

Section 1

LIMITATIONS

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Section 1

LIMITATIONS

1-1. INTRODUCTION

Compliance with Limitations section is required by appropriate operating rules. Anytime an operating limitation is exceeded, an appropriate entry shall be made in helicopter logbook. Entry shall state which limit was exceeded, duration of time, extreme value attained, and any additional information essential in determining maintenance action required.

Intentional use of transient limits is prohibited.

Torque events shall be recorded. A torque event is defined as a takeoff or lift, internal or external load ([BHT-407-MD-1](#)).

Landings shall be recorded. Run-on landings shall be recorded separately.

A run-on landing is defined as one where there is forward ground travel of the helicopter greater than 3 feet with the weight on the skids.

1-2. BASIS OF CERTIFICATION

This helicopter is certified under FARs Parts 27 and 36, Appendix J. Additionally, it is approved under Canadian Airworthiness Manual Chapters 516 (ICAO Chapter 11) and 527, Sections 1093 (b) (1) (ii) and (iii), 1301-1, 1557 (c) (3), 1581 (e) and 1583 (h).

1-3. TYPES OF OPERATION

1-3-A. PASSENGERS

Basic configured helicopter is approved for seven place seating and is certified for land

operation under day or night VFR non-icing conditions.

1-3-B. CARGO

The maximum allowable cabin deck loading for cargo is 75 pounds per square foot (3.7 kg per 100 cm²). The maximum allowable baggage compartment deck loading is 86 pounds per square foot (4.2 kg per 100 cm²) with a maximum allowable weight of 250 pounds (113.4 kg). Refer to [BHT-407-MD-1](#) for cargo restraint and tie-down locations.

Cargo must be properly secured by tie-down devices to prevent the load from shifting under anticipated flight and ground operations. If the mission requires both passengers and cargo to be transported together, the cargo must be loaded and secured so that it does not obstruct passenger access to exits.

1-4. FLIGHT CREW

Minimum flight crew consists of one pilot who shall operate helicopter from right crew seat.

Left crew seat may be used for an additional pilot when approved dual controls are installed.

1-5. CONFIGURATION

1-5-A. REQUIRED EQUIPMENT

A functional flashlight is required for night flights.

FADEC system software shall be version 5.202.

1-5-B. OPTIONAL EQUIPMENT

The snow deflector kit (BHT-407-FMS-4) shall be installed when conducting flight operations in falling and/or blowing snow.

Refer to appropriate flight manual supplement(s) (FMS) for additional limitations, procedures, and performance data for optional equipment.

1-5-C. DOORS REMOVED

NOTE

Indicated altitude may be up to 100 feet lower than actual altitude with crew door(s) removed.

Flight with any combination of doors removed is approved. With litter door removed, left passenger door shall be removed. Refer to Airspeed limitations.

With door(s) removed, determine weight change and adjust ballast if necessary. Refer to [Section 5](#).

NOTE

All unsecured items shall be removed from cabin when any door is removed.

1-6. WEIGHT AND CENTER OF GRAVITY

1-6-A. WEIGHT

Maximum approved internal GW for takeoff and landing is 5000 pounds (2268 kg).

Minimum GW for flight is 2650 pounds (1202 kg).

Minimum weight at fuselage station 65.0 is 170 pounds (77.1 kg).



LOADS THAT RESULT IN GW ABOVE 5000 POUNDS (2268 KG) SHALL BE CARRIED ON THE CARGO HOOK AND MUST BE JETTISONABLE.

Maximum approved GW for flight with jettisonable external load is 6000 pounds (2722 kg).

1-6-B. CENTER OF GRAVITY

The pilot is responsible for determining weight and balance to ensure gross weight and center of gravity will remain within limits throughout each flight. Refer to [Section 5](#) for loading tables and instructions.

NOTE

Ballast as required to maintain most forward or most aft CG within GW flight limits ([Figure 1-1](#)). For standard passenger and fuel loadings, applicable Weight Empty Center of Gravity Chart in [BHT-407-MM-1](#) may be used to determine required ballast.

For longitudinal CG limits, refer to Gross Weight Longitudinal Center of Gravity Limits chart ([Figure 1-1](#)).

For lateral CG limits, refer to Gross Weight Lateral Center of Gravity Limits ([Figure 1-2](#)).

1-7. AIRSPEED

Basic V_{NE} is 140 KIAS, sea level to 3000 feet H_D . Decrease V_{NE} for ambient conditions in accordance with AIRSPEED LIMITATIONS Placards and Decals ([Figure 1-3](#)).

V_{NE} at 93.5 to 100% TORQUE (takeoff power) is 100 KIAS, not to exceed placarded V_{NE} .

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V_{NE} is 100 KIAS or placarded V_{NE} , whichever is less, when takeoff loading is in shaded area of the Gross Weight Lateral Center of Gravity Limits (Figure 1-2).

V_{NE} is 100 KIAS with any door(s) removed, not to exceed placarded V_{NE} .

V_{NE} is 100 KIAS or placarded V_{NE} , whichever is less for steady state autorotation.

Maximum allowable airspeed for sideward and rearward flight or crosswind hover is 35 KTAS.

1-8. ALTITUDE

Maximum operating altitude is 20,000 feet H_D or 20,000 feet H_p , whichever is lower.

1-9. MANEUVERING

1-9-A. PROHIBITED MANEUVERS

Aerobatic maneuvers are prohibited.

1-9-B. CLIMB AND DESCENT

Maximum rate of climb is 2000 feet per minute.

1-9-C. SLOPE LANDING



SLOPE LANDINGS HAVE BEEN DEMONSTRATED TO THE SLOPE LANDING LIMITS. OTHER CONDITIONS INCLUDING, BUT NOT LIMITED TO, WIND DIRECTION AND VELOCITY, CENTER OF GRAVITY, AND THE CONDITION OF THE SLOPE (LOOSE ROCK, SOFT MUD, SNOW, WET GRASS, ETC.) MAY LIMIT MAXIMUM SLOPE TO A VALUE LESS THAN THE PUBLISHED LIMITS.

Slope landings are limited to 10° side slopes, 10° nose up slope or 5° nose down slope.

1-10. NOT USED

1-11. AMBIENT TEMPERATURES

Maximum sea level ambient air temperature for operation is 51.7°C (125°F) and decreases with H_p at standard lapse rate of 2°C (3.6°F) per 1000 feet. Refer to Ambient Air Temperature Limitations chart (Figure 1-4).

Minimum ambient air temperature for operation at all altitudes is -40°C (-40°F).

ENG ANTI ICE shall be ON in visible moisture when OAT is below 5°C (40°F).

1-12. ELECTRICAL

1-12-A. GENERATOR

Continuous operation, up to 10,000 feet H_p	0 to 180 amps
Maximum continuous up to 10,000 feet H_p	180 amps
Continuous operation, above 10,000 feet H_p	0 to 170 amps
Maximum continuous above 10,000 feet H_p	170 amps
Transient, 2 minutes	180 to 300 amps
Transient, 5 seconds	300 to 400 amps

1-12-B. STARTER

<u>External Power Start</u>	<u>Battery Start</u>
40 seconds ON	60 seconds ON
30 seconds OFF	60 seconds OFF
40 seconds ON	60 seconds ON
30 seconds OFF	60 seconds OFF
40 seconds ON	60 seconds ON
30 minutes OFF	30 minutes OFF

NOTE

28 VDC GPU for starting shall be limited to 500 amps.

1-13. POWER PLANT

Rolls-Royce model 250-C47B.

NOTE

Intentional use of any power transient is prohibited.

1-13-A. GAS PRODUCER RPM (N_G)

NOTE

FADEC will limit N_G in accordance with GAS PRODUCER RPM (N_G) LIMIT placard. N_R decay will result if power demand exceeds placard limit.

Maximum continuous N_G is limited in accordance with GAS PRODUCER RPM (N_G) LIMIT placard (Figure 1-3) when operating above 10,000 feet H_P and with OAT below -30°C (-22°F).

Continuous operation	63 to 105%
Maximum continuous operation	105%
Transient, 10 seconds	105.1 to 106%

1-13-B. POWER TURBINE RPM (N_P)

Avoid continuous operations	68.4 to 87.1%
Minimum	99%
Continuous operation	99 to 100%
Maximum continuous	100%
Maximum transient, 15 seconds	102.1 to 107% N_P

NOTE

ENGINE OVSPD warning light will illuminate when N_P versus TORQUE is between 102.4% N_P at 100% TORQUE and 108.6% N_P at 0% TORQUE.

When operating in MANUAL mode N_P should be maintained between 95 and 100%.

1-13-C. MEASURED GAS TEMPERATURE (MGT)

GAUGE P/N 407-375-001-101/-103

Continuous operation	100 to 727°C
Maximum continuous	727°C
Takeoff, 5 minutes	727 to 779°C
Maximum for takeoff	779°C
Transient, 12 seconds	780 to 826°C
Maximum starting, do not exceed 10 seconds above 826°C or 1 second at 927°C.	927°C

NOTE

Either MGT gauge may be installed.

GAUGE P/N 407-375-001-105 AND SUB

Continuous operation	100 to 727°C
Maximum continuous	727°C
Takeoff, 5 minutes	727 to 779°C
Maximum for takeoff	779°C
Transient, 12 seconds	780 to 905°C
Maximum starting, do not exceed 10 seconds above 843°C or 1 second at 927°C.	927°C

TC APPROVED

1-13-D. ENGINE TORQUE

Continuous operation	0 to 93.5%
Maximum continuous	93.5%
Takeoff, 5 minute	93.5 to 100%
Transient, 5 seconds	105%

NOTE

Use of takeoff power is limited to 100 KIAS, not to exceed placarded V_{NE} .

1-13-E. FUEL PRESSURE

Minimum	8 PSI
Continuous operation	8 to 25 PSI
Maximum	25 PSI

1-13-F. ENGINE OIL PRESSURE

Minimum below 79% N_G	50 PSI
Minimum from 79 to 94% N_G	90 PSI
Minimum above 94% N_G	115 PSI
Maximum	130 PSI
Maximum cold starts only	200 PSI

NOTE

When 130 PSI is exceeded during start, operate engine at idle until oil pressure drops below 130 PSI.

1-13-G. ENGINE OIL TEMPERATURE

Continuous operation	0 to 107°C
Maximum	107°C

NOTE

Positive temperature indication is when the second segment of the trend arc is illuminated.

1-14. TRANSMISSION**1-14-A. TRANSMISSION OIL PRESSURE**

Minimum	30 PSI
Continuous operation	40 to 70 PSI
Maximum	70 PSI

1-14-B. TRANSMISSION OIL TEMPERATURE

Continuous operation	15 to 110°C
Maximum	110°C

1-15. ROTOR**1-15-A. ROTOR RPM — POWER ON**

Continuous operation	99 to 100%
Maximum continuous	100%

NOTE

When operating in MANUAL mode N_R should be maintained between 95% and 100%.

1-15-B. ROTOR RPM — POWER OFF

Minimum	85%
Continuous operation	85 to 107%
Maximum	107%



FOR AUTOROTATIVE TRAINING,
MAINTAIN STEADY STATE N_R
ABOVE 90%.

1-16. HYDRAULIC

Hydraulic fluid MIL-PRF-5606 (NATO H-515) may be used at all ambient temperatures. |

1-17. FUEL AND OIL

1-17-A. FUEL

Fuel conforming to following specifications may be used at all ambient temperatures:

ASTM-D-6615, Jet B

MIL-DTL-5624, Grade JP-4 (NATO F-40)

Fuels conforming to following specifications are limited to ambient temperatures of -32°C (-25°F) and above:

ASTM-D-1655, Jet A or A-1

MIL-DTL-5624, Grade JP-5 (NATO F-44)

MIL-DTL-83133, Grade JP-8 (NATO F-34).

For operations below -32°C (-25°F), refer to Rolls-Royce Operation and Maintenance Manual for cold weather fuel and blending instructions.

1-17-B. OIL

1-17-B-1. OIL — ENGINE

Oil conforming to MIL-PRF-7808 (NATO O-148), DOD-PRF-85734 or MIL-PRF-23699 (NATO O-156) is limited to ambient temperatures above -40°C (-40°F).

NOTE

Refer to Rolls-Royce Operation and Maintenance Manual and [BHT-407-MD-1](#) manual for approved oils and mixing of oils of different brands, types, and manufacturers.

1-17-B-2. OIL — TRANSMISSION AND TAIL ROTOR GEARBOX

NOTE

It is recommended DOD-PRF-85734 oil be used in transmission and tail rotor gearbox to maximum extent allowed by temperature limitations.

Oil conforming to DOD-PRF-85734 is limited to ambient temperatures above -40°C (-40°F).

Oil conforming to MIL-PRF-7808 (NATO O-148) is limited to ambient temperatures below -18°C (0°F).

1-18. ROTOR BRAKE

Rotor brake (if installed) application is limited to ground operation after engine has been shut down and N_R has decreased to 40% or lower.

For emergency stops, apply rotor brake any time after engine is shut down.

Engine starts with rotor brake engaged are prohibited.

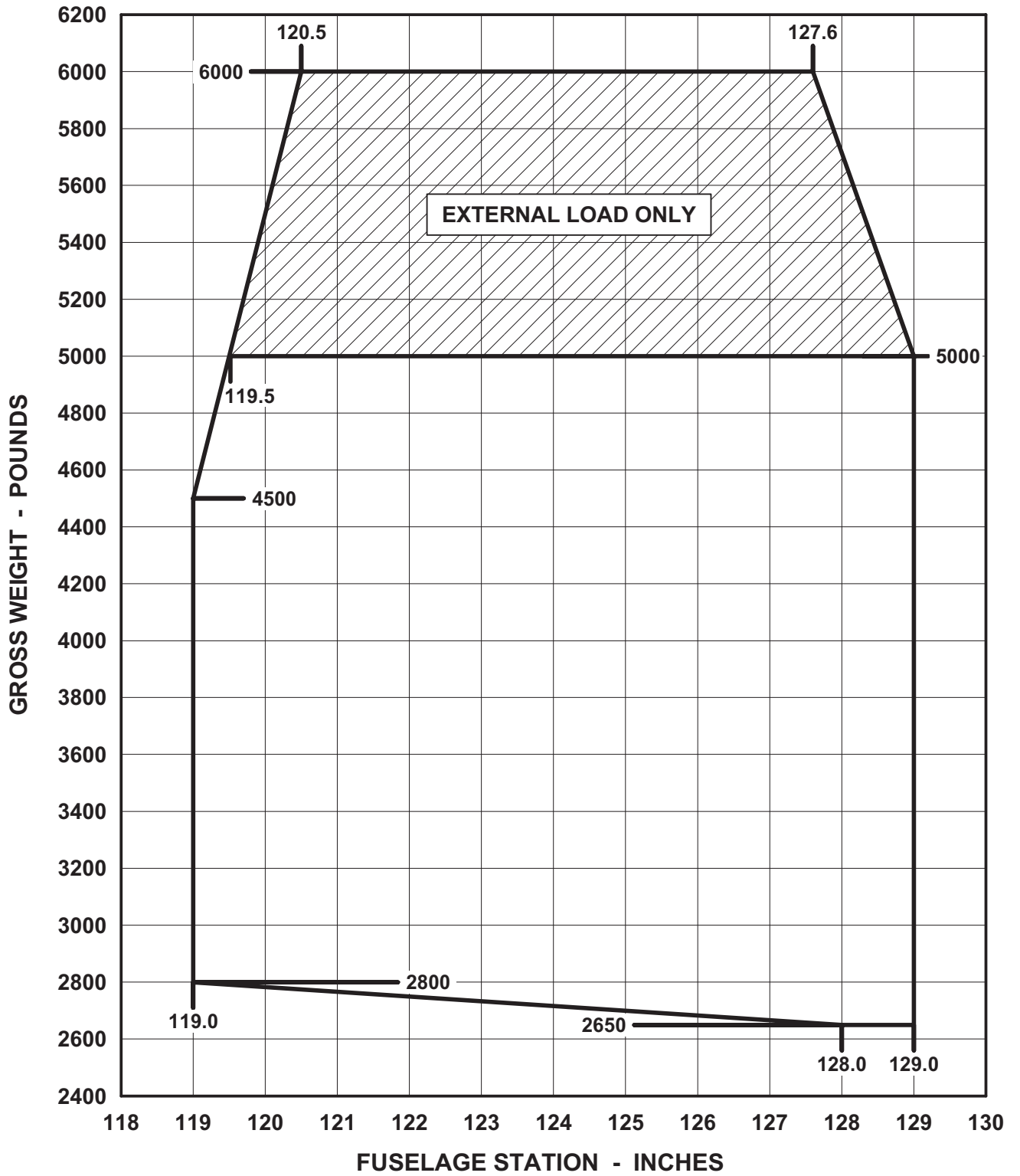
1-19. NOT USED

1-20. INSTRUMENT MARKINGS AND PLACARDS

Refer to [Figure 1-3](#) for Placards and Decals. Refer to [Figure 1-5](#) for Instrument Markings.

Illustrations shown in [Figure 1-5](#) are artist representations and may or may not depict actual approved instruments due to printing limitations. Instrument operating ranges and limits shall agree with those presented in this section.

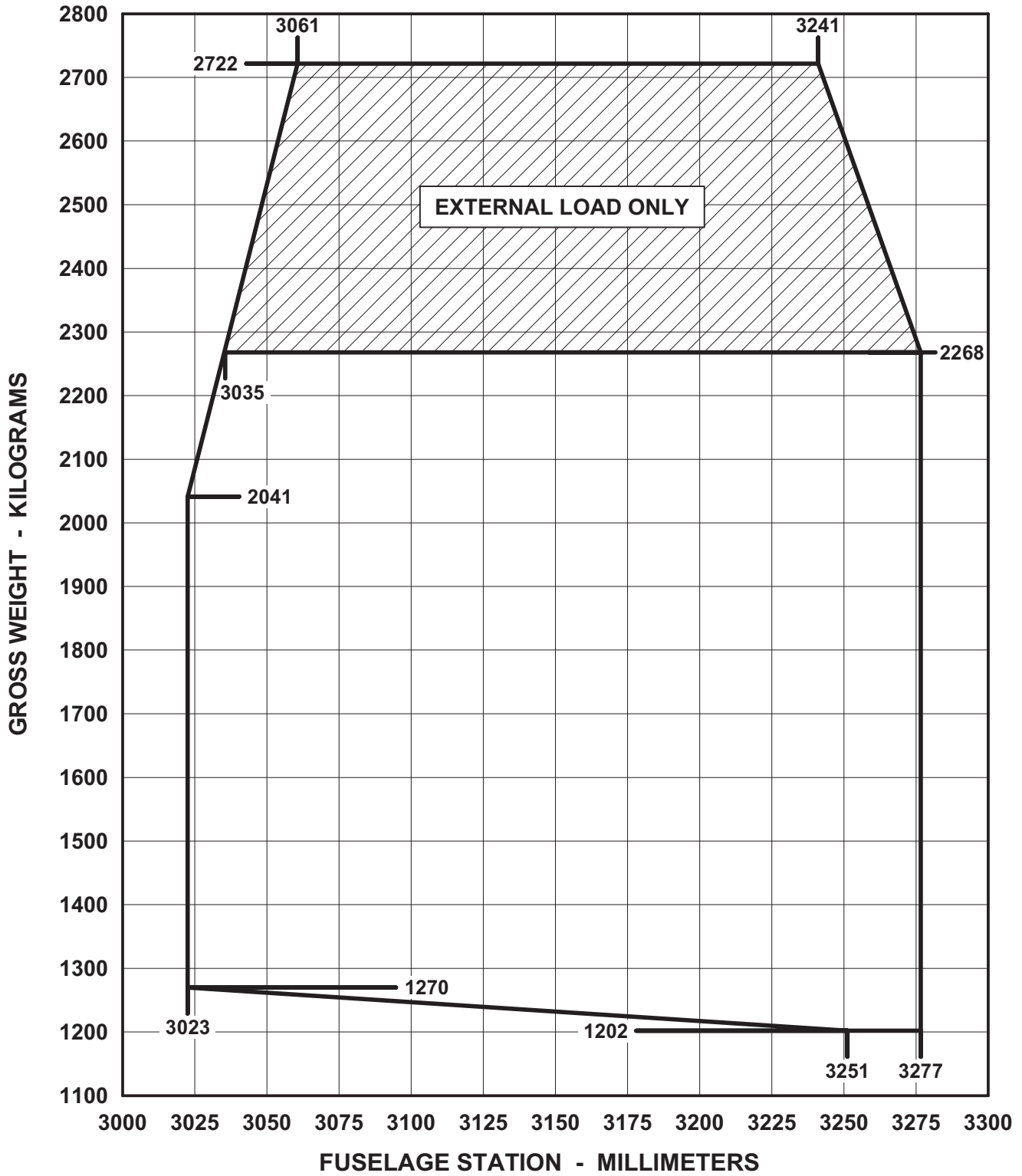
LONGITUDINAL C.G.



M407_FM-1__FIG_1-1_(1_OF_2).WMF

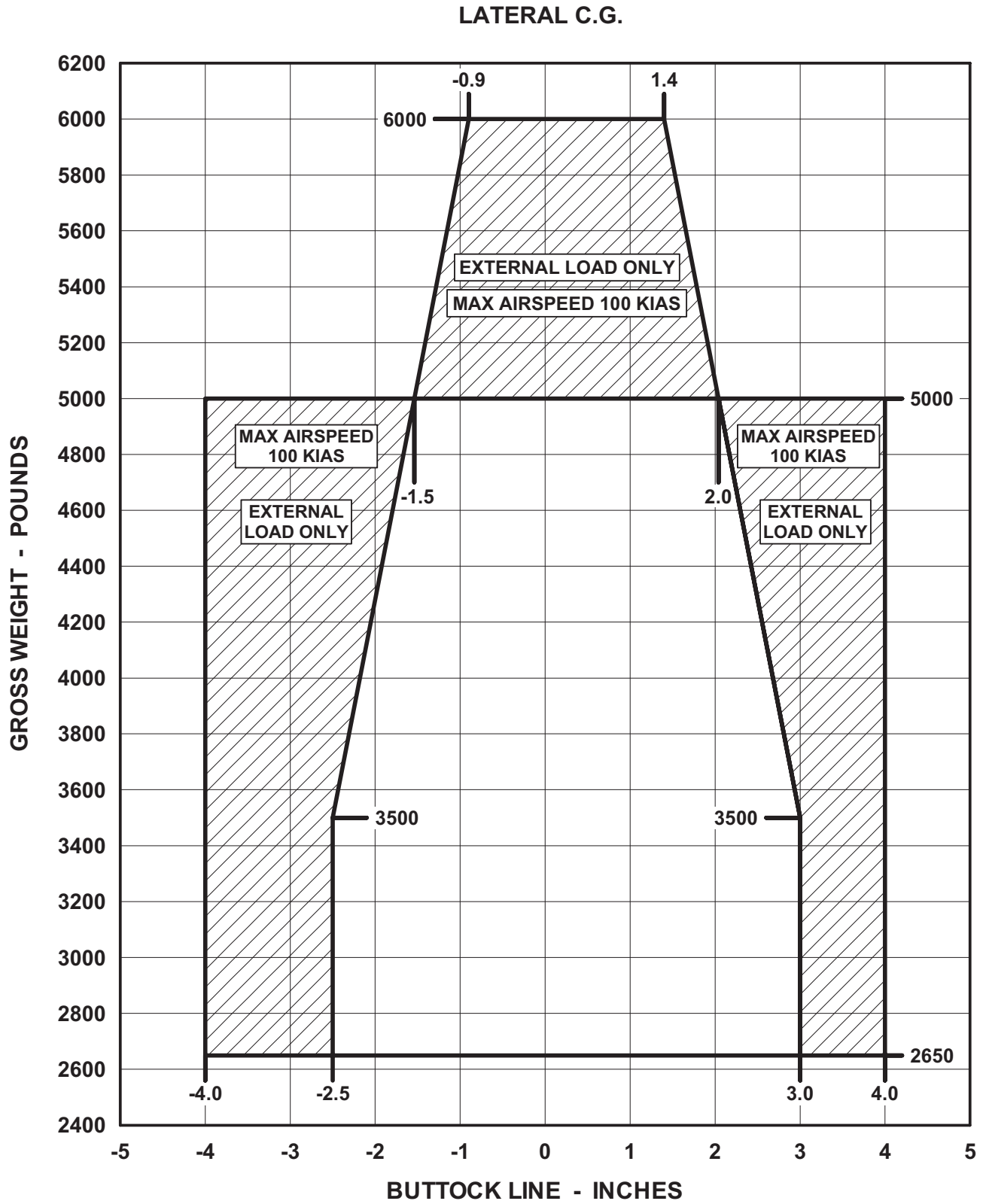
Figure 1-1. Gross weight longitudinal center of gravity limits (Sheet 1 of 2)

LONGITUDINAL C.G.



M407_FM-1__FIG_1-1_(2_OF_2).WMF

Figure 1-1. Gross weight longitudinal center of gravity limits (Sheet 2 of 2)



M407_FM-1_FIG_1-2_(1_OF_2).WMF

Figure 1-2. Gross weight lateral center of gravity limits (Sheet 1 of 2)

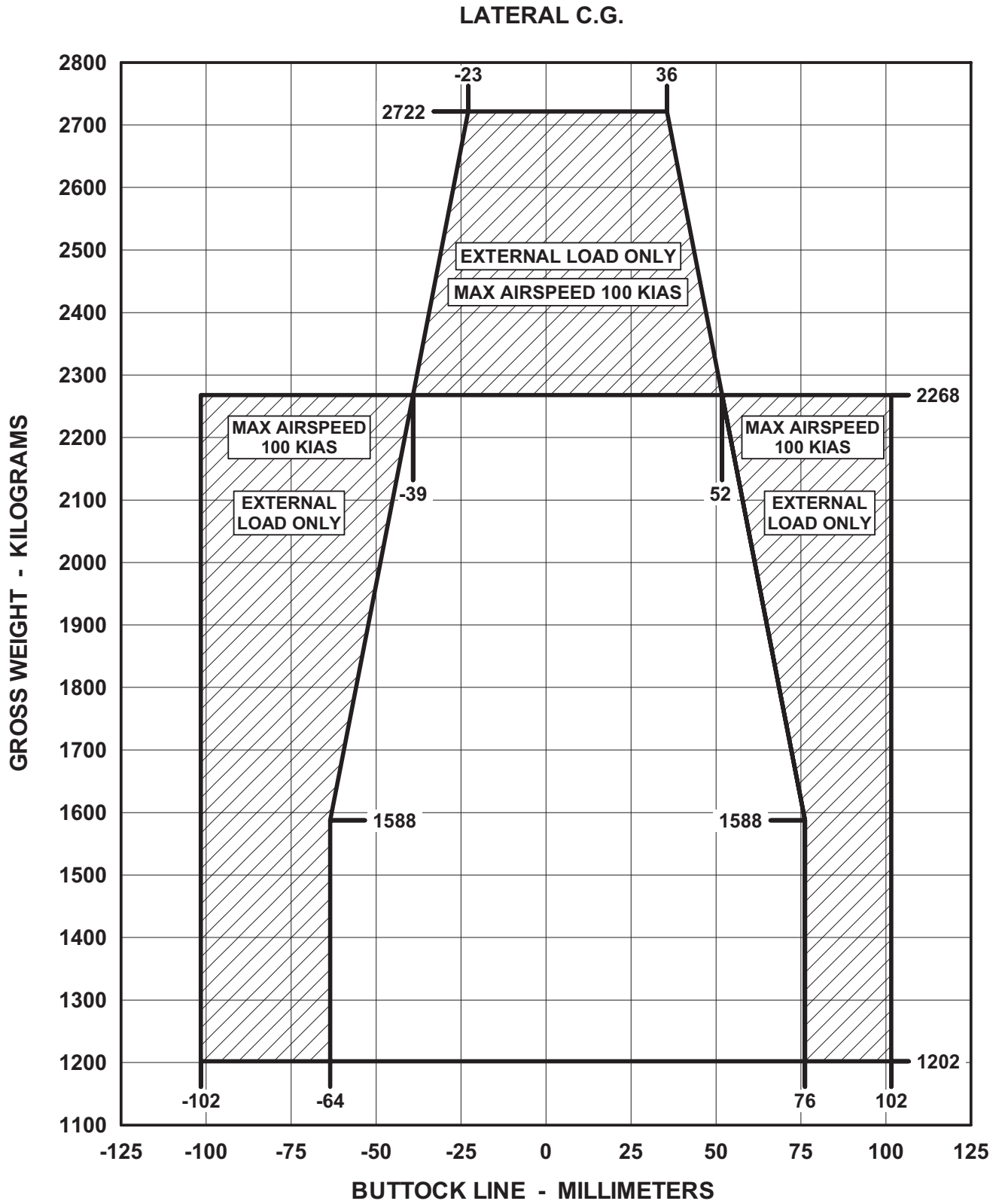


Figure 1-2. Gross weight lateral center of gravity limits (Sheet 2 of 2)

**EMERGENCY PEDAL
 STOP RELEASE
 – PULL ONLY –
 MAINT. RESET
 REQUIRED**

Location: Between Pilot and Copilot seats

407 AIRSPEED LIMITATIONS - KIAS											
OAT °C	PRESSURE ALTITUDE FT x 1000										
	0	2	4	6	8	10	12	14	16	18	20
52	137										
45	139	132	125								
40	140	133	126	119							
35	140	135	128	120	113						
30	140	137	129	122	115	108					
25	140	138	131	124	116	109	102	95			
20	140	140	133	125	118	111	103	96	89		
0	140	140	140	132	125	117	110	103	95	88	
-25	140	140	140	135	130	125	119	111	104	97	89
-40	137	133	128	123	118	114	110	105	101	97	93
MAXIMUM AUTOROTATION VNE 100 KIAS											

Airspeed limits shown are valid only for corresponding altitudes and temperatures. Hatched areas indicate conditions which exceed approved temperature or density altitude limitations.

Location: Forward of Overhead Console

M407_FM-1__FIG_1-3_(VNE).WMF

Figure 1-3. Placards and decals (Sheet 1 of 3)

**FUEL
FUEL SYSTEM USABLE CAPACITY
BASIC AIRCRAFT 127 U.S. GALLONS - 483 LITERS
WITH 407-706-011 AUX KIT 147 U.S. GALLONS = 559 LITERS
SEE FLIGHT MANUAL FOR APPROVED FUELS**

Location: Above fuel filler cap.

AVOID CONT OPS 68.4% TO 87.1% NP

Location: Instrument panel.

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

Location: Bottom and centered on instrument panel.

**DO NOT APPLY ROTOR BRAKE
ABOVE 40% RPM**

Location: Near rotor brake (if installed).

**CARGO MUST BE SECURED
IN ACCORDANCE WITH
FLIGHT MANUAL INSTR**

Location: Inside of baggage door.

407-FM-1-3-2

Figure 1-3. Placards and decals (Sheet 2 of 3)

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GAS PRODUCER RPM (NG) LIMIT											
WHEN ABOVE 10,000 FT HP											
MAXIMUM Ng % RPM WITH OAT IS AS FOLLOWS											
OAT °C	-40	-39	-38	-37	-36	-35	-34	-33	-32	-31	-30
MAX Ng %	99.0	99.2	99.4	99.6	99.8	100.0	100.2	100.4	100.6	100.8	101.1

Location: Above pilot windshield

FADEC SOFTWARE VERSION 5.202
WITH DIRECT REVERSION TO
MANUAL INSTALLED. REFER TO
FLIGHT MANUAL FOR OPERATION

Location: Instrument panel

MAX ALLOWABLE WEIGHT 250 LBS.
MAX ALLOWABLE WEIGHT PER SQ. FT. 86 LBS.

Location: Inside of baggage door

FUEL CAPACITY
BASIC 869 LBS
WITH AUX 1005 LBS
(JET A AT 15°C)

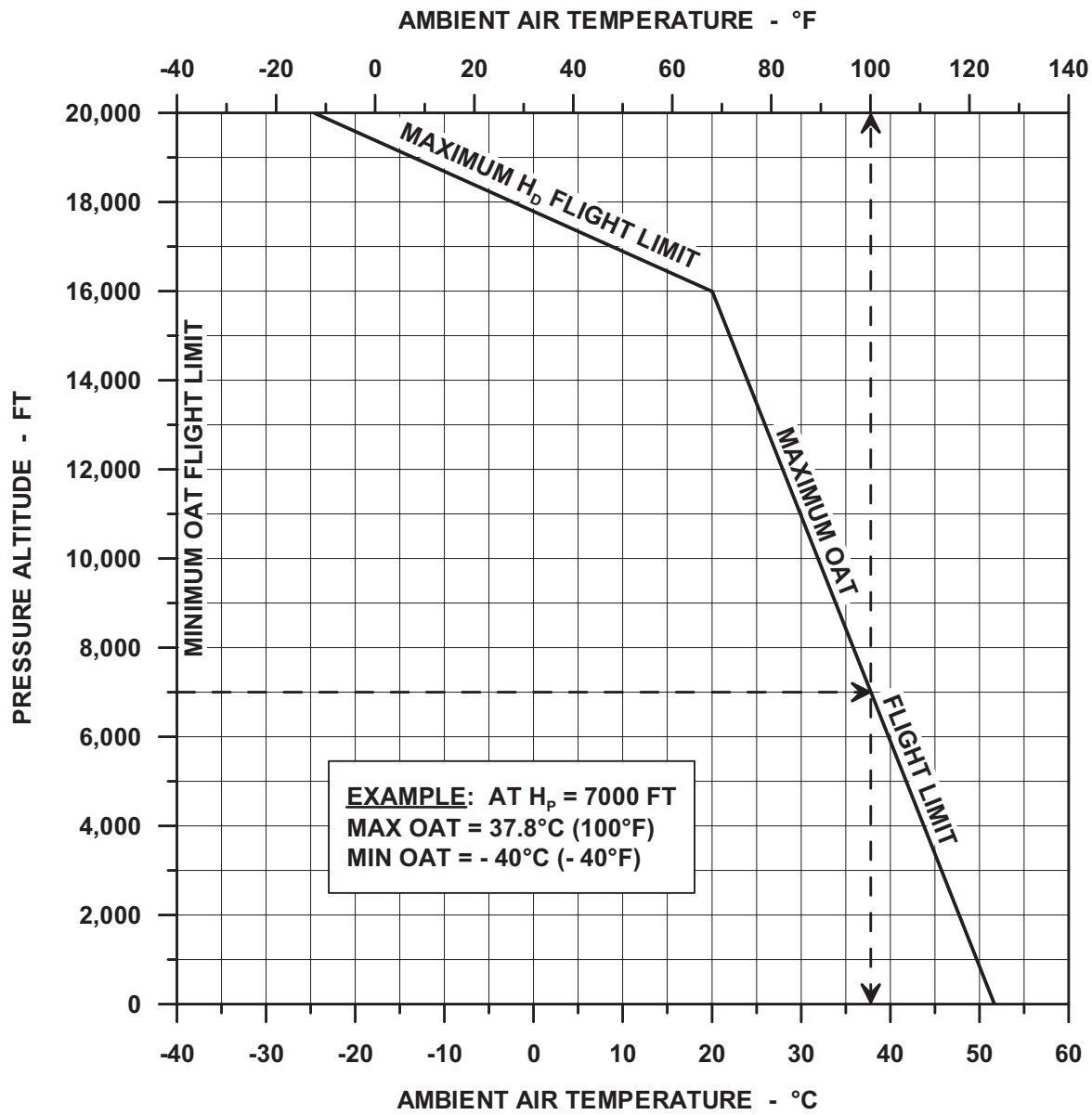
Location: Instrument panel



Location: Instrument panel and passenger compartment

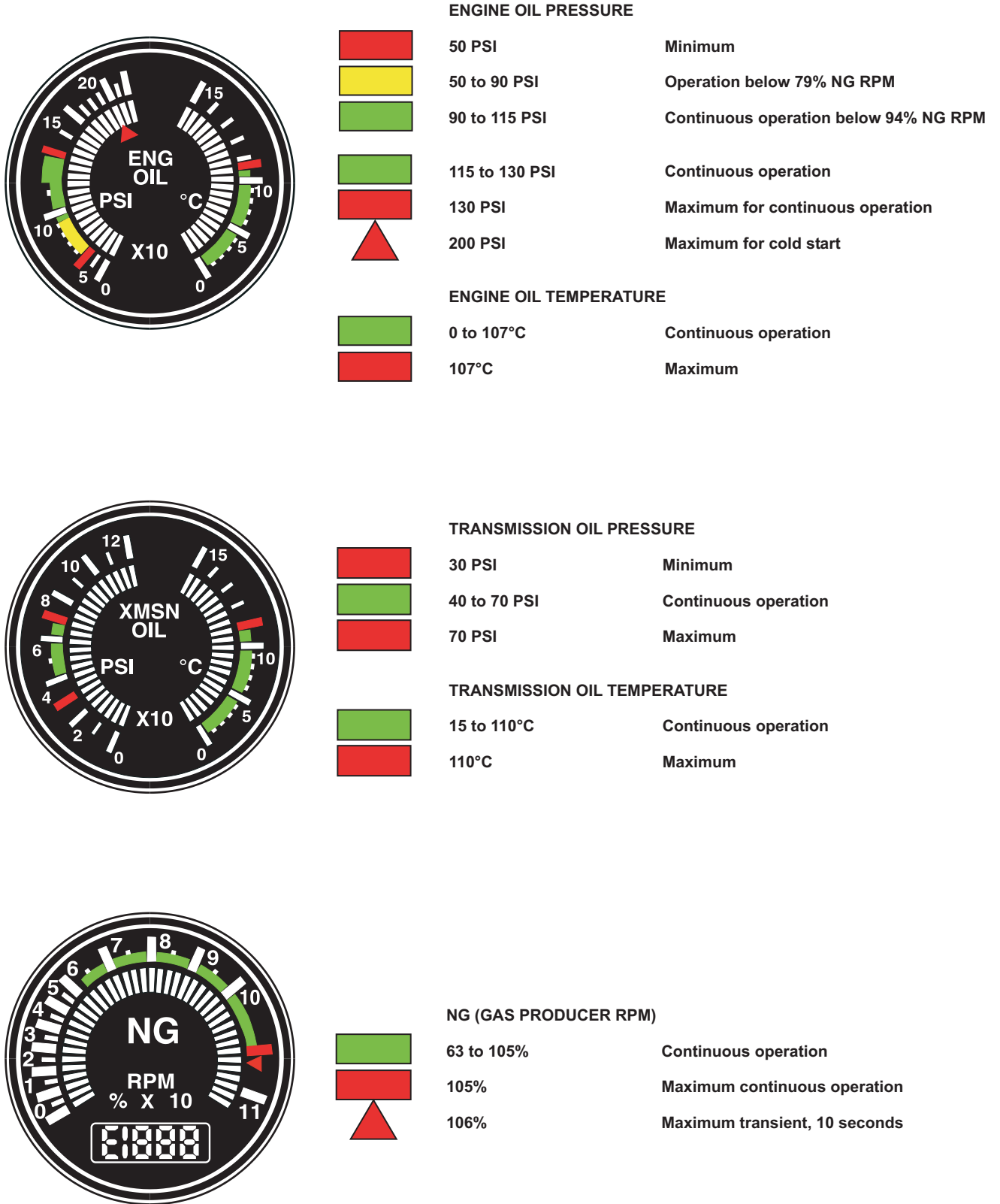
407_FM_1_0002

Figure 1-3. Placards and Decals (Sheet 3 of 3)



M407_FM-1__FIG_1-4.EMF




Figure 1-4. Ambient air temperature limitations

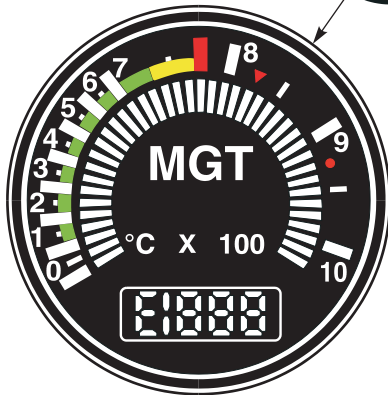


M407_FM-1__FIG_1-5_(1_OF_4).EPS






Figure 1-5. Instrument markings (Sheet 1 of 4)



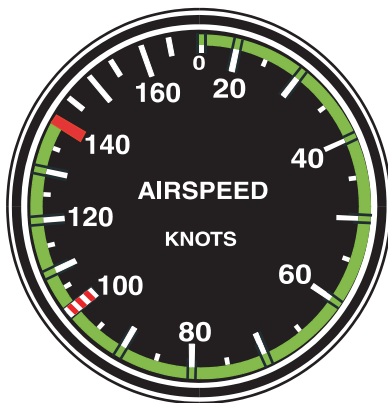
TRQ (TORQUE)		
	0 to 93.5%	Continuous operation
	93.5 to 100%	5 minute takeoff range
	100%	Maximum






407-375-001-105 AND SUB.

MGT (MEASURED GAS TEMPERATURE)		
	100 to 727°C	Continuous operation
	727 to 779°C	5 minute takeoff range
	779°C	Maximum for takeoff
	826°C or 843°C	Beginning of 10 seconds range for starting
	927°C	Maximum for start and shutdown (1 second maximum)

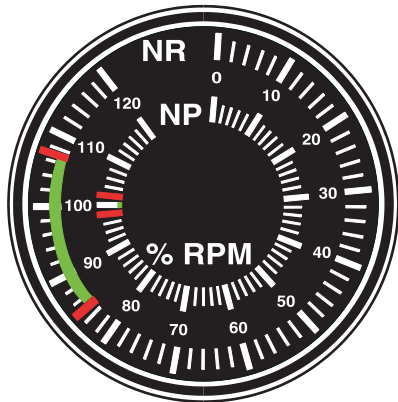
* Either gauge may be installed



AIRSPEED		
	0 to 140 Knots	Continuous operation
	100 Knots	Maximum for autorotation
	140 Knots	Maximum

407_FM_1_0003

Figure 1-5. Instrument Markings (Sheet 2 of 4)



407-375-008-101/-103

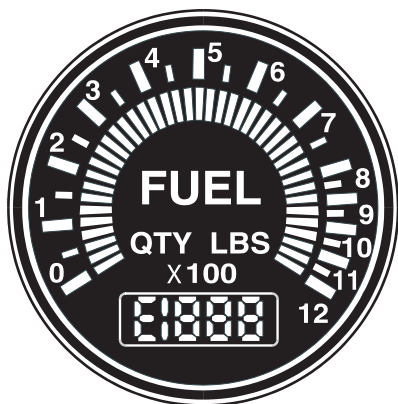
NP (POWER TURBINE RPM)

	99%	Minimum
	99 to 100%	Continuous operation
	100%	Maximum continuous



NR (ROTOR RPM)

	85%	Minimum (power off)
	85 to 107%	Continuous operation (power off)
	107%	Maximum (power off)



FUEL QUANTITY

(Jet A 6.8 lbs/gal)

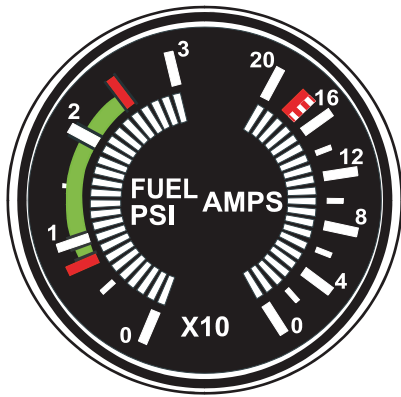
0 LBS	All tanks empty (zero useable)
195 LBS	Forward tank empty
869 LBS	Forward and aft tanks full
1005 LBS	Forward, aft and auxiliary tanks full

407_FM_1_0004

Figure 1-5. Instrument Markings (Sheet 3 of 4)

* Either gauge may be installed.

* P/N 407-075-024-101



DC LOAD

170 Amps Maximum continuous above 10,000 FT Hp

180 Amps Maximum

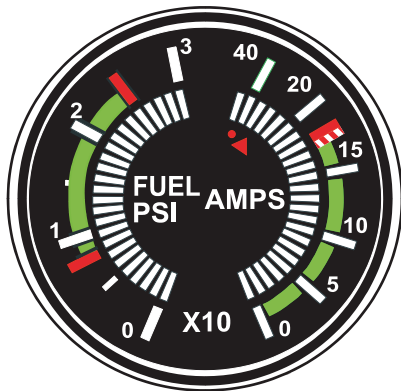
FUEL PRESSURE

8 PSI Minimum

8 to 25 PSI Continuous operation

25 PSI Maximum

* P/N 407-075-024-103,
407-375-007-105 or 407-375-007-107



DC LOAD

0 to 180 Amps Continuous operation

170 Amps Maximum continuous above 10,000 FT Hp

180 Amps Maximum

300 Amps Maximum transient, 2 minutes

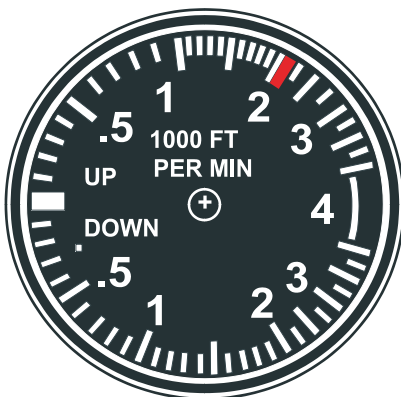
400 Amps Maximum transient, 5 seconds

FUEL PRESSURE

8 PSI Minimum

8 to 25 PSI Continuous operation

25 PSI Maximum



VERTICAL SPEED INDICATOR

2,000 Feet per minute up Maximum

Figure 1-5. Instrument markings (Sheet 4 of 4)

Section 3

EMERGENCY/MALFUNCTION PROCEDURES

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Section 3

EMERGENCY/MALFUNCTION PROCEDURES

3-1. INTRODUCTION

Following procedures contain indications of failures or malfunctions which affect safety of crew, helicopter, ground personnel or property; use of emergency features of primary and backup systems; and appropriate warnings, cautions, and explanatory notes. [Tables 3-1](#) and [3-2](#) list fault conditions and corrective actions for warning lights and caution/advisory lights respectively.

NOTE

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

A tripped circuit breaker should not be reset in flight unless deemed necessary for safe completion of the flight.

If a tripped circuit breaker is deemed necessary for safe completion of the flight, it should only be reset one time.

Helicopter should not be operated following any precautionary landing until cause of malfunction has been determined and corrective maintenance action taken.

3-2. DEFINITIONS

Following terms indicate degree of urgency in landing helicopter.

LAND AS SOON AS POSSIBLE

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

LAND AS SOON AS PRACTICAL

Landing site and duration of flight are at discretion of pilot. Extended flight beyond nearest approved landing area is not recommended.

Following terms are used to describe operating condition of a system, subsystem, assembly, or component.

Affected

Fails to operate in intended or usual manner.

Normal

Operates in intended or usual manner.

3-3. ENGINE

3-3-A. ENGINE FAILURE

3-3-A-1. ENGINE FAILURE — HOVERING

● INDICATIONS:

1. Left yaw.
2. ENGINE OUT and RPM warning lights illuminated.

3. Engine instruments indicate power loss.
4. Engine out audio activated when NG drops below 55%.
5. NR decreasing with RPM warning light and audio on when NR drops below 95%.

● PROCEDURE:

1. Maintain heading and attitude control.
2. Collective — Adjust to control NR and rate of descent. Increase prior to ground contact to cushion landing.

NOTE

Amplitude of collective movement is a function of height above ground. Any forward airspeed will aid in ability to cushion landing.

3. Land.
4. Shut down helicopter.

3-3-A-2. ENGINE FAILURE — INFLIGHT

● INDICATIONS:

1. Left yaw.
2. ENGINE OUT and RPM warning lights illuminated.
3. Engine instruments indicate power loss.
4. Engine out audio activated when NG drops below 55%.
5. NR decreasing with RPM warning light and audio on when NR drops below 95%.

● PROCEDURE:

1. Maintain heading and attitude control.
2. Collective — Adjust as required to maintain 85 to 107% NR.

NOTE

Maintaining NR at high end of operating range will provide maximum rotor energy to accomplish landing, but will cause an increased rate of descent.

3. Cyclic — Adjust to obtain desired autorotative AIRSPEED.

NOTE

Maximum AIRSPEED for steady state autorotation is 100 KIAS. Minimum rate of descent airspeed is 55 KIAS. Maximum glide distance airspeed is 80 KIAS.

4. Attempt engine restart if ample altitude remains. (Refer to ENGINE RESTART, [paragraph 3-3-B](#)).
5. FUEL VALVE switch — OFF.
6. At low altitude:
 - a. Throttle — Closed.
 - b. Flare to lose airspeed.
7. Apply collective as flare effect decreases to further reduce forward speed and cushion landing. Upon ground contact, collective shall be reduced smoothly while maintaining cyclic in neutral or centered position.
8. Complete helicopter shutdown.

3-3-B. ENGINE RESTART IN FLIGHT

An engine restart may be attempted in flight if time and altitude permit.



IF CAUSE OF FAILURE IS OBVIOUSLY MECHANICAL, AS EVIDENCED BY ABNORMAL METALLIC OR GRINDING SOUNDS, DO NOT ATTEMPT A RESTART.

3-3-B-1. RESTART – AUTOMATIC MODE

I PROCEDURE (NO RESTART FAULT OR FADEC MANUAL LIGHTS ILLUMINATED):

1. Collective — Adjust to maintain 85 to 107% NR.
2. AIRSPEED — Adjust as desired.

NOTE

Minimum rate of descent airspeed of 55 KIAS and minimum NR will allow pilot more time for air restart.

3. FUEL VALVE switch — ON.
4. Throttle — Cutoff.
5. START switch — Hold to start position (start will latch after throttle is placed to idle).
6. NG — Between 12% and 50%.
7. Throttle — Idle.
8. MGT — Monitor.
9. Throttle — Advance smoothly to FLY detent position.

If restart is unsuccessful, abort start and secure engine as follows:

10. Throttle — Closed.
11. FUEL VALVE switch — OFF.
12. Accomplish autorotative descent and landing.

3-3-B-2. RESTART — MANUAL MODE

RESTART FAULT OR FADEC MANUAL LIGHTS ILLUMINATED.

I PROCEDURE:

1. Collective — Adjust to maintain 85 to 107% NR.
2. AIRSPEED — Adjust as desired.

NOTE

Minimum rate of descent airspeed of 55 KIAS and minimum NR will allow pilot more time for air restart.

3. Throttle — Closed.
4. FADEC MODE switch — MAN.
5. FUEL VALVE switch — ON.
6. START switch — Hold to start position (starter will not latch).
7. NG — 12%.
8. Throttle — Slowly advance out of cutoff and stop advancing throttle at light off.
9. MGT — Allow to peak.
10. Throttle — Increase fuel flow by modulating throttle to maintain MGT within limits.
11. START switch — Release at 50% NG.
12. Throttle — Advance smoothly and modulate to 100% NP.

If restart is unsuccessful, abort start and secure engine as follows:

13. Throttle — Closed.

14. FUEL VALVE switch — OFF.
15. Accomplish autorotative descent and landing.

3-3-C. ENGINE UNDERSPEED

NO CAUTION/WARNING/ADVISORY LIGHTS ILLUMINATED.

● INDICATIONS:

1. Decrease in NG.
2. Subsequent decrease in NP.
3. Possible decrease in NR.
4. Decrease in TRQ.

● PROCEDURE:

1. Collective — Adjust as required to maintain 85 to 107% NR.
2. Throttle — Confirm in FLY detent position.
3. Throttle — Position throttle to the approximate bezel position that coincides with the gauge indicated NG.
4. FADEC MODE switch — MAN.
5. NR — Maintain 95 to 100% with throttle and collective.
6. Land as soon as practical.

3-3-D. ENGINE OVERSPEED

(NO CAUTION/WARNING/ADVISORY LIGHTS ILLUMINATED)

● INDICATIONS:

1. Increase in NR.
2. Increase in NP.

3. Increase in NG.
4. Increase in TRQ.

● PROCEDURE:

1. Throttle — Retard.
2. NG or NP — Attempt to stabilize with throttle and collective.
3. FADEC MODE switch — MAN.
4. NR — Maintain 95 to 100% with throttle and collective.



IF UNABLE TO MAINTAIN NR, NP, NG, OR MGT, PREPARE FOR A POWER OFF LANDING BY LOWERING COLLECTIVE AND SHUTTING DOWN ENGINE.

3-3-E. ENGINE COMPRESSOR STALL

● INDICATIONS:

1. Engine pops.
2. High or erratic MGT.
3. Decreasing or erratic NG or NP.
4. TRQ oscillations.

● PROCEDURE:

1. Collective — Reduce power, maintain slow cruise flight.
2. MGT and NG — Check for normal indications.
3. ENG ANTI ICE switch — ON.
4. PART SEP switch (if installed) — ON.

5. HEATER switch (if installed) — ON.

NOTE

Severity of compressor stalls will dictate if engine should be shut down and treated as an engine failure. Violent stalls can cause damage to engine and drive system components, and must be handled as an emergency condition. Stalls of a less severe nature (one or two low intensity pops) may permit continued operation of engine at a reduced power level, avoiding condition that resulted in compressor stall.

If pilot elects to continue flight:

6. Collective — Increase slowly to achieve desired power level.
7. MGT and NG — Monitor for normal response.
8. Land as soon as practical.

If pilot elects to shut down engine:

9. Enter autorotation.
10. Throttle — Closed.
11. FUEL VALVE switch — OFF.
12. Collective — Adjust as required to maintain 85 to 107% NR.
13. Cyclic — Adjust as required to maintain desired AIRSPEED.
14. Prepare for power-off landing.

3-3-F. ENGINE HOT START/SHUTDOWN

● **INDICATIONS:**

1. Excessive MGT.
2. Visible smoke or fire.

● **PROCEDURE:**

1. Throttle — Closed.
2. FUEL VALVE switch — OFF.

NOTE

Starter will remain engaged until MGT decreases to 150°C and then automatically disengage. Starter may be manually engaged by holding STARTER switch forward.

3. STARTER switch — Ensure starter is motoring engine until MGT stabilizes at normal temperature.
4. Shut down helicopter.

3-3-G. ENGINE OIL PRESSURE LOW OR FLUCTUATING

● **INDICATIONS:**

1. Engine oil pressure below minimum.
2. Engine oil pressure fluctuating abnormally.

● **PROCEDURE:**

1. Engine oil pressure and temperature — Monitor.
2. Land as soon as practical.

3-3-H. ENGINE OIL TEMPERATURE HIGH

● **INDICATIONS:**

1. Engine oil temperature increasing above normal.
2. Engine oil temperature above maximum.

● **PROCEDURE:**

Land as soon as practical.

3-3-J. DRIVESHAFT FAILURE**WARNING**

FAILURE OF MAIN DRIVESHAFT TO TRANSMISSION WILL RESULT IN COMPLETE LOSS OF POWER TO MAIN ROTOR. ALTHOUGH COCKPIT INDICATIONS FOR A DRIVESHAFT FAILURE ARE SIMILAR TO AN ENGINE OVERSPEED, IT IS IMPERATIVE THAT AUTOROTATIVE FLIGHT PROCEDURES BE ESTABLISHED IMMEDIATELY. FAILURE TO REACT IMMEDIATELY TO LOW RPM AUDIO, RPM LIGHT AND NP/NR TACHOMETER CAN RESULT IN LOSS OF CONTROL.

● **INDICATIONS:**

1. Left yaw
2. Rapid decrease in NR
3. Rapid increase in NP
4. LOW RPM audio horn
5. Illumination of RPM light
6. Possible increase in noise level due to overspeeding engine and driveshaft breakage.

NOTE

Engine overspeed trip system will activate at 118.5% NP causing fuel flow to go to minimum. After initial overspeed, FADEC will adjust fuel flow to maintain engine at 100% NP.

● **PROCEDURE:**

1. Maintain heading and attitude control.

2. Collective — Adjust as required to maintain 85 to 107% NR.

NOTE

Minimum rate of descent airspeed is 55 KIAS. Maximum glide distance airspeed is 80 KIAS.

3. Cyclic — Adjust to obtain desired autorotative airspeed.

NOTE

To maintain tail rotor effectiveness do not shutdown engine.

4. Landing — Complete autorotative landing.
5. Complete helicopter shutdown.

3-3-K. FADEC FAILURE**NOTE**

Takeoff power may not be available in the MAN mode. Maximum continuous power will be available for all ambient conditions.

● **INDICATIONS**

1. FADEC fail audio activated.
2. FADEC FAIL warning light illuminated.
3. FADEC MANUAL caution light illuminated.
4. AUTO RELIGHT advisory light illuminated.
5. FADEC MODE switch MAN light illuminated.

- PROCEDURE:

WARNING

WITHIN 2 TO 7 SECONDS AFTER THE FADEC FAIL WARNING NR/NP MAY INCREASE RAPIDLY, REQUIRING POSITIVE MOVEMENTS OF COLLECTIVE AND THROTTLE TO CONTROL NR.

1. Throttle — If time permits, match throttle bezel position to NG indication.
2. NR/NP — Maintain 95 to 100% with collective and throttle.
3. FADEC MODE switch — Depress one time, muting FADEC fail audio.

NOTE

Depressing FADEC MODE switch one time, will only mute FADEC fail audio. This step should not be accomplished until pilot is firmly established in MAN control.

4. Land as soon as practical.
5. Normal shutdown if possible.

3-4. FIRE

3-4-A. ENGINE FIRE ON GROUND

- INDICATIONS:

1. Smoke
2. Fumes
3. Fire

- PROCEDURE:

1. Throttle — Closed.

2. FUEL VALVE switch — OFF.
3. GEN switch — OFF.
4. BATT switch — OFF.
5. Rotor brake (if installed) — Engage.
6. Exit helicopter.

3-4-B. ENGINE FIRE DURING FLIGHT

- INDICATIONS:

1. Smoke
2. Fumes
3. Fire

- PROCEDURE:

1. Inflight — Immediately enter autorotation.
2. Throttle — Closed.
3. FUEL VALVE switch — OFF.
4. If time permits, FUEL BOOST/XFR circuit breaker switches — OFF.
5. Execute autorotative descent and landing.
6. BATT switch — OFF.

NOTE

Do not restart engine until corrective maintenance has been performed.

3-4-C. CABIN SMOKE OR FUMES

- INDICATIONS:

1. Smoke
2. Fumes

● PROCEDURE:

1. Inflight — Start descent
2. AIR COND BLO switch (if installed) — OFF
3. HEATER switch (if installed) — OFF
4. All vents — Open
5. Side windows — Open

If time and altitude permits:

6. Source — Attempt to identify and secure.
7. If source is identified and smoke and/or fumes still persist — Land as soon as possible.
8. If source is identified and smoke and/or fumes are cleared — Land as soon as practical.

3-5. TAIL ROTOR

There is no single emergency procedure for all types of antitorque malfunctions. One key to a pilot successfully handling a tail rotor emergency lies in the ability to quickly recognize the type of malfunction that has occurred.

3-5-A. COMPLETE LOSS OF TAIL ROTOR THRUST

This is a situation involving a break in drive system (e.g., severed driveshaft), wherein tail rotor stops turning and delivers no thrust.

● INDICATIONS:

1. Uncontrollable yawing to right (left side slip).
2. Nose down tucking.
3. Possible roll of fuselage.

NOTE

Severity of initial reaction of helicopter will be affected by AIRSPEED, CG, power being used, and H_D .

● PROCEDURE:

3-5-A-1. HOVERING

Close throttle and perform a hovering autorotation landing. A slight rotation can be expected on touchdown.

3-5-A-2. IN-FLIGHT

Reduce throttle to idle, immediately enter autorotation, and maintain a minimum AIRSPEED of 55 KIAS during descent.

NOTE

When a suitable landing site is not available, vertical fin may permit controlled flight at low power levels and sufficient AIRSPEED. During final stages of approach, a mild flare should be executed, making sure all power to rotor is off. Maintain helicopter in a slight flare and smoothly use collective to execute a soft, slightly nose-high landing. Landing on aft portion of skids will tend to correct side drift. This technique will, in most cases, result in a run-on type landing.



IN A RUN-ON TYPE LANDING AFTER TOUCHING DOWN, DO NOT USE CYCLIC TO REDUCE FORWARD SPEED.

3-5-B. FIXED PITCH FAILURES

This is a situation involving inability to change tail rotor thrust (blade angle) with anti-torque pedals.

- **INDICATIONS:**

1. Lack of directional response.
2. Locked pedals.

NOTE

If pedals cannot be moved with a moderate amount of force, do not attempt to apply a maximum effort, since a more serious malfunction could result. If helicopter is in a trimmed condition when malfunction occurs, TRQ and AIRSPEED should be noted and helicopter flown to a suitable landing area. Certain combinations of TRQ, NR, and AIRSPEED will correct a yaw attitude, and these combinations should be used to land helicopter.

- **PROCEDURE:**

NOTE

Pull pedal stop emergency release to ensure pedal stop is retracted.

3-5-B-1. HOVERING

Do not close throttle unless a severe right yaw occurs. If pedals lock in any position at a hover, landing from a hover can be accomplished with greater safety under power-controlled flight rather than by closing throttle and entering autorotation.

3-5-B-2. IN-FLIGHT — LEFT PEDAL APPLIED

In a high power condition, helicopter will yaw to left when power is reduced. Power and AIRSPEED should be adjusted to a value where a comfortable yaw angle can be maintained. If AIRSPEED is increased, vertical fin will become more effective and an increased left yaw attitude will develop. To accomplish landing, establish a power-on

approach with sufficiently low AIRSPEED (zero if necessary) to attain a rate of descent with a comfortable sideslip angle. (A decrease in NP decreases tail rotor thrust.) As collective is increased just before touchdown, left yaw will be reduced.

3-5-B-3. IN-FLIGHT — RIGHT PEDAL APPLIED

In cruise flight or reduced power situation, helicopter will yaw to right when power is increased. A low power, run-on type landing will be necessary by gradually reducing throttle to maintain heading while adding collective to cushion landing. If right yaw becomes excessive, close throttle completely.

3-6. HYDRAULIC SYSTEM

3-6-A. LOSS OF HYDRAULIC PRESSURE

- **INDICATIONS:**

1. HYDRAULIC SYSTEM caution light illuminated.
2. Grinding or howling noise from pump.
3. Increase in force required to move flight controls.
4. Feedback forces may be evident during flight control movement.

- **PROCEDURE:**

1. Reduce AIRSPEED to 70 to 100 KIAS.
2. HYD SYSTEM circuit breaker — Out. If hydraulic power is not restored, push breaker in.
3. HYD SYS switch — HYD SYS; OFF if hydraulic power is not restored.

4. For extended flight set comfortable AIRSPEED, up to 120 KIAS, to minimize control forces.
5. Land as soon as practical.
6. A run-on landing at effective translational lift speed (approximately 15 knots) is recommended.

3-6-B. FLIGHT CONTROL ACTUATOR MALFUNCTION

An actuator hardover can occur in any flight control axis, but a cyclic cam jam will only occur in the fore and aft axis. An actuator hardover is manifested by uncommanded movements of one or two flight controls. If two controls move, the pilot will find one of these controls will require a higher than normal control force to oppose the movement. This force cannot be "trimmed" to zero without turning the HYD SYS switch OFF. Once the hydraulic boost is OFF, the forces on the affected flight control will be similar to the "normal" hydraulic off forces.

● INDICATIONS:

1. Uncommanded flight control movements
2. High flight control forces to oppose movement in one axis
3. Feedback forces only in affected flight control axis
4. Flight control forces normal in unaffected axis

● PROCEDURE:

1. Attitude — Maintain
2. HYD SYS switch — OFF
3. AIRSPEED — Set to 70 to 100 KIAS

4. Land as soon as possible using procedure from [paragraph 3-6-A](#)

3-7. ELECTRICAL SYSTEM

3-7-A. GENERATOR FAILURE

● INDICATIONS:

1. GEN FAIL caution light illuminated.
2. AMPS indicates 0.
3. Voltmeter — Approximately 24 volts

● PROCEDURE:

1. GENERATOR FIELD and GENERATOR RESET circuit breakers — Check in.
2. GEN switch — RESET; then GEN.
3. If power is not restored, place GEN switch to OFF; land as soon as practical.

NOTE

With generator OFF, a fully charged battery will provide approximately 21 minutes of power for basic helicopter and one VHF COMM radio (35 minutes with optional 28 ampere/hour battery).

3-7-B. EXCESSIVE ELECTRICAL LOAD

● INDICATIONS:

1. AMPS indicates excessive load.
2. Smoke or fumes.

● PROCEDURE:

1. GEN switch — OFF.
2. BATT switch — OFF.

3. FUEL BOOST/XFR LEFT circuit breaker switch — LEFT (on).

WARNING

PRIOR TO BATTERY DEPLETION, ALTITUDE MUST BE REDUCED BELOW 8000 FEET H_p (JET A) OR 4000 FEET H_p (JET B). UNUSABLE FUEL MAY BE AS HIGH AS 150 POUNDS AFTER THE BATTERY IS DEPLETED DUE TO INABILITY TO TRANSFER FUEL FROM FORWARD CELLS.

NOTE

With battery and generator OFF, an 80% charged battery will operate left fuel boost pump and left fuel transfer pump for approximately 1.7 hours (2.8 hours with optional 28 ampere/hour battery).

4. Airspeed — 60 KIAS or less.

NOTE

Pedal stop disengages with loss of electrical power.

5. Land as soon as practical.

NOTE

When throttle is repositioned to the idle stop (during engine shutdown) the PMA will go offline and the engine may flame out.

3-8. FUEL SYSTEM

DUAL FUEL TRANSFER FAILURE

● **INDICATIONS:**

1. L/FUEL XFR and R/FUEL XFR caution lights illuminate.

2. Last 150 pounds of fuel in forward cell may not be usable.

3. Fuel will stop transferring from forward to aft fuel cell at approximately 345 pounds total indicated fuel.

● **PROCEDURE:**

1. LEFT and RIGHT FUEL BOOST/XFR circuit breaker switches — Check ON.
2. Determine FUEL QTY in forward cell.
3. Subtract quantity of fuel trapped in forward cell from total to determine usable fuel remaining.
4. Plan landing accordingly.

3-9. CYCLIC CAM JAM

A cyclic cam jam can only occur in the fore and aft axis, whereas, an actuator hardover can occur in any flight control axis. A cyclic cam jam is manifested when a commanded control movement requires a higher than normal fore and aft spring force. The force felt when moving the cyclic fore and aft with a cam jam is the result of overriding a spring capsule.

● **INDICATIONS:**

1. High (approximately 15 pounds) fore and aft cyclic control forces.
2. Normal pedal, collective and lateral cyclic control forces.

● **PROCEDURE:**

1. Helicopter pitch attitude — Maintain normal pitch attitudes with forward or aft cyclic force.



DO NOT TURN HYDRAULIC BOOST OFF

2. Land as soon as practical.

3-10. WARNING, CAUTION, AND ADVISORY LIGHTS/MESSAGES

Red warning lights/messages, fault conditions, and corrective actions are presented in [Table 3-1](#).

Amber caution and White advisory lights/messages and corrective actions are presented in [Table 3-2](#).

Table 3-1. Warning (red) lights

PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
BATTERY HOT	Battery overheating.	Turn BATT switch OFF and land as soon as practical. If BATTERY RLY light illuminates, turn GEN switch OFF if conditions permit. Land as soon as possible.
ENGINE OUT	NG less than $55 \pm 1\%$ and/or FADEC senses ENGINE OUT.	Verify engine condition. Accomplish engine failure procedure.
ENGINE OVSPD	NG greater than 110% or NP versus TORQUE is above maximum continuous limit (102.4% NP at 100% TORQUE to 108.6% NP at 0% TORQUE).	Adjust throttle and collective as necessary. Determine if engine is controllable, if not shut down. Maintenance action required before next flight.
FADEC FAIL (During start)	FADEC has detected a serious malfunction.	Close throttle immediately. Engage starter to reduce MGT. Applicable maintenance action required prior to next flight.
FADEC FAIL (Inflight)	FADEC has detected a malfunction and an overspeed may occur 2 to 7 seconds following activation of FADEC fail horn and illumination of FADEC FAIL warning light. Engine may underspeed significantly prior to overspeed. Any other FADEC related lights may be illuminated.	Accomplish FADEC FAILURE procedure, paragraph 3-3-K . Applicable maintenance action required prior to next flight.
RPM (with low RPM audio)	NR below 95%.	Reduce collective and ensure throttle is in FLY detent position. Light will extinguish and audio will cease when NR increases above 95%.
RPM (without audio)	NR above 107%.	Increase collective and/or reduce severity of maneuver. Light will extinguish when NR decreases below 107%.
XMSN OIL PRESS	Transmission oil pressure is below minimum.	Reduce power; verify fault with gage. Land as soon as possible.
XMSN OIL TEMP	Transmission oil temperature is at or above red line.	Reduce power; verify fault with gage. Land as soon as practical.

Table 3-2. Caution (amber) and advisory (white/green) lights

PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
AUTO RELIGHT (white)	Engine igniter is operating.	None.
NOTE		
<p>AUTO RELIGHT light will be illuminated when ignition system is activated. Ignition system is activated:</p> <p>1 - during start sequence</p> <p>2 - in MANUAL mode with NG above 55%</p> <p>3 - with FADEC detection of engine out condition with NG above 50%.</p>		
BAGGAGE DOOR	Baggage compartment door not securely latched.	Close door securely before flight. If light illuminates during flight, land as soon as practical.
BATTERY RLY	Battery relay has malfunctioned to closed (ON) position with BATT switch OFF. Battery is still connected to DC BUSS.	If BATTERY HOT light is illuminated, turn GEN switch OFF if conditions permit. Land as soon as possible.
CHECK INSTR	TRQ, MGT, or NG is about to or has detected an exceedance. Flashing LCD trend arc and digital display indicates impending exceedance. Letter E in digital display indicates an exceedance has occurred.	Reduce engine power if possible. Press INSTR CHK button to display magnitude of exceedance. Refer to BHT-407-MD-1 .
CYCLIC CENTERING	Cyclic stick is not centered.	Reposition cyclic stick to center position to extinguish CYCLIC CENTERING light.
ENGAGED	Information system status.	None.
ENGINE ANTI-ICE (white)	ANTI-ICE switch ON. Engine receiving anti-icing air.	If light (if installed) remains illuminated with ENGINE ANTI-ICE switch OFF, avoid operations requiring maximum power.
ENGINE CHIP	Ferrous particles in engine oil.	Land as soon as possible.

Table 3-2. Caution (amber) and advisory (white/green) lights (Cont)

PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
FADEC DEGRADED (Inflight)	FADEC ECU operation is degraded which may result in NR droop, NR lag, or reduced maximum power capability.	Remain in AUTO mode. Fly helicopter smoothly and nonaggressively. Land as soon as practical. NOTE It may be necessary to use FUEL VALVE switch to shut down engine after landing. Applicable maintenance action required prior to next flight.
FADEC DEGRADED (With engine shutdown)	FADEC ECU has recorded a fault during previous flight or a current fault has been detected.	Position throttle to idle; if light extinguishes, fault is from previous flight. Applicable maintenance action required prior to next flight.
FADEC FAULT	PMA and or MGT, NP or NG automatic limiting circuit(s) not functional.	Remain in AUTO mode. Land as soon as practical. Applicable maintenance action required prior to next flight.
FADEC MANUAL	FADEC is operating in MANUAL mode. No automatic governing is available. AUTO RELIGHT light will be illuminated.	Fly helicopter smoothly and nonaggressively. Maintain NR with coordinated throttle and collective movements. Land as soon as practical.
FLOAT ARM	FLOAT ARM switch is ON. Float inflation solenoid is armed.	Normal operation for takeoff and landing over water. FLOAT ARM switch — OFF. If light remains illuminated, FLOATS circuit breaker — Out. Land as soon as practical. NOTE With float inflation solenoid armed, flight should not exceed 60 KIAS and 500 feet AGL.
FLOAT TEST (green)	Float system in test mode.	None.

Table 3-2. Caution (amber) and advisory (white/green) lights (Cont)

PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
FUEL FILTER	Airframe fuel filter in impending bypass.	Land as soon as practical. Clean before next flight.
FUEL LOW	100 ±10 pounds of fuel remain in aft tank.	Verify FUEL QTY. Land as soon as practical.
R/FUEL BOOST	Right fuel boost pump has failed.	If practical, descend below 8000 feet H _p if fuel is Jet A or 4000 feet H _p if fuel is Jet B to prevent fuel starvation if other fuel boost pump fails or has low output pressure. Land as soon as practical.
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">WARNING</div> <p>IF BOTH FUEL BOOST PUMPS FAIL, ALTITUDE MUST BE REDUCED TO BELOW 8000 FEET H_p (JET A) OR 4000 FEET H_p (JET B). LAND AS SOON AS POSSIBLE.</p>		
L/FUEL BOOST	Left fuel boost pump has failed.	If practical, descend below 8000 feet H _p if fuel is Jet A or 4000 feet H _p if fuel is Jet B to prevent fuel starvation if other fuel boost pump fails or has low output pressure. Land as soon as practical.
FUEL VALVE	Fuel valve position differs from FUEL VALVE switch indication or FUEL VALVE circuit breaker out.	Check FUEL VALVE circuit breaker in. Land as soon as practical. If on ground, cycle FUEL VALVE switch.
L/FUEL XFR	Left fuel transfer pump has failed.	Land as soon as practical.

Table 3-2. Caution (amber) and advisory (white/green) lights (Cont)


PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
		
		<p>IF BOTH FUEL TRANSFER PUMPS FAIL, UNUSABLE FUEL MAY BE AS HIGH AS 150 POUNDS DUE TO INABILITY TO TRANSFER FUEL FROM FORWARD CELL. LAND AS SOON AS PRACTICAL.</p>
	<p>NOTE</p> <p>Under normal fuel transfer conditions, helicopters S/N 53000 through 53174 L/FUEL XFR and R/FUEL XFR lights will illuminate for 2.5 minutes and then extinguish. This indicates transfer is complete and transfer pumps have been automatically turned off. Helicopters S/N 53175 and subsequent inhibit illumination of the lights.</p>	
R/FUEL XFR	Right fuel transfer pump has failed.	Land as soon as practical.
GEN FAIL	Generator not connected to DC BUSS.	Verify fault with AMPS gauge. GEN switch — RESET, then ON. If GEN FAIL light remains illuminated, GEN switch — OFF. Land as soon as practical.
HEATER OVERTEMP	An overtemp condition has been detected by a temperature probe either under pilot seat, copilot seat, or in vertical tunnel.	Turn HEATER switch OFF immediately.

Table 3-2. Caution (amber) and advisory (white/green) lights (Cont)

PANEL WORDING	FAULT CONDITION	CORRECTIVE ACTION
HYDRAULIC SYSTEM	Hydraulic pressure below limit.	Verify HYD SYS switch position. Accomplish hydraulic system failure procedure (refer to paragraph 3-6).
LITTER DOOR	Litter door not securely latched.	Close door securely before flight. If light illuminates during flight, land as soon as practical.
PEDAL STOP	Pedal Restrictor Control Unit has detected a failure of part of system.	V _{NE} — 60 KIAS. PEDAL STOP emergency release — Pull. Land as soon as practical.
RESTART FAULT (white)	FADEC ECU has detected a fault which will not allow engine to be restarted in AUTO mode.	Remain in AUTO mode. Plan landing site accordingly. Applicable maintenance action required prior to next flight.
NOTE		
When throttle is repositioned to idle stop (during engine shutdown) the PMA will go offline and engine may flameout.		
START (white)	Start relay is in START mode.	If START switch has not been engaged and there is zero indication on AMPS gage; START relay has malfunctioned and helicopter is on battery power. START circuit breaker — Out. Land as soon as practical.
T/R CHIP	Ferrous particles in tail rotor gearbox oil.	Land as soon as possible.
XMSN CHIP	Ferrous particles in transmission oil.	Land as soon as possible.

Section 2

NORMAL PROCEDURES

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Section 2

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NORMAL PROCEDURES

2-1. INTRODUCTION

This section contains instructions and procedures for operating helicopter from planning stage, through actual flight conditions, to securing helicopter after landing.

Normal and standard conditions are assumed in these procedures. Pertinent data in other sections is referenced when applicable.

Instructions and procedures contained herein are written for purpose of standardization and are not applicable to all situations.

2-1-A. COLD WEATHER OPERATIONS

Battery starts have been demonstrated to -29°C (-20°F) with standard 17 amp-hour battery and -35°C (-31°F) with optional 28 amp-hour battery.

During engine start in cold temperatures, initial engine oil pressure of 200 PSI and pressure excursions down to 50 PSI during warm up are normal. Normal oil pressure and temperature indications as per Section 1 should be obtained after approximately 5 minutes at idle.

2-1-B. HOT WEATHER OPERATIONS



DURING EXTENDED HOVER AT TAKEOFF POWER WITH THE OAT ABOVE 49.7°C (121.4°F), MONITOR THE ENGINE OIL TEMPERATURE. IF TEMPERATURE RISES ABNORMALLY, REDUCE

POWER OR TRANSITION TO FORWARD FLIGHT UNTIL TEMPERATURE DECREASES.

2-2. FLIGHT PLANNING

Each flight should be planned adequately to ensure safe operations and to provide pilot with data to be used during flight.

Check type of mission to be performed and destination.

Determine that helicopter has adequate performance to complete mission utilizing appropriate performance charts in [Section 4](#).

Determine that helicopter weight and balance will be within limits during entire mission. Utilize appropriate weight and balance charts in [Section 5](#) and limitations in [Section 1](#).

2-3. PREFLIGHT CHECK

Pilot is responsible for determining whether helicopter is in condition for a safe flight. Refer to [Figure 2-1](#) for preflight check sequence.

NOTE

A preflight check is not intended to be a detailed mechanical inspection, but simply a guide to help pilot check condition of helicopter. It may be as comprehensive as conditions warrant at discretion of pilot.

All areas checked shall include a visual check for evidence of corrosion, particularly when helicopter is flown near salt water or in areas of high industrial emissions.

2-3-A. BEFORE EXTERIOR CHECK

1. Flight planning — Completed.
2. Publications — Checked.
3. GW and CG — Computed.
4. Helicopter servicing — Completed.
5. Battery — Connected.

2-3-B. EXTERIOR CHECK**2-3-B-1. FUSELAGE — CABIN RIGHT SIDE****WARNING**

FAILURE TO REMOVE ROTOR TIEDOWNS BEFORE ENGINE STARTING MAY RESULT IN SEVERE DAMAGE AND POSSIBLE INJURY.

1. All main rotor blades — Tiedowns removed, condition.
2. Right static port — Condition.
3. Cabin doors and hinge bolts — Condition and security.
4. Windows — Condition and security.
5. Landing gear — Condition. Ground handling wheel removed.
6. Forward and aft crosstube fairings (if installed) — Secured, condition, and aligned.

2-3-B-2. FUSELAGE — CENTER RIGHT SIDE

1. Engine inlet — Condition; remove inlet covers.
2. Cabin roof, transmission cowling, and engine air inlet area — Cleaned of all debris, accumulated snow and ice; cowling secured.
3. Forward fairing — Secured.

4. Transmission — Check oil level. Verify actual presence of oil in sight gauge.
5. Transmission oil cooler lines — Condition and security.
6. Transmission mounts — Condition and security.
7. Main driveshaft — Condition.
8. Access door — Secured.
9. Fuel filler cap — Visually check fuel level and cap secured.

NOTE

If helicopter is not parked on a level surface, fuel sump may not properly drain contaminants.

10. Fuel sump — Drain fuel sample as follows:
 - a. RIGHT and LEFT FUEL BOOST/XFR circuit breaker switches — OFF.
 - b. BATT switch — BATT (on).
 - c. FUEL VALVE switch — OFF.
 - d. FWD and AFT FUEL SUMP drain buttons — Press, drain sample, then release.
11. Airframe fuel filter — Drain and check before first flight of day as follows:
 - a. RIGHT and LEFT FUEL BOOST/XFR circuit breaker switches — LEFT and RIGHT (on).
 - b. FUEL VALVE switch — ON.
 - c. Fuel filter drain valve — Open, drain sample, then close.
12. Fuel filter test switch — Press and check FUEL FILTER caution light illuminates. Release switch and check light extinguishes.

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- 13. **FUEL VALVE switch — OFF.**
 - 14. **LEFT and RIGHT FUEL BOOST/XFR circuit breaker switches — OFF.**
 - 15. **BATT switch — OFF.**
 - 16. **Power plant area:**
 - a. **Main driveshaft aft flexure — Condition.**
 - b. **Engine — Condition, security of attachments, evidence of oil leakage.**
 - c. **Engine mounts — Condition and security.**
 - d. **Throttle linkage — Condition, security, and freedom of operation.**
 - e. **Engine fuel pump — Security and condition, evidence of leakage.**
 - f. **Hydromechanical unit — Security and condition, evidence of leakage.**
 - g. **Hoses and tubing — Chafing, security, and condition.**
 - 17. **Engine cowl — Secured.**
 - 18. **Generator cooling scoop — Clear of debris.**
 - 19. **Oil tank — Leaks, security, and cap secured.**
 - 20. **Access door — Secured.**
 - 21. **Aft fairing — Secured.**
- 2-3-B-3. FUSELAGE — AFT RIGHT SIDE**
- 1. **Fuselage — Condition.**
 - 2. **Tail rotor driveshaft cover — Condition and security.**
 - 3. **Tailboom — Condition.**
 - 4. **Horizontal stabilizer and position light — Condition and security.**
- 2-3-B-4. FUSELAGE — FULL AFT**
- 1. **Vertical fin — Condition.**
 - 2. **Tail rotor guard — Condition and security.**
 - 3. **Anticollision light — Condition and security of lens.**
 - 4. **Aft position light — Condition.**
 - 5. **Tail rotor gearbox — Oil level, leaks and security.**
 - 6. **Tail rotor — Tiedown removed, condition and free movement.**
 - 7. **Tail rotor controls — Condition and security.**
 - 8. **Tail rotor blades:**
 - a. **General condition.**
 - b. **Tip block — Security and seal integrity.**
 - c. **Internal blade root — Clear of snow and ice.**
 - 9. **Tail rotor yoke — Condition, evidence of static stop contact damage (deformed static stop yield indicator).**
- 2-3-B-5. FUSELAGE — AFT LEFT SIDE**
- 1. **Tailboom — Condition.**
 - 2. **Tail rotor driveshaft cover — Condition and security.**
 - 3. **Horizontal stabilizer area:**
 - a. **Horizontal stabilizer — General condition and security of attachment.**
 - b. **Position light — Condition and security.**
 - c. **Forward and aft section of left upper stabilizer support to tailboom area — Condition of tailboom.**

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4. Fuselage — Condition.
 5. Forward tail rotor driveshaft coupling — Condition of splined adapter.
 6. Oil cooler blower shaft hanger bearings — Evidence of grease leakage and overheating.
 7. Oil cooler blower — Clear of obstructions and condition.
 8. Oil cooler — Condition and leaks.
 9. Oil cooler blower access door — Secured.
 10. Oil tank sight glass — Check oil level.
 11. Aft fairing — Secured.
 12. Baggage compartment — Cargo tied down, door secured.
 13. Exhaust cover — Removed.
 14. Power plant area:
 - a. Engine — Condition, security of attachments.
 - b. Engine mounts — Condition and security.
 - c. Exhaust stack — Condition and security.
 - d. Evidence of fuel and oil leaks.
 - e. Fuel and oil filter bypass indicators — Check retracted.
 - f. Hoses and tubing for chafing and condition.
 - g. Pneumatic lines — Condition and security.
 - h. Tail rotor driveshaft — Condition of splines and couplings.
 - i. Air induction diffuser duct — Condition and security.
 - j. Rotor brake disc and caliper (if installed) — Condition, security of attachment and leakage. Ensure brake pads are retracted from brake disc.
 - k. Engine cowling — Secured.
 - l. Air induction cowling — Secured.
 - m. Cabin roof, transmission cowling, engine air inlet area, and plenum — Clear of all debris, accumulated snow and ice; cowling secured.
15. Transmission area:
- a. Transmission mounts — Condition and security of elastomeric mounts.
 - b. Transmission oil filter — Ensure bypass indicator not extended.
 - c. Main driveshaft — Condition.
 - d. Transducers and pressure lines — Condition and security.
 - e. Access door — Secured.
- 2-3-B-6. CABIN ROOF
1. Main rotor dampers and fairing — Condition and security.
 2. Main rotor hub, yoke and frahm — Condition and security.
 3. Main rotor blade and skin — Condition.
 4. Pitch horn bearing — Wear and security.
 5. Main rotor pitch links — Condition and security of attachment bolts and locking hardware.
 6. Swashplate assembly — Condition, security of attached controls, and boot condition.

7. Control linkages to swashplate — Condition, security of attachment bolts and locking hardware.
8. Control tube hydraulics-off balance springs — Condition and security.
9. Hydraulic reservoir filler cap — Closed and locked.
10. Hydraulic system filters — Bypass indicator retracted.
11. Hydraulic actuators and lines — Condition, security, interference, leakage.

2-3-B-7. FUSELAGE — CABIN LEFT SIDE

1. Forward fairing and access door — Secured.
2. Cabin doors and hinge bolts — Condition and security.
3. Windows — Condition and security.
4. Hydraulic reservoir — Check fluid level.
5. Landing gear — Condition and ground handling wheel removed.
6. Forward and aft crosstube fairings (if installed) — Secured, condition, and aligned.
7. Left static port — Condition.

2-3-B-8. FUSELAGE — FRONT

1. Exterior surfaces — Condition.
2. Windshield — Condition and cleanliness.
3. Battery and vent lines — Condition and security.
4. HOUR METER circuit breaker — In.
5. Battery access door — Secured.
6. Pitot tube — Cover removed, clear of obstructions.

7. External power door — Condition and security.
8. Landing light lamps — Condition.
9. Antennas — Condition and security.

2-4. INTERIOR AND PRESTART CHECK

1. Cabin interior — Clean, equipment secured.
2. Fire extinguisher — Installed and secured.
3. Cabin loading — Maintain CG within limits.
4. Passenger seat belts — Secured.
5. Copilot seat belt — Secured (if solo).
6. Doors — Secured.
7. Throttle — Closed.
8. LDG LTS switch — OFF.
9. Communications switches — Set.
10. Altimeter — Set.
11. Instruments — Correct indications.
12. Overhead switches — Set:
 - a. BATT switch — OFF.
 - b. GEN switch — OFF.
 - c. PART SEP switch (if installed) — OFF.
 - d. ANTI COLL LT switch — ANTI COLL LT (on).
 - e. HYD SYS switch — HYD SYS (on).
 - f. CABIN LT/PASS switch — OFF.
 - g. POS LT switch — As desired.
 - h. DEFOG switch — OFF.
 - i. PITOT HEATER switch — OFF.

- j. ENG ANTI ICE switch — OFF.
 - k. AVIONICS MASTER switch — OFF.
 - l. HEATER switch (if installed) — OFF.
 - m. INSTR LT rheostat — OFF.
13. Overhead circuit breaker switches — OFF.
 14. Overhead circuit breakers — In.
 15. Rotor brake handle (if installed) — Up and latched.
- c. After 3 seconds; ENG OUT, FADEC DEGRADE, FADEC FAULT, RESTART FAULT, and ENGINE OVSPD lights illuminate with activation of engine out audio for 3 seconds.
 - d. ENG OUT light re-illuminates with reactivation of engine out audio, after 3 seconds.
18. HORN MUTE button — Press to mute.
 19. Caution lights — ENG OUT, XMSN OIL PRESS, RPM, HYDRAULIC SYSTEM, GEN FAIL, L/FUEL BOOST, R/FUEL BOOST, L/FUEL XFR, and R/FUEL XFR will be illuminated.



28 VDC GPU SHALL BE 500 AMPERES OR LESS TO REDUCE RISK OF STARTER DAMAGE FROM OVERHEATING.

16. GPU — Connected (if used).
17. BATT switch — ON for battery start, ON for GPU start, OFF for battery cart start. Observe the following:
 - a. Low rotor audio horn activated.

NOTE

With “Ahlers” NR/NP gauge installed, NR/NP needles do not self test.

- b. For 8 seconds,
 - (1) Trend arcs on LCD instruments indicate full scale.
 - (2) TORQUE and NG digits display 8188.8.
 - (3) MGT and FUEL digits display 81888.
 - (4) NR and NP needles move to 107% and 100%, respectively.

NOTE

L/FUEL XFR and R/FUEL XFR will not be illuminated when forward fuel tank is empty.

20. PEDAL STOP PTT switch annunciator:

Pedals — Centered.

Press — Verify PEDAL STOP caution and ENGAGED annunciator illuminated and left pedal travel restricted.

Release — Verify PEDAL STOP caution and ENGAGED annunciator extinguished and both pedals travel unrestricted.

21. Flight controls — Loosen frictions; check travel and verify CYCLIC CENTERING light operation; position for start. Tighten friction as desired.
22. Throttle — Check freedom of travel and appropriate operation at OFF, I (idle), FLY and MAX positions. Return throttle to OFF position.

NOTE

With INSTR LT rheostat on and CAUT LT switch positioned to DIM, caution

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lights are dimmed to a fixed intensity and cannot be adjusted by INSTR LT rheostat.

23. INSTR LT rheostat — As desired.
24. CAUT LT switch — As desired.
25. FUEL BOOST/XFR circuit breaker switches — LEFT (on) and RIGHT (on) and verify all boost and transfer caution lights extinguish.
26. FUEL pressure — Check.
27. CAUTION LT TEST button — Press to test.
28. INSTR CHK button — Press and check for exceedances.
29. LCD TEST button — Press to test, if desired.
30. FADEC HORN TEST button — Press to test.
31. FADEC MODE switch — AUTO.
32. FUEL VALVE switch — ON, guard closed, FUEL VALVE light illuminates then extinguishes.
33. FUEL QTY — Check TOTAL and FWD tank quantity.
34. OAT/VOLTS display — Check OAT and select VOLTS.



ANY ATTEMPT TO START ENGINE WHEN VOLTAGE IS BELOW 24 VOLTS MAY RESULT IN A HOT START. MONITOR FOR FADEC FAILURE. IF FADEC FAILS (FADEC FAIL WARNING LIGHT), ABORT START BY ROLLING THROTTLE TO CUTOFF AND ENGAGE STARTER TO REDUCE MGT.

2-5. ENGINE START

1. Collective — Full down.

2. Cyclic and pedals — Centered and CYCLIC CENTERING light extinguished.

NOTE

If throttle is positioned in idle for more than 60 seconds, starter latching is disabled and throttle must be repositioned to cut off and then back to idle to enable it for another 60 seconds.

It is recommended that MGT be below 150°C when below 10,000 feet H_p or below 65 °C when above 10,000 feet H_p prior to attempting an engine start. Compliance with this recommendation will allow for cooler starts and reduce potential of reaching hot start abort limits. Refer to DRY MOTORING RUN, [paragraph 2-5-A](#).

3. Throttle — Idle position.
4. START switch — Momentarily press (hold for approximately 1 second) and observe START and AUTO RELIGHT lights are illuminated.
5. MGT — Monitor.



IF MAIN ROTOR IS NOT ROTATING BY 25% NG, ABORT START BY ROLLING THROTTLE TO CUTOFF. ENSURE STARTER HAS DISENGAGED WHEN MGT DECREASES BELOW 150°C.

6. START light — Extinguished at 50% NG (starter has disengaged).
7. AUTO RELIGHT light — Extinguished at 60% NG.
8. ENG and XMSN OIL pressures — Check.



IF ENGINE HAS BEEN SHUT DOWN FOR MORE THAN 15 MINUTES, STABILIZE AT IDLE FOR 1 MINUTE BEFORE INCREASING THROTTLE.

NOTE

During cold temperature operations, normal transmission and engine oil pressure limits may be exceeded during start. Stabilize engine at idle until minimum temperature and pressure limits are attained.

9. Idle — 63 ±1% NG.
10. BATT switch — ON (if applicable).
11. GPU — Disconnect and close door (if applicable).
12. GEN switch — GEN (on); observe GEN FAIL light extinguishes.

NOTE

Turn generator OFF if ammeter indication drops to zero amps after an initial full scale indication. One reset is allowed. RESET generator and then turn generator back ON (applicable with AMPS/FUEL PSI gauge PN 407-075-024-101 and sub.). Refer to BHT-407-MD-1.

13. Voltmeter — 28.5 ±0.5 volts.
14. FLIGHT INSTR circuit breaker switches (3) (if installed) — DG, ATT and TURN (on).

NOTE

If dual controls are installed, guard throttle to prevent inadvertent manipulation from co-pilot position.

2-5-A. DRY MOTORING RUN

The following procedure is used to reduce residual MGT to recommended levels for engine start.

1. Throttle — Closed position.
2. START switch — Hold engaged for 15 seconds, then release.

Follow ENGINE START procedure, [paragraph 2-5](#), once 0% NG is indicated.

2-5-B. ALTERNATE ENGINE START

This procedure may be used in hot and/or high altitude environment where aborted hot starts have been experienced and when prior troubleshooting has not revealed any engine maintenance issues.

1. Collective — Full down.
2. Cyclic and pedals — Centered and CYCLIC CENTERING light extinguished.

NOTE

It is recommended that MGT be below 150°C when below 10,000 feet H_p or below 65°C when above 10,000 feet H_p prior to attempting an engine start. Compliance with this recommendation will allow for cooler starts and reduce potential of reaching hot start abort limits. Refer to DRY MOTORING RUN, [paragraph 2-5-A](#).

3. Throttle — Closed position.
4. START switch — Hold engaged and observe START and AUTO RELIGHT lights are illuminated.
 - a. Throttle — Open to IDLE at approximately 16% NG.
5. MGT — Monitor.

NOTE

Engine will detect light off and smoothly accelerate to idle while limiting MGT, if necessary.

- a. **START** switch — Once light off is detected, release.



IF MAIN ROTOR IS NOT ROTATING BY 25% NG, ABORT START BY ROLLING THROTTLE TO CUTOFF. ENSURE STARTER HAS DISENGAGED WHEN MGT DECREASES BELOW 150°C.

6. **START** light — Extinguished at 50% NG (starter has disengaged).
7. **AUTO RELIGHT** light — Extinguished at 60% NG.
8. **ENG** and **XMSN OIL** pressures — Check.



IF ENGINE HAS BEEN SHUT DOWN FOR MORE THAN 15 MINUTES, STABILIZE AT IDLE FOR 1 MINUTE BEFORE INCREASING THROTTLE.

NOTE

During cold temperature operations, normal transmission and engine oil pressure limits may be exceeded during start. Stabilize engine at idle until minimum temperature and pressure limits are attained.

9. **Idle** — 63 ±1% NG.
10. **BATT** switch — ON (if applicable).

11. **GPU** — Disconnect and close door (if applicable).
12. **GEN** switch — **GEN** (on); observe **GEN FAIL** light extinguishes.

NOTE

Turn generator OFF if ammeter indication drops to zero amps after an initial full scale indication. One reset is allowed. **RESET** generator and then turn generator back ON (applicable with **AMPS/FUEL PSI** gauge PN 407-075-024-101 and subsequent). Refer to BHT-407-MD-1.

13. **Voltmeter** — 28.5 ±0.5 volts.
14. **FLIGHT INSTR** circuit breaker switches (3) (if installed) — **DG**, **ATT** and **TURN** (on).

NOTE

If dual controls are installed, guard throttle to prevent inadvertent manipulation from co-pilot position.

2-6. SYSTEMS CHECK**2-6-A. PRELIMINARY HYDRAULIC SYSTEMS CHECK****NOTE**

Uncommanded control movement or motoring with hydraulic system off may indicate hydraulic system malfunction.

1. **HYD SYS** switch — OFF.
2. **HYDRAULIC SYSTEM** caution light — Illuminated.
3. **HYD SYS** switch — **HYD SYS** (on).
4. **HYDRAULIC SYSTEM** caution light — Extinguished.

2-6-B. FADEC MANUAL CHECK

WARNING

AUTO TO MANUAL MODE TRANSITIONS WITH NR/NP AT 100% FLAT PITCH CAN RESULT IN RAPID NR/NP ACCELERATION IN APPROXIMATELY 7 SECONDS. TO AVOID POSSIBLE OVERSPEED CONDITION, PERFORM THE FOLLOWING CHECK AT IDLE (63% NG).

1. Throttle — Idle (63% NG).
2. FADEC MODE switch — MAN.
3. FADEC MANUAL and AUTO RELIGHT lights — Illuminated.
4. Check NG stabilized at 75% or less.
5. Throttle — Increase slowly to ensure engine responds, then return to idle.
6. FADEC MODE switch - AUTO.
7. FADEC MANUAL and AUTO RELIGHT lights — Extinguished.

2-6-C. ENGINE RUNUP


CAUTION

FAILURE TO SMOOTHLY TRANSITION THE THROTTLE FROM THE GROUND IDLE POSITION TO THE FLY POSITION, MAINTAINING TORQUE LESS THAN 40% MAY RESULT IN ENGINE OVERSPEED OR OVERTORQUE.

1. Throttle — Increase smoothly to FLY detent position while maintaining torque below 40%. Check RPM warning light extinguished at 95% NR.

2. NR and NP needles — Check matching and indicating 100%.

NOTE

Overhead circuit breakers highlighted with arrow graphic ; are powered through AVIONICS MASTER switch.

3. AVIONICS MASTER switch — AVIONICS MASTER (on).
4. ELT (if installed) — Check for inadvertent transmission.
5. Flight controls — Check freedom with minimum friction.
6. ENG ANTI ICE switch — ENG ANTI ICE (on); check for MGT increase and illumination of ENGINE ANTI-ICE light (if installed).
7. ENG ANTI ICE switch — OFF; check MGT returns to normal and ENGINE ANTI-ICE light (if installed) extinguishes; then ENG ANTI ICE (on) if required.

NOTE

If temperature is below 5°C (40°F) and visible moisture is present, ENG ANTI ICE shall be on.

8. PART SEP switch (if installed) — As required.

2-6-D. HYDRAULIC SYSTEMS CHECK

NOTE

Hydraulic systems check is to determine proper operation of hydraulic actuators for each flight control system. If abnormal forces, unequal forces, control binding, or motoring are encountered, it may be an indication of a malfunctioning flight control actuator.

1. Collective — Full down.

2. NR — 100% RPM.
3. HYD SYS switch — OFF.
4. HYDRAULIC SYSTEM caution light — Illuminated.
5. Cyclic — Centered.
6. Cyclic control — Check normal operation by moving cyclic forward and aft, then left and right (approximately 1 inch). Center cyclic.
7. Collective — Check normal operation by increasing collective slightly (1 to 2 inches). Repeat two to three times as required. Return to full down position.
8. Pedals — Check normal operation by displacing pedals slightly (1 inch).
9. HYD SYS switch — HYD SYS (on).
10. HYDRAULIC SYSTEM caution light — Extinguished.
11. Cyclic and collective friction — Set as desired.

2-7. BEFORE TAKEOFF

1. ENG ANTI ICE switch — As required.
2. Light switches — As required.
3. INSTR LT rheostat — As desired.

NOTE

For night flight, it is recommended to point the map light at the flight instruments and set to a low intensity. Sufficient night lighting will be provided in the event of an instrument lighting failure.

4. Radio(s) — Check as required.
5. Flight controls — Position and adjust frictions for takeoff.



FAILURE TO POSITION AND MAINTAIN THROTTLE IN FLY DETENT POSITION PRIOR TO TAKEOFF AND DURING NORMAL FLIGHT OPERATIONS CAN LIMIT AVAILABLE ENGINE POWER.

6. Throttle — Open to FLY detent position. Check 99 to 100% NR/NP.
7. Engine, transmission, and electrical instruments — Within limits.
8. Flight and navigation instruments — Check.
9. FUEL QTY — Note indication.
10. FUEL QTY FWD TANK button — Press, note fuel remaining in forward cell.

2-8. TAKEOFF

1. Rear facing seat headrests — Adjusted to proper position.

NOTE

During takeoffs disregard CYCLIC CENTERING light and position cyclic as required.

2. Collective — Increase to hover.
3. Directional control — As required to maintain desired heading.
4. Cyclic — Apply as required to accelerate smoothly.
5. Increase collective, up to 5% torque above hover power, to obtain desired rate of climb and airspeed. Once clear of the HV diagram shaded areas, adjust power and airspeed as desired.

6. PEDAL STOP PTT switch — Check ENGAGED annunciator illuminated above 55 ±5 KIAS.

6. FUEL QTY FWD TANK button — Press, note forward fuel tank indication.

2-9. IN-FLIGHT OPERATIONS

1. AIRSPEED — As desired (not to exceed V_{NE} at flight altitude).



AT HIGH POWER AND HIGH AIRSPEED, CYCLIC ONLY ACCELERATIONS AND MANEUVERING MAY SIGNIFICANTLY INCREASE MGT AND TORQUE WITH NO COLLECTIVE INPUT. THIS INCREASE IS MORE RAPID AT LOWER OAT.

NOTE

Pilot shall keep feet on tail rotor pedals at all times. Do not press PEDAL STOP PTT switch in flight.

2. PEDAL STOP PTT switch — Check ENGAGED annunciator illuminated above 55 ±5 KIAS.
3. ENG ANTI ICE and PITOT HEATER switches — ENG ANTI ICE and PITOT HEATER switches on in visible moisture when ambient temperature is at or below 5°C (40°F).
4. PITOT HEATER — Confirm operation (increase ammeter load).

NOTE

When ENG ANTI ICE switch is in ENG ANTI ICE (on), MGT will increase. Monitor MGT when selecting ENG ANTI ICE at high power settings.

5. Altimeter — Within limits.

NOTE

Full forward fuel tank quantity (approximately 256 pounds) will be indicated at approximately 770 pounds or greater total fuel. Fuel transfer will be complete at approximately 195 pounds total fuel.

2-10. DESCENT AND LANDING

NOTE

Large reductions in collective pitch at heavy GW may permit NR to increase independent of NP (needles split). Main rotor may be reengaged with a smooth increase in collective pitch.

1. Rear facing seat headrests — Adjusted to proper position.
2. Flight controls — Adjust friction as desired.
3. Throttle — Fly detent position. Check 99 to 100% NP.
4. Flight path — As required for type of approach.
5. ENG ANTI ICE — As required.
6. LDG LTS switch — As desired.

NOTE

During run-on or slope landings, disregard CYCLIC CENTERING light and position cyclic as required. After landing is completed and collective is full down, reposition cyclic so that CYCLIC CENTERING light is extinguished.

7. PEDAL STOP PTT switch — Check ENGAGED annunciator extinguished below 50 ±5 KIAS.

2-11. ENGINE SHUTDOWN

1. Collective — Full down.
2. Cyclic and pedals — Centered and CYCLIC CENTERING light extinguished.
3. Cyclic friction — Increase so that cyclic maintains centered position.
4. LDG LTS switch — OFF.
5. Throttle — Reduce to idle stop. Check RPM warning light illuminated and audio on at 95% NR.

NOTE

If dual controls are installed, guard throttle to prevent inadvertent manipulation from co-pilot position.

6. HORN MUTE button — Press to mute.
7. MGT — Stabilize at idle for 2 minutes.
8. ENG ANTI ICE switch — OFF.
9. FLIGHT INSTR circuit breakers switches (if installed) — OFF.
10. FUEL BOOST/XFR LEFT circuit breaker switch — OFF.

NOTE

Left fuel boost and transfer pumps will continue to operate until either LEFT FUEL BOOST/XFR circuit breaker switch (highlighted with yellow border) or FUEL VALVE switch is positioned to OFF. These pumps operate directly from battery and will not be deactivated when BATT switch is OFF. Battery power will be depleted if both switches remain on.

11. ELT (if installed) — Check for inadvertent transmission.

12. AVIONICS MASTER switch — OFF.
13. GEN switch — OFF.
14. OVSPD TEST button — If required; press, hold 1 second, and release.

NOTE

Overspeed shutdown test should be accomplished on first engine shutdown of the day. ENGINE OVSPD light will momentarily illuminate in addition to those lights that illuminate during a normal shutdown.

15. IDLE REL switch — Press and hold.



POSITIONING THROTTLE OUT OF CUT-OFF DURING NG SPOOL DOWN MAY CAUSE POST ENGINE SHUTDOWN FIRE.

16. Throttle — Closed; check MGT and NG decreasing, ENGINE OUT warning light illuminated and audio on at 55 ±1%.
17. HORN MUTE button — Press to mute.



AVOID RAPID ENGAGEMENT OF ROTOR BRAKE IF HELICOPTER IS ON ICE OR OTHER SLIPPERY OR LOOSE SURFACE TO PREVENT ROTATION OF HELICOPTER.

18. Rotor brake (if installed) — Apply full rotor brake at or below 40% NR. Return rotor brake handle to stowed position just prior to main rotor stopping.
19. FUEL VALVE switch — OFF.



DO NOT INCREASE COLLECTIVE OR APPLY LEFT TAIL ROTOR PEDAL TO SLOW ROTOR DURING COASTDOWN.

- 20. Pilot — Remain on flight controls until rotor has come to a complete stop.
- 21. All overhead switches, except HYD SYS switch — OFF.

NOTE

Ensure engine rotation has completely stopped prior to positioning BATT switch to OFF.

- 22. BATT switch — OFF, with NG at 0%.



APPLICABLE MAINTENANCE ACTION MUST BE PERFORMED PRIOR TO FURTHER FLIGHT IF A FADEC LIGHT HAS ILLUMINATED DURING THE PREVIOUS FLIGHT OR ON ENGINE SHUTDOWN.

NOTE

If shutting down at, or refueling to, between approximately 195 to 213

pounds total fuel quantity, up to 18 pounds of fuel may remain in forward fuel cell as unusable.

2-12. POSTFLIGHT CHECK

If any of following conditions exist:

- Thunderstorms are in local area or forecasted.
- Winds in excess of 35 knots or a gust spread of 15 knots exists or is forecasted.
- Helicopter is parked within 150 feet of hovering or taxiing aircraft that are in excess of basic GW of helicopter.
- Helicopter to be left unattended.

Perform following:

1. Install main rotor blade tie-downs.
2. Secure tail rotor loosely to tailboom with tie-down strap to prevent excessive flapping.
3. Install exhaust cover, engine inlet protective plugs and pitot cover.

NOTE

Refer to [BHT-407-MD-1](#) for additional tie-down data.

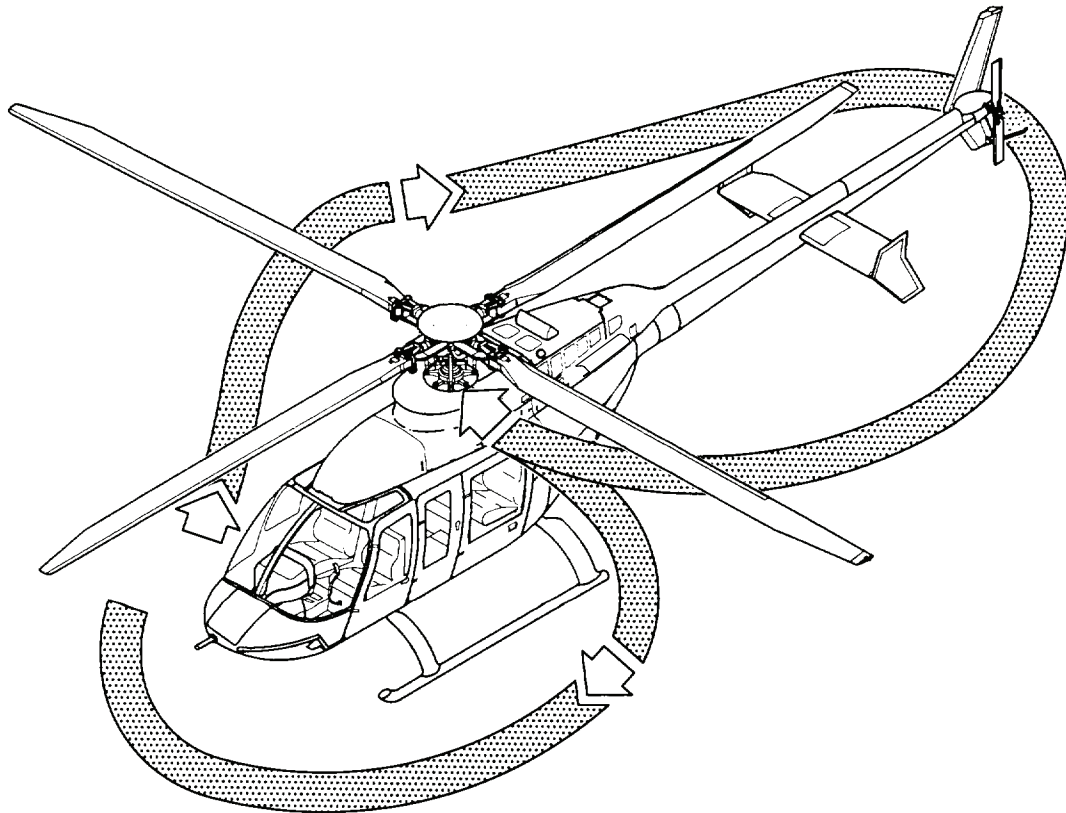


Figure 2-1. Preflight check sequence

407FM-2-1

