MD HELICOPTERS INC.

CSP-HE/HS-1

Rotorcraft Flight Manual

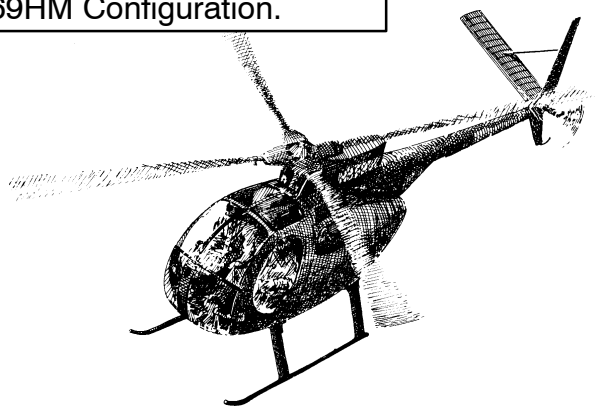
FOR

MDHI 500 (369HE/HS/HM) HELICOPTERS

NOTE
This manual has been reprinted and now contains
Revisions 1 through 6

MD500 Models
369HE, 369HS and 369HM*

*This manual applies to the following 369HM serial numbers only. Helicopter Serial No. 0101M thru 0214M, 0220M thru 0231M, 0233M thru 0238M, 0244M and subsequent. Refer to Section IX for 369HM Configuration.



FAA APPROVED ROTORCRAFT FLIGHT MANUAL

Type Certificate No. H3WE

Approved By Donald Armstrong
Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office
Transport Airplane Directorate

Original Issue ..... 369HS – Configuration A: 2 July 1969
369HS – Configuration B: 9 March 1972

Original Issue ..... 369HE – Configuration A: 19 May 1969
369HE – Configuration B: 10 April 1972

Approval Date: 13 July 1998

Original Issue ..... 369HM* – Configuration A: 4 May 1970
369HM* – Configuration B: 10 April 1972

Revision 4: 10 Oct 2000

THE FAA APPROVED ROTORCRAFT FLIGHT MANUAL CONSISTS OF THE FOLLOWING SECTIONS.

SECTION II - LIMITATIONS
SECTION III - EMERGENCY PROCEDURES
SECTION IV - NORMAL PROCEDURES
SECTION V - PERFORMANCE DATA
SECTION IX - OPTIONAL EQUIPMENT

The helicopter must be operated in compliance with the operating limitations as set forth in Section II of this manual and any additional limitations from Section IX as a result of an installed optional equipment item.

Sections III, IV, V, and portions of section IX contain recommended procedures and data and are FAA approved.

THIS MANUAL MUST BE KEPT IN THE HELICOPTER AT ALL TIMES.

Revision 5

LOG OF REVISIONS BY DATE

FAA / NON-FAA REVISIONS

REVISION NUMBER AND DATE	
Original Issue . . .	369HS – Configuration A: 2 July 1969 369HS – Configuration B: 9 March 1972
Original Issue . . .	369HE – Configuration A: 19 May 1969 369HE – Configuration B: 10 April 1972
Original Issue . . .	369HM* – Configuration A: 4 May 1970 369HM* – Configuration B: 10 April 1972
Original	13 July 1998
Revision 1	12 November 1998
Revision 2	25 February 2000
Revision 3	22 May 2000
Revision 4	10 October 2000
Revision 5	22 March 2001
Revision 6	4 October 2006

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Transport Airplane Directorate

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SUMMARY OF REVISIONS TO THE ROTORCRAFT FLIGHT MANUAL

NOTE: Revisions are listed below by number with appropriate remarks.
Section II pages marked [C]* indicate FAA approved color pages. Black-and-white reproductions of color pages are not considered to be "FAA Approved".

REVISION NUMBER	REMARKS
Revision 6	Section I: Removed company logo from all pages and replaced references to McDonnell Douglas with MDHI. Section II: Figure 2-5. Corrected error in oil pressure range on 4-pack instrument cluster. Paragraph 2-11. Updated fuel specification designations and added alternate fuels. Section III: Removed company logo from all pages. Paragraph 3-9. Added malfunctions procedures for low engine oil pressure and loss of torque indication. Section IV: Paragraph 4-1. Added check for torque stripe paint across tail rotor retainer nut, tang washer, and fork assembly. Paragraph 4-3. Corrected starter time limit note. Section VI: Removed company logo from all pages. Section VII: Removed company logo from all pages. Updated Table 7-1. Section VIII: Removed company logo from all pages. Section IX: Table 9-1 and Table 9-2. Added part number for cargo hook kit. Removed company logo from all pages. Paragraph 9-5. Corrected maximum load combination gross weight.

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SECTION I
GENERAL

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SECTION I
GENERAL

1-1. INTRODUCTION

The Pilot's Flight Manual has been prepared with one very fundamental goal in mind; that is, to provide the pilot with all information necessary to accomplish the intended mission with the maximum amount of efficiency and safety.

NOTE: Unless otherwise stated, information presented in this manual pertains to both Model 369HE or 369HS helicopters equipped with the Allison 250-C18 or 250-C20 engines. When information is affected by model designation or engine configuration, that information will be so noted. Be sure to select the appropriate data for model type and engine installed.

1-2. SCOPE

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

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

1-3. HELICOPTER CERTIFICATION

The helicopter is certified by the Federal Aviation Administration under FAA Type Certificate Number H3WE.

The FAA model designations are - Models 369HE and 369HS.

The MDHI commercial designation is - MD 500.

The FAA/ICAO aircraft type designator is HU50.

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

1-4. MULTI PURPOSE 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 Optional Equipment.

MDHI optional equipment items and STC items which are FAA approved for the 369HE/HS may be installed and used.

1-5. PILOT'S BRIEFING

Prior to flight, passengers should be briefed on the following.

- Approach and depart the helicopter from the front in full view of the pilot, being aware of the main rotor.
- Use of seat belts and shoulder harnesses.
- Smoking.
- The opening and closing of doors.
- Evacuation of the aircraft in an emergency.
- Location and use of emergency/survival equipment.
- Proper securing of loose personal belongings (purses, coats, briefcases, etc.) to keep clear of controls and when flying with the doors removed.

1-6. ORGANIZATION

FRONT MATTER:

Contains: Log of Revisions by Date, Table of Contents, Summary of Revisions, and the List of Effective Pages.

By referring to the Log of Revisions By Date, the pilot may review a chronological listing of changes to the Flight Manual.

Reading the Summary of Revisions will inform the pilot of what changes have been made by paragraph reference. This summary contains only the latest Flight Manual change.

The List of Effective Pages allows the pilot quick reference to page numbers and their respective revision number. The pages listed should reflect the revision number that appears at the bottom of each page.

SECTION I - GENERAL

Information of general interest to the pilot, owner or operator of the aircraft and general rotorcraft information and conversion charts.

SECTION II - LIMITATIONS (FAA Approved)

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

SECTION III - EMERGENCY AND MALFUNCTION PROCEDURES (FAA Approved)

Problems which could be encountered in flight are defined and the procedures necessary to cope with or alleviate them are discussed. The data is recommended by MDHI.

SECTION IV - NORMAL PROCEDURES (FAA Approved)

Normal operating procedures from preflight through shutdown. The data is recommended by McDonnell Douglas.

SECTION V - PERFORMANCE DATA (FAA Approved)

Aircraft performance as defined within certain conditions, such as airspeed, weight, altitude, temperature, humidity, and wind velocity. Data is provided in tabular or graph form to allow the pilot to determine the aircraft's capabilities in relation to the intended mission and prevailing conditions.

SECTION VI - WEIGHT AND BALANCE DATA

Provides aircraft weight and balance operational data in chart and table form and provides examples that allow the pilot to accurately determine the aircraft's gross weight, and whether the load is within longitudinal and lateral center of gravity limits. Also contained in this section are the original weight and balance report and equipment list (equipment both required and optional) installed on the aircraft at the time of licensing.

SECTION VII - AIRCRAFT HANDLING, SERVICING, AND MAINTENANCE

The 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 may have direct involvement either while at his normal base of operations or in the field.

SECTION VIII - ADDITIONAL OPERATIONS AND PERFORMANCE DATA

The information provided in Section VIII is given by the manufacturer to further assist the pilot in obtaining maximum utilization of the rotorcraft.

SECTION IX OPTIONAL EQUIPMENT (FAA Approved)

Certain optional equipment is available for performance of specific tasks. In many cases the equipment is removable and may be used in combination with other optional items. Whenever the installation of an option affects FAA approved limitations, normal/emergency procedures or performance (Sections II thru V), an FAA approval is required. In addition, a tabular listing of all options is provided as well as a table showing the compatibility of the various options with one another.

At the front of each section a table of contents lists the data by paragraph number, title, and page number.

1-7. METHOD OF PRESENTATION

General information in the various sections is provided 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 describing a particular operation to be accomplished. Expansion of the steps is accomplished as follows:

WARNING **A WARNING brings to the pilot's immediate attention that equipment damage and/or personal injury will occur if the instruction is disregarded - placed after the instruction/step.**

CAUTION **A CAUTION alerts the individual that equipment damage may result if the procedural step is not followed to the letter - placed after the instruction/step.**

NOTE: A NOTE expands upon and explains the preceding step and provides fuller understanding of the particular operation.

A black change bar (▌) in the page margin designates the latest new or changed information appearing on that page. A hand  points to changes in the contents of an illustration.

1-8. DEFINITION OF TERMS

The concepts of procedural word usage and intended meaning that have been adhered to in preparing this manual is as follows.

"Shall" has been used only when the application of a procedure is mandatory.

"Should" has been used only when the application of a procedure is recommended.

"May" and "need not" have been used only when the application of a procedure is optional.

The terms **IMMEDIATELY, POSSIBLE**, and **PRACTICAL** as used in this manual refer to the degree of urgency with which a landing must be made.

LAND IMMEDIATELY - Execute a power-on approach and landing without delay.

LAND AS SOON AS POSSIBLE - Execute a power-on approach and landing to the nearest safe landing area that does not further jeopardize the aircraft or occupants.

LAND AS SOON AS PRACTICAL - Extended flight is not recommended. Whether to complete the planned flight is at the discretion of the pilot-in-command. However, the nature of the specific problem or malfunction may dictate termination of the flight before reaching the destination.

1-9. ABBREVIATIONS

SIGNS

A

A/N	Alphanumeric
AGL	Above Ground Level
ALT	Alternate; Altitude
APU	Auxiliary Power Unit
ATT	Attitude
AUTO	Automatic
AUX	Auxiliary

B

BATT	Battery
BLD	Bleed
BL	Butt Line

C

C	Celsius
CAB	Cabin
CAB HEAT	Cabin Heat
CAUT	Caution
CG	Center of Gravity
CKP(T)	Cockpit
Cm	Centimeters
COM	Communication
CCW	Counter Clockwise
CW	Clockwise

D

DC	Direct Current
DIR	Direction; Directional

E

ENG	Engine
EXT	Extend; External

F

F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FS	Fuselage Station
Ft	Foot, Feet

G

GAL	Gallons
GEN	Generator
GPU	Ground Power Unit
GW	Gross Weight

H

H_D	Density Altitude
Hg	Mercury
H_P	Pressure Altitude
HSI	Horizontal Situation Indicator
HVR	Hover

I

IAS	Indicated Airspeed
ICS	Intercommunication System
IFR	Instrument Flight Rules
IGE	In Ground Effect
IGN	Ignitor(s)
IMC	Instrument Meteorological Conditions
IMP	Imperial
INST	Instrument
In	Inches
INST(R)	Instrument
IVSI	Instantaneous Vertical Speed Indicator

K

Kg	Kilogram
KCAS	Knots Calibrated Airspeed
KG	Kilogram(s)
KIAS	Knots Indicated Airspeed
Km	Kilometer
KmH	Kilometers per Hour
KTAS	Knots True Airspeed

L

L	Left; Liters
LAT.	Lateral
Lb(s)	Pound(s)
LND	Landing
LONG.	Longitudinal
LT	Light

M

M	Meters
MAN	Manual
Mbar	Millibar
MCP	Maximum Continuous Power
Min	Minutes
MPH	Miles-Per-Hour

N

N_1	Gas Producer Speed
N_2	Power Turbine Speed
NAV	Navigation
N_P	Power Turbine Speed
N_R	Rotor Speed

O

OAT	Outside Air Temperature
OGE	Out of Ground Effect

P

PNL	Panel
POSN	Position
PRI	Primary
PRESS	Pressure
PSI	Pounds per Square Inch
PWR	Power

Q

QTY	Quantity

R

R	Right
REL	Release
RET	Retract
RPM	Revolutions per Minute
RTR	Rotor

S

Sec	Seconds
SHP	Shaft Horsepower
SL	Sea Level
STBY	Standby
STA	Station
STC	Supplemental Type Certificate
SYS	System

T

TOP	Takeoff Power

U

U.S.	United States

V

VFR	Visual Flight Rules
V_H	Maximum speed in level flight at MCP
VLV	Valve
VMC	Visual Meteorological Conditions
V_{NE}	Never Exceed Speed
Vs	Versus
V_Y	Best Rate of Climb Speed

W

WL	Water Line

X

XMSN	Transmission
XPNDR	Transponder

1-10. TECHNICAL PUBLICATIONS

A file of technical publications is available to aid in obtaining maximum utilization of your helicopter. Revisions and new issue publications are provided to continually update and expand existing data.

MDHI Publications Revisions and Reissues

Changes in limitations, procedures, performance, optional equipment, etc., require flight manual revisions and change or replace flight manual content as appropriate. To ensure that MDHI manuals continue to show current changes, revised information is supplied as follows.

Revisions

Change to parts of the manual by the replacement, addition and/or deletion of pages is done by revision. The List of Effective Pages that accompanies each revision, identifies all affected pages. Such pages must be removed from the manual and discarded. Added or replaced pages must be put in and examined against the List of Effective Pages.

Reissues

Occasionally the manual may be reissued and is identified as “Reissue #1, Reissue #2”, etc. The preceding issue of the manual then becomes obsolete and must be discarded. The reissue includes all prior revisions. All pages in a reissue become “Original” pages. The reissue may also include new or changed data. These changes will be identified on the “Summary of Revisions” page as well as having change bars appear in the page margin on the effected pages.

The publications available are the following.

Pilot’s Flight Manual (containing the FAA Approved Rotorcraft Flight Manual).

Basic Handbook of Maintenance Instruction (HMI) - CSP-H-2:

Optional Equipment Manual (Basic HMI Appendix A)

Periodic Inspections, Overhaul and Retirement Schedule and Weight and Balance Procedure (Basic HMI Appendix B)

Component Overhaul Manual (Basic HMI Appendix C)

Structural Repair Manual (Basic HMI Appendix D)

Illustrated Parts Catalog (IPC)

Illustrated Optional Accessories and Modification Kit Catalog (IKC)

Service Information Notices and Letters

Corrosion Control Manual

New and revised publications are available through MDHI Subscription Service. Further information may be obtained by contacting:

MD Helicopters, Inc.
M615-G048
4555 E McDowell Rd
Mesa, AZ 85215-9734
or your local Service Center, Distributor, or Sales Company.

All persons who fly or maintain MDHI helicopters are urged to keep abreast of the latest information by using the subscription service.

1-11. DESIGN AND CONSTRUCTION

369HE/HS differences:

Except for interior trim upholstery and floor coverings, equipment furnishings, paint finish and other details, the 369HS and 369HE are essentially identical to the basic helicopter configuration. Normally, the 369HS has the standard trim package and the 369HE has the executive trim package. Furnishing variations between models include a passenger/cargo compartment folding table, passenger steps, and different ashtray locations and passenger/cargo convenience panels.

The MD 500 helicopter is a turbine powered, rotary-wing aircraft constructed primarily of aluminum alloy. The main rotor is a fully articulated four-bladed system, while the tail rotor is a two-bladed semi-rigid type. Power from the turboshaft engine is transmitted through the drive shafts to the main 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 airframe structure is egg-shaped and provides very clean aerodynamic lines. The rigid, three-dimensional truss type structure increases crew safety by means of its roll bar design, and by reduction in the number of potential sources of failure. The airframe structure is designed to be energy absorbing and fails progressively in the event of impact.

The fuselage is a semi-monocoque structure that is divided into three main sections. The forward section is comprised of a pilot compartment and, directly aft separated by a bulkhead, a passenger/cargo compartment. The pilot compartment is equipped with seats for the pilot and either one or two passengers. A canopy of transparent tinted acrylic panels provide excellent visibility. The left seat in the pilots compartment (looking forward) is the pilot's seat (command position); in special military version helicopters, the pilot's seat is on the right side.

The MD 500 requires a minimum crew of one pilot seated on the left side of the compartment. The passengers sit to the right, abreast of the pilot. Seat

belts are provided for all positions. In the military version, the center seat is eliminated.

An instrument panel is located forward of the seat 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 communication and navigation equipment.

The lower fuselage structure beneath the pilot/passenger floor contains compartment space for the aircraft battery and provision for small cargo storage or installation of avionics equipment. Access to the compartments is through two floor door plates.

The cargo compartment in the center of the aircraft contains provisions for installation of a bench or individual folding type passenger seats, which are adjustable in height.

Seat belts are provided with several styles being offered. The seats and belts are easily removed. Cargo compartment bench-type seats may be easily folded out of the way or completely removed for accommodating cargo.

During cargo carrying operations, the compartment floor serves as the cargo deck. Removable and interchangeable cargo tiedown fittings are available.

The aft section includes the structure for the tailboom attachment and engine compartment. Access to the engine compartment is provided through clamshell doors contoured to the shape the fuselage.

The lower section is divided by the center beam and provides a housing for the two fuel cells. Provisions for the attachment of a cargo hook are located on the bottom of the fuselage in line with the center beam.

Four doors are installed on the helicopter-two on each side. The two forward doors permit access to the forward compartment for pilot and passengers. The two aft doors allow entry to the passenger/cargo compartment. Transparent tinted windows are contained in the doors.

The power plants used are either the Allison Model 250-C18 gas turbine engine with a takeoff power rating of 317 shp or the Allison 250-C20 with a take-off power rating of 400 shp. Only 278 shp at 104 percent N_2 RPM is used for takeoff; 243 maximum continuous shp provides sufficient power for all other flight modes.

Limiting the maximum power to less than the maximum rated power provides a higher engine critical altitude. The power turbine governor provides automatic constant speed control of rotor RPM.

The overrunning clutch transmits power from the engine to the main drive shaft. The clutch has no external controls and disengages automatically during autorotation and engine shutdown. The main drive shaft connects to the main rotor transmission input shaft. The engine oil cooler blower is belt driven off the main drive shaft. The oil cooler blower draws cooling air from the air inlet fairing to supply ambient air to the engine oil cooler and to the engine compartment.

The main rotor transmission is mounted on the basic airframe structure above the passenger/cargo compartment. The transmission is lubricated by its own internal lubrication system.

The main rotor static mast is non-rotating and is rigidly mounted to the mast support 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 eliminating thrust loading of transmission parts.

The tailboom is a monocoque structure of aluminum alloy frames and skin. The tailboom is the supporting attachment structure for the stabilizers, tail rotor transmission and tail rotor. The tailboom also houses the tail rotor transmission drive shaft; the one piece dynamically balanced shaft requires no intermediate couplings or bearings. Metallic diaphragm shaft-end-couplings are used.

The tail rotor transmission is mounted on the aft end of the tailboom and has a self contained lubrication system. The tail rotor is mounted on the output shaft of the transmission and consist of two variable pitch blades.

The helicopter utilizes a four bladed, fully articulated main rotor assembly with unique features. While contemporary helicopters use torsion tension straps in lieu of thrust bearing stacks to contain blade centrifugal loading and allow feathering, the MDHI strap pack arrangement goes three steps further. First, the strap configuration (while secured firmly to the hub) actually allows the centrifugal load exerted by one blade to be countered by the force exerted by the opposite blade. Thus, very light centrifugal loads are sensed by the hub. Second, the V-legs of the strap pack rotate as driving members to turn the blades. Finally the straps are configured to allow feathering and flapping of the blades. The main rotor blades are secured to the hub with quick release lever type pins.

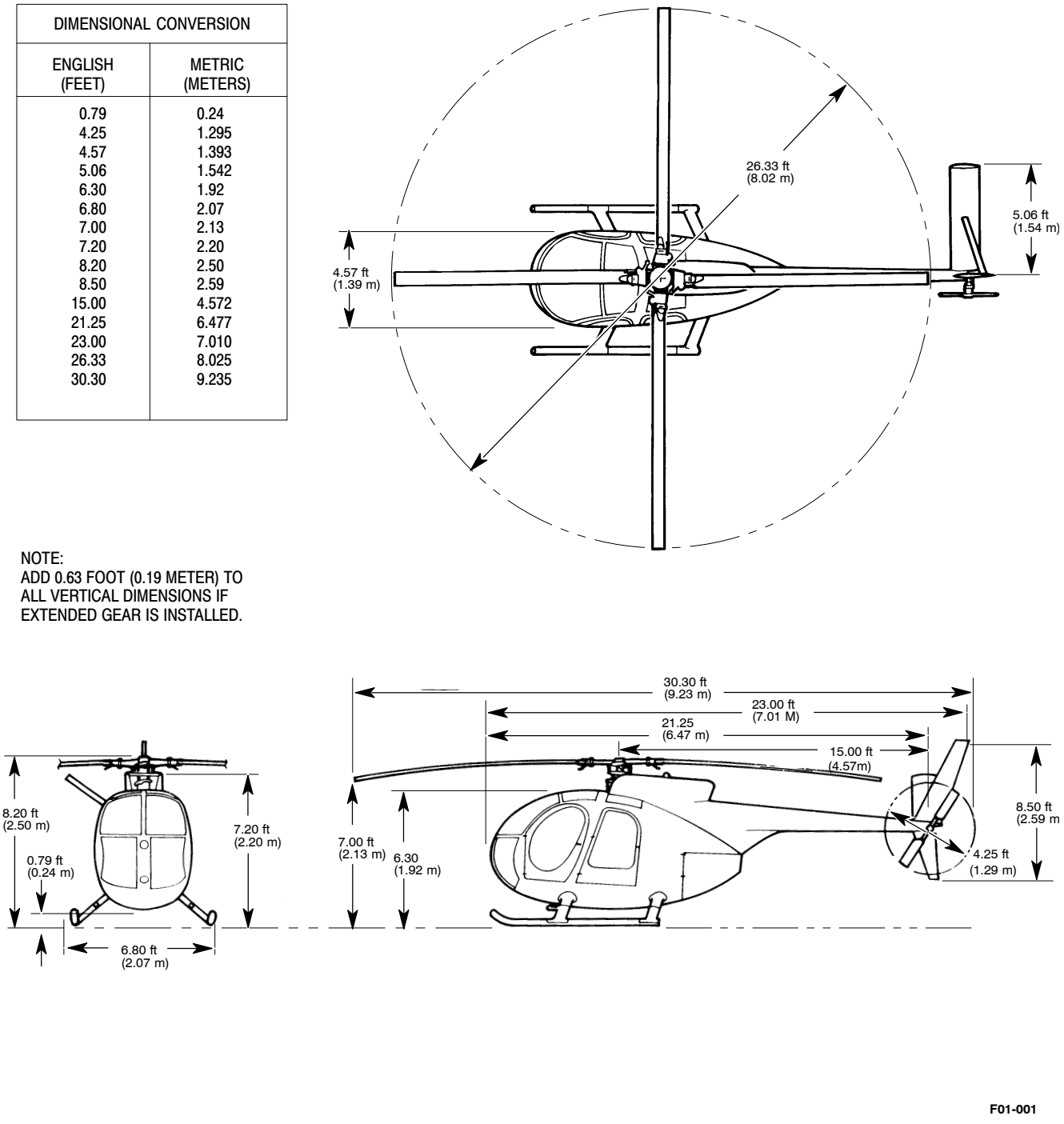
Cyclic, collective, and adjustable pedal controls are provided at the left crew position (right position, military only). Adjustable friction devices, which may be varied to suit the individual pilot, are incorporated in the cyclic, collective and throttle controls. In addition, electrical cyclic trim actuators allow flight loads to be trimmed out. Since stick control forces are low, a hydraulic boost system is unnecessary. An optional dual control system may be easily removed to provide room for passengers or cargo.

The landing gear is a skid-type attached to the fuselage at 12 points and is not retractable. Aerodynamic fairings cover the struts. Nitrogen charged landing gear dampers act as springs and shock absorbers to cushion landings and provide ground resonance stability. Provisions for ground handling wheels are incorporated on the skid tubes.

1-12. GENERAL DIMENSIONAL DATA

DIMENSIONAL CONVERSION	
ENGLISH (FEET)	METRIC (METERS)
0.79	0.24
4.25	1.295
4.57	1.393
5.06	1.542
6.30	1.92
6.80	2.07
7.00	2.13
7.20	2.20
8.20	2.50
8.50	2.59
15.00	4.572
21.25	6.477
23.00	7.010
26.33	8.025
30.30	9.235

NOTE:
ADD 0.63 FOOT (0.19 METER) TO ALL VERTICAL DIMENSIONS IF EXTENDED GEAR IS INSTALLED.



F01-001

Figure 1-1. MD 500 Helicopter Principal Dimensions

1-13. CAPACITIES - FUEL SYSTEM

JET A:

Standard non self-sealing tanks:
Capacity is 64.0 U.S. gallons (242 liters), 435.0 pounds.
Usable fuel is 63.4 U.S. gallons (240 liters), 431.1 pounds.

Optional self-sealing tanks:
Capacity is 62.0 US gallons (234 liters), 421.6 pounds.
Usable fuel is 59.9 U.S. gallons (226.8 liters), 407.5 pounds.

JET B:

Standard non self-sealing tanks:
Capacity is 64.0 U.S. gallons (242 liters), 416.0 pounds.
Usable fuel is 63.4 U.S. gallons (240 liters), 412.1 pounds.

Optional self-sealing tanks:
Capacity is 62.0 US gallons (234 liters), 402.0 pounds.
Usable fuel is 59.9 U.S. gallons (232 liters), 389.5 pounds.

CAPACITIES - OIL

Engine oil - 3.0 US quarts (2.84 L)

Main transmission - 12.0 US pints (5.67 liters)

Tail rotor transmission - 0.5 US pint (0.23 liter)

1-14. CONVERSION CHARTS/TABLES

EXAMPLE: CONVERT 100 KNOTS TO MPH AND TO KM/HR:
ENTER CHART AT 100 KNOTS AND FOLLOW ARROW TO SLOPING LINE. TO FIND MPH, MOVE LEFT AND READ 115 MPH. TO FIND KM/HR, MOVE RIGHT FROM THE SLOPING LINE AND READ 185 KM/HR

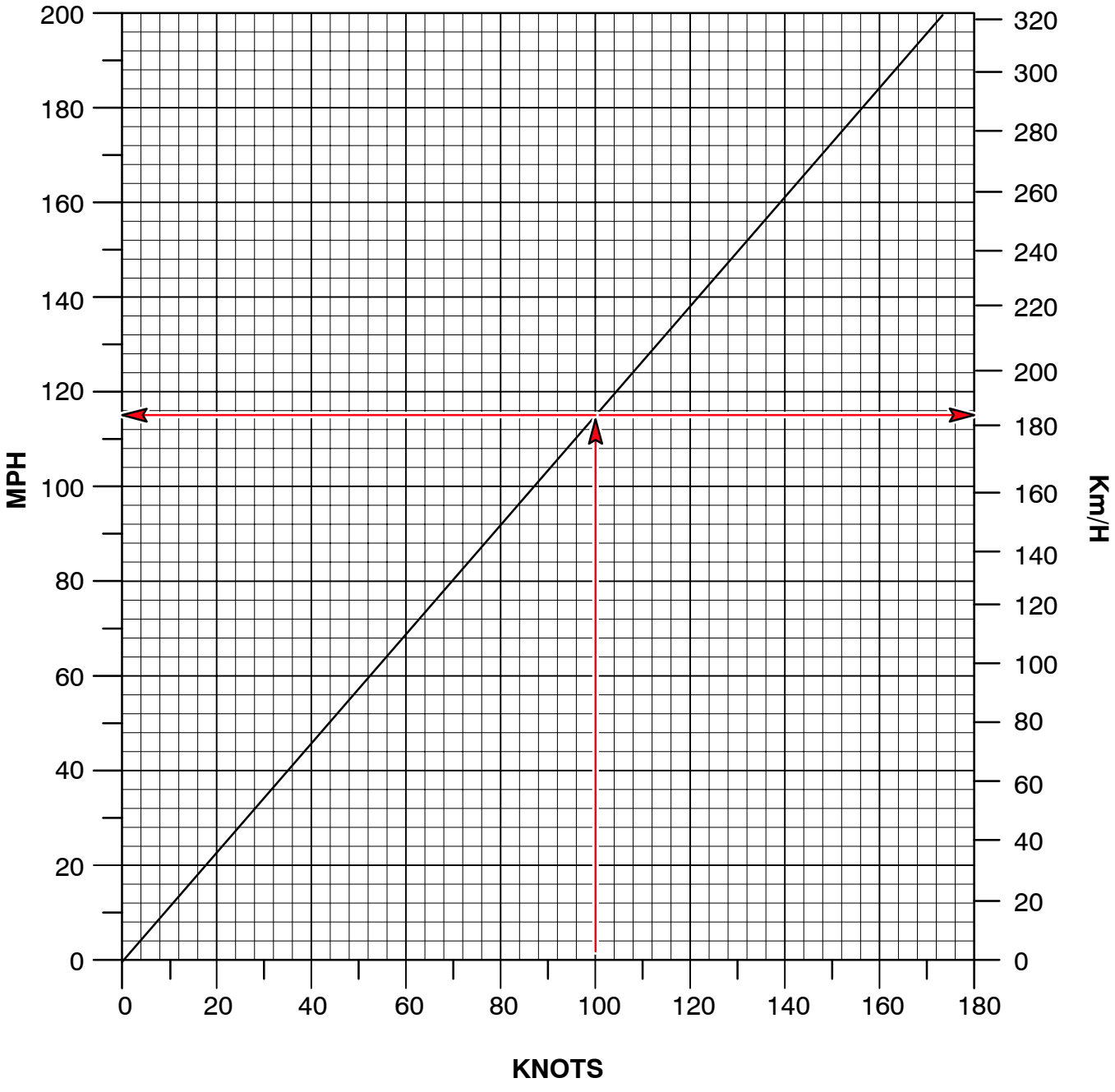


Figure 1-2. Speed: MPH/Knots/KmH

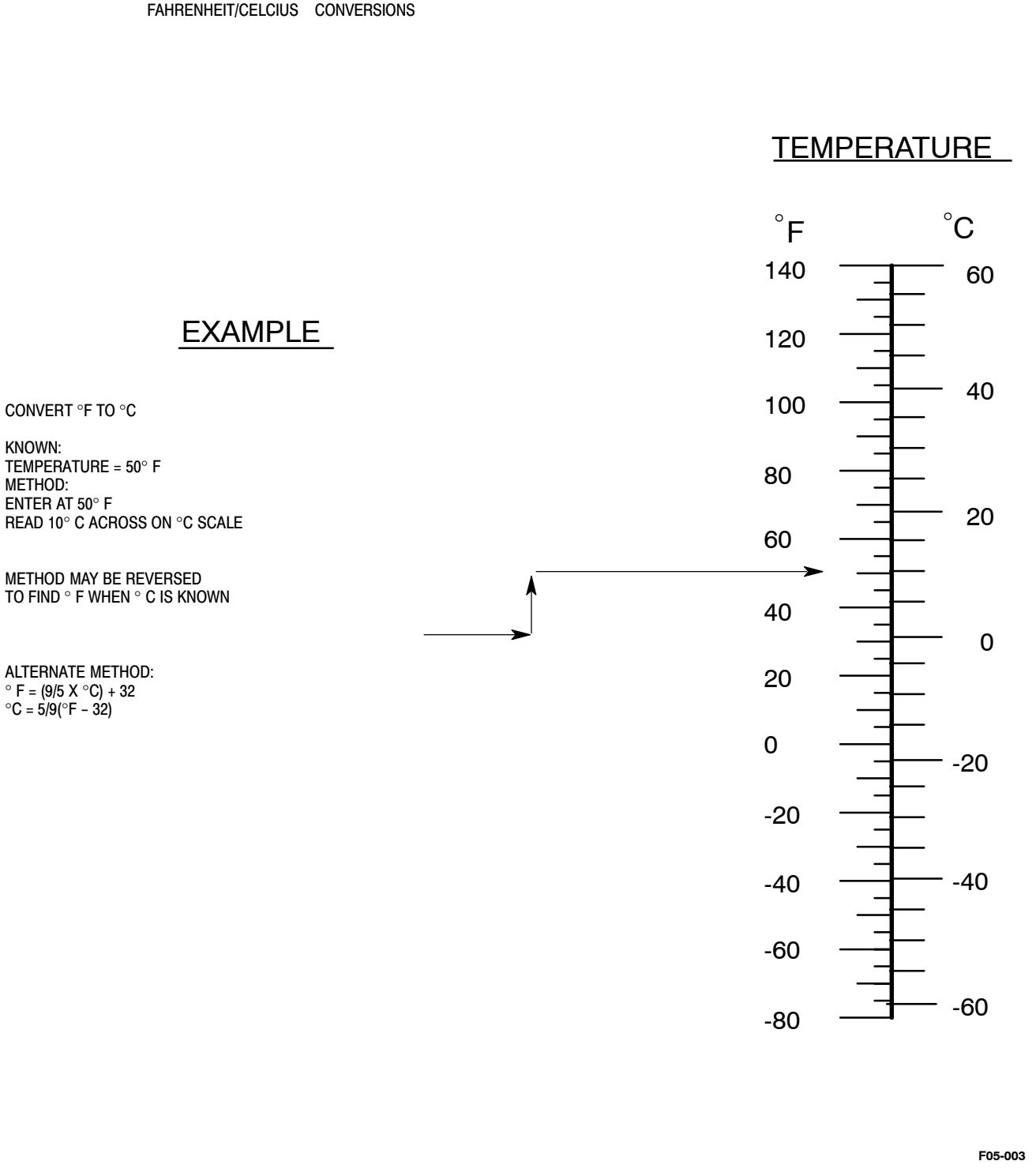


Figure 1-3. Temperature Conversion Chart

Table 1-1. Liquid Measure - U.S. Gal/L U.S. Gallons-to-Liters

U.S. Gallons	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

Table 1-2. Linear Measure - In/Cm Inches-to-Centimeters

Inches	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	182.88	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

Table 1-3. Linear Measure - Ft/M Feet-to-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

Table 1-4. Weight - Lb/Kg Pounds-to-Kilograms

Pounds	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	27.669	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298
70	31.751	32.205	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

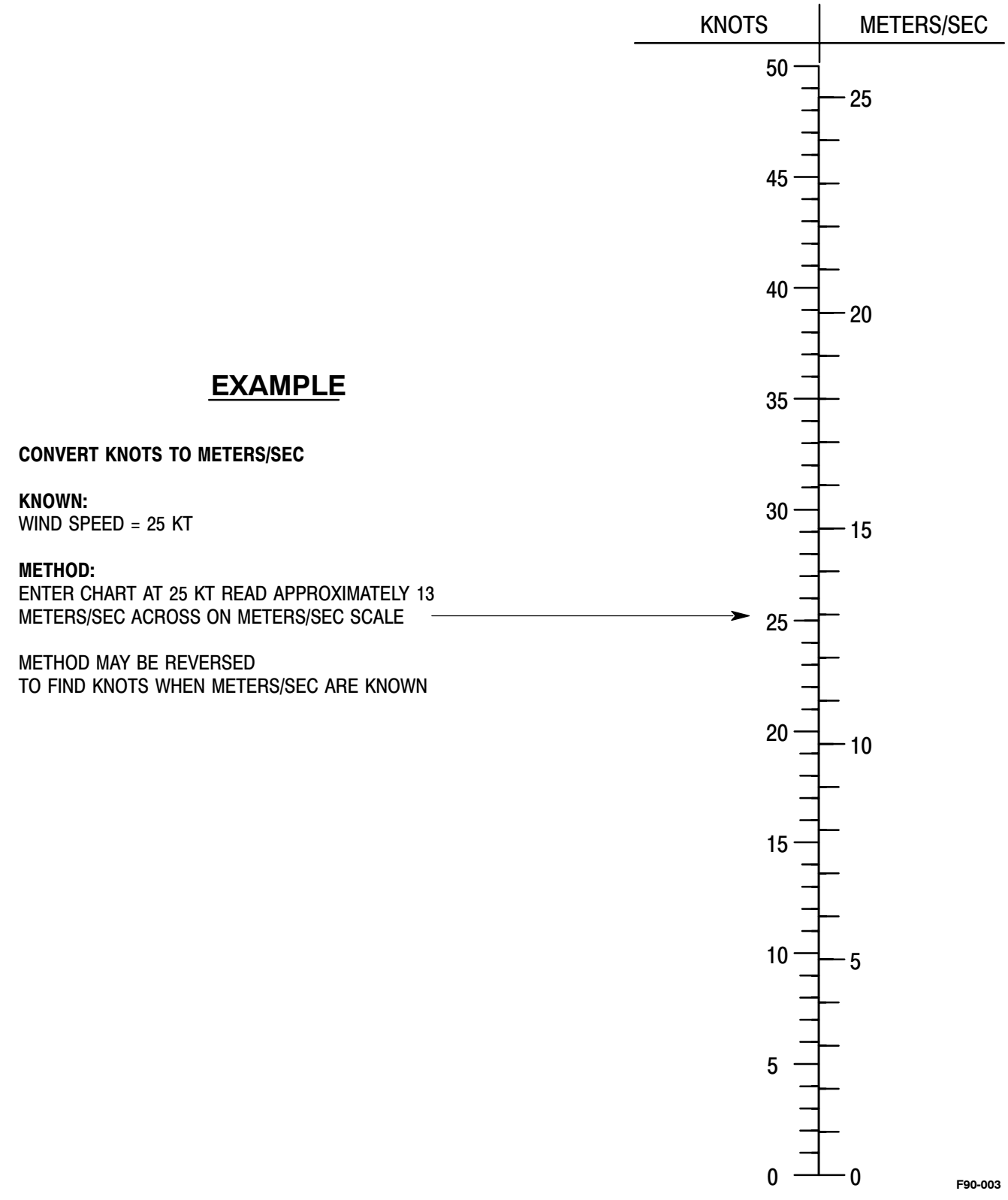


Figure 1-4. Conversion Chart: Knots - Meters/Second

Table 1-5. Standard Atmosphere Table

Standard Sea Level Conditions:
Temperature: 59°F (15°C)
Pressure: 29.921 in. Hg (1013.25 mbar)
Density: 0.0023769 slugs/ft^3 (1.225 kg/m^3)

ALTITUDE (feet)	DENSITY RATIO σ	$\frac{1}{\sqrt{\sigma}}$	TEMPERATURE		PRESSURE (mbar)	PRESSURE (in. Hg)	PRESSURE RATIO
			(°C)	(°F)			
0	1.0000	1.000	15.00	59.000	1013.25	29.921	1.0000
1000	0.9711	1.0148	13.019	55.434	997.18	28.856	0.9644
2000	0.9428	1.0299	11.038	51.868	942.14	27.821	0.9298
3000	0.9151	1.0454	9.056	48.302	908.14	26.817	0.8962
4000	0.8881	1.0611	7.076	44.735	875.12	25.842	0.8637
5000	0.8617	1.0773	5.094	41.196	843.08	24.896	0.8320
6000	0.8359	1.0938	3.113	37.603	811.99	23.978	0.8014
7000	0.8106	1.1107	1.132	34.037	781.86	23.088	0.7716
8000	0.7860	1.1279	-0.850	30.471	752.63	22.225	0.7428
9000	0.7620	1.1456	-2.831	26.905	724.29	21.388	0.7148
10000	0.7385	1.1637	-4.812	23.338	696.82	20.577	0.6877
11000	0.7155	1.1822	-6.793	19.772	670.21	19.791	0.6614
12000	0.6932	1.2011	-8.774	16.206	644.40	19.029	0.6360
13000	0.6713	1.2205	-10.756	12.640	619.44	18.292	0.6113
14000	0.6500	1.2403	-12.737	9.074	595.23	17.577	0.5875
15000	0.6292	1.2606	-14.718	5.508	571.83	16.886	0.5643
16000	0.6090	1.2815	-16.669	1.941	549.14	16.216	0.5420
17000	0.5892	1.3028	-18.680	-1.625	527.23	15.569	0.5203
18000	0.5669	1.3246	-20.662	-5.191	505.99	14.942	0.4994
19000	0.5511	1.3470	-22.643	-8.757	485.48	14.336	0.4791
20000	0.5328	1.3700	-24.624	-12.323	465.63	13.750	0.4595
21000	0.5150	1.3935	-26.605	-15.899	446.47	13.184	0.4406
22000	0.4976	1.4176	-28.587	-19.456	427.91	12.636	0.4223
23000	0.4806	1.4424	-30.568	-23.002	409.99	12.107	0.4046
24000	0.4642	1.4678	-32.549	-26.588	392.72	11.597	0.3874
25000	0.4481	1.4938	-34.530	-30.154	375.99	11.103	0.3711

SECTION II
LIMITATIONS

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SECTION II
LIMITATIONS

NOTE: Unless otherwise stated, information presented in this section pertains to both Model 369HE and 369HS helicopters equipped with the Allison 250-C18 or 250-C20 engines. When any limitation or restriction is affected by serial number, model, or engine configuration, that information will be noted. Be sure to select the appropriate limitation or restriction for model type and engine installed.

2-1. FLIGHT RESTRICTIONS

Approved as a five place (maximum) helicopter.

The minimum flight crew consists of one pilot operating the helicopter from the left seat. The right crew seat may be used for an additional pilot when the approved dual controls are installed.

Aerobatic flight is prohibited.

Installed equipment:

Certification is based on an Engine Failure Warning System (including both visual and audio indications) and an Outside Air Temperature gauge being installed and operable.

Flight with doors removed is approved under the following conditions.

Approved doors-off configurations

All doors off.

Both rear doors off.

Any single door off.

Model 369HS

For helicopters with serial numbers 0272S and prior that have been modified by the installation of 369A2405-29 and -30 stiffener on the 369A2405 overhead canopy panels or serial numbers 0273S and subsequent, flight limitations are unchanged.

For helicopters with serial numbers 0272S and prior that have not been modified, V_{NE} is 85 knots IAS.

Model 369HE

For helicopters with serial numbers 0215E and prior that have been modified by the installation of 369A2405-29 and -30 stiffener on the 369A2405 overhead canopy panels or serial numbers 0216E and subsequent, flight limitations are unchanged.

For helicopters with serial numbers 0215E and prior that have not been modified, V_{NE} is 85 knots IAS.

See Sec. IV, Doors Off Flight, for interior configuration changes required.

WARNING **Any object that is not properly secured may exit the aircraft during flight. Items secured with Velcro tape should not be considered properly secured (see Section IV, Doors Off Flight).**

Flight with the center seat occupied:

Dual controls removed (refer to the HMI).

Right hand seat cushion relocated outboard and secured.

Center location seatback and seat cushion installed and secured.

Seat belt(s) and shoulder harness(es) installed and operable.

2-2. ENVIRONMENTAL OPERATING CONDITIONS

Kinds of operations:

This rotorcraft is certified in the normal helicopter category for day and night VFR operation when the appropriate instruments and equipment required by the airworthiness and/or operating rules are approved, installed and are in operable condition.

Maximum operating altitude:

Maximum operating density altitude is 20,000 feet.

Ambient temperature limitations:

At sea level, the maximum engine inlet temperature is 54°C (130°F) varying linearly to 6000 feet pressure altitude at a maximum temperature of 35°C (95°F) varying linearly to 20,000 feet pressure altitude at a temperature 0°C (32°F). It is to be assumed that engine air inlet temperature is the same as ambient (free air) temperature.

Cold weather operations:

Flight into known icing conditions is prohibited.

Flight operation is permitted in falling and/or blowing snow only when the Automatic Engine Reignition Kit and Engine Failure Warning System are installed and operable.

2-3. AIRSPEED LIMITATIONS

From sea level to 3000 feet: Limit V_{NE} to 130 knots IAS.

Select the appropriate V_{NE} placard (based on gross weight) prior to takeoff (Ref. paragraph 2-14)

See Figure 2-1 for variations of V_{NE} with altitude with 250-C18.

See Figure 2-2 for variations of V_{NE} with altitude with 250-C20.

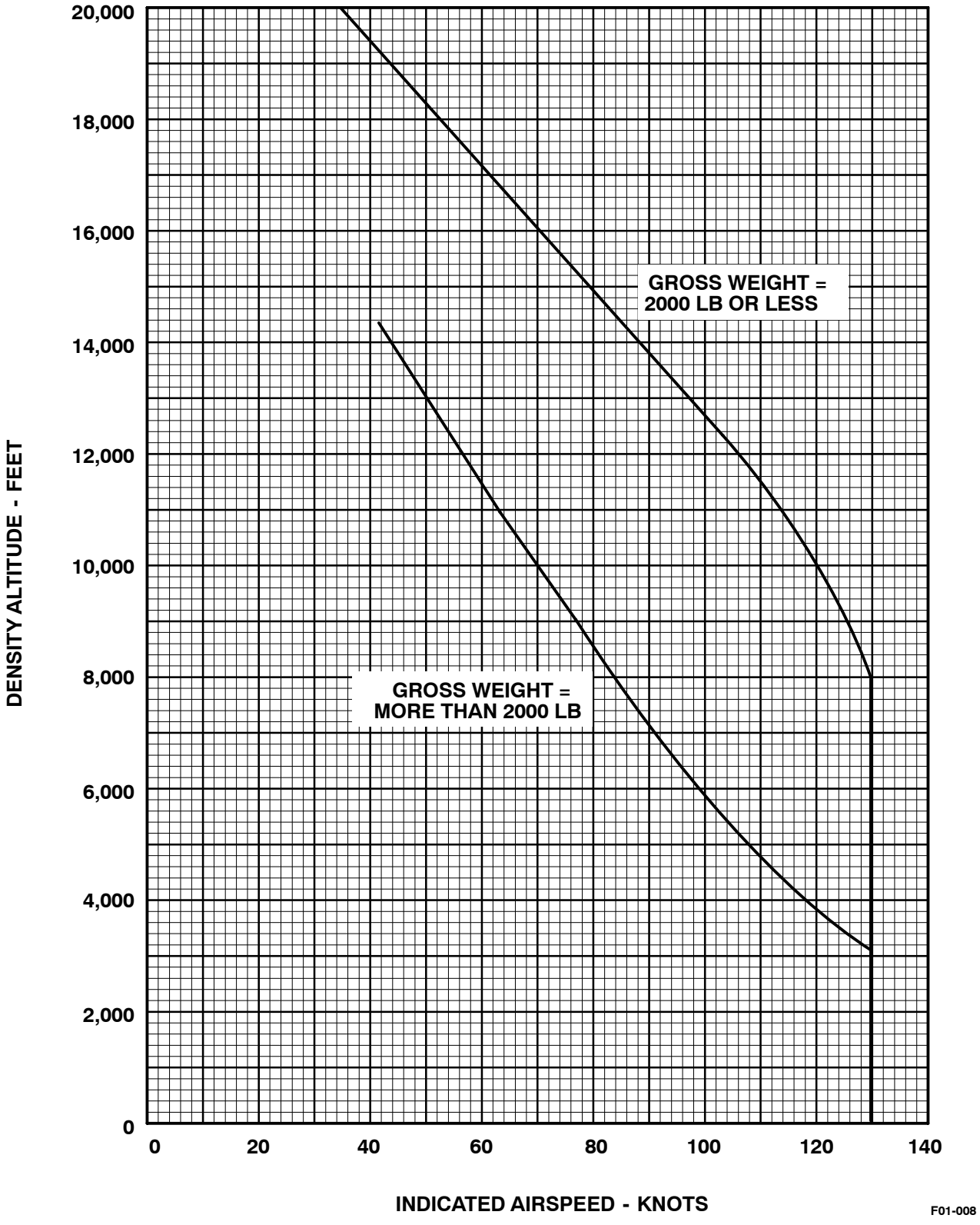


Figure 2-1. Variation of V_{NE} With Altitude - 250-C18

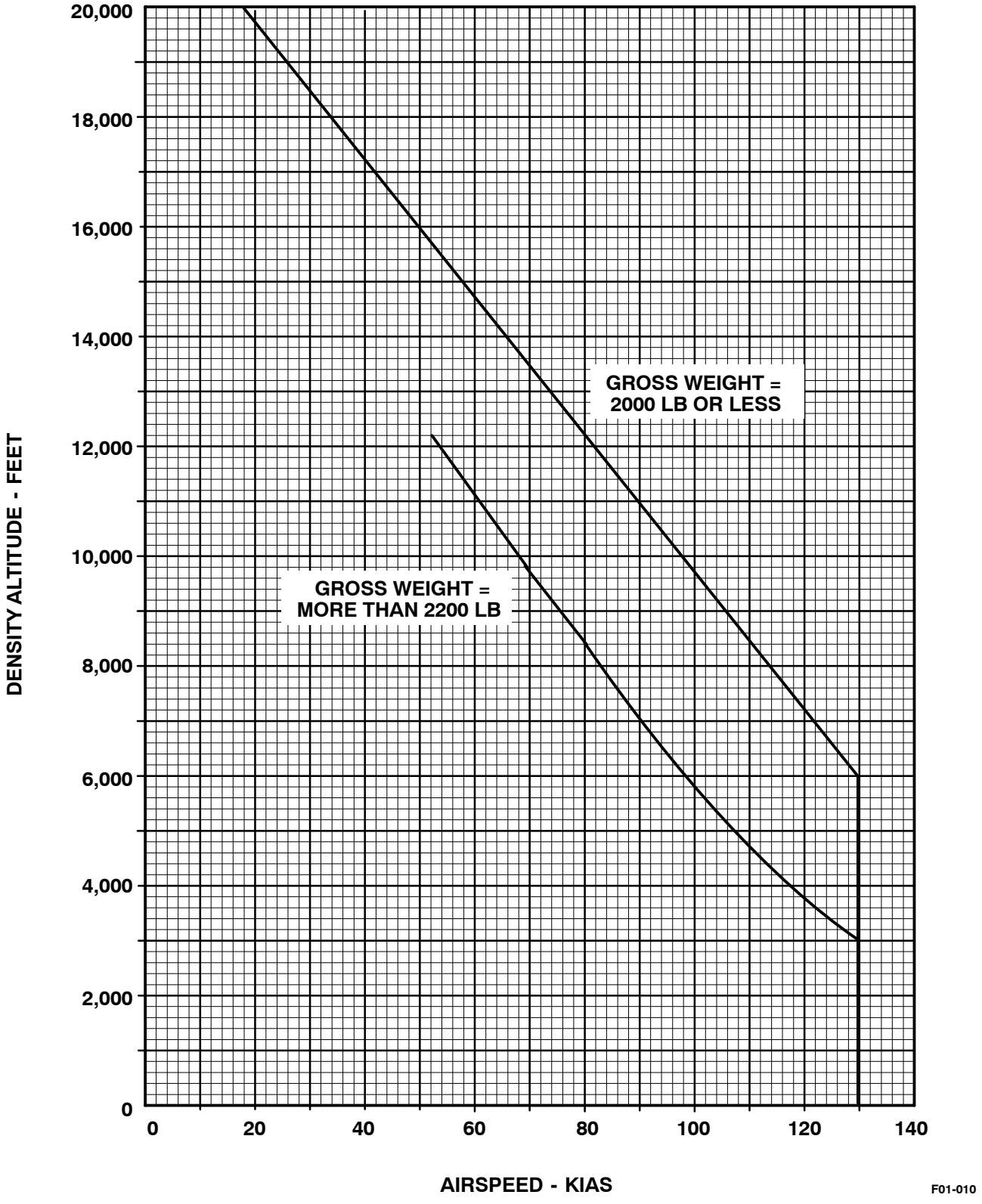


Figure 2-2. Variation of V_{NE} with Altitude - 250-C20

2-4. WEIGHT LIMITATIONS

Maximum gross weight:

369HE/HS, S/N 0001 thru 0100:

Maximum gross weight is 2400 pounds.

369HE/HS, S/N 0101 and subs

Maximum gross weight is 2550 pounds.

NOTE: See Figure 2-3 for takeoff and landing weight limitations for helicopters not equipped with aluminum tail rotors.

Cargo deck capacity:

369HE/HS S/N 0001 thru 0100

950 LB at 115 pounds per square foot.

369HE/HS S/N 0101 and subsequent

1300 LB at 115 pounds per square foot.

Utility stowage compartment:

Maximum weight in the utility stowage compartment is 50 pounds.

C.G. limits:

Table 2-1. Center of Gravity Limits

Gross Weight (lb)	Longitudinal C.G. Limit (Sta-in.)		Lateral C.G. Limit (Sta-in.)
	Forward	Aft	(-) Left (+) Right
2401 to 2550	99.0	104	±3.0
2201 to 2400	97.0	104	±3.0
2001 to 2200	97.0	104 105	-3.0; +4.0 -1; +3
2000 and below	97.0	104 106	-3; +5 -1; +3

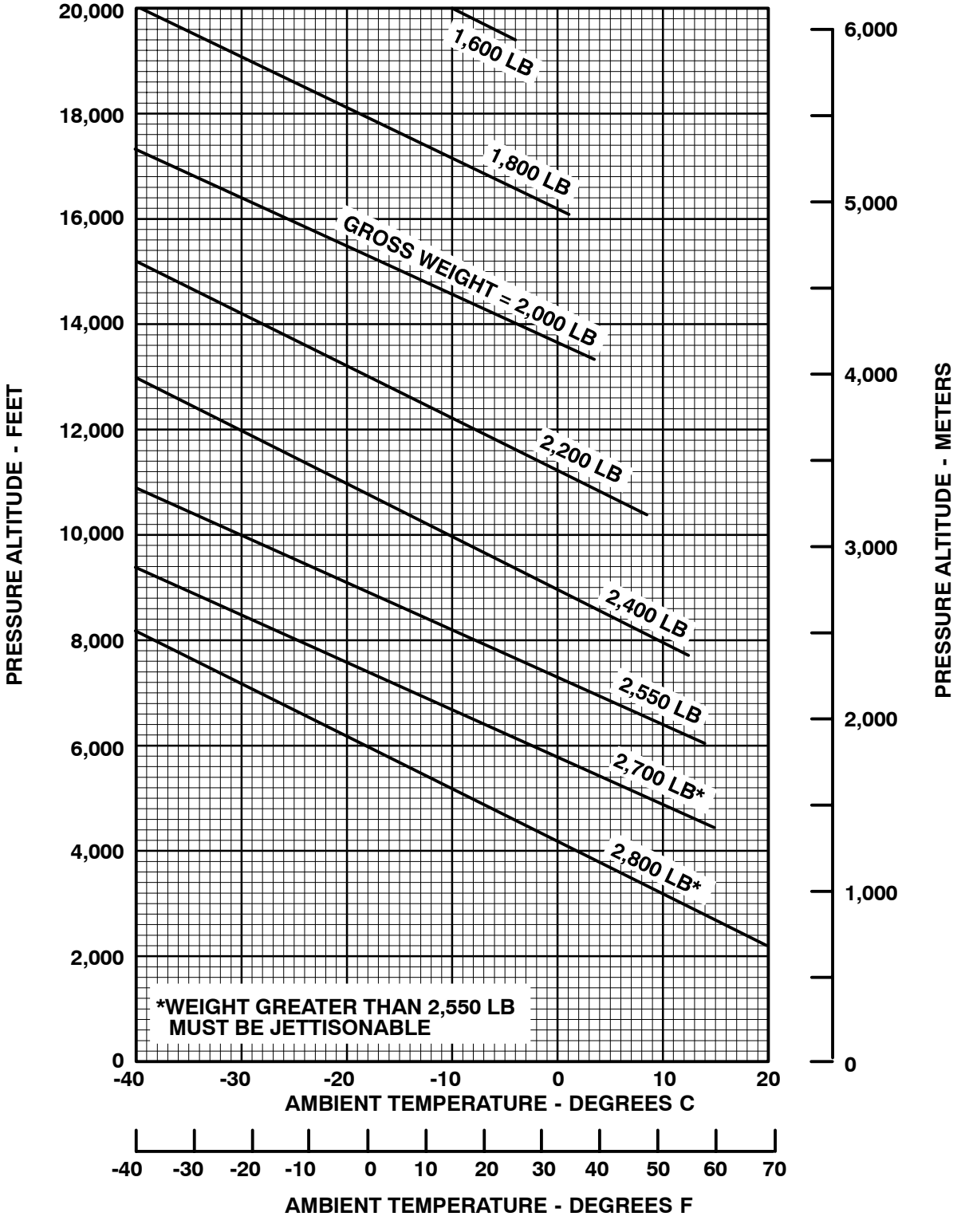


Figure 2-3. Takeoff and Landing Weight Limitations - Helicopters Without Aluminum Tail Rotors

2-5. ROTOR BRAKE LIMITATIONS (IF INSTALLED)

The rotor brake is to be applied only while the helicopter is on the ground during normal engine shutdown with N_R at or below 235 RPM.

Do not apply collective to assist in slowing rotor.

CAUTION **Damage to the main rotor strap pack may result from holding the collective in other than the full down position during rotor brake application.**

Release rotor brake during the last revolution of the rotor.

CAUTION **Damage to the rotor blades and drive train can result from sudden stoppage of the rotor.**

2-6. ROTOR SPEED LIMITS - ALLISON 250-C18

Maximum RPM **Power on:** 489 RPM (Ref: 104 percent N_2)

Minimum RPM **Power on:** 484 RPM (Ref: 103 percent N_2)

Maximum RPM **Power off:** 514 RPM

Minimum RPM **Power off** 400 RPM

2-7. ROTOR SPEED LIMITS - ALLISON 250-C20

Maximum RPM **Power on** 489 RPM (Ref: 104 percent N_2)
Minimum RPM **Power on** 484 RPM (Ref: 103 percent N_2)
Maximum RPM **Power off** 523 RPM
Minimum RPM **Power off** 400 RPM

2-8. POWER PLANT LIMITS - ALLISON 250-C18

Engine torque limits:

Maximum takeoff (5 minute): 80.3 psi torque.

Maximum continuous: 70 psi torque.

Transient torque limits:

80.4 to 90.0 psi torque for 10 seconds at 104 percent N_2.

90.1 to 100.0 psi torque for 3 seconds at 104 percent N_2.

Turbine outlet temperature limits:

Maximum takeoff (5 minute): 749°C

Maximum continuous: 693°C

Maximum for starting (lightoff): 150°C

Transient limits:

During start and shutdown: 749°C to 927°C for up to 10 seconds with a momentary peak temperature of 927°C for not more than 1 second.

During power changes in flight: 749°C to 843°C for 6 seconds.

Gas producer (N_1) speed limits:

Maximum continuous: 104%.

Ground idle speed 62 - 67%.

NOTE: During autorotative flight, the N_2 governor may reduce N_1 below 62 percent.

Transient limits: 105% for 15 seconds.

N_2 limits:

Normal Power On operation: 103% to 104% N_2.

Transient over speed limit (15 seconds maximum): 110% (red dot on N_2 scale) at idle power varying linearly to 106% at 80.3 psi torque.

Engine oil system limits:

Flight operation temperature limits:

0°C to 107°C provided engine oil pressure is within limits.

NOTE: These engine oil temperature limits pertain to all gauge configurations. 0°C is when the needle is at the bottom of the yellow/green arc.

Flight operation pressure limits:

97 percent N_1 and above:	110 - 130 psig
78 to 97 percent N_1 speed:	90 - 130 psig
78 percent N_1 and below:	50 psig min.

2-9. POWERPLANT LIMITATIONS ALLISON 250-C20

Engine torque limits:

Maximum takeoff power (5 minute): 64.5 psi torque

Maximum continuous: 56.0 psi torque

Transient torque limits:

72.0 psi torque for 10 seconds at 104 percent N_2.

80.0 psi torque for 3 seconds at 104 percent N_2.

Turbine Outlet Temperature limits:

Maximum takeoff (5 minute): 793°C

Maximum continuous: 737°C

Maximum for starting (lightoff): 150°C

Transient limits:

During start and shutdown: 793°C to 927°C for up to 10 seconds with a momentary peak temperature of 927°C for not more than 1 second.

During power changes in flight: 793°C to 843°C for 6 seconds.

Gas Producer (N_1) speed limits:

Maximum continuous: 104%

Ground idle speed: 61 - 65%

Transient limits:

104 - 106% for 15 seconds

Power Turbine (N_2) speed limits:

Normal Power On operation: 103% to 104% N_2.

Transient overspeed limit (15 seconds maximum): 113% at idle power varying linearly to 108% at 64.5 psi torque.

Engine oil system limits:

Flight operation temperature limits: 0°C to 107°C

NOTE: These engine oil temperature limits pertain to all gauge configurations. 0°C is when the needle is at the bottom of the yellow/green arc.

Flight operation pressure limits:

94.2 percent N_1 and above:	115 - 130 psig
78.5 to 94.2 percent N_1:	90 - 130 psig
78.5 percent N_1 and below:	50 - 130 psig

2-10. ELECTRICAL SYSTEM LIMITATIONS

Generator limits:

Maximum continuous: 66 amps

66 to 150 amps: 10 minutes

>150 amps: 2 minute limit prior to takeoff during battery recharging cycle only.

Battery limits:

Flight following a battery overtemperature of 160°F (71°C) or above is prohibited until the battery has been inspected.

2-11. STARTER LIMITATIONS

If ignition is not attained:

1 minute on, 1 minute off;
1 minute on, 23 minutes off;

2-12. FUEL SYSTEM LIMITATIONS

Fuel Specifications:

For additional information on fuels, refer to the appropriate Rolls Royce Operation and Maintenance Manual.

Primary

Jet A (ASTM D-1655); Jet A-1 (ASTM D-1655); Jet B (ASTM-D-1655)
JP-1 conforming to ASTM D-1655, Jet A or Jet A-1
JP-4 (MIL-DTL-5624); JP-5 (MIL-DTL-5624); JP-8 (MIL-DTL-83133)
Arctic Diesel Fuel DF-A conforming to ASTM D-1655, Jet A or Jet A-1
Diesel No. 1 conforming to ASTM D-1655, Jet A or Jet A-1
Peoples Republic of China RP-3.

Alternate

AVGAS/JetA, A-1, JP-5 or JP-8 mixture may be used at ambient temperatures of 4°C and below.

Refer to Rolls Royce Operation and Maintenance Manual for AVGAS mix, cold weather fuel and blending instructions.

Emergency

Aviation Gasoline MIL-G-5572E.

CAUTION **MIL-G-5572 aviation gasolines containing Tri-Cresyl-Phosphate (TCP) additives shall not be used. Use of MIL-G-5572E gasolines is limited to a maximum of 6 hours of operation per engine overhaul period and operation within safe conditions. (Ref. Figure 2-4).**

CAUTION **When using alternate fuel mixtures or emergency fuels, the start pump must be on until the engine is shutdown. (Ref. Figure 2-4).**

Cold weather operations:

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

Refer to Section VII for additional cold weather fuel information.

Fuel filter:

Upon completion of the flight in progress, further flight is prohibited until the fuel filter has been serviced following the illumination of the FUEL FILTER caution light.

Fuel system purging:

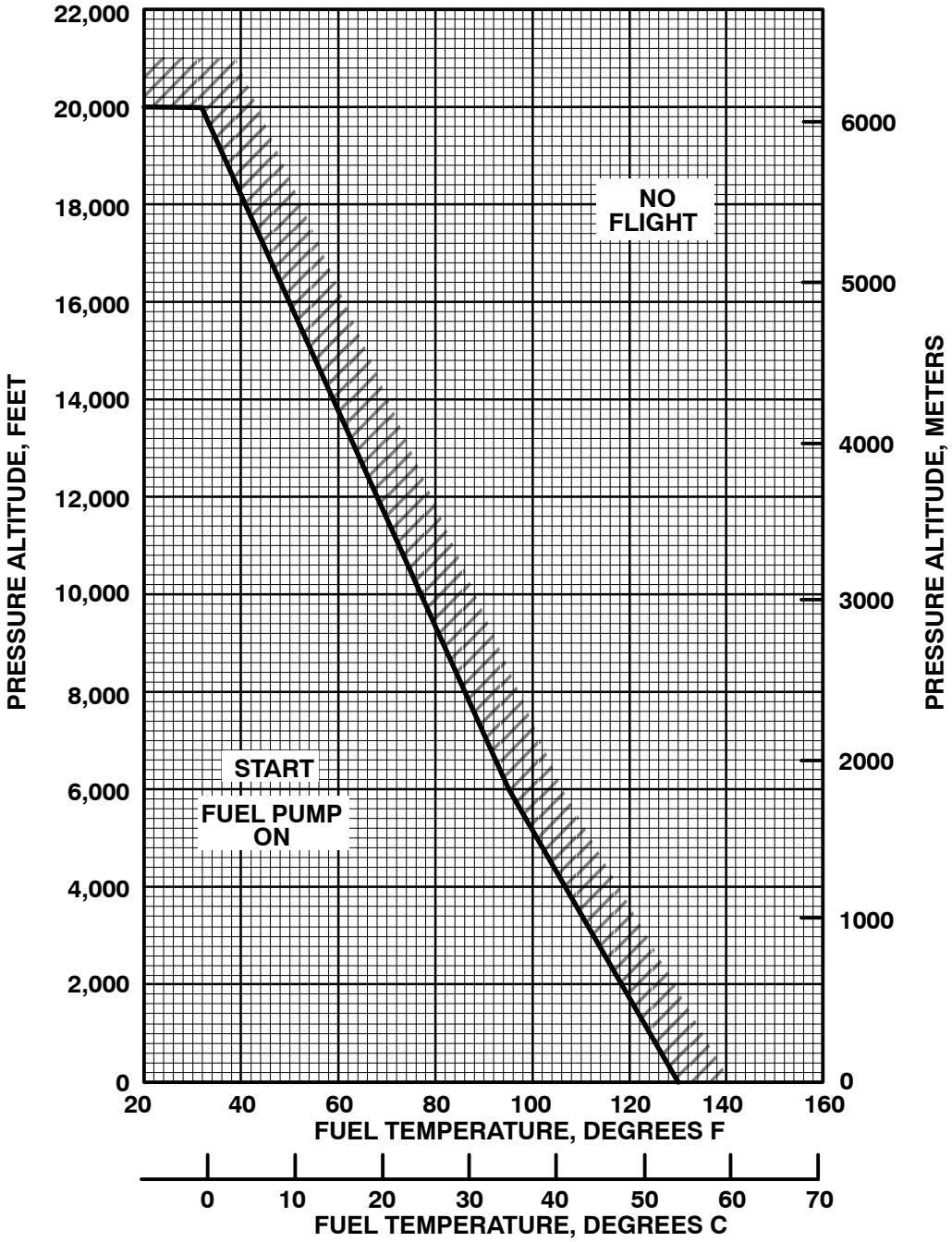
Further flight is prohibited until the fuel system is purged (see HMI) following:

Engine flameout caused by fuel exhaustion.

Draining fuel from engine compartment fuel drains (if installed) without the start pump on.

Engine shutdown using emergency fuel shutoff valve.

Motoring the helicopter engine without fuel in the fuel tank.



NOTES: (1) USE OF MIL-G-5572E FUEL IS LIMITED TO A MAXIMUM OF 6 HOURS OF OPERATION PER ENGINE OVERHAUL PERIOD.

(2) TO CONSERVATIVELY ESTIMATE THE FUEL TEMPERATURE, ASSUME IT TO BE EQUAL TO THE HIGHEST TEMPERATURE THE HELICOPTER HAS BEEN EXPOSED TO DURING THE PRECEDING 24 HOURS.

F01-007

Figure 2-4. Operating Limitations: MIL-G-5572E Emergency Fuel (Aviation Gasoline)

2-13. INSTRUMENT MARKINGS

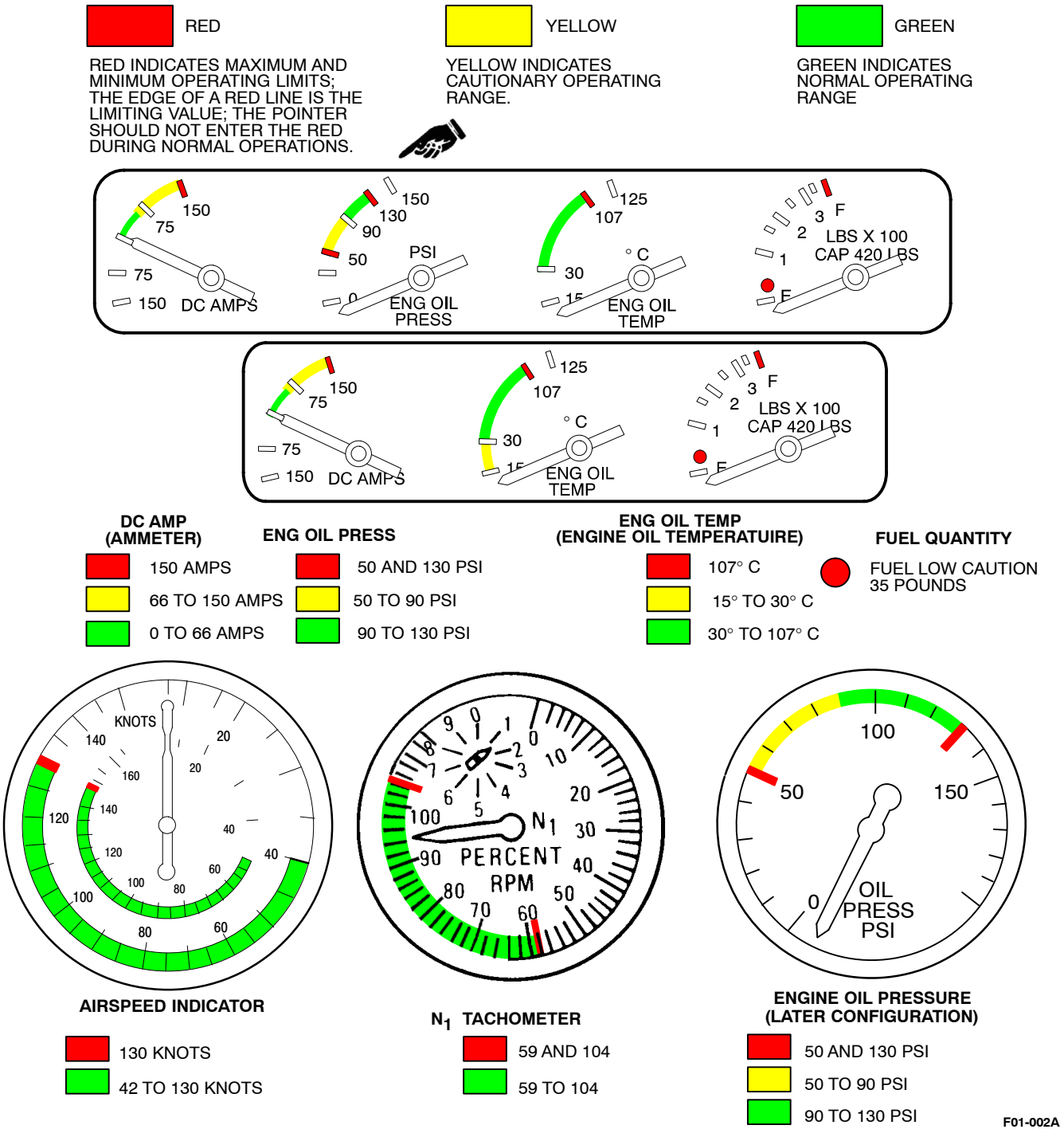


Figure 2-5. Instrument Markings

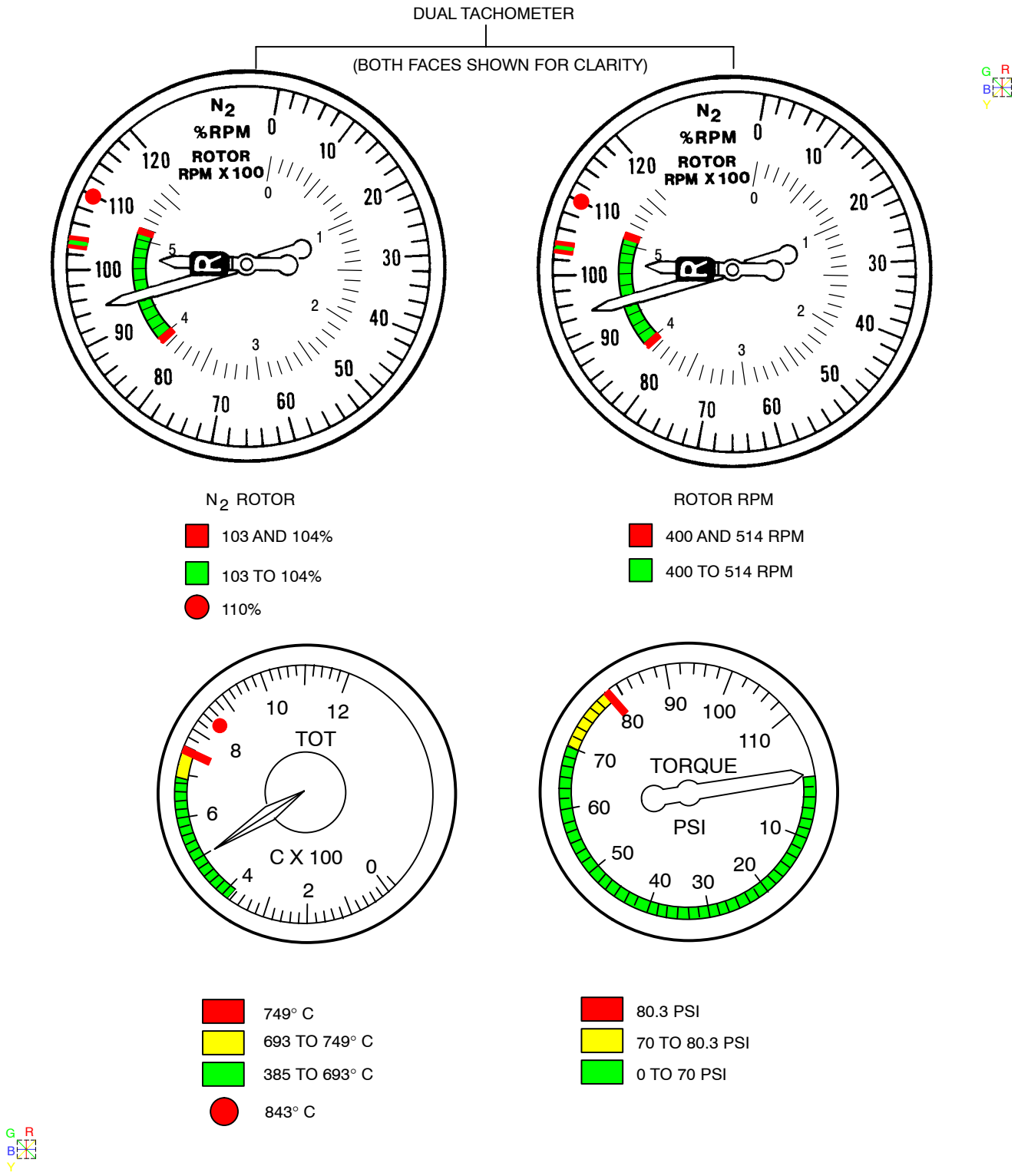


Figure 2-6. Instrument Markings Allison - 250-C18 Engine

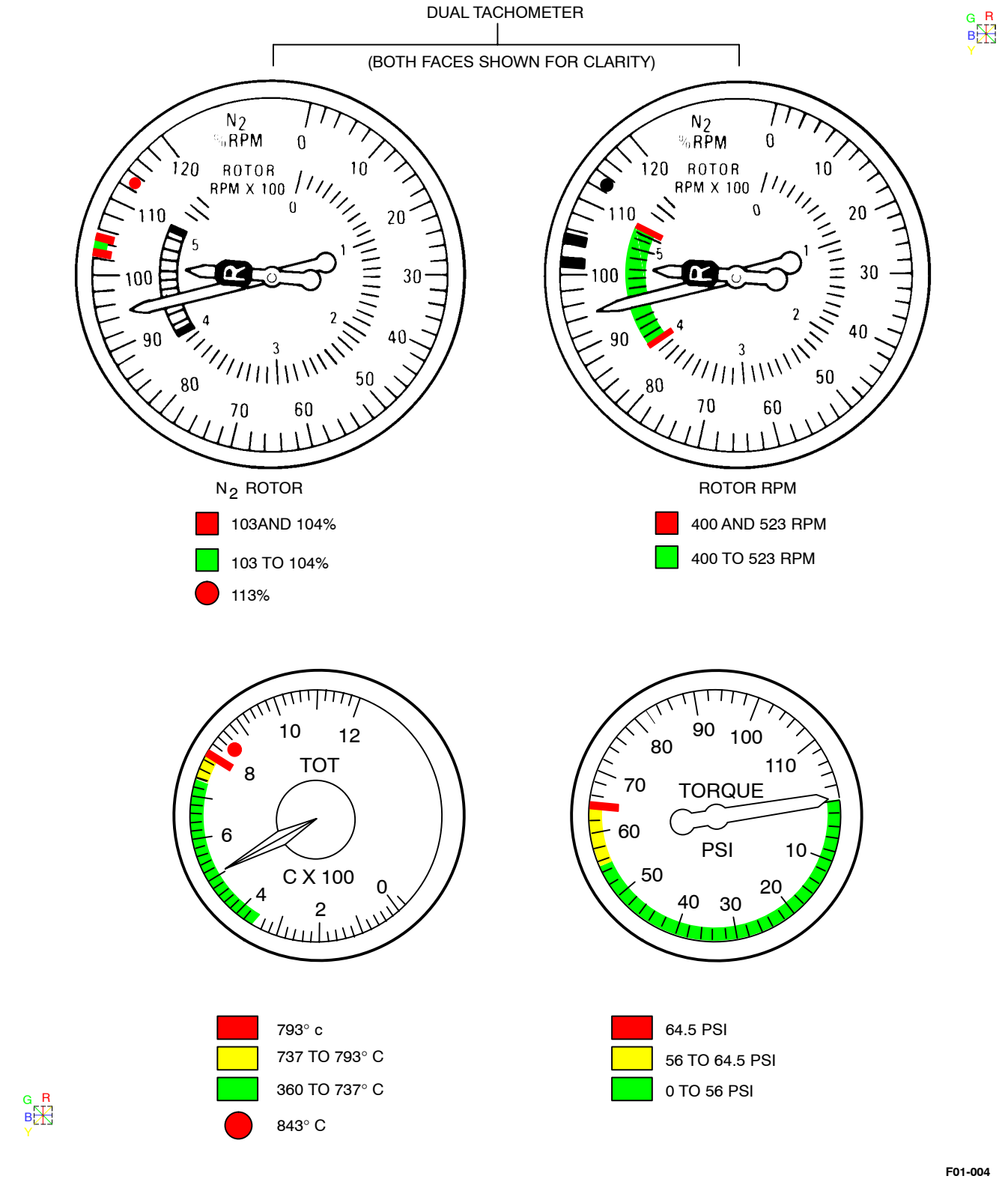


Figure 2-7. Instrument Markings - Allison 250-C20 Engine

2-14. PLACARDS AND DECALS

	V_{NE}, KNOTS, IAS GROSS WEIGHT = 2000 LBS OR LESS							
PRESSURE ALTITUDE x 1000 / °C OAT	0	1	4	7	10	13	17	20
-30	130					116	73	40
-15					126	102	58	- -
0					116	86	42	- -
15				127	103	71	- -	- -
30				118	89	56	- -	- -
45			129	107	76	43	- -	- -

	V_{NE}, KNOTS, IAS GROSS WEIGHT = MORE THAN 2000 LBS							
PRESSURE ALTITUDE x 1000 / °C OAT	0	1	4	7	10	13		
-30	130				92	66		
-15				108	79	54		
0			128	92	66	43		
15			109	80	55	- -		
30			94	68	45	- -		
45	125	112	83	58	- -	- -		

Figure 2-8. V_{NE} Placards - Allison 250-C18

	V_{NE}, KNOTS, IAS GROSS WEIGHT = 2200 LBS OR LESS							
PRESSURE ALTITUDE x 1000 / ° C OAT	0	1	4	7	10	13	17	20
-30	130				123	93	52	22
-15					108	78	38	- -
0				123	93	64	- -	- -
15				109	79	50	- -	- -
30			125	95	66	37	- -	- -
45			112	83	- -	- -	- -	- -

	V_{NE}, KNOTS, IAS GROSS WEIGHT = MORE THAN 2200 LBS							
PRESSURE ALTITUDE x 1000 / ° C OAT	0	1	4	7	10	13		
-30	130				91	64		
-15				107	77	51		
0			128	91	64	39		
15			108	78	52	- -		
30			93	66	41	- -		
45	125	111	81	55	- -	- -		

Figure 2-9. V_{NE} Placards - Allison 250-C20

Starting Recommendations			
OAT, °C	-32 TO -18	-18 TO 7	7 AND ABOVE
N_1%	12	13	15

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

CAUTION CYCLIC
FORCES TO BE TRIMMED
TO NEUTRAL DURING
STARTUP AND SHUTDOWN

NOTE: Above placards located on instrument panel.

50 POUNDS MAXIMUM LOAD UNIFORMLY DISTRIBUTED

NOTE: Above placard located inside utility stowage compartment.

IF MOISTURE VISIBLE
AND OAT BELOW 5°C
USE ANTI-ICE

NOTE: Above placard located by OAT gauge.

Figure 2-10. Decals and Placards

SECTION III
EMERGENCY AND MALFUNCTION PROCEDURES

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SECTION III
EMERGENCY AND MALFUNCTION PROCEDURES

NOTE: Unless otherwise stated, information presented in this section pertains to both Model 369HE and 369HS helicopters equipped with the Allison 250-C18 or 250-C20 engines. When any information is affected by model designation or engine configuration, that information will be so noted. Be sure to select the appropriate procedure for model type and engine installed.

3-1. GENERAL

The procedures contained in this section are recommendations to be followed in the event of an emergency or malfunction that may potentially affect the safety of the aircrew, passengers, aircraft, or personnel on the ground.

These procedures are recommended to minimize danger to the helicopter. However, these procedures should not limit the pilot from taking additional actions if the situation warrants.

In the event of an emergency or malfunction, the **pilot's primary consideration is control of the aircraft**. Then, the pilot must identify the problem and perform the appropriate procedures relevant to the situation.

Terms such as **"land immediately"**, **"land as soon as possible"**, and "**land as soon as practical"** are defined in Section I.

3-2. WARNING AND CAUTION INDICATORS

Warning and caution indicators are located at the top of the instrument panel. A red warning or yellow caution indicator will illuminate indicating a failure or malfunction, and in the event of an engine failure, the engine out audible horn will also sound.

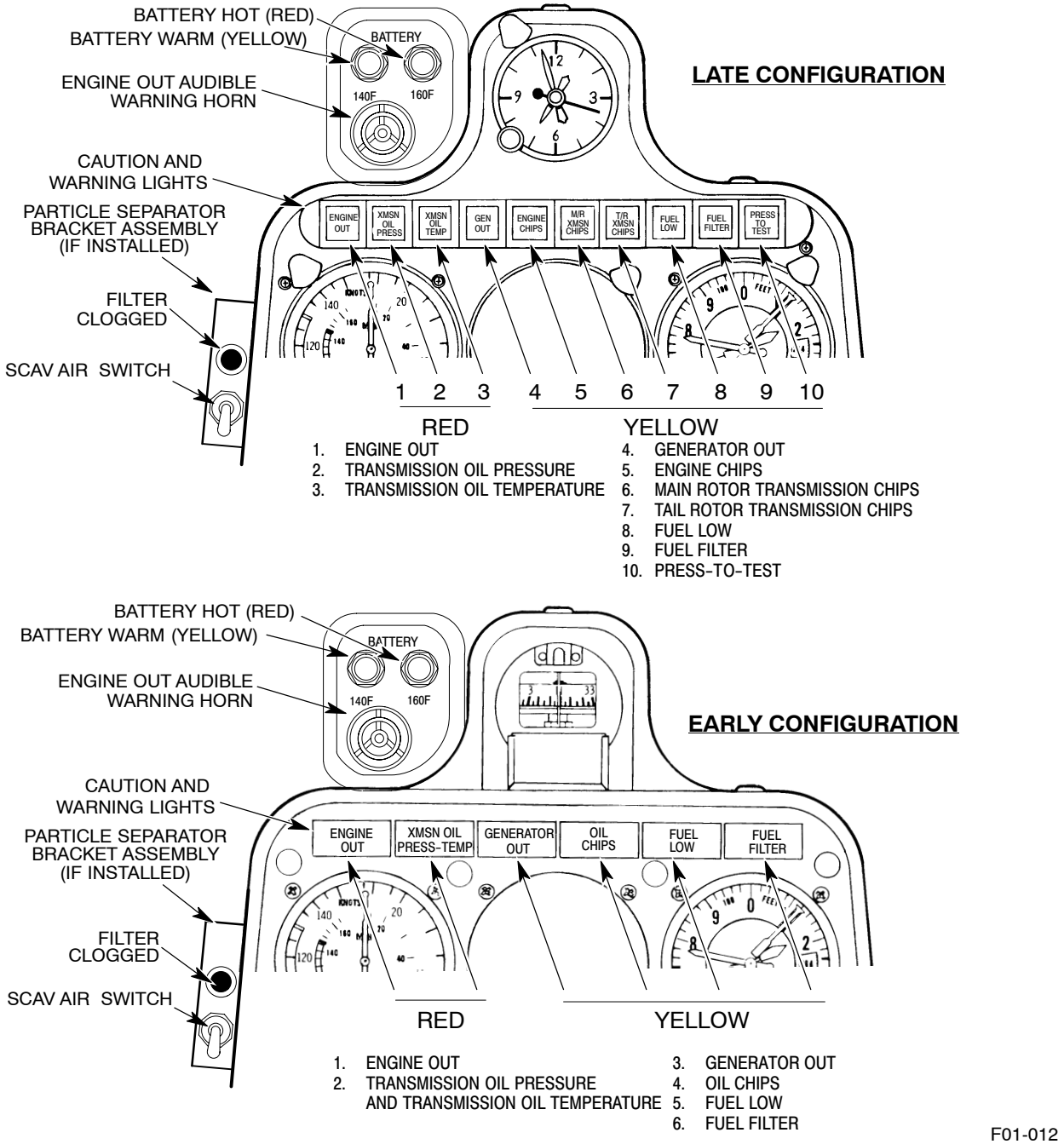


Figure 3-1. Warning and Caution Indicators

3-3. ENGINE FAILURE

COMPLETE POWER LOSS

Indications: Flashing red warning tone | ENGINE OUT | warning indicator ON with engine out audible in headset.

Left yaw (due to a reduction in torque)
Drop in engine speed.
Drop in rotor speed.
Change in noise level.

NOTE: The amount of yaw is dependent upon the amount of torque at the moment of power loss. High torque will cause a large yaw while low torque will cause a relatively small yaw.

WARNING

Respond immediately to the ENGINE OUT/low rotor RPM warning by adjusting collective to maintain rotor RPM within limits, then check engine instruments and other indications to confirm engine trouble.

Conditions: The failure indicators are actuated when N_1 falls below 55%.

Procedures: **Engine Failure - In Cruise at 420 Feet AGL or Above**

- **Allison C-18 engine**: Adjust collective pitch according to altitude and airspeed to maintain rotor speed between 400 and 514 RPM.
- **Allison C-20 engine** Adjust collective pitch according to altitude and airspeed to maintain rotor speed between 400 and 523 RPM.
- Apply pedal pressure as necessary to control aircraft yaw.
- Adjust cyclic control as necessary to control airspeed and flight path.

NOTE: The minimum rate of descent with power off will be attained at an airspeed of 60 KIAS and 400 rotor RPM.

The maximum glide distance with power off will be attained at an airspeed of 80 KIAS and 400 rotor RPM.

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).

- After confirming complete loss of power, time and altitude permitting, place twistgrip in cutoff and close fuel shutoff valve.

- Select landing area and maneuver as required.
- If operating at reduced rotor RPM to extend glide or reduce rate of descent, restore rotor RPM by lowering collective prior to flare out.
- Flare as required for the terrain to reduce forward speed and rate of descent. Level aircraft before ground contact.
- Touch down in a level attitude, increasing collective pitch to cushion landing.
- Avoid the use of aft cyclic or rapid lowering of the collective pitch during initial ground contact or any subsequent ground slide.

Conditions: **Engine Failure - Altitude above 8 feet and below 420 feet AGL**

The Height - Velocity Diagram (Ref. Section V) depicts the combinations of airspeeds vs. altitudes wherein a successful autorotation landing can be made in the event of an engine failure. Flight within the cross-hatched regions represent airspeed/altitude combinations from which a successful autorotation landing may be difficult to perform. Operation within the cross-hatched area should be undertaken with caution.

Procedures:

- In the event of a power failure during takeoff/low level flight, the collective pitch must be initially lowered to maintain rotor speed. The amount and duration of collective reduction depends upon the airspeed and height above the ground at which the power loss occurs.
- As the ground is approached, flare as required to reduce forward speed and rate of descent.
- Touch down in a level attitude, increasing collective pitch to cushion landing.
- Avoid the use of aft cyclic or rapid lowering of the collective during initial ground contact or during ground slide.

Conditions: **Engine Failure - Hovering Flight Below 8 Feet AGL**

Procedures:

- Do not reduce collective pitch.
- Apply right pedal to prevent yawing.
- Increase collective pitch as necessary to cushion landing.

PARTIAL POWER LOSS

Indications: Under partial power conditions, the engine may operate smoothly with reduced power or it may operate erratically with intermittent surges of power.

Procedures:

- Turning the start pump ON may smooth out an erratic operating engine and/or restore power enabling the pilot to fly to a favorable landing area. However, do NOT disregard the need to land.
- If possible, fly at reduced power to the nearest safe landing area and land as soon as possible. Be prepared for a complete power loss at any time.

3-4. AIR RESTART - ENGINE

Because the exact cause of engine failure cannot be determined in flight, the decision to attempt a restart will depend on aircraft altitude, time available, rate of descent, and potential landing areas.

CAUTION **Do not attempt restart if a malfunction is suspected.**

Conditions: At low altitude or where time is critical.

Procedures:

- Close twist grip to cutoff position.
- Press start/ignition button immediately.

NOTE: Pressing the starter button actuates the igniter. If N_1 is 18 percent or above, open twist grip immediately to ground idle. N_1 speeds of 25 to 40 percent are preferred for coolest and fastest restarts. Maintain safe autorotational airspeed.

Conditions: When altitude and time permit.

Procedures:

- Perform normal engine start, if N_1 has decayed below 18 percent. Refer to Section IV, Engine Starting.
- Recommended airspeed is 60 KIAS.
- Advance twistgrip from ground idle to full open once N_1 reaches 60 - 65%.
- Collective pitch: increase as required once N_2/N_R are 103 - 104%.

3-5. LOW ROTOR SPEED

NOTE: Early versions of the engine power out warning unit do not sense rotor rpm and do not activate the audible and visual warning indicators.

Indications: Red ENGINE OUT warning indicator ON and audible warning in headset.

Drop in rotor RPM.
Change in noise level.

NOTE: The LOW ROTOR warning is activated when N_R falls below approximately 460.

Conditions: Low rotor RPM will most commonly be associated with the following:

Engine Failure.
Transient rotor droop during large, rapid increases in power.
Governor failure producing an underspeed.

Procedures:

- Respond immediately to the low rotor RPM warning by adjusting collective to maintain rotor RPM within limits.
- Check other Caution/Warning indicators and engine instruments to confirm engine trouble and respond in accordance with appropriate procedures in this section.

3-6. EMERGENCY LANDING PROCEDURES

WATER LANDING

Conditions: Power off.

Procedures:

- Adjust collective pitch as necessary to establish autorotation.
- If time permits, open doors and push door handle full down to prevent relatching.
- Make autorotative approach, flaring as required to minimize forward speed at touchdown.

- Level aircraft and apply full collective pitch as contact is made with the water.
- When aircraft begins to roll, lower collective to full down to minimize blades skipping off the water.
- Release safety harness and clear the aircraft as soon as the rotor blades have stopped turning

WARNING **Do not inflate personal flotation gear before exiting aircraft. Safe exit will be restricted.**

Conditions: Power on.

Procedures:

- Descend to hovering altitude over water.
- Open doors and push door handle full down to prevent relatching.
- Passengers and copilot exit aircraft.
- Fly a safe distance away from all personnel in the water to avoid injury.
- Close twistgrip to the cutoff position and perform a hovering autorotation.
- Allow aircraft to settle in a level attitude while applying full collective pitch.
- When aircraft begins to roll, reduce collective to full down to minimize blades skipping off the water.
- Release safety harness and exit the aircraft as soon as the blades have stopped turning.

WARNING **Do not inflate personal flotation gear before exiting aircraft. Safe exit will be restricted**

3-7. FIRE

The safety of the helicopter occupants is the primary consideration when a fire occurs. Therefore, if airborne, it is imperative that the pilot maintain control of the aircraft and land immediately. If the fire occurs on the ground or upon landing from an inflight fire, it is essential that the engine be shut down, crew and passengers evacuated and fire fighting begun immediately. If the situation permits, a "MAYDAY" radio call should be made before electrical power is OFF to expedite assistance from fire fighting and rescue personnel.

Indications: The sound of electrical arcing, the smell of burning insulation, or the sighting of smoke and/or flame are all possible indicators of an on board fire. Also, the pilot may be notified of an on board fire by personnel outside the aircraft via visual or audio communication methods.

CAUTION **At unprepared landing sites, dried grass or brush may catch fire if allowed to contact hot engine exhaust.**

Procedures: **Cabin Smoke and Fume Elimination**

CAUTION **Smoke and fume accumulation in the cabin can impede the pilot's ability to maintain control of the aircraft and execute a safe landing. To protect the pilot and passengers from the effects of toxic fumes and smoke, ventilate the cabin:**

- Cabin heat (if source of smoke is the cabin heat duct) — **OFF**
- Fresh air vent — **OPEN**
- Pilot/Cabin door vents — **OPEN AND FACING AFT**

NOTE: If necessary, open pilot's door to expedite smoke and fume evacuation. Door will stabilize open a few inches in forward flight.

Procedures: **Aircraft Evacuation**

- A thorough preflight passenger briefing is essential for a quick and safe evacuation of passengers and crew when fire is involved. How to release seat belts, the opening of doors, the proper exiting of the helicopter keeping head and hands low to avoid the main rotor, are all critical to insure the safety of passengers and crew.

Procedures: **Fire extinguisher**

- Pilots should be familiar with the operating instruction and hazards associated with the particular type of fire extinguisher installed in their aircraft. Classes (type) of fire for which it is approved, operating instructions, and hazards associated with its use are listed on the extinguisher.

- Use of a fire extinguisher on a cabin fire while still airborne is NOT recommended and should only be considered after all other means to extinguish and control the fire have been tried. The pilot's first responsibility is to fly the helicopter and land immediately. Once on the ground, with passengers and crew evacuated, attention can be turned to extinguishing the fire.

- If a fire extinguisher is discharged in the cabin, use only the amount of extinguishing agent necessary to extinguish the fire. This will minimize the adverse effects of the particular agent being used in a confined and occupied space. Ventilate the cabin area as soon as possible after extinguishing the fire.

WARNING **Use extreme caution when attempting to extinguish an aircraft fire on the ground. The possibility of an explosion should not be disregarded!**

ENGINE FIRE ON THE GROUND

Conditions: Engine fire during starting

An engine fire during start could be caused by an overloading of fuel in the combustion chamber and a delayed ignition of the fuel resulting in flame emanating from the engine exhaust. This condition is normally accompanied by a rapid rise in TOT. To extinguish the fire:

Procedures:

- Twistgrip — **CUTOFF**
- Starter — **MOTOR UNTIL TOT IS BELOW 150°C**
- Fuel shut-off valve — **PULL TO CLOSE**

Conditions: Engine compartment fire

Procedures:

- Twistgrip — **CUTOFF**
- Fuel shutoff valve — **PULL TO CLOSE**
- BATTERY/EXT PWR switch — **OFF**
- Passengers/crew — **EVACUATE**

If time and situation permit:

- Rotor brake (if installed) — **APPLY**
- Secure area — **HAVE PASSENGERS AND SPECTATORS MOVE A SAFE DISTANCE FROM THE AIRCRAFT**
- Fire extinguisher — **USE AS APPROPRIATE**

ENGINE FIRE DURING FLIGHT

Conditions: At low altitude (AGL)

Procedures:

- Land immediately — **POWER ON APPROACH AND LANDING WITHOUT DELAY**
- Twistgrip — **CUTOFF-AS SOON AS HELICOPTER IS ON GROUND**
- Fuel shutoff valve — **PULL TO CLOSE**
- BATTERY/EXT PWR switch — **OFF**
- Passengers/crew — **EVACUATE**

Conditions: At high altitude (AGL)

Procedures:

Prevailing circumstances such as altitude (AGL), available landing areas, and confirmation of engine fire must be considered in order to determine whether to execute a power-on approach, as described for low altitude (AGL) fires, or a power off autorotational descent to the ground. If a power off descent is chosen proceed as follows.

- Collective — **DOWN TO ESTABLISH AUTOROTATION TO SELECTED AREA**
- Twistgrip — **CUTOFF**
- Fuel shutoff valve — **PULL TO CLOSE**
- Radio — **"MAYDAY" CALL**
- Execute autorotational landing — **MAINTAIN CONTROL**
- BATTERY/EXT PWR switch — **OFF**
- Passengers/crew — **EVACUATE**

CABIN FIRE/SMOKE

Conditions: On ground

Procedures:

- Twistgrip — **CUTOFF**
- BATTERY/EXT PWR switch — **OFF**
- Passengers/crew — **EVACUATE**

If time and situation permit:

- Rotor brake (if installed) — **APPLY**
- Secure area — **HAVE PASSENGERS AND SPECTATORS MOVE A SAFE DISTANCE FROM THE AIRCRAFT**
- Fire extinguisher — **USE AS APPROPRIATE**

Conditions: In flight

Procedures:

- Land immediately — **POWER ON APPROACH AND LANDING WITHOUT DELAY**
- Air vents — **VENTILATE CABIN AS NECESSARY**
- Twistgrip — **CUTOFF-AS SOON AS HELICOPTER IS ON GROUND**
- BATTERY/EXT PWR switch — **OFF**
- Passengers/crew — **EVACUATE**

If unable to land immediately and fire source can be identified:

- Malfunctioning system — **OFF**
- Fire extinguisher — **USE AS NECESSARY**
- Cabin — **VENTILATE**
- Land — **AS SOON AS POSSIBLE**

If fire source is unknown:

- Cabin heat — **OFF**
- GEN — **OFF**
- All electrical circuits (not required for safety of flight) — **OFF**
- Cabin — **VENTILATE**
- Land — **AS SOON AS POSSIBLE**

3-8. ENGINE FUEL CONTROL SYSTEM MALFUNCTIONS

FUEL CONTROL OR POWER TURBINE GOVERNOR FAILURE

Indications: Failure is indicated by an instrument needle fluctuation. A rise or drop of:

N_1
N_2/N_R
TOT
Torque

Conditions: Failure Producing an Overspeed.

Indications: Engine torque, TOT, N_1 and N_2/N_R, suddenly increasing. Possible right yaw.

Procedures:

- Increase collective to load the main rotor, simultaneously rolling the twistgrip toward the ground idle position until control of N_2 speed is obtained.
- Manually control N_2 speed (103-104%) with the pilots twistgrip.
- If operating RPM cannot be controlled, close twistgrip to CUTOFF and make an autorotational landing.

CAUTION

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

Conditions: Failure Producing an Underspeed:

Indications:

N_2/N_R decaying.

Possible left yaw.

Possible low rotor warning indication.

Procedures:

- Lower collective to maintain rotor RPM in the green (400-514) and attempt level flight at 60 knots IAS.
- If power is insufficient for level flight or a power-on decent, make an autorotational landing.

Conditions: Power Turbine Governor Surge.

Indications: N_2 fluctuating: governor not maintaining pre-set speed (103-104%N_2).

Procedures:

NOTE: Turning the start pump ON may allow the engine to operate smoothly. If operation of the engine returns to normal, it may be possible to fly to a favorable landing area, however do not disregard the need to land.

- Beep N_2 to maximum.
- Control N_2 manually with twistgrip (103% to 104% N_2).

NOTE: This action takes the governor out of the system allowing the pilot manual control of the N_2 and should eliminate the surge.

3-9. OTHER ENGINE CAUTION INDICATIONS

ENGINE/OIL CHIP DETECTOR

Indications: Yellow [ENGINE CHIPS] indicator ON.

Conditions: Metal contamination of engine oil.

Procedures:

- Land as soon as possible.

Indications: Yellow [OIL CHIPS] indicator ON (early configuration).

Conditions: Metal contamination of engine, main or tail rotor transmission oil.

Procedures:

- Land as soon as possible.

LOW ENGINE OIL PRESSURE

Indications: Oil pressure decreasing below normal operating range (Ref. Section II).

Conditions: **In flight.**

Procedures:

- Land as soon as possible.
- Shut engine down.

Conditions: **On ground.**

- Shut engine down.

ENGINE TORQUE

Indications: Loss of engine torque indication.

NOTE: Loss of torque indication may be the result of broken torque meter tubing.

Conditions: **In flight.**

Procedures:

- Land as soon as possible.
- Shut engine down.

Conditions: **On ground.**

- Shut engine down.

3-10. MAIN ROTOR AND TAIL ROTOR TRANSMISSION MALFUNCTIONS

M/R TRANSMISSION OIL PRESSURE

Indications: Red [XMSN OIL PRESS] indicator ON (late configuration).

Conditions: Transmission oil pressure low.

Procedures:

- Land as soon as possible.

M/R TRANSMISSION OIL TEMPERATURE

Indications: Red [XMSN OIL TEMP] indicator ON (late configuration).

Conditions: Transmission oil temperature exceeds maximum limit.

Procedures:

- Land as soon as possible.

M/R TRANSMISSION CHIP DETECTOR

Indications: Yellow [M/R XMSN CHIPS] indicator ON (late configuration).

Conditions: Metal contamination of oil.

Procedures:

- Land as soon as possible.

TAIL ROTOR TRANSMISSION CHIP DETECTOR

Indications: Yellow [T/R XMSN CHIPS] indicator ON (late configuration).

Conditions: Metal contamination of oil.

Procedures:

- Land as soon as possible.

OIL CHIPS

Indications: Yellow [OIL CHIPS] indicator ON (early configuration).

Conditions: Metal contamination of engine, main or tail rotor transmission oil.

Procedures:

- Land as soon as possible.

OIL PRESSURE-TEMPERATURE

Indications: Yellow [XMSN OIL PRESS-TEMP] indicator ON (early configuration).

Conditions: Transmission oil pressure low or transmission oil temperature exceeds maximum limit.

Procedures:

- Land as soon as possible.

3-11. FLIGHT CONTROL MALFUNCTIONS

ANTI-TORQUE FAILURE

Different types of failure may require slightly different techniques for optimum success in recovery. Therefore, it is not possible to provide a standardized solution for an anti-torque emergency.

The nose of the aircraft will turn right with power application. The nose of the aircraft will turn left with power reduction.

Conditions: Complete loss of thrust - Forward flight

This involves a break in the drive system (ie., a broken drive shaft) that causes the tail rotor to stop turning, resulting in a complete loss of thrust. Directional control becomes dependant on airspeed and power setting.

Indications: Failure is normally indicated by an uncontrollable (by pedal) yawing to the right.

Procedures:

- Reduce power by lowering collective.
- Adjust airspeed to 50 - 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.

Conditions: Complete loss of thrust - at a hover

Indications: Failure is normally indicated by an uncommanded right turn.

Procedures: Place the twistgrip in the ground idle position and perform a hovering autorotation.

WARNING

When hovering at altitudes within the cross-hatched areas depicted on the Height Velocity Diagram (Ref. Section V), reduce altitude to 8 feet or less prior to placing the twistgrip in the ground idle position and performing a hovering autorotation.

Conditions: Anti-torque failure, fixed tail rotor pitch setting.

Procedures:

- Adjust power to maintain 50 - 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.

ONE-WAY LOCK FAILURE

NOTE: The one-way lock assembly is a self-contained hydraulic unit that prevents aft feedback forces in the longitudinal cyclic control system.

Indications: Aft feedback in the cyclic at high airspeed and/or during pull ups from high airspeed or higher than normal forces required to move the cyclic longitudinally.

NOTE: If the one-way lock has a push rod shaft or check valve seizure in the closed valve position, a pull or push of 30 pounds will be necessary to open the hydraulic relief valve and bypass the check valve. This additional pull or push will be required for each subsequent longitudinal movement of the cyclic stick.

Procedures:

- Reduce airspeed to 100 KIAS or less.
- Limit cyclic movement to those movements required to safely fly the helicopter. Abnormal or extreme control inputs are not not necessary.

CYCLIC TRIM FAILURE

Indications: Inability to reduce cyclic forces with the cyclic trim switch. The failure will be one of the following types.

WARNING

Control of the helicopter is the primary consideration of a pilot confronted with any type of trim motor or switch malfunction. The pilot-in-command should land the helicopter immediately if the pilot's physical condition, strength, or threshold of fatigue, would compromise their ability to safely control the helicopter in continued flight.

Indications: Inoperative trim

Conditions: The trim motor fails to respond to application of the cyclic trim switch in one or more directions.

Procedures:

- Establish a safe flight condition that produces the least cyclic control force. Normally straight and level at the last trimmed airspeed.
- Actuate the trim switch thru all positions in an attempt to restore trim capability and determine the extent of trim failure. If restored, trim to a near neutral position and land as soon as practical avoiding further trimming.
- If trim failure is determined to be in all directions, and control of the helicopter can be maintained safely, Check/reset TRIM circuit breaker.
- Land as soon as practical if unable to re establish full cyclic trim control with the pilot's cyclic.

Conditions: Runaway trim

Indications: An uncommanded longitudinal or lateral cyclic trim actuation. The cyclic may move to a full travel position or some intermediate position resulting in cyclic forces up to the maximum. Uncommanded movement can occur after cyclic trim switch actuation or as a result of an electrical short.

NOTE: Runaway cyclic trim failures can produce cyclic stick forces of approximately 30 pounds in the direction of the runaway. Although the forces required to move the cyclic will be higher than normal, the helicopter will respond normally to all cyclic inputs by the pilot.

Procedures:

- Establish a safe flight condition that produces the least cyclic control force.

NOTE: If a forward longitudinal runaway trim failure is experienced, it may be possible to reduce cyclic stick forces by maintaining higher airspeeds. Cyclic stick forces may be reduced if an aft longitudinal runaway trim failure is experienced by maintaining slower airspeeds. Lateral runaway trim forces cannot be reduced by adjusting flight conditions.

- Utilize left hand and legs, as necessary, to apply pressure against the cyclic stick to relieve the right hand loads and conserve strength for landing. Use collective friction to prevent unwanted collective movement and associated power change. Be prepared to respond to any emergency requiring the use of collective pitch.

- Actuate the trim switch thru all positions, several times if necessary, as this will generally re-establish trimming capability. When restored, trim to a near neutral position and land as soon as practical avoiding further trimming.

- If trim runaway is to the full forward position, accomplish landing into the wind and do not hover downwind.

3-12. ABNORMAL VIBRATIONS

Indications: Sudden, unusual or excessive vibrations occurring during flight.

Conditions: The onset of unusual or excessive vibrations in the helicopter may be an indication of problems in the rotor or drive train systems.

Procedures:

- LAND AS SOON AS POSSIBLE.
- No further flights should be attempted until the cause of the vibration has been identified and corrected.

3-13. FUEL SYSTEM MALFUNCTIONS

FUEL FILTER

Indications: Yellow [FUEL FILTER] caution indicator on.

Conditions: A predetermined pressure differential across the filter has been reached and an impending bypass condition exists.

Procedures:

- Turn on start pump.
- Continue flight

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

- Turn start pump ON, monitor engine instruments and continue flight.
- Service the fuel filter prior to the next flight. (Ref. the HMI and the Allison Engine Operation and Maintenance Manual).

NOTE: Following the completion of the flight in progress, additional flight is prohibited until the fuel filter has been serviced.

FUEL LOW

Indications: Yellow FUEL LOW indicator ON when approximately 35 pounds of fuel remains in fuel tank.

Procedures:

- Avoid large steady side slip angles and uncoordinated maneuvers.

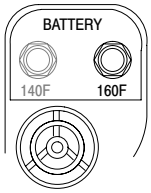
CAUTION **Never use the FUEL LOW light as a working indication of fuel quantity.**

- Land as soon as possible.

WARNING **Fuel consumption rates vary with power demand. Pilots should land prior to fuel exhaustion. Fuel exhaustion will result in engine flameout.**

3-14. ELECTRICAL SYSTEM MALFUNCTIONS

BATTERY OVERTEMPERATURE

Indications: Red 

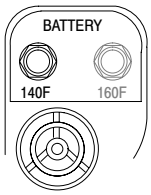
battery 160°F warning indicator ON.

Conditions: Battery overtemperature at 160°F (71°C) or above.

Procedures:

- Battery switch: OFF
- Land as soon as possible

NOTE: No further flights are authorized until battery is inspected and cause of overtemp corrected.

Indications: Yellow 

battery 140°F caution indicator ON.

Conditions: Battery overtemperature at 140°F (60°C).

Procedures:

- Battery switch: OFF
- Battery must remain off line during remainder of flight.

NOTE: The Yellow battery 140°F light will go out after the battery has cooled to below 140°F (60°C). No further flights are authorized until battery is inspected and cause of overtemp corrected.

GENERATOR MALFUNCTION

Indications: Yellow | GEN OUT | indicator ON and ammeter indicating zero.

Conditions: Generator is not powering electrical bus.

Procedures:

- Check generator (GEN) circuit breaker IN
- Turn the generator (GEN) switch, OFF then ON to reset.
- If GEN OUT indicator remains ON or comes back ON, pull generator circuit breaker OUT and insure generator switch is in the ON position for the remainder of the flight.

NOTE: The generator switch must be in the ON position to enable the Engine Out/Low Rotor audio warning to function as required.

- If GEN OUT indicator remains ON, reduce electrical load to a minimum.
- Land as soon as practical.

3-15. OTHER MALFUNCTIONS

ENGINE AIR PARTICLE SEPARATOR (IF INSTALLED)

Indications: Yellow FILTER CLOGGED indicator ON.

Conditions: A predetermined pressure differential has been reached across the engine air inlet.

Procedures:

- FILTER BYPASS control handle: pull OPEN
- SCAV AIR: OFF
- Service particle separator prior to next flight (Ref. HMI).

CAUTION **To prevent compressor erosion avoid operation in a dirty or dusty environment with the filter bypass door open.**

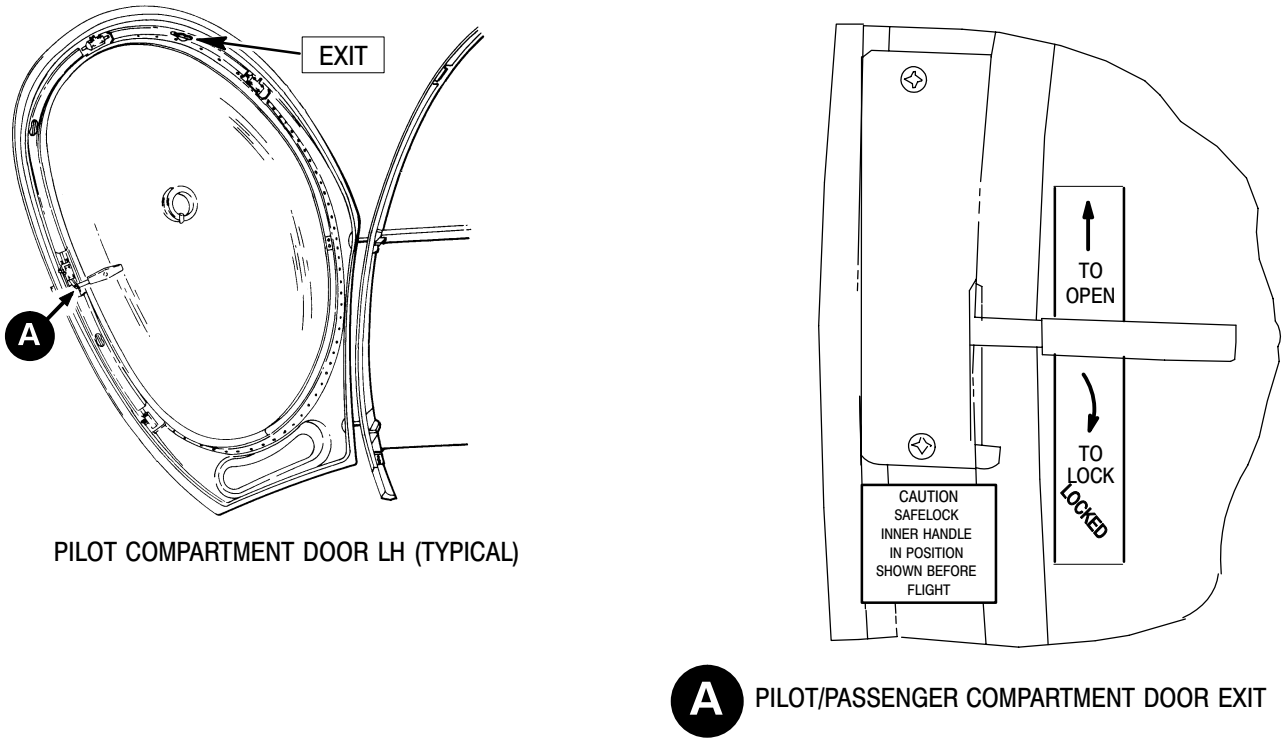
3-16. EMERGENCY EGRESS

Pilot compartment doors:

Pilot doors function as primary and emergency exits.

Cabin doors:

Passenger doors function as primary and emergency exits.



PILOT COMPARTMENT DOOR LH (TYPICAL)

Figure 3-2. Emergency Exits

3-17. EMERGENCY EQUIPMENT

First Aid Kit:

The first aid kit is located on the right side forward edge of the pilot's seat structure.

The kit is a commercial type containing the items necessary to render limited emergency first aid.

Fire Extinguisher:

The fire extinguisher is located on the pilot side forward door frame.

See the paragraph in this section entitled "FIRE" for recommended use of fire extinguisher.

SECTION IV
NORMAL PROCEDURES

TABLE OF CONTENTS

SECTION IV
NORMAL PROCEDURES

4–1. PREFLIGHT REQUIREMENTS

NOTE: Unless otherwise stated, information presented in this section pertains to both Model 369HE and 369HS helicopters equipped with the Allison 250–C18 or 250–C20 engines. When information is affected by model designation or engine configuration, that information will be so noted. Be sure to select the appropriate data for model type and engine installed.

"CHECK" means to observe the helicopter and note any 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 attachment, dents, cracks, punctures, abrasion, chafing, galling, nicks, scratches, delamination and evidence of corrosion. These are the most common types of damage, however, checks should not be limited to these items.

Further checks shall be performed before 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.

Have a thorough understanding of operating limitations. (Ref. Section II).

Service helicopter as required. (Ref. Section VII and the Aircraft Maintenance Manual).

Determine that helicopter loading is within limits. (Ref. Sections II and VI).

Check helicopter performance data. (Ref. Sections V, VII, and IX).

CAUTION **Be sure to include a review of the appropriate flight manual supplemental data for type of optional equipment installed (including STC items) as a regular part of preflight planning (Section IX).**

Perform Pilot's Daily Preflight check prior to the first flight of the day.

Perform Pilot's Preflight Check prior to subsequent flights that same day.

Brief passengers on relevant operational procedures and associated hazards (Ref. Sec. I, Pilot's Briefing).

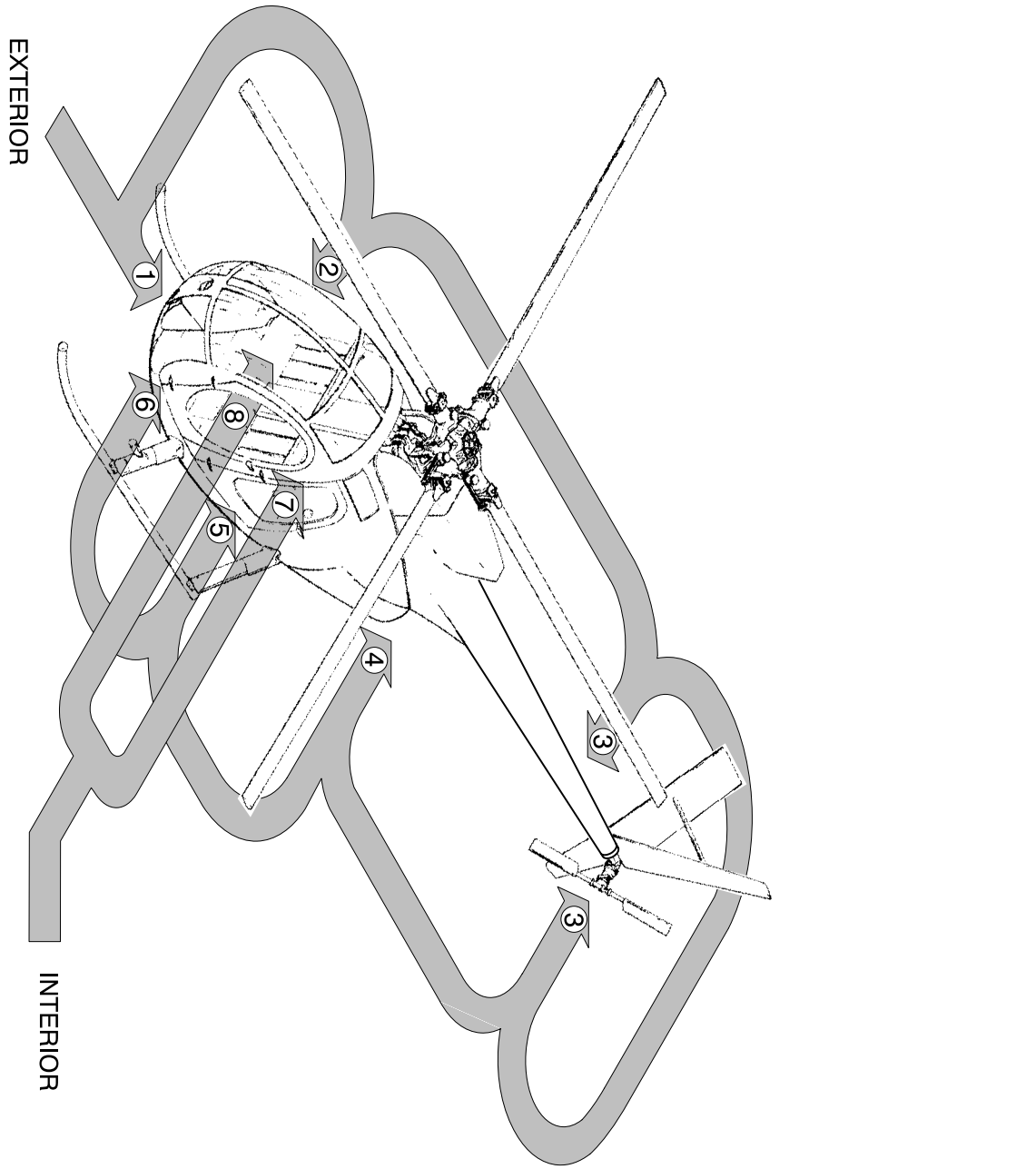


Figure 4–1. Pilot's Preflight Guide

DAILY PREFLIGHT CHECKS

PRELIMINARY CHECKS

• Fuel cell drain valve – take sample (Start Pump **OFF**)	**CHECK FOR CONTAMINANTS**

FUSELAGE – FORWARD END 1

• Aircraft tiedowns and covers	**REMOVED**
• Aircraft attitude for weak or damaged dampers	**CHECK**
• **Canopy:**	
• • Condition and cleanliness	**CHECK**
• • OAT thermometer sun shield	**CHECK**
• Fresh air vent	**NO OBSTRUCTIONS**
• Pitot tube	**NO OBSTRUCTIONS**
• **Anti-torque pedals:**	
• • Condition and security of quick–release pins (both sides with dual controls)	**CHECK**
• Landing light	**CHECK**
• Antennas	**CHECK**
• Lower access panels	**CHECK**
• Lower fuel tank vent fairing	**NO OBSTRUCTIONS**

FUSELAGE – RIGHT SIDE 2

- **Landing gear:**
  - Skid tube — **CHECK**
  - Abrasion strips — **CHECK**
  - Strut fairings and cuffs — **CHECK**
  - Position light – skid or step — **CHECK**
- Fuselage skin — **CHECK**
- Right side static port — **NO OBSTRUCTIONS**
- Passenger steps for condition and security — **CHECK**
- Right front door for condition and latching — **CHECK**
- **Right front interior:**
  - Seats, seat belts, and shoulder harness — **CHECK**
  - Co–pilot controls (if installed) — **CHECK**
  - First aid kit — **CHECK**
  - Airworthiness and Registration certificates — **CHECK**
- Right front door for condition and latching — **CHECK**
- **Right cabin interior:**
  - Forward landing gear damper — **CHECK**
  - Seats, seat belts, and shoulder harness — **CHECK**
  - Loose equipment or cargo — **SECURED**

NOTE: With passengers in cabin, cargo or baggage should be secured so as not to block emergency egress.

Refer to “DOORS OFF FLIGHT” if planning flight with doors removed.

  - Cabin heat outlets — **AS DESIRED**
  - M/R transmission oil level — **CHECK**
- Engine air inlet bypass door — **CHECK**

- **Rotor system:**
  - Main rotor hub, pitch control rods, blade dampers for correct phasing, swashplate and mast — **CHECK**
  - Main rotor strap pack — **CHECK**
  - Blade and damper attach pins — **CHECK**
  - Main rotor blade root fittings and lead-lag link assemblies for cracks. — **CHECK**
  - Main rotor blades for chordwise cracks on the underside of the blade skin and doubler. — **CHECK**
- Engine air inlet — **NO OBSTRUCTIONS**

CAUTION **If helicopter has been standing in falling snow, clear engine inlet area and surrounding skin areas of all accumulated snow and ice.**

Open plenum chamber door and inspect the inlet screen and particle separator (if installed) for ice and snow blockage.

- Oil cooler air inlet — **CHECK**
- All inspection panels and cabin doors — **SECURED**
- Fuel level; cap security — **CHECK**
- Engine oil level; cap security — **CHECK**

NOTE: Engine oil level should be checked within 15 minutes after shutdown.

TAILBOOM AND TAIL ROTOR 3

- Tailboom — **NO DAMAGE ALLOWED**
- Antennas (if installed) — **CHECK**
- Position and anti collision lights — **CHECK**
- Stabilizers and strut for obvious damage. Check for secure attachment. — **CHECK**
- Tail skid — **CHECK**
- **Tail rotor transmission:**
  - Tail rotor transmission attach bolt faying surfaces for evidence of movement. — **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**

CAUTION **Check for torque stripe paint across retainer nut, tang washer, and fork assembly. If torque stripe on nut and tang washer is not in line with stripe on drive fork, the tang washer inner key tang may be sheared. Advise maintenance.**

- **Tail rotor drive fork conical/sphericalbearings** (if installed):

- ● ● Pivot tail rotor hub and fork through full range of travel and check for axial play between the conical bearing inner and outer races. No play is allowed. **CHECK**

- **Tail rotor drive fork elastomeric bearings** (if installed):

NOTE: Check bearing for general condition. Elastomeric bearings are suspected of being unserviceable if rubber deterioration or separation, or a vibration is noted. Evidence of light swelling, pock marks and crumbs are surface conditions and are not indications of bearing failure.

- ● ● Apply teetering force by hand to tail rotor blades (stop-to-stop). Check for fork-to-bearing bond failure. Failure is indicated by any motion between outer bearing cage and fork (bearing turns in fork). **CHECK**
- ● ● Teeter blades stop-to-stop. Observe four radial molded ridges on each bearing as teetering takes place. If ridges assume continuous curved shape, bearings are intact. Discontinuity in molded ridges indicates bearing failure. **CHECK**

- Tail rotor pitch bearing
- ● ● Hold tail rotor hub firmly and check lead-lag play at tip of each blade. Play in excess of approximately 0.25 in. on either blade is not considered acceptable. **CHECK FOR WEAR**
- Tail rotor blades and abrasion strips **CHECK**

NOTE: Visually check each tail rotor blade abrasion strip for evidence of debonding along the abrasion strip/airfoil bond line.

- Tail rotor blade pitch links **CHECK**
- **Tail rotor drive shaft coupling** **NO DAMAGE ALLOWED**

- ● ● Rock tail rotor back and forth in plane of rotation and check main rotor blades for coincidental movement.

NOTE: If tail rotor blade tip moves in excess of 3/4 inch (1.9 cm) without coincidental movement of the main rotor blades, inspect tail rotor drive shaft couplings in accordance with the Handbook of Maintenance Instructions.

- Main rotor blades for condition and abrasion strip for condition and bonding (do not handle trim tabs) **CHECK**
- Overrunning clutch (turn main rotor blade forward then aft) **CHECK**
- All inspection panels **CHECK**

ENGINE COMPARTMENT 4

- Engine mounts, mounting pads, and firewalls **CHECK**
- Landing gear attach points, rear dampers (leaks, inflation and evidence of hard landing) **CHECK**
- Engine oil, air, and fuel lines **CHECK**
- Engine electrical connections **CHECK**
- Fuel control, N_2 governor, and associated linkages **CHECK**
- Scavenge oil filter bypass indicator (if installed) **CHECK**
- Exhaust ducts **CHECK**
- Engine compartment doors for condition and security **CHECK**

FUSELAGE – LH SIDE 5

- Skid, strut fairings, strut cuff. **CHECK**
- Position light – skid or step. **CHECK**
- Pilot and cabin doors – condition and latching **CHECK**
- Fuselage skin **CHECK**
- Overhead canopy **CHECK**

FUSELAGE – UNDERSIDE 6

- Fuselage skin **CHECK**
- Cargo hook (if installed) **CHECK**
- Fuel tank vent **NO OBSTRUCTIONS**
- Antennas **CHECK**
- Anti–collision light **CHECK**

AFT COMPARTMENT 7

- Oil cooler blower belt **CHECK**
- Fuel cell access panels **SECURED**
- Controls access panel **SECURED**

NOTE: Refer to Paragraph "DOORS OFF FLIGHT" if planning flight with doors removed.

- Loose equipment or cargo **SECURED**
- Seats, seat belts, and shoulder harness **CHECK**
- Compartment doors closed and latched **CHECK**

FORWARD COMPARTMENT 8

- Battery compartment **CHECK**
- Fire extinguisher and first aid kit **CHECK**
- Loose equipment or cargo **CHECK**

NOTE: Refer to Paragraph "DOORS OFF FLIGHT" if planning flight with doors removed.

- Seats, seat belts, and shoulder harness **CHECK**
- Interior and exterior lights (all switches **OFF** after check) **CHECK**

PREFLIGHT CHECKS

Perform these checks prior to subsequent flights of the same day.

- Fluid levels **CHECK**
- Engine compartment – fluid leaks and bypass indicators **CHECK**
- Air inlet screens/particle separator **CHECK**
- Fuel cap, access doors and panels **CHECK**
- Main rotor blades **CHECK**
- Tailboom and empennage **CHECK**
- Tail rotor rotor blades **CHECK**
- Cargo and loose equipment **CHECK**
- Crew and cabin doors **CHECK**

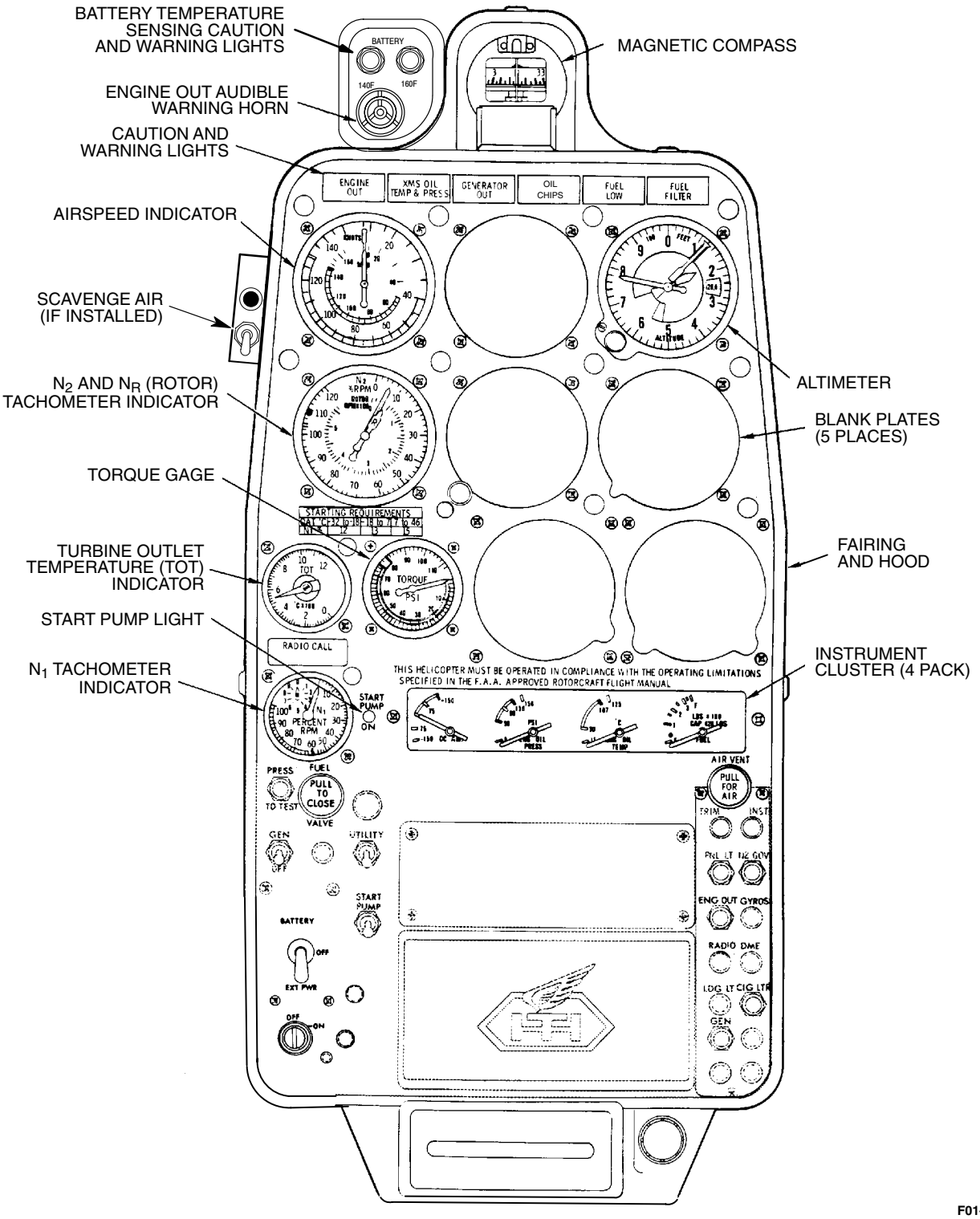


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Figure 4–2. Instrument Panel (Sheet 1 of 2)

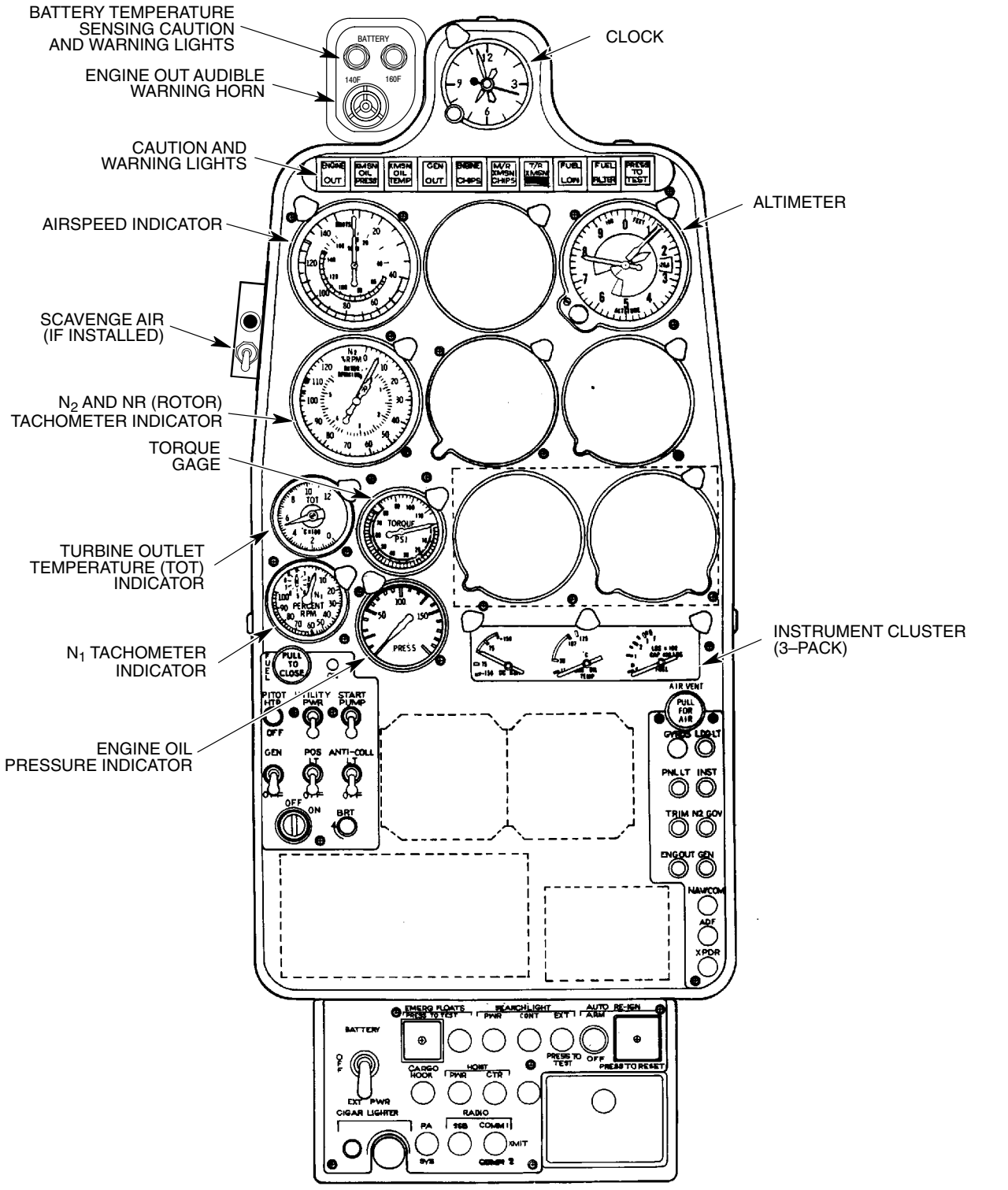

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Figure 4–2. Instrument Panel (Sheet 2 of 2)

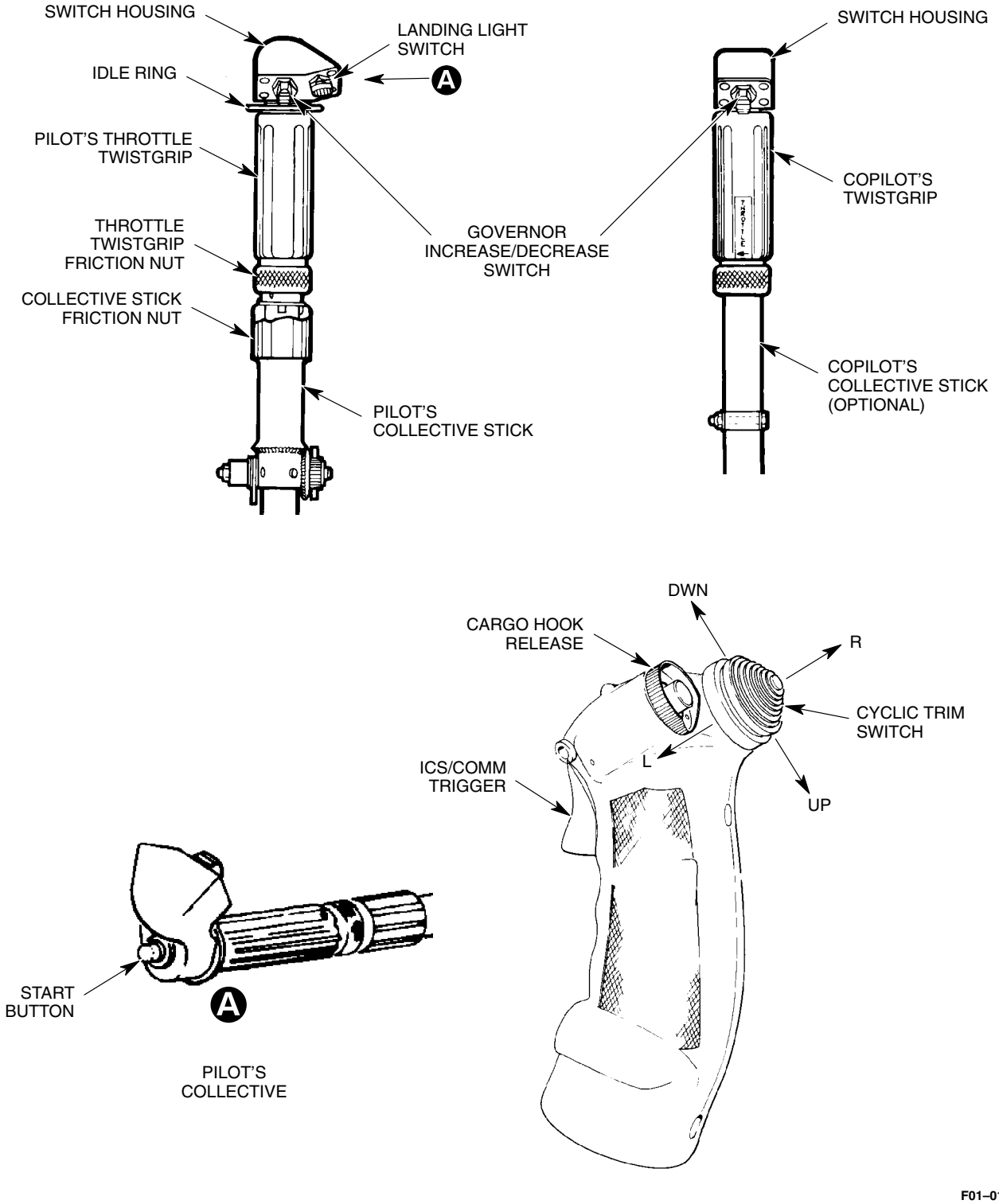

Figure 4–3. Cyclic and Collective Stick Grip

4–2. ENGINE PRE–START COCKPIT CHECK

ELECTRICAL POWER – OFF

- All cabin doors **CLOSED AND SAFELOCKED** — **CHECK**
- Tail rotor pedals — **ADJUST**

NOTE: Adjust pedal position to insure that the pedals can be moved throughout the entire range of travel.

- Tail Rotor pedal lock pins — **SECURED**
- Seat belt and shoulder harness for proper fit and engagement of buckle — **FASTENED**

NOTE: Insure center seat shoulder harness crosses over center of body.

- Operation of shoulder harness inertia lock — **CHECK**
- Cyclic, collective (frictions off), and pedals — **CHECK FULL TRAVEL**
- Cyclic stick — **NEUTRAL FRICTION ON**

NOTE: Cyclic stick longitudinal neutral position is about 35 percent (1/3) travel from full aft; lateral position may be determined by centering the friction control knob in the guide link.

- Tail rotor pedals — **CENTERED**
- Collective stick — **FULL DOWN FRICTION ON**
- Landing light — **OFF**
- Rotor brake handle (if installed) — **STOWED**
- Air filter **BYPASS CONTROL** handle (if installed) — **CHECK SECURITY AND POSITION**
- Anti–ice valve — **OFF**
- Cabin heat (if installed) — **OFF**

CAUTION **Attempting to start the engine with any bleed air device ON may result in a "Hot Start".**

- Magnetic compass heading — **CHECK**
- V_{NE} card — **SELECT**
- Static position of all instruments — **CHECK**

• Altimeter	**SET**
• All electrical switches	**OFF**
• Radio switches	**OFF**
• Circuit breakers	**AS REQUIRED**
• Fuel shutoff valve	**OPEN (IN)**

ELECTRICAL POWER – ON

- **Electrical power:** Battery or external power start:
  - BATTERY/EXT PWR switch – set to BATTERY for battery start; to EXT PWR for external power start — **AS REQUIRED**
  - If used, connect ground power cart per manufacturer's instructions.

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

• • Lights	**AS REQUIRED**
• • Ignition key	**ON**
• **ENGINE OUT** warning system check	**GEN SWITCH ON THEN OFF**

NOTE: Proper engine out warning system operation is indicated by flashing indicator light on the caution and warning light panel and audible warning in headsets (if installed) and external horn mounted on the instrument panel. Audio warning system will be inoperative if generator (**GEN**) switch is set to **OFF**.

• Auto–reignition test (if installed)	**CHECK (REF. SECTION IX)**
• Fuel gauge	**CHECK READING**
• All other instruments	**CHECK**
• Transmission, engine out warning lights and generator caution light	**ON**
• **Warning and caution light checks:**	
• • Press–to–test caution and warning lights	**CHECK**
• • Caution light dimming (early models with night lighting kit, or late models with caution light dim switch.)	**CHECK**

NOTE: Caution lights will return to bright when all power is removed (**BATTERY** and **GEN OFF**) and restored, or by pulling and resetting the **PNL LT** circuit breaker.

• •	Caution light dimming (lights on some later models may be dimmed by pressing the legend face of the indicator. Pressing the indicator a second time restores the light to bright)	**CHECK**
•	Twistgrip to **FULL OPEN**, return to **GROUND IDLE STOP**, then to **CUTOFF** position	**CHECK**
•	**Cyclic trim control check**:	
• •	Cyclic friction	**OFF**
• •	Momentarily motor cyclic trim control – forward, left, right, aft – listen for motor actuation	**OPERATE**

4-3. ENGINE START

- Cyclic stick trimmed to neutral; friction - ON — **RECHECK**

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

- Collective stick - full down; friction on — **RECHECK**
- Twistgrip - **CUTOFF** position — **RECHECK**
- Start pump — **AS REQUIRED**

NOTE: Start pump required when using alternate or emergency fuels (Ref. Section II).

- Rotors — **CLEARED**
- Start/ignition button — **PRESS AND HOLD**

NOTE: Starter time limits are 1 minute ON, 1 minute OFF; 1 minute ON, and 23 minutes OFF.

- Rotate twistgrip the appropriate amount (based on type of engine control system) for ignition when N_1 indicates 12 to 15 percent (see Section II, Minimum N_1 Speed Starting Recommendations Placard).

NOTE: The 250-C20 Series engine has two qualified control systems. They are: The Bendix system which uses an automatic start mode and the CECO system which uses a modulated start mode. The 250-C18 Series engine uses only the automatic start mode.

Automatic Start Mode (Bendix system):

Rotate twistgrip to ground idle for ignition when N_1 indicates 12 to 15 percent.

Modulated Start Mode (Ceco system):

Rotate twistgrip toward ground idle until engine lights off when N_1 indicates 12 to 15 percent. Monitor TOT and N_1 and adjust twistgrip to accelerate N_1 to idle while maintaining TOT within specified limits. Insure twistgrip is in the ground idle detent once N_1 is at idle (61% - 65%).

NOTE: Peaking of N_1 below 15 percent may occur during cold weather starting conditions. Under these conditions, a start may be attempted at a minimum of 12 percent N_1. APU starts are recommended when normal cranking speed can not be obtained by using the battery.

CAUTION **During starts, overtemperatures between 793°C (C20) or 749°C (C18) and 927°C are permitted for up 10 seconds with a momentary peak at 927°C for not more than 1 second. Consult Allison Engine Operation and Maintenance Manual if these limits are exceeded.**

ABORT START IF:

1. **An immediate temperature rise is not observed on the TOT indicator.**
2. **No indication of engine oil pressure is observed.**
3. **Main rotor is not rotating by 25 percent N_1.**
4. **A zero or positive indication is observed on ammeter with the start button pressed.**

NOTE: If an engine fire (may be indicated by flames emanating from the tailpipe) occurs, pull out fuel valve and abort start.

- **Abort start procedures:**
- Close twistgrip to the cutoff position.
- Use starter to continue motoring engine for at least ten seconds or until TOT decreases below 150°C.
- Start/ignition button - release at 58 to 60 percent N_1 **RELEASE**
- Engine oil pressure 50 to 130 psi **CHECK**

NOTE: During cold weather operation, 150 psi oil pressure is allowable following an engine start. Remain at ground idle RPM until normal oil pressure limits are attained.

- 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:**
- **250-C18** - 62 to 67 percent N_1 **CHECK**
- **250-C20** - 61 to 65 percent N_1 **CHECK**

NOTE: During engine operation at ground idle, keep pedals centered.

- All other engine instruments **CHECK**
- N_2 engine and rotor rpm indicators for superimposed reading. **CHECK**

CAUTION **If rotor and engine rpm indicator needles are not superimposed, shut down engine.**

NOTE: "Superimposed" means within 1/2 needle width. The relative positions of the superimposed needles should remain constant during powered flight.

- Start pump — **AS REQUIRED**

4–4. ENGINE RUN–UP

NOTE: Checks with an asterisk (*) need only be performed prior to the first flight of the day. Insure that an "Auto Reignition Check" is performed prior to flying into falling or blowing snow.

- Electrical power — **SELECT**
- External start: Set **BATTERY/EXT PWR** switch to **BATTERY,** disconnect external power source. — **CHECK**
- Set generator (**GEN**) to **ON** (**GEN OUT** caution light out; ammeter will show charge) — **OPERATE AND CHECK**
- Cyclic friction — **RELEASE AND SET AS DESIRED**
- Avionics (as required) — **ON AND CHECK**
- Twistgrip — **FULL OPEN**

CAUTION **Check for unusual aircraft vibration or noise while accelerating from ground idle to flight idle. If any unusual vibration or noise occurs, this may be an indication of a loose or defective tailrotor dirveshaft damper. Shut aircraft down and advise maintenance.**

CAUTION **Avoid rapid acceleration when parked on slippery surfaces.**

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

• ⁎ **Engine controls:**	
• • **250-C18:**	
• • • N_2 high beep range – 104 percent or more (105 percent maximum)	**CHECK**
• • • N_2 low beep range – 100 percent or less	**CHECK**
• • **250-C20:**	
• • • N_2 high beep range – 104 percent or more (105 percent maximum)	**CHECK**
• • • N_2 low beep range – 100 percent or less	**CHECK**

NOTE: If malfunction is noted, shut down engine.

• • Low rotor warning (if installed) and Auto–reignition (if installed) – ON at 98 ±1 percent	**CHECK**
• ⁎ **Engine bleed air device checks:**	
• • **SCAV-AIR** switch (if installed) observe slight rise in TOT (about 5°C)	**ON**
• • Engine **ANTI-ICE ON** – Observe TOT increase (10 – 15°C)	**CHECK**
• • **CABIN HEAT** (if installed) – **ON** observe 20 – 30°C increase in TOT	**CHECK**
• • **CABIN HEAT OFF**	**NOTE TOT DECREASE**
• • **ANTI-ICE** switch **OFF**	**NOTE TOT DECREASE**
• • **SCAV-AIR** (if installed)	**PILOT'S DISCRETION**
• ⁎ **Throttle rigging check:**	
• • N_2 104 percent	**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.**

If engine flames out, refer to the HMI for proper throttle control rigging.

• • If dual controls are installed, repeat procedure using copilot's twistgrip.	**RECHECK**
• • Twistgrip	**FULL OPEN**
• N_2 – 103 percent	**RECHECK**
• Engine oil pressure – above 90 pounds	**RECHECK**
• Ammeter	**CHECK READING**

NOTE: Ammeter reading will fluctuate slightly when anti–collision lights are on.

• All caution and warning lights out	**RECHECK**

4–5. BEFORE TAKEOFF

• All cabin doors closed and safelocked	**RECHECK**
• Collective friction	**RELEASE AND SET AS DESIRED**

WARNING **When removing collective friction, be alert for abnormal collective loads that would cause the collective to raise by itself.**

- **Cyclic response check:**

• • With collective pitch full down, gently move cyclic stick and observe rotor tip for correct movement and track	**CHECK**
• All instruments in the green	**CHECK**
• Position and anti collision lights	**AS REQUIRED**
• Pitot heat (if installed)	**AS REQUIRED**
• SCAV AIR (if installed)	**ON**
• Cabin heat (if installed)	**AS REQUIRED**
• • Use engine ANTI-ICE when OAT (outside air temperature) is below 5°C (41°F) and visible moisture is present.	**AS REQUIRED**

NOTE: Hover performance is reduced with cabin heat and/or anti–ice ON (Refer to Section V).

4–6. TAKEOFF

NOTE: For takeoff in noise–sensitive areas, refer to paragraph 4–19, "Noise Impact Reduction Procedures".

Determine that hover area and takeoff path are clear.

Follow normal helicopter takeoff procedures with engine speed at 103 to 104 percent N_2.

Governed N_2 rpm should increase 1 to 2 percent (C18); 1-1/2 to 2 percent (C20) on takeoff - adjust as necessary to maintain N_2 at 104 percent.

WARNING **If sudden, unusual or excessive vibrations should occur during flight, a precautionary landing should be made. No further flights should be attempted until the cause of the vibration has been identified and corrected.**

CAUTION **Follow recommended takeoff profile shown in Height Velocity Diagram (Refer to Section V).**

NOTE: Momentary fluctuation in indicated airspeed may occur during acceleration and climbout. This fluctuation is characterized by a rapid rise in indicated airspeed to approximately 40 knots, followed by a drop back to 30 knots and then normal increase as determined by the rate of acceleration. Maintain recommended takeoff profile to minimize fluctuation. Indicated airspeed is unreliable when airspeed is less than 40 KIAS.

Use Cyclic trim as required to minimize cyclic stick forces.

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

4–7. CRUISE

Scav Air switch (part of the optional engine air particle separator kit) may be turned OFF.

NOTE: Decision to use the particle separator scavenge air should be based on atmospheric conditions and height above terrain where operations are to be conducted.

It is recommended that the SCAV AIR switch be placed in the ON position at all times except in those takeoff and landing situations when maximum power is required. In those situations, the switch may be briefly placed in the OFF position, but should be returned to the ON position as soon as power is reduced. Filtration is significantly improved with SCAV AIR ON.

Trim – use proper trimming procedures described for climbout.

Above 50 knots and 50–foot altitude above terrain, select N_2 between 103 and 104 percent for best comfort level.

Use engine anti–icing when OAT is below 5°C (41°F) and visible moisture conditions prevail.

4–8. LOW SPEED MANEUVERING

Avoid maneuvers that exceed thrust capability 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 downwind condition.

Avoid any maneuver that requires full pedal.

Avoid extreme aircraft attitudes and maneuvers at low speeds.

WARNING **Uncoordinated turns/maneuvers may cause fuel starvation with less than 35 pounds of fuel on board.**

Controllability during downwind hovering, sideward flight and rearward flight has been demonstrated to be adequate in winds up to 20 knots.

CAUTION **Observe altitude recommendations of Height Velocity diagrams (Refer to Section V).**

4–9. PRACTICE AUTOROTATION

WARNING **Perform throttle rigging check prior to attempting practice autorotations. (See Engine Run–up).**

Misrigging of the throttle control may result in inadvertent flameout during rapid closing of the twistgrip to the ground idle position.

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

Make practice autorotation landings as follows:

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.

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.

If a power recovery is desired, lower collective to full down, rotate the twistgrip to the full open position, verify that N_2 is between 103 and 104 percent and that full engine power is available prior to increasing collective.

Maintain rotor between 400 and 514/523 (observe rotor limits on rotor tach) by use of the collective control.

Maximum gliding distance is obtained at 80 knots and 400 rotor rpm.

Minimum rate of descent is obtained at 60 knots and 400 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).

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 2200 pounds gross weight at sea level, 60 knots. Rotor speed will decrease approximately 12 rpm for each 100 pounds reduction in gross weight and increase 7 rpm for each 1000 foot increase in density altitude. For gross weights greater than 2200 pounds, increase collective control as required to maintain approximately 485 rpm.

4–10. DOORS OFF FLIGHT

Doors off flight is permitted in accordance with the restrictions noted in Section II and the following.

WARNING

Any object that is not properly secured may exit the aircraft during flight:
1. Items (ie. first aid kit, seat cushions,) secured with velcro should not be considered properly secured.
2. Secure or stow in the baggage compartment all loose equipment.
3. Secure or remove unoccupied seat cushions.
4. Secure folding tables (369HE only).

For HE/HS aircraft with serial numbers 0101E thru 0215E and 0101S thru 0200S the following interior components should be removed prior to doors off flight.

Aft bulkhead right and left hand panels.

Aft bulkhead lower panel

Transmission cover

Seat back covers

Floor covering

For HE/HS aircraft with serial numbers 0216E and subsequent and 0201S and subsequent the following interior component should be removed prior to doors off flight.

Floor covering

Use ear protection.

4–11. COLD WEATHER OPERATION

If operations are to be conducted at ambient temperatures below 10°F, it is recommended that the 369H90127 Winterization Kit be installed. Helicopters 0333S and 0216E and subs have the kit installed as standard equipment.

4–12. LANDING APPROACH

Set N_2 to 104 percent.

Set SCAV–AIR (if installed) as required.

4–13. RUNNING LANDING

Maximum recommended ground contact speed is 30 knots for smooth hard surface.

Avoid rapid lowering of the collective after ground contact.

Avoid the use of aft cyclic after ground contact.

4–14. ENGINE/AIRCRAFT SHUTDOWN

CAUTION **Care should be taken when rotating the twistgrip to the ground idle position and from ground idle to the cut off position if the helicopter is parked on a 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 or operational considerations dictate otherwise.

- Pilot's twistgrip — **PERFORM DECELERATION CHECK**

NOTE: To insure proper engine performance, perform the deceleration check during shut down after the last flight of the day (see "Deceleration Check").

- Twistgrip to **GROUND IDLE** stop – hold for 2 minutes — **SET**
- Collective stick — **FULL DOWN FRICTION ON**
- Cyclic stick (neutral position – approximately 1/3 from full aft) — **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 — **SET**

NOTE: Immediately after closing twistgrip to the **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 per HMI.

To ensure throttle cutoff, hold twistgrip in cutoff position until N_1 decelerates to zero and TOT is stabilized. Check for TOT decrease.

CAUTION **An engine fire (recognized by a rapid increase in TOT) can occur during shutdown if fuel cutoff is not complete. If an shutdown 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 the CUTOFF position and pull out the fuel shutoff valve. Observe TOT limits.**

NOTE: If thumping or a rapping sound is heard from the drive train during the final revolution of the main rotor, inspect the tail rotor drive shaft couplings in accordance with the HMI.

- Engine out warning at 55 percent N_1 — **CHECK**
- Auto reignition light (if installed) — **ON**

CAUTION **Do not use collective pitch to slow rotor.**

- Generator switch — **OFF**
- NAV/COM switches — **OFF**
- All other switches — **OFF**

CAUTION **Care should be taken while applying the rotor brake if the helicopter is parked on a slippery or icy surface. The tail rotor control is minimized at less than normal operating RPM when the engine is not driving the rotor system. Full control of the helicopter during these conditions may be limited.**

Damage to the rotor blades and strap pack can result from sudden stopping of rotor.

- Rotor brake (if installed) – apply at 235 rpm or less, release during last rotor revolution — **APPLY**
- Rotor brake handle stowed (up) — **CHECK**
- BATTERY/EXT PWR switch — **OFF**

4–15. 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**

NOTE: Oil level should be checked within 15 minutes after shutdown.

- Engine oil tank for correct oil level — **REPLENISH IF LOW**

4–16. DECELERATION CHECK

- Generator (**GEN**) switch — **OFF**
- Pilot's twistgrip — **FULL OPEN**
- Pilot's collective control — **FULL DOWN FRICTION ON**
- Stabilize N_2 at exactly 104 percent (BEEP as required) — **SET**
- Pilot's twistgrip — **SNAP TO IDLE**

Begin time check with stop watch. Stop time as N_1 passes through 65 percent. 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 two seconds, make two more checks to confirm time. If confirmed time is less than the allowable minimum, refer to the applicable Allison 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, refer to the HMI.

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

- Generator switch — **ON**

4–17. NORMAL ENGINE RESTART

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

Reduce TOT by motoring engine with starter. Speeds in excess of 15 percent N_1 may be experienced.

4–18. NOISE IMPACT REDUCTION PROCEDURES

CAUTION **Safe operation of the helicopter always has the highest priority. Utilize the following procedures only when they will not conflict with safe helicopter operation.**

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 flying the helicopter.

Takeoff:

Takeoff using maximum takeoff power at the speed for best rate of climb.

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 where possible.

Maintain speed of no more than 110 knots over populated areas.

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

SECTION V
PERFORMANCE DATA

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SECTION V
PERFORMANCE DATA

5–1. GENERAL

CAUTION **Be sure to include a review of the appropriate flight manual supplemental data for any optional equipment installed (including STC items) as a regular part of preflight planning (Section IX).**

NOTE: Unless otherwise stated, information presented in this section pertains to both Model 369HE and 369HS helicopters equipped with the Allison 250–C18 or 250–C20 engines. When any data is affected by model designation or engine configuration, that information will be so noted. Be sure to select the appropriate performance data for model type, engine, and optional equipment installed.

Figure numbers marked with an asterisk (*) indicate data pertinent to an installed optional equipment item.

This section contains helicopter performance information as defined within certain conditions such as airspeed, weight, altitude, temperature, wind velocity and engine power available.

Controllability during downwind hovering, sideward and rearward flight has been demonstrated to be adequate in winds up to 20 knots.

Engine Critical Altitude:

Above the “Engine Critical Altitude” line on hover performance charts, power is limited by:

Helicopters equipped with 250–C18 engines; Maximum TOT (749°C). Below that line, power is limited by maximum engine torque pressure (80.3 psi).

Helicopters equipped with 250–C20 engines; Maximum TOT (793°C). Below that line, power is limited by maximum engine torque pressure (64.5 psi).

5–2. AIRSPEED CALIBRATION CURVE

Description:

This chart shows the difference between indicated and calibrated airspeeds.

Indicated airspeed (IAS) corrected for position and instrument error equals calibrated airspeed (CAS).

Use of Chart:

Use the chart as illustrated by the example. To determine calibrated airspeed, the pilot must know the indicated air speed.

Example:

WANTED: Calibrated airspeed

KNOWN: Indicated airspeed = 80 knots

METHOD: Enter the bottom of the chart at the indicated airspeed of 80 knots. Move up to the airspeed calibration line; move left and read approximately 83 knots, calibrated airspeed.

By entering the chart from the opposite direction, calibrated airspeed may be converted to indicated airspeed.

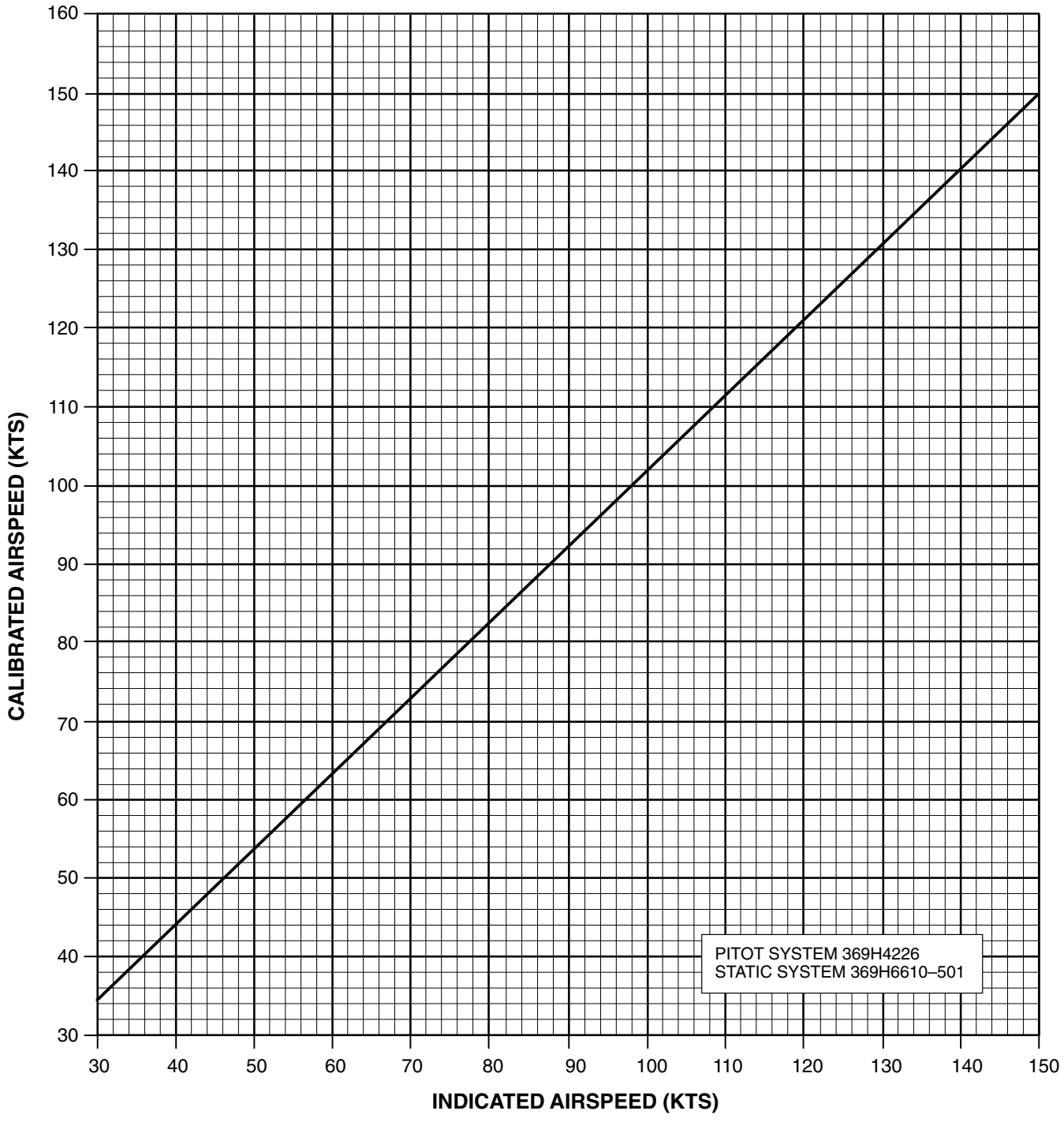


Figure 5–1. Airspeed Calibration Curve

5–3. DENSITY ALTITUDE CHART

Description:

This chart allows a quick estimation of the density altitude when pressure altitude and OAT are known. This chart should be used for determining density altitude for use with gross weight limits for the HV Diagram and speed for Best Rate of Climb Chart. This chart can also be used to determine true airspeed.

Use of Chart:

To determine density altitude, the pilot must know pressure altitude and outside air temperature. Enter bottom of chart with known or estimated OAT, move up to known pressure altitude line, move to left and note density altitude.

NOTE: Pressure altitude is found by setting 29.92 (1013 mb) in kolsman window ± altimeter error.

To determine true airspeed, convert indicated airspeed (IAS) to calibrated airspeed (CAS) utilizing the Airspeed Calibration Curve (Ref. Figure 5–1). Read value on right of chart opposite known density altitude. Multiply CAS by this value to determine true airspeed.

Examples:

Wanted: Find density altitude

Known: Temperature = –15°C; H_P = 6,000 FT

Method: Follow –15°C line to 6,000 FT pressure altitude line; read density altitude (3780 ft).

Wanted: Find True Airspeed

Method: First, find density factor by reading directly across from density altitude (3780 ft). Note density factor of 1.058.

To determine true airspeed:

130 KIAS = 130.5 KCAS
130.5 KCAS × 1.058 = 138.1; round to 138 knots true airspeed.

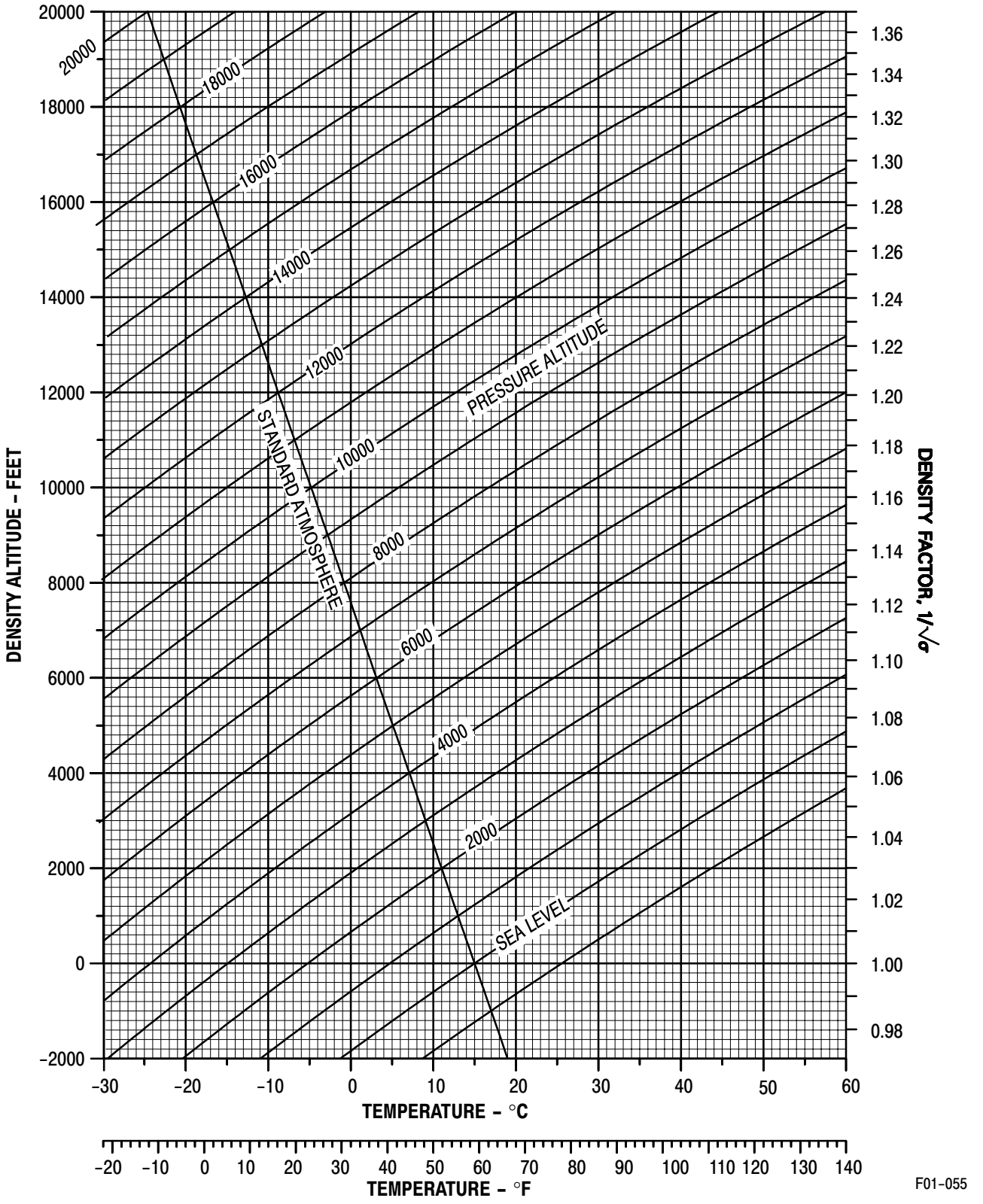


Figure 5–2. Density Altitude Chart

5–4. SPEED FOR BEST RATE OF CLIMB

Description:

This chart shows the indicated airspeed to use for the best rate of climb at any given density altitude.

Use of Chart:

Use the chart as illustrated by the example below.

Example:

Wanted: Best rate of climb

Known: Density altitude = 9,000 feet Gross Weight =2100 pounds

Method: Enter the left side of chart at the known density altitude of 9,000 feet. Move to the right along line and read 60 knots indicated airspeed (IAS) as the best rate of climb.

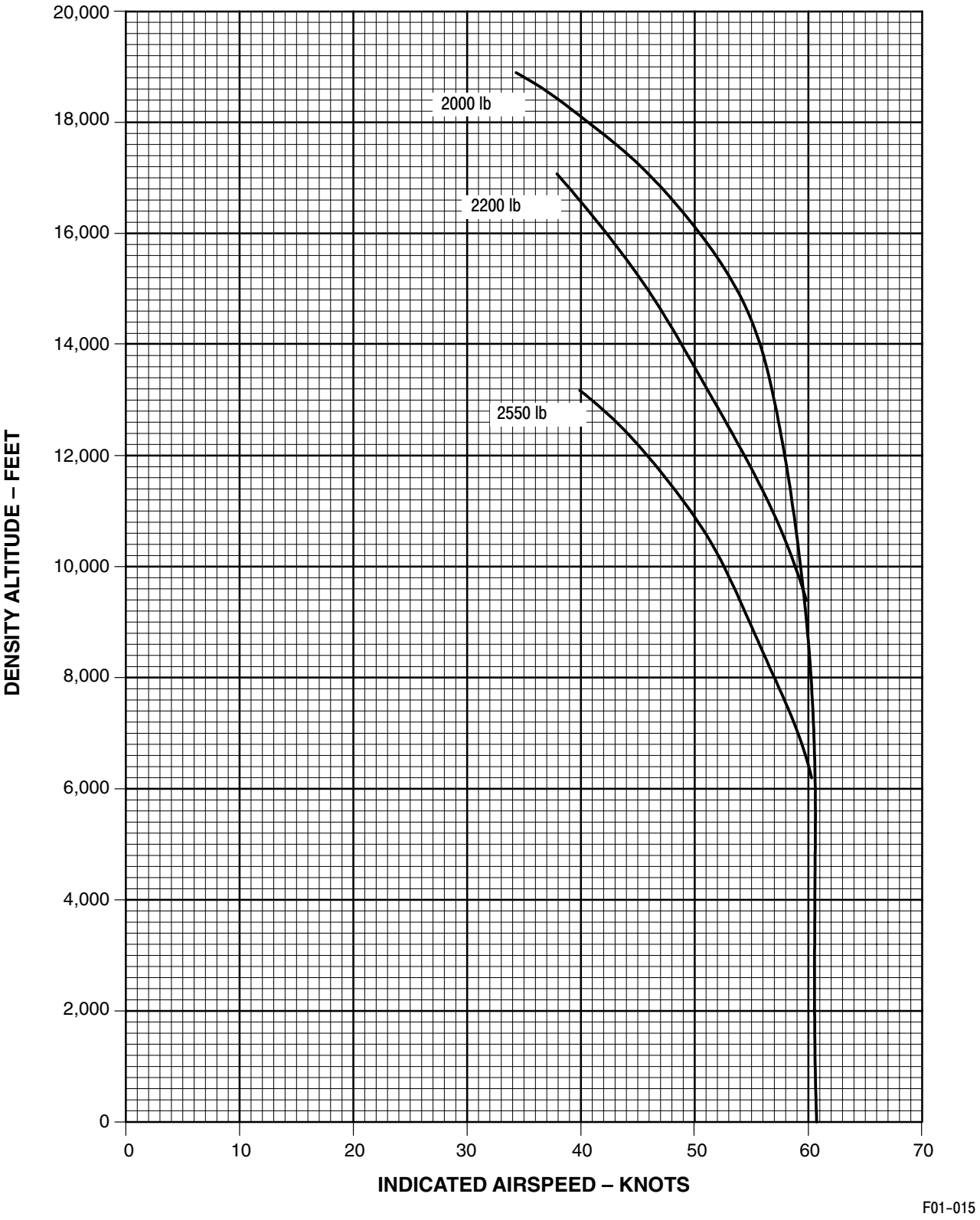


Figure 5–3. Speed for Best Rate of Climb

5–5. HEIGHT VELOCITY DIAGRAM – GROSS WEIGHT LIMITS FOR HEIGHT VELOCITY DIAGRAM

Description:

Airspeed/altitude combinations to be avoided in the event of an engine failure during takeoff are shown in the height–velocity diagram.

Conditions:

The height velocity diagram is based on sea level, standard day conditions, over a smooth hard surface at 2550 pounds gross weight.

Use of Chart:

CAUTION **Observe the cross–hatched regions of the Height Velocity Diagram. These areas represent hazardous airspeed/ altitude combinations from which a successful autorotation landing may be difficult to perform. Operation within the cross–hatched area is not prohibited, but should be undertaken only with extreme caution.**

The recommended takeoff profile line shows the airspeed/altitude combinations recommended for takeoff sequence.

The unmarked region represents the area in which safe autorotational landings may be performed with average pilot skill and reaction time.

Gross Weight Limits for Height Velocity Diagram:

Description:

The gross weight limits for this chart show the reduction in gross weight required as a function of density altitude in order for the Height Velocity curve to apply.

Use of Chart:

Use chart to determine gross weight at which Height Velocity curve will apply for other density altitudes above sea level.

Example:

Wanted: Gross weight for Height Velocity Diagram

Known: Density altitude = 2000 feet

Method: Enter left side of chart at 2000 feet density altitude. Move right to the line; move down and note 2465 pounds gross weight.

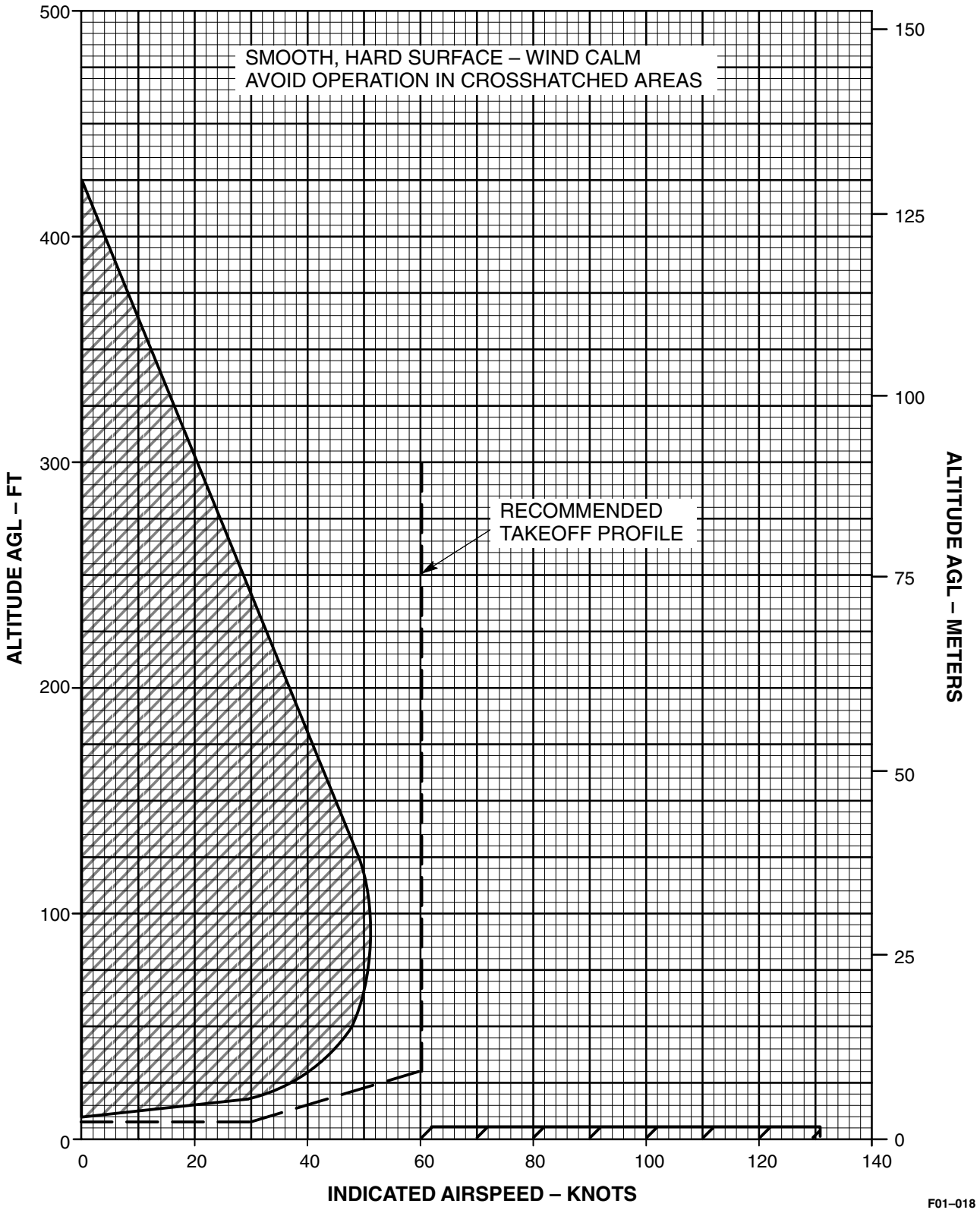


Figure 5–4. Height Velocity Diagram

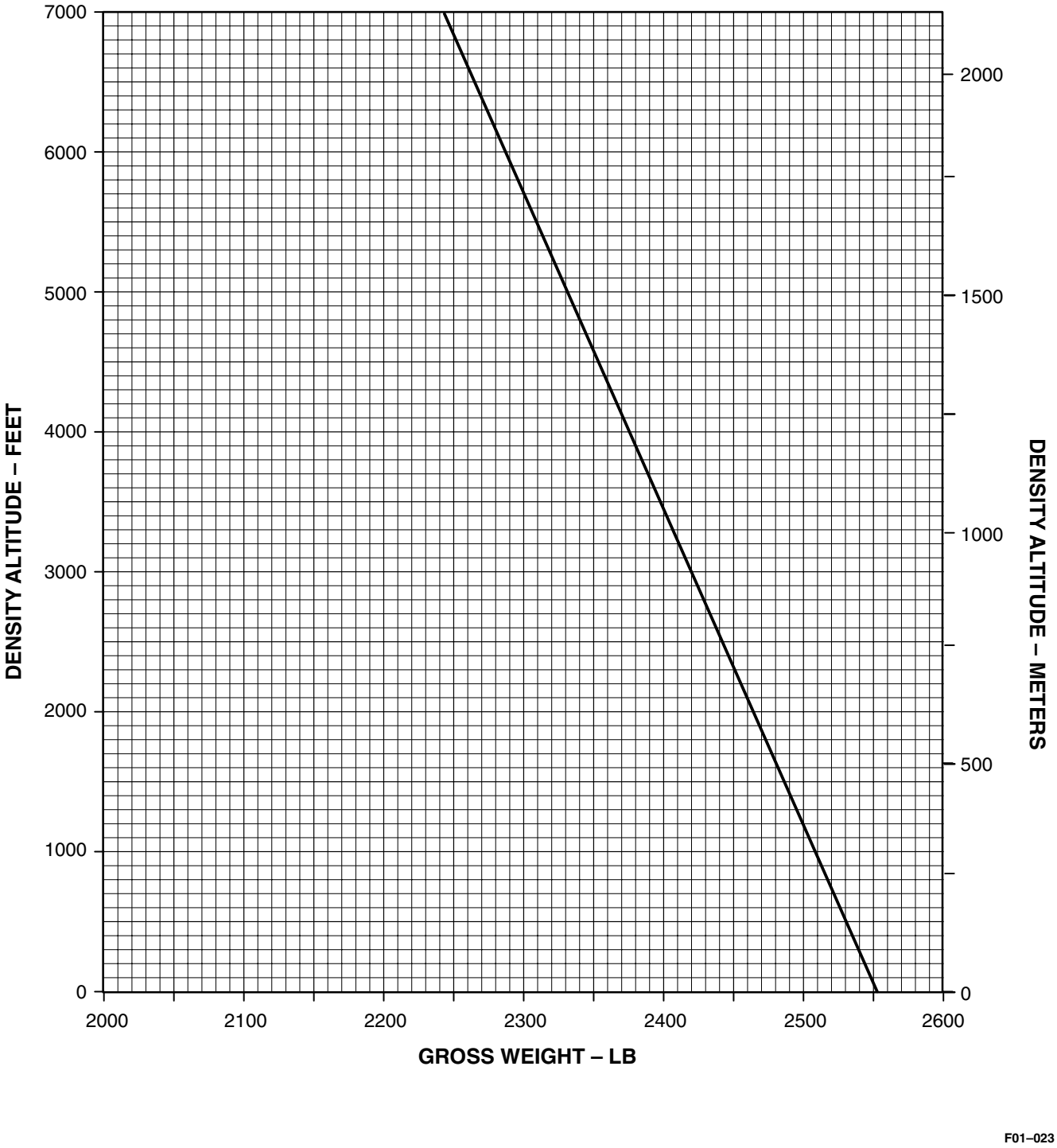


Figure 5–5. Gross Weight Limits for Height Velocity Diagram

5–6. HOVER CEILING VS TEMPERATURE – IGE

WARNING **Ensure that the appropriate hover ceiling chart for type of engine and optional equipment installed is selected prior to determining IGE hover performance.**

NOTE: The hover performance charts are grouped according to the engine type installed: 250–C18 then 250–C20.

Description:

The hover ceiling charts show the hover ceiling in ground effect (IGE) for known conditions of gross weight and outside air temperature (OAT).

The Hover Ceiling vs Temperature charts are based on:

1. Takeoff power at 104 % N_2
2. Cabin heat and engine anti-ice OFF
3. Electrical load of 10 amps

If cabin heat and/or anti-ice are used, reduce weight capability (LBS) as per the applicable chart.

If the engine air particle separator is installed, hover performance is affected. Reduce takeoff gross weight by:

Allison 250-C18

33 pounds with particle separator.
11 pounds with engine inlet screen, 369H8086, installed.

Allison 250-C20

Reduce hover ceiling 400 FT above critical altitude over and above any other hover reduction for any other installed kit (or basic aircraft) when the particle separator is installed.

Allison 250-C18 and 250-C20

33 pounds with SCAV AIR ON.
50 pounds with main rotor abrasion tape installed.

NOTE The IGE hover charts that depict 6–foot skid clearance may be used if the optional rotorcraft cargo hook kit is installed in the helicopter.

Use of Chart:

The following example explains the correct use of the chart as in Figure 5-6. To determine the maximum hover ceiling at 3.0 ft. skid height, the pilot must know the gross weight and the outside air temperature.

Example:

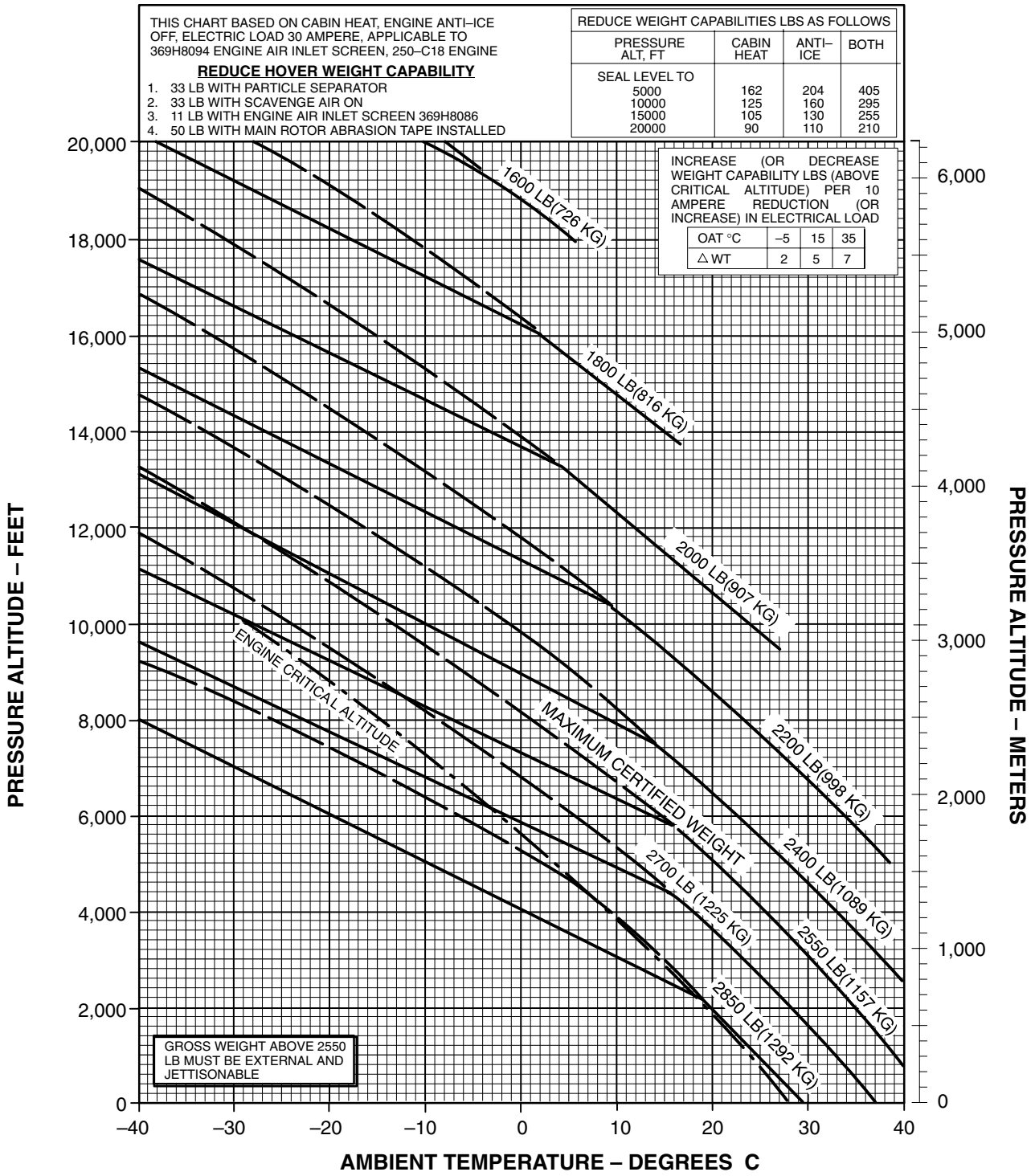
Helicopter configuration:

Short landing gear
Standard engine air inlet
Engine bleed air devices OFF
250C-18 engine

Wanted: Maximum gross weight for hover at 3.0 feet skid height at takeoff power

Known: Gross weight = 2190; Ambient Temperature = 25°C

Method: Select the appropriate chart (Figure 5-6 for this example). Enter the chart at 25°C on the ambient temperature scale and move vertically to 2190 LB (interpolation is required) and move directly to the left to read 8000 PA as the maximum hover ceiling.



NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASHED LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS.

F01–024

Figure 5–6. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Short Landing Gear, Takeoff Power

<<<< Allison 250–C18 >>>>

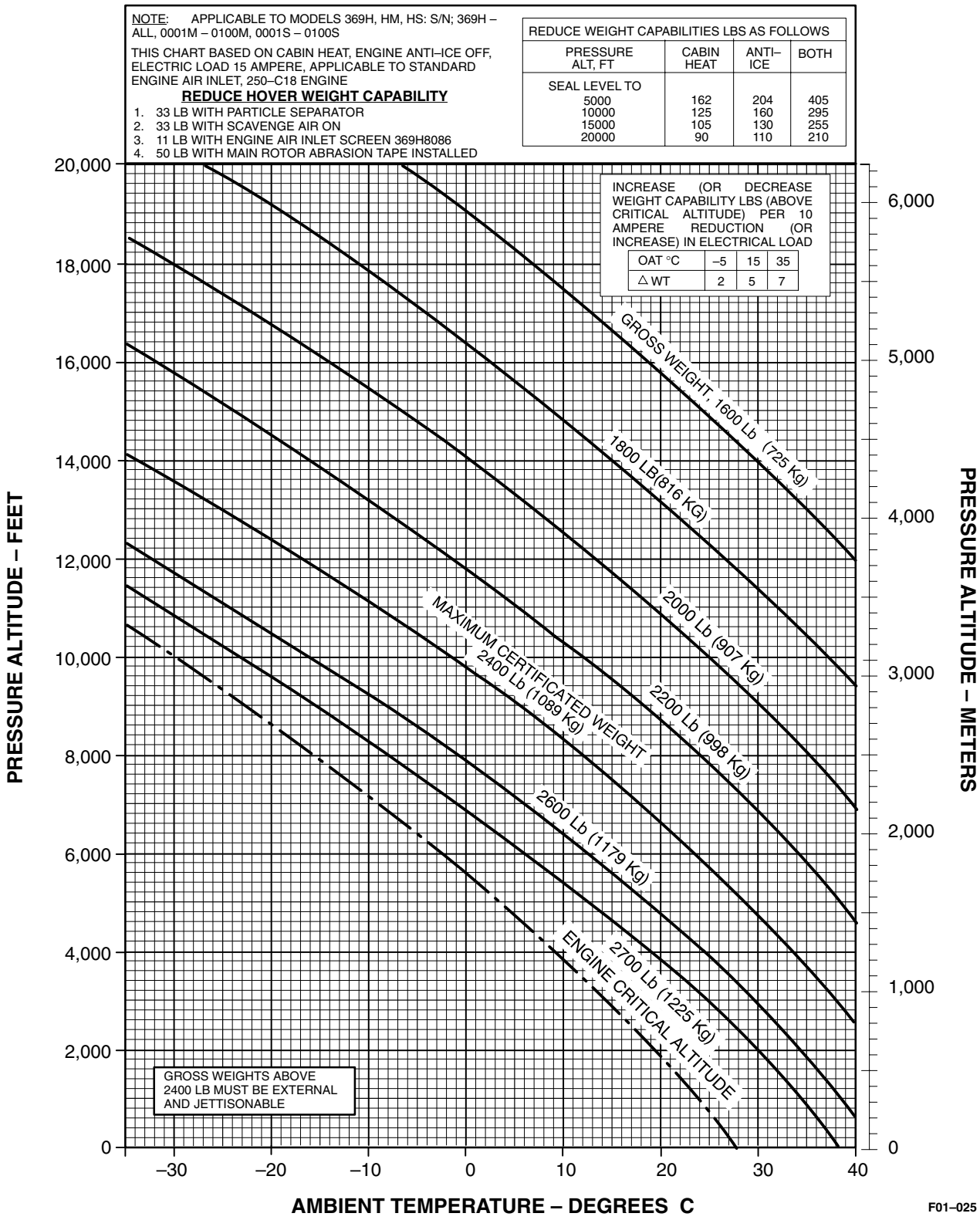


***Figure 5–7. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Short Landing Gear, Aluminum Tail Rotor, Takeoff Power, (Sheet 1 of 2)**

<<<< Allison 250–C18 >>>>

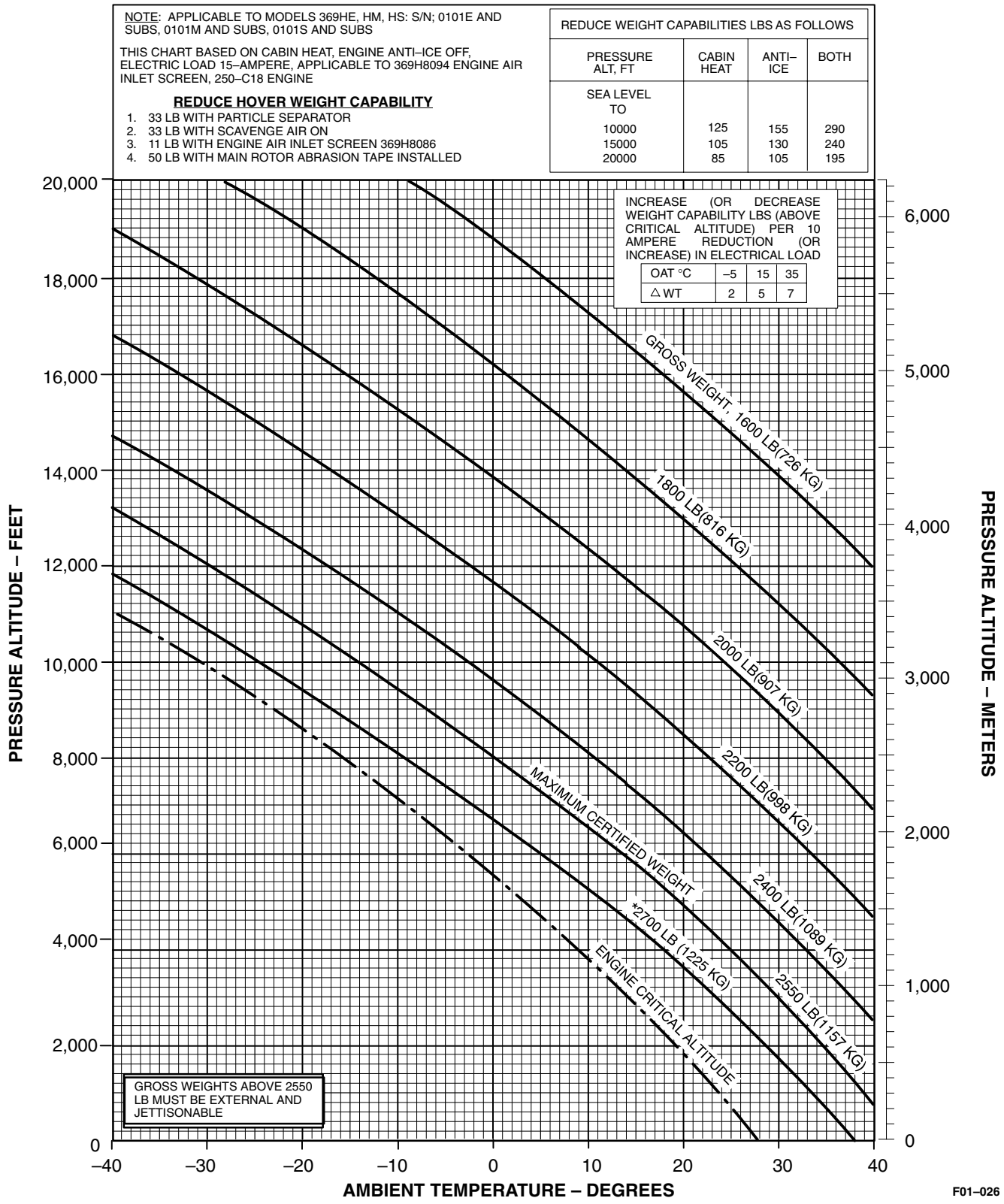
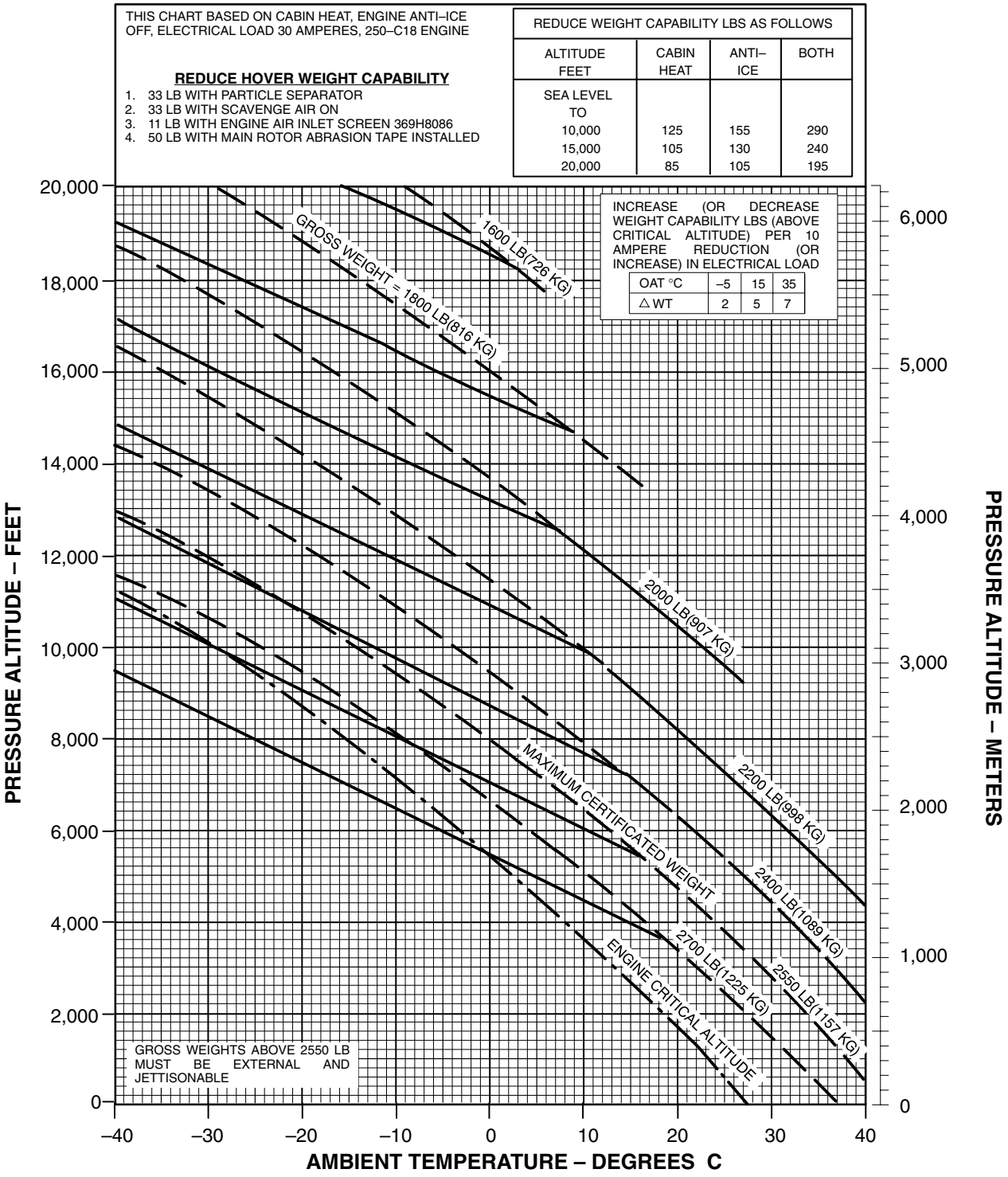


***Figure 5–7. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Short Landing Gear, Aluminum Tail Rotor, Takeoff Power (Sheet 2 of 2)**

<<<< Allison 250–C18 >>>>



NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASH LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS.

F01–031A

***Figure 5–8. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Extended Landing Gear, Takeoff Power**

<<<< Allison 250–C18 >>>>

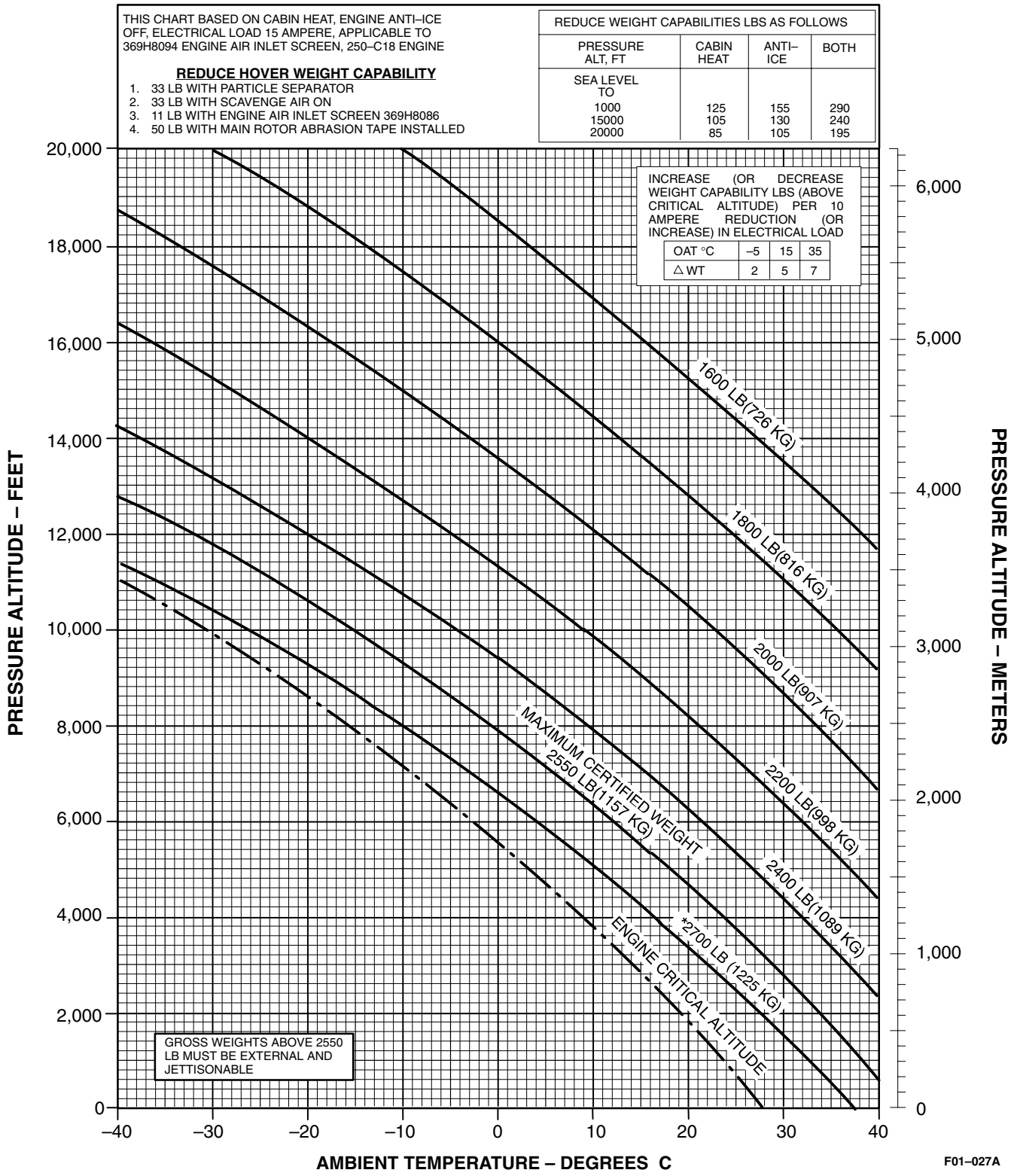
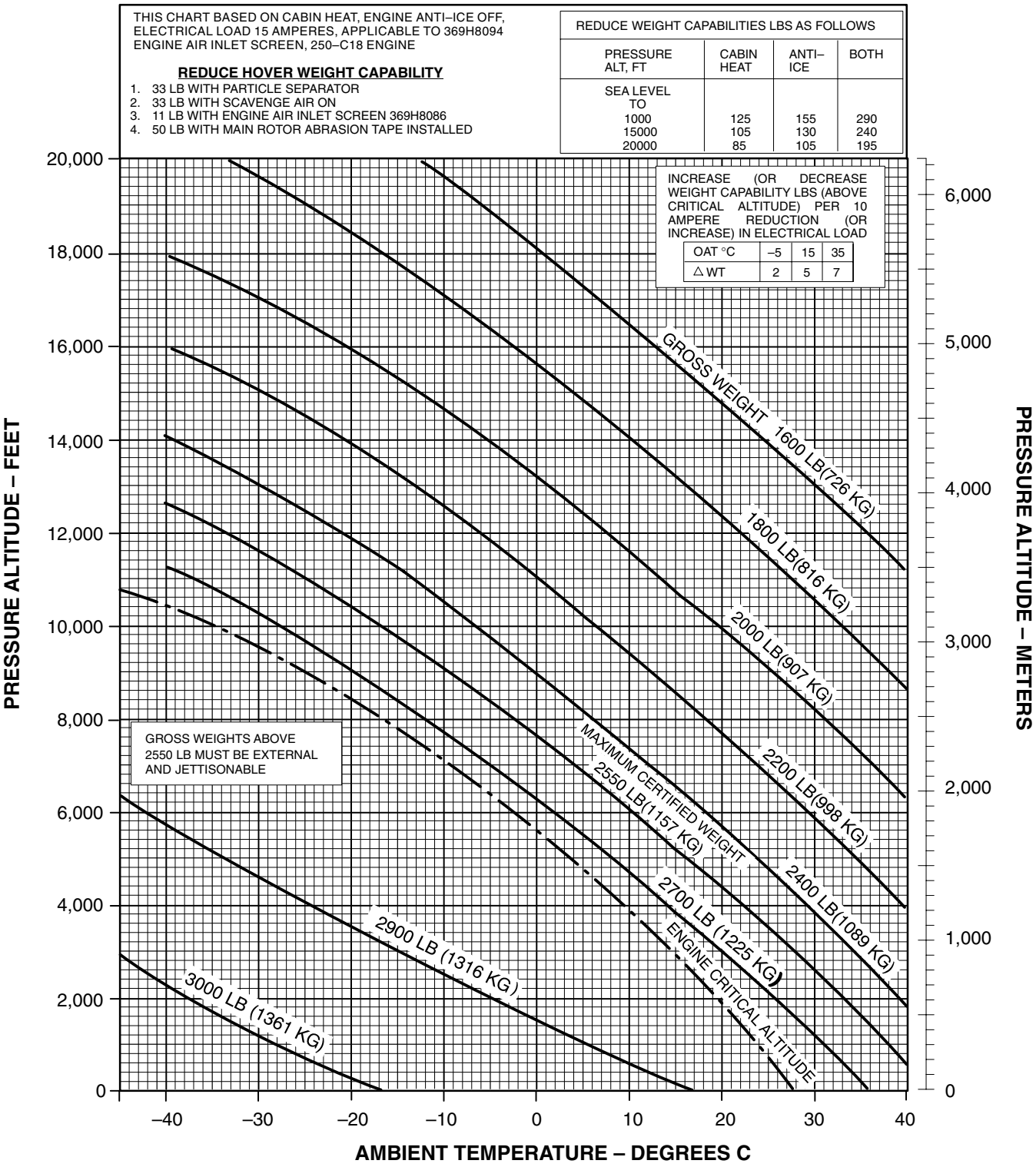


***Figure 5–9. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Extended Landing Gear, Aluminum Tail Rotor, Takeoff Power**

<<<< Allison 250–C18 >>>>

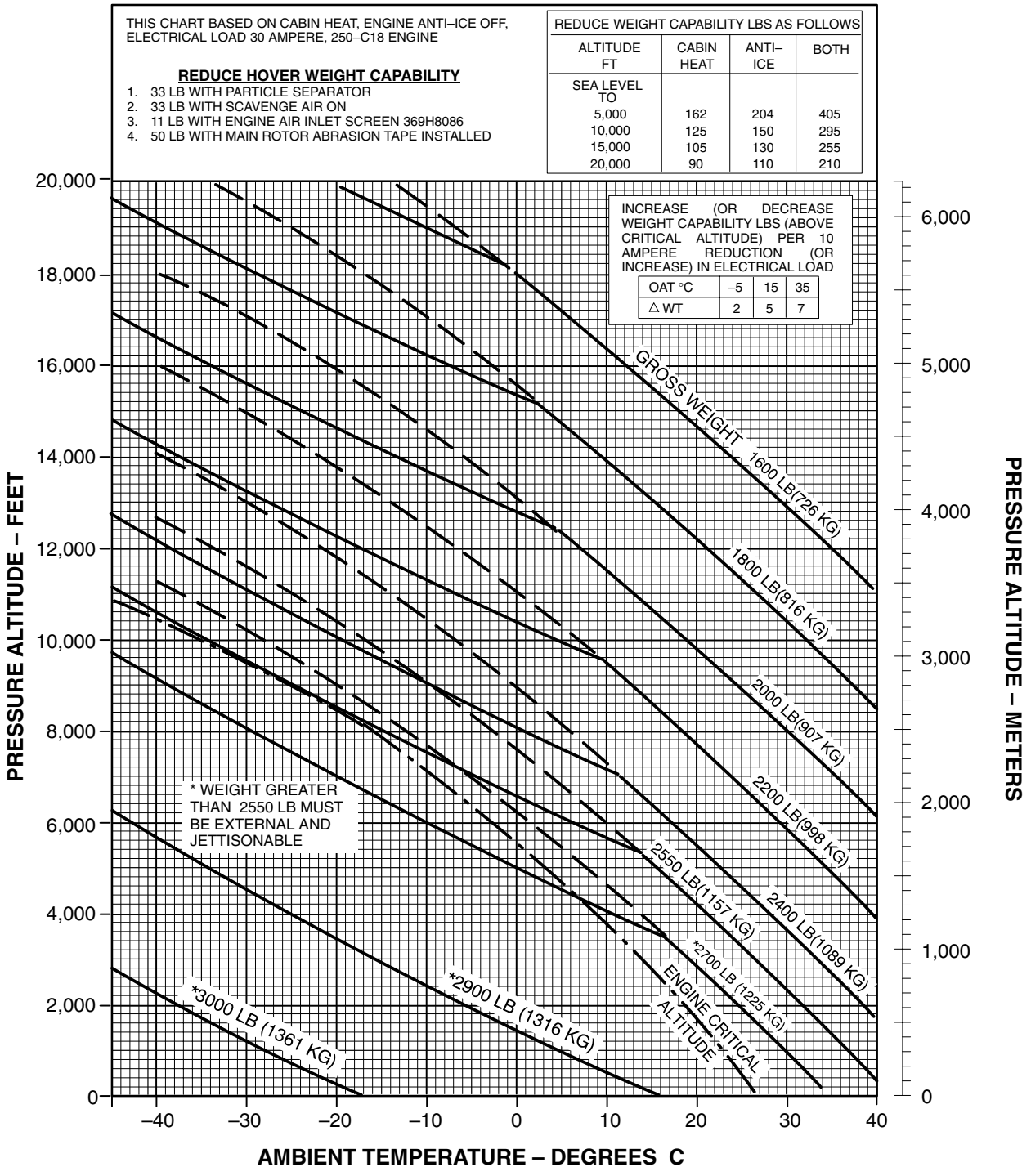


NOTE: 5–FOOT SKID CLEARANCE WITH EXTENDED LANDING GEAR INSTALLED

F01–028

***Figure 5–10. Hover Ceiling vs Temperature, IGE, 6–Foot Skid Clearance, Short Landing Gear, Aluminum Tail Rotor,Takeoff Power**

<<<< Allison 250–C18 >>>>

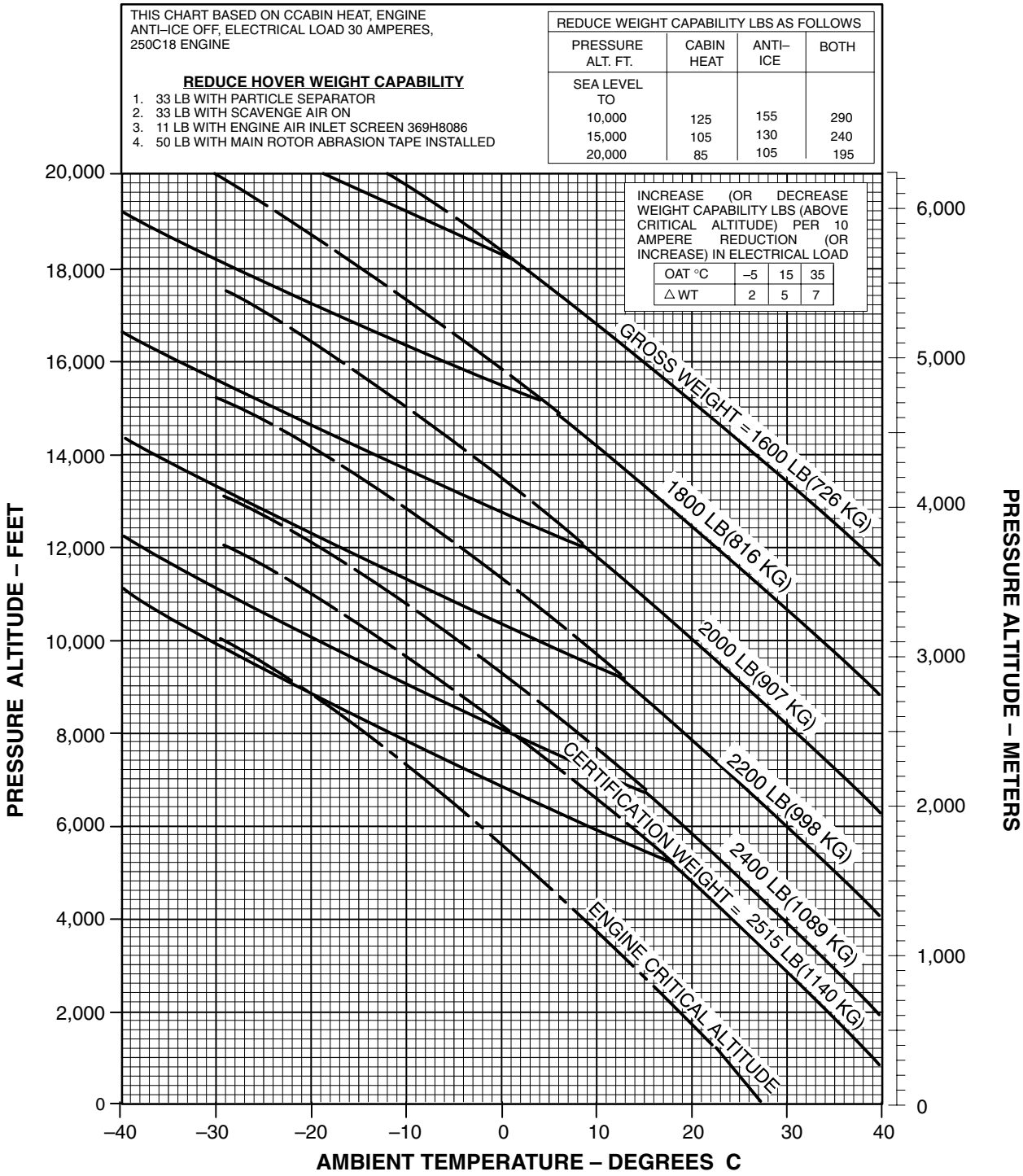


NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASHED LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS. 5–FOOT SKID CLEARANCE WITH EXTENDED LANDING GEAR INSTALLED.

F01–032

Figure 5–11. Hover Ceiling vs Temperature, IGE, 6–Foot Skid Clearance, Short Landing Gear, Takeoff Power

<<<< Allison 250–C18 >>>>



NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASHED LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS.

F01–029

***Figure 5–12. Hover Ceiling vs Temperature, IGE, 2–Foot Skid Clearance, Extended Landing Gear, Utility Floats Installed, Takeoff Power**

<<<< Allison 250–C18 >>>>

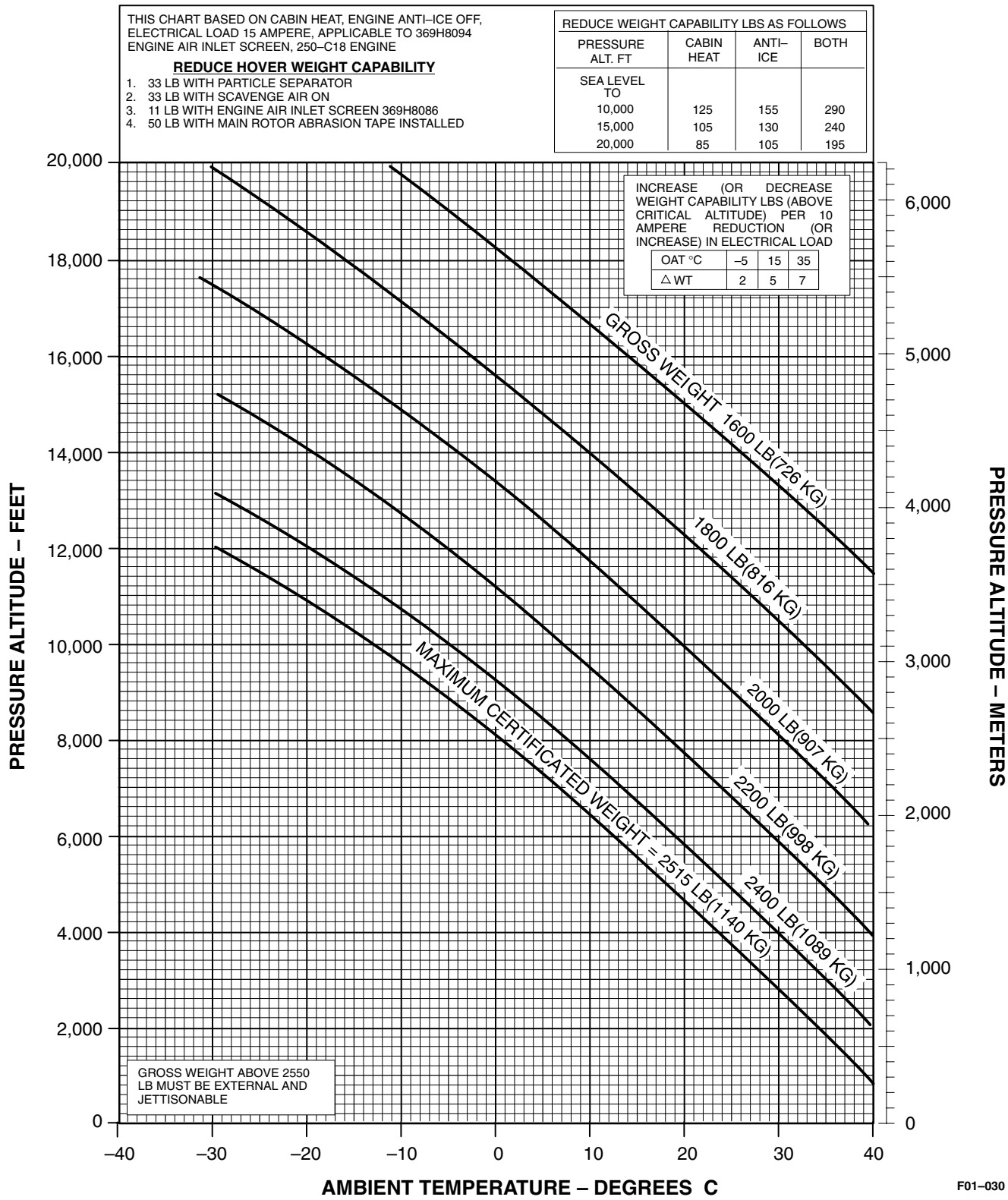


***Figure 5–13. Hover Ceiling vs Temperature, IGE, 2–Foot Skid Clearance, Extended Landing Gear, Aluminum Tail Rotor and Utility Floats, Takeoff Power**

<<<< Allison 250–C18 >>>>

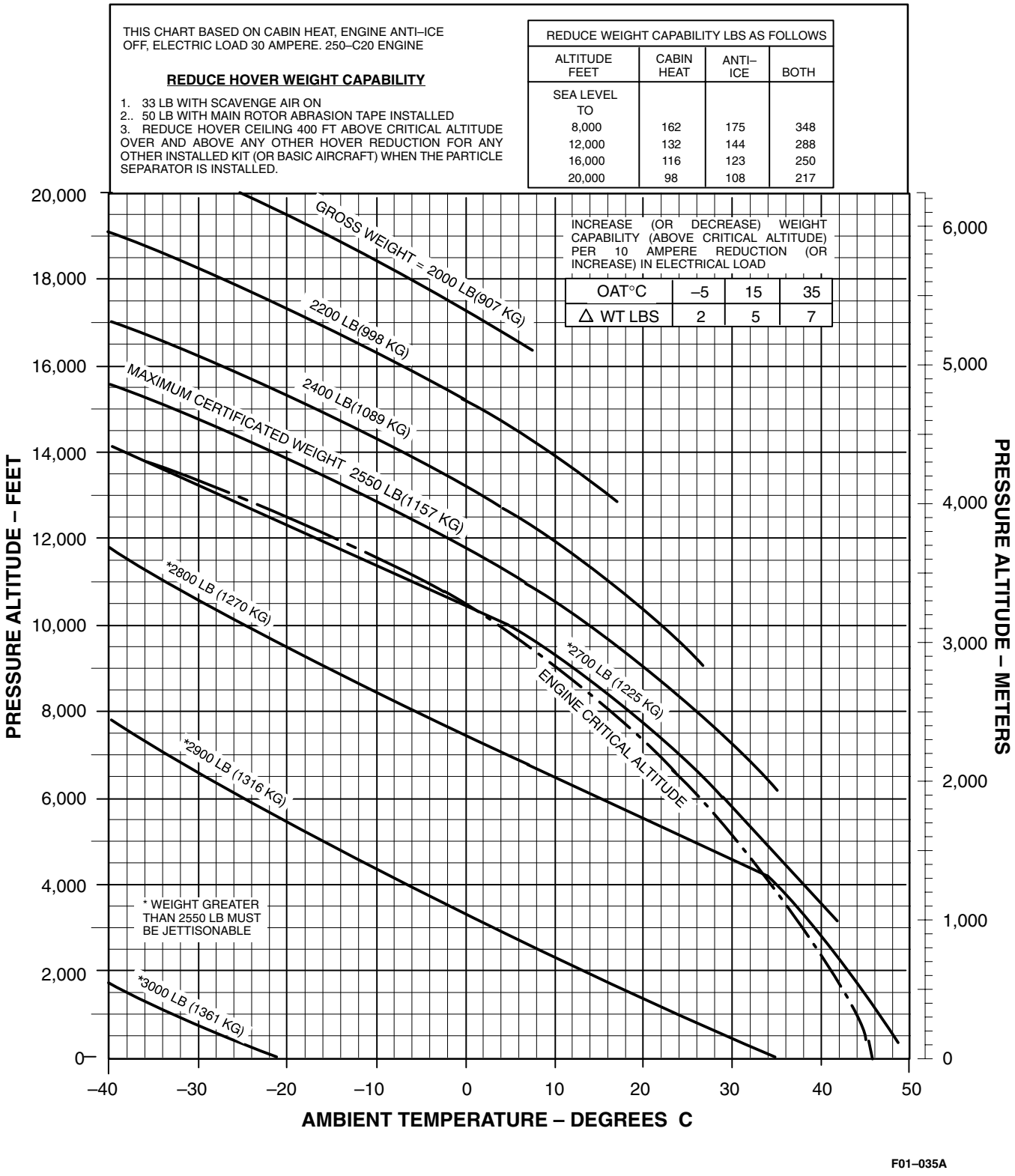


Figure 5–14. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Short Landing Gear, Takeoff Power

<<<< Allison 250–C20 >>>>

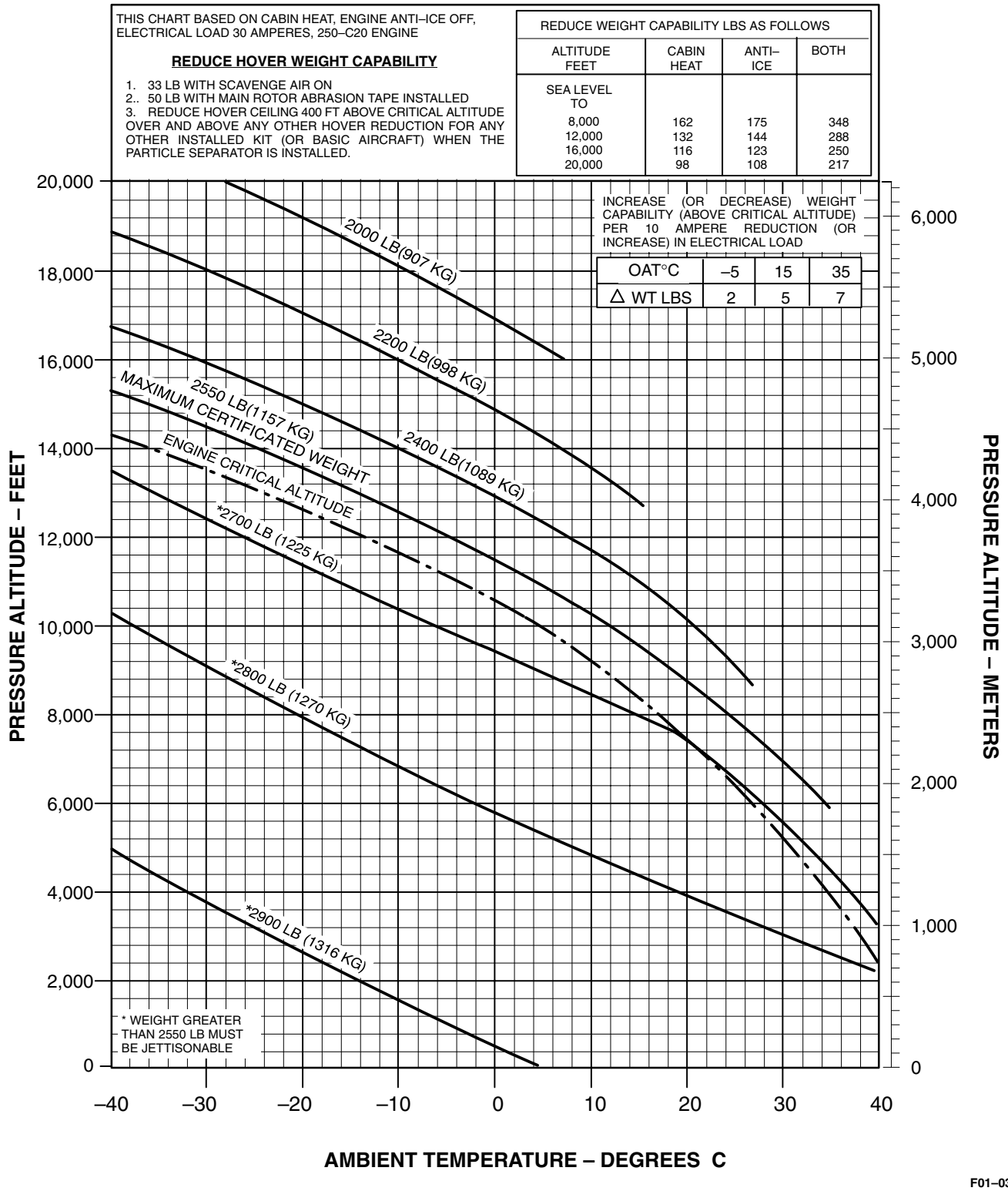


***Figure 5–15. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Short Landing Gear, Tail Rotor Blade Abrasion Strips Installed, Takeoff Power**

<<<< Allison 250–C20 >>>>

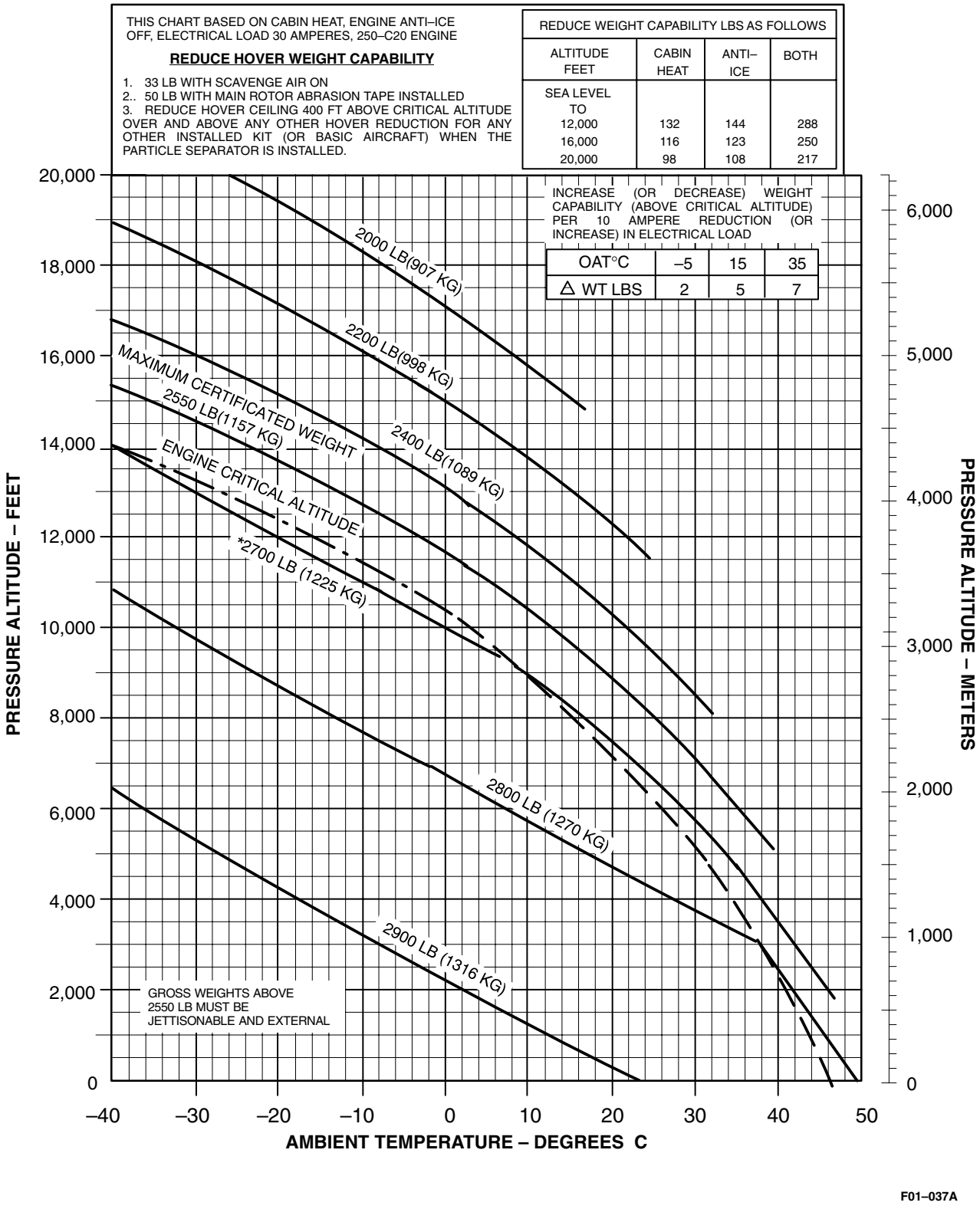


***Figure 5–16. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Extended Landing Gear, Take–off Power**

<<<< Allison 250–C20 >>>>

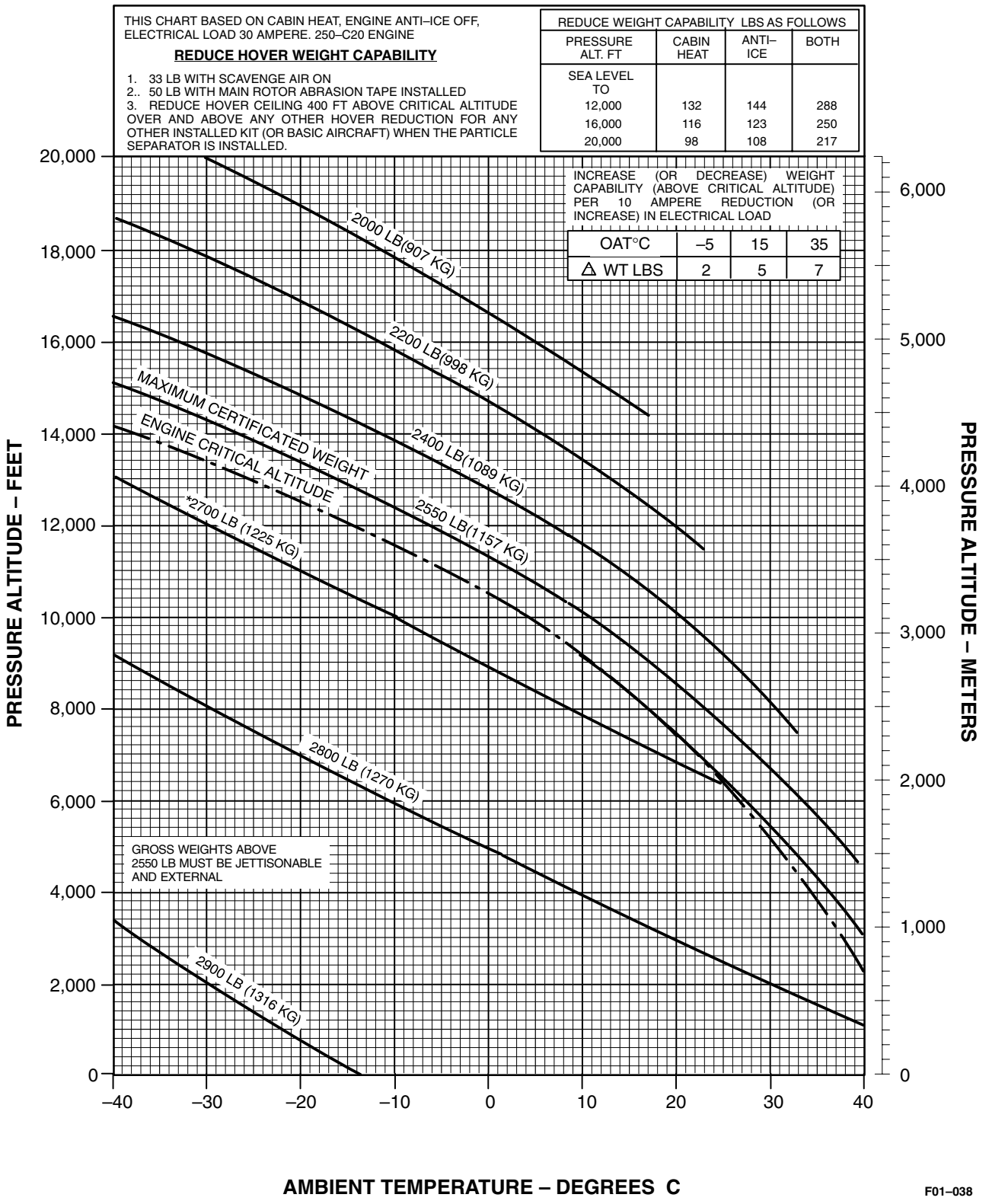
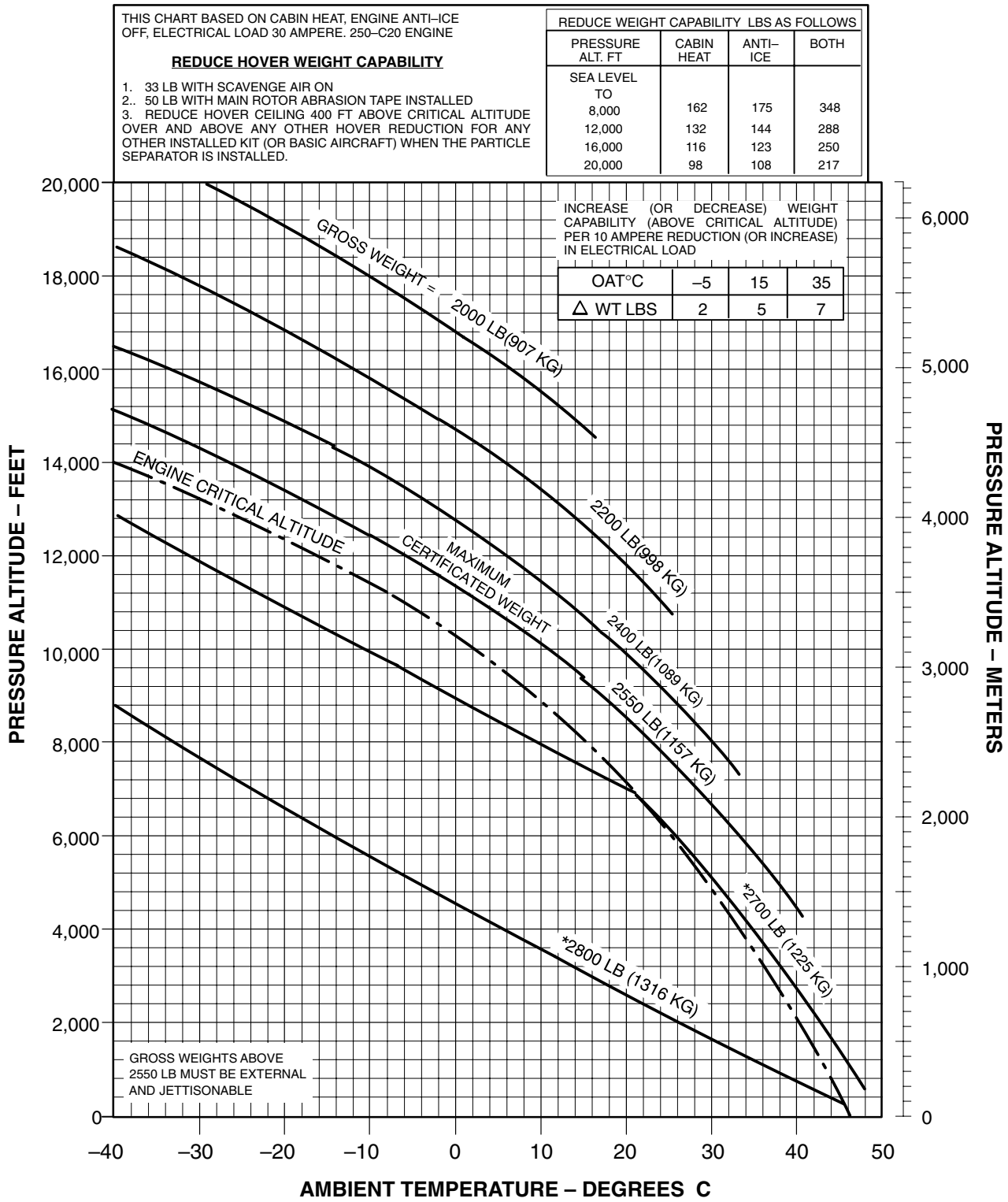


***Figure 5–17. Hover Ceiling vs Temperature, IGE, 3–Foot Skid Clearance, Extended Landing Gear, Tail Rotor Blade Abrasion Strips Installed, Takeoff Power**

<<<< Allison 250–C20 >>>>

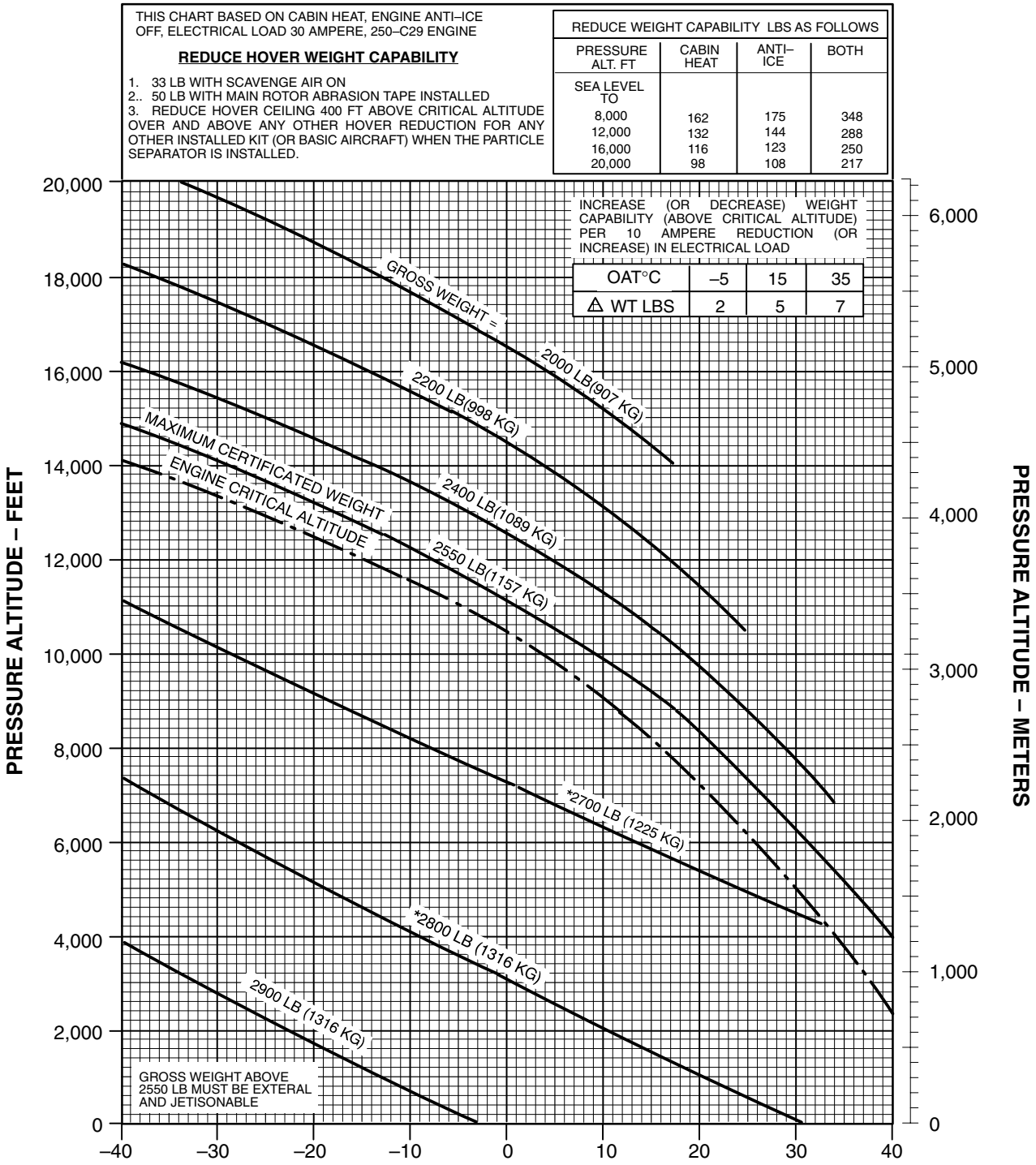


NOTE: 5–FOOT SKID CLEARANCE WITH EXTENDED LANDING GEAR INSTALLED

F01–039

Figure 5–18. Hover Ceiling vs Temperature, IGE, 6–Foot Skid Clearance, Short Landing Gear, Takeoff Power

<<<< Allison 250–C20 >>>>



NOTE: 5–FOOT SKID CLEARANCE WITH EXTENDED LANDING GEAR INSTALLED

F01–040A

***Figure 5–19. Hover Ceiling vs Temperature, IGE, 6–Foot Skid Clearance, Short Landing Gear, Tail Rotor Blade Abrasion Strips Installed, Takeoff Power**

<<<< Allison 250–C20 >>>>

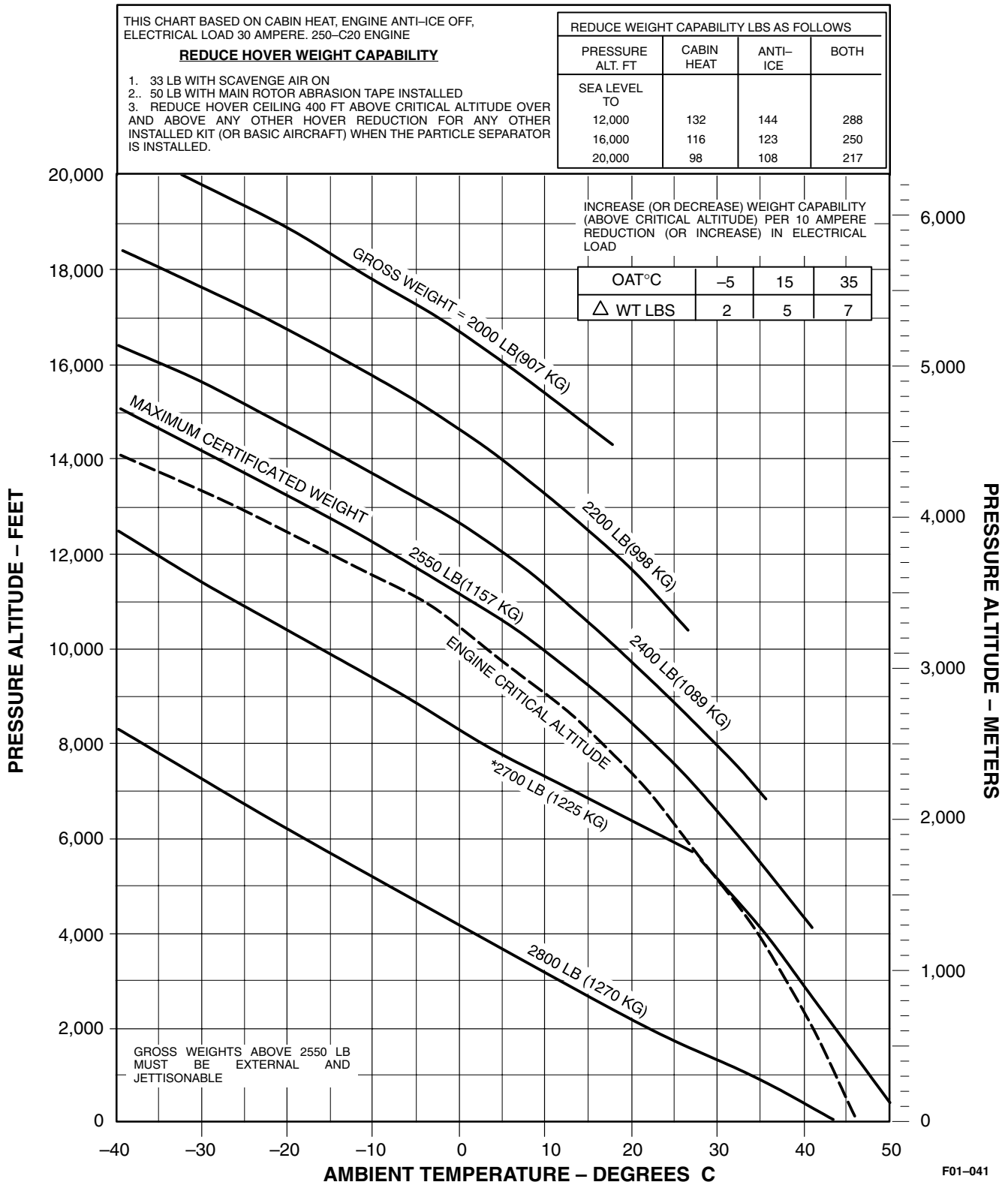


***Figure 5–20. Hover Ceiling vs Temperature, IGE, 2–Foot Skid Clearance, Extended Landing Gear, Utility Floats Installed, Takeoff Power**

<<<< Allison 250–C20 >>>>

5–7. POWER CHECK CHART – ALLISON 250–C18 ENGINE

Description

The Power Check Chart shows the relationship of engine torque, turbine outlet temperature, and horsepower at various conditions of pressure altitude and OAT for an Allison 250-C18 engine producing specification power as installed in the Model 500 helicopter. The primary purpose of this chart is its use as an engine performance trending tool to aid in determining whether 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 Allison 250–C18 Series Operation and Maintenance Manual for additional information on trend analysis.

The power check chart is based on the following conditions:

103 percent N_2.
Cabin heat and engine anti-ice OFF.
Particle separator SCAV AIR OFF.
30 amperes electrical load.
Engine bleed valve closed.

WARNING

Do not exceed engine/aircraft limits.

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

CAUTION

Maintain separation from objects in air or on the ground.

Reset altimeter if required after obtaining pressure altitude.

Use Of Chart:

The primary use of the chart is illustrated by the example below and by the sample arrows shown on the 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 103 percent N_2.

Example:

Wanted: Check engine performance

Data obtained during flight:

Torque = 52.0 psig
TOT = 600°C
PA = 2000 feet
OAT = 10°C

Method: Enter the at 52.0 psi torque. Move right along the 52.0 psig torque line to the 2000 foot pressure altitude curve, move up to the 10°C OAT curve; now move left and read specification TOT of 610°C.

Compare the specification TOT of 610°C with the TOT observed during flight (600°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 data given in this manual may not be obtained.

When trend check procedures indicate engine power deterioration, refer to the Allison Operation and maintenance Manual for corrective action.

NOTE Data obtained during engine operation with the bed valve not fully closed will result in incorrect comparisons of actual versus specification TOT.

Actual engine horsepower any be obtained by entering the chart at the observed engine torque pressure, moving horizontally along the torque line to the horsepower curve, and then moving down to read the engine shaft horsepower.

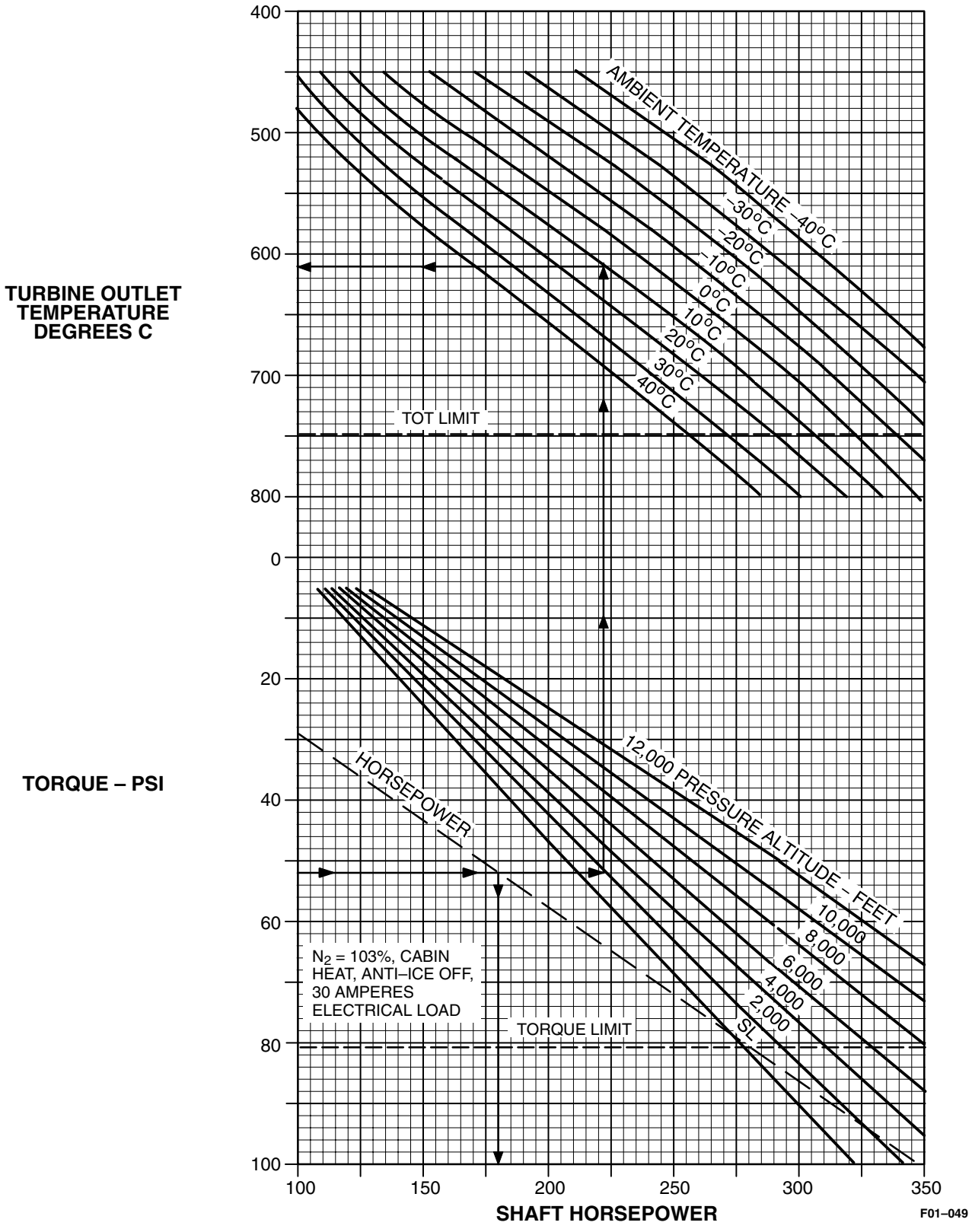


Figure 5–21. Power Check Chart

<<<< Allison 250–C18 >>>>

5–8. POWER CHECK CHART – ALLISON 250–C20 ENGINE

Description

The Power Check Chart shows the relationship of engine torque, turbine outlet temperature, and horsepower at various conditions of pressure altitude and OAT for an Allison 250-C20 engine producing specification power as installed in the Model 500 helicopter. The primary purpose of this chart is its use as an engine performance trending tool to aid in determining whether 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 Allison 250–C20 Series Operation and Maintenance Manual for additional information on trend analysis.

The power check chart is based on the following conditions:

103 percent N_2.
Cabin heat and engine anti-ice OFF.
Particle separator SCAV AIR OFF.
30 amperes electrical load.

WARNING

Do not exceed engine/aircraft limits.

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

CAUTION

Maintain separation from objects in air or on the ground.

Reset altimeter if required after obtaining pressure altitude.

Use Of Chart:

The primary use of the chart is illustrated by the example below and by the sample arrows shown on the 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 103 percent N_2.

Example:

Wanted: Check engine performance

Data obtained during flight:

Torque = 56.0 psig
PA = 4000 feet
OAT = 20°C
TOT = 710°C

Method: Enter the chart at 56.0 psig torque. Move left along the 56.0 psig torque line to the 4000 foot pressure altitude curve, move down to the 20°C OAT curve; now move right and read specification TOT of 720°C.

Compare the specification TOT of 720°C with the TOT observed during flight (710°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 data given in this manual may not be obtained.

When trend check procedures indicate engine power deterioration, refer to the Allison Operation and maintenance Manual for corrective action.

NOTE Data obtained during engine operation with the bed valve not fully closed will result in incorrect comparisons of actual versus specification TOT.

Actual engine horsepower may be obtained by entering the chart at an observed engine torque pressure, moving horizontally along the torque line to the horsepower curve, and then moving up to read the engine shaft horsepower.

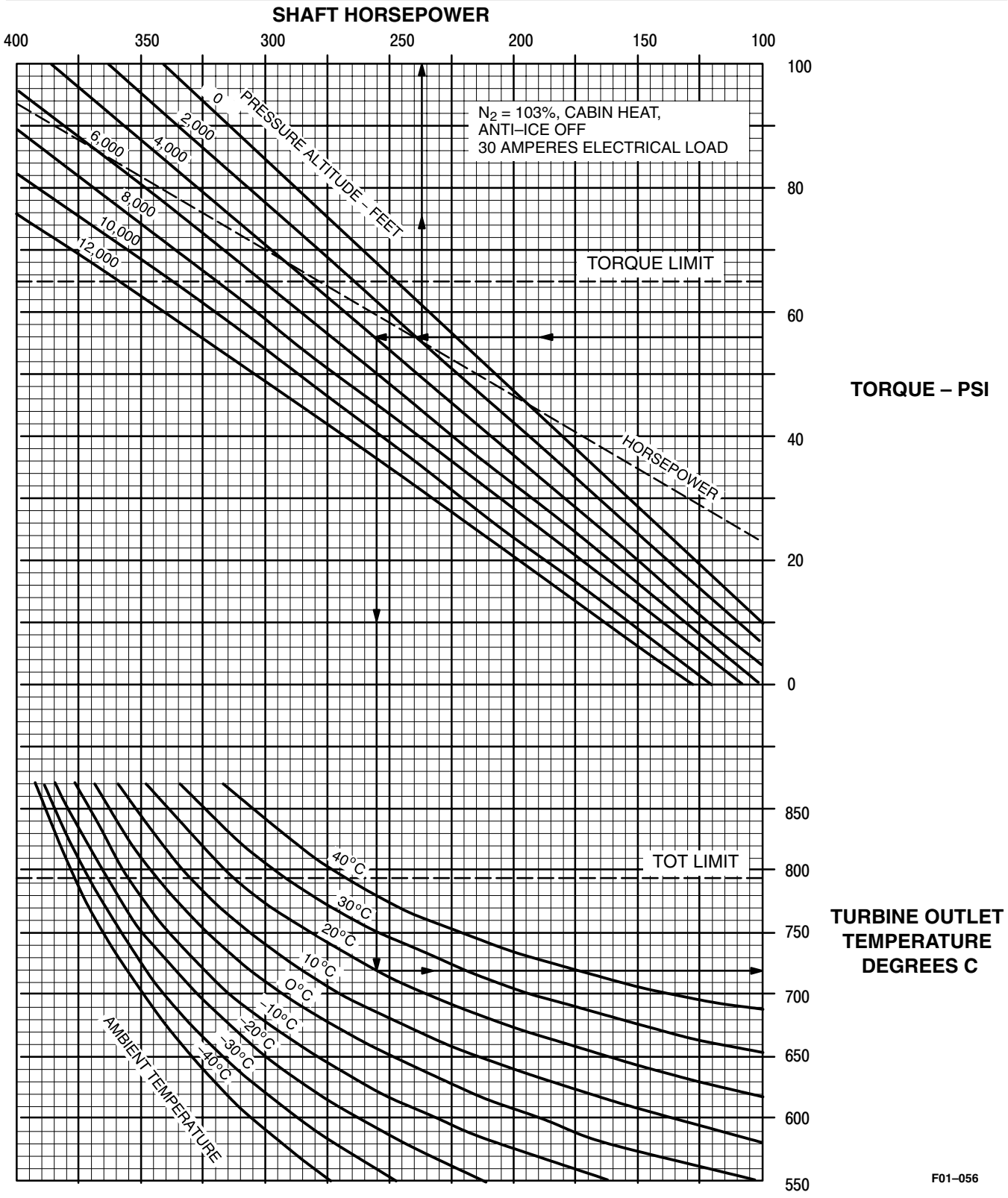


Figure 5–22. Power Check Chart

<<<< Allison 250–C20 >>>>

SECTION VI
WEIGHT AND BALANCE DATA

TABLE OF CONTENTS

SECTION VI
WEIGHT AND BALANCE DATA

6-1. WEIGHT AND BALANCE CHARACTERISTICS

The weight and balance characteristics of the McDonnell Douglas 500 helicopter are as follows (Ref. Table 6-1 and Figure 6-1).

Maximum Certified Gross Weight

Refer to Section II.

Longitudinal Reference Datum

100 inches forward of rotor centerline (rotor hub centerline is located at Station 100 (See Figure 6-2 and Figure 6-3).

Cargo Deck Capacity

950 or 1300 pounds, not to exceed 115 pounds per square foot (Ref Section II).

Utility Stowage Compartment

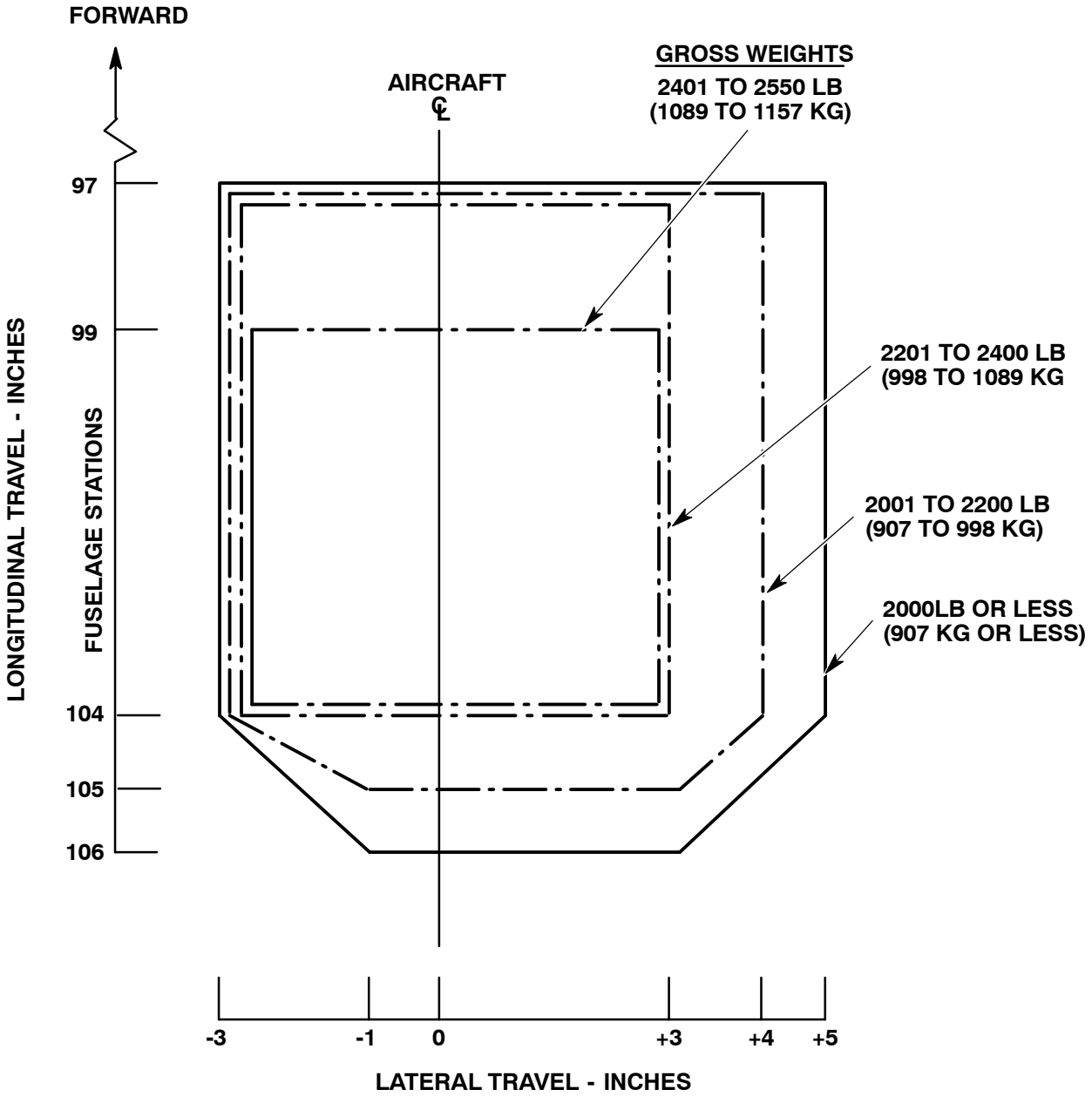
Limited to 50 pounds

Center of Gravity Limits:

Lateral (+) is right of centerline; lateral (-) is left of centerline when seated in the crew compartment looking forward.

Table 6-1. Center of Gravity Limits

Gross Weight (lb)	Longitudinal C.G. Limit (Sta-in.)		Lateral C.G. Limit (Sta-in.)
	Forward	Aft	(+) Right (-) Left
2401 to 2550	99.0	104	±3.0
2201 to 2400	97.0	104	±3.0
2001 to 2200	97.0	104 105	+4 -3 +3 -1
2000 and below	97.0	104 106	+5 -3 +3 -1



F01-006

Figure 6-1. Center of Gravity Envelope

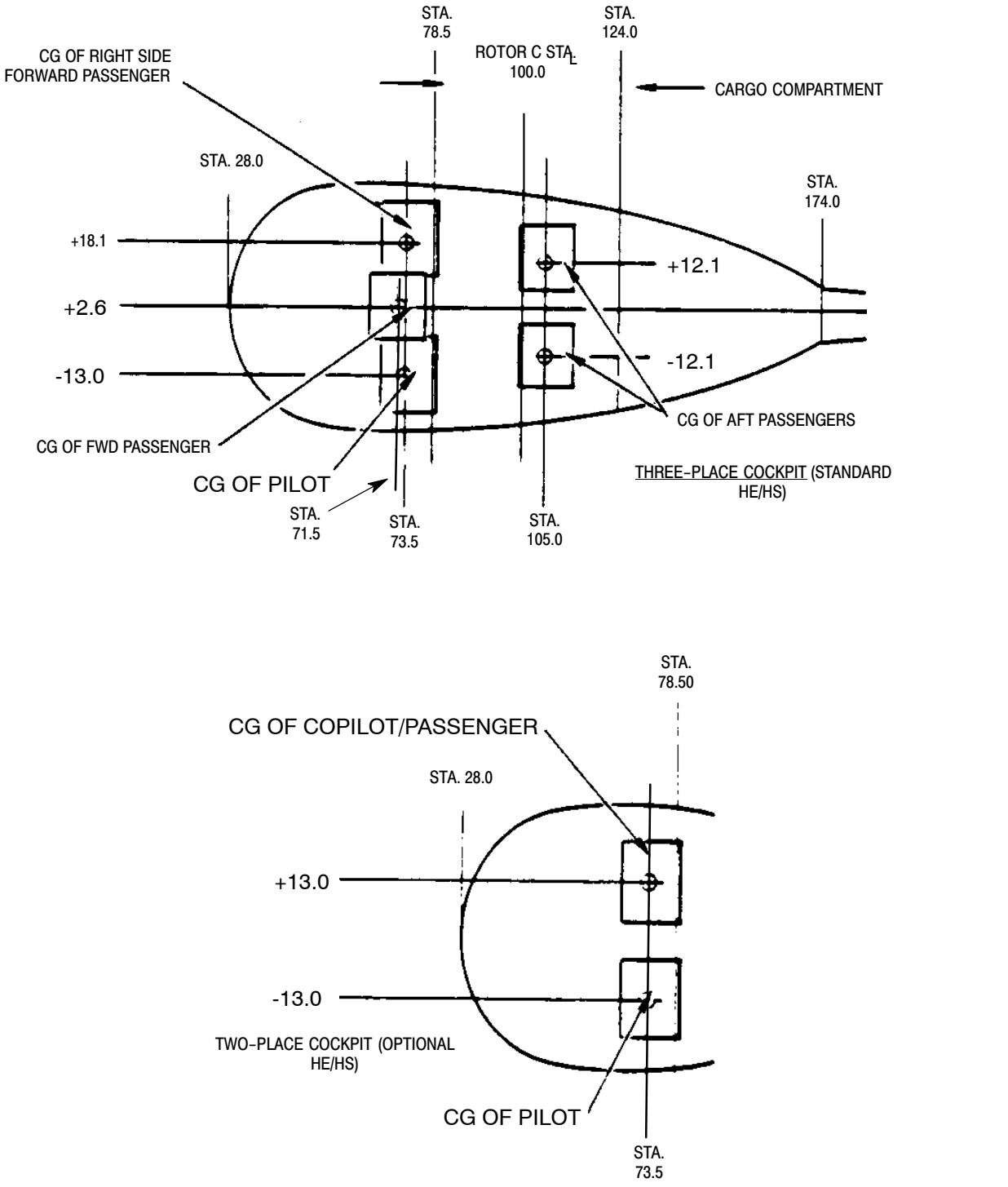


Figure 6-2. Balance Diagram (Sheet 1 of 2)

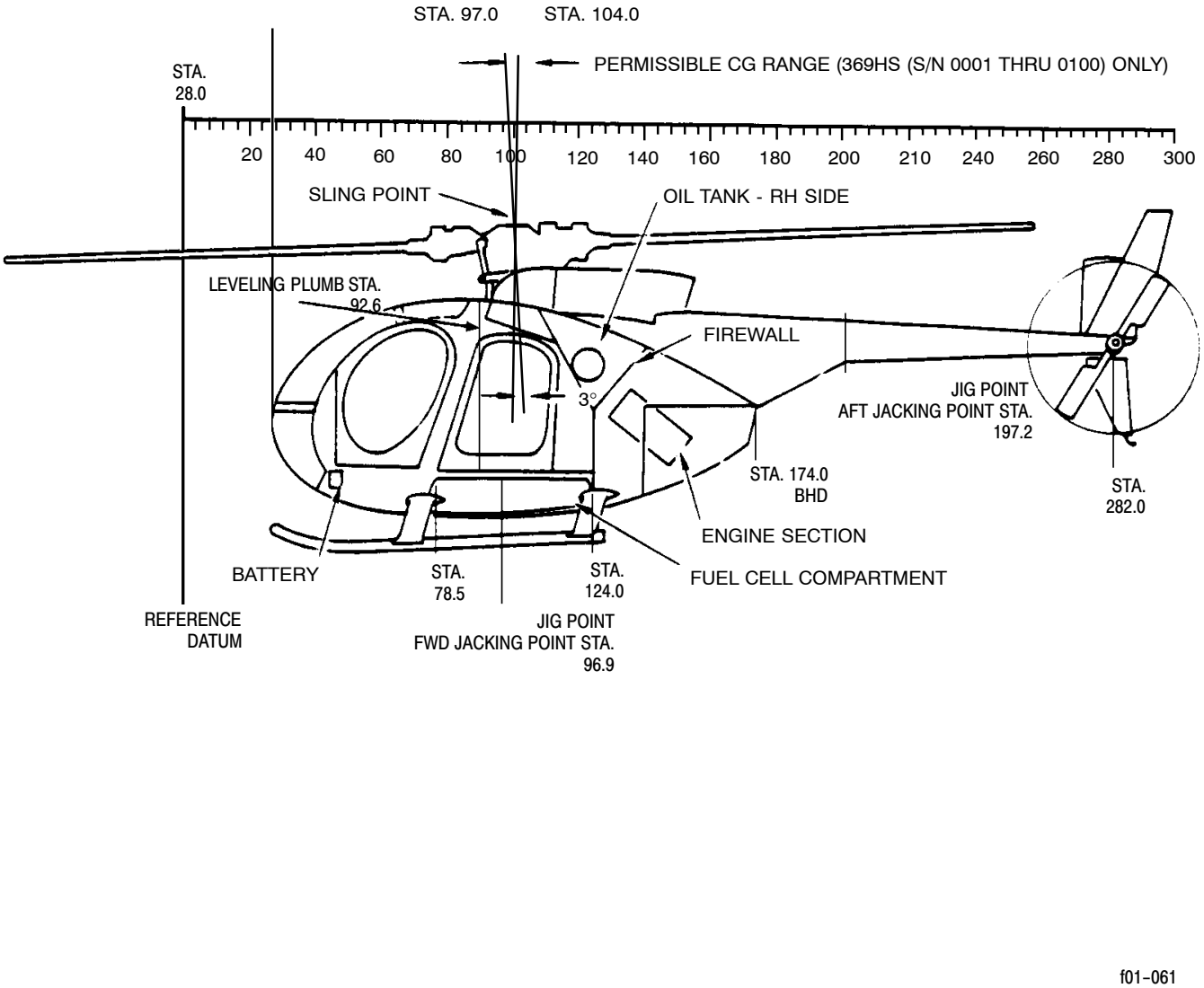


Figure 6-2. Balance Diagram (Sheet 2 of 2)

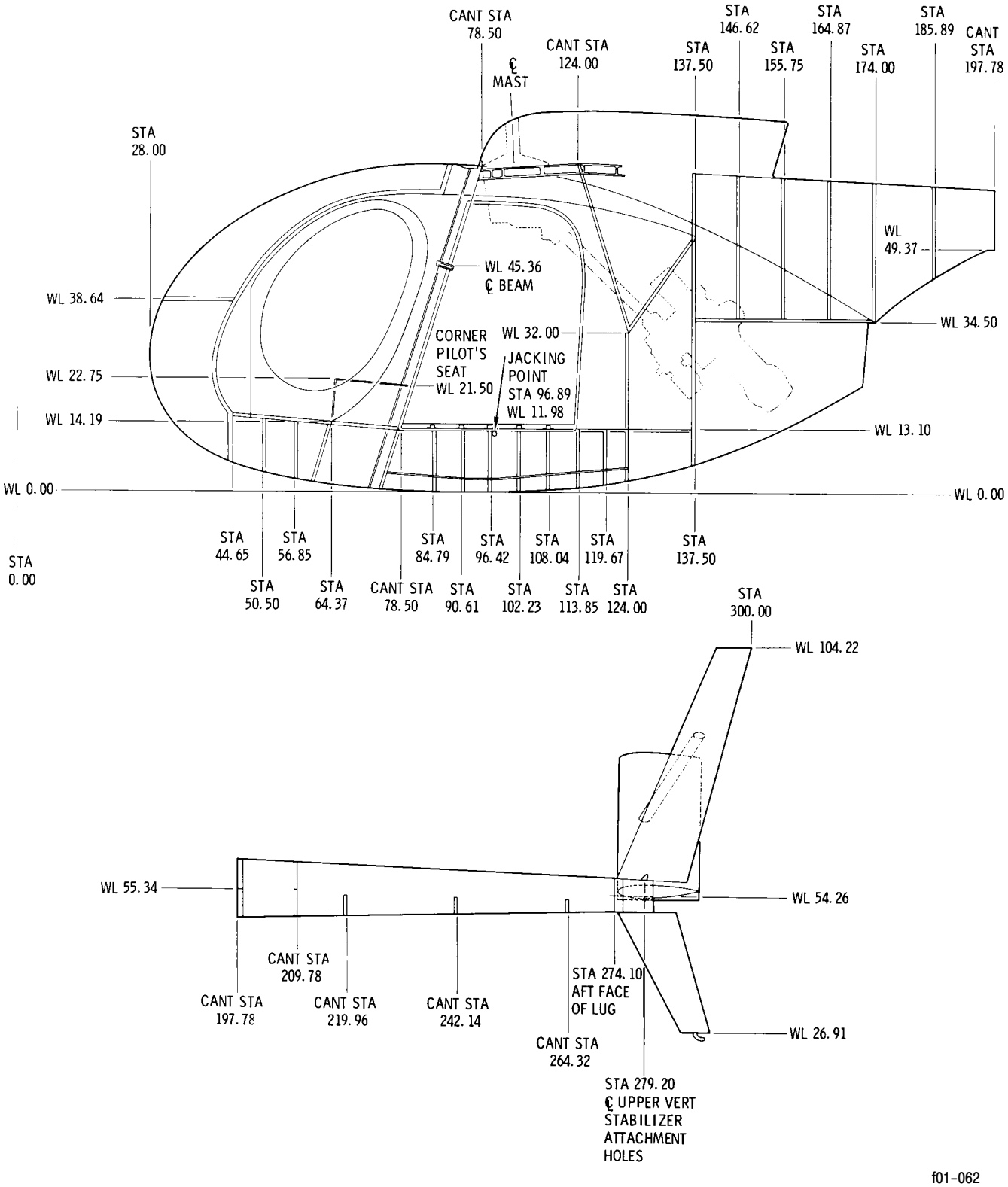


Figure 6-3. Station Diagram

WEIGHT AND BALANCE REPORT

MDHC MODEL _____

WEIGHED BY _____ CONFIGURATION _____

MODEL _____ SERIAL NO. _____ REGISTRATION NO. _____ DATE _____

WEIGHING POINTS	SCALE READING (LBS)	TARE OR CALIBRATION CORRECTION (LBS)	NET WEIGHT (LBS)	LONGI-TUDINAL ARM (INCHES)	LATERAL ARM (INCHES)	LONGI-TUDINAL MOMENT (INCH-LBS)	LATERAL MOMENT (INCH-LBS)
LEFT MAIN				96.9	-25.6		
RIGHT MAIN				96.9	+25.6		
TAIL				197.2	0.0		
TOTAL UNADJUSTED NET WEIGHT							
TOTAL WEIGHT OF SURPLUS EQUIPMENT (SEE TABLE 1)			-				
TOTAL WEIGHT OF MISSING EQUIPMENT (SEE TABLE 1)			+				
TOTAL BASIC WEIGHT							

REFER TO THE OWNER'S MANUAL FOR C.G. LIMITS APPLICABLE FOR GROSS WEIGHT RANGE.

FUEL/OIL ABOARD AT TIME OF WEIGHING:

	EMPTY	FULL
FUEL	☐	☐
ENGINE OIL	☐	☐
MAIN GEAR BOX	☐	☐
TAIL GEAR BOX	☐	☐

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McDonnell Douglas Helicopter Company

F01-063-1

Figure 6-4. Sample Weight and Balance Report (Sheet 1 of 2)

MODEL _____ SERIAL NO. _____ REGISTRATION NO. _____ DATE _____

EXAMPLES OF FORWARD, AFT AND LATERAL LOADING

EXAMPLE 1, FORWARD	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)
BASIC WEIGHT			
PILOT		73.5	
CRITICAL FUEL QUANTITY			
GROSS WEIGHT (CRITICAL FUEL) – FWD C.G.			

APPROVED FWD C.G. LIMIT FOR EXAMPLE 1 GROSS WEIGHT ___* ___ INCHES.

EXAMPLE 2, AFT	WEIGHT (LBS)	LONG. ARM (IN.)	LONG. MOMENT (IN.-LB.)
BASIC WEIGHT			
PILOT		73.5	
GROSS WEIGHT (ZERO FUEL) – AFT C.G.			

APPROVED AFT C.G. LIMIT FOR EXAMPLE 2 GROSS WEIGHT ___* ___ INCHES.

EXAMPLE 3, LATERIAL	WEIGHT (LBS)	LATRL. ARM (IN.)	LATRL MOMENT (IN.-LB.)
BASIC WEIGHT			
PILOT			
GROSS WEIGHT (ZERO FUEL) – LATERAL C.G.			

APPROVED LATERAL C.G. FOR EXAMPLE 3 GROSS WEIGHT ___* ___ INCHES.

*SEE FLIGHT MANUAL, SECTION 6, FOR C.G. LIMITS AT GROSS WEIGHT.

Page 2 of _____

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Figure 6-4. Sample Weight and Balance Report (Sheet 2 of 2)

TABLE 1
SURPLUS AND MISSING EQUIPMENT

MODEL _____ SERIAL NO. _____ REGISTRATION NO. _____ DATE _____

	WEIGHT	ARM - INCHES		MOMENT - IN/LBS	
EQUIPMENT – ITEM	LBS	LONG	LATR	LONG	LATR
SURPLUS EQUIPMENT TOTAL:	(1.3)	(96.9)	( )	(126)	( )
JACK PADS (2)	1.3	96.9		126	
MISSING EQUIPMENT TOTAL:	(15.9)	(97.4)	( )	(1549)	( )
ONE QT. ENGINE OIL	2.1	133.4		280	
UNUSABLE FUEL	12.0	93.0		1116	
FLIGHT MANUAL	1.8	85.0		153	

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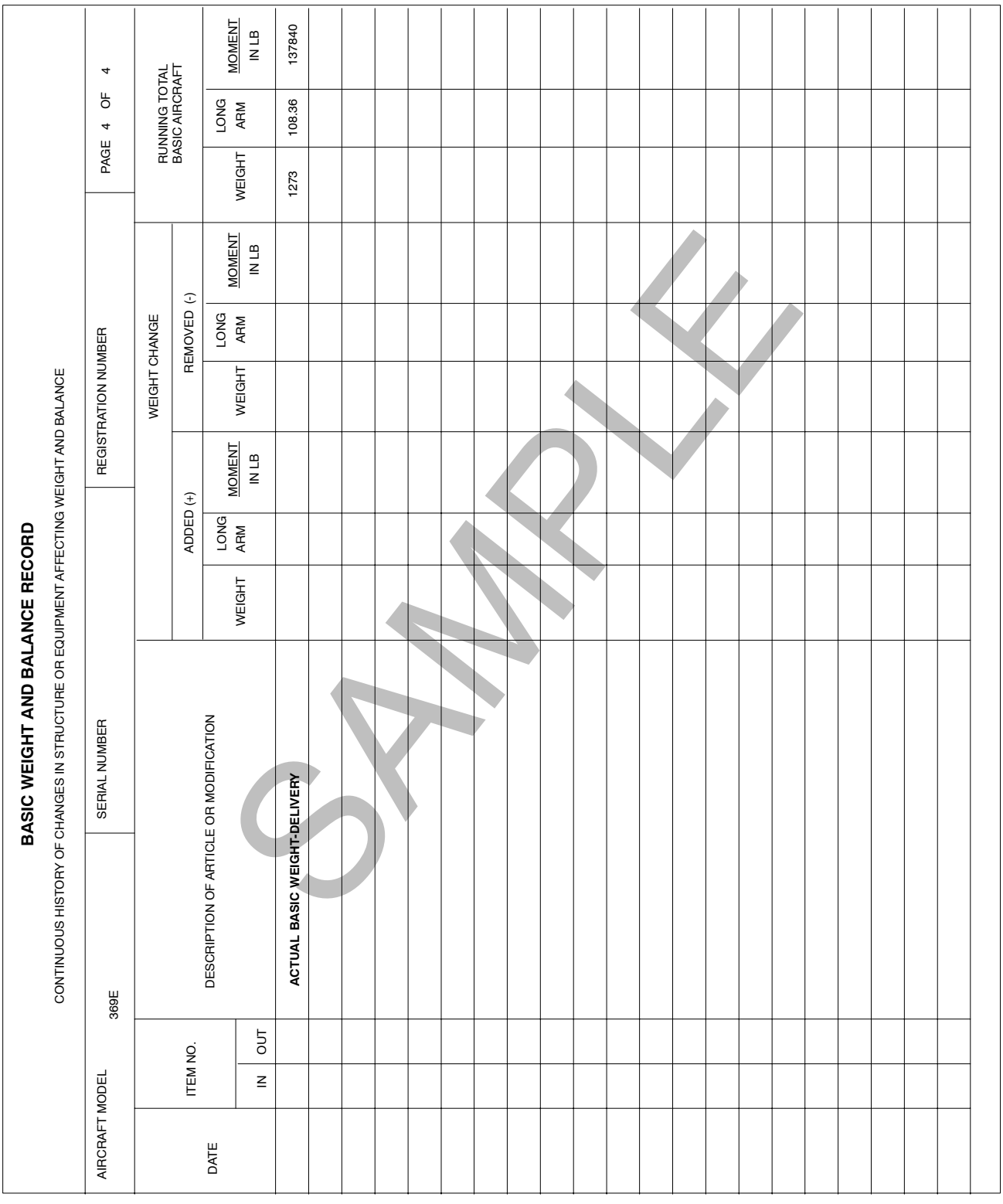
McDonnell Douglas
Helicopter Company

F01-064

Figure 6-5. Sample Surplus and Missing Items



BASIC WEIGHT AND BALANCE RECORD

CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE

AIRCRAFT MODEL 369E | SERIAL NUMBER | REGISTRATION NUMBER | PAGE 4 OF 4

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE ADDED (+) WEIGHT	ADDED (+) LONG ARM	ADDED (+) MOMENT IN LB	WEIGHT CHANGE REMOVED (-) WEIGHT	REMOVED (-) LONG ARM	REMOVED (-) MOMENT IN LB	RUNNING TOTAL BASIC AIRCRAFT WEIGHT	RUNNING TOTAL BASIC AIRCRAFT LONG ARM	RUNNING TOTAL BASIC AIRCRAFT MOMENT IN LB
			ACTUAL BASIC WEIGHT-DELIVERY							1273	108.36	137840

Hughes Helicopters, Inc.

F01-065

Figure 6-6. Sample Basic Weight and Balance Record

EXAMPLE: Find fuel moment for 340 lb fuel:

1. Enter chart at 340 lb on fuel weight scale. From that point, move to right along the 340 lb line until reaching the fuel weight CG curve. Now move down to the longitudinal CG scale to find the fuel station (CG) of approximately 96.80 - in.
2. Multiply 96.80 - in (station) by 340 lb (fuel weight) to arrive at 32,912 in - lb (moment).

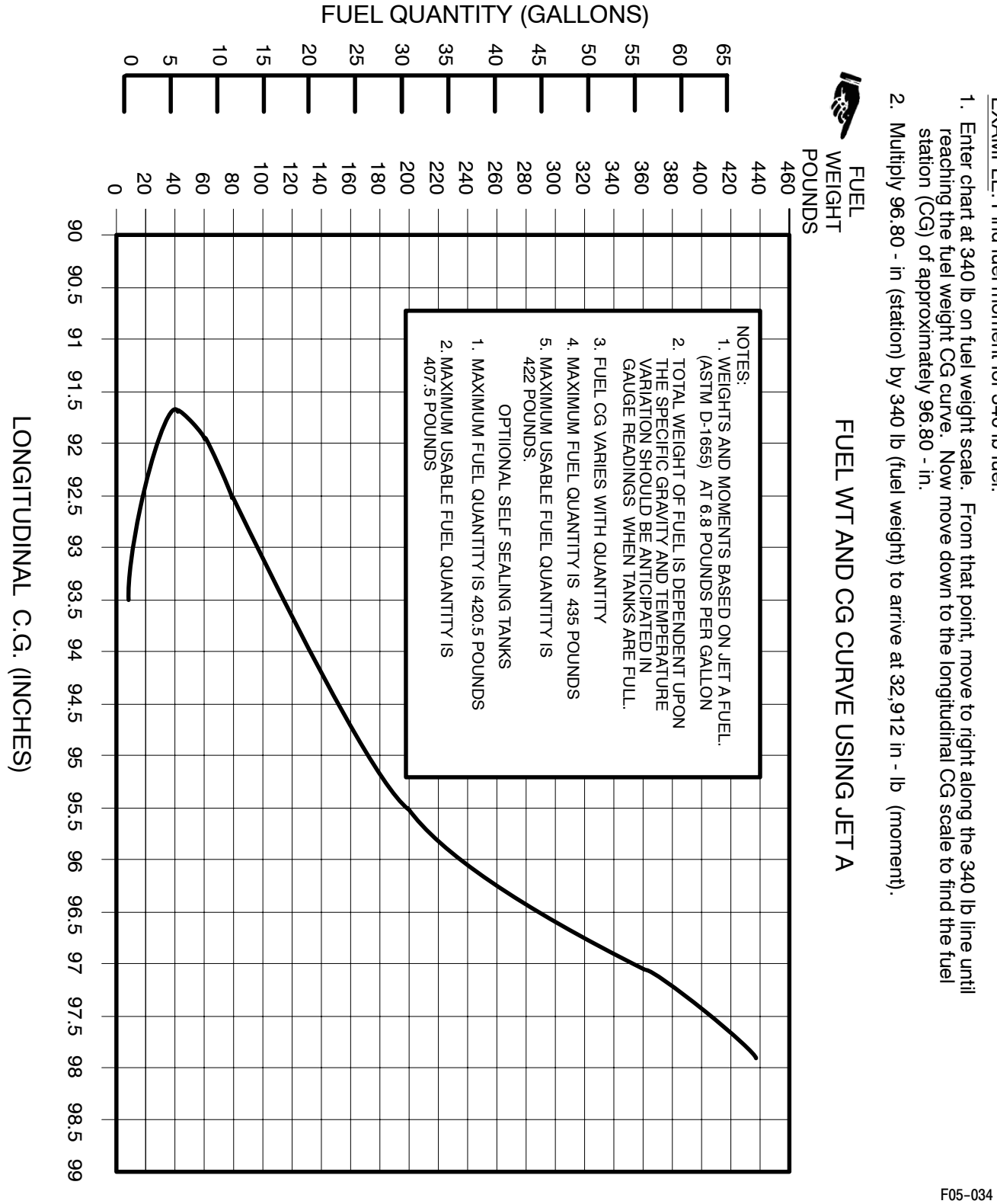


Figure 6-7. Fuel Station (JET A at 6.8 Pounds per Gallon) (Sheet 1 of 2)

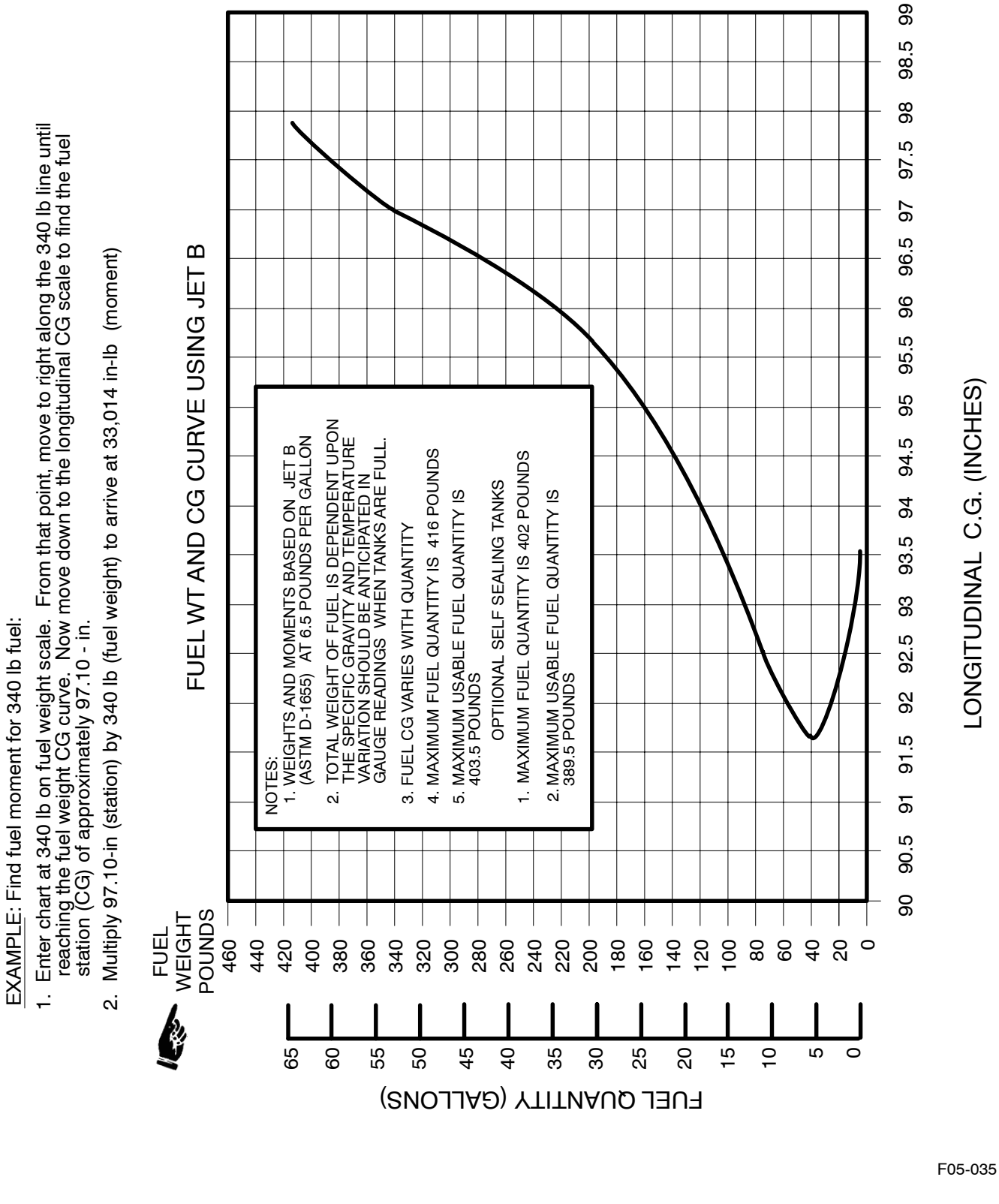


Figure 6-7. Fuel Station (JET B at 6.5 Pounds per Gallon) (Sheet 2 of 2)

6-2. WEIGHT AND BALANCE CRITERIA

Use the delivered weight as recorded in the Weight and Balance Record inserted in this section to perform all weight and balance computations. 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 Air Regulations which shall then become part of the helicopter log book file.

Record the weight and balance effects of these changes in the Weight And Balance Record inserted in this section.

Use the balance and station diagrams shown as an aid for weight and balance changes.

6-4. WEIGHT AND BALANCE DETERMINATION - PASSENGER CONFIGURATION

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.

Add above items (Ref. Example I).

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 (Ref. Example I).

NOTE: If loadings are not symmetrical about the aircraft centerline, determine lateral CG's as described in Paragraph 6-6.

CAUTION **Weight and balance must be computed for minimum front seat weight prior to loading any passengers in rear seats with only pilot in front. Ballast, if required, must be carried.**

NOTE: Ballast may be carried in the utility stowage compartment 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.

Example I :Longitudinal CG Calculation - Passenger

Items	369HE		369HS	
	Weight (lb)	Moment (in.-lb)	Weight (lb)	Moment (in.-lb)
Basic Weight	1,138	125,965	1,280	138,905
Pilot	170	12,500	170	12,500
Passenger - Fwd Outboard	170	12,500	170	12,500
Passenger - Fwd Center	170	12,155	170	12,155
Passenger - Aft R/H	170	17,850	170	17,850
Passenger - Aft L/H	170	17,850	170	17,850
Utility Stowage (Sta. 55)	20	1,100	20	1,100
Baggage (under seat)	40	4,400	40	4,400
1. Zero Fuel Weight	2,048	204,320	2,190	217,260
Add: Fuel	350	34,000	350	34,000
2. Gross Weight	2,398	238,320	2,540	251,260

Calculation of Longitudinal CG:

CG (Zero Fuel Weight)

$$\text{369HE}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{204{,}320}{2{,}048} = 99.8 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{217{,}260}{2{,}190} = 99.2 \text{ in.}$$

CG (Gross Weight)

$$\text{369HE}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{238{,}320}{2{,}398} = 99.4 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{251{,}260}{2{,}540} = 98.9 \text{ in.}$$

NOTE: The CG's fall within the limits specified in Table 6-1.

6-5. LONGITUDINAL LOADING OF CARGO

The large aft compartment of the Model 369HE/HS provides great flexibility in the variety of cargo loads it can accommodate.

In general, the placement of cargo CG within 4 inches of the center of the compartment will ensure that the helicopter will be within the approved CG limits.

To determine the gross weight and center of gravity for a given flight are within limits, proceed as follows.

Establish the weight of the cargo load.

Determine the location of the cargo longitudinal CG by measuring the distance to the cargo from the jacking point located on the side of the fuselage (station 96.9).

Cargo CG = 96.93 $\pm$ measured distance (inches); ie.,
(+) if aft of mark; (-) if forward of mark.

Obtain the cargo moment:

Cargo Moment = Cargo Weight $\times$ Cargo CG

Perform weight and balance as previously described for passenger configuration.

Refer to Example II for sample CG computation.

Example II :Longitudinal CG Calculation - Passenger and Cargo

Items	369HE		369HS	
	Weight (lb)	Moment (in.-lb)	Weight (lb)	Moment (in.-lb)
Basic Weight	1,138	125,965	1,280	138,905
Pilot	170	12,500	170	12,500
Passenger - Fwd Outboard	170	12,500	170	12,500
Cargo	500	50,800	500	50,800
1. Zero Fuel Weight	1,978	201,765	2,120	214,705
Add: Fuel	400	39,100	400	39,100
2. Gross Weight	2,378	240,865	2,520	253,805

Calculation of Longitudinal CG:

CG (Zero Fuel Weight)

$$\text{369HE}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{201{,}765}{1{,}978} = 102.1 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{214{,}705}{2{,}120} = 101.3 \text{ in.}$$

CG (Gross Weight)

$$\text{369HE}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{240{,}865}{2{,}378} = 101.3 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{253{,}805}{2{,}520} = 100.7 \text{ in.}$$

NOTE: The CG's fall within the limits specified in Table 6-1.

6-6. PERMISSIBLE LATERAL LOADINGS

Safe operation of this helicopter requires that it be flown within 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 internal and external loadings are permissible if gross weight, longitudinal, and lateral center of gravity considerations permit.

For pilot and passenger lateral center of gravity, see Figure 6-2.

6-7. LATERAL LOADING OF CARGO

To determine the gross weight and lateral center of gravity for a given flight are within limits, proceed as follows.

Find weight of load.

Determine lateral location (station) of load center of gravity.

Measure load distance from aircraft centerline (lateral station zero), right (+); left (-).

Obtain the lateral load moment as follows.

Lateral moment = lateral weight $\times$ lateral station (Ref. Example III).

Example III :Lateral CG Calculation - Passenger and Cargo

Items	369HE			369HS		
	Weight (lb)	Lateral Arm (in.)	Lateral Moment (in.-lb)	Weight (lb)	Lateral Arm (in.)	Lateral Moment (in.-lb)
Basic Weight	1,138	-0.5	-569	1,280	-0.5	-569
Pilot (L/H)	170	-13.0	-2,210	170	-13.0	-2,210
Passenger - Fwd (R/H)	170	+18.1	+3,077	170	+18.1	+3,077
Cargo	400	+2.0	+800	400	+2.0	+800
1. Zero Fuel Weight	1,878	+0.58	+1,098	2,020	+0.54	+1,098
Add: Fuel	400	0	0	400	0	0
2. Gross Weight	2,278	+0.48	+1,098	2,420	+0.45	+1,098

Calculation of Lateral CG:

CG (Zero Fuel Weight)

$$\text{369HE}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{1{,}098}{1{,}878} = +0.58 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{1{,}098}{2{,}020} = +0.54 \text{ in.}$$

CG (Gross Weight)

$$\text{369HE}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{1{,}098}{2{,}278} = +0.48 \text{ in.}$$

$$\text{369HS}\quad \frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{1{,}098}{2{,}420} = +0.45 \text{ in.}$$

NOTE: The CG's fall within the limits specified in Table 6-1.

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

Passenger Weight (lb)	Moment (in.-lb)		
	Pilot or Fwd R/H Passenger Station 73.5	Center Fwd Passenger Station 71.5	Aft Passenger R/H and L/H Station 105.0
120	8,820	8,580	12,600
140	10,290	10,010	14,700
160	11,760	11,440	16,800
170	12,495	12,155	17,850
180	13,230	12,870	18,900
200	14,700	14,300	21,000
220	16,170	15,730	23,100
240	17,640	17,160	25,200

Baggage Weights and Longitudinal Moments

Baggage Weight (lb)	Moment (in.-lb)			
	Utility Stowage Compartment Station 52.9	Under Seat and Center Station 110	Behind Seat Station 120	Fwd Bulkhead Station 87
10	529	1,100	1,200	900
20	1,058	2,200	2,400	1,700
30	1,587	3,300	3,600	2,600
40	2,116	4,400	4,800	3,500
*50	2,645	5,500	6,000	4,400
60	- -	6,600	7,200	5,200
70	- -	7,700	8,400	6,100
80	- -	8,800	9,600	7,000
90	- -	9,900	10,800	7,800
100	- -	11,000	12,000	8,700

*Maximum Capacity of Utility Stowage Compartment.

Table 6-3. Weights and Lateral Moments - Pilot, Passenger, Baggage

Pilot and Passenger Weight and Lateral Moments				
Passenger Weight (lb)	Moment (in.-lb)			
	Pilot L/H Station -13.0	Passenger R/H Fwd Station +18.1	Passenger Center Fwd Station +2.6	Aft Passenger R/H and L/H Station +12.1
120	-1,560	+2,172	+312	±1,452
140	-1,820	+2.534	+364	±1,694
160	-2,080	+2,896	+416	±1,936
170	-2,210	+3,077	+442	±2,057
180	-2,340	+3,258	+468	±2,178
200	-2,600	+3,620	+520	±2,420
220	-2,860	+3,982	+572	±2,662
240	-3,120	+4,344	+622	±2,904

Baggage Weights and Lateral Moments	
Baggage Weight (lb) Station +12.8	Moment (in.-lb)
10	+128
20	+256
30	+348
40	+512
50	+640

6-8. INTERNAL LOADING OF CARGO

The following instructions should be followed when carrying internal cargo.

Rope, cable, or equivalent must have a minimum loop strength of 1,800 pounds.

Restrain the cargo from shifting by using the correct number of restraining loops in accordance with Table 6-4.

Position restraining loop in accordance with Figure 6-8.

Cargo deck capacity is 1300 pounds (not to exceed 115 pounds per square foot).

View II shows typical tiedown for 500-pound cargo.

Restraint loops are to be secured as indicated and tied to the cargo to prevent slippage of the loops.

Variations of the tiedown are allowable, providing total restraint requirements are met.

Caution should be exercised to keep the cargo from bearing against the center slanted portion of the aft bulkhead.

Table 6-4. Cargo Weight vs Loop Restraint

Number of Required Restraint Loops			
Cargo (lb)	Forward Restraint	Aft Restraint	Vertical/Lateral Restraint
Up to 100	1	1	2
101 to 300	2	1	2
301 to 400	3	2	2
401 to 600	4	2	2
601 to 800	5	3	2
801 to 1000	6	3	3
1001 to 1100	*7	4	3
1101 to 1200	*8	4	3
1201 to 1300	*8	4	3
*Note the 7th and 8th loops are to use the outboard seat belt attach fitting (Station 124)			

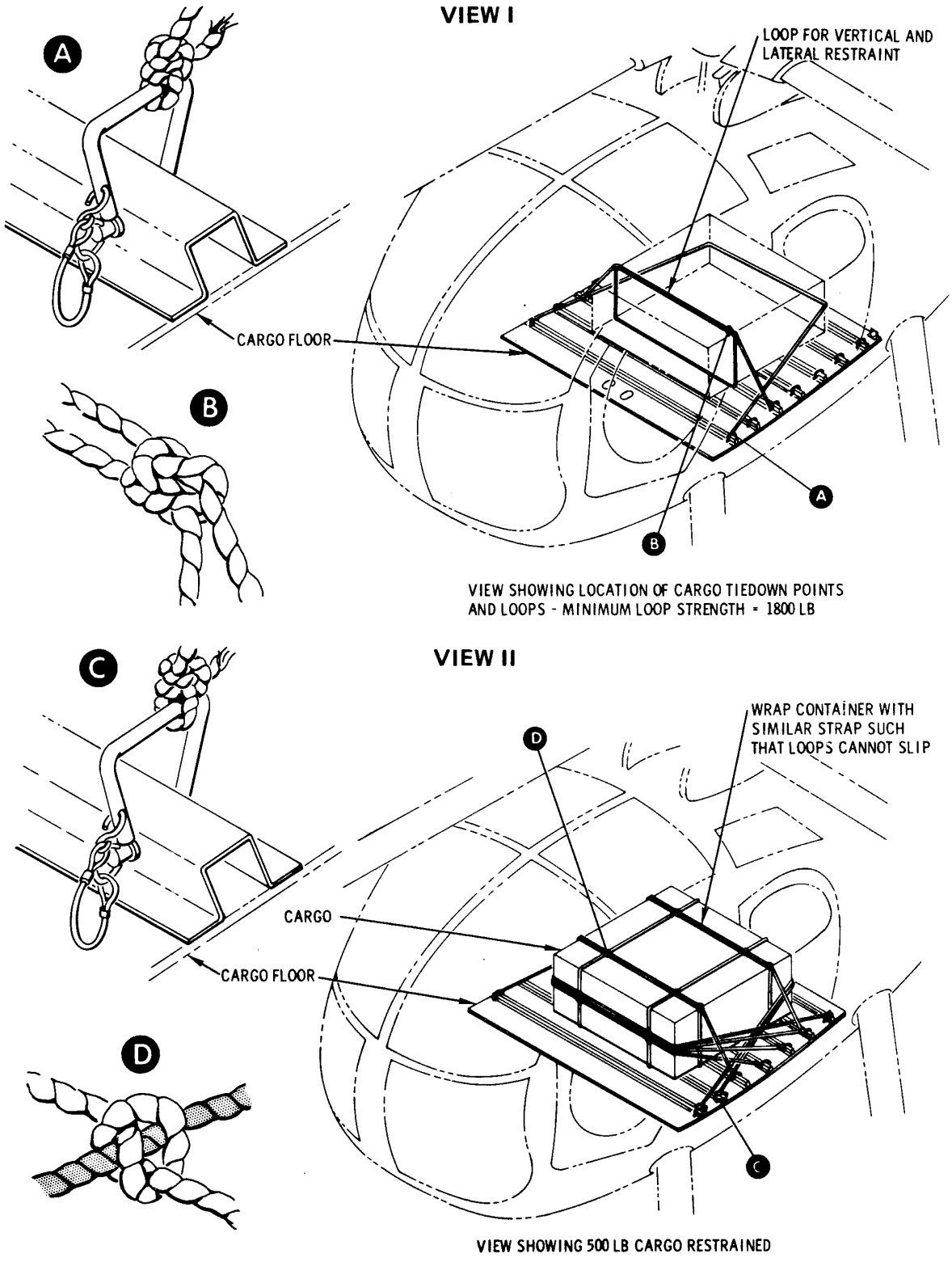


Figure 6-8. Cargo Restraint

SECTION VII
HANDLING, SERVICING AND MAINTENANCE

TABLE OF CONTENTS

SECTION VII
HANDLING, SERVICING AND MAINTENANCE

7-1. HELICOPTER COMPONENTS

The major components of the helicopter are shown in Figure 7-1.

7-2. USE OF EXTERNAL POWER

An external receptacle is located at the right side of the pilot's compartment seat structure. The right door must be open to use the receptacle. Any source of external 28-volt, direct-current power with sufficient amperage rating may be used.

Before connecting external power, be sure that helicopter main electrical power selector switch is OFF.

After power is connected to receptacle, power switch must be set to EXT PWR position to connect external power to helicopter electrical system.

7-3. HOISTING, JACKING, AND LIFTING

CAUTION

Hoisting, lifting, and jacking of the helicopter shall only be performed by qualified maintenance personnel with the proper equipment and tools as specified in the Handbook of Maintenance Instructions. Failure to follow the specified procedures may result in damage to aircraft components.

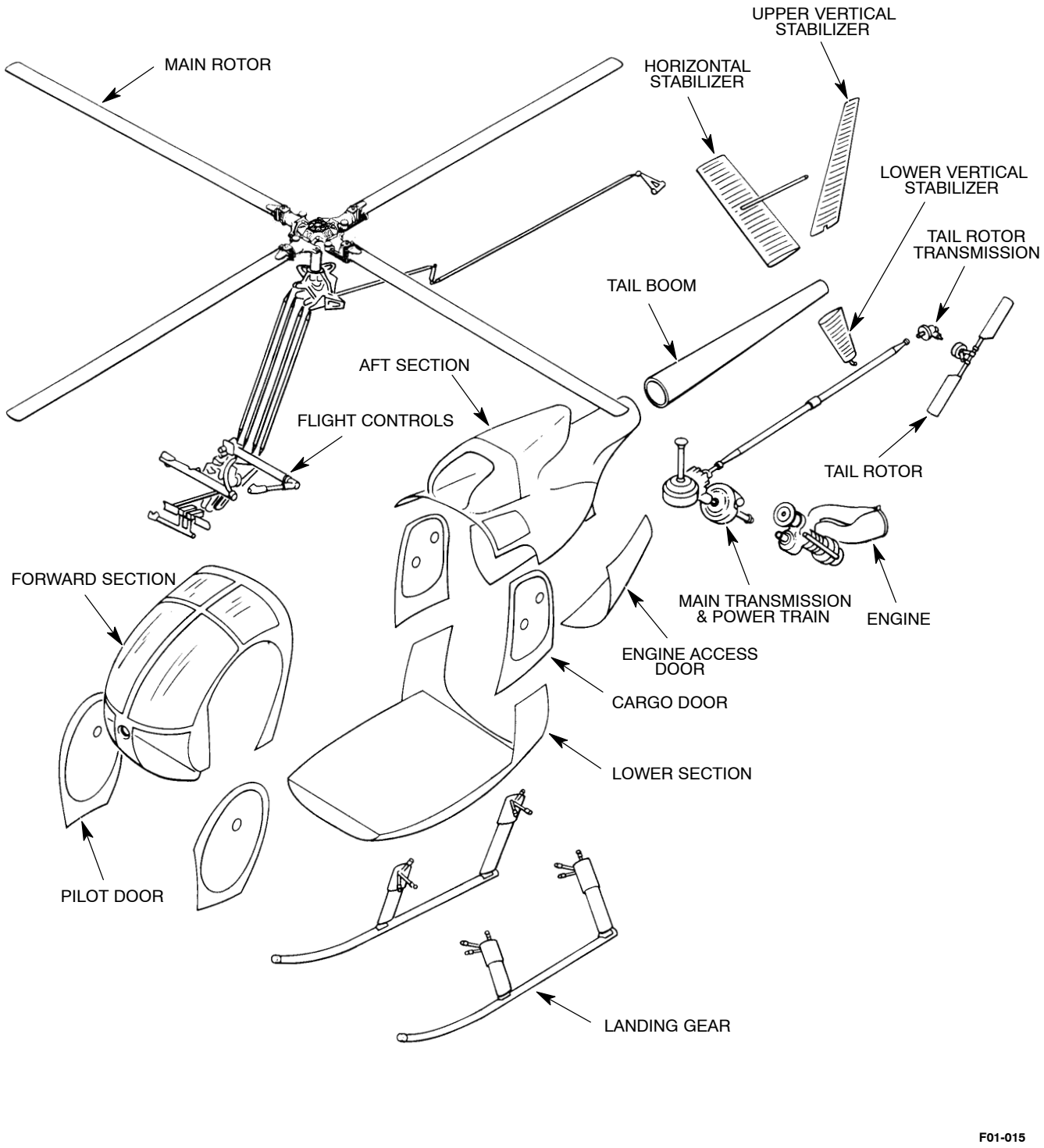


Figure 7-1. Helicopter Major Components

7-4. GROUND HANDLING WHEELS

Standard ground handling wheels are used for moving the helicopter by hand and for towing. The wheels are manually lowered with a detachable jack handle and are held in the down position (helicopter raised on wheels) by a mechanical lock.

The wheels are equipped with tow bar attach fittings. Attach ground handling wheels and hold tail up when lowering the wheels (raising helicopter).

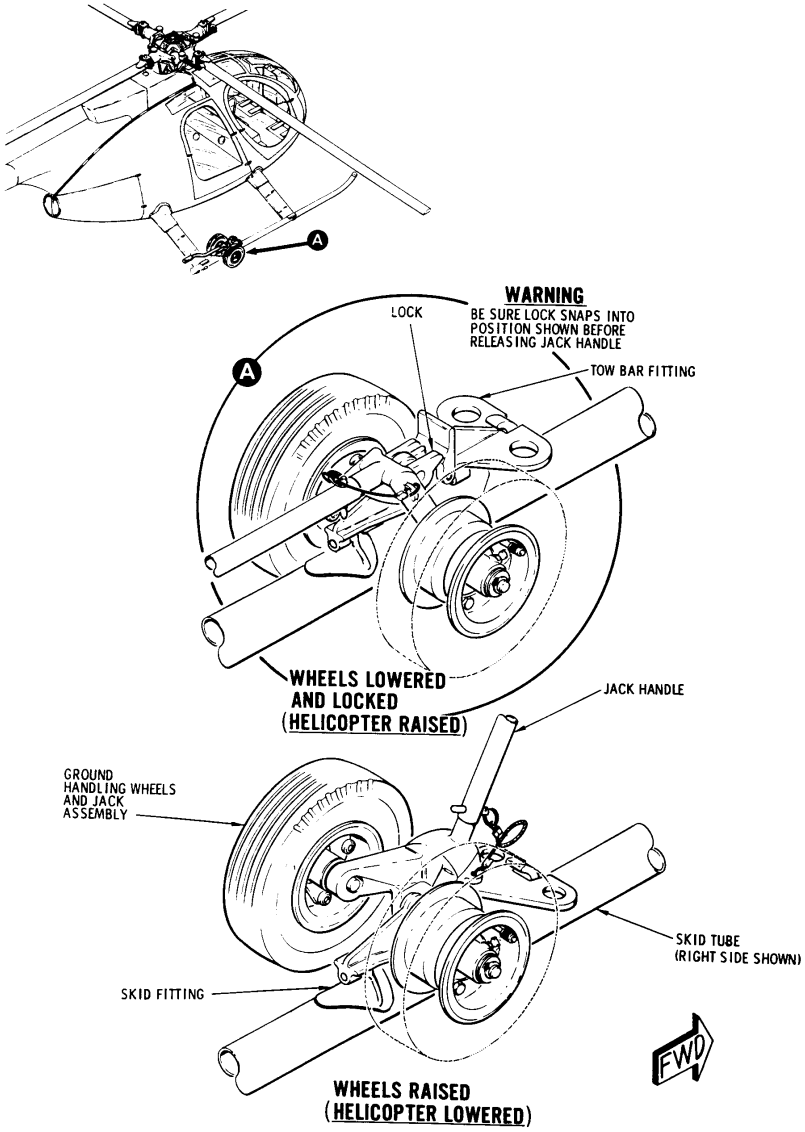


Figure 7-2. Ground Handling Wheels

7-5. MOVING AND TOWING HELICOPTER

Manually move helicopter on ground handling wheels by balancing at tailboom and pushing on rear fuselage portion of airframe.

CAUTION **Except under extreme emergency conditions, do not tow helicopter at speeds over 5 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.**

Tow helicopter on ground handling wheels by attaching suitable tow bar to tow bar fittings. If tow bar is not equipped to keep front ends of skid tubes from dragging, have an assistant balance helicopter at tailboom.

7-6. PARKING AND MOORING

Parking (Ref. Figure 7-3):

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 slightly more than one blade length clearance from nearby objects on the most level ground available.

Apply friction to lock cyclic and collective so that cyclic is neutral and collective is full down.

Secure main rotor blades as follows.

Turn blades until one blade is directly above tailboom.

Install blade socks on all blades.

Secure blade sock tiedown cord for blade located above tailboom to tailboom. Secure other blade sock tiedown cords to fuselage jack fittings.

CAUTION **When securing blade sock tiedown cords, take up slack, but do not apply excessive bending loads on blades.**

Mooring (Ref. Figure 7-3):

Whenever severe storm conditions or wind velocities higher than 40 knots are forecast, helicopter should be hangared or evacuated to safer area. If these precautions are not possible, moor helicopter as follows.

Park helicopter and remove main rotor blades and install air inlet fairing and engine exhaust covers.

Install pitot tube cover.

Fill fuel tank (if possible).

Apply friction to lock cyclic and collective sticks.

Secure helicopter to ground by attaching restraining lines (cable or rope) between jack fittings and stakes or ground anchors.

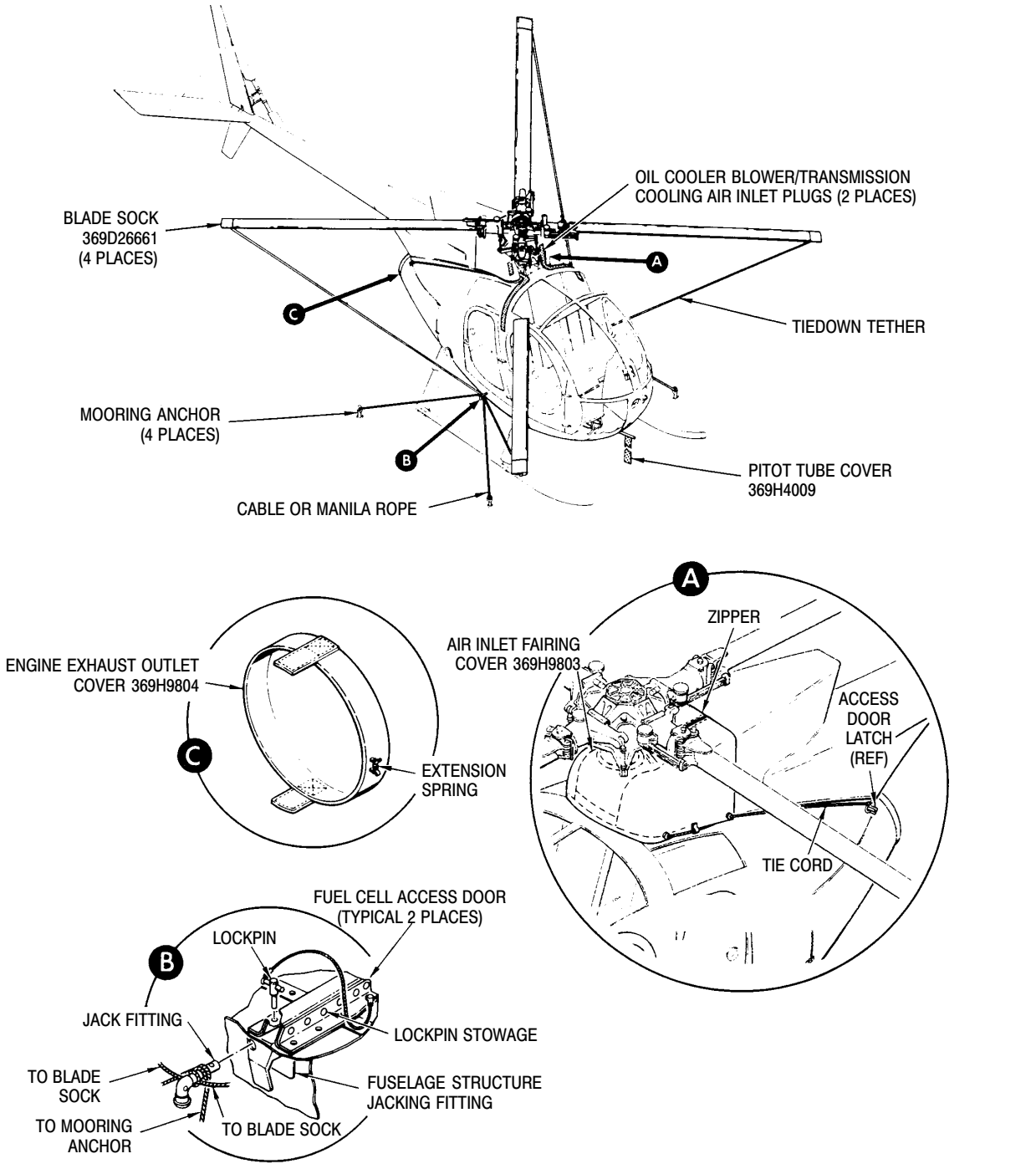


Figure 7-3. Parking and Mooring

7-7. SERVICING - GENERAL

Servicing helicopter includes replenishment of fuel, changing or replenishment of oil and other such maintenance functions.

Fuels, oils, other servicing materials and capacities are listed in Table 7-1.

Locations of servicing points are shown in Figure 7-4.

Table 7-1. Servicing Materials (Operating Supplies)

1. Tail Rotor Transmission - Capacity 0.5 US Pt (0.23 Liter)
Use the materials listed under Item 3 or Mobil SHC 626.

2. Main Transmission - Capacity: 4.0 US Quarts (3.78 liters)
Use the materials listed under Item 3 or Mobil SHC 626.

3. Engine - Capacity: 3.0 US Qt. (2.84 liters)

Ambient Temperature	Oil Type
0°C (32°F) and above	MIL-PRF-23699C or subsequent preferred
0°C (32°F) to -40°C (-40°F)	MIL-PRF-23699C or subsequent preferred or MIL-PRF-7808G or subsequent
-40 °C (-40°F) and below	MIL-PRF-7808G or subsequent only

Specification	Material	Manufacturer
MIL-PRF-7808 Series (see Footnote 2 and 3)		
	BP Turbo Oil 2389 EXXON Turbo Oil 2389	Air BP BP Products North America, Inc Maple Plaza II - 1N 6 Campus Drive Parsippany, NJ 07054
	Mobil Avrex S Turbo 256	ExxonMobil Lubricants 3225 Gallows Road Fairfax, VA 22037
	Mobil RM-284A	ExxonMobil Lubricants
MIL-PRF-23699 Series		
	Mobil Jet Oil II	ExxonMobil Lubricants

Specification	Material	Manufacturer
	Turbonycoil 600 (TN 600)	NYCO S.A. 66, Champs-Elysees-51 Rue De Ponthieu F-75008 Paris, France
	Aeroshell/Royco Turbine Oil 500	Royal Lubricants Company, Inc. River Road, P.O. Box 518 East Hanover, NJ 07936
	Hatcol 3211	Hatco Corporation King George Post Road Fords, New Jersey 08863
	BP Turbo Oil 2380 EXXON Turbo Oil 2380	Air BP
	Castrol Aero Jet5	Castrol Industrial North America Specialty Products Division 5511 District Blvd Los Angeles, CA 90040
		Hatco Corporation
MIL-PRF-23699F Series		
	Mobil Jet 254 and Mobil Jet 291	ExxonMobil Lubricants
	Aeroshell/Royco Turbine Oil 560	Royal Lubricants Company, Inc.
	Aeroshell Turbine Oil 560	Shell Aviation Ltd. Shell Centre London, SEI 7NA, England
	BPTO 2197 Exxon ETO 2197	Air BP

Specification	Material	Manufacturer
4. Fuel Cells - Standard Nonself-sealing, Capacity: 64.0 US Gal (242 liters), 416 pounds Optional Self-sealing, Capacity: 62.0 US Gal (234 liters), 402 pounds. Refer to Rolls-Royce 250 Series Operations Manual for complete fuel specifications.		
MIL-DTL-5624 JP-4	MIL-DTL-5624 JP-5	ASTM D-1655 Jet A
ASTM D-1655 Jet A-1 Peoples Republic of China RP-3	ASTM D-1655 Jet B	JP-1 conforming to ASTM D-1655, Jet A or Jet A-1
Arctic Diesel Fuel DF-A (W-F-800B) conforming to ASTM D-1655, Jet A or Jet A-1	Diesel No. 1 conforming to ASTM D-1655, Jet A or Jet A-1	MIL-DTL-83133, grade JP-8
CAUTION: At 4.4°C (40°F) and below, fuel must contain anti icing additive that meets MIL-I-27686 requirements. For blending information and authorized fuels, refer to the appropriate Rolls-Royce Operation and Maintenance Manual.		
5. Overrunning Clutch - Capacity: -1 1, -21, -31 1.52 U.S. Oz. (45cc) -41, -51 1.01 U.S. Oz. (30cc) Use the materials listed under item 4 but not Mobil SHC 626.		
6. One-Way Lock - Capacity: 0.67 US Oz (20cc)		
Specification	**Material**	**Manufacturer**
MIL-PRF-5606		
	Brayco Micronic 756 and 756PH	Castrol Industrial North America Inc. 1001 West 31st Street Downers Grove Illinois 60515
	Aero Shell Fluid 41	Shell Oil Co.
	Royco 756	Royal Lubricants Company, Inc
	Mobil Aero HF	ExxonMobil Lubricants
	Invarol FJ 13	ESSO Saf 2, rue des Martinets 92569 Rueil-Malmaison Cedex, France

Specification	Material	Manufacturer
One-Way Lock Continued		
Specification	**Material**	**Manufacturer**
MIL-PRF-6083		
	Brayco Micronic 783	Castrol Industrial North America Inc.
	Royco 783	Royal Lubricants Company, Inc.
	Hydraunycoil FH-6	NYCO, S.A.
7. Battery (NiCad) - Capacity: As required		
MS36300	Distilled Water	Any acceptable source

Footnotes:

(1) Oils approved for use in main transmission and tail rotor transmission are synthetic lubrication oils that have a certified Ryder Gear Value in excess of 2500 pounds per inch.

(2) Not a preferred lubricant for transmissions. Use MIL-PRF-7808 lubricating oil in transmission only when other oils are not available.

(3) For Model 250 Series engine oil change requirements and restrictions on mixing of oils, refer to Rolls-Royce Operation and Maintenance Manual.
DO NOT use Mobil SHC 626 oil in 250 Series engines.

WARNING: Only discretionary mixing of oils within an oil series is permitted without a time penalty. Use of mixed oils from different series in an engine is limited to five hours total running time during one overhaul period. Adequate maintenance records must be maintained to ensure that the five hour limit is not exceeded. Failure to comply with oil mixing restrictions can result in engine failure.

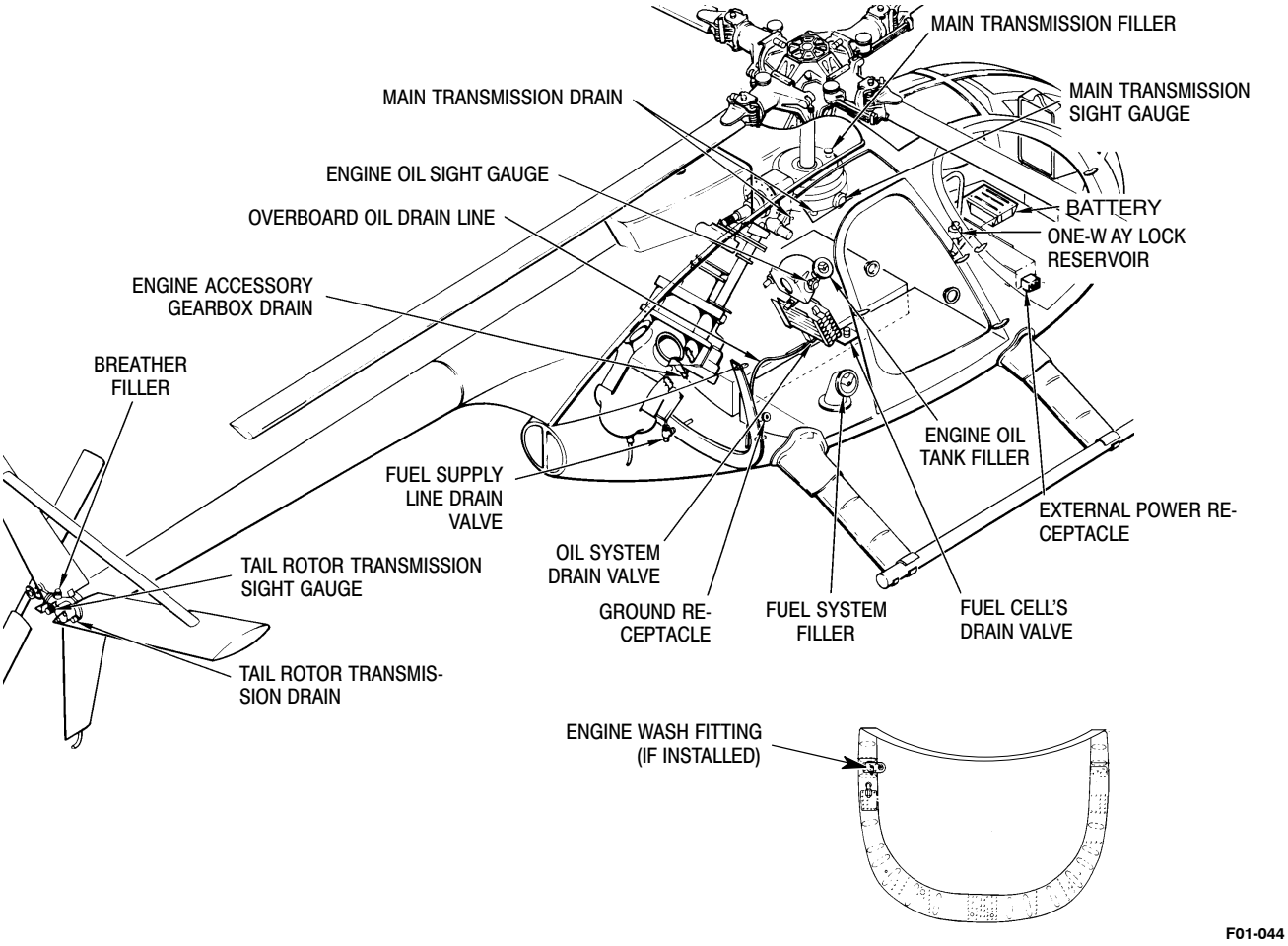


Figure 7-4. Servicing Points

7-8. FUEL SYSTEM - SERVICING

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

Before starting fueling operation, always ground fueling nozzle or fuel truck to GROUND HERE receptacle or to another bare metal location.

Comply with the following precautions when servicing the fuel system.

WARNING **Turn off electrical switches and disconnect any external power from helicopter. Electrically ground helicopter prior to refueling or defueling. Static discharge spark in presence of fuel vapors can cause fire or an explosion.**

Cold weather fuels:

Grade JP-4 (MIL-T-5624), grade JP-5, and grade JP-8 (MIL-T-3133A, or later) type fuels contain anti-ice additive which conforms to MIL-1-27686 (or later). These fuels do not require additional anti-ice additive.

Cold weather fuel mixtures

When operating at or below 4°C (40°F), a mixture of AVGAS and jet fuels (other than JP-4 or Jet B) may be used in a ratio of one part by volume AVGAS to two parts by volume commercial jet fuel.

Refer to Allison Operation and Maintenance Manual for additional cold weather fuel mix and blending instructions.

Filling:

The fuel system has two fuel cells that are interconnected for simultaneous flow and venting. Fuel system filler is on right side of helicopter.

Refuel the helicopter with the proper fuel as soon after landing as possible to prevent moisture condensation and to keep helicopter as heavy as possible in case of winds.

Keep fuel nozzle free of all foreign matter.

Check filler cap for security after refueling.

Fuel draining:

Fuel draining should be accomplished with helicopter as level as possible.

Fuel system may be defueled in two ways: One is to defuel through filler port, using a pump. The other method is to open the drain valve on fuselage underside.

Fuel cell drain valve is spring-loaded closed and is opened by depressing internal plunger.

After defueling, be sure to check drain valves for leakage.

CAUTION **To avoid possible damage to start pump, do not operate start pump with fuel tanks drained.**

7-9. ENGINE OIL SYSTEM - SERVICING

The engine oil tank filler is on the right side of the helicopter. A liquid level sight gauge for checking oil level in tank is visible through a transparent window near the filler (Ref. Figure 7-4).

NOTE: Oil level should be checked within 15 minutes after shutdown.

Replenish with correct oil until oil level is FULL on sight gauge.

CAUTION **DO NOT use Mobil SHC 626 oil in the engine oil system.**

NOTE: To avoid possible foaming of oil and/or engine oil pressure fluctuation, shake oil can thoroughly to mix anti-foam agent before filling engine oil system.

Make certain that oil tank filler cap is securely tightened immediately after servicing.

7-10. MAIN ROTOR TRANSMISSION - SERVICING

Check transmission oil level at liquid level sight gauge (Ref. Figure 7-4)

NOTE: Indicated oil level may be incorrect if aircraft is not level or has been ground handled in a tail-low attitude since last flight.

Replenish with correct oil until oil level is at the dashed lines above the ADD mark on sight gauge.

NOTE: If oil was drained from transmission cooler, ground run helicopter for 15 minutes after replenishing with oil and recheck oil level at sight gauge. Replenish oil as necessary. This purges air from the oil cooling system and ensures that entire oil cooling system is full.

Fill main transmission by lifting breather-filler cap and inserting funnel into opening. Check that spring-loaded cap closes when funnel is removed.

7-11. TAIL ROTOR TRANSMISSION - SERVICING

Transmission oil should be replaced with new oil whenever it is drained. A liquid level sight gauge for checking oil level is located on the transmission housing.

Check oil level.

Servicing of the tail rotor transmission should be performed by maintenance personnel.

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. Examples of cleaning agents that are not to be used are "Fantastic" and "409" type cleaners, or locally made strong soap cleaners.**

7-12. CLEANING - GENERAL

General cleaning of oil and dirt deposits from the helicopter by using dry-cleaning solvent, standard commercial grade kerosene or a solution of detergent soap and water.

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

7-13. CLEANING FUSELAGE INTERIOR TRIM AND UPHOLSTERY

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

Sponge soiled upholstery and trim panels with a mild soap and luke-warm water solution. Avoid complete soaking of upholstery and trim panels. Wipe solution residue from upholstery with soft 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 applicable fabric (nylon, vinyl, leather, etc).

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

7-14. CLEANING AIRCRAFT EXTERIOR AND ROTOR BLADES

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

Wash helicopter exterior, including fiberglass and rotor blades, when necessary, using a solution of clean water and mild soap.

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

Clean surface stained with fuel or oil by wiping with soft cloth dampened by solvent, followed by washing with clean water and mild soap.

Rinse washed areas with water and dry with soft cloth.

7-15. CLEANING TRANSPARENT PLASTIC

Clean outside surfaces of plastic by rinsing with clean water.

Use mild soap and water solution or aircraft type plastic cleaner to remove oil spots and similar residue.

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.**

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 or soft cloth.

7-16. 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 aft transmission are permissible if leakage rate does not exceed 2cc per hour (one drop per minute).

An acceptable alternate rate of leakage from either transmission is if oil loss is not more than from full to the add mark on sight gauge within 25 flight hours. (Repair leaks according to instructions in the HMI).

NOTE: On transmission input gear oil seals with less that 2 hours of operation, some seepage or wetting of adjacent surfaces is normal until seal is wetted and worn-in (seated). If seepage continues at rate of one drop per minute or less, seal may be continued in service. Check transmission oil level and observe seepage rate after every 2 hours of operation. Shorter inspection periods may be required is seal leakage appears to be increasing.

Engine Oil leaks

Refer to Allison Engine Operation and Maintenance Manual for definition of permissible engine oil leakage.

Landing Gear Damper - Hydraulic Fluid Leak

Hydraulic fluid leakage from any landing gear dampers is not permissible. If leakage is present, damper assembly should be overhauled as required and a serviceable unit installed. If leaking landing damper is not replaced when leakage is noticed, continuation of damper in service can cause internal damage that might not otherwise occur.

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 damper assembly. Neither of these should be considered damper leakage or cause from damper replacement.

7-17. MAIN ROTOR BLADE LEADING EDGE ABRASION TAPE

Materials:
Y-8560 Polyurethane Tape, 3.0 inches wide x 0.014 inch thick (3M Co., St. Paul, Minnesota)
Solvent (methyl-ethyl-ketone, toluene or trichloroethane)
Cement

Replacing of main rotor blade abrasion tape should be performed by maintenance personnel.

NOTE: Tape for all four blades should be equal in length and carefully applied to maintain a balanced rotor.

7-18. PRESERVATION AND STORAGE

A helicopter placed in storage or nonoperative 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 storage up to 45 days, storage up to 6 months, and indefinite storage is covered in the HMI.

7-19. FLYABLE STORAGE - NO TIME LIMIT

Inspection before storage:

Perform Daily Inspection.

Ensure that fuel cells are full (topped off), and that oil in engine oil tank and main and aft transmissions is at FULL level.

Storage:

To maintain a flyable storage condition, perform daily inspection; ground runup must be performed at least once every 5 days.

Perform daily pre-flight check.

Start engine (Section IV). After idle stabilizes, accelerate engine to flight idle. Operate until oil temperature shows an increase and ammeter reads zero.

Replenish fuel as necessary.

Open movable air vents in each cargo door; positioning air vent openings downward.

Install covers and equipment used to park and moor helicopter.

Install static ground.

Before next flight:

Remove covers and equipment used to park and moor helicopter.

Perform daily preflight check (Ref. Section IV).

7-20. ENGINE COMPRESSOR WASH

Water wash provisions are incorporated in current configuration helicopters (Ref. Figure 7-4).

Engine compressor cleaning should be performed by qualified personnel in accordance with the HMI and the Engine Operation and Maintenance Manual.

The following information is provided for pilots assisting qualified personnel in the cleaning process.

The starter-generator can be used to motor the Allison 250 Series engine for compressor cleaning cycle.

Input voltage should be 24 vdc, but it is permissible to use 12 vdc.

To prevent starter-generator damage, duty cycle (cranking) time limits that must not be exceeded are:

24 vdc External Auxiliary Power	24 vdc Helicopter Battery Power
25 Seconds ON	30 Seconds ON
30 Seconds OFF	2 Minutes OFF
25 Seconds ON	30 Seconds ON
30 Seconds OFF	2 Minutes OFF
25 Seconds ON	30 Seconds ON
30 Minutes OFF	30 Minutes OFF

12 vdc External Auxiliary Power

2 Minutes ON

30 Minutes OFF

2 Minutes ON

NOTE: Current required by starter-generator to maintain10 percent N_1 rpm should be approximately 150 amperes with 12 vdc input.

Procedures:

- Ensure engine anti-ice, cabin heat, and scav air (if installed) are off prior to engine wash or rinse.
- Water injection will be started three seconds prior to starter engagement.
- Motor the engine with the twistgrip in CUTOFF.
- Release starter switch as necessary to maintain between 5% and 10% N_1 speed during the wash/rinse.
- Water injection will continue during coast down until N_1 stops.
- Allow engine to drain.
- Within 15 minutes of the water rinse, operate the engine at idle for five minutes and actuate anti-ice, cabin heat, and scav-air (if installed) systems for one minute to purge and evaporate all residual water .

SECTION VIII
ADDITIONAL OPERATIONS AND PERFORMANCE DATA

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SECTION VIII
ADDITIONAL OPERATIONS AND PERFORMANCE DATA

8-1. GENERAL

OGE hover performance charts:

OGE hover performance charts (Ref. Figure 8-1 thru Figure 8-5) are provided for the standard Model HE/HS as well as those equipped with optional equipment.

To use the chart, follow the instructions for IGE hover charts as described in Section V.

OGE hover performance table:

An OGE hover perfromance table is provided for 369HE/HS helicopters equipped with Allison 250-C20 engines (Ref. Table 9-1). This table may be used for planning flights with external loads. When using this table for OGE hover data with internal loads, the maximum certified gross weight is limited to 2550 LBS. Weights above 2550 LBS must be external and jetisonable.

CAUTION **Be sure to select the appropriate hover ceiling chart for type of equipment installed installed on the helicopter. Figure numbers marked with an asterisk (*) indicate data pertinent to an installed optional equipment item.**

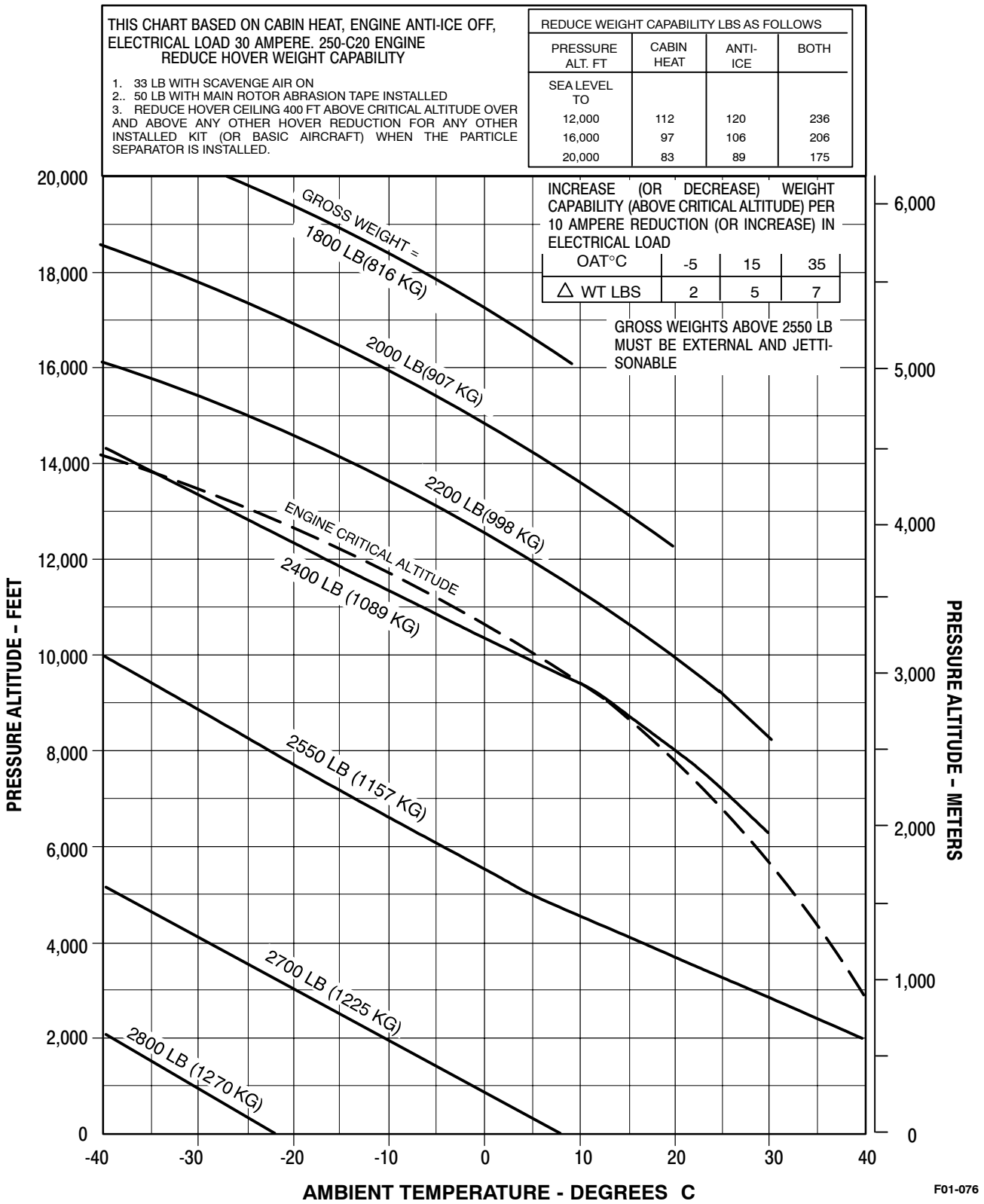


***Figure 8-1. Hover Ceiling Vs Temperature, OGE, Tail Rotor Abrasion Strips Installed, Takeoff Power**

<<<< Allison 250-C20 >>>>

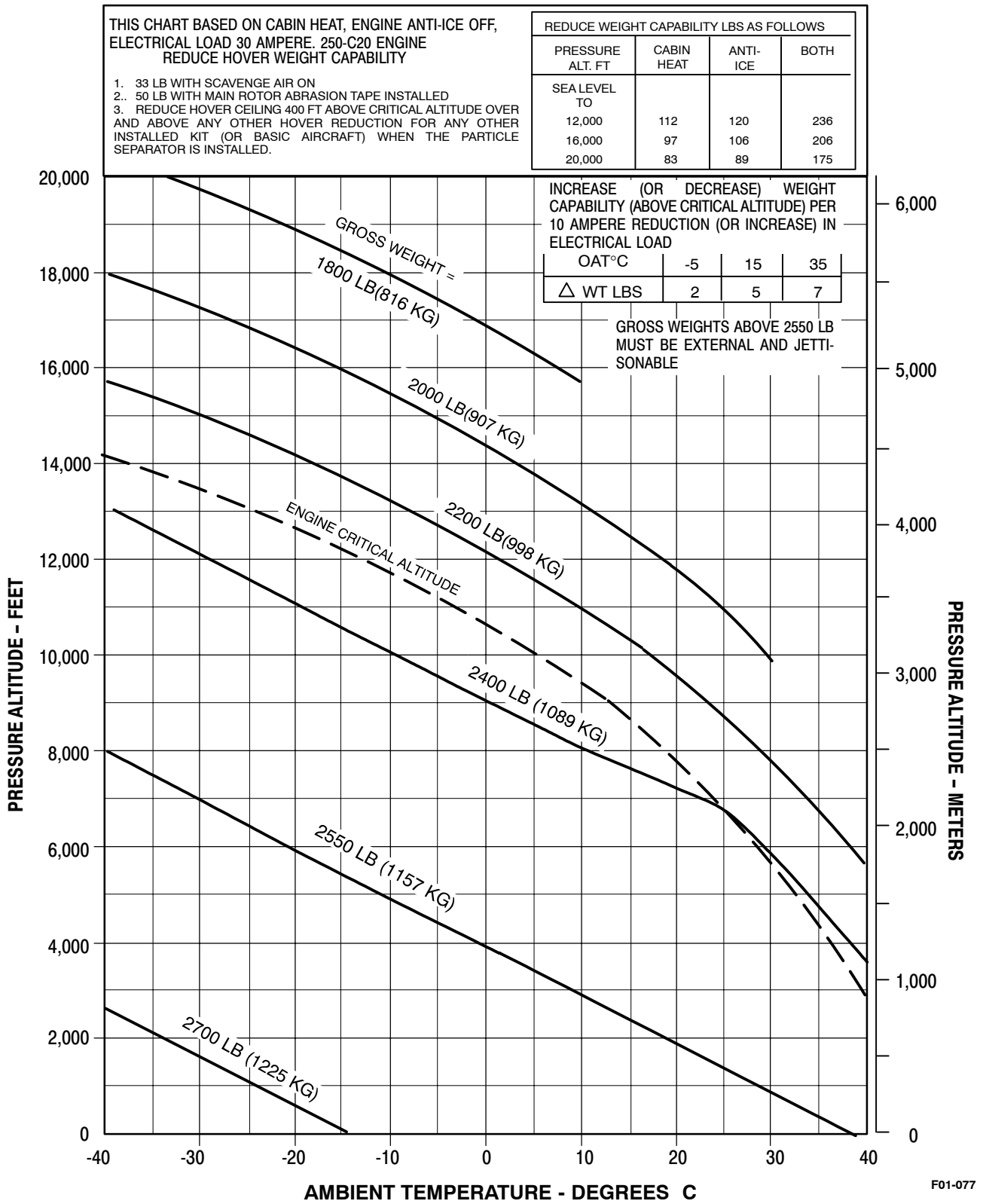


***Figure 8-2. Hover Ceiling Vs Temperature, OGE, Utility Floats Tail Rotor Abrasion Strips Installed, Takeoff Power**

<<<< Allison 250-C20 >>>>

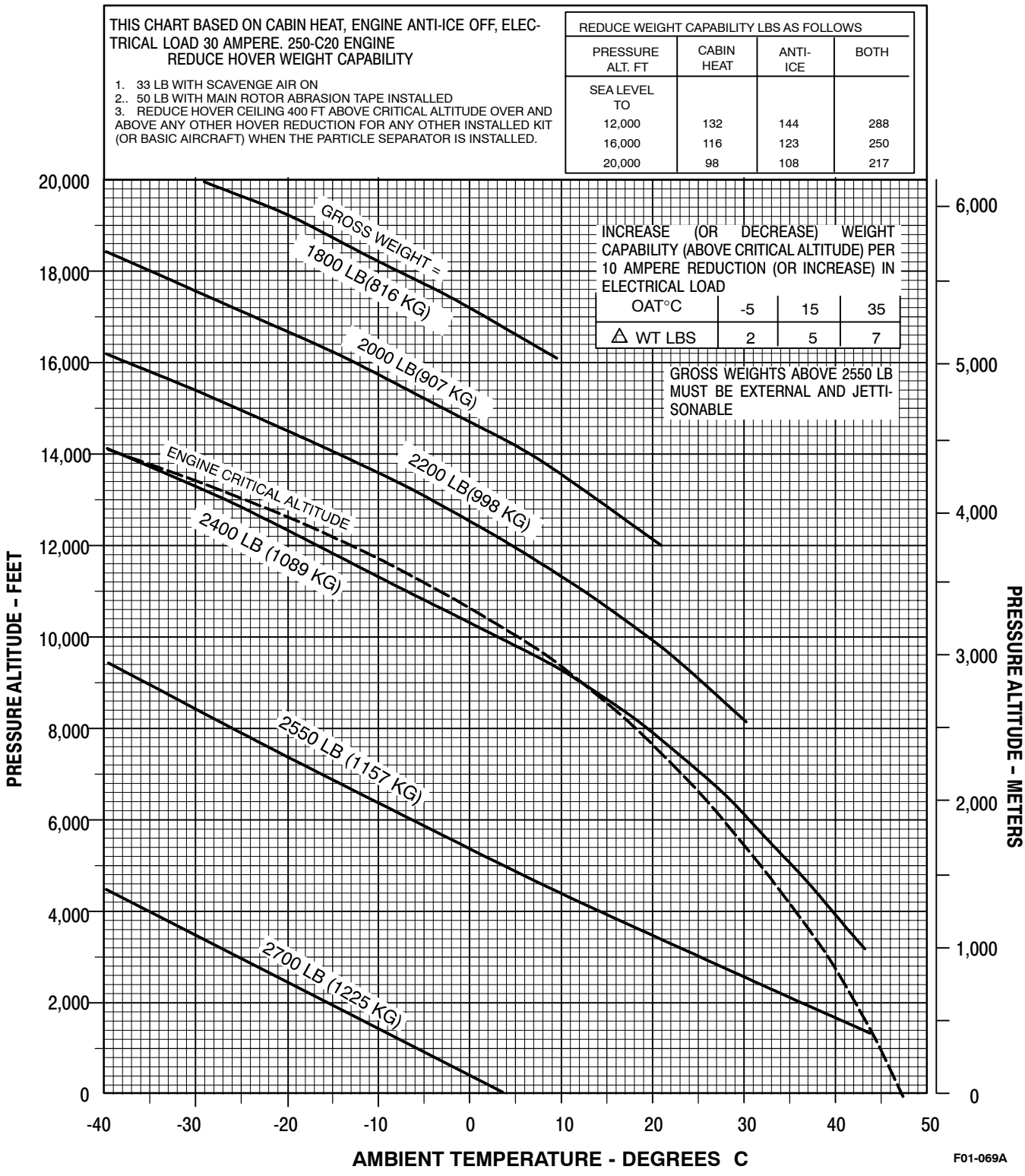
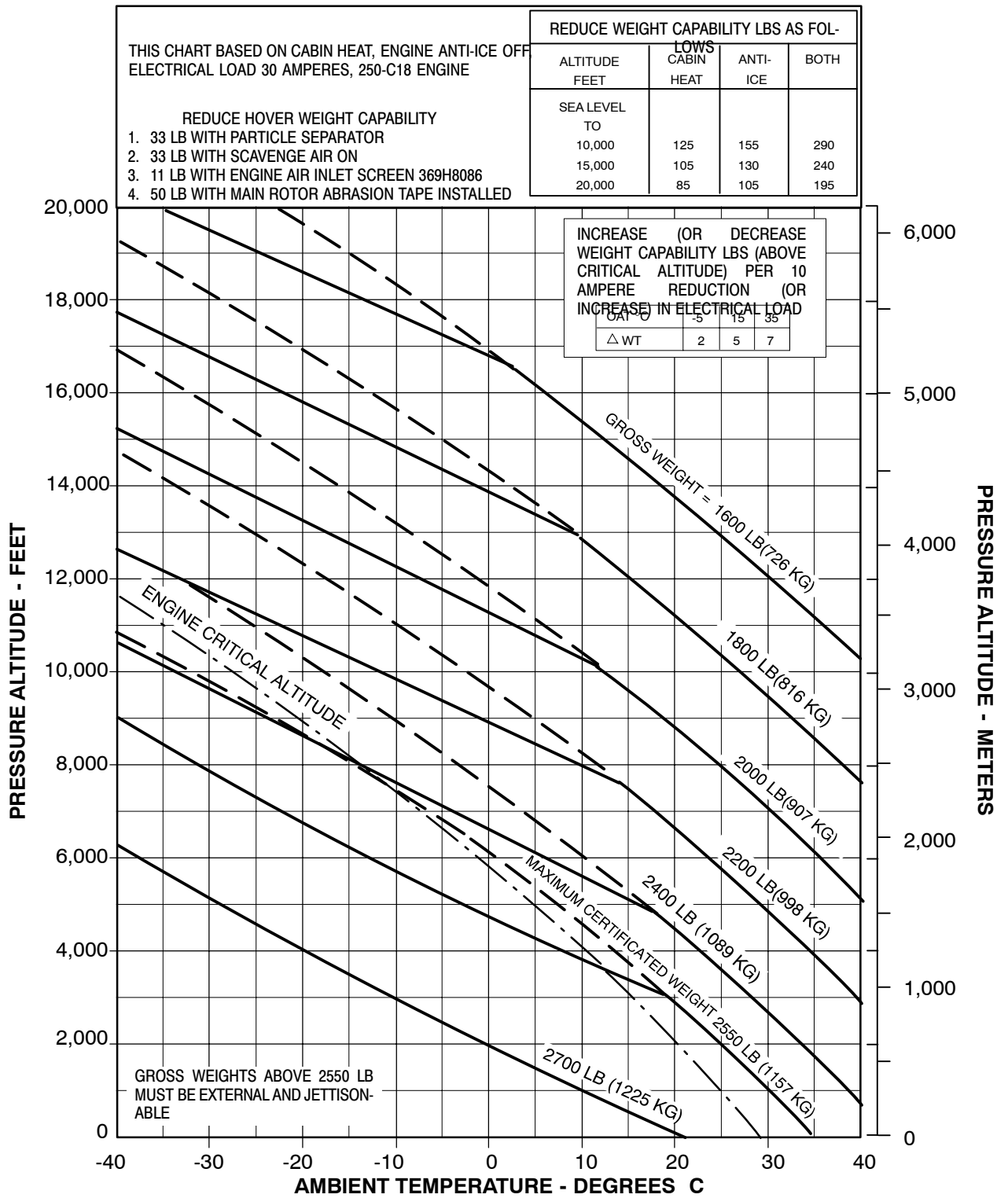


***Figure 8-3. Hover Ceiling Vs Temperature, OGE, Utility Floats, Takeoff Power**

<<<< Allison 250-C20>>>>

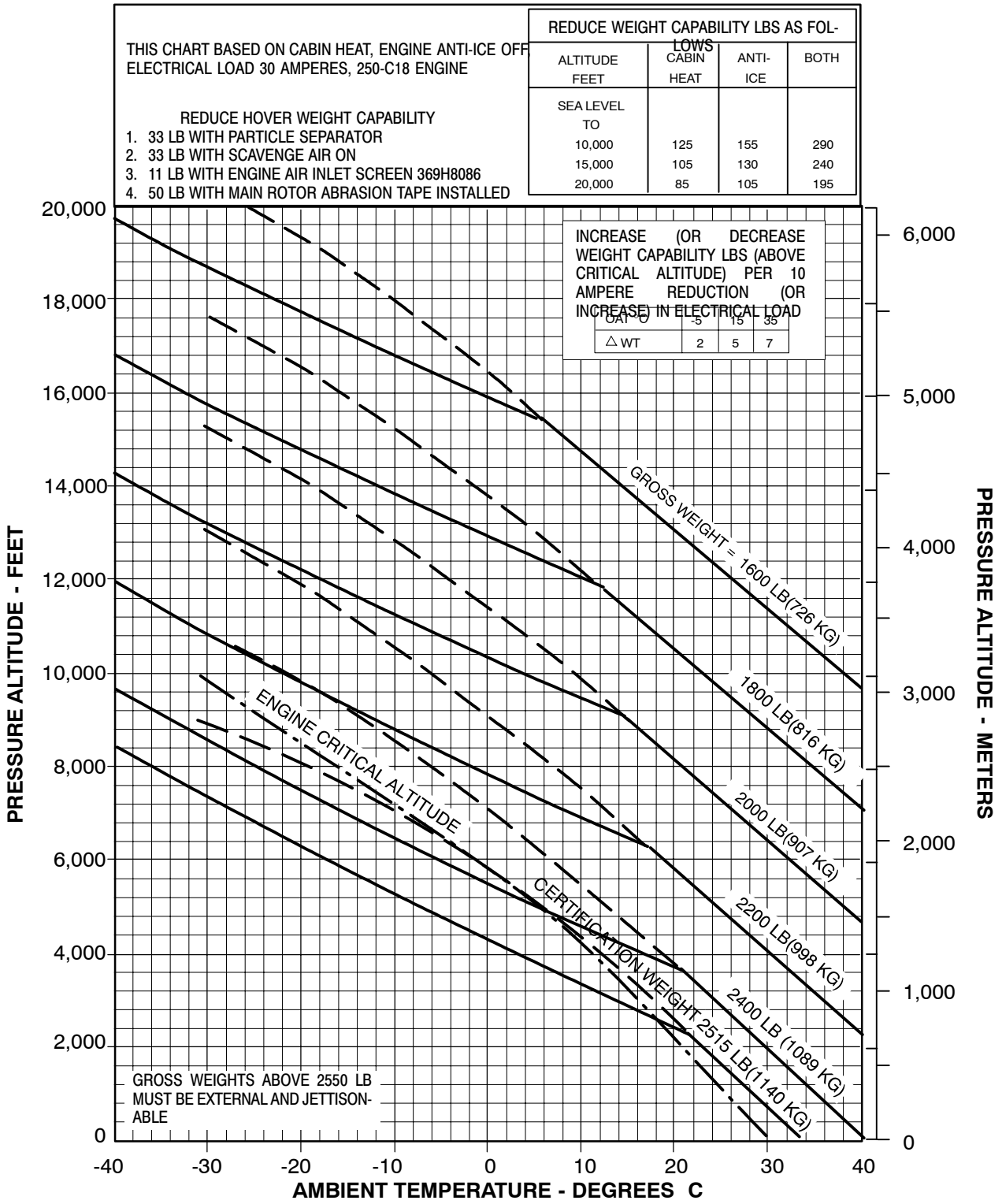


NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASH LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS.

F01-067

Figure 8-4. Hover Ceiling Vs Temperature, OGE, Takeoff Power

<<<< Allison 250-C18 >>>>



NOTE: SOLID LINES REPRESENT HOVER CAPABILITY WITHIN THE LIMITATIONS OF 20 KNOT SIDE WIND. DASH LINES ARE REPRESENTED FOR INFORMATION ONLY AND REPRESENT PERFORMANCE CAPABILITY IN ZERO WIND CONDITIONS.

F01-068

***Figure 8-5. Hover Ceiling Vs Temperature, OGE, Utility Floats, Takeoff Power**

<<<< Allison 250-C18 >>>>

Table 9-1. Maximum Hover Weight, OGE
<<< Allison 250-C20 >>>

TEMPERATURE - °C / °F		-40 / -40	-30 / -22	-20 / -4	-10 / 14	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104
H_P – FEET	H_P – METERS									
0	0	2920	2900	2860	2815	2780	2745	2710	2680	2640
1000	305	2890	2855	2815	2780	2745	2710	2680	2650	2615
2000	610	2855	2820	2785	2750	2715	2680	2645	2620	2585
3000	914	2820	2790	2750	2710	2680	2650	2615	2590	2530
4000	1219	2785	2755	2720	2680	2650	2610	2580	2555	2420
5000	1524	2750	2720	2685	2650	2610	2580	2550	2510	2320
6000	1829	2720	2690	2650	2610	2580	2550	2520	2440	2220
7000	2134	2685	2650	2615	2575	2545	2515	2455	2355	2120
8000	2438	2650	2620	2580	2545	2520	2485	2415	2255	2025
9000	2743	2620	2585	2545	2500	2485	2450	2320	2160	1940
10000	3048	2580	2550	2515	2470	2460	2365	2220	2065	1850
11000	3353	2550	2520	2480	2435	2380	2265	2130	1980	1770
12000	3658	2520	2490	2450	2395	2285	2165	2035	1890	1680
13000	3962	2475	2450	2385	2290	2190	2080	1950	1805	1600
14000	4267	2450	2370	2285	2200	2110	1990	1870	1725	
15000	4572	2355	2275	2195	2110	2020	1910	1790	1645	
16000	4877	2250	2175	2100	2025	1935	1830	1710	1570	
17000	5182	2155	2090	2020	1935	1850	1750	1635		
18000	5486	2070	2005	1935	1850	1770	1675	1560		
19000	5791	1990	1920	1850	1775	1690	1605			
20000	6096	1905	1845	1775	1700	1615	1530			

GROSS WEIGHTS ABOVE 2550 LB MUST BE EXTERNAL AND JETTISONABLE

THIS TABLE BASED ON CABIN HEAT, ENGINE ANTI-ICE OFF, ELECTRICAL LOAD 30 AMPERE. 250-C20 ENGINE

REDUCE HOVER WEIGHT CAPABILITY

1. 50 LB WITH MAIN ROTOR ABRASION TAPE INSTALLED
2. REDUCE HOVER CEILING 400 FT ABOVE CRITICAL ALTITUDE OVER AND ABOVE ANY OTHER HOVER REDUCTION FOR ANY OTHER INSTALLED KIT (OR BASIC AIRCRAFT) WHEN THE PARTICLE SEPARATOR IS INSTALLED.

REFER TO FIGURE 8-3 FOR ENGINE CRITICAL ALTITUDE LINE.

REDUCE WEIGHT CAPABILITY LBS AS FOLLOWS			
PRESSURE ALT. FT	CABIN HEAT	ANTI-ICE	BOTH
SEA LEVEL TO			
12,000	112	120	236
16,000	97	106	206
20,000	83	89	175

INCREASE (OR DECREASE) WEIGHT CAPABILITY (ABOVE CRITICAL ALTITUDE) PER 10 AMPERE REDUCTION (OR INCREASE) IN ELECTRICAL LOAD

OAT°C	-5	15	35
△ WT LBS	2	5	7

SECTION IX
OPTIONAL EQUIPMENT

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SECTION IX
OPTIONAL EQUIPMENT

9-1. GENERAL INFORMATION

This section provides general supplemental information on optional equipment for the MD 500 Model 369HE/HS helicopters. The information includes a listing of usable optional equipment and compatibility of combined equipment on the helicopter.

NOTE: Unless identified in the List of Models Effected block at the beginning of each optional equipment operating instructions, the optional equipment is approved for all MD 500 Model 369HE/HS helicopters.

Supplemental data is prepared and included in this section whenever the installation of that equipment affects the FAA Approval Data for Limitations (Section II), Emergency and Malfunction Procedures (Section III), Normal Procedures (Section IV), and Performance Data (Section V).

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

Be sure to include a review of the appropriate flight manual supplemental data for type of optional equipment installed (including STC items) as a regular part of preflight planning.

9-2. LISTING - OPTIONAL EQUIPMENT

Table 9-1 lists MDHI optional equipment items available that require additional operating instructions. This table does not include non-MDHI STC items that may be FAA approved for use. Other optional equipment items may be found in the HMI.

SPECIAL NOTE:

Items in the table marked with an asterisk (*) are optional equipment items that have had their supplemental data incorporated into the main body of the flight manual and are identified by the statement, "If installed".

Table 9-1. Optional Equipment

Equipment	Part No.	Publication No.
*Extended Landing Gear	369H90006	CSP-HE/HS-1
*Rotor Brake	369H90123	CSP-HE/HS-1
*Aluminum Tail Rotor Kit	369A9005	CSP-HE/HS-1
*Engine Air Particle Separator Filter	369H90148	CSP-HE/HS-1
*Heated Pitot Tube	369H90034 369H90115	CSP-HE/HS-1
Automatic Reignition	369H90118	Section IX
Luggage Pod	369H90002	Section IX
Litter	369H90011	Section IX
Cargo Swing	369H90017	Section IX
Cargo Hook	369H90065 369H90072	Section IX
Hoist	369H90070	Section IX
Utility Floats	369H90086	Section IX
Emergency Floats	369H90121	Section IX
Searchlight	369H90142	Section IX
Anti-Ice Fuel Filter	369A90022	Section IX
Engine Air Deflector	M30287	Section IX

*Indicates data incorporated into the flight manual (Sections I thru VIII where appropriate).

9-3. KIT COMPATIBILITY - COMBINED OPTIONAL EQUIPMENT

Table 9-2. Optional Equipment Kit Compatibility

Compatibility: Blank = Yes; X = No; ⊗ = Installable/Not Usable

Optional Equipment	Part Number	A. 90121	B. 90011	C. 90007	D. 90148	E. 90070	F. 90072 90065	G. 90086	H. 90017	I. 90002	J. 90060
A. Emergency Floats	369H90121	■				(1)(2)	(1)	X	(1)	(5)(6)	(4)⊗
B. Litter Kit	369H90011		■			⊗					
C. Ext. Landing Gear	369H90007			■							
D. Particle Separator	369H90148				■						
E. Hoist Kit	369H90070	(1)(2)	⊗			■	(1)	⊗	⊗	(3)	(3)
F. Cargo Hook Kit	369H90072 369H90065	(1)				(1)	■		X		
G. Utility Floats	369H90086	X				⊗		■			X
H. Cargo Swing	369H90017	(1)				⊗	X		■	X	X
I. Luggage Pod	369H90002	(5)(6)				(3)			X	■	X
J. Passenger Step	369H90060	(4)⊗				(3)		X	X	X	■

NOTES:

(1) Cyclic stick grip kit 369H90129 must be installed.

(2) For functional use of Hoist, emergency floats must be in stowed configuration for either standard or extended landing gear.

(3) Single Component only. Installed on opposite side of hoist.

(4) Do not use in flight.

(5) Compatible if installed on extended landing gear.

(6) Not compatible if installed on standard landing gear.

- The Anti-Ice Fuel filter is approved for use on 369HE/HS helicopters equipped with the 250-C20 engines only and may be used in combination with all other approved optional equipment.
- Emergency floats on standard landing gear may not be installed with 369H90062-5 and -6 step assemblies (components of the night flying kit).
- The search light control handle must be in the stowed (handle forward) position when the co-pilot's stick is installed.
- The Searchlight Kit may be installed simultaneously with the utility Float Kit or the Emergency Float Kit unless Skid Tip Position Lights are installed.

9-4. OPTIONAL EQUIPMENT PERFORMANCE DATA

SPECIAL NOTE:

Optional equipment that affect IGE/OGE hover performance require additional hover performance charts. Optional Equipment IGE hover performance charts are located in Section V and are marked with an asterisk (*). Optional Equipment IGE hover performance charts are located in Section V and are marked with an asterisk (*). Optional Equipment OGE hover performance charts are located in Section VIII and are marked with an asterisk (*).

9-5. OPERATING INSTRUCTIONS: ROTORCRAFT CARGO HOOK KIT

PART I
GENERAL

The MDHI Cargo Hook Kit consists of a cargo hook which attaches to the fuselage keel beam, electrical connections to provide the pilot with cargo release or jettison capability using a switch on the cyclic stick, and a manual backup release mechanism. The cargo hook kit is designed to carry hook loads up to 1800 pounds.

When the kit is installed, an owner or operator holding a valid Rotorcraft External Load Operator Certificate may utilize the helicopter for transportation of external cargo when operated by a qualified pilot. OPERATIONS WITH CARGO ON THE HOOK SHALL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE PORTIONS OF FEDERAL AVIATION REGULATIONS PART 133.

Information provided in these operating instructions is presented with the intent of furnishing important data that can be used in the Rotorcraft Load Combination Flight Manual. The Combination Flight Manual, which is required by FAR Part 133, will be prepared by the applicant to obtain the rotorcraft External Load Operator Certificate.

PART II
LIMITATIONS

Weight Limitations:

CAUTION **Maximum weight allowed on the landing gear is 2550 pounds. Weight in excess of 2550 pounds must be external and jettisonable.**

Maximum Rotorcraft - Load Combinations operating gross weight 3000 pounds (FAR 133).

Center of Gravity Limitations:

Center of gravity not to exceed the limits certified for the basic helicopter.

For gross weights greater than 2550 pounds, center of gravity limits for 2550 pounds apply.

Cargo Hook Limitations:

Cargo hook structural load limit is 1800 pounds.

Airspeed Limitations:

With no load on hook, airspeed limits are unchanged.

With load on hook, airspeed limits are presented on the external load V_{NE} placards.

NOTE: Use caution as size and shape of load, and load attaching cable size and length may affect flight characteristics. Satisfactory flight characteristics have been demonstrated with a compact load.

For operations at gross weights greater than 2550 pounds and up to 3000 pounds, V_{NE} is limited to 80 knots IAS from sea level to 2400 feet PA. Above 2400 feet, reduce V_{NE} 7 knots per 1000 feet of pressure altitude.

Placards:

Make placards stating approved load class(es) and occupancy limitations. Display placards in conspicuous location in the cockpit.

Placard stating, “External Load Limit 1800 Pounds” installed on or next to cargo hook.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

ENGINE FAILURE:

The presence of an external load may further complicate a failed engine condition. Release of loads attached through the cargo hook should be accomplished as soon as practical; consistent with other safety of flight factors (rotor RPM, altitude, airspeed, ground personnel safety, etc.).

EMERGENCY RELEASE:

Actuate mechanical release handle to release cargo in the event of an electrical failure. Operate handle quickly and deliberately.

NOTE: Ground support personnel should manually assure positive reset of the cargo hook after use of mechanical release, prior to further cargo pickups.

Static Electricity Discharge:

Instruct ground crew to insure that the helicopter has been electrically grounded prior to attaching cargo to drain charges of static electricity that may build up in flight.

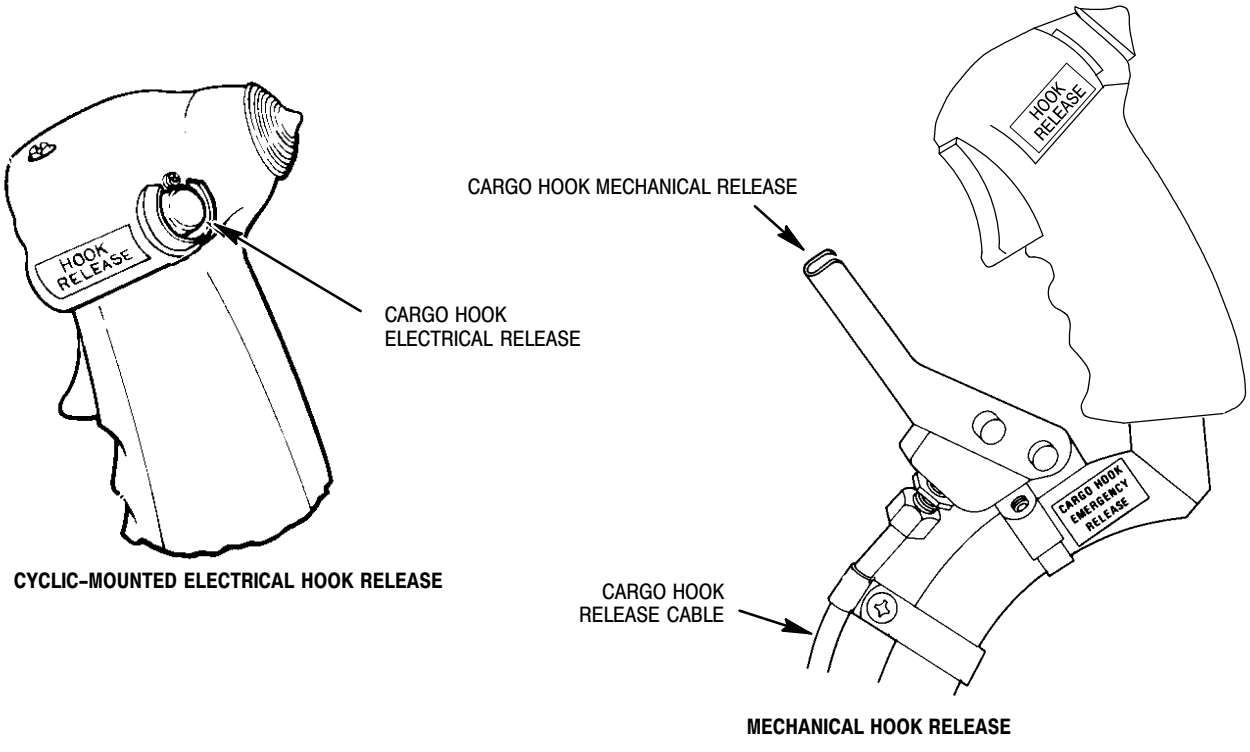


Figure 9-1. Cargo Hook Release - Electrical and Mechanical

PART IV
NORMAL PROCEDURES

Normal Operation:

Preflight

Place battery switch in BATTERY position and check that HOOK circuit breaker is in.

Push cargo load ring (D-ring or suitable substitute) into hook throat. Cargo hook keeper should permit easy entrance into throat. Leave ring in hook for remainder of operational checks.

Pull aft and downward on load ring; hook must remain in locked position.

Operational Checks

Check electrical and emergency operation of cargo release.

Check operation of external release knob (located on left side of cargo hook body).

Hook should return to the closed position after above checks.

Move pilot's cyclic to all extreme positions. Cargo hook must remain locked and external release knob must not rotate.

With load ring in cargo hook, swing hook to the limits of travel in all directions. Hook must remain in the closed position.

Inflight

Check HOOK circuit breaker IN.

Use care to avoid passing load attaching cables over landing gear skid tube when attaching load to hook with helicopter on the ground.

Apply collective smoothly when lifting cargo.

Activate cargo release switch on cyclic stick to release cargo.

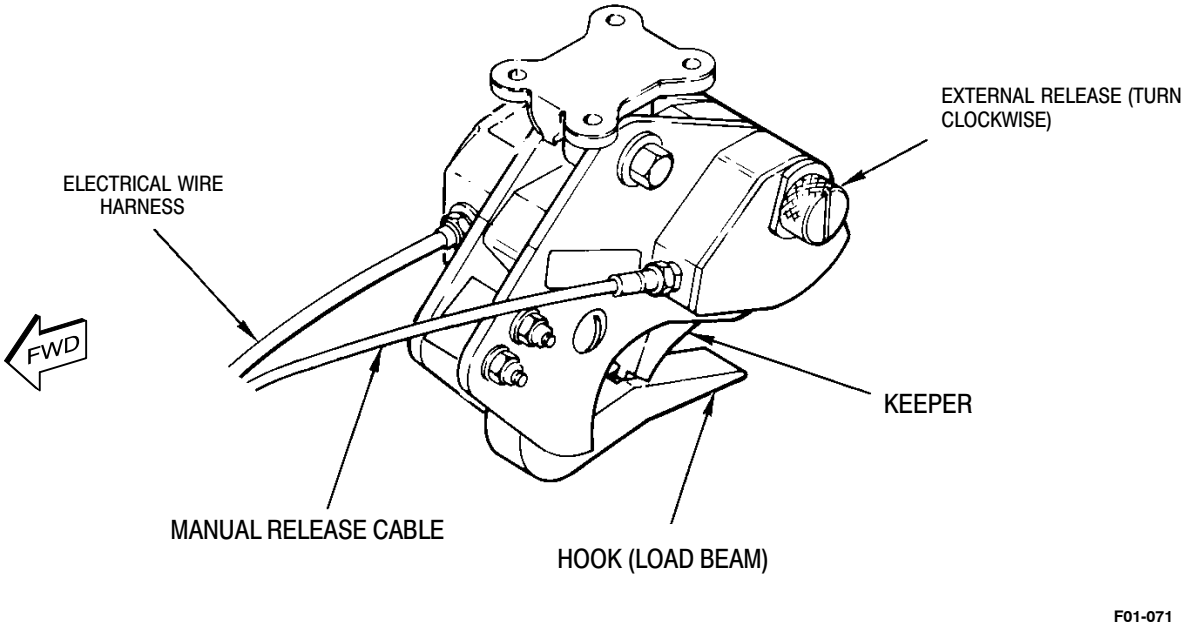


Figure 9-2. Cargo Hook

PART V
PERFORMANCE DATA

Refer to Section V for IGE Hover Ceiling vs. Temperature and Section VIII for OGE Hover Ceiling vs. Temperature.

PART VI
WEIGHT AND BALANCE DATA

The following table of Cargo Hook Loading Data should be used by the operator to assist in evaluating the helicopter center of gravity for various hook load weights.

Cargo Hook Loading Data:

Table 9-3. Cargo Hook Loading Data

Cargo Longitudinal CG = 99.3 In.	
Cargo Weight (lb)	Moment/100 (in.-lb)
100	99
200	199
300	298
400	397
500	497
600	596
700	695
800	794
900	894
1000	993
1100	1092
1200	1191
1300	1291
1400	1390
1500	1490
1600	1589
1700	1688
1800	1787

9-6. OPERATING INSTRUCTIONS: ANTI-ICE FUEL FILTER

LIST OF MODELS AFFECTED

369HS	Helicopter Serial No. 0101S and Subs
369HE	Helicopter Serial No. 0101E and Subs

NOTE: This Kit is approved for installation in helicopters equipped with Allison 250-C20 engine only.

PART I
GENERAL

The Anti-Ice Airframe Fuel Filter is designed to filter out ice particles and other solid contaminants from the fuel prior to entering the engine fuel system. Installation of the filter will delete the requirement for use of fuel containing anti-ice additives.

The filter unit is mounted on the aft face of the firewall ahead of the engine fuel pump inlet and contains a 10 micron, 500 square inch disposable filter element.

A pressure sensing switch in the filter body will illuminate a cockpit caution light and activate the start pump when the fuel differential pressure across the filter drops to a preset level. If the filter becomes clogged, a by-pass valve in the filter body will open allowing unfiltered fuel to flow to the engine fuel pump.

PART II
LIMITATIONS

Altitude limitations:

If ground temperature prior to flight is 5°C or less, flight operations are limited to 12,000 feet pressure altitude maximum.

If ground temperature prior to flight is above 5°C, flight operations are limited to 14,000 feet pressure altitude maximum, but not to exceed limitations of Basic RFM Section II.

Anti-Ice fuel Additives:

Installation of the Anti-Ice Airframe Fuel Filter eliminates the need for anti-ice fuel additives in the fuel (i.e., Prist).

Placards:

ANTI-ICE FUEL FILTER INSTALLED
For ground temperature of 5°C or less, max ALT 12,000 ft.
For ground temperature greater than 5°C, max ALT 14,000 ft.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

ANTI-ICE AIRFRAME FUEL FILTER

Indications: 

caution light on.

Conditions: Anti-ice airframe fuel filter becoming clogged with ice or other solid contaminants.

Procedures:

- Turn start pump ON.
- Land as soon as practical.

PART IV
NORMAL PROCEDURES

Preflight Checks:

- BATTERY/EXT PWR switch — **AS REQUIRED**
- Start pump — **ON**

WARNING **Do not open drain valve unless start pump is ON. An unexpected flameout or power loss may occur if air is allowed to enter the fuel system.**

NOTE: If aircraft has been exposed to freezing temperatures, failure to drain may be due to ice in filter element.

- Drain filter from valve on bottom of filter unit.

NOTE: The following checks should be performed as part of the engine compartment checks listed in the basic preflight checklist in Section IV.

- Start pump — **OFF**

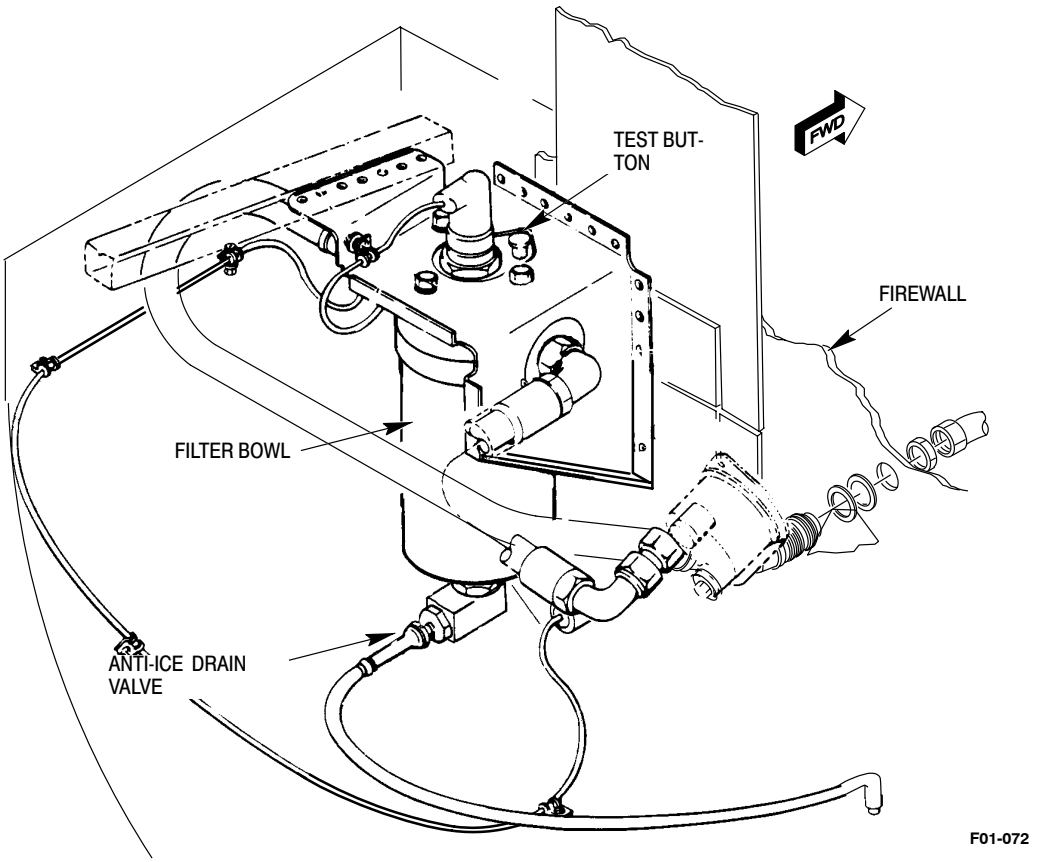


Figure 9-3. Anti-Ice Airframe Fuel Filter

Ground check of system operation:

With electrical power on, verify that FUEL ANTI-ICE circuit breaker for caution system is in the “in” position and the dimming switch is in the BRT position.

If FUEL FILTER light is illuminated, depress to ensure that system is reset.

Depress red press-to-test button located on the top of the fuel filter housing; hold for 5 seconds; FUEL FILTER and start pump lights should illuminate.

Release the press-to-test button; FUEL FILTER and start pump lights should remain on.

Depress FUEL FILTER caution light on panel; FUEL FILTER and start pump light should go out. Caution system is reset.

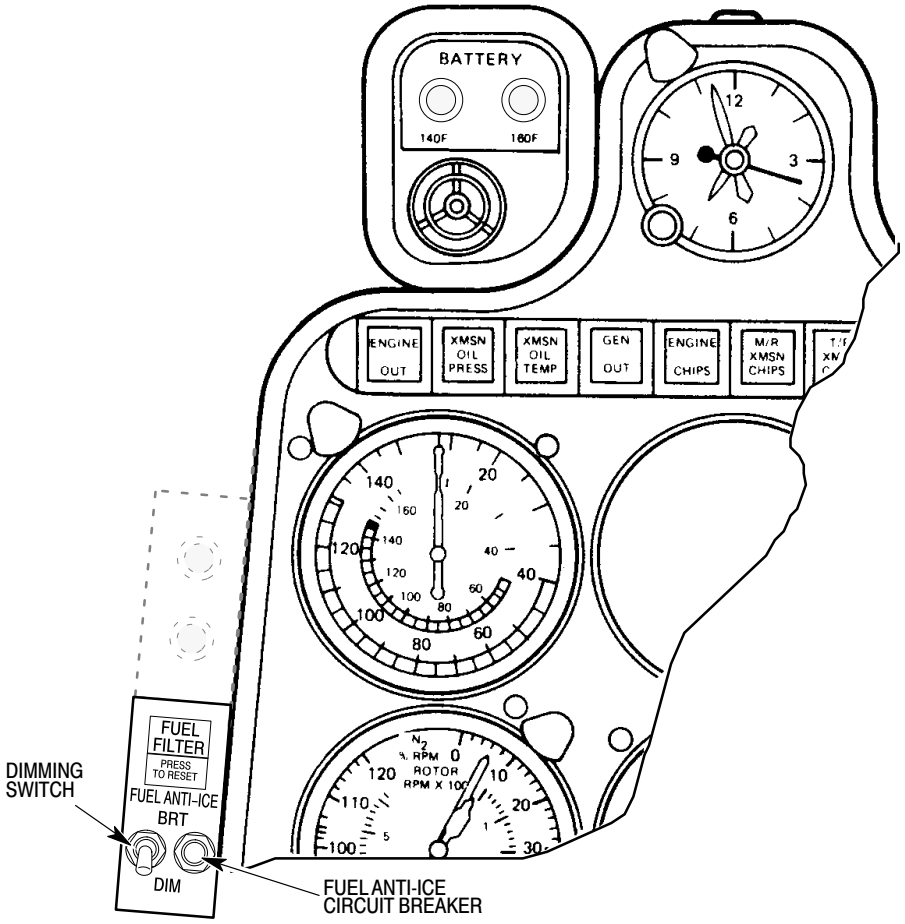


Figure 9-4. Anti-Ice Fuel Filter Switch and Indicator Panel

Inflight Operation:

Check that FUEL ANTI-ICE caution system circuit breaker is in the "in" position and the dimming switch is in the BRT position.

A fuel icing condition will be indicated by illumination of the FUEL FILTER caution light.

NOTE: Once system is activated, it will remain on until manually reset by pressing FUEL FILTER caution light.

Icing may be verified by momentary depressing the FUEL FILTER caution light. If the caution light does not re-illuminate in approximately 3 seconds, pull and reset the FUEL ANTI-ICE circuit breaker to verify that icing conditions do not exist.

Post Flight Filter Cleaning:

When ambient temperature is expected to go below freezing, filter unit should be drained following completion of flight.

Following any actuation of FUEL FILTER light, fuel filter should be serviced (Ref. HMI).

9-7. OPERATING INSTRUCTIONS: CARGO SWING

PART I
GENERAL

The MDHI Cargo Swing Kit consist of a curved tube that fits underneath the helicopter and attaches to the jacking fittings near the sill of the cargo door, cables that suspend the cargo hook from the tube, electrical connections to provide the pilot with cargo release or jettison capability using a switch on the cyclic stick, and manual backup release mechanism. The cargo hook is automatically stowed when not in use. The cargo swing kit is designed to carry hook loads up to 1400 pounds.

When the kit is installed, an owner or operator holding a valid Rotorcraft External Load Operator Certificate may utilize the helicopter for transportation of external cargo when operated by a qualified pilot. OPERATIONS WITH CARGO ON THE HOOK SHALL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE PORTIONS OF FEDERAL AVIATION REGULATIONS PART 133.

PART II
LIMITATIONS

Weight Limitations:

Gross weight not to exceed the maximum certificated for the basic helicopter.

Center of Gravity Limitations:

Center of gravity not to exceed the limits certificated for the basic helicopter.

Cargo Swing Load Limitations:

Cargo swing structural limit is 1400 pounds.

Airspeed Limitations:

With the hook stowed, airspeed limitations are unchanged.

With no load on hook and hook not stowed, 80 knots or basic helicopter V_{NE} whichever is less.

With load on hook, use caution since size and shape of load may effect controllability. Operator must establish airspeed limits in accordance with FAR part 133.

Placards:

Make placards stating approved load class(es) and occupancy limitations; display placards in a conspicuous location in cabin.

Make placard stating: “External Load Limit 1400 Pounds” and install on or next to cargo hook.

CAUTION **Fourteen hundred pounds is the allowable load limit on the cargo swing.**

Kit Combination Limitations:

The Rotorcraft Cargo Hook Kit may not be used in combination with the Cargo Swing Kit.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Engine Failure:

The presence of an external load may further complicate a failed engine condition. Release of loads attached through the cargo swing should be accomplished as soon as practicable; consistent with other safety of flight factors (rotor RPM, altitude, airspeed, ground personnel safety, etc).

Emergency Release:

Actuate the mechanical release handle to release cargo in the event of an electrical failure. Operate handle quickly and deliberately.

NOTE: Ground support personnel should manually assure positive reset of the cargo swing after use of mechanical release, prior to further cargo pickups.

Static Electricity Discharge:

Instruct ground crew to insure that the helicopter has been electrically grounded prior to attaching cargo to drain charges of static electricity that may build up in flight.

PART IV
NORMAL PROCEDURES

Normal Operations:

Check cargo release circuit breaker IN.

Activate cargo release arming switch.

CAUTION **Use care to avoid passing load attaching cables over landing gear skid tube when attaching load to hook with helicopter on ground.**

Apply collective smoothly when lifting cargo.

Activate cargo release switch on cyclic to release cargo.

NOTE: When flying without load on cargo hook, hook stow cable should be attached. Flight after release of cargo load should be limited to nominal airspeeds (80 knots) until hook can be secured to stow cable to preclude damage to underside of helicopter.

Emergency Release:

Actuate mechanical release handle to release cargo in the event of an electrical failure. Operate handle quickly and deliberately.

NOTE: Ground support personnel should manually assure positive reset of the cargo hook after the use of mechanical release, prior to further cargo pickups.

Static Electricity Discharge:

Instruct ground crew to ensure that the helicopter has been electrically grounded prior to attaching cargo to drain charges of static electricity that may build up in flight.

PART V
PERFORMANCE DATA

Refer to Section V for IGE Hover Ceiling vs. Temperature and Section VIII for OGE Hover Ceiling vs. Temperature.

PART VI
WEIGHT AND BALANCE DATA

Weight and Loading:

The following table of Cargo Swing Loading Data should be used by the operator to assist in evaluating the helicopter center of gravity for various hook load weights.

Table 9-4. Cargo Hook Loading Data

Cargo Longitudinal CG = 96.9	
Cargo Weight (lb)	Moment (in.-lb)
100	9,690
200	19,380
300	29,070
400	38,760
500	48,450
600	58,140
700	67,830
800	77,520
900	87,210
1000	96,900
1100	106,590
1200	116,280
1300	125,970
1400	135,660

9-8. OPERATING INSTRUCTIONS: ENGINE AIR INLET DEFLECTOR

PART I
GENERAL

The MDHI Engine Air Inlet Deflector Kit inhibits the ingestion into the engine air inlet of foreign objects which are of sufficient mass to puncture the inlet screen/particle separator and damage the engine.

The kit includes a hub and engine air inlet cover to inhibit the entrance of snow and water while the helicopter is parked.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Air Restart Engine:

Follow the emergency air restart procedure as described in Section III of the Pilot's Flight Manual.

Recommended pressure altitude is 11,000 feet or below.

9-9. OPERATING INSTRUCTIONS: EMERGENCY FLOATS

PART I
INTRODUCTION

The MDHI Emergency Float Kit consists of inflatable-bag type floats intended for use in emergency landings only, during over-water operation. The floats are normally carried in the stowed configuration mounted as a compact package on top of each skid. Individual press-to-test lights are provided to check the condition of the electrical actuation circuits for each float. These lights along with a circuit breaker are on an auxiliary panel at the bottom of the instrument panel. A guarded switch is provided on the cyclic stick for the pilot to initiate inflation when required. The switch actuates valves allowing air stored in cylinders within the float package to inflate the

An optional Night Landing Lighting Kit is available as an aid to landing on water at night. It consists of dual belly-mounted sealed beam lights, a circuit breaker, and a three-position switch installed on the collective control. Switch forward position activates the standard nose mounted landing light; center position is off; and aft position activates the dual belly lights. The dual belly mounted lights were developed during Certification of the Float Kit for the 500D Helicopter Model 369D. During power-on and autorotational landings on water at night it was determined that these dual belly lights enhanced perception of the water surface. This light kit has now been made available for use on the Hughes 500 Model 369H Series Helicopters.

A modification Kit, M50458, is available for converting the solenoid operated valves to squib actuated valves.

PART II
OPERATING LIMITATIONS

CAUTION **Tail low landings on hard surfaces should be avoided, as stress damage to the float extensions may occur.**

Airspeed Limitations:

Flight with floats inflated, or at time of inflation, is limited to 80 knots IAS, or basic helicopter V_{NE}, whichever is less.

With floats stowed, airspeed limitations are the same as the basic helicopter.

Gross Weight Limitations:

Emergency floats (369H90121-505) on extended landing gear, maximum gross weight is 2000 pounds.

Flight Limitations:

Night flight over water beyond autorotational capability to ground is prohibited, unless the Night Landing Kit is installed.

Placards:

Float inflation above 80 knots prohibited.

Kit Combination Limitations:

Emergency floats on standard landing gear may not be installed with 369H90062-5 and -6 step assemblies, which are components of the night lighting kit.

When the 369H90060 passenger step kit is installed in combination with the emergency floats, the steps must be removed prior to over water flight.

Type of Operation:

Night flight over water beyond autorotation capability to ground is prohibited unless the night lighting light is installed.

Operations with the emergency floats inflated is limited to flight to a servicing facility for repacking and recharging the system. Airspeed with the floats inflated is limited to 100 knots.

For water and ground landings, change of altitude is limited to 3000 feet below the altitude at inflation or to 3000 feet below the maximum altitude to which the inflated floats are subsequently flown.

NOTE: If the allowable altitude change noted above is exceeded, the minimum operational float pressure (3.0 psig) for water and ground landings may not be available.

Operational Temperature:

The minimum float operational temperature for over-water flight is a function of initial minimum charge pressure as shown in Figure 9-5.

Operational Temperature	Float Inflation Time	Altitude Required For Deployment
Up to 70°F (21°C)	9.0 sec	330 feet
Above 70°F	6.3 sec	250 feet

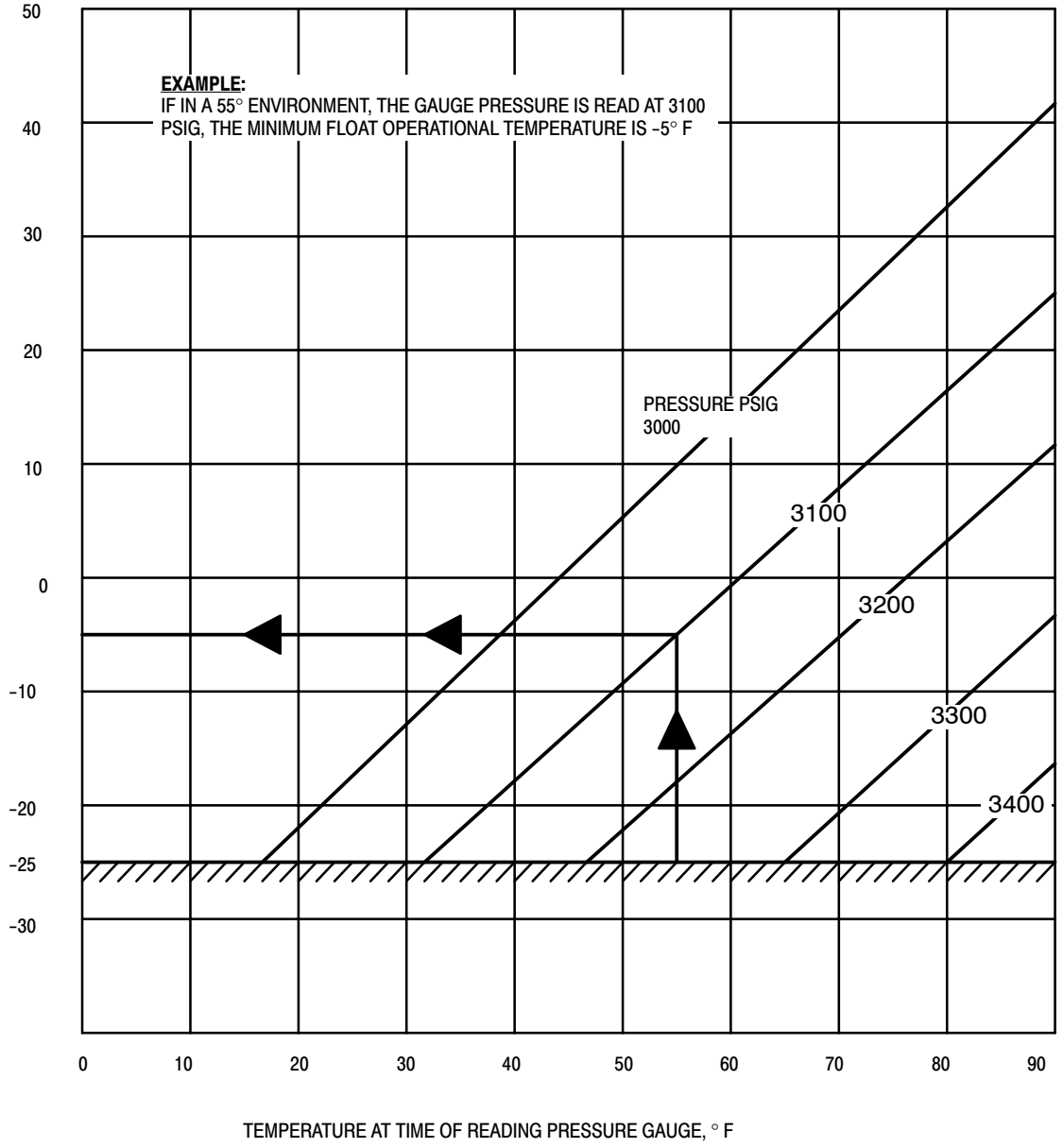


Figure 9-5. Minimum Float Operational Temperature for Over-water Flight

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Emergency Float Operation:

If emergency occurs at airspeeds greater than maximum permissible float inflation speed, i.e., 80 knots IAS, reduce speed to 80 knots or less prior to float inflation. Do not exceed airspeed limits.

NOTE: Inflations have been demonstrated up to 100 knots IAS in autorotation.

Float Inflation:

Check float circuit breaker **IN**.

Actuate guarded float inflation switch on cyclic stick grip.

NOTE: Only momentary switch actuation is required.

Float inflation time and altitude required for deployment are presented below. Deployment altitude is based on a stabilized autorotational rate of descent of 1800 feet per minute. It was calculated using the tabulated float inflation time and a two second increment for pilot reaction time:

Inflation should be accomplished in autorotation at 2,000 feet or less above landing surface to minimize differential pressure change with altitude change.

For over-water operation in the crossed hatch area of the Height Velocity Diagram, immediate pilot reaction will be required to ensure float inflation prior to water contact.

Make a normal landing approach. Minimize forward speed prior to water contact. Recommended water contact speed 10 knots or less. Do not lower collective until forward speed is 5 knots or less. Landings have been demonstrated at gross weights up to 2,550 pounds and touchdown speeds up to approximately 15 to 20 knots.

Emergency Floats (369H90121-505) on extended landing gear:

Make a normal landing approach. Minimize forward speed prior to water contact. Recommended water contact speed 5, knots or less. Landings have been demonstrated at gross weights up to 2,000 pounds and touchdown speeds up to approximately 10 knots.

NOTE: Landings should be made with the helicopter as level as possible laterally and the nose of the helicopter slightly high. One-float-first landings may produce undesirable but controllable yaw.

Solenoid Installation. After landing, open the emergency float circuit breaker to prolong the life of the solenoid.

If emergency occurs at night over water, the dual landing lights should not be illuminated above 1000 feet in order to preserve battery power. Approach and landing as noted above.

PART IV
NORMAL PROCEDURES

Checks Prior to Flight:

Check condition and security of stowed float package.

NOTE: Emergency floats with squib-actuated valve are identified by the word "SQUIB" clearly visible on float cover.

Check pressure gauge in each float package. If the pressure vessel is at 70°F (21.1°C), the pressure should read 3000 to 3500 psig.

Indicated gauge pressure will increase (decrease) approximately as tabulated below per 1°F (1°C) increase (decrease) in temperature of the pressure vessel.

See Figure 1 to verify that pressure is adequate for the anticipated minimum operating temperature.

Charge Pressure	Psig/°F	Psig/°C
3000	5.7	10.2
3100	5.9	10.5
3500	6.6	11.9

Set **BATTERY-EXT** switch in proper position (**BATTERY** when using rotorcraft battery. **EXT** when using an external power source).

Close emergency float circuit breaker.

Press-to-test. All four circuit indicator lamps should illuminate.

PART V
PERFORMANCE DATA

Hover Performance with Stowed Floats:

No change from that of the basic helicopter.

Height Velocity Diagram:

With floats stowed, Landing Height-Velocity Diagram is unchanged from that of the basic helicopter.

PART VI
WEIGHT AND BALANCE DATA

Center of Gravity Limitations:

Emergency floats (369H290121-Basic) on standard landing gear, no change.

Emergency floats (369H90121-509) on extended landing gear as follows:

Gross Weight (lb)	Longitudinal C.G. Limit (Sta-in.)		Lateral C.G. Limit (Sta-in.)
	Forward	Aft	(+) Right, (-) Left
2251 to 2550	99.0	102.0	± 3.0
2001 to 2250	99.0	103.0	± 3.0
2000 and below	99.0	104.0	± 3.0

Emergency Floats (369H90121-511) on standard landing gear as follows:

Gross Weight (lb)	Longitudinal C.G. Limit (Sta-in.)		Lateral C.G. Limit (Sta-in.)
	Forward	Aft	(+) Right, (-) Left
2001 to 2250	99.0	104.0	± 3.0
2000 and below	97.0	104.0	± 3.0

Emergency floats 369H90121-505) on extended landing gear:

Longitudinal limits . . . . . Station 99 to 103

Lateral limits . . . . . ±3 inches

Weight and station data for the float kit, after installation, become a part of the aircraft basic empty weight (Section VI of the Pilot's Flight Manual).

PART VII
HANDLING SERVICING AND MAINTENANCE

Inspection and functional checks of the emergency float system should be conducted in accordance with applicable installation instructions.

9-10. OPERATING INSTRUCTIONS: ROTORCRAFT HOIST

PART I
INTRODUCTION

The MDHI Hoist Kit is a fixed position, electrically operated unit. The hoist assembly is designed for rapid installation and removal to facilitate maximum utility of the helicopter. Approximately 110 feet of cable is provided with limit switches incorporated to automatically stop the hoist at either extreme. The rate of travel of the cable is approximately 60 feet per minute. The pilot is provided with a recessed cable cutter button on the cyclic stick. The hoist operator is provided with a safety harness, a three position switch to raise or lower the cable, and a guarded cable cutter button. The cable cutter is a redundant circuit, electrically initiated, pyrotechnic device. A door “hold-open’’ is provided for use during hoisting operation.

When the kit is installed, an owner or operator holding a valid Rotorcraft External Load Operator Certificate may utilize the helicopter for hoisting operations, compensation for hire, when operated by a qualified pilot. OPERATIONS WITH A LOAD ON THE HOIST SHALL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE PORTIONS OF FEDERAL AVIATION REGULATIONS PART 133. The operator may obtain a multiple airworthiness certificate under provisions of FAR 21.187.

PART II
LIMITATIONS

Minimum Flight Crew:

For hoist operation, minimum flight crew is two, consisting of a pilot and hoist operator.

Weight Limitations:

Gross weight not to exceed the maximum certificated gross weight for the basic helicopter.

Airspeed Limitations:

With no load on hoist, cable stowed and door closed, airspeed limits are unchanged.

During hoisting operation or with door "hold-open'' in place, flight is limited to 25 mph forward, rearward, or sideward.

Center of Gravity Limitations:

During hoisting operations:

Gross Weight (lbs)	Longitudinal CG Station (in)	Lateral CG Station (in)
2001 to 2550	99 to 105	+5.5, -5.0
200 or below	97 to 106	+5.5, -5.0
"+" is right of centerline; "-'' is left of centerline when looking forward.		

For all other operations with hoist cable stowed: same as those for the basic helicopter.

Fuel system limitations:

When using the center of gravity limits specified for hoisting operations, usable fuel is reduced to 63 US gallons (239 liters) for non self sealing fuel tanks and to 61 US gallons (230 liters) for self-sealing fuel tanks.

Hoist Limitations:

NOTE: The static load test requirements of FAR 133.43 have been accomplished.

Hoist structural load limit is 300 pounds.

Use of the hoist for personnel is restricted to rescue and should be limited to removal of the person from a perilous situation.

Kit Combination Limitations:

The Hoist may not be operated when the 369H90017 Cargo Swing is installed.

The Hoist may be installed in combination with the 369H90121 Emergency floats. However, it may only be operated if either the -509 or -511 versions (incorporating hard covers) are installed.

The Hoist may not be operated when the 369H30086 Utility Float kit is installed.

The Hoist Kit may not be operated when the 389H90011 Litter kit is installed. When litters are removed and the 369H90085 (flat glass) doors are installed, hoist operation is permitted.

When the 369H90060 Passenger Step Kit is installed, the step on the same side as the hoist must be removed prior to hoisting operations.

Operations combining cargo hook/cargo swing loads with the hoist is not permitted.

Placards:

Make placards stating approved load class(es) and occupancy limitations; display placards in conspicuous location in cabin.

NOTE: 300 pounds is the allowable loading limit on the hoist hook.

Placard stating, “External Load Limit 300 Pounds” installed on the hook.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Emergency Release:

Hoist operator may jettison hoist load by lifting guard on cable cutter switch and moving switch to CUT position.

Pilot may jettison load by depressing recessed cable cut button located on the cyclic stick grip.

PART IV
NORMAL PROCEDURES

Normal Operation:

Check hoist circuit breaker IN.

Check cable cut circuit breaker IN.

Hoist operator must wear an approved safety harness (provided with hoist) during all hoisting operations.

While in hovering flight (at speeds less than 25 mph forward, rearward, or sideward) over hoist operations site, bring the hook over the door as the door is opened, slide the bar latch into door slot to lock door in open position; attach electrical connector to hoist.

Operator may move cable up or down by means of the three position switch provided in the cargo compartment.

NOTE: Any time that the cable is extended, limit speed to 20 mph or less.

Prior to moving away from hoist operation site, the cable should be stowed, electrical connector disconnected, and the door closed.

Use of the hoist for personnel is restricted to rescue and should be limited to removal of the person from a place of peril or imminent peril to safety.

PART VI
WEIGHT AND BALANCE DATA

Weight and Loading:

The following table should be used by the operator to assist in evaluating the helicopter center of gravity for various hoist load weights. The maximum hoist load of 300 pounds and the maximum helicopter gross weight of 2550 pounds must not be exceeded. Examples of use of the tables are provided.

Table 9-5. Permissible Hoist Loads

Pilot Weight (Pounds)		Forward Passenger Weight (Pounds)	Attendant Weight (Pounds)			
			150	175	200	225
			Permissible Hoist Loads (Pounds)			
A	150	0	300	300	300	300
		150	295	285	275	260
		175	280	270	255	245
		200	265	250	240	230
		225	245	235	225	215
B	175	0	300	300	300	300
		150	300	300	295	285
		175	300	290	280	270
		200	285	275	265	255
		225	270	260	250	240
C	200	0	300	300	300	300
		150	300	300	300	300
		175	300	300	300	295
		200	300	300	290	275
		225	295	280	270	260
D	225	0	300	300	300	300
		150	300	300	300	300
		175	300	300	300	300
		200	300	300	300	300
		225	300	300	295	285

NOTE: Permissible hoist load may be increased 9 pounds for each 10 pounds of ballast or passenger weight placed at seat location opposite hoist load during hoisting operations to 300 pounds maximum.

Table 9-6. Loading Examples

NUMBER 1:	
Pilot	= 175 Pounds
Attendant Weight	= 175 Pounds
Forward Passenger Weight	= 0 Pounds
Find: Permissible Hoist Load	= ???
Consult Table I, Part B for the given weights. The maximum allowable hoist load is 300 pounds.	
NUMBER 2:	
Pilot Weight	= 225 Pounds
Attendant Weight	= 150 Pounds
Forward Passenger Weight	= 150 Pounds
Find Permissible Hoist Load	= ???
Consult Table I, Part D for the given weights. The maximum allowable hoist load is 300 pounds.	

9-11. OPERATING INSTRUCTIONS: ROTORCRAFT LITTER

PART I
GENERAL

The MDHI Litter Kit has been designed to facilitate rapid conversion of the helicopter to an air ambulance configuration. The Litter Kit provides for transporting one or two litter patients as well as one or two attendants in the cargo compartment of the helicopter. The kit consists of two litters, folding litter support structure, attaching hardware, and two special doors. The special doors incorporate provisions for quick installation of bubble windows which permit high speed and/or long distance transportation of patients and attendants in comfort. Also included in the kit is a set of basic shape door window glass panels for quick interchange with the bubble glass panels, for normal operation.

PART II
LIMITATIONS

Litters Installed Configuration:

With litters installed, operations must be conducted with the 369H92733 bubble glass window panels in the 369H90085 door installation, and limitations stated in these operating instructions apply.

Litters Removed Configuration:

If the litters are removed and the the basic shape door glass panels are installed the basic flight manual limitations apply.

If the litters are removed and the bubble glass door panels remain, limitations stated in these operating instructions apply.

Gross Weight Limitations:

Maximum gross weight with the litter kit installed is 2539 pounds for helicopters with the the 250-C18 engine installed; with the 250-C20 engine, no change.

Center of Gravity Limitations:

Center of gravity limits are the same as those for the basic helicopter except that the maximum aft longitudinal center of gravity is 104.0 inches.

Airspeed Limitations:

Maximum speed (V_{NE}) is limited to 113 knots IAS from sea level to 1400 feet.

Above 1400 feet, reduce V_{NE} in accordance with Figure 9-6.

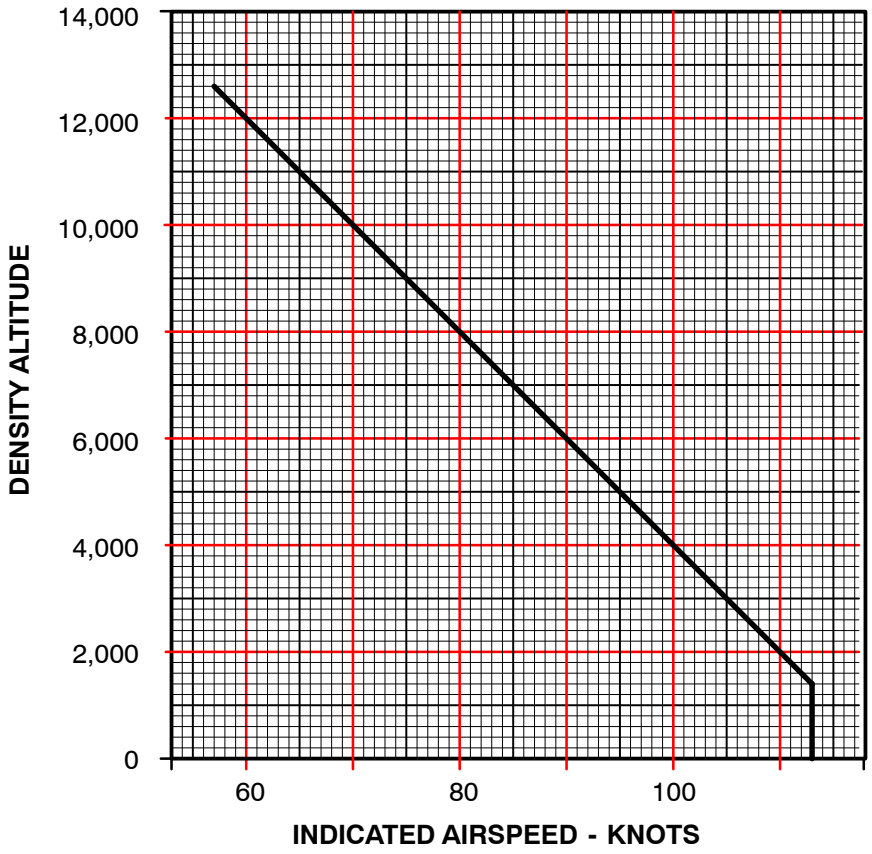


Figure 9-6. Variation of V_{NE} With Altitude

V_{NE} WITH BUBBLE DOORS 369H90085						
PRESS ALT X 1000	V_{NE} KNOTS, IAS					
°C OAT	G.W. UP TO 2536 LBS					
	0	1	4	7	10	13
- 30	113			104	86	167
- 15				95	76	58
0			104	85	67	49
15			95	77	59	-
30	111	105	87	68	50	-
45	103	97	79	61	-	-
369H6528- 511						

Figure 9-7. V_{NE} Placard

PART IV
NORMAL PROCEDURES

Before Takeoff:

Restraining belts for litter occupants should be secure prior to flight. Belts are to be installed with the fixed length, 369H6511-1 1; -13 (with buckle) attached to the outboard fitting, on each side of helicopter.

In Flight:

Attendants should remain seated with belts fastened as much as possible, especially during takeoff and landing.

When rear seats are installed, seats belts must be installed in accordance with the HMI.

PART V
PERFORMANCE DATA

Litters Installed Configuration:

When the litters are installed, operations must be conducted with the bubble glass window panels installed and performance will be as noted in the following paragraphs.

Hover Performance:

Reduce hover performance by 14 pounds with litter kit installed in basic helicopter or in combination with other optional equipment items (ie., Utility Float Kit).

Speed for Best Rate of Climb:

The variation of speed for best rate of climb is shown in Figure 9-8.

Airspeed Calibration:

Indicated airspeed versus calibrated airspeed for a ship equipped with the litter kit is shown in Figure 9-9.

Litter Removed Configuration:

If the litters are removed and the bubble glass door panels remain installed, performance will be as noted in preceding paragraphs.

If the Litters are removed and the basic shape door panels are installed, the basic flight manual (Section V) provisions apply.

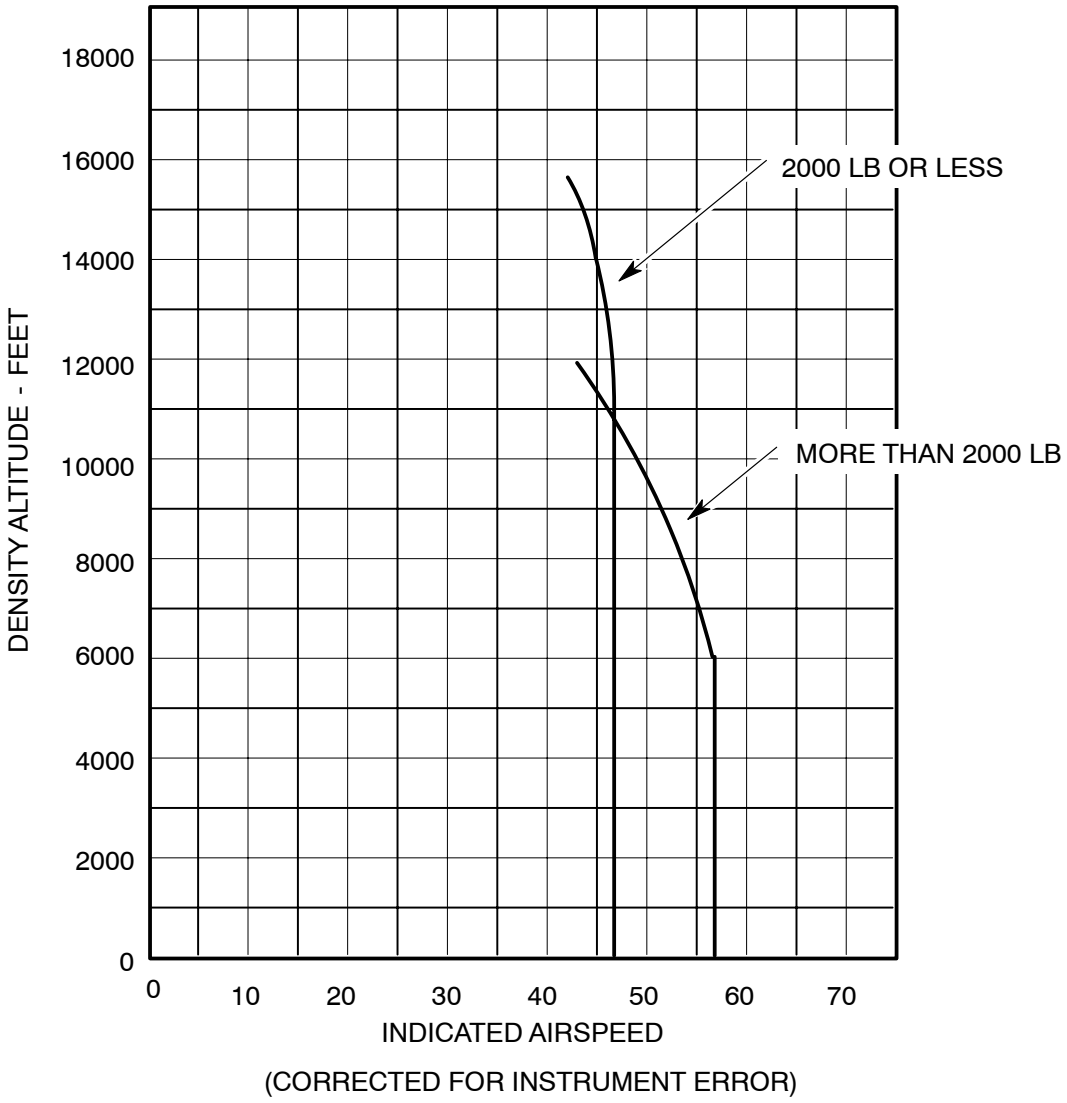
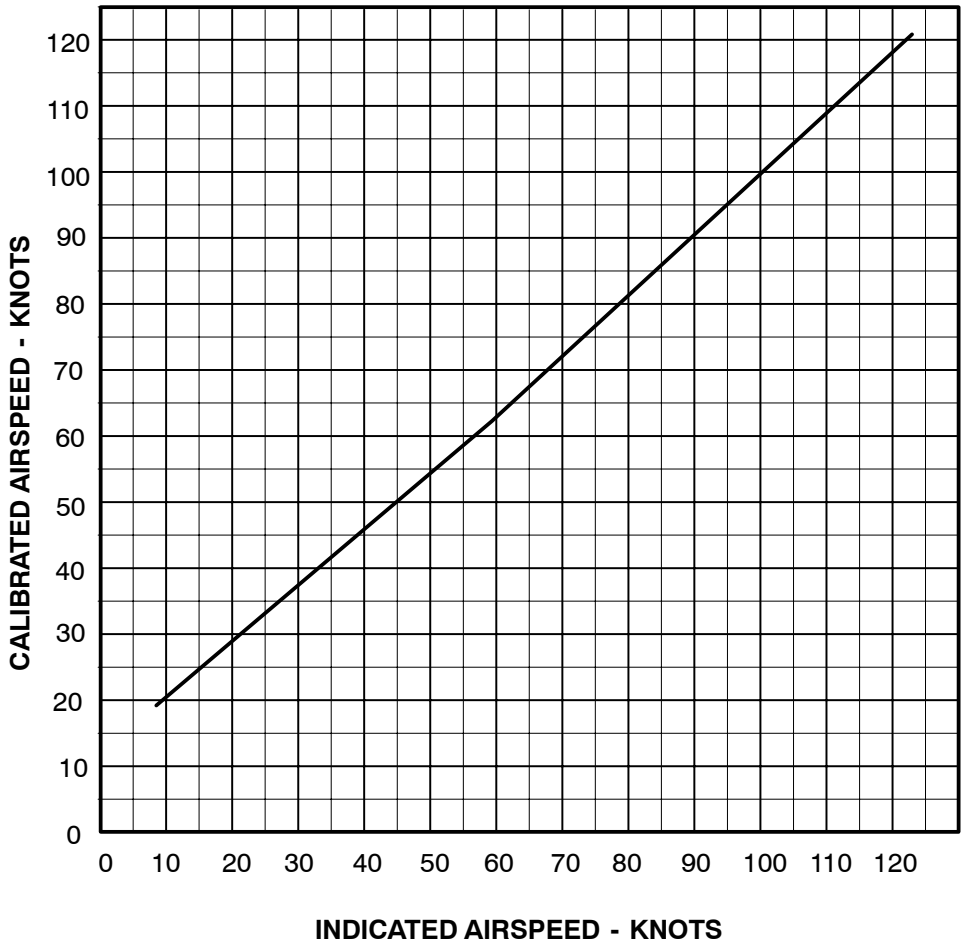


Figure 9-8. Best Rate of Climb Speed



F01-050

Figure 9-9. Indicated Airspeed Vs Calibrated Airspeed

PART VI
WEIGHT AND BALANCE DATA

Weight and Loading:

ITEM	WEIGHT (Lbs.)	STATION (In.)
Litter Kit - without bubble doors	49.9	93.3
Special doors with bubble windows	37.4	98.5
Special doors with standard windows	26.2	100.0

Aircraft loadings with litter kit are permissible for as many as seven persons (based on 170 pounds each), and may be positioned indiscriminately for any combination under seven, provided the gross weight of 2536 pounds (with 250-C18 engine) or 2550 pounds (with 250-C20 engine) is not exceeded. Some loading conditions may result in a limitation to the fuel supply. Substantial differences in the weight of the passengers will necessitate a weight and balance analysis to assure center of gravity limits are maintained.

The following longitudinal center of gravity stations should be used to determine weight and balance if required:

ITEM	LONGITUDINAL CG (IN.)
Pilot	73.5
Forward Passenger	73.5
Forward Center Passenger	71.5
Litter Load (lower)	92.4
Litter Load (Upper)	96.4
Litter Attendant(s)	116.0

9-12. OPERATING INSTRUCTIONS: LUGGAGE POD

PART I
GENERAL

The Luggage Pod Kit is designed to increase the cargo carrying capability of the helicopter.

The kit consists of one or two externally mounted luggage pods and attaching hardware. The pods attach to the side of the helicopter, below the passenger compartment doors, using the jacking fittings and the cargo hook hard-points. Fold-up steps are incorporated in the pods to facilitate entry to the passenger compartment.

PART II
LIMITATIONS

Weight Limitations:

Maximum allowable weight in each pod is 250 pounds. Do not exceed 60 pounds per square foot load density in pods.

Helicopter center of gravity including effect of pod and load in pod must not exceed the helicopter center of gravity (Section VI).

Kit Combinations Limitations:

The 369H90070 Rotorcraft Hoist Kit may not be used when a Luggage pod is installed on the same side as the hoist.

Only the 369H90121-509 version of the Emergency float Kit may be used in combination with the luggage pods.

Flight Limitations:

Pod installation is limited to one pod on each side of the helicopter. Pod/pods may be installed individually or simultaneously.

PART IV
NORMAL PROCEDURES

Prior to Takeoff:

When two pods are installed, load pods as symmetrically as possible to minimize effect on lateral center of gravity.

When one pod is installed, it is recommended that it be installed on the side opposite the pilot.

Check the security of tiedown of cargo in pods.

Check security of pod door latches.

PART V
PERFORMANCE DATA

Hover Performance:

With the Luggage Pod Kit installed, hover performance capability is reduced 19 pounds.

With the Luggage Pod Kit installed in combination with the Litter kit, reduce hover performance capability by 25 pounds.

With the Luggage Pod Kit installed in combination with any other kit that reduces hover performance capability, the sum of the reduced weight capabilities for each kit shall be applied to determine hover capability.

PART VI
WEIGHT AND BALANCE DATA

Weight and Loading:

ITEM	WEIGHT (Lbs.)	STATION (In.)
Luggage Pod (ea)	30.7	99.1

A weight and balance analysis should be performed for loading of the luggage pods. See Section VI for CG envelope. The maximum allowable load for each pod is 250 pounds.

The following center of gravity stations should be used to determine a weight and balance analysis:

Items	Longitudinal	Lateral CG (in.)
Pilot (LH or RH)	73.5	±13.0
Passenger - Fwd Outboard	73.5	±13.0
Passenger - Aft L/H	105.0	-12.1
Passenger - Aft R/H	105.0	+12.1
Luggage Pod Load (center of pod compartment)	99.1	±25.3

9-13. OPERATING INSTRUCTIONS: SEARCH LIGHT

PART I
GENERAL

The MDHI Searchlight Kit is designed to provide illumination for night search operations by law enforcement agencies or any other purpose which requires ground illumination.

The searchlight kit consists of dual searchlight assemblies mounted below the cockpit, a handle which protrudes through the cockpit floor and provides for operation of the searchlight in flight, a warning light which indicates when the lights are extended, and the necessary structural support and electrical system.

PART II
LIMITATIONS

Kit Combination Limitations:

The search light control handle must be in the stowed (handle forward) position when the copilot's cyclic stick is installed.

The Searchlight Kit may not be installed simultaneously with the Utility Float Kit or the Emergency Float Kit unless Skid Tip Position Lights are installed.

PART IV
NORMAL PROCEDURES

Operating Procedures:

The searchlight may be extended at any time following takeoff and transition into forward flight, or in hover with sufficient ground clearance.

The warning light will illuminate any time the searchlight is out of the stowed (retracted and locked) position.

Prior to landing, assure that the searchlight is in the stowed position (warning light out).

During inflight searchlight operations, the operator should use care to avoid glare and reflections on the canopy that may distract the pilot.

When the searchlight kit is installed with utility floats, the lights should not be turned on until fully extended and care should be exercised to avoid prolonged exposure of the light beam on the floats.

When the searchlight kit is installed in combination with the Cargo Hook or Cargo Sling Kit, use care to avoid fouling cargo cables in the searchlight.

9-14. OPERATING INSTRUCTIONS: UTILITY FLOATS

PART I
GENERAL

The MDHI Utility Float Kit is designed to facilitate operation of the helicopter from both land and water.

The kit consists of multicell bag-type floats, two aft skid tube extensions, and assorted attaching hardware and is mounted on extended landing gear.

An optional Night Landing Kit is available consisting of dual belly mounted sealed beam lights, a circuit breaker and a three position switch installed on the collective control. Switch forward position activates the standard nose mounted landing light; center position is off; and aft position illuminates the the belly lights. Night flight over water is permitted with the night landing light kit installed.

PART II
LIMITATIONS

Weight Limitations:

NOTE: Figure 9-10 does not apply to helicopters equipped with the optional aluminum tail rotor kit or with the 250-C20 engine installed.

Maximum gross weight is 2515 pounds with 250-C18 engine installed. See Figure 9-10 for takeoff and landing weight limitations.

Center of Gravity Limitations:

Longitudinal center of gravity limits are station 99 to 104 at all gross weights.

Flight Limitations:

Night flights with floats permitted if the following equipment is installed:

Standard night light kit.

Lighting kit, P/N 369H90062-511.

Takeoff from and landing on water, and flight over water beyond autorotational capability to the ground, is permitted at night if Night Landing Lighting Kit 369D292032 is installed.

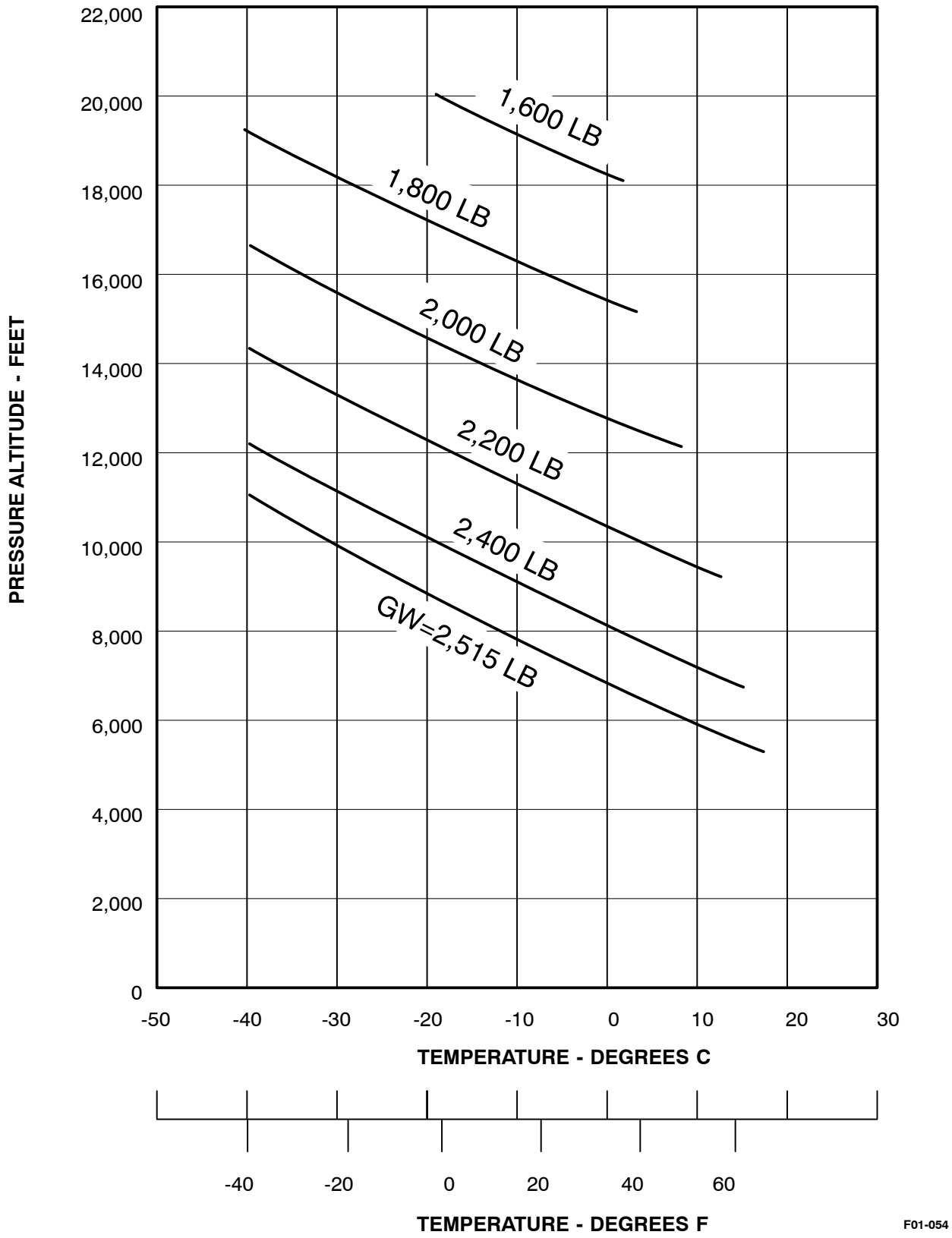


Figure 9-10. Takeoff and Landing Limitations - 250-C18 Engine

Changes of altitude are limited is accordance with the following:

If The Base Altitude Float Pressure Is: (psig)	The Allowable Altitude Increase Is: (feet)	The Allowable Altitude Decrease Is: (feet)
1.5 (minimum)	7400	0
2.0	5100	1000
3.0	3000	3000
4.0	1000	5100
5.0	0	7400

NOTE: This will include the normal variations in ambient temperature associated with changes in altitude.

The floats incorporate a pressure relief valve with a nominal setting of 5 psig. If the allowable increase in altitude noted above is exceeded, minimum operational float pressure (1.5 psig) will not be available on return to base altitude.

To account for variations in ambient temperature or water temperature at a given base of operations, the following criteria should be used to maintain the minimum 1.5 psig inflation pressure.

When an ambient (air) temperature or water temperature colder than the temperature at initial inflation is anticipated, float inflation pressure should be increased 0.5 psig (above minimum 1.5 psig) for each 15 degrees decrease in temperature anticipated.

EXAMPLE: Floats inflated to 1.5 psig

75°F	ambient temperature at time of inflation
50°F	anticipated water temperature at scheduled landing site
25°F	temperature decrease

Pressure change to account for: (25° ÷ 15°) X 0.5 psig = 0.8 psig

Minimum float inflation pressure for this operation would be:
1.5 psig + 0.8 psig = 2.3 psig

Temperature increase will increase float inflation pressure and need not be considered.

Kit Combinations Limitations:

The 369H90060 Passenger Step Kit may not be installed in combination with the Utility Floats.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Engine Failure:

Perform engine failure procedures as stated in Section III of the flight manual.

If engine failure occurs at night, do not illuminate the night landing lights above 1000 AGL.

PART IV
NORMAL PROCEDURES

Rotor Engagement or Rotor Brake Application on Water:

Determine that sufficient clearance exists between the helicopter and any obstacle during these operations. Tail swing before directional control is obtained during engagement will be approximately 200 degrees nose right and 200 degrees nose left during rotor brake application.

Landing:

Water landing speed should be 20 knots or less.

Touchdown with a slightly tail low attitude.

Water taxi speed should be less than 10 mph. It will be necessary to increase collective pitch to taxi at more than 5 mph.

For normal night landings, the night landing light should be turned on.

PART V
PERFORMANCE DATA

Hover Ceiling:

See Section V or Section VIII of the Pilot's Flight Manual.

Height-Velocity Diagram is the same as in Section V of the PFM, and includes the condition of calm water for landings on water.

9-15. OPERATING INSTRUCTIONS: AUTOMATIC REIGNITION

PART I
GENERAL

The Automatic Engine Reignition Kit provides automatic reignition of the engine in the event that power is lost as a result of engine flameout. There are three versions of this kit: an early system (250-C18 only), a later unmodified system (250-C18 or 250-C20 engine) and a later modified system (250-C18 or 250-C20 engine).

Early system (250-C18 only):

The system consists of a pressure switch in the engine compartment sensing engine torque pressure, a guarded arming switch and two indicator lights on the instrument panel in the cockpit, plus the necessary electrical components and wiring to connect the system.

When the system is armed by means of the cockpit switch, the ARMED indicator light is illuminated. Engine torque pressure less than approximately 25 psi will close the pressure switch illuminating the RE-IGN indicator light in the cockpit and energizing the engine ignition exciter to reignite the engine.

Later unmodified System (250-C18 or C20):

The system consists of a modification to the Engine Failure/ Low Rotor Speed Warning sensing unit, a guarded arming switch and two indicator lights on the instrument panel in the cockpit, plus the necessary electrical components and wiring to connect the system.

When the system is armed by means of the cockpit switch, the ARMED indicator light is illuminated. Main rotor speed less than 98% or N_1 speed less than 55%, depending on the throttle position, will illuminate the RE-IGN indicator light in the cockpit and energize the engine ignition exciter to reignite the engine.

Later, modified system (250-C18 or C20):

This system consists of a modification to the Engine Failure/Low Rotor RPM warning sensing unit, a test switch and two indicator lights on the instrument panel plus the necessary electrical components and wiring to connect the system.

Whenever there is transmission oil pressure, the **ARMED** indicator is illuminated. Rotor speeds less than 98 ±1 percent N_2 or N_1 speeds below 55 percent the **RE-IGN** indicator and energize the ignition exciter.

PART II
LIMITATIONS

Flight into falling or blowing snow is only permitted with the automatic reignition system armed and operable.

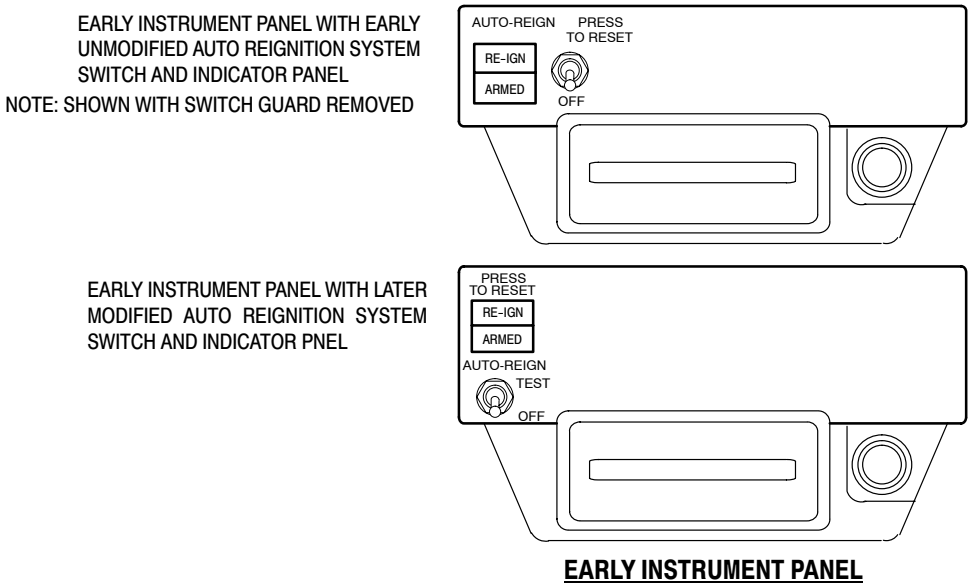
Flight into falling or blowing snow is only permitted with the center front seat occupied following completion of HN-160.

Placards:

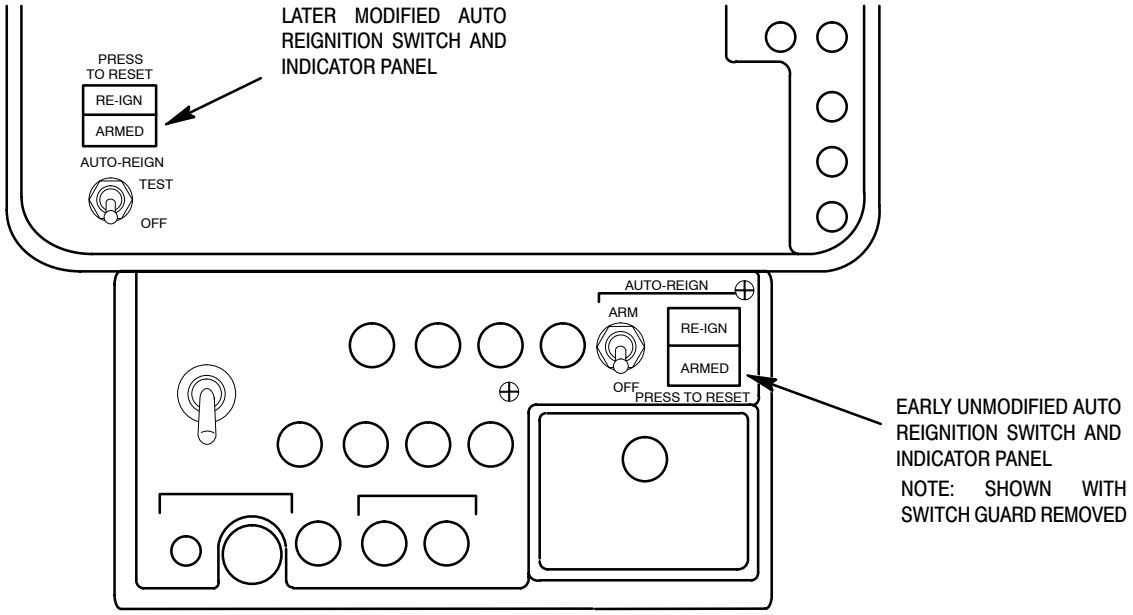
The following placard is to be located in view of the pilot and in close proximity to the automatic reignition arming switch if HN-160 has not been completed.

MIDDLE FRONT SEAT IS NOT TO BE OCCUPIED DURING FLIGHT INTO FALLING OR BLOWING SNOW

NOTE: The above placard is not required if the helicopter has been modified per HN-160 or is equipped with the "later modified automatic reignition system".



EARLY INSTRUMENT PANEL



LATER INSTRUMENT PANEL

F01-075

Figure 9-11. Auto Reignition Switch Panel Locations

PART IV
NORMAL PROCEDURES

Early system (250-C18 only):

Before engine start:

- Electrical power and key switch on.
- Lift switch guard and arm the system. **ARMED** light should illuminate and ignition igniter operation heard. Press **RE-IGN** light; light should go off and immediately come on again.
- Set **ARMED** switch to **OFF**.

Engine Run-up:

- Set engine torque to approximately 40 psi. Reset the **RE-IGN** switch.
- Lift guard on arming switch and arm the system. Green **ARMED** light should illuminate.
- Reduce engine torque to below 25 psi. The **RE-IGN** light (amber) should illuminate, indicating operation of the ignition igniter.
- If it is desired to extinguish the **RE-IGN** light, increase engine torque pressure to approximately 40 psi. Press and release **RE-IGN** light. Light should go out.
- Arm the system any time falling or blowing snow is encountered.

NOTE: Each time the engine torque pressure falls below 25 psi with the system **ARMED**, the amber **RE-IGN** indicator will illuminate, indicating that the ignition igniter is firing.

CAUTION **If RE-IGN light is reset OFF at than 40 psi torque, it will not indicate the next activation.**

NOTE: If the activation of the system is intentional, i.e. power reduction for descent, the **RE-IGN** light must be returned to **OFF** after engine torque pressure exceeds 40 psi to reset the warning light for the next activation.

- Following any activation of reignition system caused by flameout from snow, ice or water ingestion, inspect engine in accordance with Allison 250 Series C18 Operation and Maintenance Manual.
- Yawing of the helicopter may or may not follow an engine flameout and reignition sequence. The magnitude of the yaw will depend on forward

speed and power being used. Reignition has been satisfactorily demonstrated at idle power, in autorotation, and takeoff power in a climb.

LATER, UNMODIFIED SYSTEM (250-C18 or C20):

Before engine start:

- Electrical power and key switch **ON**.
- **PNL LT** and **ENG OUT** circuit breakers **IN**.
- Place arming switch in the **ARM** position. **ARMED** light and **RE-IGN** indicators illuminate.
- Press **RE-IGN** light; light should go out. Press again; **RE-IGN** light stays out and **ARMED** light stays on.
- Set arming switch to **OFF**.

Engine run-up:

- Set N_2 above 98 ±1 percent.
- Move arming switch to **ARM**. Green **ARMED** light should illuminate and **RE-IGN** indicator should be out.
- Reduce RPM to below 98 percent. The **RE-IGN** light should illuminate indicating that the ignition igniter has been energized.
- If it is desired to extinguish the **RE-IGN** light, press and release **RE-IGN** light. Light should go out.
- If continued operation of the system is not desired, disarm the system.

Arm the system any time falling or blowing snow is encountered.

Each time that the engine failure low/rotor rpm warning system is activated (main rotor speeds below 98 percent N_2 or N_1 below 55 percent) the **RE-IGN** indicator light will illuminate, indicating that the ignition igniter has been energized.

NOTE: **RE-IGN** indicator light will stay on until manually reset. The reignition system will continue to function normally whether reset or not.

If the N_R or N_1 tach generator fails, the **RE-IGN** indicator will light and the igniter will be energized until the engine is shut down or the reignition system is disarmed (**ENG OUT** circuit breaker pulled).

Failure or deactivation of the engine failure/low rotor rpm warning system, renders the reignition system inoperative. Under certain failure conditions, the **ARMED** light may stay on.

CAUTION **Pulling out the ENG OUT circuit breaker will disarm the Auto Reignition system.**

Following any activation of reignition system caused by flameout from snow, ice or water ingestion, inspect engine in accordance with the appropriate Allison 250 Series Operation and Maintenance Manual.

Yawing of the helicopter may or may not follow an engine flameout and reignition sequence. The magnitude of the yaw will depend on forward speed and power being used.

LATER, MODIFIED SYSTEM (250-C18 or C20):

Before engine start:

- Electrical power and key switch **ON**.
- **PNL LT** and **ENG OUT** circuit breakers **IN**.
- Place and hold test switch in the **TEST** position. **ARMED** and **RE-IGN** indicators illuminate and the sound of the igniter firing is heard.
- Release test switch. Only the **RE-IGN** light should remain illuminated after the test switch is released.
- Press **RE-IGN** light to reset the light.

Engine Run-up:

NOTE: The **RE-IGN** light may illuminate when the **XMSN OIL PRESS** light goes out. After flight rpm is established, press the **RE-IGN** light to reset (extinguish) the light.

Whenever there is transmission oil pressure, the **ARMED** light should be on.

- Set N_2 above 98 ±1 percent. **RE-IGN** light should be **OFF**.
- Reduce RPM to below 98 percent. The **RE-IGN** light should illuminate indicating that the ignition igniter has been energized.
- Set N_2 to 103 percent.
- To extinguish the **RE-IGN** light, press and release **RE-IGN** light. Light should go out.

Each time that the engine failure/low/rotor rpm warning system is activated (main rotor speeds below 98 percent N_2 or N_1 below 55 percent) the **RE-IGN** indicator light will illuminate, indicating that the ignition igniter has been energized.

NOTE: **RE-IGN** indicator light will stay on until manually reset. The reignition system will continue to function normally whether reset or not.

If the N_R or N_1 tach generator fails, the **RE-IGN** indicator will light and the igniter will be energized until the engine is shut down or the reignition system is disarmed (circuit breaker pulled). The reignition system is armed under all operating conditions.

Failure or deactivation of the engine failure/low rotor rpm warning system, renders the reignition system inoperative. Under certain failure conditions, the **ARMED** light may stay on.

CAUTION **Pulling out the ENG OUT circuit breaker will disarm the Auto Reignition system.**

Following any activation of reignition system caused by flameout from snow, ice or water ingestion, inspect engine in accordance with the appropriate Allison 250 Series Operation and Maintenance Manual.

Yawing of the helicopter may or may not follow an engine flameout and reignition sequence. The magnitude of the yaw will depend on forward speed and power being used.

9-16. 369HM CONFIGURATION

369HM Serial Number Effectivity
NOTE: This option configuration applies to the following 369HM serial numbers only. Helicopter Serial No. 0101M thru 0214M, 0220M thru 0231M, 0233M thru 0238M, 0244M and subsequent.

PART I
GENERAL

The 369HM configuration is essentially the same as the basic 369HE/HS except for dual flight controls ("right-hand command"), self-sealing fuel cells, mesh seats for pilot/co-pilot, and two canvas or nylon mesh passenger seats in the cargo compartment. Additionally, the helicopter may be equipped with the standard instrument panel (Ref. Section IV) or a "T" instrument panel (Ref. Figure 9-13).

PART II
LIMITATIONS

Flight restrictions:

The minimum flight crew consists of one pilot operating the helicopter from the right seat. The left crew seat may be used for an additional pilot when the approved dual controls are installed. Solo flight from the left seat is not authorized.

PART III
EMERGENCY AND MALFUNCTION PROCEDURES

Warning and Caution indicators:

The caution and warning indicators consisting of thirteen indicator lights and a PRESS-TO-TEST switch. The PRESS-TO-TEST non-lighted switch is electrically connected to the caution and warning indicators for testing indicator lights.

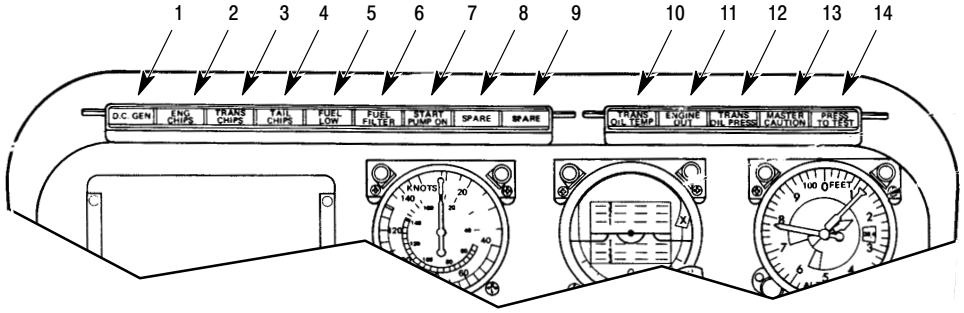
NOTE: The warning/caution indicators are not indicated by a yellow or red indicator light.

Warning and Caution annunciation:

The MASTER CAUTION light switch flashes at the same time any other warning or caution light is activated by a fault signal (e.g., engine chips). Pressing the MASTER CAUTION light/switch resets (turns off) the flashing light.

Malfunction procedures:

Refer to Section III.



1. DC GENERATOR (GENERATOR OUT)
2. ENGINE CHIPS
3. TRANSMISSION CHIPS
4. TAIL ROTOR TRANSMISSION CHIPS
5. FUEL LOW
6. FUEL FILTER
7. *START PUMP ON

*INDICATES THAT START PUMP IS "ON".

8. BATTERY 140F
9. BATTERY 160F
10. TRANSMISSION OIL TEMPERATURE
11. ENGINE OUT
12. TRANSMISSION OIL PRESSURE
13. MASTER CAUTION
14. PRESS TO TEST

F01-080

Figure 9-12. Warning and Caution Indicators - Typical

PART IV
NORMAL PROCEDURES

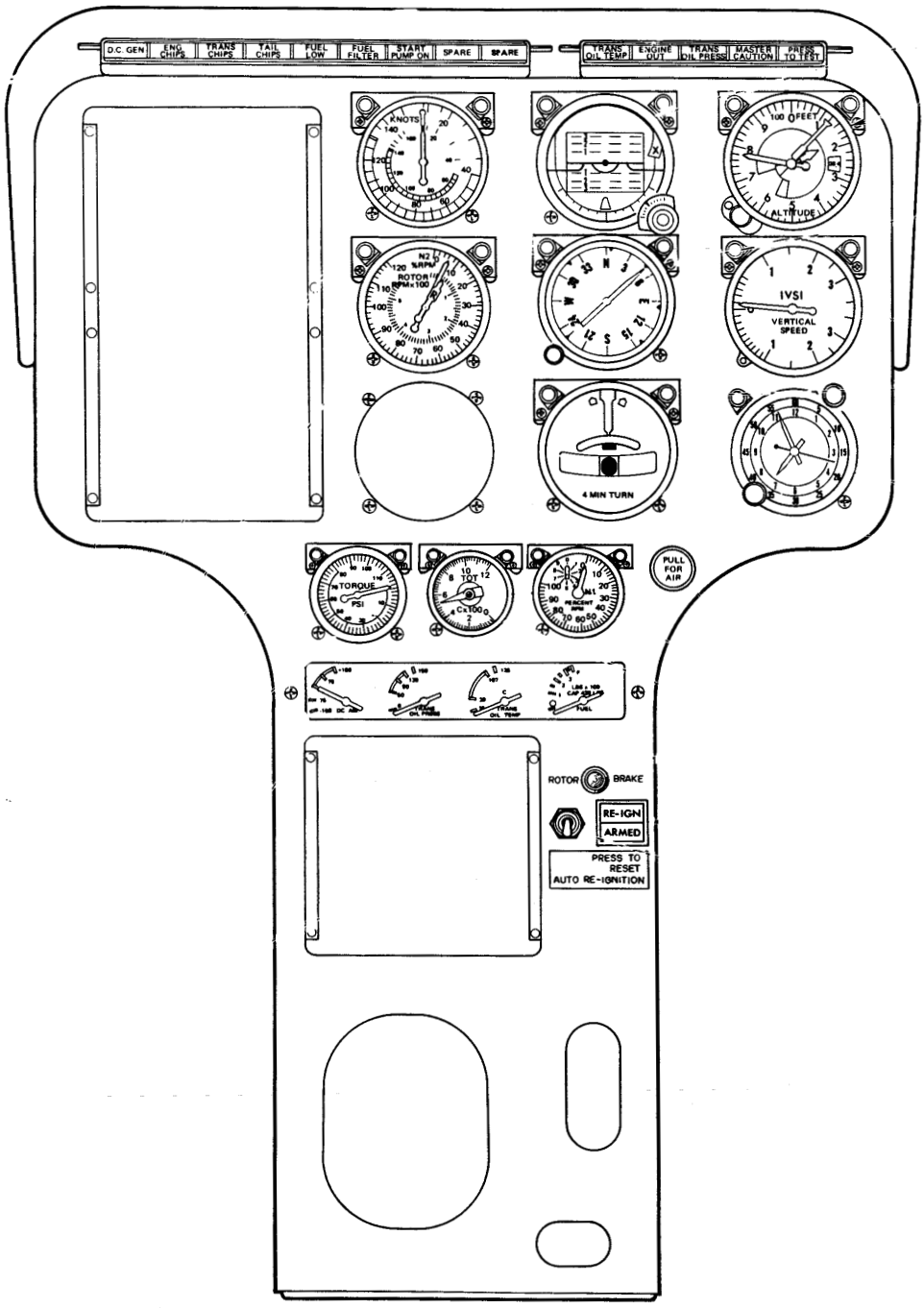


Figure 9-13. Type “T” Instrument Panel - Layout Typical

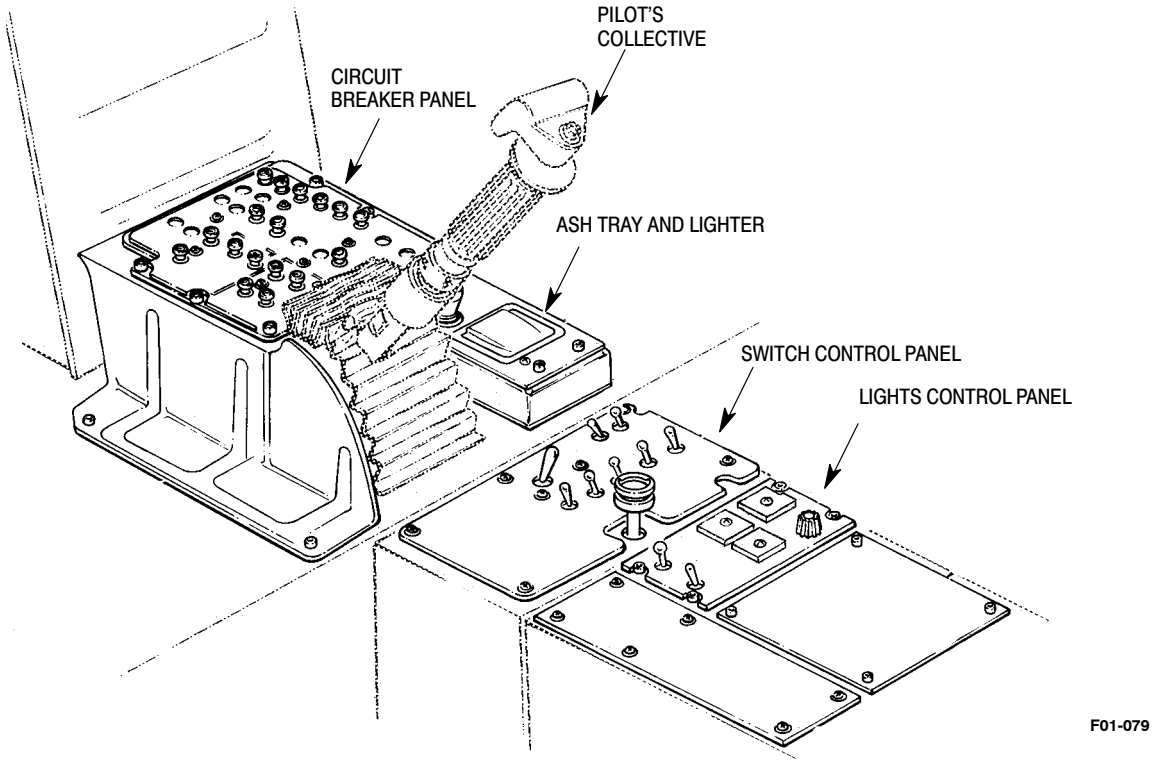


Figure 9-14. Electrical Controls Console - Layout Typical

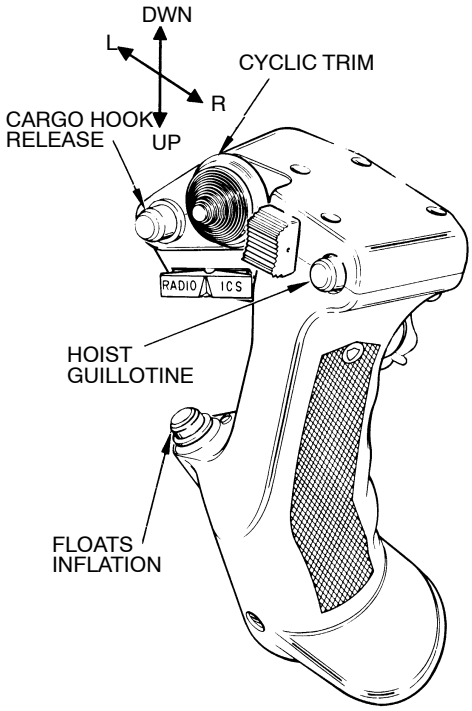


Figure 9-15. Cyclic Grip