

SA 4047-76C-14

**FAA APPROVED
ROTORCRAFT
FLIGHT MANUAL
REVISION NO. 6**

**SIKORSKY
MODEL
S-76C
PART 1**

AIRCRAFT SERIAL NO. 760511 AND SUBSEQUENT

**Applicable to all helicopters equipped with TURBOMECA
ARRIEL 2S1 engines installed. (Commonly known as S-76C+)**

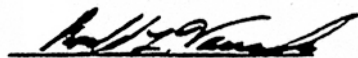


Sikorsky

A United Technologies Company

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Approved by:



Manager, Boston Aircraft
Certification Office, ANE-150

Date of Approval:
DECEMBER 20, 1999
Date of Revision:
May 26, 2004

PART 1

LOG OF TEMPORARY REVISIONS

TEMPORARY REVISION NO.	ISSUE DATE	INCORPORATED/SUPERSEDED	
		BY REV NO.	ISSUE DATE
1	3/12/02	4	4/14/03
2	4/9/02		
3	9/30/04		

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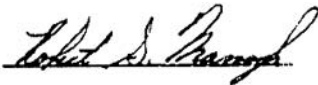
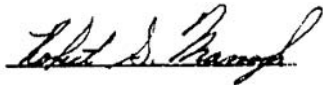
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REVISION NO.	PAGES REVISED	REMARKS	DATE	FAA APPROVED
1	Supplement Index 1/2	Updated applicable supplements.	10/20/00	 Manager, Boston Aircraft Certification Office, ANE-150
2	1-1,1-5, 1-9, 1-10,1-13, 1-22, 3-7, 3-42, 3-42A/ 3-42B, Supplement Index 1 and 2	Added OEI Training Operations, revised maximum transient engine torque limits, revised airspeed indicator in Instrument Markings graphic, revised step in procedure for Prior to or at LDP – Balked Landing (Go Around), added BUS TIE OPEN emergency procedure, updated applicable supplements.	1/9/02	 Manager, Boston Aircraft Certification Office, ANE-150

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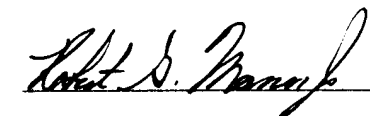
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REVISION NO.	PAGES REVISED	REMARKS	DATE	FAA APPROVED
3	2-12, 2-13, 2-19, 2-29	Added note on TU-65 DECU self test. Corrected electrical check procedures, revised T5 Margin Check Chart.	1/23/02	



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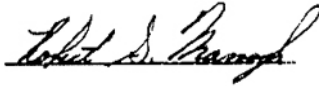
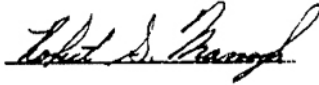
4	1-16, 1-16A/ 1-16B, 2-1, 2-3	Updated Engine Oil table in Operating Limitations. Added Cyclic Base Cover check and incorporated Temporary Revision 1 (Horizontal Stabilizer check) in Normal Procedures.	4/14/03	
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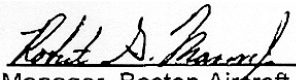
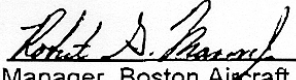
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REVISIO N NO.	PAGES REVISED	REMARKS	DATE	FAA APPROVED
5	Supplement Index 1, 2, and 3, 2-17, 2-18, 2-18A/ 2-18B	Updated applicable supplements. Revised Dual Static Inverter Check.	11/6/03	 Manager, Boston Aircraft Certification Office, ANE-150
6	2-2, 2-3, 2-4, 2-4A/2-4B, 2-8, 2-9, 2-23, 2-24, 2-27, 2-28, 2-28A, 2- 28B, 2-33, 3-59/3-60	Revised Standby Attitude Indicator System Test, added shutdown step in Normal Procedures section. Revised power assurance check procedure and charts. Added Loss of Primary Attitude Indicator in Instrument Flight Conditions procedure to Emergency Procedures section.	5/26/04	 Manager, Boston Aircraft Certification Office, ANE-150

PART 1

ACTIVE TEMPORARY REVISIONS

TEMPORARY REVISION NO.	PAGES REVISED	REMARKS	DATE	FAA APPROVED
2	4-12, 4- 24, 4-32	Revised Performance Information – Category “A” and “B” Operations.	4/9/02	 Manager, Boston Aircraft Certification Office, ANE-150
*3	1-5	Added Note to Gross Weight Reduction Due to Maximum Fuel Flow Rate Restriction	9/30/04	 Manager, Boston Aircraft Certification Office, ANE-150

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SECTION I**OPERATING LIMITATIONS****NOTE**

Law requires compliance with the limitations in this section.

WEIGHT LIMITS

Maximum takeoff and landing weight is 11,700 pounds (5,307 kilograms). This helicopter is to be operated using the approved loading schedule. Refer to Loading Information, Section II, in Part 2.

For minimum operating weight, refer to Figure 1-3.

CATEGORY "A" OPERATIONS

See Figure 1-1 for variation of allowable takeoff gross weight with altitude and temperature.

CATEGORY "B" OPERATIONS

See Figure 1-2 for variation of allowable takeoff gross weight with altitude and temperature.

OEI TRAINING OPERATIONS

See Figure 5-41 of Part 2, Section V for variation of allowable takeoff gross weight with altitude.

C.G. (CENTER OF GRAVITY) LIMITS

See Figure 1-3 for forward and aft center of gravity limits at various gross weights.

Lateral C.G. Limits: Left or right 3-1/2 inches (89 mm) except as restricted to left or right 2-1/2 inches (63.5 mm) at gross weights above 11,400 pounds (5,171 kg) for taxi, takeoff, and landing.

LOADING LIMITS

Maximum allowable cabin floor and baggage floor loading is 75 pounds per square foot (366 kg per square meter).

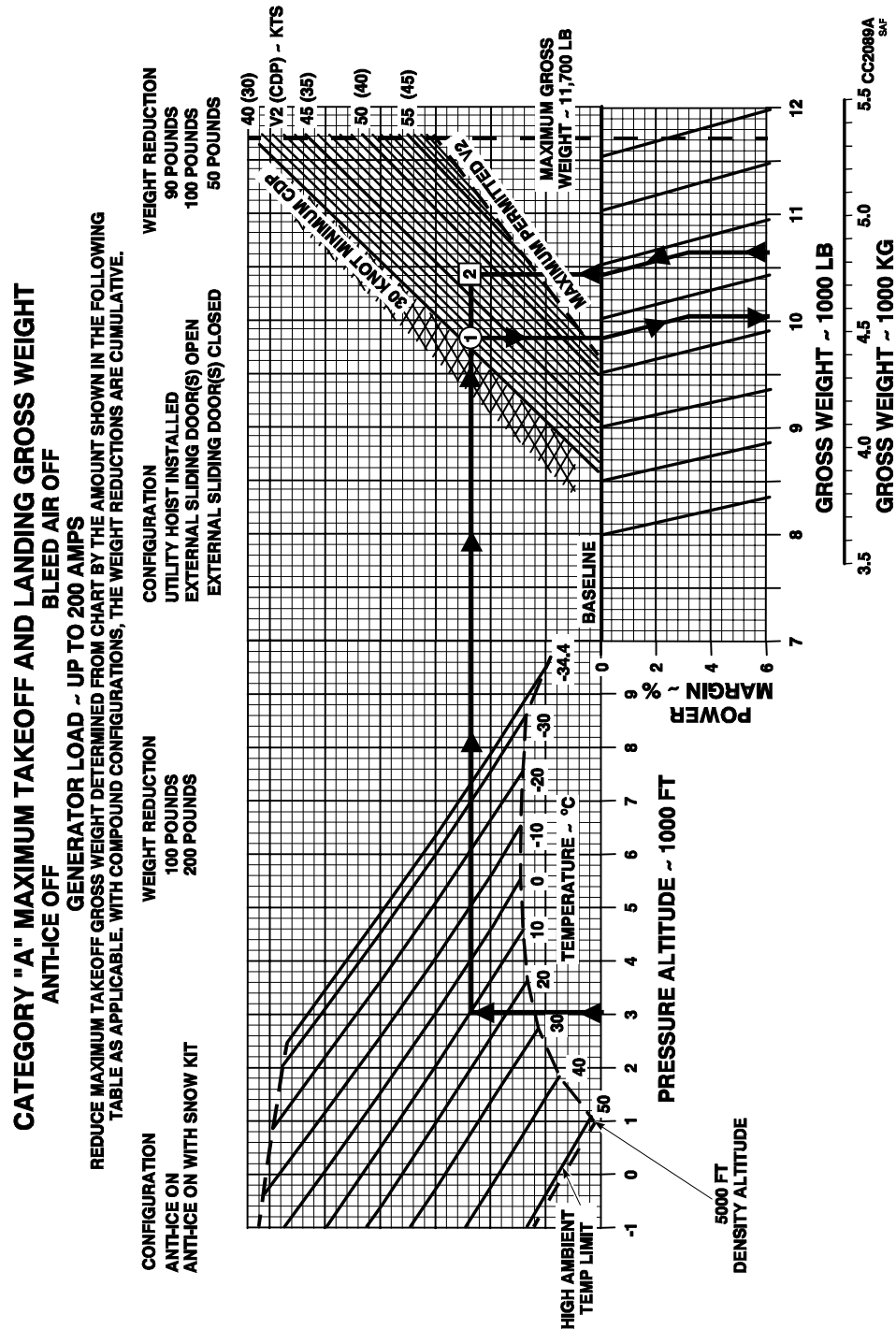


Figure 1-1. Category "A" Maximum Takeoff and Landing Gross Weight

CATEGORY "B"
MAXIMUM TAKEOFF AND LANDING GROSS WEIGHT
ANT-ICE OFF BLEED AIR OFF
GENERATOR LOAD ~ UP TO 200 AMPS

REDUCE MAXIMUM TAKEOFF GROSS WEIGHT DETERMINED FROM CHART BY
THE AMOUNT SHOWN IN THE FOLLOWING TABLE AS APPLICABLE:

CONFIGURATION	WEIGHT REDUCTION
ANT-ICE ON	20 POUNDS
ANT-ICE ON WITH SNOW KIT	20 POUNDS

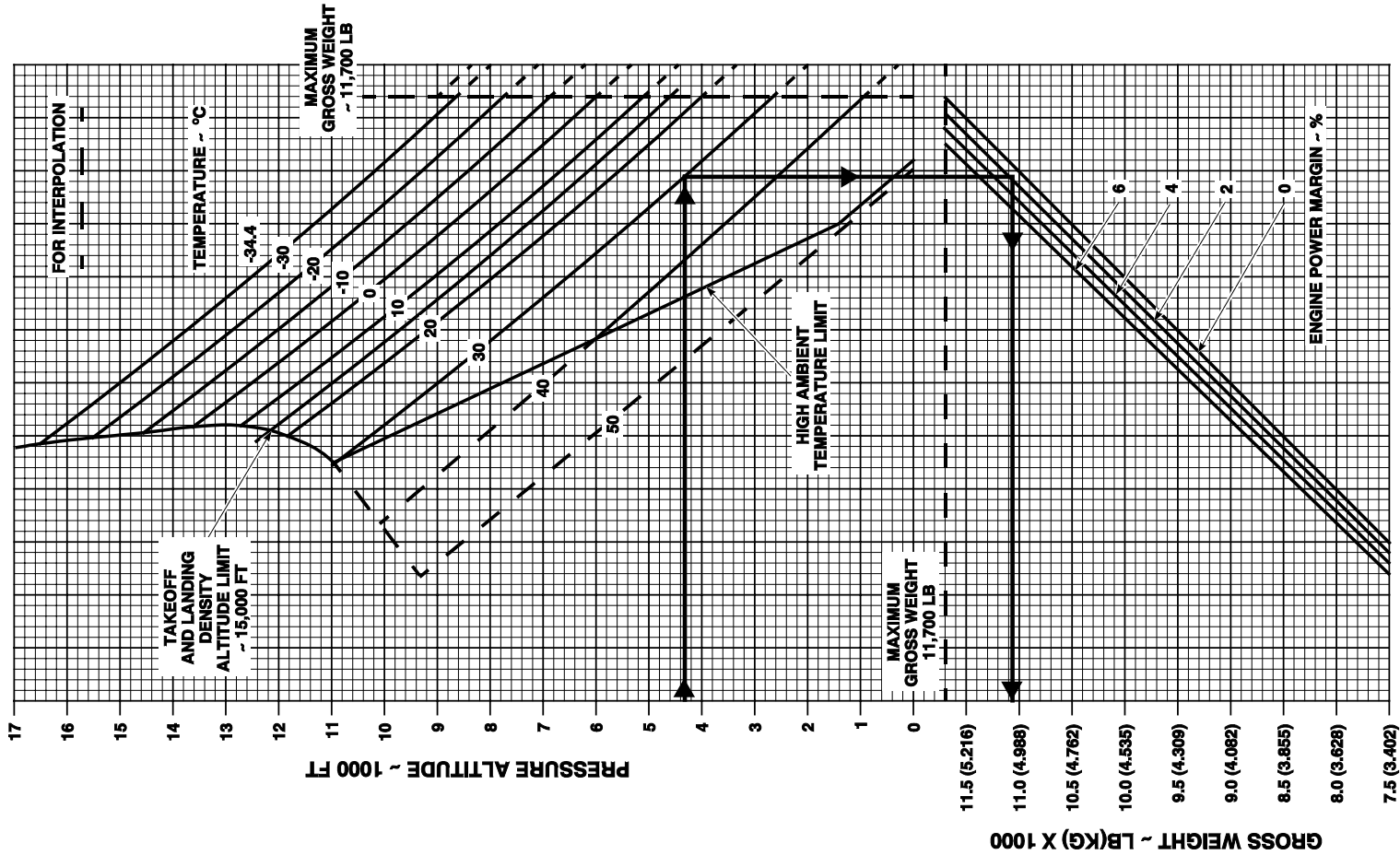


Figure 1-2. Category "B" Maximum Takeoff and Landing Gross Weight

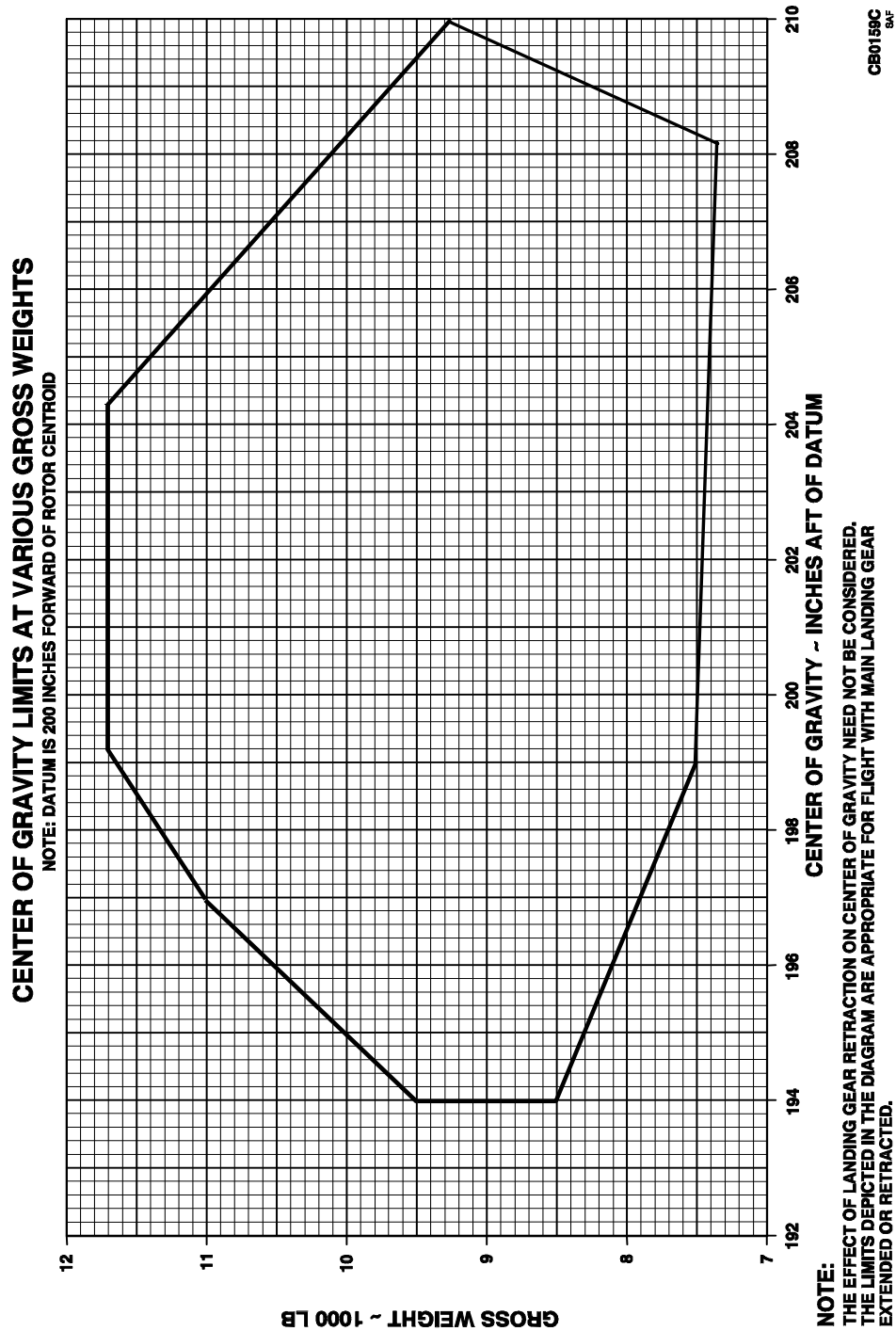


Figure 1-3. Center of Gravity Limits at Various Gross Weights

TEMPORARY REVISION NO. 3

FILING INSTRUCTIONS: Insert this temporary Revision facing page 1-5, dated January 9, 2002.

SUBJECT: Gross Weight Reduction Due to Maximum Fuel Flow Rate Restriction

This temporary revision adds a Note to Gross Weight Reduction Due to Maximum Fuel Flow Rate Restriction page of Operating Limitations, Section I.

MANUAL CHANGES:

Insert the following note between the first and second paragraphs on page 1-5.

NOTE

This weight reduction is not applicable if both engines incorporate Turbomeca Service Bulletin No. 292 73 2039 (TU39) or equivalent. This Temporary Revision is incorporated into this manual only when both engines have TU39 incorporated. If there is any change to engine configuration that removes TU39 from either engine, this Temporary Revision should be removed from this manual.

TEMPORARY REVISION NO. 3

The maximum allowable floor loading for the baggage compartment is 75 pounds per square foot (366 kg per square meter) for weights up to the maximum capacity of 600 pounds (272 kg).

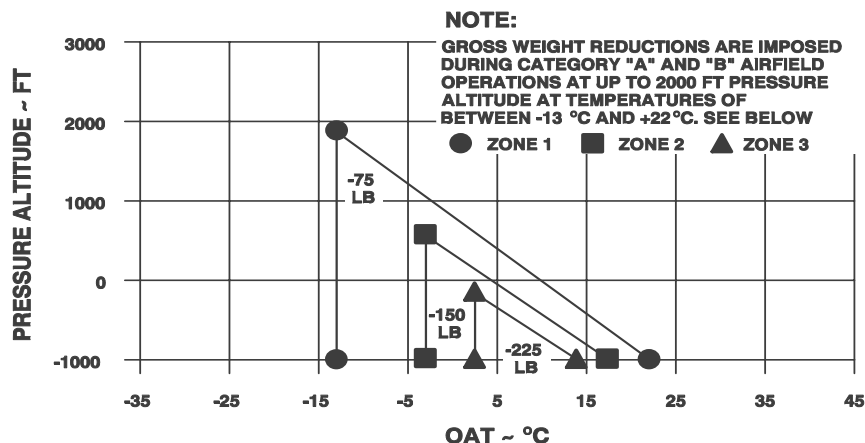
CAUTION

Caution must be taken to be sure that passenger, fuel, and/or baggage/cargo compartment loading does not cause aircraft maximum gross weight and/or C.G. limits to be exceeded.

GROSS WEIGHT REDUCTION DUE TO MAXIMUM FUEL FLOW RATE RESTRICTION

Arriel 2S1 engines may, under certain ambient conditions, encounter a reduction in 30-Second power due to a restriction in maximum fuel flow rate.

When determining Category "A" Takeoff and Landing Weight (Figure 1-1), Category "B" Takeoff and Landing Gross Weight (Figure 1-2), or Hover Out of Ground Effect Gross Weight (Figure 4-22) for these installations, perform the determination in the normal manner. Then apply an additional weight reduction as determined by the following chart:

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TYPES OF OPERATION

CATEGORY "A" AND "B" OPERATIONS

Transport

Day, Night, IFR, VFR

IFR operations not approved with any doors open.

Not approved for ditching unless the emergency flotation gear, P/N 76076-02002, and suitable lifesaving equipment (life jackets, rafts, etc.) as required by the operating rules are installed and compliance with FAR 29.1411, 29.1415, and 29.1561 is shown.

CATEGORY "B" ROTORCRAFT - EXTERNAL LOAD COMBINATIONS

Class "B" External Loads

NOTE

A class "B" external load is an external load that can be jettisoned and is lifted free of land or water during rotorcraft operation.

MINIMUM FLIGHT CREW

VFR - One pilot in right seat.

To be eligible for operations under IFR, the following equipment must be installed and operating, in addition to any other instrument or equipment which may be required by Federal Aviation Regulations.

SINGLE PILOT (IFR)

Two autopilot systems operating in the ATT Mode.

Two independent sources of AC power, and Inverter Switching operational. ■

Cyclic stick force trim.

Standby attitude indicator with emergency battery.

Standby CDI (or RMI) located on the pilot's side of the instrument panel.

Two DC generators.

A navigation and communication system that has demonstrated compliance with the pertinent FAA requirements.

Emergency ICS panel and spare headset.

TWO PILOTS (IFR)

All of the previous items apply except as follows:

Either autopilot system must be operable in the ATT mode.

Standby CDI (or RMI) is not required.

Copilot's instrument and controls must be installed and operable.

NOTE

Autopilot operation not mandatory for VFR operations.

AIRSPEED LIMITS

V_{mini} (IFR) - 50 KIAS.

V_{nei} (IFR) - 155 KIAS.

V_{ne} power on (Maximum Airspeed) is 155 KIAS.

See V_{ne} placard, Figure 1-6, for variation of V_{ne} with temperature, pressure altitude, and gross weight.

V_{ne} above 10,000 feet density altitude at actual gross weights greater than 11,000 pounds is Best Rate-Of-Climb (BROC) airspeed (see appropriate V_{ne} placard, Figure 1-6).

V_{ne} power off is 136 KIAS. See V_{ne} placard, Figure 1-6, for variation of V_{ne} with temperature and pressure altitude.

Maximum airspeed for main landing gear down or in transit is 130 KIAS.

Maximum airspeed for windshield wiper operation is 141 KIAS.

Maximum groundspeed for landing, takeoff, or taxi is 54 knots.

Maximum groundspeed for brake application is 34 knots.

ALTITUDE LIMITS

Takeoff and landing, Category A: 5,000 feet density altitude.

Takeoff and landing, Category B: 15,000 feet density altitude.

Enroute: 15,000 feet density altitude.

AMBIENT TEMPERATURE LIMITS

-34°C (-30°F) to ISA plus 37°C not to exceed 49°C (120°F).

FLIGHT LIMITS

See Figure 1-4 for altitude and airspeeds to be avoided at low altitude in case of engine failure.

No aerobatic maneuvers allowed.

360° hovering turn in less than 12 seconds prohibited.

Flight in known icing conditions prohibited.

Maximum airspeed for sideward flight or crosswind hover is 35 knots.

Maximum airspeed for rearward flight or tailwind hover is 35 knots.

With usable fuel per tank indicating 80 lbs or less, avoid sustained nose-down pitch attitudes in excess of 5° nose low.

Flight in falling or blowing snow is prohibited unless aircraft is fitted with snow protection kit P/N 76076-30008-013 and a satisfactory functional check has been performed.

Cockpit ventilation must be provided by any of the following:

1. Door vents
2. Pilot's window
3. Heater blower
4. Heater bleed-air
5. ECU

Fuel cross-feed operations limited to:

Category A - emergency operation only

Category B - cruising flight only

Both engines must remain in FLY during OEI (single engine) training operations.

The engine not in manual reversion must remain in FLY during simulated manual reversion training.

Engine ANTI-ICE ON at 2°C and below, with visible moisture.

External door locks must be unlocked before flight.

Maximum approved precision approach angle is 6.5° (uncoupled).

Operation vs. allowable wind limited to 35 knots sideward and rearward flight.

Maximum density altitude is 15,000 feet (enroute).

IFR lateral CG limits are 3.5 inches left or right.

Preflight Test (level 1 minimum) of the DAFCS must be accomplished prior to the first flight of the day or before planned flight in IMC conditions.

Flight director shall not be coupled below 60 KIAS.

The Pulselite System should not be operated in the clouds at night or on the ground while in close proximity to other aircraft.

ELECTRONIC FLIGHT INSTRUMENT SYSTEM (EFIS) LIMITS

Separate, functional, calibrated, and pitot statically powered altimeter, and airspeed indicator must be installed for use in conjunction with the 5x6 EFIS for all flight operations.

The composite mode is to be used for operational flights only after a failure of the EADI and EHSI. This does not preclude the conduct of flight training in the use of the composite mode.

The helicopter must be equipped with a functioning third attitude indicator for IFR flight.

For IFR operation, the following equipment must be operational for takeoff:

1. Aircraft equipped with the single pilot IFR option - pilot's symbol generator, EADI, EHSI, and CRT fan.

2. Aircraft not equipped with the single pilot IFR option - pilot and copilot symbol generators, EADI, EHSI, and CRT fan.

Takeoff with an engine DC generator inoperative is not authorized during night or IFR conditions.

SLIDING CABIN DOOR LIMITS

Restrictions for either/or the right hand or the left hand are:

Maximum airspeed for opening and closing cabin sliding doors is 125 KIAS. This includes up to 125 knots Maximum Continuous Power (MCP) climb and up to 125K autorotation. See Figure 1-6 for variation of maximum airspeed with temperature and pressure altitude.

Maximum airspeed with either sliding door open, or both open is 125 KIAS. This includes up to 125 knots MCP climb and up to 125K autorotation. See Figure 1-6 for variation of maximum airspeed with temperature, and pressure altitude.

IMC flight with either or both sliding doors open is prohibited.

For Category "A" operations, reduce the maximum takeoff gross weight determined from Figure 1-1 by 100 lbs if flight is to be conducted with one or both external sliding doors open.

FLOTATION SYSTEM LIMITS

Maximum airspeed for inflation of the emergency flotation gear is 75 KIAS.

Maximum airspeed with emergency flotation gear inflated is 75 KIAS.

Maximum water contact speed with emergency flotation system inflated is 33 knots.

Landing gear must be down before float inflation.

Maximum demonstrated airspeed for sideward flight or crosswind hover is 20 knots.

Maximum pressure altitude with emergency flotation gear inflated is 5,000 feet.

ENGINE LIMITS

WARNING

Except when commanded by test, the presence of a 30-Second usage light displayed on either N₁ indicator at power-up prior to engine start must be investigated and cleared prior to engine start. Flight, following such a power-up indication of the 30-Second usage light on either N₁ indicator, is prohibited.

**LIMITING HEIGHTS AND CORRESPONDING
SPEEDS FOR SAFE LANDING AFTER AN
ENGINE SUDDENLY BECOMES INOPERATIVE**

THESE CURVES ARE APPLICABLE TO ALTITUDES AND TEMPERATURES
AT THE CORRESPONDING MAXIMUM ALLOWABLE TAKEOFF GROSS
WEIGHT AS DETERMINED FOR CATEGORY A OR B. THE HIGH HOVER POINT
IS BASED ON MAXIMUM OGE HOVER WEIGHT.

INFORMATION ON TEST CONDITIONS:

1. HARD SURFACE RUNWAY
2. WINDS 5 KTS OR LESS
3. STRAIGHT TAKEOFF AND CLIMBOUT PATH
4. GEAR DOWN AT ENTRY

**NOTE: AVOID FLIGHT WITHIN SHADED AREA
EXCEPT AFTER INITIATING FLARE FOR A
NORMAL LANDING.**

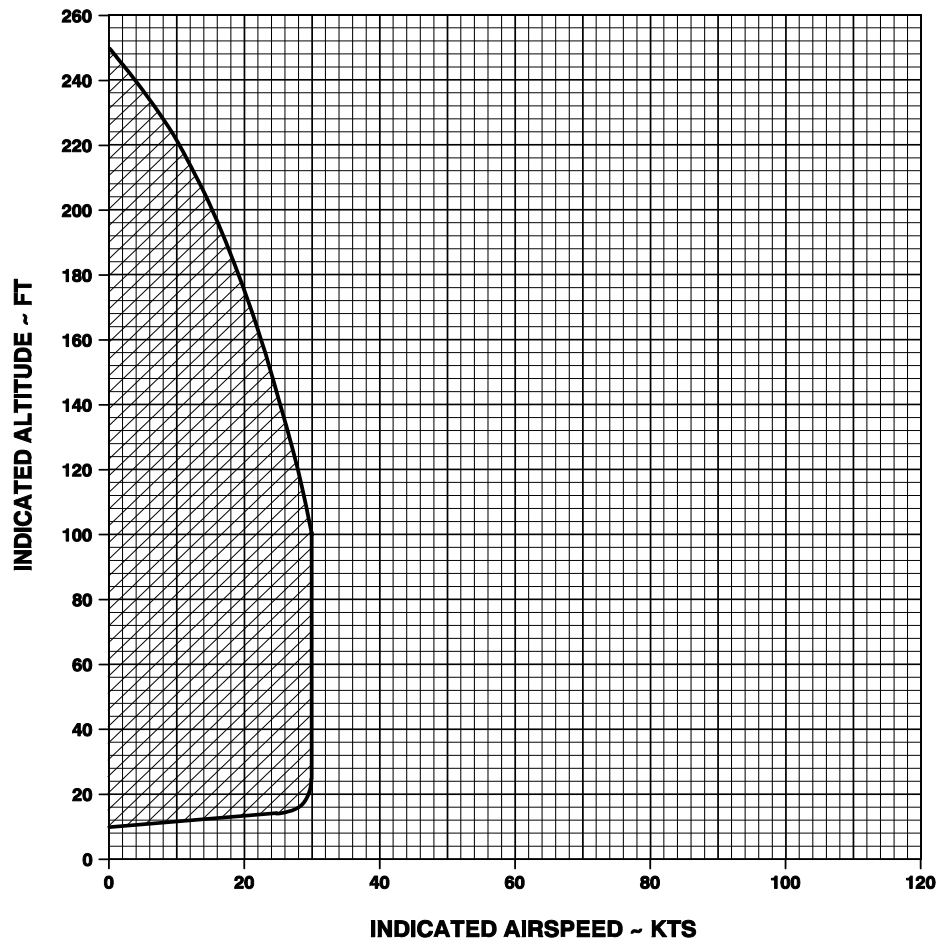
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Figure 1-4. Height/Velocity Diagram

NOTE

Engine power usage at N₁ greater than 100.9% will be cumulatively counted. Other than operations using the OEI training provision, display of either the 2-Minute or 30-Second Usage light during high power operation is indicative that usage counting is proceeding. Consult the engine maintenance manual for any consequences regarding usage counting.

ENGINE OR DRIVE SYSTEM OPERATING LIMITS

THIS TABLE IS A SUMMARY OF LIMITATIONS OBSERVE THE FIRST LIMIT ENCOUNTERED FOR ANY GIVEN OPERATING CONDITIONS

OPERATING CONDITION	TIME	TRANSMISSION LIMIT (%)	ENGINE TORQUE LIMIT (%)	T5°C	%N ₁	%N ₂
TAKEOFF	5 MIN	100 (6)	104	912	100.0 (6)	(1)
MAXIMUM CONTINUOUS (4)	--	100 (6)	104	877	97.8	(1)
30 SEC SINGLE ENG	30 SEC	136	135 (6)	1000	104.6 (6)	(1)
2 MIN SINGLE ENG	2 MIN	136	127 (6)	941	101.2 (6)	(1)
MAXIMUM CONTINUOUS SINGLE ENG	--	128	116 (2) (6)	912	100.0 (6)	(1)
TRANSIENT SINGLE ENG	5 SEC	150 (8)	--	--	--	--
TRANSIENT	20 SEC	--	160	--	101.2	109/115 (3)
TRANSIENT	10 SEC	115 (7)	--	--	--	--
STARTING	10 SEC	--	--	865 (5)	--	--

NOTES:

- (1) 108.5% N₂ - maximum.
- (2) The DECU will limit single engine torque to 110% at 106 - 108% N₂ varying linearly to 116% torque at 100% N_r.
- (3) 109% N₂ transient maximum, power on/115% N₂ transient maximum, power off.
- (4) See paragraph titled Engine Ratings and Recommended Usage in Part 2, Section 1.

- (5) Time between 750 and 865°C is limited to 10 seconds.
- (6) DECU controlled limiter value.
- (7) Dual engine transient limit 230% total torque.
- (8) Typically associated with abnormal Nr droop at DECU controlled OEI limit.

ENGINE TORQUE LIMITS**NOTE**

Refer to Transmission Limits in this section for additional torque limits.

104% Torque - 5-Minute takeoff and maximum continuous limit, dual-engine
(Refer to Engine Ratings and Recommended Usage, Section I, Part 2 for recommended usage of maximum continuous torque.)

135% Torque - 30-Second limit, single engine

127% Torque - 2-Minute limit, single engine

116% Torque - Maximum Continuous, single engine

160% Torque - Maximum transient 20 seconds

NOTE

Operation above 104% torque, 100.5% N₁, or 912°C T₅ is reserved for actual emergencies, inadvertent transient excursions, or, as artificially biased indications, with the OEI training provision.

N₁ (GAS PRODUCER) SPEED LIMITS**TWO ENGINE OPERATION:**

100.0% N₁ – 5-Minute takeoff power limit, dual engine

97.8% N₁ - Maximum continuous power, dual engine

OEI OPERATION:

104.6% N₁ - 30-Second power, single engine

101.2% N₁ - 2-Minute power, single engine

100.0% N₁ - Maximum continuous power, single engine

TRANSITIONAL OPERATION, GROUND TO FLIGHT IDLE:

53-62% N₁ - Avoid prolonged operation in this range.

TRANSITIONAL OPERATION, ROTOR RUNUP OR SHUTDOWN:
87.0-90.5% N₂ - Avoid prolonged operation in this range.

N₂ (POWER TURBINE) SPEED LIMITS

Maximum, power-on or off: 108.5% N₂

Minimum, power-on or off: 90.5% N₂

Transient Maximum, power-on: 109% N₂ for 20 seconds

Transient Maximum, power-off: 115% N₂ for 20 seconds

Transient Minimum: 68% N₂ for 20 seconds while executing an OEI landing

T₅ (POWER TURBINE) INLET TEMPERATURE LIMITS

Steady State Limits

TWO ENGINE OPERATION:

- 912°C – 5-Minute takeoff power limit, dual engine
- 877°C - Maximum continuous power, dual engine

OEI OPERATION:

- 1,000°C - 30-Second power, single engine
- 941°C - 2-Minute power, single engine
- 912°C - Maximum continuous power, single engine

Starting and Shutdown

- 750°C - no time limitation
- 750°C to 865°C - limited to 10 seconds

DIGITAL ENGINE CONTROL UNIT (DECU) LIMITS

Before takeoff, the following DECU conditions must be met:

1. Both engines DECU's must be free of all faults, Major, Degraded, and Minor, as read on the IIDS display.
2. Both throttles must be in the FLY position with Mixed Mode lights out, throttle handle blue lights out, and pilot's and copilot's blue engine control lights out.

FUEL

TYPE OF FUEL	NATO SYMBOL	SPECIFICATION			FREEZING POINT (APPROX.)	ANTI-ICE ADDITIVE
		U.S.A.	U.K.	FRANCE		
Kerosene-50 (AVTUR-FS II) JP8	F-34	JP-8, MIL-T-83133	D.ENG. RD 2453	AIR 3405 F-34	-50°C	With
Kerosene-50 (AVTUR) JET A1	F-35	Jet A1, ASTM-D-1655	D.ENG. RD 2494	AIR 3405 F-35	-50°C	Without
Kerosene	--	Jet A, ASTM-D-1655	--	--	-40°C	Without
High flash point Kerosene JP-5 (AVCAT)	F-43	--	D.ENG. RD 2498	AIR 3404 F-43	-46°C	Without
High flash point Kerosene JP-5 (AVCAT FS II)	F-44	JP-5, MIL-T-5624	D.ENG. RD 2452	AIR 3404 F-44	-46°C	With

NOTE

Fuels with anti-ice additive can be used without temperature limitation. Fuels without anti-ice additive should be mixed with appropriate additive below 4°C (40°F).

Additives for Fuels:

- Anti-ice additive

D.ENG.RD 2451, AIR 3652, PHILLIPS PFA 55 MB NATO symbol S 748, or MIL-I-27686. The anti-ice additive is mandatory at less than 4°C (40°F) in concentration by volume of 0.10% to 0.15%.

- Anti-static additive: SHELL ASA-3, maximum concentration by volume: 0.0001%.
- Fungicide additive (Biobor) restricted to a treatment every 500 operating hours or every 3 months.

FUEL FLOW RANGE

Minimum: 75 pounds per hour

Maximum: 497 pounds per hour

NOTE

Fuel flow may go beyond these ranges during transient operations including start and at idle.

ENGINE OIL

OIL TYPE	NATO SYMBOL	SPECIFICATION			APPROVED OIL BRANDS
		FRANCE	USA	U.K.	
Recommended use Average synthetic 5 cSt at 98.9°C	0-156	-	MIL-L-23699	DERD 2499	AeroShell Turbine Oil 560 EXXON Turbo Oil 2197 MOBIL Jet Oil 254 MOBIL Jet Oil 291
Normal use Average synthetics 5 cSt 98.9°C	0-156	-	MIL-L-23699	DERD 2499	CASTROL 5000 AeroShell Turbine Oil 500 EXXON Turbo Oil 2380 MOBIL Jet Oil 2 TURBO NYCOIL 600
Other oil types Synthetic fluid 3 to 3.5 cSt at 98.9°C	0-148	-	MIL-L-7808		CASTROL 325 CASTROL 3C EXXON Turbo Oil 2389 MOBIL AVREX 256 TURBO NYCOIL 160
	0-150	AIR 3514	-	-	ELF Jet Synthetic Oil 15 TURBO NYCOIL 13B
Synthetic fluid 3.9 cSt at 98.9°C	-	-	-	-	AeroShell Turbine Oil 390

NOTE: The oil types mentioned under the heading "Other oil types" shall not be used at high ambient temperature ($T_0 \geq 30^\circ\text{C}$) (84°F). The oil type to be used for normal use is the synthetic fluid 5 cSt NATO symbol 0-156 between -30°C and $+50^\circ\text{C}$ (-22°F to $+122^\circ\text{F}$). If the engine is used at low temperature, the oil type to be used for normal use is the 3 cSt oil. The use of an oil type with a trademark and/or specification different from those indicated must be approved by Sikorsky Aircraft.

ENGINE OIL TEMPERATURE LIMITS

Maximum: 115°C (239°F)

ENGINE OIL PRESSURE LIMITS

In Flight: Normal - 25 to 72 PSI or 87 PSI as marked
Minimum - 18 PSI, only at N_1 less than 85%

Ground Idle: Minimum - 10 PSI

TRANSMISSION LIMITS

NOTE

Operation above 104% torque on one engine (200% total torque), 100.5% N₁, or 912°C T₅ is reserved for actual emergencies, inadvertent transient excursions, or, as artificially biased indications, with the OEI training provision.

TORQUE LIMITS**Dual-Engine Operation**

100% Torque per engine – 5-Minute takeoff and maximum continuous limit

NOTE

Takeoff torque may exceed 100% on one engine to a maximum of 104% provided that the torque on the other engine is less than 96% and the sum of the individual torque values does not exceed 200%.

115% Torque per engine – 10-Second transient

OEI Operation

136% Torque - 2 1/2-Minute limit

128% Torque - Maximum Continuous

150% - 5-Second transient

TRANSMISSION OIL

Dexron II or III ATF - Low temperature limit -34°C (-30°F)

MIL-L-21260 Type I, Grade 30 - Low temperature limit -9°C (15°F)

MIL-L-23699 or DOD-L-85734 - Low temperature limit -34°C (-30°F)

TRANSMISSION OIL TEMPERATURE LIMITS

Maximum: 135°C

Minimum: -20°C

TRANSMISSION OIL PRESSURE LIMITS

Maximum: 120 PSI

Minimum: 20 PSI

ROTOR LIMITS**POWER OFF**

Maximum: 115% Nr

Minimum: 91% Nr

Transient (Minimum): 74% Nr

Transient (Minimum): 68% Nr at touchdown while executing an autorotative landing

Transient (Maximum): 121% Nr

POWER ON

Maximum: 108% Nr; except 109% transient operation for 20 seconds

Minimum: 106% Nr (dual-engine operation)

Minimum: 100% Nr (one engine inoperative)

Transient: 91% Nr

Transient 68% at touchdown while executing an OEI landing

One engine operation up to best rate of climb speed, 100% to 108% Nr

One engine operation above best rate of climb speed, 106% Nr to 108% Nr

ROTOR BRAKE LIMITS

ROTOR TURNING

Rotor brake application limited to one (or two) engine(s) operating at idle or both engines shut down.

Maximum rotor speed for normal rotor brake application is 65% Nr.

Maximum rotor speed for emergency rotor brake application with both engines shut down is 107% Nr.

A rotor shutdown using the rotor brake shall not be performed more than one time in any 10-Minute period.

ROTOR STOPPED

Engine operation limited to one or both engines at idle.

Main rotor blades must be positioned at approximately 45° to the longitudinal axis of the helicopter with one or both engines operating.

ENGINE COWLING LIMITS

Engine operation with cowlings open or unlatched is prohibited.

RETRACTABLE BOARDING STEP LIMITS

If the BD STEP caution is annunciated:

Maximum speed with step(s) extended is 141 knots.

Maximum speed for step(s) transition (extend/retract) is 70 knots.

EMERGENCY LOCATOR TRANSMITTER (ELT)

The ELT should only be activated when an emergency landing is imminent. It may be actuated for test under the following conditions only:

1. While on the ground.
2. During the first five minutes of each hour.
3. For a maximum duration of three sweeps of the warble tone (about one second).
4. The control tower has been notified prior to the test.

BENDIX/KING CAS-66A TCAS I TRAFFIC COLLISION AVOIDANCE SYSTEM

1. The pilot should not maneuver the aircraft based on the traffic display only. The traffic display is intended to assist in visually locating the traffic. The traffic display lacks the resolution necessary for use in evasive maneuvering.
2. This RFM is applicable to installations interfaced with the TA/VSI displays and radio altimeter.
3. This installation is not approved for Air Carrier operation under FAA Part 127.

PRIMUS 440 DIGITAL WEATHER RADAR SYSTEM**WARNING**

The protection inherent in the Forced Standby Mode should not be relied upon to prevent radiation of personnel in the vicinity of

the aircraft. Do not select a radiation mode when personnel are close to the front of the aircraft. Before overriding the Forced Standby Mode, insure that personnel are at least fifty feet from the 270-degree segment centered on the nose of the aircraft.

NOTE

The Forced Standby Mode prevents microwave radiation on the ground, which, under some circumstances, could hazard personnel in the vicinity of the aircraft. (See related Advisory Circular in Appendix A of P-440 Pilot's Manual.) Depression of the S-76C Weight-On-Wheels switch upon landing terminates radiation of the P-440, even if a radiation mode has been selected. The Forced Standby feature inhibits selection of a radiation mode on the ground. When ground radiation is necessary for system checks or weather observation, the Forced Standby Mode can be overridden by pressing the STAB button four times in three seconds.

INSTRUMENT MARKINGS

See Figure 1-5.

PLACARDS

"THIS HELICOPTER MUST BE OPERATED IN ACCORDANCE WITH THE OPERATING LIMITS SPECIFIED IN THE FAA APPROVED ROTORCRAFT FLT MAN. THE AIRWORTHINESS LIMITATIONS SECT OF THE ROTORCRAFT MAINTENANCE MANUAL MUST BE COMPLIED WITH." (On instrument panel.)

"CAUTION - TURN OFF STROBE LIGHT WHEN TAXIING NEAR OTHER AIRCRAFT OR WHEN FLYING IN FOG OR CLOUDS. STANDARD POSITION LIGHTS MUST BE USED FOR ALL NIGHT OPERATIONS." (On instrument panel.)

CAUTION

"WITH USABLE FUEL PER TANK INDICATING 80 LBS OR LESS, AVOID SUSTAINED NOSE DOWN PITCH ATTITUDES IN EXCESS OF 5°." (On instrument panel.)

"THE MAXIMUM ALLOWABLE FLOOR LOADING FOR THE BAGGAGE COMPT. IS 75 LB. PER SQ FT. FOR WEIGHTS UP TO THE MAXIMUM COMPARTMENT CAPACITY OF 600 LB." (On baggage compartment doors.)

"CAUTION - NORMAL ROTOR BRAKE STOPS ARE AUTHORIZED ONLY AT 65% Nr OR LESS WITH BOTH ENGINES SHUT OFF, OR ONE OR BOTH ENGINES AT IDLE." (On rotor brake handle.)



CAUTION

"ENGINE OPERATION WITH ROTOR STOPPED LIMITED TO: BLADES 45° TO LONG AXIS." (On instrument panel).

V_{ne} PLACARDS: See Figure 1-6. (On instrument panel.)

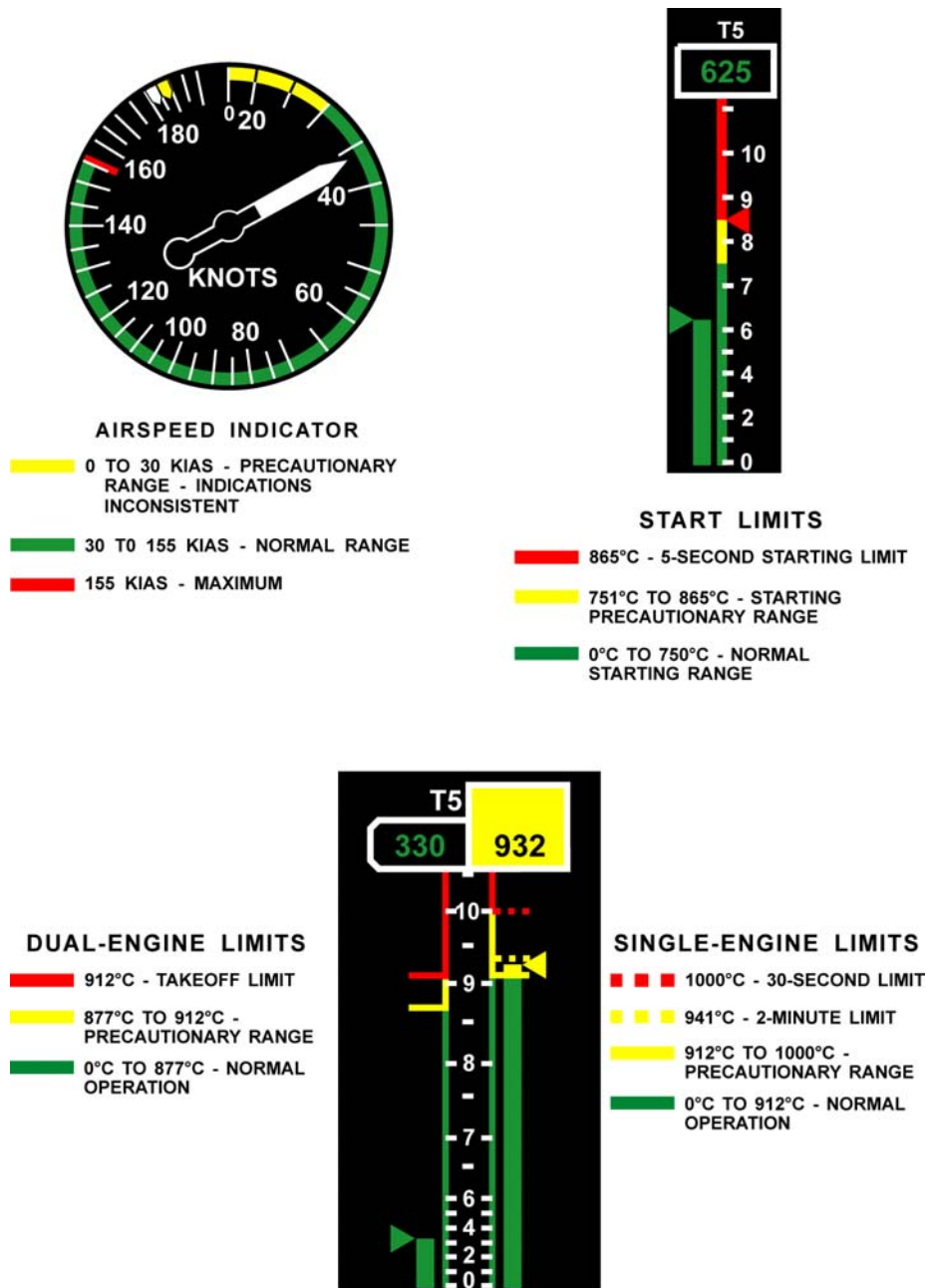


Figure 1-5. Instrument Markings (Sheet 1 of 4)

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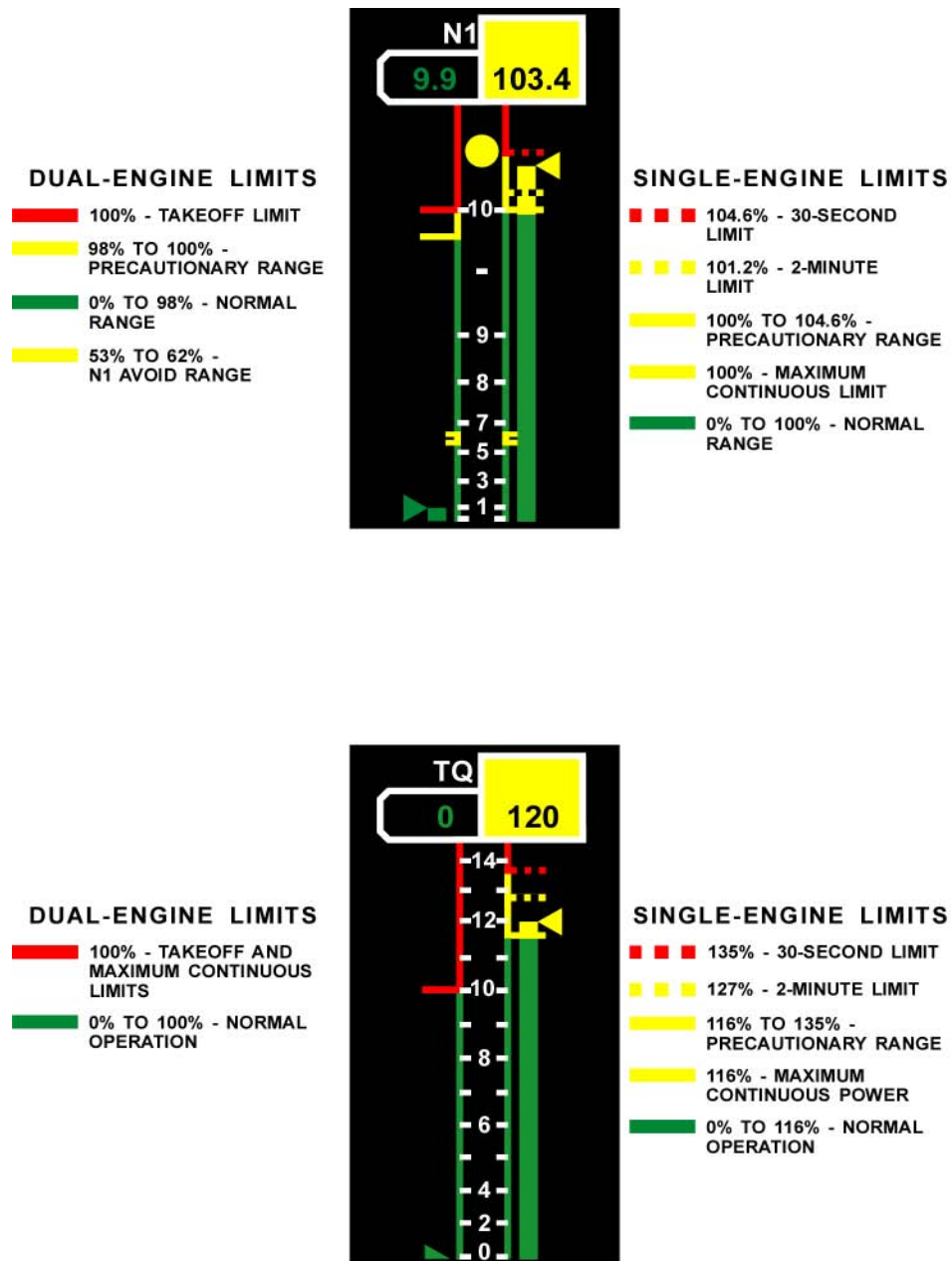
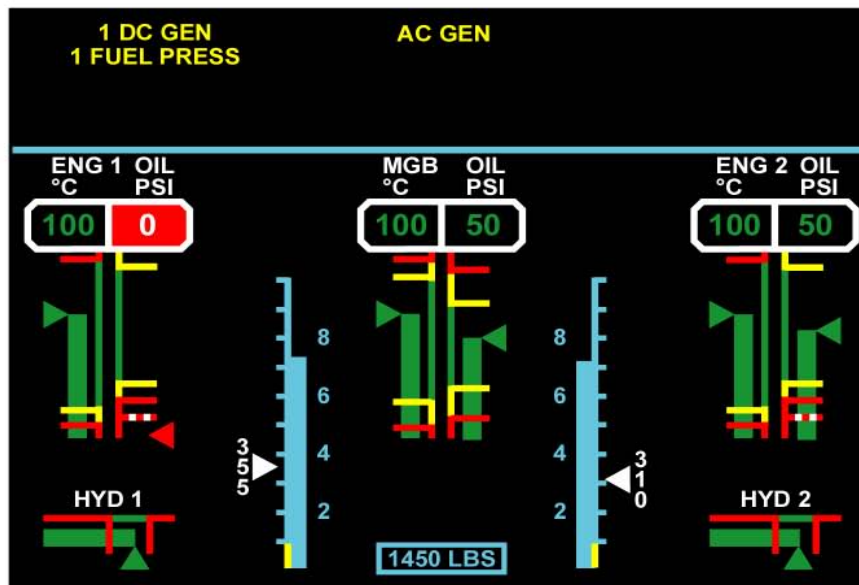
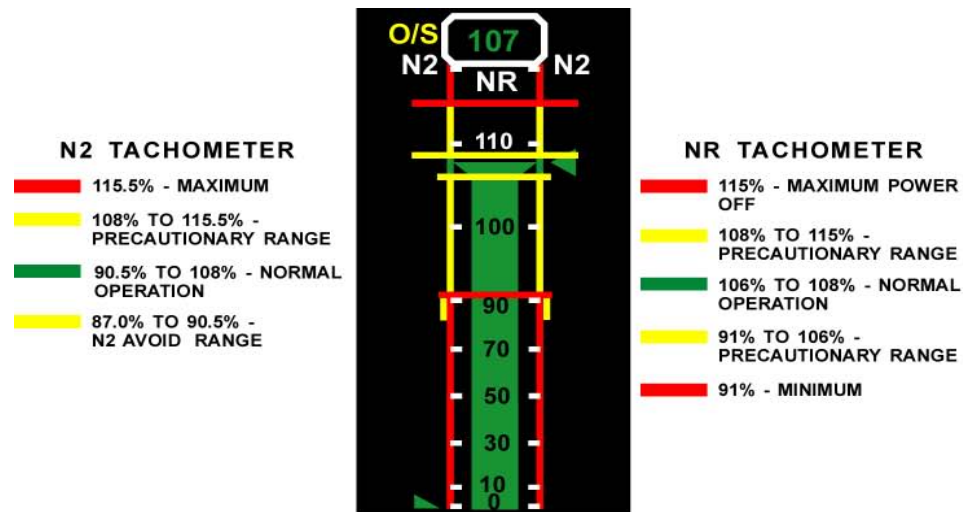
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Figure 1-5. Instrument Markings (Sheet 2 of 4)



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

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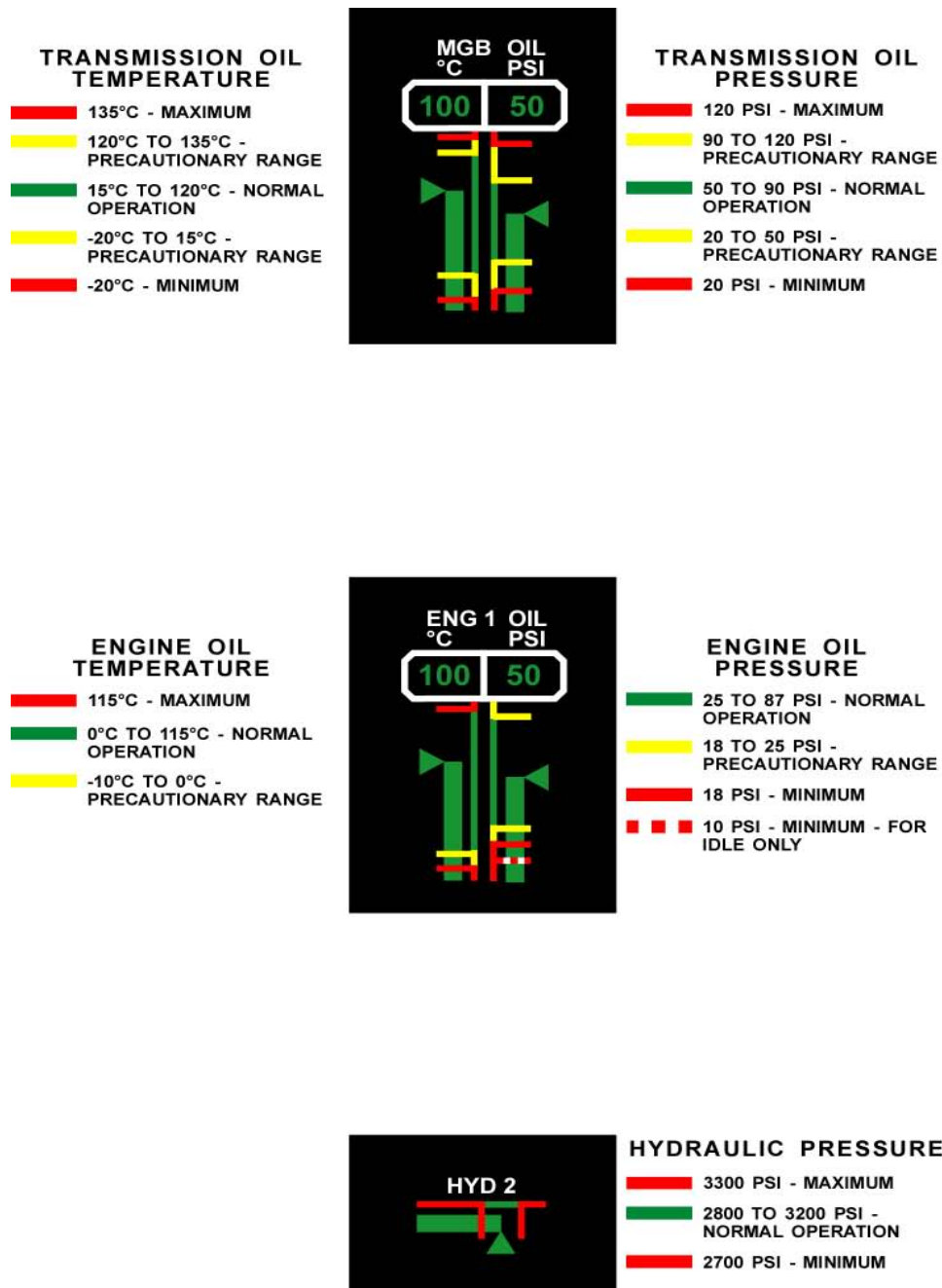
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Figure 1-5. Instrument Markings (Sheet 4 of 4)

		WHITE AREA ABOVE 10,000 FT HD VNE (IAS) POWER ON 106-108% NR										
		-35	-30	-20	-10	0	10	20	30	40	50	
PRESS ALT X 1000	-1	OAT ~ °C										
	0	11,700 LB									150	
	1	155 KTS								149	143	
	2									148	142	137
	3						154	148	141	136	130	
	4					154	147	141	135	129	123	
	5				154	147	141	134	128	122	117	
	6	152	153	154	147	140	134	127	121	115	109	
	8	134	135	136	133	126	120	114	107	101	95	
	10	118	118	118	119	112	105	99	92	86	80	
	12	99	99	99	104	97	90	84	77			
	14	80	92	92	89	82	76					
	16	73	73	73	73							
	18	56	56	FLIGHT NOT ALLOWED								

Vne POWER ON

NOTE

Vne ABOVE 10,000 FEET DENSITY ALTITUDE AT GROSS WEIGHTS GREATER THAN 11,000 POUNDS IS BEST RATE OF CLIMB AIRSPEED AS SHOWN BELOW.

		VNE (IAS) POWER ON 106-108% NR									
		-35	-30	-20	-10	0	10	20	30	40	50
PRESS ALT X 1000	-1										
	0										
	1										
	2										
	3										
	4										
	5										
	6										
	8										
	10										
	12										
	14										
	16										
	18										
		FLIGHT NOT ALLOWED									

Vne POWER ON

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Figure 1-6. Vne Placards (Sheet 1 of 2)

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	-35	-30	-20	-10	0	10	20	30	40	50	
	OAT ~ °C										
-1	134										VNE (IAS) POWER OFF 115% NR MAX
0	131										
1	129	134									WHITE AREA ABOVE 10,000 FT HD
2	126	132				136 KTS					
3	124	129								131	Vne POWER OFF ALL WEIGHTS
4	122	127							130	124	
5	120	125	134				135	129	123	118	FLIGHT NOT ALLOWED
6	118	123	132			135	128	122	116	110	
8	113	118	127	134	127	121	115	108	102	96	Vne POWER OFF ALL WEIGHTS
10	109	114	121	120	113	106	100	93	87	79	
12	101	101	101	105	98	91	85	76			Vne POWER OFF ALL WEIGHTS
14	82	94	94	90	83	75					
16	75	75	75	75							Vne POWER OFF ALL WEIGHTS
18	48	48									

VNE (IAS) ALL GROSS WEIGHTS											
POWER ON / OFF SLIDING DOOR OPEN / OR NIGHTSUN EXTENDED											
WHITE AREA ABOVE 10,000 FT HD											
	-35	-30	-20	-10	0	10	20	30	40	50	
	OAT ~ °C										
-1											11,700 LB
0										121	
1						125 KTS				120	116
2								120	114	110	
3	124						119	114	109	104	
4	122					118	113	108	104	100	
5	120			124	118	113	108	103	98	94	
6	118	123		118	113	108	102	98	93	88	
8	113	118	113	107	102	96	92	86	81	76	
10	109	108	102	96	91	85	80	74	67	61	
12	99	96	90	84	78	72	65	59			
14	82	84	78	71	63	57				11000 LB	
16	74	70	62	54							
18	48	48									FLIGHT NOT ALLOWED

POWER ON / OFF VNE ABOVE 10,000 FT DENSITY ALTITUDE AT GROSS WEIGHTS GREATER THAN 11,000 LB IS BEST RATE OF CLIMB AIRSPEED

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Figure 1-6. Vne Placards (Sheet 2 of 2)

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1-27/1-28

SECTION II**NORMAL PROCEDURES****EXTERIOR CHECK**

The pilot will determine that the following exterior preflight check has been done before the first flight of the day or before the next flight after extended maintenance. Those items marked with an asterisk (*) should be checked just prior to each flight. Following removal and proper stowage of protective plugs, tie downs, and other associated supplementary equipment, the following check is performed beginning at the pilot's door and proceeding clockwise around the helicopter.

EXTERIOR CHECK	
CHECK	FOR
*Pilot and Right Cabin Doors	Proper operation, fit, condition, window clean and unscratched, condition of hinges and latches, security of jettison handles. Ensure keylocks unlocked (if installed) by physically opening each door from the outside.
Cyclic Base Covers (Boots)	Check clear of interference with controls
Rotor Brake	Off
Nose Flotation Gear Bottle	Proper pressure
Retractable Boarding Step	Condition and security
Right Cabin Sliding Door	Proper operation, condition of window and rails, security of window jettison handle.
Main Gear Box (right side)	Proper oil level
Oil Filter Bypass	Unpopped
Hydraulic Module - Second Stage	Proper fluid level, filter button, no leakage
Main Rotor Servo (If aircraft has been non-operational for more than 2 hours in freezing temperatures)	Attempt to manually move input link to forward main rotor servo. Input link should move freely with no restrictions approximately 1/4-inch.
Main Rotor Head	General condition

EXTERIOR CHECK	
CHECK	FOR
Main Rotor Blades	General condition: tip cap for condition and security; blade upper and lower surfaces for raised skin indicative of disbond. Rotate the rotor system as required to view all blade surfaces and tip caps.
<p align="center">CAUTION</p> <p>Normal engines use a minimal amount of oil. Any sudden increase in oil consumption is indicative of oil system problems that must be corrected.</p>	
Engine Oil Reservoirs	Proper fluid level; if low and engine has been stopped more than 15 minutes, motor engine 30 seconds and recheck. Ensure filler cap secure.
Engine Area	General condition of engine. Check all accessible areas for obvious loose bolts, broken or loose connections, security of mounting accessories, broken or missing safeties, and evidence of fuel and/or oil leakage.
Compressor Inlet	Damage, accumulation of dirt, sand, snow or ice.
Engine Air Intake	Obstructions and foreign objects which may be drawn into compressor. Condition and integrity of T1 sensor.
*Fuel Filler Cap	Fuel level, cap secure
*Baggage Compartment	Contents, fuel leakage, door secure
*Electrical Compartment Access	Panel secure
Main Landing Gear Compartment	Tire condition and inflation, strut extension, door and gear actuator rods properly attached and undamaged, condition of flotation bag sharp edge protection, fluid leakage, elastomeric bearing condition.
*Tiedown ring	Tiedown ring stowed flat against shock strut
<p align="center">CAUTION</p> <p>Tiedown rings that are not stowed flat may lead to failure of the landing gear to retract or extend.</p>	
*Downlock pin	Downlock pin removed.

EXTERIOR CHECK	
CHECK	FOR
Flotation Gear	Bags for proper storage, covers for condition and security, bottles for proper pressure.
Fluid Drains and Vents	Leakage
Oil Cooler Blower Duct	Obstructions
Engine Fire Bottle	Proper pressure
Antennas	Damage, corrosion, security
Tail Cone Static Ports	Clear of soot and obstructions
Pylon Skin and Fairings	General condition
Horizontal Stabilizer	General condition. Check that the attachment is tight and that there is no movement (play) in any direction
Side Position Light	Cracked or broken lens
Lower Surface of Intermediate Gear Box Fairing	Scrapes and condition
*Intermediate Gear Box	Proper oil level, cooling inlet clear
Tail Rotor Head	General condition
Tail Rotor Blades	General condition
*Tail Rotor Gear Box	Proper oil level
Anti-collision and Position Light	Cracked or broken lenses
Pylon Skin and Fairings (Left Side)	General condition
Horizontal Stabilizer	General condition, IGB cooling inlet clear
Side Position Light	Cracked or broken lens
Antennas	Damage, corrosion, security
Tail Cone Static Ports	Clear of soot and obstructions
Tail Cone Access Panel	Security, condition
Engine Fire Bottle	Proper pressure
Oil Cooler Blower Duct	Obstructions
Main Landing Gear Compartment	Tire condition and inflation, strut extension door and gear actuator rods properly attached and undamaged, condition of flotation bag sharp edge protection, fluid leakage, elastomeric bearing condition.

EXTERIOR CHECK	
CHECK	FOR
*Tiedown ring	Tiedown ring stowed flat against shock strut
<p align="center">CAUTION</p> <p align="center">Tiedown rings that are not stowed flat may lead to failure of the landing gear to retract or extend.</p>	
*Downlock pin	Downlock pin removed.
Flotation Gear	Bags for proper storage, covers for condition and security, bottles for proper pressure.
Fluid Drains and Vents	Leakage
Fuel Sump Drain	Drain - Check for water and visible contaminants. Adequate water drainage is provided only with the helicopter approximately level (less than 3° nose up or down).
*Baggage Compartment	Contents, fuel leakage, door secure
*Fuel Filler Cap	Fuel level, cap secure
Thermal Relief Indicator Button	Unpopped
Engine Area	General condition of engine. Check all accessible areas for obvious loose bolts, broken or loose connections, security of mounting accessories, broken or missing safeties, and evidence of fuel and/or oil leakage.
Oil and Fuel Filter Bypasses Engine 1	Unpopped
Oil and Fuel Filter Bypasses Engine 2	Unpopped
<p align="center">NOTE</p> <p>It is possible for the impending oil filter bypass indicator to extend during a start of a cold soaked engine, giving an erroneous indication of a dirty oil filter. If the impending filter bypass indicator is extended, run the engine until the oil is at operating temperature and push the indicator button in. If the button remains in throughout the normal speed range of the engine, the filter does not require cleaning.</p>	
Compressor Inlet	Damage, accumulation of dirt, sand, snow, or ice.
Engine Air Intake	Obstructions and foreign objects which may be drawn into compressor. Condition and integrity of T1 sensor.
Main Rotor Head	General condition

Hydraulic Module - First Stage	Proper fluid level, filter button, no leakage.
Main Rotor Servo (If aircraft has been non-operational for more than 2 hours in freezing temperatures)	Attempt to manually move input link to Lateral and Aft Main Rotor Servos. Input link should move freely with no restrictions approximately ¼ inch.
Rotor Brake Accumulator	Proper fluid level, leakage

EXTERIOR CHECK	
CHECK	FOR
<p align="center">WARNING</p> <p>Specifically check the security of the aft engine cowl latches and straps just prior to each flight.</p>	
*All Engine and Transmission Doors and Cows	Condition, security including hinges, latches, camlocs, and straps.
Left Cabin Sliding Door	Proper operation, condition of window and sliding rails, security of window jettison handle.
Retractable Boarding Step	Condition and security
*Copilot and Left Cabin Doors	Proper operation, fit, condition, window clean and unscratched, condition of hinges and latches, security of jettison handles. Ensure keylocks unlocked (if installed) by physically opening each door from the outside.
*Nose Gear Lockpin (copilot's side of console)	Removed
OEI Training Switch	OFF
*Copilot Seat Belt	Security, if seat is to be unoccupied.
Nose Flotation Gear Bottle	Proper pressure
Electrical Compartment	Panels closed
Windscreen Washer	Fluid level
Windscreen	Glass clean and unscratched
Windshield Wipers	Clean, wear, condition
T0 Sensor	Clean, free of obstructions
Nose Gear Compartment	Tire inflation, strut extension, doors and gear actuator rods properly attached.
Battery Vents (if equipped)	Free of obstructions
Nose Flotation Gear Panels	Condition
Pitot Tubes	Covers removed, free of obstructions
Searchlight or Landing Light	Lens damage, proper stowage
Emergency Blow Down Bottle	Proper pressure
OAT Source	Free of obstructions

EXTERIOR CHECK	
CHECK	FOR
Main Rotor	Free to turn; walk rotor through 90° to next 45° position, as necessary.

INTERIOR CHECK

The weight and balance for takeoff and anticipated landing gross weight should be determined before takeoff and checked against the Loading Information contained in Part 2, and Part 1, Operating Limitations.

NOTE

Throughout the remainder of Section II, checks marked with a plus symbol (+) are required only before the first flight of each day. All other checks should be done before each flight.

1. Passenger briefing - Performed.
2. Cabin exits - Secure, locked, and accessible.
3. Cargo - Secure.
- +4. Fire extinguishers - Charged and secure.
- +5. First aid kit - Sealed and secure.
- +6. Emergency locator transmitter - Secure, antennas connected, switch to ARM.
7. Required aircraft documents checked.

NIGHT FLIGHTS

1. All interior lights - Check.
2. All exterior lights - Check.

BEFORE STARTING ENGINES

1. Aft doors - Secure. Check lockpins.
2. Seat(s) - Adjust to achieve pilot eye reference point.
3. Tail rotor pedals - Adjust reach.

4. Wheel brakes - Set.
5. Safety belt and shoulder harness - Check and fasten.
6. Landing gear handle - DN.
7. Landing gear emergency T-handle - In.
8. RADIO and EFIS master switches - OFF.
9. Power on V_{ne} placard - Select.
10. Flight control servo switches - Centered.
11. Generator switches - ON.
12. Inverter switches - OFF.
13. Load shed switch (if installed) - OFF.
14. Master start switch - ON.
15. Stick trim switches - ON.
16. Arming switches - OFF.
17. Remaining center console switches - As desired.
- +18. Battery Feed Fault Test (for aircraft with nose battery installation):
 - a. BATT Feed Fault Test switch - Hold FWD.
 - b. Battery switch - ON.
 - c. Check BATT FEED fault light - On.
 - d. Battery switch - OFF.
 - e. Repeat steps a. through d. using AFT switch position.
19. Test Standby Attitude Indicator System (if installed):
 - a. With all power off, press Emergency Battery BATT TEST switch. Switch should annunciate GOOD.
 - b. Press EMERG PWR switch. Switch should annunciate ARM, Standby Attitude Indicator should be powered on, and for approximately three

seconds, the Alert Horn should activate. Check Standby Attitude Indicator for proper indication, flag out of view, and internal lighting on.

c. Turn on aircraft power (battery or external). EMERG PWR switch should continue to annunciate ARM and Alert Horn should silence if on.

d. Cage/uncage attitude indicator as necessary. Check PULL TO CAGE knob – In.

e. Attitude indicator OFF flag – Retracted.

20. Battery switch - ON. Check power up and PASS status of each IIDS. Set brightness as desired.

NOTE

If cold soaked to ambient temperatures below -20°C , visible display illumination may be delayed as much as 30 seconds.

21. DAFCS switches - OFF.

22. IIDS:

a. Check cumulative counters page. Flight must be aborted if 30-Second cumulative time/event information is shown for either engine.

b. Check for present Major, Degraded, or Minor faults.

NOTE

Any DECU faults shown as previous flight faults (shown in white verses magenta) will be erased during engine start.

c. IIDS reversion - Actuate the pilot reversion switch and check that the displays move one position counter-clockwise for each command. Check the copilot reversion switch if two pilot operation. Return displays to normal location.

d. IIDS - Press to test all three displays. Observe parameter slewing, test results, and illumination of these auxiliary warning lights:

Master Warning panels
Engine control lights, press to dim
Landing gear unlock
Fire extinguisher test

Engine lever handle lights
Mixed mode lights
Float panel test (if installed)
OEI TRNG light

NOTE

- Newly displayed fault information resulting from press to test should be noted and referred for maintenance action, but system performance will not be affected.
- If using battery power, depressing the copilots display test button will not illuminate the auxiliary warning lights.

23. Rotor brake handle - Off, handle in detent. Check ROTOR BRAKE caution light off.
24. Rotor brake handle - On (two strokes required). Check ROTOR BRAKE caution light on and pressure gage for at least 200 PSI.
25. Rotor brake off starts - If desired. Release brake, handle in detent, and check caution light off within 3 seconds.
26. External power switch (If desired and external power available) - ON.
27. Landing gear down and locked lights (3 green) - On.
28. Fuel quantity - Check.
- +29. Engine failure warning system - Check.
- a. #1 and #2 ENGINE OUT warning lights - On.
 - b. Engine out ground test switch (side of console) - Hold in TEST. Alternating tone will be heard. Press ENGINE OUT warning light capsules to reset tone. Warning lights will remain on.
 - c. Engine out ground test switch - OFF.
30. Essential bus recovery switch - OFF.
31. Check for the presence of the following annunciators lights:
- Engine overspeed system caution lights - On
 - Bleed valve warning lights - On
 - OEI Usage lights - Off

- Caution Advisory System: Check warning and caution lights:
 - ENG CHIP detector caution lights - Off
 - Engine FUEL FILTER caution lights - Off
 - Engine OIL PRESS warning lights - On
 - Main MGB PRESS warning light - On
 - SERVO SYS caution lights - On
 - 32. Circuit breaker panels - Check.
 - 33. Manual reversion switch - Off.
 - 34. Engine prime switches - OFF.
 - +35. Fire detector system - Check.
 - a. Fire detector test switch - FWD. FIRE warning lights and T-handle lights should illuminate and continuous tone should be heard.
 - b. Press FIRE warning light capsules to reset tone.
 - c. Fire detector test switch - NORM. All FIRE warning lights off.
 - d. Fire detector test switch - AFT/BAG. FIRE warning lights and T-handle lights should illuminate and continuous tone should be heard.
- NOTE**
- If external power is in use, the AFT BAG SMOK warning light will go on.
- e. Press FIRE warning light capsules to reset tone.
 - f. Fire detector test switch - NORM. All FIRE warning lights off.
36. Fire extinguisher test switch - NORM.
37. Heater and air conditioning control switches - OFF.
38. Fire extinguisher switch - OFF.
39. Engine levers - STOP, handle lights off.
40. Mixed Mode lights - Off.
41. Fuel levers - XFEED.
42. Engine T-handles - Forward.

43. Engine power assurance target values. Use Figure 2-1 to determine target torque and maximum N1 value.
44. Electronic Flight Instrument System (EFIS).

The Airspeed Bug Select Switch is used to select either the single airspeed or the dual airspeed bug system. The single airspeed bug is provided for optional use as desired by the pilot. The dual bug system is used in conjunction with Category A takeoff procedures. In the dual system the white bug is CDP, and the yellow bug is V2. The bugs move together, and CDP is always 10 knots less than V2.

NOTE

There are two optional methods to display airspeed with the EDZ-756 EFIS system that is dependent upon the aircraft installation. The airspeed tape may either be phased so that increases in airspeed cause the tape to move upward towards higher airspeed indications or, in the alternative display format, downward towards higher airspeeds. The pilot should become familiar with the method of airspeed display installed prior to flight.

45. Retractable Boarding Step(s) – AUTO.

STARTING ENGINES (BATTERY OR EXTERNAL POWER)

NOTE

Maximum wind speed for which rotor engagements have been demonstrated on an aircraft with rotor brake fitted is 40 knots with gusts to 50 knots. No difficulties were encountered at these conditions and operators may agree to higher values with their local authorities. Sikorsky Aircraft should be kept advised of these higher values.

1. Rotor area - Clear.

WARNING

Passengers and crewmembers should not be allowed to approach or depart the helicopter directly from the front because of rotor clearance, especially at low rpm and with gusty wind conditions.

2. Passengers and crew - Alerted.

3. No. 1 engine - Start.

NOTE

- When power is applied to the aircraft the DECUs perform a self-test sequence, which requires about 10 seconds to complete. Do not attempt to start the engine(s) before this test is completed since doing so will abort the test and might create a DECU fault condition or allow degraded operation.
- Either engine may be started first.
- Engine starts from external power may result in the DECU entering initial power-up self-test. Symptoms include DECU faults, loss of T5 and/or N1 indications and hung or hot starts. If a start from external power is attempted and any of the above irregularities are seen, abort the start immediately. Remove all electrical power from the aircraft and perform a start using battery power for the first engine and cross-side generator power for the second engine.
- During external power starts with the battery switch inadvertently off, some external power supplies might cause a sharp fluctuation of cockpit indicators. Turn battery on to eliminate.
- Select air conditioner (if equipped) OFF prior to engine starter engagement.
- Continuous low fuel pressure (fuel pressure warning light on) or no fuel flow rise accompanied by the failure to attain light off (with functioning ignition) during a start attempt are indications of possible loss of fuel prime. This condition is most likely to occur following fuel system maintenance or storage of the aircraft. See Fuel Priming Procedures – During Normal Start in the Optional Procedures at the end of Section II for details.
- The start is aborted by depressing the trigger and retarding the engine lever to OFF. Consider motoring the engine if T5 fails to decrease normally. If an abort is performed at ambient temperatures below -10 °C, motor the engine to achieve a T5 of 130 °C or colder before attempting a subsequent start.
- Starter use limits vary depending on whether or not fuel ignition (light-off) occurs in the engine. With fuel ignition, the starter limits are: a 60-Second start attempt, a 60-Second interval, and then a 60-Second start attempt followed by a 15-minute interval. Repeat cycle. Without fuel ignition the limits are a 30-Second

engagement, a 30-Second interval, a 30-Second engagement, followed by a 15-minute interval. Repeat cycle.

CAUTION

- Rotor brake limits are as follows: With blades positioned 45° to the longitudinal axis and rotor brake applied in accordance with procedures, one or two engines may be started and run at idle without time limitation.
- Engine operation with cowling open or unlatched is prohibited.
- If rotor should begin to turn during start with the rotor brake on, shut down the engine(s) or release the rotor brake. See Section III, Emergency Procedures for details.

a. Normal (automatic) start.

- (1) No. 1 engine lever - Select IDLE position, confirm that engine lever is in normal track.
- (2) Starter button - Press and release. Reranged T5 and N1 indicator repeaters will appear on the IIDS engine display inboard of the respective engine oil temperature/pressure indicator. The repeaters will be erased in one of four ways; N1 greater than 65%, a start commanded on the other engine, touch MENU key, or after 60 seconds has elapsed, whichever occurs first.
- (3) Observe increasing N1, light-off, and check that the DECU controls T5 within starting limits. Remain prepared to initiate an abort in the event of a hot start.
- (4) Oil pressure above 18 PSI. Low oil pressure warning light off.

NOTE

Oil pressure warning light may be on at idle. Check oil pressure at or above 10 PSI.

- (5) At idle, 48 to 52% N1, check No. 1 DC GEN caution light off (confirmation of starter dropout).
- (6) The duration of a normal start is 15 to 30 seconds.
- (7) When starting with rotor brake off, check that overspeed caution light goes off with N2 greater than 25%. Overspeed system warning light will remain on with rotor brake on.

b. Manual start - recommended only when other engine is at 107% Nr.

NOTE

- Refer to Digital Engine Control Unit (DECU) Limits in Section I concerning DECU fault status at takeoff.
 - Manual start procedure is only recommended to enable a start after a T5 SGNL Degraded fault is latched or for pilot proficiency.
- (1) No. 2 engine - FLY position, 107% N₂/N_r.
 - (2) No. 1 engine lever - Position to FLY.
 - (3) Manual reversion switch - Select No. 1 Engine, confirm blue handle light on.
 - (4) No. 1 engine lever - Retard slowly in manual track to STOP.
 - (5) No. 1 engine Mixed Mode light - On.
 - (6) Starter button - Depress and hold.
 - (7) No. 1 engine lever - Holding the trigger, immediately advance to approximately the IDLE position.
 - (8) Observe increasing N₁ and begin advancing the lever further forward as light off occurs, modulating as required to control T5 within starting limit. Abort start if initial fuel flow is as much as 100 PPH or greater, and remain prepared to initiate an abort in the event of hot start.
 - (9) Oil pressure above 18 PSI. Warning light off.

NOTE

Oil pressure warning light may be on at idle. Check oil pressure at or above 10 PSI.

- (10) Starter button - Release at or above 48% N₁ and check No. 1 DC GEN caution light off (confirmation of starter dropout).
- (11) No. 1 engine lever - Adjust to set idle at 48 to 52% N₁. The lever position at idle may be expected to be far forward of the normal idle position.
- (12) Check overspeed caution light goes off at greater than 25% N₂.
- (13) Manual reversion switch - Select OFF. Check throttle handle blue light and glareshield ENGINE CONTROL blue lights off. Anticipate that the engine will accelerate to achieve 107% N₂.

- (14) No. 1 engine lever - Reposition as necessary to FLY and check Mixed Mode light off.

NOTE

During starting in very cold conditions, oil pressure can rise above normal range and then fall back below 18 PSI with the oil pressure warning light on. The pressure should go back in the green or yellow when the oil temperature reaches the power on limit.

4. Engine Oil Temperature.

Above 0 °C (32 °F) with 5 CST oil

Above -10 °C (14 °F) with 3 or 3.9 CST oil

CAUTION

In cold weather (OAT below -20 °C (-4 °F)), stabilize N₁ at idle or 63 to 70% N₁ until the oil temperature listed above is reached before accelerating engine to flight condition.

5. For rotor brake off starts, check transmission oil pressure, servo pressure, and tip path response to cyclic inputs.
6. Inverter switches - ON.
7. Rotor brake – Release brake, handle in detent, and check caution light off within 3 seconds.
8. Transmission oil and servo hydraulic system pressures - Check IIDS for normal range and MGB PRESS warning light and, SERVO SYS caution lights - Off.
9. Check that overspeed warning light goes off when N₂ exceeds 25%.
10. No. 1 engine lever - Move forward towards FLY while positioning cyclic to minimize droop stop interference.
11. Flight controls and servos systems - Check at 65% to 70% N_r with droop stops out.

CAUTION

- If flight controls do not respond correctly or a restriction in control motion is evident during operation on either isolated hydraulic system, move servo switch to center (both ON) and proceed with shutdown.
 - Do not move flight control servo switch from ON during flight, except in case of emergency where it is necessary to turn off a malfunctioning servo stage.
- a. Move all flight controls through a displacement of 1 inch from trimmed position, checking for binding or roughness. Observe tip-path plane for proper response.
 - b. Pilot's flight control servo switch - NO. 1 OFF. Note that No. 1 SERVO SYS caution light goes on immediately. There should be no jump in controls. Check flight controls as above.
 - c. Pilot's flight control servo switch - Move rapidly to NO. 2 OFF. No. 1 SERVO SYS caution light goes off and No. 2 SERVO SYS caution light goes on immediately. There should be no jump in controls. Check flight controls as above.
 - d. Pilot's flight control servo switch - ON. Both servo pressures normal and both caution lights off.
12. No. 2 engine - Start. Follow same procedure as for No. 1 engine and check overspeed light out when N2 exceeds 25%.
 13. Advance both engine levers to FLY.
 14. AC generator - Check ON. AC GEN caution light off.
 15. Engine anti-ice - ON below 2 °C (36 °F) with visible moisture.

NOTE

With the snow protection kit installed, turning on the engine anti-ice will put on the anti-ice caution lights. These lights will go off when the heating elements in the firewall and engine bellmouth reach about 18 °C.

16. Heater/air conditioner - As desired.
17. Fire detector test switch - AFT/BAG. The AFT BAG SMOK warning light on the IIDS should illuminate. Also, fire warning lights and T-handle lights should

illuminate and continuous tone should be heard. Return fire detector test switch to NORM. All fire lights will go off.

NOTE

If a fire should occur in the baggage compartment, only the AFT BAG SMOK warning light will go on. (The continuous tone will not be heard.)

18. Fuel levers - DIRECT.

19. External power - OFF and disconnected.

+20. AC generator - Check at 107% Nr .

- a. AC generator overvolt-undervolt test switch - Hold at UNDERVOLT for about 5 seconds.
- b. AC generator should drop off the line as indicated by the lighting of the AC GEN caution light.
- c. Place AC generator switch OFF, then ON, to restore generator output.
- d. AC generator overvoltage-undervoltage test switch - Hold at OVERVOLT. Generator dropout should be immediate. Repeat steps b. and c.
- e. AC generator feeder fault test switch - FEEDER FAULT. Repeat steps b. and c.

+21. Dual Static Inverter - Check.

NOTE

During steps b., d., and f., a 1 INV FAIL or 2 INV FAIL will appear on the IIDS.

- a. AC generator - OFF.
- b. No. 2 inverter ON and No. 1 inverter - OFF, Observe that when rotating the Course #1 and Course #2 knobs on the Remote Instrument Controller, the Pilot and Co-pilot's course pointers on each EHSI will move in the direction of knob movement.
- c. No. 1 inverter – ON.
- d. No. 2 inverter - OFF, check as in step b. above.
- e. AC generator - ON.

- f. Both inverters - OFF, check as in step b. above.
 - g. AC generator, No. 1 inverter, and No. 2 inverter - ON.
- +22. DC generators - Check that the BUS TIE OPEN caution light remains off throughout sequence.
- a. No. 1 generator test switch - Hold at GND FAULT for about 5 seconds.
 - b. No. 1 generator should drop off the line as indicated by lighting of the No. 1 DC GEN caution light.
 - c. Observe that the DC ESS BUS and No. 1 DC PRI BUS remain powered by actuating the fire detector test switch to AFT BAG and observing engine fire lights and AFT BAG SMOK caution light. Check that No. 2 DC PRI BUS remains powered by actuating essential bus recovery switch to TEST and observing ESS VOLTS LOW caution light.
 - d. Place No. 1 generator switch OFF, wait for 5 seconds, move to RESET to restore generator output.
 - e. No. 1 DC GEN caution light - OFF when generator output is restored. Repeat test with No. 1 generator test switch at OVERVOLT. Generator dropout should be immediate. (Repeat steps a. through d.).
 - f. Repeat steps a. through e. for No. 2 generator.
- +23. Essential bus recovery system - Check.
- a. Essential bus recovery switch - Hold in test.
 - b. ESS VOLTS LOW caution light, the MASTER CAUTION, and the amber identification light above the test switch should illuminate.
 - c. Essential bus recovery switch - Release, lights go off.
 - d. Battery switch - OFF, BATT OFF caution light - On.
 - e. Essential bus recovery switch - ON.
 - f. BUS TIE OPEN and No. 1 DC GEN caution lights should illuminate while the ESS VOLTS LOW and amber identification light remain off.
 - g. Check that all DC buses remain powered (confirmed by selecting fire detector test to AFT/BAG and observing AFT BAG SMOK and T-handle illuminated and additionally by checking the press-to-test function of the copilot IIDS and observing master warning panel lights test).



- h. Battery switch - ON, BATT OFF caution light - Off.
- i. Essential bus recovery switch - OFF.
- j. BUS TIE OPEN and No. 1 DC GEN caution lights off.

24. RADIO master switch and EFIS MASTER 1 and EFIS MASTER 2 switches to the ON position.
25. Avionics - As desired.
26. Deleted.
27. CVR - Check.
 - a. Test button - Press for 1 second and release.
 - b. Pass fail lights - Illuminate alternately.
 - c. Signal level indicator - Modulates with ambient noise.
 - d. Pass light - after 35 seconds, illuminates with successful test then extinguishes.

SPECIAL CHECKS

Testing the DAFCS and Checks before IFR Takeoff:

1. IVSI - Needle near zero
2. Altimeters - Set and check
3. Radar Altimeter
 - a. Altitude - Zero
 - b. OFF flag - Retracted
 - c. DH - Set as desired

CAUTION

During these tests, the tip path plane is actually being deflected outside the aircraft. Use caution not to endanger persons or objects near the helicopter rotor disk.

NOTE

Autopilot should not be engaged until successfully passing Level 1 Preflight Test. Refer to Tests and Continuous Monitoring section for definition of error codes.

4. Perform Level 1 and 2 preflight test of DAFCS - Display shows END flashing.

5. A preflight test of retraction fault annunciation of the retractable boarding step(s) may be performed if desired. Hold the switch to TEST for approximately 10 seconds and check for presence of BD STEP caution light.

TAXIING

CAUTION

During prolonged operation on the ground, keep pilot's feet positioned on the pedals, disengage yaw trim switch, or disengage autopilots.

NOTE

- Taxiing is permitted with the Autopilots engaged and the Flight Director in SBY. When taxiing over rough, inclined or uneven surfaces, it may be preferable to disengage the autopilots or switch to the SAS mode.
 - Use tip path plain to control taxi speed. Use wheel brakes only as needed to slow down, turn, stop, or maintain a ground position.
1. Pilot door(s) - Secured. Check lockpins. DOOR OPEN caution light off.
 2. Chocks - Removed.
 3. Parking brake - Guide handle to OFF position.
 4. Wheel brakes - Checked.

PRE-TAKEOFF

1. Engine and transmission instruments - Normal range, both engines in FLY.
- +2. OEI limits selection - Check as follows:
 - a. No. 1 engine lever - Pull down and retard slightly.
 - b. No. 2 engine N1 indicator - Check 2-Minute Armed light on.
 - c. Collective OEI limits select switch - OEI MCP (depress), check neither Armed light on.
 - d. Collective OEI limits select switch - 30 Seconds, check N1 indicator 30-Second Armed light on.

- e. Collective OEI limits select switch - 2 Minutes, check N1 indicator 2-Minute Armed light on.
 - f. No. 1 engine lever - FLY.
 - g. Repeat steps a. through f. using the opposite engine combination. Use the copilot's collective switch if appropriate.
- +3. N1 check. At a stable condition, engine not accelerating or decelerating, compare the DECU supplied primary N1 indication with the corrected backup indication as follows:
- a. Select MENU and press IIDS N1 TEST soft key.
 - b. Check that the digital N1 TEST values are within 0.2% N1 of the normal digital display at the top.
 - c. N1 TEST times out in 8 seconds. Repeat as necessary.
4. Press the collective mounted DECU FAIL ACCESS switch and check that both engines are free of Major, Degraded, and Minor faults.
5. Check Mixed Mode lights, blue engine lever handle lights, and pilot's and copilot's glareshield mounted blue ENGINE CONTROL lights all off.
6. Master warning lights - Check.
7. Engine levers - FLY.
8. BLEED AIR heater switch - OFF.
9. Heater blower on, pilot window open or door vents open for ventilation as desired.
10. Stick trims and DAFCS - As desired (Cyclic trim - ON for IMC flight).
11. Engine anti-ice switches - As required.

NOTE

Engine anti-ice must be on at or below 2 °C (36 °F) with visible moisture.

12. Engine power assurance (at least once every 20 flight hours) - Check each engine separately at 107% Nr.

NOTE

- Power assurance target look-up and data acquisition may be processed automatically by following the steps outlined in 12.a described below or manually as described in 12.a.1.
 - Two engine power assurance procedures, a single point check and trending, are provided. Either procedure may be used to ensure the availability of engine power necessary to meet the performance data contained in this Rotorcraft Flight Manual. If acceptance criteria of either procedure is not met, engine maintenance action must be done in accordance with the applicable maintenance manuals prior to flight.
 - The single-point power assurance check is defined in steps 12.a. and 12.a.1.
 - The ten-point rolling average trend analysis procedure is an alternate engine power check that may be used in lieu of the single-point power assurance check for those who wish to maintain engine trend analysis to permit better visualization of engine health. This procedure is defined in steps 12.b. and 12.c., and a copy of the trend results for a specific aircraft may be found in Part 2, Section V, Supplemental Performance Data.
 - Both procedures are accomplished using installed Power Assurance Check chart in Figure 2-1.
 - The power assurance check should be done only when engine and transmission oil temperatures are in the normal range (green arc).
- a. Single point power assurance check; automatic target look-up, data acquisition, and result determination.
- (1) Position the helicopter nose into wind and select heater bleed-air - OFF.

CAUTION

With aircraft anti-ice ON or OFF, as appropriate for takeoff, depress PWR ASSUR soft key on the performance display to command a power check with anti-ice OFF and EAPS OFF or not installed. Use this soft key selection regardless of whether aircraft anti-ice is ON or OFF.

NOTE

An exit from power assurance can be commanded at any time by depressing the MENU key.

- (2) Retard one engine to ground idle. Collective OEI limit select switch – OEI MCP (depress).
- (3) Turn the DC generator of the engine being checked OFF, configure anti-ice as set in step (1) above, and increase collective to set the 5% increment torque value indicated on the display. Although possibly light on wheels, the check must be accomplished on the ground. Hover using the power of one engine only is prohibited.
- (4) Check that the countdown timer proceeds from 2:45 to 0 seconds and that sampling is then initiated. If the countdown timer stops during the final 60 seconds, check indicated torque and adjust to the target value as required.
- (5) Observe the power assurance result normally displayed 15 seconds after the start of sampling.

NOTE

If the DECU reports an INVALID check or if NO RESPONSE is received within 30 seconds, the REPEAT soft key may be commanded to REPEAT or CONTINUE selected if a check of the other engine is desired.

- (6) Evaluate the power margin and T5 margin results (refer to Figure 2-2). Also cross-check with cockpit indicators the pressure altitude and OAT values (± 250 ft, $\pm 2^{\circ}\text{C}$) that are displayed. Select REPEAT if another check of that engine is desired.
- (7) Restore DC generator, depress the CONTINUE soft key, and advance the other engine to FLY.
- (8) Repeat steps (3) through (8) to check the other engine.
- (9) Both engines - FLY, 107% Nr, N1 matched.
- (10) Assess power assurance results:
 - (a) If the power and T5 margins are at least zero, published performance is assured.

- (b) If either the power margin or T5 margin is negative, there is no margin and engine maintenance must be accomplished in accordance with the maintenance manual before flight.
- (11) To take performance credit for a positive power margin, refer to Section IV, Performance Information.
- a.1. Single point power assurance check; manual target look-up, data acquisition, and result determination.
 - (1) Using ambient OAT and pressure altitude, select the nearest 5% increment target torque from the Power Assurance Check Chart.
 - (2) Heater Bleed-air - OFF.
 - (3) Engine not being checked - IDLE. Collective OEI limit select switch – OEI MCP (depress).
 - (4) DC generator switch - OFF.
 - (5) Engine anti-ice of engine being checked - OFF or ON, as appropriate for takeoff.
 - (6) With aircraft nose into the wind, use collective to set target torque. Allow 3 minutes after initial power application for engine stabilization and then note representative N1 and T5 values for the condition. Although light on the wheels, the check must be accomplished on the ground.
 - (7) Record:
 - (a) N1
 - (b) T5
 - (c) Torque
 - (d) OAT
 - (e) Pressure altitude
 - (8) DC generator - ON.
 - (9) Repeat steps (3) through (7) when checking the opposite engine.
 - (10) Both engines - FLY, 107% Nr, matched N1.
 - (11) Determine power margin (number of divisions between points [A] and [B] on the engine power margin scale). Note that when [A] is to the right of [B], a positive margin exists, and when [A] is to the left of [B], a negative margin exists. An acceptable T5 margin is confirmed when the

subtraction of the observed T5 value from the chart value results in a positive margin or zero.

- (a) If the power and T5 margins are at least zero, published performance is assured.
 - (b) If either the power margin or T5 margin is negative, there is no margin and engine maintenance must be accomplished in accordance with the maintenance manual before flight.
- (12) To take performance credit for a positive power margin, refer to Part 1, Section IV, Performance Information.
- b. Power assurance trend check; long term averaging of the single point checks.

NOTE

When initiating a trending program, the single-point power assurance check, 12.a. or 12.a.1. is used to determine acceptability until data for the first 10 points have been accumulated. Maintain a record of all power margin and trending data (per the Part 2, Section V, Supplemental Performance Data). Trended data must include all consecutive data points to be meaningful.

- (1) Refer to the trended power margin average based on the most recent consecutive 10 points of operation. At start of trending, perform the single-point power assurance check and record necessary information for the 10 consecutive data points that will form the basis for trending. With the average established, continue to perform the single-point check recording the results from the automatic or manual single-point check for entry in Figure 5-42, the Power Assurance Trending Record.
- (2) Assess the recorded power assurance results and the effect on the trended average criteria below:
 - (a) If the single-point power and T5 margins are zero or higher, published performance is assured or;
 - (b) If the trended power margin average is at least zero, the single-point T5 margin is zero or greater, the single-point power margin (if negative) is no more than 3% below the average, and no three successive flights have shown negative single-point power margins, published performance is assured. (See following Note)

NOTE

If a negative single point power margin is recorded, subsequent power checks must be performed once per flight day until three successive positive power margins are recorded.

- (c) However, if a single-point negative T5 margin is confirmed, the trended power margin average becomes negative, a negative single-point power margin is recorded that is more than 3% below the trended average, or single-point power margins for three successive flights are negative, engine maintenance must be accomplished in accordance with the maintenance manual before flight.

- c. Trend check calculations.

NOTE

For each engine, maintain a record of power margin as determined from step (2) below and establish a rolling average (trend line) for 10 consecutive data points of operation. Also, keep a record of the single-point T5 margins accompanying the power margin points.

- (1) Determine the average value of power margin based on the most recent consecutive 10 data points of operation.

EXAMPLE

POINT NO.	SINGLE-POINT POWER MARGIN	SUMS	ROLLING AVE.	SINGLE-POINT T5 MARGIN (record only)
1	2.2			6
2	2.3			8
3	2.4			7
4	1.6			6
5	1.8			7
6	2.0			9
7	2.1			7
8	2.8			4
9	1.6			8
10	1.6			9
11	1.8	PT (2 THRU 11)/10	2.0	5
12	2.0	PT (3 THRU 12)/10	2.0	8
13	1.7	PT (4 THRU 13)/10	1.9	6

The previous EXAMPLE shows the details in determining the rolling average. The values of single-point power margin are given. The sums are determined using the mathematical relationship in the table that result in the rolling average in the fourth column. T5 is not used in the rolling average scheme but is presented for record.

- (2) Record power margin data and include date and engine hours for each entry.

NOTE

Continue rolling average for each engine for as long as it remains in the aircraft without interruption except when engine module M01, M02, or M03 is replaced. Should this occur, the rolling average must be reestablished.

13. Flight instruments - Check and set.
14. Navigation and communication equipment - Check and set.
15. Windshield heat - As required.
16. Pitot heat - As required.

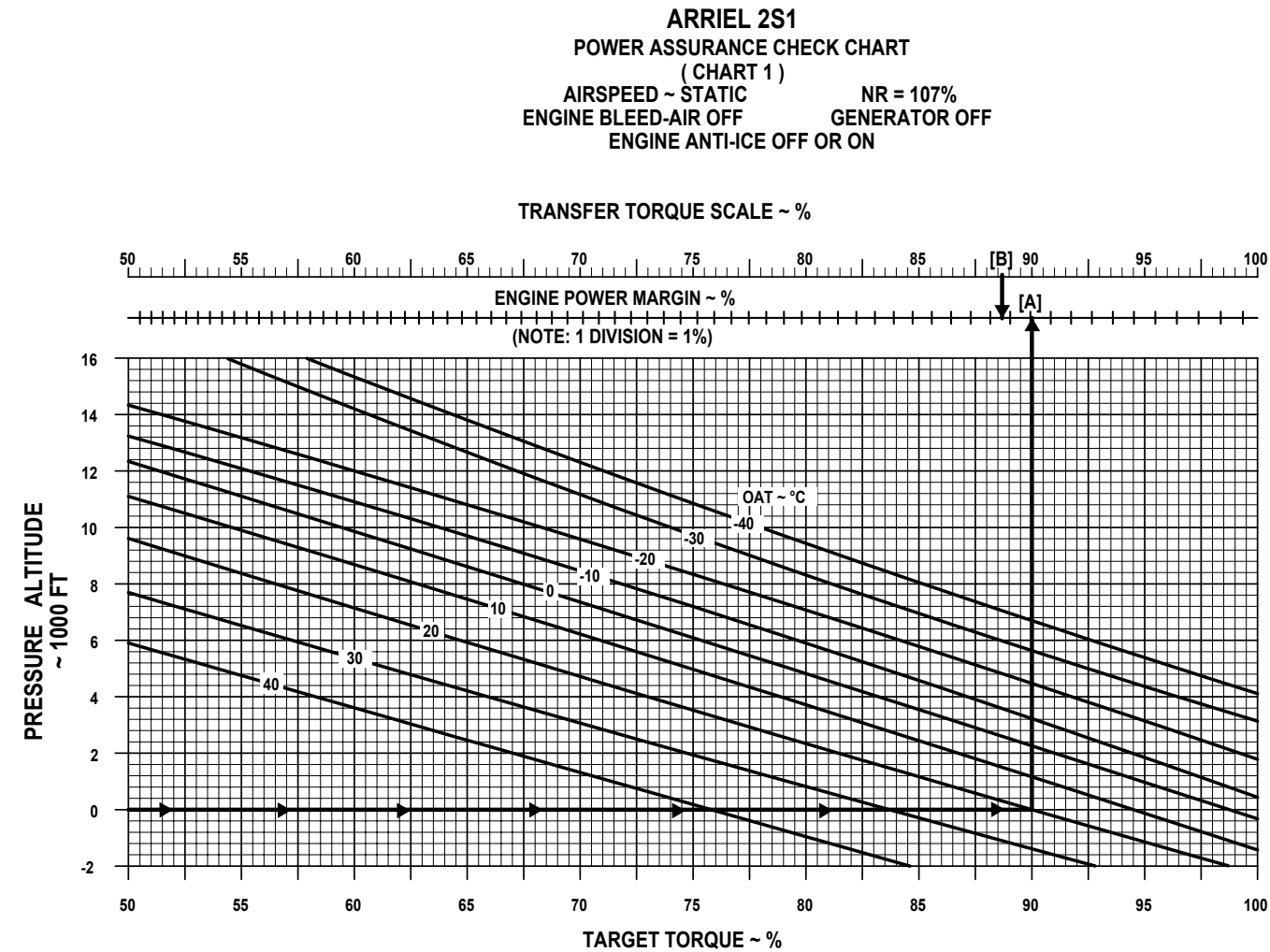
TAXI AND TAKEOFF

CAUTION

The nosewheel will not self-center after lift-off if it has swiveled about 180° just before lift-off. If retracted in this position, the nosewheel will jam in the up position and normal extension will not be possible. If nosewheel is swiveled more than 90°, slight forward taxi is recommended before lift-off.

NOTE

- After a period of prolonged wheel brake use, leave landing gear extended for a minimum of 5 minutes before gear retraction.
- For night takeoff with controllable searchlight, adjust light in hover so that spot appears in front, just above glare shield. Leave light in this position throughout the takeoff.

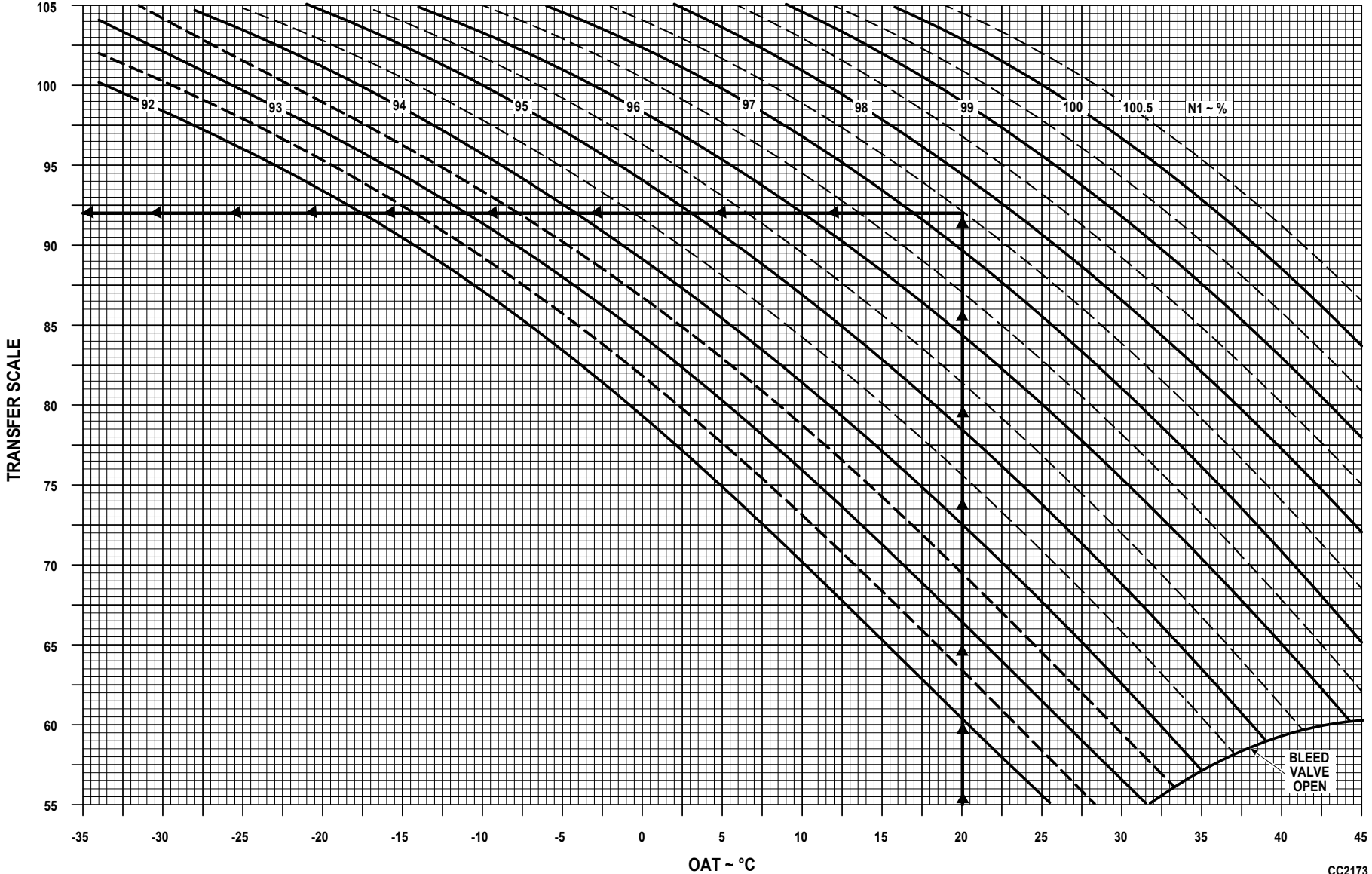


- EXAMPLE**
- GIVEN: PRESSURE ALTITUDE = 0 FT
OAT = 20 °C
- DETERMINE ENGINE POWER MARGIN AS FOLLOWS:
1. ENTER CHART 1 AT 0 FT Hp AND 20 °C, READ NEAREST 5% INCREMENT
TARGET TORQUE = 90%
 2. MOVE VERTICALLY UP AT 90% TARGET TORQUE TO DETERMINE POINT [A] AT INTERSECTION OF ENGINE POWER MARGIN SCALE.
 3. CONDUCT POWER CHECK AND RECORD
N1 = 97.5%.
 4. ENTER OAT SCALE ON CHART 2 AT 20°C OAT, MOVE VERTICALLY UP TO INTERSECT 97.5% N1, THEN LEFT TO INTERSECT TRANSFER SCALE AT 92.
 5. ENTER TRANSFER SCALE ON CHART 3 AT 92, MOVE LEFT OR RIGHT TO INTERSECT 0 FT Hp AND THEN VERTICALLY DOWN TO DETERMINE POINT [B], TRANSFER TORQUE VALUE OF 88.8%.
 6. REENTER CHART 1 ON THE TRANSFER TORQUE SCALE AT 88.8% POINT [B] AND COUNT 1.3 DIVISIONS BETWEEN POINTS [A] AND [B] ON THE ENGINE POWER MARGIN SCALE. SINCE [A] IS TO THE RIGHT OF [B], THE ENGINE POWER MARGIN IS POSITIVE (ie + 1.3%).

Figure 2-1. Power Assurance Check (Sheet 1 of 3)

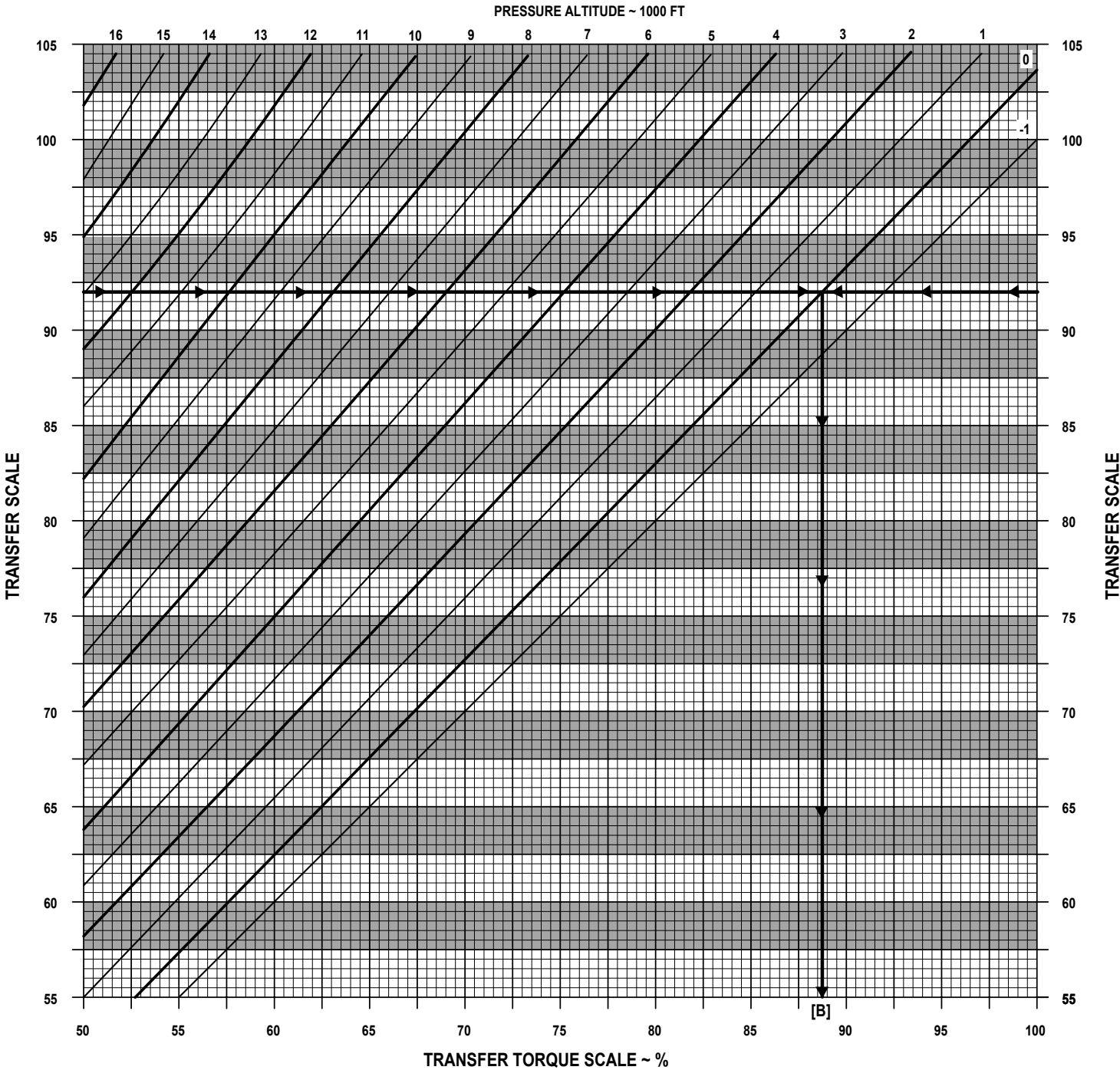
CC2173_1D
SAF

ARRIEL 2S1
POWER ASSURANCE CHECK CHART
(CHART 2)
AIRSPEED ~ STATIC NR = 107%
ENGINE BLEED-AIR OFF GENERATOR OFF
ENGINE ANTI-ICE OFF OR ON



CC2173_2D
SAF

Figure 2-1. Power Assurance Check (Sheet 2 of 3)



ARRIEL 2S1
POWER ASSURANCE CHECK CHART
(CHART 3)
AIRSPEED ~ STATIC NR = 107%
ENGINE BLEED-AIR OFF
GENERATOR OFF
ENGINE ANTI-ICE OFF OR ON

CC2173_3D
SAF

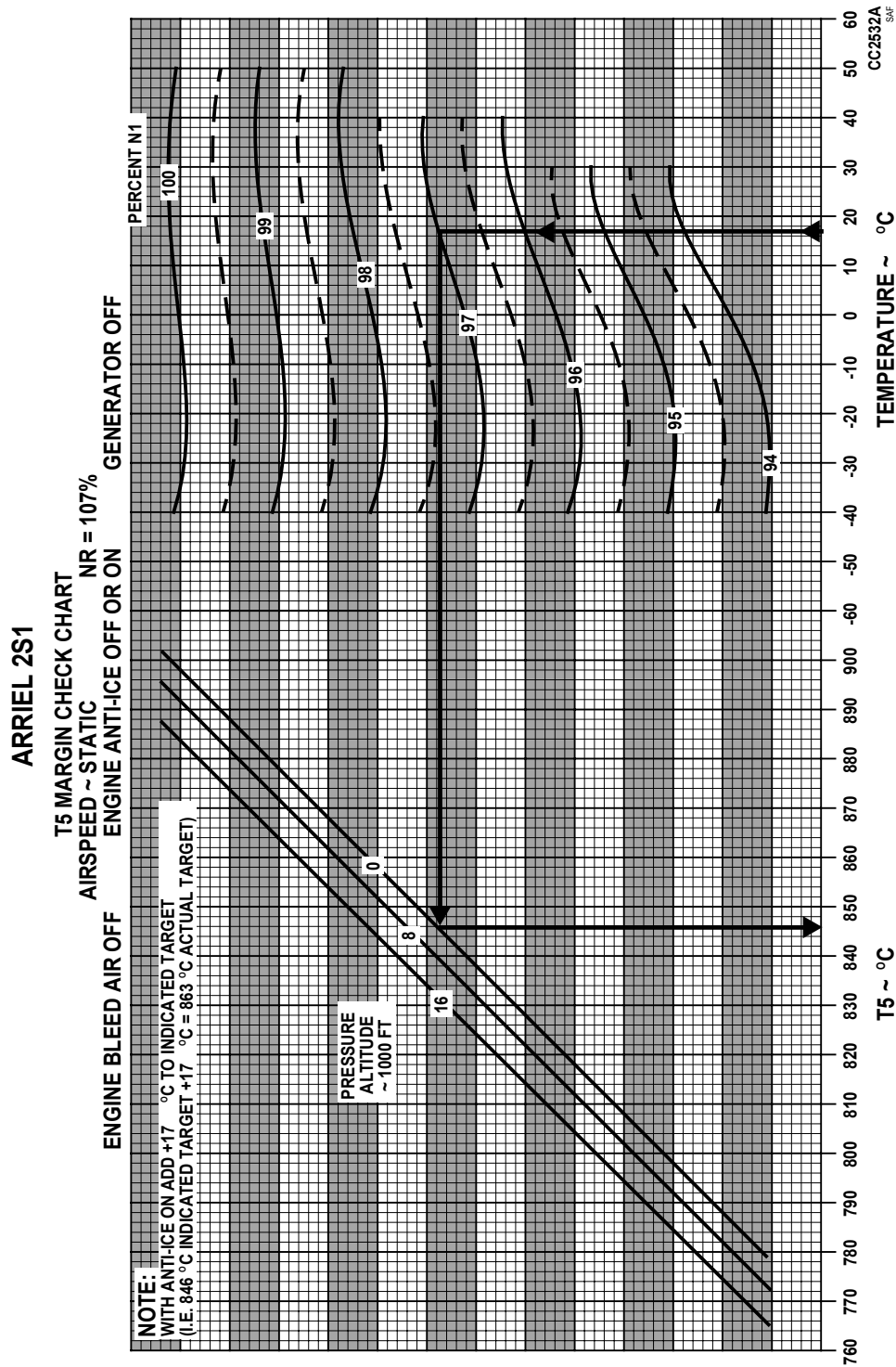


Figure 2-2. T5 Margin Check Chart

NOTE

When taking off over water, the floats switch should be in the ARMED position until airspeed approaches 75 KIAS.

AP1 - As required
AP2 - As required
FD1 - SBY
FD2 - SBY

CATEGORY "A" TAKEOFF

1. Refer to Section IV, Figures 4-7 and 4-8 for CDP and V₂ (CDP + 10 knots) determination.
2. Set the white airspeed bug at the CDP speed and the amber bug at the V₂ speed.
3. Hover at 5-foot wheel height. Note the average of stabilized hover torque required. Recommend using the mid-scale average of the two linear bar/pointer indicators.
4. Increase collective to achieve 10% torque greater than hover, and lower the nose as necessary to result in a 5- to 10-foot wheel height, level acceleration to the CDP (CDP airspeed at 5- to 10-foot wheel height).
5. Upon passing the CDP, adjust pitch attitude to initiate a climb at V₂.
6. With V₂ established in a positive climb and clear of obstacles, gradually accelerate to best rate of climb speed (V_{broc}) and retract the landing gear.

CATEGORY "B" TAKEOFF

1. Hover at 5-foot wheel height. Note average of stabilized hover torque required. Recommend using the mid-scale average of the two linear bar/pointer indications.
2. Accelerate forward while maintaining 5- to 10-foot wheel height.
3. Increase collective to achieve up to 10% torque over hover, if available, and continue level acceleration. Do not exceed takeoff limits.
4. As 50 KIAS is achieved, raise nose to maintain 55 KIAS and climb until all obstructions are cleared. During takeoff and climb, observe height-velocity limits (Figure 1-4).
5. After obstructions are cleared, raise landing gear and accelerate to best rate of climb speed.

CLIMB

1. Landing gear lever - UP before reaching 130 KIAS.
2. Heater - As desired.

CRUISE**NOTE**

- During single system Autopilot operation at airspeeds above 60 knots, the Autopilot roll axis will normally hold heading. However, if excessive roll activity is experienced in turbulence, it may be desirable to fly with feet on the pedal switches. This action will cause the autopilot roll axis to hold "wings level".
- In 3 cue coupled climb or altitude hold, the FZ-706 Flight Control Computer will allow commanded airspeed to decrease to preserve commanded climb rate and altitude hold as a collective limit is approached.

PRE-LANDING

1. Crew and passengers - Alerted.
2. Landing gear lever - DN below 130 KIAS, three green lights - On.
3. BLEED AIR heater switch - OFF.
4. Press DECU FAIL ACCESS switch and check for presence of detected DECU faults. Proceed in accordance with the Emergency Procedure for all detected faults, if any, and refer to any appropriate recommendations listed in Part 2, Section I.
5. Heater blower on, pilot's window open, or door vents open for ventilation.
6. Engine anti-ice switches - As required.

NOTE

Engine anti-ice must be on at or below 2°C (36°F) with visible moisture.

APPROACH AND LANDING

CAUTION

- During landing and operations near the ground, avoid attitudes greater than 10° nose-up, to reduce possibility of tail to ground contact, especially during operations at aft CG.
- During high speed running landings, allow 2 minutes of intervening forward flight time above 50 KIAS or 10 minutes of intervening ground time between maximum performance wheel-brake applications to permit brake disc cooldown.

IFR Approach – Maximum recommended IFR approach speed range is 60 to 130 KIAS. Recommended entry airspeed when using ILS DECEL is 130 KIAS. Maximum altitude to engage decel is 2,047 feet RAD ALT. Maximum demonstrated precision approach gradient is 6.5 degrees.

NOTE

- DECEL at entry speeds greater than 130 KIAS may result in greater than 70 KIAS at 200 feet radar altitude.
- Irregular terrain may affect DECEL capture and Auto-Level performance.
- The FZ-706 Flight Control Computer does not recognize engine failure. Following engine failure, the DECU will initially limit total single engine output to the 30-second limit. The DAFCS computer, however, will attempt to limit the collective position to cruise power. Pilot must disengage coupling or manually override collective limiting.

GLIDESLOPE

WARNING

If for any reason the computer does not receive a radar altitude signal, the Auto Level will not occur and the aircraft will continue to follow the glideslope signal.

GO-AROUND

Go-Around (GA) engagement, when coupled to the Autopilot, will produce pitch up to achieve approximately a 750 FPM climb rate. If coupled 3 cue, collective will move as necessary to ensure that airspeed does not fall below V_y (75 KIAS) and the roll axis will hold heading present at GA engagement.

PRE-SHUTDOWN**CAUTION**

During prolonged operation on the ground, keep pilot's feet positioned on the pedals, disengage yaw trim switch, or disengage autopilots.

1. DAFCS switches - OFF.
2. Parking brakes - Set.
3. Flight controls - Centered, collective down.
4. Avionics - OFF.
5. RADIO and master switches - OFF.
6. Standby Attitude Indicator EMER PWR switch - OFF.

SHUTDOWN**CAUTION**

- Maximum manual rotor brake application is not recommended when commenced below 30% Nr. Brake applications begun at less than 30% Nr should be light enough to produce a smooth, gentle stop.
- Engine operation at IDLE with rotor stopped limited to blades 45° to the longitudinal axis.

NOTE

- Before shutdown, engines must have been running for at least 30 seconds with N₁ lower than 85%. For instance, taxiing with both engine operating and minimum collective pitch is suitable for this cooling down.
 - Droop stops should be in at about 45% Nr. Tip path plane clearance is reduced if droop stops are not in.
 - Normal Nr for rotor brake application with one or both engines at idle or with both engines shut down is 40% to 60% Nr. Maximum for shutdown is 65%. For emergencies with both engines shut off, rotor brake may be applied up to 107% Nr.
1. Engine lever(s) - Pull down and retard to IDLE.

2. Engine lever(s) - STOP with cooling requirement satisfied.
3. Rotor brake handle - As desired. If on, (two strokes required), check ROTOR BRAKE caution light on.
4. Remaining engine lever - STOP.

POST SHUTDOWN

1. Fuel levers - OFF.
2. Center console switches - As desired.
3. Engine instruments - Normal.
4. Master start switch - OFF.
5. IIDS - Check cumulative counters page. If 30-Second cumulative time/event information is shown, subsequent flight is prohibited.
6. Depress DECU FAULT ACCESS switch and check for faults.
7. Battery switch - OFF after rotor stops.
8. Standby Attitude - OFF

OPTIONAL PROCEDURES

ENGINE FIRE EXTINGUISHER SYSTEM TEST

The fire extinguisher test panel provides a method of performing a full functional check of the fire extinguisher system from the cockpit. This test may be performed whenever desired by the pilot or as required by maintenance.

Make this check before starting engines:

1. Fire extinguisher test switch - OPEN. Check red WARN light on.
2. Pull both T-handles back 1 inch.
3. Fire extinguisher - MAIN, then RESERVE. Check that green TEST light goes on in each position. Release switch.
4. Fire extinguisher test switch - SHORT. Check red WARN light and green test light - On.
5. Fire extinguisher switch - MAIN, then RESERVE. Check that green TEST light stays on in each position.

6. Both T-handles - Full forward.
7. Fire extinguisher test switch - NORM.
8. Check red WARN light and green TEST light - Off.

FLOTATION SYSTEM TEST

Make this check for electrical continuity daily before all anticipated overwater flights. DC external power must be available or the helicopters DC generators must be operating to make this test.

1. Flotation test switch - TEST. Check red WARN indicator light - On.
2. Floats arming switch - ARMED. Check FLOTATION ARMED advisory light - On.
3. Floats inflation switch (pilot's cyclic) - Press. Check TEST 1 and TEST 2 green indicator lights - On. Release switch, lights out.
4. Floats inflation switch (copilot's cyclic) - Press. Check TEST 1 and TEST 2 green indicator lights - On. Release switch, lights out.
5. Floats arming switch - OFF. Check FLOATS ARM advisory light - Off.
6. Flotation test switch - NORM. Check red WARN indicator light - Off.

FUEL PRIMING PROCEDURES – DURING NORMAL START

Loss of fuel prime can be indicated by continued illumination of the low fuel pressure light, absence of indicated fuel flow, and the failure to attain light off (with functioning ignition) during the start attempt. This condition is more likely to occur following engine or fuel system maintenance or prolonged storage of the helicopter. The following prime procedure should be used to attain light off. If loss of prime is noted after relatively short intervals, suspect a malfunctioning fuel line check valve.

1. Starter motoring: In a sea level environment, two start attempts with the fuel lever in DIRECT (30-Seconds start, 30-Seconds off, 30-Seconds start) will usually result in a successful light-off by the end of the second start attempt. With fuel ignition (light-off), the 60-Second start attempt and 60-Second interval sequence may be used.
2. Engine cross prime: With one engine running with fuel lever in DIRECT, the other engine can be primed as follows:
 - a. Fuel lever of engine to be primed - PRIME.



- b. Engine prime switch of engine to be primed - PRIME.
- c. Prime for two minutes.
- d. Engine - Start.
- e. Engine prime switch - OFF.
- f. Fuel lever - XFEED until engine operates steadily.
- g. Fuel lever - DIRECT.

NOTE

Extended running of an engine in DIRECT with the opposite engine's prime switch at ON and fuel lever at PRIME or XFEED can result in vent overflow if tanks are full.

- 3. Manual priming: The engine can be primed after maintenance using the fuel prime port in the engine fuel system. Consult the Maintenance Manual for details.

NAV TEST SWITCH FUNCTION

(When used in conjunction with King Radio Navigation System)

When NAV TEST switch is at PILOT or COPILOT, all the corresponding pilot's or copilot's Marker Lamps should go on. If the appropriate Marker audio selector switch on the ICS control is selected, a tone should be heard.

(When used in conjunction with the Collins Radio Navigation System)

- 1. Turn on VOR receiver(s) and select a VOR frequency on the appropriate navigation control panel.

Set pilot's HSI display switch to PLT NAV; copilot's HSI display switch to CPLT NAV; HSI OBS switch to NORM; PLT/CPLT bearing switches to VOR.

- 2. Set and hold NAV TEST switch at PLT (to test pilot's system), or CPLT (to test copilot's system).
- 3. Select the corresponding HSI Course Select Knob to center CDI.
- 4. The following should occur on the appropriate indicator:
 - a. The NAV and both GS warning flags should remain out of view.

- b. The deviation bar should center at a course of $000^{\circ}+5^{\circ}$ and GS deviation bar should deflect approximately 1 1/2 dots down.
 - c. The To/From indicator will indicate TO.
 - d. The bearing pointer will indicate $000^{\circ}+5^{\circ}$.
 - e. All of the pilot's (or copilot's if CPLT position is selected) MKR BCN lights should illuminate.
5. Release the NAV TEST switch.
6. Select a Localizer frequency on the appropriate navigation control panel, and rotate Course Set Knob to select the helicopter indicated heading.
7. Set and hold the NAV TEST switch in PLT position (to test pilot's system) or CPLT position (to test copilot's system).
8. The following should occur on the appropriate indicator:
- a. The LOC and both GS warning flags should remain out of view.
 - b. The Localizer deviation bar should deflect approximately 1 1/2 dots to the right.
 - c. The GS deviation bar should deflect approximately 1 1/2 dots down.
 - d. All of the pilot's (or copilot's if CPLT position is selected) Marker Lamps should illuminate.
9. Select MKR audio on the appropriate ICS control. A tone should be heard.
10. Release the NAV TEST switch.

FUNCTIONAL CHECK – SNOW PROTECTION KIT P/N 76076-30008-013

This full functional check of the snow protection kit must be performed daily when flight in falling or blowing snow is anticipated. It is to be done with both engines running, both DC generators and the AC generator operating.

1. No. 1 and No. 2 engine anti-ice switches - ON. Check that No. 1 and No. 2 ANTI-ICE caution lights and No. 1 and No. 2 ANTI-ICE advisory lights go on.

NOTE

If No. 1 and No. 2 ANTI-ICE caution lights do not go on, there is either a snow protection system malfunction or the ambient air

temperature is too warm (about 18 °C OAT) to permit a valid check of the snow protection system.

2. Check that the No. 1 and No. 2 ANTI-ICE caution lights go off within 2 minutes and remain off, and that the No. 1 and No. 2 ANTI-ICE advisory lights remain on.
3. Engine ANTI-ICE, NO. 1 and NO. 2 AC circuit breakers (monitor bus) - Pull.
4. No. 1 generator switch - OFF. Check that No. 1 and No. 2 ANTI-ICE caution lights go on within 4 minutes, and that No. 1 and No. 2 ANTI-ICE advisory lights remain on.

NOTE

In case of failure of the snow protection kit in actual snow conditions, the caution lights will go on in a considerably shorter period of time.

5. No. 1 generator switch - ON. Check that No. 1 and No. 2 ANTI-ICE caution lights go off within 2 minutes.
6. No. 2 generator switch - OFF. Check that No. 1 and No. 2 ANTI-ICE caution lights go on within 4 minutes, and that No. 1 and No. 2 ANTI-ICE advisory lights remain on.
7. Reset engine ANTI-ICE, NO. 1 and NO. 2 circuit breakers. Check that No. 1 and No. 2 ANTI-ICE caution lights go off within 2 minutes.
8. No. 2 generator switch - ON.

FUNCTIONAL CHECK – RETRACTABLE BOARDING STEP(S)

A preflight test of retraction fault annunciation may be performed if desired. Hold the switch to TEST for approximately 10 seconds and check for presence of BD STEP caution light.

FUNCTIONAL CHECK – EMERGENCY LOCATOR TRANSMITTER (ELT)

The ELT may be tested in the following manner:

1. Tune and monitor a VHF communications radio to 121.5 MHz.
2. Place the cockpit ELT switch from ARM to ON for approximately 1 second while monitoring the communication radio and viewing the activate annunciator located on the cockpit switch panel.

NOTE

The ELT should be tested periodically (every 100 hours or every 3 months).

OPERATION

1. The ELT may be activated manually by placing the cockpit switch in the ON position. After activation, the unit may be turned off by returning the cockpit switch to the ARM position.
2. The ELT has an automatic mode wherein the positions of the cockpit and unit switch priority are overridden by the internal G switch in a crash situation. This function applies only when the ELT unit is securely fastened in its mount, a situation that precludes activation by dropping the unit.

AIRDATA ACCESSORY UNIT**OPERATION**

The altitude code output is active whenever the Accessory Unit is receiving 28 vdc from its circuit breaker and valid Arinc 429 data from the associated Digital Airdata Unit.

The landing gear warning circuit monitors weight-on-wheels logic, radio altimeter 250 feet trip, radio altimeter DH, airspeed (from the pilot's airdata computer), and self-test/reset logic.

At lift off, weight-on-wheels logic is removed; this arms the initial warning mode. If the landing gear is retracted prior to attaining 60 knots airspeed or climbing above 250 feet radio altitude, the LDG GEAR UP annunciators will illuminate steady and no tone will be heard.

After reaching 60 knots airspeed or 250 feet radio altitude, the second warning mode will be armed.

If the airspeed decreases below 60 knots or the rotorcraft descends below the radio altimeter decision height (with the landing gear retracted), the LDG GEAR UP annunciators will illuminate steady and the warning tone will sound. Pressing either annunciator will cancel the tone; the annunciators will stay illuminated.

If a second warning condition occurs before the first condition is cleared (i.e., the airspeed falls below 60 knots while still below DH), the annunciators will flash at a 90 ppm rate; no additional tone will sound. Pressing either annunciator will cause both annunciators to illuminate steady until the warning condition has been cleared.

To clear the warning condition, the landing gear may be lowered, or the rotorcraft may increase airspeed to above 60 knots and climb above DH (or reset DH tone altitude below indicated radio altitude).

When the rotorcraft is not being operated within the warning envelope, pressing either LDG GEAR UP annunciator will put the system into self test. During self test, if the system is operative, the warning tone will be generated as long as the annunciator is depressed. Both annunciators will flash during this same time and will continue to flash for up to two seconds after the annunciator is released.

If the pilot's airdata information to the system fails, landing gear up warning will be triggered by the radio altimeter 250 feet trip and/or DH (decision height).

If no warnings are active, self test of the unit will indicate failure of the airdata information by a steady lamp, and no tone when the LDG GEAR UP annunciator is pressed.

CAUTION

When the Shadin ADC Accessory Unit is installed, no aural landing gear up warning is provided until 250 feet radio altitude or 60 knots airspeed is achieved. If a takeoff is rejected below 250 feet and 60 knots after the gear has been raised, no additional gear up warning light is provided.

NOTE

System self-test should be performed during preflight, and may be performed at any other time.

LITEF LCR-92S AHRS

OPERATION

1. The heading function is provided by the dual LITEF AHRS, and is operated via the compass controller.
2. After takeoff (sensed by weight off wheels), the AHRS will initiate a heading realignment at a slaving rate of one-degree per second, or less, dependent upon flight maneuvering.

NOTE

Except when following the recommendation in step 4. below intended for unusual circumstances, realignment in SLAVE is recommended after each takeoff to cancel any heading errors caused by distorted magnetic fields at the takeoff site. This action should only be performed once established in straight and

level flight. The pilot's feet should be positioned on the pedal switches to avoid sudden aircraft heading changes as a result of heading realignment.

3. Immediate heading realignment is provided in the SLAVE mode by momentarily selecting the slew function right or left while in unaccelerated, wings level flight or level on the ground. If realignment is inadvertently commanded in other than wings level flight, slaving will be immediate and convergence will proceed at one degree per second or less once wings level.
4. Prior to takeoff with AHRS selected normally in the SLAVE mode, significant heading error can occur when operating from areas with known or suspected adverse magnetic influence (metal structures such as oil rigs, steel reinforced subsurface construction, metal fencing, etc.). In such situations, consider using the slew function to realign indicated heading to a known visual reference (e.g. runway heading or equivalent) in the FREE mode. Then, after takeoff, when established in straight and level flight, switch to the SLAVE mode with pilot's feet on pedal switches.
5. An AHRS test mode can be commanded by either the pilot's or copilot's AHRS TEST switch. When selected, the AHRS will present 015 degrees heading, 5 degrees pitch up, 45 degrees roll right and right turn rate data. The test data will remain displayed for 1 second after the switch is released. The test mode is inhibited in flight.

NOTE

An interlock is incorporated to inhibit the AHRS test function whenever N_r is greater than approximately 5%. This is incorporated to prevent adverse stick movement with SAS engaged during AHRS tests.

PULSELITE SYSTEM

OPERATION

To pulse the landing/recognition lights, move the corresponding switch to the PULSE position.

RECOGNITION LIGHTS

OPERATION

The RCGN LTS control switch is located on one of the overhead switch panels or on the master switch panel. It has two positions labeled ON and OFF.

The RCGN LTS control system will have a third position labeled PULSE. When the switch is moved to this position, the recognition lights will pulse on and off.

CABIN LIGHTING CONTROL SYSTEM

OPERATION

To turn the cabin lights to full bright from the cockpit, put the CABIN LTS switch to the BRT position.

To turn the cabin lights off from the cockpit, put the CABIN LTS switch to the OFF position.

To operate the cabin lights from the cabin, put the CABIN LTS switch to the CONT position (VIP interior). Any of the cabin's light control panels will control the brightness of the lights. Pushing the arrow pointing up will increase the brightness and pushing the arrow pointing down will dim the cabin lights, or if knob is installed, clockwise rotation to increase brightness and counterclockwise rotation to decrease brightness.

The reading lights have individual controls. Pushing the READ switch will alternately turn the reading light on or off (if installed).

The entry lights are activated from the cabin ENTRY switch (if installed). When the switch is momentarily depressed, the entry lights will be illuminated for approximately 100 seconds.

LOGO LIGHT SYSTEM

OPERATION

The LOGO LTS control switch is located on one of the overhead switch panels or on the master switch panel. It has two positions labeled ON and OFF.

If a Pulselite system is installed, the LOGO LTS control switch will have a third position labeled PULSE. When the switch is moved to this position, the logo lights will pulse on and off.

FIXED LANDING LIGHT(S)

OPERATION

The LDG LT master switches are on the collective sticks and have two positions marked ON and OFF. Either pilot can turn the landing light(s) on. However, both pilots must set their switches to OFF in order to extinguish the light(s). When the light(s) is/are on, the LANDING LIGHT annunciator, if provided, will illuminate. The landing light(s) and annunciator will automatically extinguish when the main gear is raised.

The LDG LT master switch(es) is/are located on the overhead switch panel and has two positions marked ON and OFF.

COLLINS ALT-50 AND ALT-55B RADIO ALTIMETER SYSTEM GROUND TEST**NOTE**

The radio altimeter test functions are inhibited during modes in which the DAFCS is using radio altimeter data.

The pilot's and copilot's radio altimeter indicator test switches and the pilot's and copilot's EFIS control panel test switches will each test the single radio altimeter system that affects all four displays.

Depressing the pilot's radio altimeter indicator test switch will cause the pilot's and copilot's EADIs to display ---RA, the left bottom RA annunciator will flash, and the rising runway will disappear, while the pilot's radio altimeter indicator flag will drop into view and the pointer will indicate 50 ± 5 feet. The copilot's radio altimeter indicator flag will be out of view and the pointer will indicate 50 ± 5 feet.

Depressing the copilot's radio altimeter indicator test switch will have the same results as above except the copilot's radio altimeter indicator flag will be in view while the pilot's radio altimeter indicator flag is not.

Depressing the pilot's EFIS control panel test switch will cause the pilot's and copilot's radio altimeter indicator pointers to indicate 50 ± 5 feet, and will cause the pilot's EADI to display a radio altitude of 50 ± 5 feet, the left bottom DH setting will be ---DH, the DH annunciator should not be visible, the left bottom RA annunciator should flash, and the rising runway should indicate 50 feet. The copilot's EADI will display ---RA, the left bottom RA annunciator will flash, and the rising runway will disappear.

Depressing the copilot's EFIS control panel test switch will have the same results as above except the copilot's EADI will display a radio altitude of 50 ± 5 feet, the left bottom DH setting will be ---DH, the DH annunciator should not be visible, the left bottom RA annunciator should flash, and the rising runway should indicate 50 feet, while the pilot's EADI will display ---RA, the left bottom RA annunciator will flash, and the rising runway will disappear.

BENDIX/KING CAS-66A TCAS I TRAFFIC COLLISION AVOIDANCE SYSTEM FUNCTIONAL TEST**1. Pilot-initiated TCAS Self Test:**

The TCAS should be tested using the pilot-initiated self-test feature during flight preparation.

Use of the self-test function in flight will inhibit TCAS operation for up to 12 seconds depending upon the number of targets being tracked.

2. TCAS Traffic Advisory Annunciations (TA):

AURAL

"Traffic Traffic"

VISUAL

A filled yellow circle on the traffic display.

CREW RESPONSE

Conduct visual search for the intruder. If successful, maintain visual acquisition to ensure safe operation.

NOTE

A traffic advisory in which the bearing information is not available will be displayed as a yellow message. Example: 2.0 NM/-06°

- a. Aural alerting is enabled at 600 feet AGL climbing.
- b. Aural alerting is inhibited at 400 feet AGL descending.

3. Response to a Traffic Advisory:

NOTE

In most situations, no maneuvering will be necessary to maintain safe separation. Maneuver only if it becomes apparent that safe separation will not be maintained.

- a. Attempt to visually acquire the intruder aircraft and maintain/attain safe separation in accordance with regulatory requirements and good operating practice.
- b. If the intruder aircraft is not visually acquired, air traffic control should be contacted to obtain any information that may assist concerning the intruder aircraft.
- c. Minor adjustments to the vertical flight path consistent with air traffic requirements are not considered evasive maneuvers.

WARNING

There is some likelihood that maneuvering based upon traffic display information only will actually result in reduced separation from an intruder aircraft.

- 4. Pushing the FL button will display own aircraft and altitude reporting targets as altitudes corrected to 29.92 inches Hg.

NOTE

- Traffic advisories can be expected to occur during normal flight operation. Generally, traffic advisories will occur more frequently in terminal areas during arrival, and less frequently during departure and enroute operations. In the vast majority of these cases, the aircraft displayed will be safely separated and there will be no need for pilots to initiate any avoidance maneuvers.
 - Evasive maneuvers (rapid change in pitch, roll, normal acceleration, or speed) should only be conducted after visual acquisition of the intruder and then only when necessary to achieve or assure safe separation.
 - Minor adjustments to the vertical flight path that are consistent with an existing ATC clearance, instruction, or restriction are not considered evasive maneuvers.
 - An amber RA FAIL annunciation displayed on a TA/VSF is to be ignored. This annunciator is for TCAS II systems only.
5. If a traffic display amber TCAS annunciation and/or a red FAIL annunciation occurs on the control, it is recommended to place the TCAS into the Standby or OFF mode until the fail condition is resolved.
6. Abnormal traffic display - If distracting target display anomalies occur, select TCAS Standby or OFF until the situation improves.

CAUTION

Traffic advisories located directly behind the aircraft may be momentarily lost due to airframe shading of the antenna system.

SECTION III**EMERGENCY PROCEDURES****INTRODUCTION**

The procedures outlined in this section deal with the common types of emergencies; however, the actions taken in each actual emergency must relate to the complete situation. Extraordinary circumstances such as compound emergencies may require departures from the normal corrective procedures used for any specific emergency.

Throughout this section, the terms "land immediately", "land as soon as possible" and "land as soon as practicable" are used to reflect the degree of urgency with which a landing must be made.

Land immediately - Self-explanatory.

Land as soon as possible - Land at the nearest site at which a safe landing can be made.

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

Many of the malfunctions described in this section will be indicated by the lighting of warning or caution lights, the master caution light, and in some cases, a tone in the headsets. Whenever a caution light goes on, the master caution light capsule should be pressed in to put the master caution light off, and reset it for another condition. An audio tone can be eliminated and reset for another condition by pressing the appropriate warning light capsule.

NOTE

- Several of the following procedures require pulling and resetting circuit breakers. The circuit breakers referenced in these procedures are marked in white for ease of identification.
- When locating circuit breakers at night, it is recommended that the glare shield lights be set to BRIGHT.

In the event of multiple or compound emergencies where more than five cautions and warnings have been accumulated in one of the three available columns, the IIDS remote scrolling function may be used to retrieve them for review. Warnings and cautions are stored chronologically with the latest one shown at the top of its assigned column.

ENGINE SYSTEM MALFUNCTIONS

Engine system malfunctions generally are of three types: (1) partial or total failure of the engine to provide power as demanded, (2) failure of an engine control system, (3) failure of engine auxiliary systems, (lubricating system, torque system, N1 indication, etc.)

As is the case with any malfunction, the first duty of the crew is to make sure of continued safe flight until the malfunction can be diagnosed. Particular care must be taken to confirm which engine has the malfunction and to reconfirm before initiating any subsequent actions such as restart, crossfeed, or in-flight shutdown.

SINGLE-ENGINE POWER FAILURE

Symptoms:

Initial:

- Large torque split
- NO. 1 or NO. 2 ENG OUT warning light and alternating tone.
- IIDS single eng page

Confirming:

- Nr remains at 107% or droops depending upon collective position.
- Torque decreases to zero
- N1 decreasing below ground idle
- N2 decreasing
- T5 decreasing

NOTE

The AC generator is automatically dropped off line when either engine out is sensed unless the snow protection kit P/N 76076-30006-013 is installed and on.

SINGLE-ENGINE POWER FAILURE WITH ANTI-ICE OPERATING

Anti-ice will continue to operate for the remaining engine. The ANTI-ICE caution light for the inoperative engine will go on and the ANTI-ICE advisory light for the inoperative engine will go off.

SINGLE-ENGINE FAILURE - HOVER (5 TO 10 FEET)

1. Maintain collective pitch setting or lower collective slightly if required to establish descent.
2. Increase collective to cushion landing as touchdown becomes imminent.

3. After touchdown, neutralize cyclic and simultaneously reduce collective to minimum.

SINGLE-ENGINE FAILURE ON TAKEOFF - CATEGORY "A"

Engine failure during Category "A" takeoff can be detected by the occurrence of an unusual torque split and possible rotor droop, as well as illumination of the engine out light and sounding of the engine out tone. The procedure to be followed depends upon the point in the takeoff sequence where the failure occurs. If an engine fails before or at the critical decision point (CDP), the takeoff is rejected, while the takeoff is continued if the failure occurs after the CDP.

During Category A climbouts, 100% N_r is used to maximize climb rates for speeds from CDP airspeed to best rate-of-climb speed. For single-engine flight above best rate-of-climb speed, use 107% N_r .

Prior to Reaching 30 KIAS:

1. Initiate a reject by rotating nose-up to 5° - 10° pitch attitude.
2. Apply collective to cushion ground contact.
3. After touchdown, neutralize cyclic and reduce collective to minimum.
4. Apply wheel brakes as necessary to stop within the available reject distance.

At or After Passing 30 KIAS Up To and Including the CDP at 5-10 Foot Wheel Height:

1. Initiate a reject by rotating nose-up to 10° pitch attitude, and when sufficient ground clearance is gained, continue rotation as necessary, up to a maximum of 25° pitch attitude.
2. Positively reduce collective to maintain rotor RPM in the resultant level deceleration.
3. With adequate reduction in apparent ground speed, reduce flare to 5° - 10° nose-up pitch attitude.
4. Apply collective to cushion ground contact.
5. After touchdown, neutralize cyclic and reduce collective to minimum.
6. Apply wheel brakes as necessary to stop within the available reject distance.

After CDP (CDP Airspeed at 5-10 Foot Wheel Height):

1. Gently adjust pitch attitude to accelerate to and establish a climb at V₂ airspeed.
2. Adjust collective as required to droop the rotor to 100% N_r against the OEI limiter and check N₁ indicator 30-Second Usage light on. Confirm N₁, T₅, and torque indications within limits.
3. When or before the 30-Second Usage light starts to flash, command 2-Minute using the collective OEI limits select switch and adjust collective as needed to maintain 100% N_r. Check 2-Minute Usage light on and confirm N₁, T₅, and torque indications within limits.
4. With a positive climb rate established, retract the landing gear.
5. When obstacles are cleared, continue climb and gradually accelerate to V_{broc} (best of rate of climb airspeed).
6. When or before the 2-Minute Usage light starts to flash, command OEI MCP using the limits select and adjust collective as needed to maintain 100% N_r. Check indications within limits.
7. Land as soon as practicable.
8. For single-engine climb or cruise at airspeeds above V_{broc}, lower collective as required to achieve 107% N_r.

SINGLE-ENGINE FAILURE ON TAKEOFF - CATEGORY "B"

If gross weight and flight path permit, takeoff and climbout may be continued. For a rejected takeoff, do this:

1. Collective pitch - Reduce as necessary to maintain rotor rpm if altitude permits.
2. Make a partial flare at about 50 feet to reduce ground speed. Limit flare to 10° when close to the ground.
3. Collective - Apply to cushion ground contact.
4. After touchdown, neutralize cyclic and simultaneously reduce collective to minimum.
5. Apply wheel brakes to minimize ground roll.

SINGLE-ENGINE FAILURE DURING CRUISE

1. Adjust collective as necessary to maintain desired rotor rpm while transitioning to appropriate single-engine airspeed. Altitude loss will be minimized at best rate of climb airspeed.
2. Maintain 107% Nr above best rate of climb speed.
3. Observe the N1 indicator usage lights and select 2-minute limit when or before the usage light starts to flash. Confirm N1, T5, and torque indications within limits.
4. Select OEI MCP for cruise. Check indications within limits.

NOTE

Use care when operating in cruise flight and confirm the limiter selected following power reductions whether the result of intentional collective adjustments, airspeed deceleration, or gust turbulence. The 30-Second limit will be automatically rearmed at N1 values less than 95.0%.

5. Consider air restart. Follow procedures in paragraph titled Engine Restart in Flight. Restart should be attempted only if the cause of the initial failure has been determined and corrected.
6. If restart fails or no attempt to restart is made because of conditions causing engine failure, follow procedures in paragraph titled Engine Shutdown in Flight.

Engine Restart in Flight

An engine restart may be attempted after a flameout subject to the pilot's evaluation of the cause of flameout. The following procedure assumes that the affected engine was operating with its fuel lever in DIRECT. If a flameout occurs with the fuel lever in XFEED, attempt restart with the fuel lever in DIRECT (no prime will be available). Confirm prior to initiating the engine restart procedure. Anticipate a significant increase in T5.

CAUTION

Increased generator load during an air restart could cause a significant increase in T5 on the operating engine. The power setting on the operating engine should be adjusted to allow this increase without exceeding engine limits.

1. T-handle (affected engine) - Forward.

2. Engine lever (affected engine) - STOP.
3. Fuel level (affected engine) - XFEED.
4. Engine prime switch (affected engine) - ON.
5. Master start switch - ON.
6. Operating engine - With the OEI limiter set to 2-Minute or OEI MCP as appropriate, adjust collective pitch to achieve sufficient T5 margin (20° - 30°) to accommodate an anticipated T5 rise during the start.
7. Engine - Start; use the normal automatic start procedure.
8. Engine lever to FLY.
9. Nr and torque - Reestablish 107% Nr and set desired torque.
10. Engine prime switch - OFF.

NOTE

If the restart attempt fails and/or no further attempts are to be made, shut the engine down.

Fuel Crossfeed after Engine Failure

CAUTION

- Fuel crossfeed after an engine failure should only be considered if necessary to permit flight to a suitable landing area. There is some possibility that fuel contamination or a fuel system malfunction was the cause of the first engine failure, and that crossfeeding might expose the remaining engine to a similar problem. The following procedure will minimize the chance of interrupting fuel flow to the remaining engine. If unsteady operation of the operating engine is noted at any time during the procedure, rapidly discontinue attempts to crossfeed. Confirm prior to proceeding with the fuel crossfeed procedure.
 - Confirm failed engine/remaining engine positions prior to proceeding with the fuel crossfeed procedure.
1. Failed engine - Shut down for at least 5 minutes to minimize possible ignition source for fuel leaks.
 2. Failed engine fuel lever - PRIME.

3. Failed engine prime switch - PRIME for at least 1 minute, (monitor operating engine fuel pressure (absence of warning light), fuel flow, N₁ and T₅. If signs of unsteady operation are noted, quickly move the fuel lever of the failed engine to OFF and discontinue attempts to crossfeed.)
4. Failed engine fuel lever - OFF.
5. Failed engine prime switch - OFF.
6. Operating engine fuel lever - XFEED. Monitor operating engine fuel pressure, fuel flow, N₁, and T₅. If signs of unsteady operation are noted, quickly switch fuel lever back to DIR and discontinue attempts to crossfeed.

Engine Shutdown in Flight - Confirm failed engine/remaining engine positions prior to proceeding.

1. Engine lever - STOP.
2. Fuel lever - OFF.

SINGLE-ENGINE FAILURE DURING APPROACH - CATEGORY "A"

The Category "A" Landing Decision Point (LDP) is 200 feet above the touchdown elevation at 45 KIAS and a descent rate of not more than 600 FPM. If an engine failure occurs before or at the LDP, the pilot may elect to perform a balked landing or continue the approach to complete a single engine landing. The approach must be continued to touchdown if the failure occurs after the LDP.

Prior to or at LDP - Balked Landing (Go Around)

1. Increase collective to droop N_r to 100%, check N₁ or torque indication at the 30-second limit, and confirm Usage light on. Confirm T₅ indications within limits.
2. Adjust pitch attitude to achieve a gradual acceleration to 60 KIAS.
3. When or before the 30-Second Usage light starts to flash, select 2-Minute limiting using the collective limit select switch. Adjust collective to maintain 100% N_r. Confirm operation within limits.
4. With a positive climb rate established, retract the landing gear.
5. When obstacles are cleared, continue climb and gradually accelerate to V_{broc} (best of rate of climb airspeed).
6. When or before the 2-Minute Usage light starts to flash, select OEI MCP limiting and adjust collective to maintain 100% N_r. Confirm operation within limits.

7. Land as soon as practicable.
8. For single-engine climb or cruise at airspeeds above V_{broc} , reduce collective as required to achieve 107% N_r .

After LDP - See SINGLE-ENGINE LANDING - CATEGORY "A" OR "B" below.

SINGLE-ENGINE LANDING - CATEGORY "A" OR "B"

1. Establish normal approach so as to arrive at a point 200 feet above the touchdown elevation at 45 KIAS and a descent rate of no more than 600 fpm.
2. Confirm 30-Second Armed (green) or Usage (amber) light is on. Select the 30-Second OEI limiter if neither light is on.
3. Initiate a deceleration passing 50 feet at 45 KIAS.
4. Continue deceleration to running touchdown at or above translational lift. Use collective pitch to cushion touchdown.
5. After touchdown, neutralize cyclic and simultaneously reduce collective to minimum.
6. Apply brakes as necessary to stop within heliport confines.

SINGLE-ENGINE FAILURE DURING APPROACH - ALTERNATE CATEGORY "A" PROFILE

The Alternate Category "A" Landing Decision Point (LDP) is 75 feet above the touchdown elevation at 60 KIAS and a descent rate of not more than 300 FPM. If an engine failure occurs before or at the LDP, the pilot may elect to perform a balked landing or continue the approach to complete a single engine landing. The approach must be continued to touchdown if the failure occurs after the LDP.

Prior to or at LDP - Balked Landing (Go Around)

1. Apply collective to droop N_r to 100%, check N_1 or torque indication at the 30-second limit, and confirm Usage light on. Confirm N_1 , T_5 , and torque indications within limits.
2. Maintain 60 KIAS.
3. When or before the 30-Second Usage light starts to flash, select 2-Minute limiting using the collective limit select switch. Adjust collective to maintain 100% N_r . Confirm operation within limits.
4. With a positive climb rate established, retract the landing gear.

5. When obstacles are cleared, continue climb and gradually accelerate to V_{broc} (best of rate of climb airspeed).
6. When or before the 2-Minute Usage light starts to flash, select OEI MCP limiting and adjust collective to maintain 100% Nr. Confirm operation within limits.
7. Land as soon as practicable.
8. For single-engine climb or cruise at airspeeds above V_{broc} , lower collective as required enabling Nr to increase to 107%.

After LDP - See SINGLE-ENGINE LANDING - ALTERNATE CATEGORY "A" PROFILE below.

SINGLE-ENGINE LANDING - ALTERNATE CATEGORY "A" PROFILE

1. Establish an approach to arrive at the LDP, a point 75 feet above the touchdown elevation, at 60 KIAS and a descent rate of no more than 300 FPM.
2. Confirm 30-Second Armed (green) or Usage (amber) light is on. Select the 30-Second OEI limiter if neither light is on.
3. Upon passing the LDP, initiate a smooth deceleration while reducing collective to continue the descent through 50 feet with up to 20° -25° flare attitude.
4. Apply collective to reduce descent rate and decrease flare attitude to pass 20 feet at approximately 30 KIAS.
5. Continue deceleration to running touchdown at or above translational lift. Use collective pitch to cushion touchdown.
6. After touchdown, neutralize cyclic while simultaneously reducing collective to minimum.
7. Apply brakes as necessary to stop within heliport confines.

DUAL-ENGINE FAILURE

WARNING

Rotor RPM will decrease to an unrecoverable state with resultant loss of control unless autorotation is entered immediately.

GENERAL

Dual-engine failure requires immediate action for a power-off landing. The varied conditions under which engine failure may occur prevent dictating a standard procedure. However, a thorough knowledge of the helicopter's characteristics and will enable a pilot to respond correctly to the emergency. The altitude and airspeed at which engine failure occurs will dictate the action to be taken to effect a safe landing. Should dual-engine failure occur, a safe autorotative landing can usually be made. Upon dual-engine failure, the helicopter will swing to the left, due to the reduction in torque as engine power decreases. An immediate collective pitch reduction will be required to maintain N_r within safe limits. Minimum collective (full down) should be selected until N_r builds to within normal operating range; then a subsequent collective increase adjustment will likely be required to maintain desired N_r within limits. Apply tail rotor pedal as necessary to maintain heading.

DUAL-ENGINE FAILURE WHILE HOVERING OR ON TAKEOFF AT 10 FEET OR BELOW

Settling will be very rapid; however, the landing can be cushioned by rapidly increasing collective pitch prior to ground contact as the helicopter settles to the ground. Decreasing collective could cause an excessive sink rate. The helicopter should be held in a level attitude until contact is made with the ground, then the cyclic control stick should be moved slightly forward of neutral. After ground contact is made, reduce collective pitch to minimum and apply wheel brakes.

WARNING

Excessive displacement of the cyclic control stick aft of neutral will decrease the main rotor blade-tail cone clearance and increase the possibility of striking the tail cone with a main rotor blade.

DUAL-ENGINE FAILURE DURING TAKEOFF AND INITIAL CLIMB

After climb has been started, do this:

1. Immediately decrease collective pitch to minimum and establish a glide at 75 KIAS, when altitude permits. Regulate collective pitch to maintain rotor speed within limits. 100% to 105% N_r should be the optimum for glide to touchdown.
2. Cabin occupants - Alerted.
3. Landing gear - DOWN. UP over water if flotation system is not installed.
4. Make an autorotative landing following procedure in paragraph titled Autorotative Landings in this section.

DUAL-ENGINE FAILURE DURING CRUISE

A safe autorotative landing can be made if the helicopter is being flown at a safe altitude-airspeed combination and there is enough terrain clearance to reach a suitable landing area. When altitude and conditions permit, an air restart should be attempted. If neither engine will start, a normal power-off landing should be made as described in the paragraph titled Autorotative Landings in this section.

1. Reduce collective pitch immediately and establish an autorotative glide at 75 KIAS. Regulate collective pitch to keep rotor speed within limits. A comfortable rate of descent will be reached if Nr is adjusted to approximately 100% to 105%.
2. Landing gear - DOWN. UP over water if flotation system is not installed.
3. Fuel levers - OFF.
4. Engine levers - STOP.
5. Cabin occupants - Alerted.
6. If time and altitude permit, try to restart one or both engines.

NOTE

It will be left to the pilot's judgment, whether to attempt a start or to make an autorotative landing. If an attempt to start is to be made, check Master Start switch is on and perform a normal automatic start with engine lever in the IDLE or FLY position.

AUTOROTATIVE LANDINGS**NOTE**

Autorotative landings for training purposes are not recommended.

Power-off autorotative landing may be safely made except when operating at low altitude and at a low airspeed. These procedures apply after autorotative entry has been completed:

1. Establish a glide at a minimum 75 KIAS with approximately 100% to 105% Nr.
2. Landing gear - DOWN. UP over water if flotation system is not installed.
3. At about 50 to 75 feet, execute a flare to about 20° nose up by moving cyclic stick back with not change in collective pitch. Avoid excessive flare rate that

can result in ballooning. When performed properly, the flare will check the rate of descent and reduce airspeed while causing an increase in rotor RPM.

4. As the flare loses effectiveness and the helicopter begins to settle, smoothly reduce the flare attitude to about 10° nose up.
5. Just prior to ground contact, increase collective to cushion the landing.
6. Maximum desired ground contact speed is 40 knots. Desired nose attitude is +10° or less.
7. Immediately after ground contact, decrease collective pitch smoothly and slowly and neutralize cyclic.
8. Apply wheel brakes.

ENGINE CONTROL MALFUNCTIONS

NOTE

- During operation with an engine in manual reversion (DECU major fault), normal dual engine limiting of the other engine is inhibited. Careful adherence to these emergency procedures will ensure that unnecessary single engine power usage and counting is avoided.
- If desired, refer to specific fault information listed by category and fault in Part 2, Section I.
- Most DECU faults are latched and cannot be corrected in flight by pilot action.

DECU MAJOR FAULT ON ONE ENGINE (MAJOR)

Symptom:

Illumination of the blue ENGINE CONTROL light for the affected engine.

An apparent absence of load sharing, because the affected engine remains at approximately fixed power and does not respond to increasing or decreasing collective inputs.

Confirming:

Blue engine lever handle light of the affected engine is on.

Magenta down facing arrow appears in advisory area of performance display.

The affected engine is in manual reversion, and therefore N₁, torque, and T₅ are constant and unchanged in response to increasing or decreasing collective inputs.

NOTE

- The blue ENGINE CONTROL lights include a press to dim feature that is intended for night operations only. If pressed during daylight operations, the light is difficult to see.
- After a DECU MAJOR fault has been latched, no other faults for that engine can be viewed on the IIDS until after landing.
- A DECU FAIL major fault as announced in the DECU fault area of the IIDS may not be accompanied by the illumination of the respective blue ENGINE CONTROL light or engine lever handle light. The engine is in manual reversion and will not respond to increasing or decreasing collective inputs. In this condition, T₅ and N₁ indications will be the backup values, and torque will be absent.

Action:

During Takeoff

If fault occurs in hover prior to initial power application for takeoff, land and investigate.

If fault occurs after initial power application, continue takeoff and climb. When power is changed to alter climb rate or establish cruise flight, confirm that affected engine does not respond to the collective input. If necessary to maintain 107% N_r or to ensure that both engines remain within limits, adjust the engine lever, confirmed by the blue lighted handle, at a rate not greater than 1 inch per second. See recommendations paragraph below. Land as soon as practicable.

Depressing the DECU FAULT ACCESS switch may access the specific fault and status or recommendation. Depress the DECU FAULT ACCESS switch again to view advisories if desired.

During Cruise

If necessary to maintain 107% N_r or to ensure both engines remain within limits, adjust the manual engine lever, confirmed by the lighted blue handle, at a rate not greater than 1 inch per second. See recommendations paragraph below. Land as soon as practicable.

During Approach or Landing with DECU MAJOR Fault

CAUTION

Landing with an engine in manual reversion is approved without restriction for two pilot operation only. During single pilot operation, the approach and landing maneuver with an engine in manual reversion is to be performed to areas offering at least 2,000 feet of landing surface.

A slow descent rate, 40-knot steep approach is recommended to minimize manual engine lever adjustment upon transitioning to hover. At 40 knots in level flight, confirm and adjust the manual engine lever to set as much as 30% torque. Remain prepared to readjust as required to maintain 107% Nr when initiating the descent, but in most cases the 30% value can be sustained until late in the approach.

Anticipate the power required to terminate the approach, and passing 50 to 100 ft, begin increasing the contribution of the manual engine to as much as 70% torque while maintaining 107% Nr. All manual engine lever inputs must be controlled at a rate not greater than 1 inch per second. Ensure that both engines are maintained within limits.

Reduce the manual engine lever at ground contact before lowering collective. See recommendations paragraph below.

Recommendations:

Remain aware of the power contribution of the unaffected normal engine. It can provide total rotor governing at 107% Nr if it is not constrained at the high end by a maximum power limit or at the low end by the inability to reduce total power once it has reached zero torque. As much as possible, use smaller and slower, careful collective inputs to bracket the power level of the normal engine between a minimum and maximum level; a range of 5% torque to takeoff power is recommended. With no increase in pilot workload, normal rotor governing at 107% with no risk of limit exceedance may be expected if the guideline is followed.

When transitioning to a descent that would result in a power level less than the recommended 5% value, retard the manual engine lever as required to rerange the normal engines power level upward, and similarly, when transitioning to a higher power condition where the nominal engine would exceed takeoff power, advance the manual engine lever to rerange the normal engine downward. Manual engine control inputs must be at a rate not greater than 1 inch per second.

Other than transitioning to approach and then to hover or run-on, it is expected that most flight tasks can be accomplished without adjustment of the manual engine lever.

DECU MAJOR FAULTS ON BOTH ENGINES**Symptoms:**

As described for DECU MAJOR faults on one engine.

Confirming:

As described for DECU MAJOR faults on one engine except that both engines remain at fixed power. Neither engine will govern.

Actions:

All collective inputs must be small and deliberate. If increased power is desired, increase collective first and follow with manual throttle to reestablish 106-108% Nr. If decreased power is desired, decrease manual throttle first and follow with collective. Attempt to maintain rotor rpm at or to the low side of the reference. All engine lever inputs must be at a rate no greater than 1 inch per second.

Select a landing area offering at least 2,000 ft of usable surface. The approach and landing profile must be a steep, slow rate of descent, constant angle profile that will minimize power changes during the approach. A roll-on landing is recommended. All engine lever inputs must be at a rate no greater than 1 inch per second.

DECU DEGRADED FAULT**Symptoms:**

Degraded engine control performance or an abnormal engine indication is observed; i.e., one engine lagging behind the other during power increase or decrease, small transient Nr overshoots or undershoots of the 107% reference, steady state trimmed Nr is outside the 106% to 108% normal operating range, degraded N1 matching, N1 indicator OEI light(s) displayed with both engines operating in FLY within limits, or an abnormal shift in torque or T5 relationship between engines.

A magenta arrow is displayed in the advisory area of the IIDS performance display.

Confirming:

A DECU DEGRADED fault is displayed on the IIDS for the effected engine after depressing the DECU FAULT ACCESS switch. Scroll downward for multiple faults when shown by the presence of a magenta arrow. All faults have

been acknowledged when no magenta direction is present. Acknowledged faults can be reviewed by following the cyan direction.

Possibly, one or both amber mixed mode lights are on.

Actions:

If engine control abnormality is observed prior to initiating takeoff, land and investigate.

As much as possible, reduce the magnitude and rate of collective inputs to minimize any observed undesirable effect without compromising normal flight tasks. If N1 indicator OEI light(s) displayed, consider selecting the OEI MCP limit. In the event of a large torque split with an N1 indicator OEI light displayed, consider selecting OEI MCP to enable power contribution of the low engine when the high engine reaches the limit. Avoid aggressive maneuvering flight.

NOTE

Some faults will inhibit the default to 30-Second power in the event of an engine failure.

Use caution when proceeding with OEI MCP selected and select the desired limit, 30 seconds or 2 minutes, if required.

If an abnormal parameter indication or shift in relationship between engines is observed, carefully monitor and use the indications of the other engine as a guide when operating near limits.

If an amber mixed mode light is on, adjust the engine lever as required to extinguish the light.

Depress the DECU FAULT ACCESS switch to display advisories if desired.

Land as soon as practicable. If desired, refer to the degraded fault information listed in Part 2, Section I for any specific recommendations.

DECU MINOR FAULT

NOTE

Minor faults are, for the most part, not detectable in flight. Some are single sensor faults where the redundant backup is used, others are faults where the same component from the other engine serves as backup, and the remainder include faults that may affect engine shutdown or start-up for the next flight but do not affect the present flight.

Symptoms:

A minor fault is displayed on the IIDS after depressing the DECU FAULT ACCESS switch. Scroll downward for multiple faults when shown by the presence of a magenta arrow. All faults have been acknowledged when no magenta direction is present. Acknowledged faults can be reviewed by following the cyan direction.

Actions:

Reduce the magnitude and rate of collective inputs to minimize any observed transient degradation in N1 matching that may accompany faults that use cross channel information.

If desired, refer to the minor faults information listed in Part 2, Section I for any specific recommendations especially prior to initiating manual reversion training or operation in mixed mode, and prior to shutdown.

Depress the DECU FAULT ACCESS switch to display advisories if desired

Continue flight.

ENGINE CONTROL OSCILLATIONS (Without Detected Fault Category)**Symptoms:**

Unsteady engine operation, random or periodic uncommanded oscillations, significantly degraded N2 governing, or large torque swings.

Confirming:

No faults displayed on the IIDS after depressing the DECU FAULT ACCESS switch, or the emergency procedures described above for major, degraded, and minor faults have not been effective.

Actions:

While observing N1, make several collective inputs up or down and attempt to judge which engine's N1 follows the collective input. Using mixed mode, reduce the engine lever of the engine that did not follow the collective input to a decreasing power level until the oscillatory response is reduced. If the oscillations degrade, return the engine lever to the detent and repeat the process using the other lever.

Also review the DECU DEGRADED FAULT procedure above to determine whether an unannounced fault has been latched.

Manual reversion may be selected on the suspected engine if mixed mode proves to be ineffective.

Land as soon as possible.

ENGINE OVERSPEED CAUTION LIGHT ON (In Powered Flight)

Symptom: No. 1 or No. 2 overspeed caution light on - There is a system malfunction resulting in a loss of overspeed protection.

Action: Proceed with the flight. Perform corrective maintenance before the next flight.

ENGINE AUXILIARY SYSTEMS FAILURE

ENGINE OIL SYSTEM FAILURE

NOTE

If engine oil pressure is observed to be above the normal operating range, continue the flight. Upon landing, make an appropriate notation in the aircraft maintenance log.

Symptoms: 1 or 2 OIL PRESS warning light on and engine oil pressure below 18 PSI, or engine oil temperature above 115°C.

Action: Transition into single-engine flight if possible. Shut down affected engine and land as soon as practicable.

If single-engine flight is not possible, select manual reversion on the affected engine, and reduce its power contribution to the minimum required to reach a landing site. Land as soon as possible following specific landing procedures described under DECU MAJOR FAULT ON ONE ENGINE.

NOTE

A single indication of low oil pressure, indicator or warning light, should not be treated as an oil system failure unless it can be verified that the other indicating system has failed or there is some other failure indication.

FUEL PRESSURE WARNING LIGHT ON

Illumination of the 1 or 2 FUEL PRESS warning light indicates that the engine fuel pressure at the high-pressure pump inlet has fallen below 25 PSI.

Blockage or Failure of the engine low-pressure ejector pump could cause loss of fuel pressure. The engine should operate normally with an ejector pump failure, but the condition must be corrected prior to the next flight.

Low fuel pressure fluctuation might be caused by air in the engine fuel line, which could be caused by a leak in a fuel line or impending fuel starvation. Such causes will usually result in unsteady engine operation, including fluctuation in output torque, N1, T5, and possibly unsteady rumbling noises.

Symptoms: Initial: 1 or 2 FUEL PRESS warning light on.

Confirming: Possibly none or if a fuel line leak or impending starvation, erratic fuel flow indication, and fluctuating N1, T5, or torque.

Action: Note discrepancy. Correct prior to next flight. Consider crossfeed if judged to be a fuel quantity condition.

If other engine parameters indicate a possible engine problem, adjust flight conditions to minimize impact of possible engine failure. Land as soon as practicable.

FUEL FILTER CAUTION LIGHT ON

Symptom:

1 or 2 FUEL FILTER caution light illuminates.

Action:

Continue flight. Perform corrective maintenance before next flight.

FUEL FLOWMETER BEYOND NORMAL RANGE

If a fuel flowmeter indicates erratically or goes beyond normal range (will display dashes, =, above 600 PPH), cross check the other engine indicators (N1, T5, torque, fuel pressure caution light). If all other indications are normal, continue the flight and monitor the other engine instruments closely.

ANTI-ICE CAUTION LIGHT ON

The anti-ice caution light for each engine is on in the following cases:

- (A) Anti-ice switch ON but
Engine anti-ice bleed air failed.
- (B) Anti-ice switch OFF but
Engine anti-ice bleed air on.

- Symptoms: Either engine anti-ice caution light on --
 That engine anti-ice switch ON and
 That engine anti-ice advisory light is off.
- Action: Assume anti-ice failure on that engine --
 Land as soon as practicable
 Anticipate possible ice ingestion (if in icing condition) on effected engine.
- Symptoms: Either engine anti-ice caution on --
 That engine anti-ice advisory light on --
 That engine anti-ice switch OFF.
- Action: Assume anti-ice bleed air is flowing on affected engine. Check AI
 CONT circuit breaker in and cycle anti-ice switch to attempt to
 reset anti-ice valve. If reset is unsuccessful, plan on slightly
 reduced power available on affected engine.

NOTE

(Helicopters equipped with snow protection kit)

- The engine anti-ice caution light of the affected engine will go on if the inlet heater pads of the ice protection kit should overheat or fail to achieve proper operating temperature when the respective engine anti-ice switch is on. The engine anti-ice advisory light will remain on when this occurs indicating proper operation of the engine anti-ice bleed air system.
- If any element of the snow protection kit should fail, flight in snow conditions should be avoided.

ELECTRONIC FLIGHT INSTRUMENT SYSTEM (EFIS) MALFUNCTIONS

In the event of a failure of any component in the EFIS master switch system, a Radio/EFIS master bypass panel is provided to supply power directly to each EFIS 28 vdc bus. If a failure is detected by the absence of power on either EFIS, the appropriate switch on the Radio/EFIS master bypass panel may be activated to the BYPASS position.

A CRT FAN FAIL annunciator is provided to annunciate a fan failure. If a CRT fan fails in flight, continue to destination. Correct the malfunction, if required, before the next flight.

When dual pilot and CRT failure requires use of composite mode, use the remaining full pilot display for an approach. If single pilot and composite mode is required, use radar vectors for precision approach positioning, since ADF information is not available on the composite display.

In the event of a failure of the 5x6 altimeter or airspeed display during flight, the pilot should use the corresponding pitot statically powered instrument displays for altitude or airspeed, and land as soon as practicable.

Failures of SG, ATT, HDG. and ADC can be handled by reversion to alternate sources. Refer to the EDZ-756 EFIS Pilot's Manual for specific procedures.

ENGINE INSTRUMENTS MALFUNCTIONS

N1 INDICATOR OR TORQUE INDICATOR MALFUNCTION

Action: Revert performance display to different position and reassess.

Use the torque indicator and N1 of the unaffected engine to manage power.

The N1 indication source is redundant. The indicator will display a corrected backup signal if the primary source fails.

T5 INDICATOR MALFUNCTION

Symptom: T5 indicator inoperative.

Sudden shift in T5 relationship with respect to other engine parameter or T5 of the other engine.

Actions: If T5 indication is abnormal, alter required power, when able, to remain within limits and compare indications to N1, T5, fuel flow, and torque of other engine to determine validity.

ENGINE CHIP DETECTOR CAUTION LIGHT ON

Symptoms: 1 ENG CHIP or 2 ENG CHIP caution light on.

Action: Pull and reset CHIP DET circuit breaker of affected engine.

If light remains off, continue flight.

If light comes back on, transition to flight conditions suitable for single-engine operation, retard the affected engine to IDLE, and land as soon as practicable. During the approach to landing, it is permissible to readvance the engine to FLY and complete a normal dual engine landing. Check the engine instruments for secondary malfunction indications before advancing the engine lever. If secondary indications are evident, refer to the applicable procedure. After touchdown, initiate the 30-Second cooldown and secure the engine as soon as possible. Refer to the Maintenance Manual actions required prior to subsequent flight.

If single-engine flight is not possible, select manual reversion on the affected engine and reduce its power contribution to the minimum required to reach a landing site. Land as soon as possible. Upon transitioning to the approach, exit manual reversion, reselect FLY, and complete a normal dual-engine landing. After touchdown, initiate the 30-Second cooldown and secure the engine as soon as possible. Refer to the Maintenance Manual for actions required prior to subsequent flight.

MAIN GEAR BOX SYSTEM FAILURES

The most common main gear box system malfunctions are of three general types: (1) lubrication system failure, (2) transmission component failure, and (3) transmission accessory failure. The pilot has a cockpit gage indicating oil temperature and pressure and three caution lights monitoring low oil pressure, high oil temperature and chip detected, which inform him of the operating condition of the system. A thorough knowledge of the main transmission and accessory systems will enable the pilot to evaluate the indications available to him, diagnose problems, and act accordingly. In general, a single failure indication dictates that the helicopter be landed as soon as practicable. If multiple failure indications, including abnormal noise and/or vibration, are noted, land immediately.

MAIN GEAR BOX OIL SYSTEM FAILURES

Main Gear Box Oil Pump Failure

Symptom: Oil pressure falls to 40 to 45 PSI and remains steady.

Action: Land as soon as practicable. Monitor main transmission gages and caution light for further failure indications.

NOTE

The remaining pump will normally provide adequate lubrication for the main gear box.

Low Oil Pressure

Symptom: MGB PRESS warning light on.

Confirming: Main transmission oil pressure less than 20 PSI.

Action:

Over Land

Land as soon as possible.

Descend to a minimum safe altitude and reduce airspeed to 80 knots if required to reach a landing site.

If loud or unusual noises or high vibration levels occur, land immediately.

Over Water

Descend to a minimum safe altitude, proceed to the nearest landing site, and reduce airspeed to 80 knots. Land as soon as possible.

If loud or unusual noises or high vibration levels occur, land immediately.

Most likely cause of low oil pressure is an excessive loss of transmission oil. Other indications such as high temperature or chips detected may or may not occur. Do not attempt further flight until cause of low-pressure indications has been corrected.

High Oil Temperature

Symptom:

MAIN XMSN OIL HOT warning light on.

Confirming:

Main transmission oil temperature above 120 °C.

Action:

Reduce power, and land as soon as practicable. If oil temperature rises above 135 °C or if oil pressure drops, land as soon as possible.

NOTE

If the indicated oil temperature remains above 120 °C, a transmission oil cooler malfunction is indicated. Transmission oil temperature should be controlled by avoiding high power settings and/or prolonged hovering.

Main Gear Box Chip Detector

The main transmission is equipped with Fuzz Burn type chip detectors.

Symptom:

MAIN XMSN CHIP caution light on.

Action:

Pull and reset MGB CHIP DET circuit breaker.

If light remains off, continue flight.

If light comes back on, land as soon as practicable.

In case of secondary failure indications such as an oil pressure loss or temperature rise, land as soon as possible. Operate at best rate of climb speed (minimum power required) and at a safe minimum altitude.

If loud noises or high vibration levels occur, land immediately.

**INTERMEDIATE OR TAIL GEAR BOX CHIP/HIGH OIL TEMPERATURE
DETECTED**

Symptom:

INT GB CHIP/HOT or TAIL GB CHIP/HOT caution light on.

Action:

Pull and reset the DET I/TGB circuit breaker.

If light remains off, continue flight.

If light comes on, land as soon as possible.

If loud noises, smoke or high vibration levels occur, land immediately. Anticipate tail rotor loss of thrust. (See TAIL ROTOR MALFUNCTIONS.)

Intermediate and tail gear boxes have combination high-temperature and fuzz burn chip detectors.

ROTOR BRAKE CAUTION LIGHT ON – ROTOR TURNING

Symptom:

ROTOR BRAKE caution light on.

Action:

During start or shutdown on ground:

Shut down and investigate.

During Flight:

Rotor brake handle - Check in detent.

If ROTOR BRAKE caution light remains on, investigate for rotor brake fire (smoke, unusual noises or vibrations, etc.). If rotor brake fire is suspected, land immediately.

The ROTOR BRAKE caution light indicates that pressure has been applied to the rotor brake system. If this pressure results in a rotor brake puck dragging against brake disk, an overheated brake disk and possible rotor brake fire might occur.

FLIGHT CONTROL HYDRAULIC SERVO SYSTEM FAILURE

Complete control of the helicopter can be maintained through either stage of the flight control system; however, prolonged operation with only one servo system operating is not recommended. This is an emergency condition, since control is not possible with both servo systems inoperative. Flight conditions and route should be chosen which would allow a safe immediate landing.

PUMP FAILURE OR LOSS OF PRESSURE IN BASIC HYDRAULIC SYSTEM

Symptom:

#1 or #2 SERVO SYSTEM caution light on (below 1,600 PSI).

Confirming:

Decrease in corresponding gage pressure.

Action:

1. Servo switch - Failed system OFF if no usable pressure remains or if erratic pressure is observed.
2. Reduce airspeed to 125 KIAS or lower.
3. Land as soon as possible.
4. If controls bind or are restricted, land immediately.

NOTE

If the second stage has malfunctioned and flight range considerations permit, immediately lower the landing gear. If gage pressure has decreased to below about 2,000 PSI, it may be necessary to use the emergency landing gear system to lower the landing gear.

LOSS OF HYDRAULIC PRESSURE TO THE TAIL ROTOR SERVO

Symptom: #1 and #2 SERVO SYSTEM caution lights on. Extremely high pedal forces required to control heading. Collective drives down with left pedal and up with right pedal.

Confirming: No. 1 system pressure normal.
No. 2 system pressure decreasing or zero.

Control of the helicopter can be maintained in the unlikely event that pressure is lost in both hydraulic lines to the tail rotor servo. Transient response and the degree of uncoordinated trimmed flight will depend upon the initial flight condition, whether level cruise, climbing, descending, high speed, slow speed, or hover.

Due to the mechanical interaction of pedals and collective within the mixing unit not normally seen when the tail servo is functioning, the collective will drive when a force is applied to move pedals, and the pedals will similarly move if not restrained when a collective input is made. Pedal motion is indicative of mixer unit interaction and not tail rotor pitch control. Attempting to react pedal and collective forces within normal capability will result in some contribution to yaw control although priority should be given to collective input at the expense of heading control when necessary to control altitude or prevent unplanned ground impact.

While the following procedures are intended to provide optimum control of the helicopter, some uncoordinated flight is to be expected in transitioning from the initial flight condition, through the approach, and up to the landing. Make all control inputs smoothly and gradually to soften any transient response.

Action:

- Cruise Flight:
1. Reduce airspeed to 125 knots and proceed to a location where a run-on landing can be made.
 2. Lower the landing gear using the landing gear emergency T-handle.
 3. Initiate a long shallow approach, gradually reducing airspeed to 45 knots. During the transition to 45 knots, the helicopter will yaw left and it may be desirable to accept some left yaw instead of trying to overcome the collective load. As the 45-knot airspeed range is approached, less pedal and collective force will be required to maintain heading.
 4. When over the landing surface, level the helicopter at 45 knots. The helicopter should be in nearly coordinated flight.

5. Perform a run-on landing.
6. After touchdown use differential braking to maintain heading.

CAUTION

Do not allow airspeed to go below 45 knots during the approach.
If below 45 knots DO NOT attempt a go around.

- Below 45 Knots:** Varying amounts of right yaw will be experienced depending on airspeed and gross weight. It will require the pilot's judgement as to whether the pedal and collective loads are manageable enough to gradually continue to 45 knots. If the determination is made to continue, follow the approach procedure in the section under cruise flight. If the yawing is unmanageable, level the aircraft and land immediately.
- Hover:** The aircraft will immediately yaw right. Left pedal force required to arrest this yaw would be so great that the resultant down collective load will be very difficult to override. As much as 200 pounds left pedal force resulting in 50 to 70 pounds down collective load may be expected. Therefore, level the aircraft and land immediately.

SERVO UNIT JAM OR MALFUNCTIONING SERVO SHUTOFF VALVE

Symptom:

#1 or #2 SERVO SYSTEM caution light on and corresponding hydraulic gage pressure normal.

Confirming:

Both system gage pressures - Normal.

Both flight control servo switches - ON.

Action:

1. Reduce airspeed to 125 KIAS or lower.
2. If binding or restrictions in the controls are felt, shut off failed system and land as soon as possible.
3. If binding or restriction in the controls does not disappear after failed system is shut off, land immediately.

4. If no binding or restriction in controls is felt, recycle appropriate SVO JAM circuit breaker on DC ESNTL bus panel. If appropriate SERVO SYSTEM light goes off, a momentary jam is indicated. Continue for a landing as soon as practicable.
5. If SERVO SYSTEM light remains on after step 4., either a jam or malfunctioning servo shutoff valve is indicated or, additionally, a tail rotor servo system hydraulic leak may have been isolated if the #1 SERVO SYSTEM has been the problem system. Land as soon as possible.

NOTE

- When a SERVO SYSTEM caution light goes on in flight, a holding relay will keep the light on even if the cause was momentary. Since the holding relay operates through the landing gear interlock that functions only when the helicopter is airborne, the caution light will go off upon landing if caused by a momentary jam condition. The caution light may be cleared in flight by recycling the appropriate SVO JAM circuit breaker on the DC ESNTL bus panel.
- Troubleshooting a malfunctioning servo shutoff valve; specifically, pulling the NO. 1 SVO SHUTOFF circuit breaker, will defeat the tail servo isolation protection resulting in possible system depletion if an actual leak had been isolated.

FLIGHT CONTROL DAMPER JAM

Symptom:

Cyclic or collective control of pitch, roll, or collective will not move with normal hand-control pressure.

Confirming:

Typically, only one axis is involved, and remaining axes are normal.

Action:

If on the ground, shutdown and investigate. In flight, check that securing the affected trim system does not alleviate jam and a foreign object does not impede that cockpit controls travel.

Applying increased hand-control pressure will relieve a shear device within the jammed flight control damper. Typical amount of force required is:

Collective	55 - 62 pounds
Pitch	17 - 20 pounds
Roll	35 - 40 pounds

TAIL ROTOR MALFUNCTIONS

Tail rotor malfunctions can be classified generally as drive system or control system failures. The helicopter's reactions and consequences of tail rotor failures will vary widely, depending upon the type of failure and the flight condition of the helicopter at the time of the failure. In general, however, control system failure is less critical than drive system failure.

TAIL ROTOR DRIVE SYSTEM FAILURE IN FORWARD FLIGHT

Since tail rotor drive system failures may produce a large response from the helicopter it is very important to recognize impending failure. Excessive noise or vibration in the tail section will usually precede the failure. When this occurs at high speed, immediately slow to 100 to 110 KIAS. Tail rotor drive system failure is always accompanied by a sharp yaw to the right. Reduce collective as necessary to control the yaw. Autorotate if necessary to control yawing rate. When a landing is to be made:

1. Autorotate.
2. Maintain airspeed of 75 KIAS.
3. Landing gear - DOWN. UP over water if flotation system is not installed.
4. Engines - Shutdown before touchdown.
5. Execute autorotative landing.

NOTE

Ground contact speed must be held to a minimum to reduce the tendency to roll over due to yaw.

TAIL ROTOR DRIVE SYSTEM FAILURE IN A HOVER

1. Maintain helicopter attitude and attempt to achieve zero groundspeed and drift.
2. Engine levers - STOP at about 10 feet if possible.
3. Increase collective to cushion landing.

TAIL ROTOR CONTROL SYSTEM FAILURE

The most probable tail rotor control failures are jammed or binding controls, before or after the mixing unit. An interruption of the control system such as a severed control cable is also possible. The helicopter's reaction and the cues available to the pilot will vary widely with flight regime.

Depending upon the origin of the interference, the pedals may not be movable (control bind or interference between the pedals and the collective to yaw control mixer), or movable through a restricted range (blocked pedal damper orifice). Full collective control is available under these conditions and normal collective to yaw inputs to tail rotor pitch will be available. Minimal yaw control loss will result from this condition.

Fixed Pitch Setting - General

A control bind or interference aft of the mixer output will result in a fixed tail rotor pitch situation. Full collective control is available when this occurs only if the pilot allows the pedals to move simultaneously with collective. No tail rotor pitch control is available, and adverse yaw proportional to the amount of collective change should be expected. Therefore, in this fixed tail rotor pitch condition, disregard pedal motion as an indicator of potential tail rotor control.

The technique for landing the helicopter will vary greatly, depending upon the resulting tail rotor thrust. A practice approach at altitude may be useful in predicting yaw response as a function of airspeed, but care should be taken to avoid slowing beyond safe limits. Yaw SAS will continue to provide short-term damping reducing gust-related disturbances and both channels should be selected on, if available. In general, touchdown will be made with some yaw. Attempt to land with a minimum rate-of-descent. Touchdown should occur first on the most forward main landing gear. Counter roll tendency with cyclic while allowing nose of helicopter to pivot toward direction of landing. After touchdown, slowly lower collective to minimum and use differential braking to control helicopter on ground.

Fixed Pitch Setting - Reduced Power

The helicopter will swing right as power is applied, with the amount and rate of yaw proportional to the amount and rate of power applied. Decrease power as necessary to control the heading of the helicopter. Make a roll-on landing at the speed, up to 40 knots, which results in minimum yaw on touchdown.

Fixed Pitch at High Power Settings

The helicopter will swing left as collective pitch is reduced, at a rate and amount proportional to the rate and amount of collective reduction. Make an approach and landing, accepting some left yaw on approach. Touch down at a speed slow enough to permit an increase of collective at touchdown to minimize yaw.

Consideration might be given to selecting a runway with a right crosswind, which will reduce some of the adverse yaw on touchdown.

Fixed Pitch Setting at Cruise Power

The helicopter will swing left or right as power is reduced or added, although in general the reaction should be milder than in the previous cases described. Plan approach and landing to touch down at the airspeed below 50 knots that corresponds to the cruise power setting.

Tail Rotor Cable Failure - Centering Spring Active

Normally passive, the centering spring(s) will become active upon the failure of the respective control cable(s). Upon recognizing a tail rotor cable failure, proceed to a landing area offering at least 2,000 feet of surface. Crosswind landings with winds greater than 10 knots are not recommended. Yaw SAS continues to provide short-term damping that reduces gust related disturbances and both channels should be selected on.

If insufficient yaw control remains to enable trimmed flight, accept the sideslip and fly the helicopter along a desired track using lateral cyclic. A single cable failure will affect tail rotor control from the centering spring position (-2°) in failed direction only, leaving full control in the opposite direction by means of the remaining cable. Although the helicopter may continue to fly normally enroute and during descents, it is recommended that the following dual cable failure landing procedure be followed to complete a roll-on landing as soon as the helicopter heading is satisfactorily aligned with the runway.

Landing Procedure - Tail Rotor Control Cable Failure, Centering Spring Active

Initiate a long shallow approach, commencing descent at about 80 KIAS. Plan approach to be established low, on short final, with 60 KIAS. Expect heading to remain left of track but responsive to collective change, yawing further left with collective reduction and right with collective increase.

When over the landing surface, arrest remaining rate of descent with a gradual cyclic flare that results in a level flight deceleration to 40 KIAS. Use small collective inputs as necessary and continue a level flight deceleration at 10 feet wheel height or lower. Left yaw will decrease, as airspeed decreases and power required increases. Plan touchdown point to occur as helicopter heading becomes aligned with runway. Do not attempt to slow beyond where an acceptable yaw attitude is realized. After touchdown, gradually reduce collective while maintaining runway heading with differential braking.

A balked landing is executed during the approach by adding sufficient collective to initiate a gradual acceleration while establishing a shallow climb. As airspeed increases, additional collective may be used if a steeper climb is desired. A

balked landing should not be attempted once the nose swings right of center. Collective application beyond this point can result in a continuing flat rotation to the right.

CAUTION

Large control inputs at moderate to rapid rates are to be avoided. Collective applications, especially, should be slow and deliberate, not exceeding that required to gradually transition from one flight regime to the next (approach to balked landing, descent to level off, and touchdown to rollout are examples).

TAIL ROTOR DAMAGE

Damage to the tail rotor can be noted by a sharp increase in tail rotor vibration. Slow to about 90 KIAS and land as soon as possible.

FIRE

ENGINE COMPARTMENT FIRE

Symptom:

#1 or #2 FIRE warning light and respective T-handle light on with continuous tone heard.

Confirming:

Smoke, burning odor, or erratic engine indications.

Action:

Reset tone by pressing a FIRE warning light.

With fire confirmed, establish safe single-engine flight while fully retarding the illuminated T-handle of affected engine.

Place fire extinguisher switch to MAIN. An extinguishing of the appropriate fire warning light and T-handle is supportive information the fire has been arrested. If fire persists, place fire extinguisher switch to RESERVE.

If any sign of fire still persists, land immediately, otherwise land as soon as possible.

Shut down and leave helicopter immediately.

INTERNAL ENGINE FIRE AFTER SHUTDOWN**Symptom:**

Smoke, flames and/or a rapid increase in T5.

Confirming:

No FIRE warning light or tone.

Action:

With engine lever at STOP and trigger released, press and hold starter button to motor engine.

If smoke or flames persist, fully retard T-handle and continue to motor engine while fire guard discharges an extinguisher into engine air intake.

If fire persists, shut off all switches and leave helicopter.

NOTE

If fire-warning lights should go on at any time during this procedure, follow procedure in the paragraph titled ENGINE COMPARTMENT FIRE.

CABIN OR COCKPIT FIRE

1. Begin a descent, if able.

CAUTION

If smoke accumulation becomes a problem, execute SMOKE AND FUME ELIMINATION procedure below and continue to fight fire.

2. Close all cabin ventilation.
3. Heater control BLEED AIR switch - OFF.
4. Determine location and extent of fire. Use portable fire extinguisher.
5. Land as soon as possible and shut down.
6. If fire is not out, land immediately and leave helicopter.

BAGGAGE COMPARTMENT SMOKE DETECTED

Symptom:

SMOKE DET BAGGAGE warning light illuminated.

Confirming:

Unusual smell or smoke.

Action:

Land as soon as possible. Inspect baggage compartment and fight fire with fire extinguisher if required.

NOTE

The baggage compartment is sealed so that harmful quantities of smoke will not enter the cockpit and cabin. Large quantities of smoke in the baggage compartment will probably be smelled in the cockpit/cabin area.

SMOKE AND FUME ELIMINATION

The following procedures will eliminate smoke and fumes from the cockpit and cabin.

1. Pilot's clear view window - OPEN.
2. Heater BLOWER switch - ON. Turn OFF if smoke or fumes are noted coming from cabin or cockpit air outlets.
3. Door vents and cabin exhaust ducts, if equipped - OPEN.

ELECTRICAL FIRE

Electrical fires are generally indicated by a smell of burning insulation and/or acrid smoke. As in any fire, the most important consideration is to maintain safe flight while dealing with the fire. When detecting an electrical fire, the pilot must shut down any unnecessary electrical equipment.

If in VMC, perform the following:

Turn off both DC generators, the AC generator, and the inverter(s), and pull DC bus-tie circuit breakers (2) on the DC primary circuit breaker panel. Choose the appropriate action.

Action:

- If fire persists, turn on all generators and inverter(s), and turn off battery. The fire should go out. Land as soon as possible. The emergency blowdown system will be required for landing gear extension.

or

- If fire goes out, restore the following equipment in sequence. Allow a brief interval between actions to assess response. Disengage the component if signs of fire return. Land as soon as possible.
- AC generator
- No. 1 DC generator, and if fire remains out, reset the bus-tie circuit breakers (2).

If in IMC, transition immediately to VMC flight if possible. If it is not possible to achieve VMC flight and the source of the fire is not evident, see Figure 3-1.

LANDING GEAR MALFUNCTIONS

The lighting of all three green gear down indicator lights and the red UNLKD gear warning light going off indicate normal gear extension. Complete retraction will result in all four lights going off. Any other indications must be assumed unsafe and require the following emergency action.

NOTE

- Once a safe down indication is obtained, the landing gear should not be cycled. Land gently, have the gear pinned, and shut down. Taxi operations with unpinned gear should be avoided. Also avoid the use of the rotor brake with unpinned gear.
- If gear cannot be made to extend completely or cannot be pinned, a landing on a cradle or similar fixture should be made (mattresses, sandbags, etc.). An asymmetrical gear extension could increase roll tendency. Landing with all wheels up would probably not lead to roll over. Consider evacuation of passengers and unrequired crew while at a hover; avoid rapid deceleration of rotor.

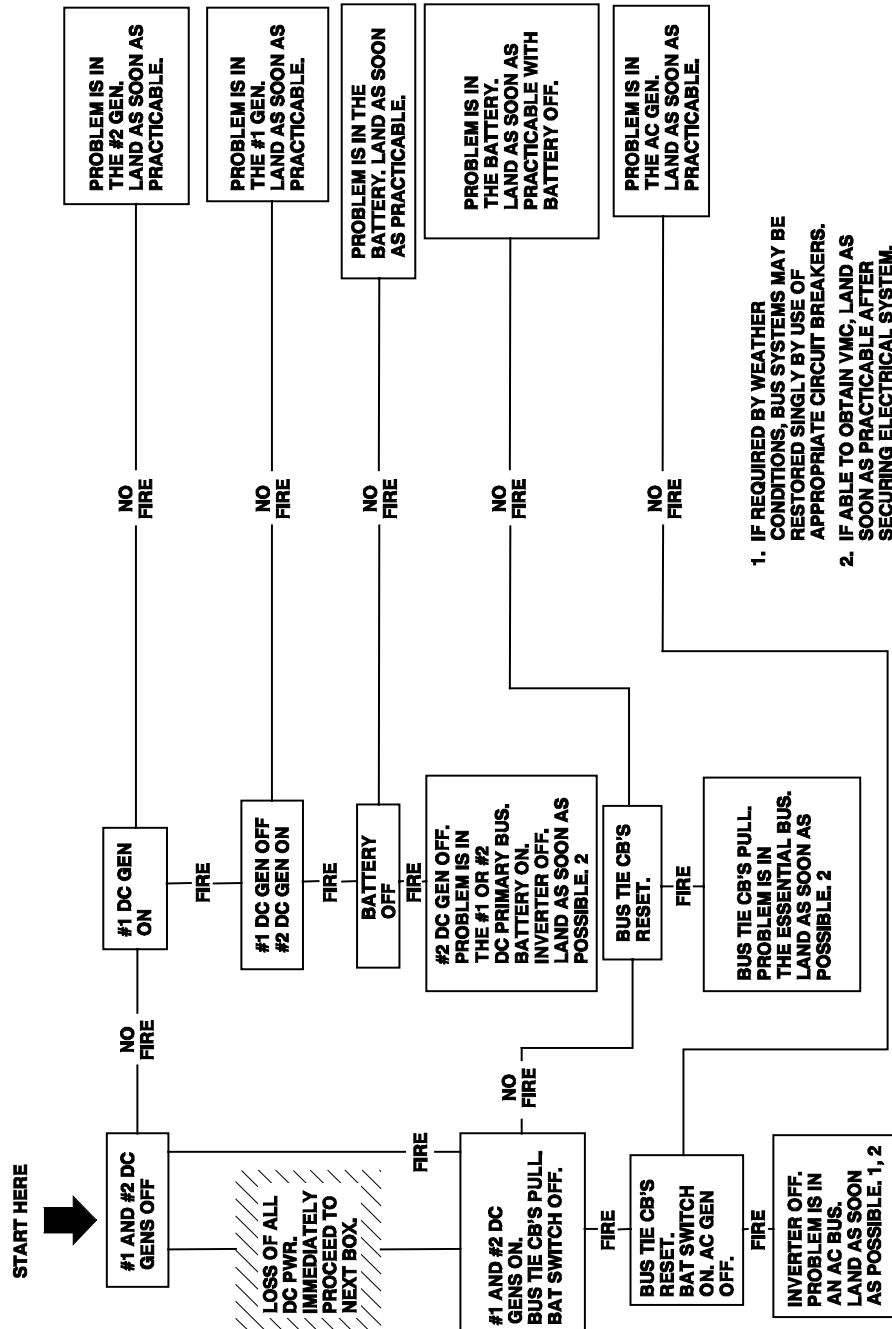


Figure 3-1. Electrical Fire Procedures, IMC

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LANDING GEAR WILL NOT EXTEND**NOTE**

Absence of normal No. 2 hydraulic pressure or DC essential bus power requires the use of the emergency landing gear blowdown system.

Symptom:

On lowering the gear handle, none of the three green indicator lights illuminate within the normal extension period.

Action:

Press any IIDS test button and check landing gear lights.

Slow to about 80 KIAS.

Check that LDG GR CONT and LDG GR POS LTS circuit breakers are set.

Attempt to cycle the gear handle several times and leave down.

On final approach before reaching a hover, check that the normal gear handle is selected DN, and then turn and pull the emergency landing gear T-handle to discharge the blowdown bottle.

A three green safe indication is to be expected following use of blowdown.

NOTE

Once blowdown bottle has been discharged, do not attempt to raise landing gear. Maintenance is required prior to next flight.

Complete the landing by touching down lightly. Have a crewman pin the gear prior to taxi or shutdown.

UNSAFE INDICATION - GEAR EXTENSION**Symptom:**

On lowering gear handle, one or two of the three green indicator lights do not light, and/or red UNLKD light remains on.

Action:

If a green light is off, press test button on caution-advisory panel. If light does not test, switch light bulb with one of other lights and check for a safe indication.

Slow to about 80 KIAS.

Check that LDG GR CONT circuit breaker is set.

Cycle landing gear several times.

CAUTION

If any indications of a jammed gear are present, leave gear handle DN.

If landing gear still does not extend, hover and have someone outside examine landing gear. Consider having ground crew make a careful attempt to pull gear into place. Use of the emergency blowdown system is not recommended for cases with mixed safe and unsafe indications.

If at this point the gear appears to be extended and/or a safe gear indication is obtained, touch down lightly and have crew pin gear. Do not put weight on or taxi on unpinned gear.

UNSAFE INDICATION - GEAR RETRACTION

Flight above 130 KIAS is not authorized with the landing gear extended or partially extended.

Symptom:

With gear handle UP, one or more green indicator lights or the red UNLKD light remain on.

Action:

Slow helicopter to 80 KIAS.

Lower gear handle. If a safe down indication is obtained and destination can be reached with gear down, continue flight at airspeeds up to 130 KIAS. Do not consider raising gear again unless no safe landing area is within reach with gear extended.

If gear will not extend, continue as in the section titled Unsafe Indication – Gear Extension.

ELECTRICAL SYSTEM FAILURES**BATTERY OVERTEMPERATURE**

Symptom:

BATT HOT warning light on.

Action:

Check BATT OFF caution light on. If caution light is not on, place battery switch OFF.

Land as soon as practicable.

If any smoke or odor is noted, land as soon as possible.

FEEDER FAULT (For Aircraft with Nose Battery Installation)

Symptom:

BATT FEED light on, and BATT OFF light on.

Action:

Cycle the battery OFF, then ON. If light extinguishes, continue. If light remains on, turn battery switch OFF. Land as soon as practicable.

NOTE

With battery power only, the BATT FEED light will not be accompanied by a BATT OFF light. With external power, the battery is automatically disconnected and BATT FEED light cannot illuminate.

SINGLE DC GENERATOR FAILURE

Symptom:

#1 or #2 DC GEN caution light on.

Action:

Move affected generator switch to OFF, wait 5 seconds and move to RESET, then ON. Repeat as necessary.

If unable to restore generator output, place failed generator switch OFF. If in IMC, transition to VMC as soon as practicable and continue flight.

If single generator fails, the remaining generator will normally provide required power for all other installed equipment. Consider shutting off unnecessary equipment, however, as a conservative measure. The radio master switches, if installed, may be used to turn off non-essential avionics equipment.

DUAL DC GENERATOR FAILURE

CAUTION

Failure to regain the essential bus leaves only 30 minutes operating time for the standby attitude indicator.

Failure of both DC Generators and Battery:

LAND AS SOON AS PRACTICABLE

Failure of No. 1 or No. 2 DC Generator:

If unable to reset generator, place failed generator switch to OFF; if in IMC, transition to VMC as soon as practicable and continue flight.

NOTE

An emergency battery is provided to power the standby attitude indicator and its internal light in the event of a total dc power loss.

The dc electrical system automatically supplies power to the affected bus from the remaining bus. During this transition, the autopilot on the affected bus may drop off line but may be reengaged when bus switchover is completed.

Symptoms:

#1 and #2 DC GEN caution lights on.

BUS TIE OPEN caution light on - indicating that both DC primary buses are inoperative.

NOTE

With loss of both DC generators, the only DC power source available is the battery, which powers the DC essential bus. All non-flight instruments will be retained except fuel flow and N₂.

Action:

Attempt to reset both DC generators. In turn, select DC generator switches to OFF, wait 5 seconds, then select RESET, and then ON.

With loss of both DC generators: If in IMC, transition to VMC as soon as possible.

If operating at night, turn on glareshield lights.

Reduce electrical load by shutting off unnecessary equipment.

Turn inverter OFF if AC generator is on line.

Land as soon as practicable.

If equipped with the emergency load shed switch, approximately one hour of night flight in IMC is possible using the following procedures (assuming a fully charged battery):

1. EMER LOAD SHED switch - SHED
2. Inverter - ON

NOTE

With the load shed switch in the SHED position, the inverter continues to operate at reduced loads to maintain AC power for the pilot's navigation system (pilot's EHSL, VOR and C-14 compass). Loads that are shed include:

- Anti-collision lights
- Non-flight instrument lights
- ATC transponder
- Weather radar
- Copilot clock
- DATA NAVIGATION (if installed)
- DAFCS (channel 1)

3. Pilot's PITOT HEAT switch - OFF.
4. LANDING LIGHT switch - OFF (landing light should be used for a maximum of 1 minute during landing only).

NOTE

Items 1, 3, and 4 above are to be initiated within 5 minutes after annunciation of the second DC generator failure to attain the approximately one hour flight duration.

5. If in IMC flight, transition to VMC as soon as possible. Land as soon as practicable.

NOTE

The pilot's pitot heat may be selected on for an additional period of up to 5 minutes without reducing the specified battery endurance.

DC GENERATOR OVERTEMPERATURE (Optional Configuration)

Symptom:

No. 1 of No. 2 DC GEN HOT caution light illuminated.

Action:

Move affected DC generator switch to OFF.

If DC GEN HOT light remains on, land as soon as practicable.

If light remains on and indications of a fire are evident, such as burning odor or smoke, shut down the affected engine.

BUS TIE OPEN

Symptoms:

BUS TIE OPEN caution light is illuminated.

No other DC electrical system caution lights are illuminated.

Action:

Transition to or remain in VMC.

If unable to maintain VMC, land as soon as possible.

NOTE

When the Bus Tie is open the DC essential bus is powered by the battery only. Continued flight will eventually result in draining the battery and loss of power to the DC essential bus.

Consider placing the Essential Bus Recovery Switch – ON and/or reducing DC essential bus loads as practicable.

If abnormal behavior is observed in equipment powered by the DC essential bus or the ESS BUS VOLTS LOW caution light illuminates, place the Essential Bus Recovery Switch – ON and proceed as instructed in the section titled DC ESSENTIAL BUS FEED FAILURE.

DC ESSENTIAL BUS FEED FAILURE

Symptoms:

ESS VOLTS LOW caution light is illuminated.

Some abnormalities may be apparent in systems powered by DC essential bus (VHF COMM, VOR NAV, etc.).

Action:

Essential bus recovery switch - ON. (Switch location is facilitated by illuminated amber identification light.)

Check that BUS TIE OPEN and No. 1 DC GEN caution lights illuminate.

Check that DC essential bus powered systems are normal.

If in IMC, transition to VMC as soon as practicable, and continue flight.

NOTE

Because the #1 and #2 DC primary and DC essential buses are powered by the #2 DC generator with the essential bus recovery system activated, consider shutting off unnecessary equipment.

INVERTER FAILURE

Symptom:

INVERTER caution light(s) on.

Action:

If in IMC, consider transition to VMC as soon as practicable, and continue flight.

If both inverters fail, transition to or remain VMC.

NOTE

- Subsequent failure of an engine or the AC generator will cause loss of all AC electrical power.
- Subsequent failure of the second inverter will result in the AC generator powering all AC systems.
- Subsequent failure of the second inverter may result in both autopilots (or SAS) becoming disengaged. Both autopilots may be reengaged manually.

AC GENERATOR FAILURE

- If in IMC, consider transition to VMC as soon as practicable and continue flight.

- If subsequently an inverter fails, transition to or remain in VMC.

- The AC electrical system automatically supplies power to the affected bus from the remaining bus. During transitions, the autopilot on the affected bus may drop off line but may be reengaged when bus switchover is completed.

Symptom:

AC GEN caution light on.

Action:

Turn AC generator switch OFF, then ON.

If generator is not regained, turn switch OFF.

If in IMC, consider transition to VMC as soon as practicable, and continue flight.

NOTE

- Failure of either engine will result in irretrievable loss of the AC generator unless the snow protection kit is installed and switched on.
- The inverters are capable of providing AC power for all installed equipment except the optional heated windshield, which is on the monitored bus and will be dropped automatically.

If subsequently an inverter fails, transition to or remain in VMC.

AC Generator Bearing Failure

Symptom:

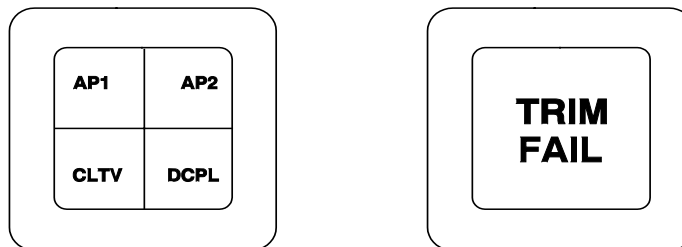
AC GEN BRNG caution light on.

Action:

Continue flight. Limit flight to 5 hours.

MISCELLANEOUS SYSTEM FAILURES OR INCIDENTS

DAFCS malfunctions are annunciated on a four segment DAFCS Caution Panel, Figure 3-2, located on the instrument panel. The illumination of any one (except DCPL) of the segments will also trigger the Master Caution annunciator and IIDS DAFCS annunciator.



CA0001
SA

Figure 3-2. DAFCS Caution Panel

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The following procedures should be used after illumination of any segment of the DAFCS caution panel.

DAFCS MALFUNCTIONS**Autopilot**

AP1 or AP2 fail light ON:

1. Attempt to reset by pressing the RESET switch for the affected system only; then reengage the affected system.
2. If affected system cannot be reengaged, continue flight on the remaining system.

NOTE

When operating with both Autopilots engaged and with flight director modes coupled, a failure of either AP will automatically decouple the FD modes. The pilot may reengage the FD modes but coupling to the single AP is inhibited. The pilot must manually steer the aircraft to follow the command cues.

AP1 and AP2 fail lights both ON:

1. Reduce airspeed to 120 KIAS while flying in IMC conditions.
2. Attempt to reset by pressing the RESET switch for each system separately; then try to reengage each system.
3. If neither system is restored, advise Air Traffic Control (if flying under IFR) and land as soon as practicable or establish VMC, if possible, and continue.

Sudden Disturbances (Hardovers)

A sudden disturbance (hardover) is an abrupt movement in pitch, roll, or yaw caused by a fully extended or retracted series actuator. The pilot should take manual control of the helicopter and return to level flight.

NOTE

Maximum demonstrated altitude loss with a pitch down autopilot malfunction during a coupled ILS approach is 25 feet with a 2.9° glideslope.

Oscillatory Malfunctions

CAUTION

Landings should not be attempted with faulty autopilot engaged while oscillatory malfunctions exist.

An oscillatory malfunction is a slow to medium oscillation of the helicopter occurring in pitch, roll, or yaw that is not associated with turbulence.

1. Disengage FD (i.e., SBY)
2. If oscillation continues, each autopilot should be turned off individually to verify that the DAFCS is the source of the oscillation. If an oscillatory malfunction is verified, DO NOT reengage the faulty autopilot.

Flight Director

A flight director failure will be annunciated by an FD FAIL warning on the appropriate EADI. Attempt to reset the flight director/autopilot by pressing the appropriate RESET switch and reengaging the autopilot. A successful reset will return the Flight Director in SBY mode. Flight Director modes may then be reengaged and flight continued.

Sensor Failures

The autopilot relies on various sensors to provide reference signals for automatic flight path control. Since the vertical gyros are the primary sensors for all modes of operation, an invalid gyro will cause the corresponding autopilot (AP1 or AP2) to disengage. The pitch and roll flight director command bars will bias from view, however, the flight director mode annunciator will remain on. If the gyro stays valid, continue flight on the remaining system.

Failures of other sensors that are used by the flight director system will result in the affected command bar being biased from view which causes the autopilot system to switch to reversionary modes (i.e., pitch attitude hold, roll heading hold, collective holds fixed position). The flight director modes will remain engaged during the invalid condition, and if the sensor data becomes valid, the command bars will come back into view and the system will reacquire the selected flight path.

1. For invalid NAV systems, the pilot may switch to a valid NAV source and continue coupled flight.
2. For invalid sensors that are redundant but are connected directly to the flight director system, the pilot may choose to select (FD 1/2) the other flight director.

3. For simplex sensors that are connected to both autopilots, an invalid sensor will cause a loss of the use of that function. The pilot may continue flight within the limitations of the reversionary modes.

Momentary invalid conditions are normal for some of the NAV sensors. The autopilot is designed to work through these anomalies whereby temporary invalids are transparent to autopilot operation and require no special pilot action.

Upon engagement of modes for coupled operation, the pilot should verify that the modes remain engaged and the flight director command bars are in view and centered. In all cases, the pilot must make frequent cross checks of the primary flight instrument (attitude, heading, airspeed, and altitude) to verify proper autopilot operation.

Air Data Failure

All flight director pitch modes including go-around will be inoperative and the autopilots will assume a fixed value of 110 knots. The VEL HOLD mode and low speed heading hold with yaw will be inoperative.

Collective

CLTV light ON (DAFCS Caution Panel):

- If STICK TRIM, CLTV switch is OFF, switch should be placed in the ON position.

Collective command limit (N₁, engine torque or temperature [T₅] limit) exceeded:

1. Check engine instruments.
2. Manually reduce collective position.
3. If collective is coupled, reduce collective command by reducing IAS or VS reference number.
4. Attempt to reset CLTV fail light by turning either autopilot off and then back on.
5. If fault is not cleared, turn off collective trim switch and manually fly collective.

NOTE

- Pilot should manually adjust collective to satisfy CLTV command bar on EADI.

- If the helicopter is modified with the Vertical Procedure Collective Detent System, pulling the collective trim switch to the second detent enables the Vertical Procedure Detent. Pulling the switch to the second detent also causes the Torque and N1 limiting functions of the DAFCS to be deactivated for one minute. If collective coupled, any time the second collective trim detent is engaged, the CLTV warning, DAFCS caution and MASTER CAUTION lights will illuminate. During this condition, the AL-300 may also display failure codes.

Trim Fail Light On:

- Attempt to reset TRIM FAIL light by turning either autopilot off and then back on.

Miscellaneous Failures

Pilot's Audio Station

In the event the pilot's audio panel or cyclic transmit switch fails, the Emergency ICS Panel is used. To use the Emergency ICS Panel:

1. Plug headset into EMER ICS panel jack.
2. Set switch to EMER position.
3. Operate pilot's radio with pilot's foot switch.

NOTE

If the communications are not restored, repeat above procedures using emergency (spare) headset.

Magnetic Brake Failure (Cyclic)

In the event of a magnetic brake failure (i.e., cyclic trim will not hold stick):

1. Select SAS mode on autopilot controller and hand-fly the cyclic.
2. Continue flight.

Magnetic Brake Failure (Collective)

In the event of a magnetic brake failure (i.e., collective trim will not hold stick):

- When operating in 3 cue, the pilot must manually move the collective to satisfy the collective command cue.

Emergency Battery Annunciator

In the event of a full dc power loss, the following applies:

“ON”: Emergency battery is supplying power to the standby attitude indicator, including lighting, and the warning horn. Depressing the BATT TEST ALARM OFF switch will suppress the warning horn.

“OFF”: Standby attitude indicator will not be powered.

PITOT HEAT CAUTION LIGHT ON

Symptom:

PLT PITOT or CPLT PITOT caution light on with respective pitot heat selected on.

Action:

Switch off the affected system and pull and reset the circuit breaker, DC essential for pilot system or No. 1 DC primary for copilot system. Reenable the system switch and if caution light reappears, continue flight using the airspeed instrument of the unaffected pilot station or alter flight condition if possible so that pitot heat is not required.

Land as soon as practicable.

WINDSHIELD HOT CAUTION LIGHT

The W/S HEAT HOT caution light goes on when either the pilot or copilot's windshield exceeds 58 °C (135 °F). The system should be turned off to prevent overheat damage to the windshield. If required, the individual overheated windshield can be identified and left off to allow operation of the remaining windshield half. If the caution light remains on after the windshield heater switches are turned off, the electrical contactors may have welded. The windshield power circuit breakers should be pulled in this case.

Symptom:

W/S HEAT HOT caution light on.

Action:

Pilot and copilot windshield heater switches - OFF.

Check:

W/S HEAT HOT caution light - Off.

If the caution light does not go off, pull the PLT and CPLT WSHLD HTR PWR circuit breakers on the AC MON BUS panel.

If the heated windshield is required and the power circuit breakers were not pulled, the functional windshield can be restored as follows:

Action:

Feel center of pilot and copilot's windshield with hand. If one windshield feels distinctly cooler than the other, turn on the windshield heater switch for the cooler windshield. If the W/S HEAT HOT caution light returns, turn the switch off and do not attempt to use either windshield heater.

EMERGENCY ENTRANCES AND EXITS

Emergency entrances and exits are through the four personnel doors.

HINGED DOORS

The hinged doors are opened from the outside by lifting the door latch or from inside by lifting up the lockpin button on the lower aft window frame of each door and pulling the door latch aft. The doors may also be jettisoned from inside using the door lockpin and jettison handles, forward of the door latches. The jettison levers are under a plastic protective panel. A finger grip in the plastic cover is used to pop the cover loose from the door frame. The red jettison handle is pulled up to release the hinges, and a sharp blow with the fist on the door below the jettison handle will jettison the door. Decals as shown in Figure 3-3 provide instructions for normal opening or jettisoning of doors.

If door does not open normally, attempt to jettison it.

Door Jettison Procedure

1. Lift door lockpin.
2. Remove jettison handle plastic cover.
3. Pull jettison handle up.
4. Strike door below the jettison handle sharply with the fist.

SLIDING DOOR(S) (OPTIONAL)

The sliding door is opened from the outside or inside by rotating the handle to the UNLOCK position and pulling the door aft. If the door does not open normally attempt to jettison window.

Window Jettison Procedure**NOTE**

Do not jettison window in flight.

1. Remove plastic cover over the window jettison handle.
2. Pull window jettison handle.
3. Push window out from the bottom.

Sliding Door Open In Flight

If sliding door becomes unlocked or opens in flight, decrease airspeed to below 125 KIAS before closing. If not possible to close door, open fully and lock aft. Do not exceed 125 KIAS for remainder of flight.

RETRACTABLE BOARDING STEP(S)

Symptom:

BD STEP caution light on.

Action:

Attempt to actuate RET at or below 70 knots. If step(s) remain extended in flight, limit maximum airspeed to 141 knots.

DITCHING (FLOTATION SYSTEM)

The optional emergency flotation system is designed only for emergency landing on water. The system may be expected to keep the helicopter upright long enough to permit passengers and crew to exit to life rafts or rescue boats. A subsequent takeoff or long term towing should not be attempted.

When it appears that ditching is likely, consideration must be given to such factors as wind direction and velocity, sea state conditions, and helicopter power available for ditching. The maximum permissible water entry conditions are 33 knots water speed at 300 feet per minute rate of descent in a calm sea. Optimum ditching conditions would occur in a calm sea state with the forward speed of the helicopter reduced to as near zero as possible, and with little or no lateral drift component. Minimum touchdown forces will be achieved when touchdown is made on the crest or back of a wave with a minimum rate of descent. Greatly increased touchdown forces will be experienced if the landing is made on the front or rising face of a wave. Every effort should be made to land the helicopter

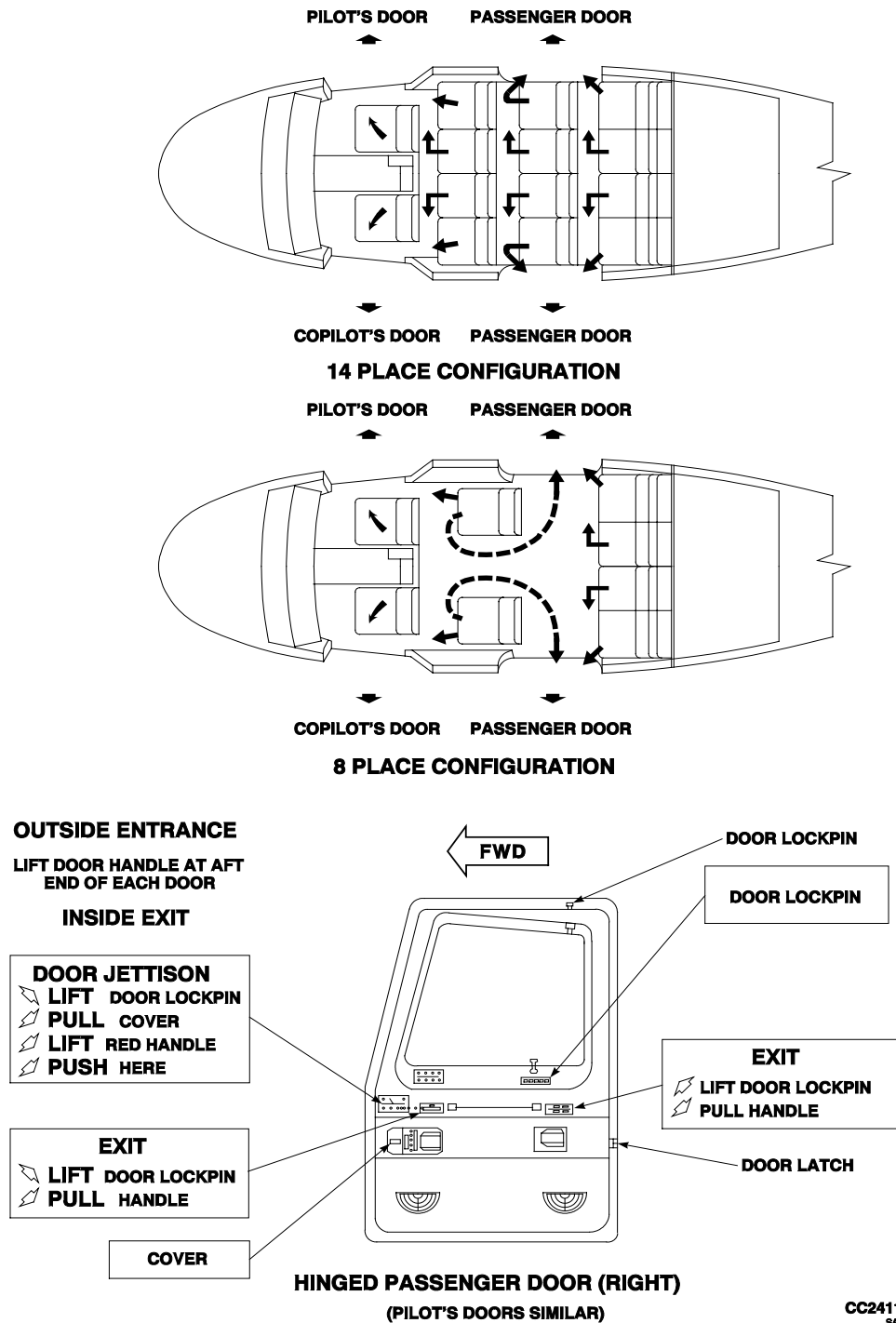
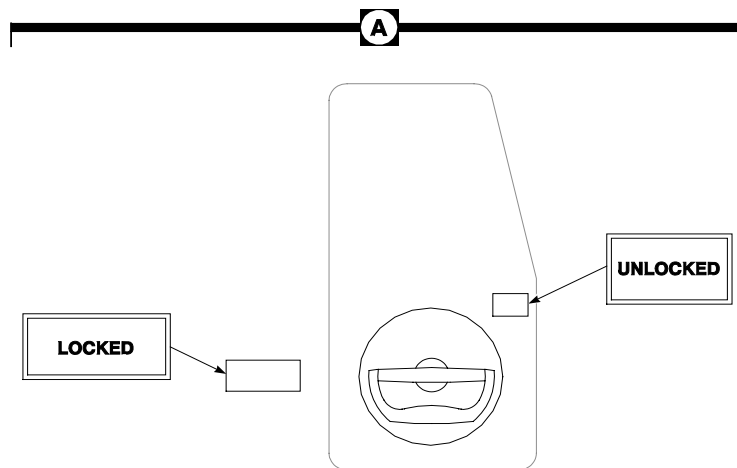
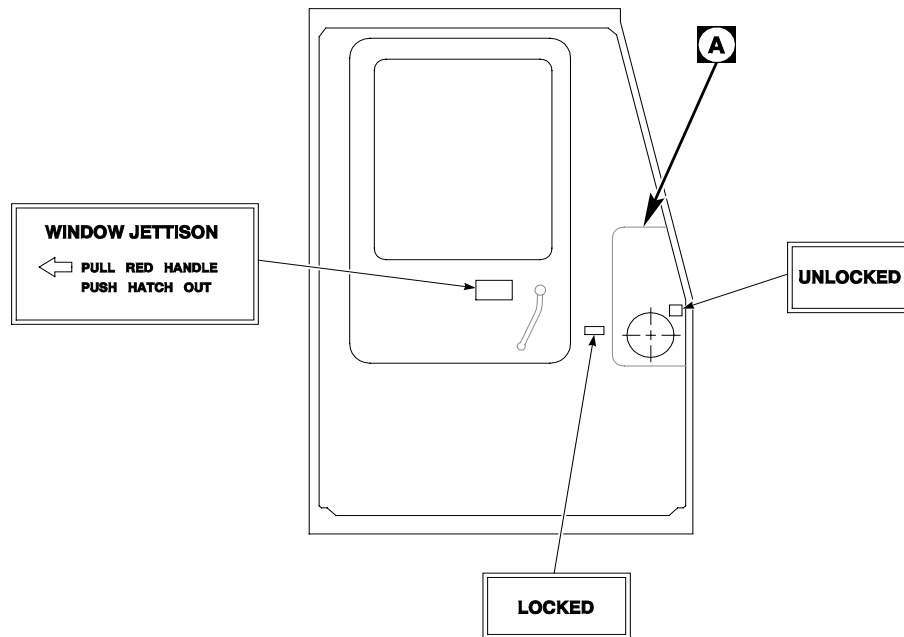


Figure 3-3. Emergency Entrances and Exits (Sheet 1 of 2)



SLIDING PASSENGER DOOR (L.H. SIDE)
VIEW LOOKING OUTBOARD
(R.H. DOOR SIMILAR)

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SA

Figure 3-3. Emergency Entrances and Exits (Sheet 2 of 2)

with as little sideward drift as possible as the roll rate after touchdown increases sharply with any increase in lateral motion. Ditching with power available (such as when fuel starvation is imminent or a loss of transmission oil pressure dictates such action) will greatly increase controllability, reduce touchdown forces, and assist in preventing the helicopter from rolling after impact. Power off ditching (autorotation) should be avoided if possible. With sufficient power available to fully control the helicopter descent rate, sideward drift and forward speed to near zero values, successful ditchings may be accomplished in sea states up to and including Sea State 4 (wave height 6.5 feet, wave length to height ratio - 10 to 1) depending on wind conditions.

All possible control available from the rotor system should be used to prevent rolling after impact. Consideration should be given to extended power on water taxi, if wave conditions make rotor to water contact improbable. Power-on water taxi will greatly increase the roll stability of the helicopter and will allow yaw and heading control. The floats may be inflated at any time during the ditching procedure (below 75 KIAS). Allow sufficient time for full inflation before water contact. Float inflation time is within 10 seconds.

The following general ditching techniques are recommended as the best for a successful controlled emergency water landing:

- Activate the inflation system in a hover if sufficient power is available to permit a hover.
- Reduce forward speed to as near zero as possible.
- Reduce lateral drift component to a minimum.
- Avoid rising faces of large waves.
- Reduce rate of descent to minimum at touchdown.
- Fuselage angle at impact should be between 0° and 10° nose up.
- Use all control available from the rotor system to prevent the helicopter from pitching or rolling after touchdown.
- The pilot should endeavor to touch down, heading into wind, as near the crest of a wave as possible to minimize the impact vertical velocity.
- If the helicopter is towed, it should be towed at a slow rate of speed.

DITCHING PROCEDURES

1. Flotation system test switch - Check NORM.
2. Landing gear - DN.

NOTE

If the landing gear cannot be extended for any reason, the floats can be deployed with the gear retracted.

CAUTION

Operation of the landing gear during or after float inflation may result in damage to the floats and partial loss of flotation capability.

3. Float arming switch - ARMED.
4. Press the cyclic stick float inflation switch. Allow sufficient time for full inflation prior to water contact.

NOTE

Float inflation time is 10 seconds.

5. Notify all occupants to prepare for emergency water landing.

NOTE

- Cabin occupants should fasten their safety belts and remain in their seats with their arms braced against their knees until water contact is made.
 - If time and conditions permit, consider opening and locking sliding door(s).
6. Transmit distress message.
 7. Check life vests for security and lock shoulder harness.
 8. Hold the helicopter level as possible, contact the water with minimum forward speed and rate of descent.
 9. Water and aircraft conditions permitting - consider extended water taxi using collective pitch for increased stability.
 10. If the helicopter is unstable or taking on water, shut down engines, notify cabin occupants to evacuate through the cabin doors after the rotor blades have stopped turning. The rotor brake may be used with a gentle application to result in slow deceleration.

WARNING

Do not evacuate the helicopter until the rotor blades have stopped turning. Do not inflate life vests until clear of the helicopter.

SINGLE-ENGINE LANDING IN THE WATER (FLOTATION GEAR INFLATED)

NOTE

The following procedures are recommended if single engine flight to a safe landing area is not possible.

1. Establish normal approach to arrive at approximately 100 feet above touchdown point at 40 KIAS at a rate of descent of no more than 600 FPM.
2. Initiate a deceleration passing 50 feet at 40 KIAS and increase power to reduce rate of descent to a maximum of 300 FPM.
3. Continue deceleration to running touchdown at or above translation lift.
4. Water and aircraft conditions permitting - consider extended water taxi using collective pitch for increased stability.
5. If the helicopter is unstable or taking on water, shut down engines, notify cabin occupants to evacuate through the cabin doors after the rotor blades have stopped turning. The rotor brake may be used with a gentle application to result in slow deceleration.

WARNING

Do not evacuate the helicopter until the rotor blades have stopped turning. Do not inflate life vests until clear of the helicopter.

AUTOROTATIVE LANDING TO THE WATER

1. Establish autorotative glide.
2. Inflate floats using Ditching Procedures above.
3. At about 50 to 75 feet, execute a partial flare to about 20° nose up by moving cyclic stick back with no change in collective pitch. This will reduce airspeed and rate of descent and will cause an increase in rotor rpm.
4. Gradually increase collective pitch and apply forward cyclic as the helicopter settles and until water contact is made.
5. Maximum desired water contact speed is 30 knots. Desired nose attitude is +10° or less.
6. Immediately after water contact, decrease collective pitch smoothly and slowly.

7. Water and helicopter conditions permitting, consider remaining in helicopter until rescued.
8. If the helicopter is unstable or taking on water, shut down engines, notify cabin occupants to evacuate through the cabin doors after the rotor blades have stopped turning. The rotor brake may be used with a gentle application to result in slow deceleration.

LITEF LCR-92S AHRS

AHRS failures and warnings are presented via standard heading, attitude and turn rate flags, and by a 1 AHRS FAIL or 2 AHRS FAIL legend and will set the master caution light. In the case of an AHRS cooling fan failure, the 1 AHRS FAIL or 2 AHRS FAIL legend will illuminate 1 minute after landing (WOW).

NOTE

- Operational AHRS cooling fans are desired but not a requirement.
- Power-up of the AHRS in flight during turbulent flight conditions may result in prolonged invalid heading data despite valid attitude data. Once the attitude data becomes valid, manually activate the heading data by selecting "FREE" followed by "SLAVE".

LOSS OF 26 VAC REFERENCES

A loss of 26 vac to the AHRS will be indicated by the AHRS 1 or AHRS 2 annunciator. The attitude and heading displays will remain valid.

LOSS OF 26 VAC ATT REFERENCE

Symptom:

AHRS 1 or AHRS 2 annunciator accompanied by valid attitude and heading displays. Complementary DAFCS AP1 or AP2 OFF.

Pilot Action:

Continue flight on the remaining system. Flight Director modes will be available but the DAFCS cannot be coupled with either AP inoperative.

LOSS OF 26 VAC HDG REFERENCE

Symptom:

AHRS 1 or AHRS 2 annunciator accompanied by valid attitude and heading displays. DAFCS lateral guidance, if selected, is lost. DAFCS error codes 27 and/or 38 may be present. In addition, roll or yaw disturbances may be present below 60 knots. Above 60 knots, momentary roll disturbances of up to 20° may be seen.

Pilot Action:

Deselect the corresponding AP.

WARNING

Do not evacuate the helicopter until the rotor blades have stopped turning. Do not inflate life vests until clear of the helicopter.

DITCHING (WITHOUT FLOTATION SYSTEM)

The general procedures outlined under Ditching (Flotation System) should be followed. Passengers and crew should be briefed to plan to exit the helicopter as soon as the rotor blades have stopped turning.

IIDS DISPLAY FAILURE

Symptom:

Performance or engine display becomes black or otherwise fails to provide normally displayed information.

Action:

If the pilot is flying aircraft, depress either IIDS REV button one time. If engine display was the failed unit, it will appear at the copilot position, or if the pilot performance display was the failed unit, it will appear at the center location and the engine display will move to the copilot position.

If the copilot is flying the aircraft, either IIDS REV button is depressed two times to achieve the desired result.

Continue flight.

Symptom:

Dual IIDS failure.

Action:

Press and hold the pilot's MENU key for at least three seconds to call up the composite page.

Land as soon as practicable.

RADIO MASTER SYSTEM

A RADIO MASTER BYPASS panel is located in the lower console. In the event that the RADIO MASTER switch or relay fails, indicated by a lack of power to equipment tied to a particular bus, an alternate path is supplied to restore power to the equipment.

Moving the BYPASS switches (EFIS MASTER 1 and EFIS MASTER 2) from the NORM position to the BYPASS position for the effected bus is the only action required.

**LOSS OF PRIMARY ATTITUDE INDICATOR IN INSTRUMENT
METEOROLOGICAL CONDITIONS**

The ADI-335D standby attitude indicator will be available to the pilot under all conditions of partial or total electrical failure that result in the loss of the primary attitude indicator. However, if the standby indicator is caged and uncaged in the air, it may take as long as two minutes for the instrument to display accurate pitch information. Additional pitch errors develop with angle of bank. Therefore, when relying on the standby attitude indicator during instrument meteorological conditions, standard rate turns are advisable, with frequent cross checks of the standby altimeter.

In a manner similar to that seen in the pitch axis, the roll attitude of the aircraft is referenced to zero at the moment of uncaging.

WARNING

Do not cage and uncage the standby attitude indicator in instrument meteorological conditions unless it is certain that the aircraft is in straight and level flight. Otherwise, large roll attitude errors will be developed in the standby attitude indicator.

Symptom: Primary attitude indicator flagged inoperative.

Action: Scan standby attitude indicator, cross checking standby altimeter to maintain altitude, climb, or descend.

TEMPORARY REVISION NO. 2

FILING INSTRUCTIONS: Insert this Temporary Revision facing page 4-1, dated December 20, 1999.

SUBJECT: CATEGORY "A" AND "B" OPERATIONS

This temporary revision adds a rejected takeoff and landing distance adjustment for aircraft that have 5014067 rotating brake disk(s) installed as determined per Aircraft Braking Systems' Alert Service Bulletin No. S76-32-A24 or S76-32-A25.

MANUAL CHANGES:

If the 5014067 brake disks are installed or the brake disk configuration has not been confirmed, calculate the Category "A" Rejected Takeoff Distance and Category "A" Landing Distance or Category "B" Landing Distance normally, as applicable. Multiply the distance(s) by 1.67 to obtain the corrected distance(s).

Applicable figures:

Figure Number	Title
4-7	Category "A" Rejected and Continued Takeoff Distances
4-14	Category "A" Landing Distance
4-21	Category "B" Landing Distance

TEMPORARY REVISION NO. 2

SECTION IV**PERFORMANCE INFORMATION****LIST OF PERFORMANCE CHARTS**

<u>FIGURE NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
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4-2	Temperature Conversion Chart.....	4-3
4-3	Airspeed Calibration - Pilot's System	4-4
4-4	Airspeed Calibration - Copilot's System	4-5
4-5	Category "A" Takeoff Profile.....	4-10
4-6	Wind Components	4-11
4-7	Category "A" Rejected and Continued Takeoff Distances	4-12
4-8	Category "A" Maximum Takeoff and Landing Gross Weight.....	4-13
4-9	Forward Climb Performance - Single Engine, 2-Minute Power	4-14
4-10	Category "A" Takeoff Flight Path.....	4-15
4-11	Forward Climb Performance - Single Engine, Maximum Continuous Power	4-20
4-12	Category "A" Landing Profile	4-22
4-13	Category "A" Alternate Landing Profile	4-23
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4-15	Category "B" Takeoff Profile.....	4-26
4-16	Category "B" Takeoff Distance	4-27
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4-19	Forward Climb Performance - Two Engines, Normal Cruise Power	4-30
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4-21	Category "B" Landing Distance	4-32
4-22	Hover Out of Ground Effect.....	4-33/4-34

DENSITY ALTITUDE CHART

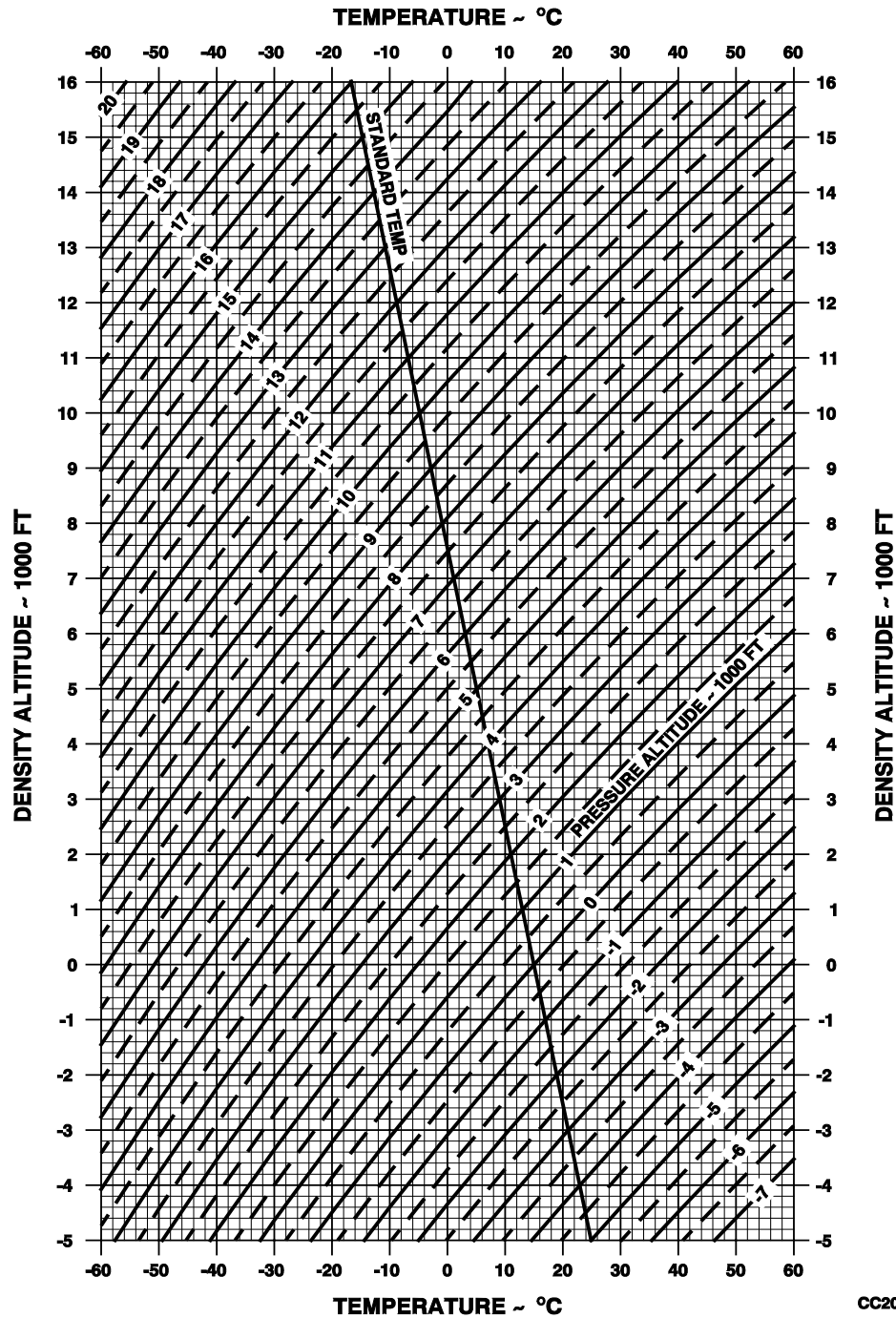


Figure 4-1. Density Altitude Chart

FAA APPROVED DECEMBER 20, 1999

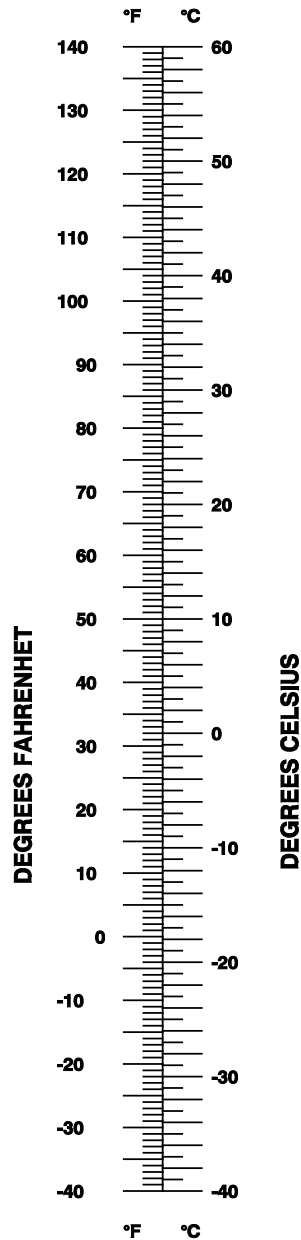
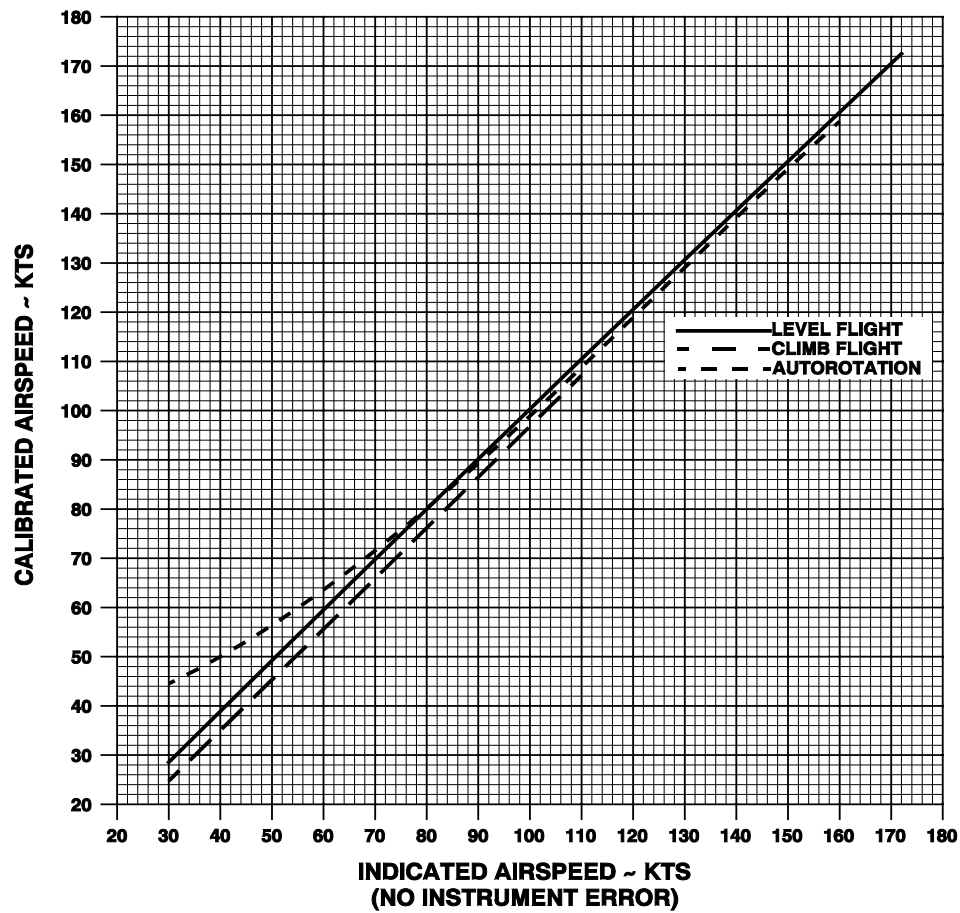
**TEMPERATURE CHART
CENTIGRADE - FAHRENHEIT**CC2093
SA

Figure 4-2. Temperature Conversion Chart

FAA APPROVED DECEMBER 20, 1999

**S-76 AIRSPEED CALIBRATION
PILOT AIRSPEED SYSTEM**



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SA

Figure 4-3. Airspeed Calibration - Pilot's System

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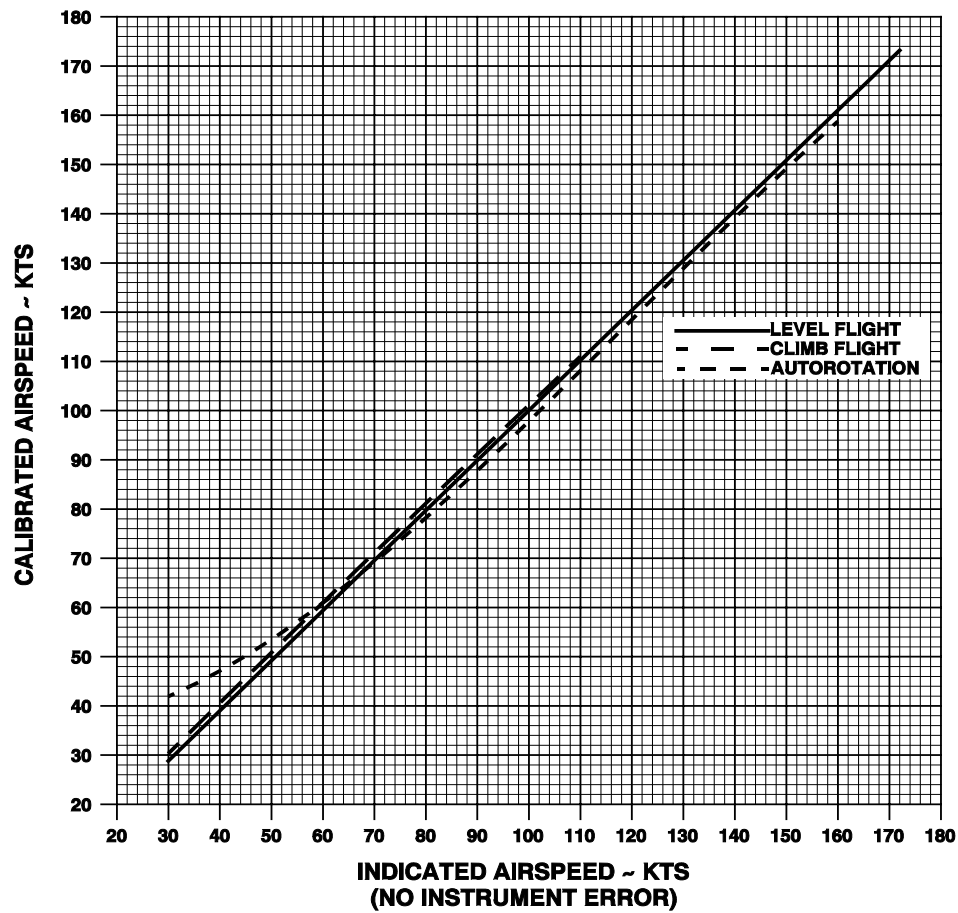
**S-76 AIRSPEED CALIBRATION
COPLOT AIRSPEED SYSTEM**CC2096
SA

Figure 4-4. Airspeed Calibration - Copilot's System

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NOISE LEVEL CERTIFICATION

The S-76C aircraft is certified at gross weights up to and including 11,700 lbs. in accordance with the rules and procedures for a stage 2 aircraft of FAR Part 36, Subpart H.

The following noise levels comply with FAR Part 36, Subpart H, and stage 2 requirements. They were obtained by analysis of approved data from noise tests conducted under the provisions of FAR Part 36, Amendment 36-14. The test and analysis procedures used to obtain these noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume I, Chapter 8.

ICAO Annex 16, Volume I, Chapter 8 approval is applicable only after endorsement by the Civil Aviation Authority of the country of aircraft registration.

The certified noise levels are:

<u>EPNL (EPNdB)</u>	<u>Regime</u>
93.9	Takeoff
96.1	Approach
91.6	Flyover

NOTE

No determination has been made by the Federal Aviation Administration that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

ENGINE HEALTH

The performance charts are formatted to permit performance credit to be taken for engines that deliver above specification power (i.e., demonstrate positive power margins) as determined from the power assurance check contained in Part 1, Section II Normal Procedures.

The following guidelines apply when opting to claim performance credit for above specification engines:

1. Power assurance checks must be performed once per flight day on both engines. Performance credit is then assessed on the basis of the critical engine (i.e., the engine with the lower power margin).

2. When engine power margins are established in accordance with the single-point power assurance procedure, enter performance charts with the power margin of the critical engine reduced to the nearest whole percent.
3. When engine power margins are established in accordance with the power assurance trend check procedure, enter performance charts with the trended average (i.e., ten-point rolling average) margin of the critical engine.

NOTE

The use of single point power margins to claim above specification engine performance credit is not permitted once the trended average is established.

ANTI-ICE EFFECT ON PERFORMANCE

Unless otherwise noted, the performance data shown on the charts are for anti-ice selected OFF. If anti-ice selected ON affects performance, the decrease in performance is noted on the chart.

CATEGORY "A" TAKEOFF

DESCRIPTION

The S-76C Category "A" takeoff procedure shown diagrammatically in Figure 4-5 features variable critical decision point (CDP) and takeoff safety speed (V₂). The CDP, expressed only in terms of airspeed, is selectable in 1-knot increments between 30 and 49 knots while V₂, defined as CDP+10 knots, varies in 1-knot increments between 40 and 59 knots. This permits payload to be traded off against available field length in such a manner that Category "A" One Engine Inoperative (OEI) climb performance minima can be maintained over a wide range of environmental conditions.

Figure 4-7 shows the rejected takeoff (RTO) and continued takeoff (CTO) distances as a function of pressure altitude, temperature, headwind component, CDP speed, and V₂ speed. RTO and CTO distances are directly proportional to CDP and V₂ speeds respectively, therefore lower CDP and V₂ speeds equate to shorter field lengths. Figure 4-8 shows the maximum takeoff and landing gross weight as a function of pressure altitude, temperature, and CDP/V₂ speeds. Maximum takeoff and landing gross weight is also directly proportional to CDP/V₂ speeds, therefore higher CDP/V₂ speeds can equate to higher maximum takeoff gross weights.

The Category "A" takeoff procedure provides the flexibility to address specific payload and/or field length requirements appropriate to either of the following operational scenarios.

1. Determine the maximum takeoff gross weight, given the available field length.

2. Determine the required field length, given the desired mission takeoff gross weight.

Specific numerical examples follow which illustrate the use of the charts for each of the above stated scenarios.

Example 1

Determine the maximum takeoff gross weight, given the available RTO field length, pressure altitude, temperature, engine power margin, and headwind component.

1. Enter Figure 4-7 with the RTO space available, and using the headwind component, pressure altitude, and temperature, read the resultant CDP speed. Note: If resultant CDP is greater than 49 knots, use 49 knots as CDP.
2. Enter Figure 4-8 with pressure altitude, temperature, engine power margin, and CDP speed from Step 1, and determine the maximum takeoff gross weight. Notes: (1) If the horizontal line defined by pressure altitude and temperature intersects 11,700 lbs at a CDP speed lower than the CDP from Step 1, use the lower CDP speed, or (2) if the desired takeoff gross weight is less than the maximum permitted takeoff gross weight, use the lower CDP speed corresponding to the desired takeoff gross weight.
3. Using Figure 4-7, verify that the CTO distance for V2 (CDP+10 knots) is suitable for the takeoff area.

Given:

Available RTO Field Length	650 ft
Pressure Altitude	3,000 ft
Temperature	10 °C
Engine Power Margin	3%
Headwind Component	10 kts

Determine:

CDP Speed	31 kts
Maximum Takeoff Gross Weight	10,000 lbs
V2 Speed	41 kts
CTO Distance	770 ft

Example 2

Determine the required field length, given the desired mission takeoff gross weight, pressure altitude, temperature, engine power margin, and headwind component.

1. Enter Figure 4-8 with the desired takeoff gross weight, and using the pressure altitude, temperature, and engine power margin, read the resultant CDP and V2 (CDP+10 knots) speeds.
2. Enter Figure 4-7 with pressure altitude, temperature, headwind component, and CDP and V2 from Step 1, and determine the RTO and CTO field length requirements.

Given:

Desired Takeoff Gross Weight	10,600 lbs
Pressure Altitude	3,000 ft
Temperature	10 °C
Engine Power Margin	3%
Headwind Component	10 kts

Determine:

CDP Speed	37 kts
V2 Speed	47 kts
RTO Distance	820 ft
CTO Distance	910 ft

TECHNIQUE

After determining and setting bugs for CDP and V2 on airspeed indicator, hover at 5-foot wheel height. Increase collective pitch to achieve 10% torque above hover torque and accelerate forward maintaining 5- to 10-foot wheel height until reaching CDP. After passing CDP rotate nose-up to initiate climb at V2. When clear of obstacles gradually accelerate to best rate of climb speed (V_{broc}) and retract landing gear.

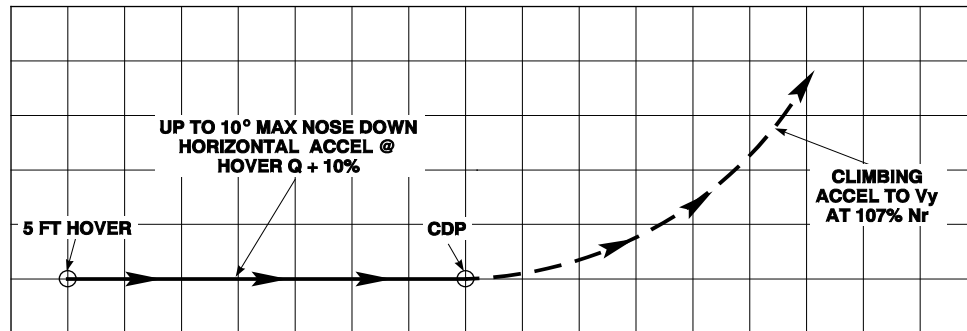
ASSOCIATED CONDITIONS

Bleed Air: OFF

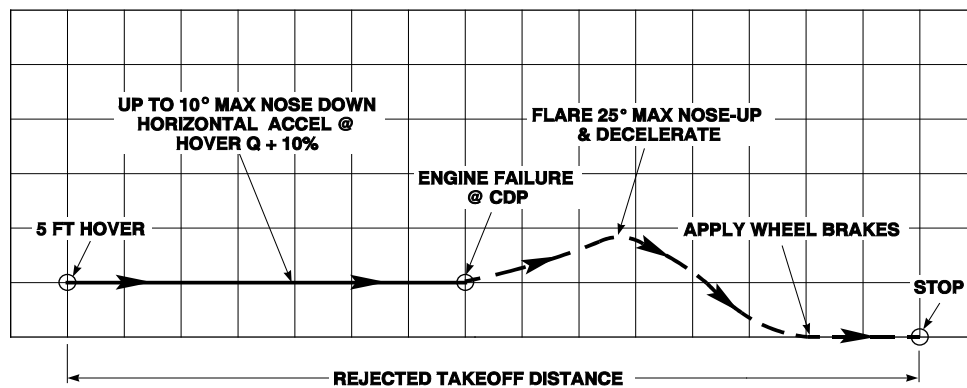
Anti-Ice: OFF or ON

CATEGORY "A" TAKEOFF PROFILES

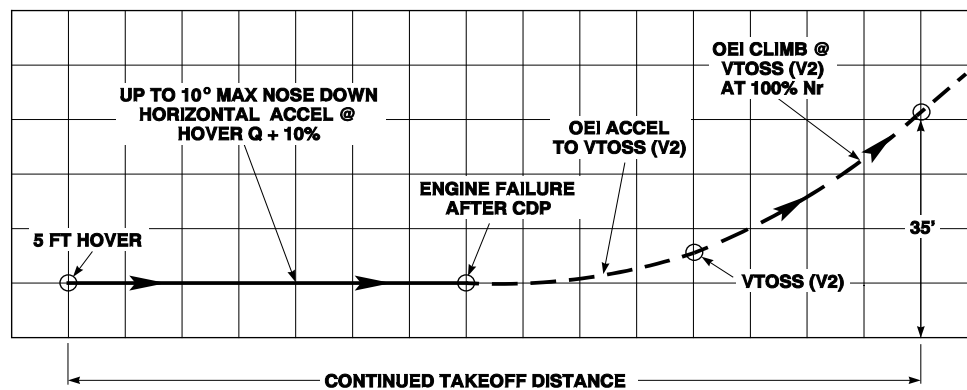
NORMAL TAKEOFF



REJECTED TAKEOFF



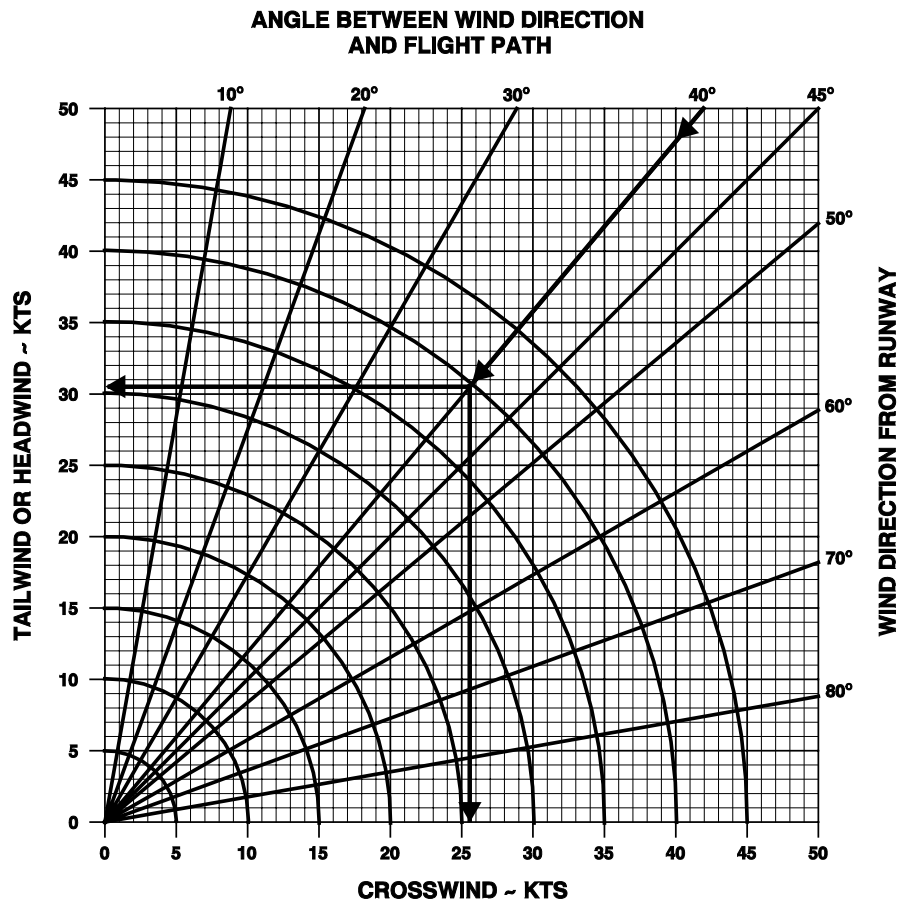
CONTINUED TAKEOFF



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Figure 4-5. Category "A" Takeoff Profile

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WIND COMPONENTS**CONDITION:**

WIND VELOCITY - 40 KTS
 WIND DIRECTION - 130 °
 FLIGHT PATH - 090 °

EXAMPLE:

ENTER CHART AT WIND DIRECTION FROM FLIGHT PATH - 40 °
 MOVE DOWN TO WIND VELOCITY ART = 40 KTS
 MOVE LEFT TO HEADWIND COMPONENT = 30.6 KTS
 MOVE DOWN TO CROSSWIND COMPONENT = 25.7 KTS

CC2091
SA

Figure 4-6. Wind Components

CATEGORY "A"
REJECTED AND CONTINUED TAKEOFF DISTANCES
BLEED AIR OFF ANTI-ICE OFF OR ON
HARD SURFACE RUNWAY

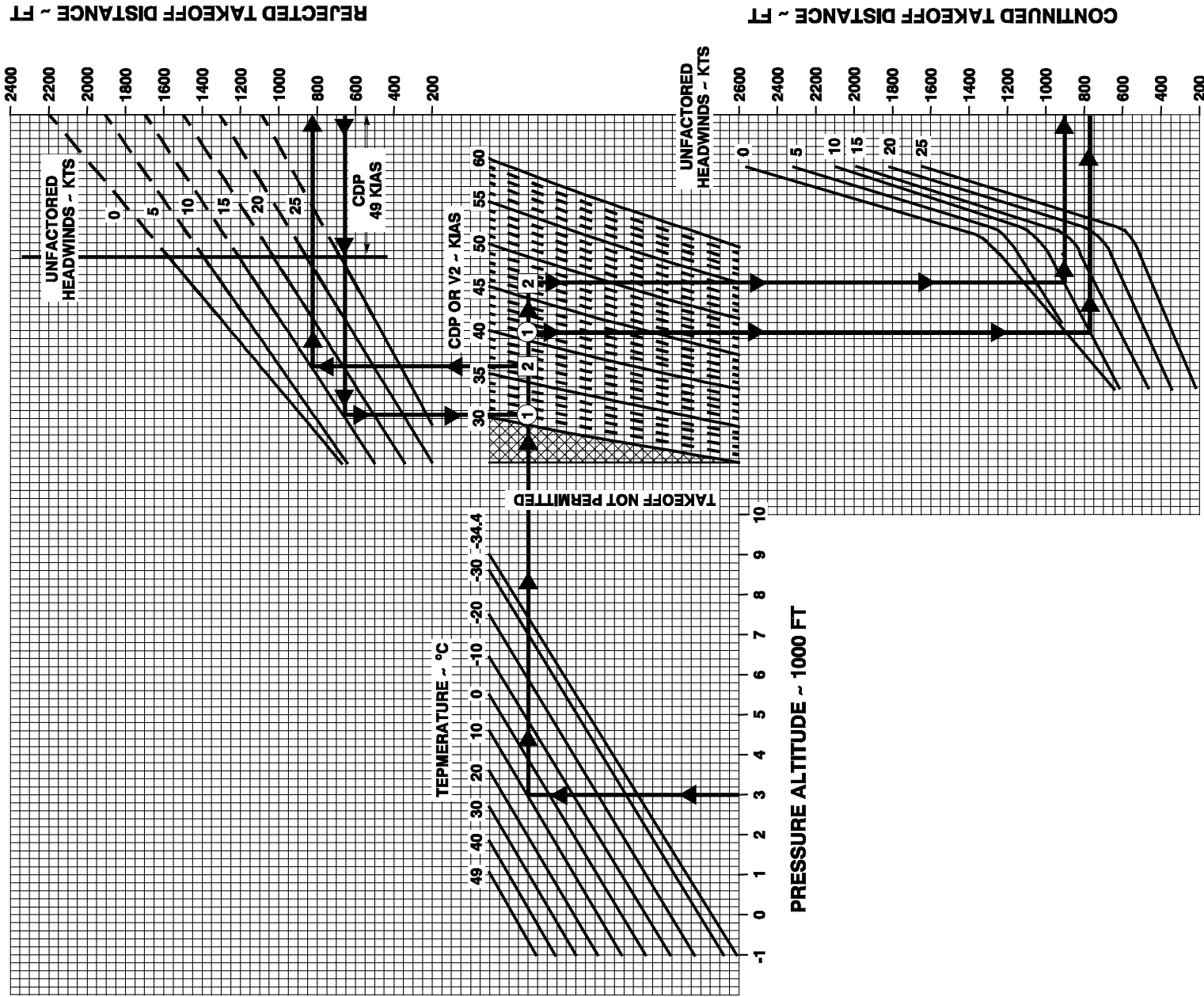


Figure 4-7. Category "A" Rejected and Continued Takeoff Distances

CATEGORY "A" MAXIMUM TAKEOFF AND LANDING GROSS WEIGHT

ANTHICE OFF

BLEED AIR OFF

GENERATOR LOAD ~ UP TO 200 AMPS

REDUCE MAXIMUM TAKEOFF GROSS WEIGHT DETERMINED FROM CHART BY THE AMOUNT SHOWN IN THE FOLLOWING TABLE AS APPLICABLE. WITH COMPOUND CONFIGURATIONS, THE WEIGHT REDUCTIONS ARE CUMULATIVE.

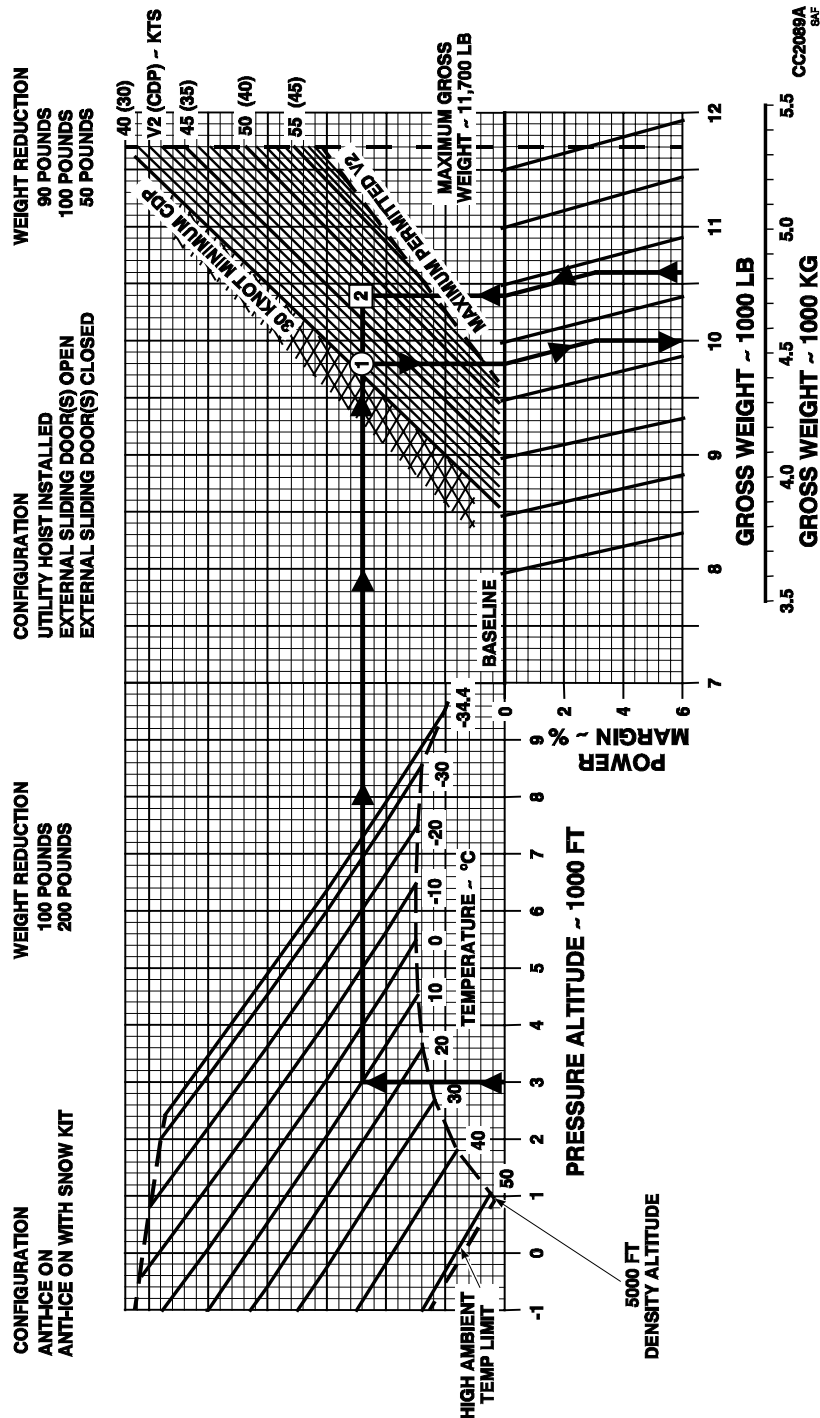
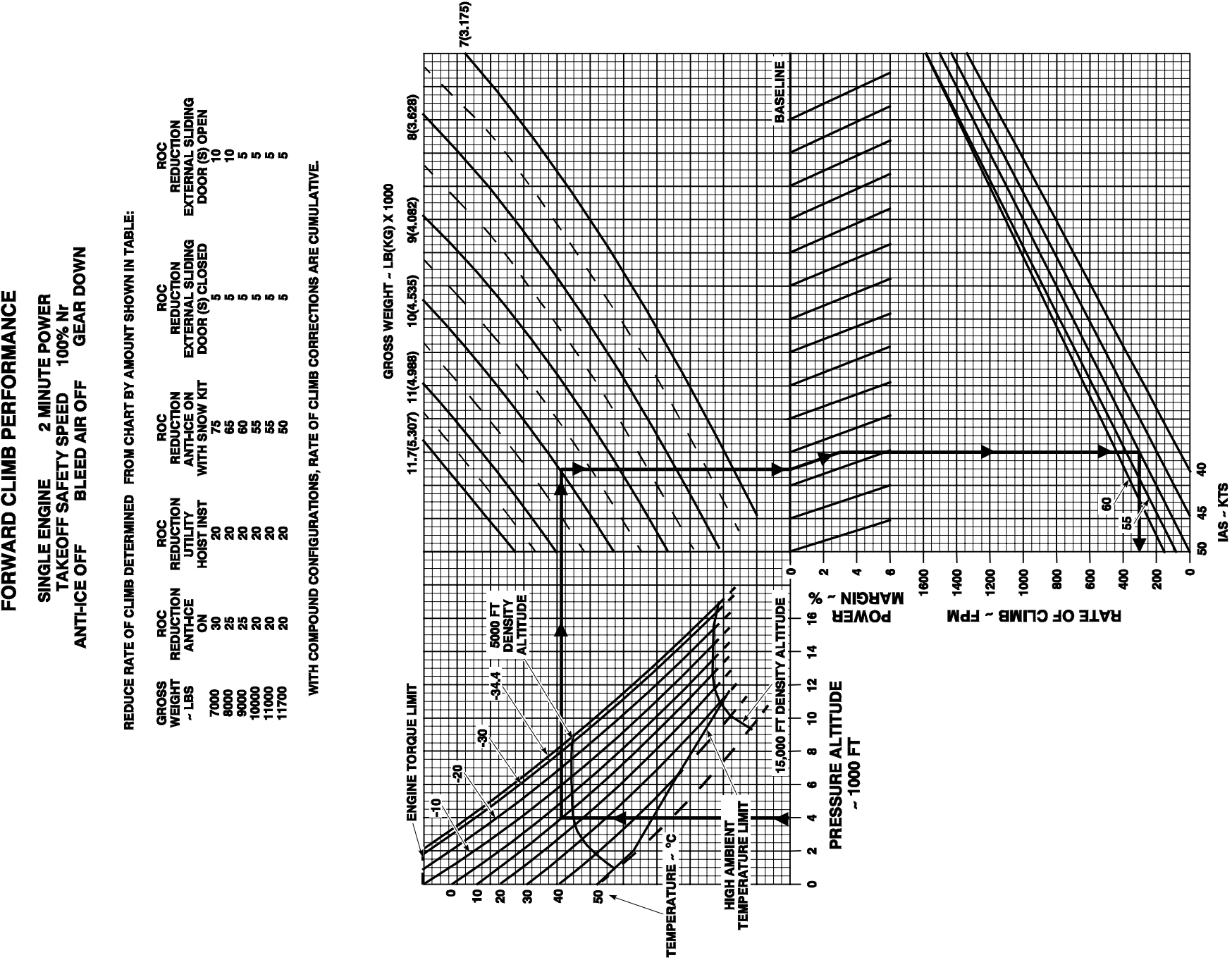
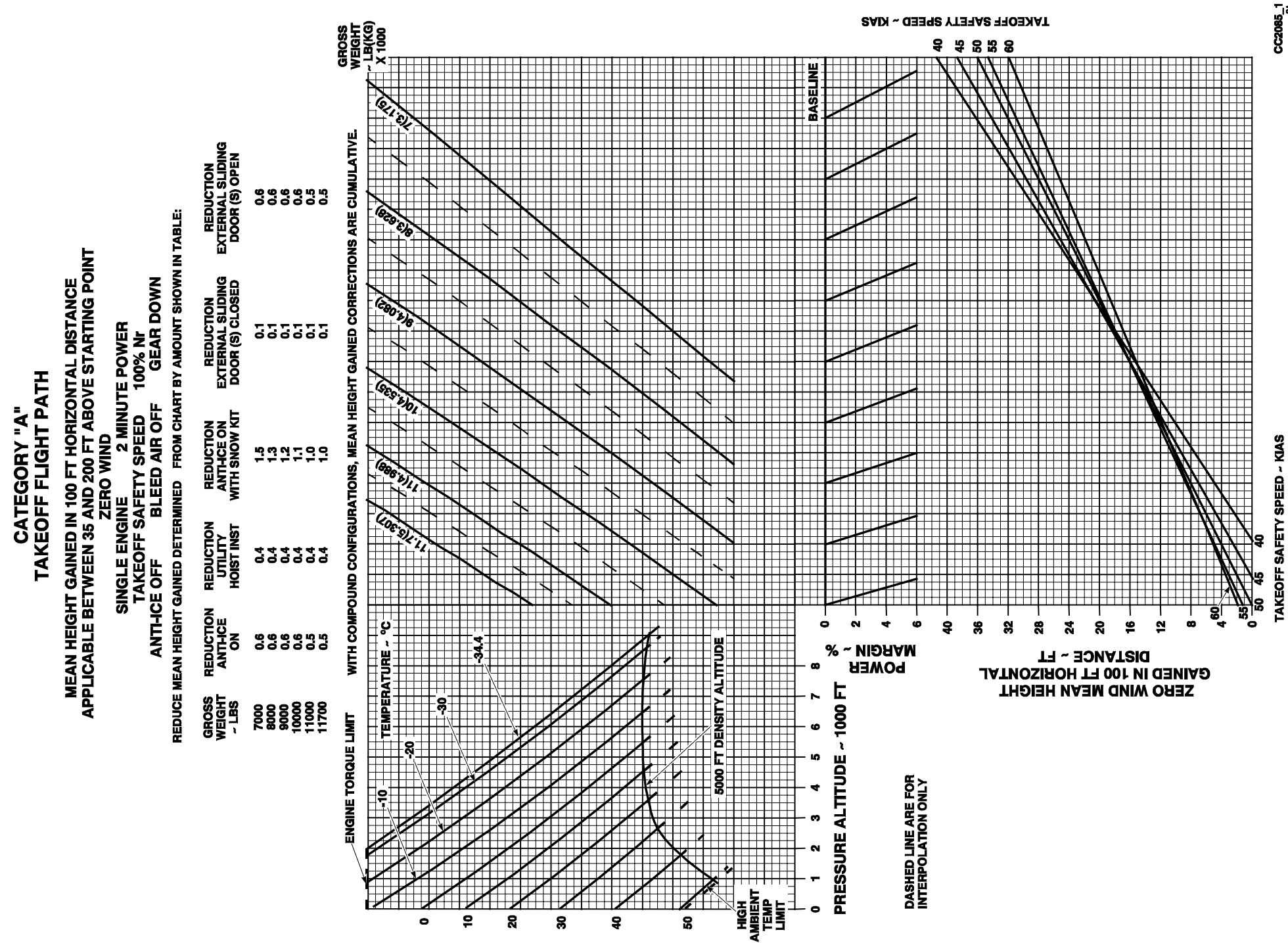


Figure 4-8. Category "A" Maximum Takeoff and Landing Gross Weight
 (This Figure same as Figure 1-1)



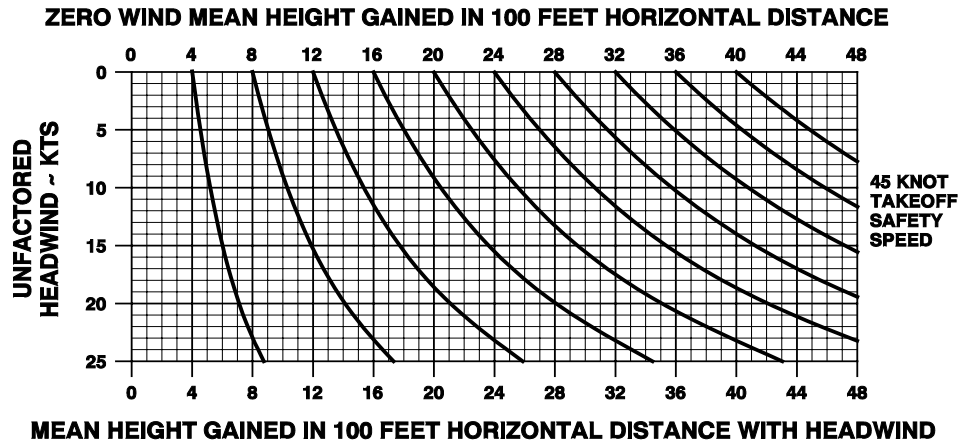
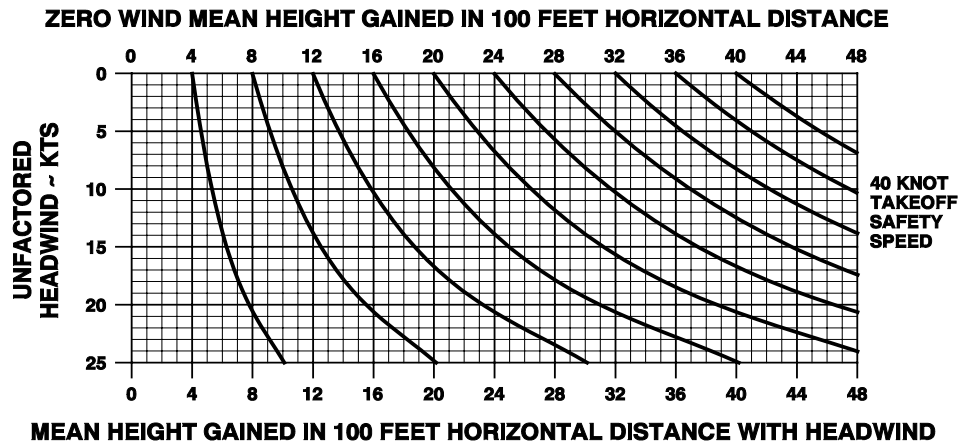
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Figure 4-9. Forward Climb Performance - Single Engine, 2-Minute Power



**CATEGORY "A"
TAKEOFF FLIGHT PATH**

**ZERO WIND MEAN HEIGHT GAINED IN 100 FT HORIZONTAL DISTANCE
VS
MEAN HEIGHT GAINED IN 100 FEET HORIZONTAL DISTANCE WITH HEADWIND
APPLICABLE BETWEEN 35 AND 200 FEET ABOVE STARTING POINT**



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Figure 4-10. Category "A" Takeoff Flight Path (Sheet 2 of 5)

FAA APPROVED DECEMBER 20, 1999

**CATEGORY "A"
TAKEOFF FLIGHT PATH**

**ZERO WIND MEAN HEIGHT GAINED IN 100 FT HORIZONTAL DISTANCE
VS
MEAN HEIGHT GAINED IN 100 FEET HORIZONTAL DISTANCE WITH HEADWIND
APPLICABLE BETWEEN 35 AND 200 FEET ABOVE STARTING POINT**

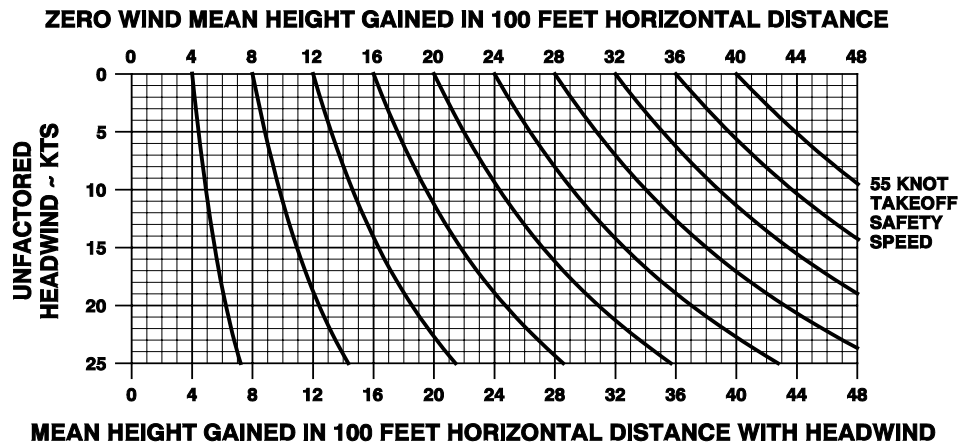
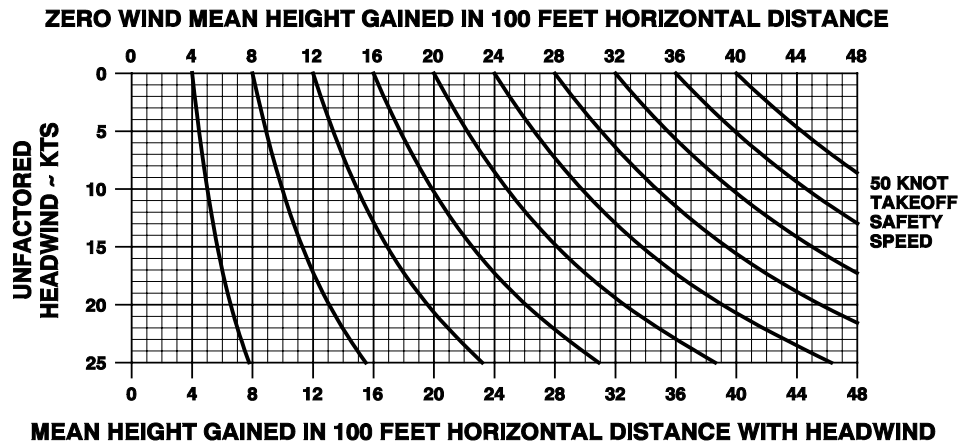
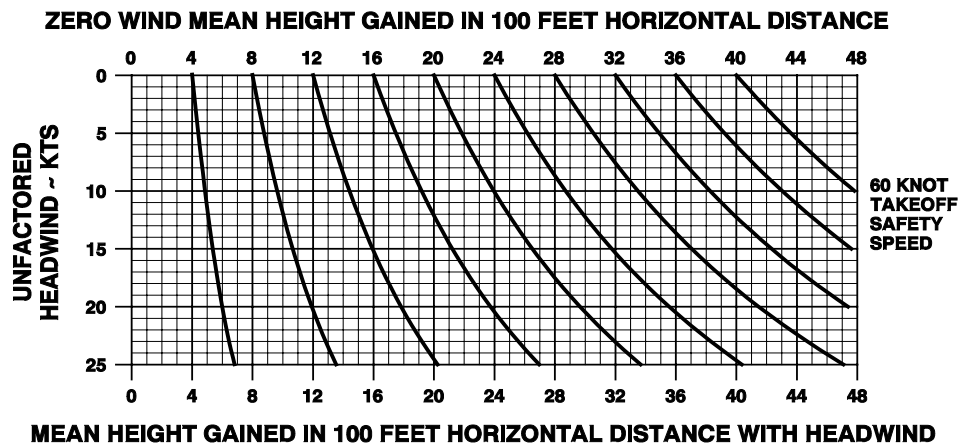
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Figure 4-10. Category "A" Takeoff Flight Path (Sheet 3 of 5)

**CATEGORY "A"
TAKEOFF FLIGHT PATH**

**ZERO WIND MEAN HEIGHT GAINED IN 100 FT HORIZONTAL DISTANCE
VS
MEAN HEIGHT GAINED IN 100 FEET HORIZONTAL DISTANCE WITH HEADWIND
APPLICABLE BETWEEN 35 AND 200 FEET ABOVE STARTING POINT**



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Figure 4-10. Category "A" Takeoff Flight Path (Sheet 4 of 5)

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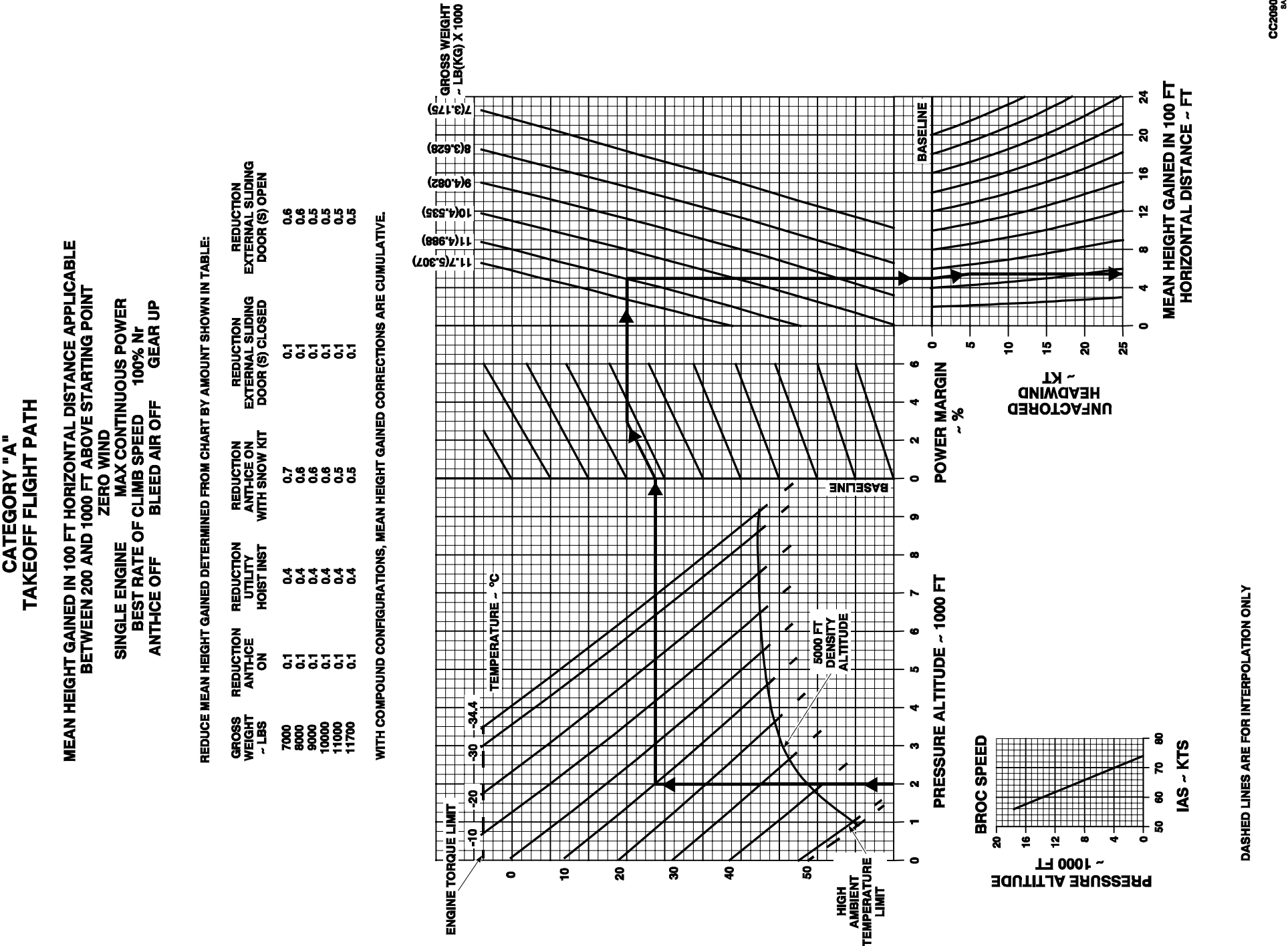


Figure 4-10. Category "A" Takeoff Flight Path (Sheet 5 of 5)

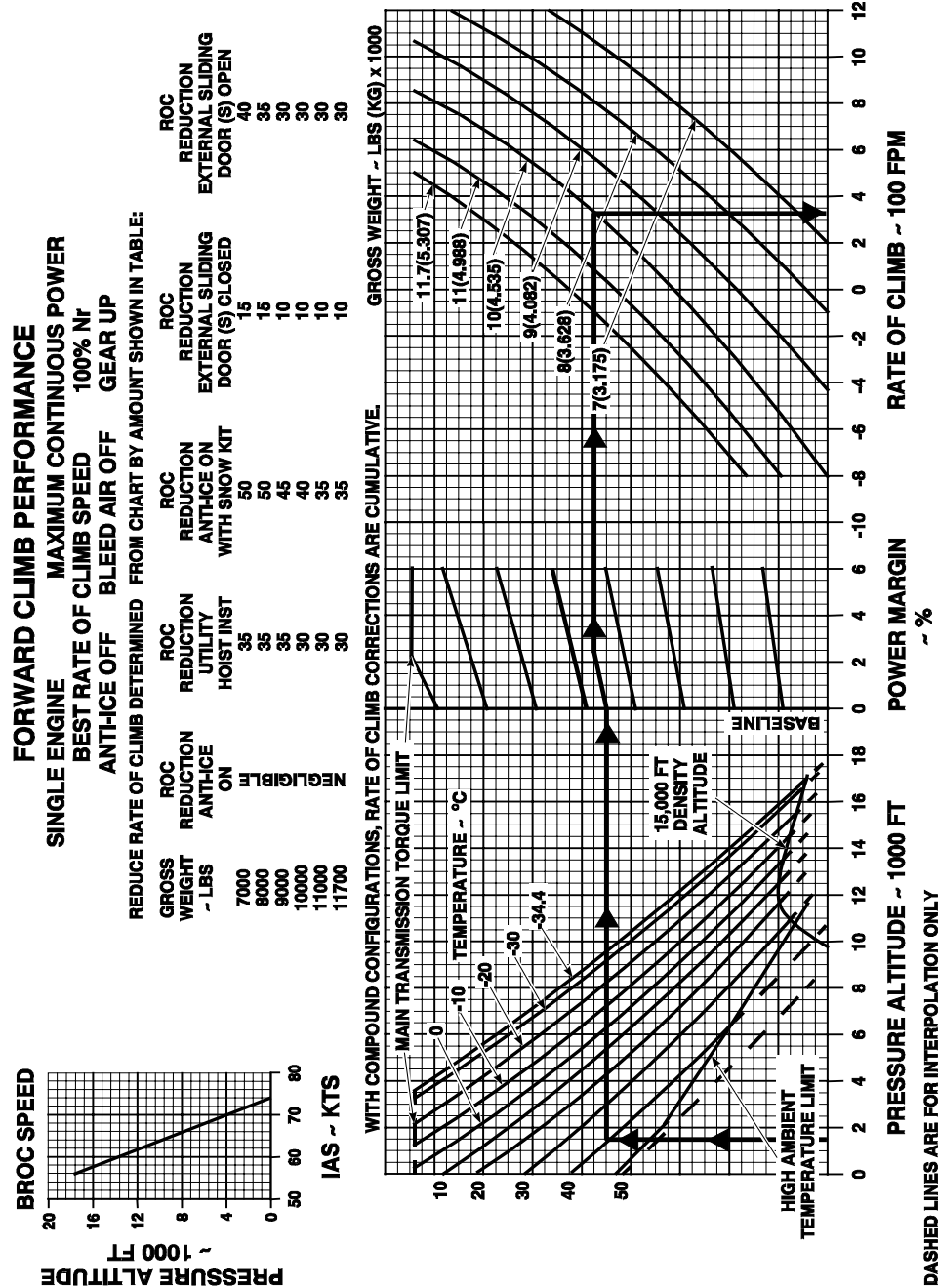


Figure 4-11. Forward Climb Performance - Single Engine, Maximum Continuous Power

CATEGORY "A" LANDING

The Category "A" Landing Procedure is shown diagrammatically in Figure 4-12.

Establish an approach to arrive at the LDP, a point 200 feet above the touchdown elevation, with 45 KIAS, and a rate of descent of no more than 600 FPM. Initiate a deceleration passing 50 feet at 45 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single-engine landing.

ASSOCIATED CONDITIONS

Bleed air: OFF

Anti-ice: OFF or ON

LANDING DISTANCE

The landing distances shown in Figure 4-14 reflect one-engine inoperative landings to a hard-surfaced runway.

ALTERNATE CATEGORY "A" LANDING TECHNIQUE

The Category "A" Alternate Landing Procedure is shown diagrammatically in Figure 4-13.

Establish an approach to arrive at the LDP, a point 75 feet above the touchdown elevation, with 60 KIAS and a rate of descent of no more than 300 FPM. Upon passing the LDP, initiate a smooth deceleration while reducing collective to continue descent through 50 feet with up to 20° to 25° flare attitude. Apply collective to reduce descent rate and decrease flare attitude to pass 20 feet at approximately 30 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single-engine landing.

ASSOCIATED CONDITIONS

Bleed air: OFF

Anti-ice: OFF or ON

LANDING DISTANCE

The landing distance reflects one-engine inoperative landings to a hard-surfaced runway. The landing distance is 1,000 feet for all weight, altitude, and temperature combinations.

CATEGORY "A" LANDING PROFILE

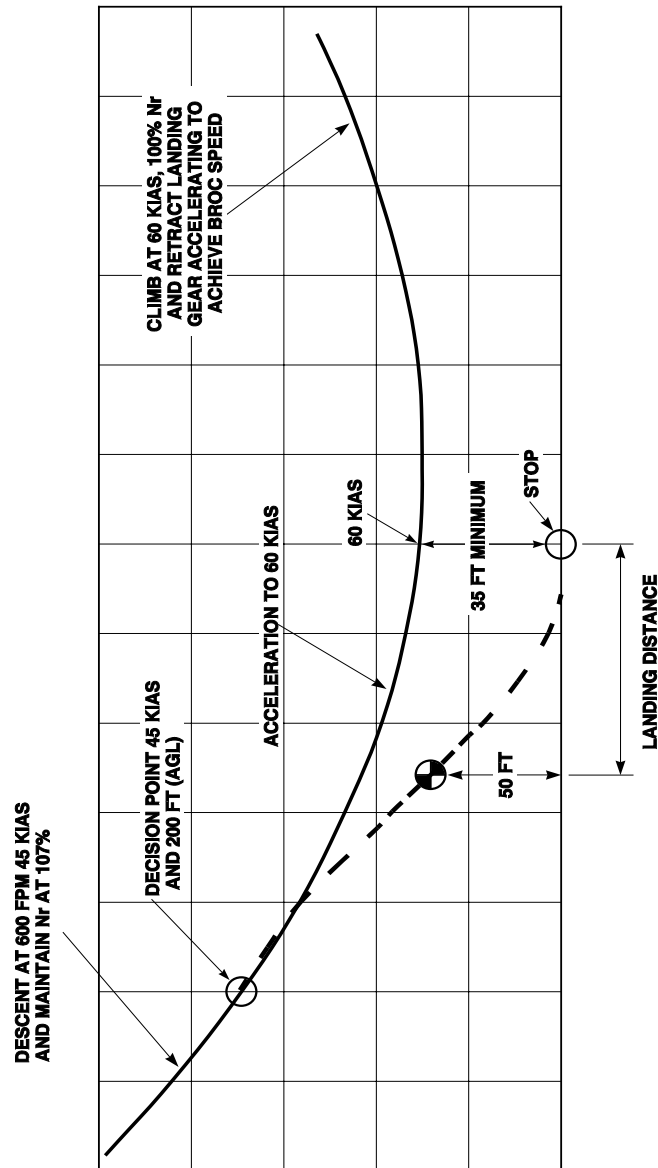


Figure 4-12. Category "A" Landing Profile

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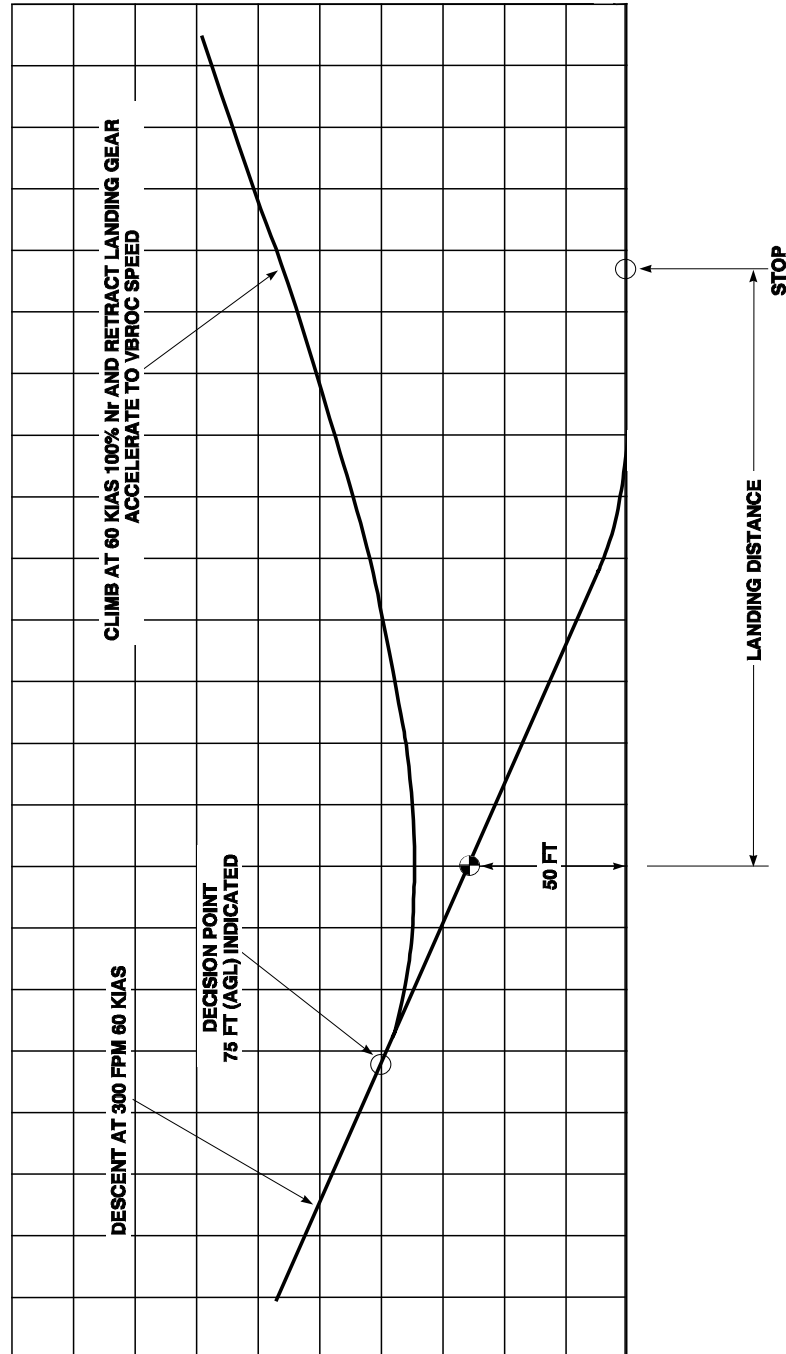
CATEGORY "A" ALTERNATE LANDING PROFILE


Figure 4-13. Category "A" Alternate Landing Profile

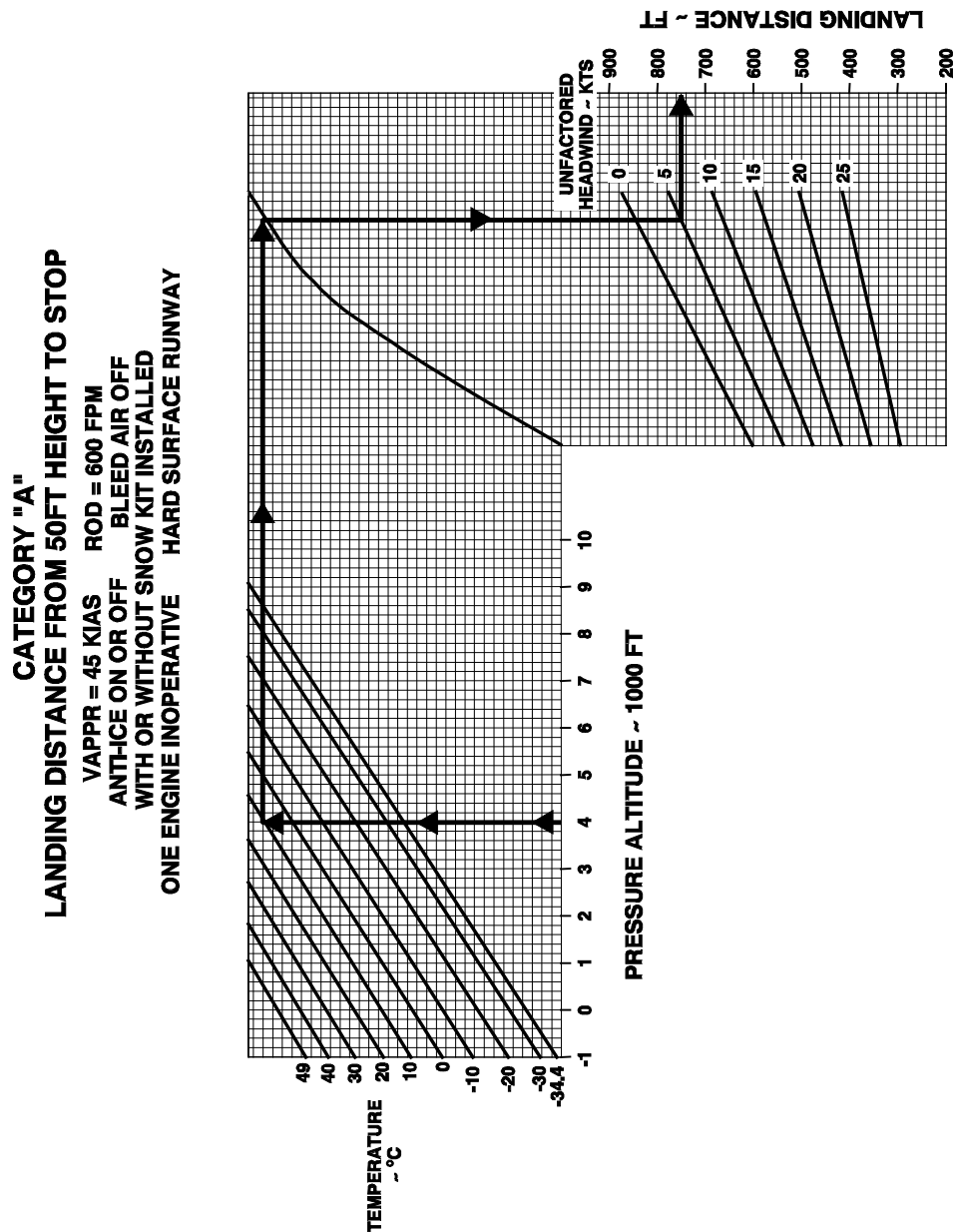


Figure 4-14. Category "A" Landing DistanceCategory "B" Takeoff

TECHNIQUE

The Category "B" Takeoff Procedure is shown diagrammatically in Figure 4-15.

Rise vertically to 5-foot wheel height. Increase collective pitch to achieve up to 10% torque above hover torque (not to exceed takeoff power limits) and accelerate forward maintaining 5- to 10-foot wheel height. Rotate nose-up at 50 KIAS, and climb at 55 KIAS until obstructions are cleared.

ASSOCIATED CONDITIONS

Bleed air: OFF

Anti-ice: OFF or ON

TAKEOFF DISTANCE

The takeoff distances from 5-foot hover to 50-foot height are shown in Figure 4-16. Figure 4-17 shows the effect of headwind component.

CATEGORY "B" LANDING**TECHNIQUE**

The Category "B" Landing Procedure is shown diagrammatically in Figure 4-20.

Establish approach to pass through a point 200 feet above the touchdown elevation at 45 KIAS and 600-FPM rate of descent. Initiate a deceleration passing through 50 feet at 45 KIAS. Continue approach and deceleration to a running touchdown or hover. Refer to emergency procedures for single-engine landing.

ASSOCIATED CONDITIONS

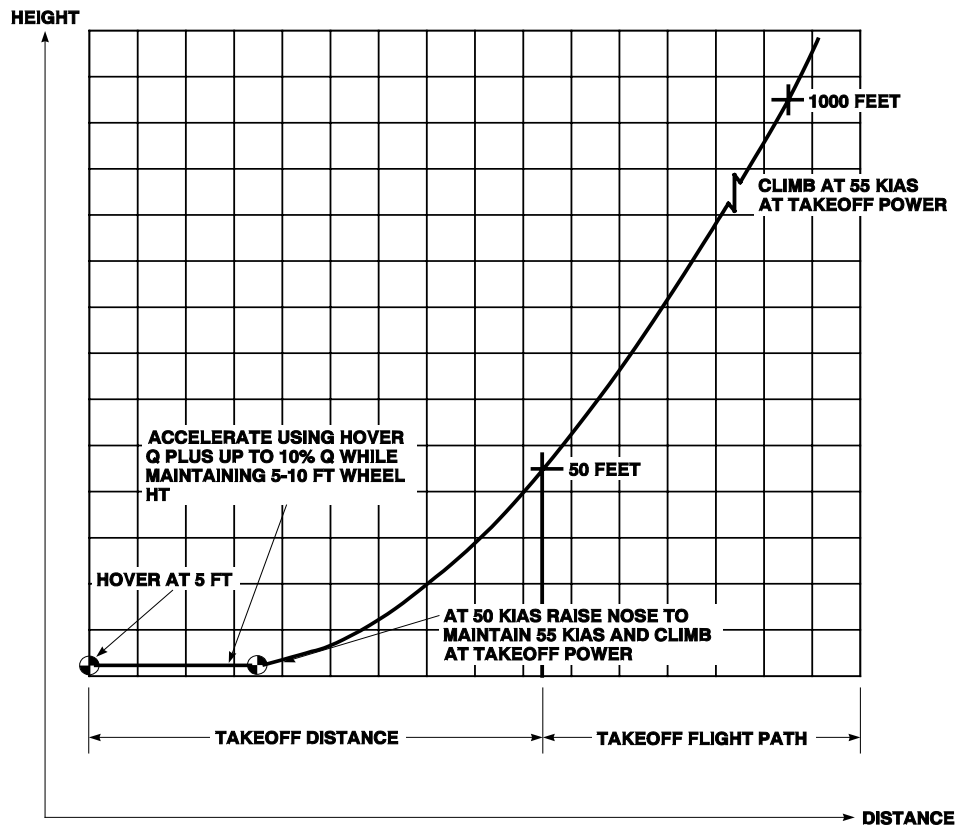
Bleed air: OFF

Anti-ice: OFF or ON

LANDING DISTANCE

The landing distances shown in Figure 4-21 reflect one-engine inoperative landings to a hard-surfaced runway.

**CATEGORY "B"
TAKEOFF PROFILE**



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Figure 4-15. Category "B" Takeoff Profile

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CATEGORY "B" TAKEOFF DISTANCE
BLEED AIR OFF
ANTHCE: OFF OR ON WITH OR WITHOUT SNOW KIT INSTALLED

OAT ~ °C	PRESSURE ALTITUDE 1000 FT	GROSS WEIGHT LB					
		7000	8000	9000	10,000	11,000	11,700
-34.4	0	630	670	720	760	810	840
	1	670	710	760	800	840	870
	2	700	750	790	830	880	910
	3	740	780	830	870	910	940
	4	780	820	860	900	950	970
	5	820	860	900	940	980	1010
	6	850	890	930	970	1010	1040
	7	890	930	960	1000	1040	1080
	8	930	960	1000	1030	1080	1210
	9	960	1000	1030	1060	1140	1470
	10	1000	1030	1060	1090	1350	1800
	11	1040	1060	1080	1130	1660	2160
	12	1070	1090	1110	1320	2010	2580
	13	1100	1110	1140	1610	2410	3060+
	14	1130	1140	1270	1970	2880	
	15	1150	1160	1520	2380	3430+	
	16	1170	1210	1870	2860		
	17	1190+	1400+	2270+	3420+		
-30	0	650	690	740	780	830	860
	1	690	730	770	820	860	890
	2	720	770	810	850	890	920
	3	760	800	840	890	930	960
	4	800	840	880	920	960	990
	5	830	870	910	950	990	1020
	6	870	910	950	990	1020	1060
	7	910	940	980	1020	1060	1100
	8	940	980	1010	1050	1100	1300
	9	980	1010	1040	1070	1210	1590
	10	1020	1040	1070	1110	1460	1920
	11	1050	1070	1090	1190	1780	2300
	12	1080	1100	1120	1420	2150	2730
	13	1110	1120	1160	1740	2570	3240+
	14	1140	1150	1350	2110	3060	
	15	1160	1170	1640	2530	3630+	
	16	1180	1280	2010	3040+		
	17	1200+	1500+	2430+	3620+		
-20	0	690	730	780	820	860	900
	1	730	770	810	860	900	930
	2	760	800	850	890	930	960
	3	800	840	880	920	960	990
	4	840	880	920	960	1000	1030
	5	870	910	950	990	1030	1070
	6	910	950	980	1020	1060	1110
	7	950	980	1010	1050	1100	1290
	8	980	1010	1040	1080	1200	1560
	9	1020	1040	1070	1110	1440	1880
	10	1050	1070	1090	1190	1750	2240
	11	1090	1100	1120	1400	2090	2650
	12	1110	1120	1160	1700	2490	3130+
	13	1140	1150	1340	2050	2950+	3690+
	14	1160	1170	1610	2460	3500+	
	15	1180	1270	1950	2930+		
	16	1200+	1480+	2350+	3480+		
	17	1230+	1790+	2820+			

IN SHADED AREAS, REDUCE TAKEOFF DISTANCE BY 30 FT FOR EVERY PERCENT OF POWER MARGIN.

FLIGHT NOT ALLOWED.

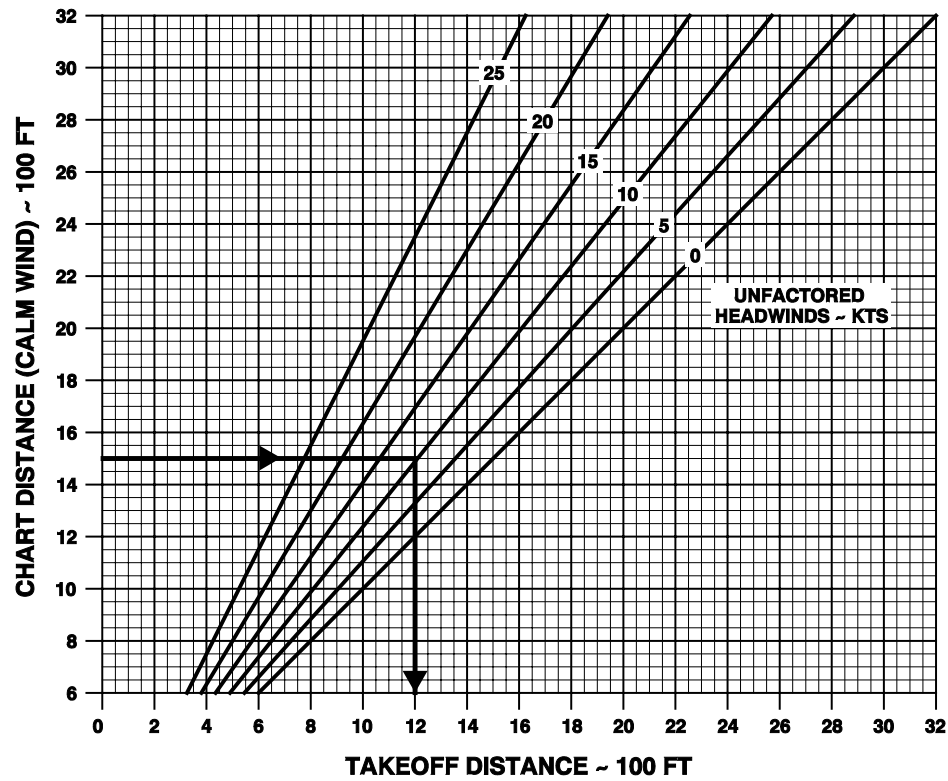
OAT ~ °C	PRESSURE ALTITUDE 1000 FT	GROSS WEIGHT LB					
		7000	8000	9000	10,000	11,000	11,700
0	0	770	810	850	890	930	960
	1	800	840	880	930	970	1000
	2	840	880	920	960	1000	1030
	3	870	910	950	990	1030	1070
	4	910	950	980	1020	1060	1110
	5	950	980	1010	1050	1100	1250
	6	980	1010	1040	1080	1180	1500
	7	1020	1040	1070	1110	1380	1790
	8	1050	1070	1090	1170	1670	2120
	9	1080	1100	1120	1350	1980	2490
	10	1110	1120	1160	1620	2350	2930+
	11	1140	1140	1290	1940	2760+	3430+
	12	1160	1170	1530	2310	3240+	4010+
	13	1180	1240	1840	2720+	3810+	
	14	1200+	1420+	2200+	3220+		
	15	1220+	1680+	2610+	3800+		
	16	1310+	2020+	3110+			
20	0	840	880	920	960	1000	1030
	1	870	910	950	990	1030	1070
	2	910	940	980	1020	1060	1100
	3	940	980	1010	1050	1100	1260
	4	980	1010	1040	1070	1180	1490
	5	1010	1040	1070	1110	1380	1770
	6	1050	1070	1090	1170	1650	2080
	7	1080	1100	1120	1350	1940	2420
	8	1110	1120	1150	1610	2290	2830+
	9	1130	1140	1300	1910	2680	3290+
	10	1150	1160	1520	2250	3120+	3830+
	11	1170	1240	1820	2640+	3650+	
	12	1200+	1420+	2160+	3110+		
	13	1220+	1680+	2550+	3640+		
	14	1330+	2010+	3010+			
40	0	900	940	970	1010	1050	1230
	1	940	970	1010	1040	1160	1450
	2	970	1000	1030	1070	1360	1700
	3	1010	1030	1060	1160	1600	1970
	4	1040	1060	1090	1340	1870	2280
	5	1070	1090	1140	1590	2170	2630
	6	1100	1110	1310	1860	2520	3030+
	7	1120+	1150+	1550+	2180+	2910+	3490+
	8	1150+	1280+	1840+	2540+	3370+	4030+
	9	1170+	1500+	2160+	2950+	3900+	
	10	1280+	1790+	2530+	3440+	4530+	
	11	1460+	2120+	2970+	4000+		
	12	1730+	2500+	3470+			
49	0	930	960	1000	1030	1320	1640
	1	960	1000	1030	1130	1540	1870
	2	1000	1030	1060	1290	1770	2130
	3	1030+	1060+	1120+	1510+	2030+	2430+
	4	1070+	1080+	1260+	1750+	2320+	2770+
	5	1090+	1120+	1480+	2020+	2650+	3150+
	6	1120+	1240+	1710+	2320+	3030+	3600+
	7	1140+	1410+	1990+	2670+	3480+	

+ PRESENTED FOR INTERPOLATION ONLY. DATA ABOVE 15,000 FT DENSITY ALTITUDE LIMIT, OR HIGH AMBIENT TEMPERATURE LIMIT, OR EXCEEDS CAT "B" WAT LIMITS.

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Figure 4-16. Category "B" Takeoff Distance

**CATEGORY "B" TAKEOFF
HEADWIND INFLUENCE**



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SA

Figure 4-17. Category "B" Takeoff Headwind Influence

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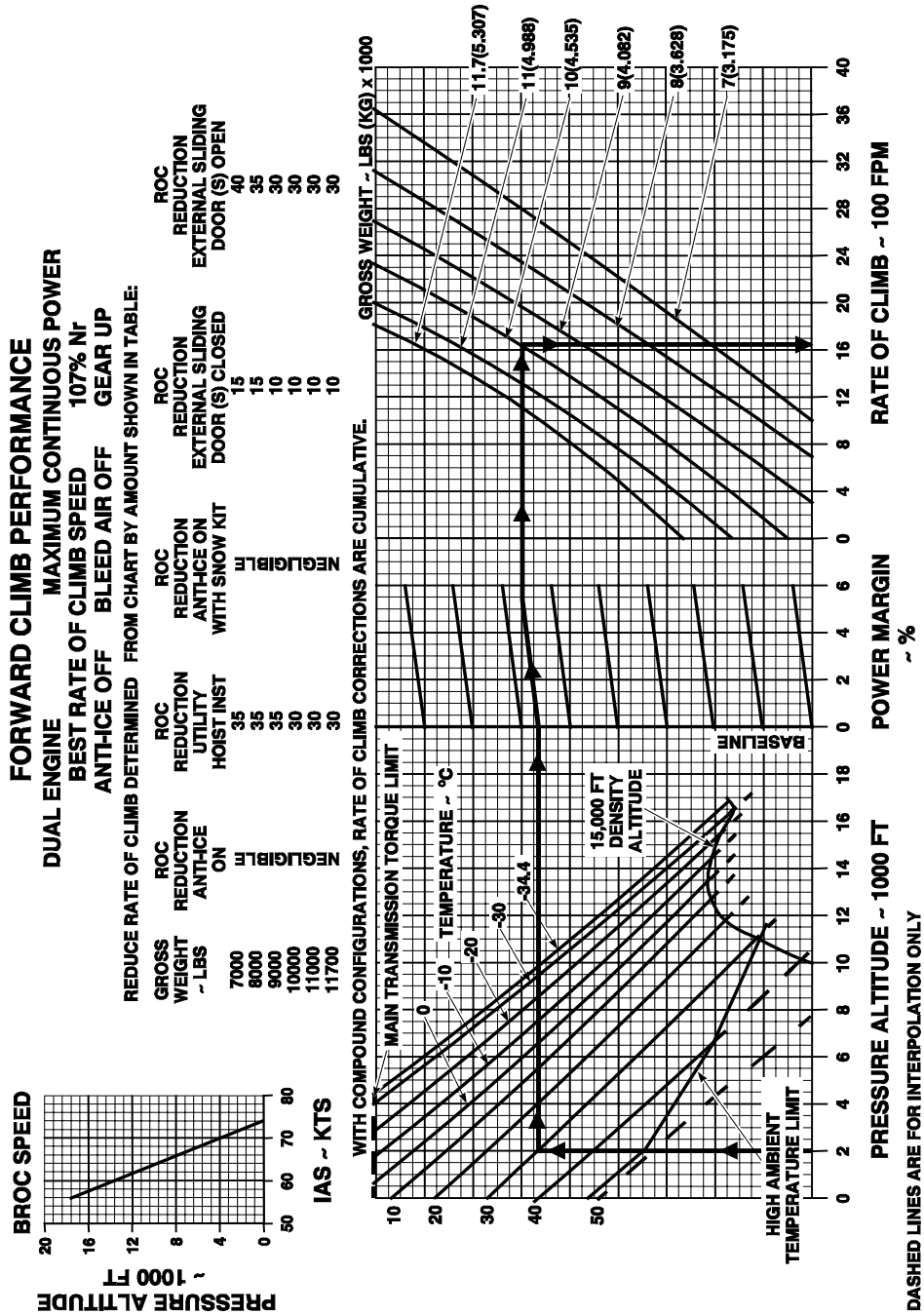


Figure 4-18. Forward Climb Performance - Two Engines, Maximum Continuous Power

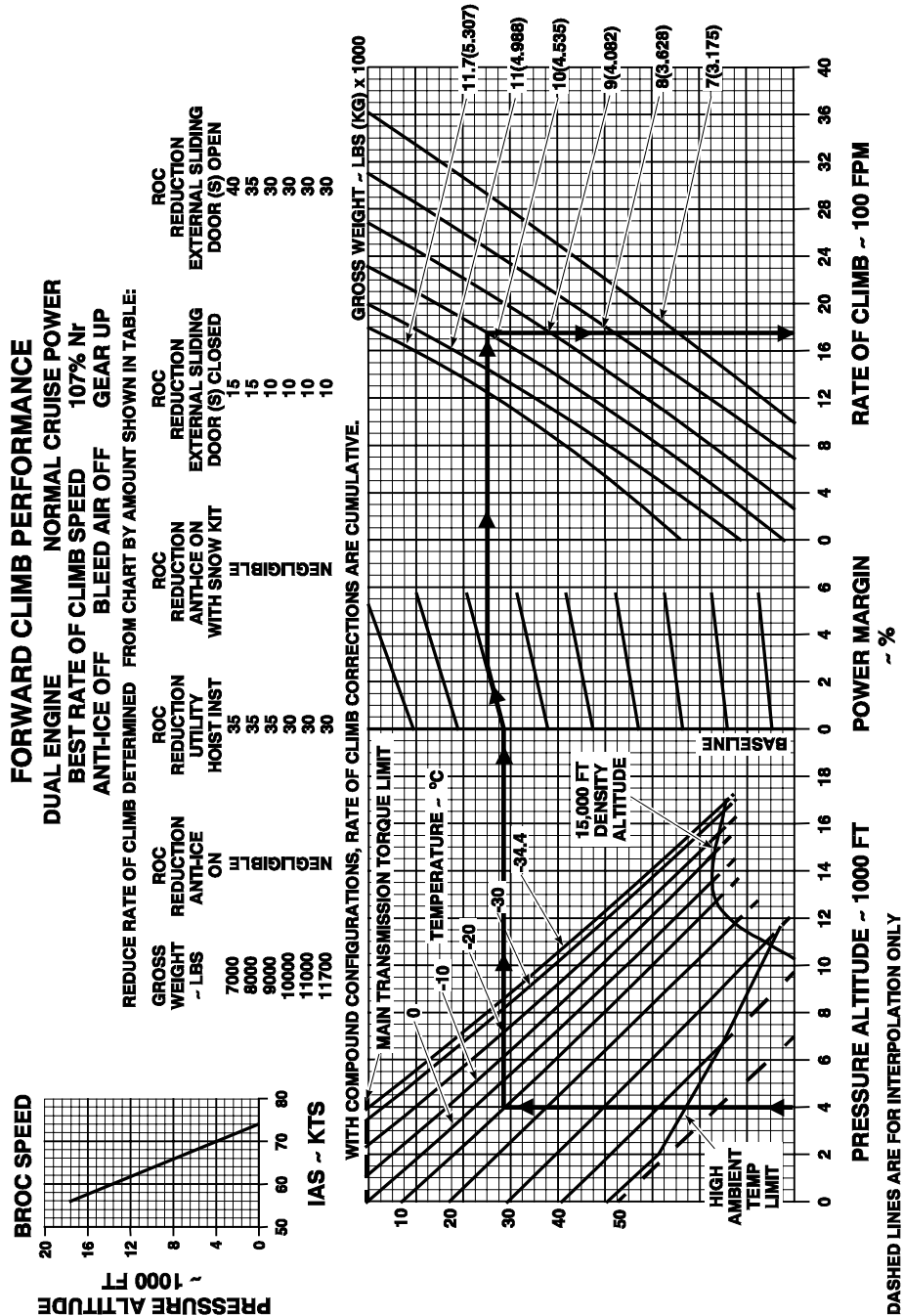


Figure 4-19. Forward Climb Performance - Two Engines, Normal Cruise Power Information

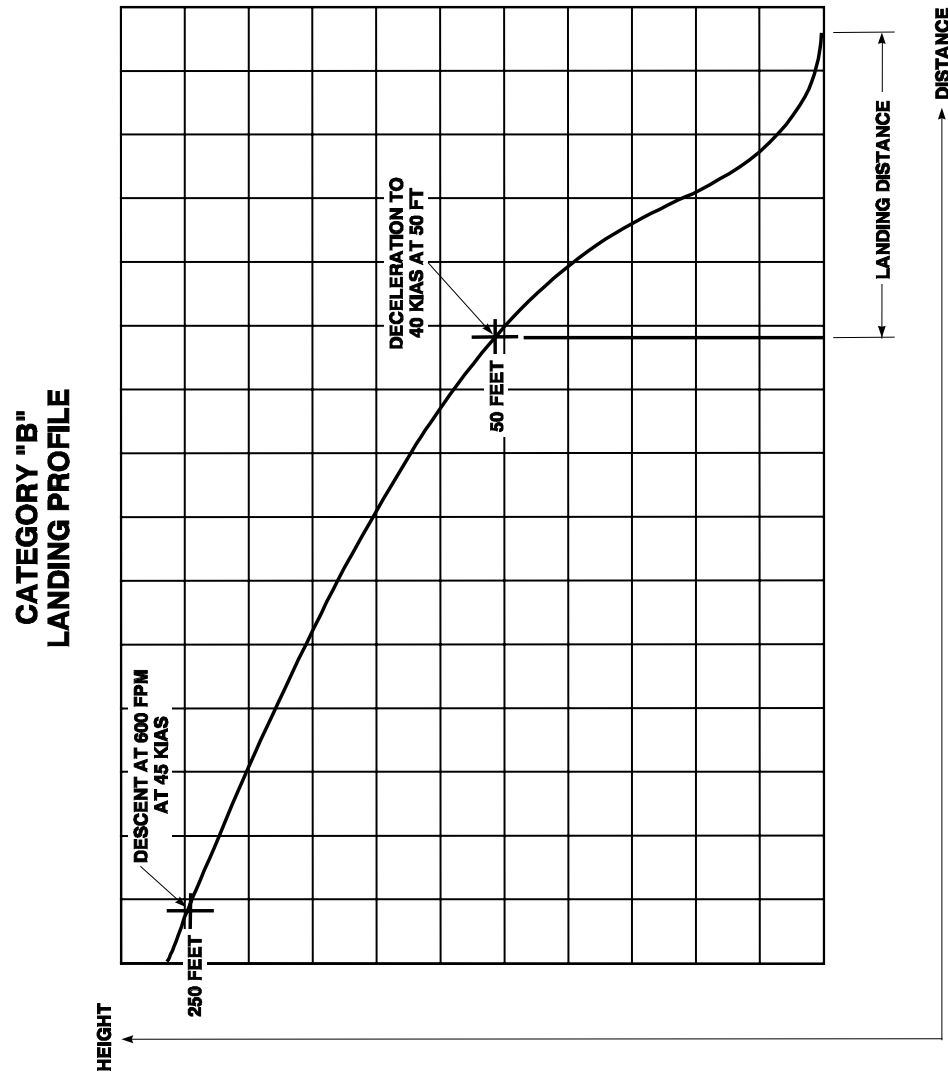


Figure 4-20. Category "B" Landing Profile

**CATEGORY "B" LANDING DISTANCE
FROM 50 FOOT HEIGHT TO STOP**

ANTI-ICE ON OR OFF
BLEED AIR OFF WIND CALM
WITH OR WITHOUT SNOW KIT INSTALLED
V_{app} = 45 KIAS ROD = 600 FT/MIN

PRESSURE ALTITUDE ~ 1000 FT	FREE AIR TEMPERATURE ~ °C									
	-34.4	-30	-20	-10	0	10	20	30	40	49
0	620	630	650	670	690	710	730	760	790	820
1	640	650	670	690	710	740	760	800	830	870
2	660	670	690	710	740	760	800	840	880	920
3	680	690	710	740	760	800	840	890	940	990+
4	700	710	730	760	800	840	890	940	1000	1050+
5	720	730	760	800	850	900	950	1010	1070	1130+
6	740	760	800	850	900	960	1020	1080	1150	1220+
7	780	800	850	900	960	1020	1090	1160	1250+	1340+
8	820	840	900	960	1030	1090	1170	1260	1390+	
9	870	900	960	1030	1100	1180	1280	1410	1570+	
10	930	960	1030	1100	1190	1290	1430	1610	1800+	
11	990	1030	1100	1190	1300	1450	1630	1840+	2040+	
12	1060	1100	1190	1310	1470	1660	1870+	2080+		
13	1150	1190	1310	1480	1680	1900+	2110+			
14	1250	1310	1490	1700	1920+	2140+				
15	1400	1490	1710	1940+	2170+					
16	1600	1710	1950+	2190+						
17	1840+	1960+	2200+							

LANDING NOT ALLOWED

+ PRESENTED FOR INTERPOLATION ONLY. DATA ABOVE 15,000 FT DENSITY ALTITUDE OR HIGH AMBIENT TEMPERATURE LIMIT.

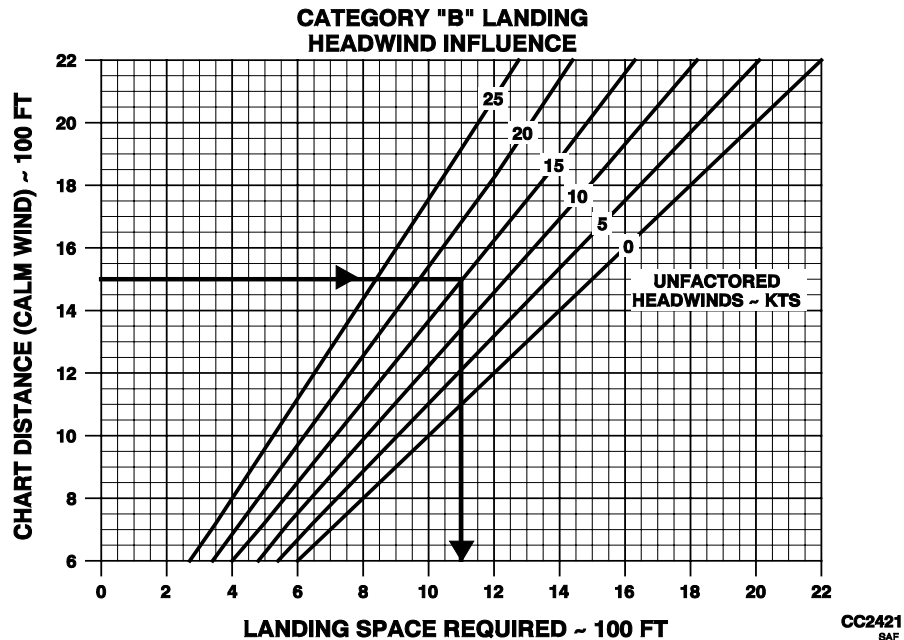


Figure 4-21. Category "B" Landing Distance

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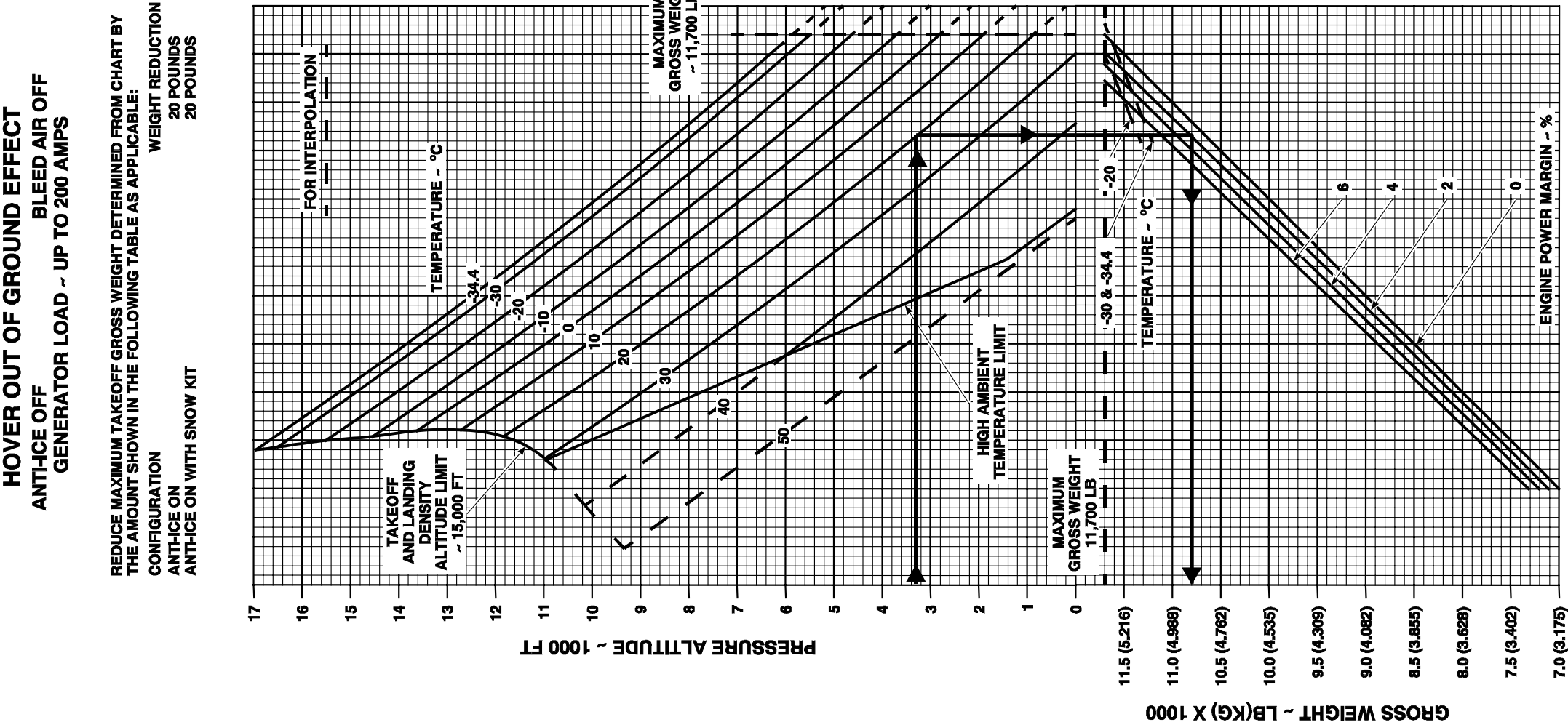


Figure 4-22. Hover Out of Ground Effect

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S-76C+ SUPPLEMENT INDEX**INTRODUCTION**

The supplements listed below are not applicable to every serial number helicopter. The operator is only required to have those supplements that pertain to the equipment installed on their helicopter. If the operator installs the equipment described in a supplement at a later date, the applicable supplement may be ordered from Sikorsky Aircraft.

Annotate with an "X" in the **APPLICABLE** column those supplements that apply to your helicopter. Please update any revised Supplement Index, as required, when received with future changes.

SUPP. NO.	APPLICABLE	SUBJECT	PART 1 REV. NO.	PART 1 REV. DATE	PART 2 REV. NO.	PART 2 REV. DATE
<u>FAA SUPPLEMENTS – NORTHERN REGION</u>						
6	_____	Cyclic Position Warning System	1	4/15/02	N/A	N/A
8	_____	Category "A" Vertical Operations From Ground-Level Heliports	2	11/24/00	1	1/23/02
9	_____	Category "A" Vertical Operations From Elevated Heliports	2	11/24/00	1	11/24/00
12	_____	Hovering Operations at 30-Minute Power	1	12/20/99	N/A	N/A
16	_____	Engine/Inlet Cowl Open Annunciation System	Basic	6/17/02	Basic	6/17/02
17	_____	In-Flight Power Assurance Trending	1	1/23/02	1	1/23/02
18	_____	Lucas Variable Speed Utility Hoist	Basic	6/20/01	1	11/4/02
19	_____	External Cargo Hook and Optional Cargo Hook Load Indicator	Basic	10/31/01	Basic	10/31/01
76	_____	Data Nav V Display System	2	10/20/00	N/A	N/A
77	_____	Argus 7000 or Argus 7000/CE Moving Map Display System	5	10/20/00	N/A	N/A
80	_____	Magnastar C-2000 Digital Airborne Telephone	1	10/20/00	N/A	N/A
83	_____	BF Goodrich Stormscope WX-950 Weather Mapping System	2	10/20/00	1	10/20/00

SUPP. NO.	APPLICABLE	SUBJECT	PART 1 REV. NO.	PART 1 REV. DATE	PART 2 REV. NO.	PART 2 REV. DATE
88	_____	SPZ-7600 Digital Automatic Flight Control System (DAFCS)	2	10/24/03	4	10/24/03
90	_____	Emergency Locator Transmitter	2	4/15/02	1	4/15/02
91	_____	Honeywell Primus P-700/701 Radar System	1	6/20/01	N/A	N/A
98	_____	FLEXCOMM II Dual 5000, Global Wolfsberg	2	6/20/01	1	6/20/01
99	_____	METAIR Long Range Fuel System	2	11/7/00	1	11/7/00
104	_____	J.E.T. Standby Attitude Indicator, ADI-335D	2	2/4/03	N/A	N/A
106	_____	UNS-1D FMS Flight Management System (FMS)	2	10/20/00	N/A	N/A
107	_____	Cabin ECS System	N/A	N/A	1	10/20/00
113	_____	LSZ-850 Lightning Sensor	1	6/20/01	N/A	N/A
114	_____	P&G Solid-State Combined Voice and Flight Data Recorder	1	7/3/01	N/A	N/A
117	_____	Category "B" Operations with 9 or Less Passenger Seats	1	4/15/02	N/A	N/A
118	_____	Collins MDF-124F Direction Finder	1	6/20/01	N/A	N/A
119	_____	Hunting Aviation/Metair Long Range Fuel System	3	7/3/01	1	7/3/01
120	_____	Primus 880 Weather Radar	1	10/20/00	N/A	N/A
121	_____	BF Goodrich Skywatch Traffic Advisory System SKY497	1	6/20/01	1	6/20/01
122	_____	Automatic Cabin Temperature System	1	10/20/00	1	10/20/00
123	_____	Collins RTU 4200 Radio Control Unit	1	10/20/00	N/A	N/A
126	_____	Spectrolab Nightsun Searchlight	2	4/15/02	1	6/20/01
127	_____	Sikorsky Radio Altitude Warning System	1	10/24/03	1	10/24/03
128	_____	FLIR Systems 2000HP FLIR or Ultra Media Camera System	1	6/20/01	1	6/20/01

SUPP. NO.	APPLICABLE	SUBJECT	PART 1 REV. NO.	PART 1 REV. DATE	PART 2 REV. NO.	PART 2 REV. DATE
130	_____	AUX BUS Supplemental Battery Power Pack	1	4/15/02	1	4/15/02
136	_____	Trimble 2101 I/O Approach Plus GPS Navigator System	1	10/20/00	N/A	N/A
139	_____	NAT 110/220 Watt Loud Hailer System	1	7/3/01	1	7/3/01
142	_____	Honeywell AV-850A Cockpit/Cabin Audio System	1	10/20/00	1	10/20/00
145	_____	DB Systems Audio System	2	2/4/03	1	12/5/00
154	_____	Cabin Electrical System	N/A	N/A	2	11/2/02
158	_____	Honeywell MK XXII Enhanced Ground Proximity Warning System	Basic	2/9/01	Basic	2/9/01

