MD HELICOPTERS INC.

Rotorcraft Flight Manual

FOR

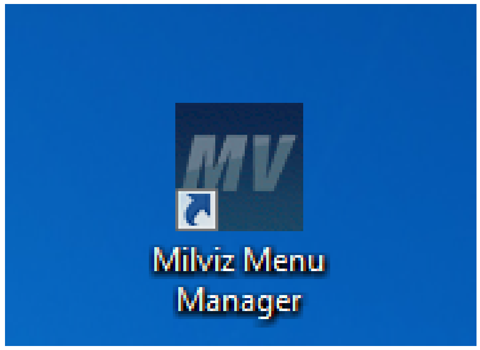
MDHI 530F–Plus (369FF) HELICOPTERS

Welcome to the MV MD530F Helicopter. We have strived to make this one the best simulation that we can. We worked hard, studied hard and talked to pilots from around the world.

If you should require or need support, please contact mailto:roadburner440@milviz.com?subject=Support forums with your proof of purchase and your requested username. He will set you up on our forums and you may ask/post your question/problem there.

So on to how to get this bird in the air...

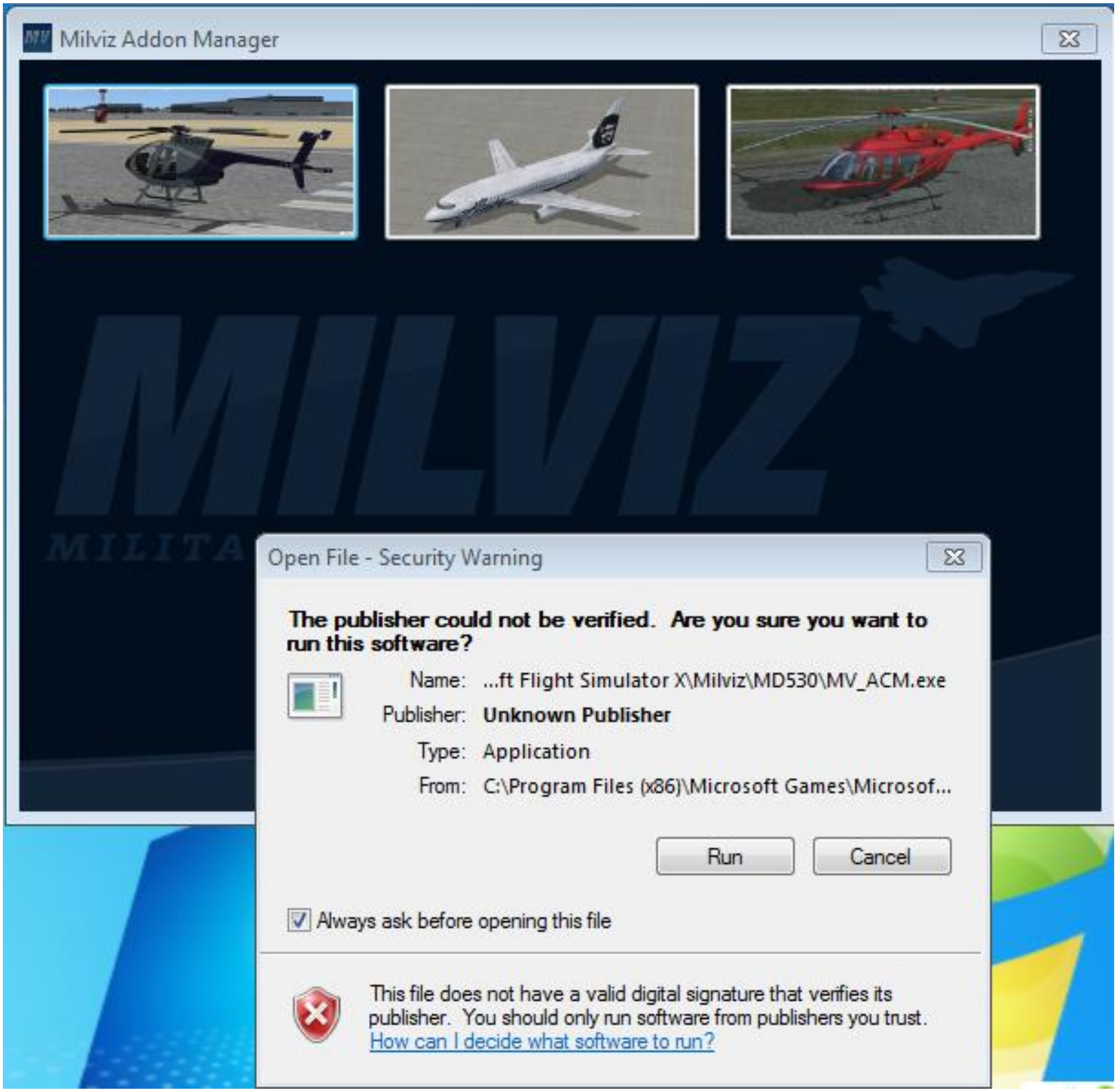
The first thing that you need to do is to run the ACM. The ACM is a program that contains all of the available parameters for the aircraft. This program is on your desktop and looks like this:



Once you've double clicked on this icon, you will be taken to the MV Manager. This is where you can control the parameters for all of the (newer) MV products. It looks like this:

Choose the MD530. In this pic, it's the first one of three. Depending on how many products you have this may be different. If it's the only one... Please, go and buy more !

Once you have selected the MD530F, you will be presented with the actual ACM of the aircraft. Before it runs, it will probably ask you to accept running this program. Please click RUN! See pic here:

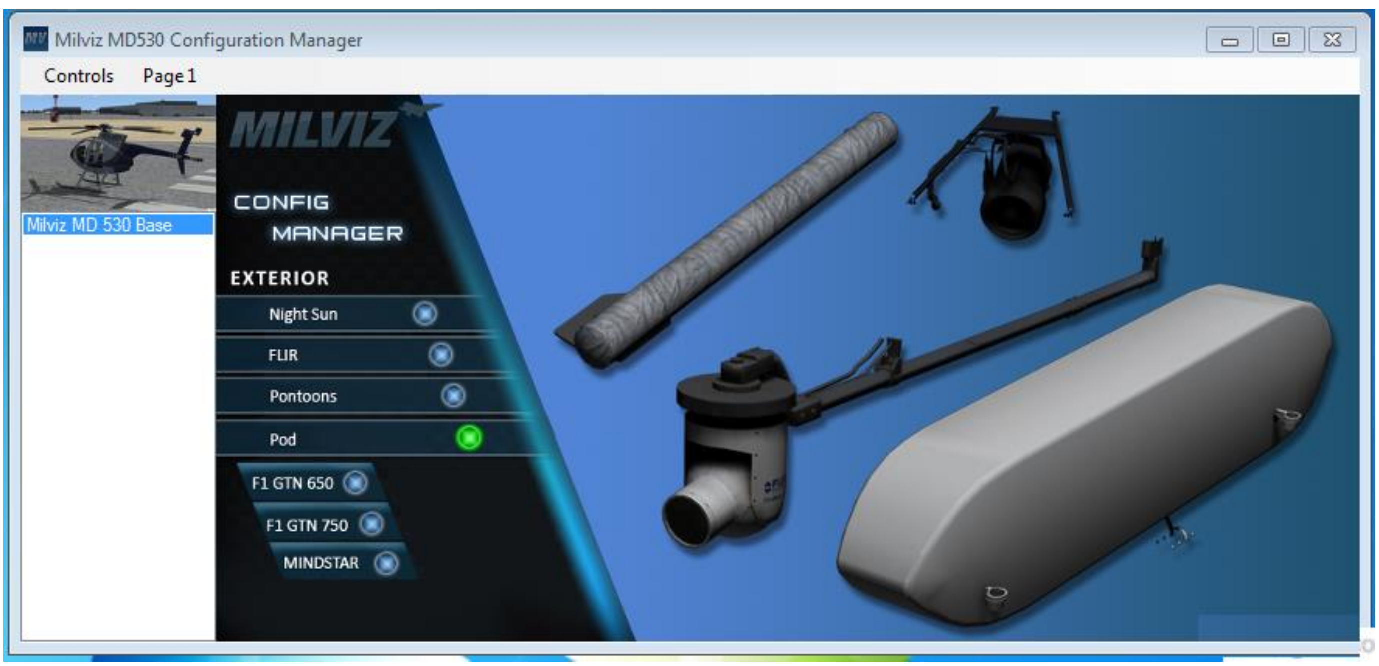


After you've chosen run, you will then be presented with the ACM:

You may pick and choose the items you wish to display on the model, pick the avionics you wish to have and, pick the state of the aircraft. You may do this differently on each and every livery that you have added.

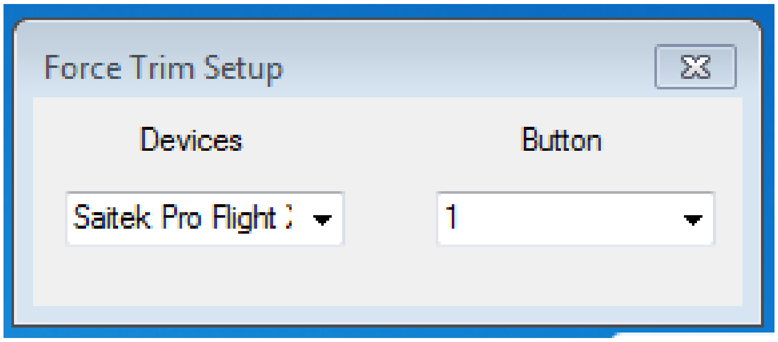
It's important to note that your default aircraft SHOULD be the Default C172 with all systems off. This allows the aircraft to set itself up properly.

If you have purchased any addon packs from us (Mindstar GPS, F1 GTN's or the MV Addons), you can use page 2 for adding or removing these. See pic:



There is also a controls menu selection that you may click. This allows you to use what is called FORCE TRIM. Though this doesn't actually exist in the MD530, there is a similar system that does essentially the same thing.

It looks like this:



Once you've done all of these, please press SAVE SETUP.   The light will light up briefly letting you know that the save has been done.

Exit the program.

Start FSX. Please do make sure that your settings are at full realism and that crash and detect damage are on.   DX10 and DX9 are both supported.

Choose the MV MD530F in the livery choice you wish. The aircraft should be in the state that you chose. If not, please check to make sure that your default aircraft is either the trike or the default C172,

If you've chosen Ready To Fly on the ACM, you are now Ready To Fly and you may move the collective up and away you go.

If, on the other hand, you have chosen Cold and Dark on the ACM.... You will have to start it up and then, you can fly away...

This helicopter, unlike the MV407 that we recently released, doesn't have FADEC. What this means is that you will have to watch your temperatures and your RPMs as well as your Torque to make sure that you do not either blow the engine or flame out.

Here are the things you must do (quickstart) to get the engine running and you, up in the air:

If it's dark outside, look towards the cabin and up and you will see a round hole... click on that. It's the cockpit light.

1) KEY ON

2) Red FUEL button IN

3) Battery ON.

4) Assure that the throttle is in cut off.

5) Starter is engaged by pressing the start button on the front of the collective for 5 seconds.

6) When N1 reaches 12%, the pilot opens the throttle twist grip until the engine lights off and watches the TOT for an immediate temperature rise (about 760C)

7)As the engine spools up, the pilot rotates the twist grip to maintain between 760-820C TOT (the temp will drop if you don't maintain it with the twist grip because more cooling air is coming into the engine) Engine starts that are allowed to go below 760C are bad for the engine (due to a shift in the flame pattern) and the manual says to abort the start if the temps don't go above 760C. Engine starts where the temps exceed 826C for 10 seconds or 927C for 1 second are hot starts and the start must be aborted before you melt the engine down. (There will be a bang of sorts and the aircraft will not be startable. You will have to restart your flight).

7) The pilot continues to increase throttle until it reaches the idle detent (the throttle collar will click).

8) Once the N1 reaches 58-60% the starter is released.

You may get a little nervous during the initial light off and back the throttle off which causes the fire to go out. Not a big deal as long as the starter is still motoring, just embarrassing. You may do a restart.

http://www.milviz.com/manuals/1.jpg

http://www.milviz.com/manuals/2.jpg

We have included for you in this package, the "actual" manual for a MD530F. Do note that some systems will not work as per the real thing... (emergency issues such as fire...) but, for the most part, we have pretty much done it as per the manual.

Please fly safely and avoid running into wires.

On the following pages are the basic numbers for the helicopter.

Thank your for your purchase.

The MV Team.

Credits:

Senior Coder: Chuck Jodry

Secondary Coder: Jon Bleeker

Assisted by: Federico Sucari

Model and Paint: Ion Carbuni

Nightlighting: Dmitriy Usatiy

Manual: Colin Pearson.

Project Management: Colin Pearson.

Though we usually list out our testers, for this one we will not be doing that. We do, however, think very highly of them! Thanks guys!

Engine limits, Fuel systems and Flight Control systems:

Engine torque limits:
Maximum takeoff (5 minute): 59.6 psi torque.
Maximum continuous: 48.9 psi torque
Transient torque limits: None.
Turbine outlet temperature limits:
Maximum takeoff (5 minute): 768°C
Maximum continuous: 694°C
Maximum for starting (lightoff): 150°C
Transient limits:
During start and shutdown: 826°C to 927°C for 10 seconds or less with a momentary peak temperature of 927°C for not more than 1 second.
During power changes in flight: 768°C to 905°C for 12 seconds.
Gas producer (N1) speed limits:
Maximum continuous: 105%.
Minimum: ground idle speed 64%.
Transient limits: 106% for 10 seconds.
Power Turbine (N2) speed limits:
Maximum allowable output shaft (N2) speed exceeds helicopter allowable speed (red dot at 106.5 percent N2). Observe rotor limits.
Power turbine (N2) speed avoid range:

Avoid steady state operations between 71.8% and 91.5%.

Engine out warning at 55 percent N1

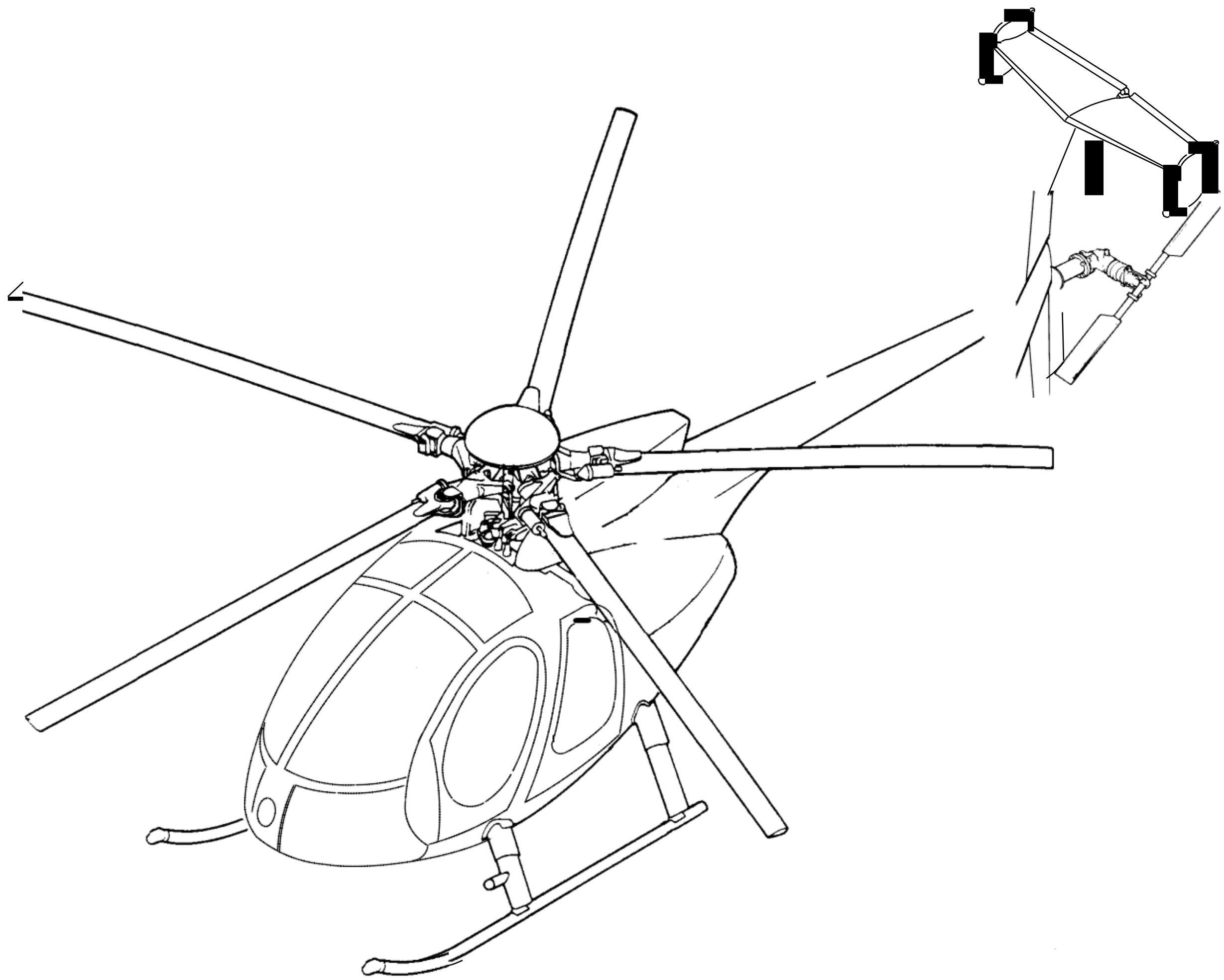
Fuel Cells - Standard Nonself-sealing, Capacity: 64.0 US Gal (242 liters), 416

All flight controls are manual. The helicopter is equipped with Honeywell dual KX175 navigation system receivers and Honeywell (formerly Allied Signal) KR 85 automatic direction finder, night flying lighting, attitude and directional gyroscopes and a rate climb indicator. An alternative avionics fit includes a Rockwell Collins VHF-251/231 navigation receiver fitted with an IND-350 navigation indicator and an ADF-650 automatic direction finder.

The communications system is based on a dual Honeywell KY195 transmitter / receiver and KT76 transponder or alternatively a Rockwell Collins VHF-251 and TDR-950 transceiver and transponder.

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 N2.
80.0 psi torque for 3 seconds at 104 percent N2.
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 (N1) speed limits:
Maximum continuous: 104%
Ground idle speed: 61 - 65%
Transient limits:
104 - 106% for 15 seconds
Power Turbine (N2) speed limits:
Normal Power On operation: 103% to 104% N2.
Transient overspeed limit (15 seconds maximum): 113% at idle power varying
linearly to 108% at 64.5 psi torque.
Avoid steady state operations between 75% and 88%. Transition through the
speed avoid range is to be accomplished as quickly as possible.
Maximum allowable time in the speed avoid range is 1 minute.
NOTE: Refer to Rolls-Royce CEB A-1400.
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 N1 and above: 115 - 130 psig
78.5 to 94.2 percent N1: 90 - 130 psig
78.5 percent N1 and below: 50 - 130 psig

MD 530F PLUS



ROTORCRAFT FLIGHT MANUAL

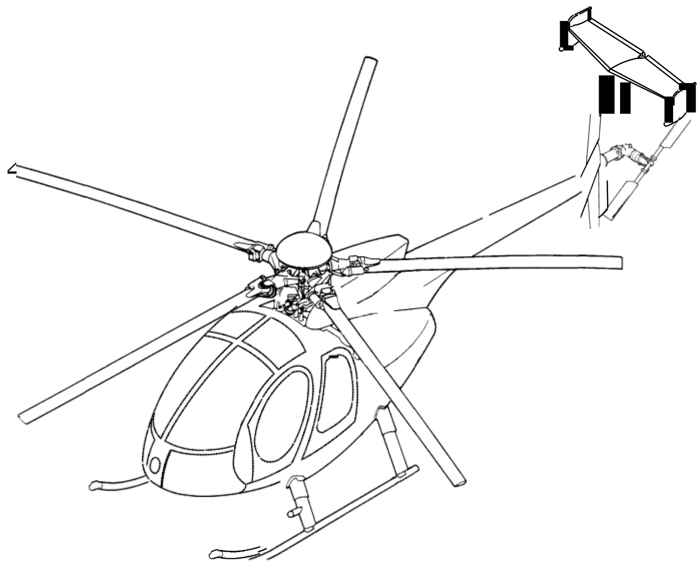
REGISTRATION NO: ________________

SERIAL NO: ________________

F04–000

HELICOPTERS®

MD 530F PLUS®



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 Approval Date: 25 October 1985

Reissue #1: 14 August 1998

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, AND V CONTAIN RECOMMENDED PROCEDURES AND DATA AND ARE FAA APPROVED.

THE "AIRWORTHINESS LIMITATIONS" LISTED IN SECTION 04-00-00 OF CSP-HMI-2 SHALL BE COMPLIED WITH.
THIS MANUAL MUST BE KEPT IN THE HELICOPTER AT ALL TIMES.

LOG OF REVISIONS BY DATE

FAA / NON–FAA REVISIONS

REVISION DATE/NUMBER	
Original Issue . . .	25 October 1985
Revision 1	11 April 1990
Revision 2	29 May 1990
Revision 3	17 August 1990
Revision 4	1 April 1992
Revision 5	17 July 1995
Reissue #1	14 August 1998
Revision 1	8 January 1999
Revision 2	30 December 1999
Revision 3	10 October 2000
Revision 4	22 March 2001
Revision 5	3 October 2003
Revision 6	4 October 2006
Revision 7	2 June 2009

Manager, Flight Test Branch, ANM-160L
Federal Aviation Administration
Los Angeles Aircraft Certification Office

TABLE OF CONTENTS

Section I − General

Section II − Limitations

Section III – Emergency and Malfunction Procedures

Section IV − Normal Procedures

Section V − Performance Data

Section VI − Weight and Balance Data

PARAGRAPH **PAGE**

Section VII − Handling, Servicing, and Maintenance

Section VIII − Additional Operations and Performance Data

Section IX − Optional Equipment

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 7	Section I: Paragraph 1–3. Updated FAA/ICAO aircraft type designator. Section II: Paragraph 2–6: Corrected minimum "Power on" RPM Paragraph 2–7. Added power turbine speed avoid range. Paragraph 2–12: Corrected 2601 to 2700lb VNE placard Section IV: Paragraph 4–1: Added requirement to check lead–lag link attach nuts for cracks. Paragraph 4–4 and 4–9: Added reference to power turbine speed avoid range. Paragraph 4–14: Added requirement to record torque events. Section VII: Paragraph 7–8: Removed reference to AVGAS in "Cold Weather Fuels". Paragraph 7–17: Changed reference from 103% N_2 to 100% N_2. Section VIII: Figure 8–3. Corrected example in chart. Section IX: Figure 9–1: Removed 20,000ft column from placards.

LIST OF EFFECTIVE PAGES			
SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
FRONT MATTER	Cover	– – – – – – – – –	Revision 3
	F–i	Revision 7	– – – – – – – – –
	F–ii	Revision 7	– – – – – – – – –
	F–iii	– – – – – – – – –	Revision 4
	F–iv	– – – – – – – – –	Revision 5
	F–v	– – – – – – – – –	Revision 6
	F–vi	– – – – – – – – –	Revision 5
	F–vii	– – – – – – – – –	Revision 7
	F–viii	– – – – – – – – –	Revision 7
	F–ix	– – – – – – – – –	Revision 7
	F–x	– – – – – – – – –	Revision 7
	F–xi	– – – – – – – – –	Revision 7
	F–xii	– – – – – – – – –	Revision 6
	F–xiii	– – – – – – – – –	Revision 7
	F–xiv	– – – – – – – – –	Revision 7
I	1–i/(1–ii blank)	– – – – – – – – –	Revision 5
	1–1	– – – – – – – – –	Revision 7
	1–2	– – – – – – – – –	Revision 5
	1–3	– – – – – – – – –	Revision 5
	1–4	– – – – – – – – –	Revision 5
	1–5	– – – – – – – – –	Revision 5
	1–6	– – – – – – – – –	Revision 5
	1–7	– – – – – – – – –	Revision 5
	1–8	– – – – – – – – –	Revision 5
	1–9	– – – – – – – – –	Revision 5
	1–10	– – – – – – – – –	Revision 5
	1–11	– – – – – – – – –	Revision 5
	1–12	– – – – – – – – –	Revision 5

LIST OF EFFECTIVE PAGES

SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
	1−13	− − − − − − − − −	Revision 5
	1−14	− − − − − − − − −	Revision 5
	1−15	− − − − − − − − −	Revision 5
	1−16	− − − − − − − − −	Revision 5
	1−17	− − − − − − − − −	Revision 5
	1−18	− − − − − − − − −	Revision 5
	1−19	− − − − − − − − −	Revision 5
	1−20	− − − − − − − − −	Revision 5
	1−21/(1−22 blank)	− − − − − − − − −	Revision 5
II	2−i/(2−ii blank)	Revision 4	− − − − − − − − −
	2−1	Revision 4	− − − − − − − − −
	2−2	Revision 4	− − − − − − − − −
	2−3	Revision 4	− − − − − − − − −
	2−4	Revision 7	− − − − − − − − −
	2−5	Revision 7	− − − − − − − − −
	2−6	Revision 6	− − − − − − − − −
	2−7	Revision 4	− − − − − − − − −
	2−8 [C]*	Revision 4	− − − − − − − − −
	2−9 [C]*	Revision 4	− − − − − − − − −
	2−10	Revision 4	− − − − − − − − −
	2−11	Revision 4	− − − − − − − − −
	2−12	Revision 4	− − − − − − − − −
	2−13	Revision 7	− − − − − − − − −
	2−14	Revision 4	− − − − − − − − −
	2−15	Revision 4	− − − − − − − − −
	2−16	Revision 4	− − − − − − − − −
III	3−i	Revision 5	− − − − − − − − −
	3−ii	Revision 5	− − − − − − − − −
	3−1	Revision 5	− − − − − − − − −
	3−2	Revision 5	− − − − − − − − −

LIST OF EFFECTIVE PAGES

SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
	3−3	Revision 5	− − − − − − − − −
	3−4	Revision 5	− − − − − − − − −
	3−5	Revision 5	− − − − − − − − −
	3−6	Revision 5	− − − − − − − − −
	3−7	Revision 5	− − − − − − − − −
	3−8	Revision 5	− − − − − − − − −
	3−9	Revision 5	− − − − − − − − −
	3−10	Revision 5	− − − − − − − − −
	3−11	Revision 5	− − − − − − − − −
	3−12	Revision 5	− − − − − − − − −
	3−13	Revision 5	− − − − − − − − −
	3−14	Revision 5	− − − − − − − − −
	3−15	Revision 5	− − − − − − − − −
	3−16	Revision 5	− − − − − − − − −
	3−17	Revision 5	− − − − − − − − −
	3−18	Revision 5	− − − − − − − − −
	3−19	Revision 5	− − − − − − − − −
	3−20	Revision 5	− − − − − − − − −
	3−21	Revision 5	− − − − − − − − −
	3−22	Revision 5	− − − − − − − − −
	3−23	Revision 5	− − − − − − − − −
	3−24	Revision 5	− − − − − − − − −
	3−25	Revision 5	− − − − − − − − −
	3−26	Revision 5	− − − − − − − − −
	3−27/(2−28 blank)	Revision 5	− − − − − − − − −
IV	4−i/(4−ii blank)	Revision 4	− − − − − − − − −
	4−1	Revision 4	− − − − − − − − −
	4−2	Revision 4	− − − − − − − − −
	4−3	Revision 4	− − − − − − − − −
	4−4	Revision 7	− − − − − − − − −
	4−5	Revision 6	− − − − − − − − −
	4−6	Revision 4	− − − − − − − − −

LIST OF EFFECTIVE PAGES

SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
	4−7	Revision 4	− − − − − − − − −
	4−8	Revision 4	− − − − − − − − −
	4−9	Revision 4	− − − − − − − − −
	4−10	Revision 4	− − − − − − − − −
	4−11	Revision 4	− − − − − − − − −
	4−12	Revision 4	− − − − − − − − −
	4−13	Revision 4	− − − − − − − − −
	4−14	Revision 4	− − − − − − − − −
	4−15	Revision 4	− − − − − − − − −
	4−16	Revision 5	− − − − − − − − −
	4−17	Revision 4	− − − − − − − − −
	4−18	Revision 7	− − − − − − − − −
	4−19	Revision 4	− − − − − − − − −
	4−20	Revision 4	− − − − − − − − −
	4−21	Revision 4	− − − − − − − − −
	4−22	Revision 4	− − − − − − − − −
	4−23	Revision 4	− − − − − − − − −
	4−24	Revision 4	− − − − − − − − −
	4−25	Revision 7	− − − − − − − − −
	4−26	Revision 4	− − − − − − − − −
	4−27	Revision 4	− − − − − − − − −
	4−28	Revision 4	− − − − − − − − −
	4−29	Revision 7	− − − − − − − − −
	4−30	Revision 4	− − − − − − − − −
V	5−i	Revision 4	− − − − − − − − −
	5−ii	Revision 6	− − − − − − − − −
	5−1	Revision 4	− − − − − − − − −
	5−2	Revision 4	− − − − − − − − −
	5−3	Revision 4	− − − − − − − − −
	5−4	Revision 4	− − − − − − − − −
	5−5	Revision 4	− − − − − − − − −
	5−6	Revision 4	− − − − − − − − −
	5−7	Revision 4	− − − − − − − − −

LIST OF EFFECTIVE PAGES			
SECTION	**PAGE NUMBER**	**FAA APPROVED REVISION NUMBER**	**NON FAA APPROVED REVISION NUMBER**
	5−8	Revision 4	− − − − − − − − −
	5−9	Revision 4	− − − − − − − − −
	5−10	Revision 4	− − − − − − − − −
	5−11	Revision 5	− − − − − − − − −
	5−12	Revision 4	− − − − − − − − −
	5−13	Revision 4	− − − − − − − − −
	5−14	Revision 4	− − − − − − − − −
	5−15	Revision 4	− − − − − − − − −
	5−16	Revision 4	− − − − − − − − −
	5−17	Revision 4	− − − − − − − − −
	5−18	Revision 4	− − − − − − − − −
	5−19	Revision 4	− − − − − − − − −
	5−20	Revision 4	− − − − − − − − −
	5−21	Revision 6	− − − − − − − − −
	5−22	Revision 6	− − − − − − − − −
	5−23	Revision 6	− − − − − − − − −
	5−24	Revision 6	− − − − − − − − −
	5−25/(5−26 blank)	Revision 6	− − − − − − − − −
VI	6−i	− − − − − − − − −	Revision 4
	6−ii	− − − − − − − − −	Revision 4
	6−1	− − − − − − − − −	Revision 4
	6−2	− − − − − − − − −	Revision 4
	6−3	− − − − − − − − −	Revision 4
	6−4	− − − − − − − − −	Revision 4
	6−5	− − − − − − − − −	Revision 4
	6−6	− − − − − − − − −	Revision 4
	6−7	− − − − − − − − −	Revision 4
	6−8	− − − − − − − − −	Revision 4
	6−9	− − − − − − − − −	Revision 4
	6−10	− − − − − − − − −	Revision 4
	6−11	− − − − − − − − −	Revision 4
	6−12	− − − − − − − − −	Revision 4

LIST OF EFFECTIVE PAGES

SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
	6–13	– – – – – – – – –	Revision 4
	6–14	– – – – – – – – –	Revision 4
	6–15	– – – – – – – – –	Revision 4
	6–16	– – – – – – – – –	Revision 4
	6–17	– – – – – – – – –	Revision 4
	6–18	– – – – – – – – –	Revision 4
	6–19	– – – – – – – – –	Revision 4
	6–20	– – – – – – – – –	Revision 4
	6–21	– – – – – – – – –	Revision 4
	6–22	– – – – – – – – –	Revision 4
	6–23/(6–24 blank)	– – – – – – – – –	Revision 4
VII	7–i/(7–ii blank)	– – – – – – – – –	Revision 5
	7–1	– – – – – – – – –	Revision 5
	7–2	– – – – – – – – –	Revision 5
	7–3	– – – – – – – – –	Revision 5
	7–4	– – – – – – – – –	Revision 5
	7–5	– – – – – – – – –	Revision 5
	7–6	– – – – – – – – –	Revision 5
	7–7	– – – – – – – – –	Revision 5
	7–8	– – – – – – – – –	Revision 5
	7–9	– – – – – – – – –	Revision 5
	7–10	– – – – – – – – –	Revision 5
	7–11	– – – – – – – – –	Revision 5
	7–12	– – – – – – – – –	Revision 5
	7–13	– – – – – – – – –	Revision 7
	7–14	– – – – – – – – –	Revision 5
	7–15	– – – – – – – – –	Revision 5
	7–16	– – – – – – – – –	Revision 5
	7–17	– – – – – – – – –	Revision 5
	7–18	– – – – – – – – –	Revision 7
	7–19	– – – – – – – – –	Revision 5
	7–20	– – – – – – – – –	Revision 5
	7–21/(7–22 blank)	– – – – – – – – –	Revision 5

LIST OF EFFECTIVE PAGES

SECTION	PAGE NUMBER	FAA APPROVED REVISION NUMBER	NON FAA APPROVED REVISION NUMBER
VIII	8−i/(8−ii blank)	− − − − − − − − −	Revision 5
	8−1	− − − − − − − − −	Revision 5
	8−2	− − − − − − − − −	Revision 5
	8−3	− − − − − − − − −	Revision 5
	8−4	− − − − − − − − −	Revision 7
IX	9−i/(9−ii blank)	Revision 5	− − − − − − − − −
	9−1	Revision 5	− − − − − − − − −
	9−2	Revision 5	− − − − − − − − −
	9−3	Revision 5	− − − − − − − − −
	9−4	Revision 5	− − − − − − − − −
	9−5	Revision 7	− − − − − − − − −
	9−6	Revision 5	− − − − − − − − −
	9−7	Revision 5	− − − − − − − − −
	9−8	Revision 5	− − − − − − − − −
	9−9	Revision 5	− − − − − − − − −
	9−10	Revision 5	− − − − − − − − −
	9−11	Revision 5	− − − − − − − − −
	9−12	Revision 5	− − − − − − − − −
	9−13	Revision 5	− − − − − − − − −
	9−14	Revision 5	− − − − − − − − −
	9−15	Revision 5	− − − − − − − − −
	9−16	Revision 5	− − − − − − − − −
	9−17	Revision 5	− − − − − − − − −
	9−18	Revision 5	− − − − − − − − −
	9−19	Revision 5	− − − − − − − − −
	9−20	Revision 5	− − − − − − − − −
	9−21	Revision 5	− − − − − − − − −
	9−22	Revision 5	− − − − − − − − −

SECTION I
GENERAL

TABLE OF CONTENTS

SECTION I
GENERAL

1−1. INTRODUCTION

The Rotorcraft Flight Manual has been prepared to provide the pilot with all information necessary to accomplish the intended mission with the maximum amount of efficiency and safety.

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. ROTORCRAFT CERTIFICATION

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

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.

The FAA model designation is Model 369FF.

The FAA/ICAO aircraft type designator is H500.

The MDHI commercial designation is MD 530F Plus.

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 MD 530F Plus may be installed and used.

1−5. PILOT’S BRIEFING

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

Approach and depart the rotorcraft from the front in full view of the pilot, being aware of the main and tail 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.

Securing baggage and cargo to prevent blockage of emergency egress.

1−6. ORGANIZATION

This manual is organized in the following manner:

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 MDHI.

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

A

AC	Air Conditioner
AGL	Above Ground Level
ALT	Alternate; Altitude
APU	Auxiliary Power Unit
ATT	Attitude
AUTO	Automatic
AUX	Auxiliary

B

BAT	Battery
BLD	Bleed

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

dBA	Decibel, A−weighted
DC	Direct Current
DIR	Direction; Directional

E

EGT	Exhaust Gas Temperature
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
GCU	Generator Control Unit
GEN	Generator
GPU	Ground Power Unit
GW	Gross Weight

H

H_D	Density Altitude
Hg	Mercury
HIRF	High Intensity Radiated Field
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
Min	Minutes
MPH	Miles–Per–Hour

N

N_1	Gas Producer Speed
N_2	Power Turbine Speed
NAV	Navigation
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
RPM	Revolutions per Minute
RTR	Rotor

S

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

T

TOP	Takeoff Power

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	WL	Water Line
	U		X
U.S.	United States	XMSN	Transmission
	W	XPNDR	Transponder

1−10. TECHNICAL PUBLICATIONS

A file of technical publications is available to aid in obtaining maximum utilization of your rotorcraft. 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 following publications are available.

Pilot’s Flight Manual (CSP−FF−1).

Handbook of Maintenance Instructions (HMI)

Servicing and Maintenance

Instruments − Electrical − Avionics

Component Maintenance Manual (CMM)

Structural Repair Manual (SRM)

Illustrated Parts Catalog (IPC)

Service Information Notices and Letters

New and revised publications are available through MDHS 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 MDHS helicopters are urged to keep abreast of the latest information by using the subscription service.

1−11. DESIGN AND CONSTRUCTION

The MD 369FF helicopter is a 5 place, turbine powered, rotary−wing aircraft constructed primarily of aluminum alloy. The main rotor is a fully articulated five−bladed system, with anti−torque provided by a 2−bladed semi−rigid type tail rotor. Power from the turboshaft engine is transmitted through the main drive shaft to the main rotor transmission and from the main transmission through a drive shaft to the tail rotor. An overrunning (one−way) clutch, placed between the engine and main rotor transmission permits free−wheeling of the rotor system during autorotation.

Airframe:

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 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 seats for two passengers, which are adjustable in height.

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.

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.

Landing gear:

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.

Helicopter interior:

The standard MD 530F Plus requires a minimum crew of one pilot seated on the left side of the cockpit. 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.

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.

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.

Power plant:

The power plant used is the Rolls Royce Model 250−C30 gas turbine engine. The engine is capable of producing a nominal 447 shp at sea level, standard day. Up to 425 shp at 100 percent N2 is used for takeoff; 350 maximum continuous shp at 100 percent RPM 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.

Drive System:

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 and transmission oil coolers 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 air cooled 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. Lifting loads are prevented from being imposed onto the main transmission eliminating thrust loading of transmission parts.

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

Main rotor system:

The helicopter utilizes a five 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 two blades. 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.

Flight controls:

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.

1–12. ELECTRICAL SYSTEM

The 530F Plus electrical system is a direct current (DC) system with electrical power supplied by a 24 volt battery and a 28 volt, 200 amp generator driven by the aircraft’s powerplant.

The original (‘‘pre–generic") system utilizes a model–specific wire harness with additional wiring added as needed for optional equipment. Voltage regulation and control is handled by a voltage regulator, reverse current relay, overvoltage relay and a generator switch. This ‘‘pre–generic" system was delivered on aircraft serial numbers 001FF through 075FF.

Beginning with aircraft serial number 076FF the electrical system incorporated a generic electrical wire harness that is common with other current production MD500 series aircraft and includes wiring for common optional equipment kits and future growth. Co–location of major power distribution components, increased size and isolation of main feeder lines, and the use of a single generator control unit (GCU) increases the reliability and performance of the helicopter’s electrical system.

The early (‘‘early generic") version of the generic system utilized an air/ground switch to disable the ENGINE OUT/low rotor audio warning while on the ground and a three position RE–IGN test switch that, in addition to testing the reignition system, also tested the ENGINE OUT/low rotor audio warning. This ‘‘early generic" version was delivered on aircraft serial numbers 076FF through 095FF.

On aircraft serial numbers 096FF and subsequent, a modified (‘‘late generic") version of the system eliminated the air/ground switch, incorporated the ENGINE OUT/low rotor audio warning disable into the generator switch, and changed the RE–IGN test switch back to a two–position, momentary–type switch. In operating the reignition system and checking the ENGINE OUT/low rotor audio warning the ‘‘late generic" system functions almost identical to the ‘‘pre–generic" system.

Pilots should be aware that aircraft originally delivered with the ‘‘early generic" version of the system may have been modified in the field to the ‘‘late generic" version. Look at the RE–IGN test switch and it’s labelling to determine which version of the system is installed in your particular helicopter. ‘‘Pre–generic" and ‘‘late generic" utilize a two–position, momentary–type switch, labelled OFF at the bottom and TEST at the top. ‘‘Early generic" systems utilize a three–position switch labelled OFF at the bottom, FLT in the middle, and TEST GND at the top (Ref Section IV).

1−13. AUTO REIGNITION SYSTEM

The automatic reignition system provides automatic actuation of the ignition exciter in the event that power is lost as a result of engine flameout.

The system senses signals from the engine power out warning unit and consists of a indicator light (RE IGN P RST) on the instrument panel, a RE−IGN test switch, and the necessary electrical components and wiring to connect the system. Power is supplied through the ENG OUT circuit breaker and the system is armed by M/R transmission oil pressure.

Each time that an ENGINE OUT/low rotor warning is activated, the RE IGN P RST caution light will illuminate, showing that the ignition exciter has been energized. This light will remain ON until manually reset after N_1 and N_R increase back above the values (55% N_1/453 N_R) that activate the ENGINE OUT/ low rotor warning.

On Aircraft equipped with the original (‘‘pre−generic’’) electrical system the ignitor will stop firing once the N_1 and N_R increase above 55% N_1/453 N_R.

On aircraft equipped with a generic wire harness style electrical system, the ignitor will also continue to fire until the RE IGN P RST caution light is reset.

NOTE: In the event of a N_R or N_1 tach generator failure, the RE IGN P RST caution light will illuminate and the continuous duty ignition exciter will remain energized until the engine is shut down or the auto reignition system is disarmed. The reignition system is armed under all operating conditions.

Following any activation of the automatic reignition system as a result of flameout due to snow, ice, or water ingestion, inspect the engine in accordance with the appropriate Allison Operation and Maintenance Manual.

Yawing of the helicopter may or may not follow an engine flameout and reignition sequence. Magnitude of the yaw will depend on forward speed and power being used.

Failure or deactivation of the ENGINE OUT/low rotor waring system, renders the reignition system inoperative.

1−14. CAPACITIES AND DIMENSIONS

Table 1−1. Fuel System: Standard Non Self−Sealing Fuel Tanks

Fuel Type	Liters	Imp. Gal	U.S. Gal	Pounds/ Kilograms
Jet−A				
Usable	235	51.7	62.1	421.9/191.4
Unusable	7.2	1.6	1.9	13.1/5.9
Total	242	53.3	64.0	435.0/197.3
Jet−B				
Usable	235	51.7	62.1	403.5/183.0
Unusable	7.2	1.6	1.9	12.5/5.7
Total	242	53.3	64.0	416.0/188.7

Table 1−2. Fuel System: Optional Self−Sealing Fuel Tanks

Fuel Type	Liters	Imp. Gal	U.S. Gal	Pounds/ Kilograms
Jet−A				
Usable	226.8	49.9	59.9	407.0/184.9
Unusable	7.9	1.7	2.1	14.3/6.5
Total	234.7	51.6	62.0	421.3/190.8
Jet−B				
Usable	226.8	49.9	59.9	389.4/176.7
Unusable	7.9	1.7	2.1	13.6/6.2
Total	234.7	51.6	62.0	403.0/182.0

Capacities − Oil:

Engine oil tank: 3.0 U.S. quarts (2.84 L)

Main transmission: 12.0 U.S. pints (5.67 L)

Tail rotor transmission: 0.5 U.S. pints (236 cc; 0.23 L)

Dimensions

Refer to Figure 1−1 for exterior dimensions.

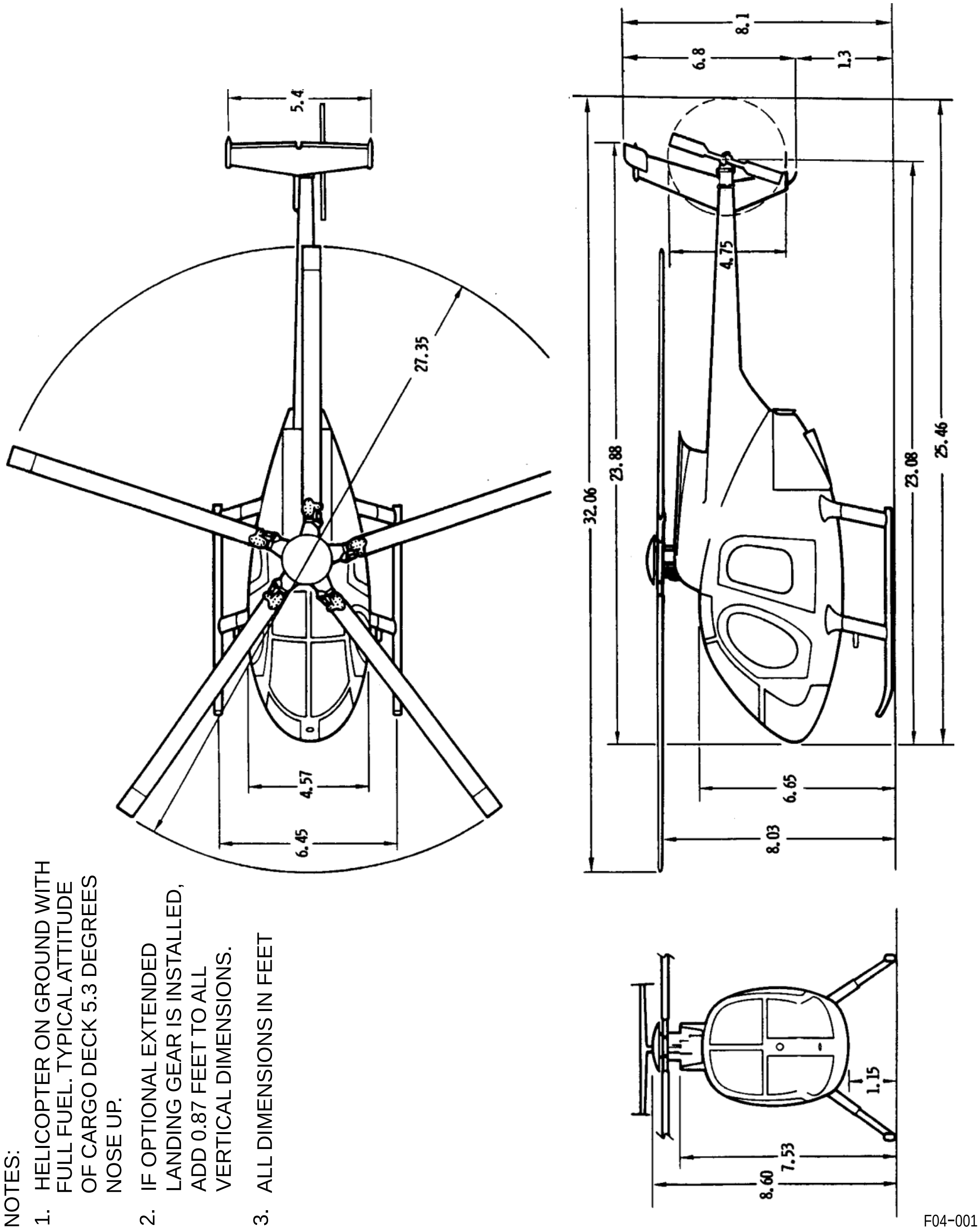


Figure 1−1. MD 530F Plus Principal Dimensions − Standard Landing Gear

1−15. CONVERSION CHARTS AND 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

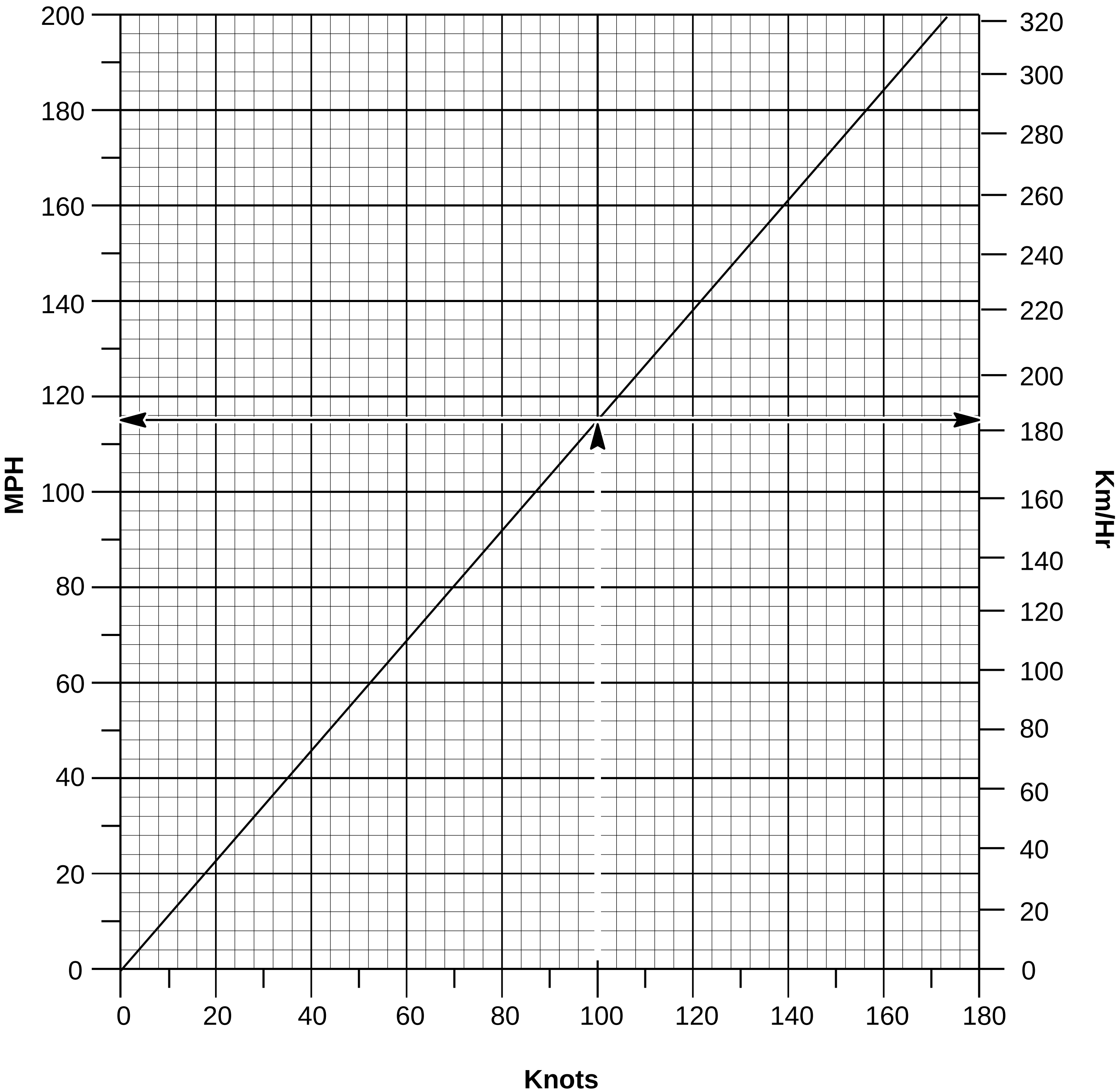


Figure 1−2. Speed: MPH/Knots/KmH

EXAMPLE:

CONVERT °F TO °C

KNOWN:
TEMPERATURE = 50° F

METHOD:
ENTER AT 50° F
READ 10° C ACROSS ON °C SCALE

METHOD MAY BE REVERSED
TO FIND ° F WHEN ° C IS KNOWN

ALTERNATE METHOD:
° F = (9/5 X °C) + 32
°C = 5/9(°F − 32)

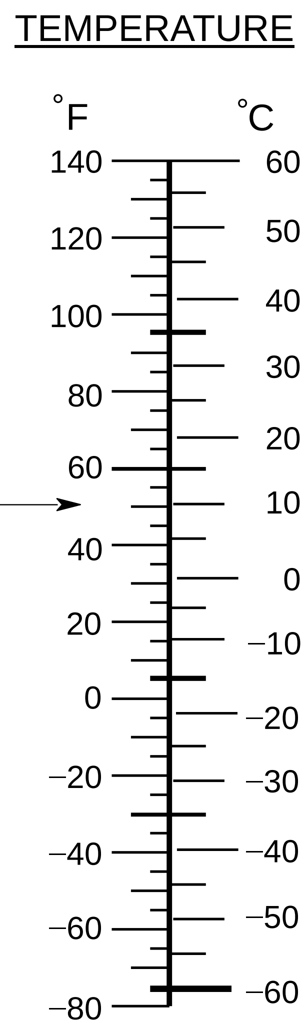


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Figure 1−3. Temperature Conversion Chart

Table 1−3. Liquid Measure − U.S. Gallons to Liters

U.S. Gallons	0 Liters	1 Liters	2 Liters	3 Liters	4 Liters	5 Liters	6 Liters	7 Liters	8 Liters	9 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
110	416.40	420.18	423.97	427.75	431.54	435.62	439.11	442.89	446.68	450.46

Table 1−4. Linear Measure − Inches to Centimeters

Inches	0 Cm	1 Cm	2 Cm	3 Cm	4 Cm	5 Cm	6 Cm	7 Cm	8 Cm	9 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 1–5. Linear Measure – Feet to Meters

Feet	0 Meters	1 Meters	2 Meters	3 Meters	4 Meters	5 Meters	6 Meters	7 Meters	8 Meters	9 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 1–6. Weight – Pounds to Kilograms

Pounds	0 Kilo-grams	1 Kilo-grams	2 Kilo-grams	3 Kilo-grams	4 Kilo-grams	5 Kilo-grams	6 Kilo-grams	7 Kilo-grams	8 Kilo-grams	9 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

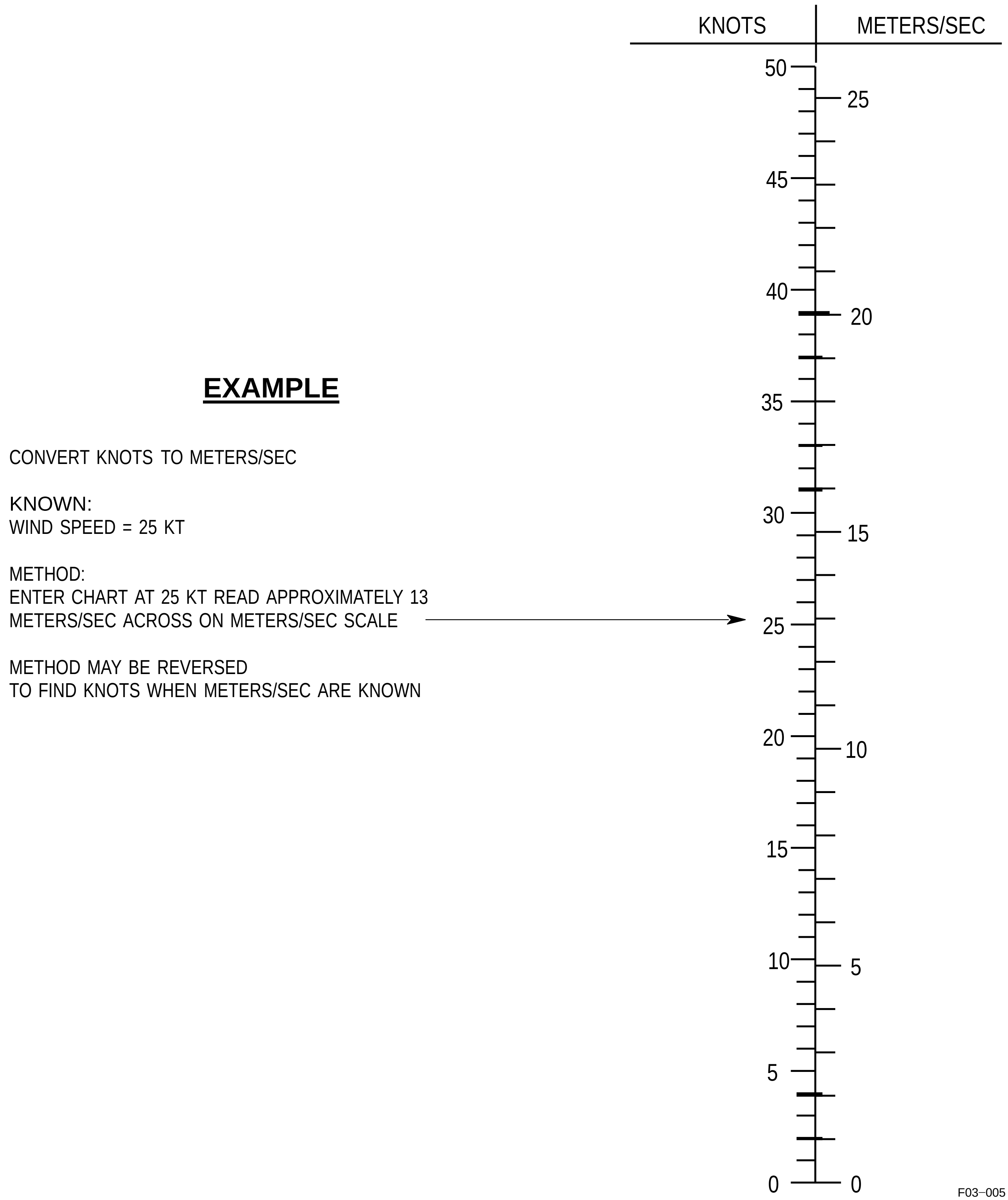


Figure 1−4. Conversion Chart: Knots − Meters/Second

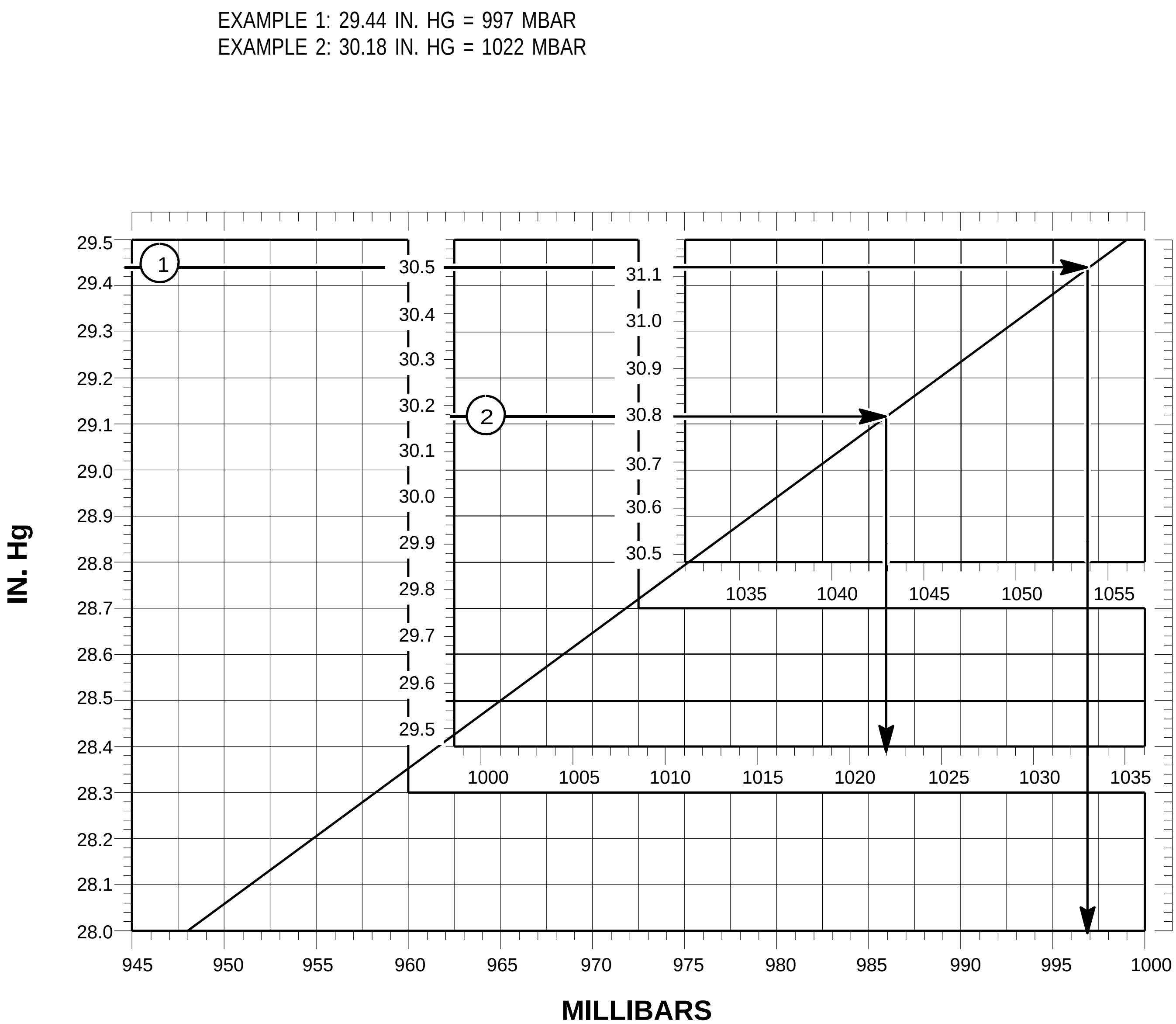


Figure 1−5. Conversion Chart: Inches of Mercury − Millibars

Table 1−7. 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

TABLE OF CONTENTS

SECTION II
LIMITATIONS

2−1. FLIGHT RESTRICTIONS

Approved as a five place (maximum) helicopter.

Flight crew position:

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

OR

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

Aerobatic flight is prohibited.

Hovering downwind with a cyclic trim failure (full forward) when wind is above 15 knots is prohibited.

Installed equipment:

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

Flight with doors removed is approved under the following conditions.

Approved doors−off configurations

All doors off.

Both rear doors off.

Both forward doors off.

Any one door off.

All loose items properly secured or stowed.

Unoccupied seat cushions and seat backs properly secured or stowed.

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, for Doors Off Flight).**

V_{NE} with doors removed: 130 KIAS or less − Ref. Paragraph 2−12.

Flight with center front seat occupied is approved under the following conditions.

Dual controls removed.

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 16,000 feet.

Ambient temperature limitations:

The maximum inlet temperature is 54°C (130°F) at sea level, decreasing linearly to 23°C (74°F) at 16,000 feet pressure altitude. Engine inlet air temperature is the same as ambient air temperature (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

V_{NE} is 50 knots IAS when torque is above 48.9 PSI.

V_{NE} is 152 KIAS or less (Ref. Paragraph 2−12).

V_{NE} is 130 KIAS (‘‘barber pole’’ on airspeed indicator) or less during autorotation (Ref. Paragraph 2−12).

V_{NE} is 130 KIAS or less when carrying less than 35 pounds of fuel (Ref. Paragraph 2−12).

V_{NE} is 130 KIAS or less during doors off flight (Ref. Paragraph 2−12).

2−4. WEIGHT LIMITATIONS

Maximum gross weight: 3100 lbs.

Minimum flying gross weight: 1700 lbs.

Cargo deck capacity: 1300 lbs. (not to exceed 115 lbs. per square foot).

Utility stowage compartment:

Maximum weight in the utility stowage compartment is 50 pounds.

CG Limits:

Ensure helicopter CG and weight are within approved limits throughout flight (Ref. Figure 2−1).

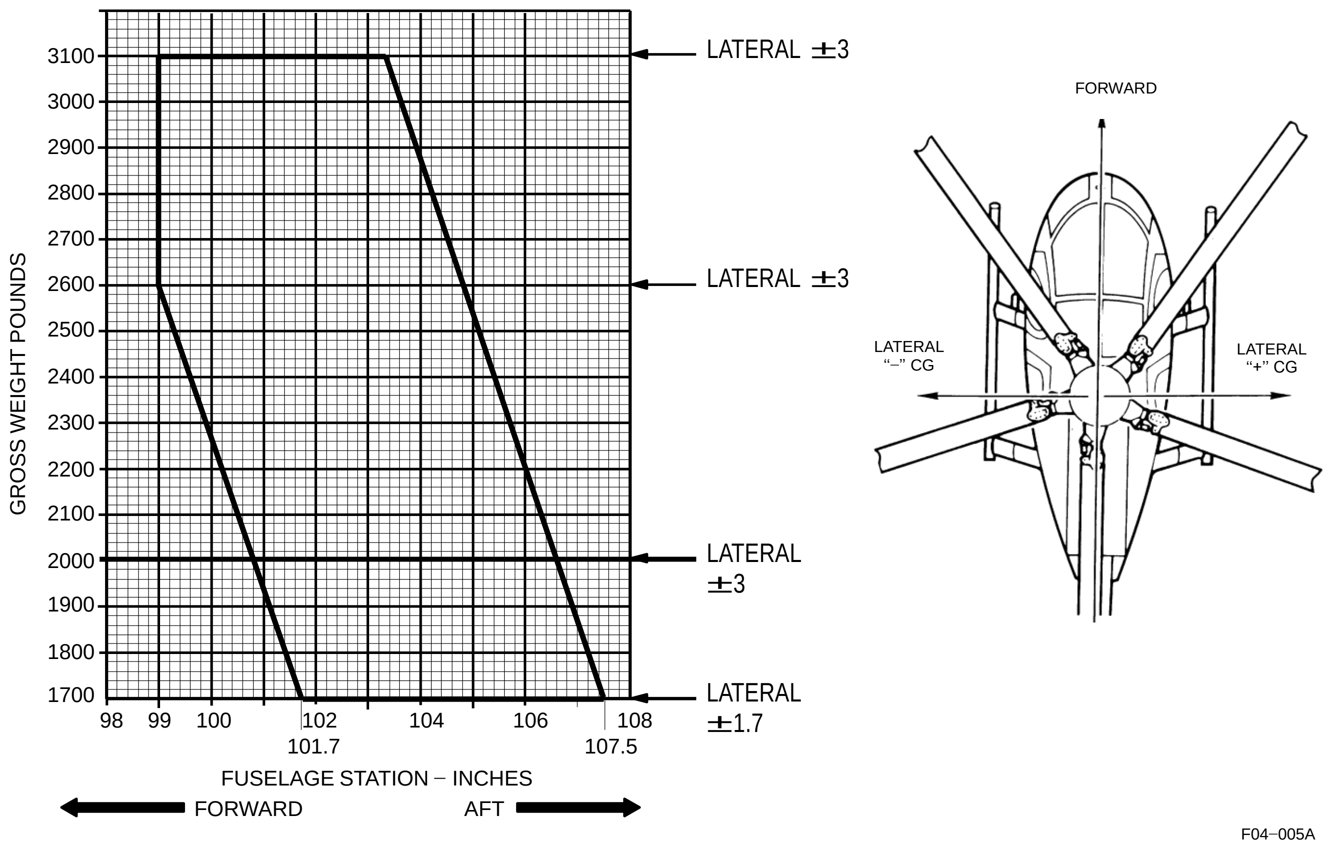


Figure 2−1. Center of Gravity Envelope

2−5. ROTOR BRAKE LIMITATIONS (IF INSTALLED)

The rotor brake must be in the stowed position prior to engine starting.

The rotor brake may be applied after engine shutdown with the rotor at or below 195 RPM.

2−6. ROTOR RPM (SPEED) LIMITATIONS

Normal Operating Range: 473 RPM to 477 RPM (99 − 100 percent N_2)

Power on: maximum RPM is 477 RPM (Ref 100 percent N_2)

Power on: minimum RPM is 473 RPM (Ref 99 percent N_2)

Power off: maximum RPM is 508 RPM (Ref 106.5 percent N_2)

Power off: minimum RPM is 410 RPM (Ref 87 percent N_2)

2−7. POWERPLANT LIMITATIONS

Engine torque limits:

Maximum takeoff (5 minute): 59.6 psi torque.

Maximum continuous: 48.9 psi torque

Transient torque limits: None.

Turbine outlet temperature limits:

Maximum takeoff (5 minute): 768°C

Maximum continuous: 694°C

Maximum for starting (lightoff): 150°C

Transient limits:

During start and shutdown: 826°C to 927°C for 10 seconds or less with a momentary peak temperature of 927°C for not more than 1 second.

During power changes in flight: 768°C to 905°C for 12 seconds.

Gas producer (N_1) speed limits:

Maximum continuous: 105%.

Minimum: ground idle speed 64%.

Transient limits: 106% for 10 seconds.

Power Turbine (N_2) speed limits:

Maximum allowable output shaft (N_2) speed exceeds helicopter allowable speed (red dot at 106.5 percent N_2). Observe rotor limits.

Power turbine (N_2) speed avoid range:

Avoid steady state operations between 71.8% and 91.5%.

NOTE: Refer to Rolls−Royce CEB A−72−3272.

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:

50 to 130 psi with the following minimums:

115 psi at 94 percent N_1 and above.

90 psi at 79 percent N_1.

50 psi below 79 percent N_1.

2−8. ELECTRICAL SYSTEM LIMITATIONS

Generator limits:

Maximum continuous: 140 amps

140 to 200 amps: 10 minutes

Battery limits:

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

2−9. STARTER LIMITATIONS

If ignition is not attained:

30 seconds ON; 2 minutes OFF
30 seconds ON; 2 minutes OFF
30 seconds ON; 30 minutes OFF

2−10. 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.

Emergency

WARNING **The use of AVGAS (MIL−G−5572) only as an emergency fuel is not allowed. Unexpected engine flameout may occur.**

Table 1. Unusable Fuel: Standard Non Self−Sealing Fuel Tanks

Fuel Type	Liters	Imp. Gal	U.S. Gal	Pounds/ Kilograms
Jet−A	7.2	1.6	1.9	13.1/5.9
Jet−B	7.2	1.6	1.9	12.5/5.7

Table 2. Unusable Fuel: Optional Self−Sealing Fuel Tanks

Fuel Type	Liters	Imp. Gal	U.S. Gal	Pounds/ Kilograms
Jet−A	7.9	1.7	2.1	14.3/6.5
Jet−B	7.9	1.7	2.1	13.6/6.2

Cold weather operations:

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

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.

Engine shutdown using emergency fuel shutoff valve.

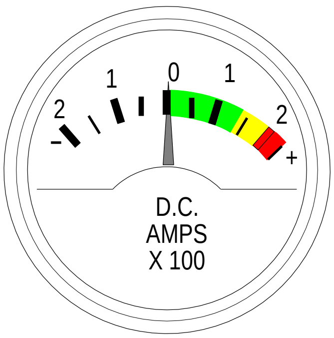
Motoring the helicopter engine without fuel in the fuel tank.

2−11. INSTRUMENTATION

RED
RED INDICATES MAXIMUM AND MINIMUM OPERATING LIMITS; THE EDGE OF A RED LINE IS THE LIMITING VALUE; THE POINTER SHOULD NOT ENTER THE RED DURING NORMAL OPERATIONS

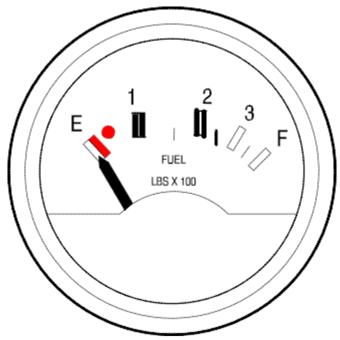
YELLOW
YELLOW INDICATES CAUTIONARY OPERATING RANGE.

GREEN
GREEN INDICATES NORMAL OPERATING RANGE.



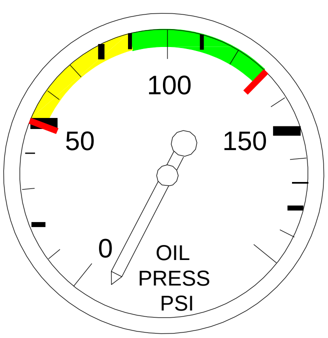
AMMETER

- 200 AMPS AND ABOVE
- 140 TO 200 AMPS
- 0 TO 140 AMPS



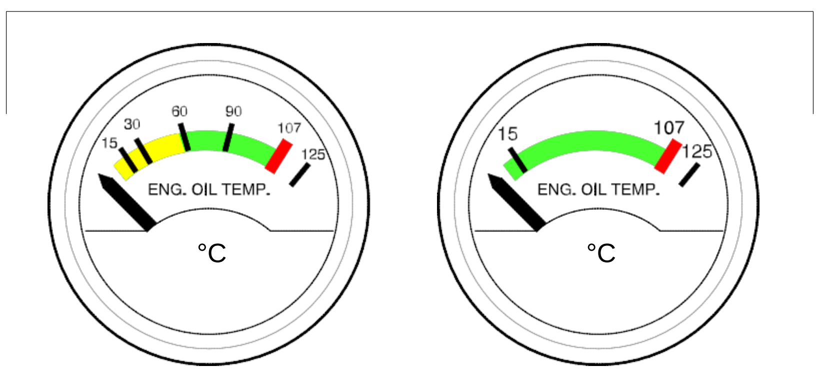
FUEL QUANTITY

- FUEL LOW CAUTION 35 POUNDS
- 12.5 POUNDS (UNUSABLE)



ENGINE OIL PRESSURE

- 50 AND 130 PSI
- 50 TO 90 PSI
- 90 TO 130 PSI



ENGINE OIL TEMPERATURE
EARLIER CONFIGURATION

- 107°C
- 0° TO 54°C
- 54° TO 107°C

ENGINE OIL TEMPERATURE
LATER CONFIGURATION

- 107°C
- 0° TO 107°C

F04−006−1

Figure 2−2. Instruments (Sheet 1 of 2)

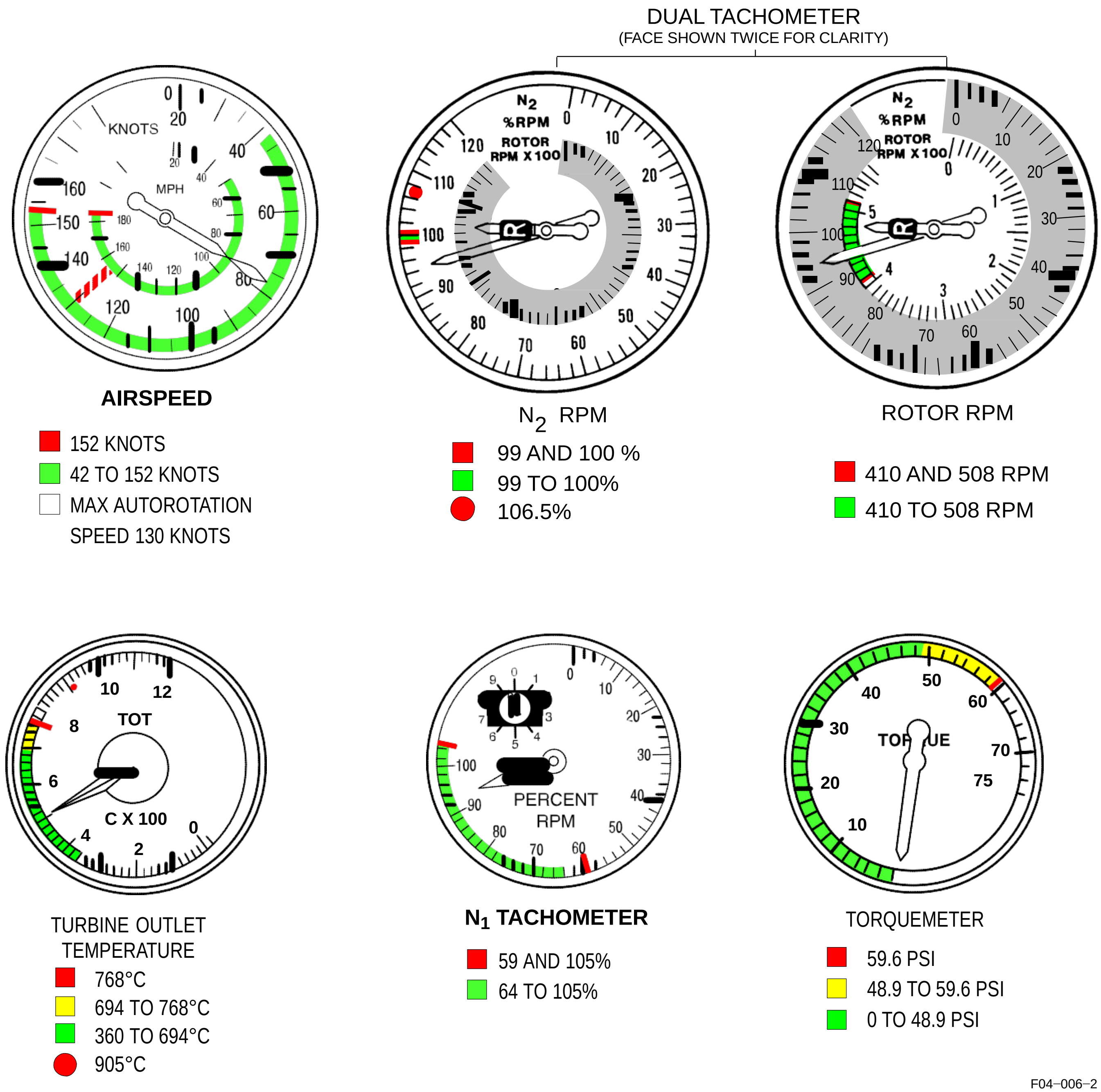


Figure 2–2. Instruments (Sheet 2 of 2)

2−12. V_{NE} PLACARDS

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2000 OR LESS					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	107	103	
−20	147	142	136	132	127	122	118	113	96	
−10		148	143	138	133	128	123	104		
0			150	144	139	134	114	97		
10				150	145	126	106			
20	152			150	141	116	98			
30				146	129	108			NO FLIGHT	
40			151	142						
45			149							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (85K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2001 TO 2100 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	107	101	
−20	147	142	136	132	127	122	118	109	93	
−10		148	143	138	133	128	121	101		
0			150	144	139	134	110	94		
10				150	145	122	102			
20	152			150	135	112	95			
30				146	125	104			NO FLIGHT	
40			151	140						
45			149							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (86K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2101 TO 2200 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	107	97	
–20	147	142	136	132	127	122	118	105	89	
–10		148	143	138	133	128	116	97		
0			150	144	139	129	106	90		
10				150	145	118	98			
20	152			150	132	108	91			
30				146	120	100			NO FLIGHT	
40			151	135						
45			149							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS
(87K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2201 TO 2300 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	107	93	
–20	147	142	136	132	127	122	118	101	85	
–10		148	143	138	133	128	111	93		
0			150	144	139	123	102	86		
10				150	139	112	94			
20	152			150	125	103	88			
30				142	115	96			NO FLIGHT	
40			151	129						
45			149							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS
(88K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2301 TO 2400 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	106	89	
−20	147	142	136	132	127	122	117	97	82	
−10		148	143	138	133	128	106	90		
0			150	144	139	118	98	83		
10				150	132	108	91			
20	152			150	120	100	85			
30				135	110	93			NO FLIGHT	
40			151	124						
45			147							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (89K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2401 TO 2500 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	102	86	
−20	147	142	136	132	127	122	113	94	79	
−10		148	143	138	133	125	102	86		
0			150	144	139	114	94	79		
10				150	127	104	88			
20	152			143	116	96	81			
30				129	106	89			NO FLIGHT	
40			148	119						
45			140							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (90K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)										
OAT	PRESS ALT X 1000				GROSS WT = 2501 TO 2600 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	98	82	
−20	147	142	136	132	127	122	108	90	75	
−10		148	143	138	133	120	98	82		
0			150	144	134	108	90	76		
10				150	121	99	83			
20	152			136	110	92	77			
30				123	101	85			NO FLIGHT	
40			140	113						
45			133							
FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (91K MIN); DO NOT EXCEED CHART V_{NE}										
MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL										

V_{NE} IAS (KNOTS)										
OAT	PRESS ALT X 1000				GROSS WT = 2601 TO 2700 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	93	79	
−20	147	142	136	132	127	122	103	86	72	
−10		148	143	138	133	114	93	79		
0			150	144	128	103	87	73		
10				145	115	95	80			
20	152			130	105	88	74			
30			149	118	96	82			NO FLIGHT	
40			133	108						
45			128							
FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (92K MIN); DO NOT EXCEED CHART V_{NE}										
MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL										

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2701 TO 2800 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	109	90	76	
–20	147	142	136	132	127	122	99	83	69	
–10		148	143	138	133	109	90	76		
0			150	144	122	99	84	70		
10				138	110	91	77			
20	152			124	101	85	71			
30			141	113	93	79			NO FLIGHT	
40			127	103						
45			121							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (93K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2801 TO 2900 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	104	87	72	
–20	147	142	136	132	127	116	94	79	66	
–10		148	143	138	130	104	87	73		
0			150	143	116	95	80	66		
10				131	105	88	74			
20	152		151	118	96	81	68			
30			133	107	89	75			NO FLIGHT	
40			121	98						
45		146	115							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS (94K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2901 TO 3000 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	100	83	69	
−20	147	142	136	132	127	111	91	76	63	
−10		148	143	138	124	100	83	69		
0			150	143	111	91	77	63		
10				125	101	84	70			
20	152		143	113	93	78	65			
30			127	103	86	72			NO FLIGHT	
40		148	116	95						
45		139	111							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS
(95K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 3001 TO 3100 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	95	79	66	
−20	147	142	136	132	127	105	86	72	60	
−10		148	143	138	118	94	79	66		
0			150	135	105	87	73	60		
10				119	95	80	67			
20	152		137	107	88	74	62			
30			122	97	82	69			NO FLIGHT	
40		141	110	90						
45		133	105							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22 KTS
(96K MIN); DO NOT EXCEED CHART V_{NE}

MAX V_{NE} 130 KTS WITH LESS THAN 35 LB FUEL

2–13. PLACARDS AND DECALS

RECOMMENDED MINIMUM N1 SPEED FOR STARTING IS 12 PERCENT

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 2–3. Decals and Placards

SECTION III
EMERGENCY AND MALFUNCTION PROCEDURES

TABLE OF CONTENTS

SECTION III EMERGENCY AND MALFUNCTION PROCEDURES

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.

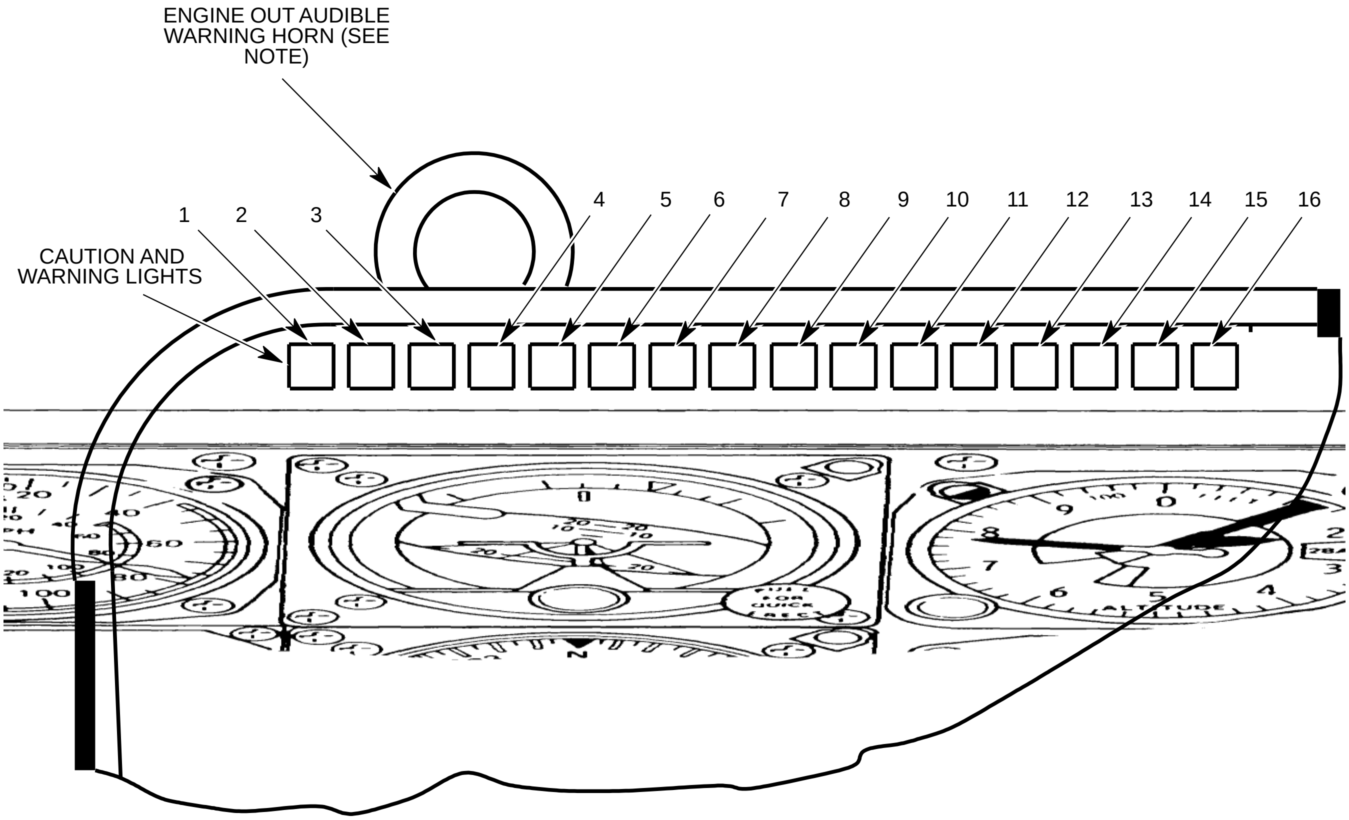
In the event of an emergency or malfunction, the pilot's primary consideration is control of the aircraft. Then, the pilot must identify the problem and perform the appropriate procedures relevant to the situation.

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 and in some cases, an audible warning will sound announcing a failure or malfunction.

Audible and visual warnings are provided for:
ENGINE OUT and LOW ROTOR



1. ENGINE OUT
2. XMSN OIL PRESS
3. XMSN OIL TEMP
4. N_2 OVSP P RST (DEACTIVATED)
5. BATTERY TEMP 160° F
6. BATTERY TEMP 140° F
7. RE−IGN P RST
8. FUEL LEVEL LOW
9. FUEL FILTER
10. M/R XMSN CHIPS
11. T/R XMSN CHIPS
12. ENGINE CHIPS
13. GEN OUT
14. BLANK
15. AIR FILTER CLOGGED*
16. PRESS TO TEST WARN LTS

* OPTIONAL EQUIPMENT

NOTE:

ON LATER MODEL 369FF HELCOPTERS ENGINE OUT AUDIBLE WARNING HORN RELOCATED ADJACENT TO PILOT'S UTILITY LIGHT ON MAP CASE PANEL.

F04−008

Figure 3−1. Warning and Caution Indicators

3−3. ENGINE FAILURE

COMPLETE POWER LOSS

Indications: Red ENGINE OUT warning indicator ON and audible warning 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% or N_R falls below 453 N_R (Ref. 95 ± 1% N_2).

Procedures: Engine Failure − In Cruise at 500 Feet AGL or Above

- Adjust collective pitch according to altitude and airspeed to maintain rotor speed between 410 and 508 RPM.
- Apply pedal pressure as necessary to control aircraft yaw.
- Adjust cyclic control as necessary to control airspeed and flight path. Allow airspeed to stabilize at 130 Knots IAS or lower (refer to V_{NE} placards).

NOTE: At airspeeds above maximum autorotational V_{NE} (130 KIAS or less Ref. Section II V_{NE} Placards), use aft cyclic to maintain aircraft's attitude and slow to desired airspeed as collective pitch is lowered. Increase collective as necessary after entering autorotation to prevent rotor overspeed. If desired, operate at minimum rotor speed to reduce rate of descent and/or extend glide distance.

The minimum rate of descent with power off will be attained at 60 KIAS and 410 N_R.

The maximum glide distance with power off will be attained at 80 KIAS and 410 N_R.

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.

Procedures: Engine Failure − Above 12 Feet and Below 500 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.

- 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.

Procedures: Engine Failure − Hovering Flight Below 12 Feet AGL

- 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:

- 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 when 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 12 percent or above, open twist grip toward ground until engine lights off. Observe TOT limits during start. Maintain safe autorotational airspeed.

Conditions: When altitude and time permit.

Procedures:

- Perform normal engine start if N_1 has decayed below 12 percent. Refer to Section IV, Engine Starting.
- Recommended airspeed is 60 knots IAS.
- 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 at 100%.

3−5. LOW ROTOR SPEED

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 453.

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: A pilot must rely on his senses to detect fire on board the aircraft. 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 (airspeed below 130 KIAS) 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**
- BAT/EXT 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**
- BAT/EXT 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**
• BAT/EXT switch	**OFF**
• Passengers/crew	**EVACUATE**

CABIN FIRE/SMOKE

Conditions: On ground

Procedures:

• Twistgrip	**CUTOFF**
• BAT/EXT 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**
• BAT/EXT 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**
• Generator	**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 twist-grip toward the ground idle position until control of N_2 speed is obtained.
- Manually control N_2 speed (99−100%) 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 (410−508) 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 99−100%N_2).

Procedures:

- Beep N_2 to maximum.
- Control N_2 manually with twistgrip (99% to 100% 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 CHIP DETECTOR

Indications: Yellow ENGINE CHIPS indicator ON.

Conditions: Metal contamination of 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.

Conditions: Transmission oil pressure low.

Procedures:

- Land as soon as possible.

M/R TRANSMISSION OIL TEMPERATURE

Indications: Red [XMSN OIL TEMP] indicator ON.

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.

Conditions: Metal contamination of oil.

Procedures:

- Land as soon as possible.

TAIL ROTOR TRANSMISSION CHIP DETECTOR

Indications: Yellow [T/R XMSN CHIPS] indicator ON.

Conditions: Metal contamination of oil.

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 between 50 to 60 knots.
- Use left lateral cyclic in combination with collective pitch to limit left sideslip to a reasonable angle.
- If conditions permit, place the twistgrip in the ground idle position once a landing area is selected and perform a normal autorotation. Plan to touch down with little or no forward speed.

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 12 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 to 60 knots airspeed.
- Perform a shallow approach and running landing to a suitable area, touching down into wind at a speed between effective translational lift and 30 knots. Directional control may be accomplished by small adjustments in throttle and or collective control.

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 10 to 20 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. Temporary forces as high as 40 pounds may be experienced when flying in turbulence.

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 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 in winds in excess of 15 knots.

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 indicator ON.

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

Procedures:

- Continue flight

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

- 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 LEVEL LOW] indicator ON when approximately 35 pounds of fuel (22.5 LBS usable) remain in fuel tank.

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

Procedures:

- Avoid large steady side slip angles and uncoordinated maneuvers.

WARNING **Sideslips may cause fuel starvation and result in unexpected power loss or engine failure. Avoid large steady side slip angles, uncoordinated maneuvers, or speeds above 130 knots IAS when FUEL LEVEL LOW caution indicator is illuminated.**

- 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 | BAT TEMP 160° | indicator ON.

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

Procedures:

- Battery switch: OFF.

NOTE: On helicopters equipped with the “generic” electrical system, the battery hi–temp relay removes the battery from the DC electrical bus when battery temperature reaches 160°F.

- Land as soon as possible

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

Indications: Yellow | BAT TEMP 140° | 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 BAT TEMP 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.

Generator (GEN) switch tripped to OFF (“early generic” configuration only)

NOTE: See Sections I and IV to determine which version of the electrical system is installed in the aircraft.

Conditions: Generator is not powering electrical bus.

Procedures:

- Check generator (GEN) circuit breaker IN and return generator switch to ON (if tripped OFF).
- Turn the generator 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 (“Pre−generic and late generic” configurations only).

- 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 FILTER CLOGGED (IF INSTALLED)

Indications: Yellow AIR FILTER CLOGGED indicator ON.

NOTE: Certain flight conditions may cause the yellow caution indicator to flicker momentarily. The FILTER BYPASS DOOR should be opened only when a steady illumination of the caution indicator is five seconds or more.

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

Procedures:

- FILTER BYPASS control handle: 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.**

ENGINE COMPRESSOR STALL

Indications: An indication of compressor stall is an audible ‘‘popping’’ noise possibly accompanied by torque oscillations, TOT fluctuations and decreasing or fluctuating N_1 rpm.

Conditions: Compressor stall or surge can occur when the proper balance between fuel flow and air flow are upset. The stall may vary in intensity and usually occurs during a rapid increase in power.

Procedures:

- For one or two low intensity ‘‘pops’’, continue operation avoiding the condition that caused the ‘‘pop’’.
- For high intensity ‘‘pop’’ or multiple ‘‘pops’’, if at high power, reduce power with collective stick until ‘‘popping’’ ceases. If at low power, increase power slowly until ‘‘popping’’ ceases. Monitor TOT and N_1 for normal indications. Collective changes during remainder of flight should be performed slowly. Return to base.
- For continuous series of high intensity ‘‘pops’’ that do not cease following power changes, land as soon as possible. Be prepared to autorotate.
- Refer to Allison 250−C30 Operation and Maintenance Manual following any compressor stall.

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.

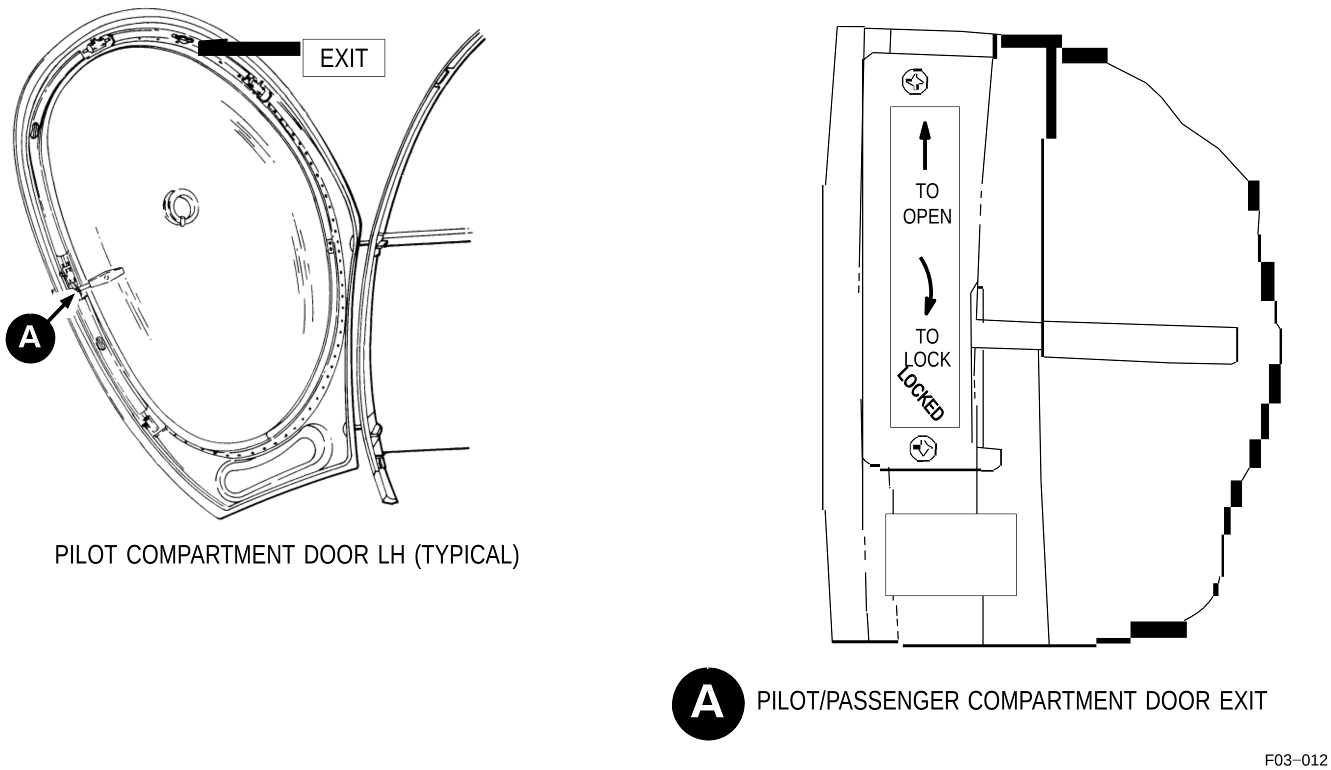


Figure 3−2. Emergency Exits

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.

Refer to the “FIRE” paragraph in this section for recommended use of fire extinguisher.

SECTION IV
NORMAL PROCEDURES

TABLE OF CONTENTS

SECTION IV
NORMAL PROCEDURES

4−1. PREFLIGHT REQUIREMENTS

NOTE: The checks described in this Section apply to the standard configuration MD 530F Plus and do not include certain optional equipment items. Preflight checks for optional equipment items may be found in Section IX of this manual. If your helicopter is equipped with STC'd items, refer to the STC holder's flight manual supplement.

"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 CSP−HMI−2).

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

Check helicopter performance data. (Ref. Sections V, VIII 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.**

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).

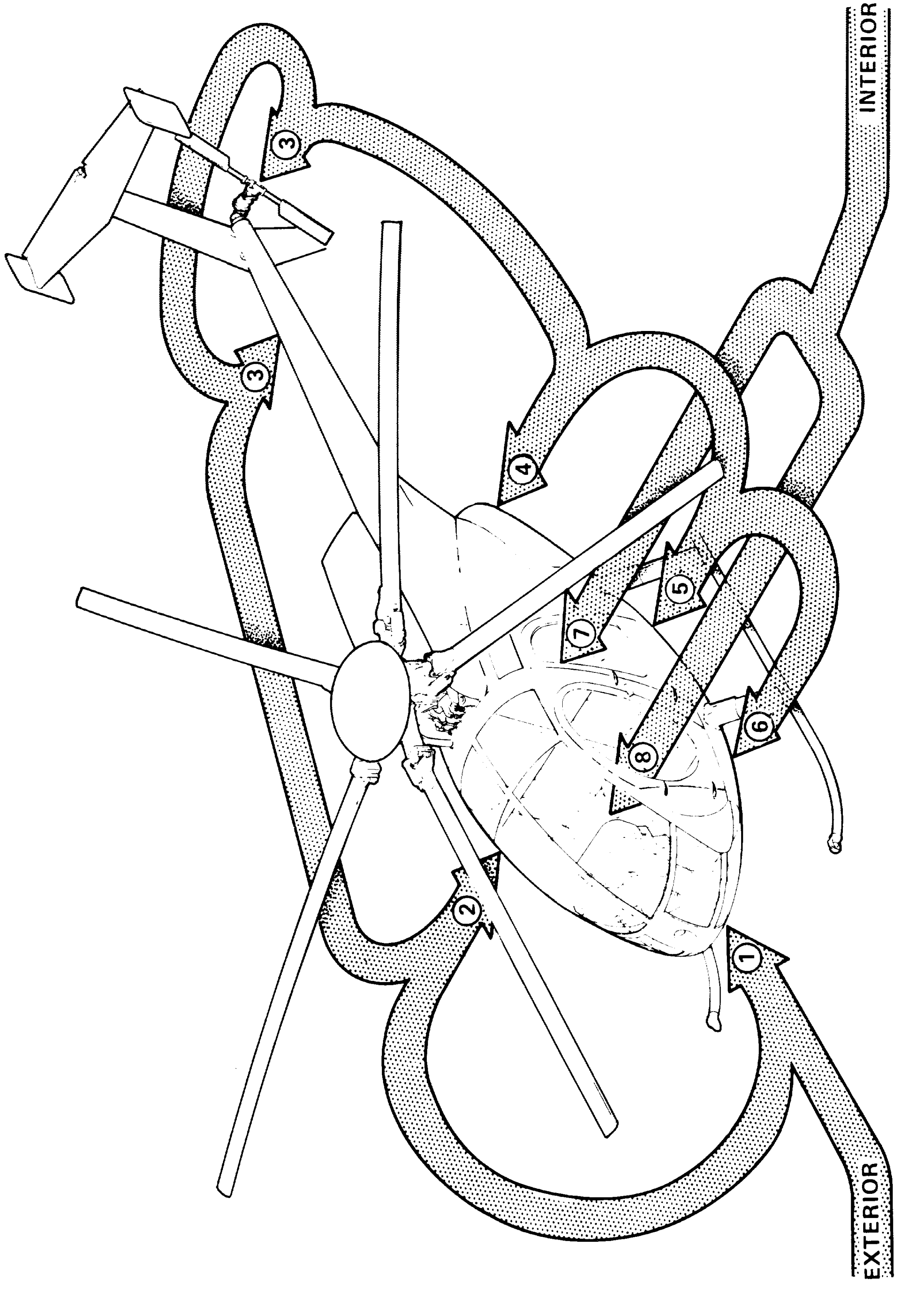


Figure 4-1. Pilot's Preflight Guide

DAILY PREFLIGHT CHECKS

PRELIMINARY CHECKS

e	Fuel cell drain valve − take sample	**CHECK FOR CONTAMINANTS**

EXTERIOR

FUSELAGE − FORWARD END []]

e	Aircraft tiedowns and covers	**REMOVED**
e	Aircraft attitude for weak or damaged landing gear dampers	**CHECK**
e	Canopy for condition and cleanliness	**CHECK**
e	OAT thermometer sun shield	**CHECK**
e	Fresh air vent	**NO OBSTRUCTIONS**
e	Pitot tube	**NO OBSTRUCTIONS**
e	Tail rotor pedals for condition and security of quick−release pins (both sides with dual controls)	**CHECK**
e	Landing light and anticollision light	**CHECK**

FUSELAGE – RH SIDE [2]

• Skid, strut fairings, strut cuffs	**CHECK**
• Position light, skid tip	**CHECK**
• Fuel tank vent	**NO OBSTRUCTIONS**
• Fuselage skin	**CHECK**
• Passenger steps for condition and security	**CHECK**
• Passenger and cargo doors condition and latching	**CHECK**
• M/R transmission oil level	**CHECK**
• M/R transmission oil filter bypass indicator (if installed)	**CHECK**
• Fuel level; cap security	**CHECK**
• Engine oil level; cap security	**CHECK**

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

• Overhead canopy for condition and cleanliness	**CHECK**
• Main rotor hub, pitch control rods, blade dampers, swashplate and mast	**CHECK**
• Lead–lag link attach nuts for cracks	**CHECK**
• Main rotor blades for chordwise cracks on the underside of the blade skin and doubler. If existing, the cracks will be at the leading and trailing edges of the root fitting in the area of the two most outboard bolts or outermost end of lower root fitting.	**CHECK**
• Oil cooler air inlet	**NO OBSTRUCTIONS**
• Engine air inlet/plenum chamber	**NO OBSTRUCTIONS OR FOREIGN OBJECTS**

CAUTION

When the helicopter has been parked outside during falling or blowing snow, remove accumulated ice and snow from engine inlet area and all helicopter exterior surfaces. Also open plenum chamber access door and visually determine that the inlet screen or particle separator (if installed) has not become clogged with ice and snow.

• Static port	**NO OBSTRUCTIONS**
• All inspections doors/panels	**SECURED**

TAILBOOM/TAIL ROTOR []}

e	Tailboom	**CHECK: NO DAMAGE ALLOWED**
e	Position and anti collision lights	**CHECK**
e	Stabilizers (vertical, horizontal and end plates)	**CHECK: NO DAMAGE ALLOWED**
e	Tail skid	**CHECK**
e	Tailboom extension to tailboom attachment for security and condition	**CHECK**
e	Tail rotor gearbox attachment to tailboom extension for security and condition	**CHECK**
e	Chip detector and wiring	**CHECK**
e	Control push−pull rod and bellcrank	**CHECK**
e	Tail rotor transmission oil level	**CHECK**
e	Output shaft dust cover, retainer nut, tang washer, 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.**

e Tail rotor drive fork elastomeric bearings:

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.

e e	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**
e e	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**
e	Tail rotor pitch bearing	
e e	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 may not be acceptable.	**CHECK FOR WEAR**
e	Tail rotor blades and pitch links	**CHECK**

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

e	Tail rotor drive shaft coupling	**CHECK: NO DAMAGE ALLOWED**
e e	Rock tail rotor back and forth in plane of rotation and check main rotor blades for coincidental movement.	
e	Main rotor blades for condition and abrasion strip for condition and bonding (do not handle trim tabs)	**CHECK**
e	Overrunning clutch (turn main rotor blade forward then aft)	**CHECK**
e	All inspection panels	**SECURED**
e	Overrunning clutch (turn main rotor blade forward then aft)	**CHECK**
e	All inspection panels	**SECURED**

ENGINE COMPARTMENT @J

e	Engine mounts, mounting pads, and firewalls	**CHECK**
e	Landing gear attach points, rear dampers (leaks and inflation)	**CHECK**
e	Engine oil, air, and fuel lines	**CHECK**
e	Scavenge oil filter bypass indicator (if installed)	**CHECK**
e	Generator inlet duct	
e	Engine electrical connections	**CHECK**
e	Generator control unit circuit breakers (2) (generic wire harness only)	**CHECK**
e	Fuel control, N_2 governor, and associated linkages	**CHECK**
e	Engine fuel filter bypass indicator	**CHECK**
e	Engine oil filter bypass indicator	**CHECK**
e	Exhaust ducts	**CHECK**
e	Engine compartment doors for condition and security	**CHECK**

FUSELAGE − LH SIDE ffi

e	Skid, strut fairings; strut cuffs	**CHECK**
e	Position light, skid tip	**CHECK**
e	Pilot and cargo doors − condition and latching	**CHECK**
e	Passenger steps for condition and security	**CHECK**

- Fuselage skin — CHECK
- Overhead canopy — CHECK
- Battery compartment vent — NO OBSTRUCTIONS

FUSELAGE − UNDERSIDE [QJ

- Fuselage skin — CHECK
- Fuel tank and other vents — NO OBSTRUCTIONS
- Cargo Hook (if installed) — CHECK (REF. SECTION IX)
- Antennas — CHECK

INTERIOR

AFT COMPARTMENT [1]

- Impeller belt — CHECK
- Fuel cell access doors — SECURED
- Controls access door — SECURED
- Loose equipment or cargo — SECURED

NOTE: Refer to Paragraph 4−10 if planning doors off flight.

- Seats, seat belts, and shoulder harness — CHECK
- Compartment doors closed and latched — CHECK

FORWARD COMPARTMENT [il

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

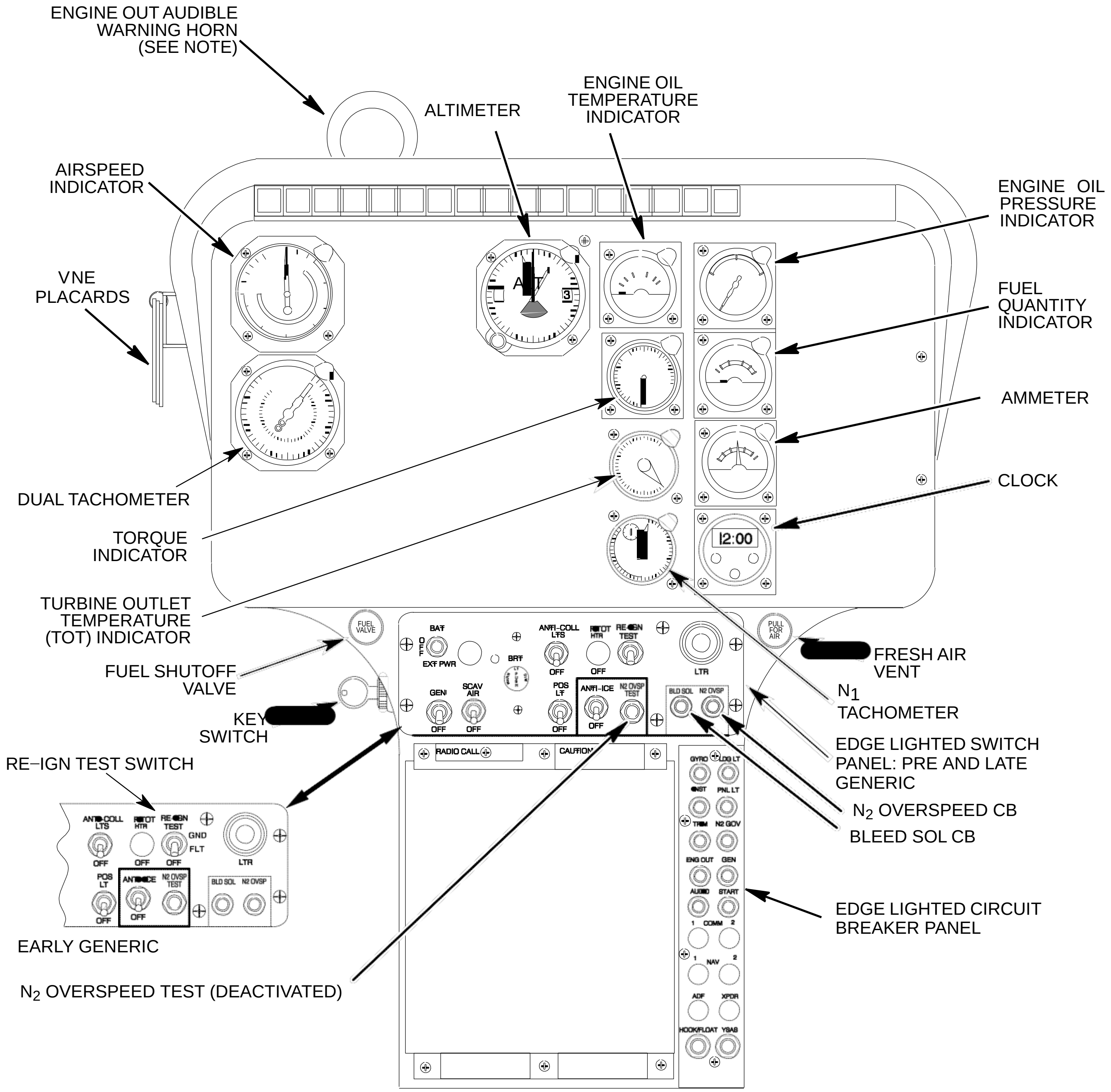
NOTE: Refer to Paragraph 4−10 if planning doors off flight.

- 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.

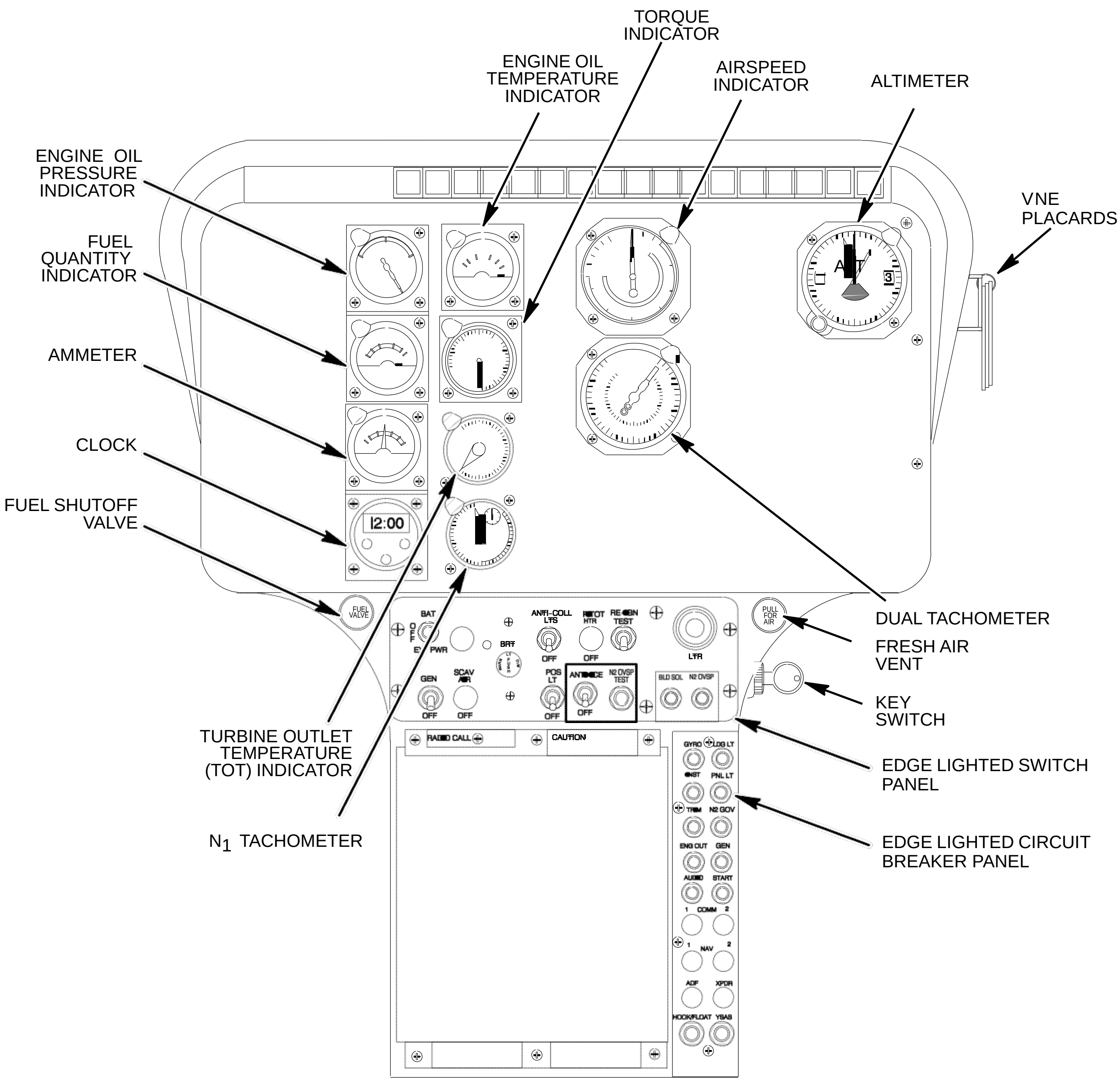
- Fluid levels — **CHECK**
- Engine compartment − fluid leaks and bypass indicators — **CHECK**
- Air inlet screens/particle separator — **CHECK**
- Fuel cap, access doors and panels — **CHECK**
- Main rotor blades — **CHECK**
- Tailboom and empennage — **CHECK**
- Tail rotor rotor blades — **CHECK**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



NOTE:
ON LATER MODEL 369FF HELICOPTERS ENGINE OUT AUDIBLE WARNING HORN RELOCATED ADJACENT TO PILOT'S UTILITY LIGHT ON MAP CASE PANEL

F04−010−1

Figure 4−2. Instrument Panel, LH Command − Layout Typical



NOTE:
INSTRUMENT LOCATION SHOWN IS TYPICAL.
INSTRUMENT LOCATION MAY VARY BASED ON INSTALLED OPTIONS.

Figure 4−3. Instrument Panel, RH Command − Layout Typical

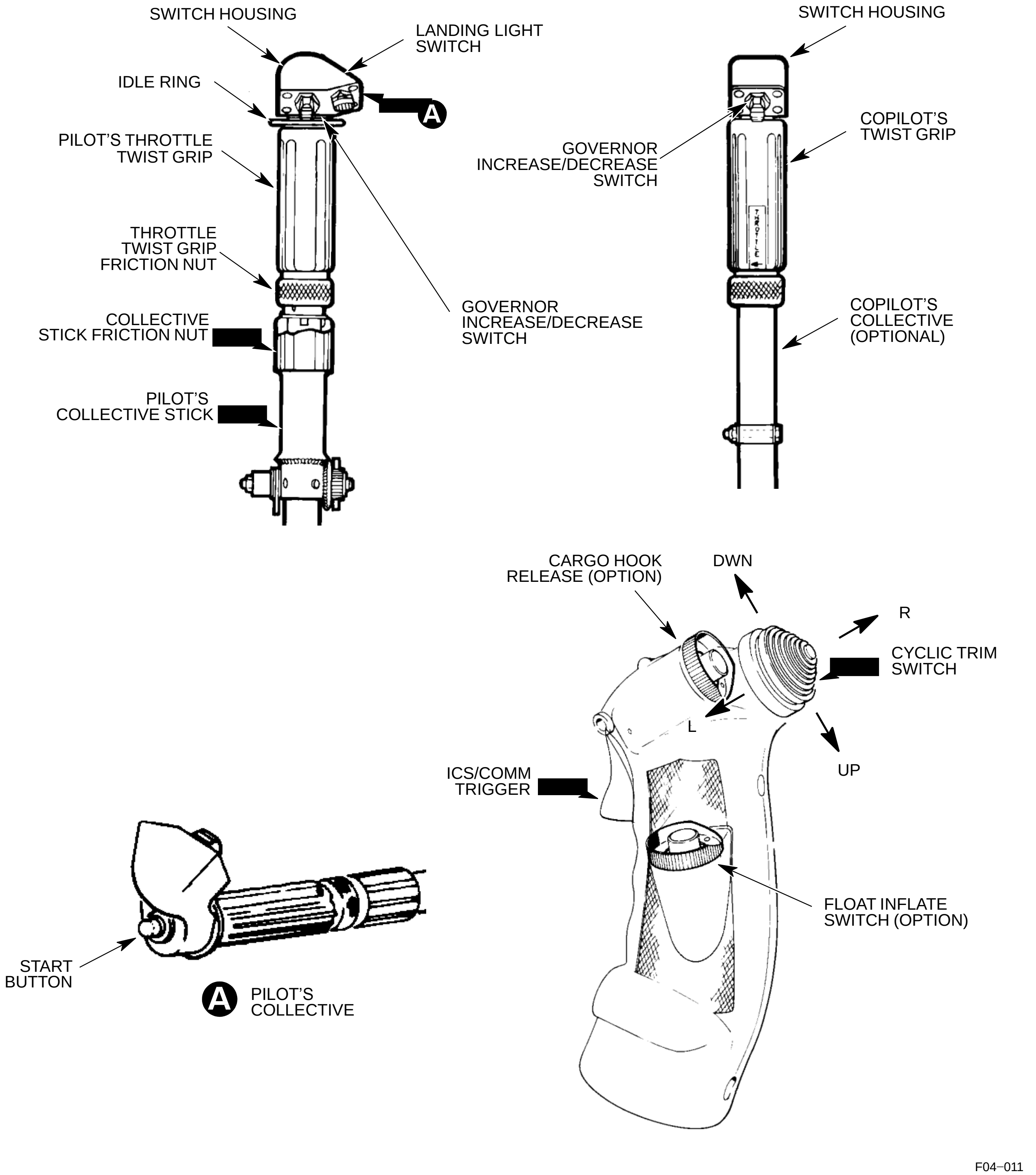


Figure 4−4. Cyclic and Collective Stick Grips

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 (friction off) and pedals — **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**
- Air filter bypass control handle (if installed) — **CHECK SECURITY AND POSITION**
- Rotor brake handle (if installed) — **STOWED**
- Cabin heat (if installed) — **OFF**
- 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	**IN**
• Fuel shutoff valve	**OPEN (IN)**

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

ELECTRICAL POWER − ON

- Electrical power: Battery or external power start
  - BAT/EXT switch: set to BAT for battery start; to EXT for external power start — **AS REQUIRED**
  - If used, connect GPU.

NOTE: Minimum capacity 20V dc with 500 amp load.
Maximum capacity 28.5V dc with 500 amp load.

- Lights — **AS REQUIRED**
- Key switch — **ON**
- Engine Out Warning System/Auto Reignition System Checks
  - Pre−Generic and Late Generic Configurations:

NOTE: See Section I and Figure 4−2 to determine which version of the electrical system is installed in the aircraft.

  - GEN switch ON then OFF to check audible engine out warnings (both external horn in the cabin and internal within the ICS system).
  - Hold RE−IGN TEST switch in the TEST position. Verify the RE−IGN caution light illuminates and the sound of the engine ignitor firing is heard. Release the RE−IGN TEST switch.
  - Press the RE−IGN caution light to reset (extinguish) the light. (Pre−generic configuration only)

- - Early Generic Configuration:
  - - - Place the Reignition Test switch in the GND TEST position (full up). Verify that the ENGINE OUT warning and RE−IGN caution lights illuminate, the audible engine out warnings activate (both external horn in the cabin and internal within the ICS system), and the sound of the ignitor firing is heard.
  - - - Return test switch to OFF

- Fuel gauge	**CHECK READING**
- All other instruments	**CHECK**
- XMSN OIL PRESS, ENG OUT, and GEN warning/caution lights	**ON**
- Press−to−test caution and warning lights	**CHECK**
- - Caution light dim switch	**CHECK**

NOTE: BAT 140° and RE−IGN P RST caution lights do not dim. All other caution lights will return to bright when power is removed and restored by cycling the BAT switch or pulling and resetting the PNL LT circuit breaker.

- Cyclic trim control check:

- - Momentarily motor cyclic trim control forward, left, right, aft (listen for motor actuation)	**OPERATE**
- Twistgrip to FULL OPEN, return to GROUND IDLE STOP, then to CUTOFF position.	**CHECK**

4−3. ENGINE START

- Cyclic stick − trimmed 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**
- Generator switch OFF **RECHECK**

CAUTION

A hot start may result if the GEN switch is left in the ON position. (Early Generic Configuration Only)

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

NOTE: If ignition is not attained, starter time limits are: 30 seconds ON, 2 minutes OFF; 30 seconds ON, 2 minutes OFF; 30 seconds ON, 30 minutes OFF.

- When 12 percent N_1 minimum cranking speed is reached, open twist grip toward ground idle detent until engine lights off. Observe TOT indicator for immediate temperature rise. If TOT rise is not noted, abort engine start.

CAUTION

To properly start engine, adjust twist grip to maintain 760−820°C during start cycle. This will ensure 20−40 seconds starts under standard day conditions. Engine starts below 760°C TOT increase engine start time and can cause a shift in combuster flame pattern that damages turbine components.

- Steadily increase N_1 speed and TOT by opening twist grip. Continue opening twist grip to ground idle detent.

NOTE: APU starts are recommended when normal cranking speed cannot be obtained using the battery. For cold weather starts (4°C or below) refer to Allison Engine Operation and Maintenance Manual.

CAUTION

During starts, overtemperatures above 826°C for 10 seconds or less with a momentary peak at 927°C for not more than 1 second are permited. 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 (Refer to Allison Operation and Overhaul Manual.)
4. A zero or positive indication is observed on ammeter (this may indicate a failure in the starting circuit that may de−energize the starter creating conditions favorable for a hot start).
5. 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**

CAUTION

If auto−(spontaneous) acceleration of the 250−C30 engine should occur, close the throttle and shut down the engine. Subsequently, restart and resume the warm-up period.

To avoid auto−acceleration, make a ground warm-up at idle speed for a period of 10 minutes prior to flight if all of the following conditions are encountered:

1. Low ambient temperature: −12°C (10°F) or lower.

2. High relative humidity: 45 percent or more.

3. The aircraft had not been hangared over night or had otherwise been allowed to cold soak.

- 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 for 369D25100 series transmissions, or within 60 seconds for 369F5100 transmissions. The auto reignition ARMED light ON; GEN OUT indicator will remain on until the generator switch is moved to the GEN position.
The reignition indicator may illuminate when the transmission warning light goes out. After ground idle RPM is attained, press the RE−IGN light to reset.

- Engine idle speed − 59 to 65 percent N_1 **CHECK**

CAUTION

During engine operation at ground idle, keep pedals centered. Pedal bungee will tend to depress left pedal, thereby decreasing N_2/N_R speed.

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

CAUTION

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

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

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.

NOTE: Refer to Section II “Power turbine (N_2) speed avoid range”.

e Electrical power	**SELECT**
e e BAT/EXT switch	**SELECT “BAT”**
e e External power start	**DISCONNECT GPU**
e Set generator (GEN) to ON (GEN OUT caution light out; ammeter will show charge)	**OPERATE AND CHECK**

NOTE: Monitor N_1 when turning generator switch ON. If N_1 decays below 60 percent, turn generator OFF and increase N_1 speed with throttle to 70 percent, then reset generator to ON.

e Avionics (as required)	**ON AND CHECK**
e Cyclic friction	**RELEASE AND SET AS DESIRED**
e 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/ENGINE OUT AND LOW ROTOR WARNING/AUTO REIGNITION CHECKS

NOTE: Whenever there is transmission oil pressure the auto−reignition system is armed.

e Press reignition (RE−IGN P RST) light	**LAMP OUT**
e N_2 high beep range − 103% to 104%	**CHECK**
e N_2 low beep range − 94% or less	**CHECK**
e Low rotor warning − on at 95 ± 1%	**CHECK**

NOTE: ENGINE OUT light only − no audio horn (early generic configuration).
ENGINE OUT light and audio horn (pre−generic and late generic).

e RE−IGN P RST indicator light	**ON**
e Set N_2 to 99%	**ESTABLISH**
e Press reignition (RE−IGN P RST)	**LAMP OUT**

CAUTION

Pulling the engine out warning system circuit breaker will disarm the auto reignition and engine out/low rotor warning systems.

*ENGINE BLEED AIR SYSTEMS CHECKS

e CABIN HEAT (if installed) − ON − Observe 30−40°C increase in TOT, then OFF.	**CHECK TOT INCREASE/ DECREASE**
e Engine ANTI−ICE ON − Observe increase 10−20°C in TOT, then OFF.	**CHECK TOT INCREASE/ DECREASE**
e SCAV−AIR Switch ON (if installed) observe slight rise in TOT (about 5°C).	**CHECK TOT INCREASE AND SET SWITCH AS DESIRED**

NOTE: If no increase in TOT is observed, operation of the scavenge air system may be checked by verifying that the flapper door (scavenge air outlet) is open.

*THROTTLE RIGGING CHECK

NOTE: If the flight will involve rolling the twistgrip to the ground idle position while airborne (Autorotation training, maintenance test flight, etc.) this check must be performed even thought it may not be the first flight of the day.

e N$_2$ 100%	**RECHECK**
e 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.

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

e If dual controls are installed, repeat procedure using copilot's twistgrip.	**RECHECK**
e Twistgrip	**FULL OPEN**
e N$_2$ − 99%	**RECHECK**

4−5. BEFORE TAKEOFF

• All caution and warning lights out	**RECHECK**
• Engine oil pressure − 90 to 130 psi	**RECHECK**
• Ammeter	**CHECK READING**

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

• All cabin doors closed and safelocked	**RECHECK**
• Cabin heat	**AS DESIRED**

NOTE: Hover performance is reduced with cabin heat ON (Ref. Sections V and VIII).

• Collective control 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**
• SCAV AIR (if installed)	**AS DESIRED**

NOTE: Air filtration is improved with SCAV−AIR on, however, hover performance is reduced (Ref. Sections V, and VIII).

• Pitot Heat (if installed)	**AS REQUIRED**

e Engine ANTI−ICE: **AS REQUIRED**

e e Use engine ANTI−ICE when OAT is below 5°C (41°F) and visible moisture is present.

e e Check for TOT increase when turning anti−ice ON

NOTE: Hover performance is reduced with ANTI−ICE ON (Ref. Sections V and VIII).

e Optional inflight test of the auto−reignition/engine out warning system: <u>(Early Generic Configuration Only):</u>

NOTE: See Section I and Figure 4−2 to determine which version (“early generic” / “late generic”) of the generic wire harness is installed in the aircraft.

This check may be performed at the pilot’s discretion.

e e <u>Prior to takeoff:</u>

e e e While on the ground at 99−100% N_2, place RE−IGN test switch in the FLT (middle) position. RE−IGN and ENGINE OUT lights should illuminate.

e e e Bring the aircraft to a hover and observe actuation of the engine out audible warnings.

NOTE: If audible warnings are not heard, this indicates a possible rigging problem with the air/ground switch. Refer to applicable maintenance instructions for adjustment.

e e e Land helicopter and return RE−IGN test switch to OFF and press RE−IGN light to reset system.

e e <u>While in cruise:</u>

e e e Place RE−IGN test switch in FLT position.

e e e RE−IGN and ENGINE OUT lights should illuminate along with the ENGINE OUT audible warning.

e e e Return RE−IGN test switch to OFF.

e e e Press RE−IGN light to reset system.

4−6. TAKEOFF

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

- Determine that hover area and takeoff path are clear.

- Follow normal helicopter takeoff procedure with N_2 set at 99 to 100 percent.

NOTE: Governed N_2 rpm should increase 1/2 to 1 percent on takeoff − adjust as necessary to maintain N_2 at 100 percent.

- Follow recommended takeoff profile shown in Height Velocity Diagram (Ref. Section V).

NOTE: To follow takeoff profile on Height Velocity Diagram, use hover power plus 12 psi or 59.6 psi torque, whichever is less (V_{NE} 50 knots when operating between 48.9 and 59.6 psi torque).

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

NOTE: Momentary fluctuation in indicated airspeed may occur during acceleration and climbout. This fluctuation is characterized by a rapid rise in indicated air speed 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 climbing at less than 40 knots IAS.

- Use Cyclic trim as desired to minimize stick forces.

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

4–7. CRUISE

- Cyclic trim: use proper trimming procedures described for climbout.
- SCAV AIR (if installed) **AS DESIRED**
- Above 50 knots and 50–foot altitude above terrain, select N_2 between 99 and 100 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

- Maneuvers that exceed thrust capability of the tail rotor should be avoided.

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

- Extreme aircraft attitudes and maneuvers at low speeds should be avoided.

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

WARNING **Observe the cross–hatched regions of Height Velocity Diagram (Ref. Section V). These represent airspeed/altitude combinations from which a successful autorotation may be difficult to perform. Operation within the cross hatched area in not prohibited, but should avoided.**

4−9. PRACTICE AUTOROTATION

WARNING

Perform throttle rigging check prior to attempting practice autorotations (paragraph 4−4). Misrigging of the throttle control may result in inadvertent flameout during rapid closing of the twistgrip to the ground idle position.

Uncoordinated turns/maneuvers may cause fuel starvation with less than 35 LBS of fuel. Do not practice autorotations if the FUEL LEVEL LOW caution indicator is ON.

CAUTION

Do not perform intentional full touchdown autorotation with blade tracking reflectors installed on blade tips.

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.

Increase collective pitch after establishing autorotation to prevent rotor overspeed if flight is 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 (N_R) by lowering collective prior to flareout.

NOTE: Refer to Section II “Power turbine (N_2) speed avoid range”.

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 99 and 100 percent and that full engine power is available prior to increasing collective.

Conduct practice autorotation at 130 knots IAS or below (see V_{NE} placards). Maintain rotor between 410 and 508 by use of the collective control.

Maximum gliding distance is obtained at 80 knots and 410 rotor rpm.

Minimum rate of descent is obtained at 60 knots and 410 rotor rpm.

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

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.

Autorotation RPM:

Normal rotor rpm (collective fully down) is 485±5 rpm at 2516 pounds gross weight at sea level; 60 knots. Rotor speed will decrease approximately 7 rpm for each 100 pound reduction in gross weight and increase approximately 6 rpm for each 1000 foot increase in density altitude. For gross weights greater than 2516 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.

WARNING

Any object that is not properly secured may exit the aircraft during flight.

Items secured with Velcro (i.e., first aid kit, seat cushions) should not be considered properly secured.

Secure or stow in the baggage compartment all loose equipment.

Secure or remove unoccupied seat cushions.

Use ear protection.

4−11. LANDING APPROACH

Set N_2 at 100 percent.

Set SCAV−AIR (if installed) as desired.

4−12. 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.

4−13. ENGINE/AIRCRAFT SHUTDOWN

CAUTION

Care should be taken when rotating the twistgrip to the ground idle position and from ground idle to the cutoff 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.

• Twistgrip to GROUND IDLE detent − 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 afterfire (recognized by a rapid increase in TOT) can occur during shutdown if fuel cutoff is not complete. If an afterfire occurs, immediately engage the 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.

- Engine out warning at 55 percent N_1 **CHECK**

NOTE: Early Generic Configuration: ENG OUT light only − no audio .
Pre−Generic and Late Generic Configuration: ENGINE OUT light and audio horn .

See Section I and Figure 4−2 to determine which version of the generic wire harness is installed in the aircraft.

- Auto reignition light **ON**

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

- Generator switch **OFF**
- NAV/COM switches **OFF**
- All other switches **OFF**
- Rotor brake (if installed) − apply at 195 rpm or less, release during last rotor revolution **APPLY**

CAUTION **Care should be taken when applying the rotor brake if the helicopter is parked on slippery or icy surface. The tail rotor has little effect controlling torque 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 handle stowed (up) **CHECK**
- BAT/EXT switch **OFF**
- Key switch **OFF**

4−14. POST FLIGHT

- Aircraft−investigate any suspected damage **CHECK**
- Fuel and oil leaks **CHECK**
- Engine oil tank for correct oil level **REPLENISH IF LOW**

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

- Logbook entries **COMPLETE**

NOTE: Record total number of Torque Events (TE’s). Ref. HMI−2, Section 04−00−00.

- Flight manual and equipment **STOWED**
- Aircraft tiedowns, covers **SECURED**

4−15. 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.

4−16. ELECTRONIC POWER TURBINE (N_2) OVERSPEED CONTROL SYSTEM

NOTE: The N_2 overspeed control system has been disabled per Allison Bulletin CEB−A−73−3018 and FAA AD79−06−05.The N_2 overspeed circuit breaker tie wrap and plug installed in the N_2 overspeed solenoid valve must not be removed.

4−17. 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 (Ref. Section V). V_{NE} 50 knots when torque exceeds 48.9 psi.

Proceed away from noise sensitive areas.

If takeoff must be made over noise sensitive area, distance (altitude) is 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 left side of helicopter.

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

Sharper turns reduce area exposed to noise.

Approach:

Use steepest glideslope consistent with passenger comfort and safety.

Keep noise sensitive areas to left side of helicopter.

SECTION V
PERFORMANCE DATA

TABLE OF CONTENTS

PARAGRAPH **PAGE**

SECTION V
PERFORMANCE DATA

5−1. GENERAL

This section contains baseline helicopter performance information as defined within certain conditions such as airspeed, weight, altitude, temperature, wind velocity and engine power available. Data is applicable to the basic helicopter without any optional equipment installed unless otherwise noted.

NOTE: Select the appropriate power check, and hover performance charts for type of optional equipment installed.

5−2. DENSITY ALTITUDE

Description:

The 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 (Figure 5−2). 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

OAT= −15°C
H_P= 6,000

Method

Follow −15°C line to 6,000 ft pressure altitude line; read density altitude (3800 ft).

Wanted

Find TAS

Method

Read directly across from density altitude: (3800 ft). Note density factor of 1.058.

1. Find calibrated airspeed (Ref. Figure 5−2)

2. Find true airspeed

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

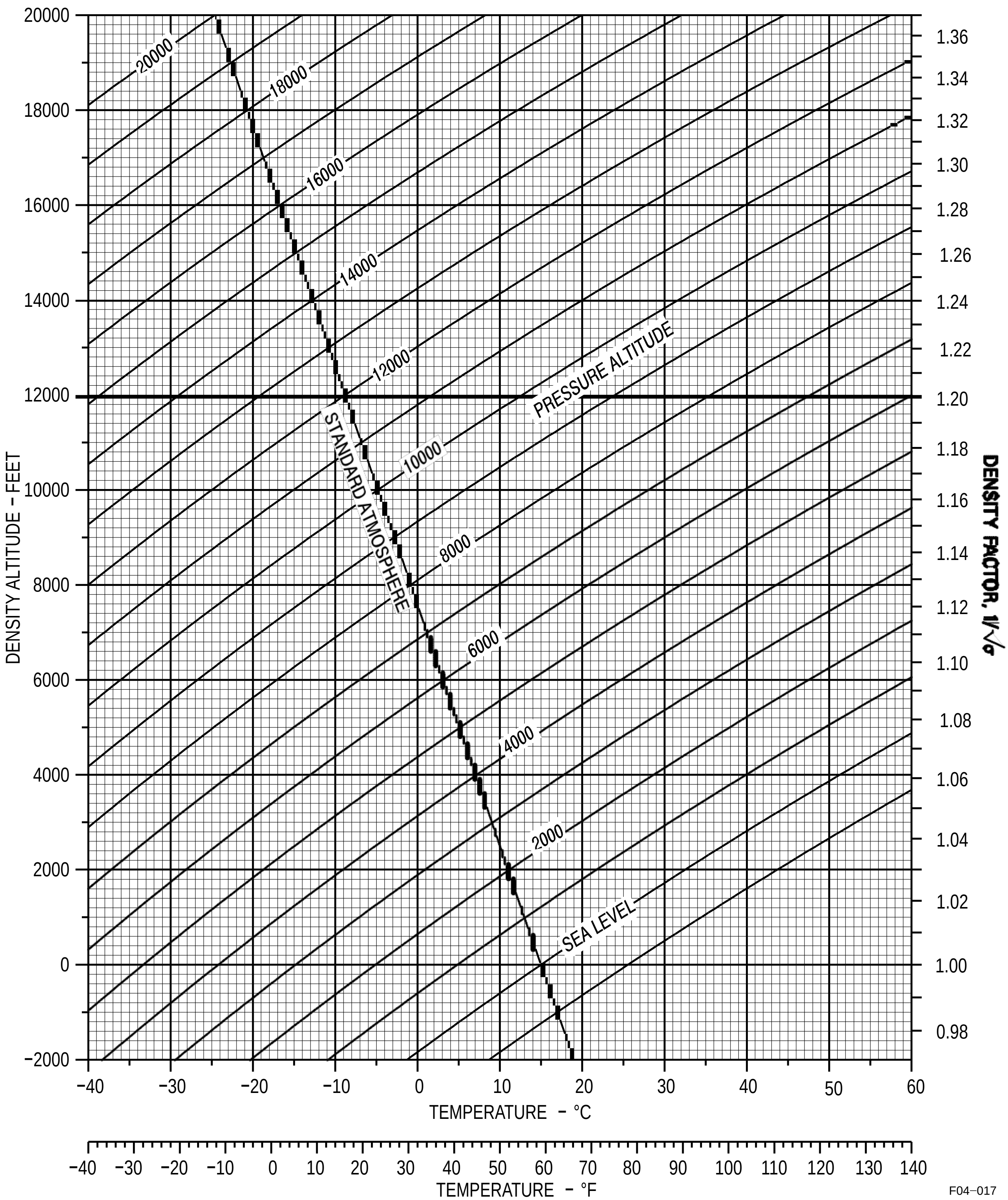


Figure 5−1. Density Altitude Chart

5−3. AIRSPEED CALIBRATION

Description:

The 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:

To determine calibrated airspeed, the pilot must know the indicated airspeed.

Example

WANTED: Calibrated airspeed

KNOWN: Indicated airspeed = 120 knots

METHOD: Enter the bottom of the chart at the indicated airspeed of 120 knots. Move up to the airspeed calibration line; move left and read 119 knots, calibrated airspeed.

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

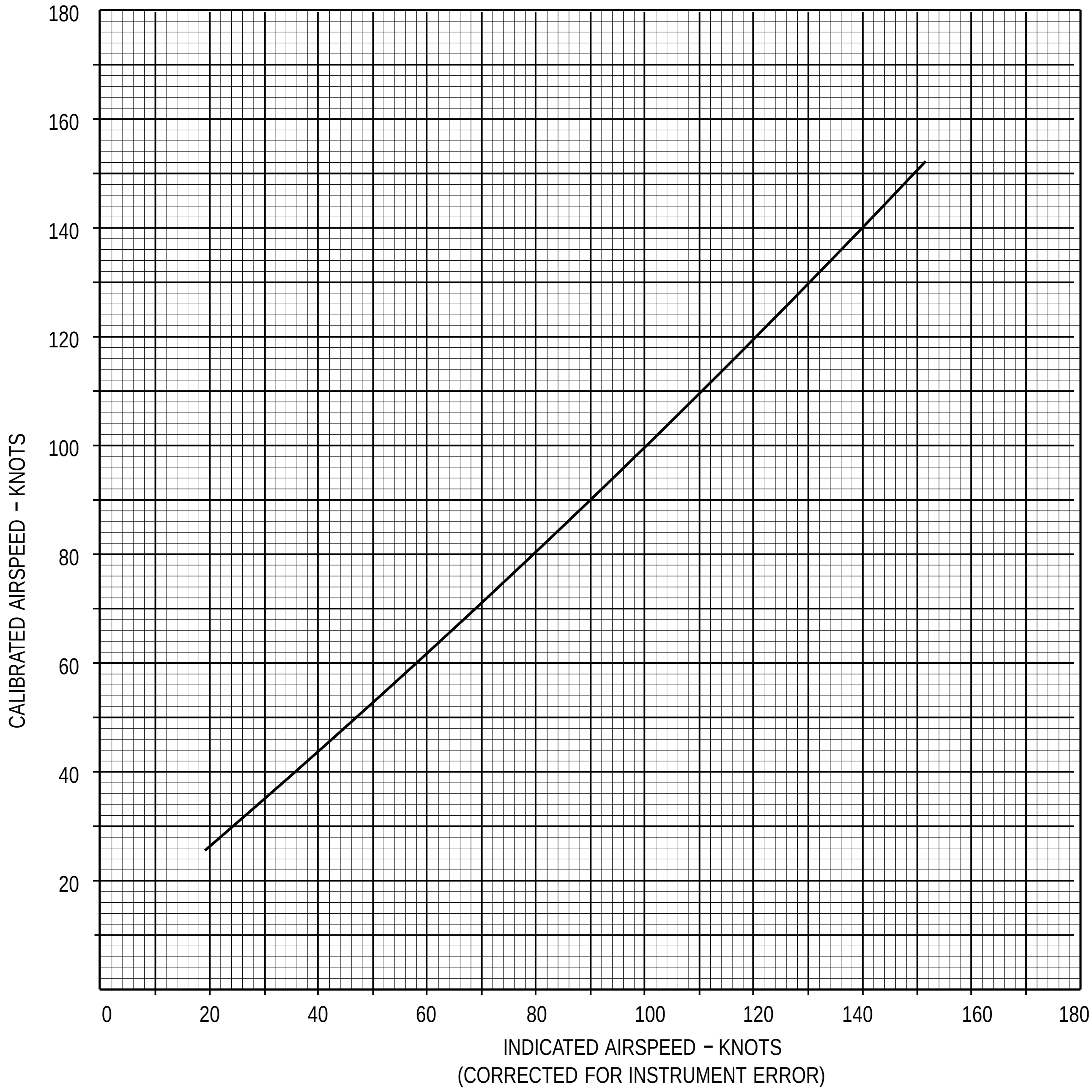


Figure 5−2. Airspeed Calibration Curve

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 the chart as illustrated by the example below.

Example:

WANTED: Speed for best rate of climb

KNOWN: Density altitude = 5000 feet

METHOD: Enter the left side of chart at the known density altitude of 5000 feet. Move to the right along line and read 67 KIAS as the speed for best rate of climb.

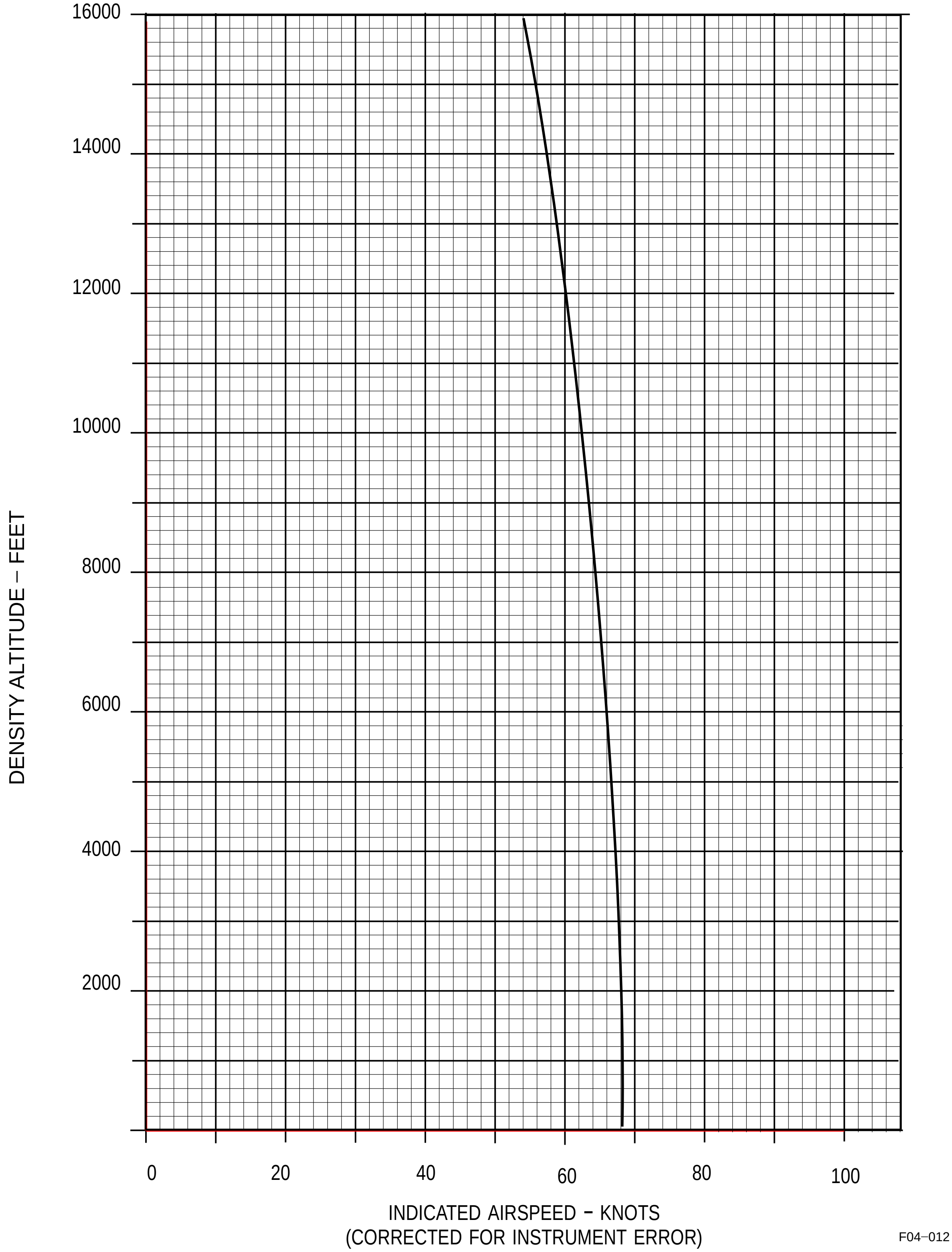


Figure 5–3. Speed for Best Rate of Climb

5−5. HOVER CEILING VS GROSS WEIGHT − IN GROUND EFFECT (IGE)

Description:

The hover ceiling charts show the maximum hover weight capability in ground effect (IGE) for known conditions of pressure altitude and outside air temperature (OAT), or alternately, the maximum hover ceiling for a known gross weight and outside air temperature.

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

The Hover Ceiling vs Gross Weight charts are based on:

1. Takeoff power at 100 % N_2
2. Cabin heat and engine anti−ice OFF
3. Electrical load of 10 amps
4. No wind conditions
5. Side winds from the right rear quarter

Use of Chart:

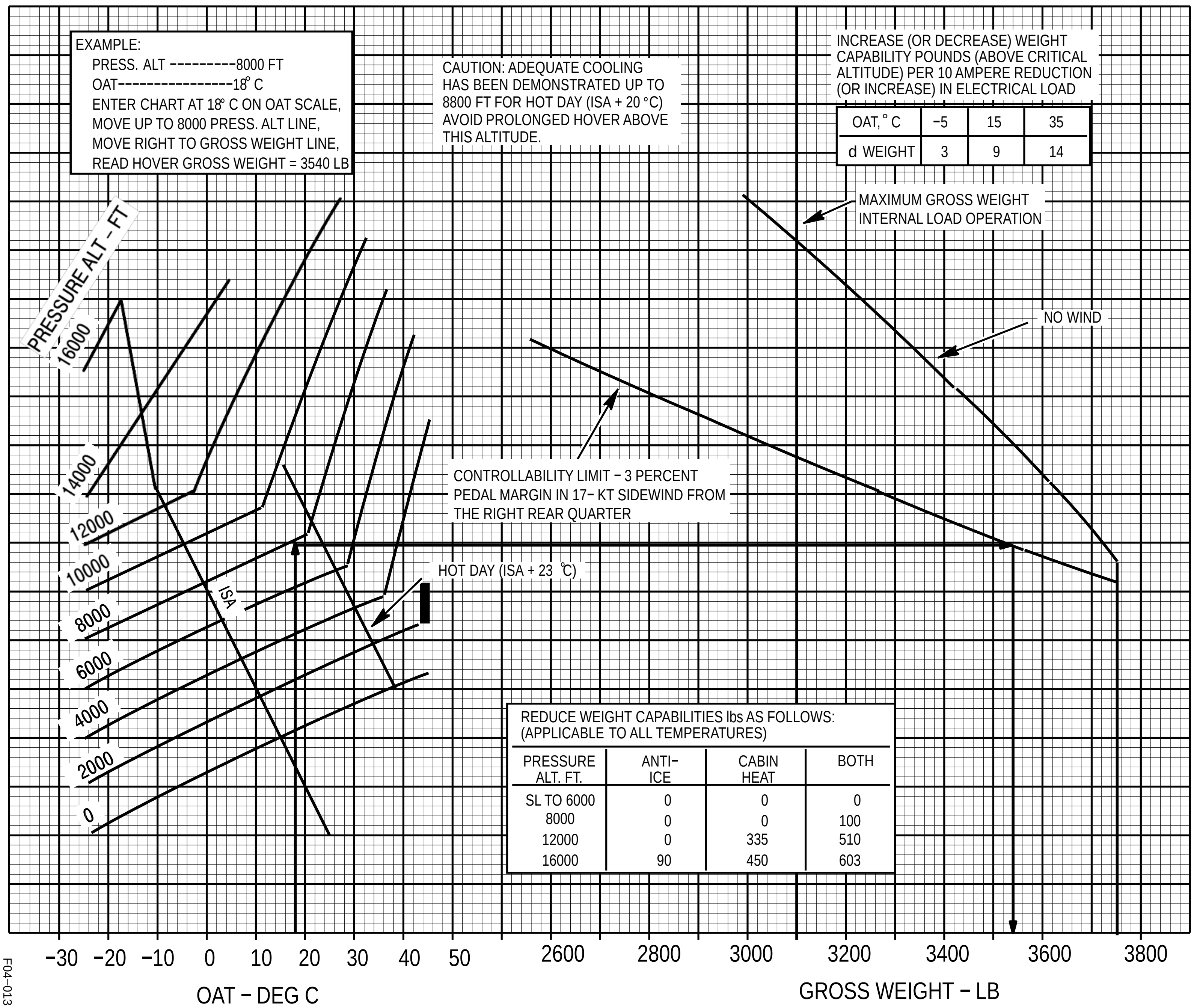
The helicopter used for this example has:
1. Standard landing gear
2. Standard engine inlet

The following example explains the correct use of the chart in Figure 5−4. To determine the maximum gross weight for hovering at 3.5 ft skid clear- ance, the pilot must know the pressure altitude and the outside air temper- ature.

<u>Example</u>

WANTED: Maximum gross weight for hover at 3.5 feet skid clearance at takeoff power.
KNOWN: PA = 8000 feet;
OAT = 18°C;
17 knot side wind from the right rear quarter
METHOD: Enter the chart at 18°C on the OAT scale and move up to the 8000 FT pressure altitude line. Move to the right to the controllabili- ty limit line and then down to read a hover gross weight capability of 3540 LB.

<u>NOTE</u>: The maximum internal gross weight is 3100 LB. All weights above 3100 LB must be external and jettisonable.



OAT, °C	–5	15	35
d WEIGHT	3	9	14

PRESSURE ALT. FT.	ANTI–ICE	CABIN HEAT	BOTH
SL TO 6000	0	0	0
8000	0	0	100
12000	0	335	510
16000	90	450	603

Figure 5–4. Hover Ceiling, IGE, 3.5 Foot Skid Clearance, Standard Landing Gear, Standard Engine Inlet

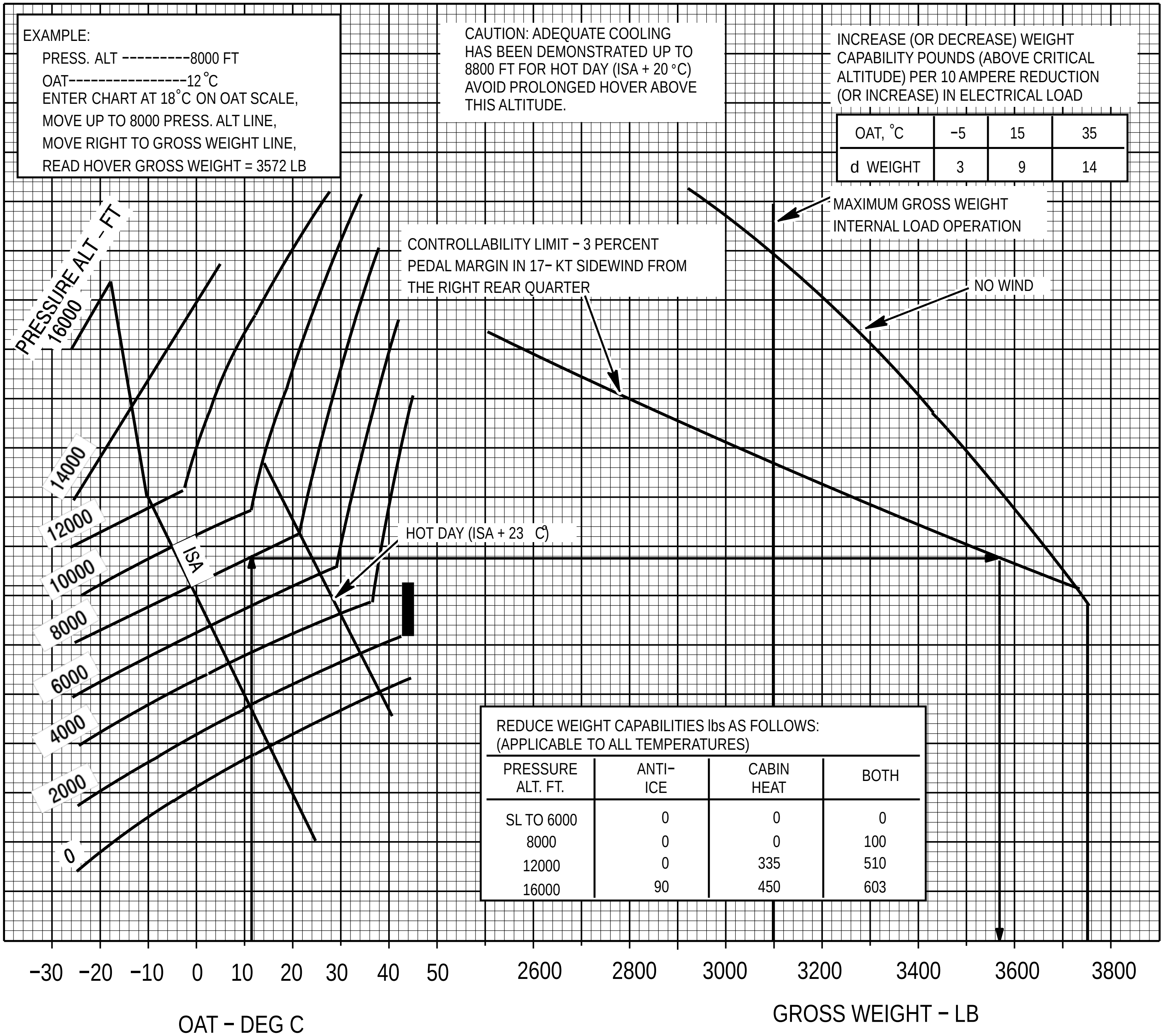


Figure 5−5. Hover Ceiling, IGE, 6 Foot Skid Clearance, Standard Landing Gear, Standard Engine Inlet

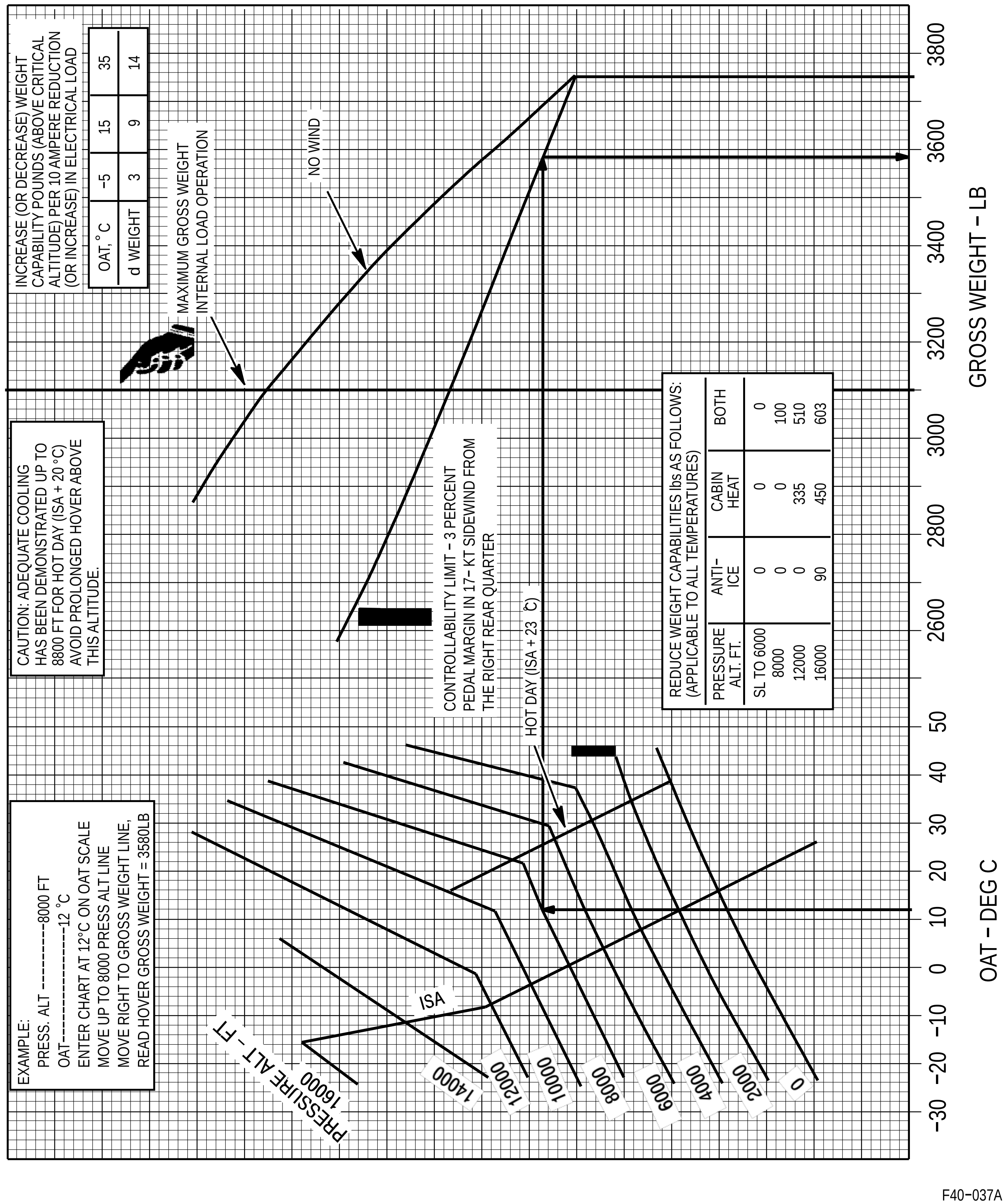


Figure 5–6. Hover Ceiling IGE, 3.5–Foot Skid Clearance Extended Landing Gear, Standard Engine Inlet

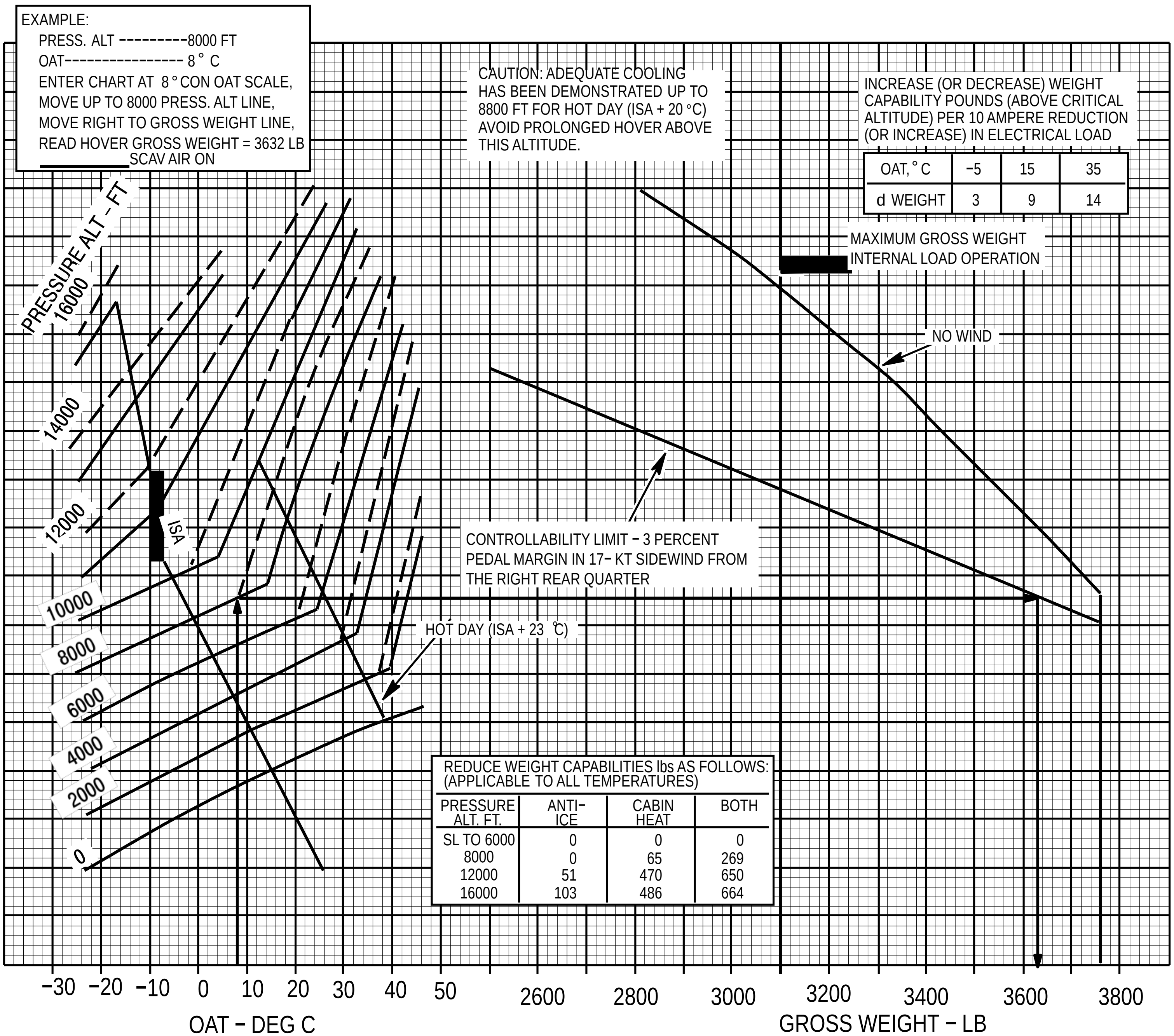


Figure 5–7. Hover Ceiling IGE, 3.5–Foot Skid Clearance, Standard Landing Gear, Particle Separator Inlet with Mist Eliminator

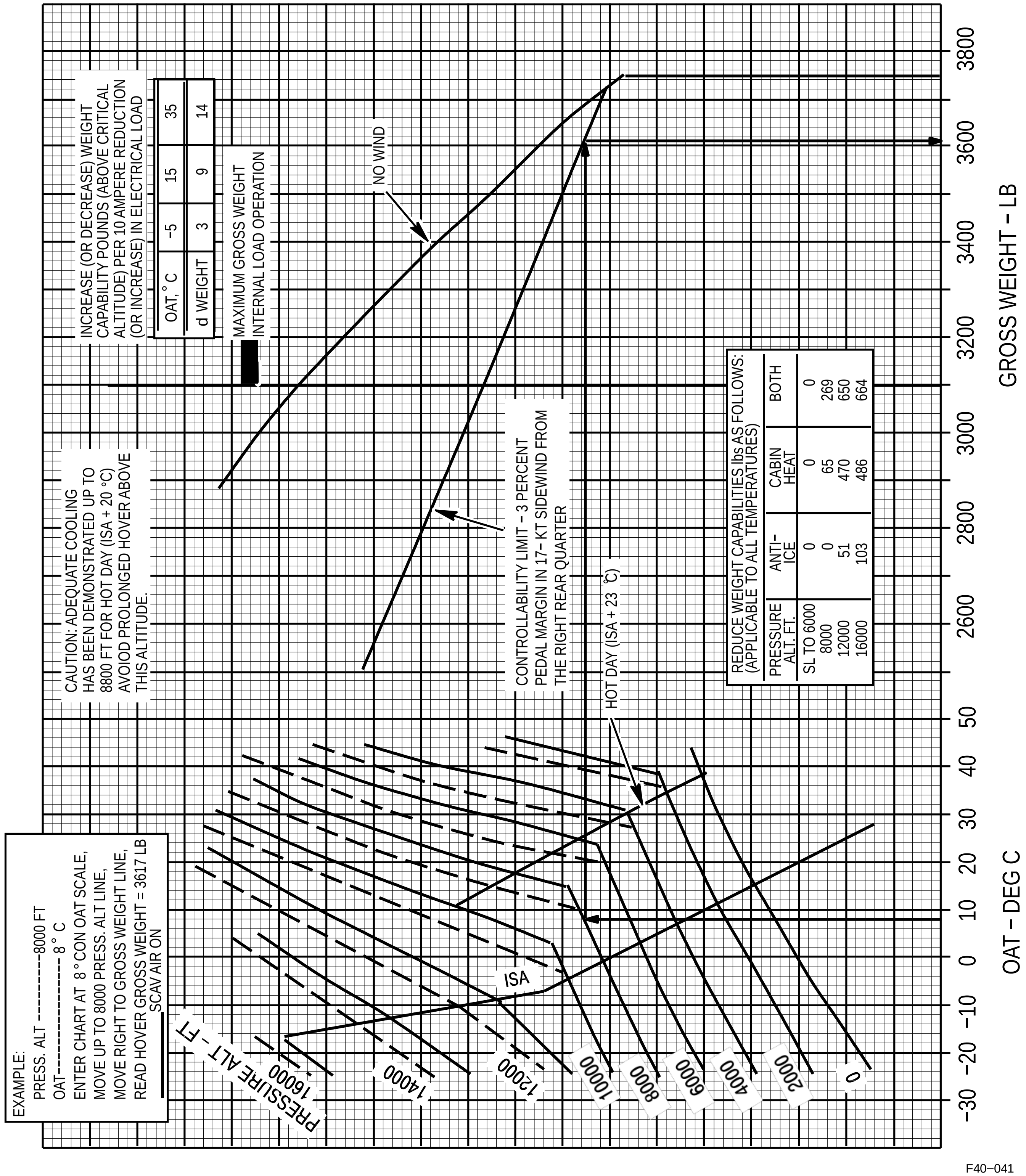


Figure 5–8. Hover Ceiling IGE, 6.0–Foot Skid Clearance, Standard Landing Gear, Particle Separator Inlet with Mist Eliminator

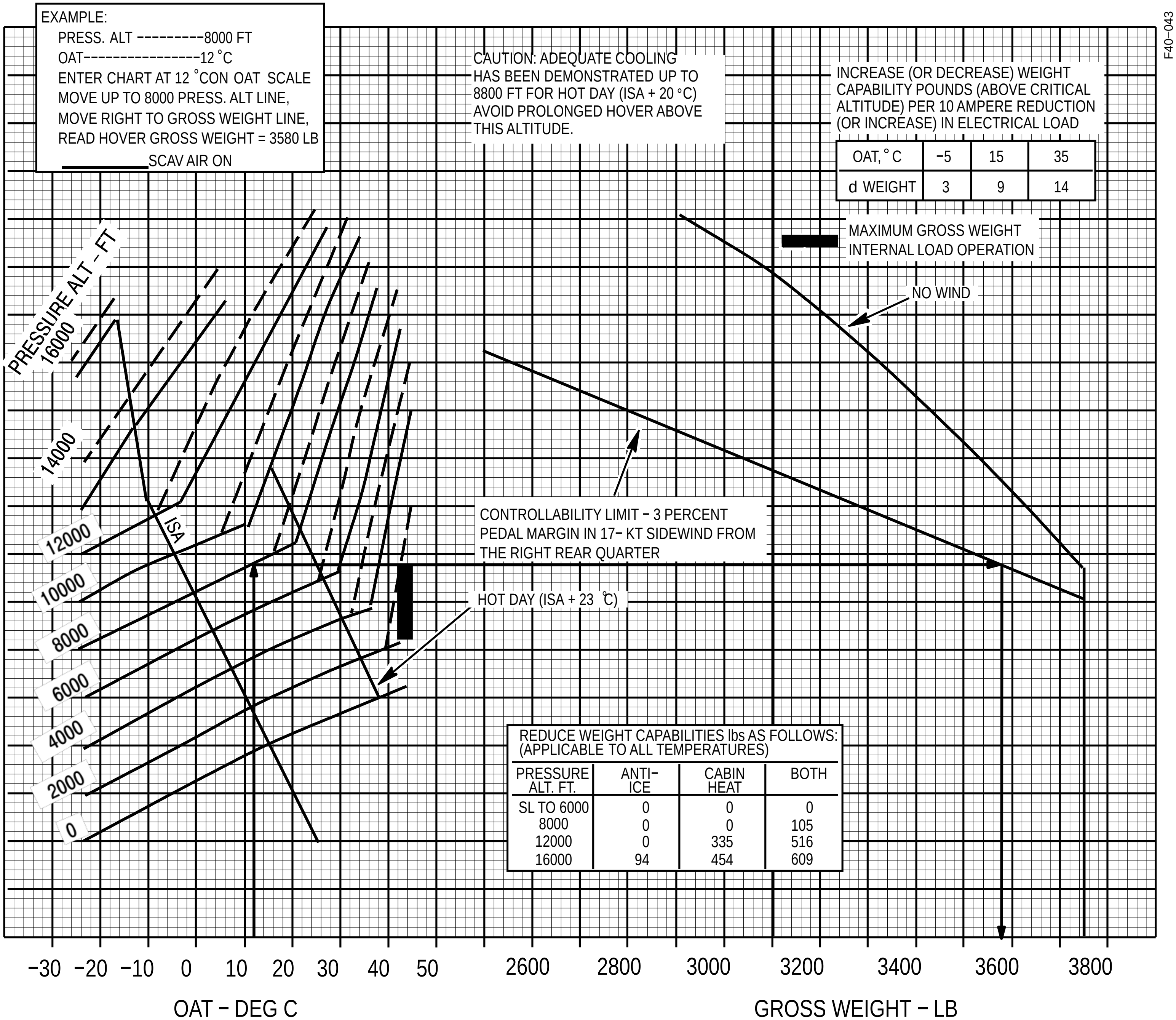
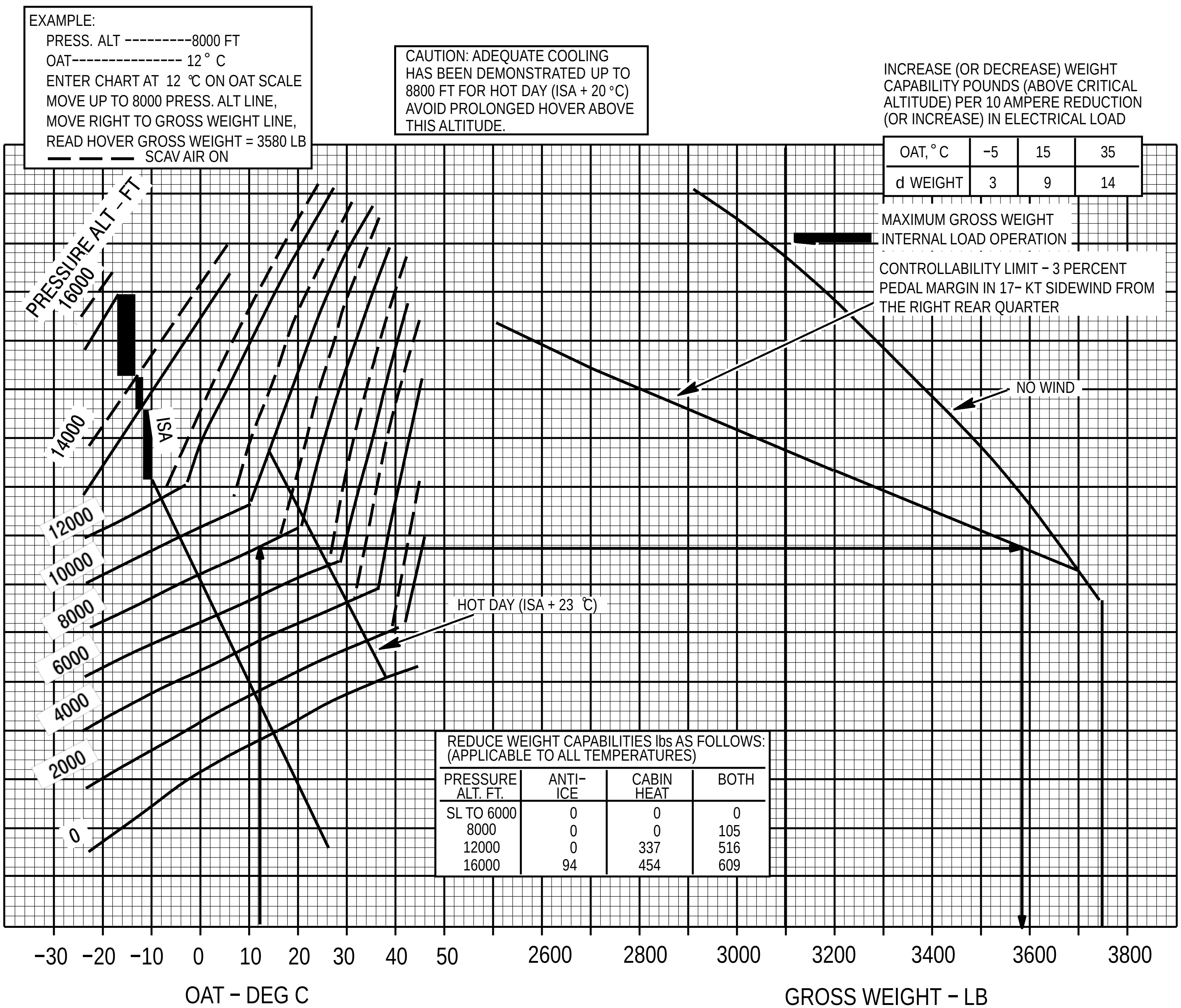


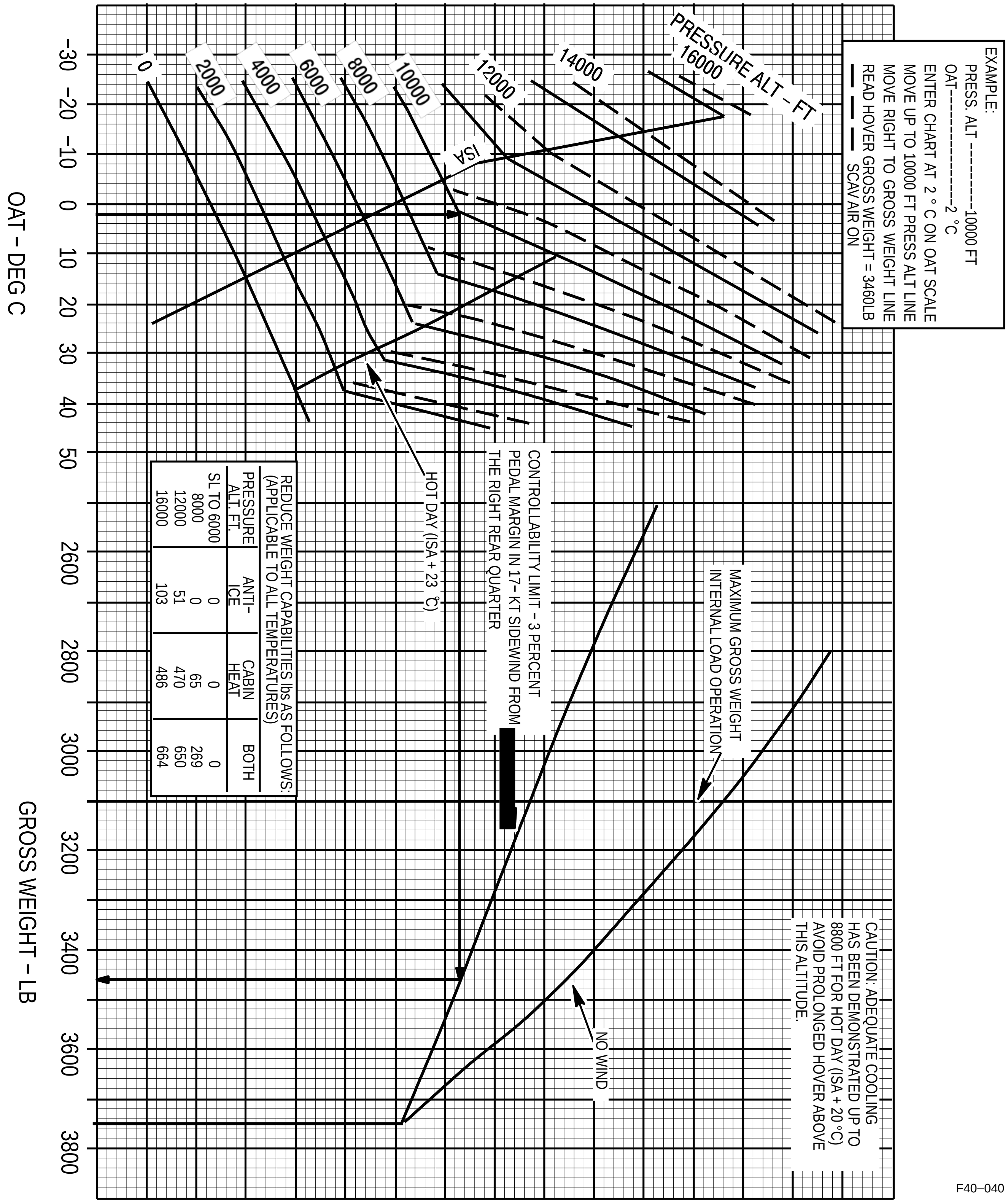
Figure 5−9. Hover Ceiling IGE, 3.5−Foot Skid Clearance, Standard Landing Gear, Particle Separator Inlet



OAT, °C	−5	15	35
d WEIGHT	3	9	14

PRESSURE ALT. FT.	ANTI–ICE	CABIN HEAT	BOTH
SL TO 6000	0	0	0
8000	0	0	105
12000	0	337	516
16000	94	454	609

Figure 5–10. Hover Ceiling IGE, 6.0–Foot Skid Clearance, Standard Landing Gear, Particle Separator Inlet



PRESSURE ALT. FT.	ANTI-ICE	CABIN HEAT	BOTH
SL TO 6000	0	0	0
8000	0	65	269
12000	51	470	650
16000	103	486	664

Figure 5−11. Hover Ceiling IGE, 3.5−Foot Skid Clearance, Extended Landing Gear, Particle Separator Inlet with Mist Eliminator

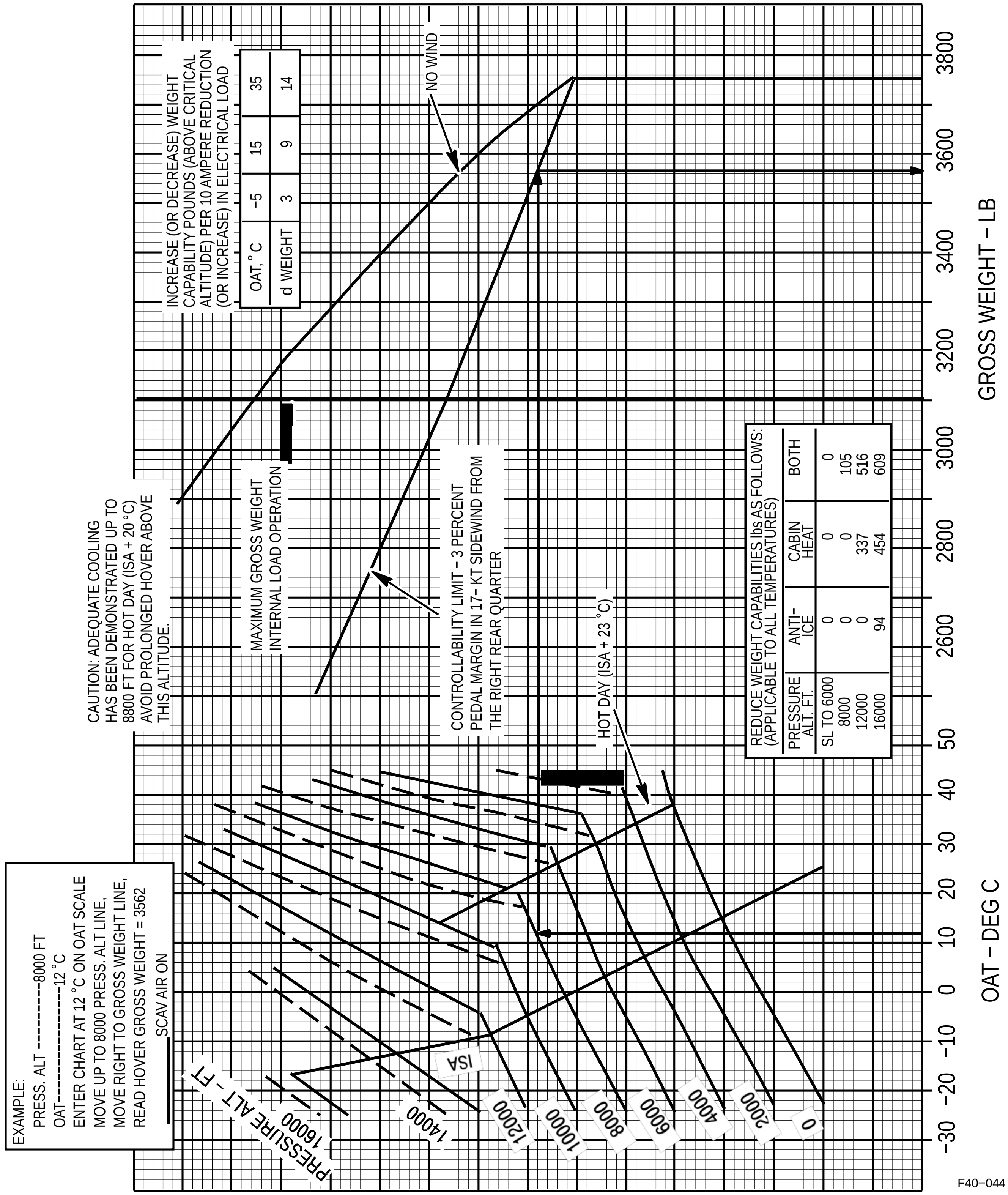


Figure 5–12. Hover Ceiling IGE, 3.5–Foot skid Clearance, Extended Landing Gear, Particle Separator Inlet

5−6. 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 (Ref. Figure 5−13).

Conditions:

The height velocity diagram is based on sea level, standard day conditions, over a smooth hard surface at 3100 pounds gross weight.

Use of Chart:

CAUTION

Observe the cross−hatched regions of the Height Velocity Diagram. These represent airspeed/altitude combinations from which a successful autorotation landing would be difficult to perform. Operation within the cross−hatched area is not prohibited, but should be avoided.

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

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 (Ref. Figure 5−14)

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 2990 pounds gross weight.

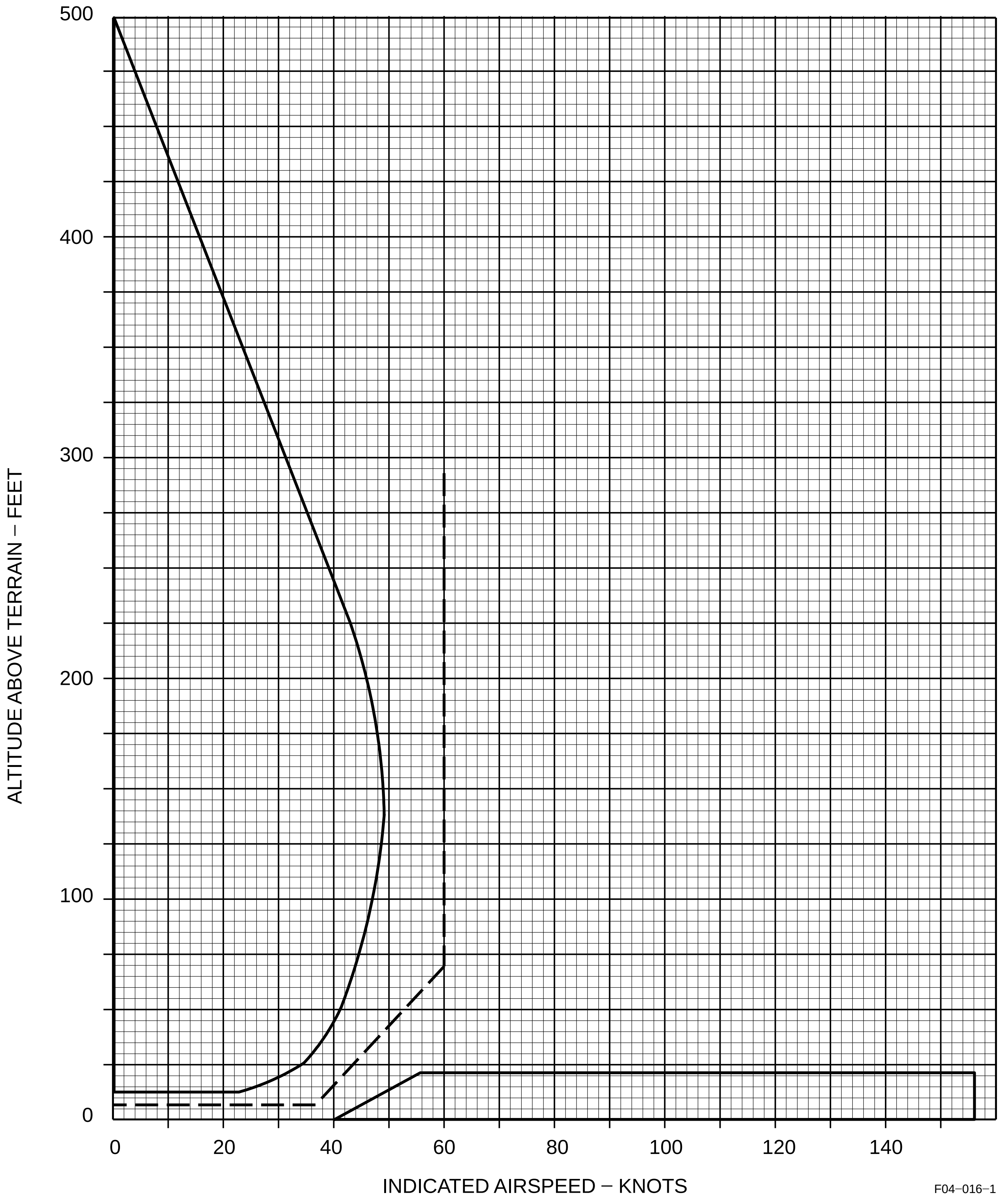


Figure 5−13. Height Velocity Diagram

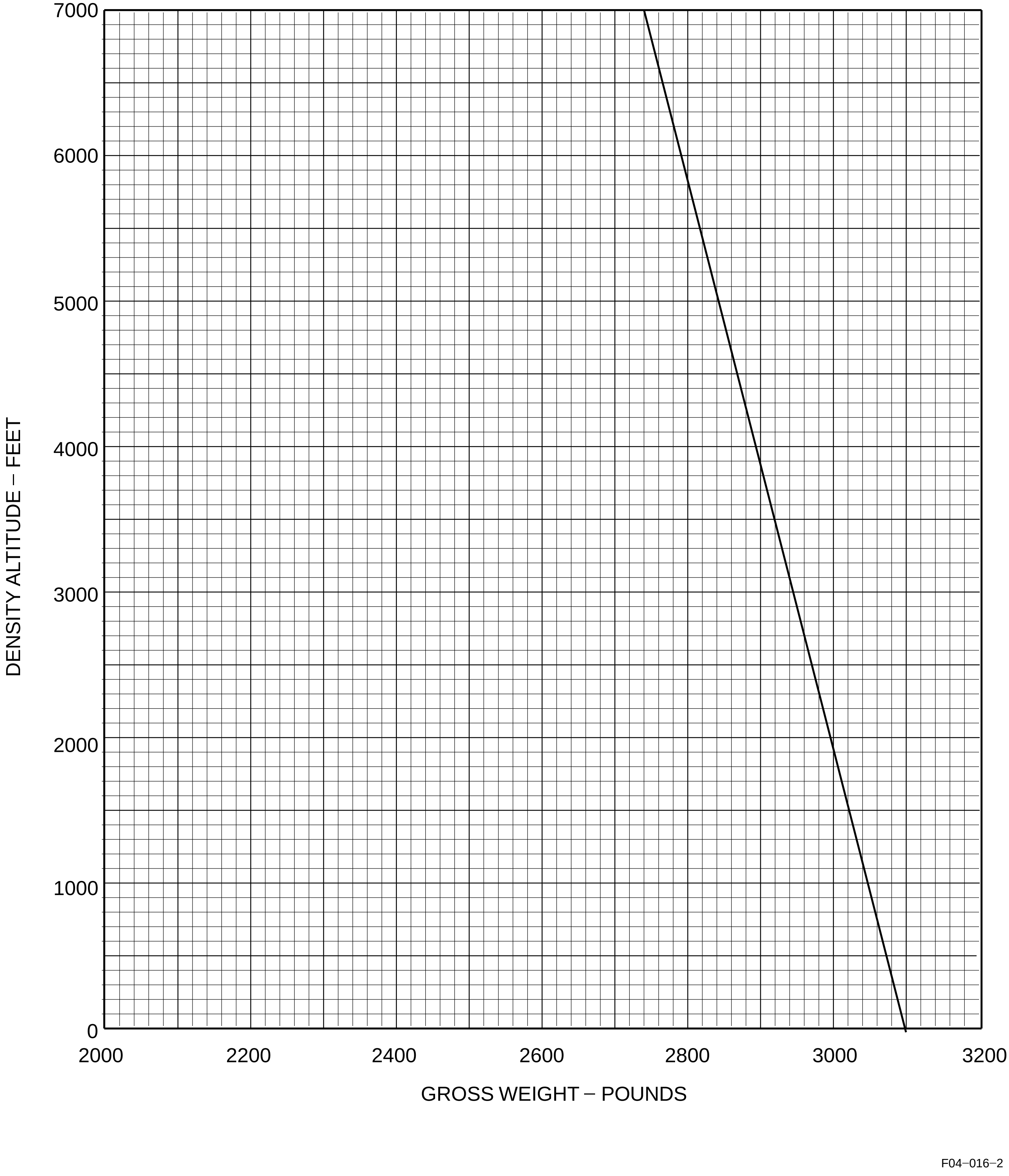


Figure 5−14. Gross Weight Limits for Height Velocity Diagram

5−7. POWER CHECK − ROLLS ROYCE 250−C30 ENGINE

NOTE: Select the appropriate Power Check Chart for type of engine inlet installed.

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 Rolls Royce 250−C30 engine producing specification power as installed in the Model 530F Plus 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 Rolls Royce 250−C30 Operation and Maintenance Manual for additional information on trend analysis.

The power check chart is based on the following conditions:

100 percent N_2
Cabin heat, scav air and engine anti−ice OFF
10 amperes electrical load
Engine bleed valve closed

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 100 percent N_2.

WARNING

Do not exceed engine/aircraft limits.

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

WARNING

Maintain separation from objects in air or on the ground.

Reset altimeter if required after obtaining pressure altitude.

Example 1 (Ref. Figure 5−15):

WANTED Check engine performance

DATA OBTAINED DURING FLIGHT:

Torque = 43 psig
TOT = 680°C
PA = 6000 feet
OAT = 30°C

METHOD

1. Enter the bottom right of the chart at 43 psig torque. Move up along the 43 psig torque line to the 6000 foot pressure altitude curve, move left to the 30°C OAT curve; now move down and read specification TOT of 700°C.

2. Compare the specification TOT of 700°C with the TOT observed during flight (680°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.

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

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

4. Actual engine horsepower may be obtained by entering the bottom of the chart at the observed engine torque pressure, moving up along the torque line to the Sea Level Pressure Altitude curve, and then moving right to read the engine shaft horsepower.

Example 2:

WANTED: Find engine horsepower at 43 psi torque.

METHOD: Enter chart at 43 psi. Move vertically to the sea level (“0”) line then to the right and read 310 shaft horse power off the shaft horsepower scale.

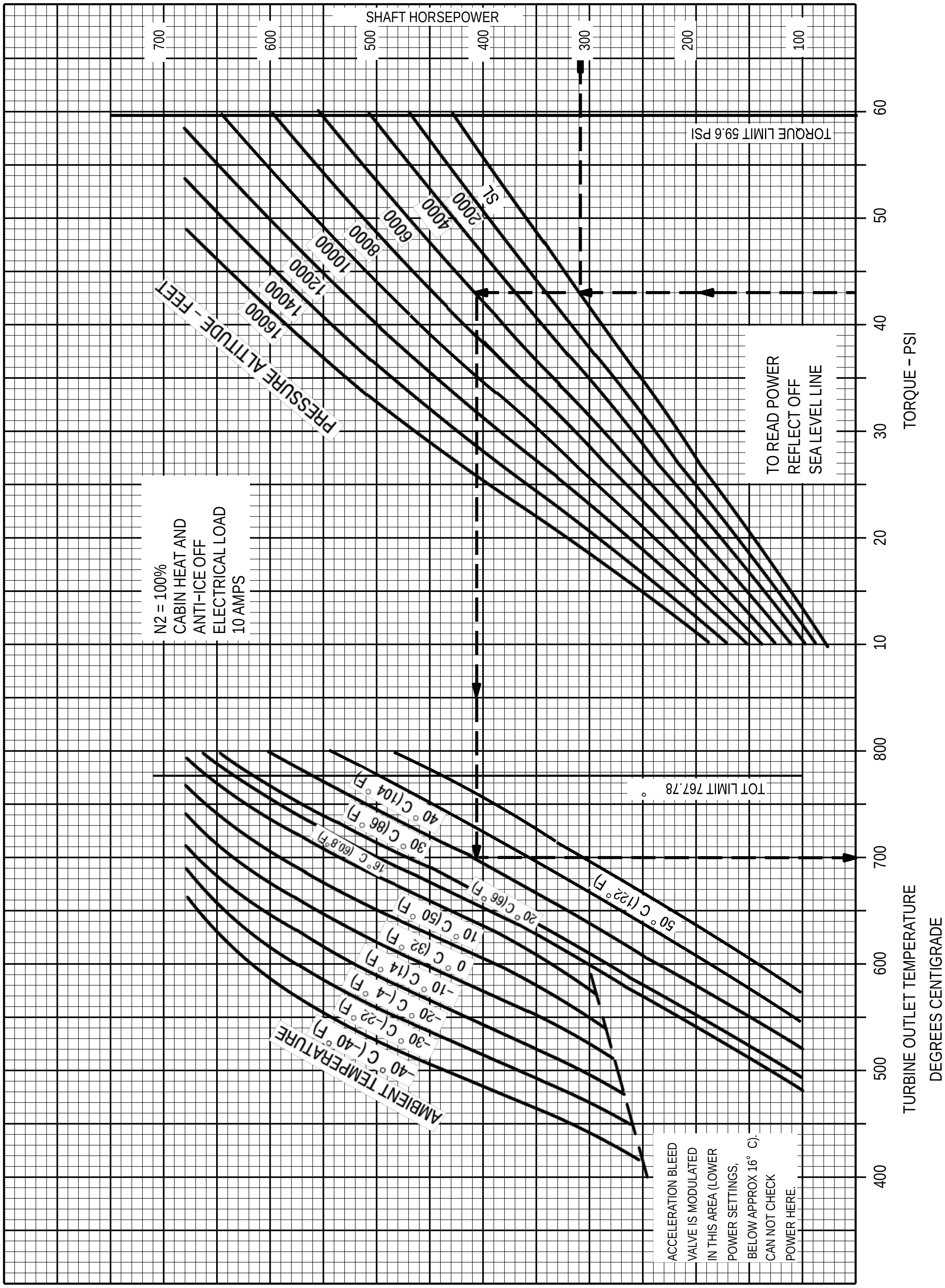
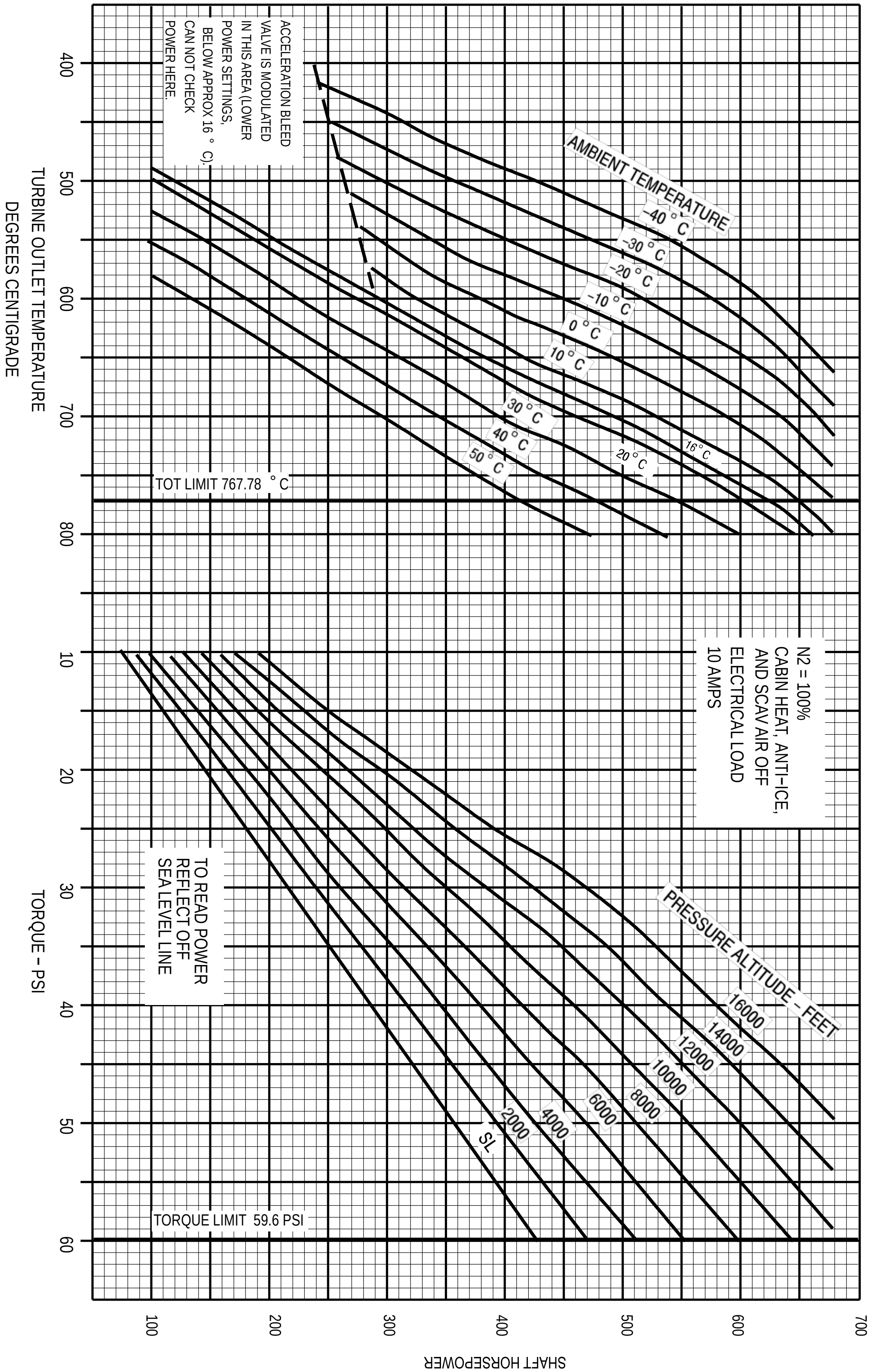


Figure 5−15. Engine Power Check Chart, Rolls−Royce 250−C30 Standard Engine Inlet



F40−047

Figure 5−16. Engine Power Check Chart, Rolls−Royce 250−C30 Engine Particle Separator Inlet

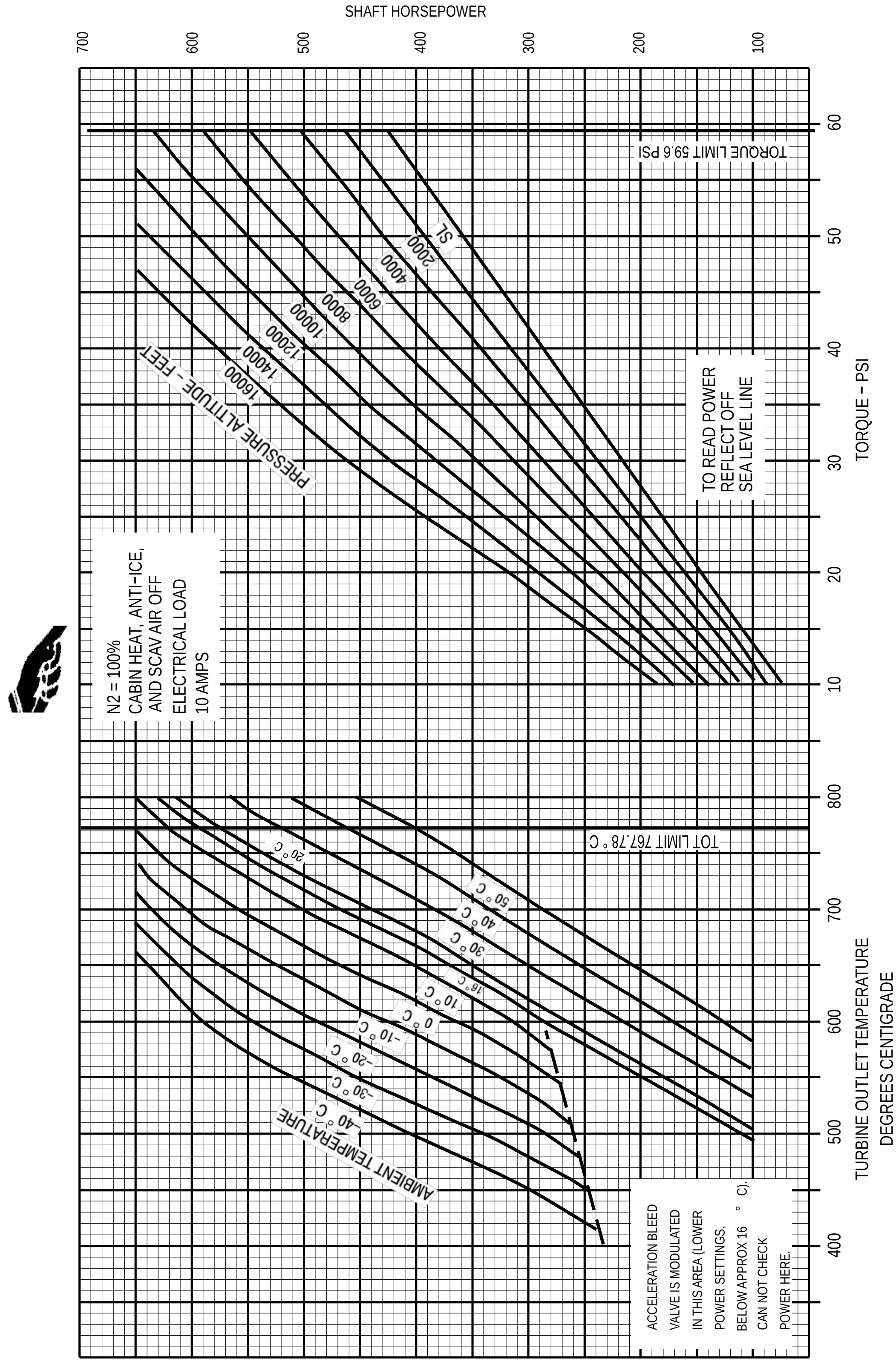


Figure 5−17. Engine Power Check Chart, Rolls−Royce 250−C30 Engine, Particle Separator Inlet with Mist Eliminator

SECTION VI
WEIGHT AND BALANCE DATA

TABLE OF CONTENTS

SECTION VI WEIGHT AND BALANCE DATA

6−1. WEIGHT AND BALANCE CHARACTERISTICS

Weight and balance characteristics:

Maximum certified gross weight − 3100 pounds.

Minimum flying weight − 1700 pounds.

Longitudinal Reference Datum100 inches forward of rotor centerline (rotor hub centerline is located at Station 100).

Cargo Deck Capacity − 1300 pounds (not to exceed 115 pounds per square foot)

Utility Stowage Compartment Limited to 50 pounds

Center of Gravity Limits:

Lateral "+" is right of centerline; lateral "−" is left of centerline when 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
3100	99.0	103.3	±3.0
2600	99.0	104.8	±3.0
2000	100.8	106.6	±3.0
1700	101.7	107.5	*±1.7
* NOTE: The CG limits vary linearly between the above given weights.			

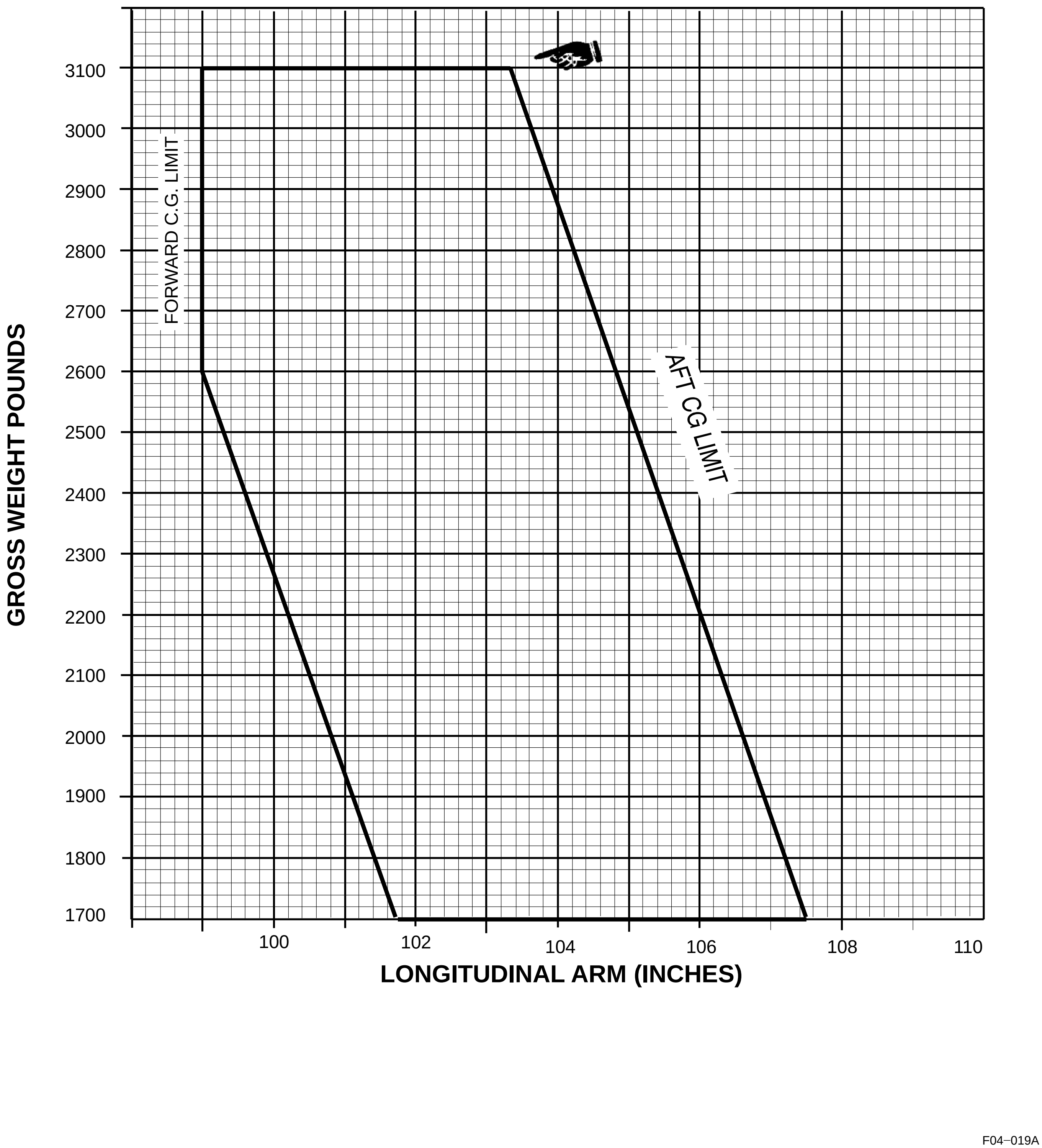


Figure 6–1. Longitudinal Center of Gravity Limits

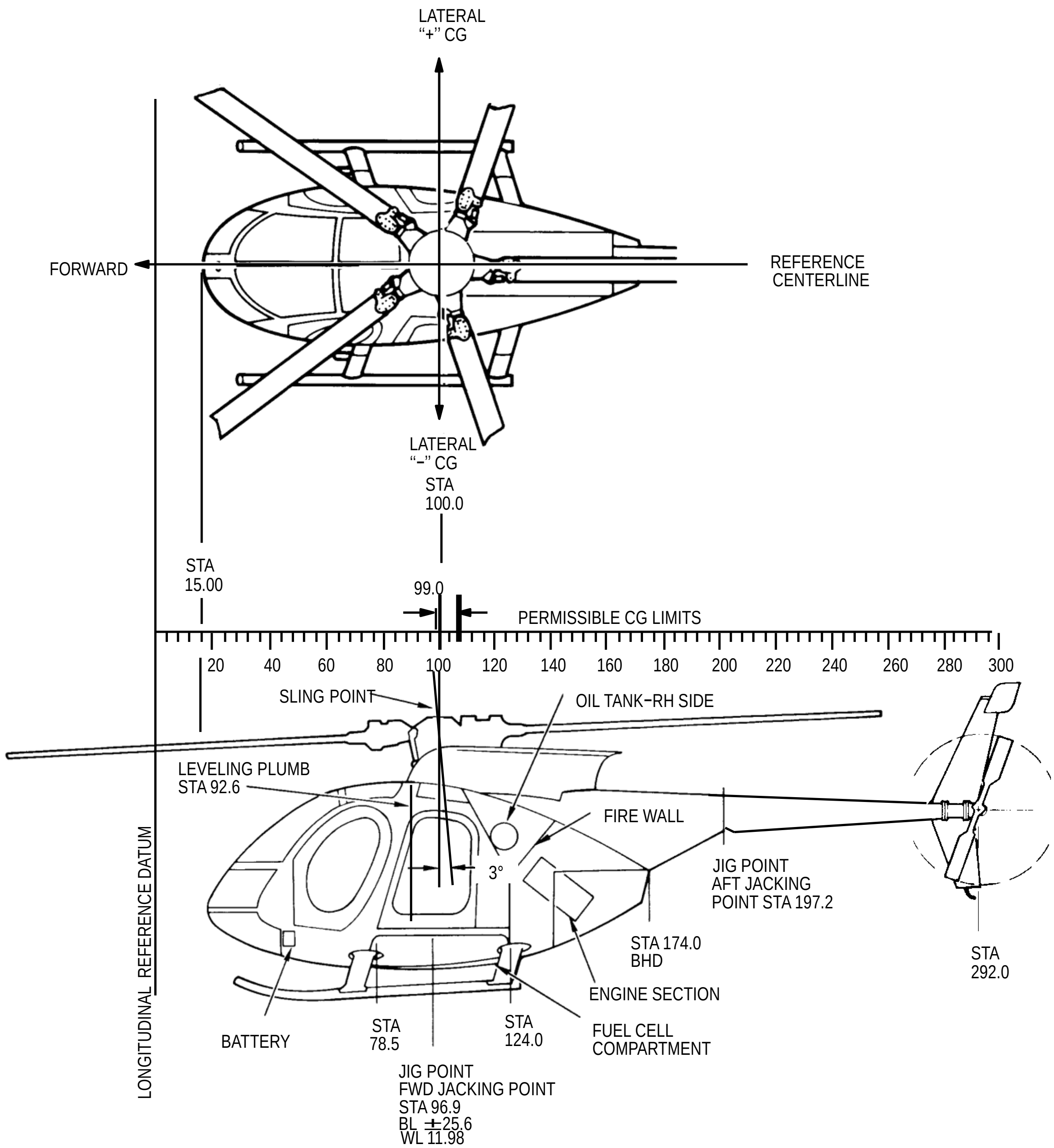


Figure 6−2. Reference Coordinates

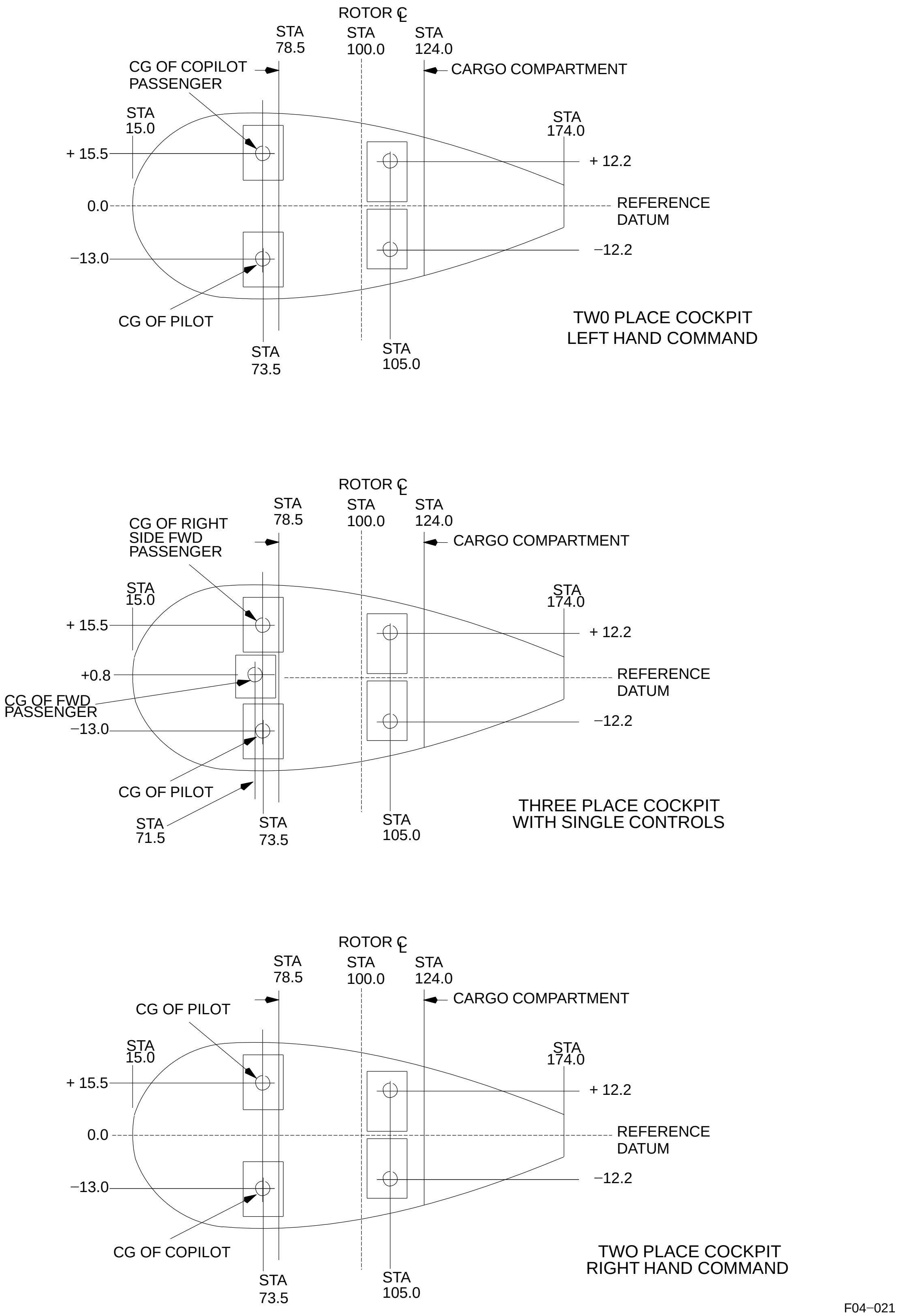


Figure 6−3. Personnel Locations

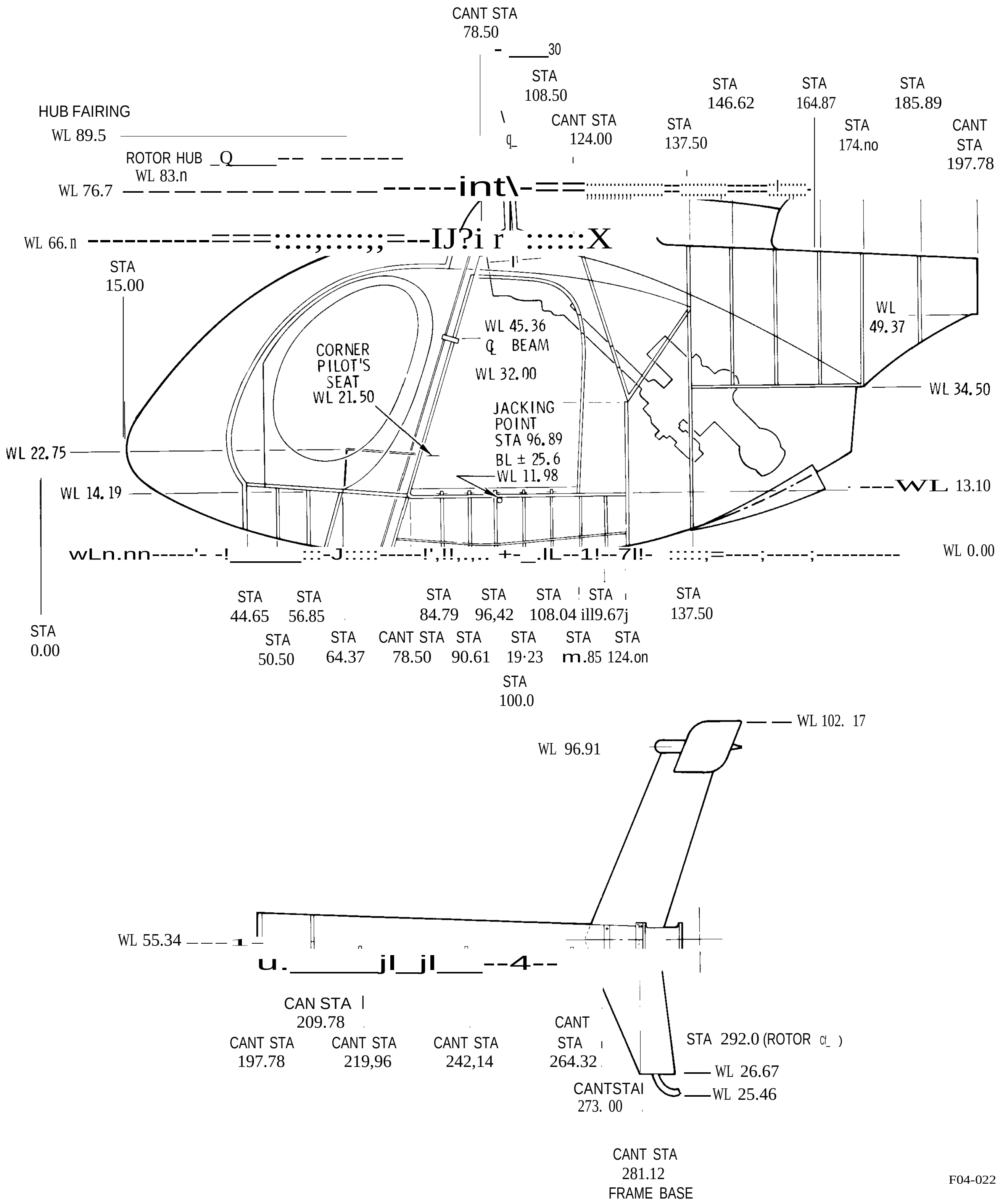


Figure 6-4. Station Diagram

WEIGHT AND BALANCE REPORT
MODEL 369FF

WEIGHED BY: J. Doe CONFIGURATION

MODEL 369FF SERIAL NO. ____________ REGISTRATION NO. ____________ DATE ____________

WEIGHING POINTS	SCALE READING (LBS)	TARE OR CALIBRATION CORRECTION (LBS)	NET WEIGHT (LBS)	LONGITU-DINAL ARM (IN.)	LATERAL ARM (IN.)	LONGITU-DINAL MOMENT (IN. LB)	LATERAL MOMENT (IN. LB)
LEFT MAIN	680.0	0.0	680.0	96.9	−25.6	65892	−17408
RIGHT MAIN	666.5	0.0	666.5	96.9	+25.6	64584	17062
TAIL	243.7	0.0	243.7	197.2	0.0	48058	0
TOTAL UNADJUSTED NET WEIGHT			**1590.2**	**112.3**	**+0.2**	**178534**	**−346**
TOTAL WEIGHT OF SURPLUS EQUIPMENT (SEE TABLE 1)			−1.3	96.9	0.0	−126	0
TOTAL WEIGHT OF MISSING EQUIPMENT (SEE TABLE 1)			71.9	86.5	−0.3	+6219	−24
TOTAL BASIC WEIGHT			**1660.8**	**111.2**	**−0.2**	**184627**	**−370**

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

FUEL/OIL AT TIME OF WEIGHING

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

Page 1 of 4

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

MODEL _369FF_ 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	1660.8	111.2	184627
PILOT	170.0	73.5	12495
PASSENGER − FWD. CENTER	170.0	71.5	12155
CRITICAL FUEL QUANTITY	40.0	90.6	3624
PASSENGER − FWD.	170.0	73.5	12495
GROSS WEIGHT (CRITICAL FUEL) − FWD C.G.	2210.8	102.0	225396

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	1660.8	111.2	184627
PILOT	170.0	73.5	12495
PASSENGER − AFT L.H.	170.0	105.0	17850
PASSENGER − AFT R.H.	170.0	105.0	17850
BAGGAGE − UNDER AFT SEAT	50.0	110.0	5500
GROSS WEIGHT (ZERO FUEL) − AFT C.G.	2220.8	107.3	238322

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

EXAMPLE 3, LATERAL	**WEIGHT (LBS.)**	**LATRL. ARM (IN.)**	**LATRL. MOMENT (IN.–LB.)**
BASIC WEIGHT	1660.8	− 0.2	− 370
PILOT	170.0	− 13.0	− 2210
PASSENGER − AFT L.H.	170.0	− 12.2	− 2074
GROSS WEIGHT(ZERO FUEL) − LATERAL C.G.	2000.8	− 2.3	− 4654

APPROVED LATERAL C.G. LIMIT FOR EXAMPLE 3 GROSS WEIGHT _*_.

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

Page 2 of _4

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

TABLE 1
SURPLUS AND MISSING EQUIPMENT

Model 369FF 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)	(0)	(126)	(0)
JACK PADS (2)	1.3	96.9	0	126	0
MISSING EQUIPMENT TOTAL:	(71.9)	(86.5)	(− 0.3)	(6219)	(− 24)
I.C.S. W/O HEADSETS	1.2	35.5	0.9	43	1
ATTITUDE GYRO IND.	3.3	42.2	0.0	139	0
DIRECTIONAL GYRO IND.	2.7	42.6	0.0	115	0
INST. VERT. SPEED IND.	1.7	45.0	3.5	77	6
VHF COMM (369D24164)	7.0	55.0	− 0.8	385	− 6
VHF NAV. (369D24164−501)	7.9	61.4	− 0.1	485	− 1
EXT. LAND. GEAR (Δ WT)	17.9	85.4	0.0	1529	0
CARGO HOOK	5.9	90.9	− 0.1	536	− 6
ROTOR BRAKE	7.4	107.3	− 2.4	794	− 18
PARTICLE SEPARATOR	16.9	125.2	0.0	2116	0

Page 3 of 4

Figure 6−6. Sample Surplus and Missing Items

BASIC WEIGHT AND BALANCE RECORD

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

AIRCRAFT MODEL 369FF	SERIAL NUMBER	REGISTRATION NUMBER	PAGE 4 OF 4

DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						RUNNING TOTAL BASIC AIRCRAFT		
				ADDED (+)			REMOVED (–)					
	IN	OUT		WEIGHT	LONG ARM	MOMENT IN LB	WEIGHT	LONG ARM	MOMENT IN LB	WEIGHT	LONG ARM	MOMENT IN LB
10/4/82			**ACTUAL BASIC WEIGHT–DELIVERY**							**1660.8**	**111.2**	**184627**

SAMPLE

F04–023A

Figure 6–7. Sample Weight and Balance Record

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 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 (Ref. Figure 6−3, and Figure 6−8).

Add above items (see 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 (see Example I).

NOTE: If loadings are not symmetrical about the aircraft centerline, determine lateral CG's as described in Paragraphs 6−6 and 6−7.

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	Weight (lb)	Moment (in. −lb)
Delivered Weight	1,661	184,627
Pilot	170	12,495
Passenger − Fwd Outboard	170	12,495
Passenger − Aft R/H	170	17,850
Passenger − Aft L/H	170	17,850
Utility Stowage (Station 52.9)	20	1,060
Baggage (under seat)	50	5,500
1. Zero Fuel Weight	2,411	251,877
Fuel	403	39,345
2. Gross Weight	2,814	291,222

Calculation of Longitudinal CG

CG (Zero Fuel Weight):

$$\frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{251{,}877}{2{,}411} = 104.5 \text{ in.}$$

CG (Gross Weight):

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{291{,}222}{2{,}814} = 103.5 \text{ in.}$$

NOTE: The CG falls within the limits specified in Table 6−1.

6−5. LONGITUDINAL LOADING OF CARGO

The large aft compartment of the Model 369FF 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 = 96.9 ± measured distance (inches); ie., + if aft of mark, − if forward of mark.

Obtain the cargo moment:

Cargo Moment = Cargo Weight x Cargo CG

Perform weight and balance as previously described for passenger configuration.

EXAMPLE II: Longitudinal CG Calculation − Passenger and Cargo

Items	Weight (lb)	Moment (in. −lb)
Delivered Weight	1,661	184,627
Pilot	170	12,495
Passenger − Fwd Outboard	170	12,495
Cargo	949	94,900
1. Zero Fuel Weight	2,950	304,517
Fuel	150	14,000
2. Gross Weight	3,100	318,517

Calculation of Longitudinal CG

CG (Zero Fuel Weight):

$$\frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{304{,}517}{2{,}950} = 103.2 \text{ in.}$$

CG (Gross Weight):

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{318{,}517}{3{,}100} = 102.7 \text{ in.}$$

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{303{,}756}{3{,}000} = 101.2 \text{ in.}$$

NOTE: The CG falls 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 crew and passenger lateral center of gravity, see Figure 6−3.

6−7. LATERAL LOADING OF CARGO

To determine if 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 = weight X lateral station. (See Example III.)

EXAMPLE III: Lateral CG Calculation − Passenger and Cargo

Items	Weight (lb)	Lateral Arm (in)	Lateral Moment (in.lb)
Delivered Weight	1,661	−0.2	−370
Pilot (L/H)	170	−13.0	−2,210
Passenger − Fwd (R/H)	170	+15.5	+2,635
Cargo	949	−2.0	−1,898
1. Zero Fuel Weight	2,950	−0.6	−1,843
Add: Fuel	150	0	0
2. Gross Weight	3,100	−0.6	−1,843

Calculation of Lateral CG

CG (Zero Fuel Weight):

$$\frac{\text{Moment at Zero Fuel Weight}}{\text{Zero Fuel Weight}} = \frac{-1{,}843}{2{,}950} = -0.6 \text{ in.}$$

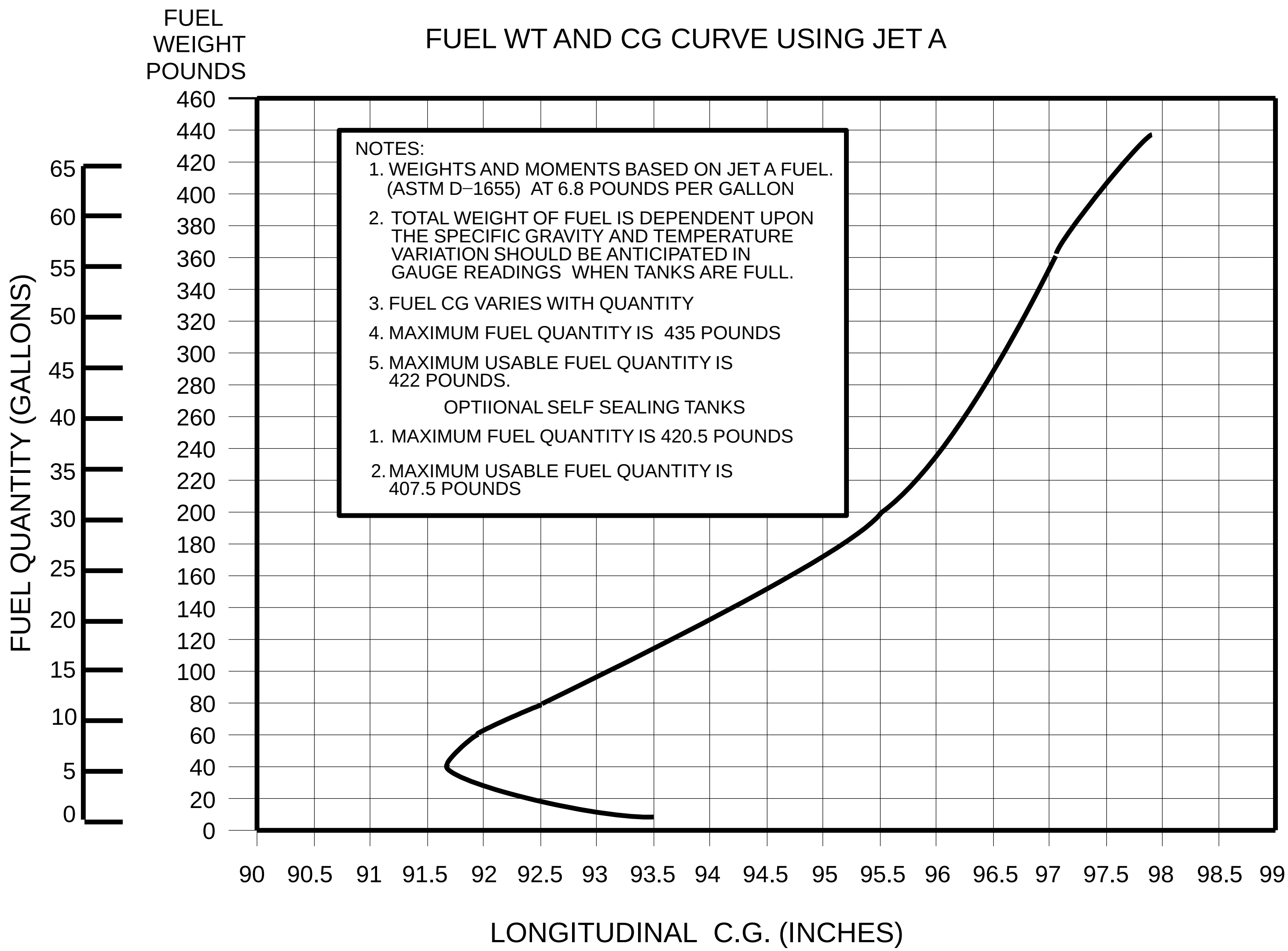
CG (Gross Weight):

$$\frac{\text{Moment at Gross Weight}}{\text{Gross Weight}} = \frac{-1{,}843}{3{,}100} = -0.6 \text{ in.}$$

NOTE: The CG falls within the limits specified in Table 6−1.

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).



F04–024

Figure 6–8. Fuel Station Diagram (Jet–A at 6.8 Pounds per Gallon) (Sheet 1 of 2)

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 97.10 – in.
2. Multiply 97.10–in (station) by 340 lb (fuel weight) to arrive at 33,014 in–lb (moment)

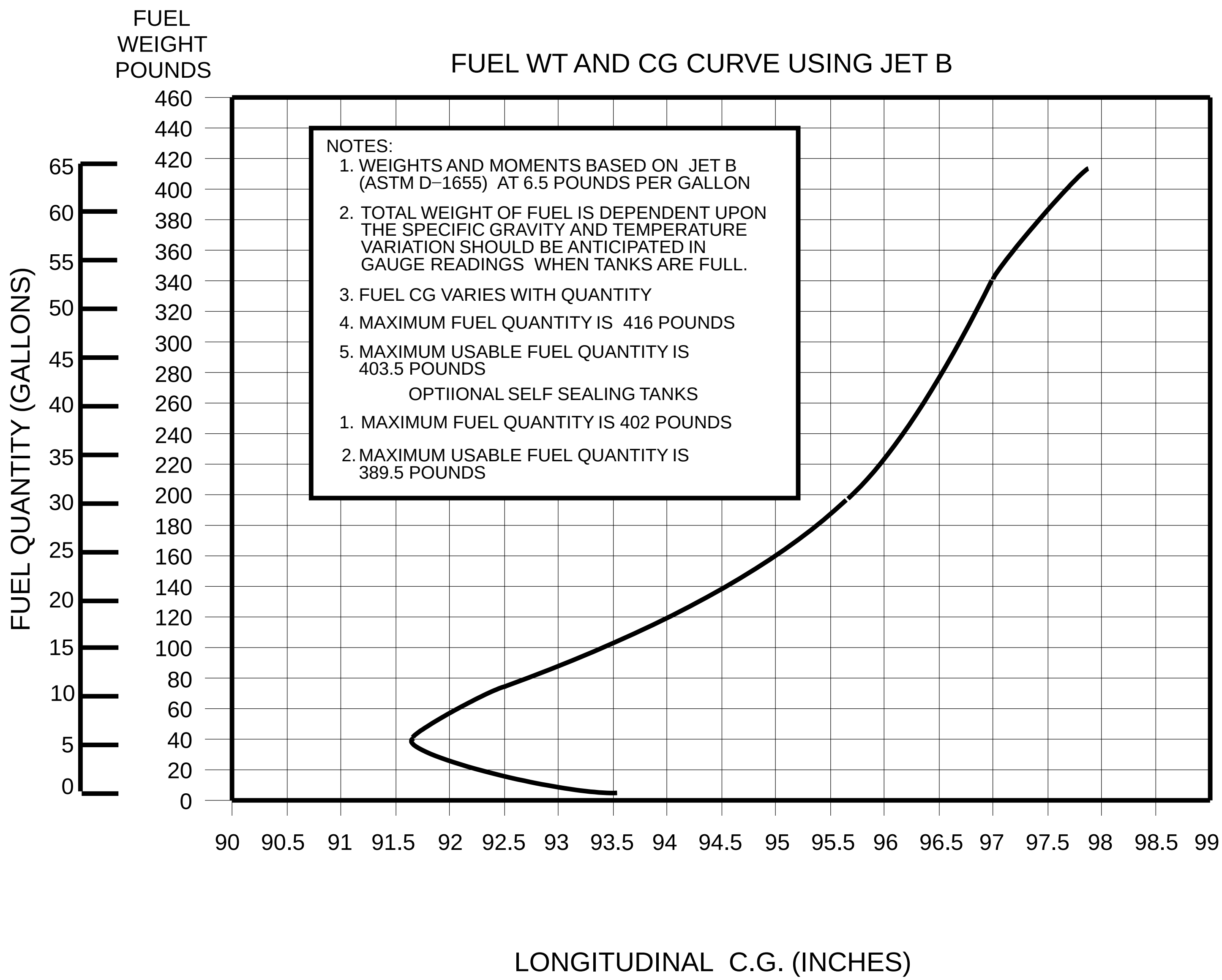


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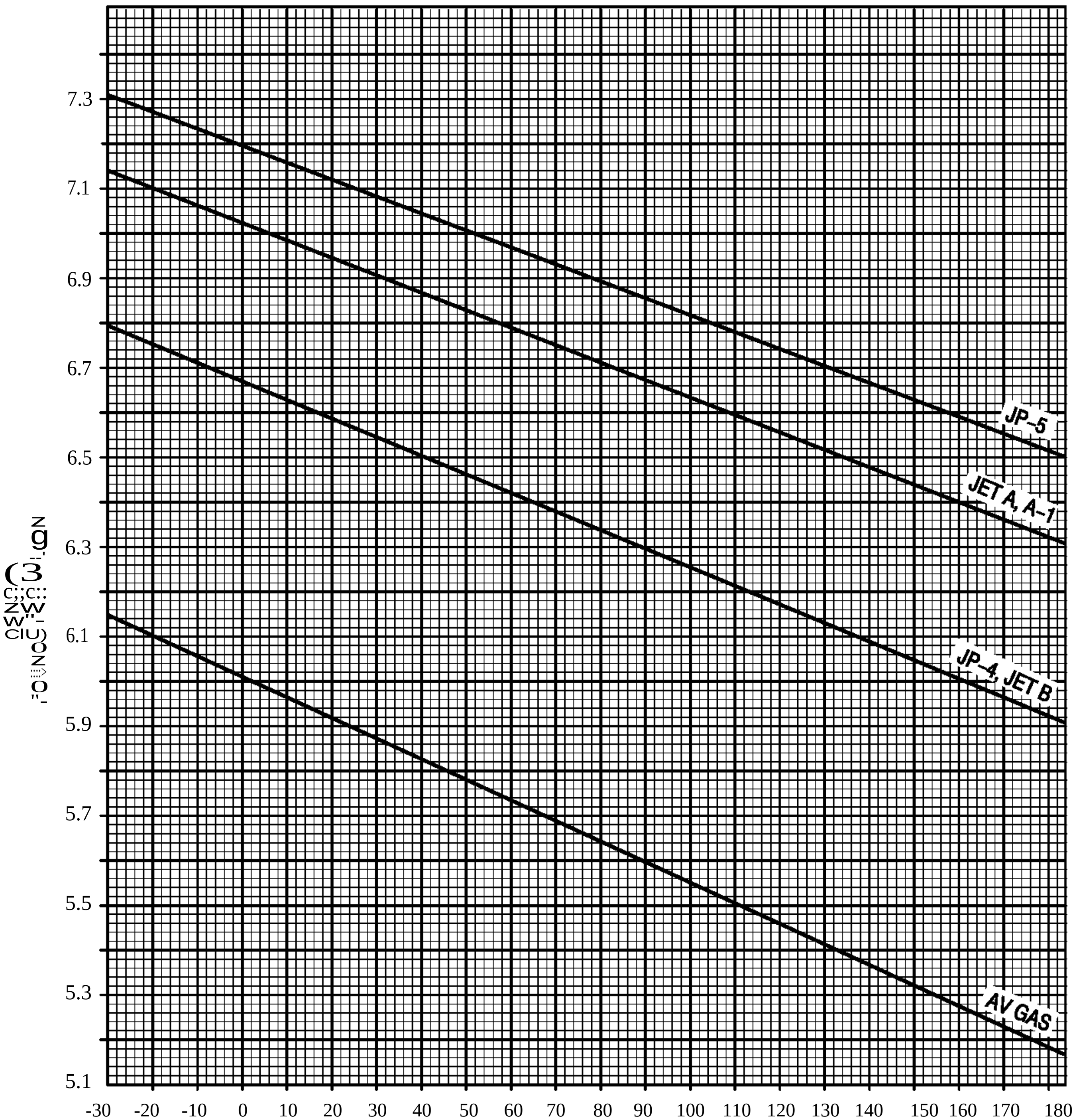
Figure 6–8. Fuel Station Diagram (Jet–B at 6.5 Pounds per Gallon) (Sheet 2 of 2)

FUELS



TEMPERATURE, °F

F04-026

Figure 6-9. Fuel Density Versus Temperature

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

Pilot and Passenger Weights and Longitudinal Moments			
Passenger Weight (lb)	Moment (in.–lb)	Moment (in.–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)	Moment (in.–lb)	Moment (in.–lb)	Moment (in.–lb)
	Utility Stowage Compartment Station 52.9	Fwd Bulkhead Station 87	Under Seat and Center Station 110	Behind Seat Station 120
10	529	870	1,100	1,200
20	1,058	1,740	2,200	2,400
30	1,587	2,610	3,300	3,600
40	2,116	3,480	4,400	4,800
*50	2,645	4,350	5.500	6,000
60	–	5,220	6,600	7,200
70	–	6,090	7,700	8,400
80	–	6,960	8,800	9,600
90	–	7,830	9,900	10,800
100	–	8,700	11,000	12,000
*Maximum Capacity				

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

Passenger Weight (lb)	Moment (in.−lb) Pilot L/H Station−13.0	Moment (in.−lb) Passenger R/H Fwd Station+15.5	Moment (in.−lb) Passenger Center Fwd Station +0.8	Moment (in.−lb) Aft Passenger R/H and L/H Station ±12.2
120	−1,560	+1,860	+ 96	±1,464
140	−1,820	+2.170	+112	±1,708
160	−2,080	+2,480	+128	±1,952
170	−2,210	+2,635	+136	±2,074
180	−2,340	+2,790	+144	±2,196
200	−2,600	+3,100	+160	±2,440
220	−2,860	+3,410	+176	±2,684
240	−3,120	+3,720	+192	±2,928

BAGGAGE WEIGHTS AND MOMENTS

Baggage Weight (lb) Station +12.8	Moment (in.−lb)
10	+128
20	+256
30	+348
40	+512
50	+640

Aft Compartment Passenger Weights and Longitudinal Moments
(High Density Seating)

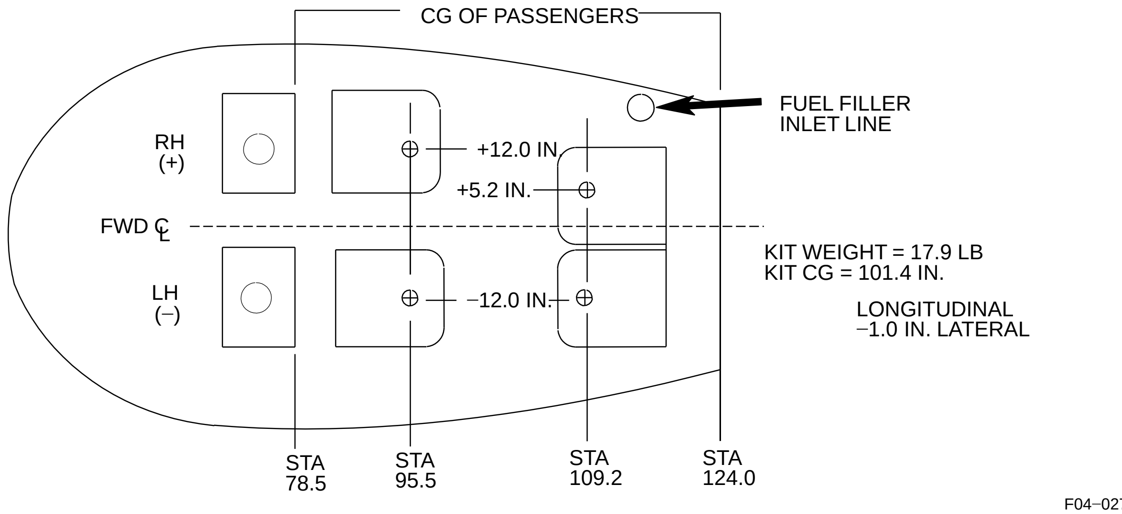


Table 6−4. Weight and Loading for 369H90035−503 Seating and Belts for Four Installation (High Density Seating)

Passenger (s) (lb)	Moment (In. lb), Fwd position (Sta 95.5)	Moment (in.−lb), Aft Position (Sta 109.2)
150	14,300	16,400
175	16,700	19,100
200	19,100	21,800
225	21,500	24,600
250	23,900	27,300
275	26,300	30,000
300	28,700	32,800
325	31,000	35,500
350	33,400	38,200
375	35,800	41,000
400	38,200	43,700

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 6−5.

Position restraining loop in accordance with Figure 6−10.

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 6−5. Cargo Weight Versus 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).

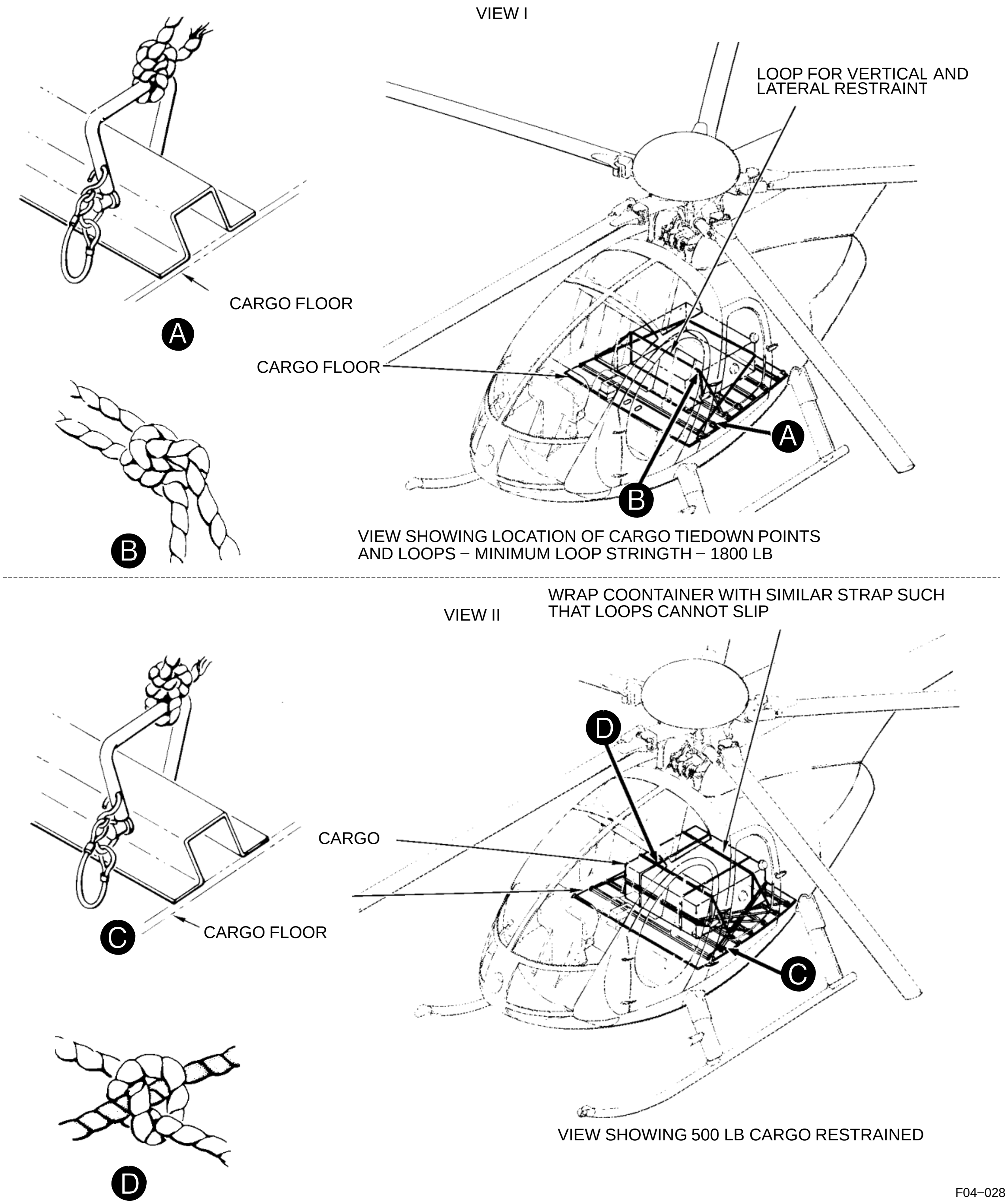


Figure 6−10. Cargo Restraint

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. Engine starting requirements are approximately 375 amperes, minimum.

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 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.

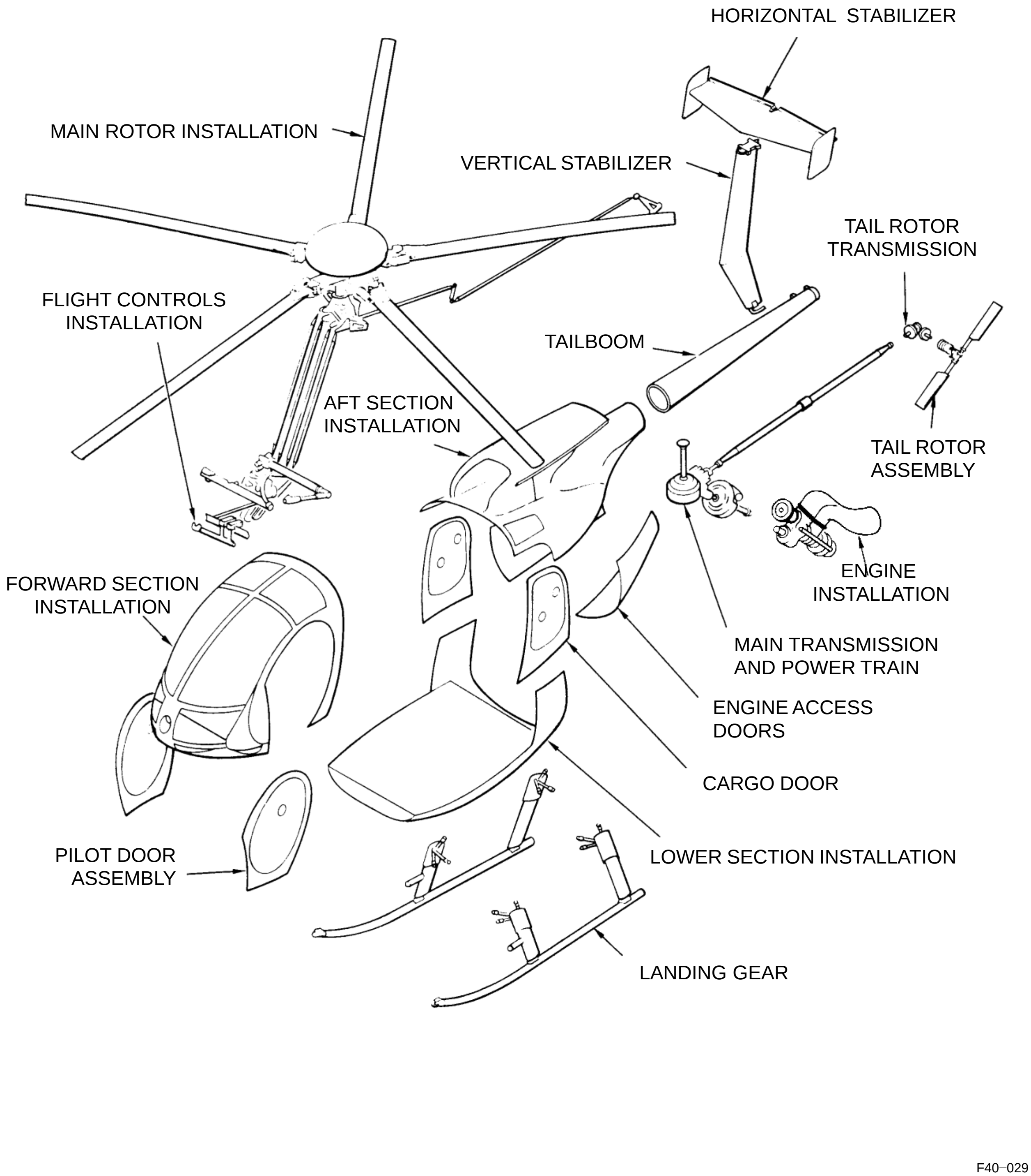


Figure 7−1. MD 369FF Helicopter − Major Components

7−4. GROUND HANDLING WHEELS

Standard ground handling wheels, available as a special tool for helicopters not equipped with floats, are used for moving helicopter by hand and for towing helicopter (Ref. Figure 7−2).

At regular intervals, check that wheel tire pressure is a maximum of 80 to 90 psi.

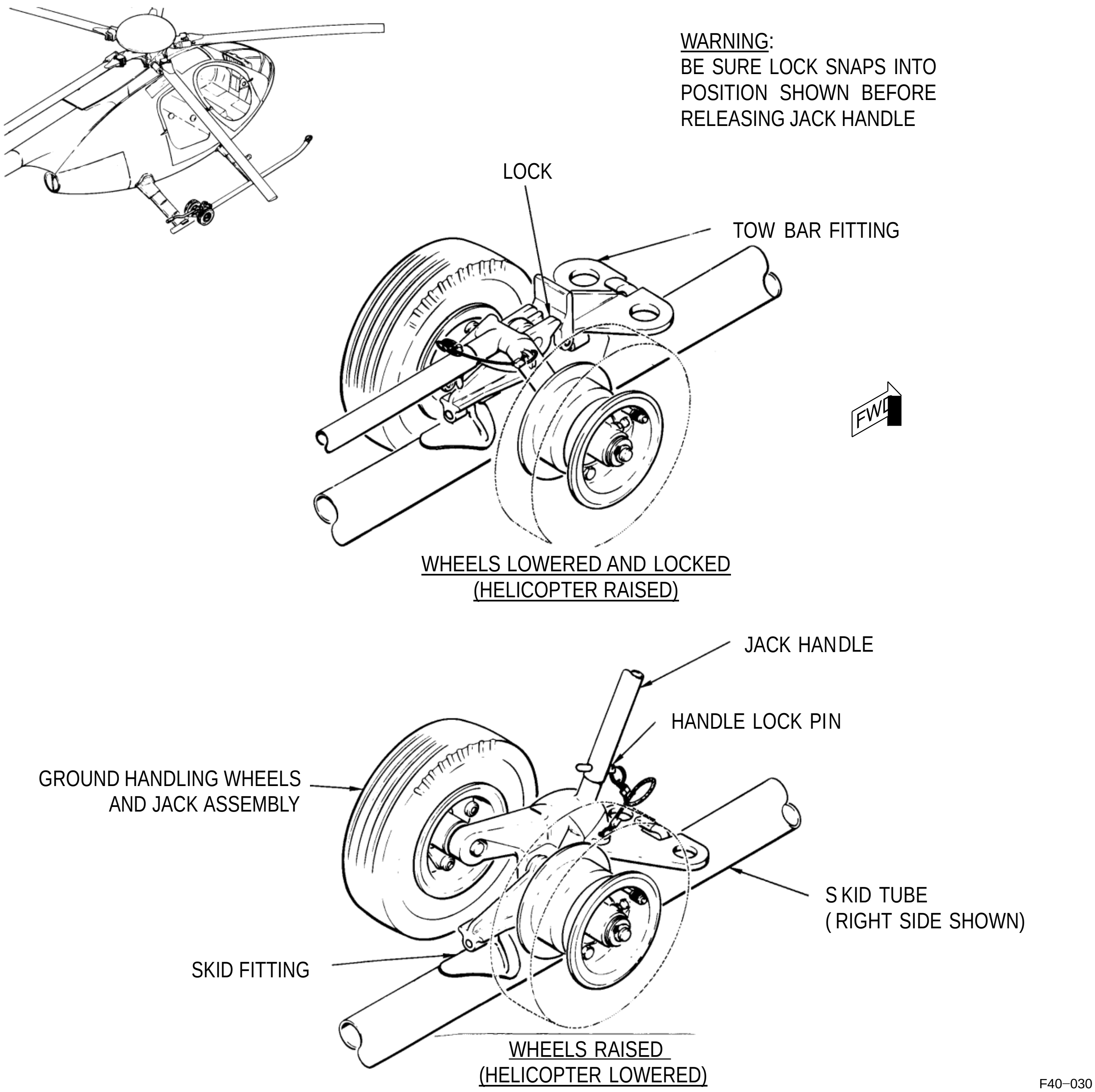


Figure 7−2. Ground Handling Wheels

7−5. MOVING AND TOWING HELICOPTER

Manual moving:

CAUTION

Excessive lead−lag load applied to the main rotor blades during ground handling can result in damage to the elastomeric damper buns and failure of the damper assembly. Operators should use extra caution to avoid lead−lag loads in excess of 35 pounds at the tip of the main rotor blades.

Ensure all stress panels are installed on helicopter before moving.

Attach ground handling wheels (Ref. Figure 7−2) and hold tail up while lowering the wheels (raising helicopter).

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

Towing:

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.

Ensure all stress panels are installed on helicopter before moving.

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.

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 blade clearance from nearby objects on most level ground available.

Apply friction to lock cyclic and collective sticks so that friction control knobs are positioned as follows: neutral for cyclic stick an full down for collective stick.

Secure main rotor blades as follows.

Turn blades until one blade is directly above tailboom (Ref. Figure 7−3).

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 or cabin steps.

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.

Park helicopter and remove main rotor blades.

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.

Install air inlet fairing cover on air inlet front fairing.

Install engine exhaust cover on exhaust tailpipe.

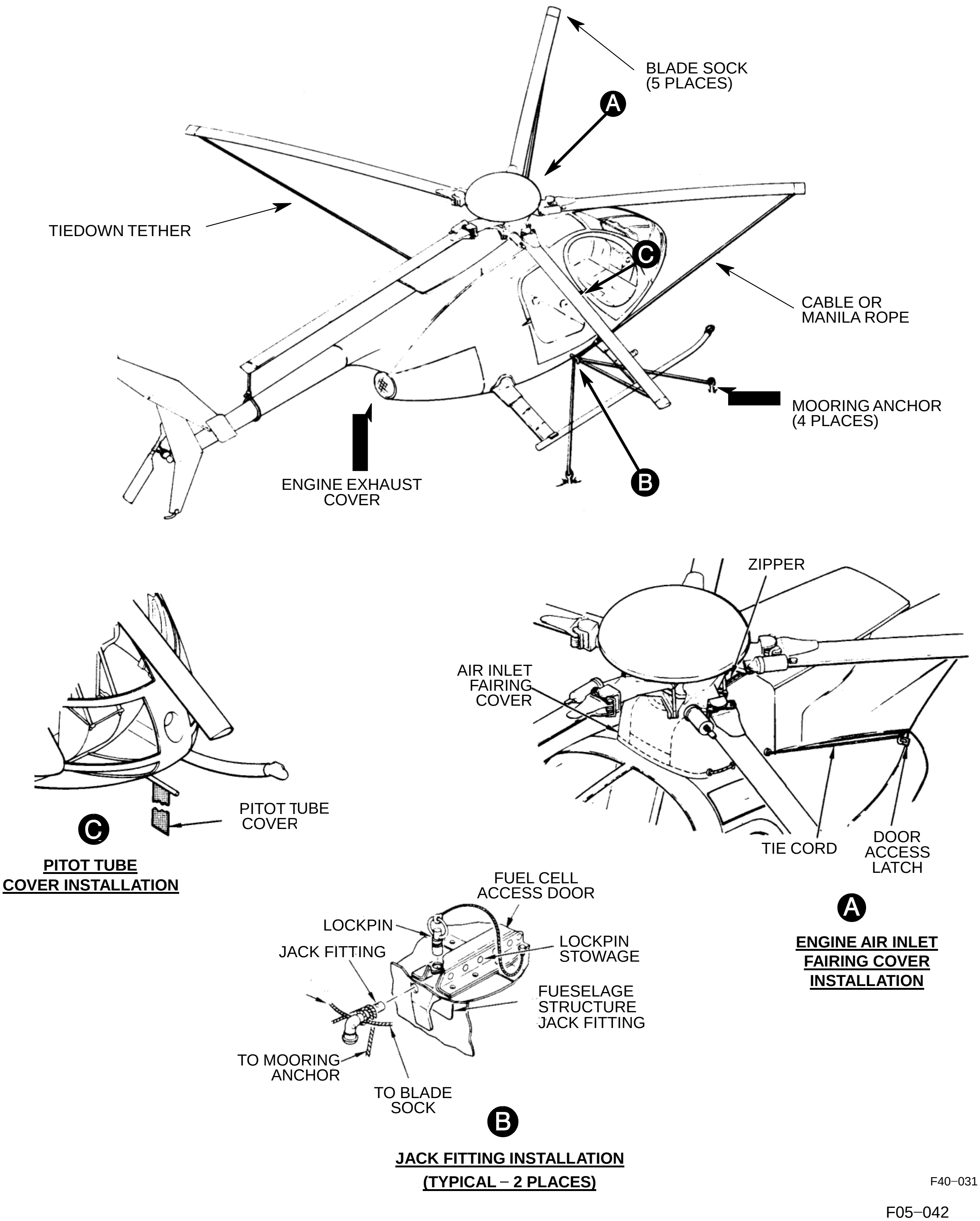


Figure 7−3. Parking and Mooring.

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 4.

2. Main Transmission (369D25100) − Capacity: 12.0 US Pt (5.67 liters)
Use the materials listed under Item 4 or Mobil SHC 626.
3. Main Transmission (369F5100) − Capacity: 14.0 US Pt (6.62 liters).
Use Mobil SHC 626 only.

4. 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

5. 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.

6. Overrunning Clutch (369A5350) − Capacity: 1.64 US Oz (45cc) Use the materials listed under item 4 but not Mobil SHC 626.

7. Overrunning Clutch (369F5450) − Capacity: 3.64 US Oz. Use Mobil SHC 626 only.

8. 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

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.
9. 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.

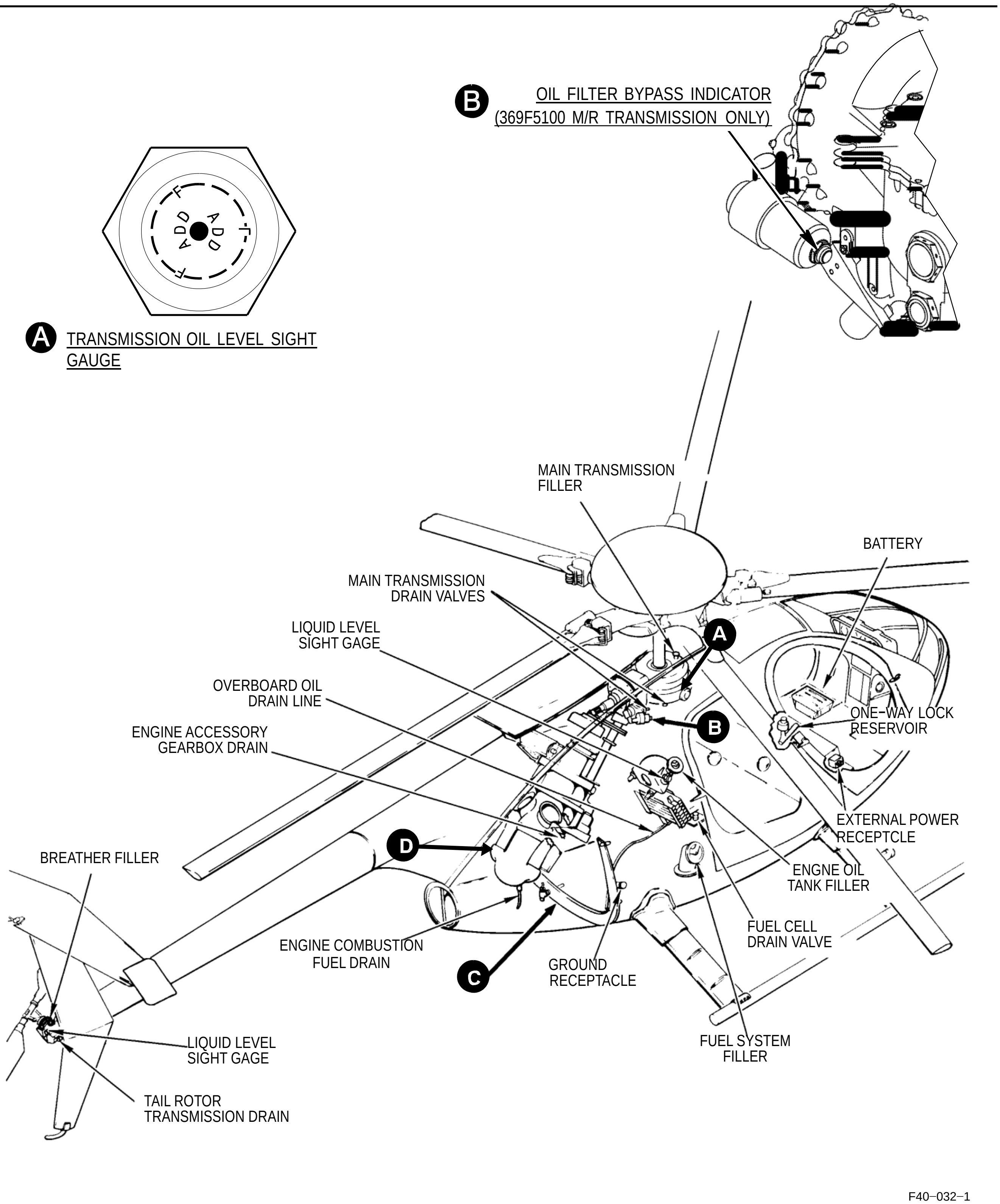


Figure 7−4. Servicing Points (Sheet 1 of 2)

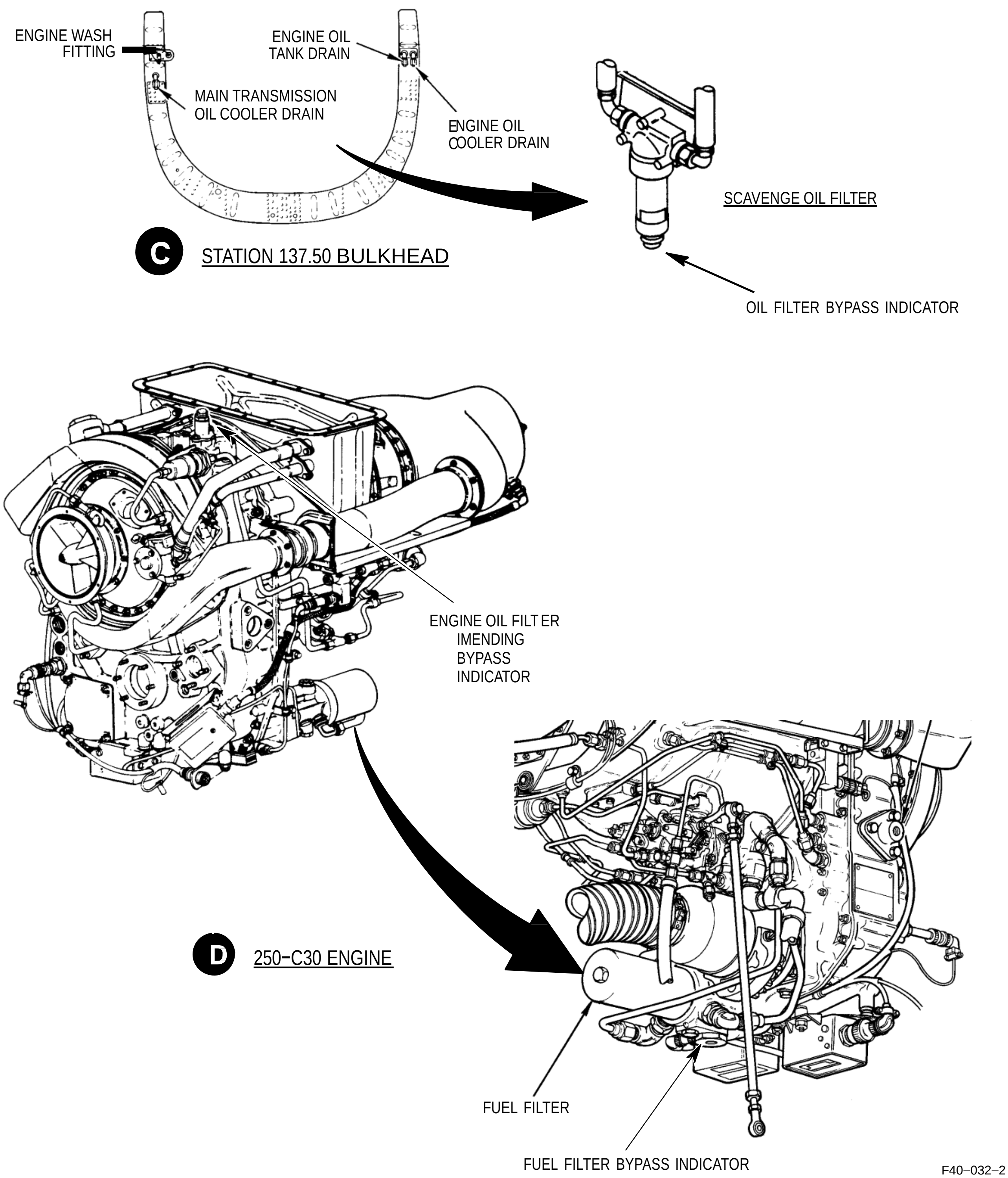


Figure 7−4. Servicing Points (Sheet 2 of 2)

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 (Ref. Figure 7−4) 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:

Grades JP−4 or JP−5 (MIL−DTL−5624), and grade JP−8 (MIL−DT−L−83133), type fuels contain anti−ice additive which conforms to MIL−I−27686 (or later). These fuels do not require additional anti−ice additive.

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.

Filling:

The fuel system has two fuel cells that are interconnected for simultaneous flow and venting.

Refuel the helicopter with the proper fuel as soon after landing as possible to prevent moisture condensation.

Keep fuel nozzle free of all foreign matter.

Fuel tank servicing is through the cell filler neck on the right side of the fuselage. The right side fuel cell contains the gravity filler port and cap.

Check filler cap for security after refueling.

Fuel draining:

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

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

The fuel cell drain valve is spring−loaded closed and is opened by depressing an internal plunger.

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

7−9. ENGINE OIL SYSTEM − SERVICING

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

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.**

Make certain that oil tank filler cap is secured after servicing.

7−10. MAIN ROTOR AND TAIL ROTOR TRANSMISSION − SERVICING

Main rotor transmission:

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.

CAUTION **Mixing of oils within an oil series, not in the same group, is not recommended. If oils of different groups are mixed, flush and re−service gearbox. Mixing of oils from different series is prohibited.**

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.

Tail rotor transmission:

A liquid level sight gauge for checking oil level is located on the rear of the transmission housing.

Check oil level by viewing sight gauge.

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

7−11. 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.

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 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 cloth dampened with clean water.

Remove imbedded grease or dirt from upholstery and carpeting by sponging or wiping with an upholstery cleaning solvent recommended for the 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−flameproofed to comply with Federal Aviation Regulation Part 27.

7−13. 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 composite components 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.

7−14. CLEANING − CANOPY AND DOOR TRANSPARENT PLASTIC

Clean outside surfaces of plastic by rinsing with clean water and rubbing lightly with palm of hand.

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

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 towels.

7−15. FLUID LEAK ANALYSIS

Main or tail rotor transmission oil leak:

Oil leakage, seepage or capillary wetting at oil seals or assembly joint lines of main or tail rotor transmission 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.

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 if seal leakage appears to be increasing.

Engine oil leaks:

Refer to engine operating and maintenance manual for definition of permissible engine oil leakage.

Landing gear damper hydraulic fluid leaks:

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.

7−16. 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.

7−17. FLYABLE STORAGE − NO TIME LIMIT

Inspection before storage:

Perform Daily Preflight Check (Ref. Section IV).

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, ground runup must be performed at least once every 5 days.

Perform daily preflight check.

Start engine (Ref. Section IV). After idle stabilizes, accelerate engine to 100 percent N_2. Operate until oil temperature shows an increase and ammeter reads zero.

Shut down engine (Ref. Section IV).

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).

7−18. COCKPIT DOOR REMOVAL AND INSTALLATION

Door removal (Ref. Figure 7−5):

Open door.

Remove interior cover plates (pilot’s side − remove fire extinguisher).

Pull lower hinge pin up to remove.

While holding door, rotate upper hinge pin until hinge pin tab clears the slot and pull down on pin to remove.

Remove door.

Stow hinge pins and cover plates.

Door installation:

Place door hinges into door frame and hold open.

While holding door open, push in and rotate upper hinge pin until hinge pin tab enters and fully seats in the slot.

Install lower hinge pin.

Install interior cover plates.

Install fire extinguisher (pilot’s side).

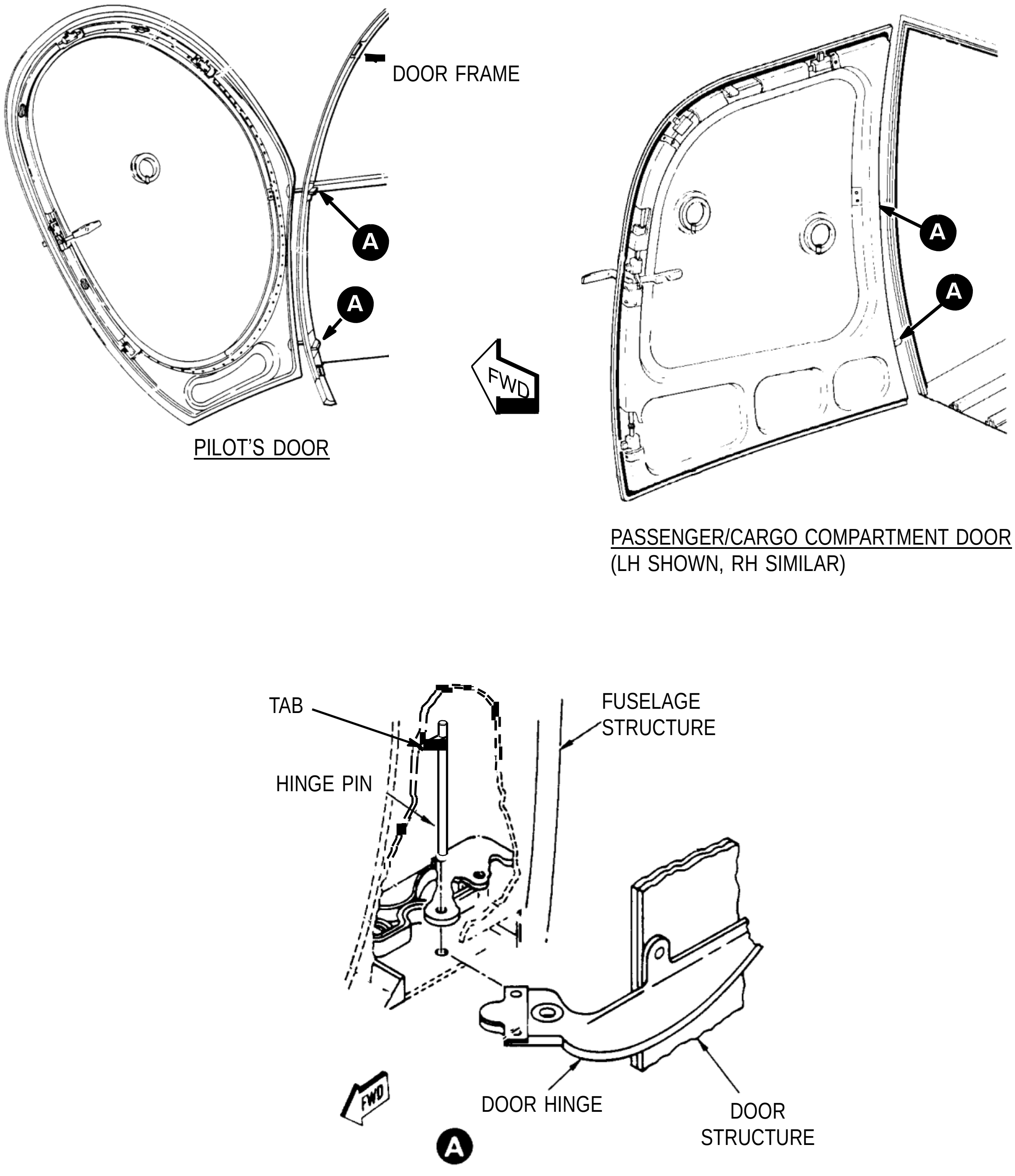


Figure 7−5. Pilot and Passenger/Cargo Door Removal

7−19. SPECIAL OPERATIONAL CHECKS AND PROCEDURES

Cleaning engine compressor:

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 Rolls−Royce 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	40 Seconds ON
30 Seconds OFF	60 Seconds OFF
25 Seconds ON	40 Seconds ON
30 Seconds OFF	60 Seconds OFF
25 Seconds ON	40 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

TABLE OF CONTENTS

SECTION VIII ADDITIONAL OPERATIONS AND PERFORMANCE DATA

8−1. HOVER CEILING − OUT OF GROUND EFFECT (OGE)

CAUTION **Select the appropriate hover performance chart for the type of engine inlet installed.**

Description:

The hover ceiling chart shows the maximum hover weight capability, out of ground effect (OGE), at take off power for known conditions of pressure altitude and outside air temperature, or alternately, the maximum hover ceiling for a known gross weight and outside air temperature.

The hover ceiling vs gross weight charts are based on:

1. Takeoff power at 100 % N_2
2. Cabin heat and engine anti−ice OFF
3. Electrical load of 10 amps
4. No wind conditions or
5. Side winds from the right rear quarter

Use of chart:

To determine OGE hover performance, refer to Section V, Hover Ceiling (IGE), ‘‘Use of chart’’ or use examples depicted on the charts.

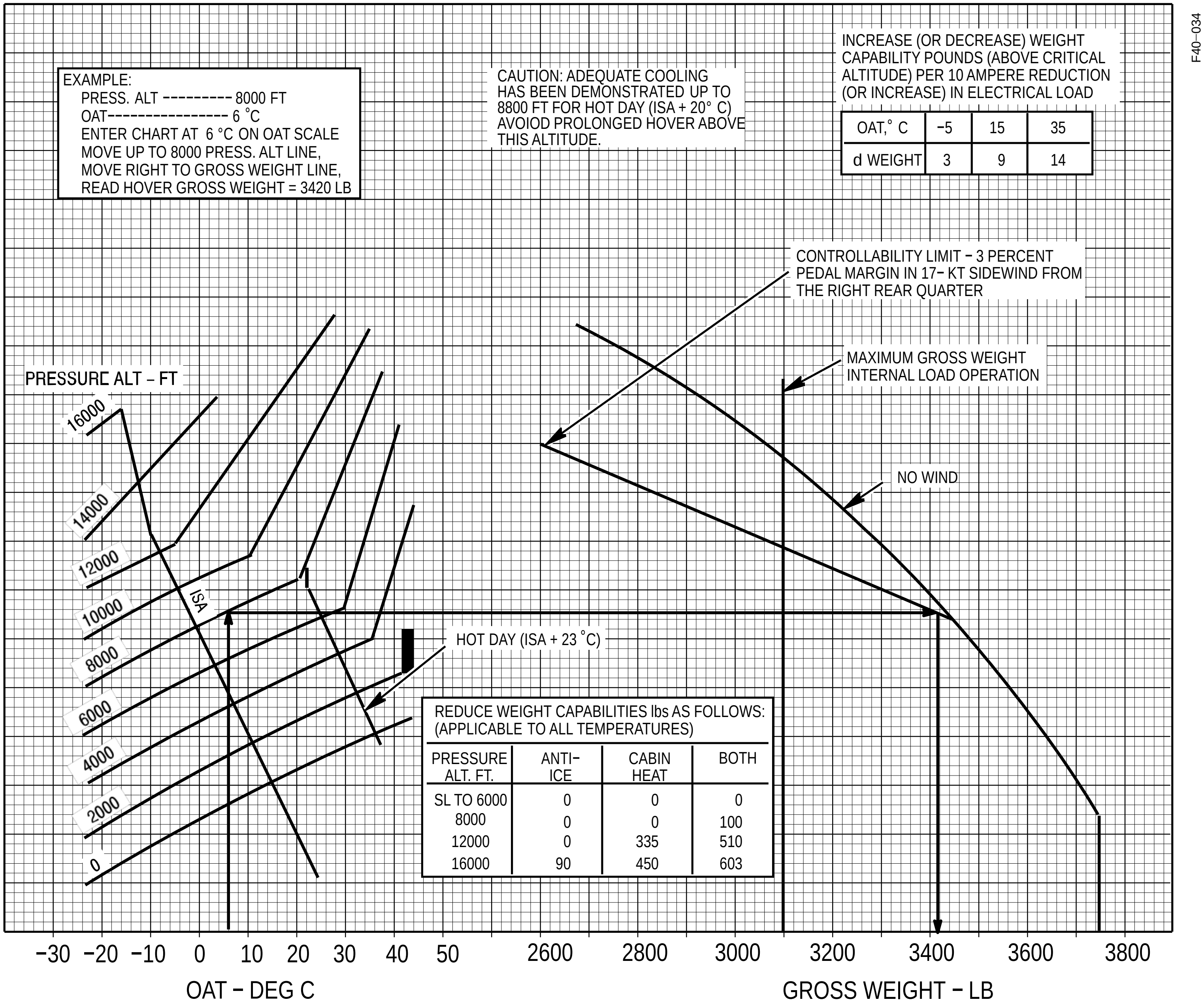
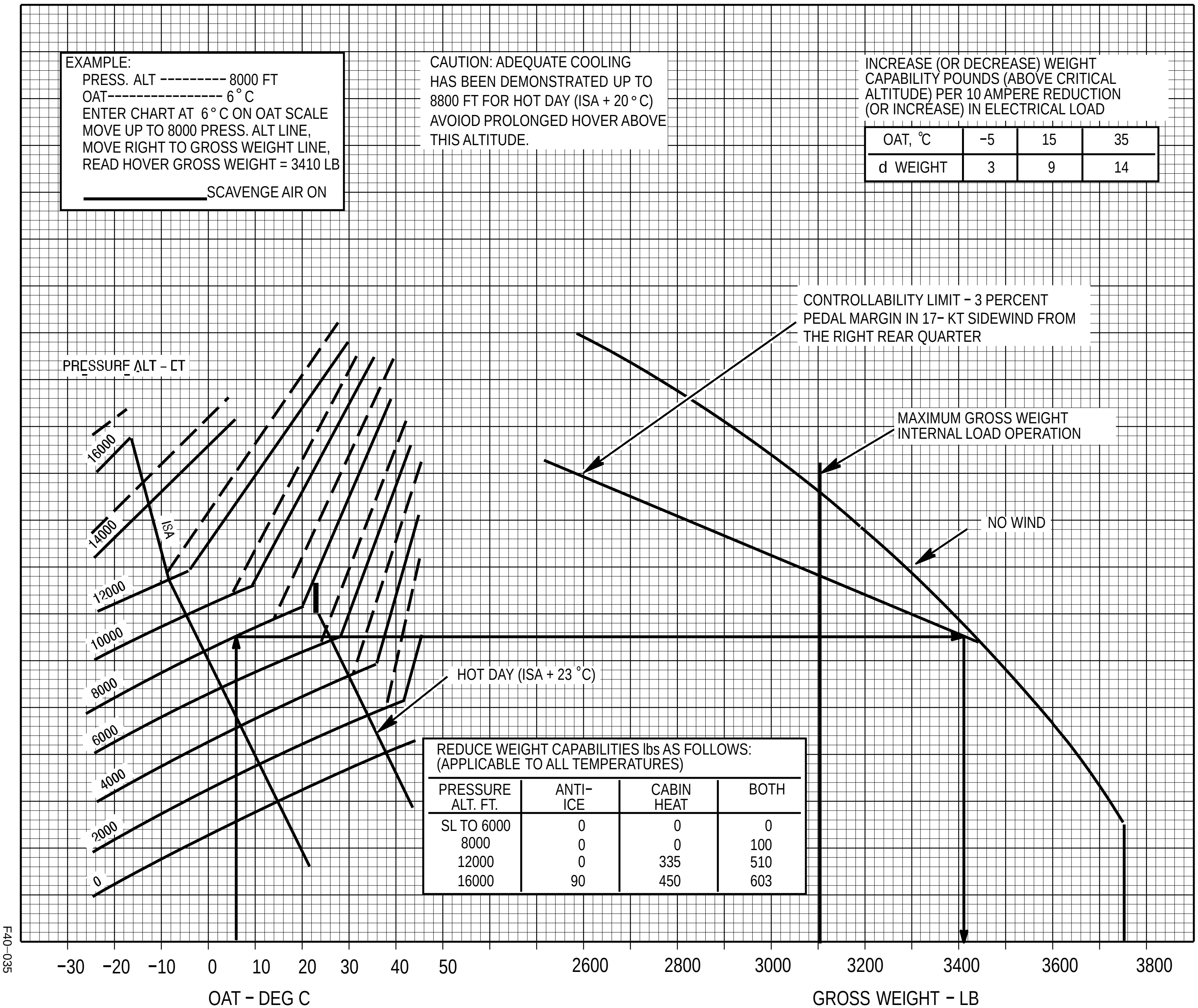


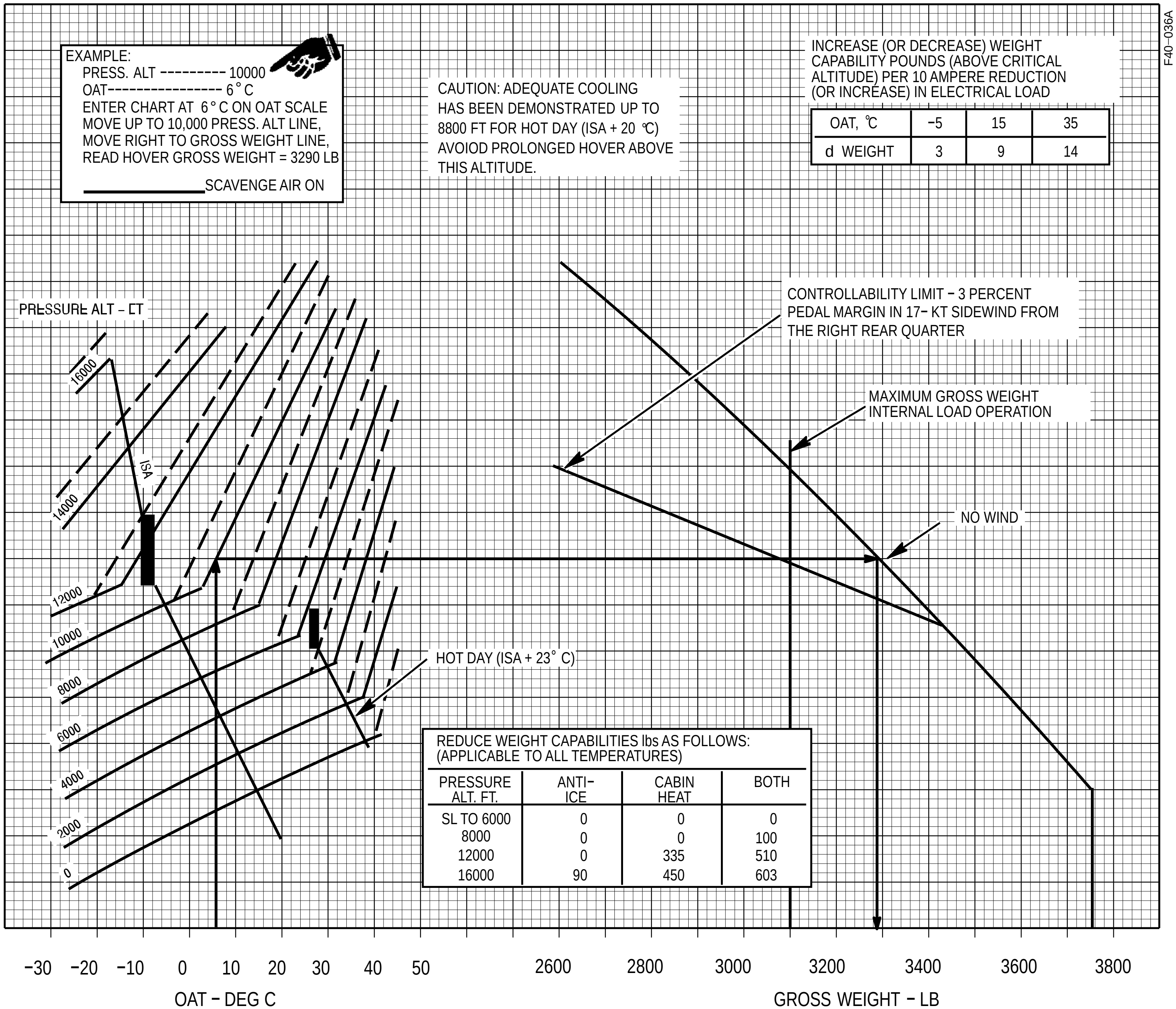
Figure 8−1. Hover Ceiling, OGE, Standard Engine Air Inlet



OAT, °C	−5	15	35
d WEIGHT	3	9	14

PRESSURE ALT. FT.	ANTI−ICE	CABIN HEAT	BOTH
SL TO 6000	0	0	0
8000	0	0	100
12000	0	335	510
16000	90	450	603

Figure 8−2. Hover Ceiling, OGE, Engine Air Particle Separator Inlet



OAT, °C	−5	15	35
d WEIGHT	3	9	14

PRESSURE ALT. FT.	ANTI−ICE	CABIN HEAT	BOTH
SL TO 6000	0	0	0
8000	0	0	100
12000	0	335	510
16000	90	450	603

Figure 8−3. Hover Ceiling, OGE, Engine Air Particle Separator Inlet with Mist Eliminator

SECTION IX
OPTIONAL EQUIPMENT

TABLE OF CONTENTS

SECTION IX
OPTIONAL EQUIPMENT

9−1. GENERAL INFORMATION

This section provides general supplemental information on optional equipment for the MD 530F Plus Helicopter. The information includes a listing of usable optional equipment.

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.

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.**

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 − Model 369FF Helicopter

Equipment	Publication No.
*Pitot heat	CSP−FF−1
*Extended landing gear	CSP−FF−1
*Rotor brake	CSP−FF−1
*Engine air particle separator filter	CSP−FF−1
Cargo hook	CSP−FF−1 Section IX
Emergency floats	CSP−FF−1 Section IX
*Indicates data incorporated into the flight manual (Sections I thru VII where appropriate).	

9−3. OPTIONAL EQUIPMENT PERFORMANCE DATA

SPECIAL NOTE:

Optional equipment that affect hover performance require additional hover performance charts. Optional Equipment IGE hover performance charts are located in Section V and Optional Equipment OGE hover performance charts are located in Section VIII.

9−4. OPERATING INSTRUCTIONS: 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 2000 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 takeoff and landing gross weight 3100 pounds. Weight in excess of 3100 pounds must be external and jettisonable.

Maximum Rotorcraft − Load Combinations operating gross weight 3750 pounds (FAR 133).

Center of Gravity Limitations:

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

For gross weights greater than 3100 pounds, center of gravity limits for 3100 pounds apply.

Cargo Hook Limitations:

Cargo hook structural load limit is 2000 pounds.

Airspeed Limitations:

With no load on hook, airspeed limits are unchanged.

With load on hook, airspeed limits are presented on the exterior load V_{NE} placards (Ref. Figure 9−1).

Altitude Limitations:

Maximum operating altitude is 15,500 feet density altitude for 3200 LB or less.

Maximum operating altitude is 12,150 feet density altitude for 3201 to 3750 LB.

Placards:

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

Placard stating, “External Load Limit 2000 Pounds” installed on or next to cargo hook.

EXTERIOR LOAD

V_{NE} IAS (KNOTS)

OAT	PRESS ALT x 1000				GROSS WT = 3200 LB OR LESS					
°C	0	2	4	6	8	10	12	14	16	18
−30								72	56	
−20								64		
−10							72	56		
0			80				65	49		
10						73	57		NO	
20						66	51		FLIGHT	
30					75	59				
40										
45										

EXTERIOR LOAD

V_{NE} IAS (KNOTS)

OAT	PRESS ALT x 1000				GROSS WT = 3201 TO 3750 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30							73	56		
−20							64			
−10						73	56			
0			80			65				
10					74	57			NO	
20					66				FLIGHT	
30				75	59					
40				68						
45										

Figure 9–1. V_{NE} Placards

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.

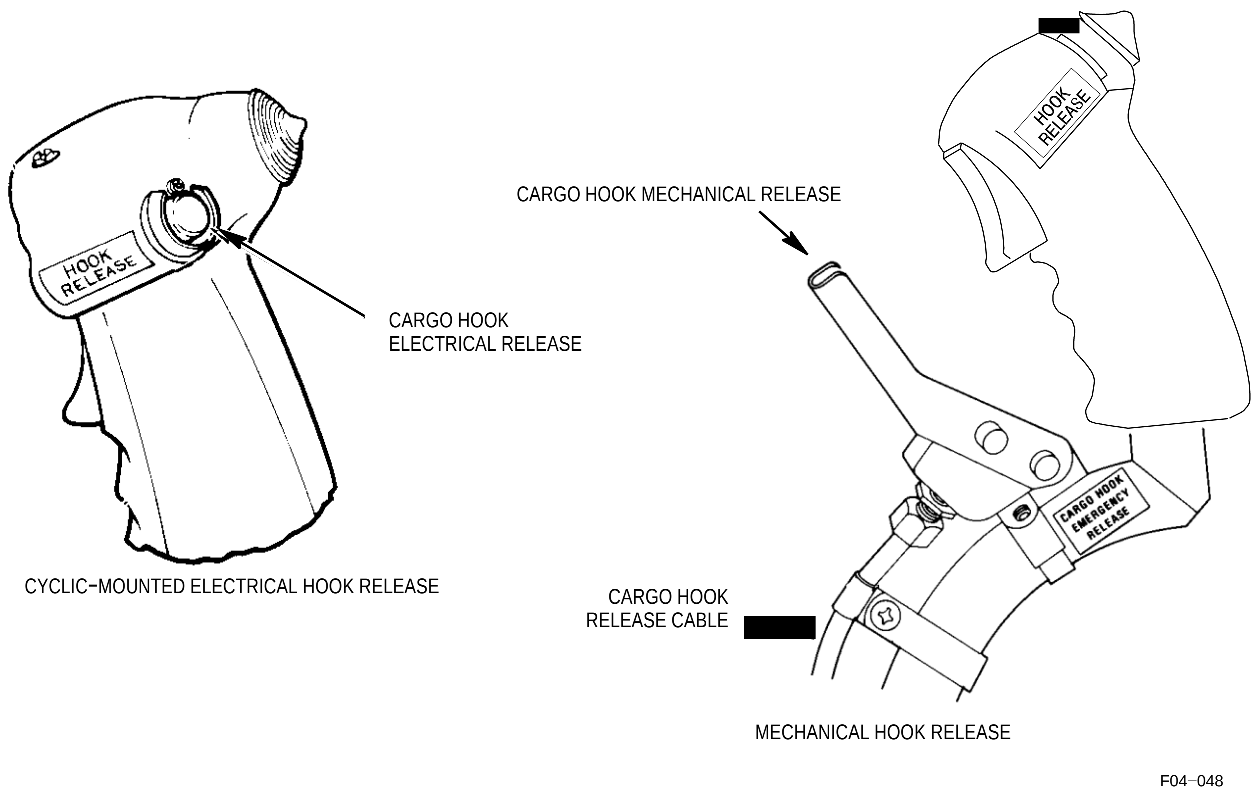


Figure 9−2. Cargo Hook Release − Electrical and Mechanical

PART IV NORMAL PROCEDURES

Normal Operation:

Preflight

Place battery switch in BAT 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 (Ref. Figure 9−3).

Pull aft and downward on load ring; hook must remain in locked position.

Operational Checks

Check electrical and emergency operation of cargo hook release (Ref. Figure 9−2).

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 cargo HOOK circuit breaker IN.

CAUTION **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.

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 2000 pound load suspended on a 3/8−inch cable 5 feet long.

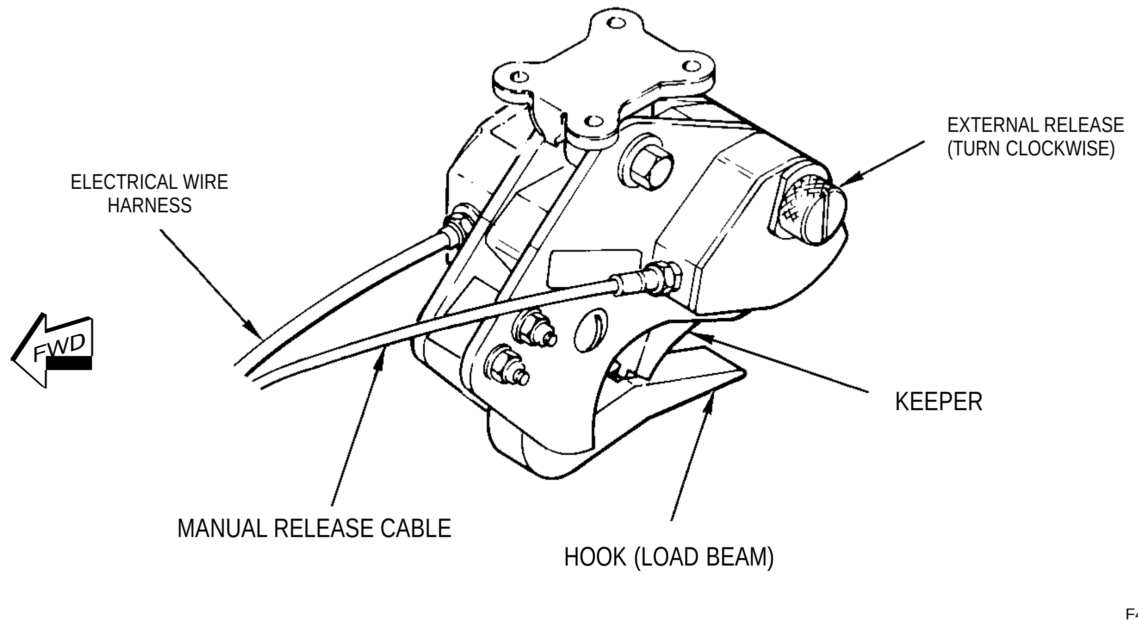


Figure 9−3. Cargo Hook

PART V
PERFORMANCE DATA

Refer to Section V for IGE hover performance or Section VIII for OGE hover performance to assist in planning operations with the cargo hook.

Figure 9−4 provides speed for best rate of climb when there is an external load of 2.0 ft^2 of drag area applied to the cargo hook.

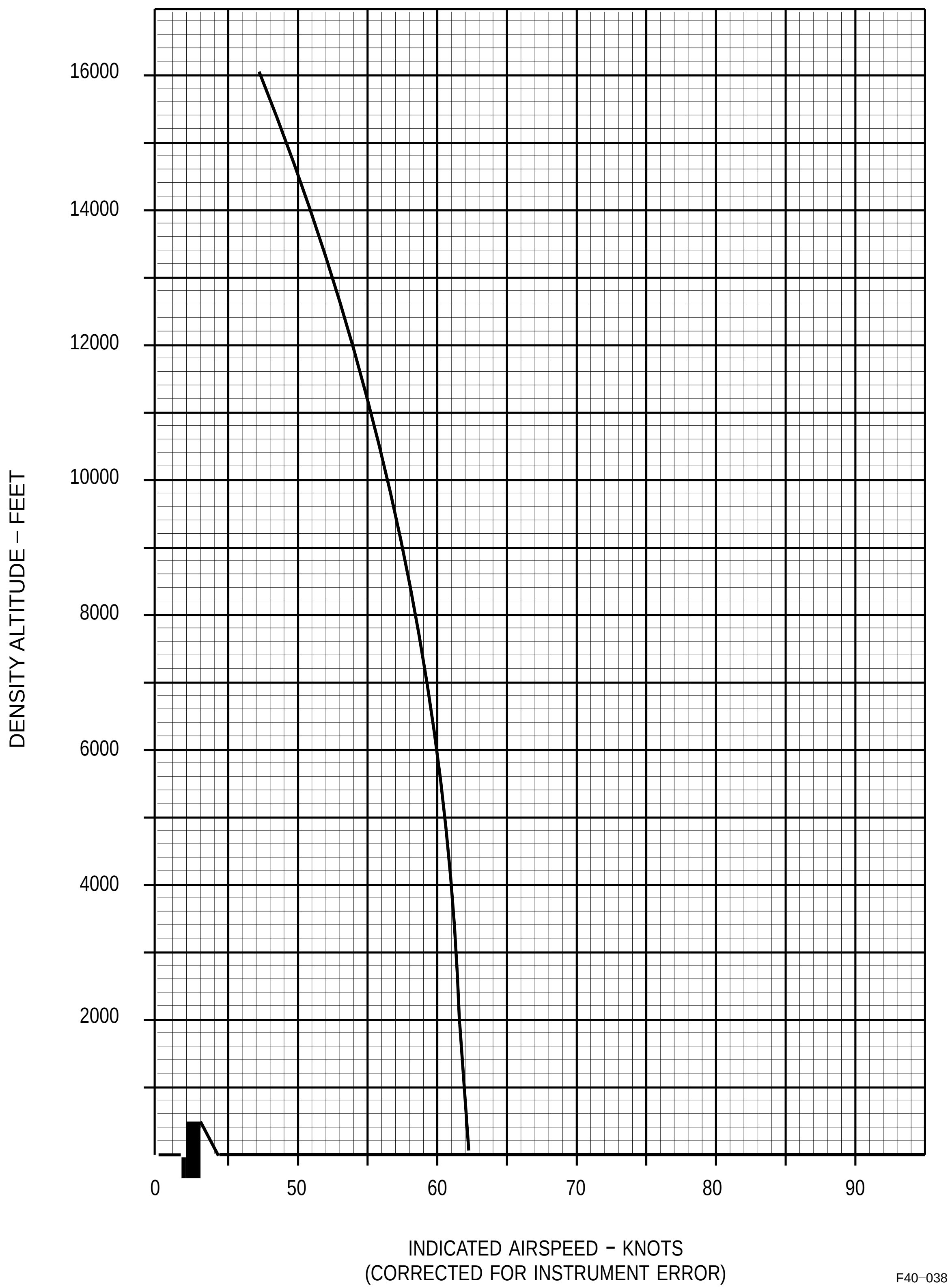


Figure 9–4. Speed for Best Rate of Climb

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:

Cargo Longitudinal CG = 99.3	
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
1900	1887
2000	1986

9−5. OPERATING INSTRUCTIONS − EMERGENCY FLOATS

PART I
GENERAL

The MDHI Emergency Float Kit, consists of inflatable bag−type floats intended for use in emergency landings only, during over−water operation. It is furnished with squib−actuated valves and with steel pressure vessels.

The floats are normally carried in the stowed configuration, mounted as a compact package on top of each skid. A press−to−test indicator light is provided to check the condition of the electrical actuation circuits for each float. This indicator is located on the caution and warning indicator panel. The circuit breaker is located at the bottom of the circuit breaker panel. A recessed switch is provided on the cyclic stick for the pilot to initiate inflation when required. The switch activates valves allowing air or nitrogen stored in pressure vessels within the float packages to inflate the floats. 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. Forward position illuminates the standard nose mounted landing light; center position is off; and aft position illuminates the belly lights. Night flight over water is permitted with the night landing light kit installed.

PART II
LIMITATIONS

Night flight over water beyond autorotational capability to ground is prohibited, unless 369D292032 Night Landing Kit is installed.

Flight with floats inflated, or at time of inflation, is limited to the conditions of altitude and temperature presented on the EMERGENCY FLOATS INFLATED V_{NE} PLACARD.

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. Refer to the appropriate V_{NE} placards (Ref. Figure 9−5).

Environmental operating conditions:

<u>Operating temperature range</u>

Operational temperature range for over water−flight is:

−25°F (−31.7°C) minimum
+117°F (+47°C) maximum

<u>Altitude limits − floats inflated</u>

For water and ground landings, change of altitude is limited to 6500 feet below the altitude at inflation or to 6500 feet below the maximum altitude to which the inflated floats are subsequently flown. This assumes the normal variation in ambient temperature associated with altitude changes.

<u>NOTE</u>: If the allowable altitude change noted above is exceeded, the minimum operational float pressure (2.0 psig) for water and ground landings may not be available.

Air speed limits:

<u>With floats stowed</u>

With floats stowed, airspeed limitations are presented on the V_{NE} IAS (knots) FLOATS STOWED placards (Ref. Figure 9−5).

<u>For float inflation</u>

Maximum speed for float inflation is 81 knots IAS at less than 6,000 feet altitude, 77 knots IAS at 6,000 feet altitude and above.

Gross weight limitations:

Maximum gross weight is 3000 pounds.

Minimum gross weight is 1803 pounds.

Center of gravity limits:

Gross Weight (lb)	Longitudinal C.G. Limit (Sta−in.)		Lateral C.G. Limit (Sta−in.)
	Forward	Aft*	(−) Left, (+) Right
3000	99.0	103.6	± 3.0
2500	99.0	104.8	± 3.0
2000	100.8	106.6	± 3.0
1803	101.4	107.2	± 3.0

* NOTE: The aft longitudinal C. G. limit varies linearly from a gross weight of 3000 pounds at Station 103.6 to 1803 pounds at Station 107.2.

Placards:

When emergency floats are installed, the following placards are required:

Placard 1. WARNING: FLOAT INFLATION ABOVE 81 KNOTS IAS AT LESS THAN 6,000 FEET ALTITUDE, 77 KNOTS IAS AT 6,000 FEET AND ABOVE, IS PROHIBITED.

Placard 2. NIGHT FLIGHT OVER WATER BEYOND AUTOROTATION CAPABILITY TO GROUND IS PROHIBITED.

NOTE: Placard 2 not required if 369D292032 Night Landing Kit is installed.

V_{NE} Placards

Refer to Figure 9−5.

CAUTION **Be sure to select the appropriate V_{NE} Placard for type of engine installed in helicopter.**

Kit compatibility:

The passenger step kit may not be installed in combination with emergency floats.

EMER FLOATS – INFLATED
V_{NE} IAS (KNOTS)

°C	0	2	4	6	8	10	12	14	16	18
–30					98	91	77			
–20				100	94	84				
–10		101		97	91	77				
0			100	94	85					
10			97	91	78			NO FLIGHT		
20			95	86						
30		98	92	79						
40		95	87							
45	100	94	84							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(85K MIN); DO NOT EXCEED CHART V_{NE}

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 1803 TO 2000 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	107	103	
–20	147	142	136	132	127	122	118	112	96	
–10		148	143	138	133	128	123	104		
0			150	144	139	134	114	97		
10	152		151	148	144	126	106			
20			150	146	141	116	98			
30		151	148	145	129	108				
40		150	147	142						
45		149	146							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(85K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130KTS WITH LESS THAN 35 LB FUEL

Figure 9–5. V_{NE} Placards (Sheet 1 of 6)

FLOATS STOWED
V_{NE} IAS (KNOTS)

°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	107	101	
–20	147	142	136	132	127	122	118	109	93	
–10		148	143	138	133	128	121	101		
0			150	144	139	134	110	94		
10	152		151	148	145	122	102			
20			150	146	135	112	95			
30		151	148	145	120	104			NO FLIGHT	
40		150	147	140						
45		149	146							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(86K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2101 TO 2200 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	107	97	
–20	147	142	136	132	127	122	118	105	89	
–10		148	143	138	133	128	116	97		
0			150	144	139	129	106	90		
10	152		151	148	145	118	98			
20			150	146	132	108	91			
30		151	148	145	120	100			NO FLIGHT	
40		150	147	135						
45		149	146							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(87K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

Figure 9–5. V_{NE} Placards (Sheet 2 of 6)

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2201 TO 2300 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	107	93	
−20	147	142	136	132	127	122	118	101	85	
−10		148	143	138	133	128	111	93		
0			150	144	139	129	102	86		
10	152		151	148	139	112	94			
20			150	146	125	103	88			
30		151	148	142	115	96			NO FLIGHT	
40		150	147	129						
45		149	146							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K (88K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2301 TO 2400 LB					
°C	0	2	4	6	8	10	12	14	16	18
−30	139	134	129	125	120	116	111	106	89	
−20	147	142	136	132	127	122	116	97	82	
−10		148	143	138	133	128	106	90		
0			150	144	139	117	98	83		
10	152		151	148	131	108	91			
20			150	146	119	100	85			
30		151	148	134	110	93			NO FLIGHT	
40		150	147	122						
45		149	146							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K (89K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

Figure 9−5. V_{NE} Placards (Sheet 3 of 6)

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2401 TO 2500 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	102	86	
–20	147	142	136	132	127	122	110	94	79	
–10		148	143	138	133	121	102	86		
0			150	144	137	111	94	79		
10	152		151	148	122	103	88			
20			150	142	113	96	81			
30		151	148	125	105	89			NO FLIGHT	
40		150	147	129						
45		149	135							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(90K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2501 TO 2600 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	111	98	82	
–20	147	142	136	132	127	122	105	90	75	
–10		148	143	138	133	116	98	82		
0			150	144	128	106	90	76		
10	152		151	148	116	99	83			
20			149	130	108	92	77			
30		151	148	118	101	85			NO FLIGHT	
40		150	135	110						
45		149	127							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(91K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

Figure 9–5. V_{NE} Placards (Sheet 4 of 6)

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2601 TO 2700 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	110	93	79	
–20	147	142	136	132	127	120	101	86	72	
–10		148	143	138	133	110	93	79		
0			150	144	121	101	87	73		
10	152		151	136	110	95	80			
20			150	122	103	88	74			
30		151	140	112	96	82			NO FLIGHT	
40		150	125	105						
45		149	120							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(92K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2701 TO 2800 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	106	90	76	
–20	147	142	136	132	127	114	97	83		
–10		148	143	138	125	105	90	76		
0			150	144	114	97	84			
10	152		151	126	106	91	77			
20			147	116	99	85	71			
30		151	129	107	93	79			NO FLIGHT	
40		150	118	101						
45		141	113							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K
(93K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

Figure 9–5. V_{NE} Placards (Sheet 5 of 6)

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2801 TO 2900 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	116	100	87	72	
–20	147	142	136	132	127	109	93	79		
–10		148	143	138	118	101	87	73		
0			150	131	109	93	80			
10	152		151	119	101	87	74			
20			133	110	95	81				
30		151	121	103	89	75			NO FLIGHT	
40		136	112	97						
45		129	108							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K (94K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

FLOATS STOWED
V_{NE} IAS (KNOTS)

OAT	PRESS ALT X 1000				GROSS WT = 2901 TO 3000 LB					
°C	0	2	4	6	8	10	12	14	16	18
–30	139	134	129	125	120	114	97	83		
–20	147	142	136	132	124	104	90	76		
–10		148	143	138	114	97	83			
0			150	124	105	90	77			
10	152		139	114	98	84	70			
20			125	106	92	78				
30		143	116	99	86	72			NO FLIGHT	
40		128	108	93						
45		123	104							

FOR AUTOROTATION V_{NE} REDUCE SPEED BY 22K (95K MIN); DO NOT EXCEED CHART V_{NE}
MAX V_{NE} 130 KTS WITH LESS THAN 30 LB FUEL

Figure 9–5. V_{NE} Placards (Sheet 6 of 6)

PART III EMERGENCY AND MALFUNCTION PROCEDURES

EMERGENCY FLOAT INFLATION

CAUTION **If emergency occurs at airspeeds greater than maximum permissible float inflation speed, i.e., 81 knots IAS at less than 6,000 feet altitude, 77 knots IAS at 6,000 feet altitude and above, reduce speed to an appropriate value prior to float inflation. Do not exceed airspeed limits of the EMERGENCY FLOATS INFLATED V_{NE} placard.**

NOTE: Inflations have been demonstrated up to 90 knots IAS in autorotation and in powered flight.

Procedures:

- Check float circuit breaker IN.
- Actuate float inflation switch. (Only momentary switch actuation is required.)
- Inflation should be accomplished at 2,000 feet or less above landing surface to minimize differential pressure change with altitude change.
- For over−water operation in conditions near 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 3,000 pounds and touchdown speeds up to approximately 10 knots.
- 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.

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.

PART IV NORMAL PROCEDURES

Preflight checks:

Check condition and security of stowed float package.

Check pressure gauge in each float package. If the pressure vessel is at 70°F (21.1°C), the pressure should read within 3000 to 3500 psig (Ref. Figure 9–6).

Indicated gauge pressure will increase (decrease) approximately, as tabulated below, per 1°F (1°C) increase (decrease) in temperature of the pressure vessel.

Charge Pressure	Psig °F	Psig °C
3000	5.7	10.2
3100	5.9	10.5
3500	6.6	11.9

Set BAT–EXT switch in proper position (BAT when using rotorcraft battery. EXT when using an external power source.)

Check FLOATS circuit breaker IN.

Press to test green float [FLOAT P TEST LH/RH] indicator. LH and RH indicator lamps should illuminate indicating that each circuit is operational.

Landing:

CAUTION **Tail–low landings on hard surfaces should be avoided, as stress damage to the float extensions may occur.**

In–flight float inflation data:

Float inflation time and altitude required for deployment are presented below. Time is affected by temperature. 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:

Float Inflation Time	9.0 sec Temps up to 21°C 6.3 sec Temps above 21°C
Altitude Required For Deployment	330 feet Temps up to 21°C 250 feet Temps up to 21°C

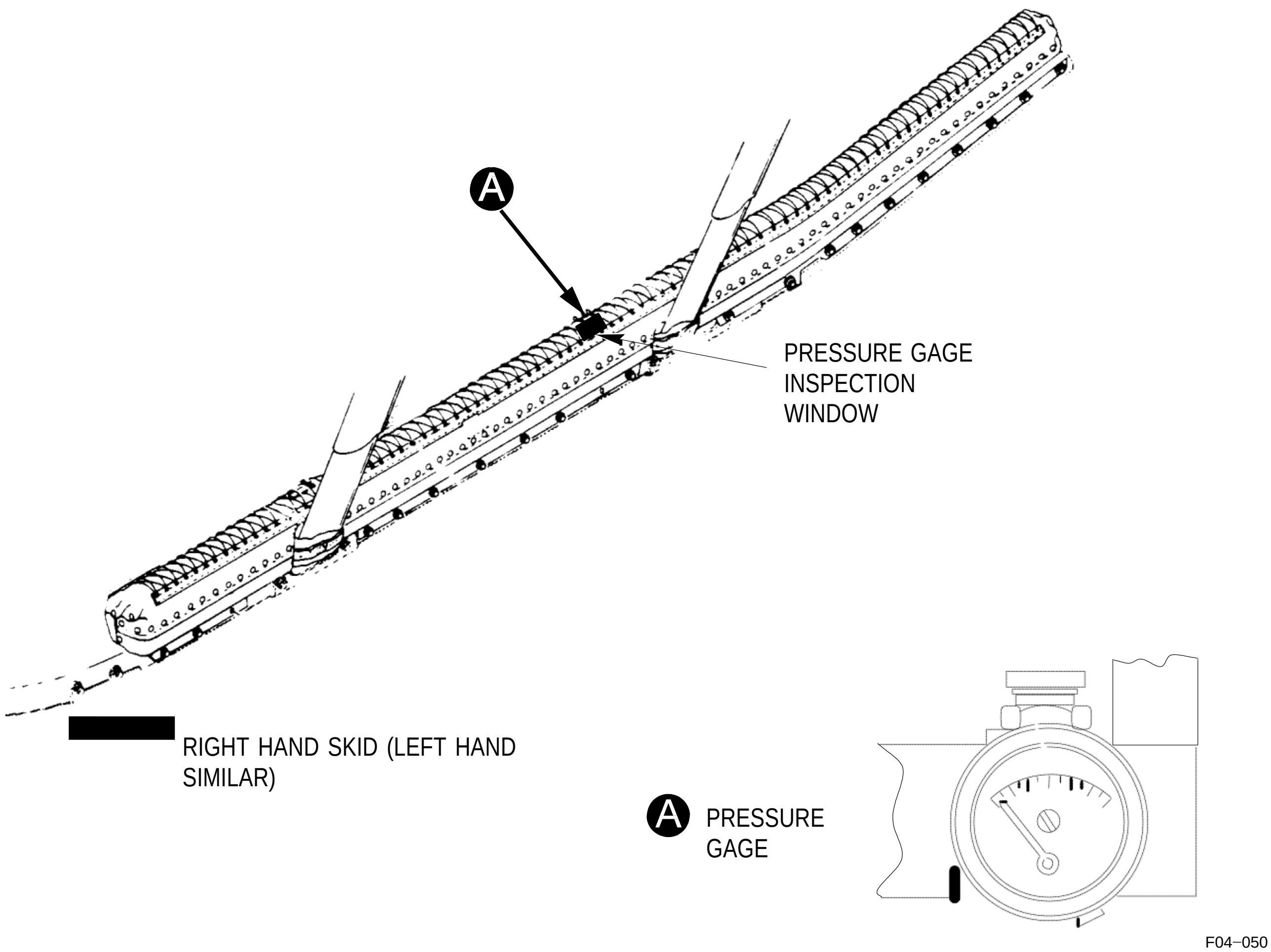


Figure 9−6. Float Pressure Gauge

PART V
PERFORMANCE DATA

Hover Performance with Stowed Floats

No change from that of the basic helicopter with extended landing gear.

PART VII HANDLING
SERVICING AND
MAINTENANCE

Inspection and functional checks of the emergency float system should be conducted in accordance with applicable installation instructions.