HMI Section 2.

7-10. JACKING

- Provisions for jacking helicopter (Fig. 7-3) are provided by one forward jacking lug and two aft jacking pads.

CAUTION

During jacking operations, ensure that jacks are perpendicular at all times.

When helicopter is jacked from one end only, use blocking under skids as necessary to maintain stability.

NOTE: A recessed pad is required to mate with the jacking lugs.

- Place suitable jacks under forward jacking lug and aft jacking pads.
- Raise helicopter to desired height.

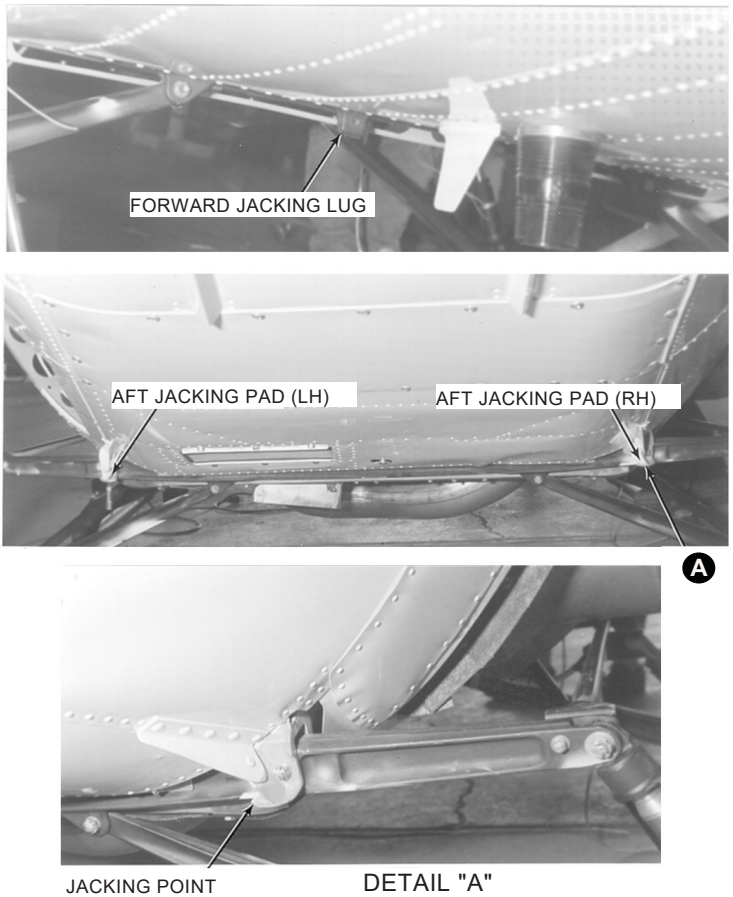


Figure 7-3. Jacking and Leveling

7-11. LEVELING

- Leveling is accomplished by jacking the helicopter to level the main rotor hub both laterally and longitudinally, using either of the methods described below.

- Spirit Level Method

- Place spirit (bubble) level on top of main rotor hub (Fig. 7-3) so that bubble glass is parallel to helicopter centerline.

- Using jacks, raise or lower aft fuselage as required to level helicopter along longitudinal axis.

- Reposition bubble level so that bubble glass is in lateral plane (perpendicular to helicopter centerline). Adjust jacks as required to level helicopter on lateral axis.

- Check level in both planes and readjust jacks as necessary.

- Plumb Bob Method

- Flip up center seat cushion as required to expose target on center seat pan. From inside surface, insert plumb bob cord thru hole provided in R.H. canopy frame. Adjust cord length to position plumb bob approximately 1/8 inch above target.

- Using jacks, adjust height of helicopter along the longitudinal and/or lateral axis until the plumb bob is aligned with the center of target.

7-12. COLLECTIVE STICK INSTALLATION AND REMOVAL

- To install collective stick set the N_1 control lever (mounted on the engine) to 30°. Align the yellow mark (the smaller of the two notches) on the collective grip with the white line on the collective stick. Insert the collective stick into the housing assembly and secure. Check each throttle and collective stick for proper travel and freedom from interference. If throttle is not within limits refer to the

HMI for rigging check. Connect associated wire harness. Remove stick in reverse order of installation.

7-13. MOVING AND TOWING HELICOPTER

- Ground handling wheels are available for the helicopter.

Ground Handling Wheels (Stowed above landing gear skid tubes)

These wheel assemblies attach to brackets on the skid tubes. For air transport, insert each wheel assembly axle through the bracket. Install a quick-release pin through each bracket and axle to hold the wheels in the up position. For ground handling, remove the pin to allow the wheel to rotate down. Remove the handle from its stowage location inside the engine compartment. Insert the handle into each wheel assembly and push (or pull) to bring the wheel over center. Align the hole in the bracket with the hole in the axle and install the pin to keep the wheels in the ground handling position. Remove the handle. **Do not operate** the helicopter with the wheels installed in the ground handling position.

CAUTION

When balancing/moving the helicopter by hand, do not push on stabilizers or any other component or surface that may sustain damage from ground handling or pushing.

- Move helicopter on ground by manually balancing on ground handling wheels and pushing on tail rotor transmission housing and on any structural member(s) of the helicopter. (i.e. cabin door may be opened and assistant may push on adjacent door frame.)

CAUTION

Except under extreme emergency conditions, do not tow helicopter at speeds over five MPH. Do not allow front end of skid tubes to drag on ground. Avoid sudden stops and starts, and short turns which could cause helicopter to turn over. Allow inside wheel to turn (not pivot) while helicopter is being turned. Safe minimum turning radius is approximately 20 feet.

7-14. PARKING (Fig. 7-4)

- To park helicopter for short intervals, perform following steps:

CAUTION

To prevent rotor damage from blade flapping (droop stop pounding) as a result of air turbulence from other aircraft landing, taking off or taxiing, or sudden wind gusts, rotor blades should be secured whenever helicopter is parked.

- - Locate helicopter in a position where there is adequate blade clearance from nearby objects, on most level ground available.

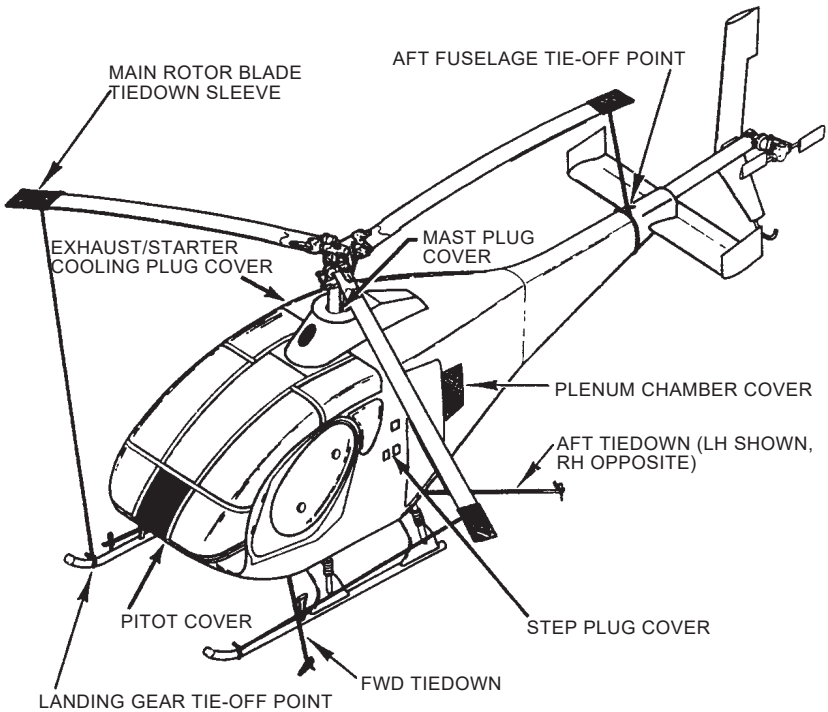


Figure 7-4. Parking and Mooring

- Apply friction to lock cyclic and collective sticks so that friction control knobs are positioned as follows; neutral for cyclic stick and full down for collective stick.
- Secure main rotor blades as follows:
  - Turn blades until one blade is directly above aft fuselage (Fig. 7-4).
  - Insert tiedown sleeve on each blade.

CAUTION

When securing tiedown sleeve cords, take up slack but do not apply bending loads on blades.

  - Secure aft tiedown sleeve cord to aft fuselage. Secure other tiedown sleeve cords to landing gear step.

- For longer duration parking, also perform the following steps:
  - Install cover on plenum chamber screen, exhaust vent, exhaust/starter cooling plug, mast plug, step plug & pitot tube.

7-15. MOORING

- Whenever severe storm conditions or wind velocities higher than 50 knots are forecast, helicopter should be housed in hanger or evacuated to a safer area.
- If these precautions are not possible, moor helicopter as follows:
  - Park helicopter and tie down or remove main rotor blades.
  - Install plenum chamber screen cover and exhaust vent cover.
  - Install pitot tube cover.

- Fill fuel cell (if possible).
- Apply friction to lock cyclic and collective sticks.
- Secure helicopter to ground by attaching restraining lines (cable or rope), in accordance with the following:
  - Attach aft lines at respective ends of aft cross beam, near the damper attach point. Tie lines to stakes/mooring anchors as shown on Fig. 7-4.
  - Attach lines to the forward ends of the respective left and right stabilizer bars, at the interface of the forward cross beam. Extend lines forward and outward at an angle that will keep lines clear of panel skins; attach lines to forward stakes/mooring anchors.

7-16. SERVICING

- Servicing of helicopter includes replenishment of fuel, changing or replenishment of oil and other such maintenance functions.
- Fuels, oils, and other servicing materials and capacities are listed in Table 7-2.

CAUTION

Use extreme care when applying any type of lubrication (grease, oil, dry-film, etc.) in vicinity of teflon bearings. Most lubricants allow a dirt-retaining film to form, or have other detrimental effects that can cause rapid deterioration of bearing surfaces.

- Locations of servicing points are shown in Fig. 7-5.

Table 7-2. Servicing Materials (Operating Supplies)

Item No.	Material	Specification
1.	Aviation Fuel	(Footnote 2)
2.	Engine Oil	MIL-L-7808 (Footnote 7) MIL-L-23699 (Footnote 7)
3.	Shell Oil, Spirax HD 90	MIL-L-2105B (Footnotes 1, 4)
	Pennzoil 4096 SAE 85W-90	MIL-L-2105B (Footnote 4)
4.	Aeroshell 14 (Oscillating Bearings)	MIL-G-25537 (Footnotes 1, 5, 7)
5.	Shell Alvania EP #1	
6.	Distilled Water	MS3600 or 0-B-41
7.	Light Oil, SAE 10	(Commercial Grade)

Footnotes:

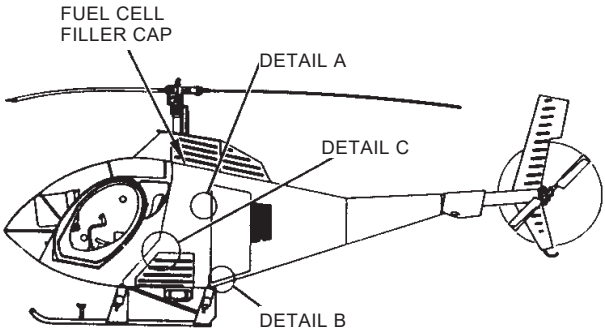
1. Initial lubricant listed for each item is the preferred lubricant. Permissible alternates for the preferred lubricants must conform to the specification indicated.
2. At 4.4°C (40°F) and below, fuel must contain anti-icing additive MIL-I-27686. For blending information and authorized fuels, refer to Rolls Royce Operation and Maintenance Manuals.
3. MIL-L-22851, Oil Grade 10 or 20 or Oil, SAE 10 or 20 approved for use at -17.8°C (0°F) and above in overrunning clutch.
4. SAE HD90 approved for use at -17.8°C (0°F) to 43.3°C (110°F) except overrunning clutch.

   SAE HD80 approved for use at -28.9°C (-20°F) to 4.4°C (40°F) except overrunning clutch.

   SAE HD90 or SAE HD80 approved for use above -6.7°C (20°F) for overrunning clutch.

Table 7-2. Servicing Materials (Operating Supplies) (cont)

5. Use only specified grease for flapping hinge bearings.
6. Do not intermix greases; and do not intermix different types of greases made by the same manufacturer, except where specifically approved by the manufacturer. If type of grease is to be changed, bearing must be thoroughly cleaned of all grease, not purged. Purging is acceptable only when relubricating with same type of grease.
7. For Model 250 Series engine oil data, refer to Rolls Royce Operation and Maintenance Manual.



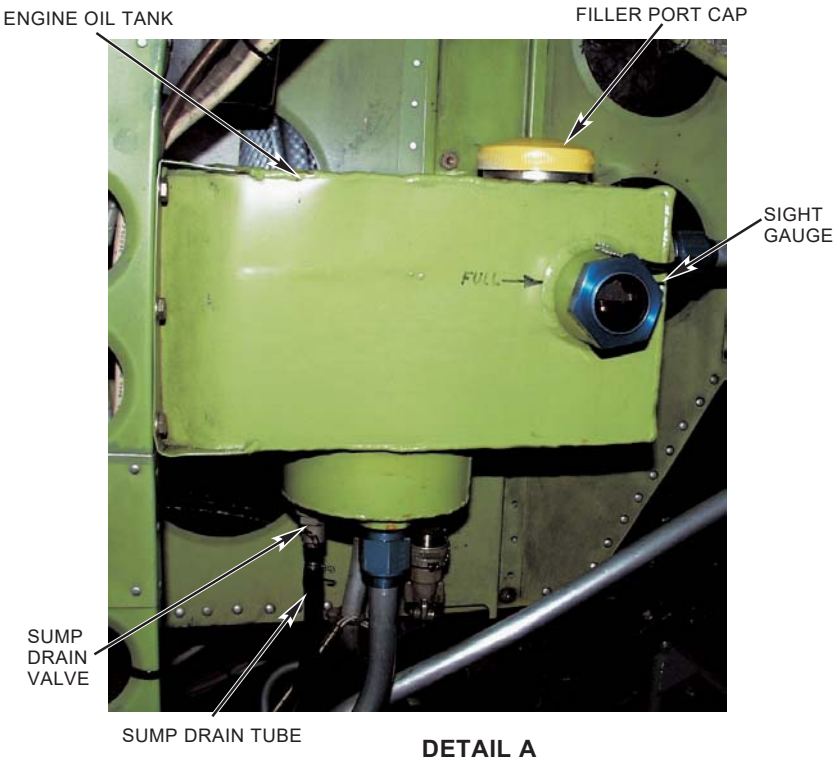
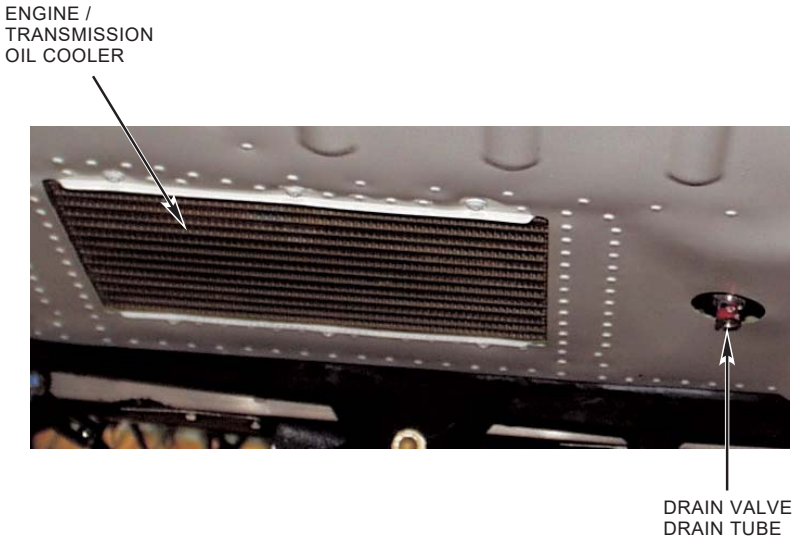
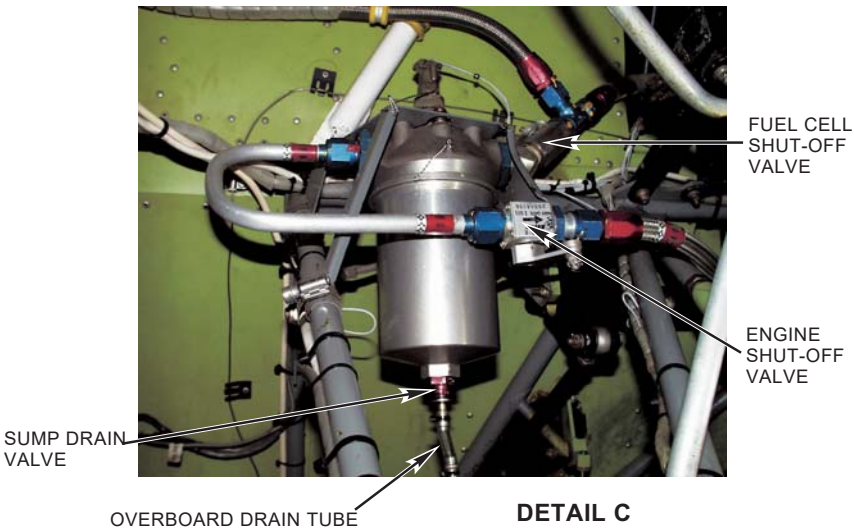


Figure 7-5. Servicing Points (Sheet 1 of 2)



DETAIL B



DETAIL C

Figure 7-5. Servicing Points (Sheet 2 of 2)

- Comply with the following precautions when servicing the fuel system:

WARNING

HOT REFUELING IS EXPRESSLY PROHIBITED. PRIOR TO REFUELING, ENSURE ENGINE IS OFF, ROTOR SYSTEM IS STATIC AND ALL ELECTRICAL POWER IS REMOVED FROM HELICOPTER. DISCONNECT EXTERNAL POWER FROM HELICOPTER AND MOVE POWER UNIT AT LEAST 20 FEET FROM HELICOPTER.

DO NOT FUEL OR DEFUEL HELICOPTER INSIDE ANY HANGAR OR BUILDING. STATIC DISCHARGE CAN IGNITE FUEL VAPORS RESULTING IN EXPLOSION AND FIRE.

- Fire extinguisher shall be readily available for all fueling and defueling operations.

- Refueling vehicle should be parked a minimum of 20 feet from helicopter rotor system during fueling operation.

- Before starting fueling or defueling operation, the following sequence should be observed.

- - Connect a grounding cable from the fueling vehicle to a satisfactory ground.

- - Connect a ground cable from ground to the aircraft. Do not attach ground cables to the radio antenna.

- - Connect a grounding cable from the fueling vehicle to the helicopter. The fueling vehicle may be equipped with a “T” or “Y” cable permitting ground attachment first and grounding of the helicopter to the other end.

- - Connect grounding cable from the fuel nozzle to a bare metal location on the helicopter before removing the fuel tank cap. This bond is essential and needs to be maintained throughout the fueling operation until the fuel tank cap is replaced.

CAUTION

Conductive-type fuel hose does not provide a satisfactory method of bonding.

- Fuel dispensing equipment grounding cables should be removed in the reverse order of installation sequence.

- No smoking or open flame within 100 feet of the helicopter and fuel truck.

- Fueling operations should be suspended when thunderstorms or lighting are within 10 nm.

7-17. FILLING - FUEL SYSTEM

- Fueling personnel should first check with flight crew, or the placard located near the fuel tank filler port, to determine the type and grade of fuel required.

- Fuel tanks shall be checked daily, or prior to the first refueling of the day, for water and contamination.

- Refuel helicopter in level attitude to achieve accurate quantities. Maintain constant visual check to prevent overfilling and spillage.

- Hold fuel filler nozzle firmly while inserted in fuel tank filler neck. Never block the nozzle lever in the open position. Be sure fuel filler cap is replaced and securely latched when fueling is completed.

- Energizing of radio and electrical equipment in the helicopter while dispensing fuel, except those switches that may be required for the fuel quantity gauge, is prohibited.

- Fueling personnel should not carry objects in the breast pockets of their clothing when servicing the helicopter or filling fuel tank.

- Step ladders or padded upright ladders may be used to provide access to fuel filler cap.

WARNING

AIRCRAFT OPERATION WITH UNSECURED FUEL FILLER CAP MAY PRODUCE FUEL VAPORS/SPILLS WHICH CAN CAUSE FIRE OR EXPLOSION.

- Check filler cap for security after fueling. (Lift tab folded down and flush with cap.)

- An optional internal fuel indicator is available for the 73 gal. fuel system to aid aircraft refueling to levels below full capacity. The indicator is inside the fuel cell and extends downward from the filler base. Fuel levels of 55, 60, and 65 U.S. gallons usable fuel are achieved by filling the cell to the white line below the respective gallon number on the indicator. Bottom edge of indicator represents 55 U.S. gallons.

  Note: Use care not to damage or scrape indicator during fueling operations.

7-18. DEFUELING - FUEL SYSTEM

- Defueling operation should be accomplished with helicopter as level as possible, and grounded to all equipment in contact with fuel.

- Fuel system may be defueled in two ways.

- - Defuel through filler port, using a pump.

- - Defuel by holding the sump drain valve open with the panel mounted main fuel selector open.

- After draining fuel system, ensure that all valves are in normal operating position and secure.

7-19. DRAINING - ENGINE OIL SYSTEM

- Open engine oil tank drain valve and engine oil cooler drain valve.

- After draining oil, ensure that both drain valves are closed and secure.

- Refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2, for instructions to drain oil from engine.

7-20. FILLING - ENGINE OIL SYSTEM

- Check oil level using sight gauge on engine oil tank.

- Remove filler port cap and replenish with correct oil type until oil level is at FULL on sight gauge.

- Ensure that filler port cap is securely tightened immediately after servicing.

7-21. DRAINING - MAIN TRANSMISSION

- Cut lockwire and remove magnetic drain/chip detector and self-closing valve. Allow sufficient time for oil to drain from sump.

- If damaged, replace O-rings used with magnetic drain/chip detector and valve.

- Reinstall magnetic drain/chip detector and self-closing valve in oil sump; lockwire in place.

7-22. FILLING - MAIN TRANSMISSION

(Access is thru R.H. main access door.)

- Transmission (gearbox) oil should be replenished when low.

- Depress button and withdraw dipstick from transmission.

- Visually check oil level on dipstick. Maintain oil level between LOW and FULL graduations on dipstick.

- Cut lockwire and open filler port cap and add required quantity of oil.

- Wipe dipstick clean and recheck oil level.

- Install dipstick in transmission and check for security.
- Close filler port cap and lockwire.

7-23. DRAINING - TAIL ROTOR TRANSMISSION

- Disconnect wire lead, cut lockwire and remove chip detector and self-closing valve. Allow sufficient time for oil to drain.
- If damaged, replace chip detector and self-closing valve O-rings.
- Install self-closing valve (50-60 in.-lb torque) and chip detector (40-50 in.-lb torque). Lockwire valve to gearbox and detector to valve.

7-24. FILLING - TAIL ROTOR TRANSMISSION

- Transmission (gearbox) oil should be replenished when low.
- Visually check oil level in sight indicator. Oil level should be above ADD mark.
- Cut lockwire and remove filler plug in top of sight gauge extension.
- With aircraft at a level attitude, add oil through access hole at top of sight gauge extension until oil level reaches the shoulder in the access hole of the sight gauge extension.
- Reinstall, tighten and lockwire plug in sight gauge extension.

7-25. REPLACING ENGINE FUEL FILTER AND AIRFRAME FUEL FILTER

- Refer to HMI.
- Refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2.
- To be performed by qualified maintenance personnel.

7-26. BATTERY SERVICING AND MAINTENANCE (LEAD ACID AND OPTIONAL NI-CAD BATTERIES)

- Verify that BATTERY switch is OFF before servicing battery.
- Perform battery servicing and maintenance according to manufacturer's instructions, in conjunction with removal/installation, inspection and cleaning procedures in HMI.
- To be performed by qualified maintenance personnel for Ni-Cad Battery.

7-27. ACCESS AND INSPECTION PROVISIONS

CAUTION

Anytime maintenance work is to be performed near engine air and engine cooling air inlets, use care to prevent entry of foreign objects that might later be sucked into compressor or cooling air blower. Place protective covers over engine inlet screens. Covers should not be removed until work is complete and debris is thoroughly cleaned out of the area.

- Removable/hinged access doors and panels are provided in the helicopter for servicing, inspection, removal, installation and adjustment of components.
- Locations of access and inspection provisions are shown in Fig. 7-6. Areas, components and items accessible through the locations shown in Fig. 7-6 are listed in Table 7-3.
- Screws are used to secure access panels in stress areas.
- Methods for removal and installation are obvious for doors and panels.

Table 7-3. Access and Inspection Provisions Information

NOTE: Refer to Fig. 7-6 for location of listed doors and panels.

Table 7-3. Access and Inspection Provisions Information (cont)

Door/Panel Description	Provides Access To
Instrument console side panel - LH/RH	Instrument console components and wiring
Collective stick access panel - LH	Collective stick gear housing - left side
Engine access panel - Lower	Engine - lower
Engine access panel - LH	Engine - left side, N_2 controls
Engine access panel - RH	Engine - right side, starter/generator, N_1 controls.
Tower assembly panel - LH	Flight controls, swashplate
Tower assembly panel - RH	Flight controls, swashplate, ELT if installed.
Main access door - LH	Electrical components/wiring, belt drive transmission, main transmission, battery, fuel lines, oil lines, engine oil tank/sight gauge
Main access door - RH	Belt drive transmission, main transmission/dipstick, fuel lines, oil lines, flight controls, generator control unit, oil filter
Aft access door	Wiring, battery cable/battery relay (optional location), internal plenum inlet screen
Aft access panel	Tail rotor drive shaft/damper, strobe power supply, battery (optional location)
Stabilizer access panel	NAV-anticollision light wiring, attachment hardware.
Forward access panel	Electrical components and wiring

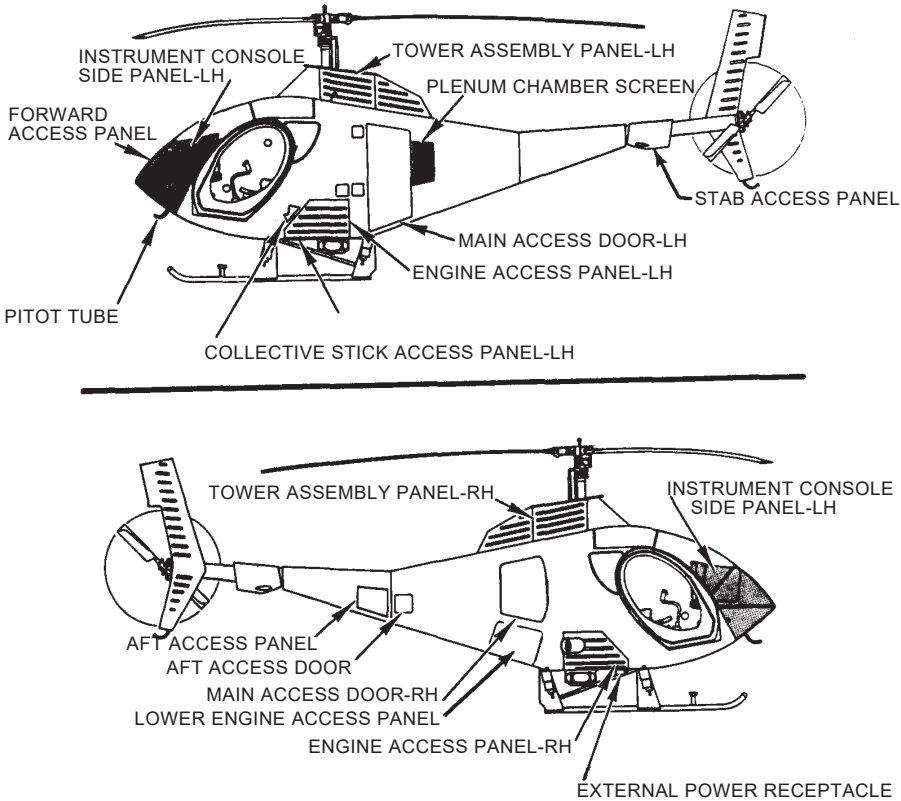


Figure 7-6. Access and Inspection Provisions and Locations

7-28. CLEANING

- General cleaning of oil and dirt deposits from the helicopter and it's components is accomplished by using dry-cleaning solvents, standard commercial grade kerosene, or a solution of detergent soap and water.

- Exceptions that must be observed are specified in the following cleaning paragraphs.

CAUTION

Some commercial cleaning agents, such as readily available household cleaners, contain chemicals that can cause corrosive action and/or leave residue that can result in corrosion. Never use cleaners with a pH over 11.0 to clean aluminum.

7-29. CLEANING FUSELAGE, INTERIOR TRIM AND UPHOLSTERY

- Clean dirt or dust accumulations from floor, and other metal surfaces, with vacuum cleaner or small hand brush.

- Sponge soiled upholstery and trim panels with a mild soap and warm water solution. Avoid complete soaking of upholstery and trim panels. Wipe solution residue from upholstery with cloth dampened with clean water.

- Remove imbedded grease or dirt from upholstery and carpeting by sponging or wiping with an upholstery cleaning solvent recommended for the fabric being cleaned (nylon, vinyl, etc. as applicable).

NOTE: If necessary, seat upholstery may be thoroughly dry-cleaned with solvent. When complete dry-cleaning is performed, upholstery must re-flameproofed in compliance with Federal Aviation Regulation Part 27.

7-30. CLEANING AIRFRAME EXTERIOR AND ROTOR BLADES

CAUTION

Use care to prevent scratching of aluminum skin when cleaning main rotor blades. Never use volatile solvents or abrasive materials. Never apply bending loads to blades or blade tabs during cleaning.

NOTE: Avoid directing soapy or clean water concentrations toward engine air intake areas and instrument static source ports.

- Wash helicopter exterior, including fiberglass components and rotor blades, when necessary, using solution of clean water and mild soap.
- Clean surfaces stained with fuel or oil by wiping with soft cloth dampened with solvent, followed by washing with clean water and mild soap.
- Rinse washed areas with water and dry with soft cloth.

7-31. CLEANING TRANSPARENT PLASTIC

CAUTION

Never attempt to dry plastic panels with cloth. To do so causes any abrasive particles lying on plastic to scratch or dull surface. Wiping with dry cloth also builds up an electrostatic charge that attracts dust particles from air.

- Clean outside surfaces of plastic panels by rinsing with clean water and rubbing lightly with palm of hand.
- Use mild soap and water solution or aircraft type plastic cleaner to remove oil spots and similar residue.
- After dirt is removed from surface of plastic, rinse with clean water and let air dry or dry with soft, damp chamois.
- Clean inside surfaces of plastic panels by using aircraft type plastic cleaner and tissue quality paper wipers.

7-32. CLEANING ENGINE OIL FILTERS

- Refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2.

7-33. CLEANING ENGINE COMPRESSOR

- Water rinse cleaning of engine compressor is accomplished by a water wash method.
- Clean engine compressor according to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2.
- To be performed by qualified maintenance personnel.

7-34. CLEANING PLENUM CHAMBER SCREEN

- Remove plenum chamber screen.
- Clean screen with soft brush to remove dirt accumulations.
- Immerse screen in solution of detergent and allow to soak approximately 15 minutes. Flush out with clean water. Allow screen to drain and air dry thoroughly.
- Install plenum chamber screen.

7-35. FLUID LEAK ANALYSIS

- Main or Tail Rotor Transmission - Oil Leak:
- - Oil leakage, seepage or capillary wetting at oil seals or assembly joint lines of main or tail rotor transmission is permissible if leakage rate does not exceed two cc per hour (one drop per minute).
- - An acceptable alternate rate of leakage from either transmission is if oil level does not exceed a loss from FULL to ADD mark on sight gauge/dip stick within 25 flight hours. (Repair leaks according to HMI instructions.)

NOTE: On transmission input pinion gear oil seals with less than two hours of operation, some seepage or wetting of adjacent surfaces is normal until seal is wetted and worn in (seated). If seepage continues at a rate of one drop per minute or less, seal may continue in service. Check transmission oil level and observe seepage rate after every two hours of operation. Shorter inspection periods may be required if seal leakage appears to be increasing.

7-36. ENGINE OIL LEAKS

- Refer to Rolls Royce Operation and Maintenance Manual, Publication No. 10W2 for definition of permissible engine oil leakage.

7-37. LANDING GEAR DAMPER - HYDRAULIC FLUID LEAK

NOTE: It is normal for a thin hydraulic oil film to remain on damper piston as a result of wiping contact with piston seal. Newly installed dampers may also have slight oil seepage from oil trapped in end cap threads during assembly. Neither of these should be considered damper leakage or cause for damper replacement.

- Hydraulic fluid leakage from any landing gear damper is not permissible. If leakage is present, damper assembly should be removed and serviceable unit installed. If leaking landing gear damper is not replaced when leakage is noticed, continuation of damper in service can cause internal damage that may otherwise not occur. Also, improper operation of damper(s) may cause conditions conducive to ground resonance.

7-38. OVERRUNNING CLUTCH - OIL LEAKAGE

- If oil leakage is noticed at overrunning clutch (sprag clutch), corrective maintenance (HMI) should be performed before further flight. Continuation in service with oil leakage may result in failure of overrunning clutch and/or oil on drive belts.

7-39. PRESERVATION AND STORAGE

- A helicopter placed in storage or nonoperational status must have adequate inspection, maintenance and preservation to avoid unnecessary deterioration of airframe and components or equipment.

- Extent of preventive maintenance that is to be performed on the helicopter for flyable storage up to 45 days.

7-40. FLYABLE STORAGE (NO TIME LIMIT)

- Inspection before storage:

- Perform Daily Inspection.

- Ensure that fuel cell is full (topped off), and that oil in engine oil tank and main and tail rotor transmissions is at full level.

- Ensure that fuel shutoff valve is closed.

  NOTE: Avoid closing valve after engine shutdown until engine compartment has cooled to near ambient temperature.

- Storage: To maintain flyable storage condition, perform daily inspection; ground runup must be performed at least once every five days.

- Perform Daily Inspection.

CAUTION

Avoid engine N_2 steady-state operation 71% to 88%. Operation within the speed avoidance range is permitted for the preflight checks specified in this flight manual. Transient operation through the speed range is to be accomplished as expediently as possible.

NOTE: Transient operation is defined as not dwelling at any N_2 speed for more than 1 second.

- Start engine (Section IV). After idle stabilizes, accelerate engine to 90% N_2. Operate until oil temperature shows an increase and ammeter reads zero.
- Replenish fuel as necessary.
- Open moveable air vents in each cockpit door; positioning air vents openings downward.
- Install covers and equipment used to park and moor helicopter.
- Install static ground.

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- Return to service:

- - Remove covers and equipment used to park and moor helicopter.

- - Perform Daily Inspection.

7-41. TORQUE DATA

- Torque wrenches:

- - Torque wrenches should be of good quality and calibration must be verified every 90 days to ensure accuracy.

- Application of torque wrench loads:

- - Recommended tightening torque values and minimum drag torque values for fine and coarse thread nuts, and minimum breakaway torque for used self-locking bolts or screws are specified in Basic HMI Section 2.

7-42. HOURMETER INSTALLATIONS

- One standard and two optional hourmeter installations are offered on the Model 269D Helicopter.

- - In the standard hourmeter installations, the hourmeter is actuated by main transmission oil pressure. The hourmeter will run and record time whenever the main rotor transmission oil pressure is above the minimum value (main rotor turning, warning light out). When this installation is utilized, no multiplying factor is required when the recorded time is used to determine periodic inspection requirements overhaul intervals, and the service life of life limited components.

- - In the optional landing gear actuated hourmeter installation, the hourmeter is actuated by a “squat” switch attached to the landing gear. The hourmeter will run and record time whenever the aircraft is in flight (no weight on the landing gear). This installation records “flight time”, or “time in service” as defined in FAR Part 1.1, and NO multiplying factor is required when this recorded time is used to determine periodic inspection requirements, overhaul intervals, and the service life of life limited components.

- In the optional collective actuated hourmeter installation, the hourmeter is actuated by a switch that senses the position of the collective control stick. The hourmeter will run and record time whenever the main rotor transmission oil pressure is above the minimum valve and the collective control is off the (down) stop. Calculated service lives are based on the percent occurrence of maneuvers provided in the FAA Approved flight spectrum. In this spectrum there is a percentage of flight time allocated for full down collective maneuvers (autorotations). In order to compensate for this unrecorded flight time when the collective actuated hourmeter is utilized, the time recorded on the hourmeter must be multiplied by 1.12 when used to determine periodic inspection requirements, overhaul intervals, and the service life of life-limited components (Model 269D HMI, Appendix B).

The hourmeter(s) (standard and/or optional) should not be used as the sole means for determining the number of flight hours used. Flight hours recorded by the pilot should be used to confirm the accuracy of the hourmeter(s) reading.

7-43. GROUND HANDLING WHEELS.

- Two configurations of ground handling wheels are available for the helicopter; standard special tool design and single wheel (stowed above landing gear skid tubes).

  Standard Special Tool Design.

  These wheel assemblies are configured with long handles which have a swiveling hook that secures the wheel in the down position and axle pins which are inserted into bushings located in the skid tube. During installation, insert the axle pin in the skid tube bushings and rotate the handle down towards the rear of the aircraft until the hook can be rotated into position under the skid tube; raise the handle to engage the hook. The weight of the aircraft will hold the handle and hook in position during ground handling movements. **Do not operate** the helicopter with these ground handling wheels installed. **Before flight,** remove ground handling wheels from the helicopter in reverse order of installation.

Single Wheel Ground Handling Wheels (Configured For Stowage in Mounts on Skid Tubes).

These wheel assemblies are configured with mount brackets permanently attached to the skid tubes and provisions for stowage of the operating handle inside the transmission compartment on the left side of the helicopter. The handle is secured in the stowage mount with a quick release pin. The single wheel assembly can remain attached to the skid tube mounts during flight or can be removed before flight. For ground handling, release the lynch pin retainer clip and remove the lynch pin from mount; rotate wheel aft to the ground. Remove the operating handle from the stowage mount and insert handle into hole in axle assembly. Rotate handle aft until lynch pin holes are aligned and insert lynch pin; secure pin with retainer clip. **Before Flight**, in reverse order of lowering the wheels, rotate wheel assemblies to the up position and secure in place with lynch pins. **Do Not Operate** the helicopter with the ground handling wheels rotated down into the ground handling position. Stow handle in mount and secure with quick release pin.

Remove the ground handling wheel assemblies from the helicopter by removing lynch pins from mounts and safety pins from inboard end of rotating axle. When removing the axle assemblies from the mounts, note number and location of washers that are placed on the axle. Install the axle assembly in the mount in reverse order of removal. During installation, two or more spacing washers are placed on the axle between the wheel and the mount and one washer is placed on the inboard end of the axle between the mount and retaining pin.

CAUTION

When balancing/moving the helicopter by hand, do not push on stabilizers or any other component or surface that may sustain damage from ground handling or pushing. If helicopter is moved in the aft direction (rearward) do not drag skid heels on the ground and avoid deep depressions in the ground surface. Damage to landing gear components may occur if heels catch on a rough surface or the wheels drop into a deep depression.

- Move helicopter on ground by manually balancing on ground handling wheels and pushing on tail rotor transmission housing and any other sturdy structural members of helicopter (i.e. access doors may be opened and assistant may push on adjacent frames and solid structures).

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SECTION VIII

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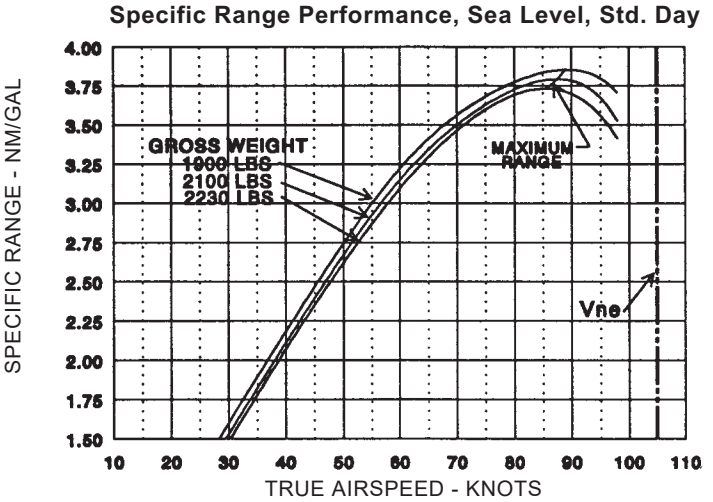
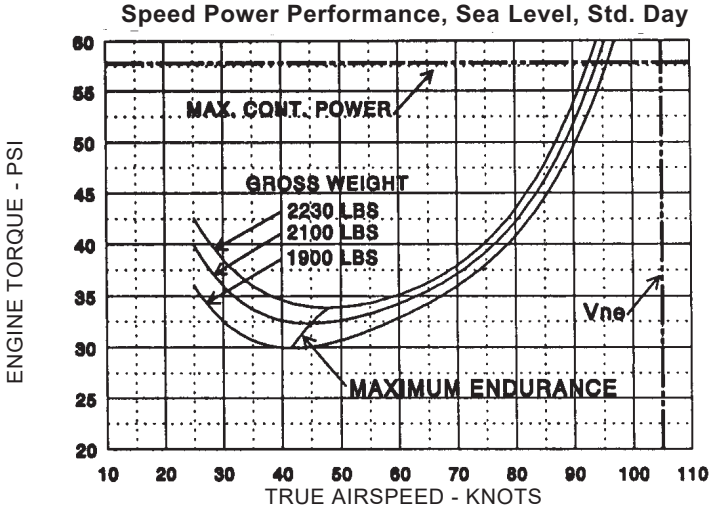
Section VIII

ADDITIONAL OPERATIONS AND PERFORMANCE DATA

Information given in this section is provided by the manufacturer to further inform the pilot of the helicopter's capabilities. By use of the data in this section the pilot may obtain maximum utilization of the helicopter.

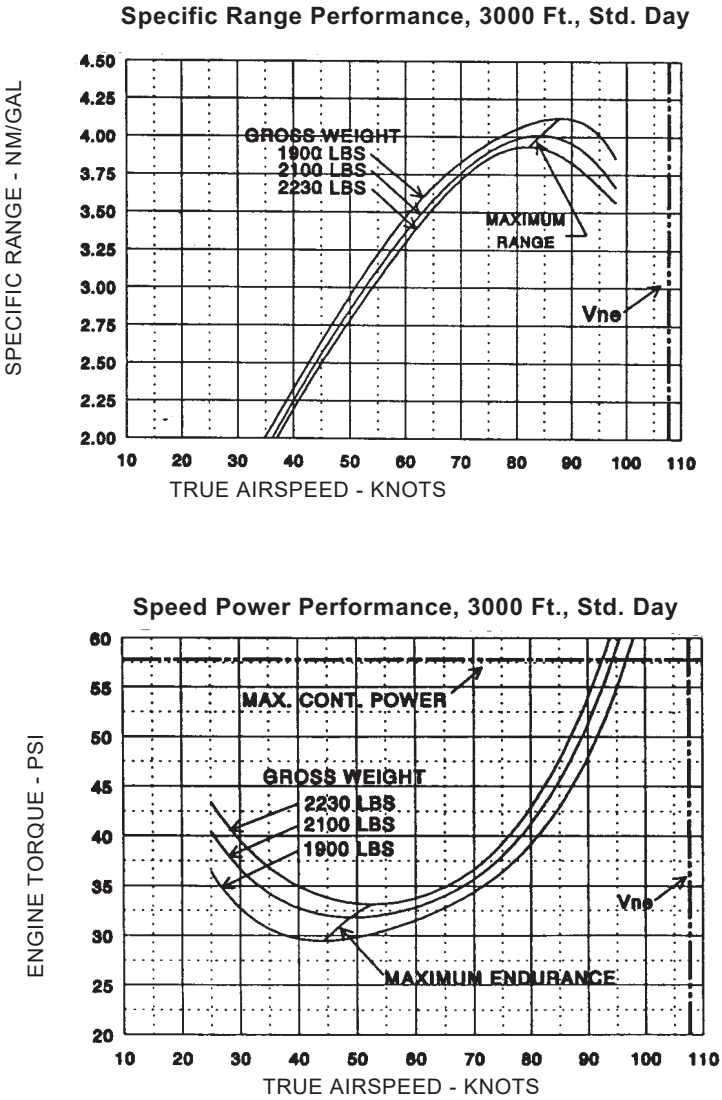
Performance data defined in this section is valid for Model 269D Helicopter equipped with either 269A1185-1 or 269A1185-5 main rotor blades.





Data Based On:
Alternate Air Door - OPENED or CLOSED
Engine Anti-Ice - OFF
Cabin Defrost and Heat - OFF

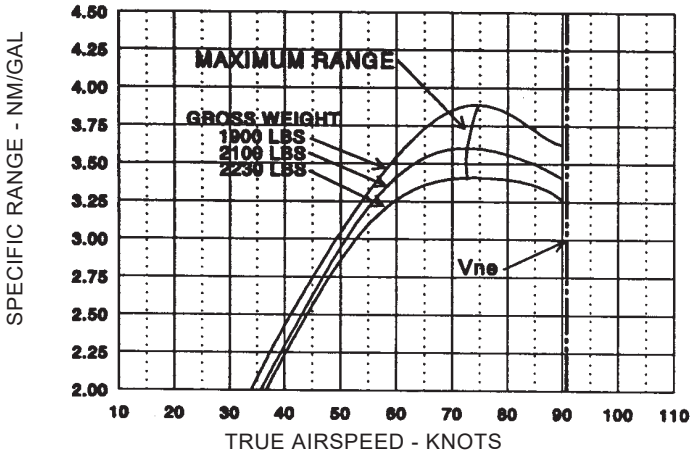
Figure 8-1. Cruise Charts at Standard Sea Level Conditions, 91% N_2



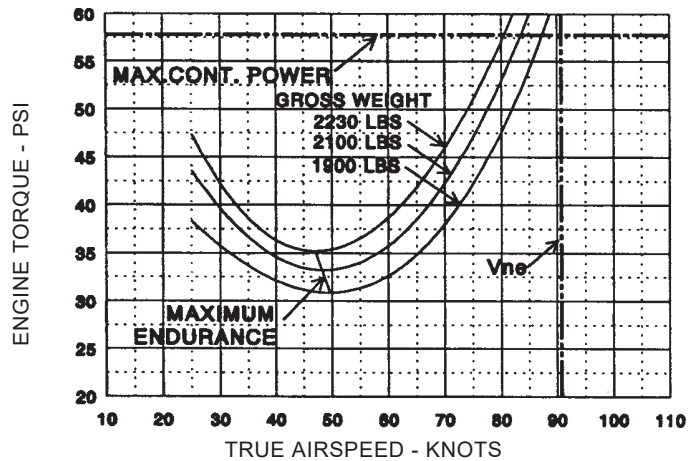
Data Based On:
Alternate Air Door - OPENED or CLOSED
Engine Anti-Ice - OFF
Cabin Defrost and Heat - OFF

Figure 8-2. Cruise Charts at 3000 FT, Standard Day Conditions, 91% N_2

Specific Range Performance, 6000 Ft., Std. Day



Speed Power Performance, 6000 Ft., Std. Day



Data Based On:
Alternate Air Door - OPENED or CLOSED
Engine Anti-Ice - OFF
Cabin Defrost and Heat - OFF

Figure 8-3. Cruise Charts at 6000 FT, Standard Day Conditions, 91% N_2

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SECTION IX

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SECTION IX

Optional Equipment Supplements

9-1. GENERAL INFORMATION

- This section provides general information on optional equipment for the Schweizer 330 Helicopter. The information includes a listing of usable optional equipment, compatibility of combined equipment on the helicopter, and a listing of all major optional equipment part numbers, publication titles, and publication numbers.

- Also included is general information on content and usage of Optional Equipment Flight Manual Supplements.

9-2. LISTING - OPTIONAL EQUIPMENT

- Table 9-1 lists optional equipment kits and their associated flight manual supplements affecting FAA approved data that appears in Sections II through V of the basic Rotorcraft Flight Manual. These kits and other optional equipment not affecting Section V of the basic Rotorcraft Flight Manual are approved and usable on the 330 Helicopter.

9-3. COMPATIBILITY - COMBINED OPTIONAL EQUIPMENT

- TBD

9-4. LISTING - OPTIONAL EQUIPMENT FLIGHT MANUALS

CAUTION

Be sure to check appropriate Optional Equipment Flight Manual Supplement as part of pre-flight planning.

- A separate Optional Equipment Flight Manual Supplement is prepared and issued, whenever the installation of that equipment affects the FAA Approved Data for limitations (Section II), Emergency and Malfunction Procedures (Section III), Normal Procedures (Section IV) and Performance Data (Section V).

- The Flight Manual Supplement Data is to be used in conjunction with the basic Rotorcraft Flight Manual data and takes precedence over that data, when the equipment is installed.

- Flight operation of the aircraft with optional equipment installed is prohibited if the applicable Flight Manual Supplement is not on board the aircraft and readily available to the pilot.

Table 9-1. Owner's Manual Supplement - 269D Helicopter		
Publication No.	**Title**	**Issue/Revision/ Reissue Date**
CSP-D-1B	Optional Instrument/Avionics Installations	Issued: 28 Jul 1993, Revised: 11 Jun 2001
CSP-D-1D	Optional Instrument Panel Installation	22 Dec 1993
CSP-D-1E	Two Passenger Center Bench Seat Operation	22 Dec 1993
CSP-D-1H	Alternate Static Source Operating Procedures	22 Dec 1993
CSP-D-1I	Auxiliary Landing Light Operating Procedures	22 Dec 1993
CSP-D-1J	Garmin GPS 150 Navigation System Operating Procedures OBSELETE	13 Apr 1994
CSP-D-1K	Engine Air Particle Separator Filter	28 Nov 1994
CSP-D-1L	Optional Instrument Trainer Operation	15 Nov 1994
CSP-D-1M	269D9230 Search Light Installation (SpectroLab SX-5 Search Light)	Issued: 15 Mar 1996, Revised: 09 Jul 2002
CSP-D-1N	Extended Height Landing Gear (269D7100)	26 Sep 2008
CSP-D-1P	Increased Diameter Main Rotor System (269A1002-11)	14 Mar 1997
CSP-D-1Q	Increased Diameter Main Rotor System (269A1002-11) in conjunction with Extended Height Landing Gear (269D7100)	Issued: 14 Mar 1997, Revised: 25 Nov 1998
CSP-D-1R	Thermal Imaging System (FLIR Systems, Ultra 3000 (269D9240-1) and FLIR Systems, Ultra 6000 (269D9265-1)	Reissued: 13 Apr 2000, Revised: 06 Oct 2000
CSP-D-1S	Thermal Imaging System (FLIR Systems, Ultra 7000 (269D9271-1 "Centerline Belly Mount") and (269D9236-1 "R/H Dual Mount")	Issued: 11 Dec 2000, Revised: 09 Jul 2002
CSP-D-1T	Cargo Hook Installation (269D9216-2 & -3)	01 May 2003
CSP-D-1U	269D9222 Load Weighing System	06 May 2003

9-5. ABBREVIATIONS

Abbreviation	Definition
Adf	Automatic direction finder
comm	Communication
ICS	Intercommunication system
ind	Indicator
Nav	Navigation
rcvr	Receiver
std	Standard
VHF	Very high frequency
xcvr	Transceiver