AMENDMENT NO. 12

THESE ARE SUPERSEDING OR SUPPLEMENTARY PAGES TO SAME PUBLICATION OF PREVIOUS DATE

Insert these pages into basic publication
Destroy superseded pages

CG-384-1
CGTO 1H-52A-1

FLIGHT HANDBOOK and STANDARDIZATION MANUAL

U.S. COAST GUARD MODEL HH-52A HELICOPTERS

TCG-18319-A

PUBLISHED BY DIRECTION OF
THE COMMANDANT OF THE U.S. COAST GUARD

1 September 1963
Amended 15 August 1971

INTRODUCTION

This manual is divided into two parts. Part I contains seven sections which are as follows: Operating Limitations, Normal Procedures, Emergency Procedures, Performance Information, Loading Information, Description, and Flight Characteristics. Part II contains a training syllabus and standardized procedures for specific missions. Each of these parts has a list of revised pages to reflect the date and pages revised.

PART I

FLIGHT HANDBOOK

HH-52A FLIGHT HANDBOOK
LIST OF EFFECTIVE PAGES

Insert latest amended pages. Destroy superseded pages.

NOTE: The portion of the text affected by the current amendment is indicated by a vertical line in the outer margins of the page.

Page No.	Issue
*Title	15 August 1971
Introduction	Original
Part I	Original
*A	15 August 1971
Something New	15 February 1965
*Flyleaf	15 August 1971
Certification-1	15 August 1967
Certification-2	15 August 1967
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*i	15 August 1971
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*iii	15 August 1971
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*2C	15 August 1971
*2D Blank	15 August 1971
3	15 August 1967
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*34	15 August 1971
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37	15 February 1965
*38	15 August 1971
39	15 February 1965
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53	15 February 1965
54	Original
54A Added	15 February 1965
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*54F Blank	15 August 1971
*55	15 August 1971
56 thru 57	15 May 1968
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*62A thru 62F Added	15 August 1971
*63	15 August 1971
64 thru 65	Original
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70B Blank	1 November 1965
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80	15 February 1967
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97	15 February 1965
98	Original
99	1 May 1969
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120	15 February 1965
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Index-6 Blank	15 May 1968
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*The asterisk indicates pages amended, added, or deleted by the current amendment.

SOMETHING NEW

A new system of publication changes is hereby started.

Commencing immediately essential and urgent changes to this technical handbook shall be issued by an Interim Change System. These changes shall be distributed to you on a non-scheduled, as needed basis to disseminate important information at the earliest possible date and eliminate much of your change page collation problems associated with large revisions.

Interim Changes shall consist of three types: (1) brief write-in instructions, (2) supplemental pages, paragraphs, and illustrations, and (3) replacement or additional pages. Write-in instructions indicated must be made directly on the affected page. Supplemental pages must be inserted next to the affected page of the handbook as instructed on the change. Replacement and additional pages must be collated into the handbook and superseded pages removed.

The changes shall be issued in message or printed form. All shall have a change number for control purposes which you must enter on the Interim Change Summary (flyleaf) in this handbook.

Periodically all Interim Changes will be considered to become a permanent part of the basic book and shall be incorporated as a formal, printed change or revision.

INTERIM HANDBOOK CHANGE SUMMARY

CANCELED OR PREVIOUSLY INCORPORATED IN THIS HANDBOOK	INCORPORATED IN THIS AMENDMENT ON PAGES INDICATED	
No. 1 Page 2 Part I	No. 3 Page 15	Part I
No. 2 Page 7 Part I	No. 4 Page 13	Part I
	No. 5 Page 18	Part I
	No. 6 Page 54C thru F	Part II

INTERIM HANDBOOK CHANGES OUTSTANDING
(to be maintained by handbook custodian)

No.	Date	Purpose

LIST OF U.S. COAST GUARD DIRECTIVES COMPLETELY INCORPORATED IN THIS MANUAL

H-52 Helicopter Change Nos. 6, 9, 16, 17, 24, 34, 37, 40, 44, 47A, 49, 53, 63, 65, 75, 75A, 84, 108

CERTIFICATION PAGE

This certification page must be used by any person who incorporates any change into this copy of the manual. A separate entry is required for each change. Each entry certifies that the person whose signature appears guarantees the accuracy and completeness of that change as it was made in this copy.

After the change has been incorporated, page check the manual. Be sure each instruction was followed accurately and completely. Before discarding superseded or deleted pages, check the date on each new page against the date listed for that page on the A page at the front of the manual or on the title page of the Interim Manual Change, whichever applies. Be sure write-in entries are accurate and placed correctly.

Make the required entry in the spaces below. Enter the date the check was made. List the official identification of the change. For printed revisions (changes) made by Sikorsky Aircraft use "Manual Revision dated ________________ " or "Interim Manual Change No. ________________ , "as applicable. Write the letters OK under Pages Checked to indicate page check compliance. Sign your name.

After incorporating the manual revision dated 15 August 1967 that contained this certification page, make a one-time check of the date on every page in this copy of the manual against the date listed for it on the newest A page. If all dates agree, complete the first entry in the spaces below, which is identified as "Complete manual dated 15 August 1967."

Date	Amendment/Change Incorporated	Pages Checked	Signature
	Complete manual dated 15 August 1967		
	Complete manual dated 15 August 1971		

Date	Amendment/Change Incorporated	Pages Checked	Signature

TREASURY DEPARTMENT
UNITED STATES COAST GUARD

Address reply to:
COMMANDANT
U.S. COAST GUARD
WASHINGTON, D.C. 20226

OAU

11 DEC 1964

LETTER OF PROMULGATION
FLIGHT HANDBOOK AND STANDARDIZATION MANUAL
U. S. COAST GUARD MODEL HH-52A HELICOPTERS (CG-384-1)

1. Purpose. This publication prescribes operating procedures and provides general information and performance data for the model HH-52A helicopter.

2. Scope. This publication contains all information and instructions required for safe operation of the model HH-52A helicopter.

3. Discussion. This publication has been previously prepared by the Sikorsky Aircraft Division at the direction of the Commandant. The Coast Guard is the sole military user of the model HH-52A helicopter and no Department of Defense publications exist for this helicopter. This publication is based upon, but by no means identical to the Flight Manual for the commercial S-62 helicopter. As an economy measure, the commercial format has been retained. This Letter of Promulgation is being distributed with Amendment 1 to the 1 September 1963 edition to establish it as a numbered Coast Guard publication and to establish that its content is directive rather than advisory in nature.

4. Distribution and Amendments. Distribution to Coast Guard units is intended to supply sufficient copies to permit individual issue to all helicopter pilots. However, custody will remain with the unit as will the responsibility for entering changes when issued. Changes will be made by serially numbered amendments. Safety of flight and other urgent changes will be promulgated by serially numbered "Interim Change Notices" distributed by the most rapid practical means. Where applicable, interim changes will be identified and included in the next succeeding published amendment.

5. Action. Operating commands and individual flight crews shall comply with the procedures and limitations established in this publication. This letter shall be bound as the first page within the front cover and remain as a permanent part of the publication.

W.W. Childress

W.W. CHILDRESS
Chief, Office of Operations

Dist:
Special Distribution List as
furnished to Sikorsky Aircraft Division

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LIST OF ILLUSTRATIONS

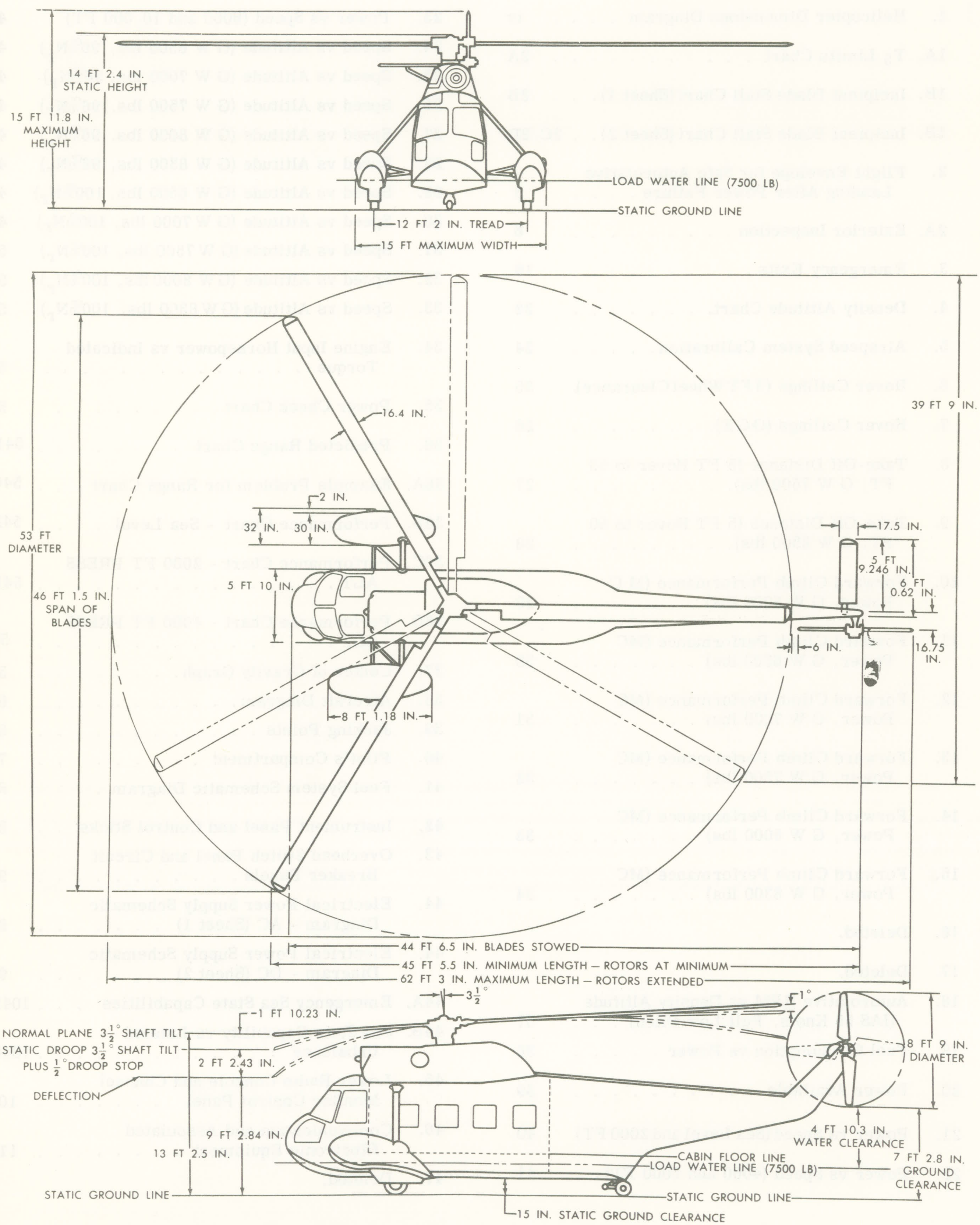
14 FT 2.4 IN.
STATIC HEIGHT
15 FT 11.8 IN.
MAXIMUM
HEIGHT
LOAD WATER LINE (7500 LB)
STATIC GROUND LINE
12 FT 2 IN. TREAD
15 FT MAXIMUM WIDTH
16.4 IN.
39 FT 9 IN.
2 IN.
32 IN.
30 IN.
53 FT
DIAMETER
17.5 IN.
5 FT
9.246 IN.
6 FT
0.62 IN.
5 FT 10 IN.
46 FT 1.5 IN.
SPAN OF
BLADES
6 IN.
16.75
IN.
8 FT 1.18 IN.
44 FT 6.5 IN. BLADES STOWED
45 FT 5.5 IN. MINIMUM LENGTH — ROTORS AT MINIMUM
62 FT 3 IN. MAXIMUM LENGTH — ROTORS EXTENDED
$3\frac{1}{2}°$
1°
1 FT 10.23 IN.
NORMAL PLANE $3\frac{1}{2}°$ SHAFT TILT
STATIC DROOP $3\frac{1}{2}°$ SHAFT TILT
PLUS $\frac{1}{2}°$ DROOP STOP
2 FT 2.43 IN.
DEFLECTION
8 FT 9 IN.
DIAMETER
4 FT 10.3 IN.
WATER CLEARANCE
9 FT 2.84 IN.
13 FT 2.5 IN.
CABIN FLOOR LINE
LOAD WATER LINE (7500 LB)
7 FT 2.8 IN.
GROUND
CLEARANCE
STATIC GROUND LINE
STATIC GROUND LINE
15 IN. STATIC GROUND CLEARANCE

Figure 1.

SECTION I

OPERATING LIMITATIONS

GENERAL.

These limitations insure your safety and help to obtain maximum utility from the helicopter and its equipment. The instruments are marked to serve as a constant reminder of limitations; however, additional limitations on operational procedures, maneuvers, and loading are given in the following paragraphs.

OPERATING LIMITS.

WEIGHT LIMITATIONS.

The maximum gross weight is 8300 pounds. Flights at gross weights above 8100 pounds shall be limited to operational situations which necessitate the higher gross weights, and whenever practicable, turbulent air shall be avoided and airspeed reduced in turbulence. (Refer to SECTION V, LOADING INFORMATION.)

CENTER OF GRAVITY LIMITATIONS.

Most forward cg: 249 inches aft of datum.
Most aft cg: 262 inches aft of datum.
Datum is located 252 inches forward of the main rotor centroid.

AMBIENT TEMPERATURE LIMITATIONS.

Minimum: -40°F (-40°C), with the winterization kit it is extended to -65°F (-53.9°C).
Maximum: 160°F (71.1°C).

ENGINE LIMITATIONS.

All normal engine limits are listed in the instrument markings in this section.

1. Shaft horsepower limits (limited by transmission life):
   a. Take-off: 730 SHP (100% torque) for 5 minutes at 100% N_f.
   b. Emergency: 845 SHP (116% torque) at 100% N_f.
   c. Maximum continuous: 670 SHP (96% torque) at 96% N_f.
2. Gas generator speed (N_g) limits:
   a. Maximum: 100% N_g.
   b. Maximum continuous: 97.5% N_g (within torque limits).
3. Power turbine inlet temperature (T_5) limits:
   a. Maximum 677°C (1250°F). Do not exceed 30 minutes
   b. Maximum continuous: 635°C (1175°F).

NOTE: The differences between stated T_5 limits and those depicted in Figure 1A are to permit latitude when setting N_g maximum topping. It is not intended that the maximum T_5 limit of of 677°C be exceeded during normal operations.

TRANSMISSION LIMITATIONS.

Operating limitations for the transmission system are governed by main gear box oil pressure and temperature which are designated in INSTRUMENT MARKINGS in this section.

TORQUE LIMITS.

1. Maximum: 100% (730 SHP). Over torque limited to 1 hour of recorded time on the elapsed time indicator.
2. Emergency: 116% (845 SHP). When this limit is exceeded for approximately 5 seconds, a red flag will appear in the window of the event indicator.

ROTOR LIMITS.

1. Power-off.
   a. Maximum: 110% (245 rpm) rotor speed.
   b. Minimum: 77% (170 rpm) rotor speed.
2. Power-on.
   a. Maximum: 103% (228 rpm) rotor speed at minimum pitch.

   NOTE: During autorotation power recovery, a transient overshoot (with partial power) above 103% may be experienced and is acceptable.

   100% (221 rpm) rotor speed at take-off power.

   b. Minimum: 94% (205 rpm) rotor speed.

MINIMUM FLIGHT CREW.

The minimum allowable crew for the operation of the helicopter is one pilot, but a copilot and crewman may also be carried.

FLIGHT LIMITS.

1. Hovering turns not to exceed a rate of 360 degrees in 10 seconds.
2. Limiting heights and corresponding airspeeds for safe landing following engine failure over land or water are as presented in figure 2.

3. Maximum, never exceed speed: at 6500 pounds gross weight is 109 knots IAS with 96% N_r and at 8300 pounds 88 knots IAS with 96% N_r.

NOTE: The preceding airspeeds differ slightly from those shown in the Speed vs Altitude curves in Section IV because the speeds used in the curves are true airspeeds and these are indicated airspeeds.

4. Maximum sideward flight speed: 25 knots.
5. Maximum rearward flight speed: 20 knots.
6. Maximum ground speed on a hard surface: 43 knots.
7. Maximum weight approved for the cargo sling is 3000 pounds.

NOTE: Extreme caution must be exercised to insure that loads carried and speeds attained do not adversely affect controllability characteristics of the helicopter.

8. Maximum weight approved for the hoist is 600 pounds.
9. Maximum forward flight speed with floats inflated: 70 knots.

CAUTION

Inflation of floats in flight not permitted.

10. Flight into known icing conditions is prohibited.

INSTRUMENT MARKINGS.

GENERAL.

1. Red radial lines - Maximum and minimum limits.
2. Yellow arc - Precautionary range.
3. Green arc - Normal operating range.

AIRSPEED INDICATOR.

1. Maximum: 109 Knots IAS - Red radial line.
2. Precautionary range: 88 to 109 knots IAS - Yellow arc.
3. Normal operating range: 45 to 88 knots IAS - Green arc.
4. Precautionary range: 0 to 45 knots IAS - Yellow arc.

DUAL TACHOMETER.

1. Engine power turbine speed (% N_f).
   a. Maximum: 110% - Red radial line.
   b. Normal operating range: 96 to 103% - Green arc.
   c. Minimum: 94% - Red radial line.
2. Rotor speed (% N_r).
   a. Maximum: 110% - Red radial line.
   b. Normal operating range: 96 to 103% - Green arc.
   c. Minimum: 77% - Red radial line.

POWER TURBINE INLET TEMPERATURE GAGE (T_5).

1. Maximum: 677°C - Red radial line.
2. Precautionary range: 635 to 677°C - Yellow arc.
3. Normal operating range: 300 to 635°C - Green arc.

GAS GENERATOR TACHOMETER (%N_g).

1. Maximum : 100% - Red radial line.
2. Precautionary range: 97.5 to 100% - Yellow arc.
3. Normal operating range: 50 to 97.5% - Green arc.

TORQUEMETER.

1. Maximum: 100% and 116% - Red radial lines.
2. Precautionary range: 96 to 100% - Yellow arc.
3. Normal operating range: 41 to 96% - Green arc.

FUEL PRESSURE GAGE.

1. Maximum: 995 psi - Red radial line.
2. Normal operating range: 190 to 450 psi - Green arc.
3. Minimum: 160 psi - Red radial line.

ENGINE OIL TEMPERATURE GAGE.

1. Maximum: 121°C - Red radial line.
2. Normal operating range: 0 to 121°C - Green arc.
3. Minimum: -54°C - Red radial line.

ENGINE OIL PRESSURE GAGE.

1. Maximum: 75 psi - Red radial line.

T_5 LIMITS CHART

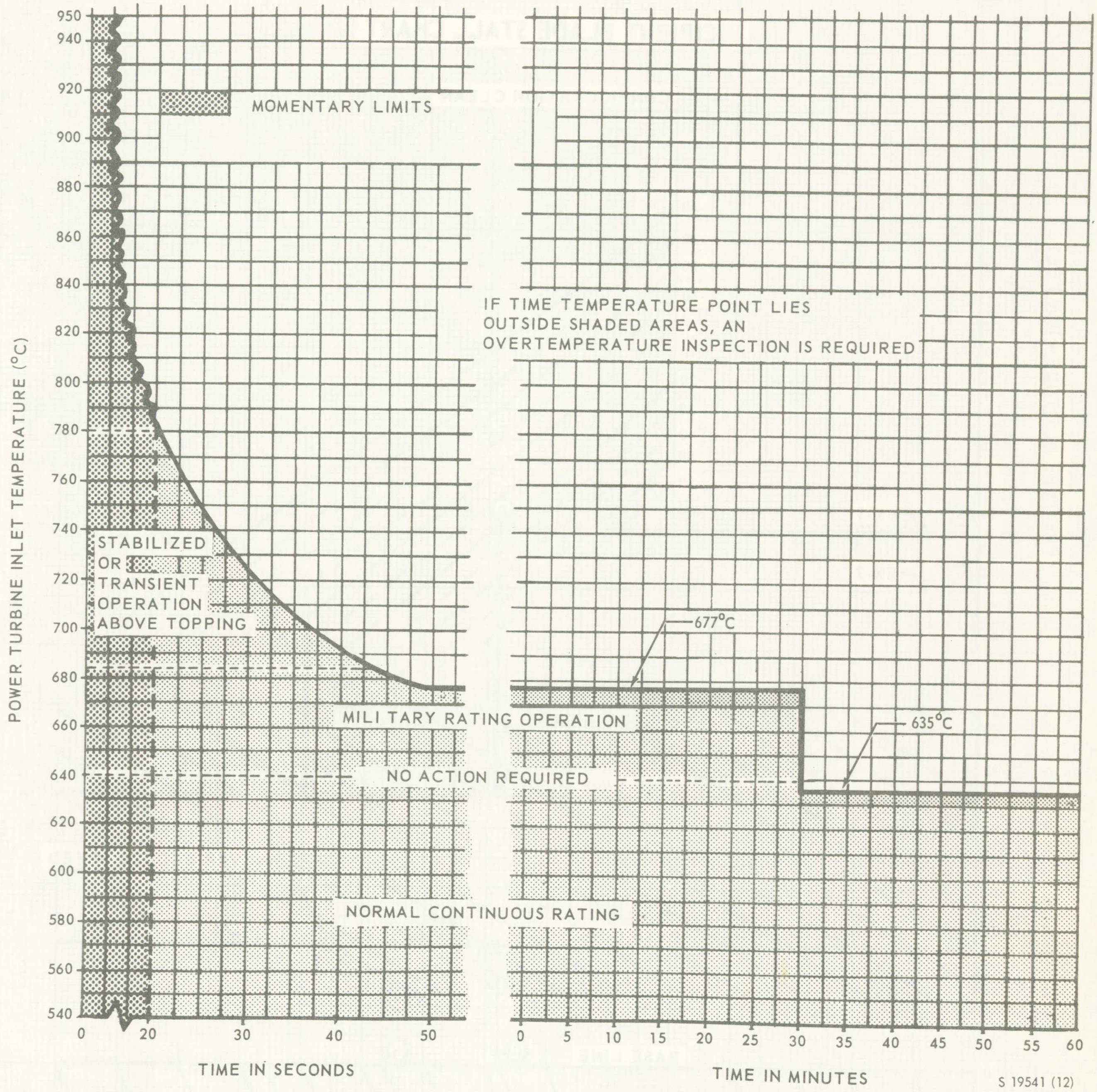

Figure 1A.

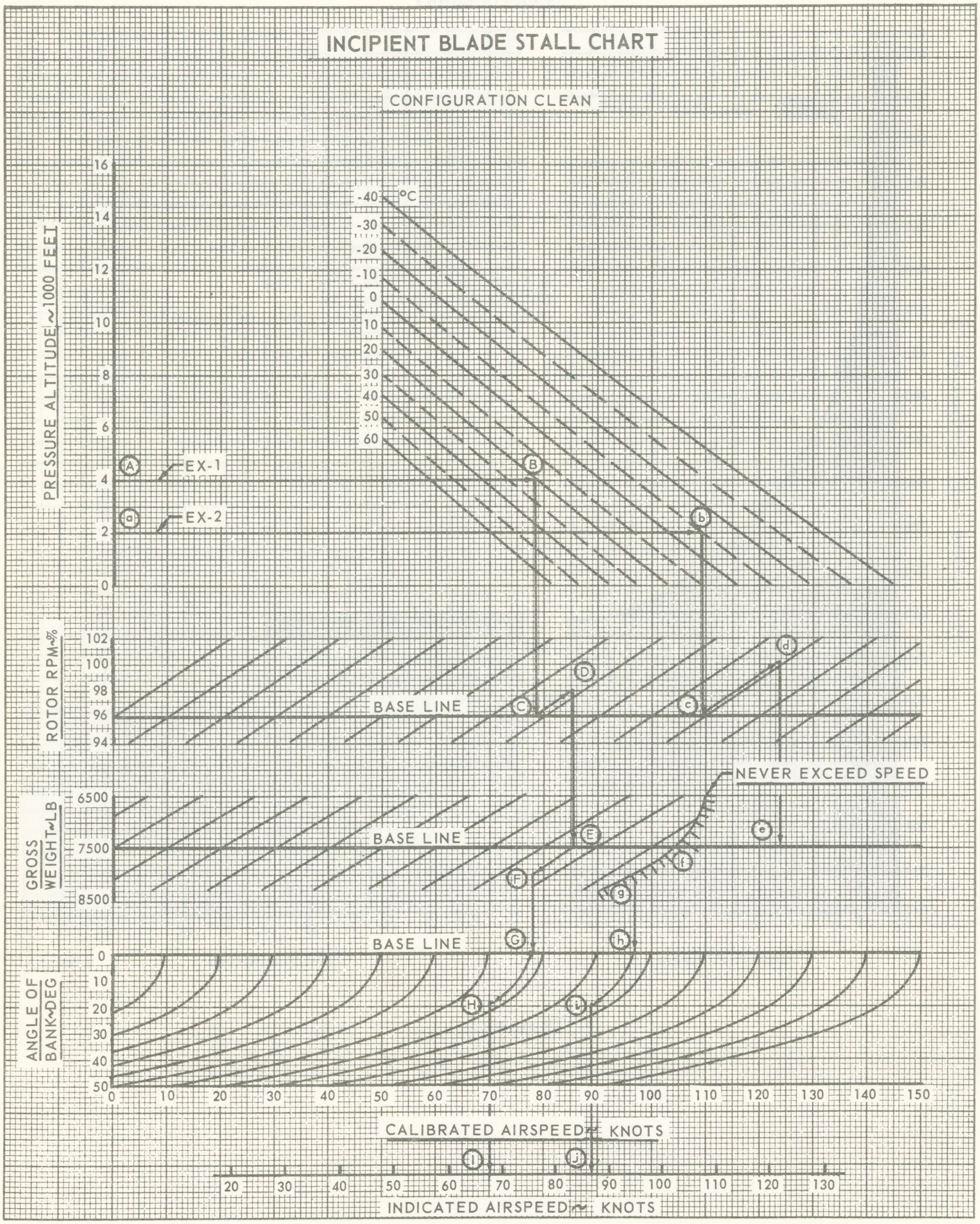

Figure 1B. (Sheet 1 of 2)

INCIPIENT BLADE STALL CHART

Example Problem 1.

Given:

Gross Weight	8000 lb
Angle of Bank	20°
Pressure Altitude	4000 feet
OAT	20°C
Main Rotor Speed	98%

Determine:
Incipient blade stall speed

Solution:

1. Enter chart at 4000 feet pressure altitude (point A).
2. From point A, move horizontally to 20°C (68°F) OAT. (point B).
3. From point B, move downward to base line, 96% N_r (point C).
4. From point C, move parallel to the rotor speed influence lines to 98% N_r (point D).
5. From point D, proceed downward to point E on the gross weight influence graph.
6. From point E, move parallel to the gross weight influence lines to 8000 pounds (point F).
7. From point F, proceed downward to zero degree angle of bank (point G).
8. From point G, move parallel to the angle of bank influence curves to a 20 degree angle of bank (point H).
9. From point H, move downward through the calibrated airspeed scale to the indicated airspeed scale (point I).
10. The indicated airspeed for the above conditions would be 68 knots.

Example Problem 2.

Given:

Gross Weight	8000 lb
Angle of Bank	20°
Pressure Altitude	2000 feet
OAT	-10°C
Main Rotor Speed	100%

Determine:
Incipient blade stall speed

Solution:

1. Enter chart at 2000 feet pressure altitude (point a).
2. From point a, move horizontally to -10°C (14°F) OAT (point b).
3. From point b, move downward to base line, 96% N_r (point c).
4. From point c, move parallel to the rotor speed influence lines to 100% N_r (point d).
5. From point d, proceed downward to point e on the gross weight influence graph.
6. Follow the gross weight base line back from point e to "never exceed speed" curve at point f.
7. From point f follow "never exceed speed" curve to desired gross weight 8000 lbs. (point g).
8. From point g, proceed downward to zero degree angle of bank (point h).
9. From point h, move parallel to the angle of bank influence curves to a 20 degree angle of bank (point i).
10. From point i, move downward through the calibrated airspeed scale to the indicated airspeed scale (point j).
11. The indicated airspeed for the above conditions would be 87 knots.

Figure 1B (Sheet 2 of 2)

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2. Normal operating range: 20 to 60 psi - Green arc.
3. Minimum: 8 psi for MIL-L-23699 oil - Red radial line. 10 psi for MIL-L-7808 oil.

TRANSMISSION OIL TEMPERATURE GAGE.

1. Maximum: 140°C - Red radial line.
2. Normal operating range: 40 to 120°C - Green arc.
3. Minimum: -15°C - Red radial line.

TRANSMISSION OIL PRESSURE GAGE.

1. Maximum: 120 psi - Red radial line.
2. Normal operating range: 40 to 90 psi - Green arc.
3. Minimum: 25 psi - Red radial line.

PRIMARY SERVO HYDRAULIC PRESSURE GAGE.

Maximum: 1100 psi - Red radial line.

Normal operating range: 850 to 1100 psi - Green arc.

Minimum: 850 psi - Red radial line.

AUXILIARY SERVO HYDRAULIC PRESSURE GAGE.

Maximum: 1600 psi - Red radial line.

Normal operating range: 1300 to 1600 psi - Green arc.

Minimum: 1300 psi - Red radial line.

FLIGHT ENVELOPE FOR SAFE AUTOROTATIVE
LANDING AFTER POWER FAILURE

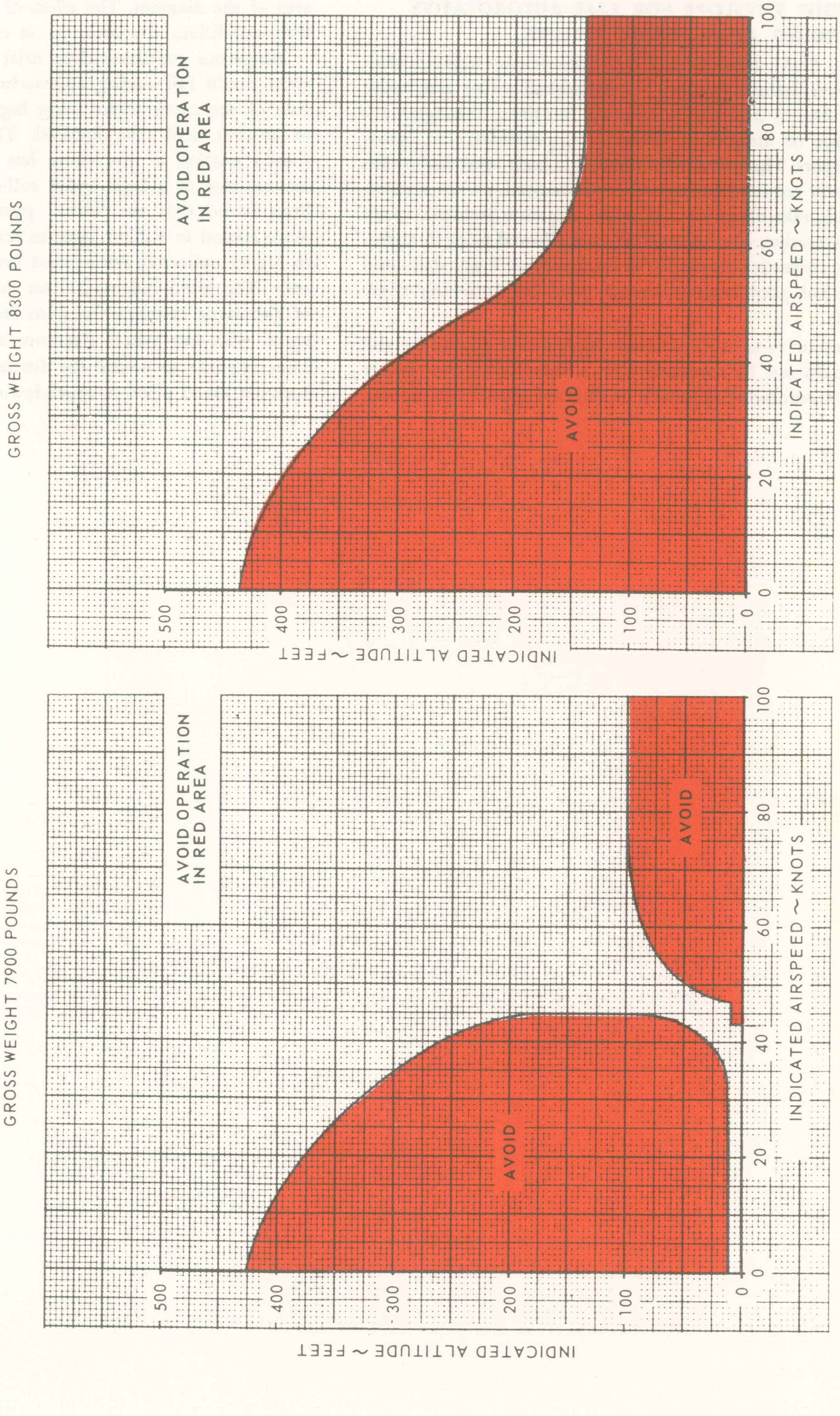

Figure 2.

FLIGHT ENVELOPE FOR SAFE AUTOROTATIVE LANDING AFTER POWER FAILURE.

The flight envelope for safe autorotative landing after power failure, figure 2, is established under zero wind conditions and per various cg locations, throughout a range of airspeeds, altitudes, temperatures, and, gross weights. The curve is formulated in both level flight with power required for the selected airspeed, and in a climb using take-off power. After the engine is suddenly made inoperative, a one second delay is allowed prior to applying corrective action for obtaining level flight data, and normal pilot reaction time is used for obtaining climb data.

This curve is established for high power conditions and should not be confused with a steady-state low power or autorotative approach established outside the shaded area of the diagram. The effect of engine failure under these conditions has little or no effect on the landing. A dangerous condition does exist however, if the engine should fail during approaches within the shaded area of the curve when using high power, a low rate of descent, and low airspeed. The right-hand (high speed) portion of the curve has been shaped in this manner due to a high speed roll-on restriction. It has been found that the "nose" portion of the curve is more critical in a climb than in level flight attitude due to higher collective setting and lower aircraft nose attitude. The small indentation on the high speed portion of the curve restricts the pilot from obtaining a high speed with low wheel clearance and allows him sufficient altitude to rotate the fuselage and decrease the forward speed prior to touchdown.

SECTION II

NORMAL PROCEDURES

Techniques for performing normal procedures are covered in Part II (Standardization Manual).

BEFORE ENTERING THE HELICOPTER.

LOADING INFORMATION. The take-off and anticipated landing gross weight and balance should be obtained before take-off and checked against the LOADING INFORMATION in Section V.

PILOT'S PRE-FLIGHT INSPECTION.

A pilot's pre-flight inspection will be accomplished prior to each flight. This will normally be performed by the assigned pilots but may be delegated to another qualified crewmember assigned to the flight. The purpose of this inspection is to visually inspect the aircraft prior to flight, to ensure removal of any protective covers/devices, and to detect damage or discrepancies which have developed since completion of the maintenance pre-flight inspection. The inspection will include, but is not limited to, the following items:

EXTERIOR INSPECTION.

1. GENERAL.
   a. Be alert for damage to any part of the aircraft that may have resulted from ground handling, careless operation of flight line vehicles, other aircraft, etc. -CHECKED.
   b. Be alert for any sign of fluid leakage - CHECKED.
2. BIM indicators for normal indication - CHECKED.
3. Bottom side and tip of main rotor blades for dents or scratches - CHECKED.
4. Tail wheel assembly for proper oleo extension and tire inflation. Lock pin in hole and shear point aligned - CHECKED.
5. Tail rotor blades for dents or scratches - CHECKED.
6. Fire extinguisher thermal discharge indicator - CHECKED.
7. Overboard drains for excessive discharge - CHECKED.
8. Left main landing gear for proper oleo extension and tire inflation - CHECKED.
9. Engine and transmission cowling for security - CHECKED.
10. Engine intake and exhaust protective covers removed - CHECKED.
11. Pitot cover removed - CHECKED.
12. Right main landing gear for proper oleo extension and tire inflation - CHECKED.

INTERIOR INSPECTION.

1. Circuit breakers (aft panel) - CHECKED.
2. Cargo for proper loading and security - CHECKED.
3. Circuit breakers; forward panel and radio panel - CHECKED.
4. Transmission overtorque clock and flag. (Note time on clock) - CHECKED AND NOTED.

BEFORE STARTING.

1. Safety belt and shoulder harness - FASTENED AND ADJUSTED.
2. Shoulder harness inertia reel lock handle - CHECK BOTH LOCKED AND UNLOCKED POSITION.
3. Seat - ADJUSTED.
4. Tail rotor pedals - ADJUST.
5. Gyro selector switch - PORT.
6. ASE hardover switches - GUARD COVERS CLOSED.
7. ASE channel disengage switches - ON.
8. Cockpit emergency window release handles - PROPER POSITION AND BREAKAWAY WIRE INTACT.
9. Flight controls - CHECK FOR COMPLETE FREEDOM OF MOVEMENT.
10. Collective friction - APPLY SLIGHT AMOUNT.

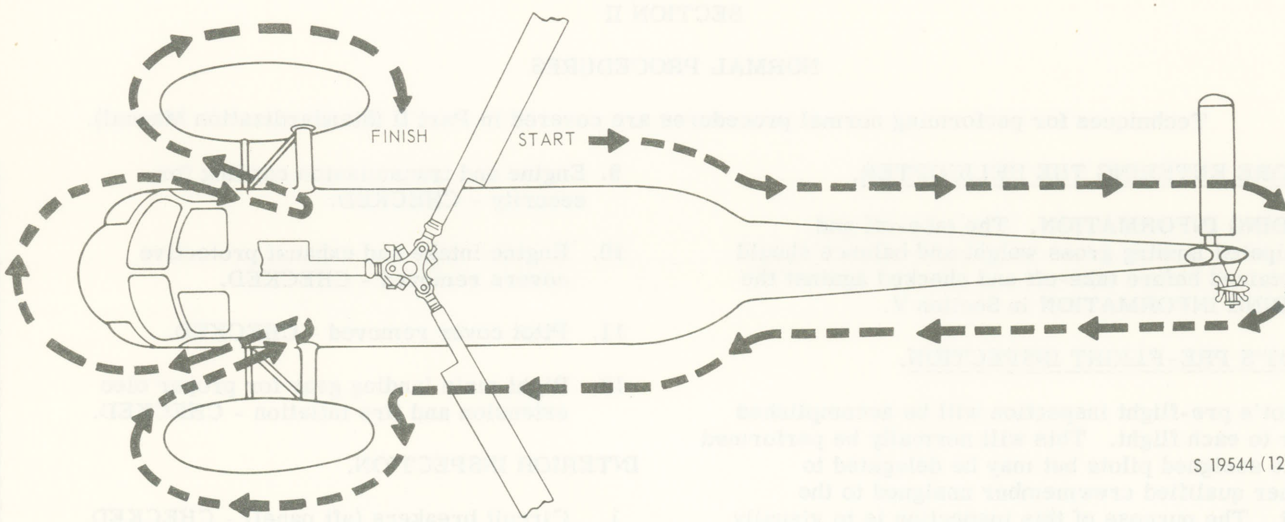

Figure 2A.

11. Emergency throttle - Operate through full travel to insure smooth and complete movements, then CLOSED.

12. Speed selector - Operate through full travel to insure smooth and complete movements, then STOPCOCKED.

13. Flight control servo shut-off switch - ON.

14. Hover and flood light switch - AS DESIRED.

15. Tail wheel - LOCKED.

16. Parking brake - RESET.

17. ASE CG trim index set ONE o'clock.

18. Lower console radios - AS DESIRED.

19. Radio transmit and receive switches - AS DESIRED.

20. Landing gear switch - DOWN.

21. Landing gear position indicator - BARBERPOLE.

22. Fuel quantity selector - TOTAL.

23. Rotor brake lever - ON.

24. Outside air temperature - CHECKED.

25. Fuel fire wall shut-off valve handle - FUEL ON.

26. P_3 valve - AS REQUIRED.

27. Pitot heater switch - AS DESIRED.

28. Windshield defroster switch - OFF.

29. Engine anti-ice switch - AS DESIRED (on below 10°C OAT).

30. Hoist master switch - OFF.

31. Hoist shear switch - OFF (Guard cover closed and breakaway wire intact).

32. DC non-essential bus override switch - OFF.

All data on this page deleted.

33. Heater master switch - OFF.

34. Heater start switch - OFF.

35. Heater HI-LO cycling switch - HI.

36. Vent blower switch - NORMAL.

37. Navigation lights master switch - ON.

38. Position lights master switch - AS DESIRED.

39. Rotating anti-collision light switch - ON.

40. Windshield wiper switch - OFF.

41. All lighting rheostats - AS DESIRED.

42. IFF - AS DESIRED.

43. Compass control - SLAVED.

44. Pilots compartment and cabin dome light switches - AS DESIRED.

45. Map light - AS DESIRED.

46. HF radio - AS DESIRED.

47. Cargo sling master switch - SAFE.

48. Release mode switch - TUGBIRD.

49. Radio master switch - ON.

50. Beeper trim switch - ON.

51. No. 1 and No. 2 fuel booster pump switches - ON.

52. Engine overspeed governor switch - AS REQUIRED.

53. Ignition switch - NORMAL.

54. No. 1 and No. 2 generator switches - ON.

55. Battery switch - OFF.

56. External power switch - OFF.

STARTING ENGINE.

BATTERY START.

This is the normal start procedure.

1. Fireguard - Posted left side forward.

2. Aircrewman (optional) - Posted forward with headset plugged in.

3. Speed selector - STOPCOCKED.

4. Battery switch - BAT START.

5. Starter button and clock - DEPRESS.

CAUTION

Do not operate starter continuously for more than 30 seconds at full engine load, except in emergency. Do not attempt more than three starts in any 30 minute period, allowing a minimum of 3 minutes between each attempt, or damage to the starter may result.

6. Motor the engine with the starter to remove fuel from the combustion chamber and until T_5 is less than 100°C. Then, advance the speed selector to GROUND IDLE when accelerating through 14% N_g. Do not tap gage.

NOTE: Failure to attain 17% N_g may result in a hot start. It is possible to get a hot start above 17% N_g if other unfavorable conditions exist, as listed in paragraph on ALTERNATE ENGINE STARTING PROCEDURE.

7. Release starter button at 45% N_g. The engine will accelerate to ground idle (56 ± 3% N_g).

CAUTION

If the engine lite-off does not occur within 15 seconds after the speed selector has been advanced to GROUND IDLE, return the speed selector to STOPCOCK and release the starter button. Before attempting another start, investigate and analyze the conditions requiring the abort. If the situation justifies another start, wait 3 minutes for fuel to drain from the manifolds, combustion chamber and exhaust hood before repeating the start procedure. It is then desirable to use an APU if available. If any doubt exists, or limits were exceeded during the start, do not attempt a second start. Record the discrepancies in the maintenance record listing all details. A hot start abort, cold hang-up or any other abnormal start should also be recorded in the aircraft maintenance record.

CAUTION

If the gas generator does not accelerate, monitor the power turbine inlet temperature indicator. If T_5 rises abnormally and/or appears it will exceed 700°C, a hot start is evident. Immediately shut down the engine by moving the speed selector to the STOP-COCK position and continue motoring the engine until it is certain that no fire remains. If the starter has been released and an engine fire remains (indicated by a 300°C or higher T5), engage the starter below 20% N_g and motor until the fire is extinguished. For additional information on hot starts, refer to ENGINE STALL or HOT START in Section III.

CAUTION

If N_g ceases to accelerate and T_5 remains below 400°C, a cold hang-up has occurred. Advance emergency throttle slowly, monitoring T_5 and N_g, until N_g reaches ground idle (56 ± 3% N_g). Return emergency throttle to the closed position.

8. Battery switch - ON.
9. When gas generator speed has stabilized at ground idle, check engine instruments for normal indications.

ALTERNATE ENGINE STARTING PROCEDURE (P3 VALVE).

NOTE: The alternate engine starting procedure should be used any time conditions conducive to a hot start prevail or when starting at a remote area. Refer to HOT START in Section III.

CAUTION

Opening P3 valve may not prevent a hot start. It is not recommended that P3 valve be opened on all starts as this may mask malfunctions that would not otherwise be noted.

1. P_3 valve - OPEN.
2. Use BATTERY START procedures, items 1 thru 6. When T_5 has peaked close P_3 valve. Approximately 50 to 100°C T_5 increase can be expected.
3. Monitor gas generator speed until it reaches 45%, then release starter button.
4. Battery switch - ON.
5. When N_g stabilizes at ground idle - check engine instruments for normal indications.

STARTING WITH EXTERNAL POWER.

External power is recommended for the first start of the day.

1. When starting with AC external power, the entire electrical system is energized. When starting with DC external power, the dc essential and non-essential buses are energized. Accomplish the same BEFORE STARTING procedures as used for a normal battery start except for the following:
   a. External power switch - ON.
   b. Battery switch - ON.
   c. After engine is on SPEED, External power switch - OFF.
   d. Disconnect external power source.

ROTOR ENGAGEMENT.

1. Before rotor engagement, check that the APU (disconnected) and personnel are clear of main and tail rotor blades.
2. Collective pitch - MINIMUM.
3. Rotor brake - OFF and ROTOR BRAKE caution light out.
4. Transmission oil pressure gage and both servo pressure gages - CHECK indications for normal operation range and that caution lights are out.

NOTE: High velocity or gusty winds can cause excessive blade flapping. The rotor should not be engaged in winds above 60 knots. When engaging or disengaging the rotor in high or gusty winds, the rotor should be accelerated or decelerated as rapidly as possible (without overtorque).

5. Flight controls - CHECK RESPONSE. As rotor speed accelerates to approximately 33% N_r, note that no unusual cyclic stick position is required to maintain a level tip path plane. Actuate the cyclic stick a slight amount in all directions and check for proper response by observing tip path plane of the main rotor blade. Activate rudder pedals and collective for freedom of movement. Note rise in tip path plane when collective is raised.

CAUTION

If flight controls do not respond correctly, shut down by applying rotor brake. Faulty response may be due to ice formation within the flight control servo unit boots (if boot is deteriorated and allows moisture to enter), rendering the servo pilot valve inoperative.

6. Primary and auxiliary servo systems - CHECK.

   a. Primary and auxiliary servo hydraulic pressure gages - CHECK.

CAUTION

When performing servo system check, keep finger on flight control servo shutoff switch and be prepared to return switch to ON (centered) position in event of erratic behavior or malfunction of flight control system when switch is placed in either PRI OFF or AUX OFF.

   b. Flight control servo shutoff switch - PRI OFF. Observe reaction of main rotor blades tip path plane. Normal indication is a slight movement of tip path plane as primary servos are allowed to move within sloppy link. If indication of tip path plane is normal when flight control servo shutoff switch is placed in PRI OFF position, continue flight control servo system check. Check all flight controls for proper operation on auxiliary servo system with TRIM RELEASE DEPRESSED. Check primary servo hydraulic pressure gage for decrease in pressure to zero. Primary hydraulic pressure caution light should illuminate.

NOTE: Fore and aft and lateral cyclic movement should be smooth.

CAUTION

Any abnormal movement of the tip path plane might indicate a primary servo malfunction. If an excessive movement of the tip path plane is noted, do not continue servo check. Place flight control servo shutoff switch in the ON (centered) position, shut down engine and rotor and conduct a thorough ground investigation of primary servos.

   c. Flight control servo shutoff switch - ON (centered). Check primary servo hydraulic pressure gage for increase to normal operating pressure and caution light out.

   d. Raise collective pitch stick slightly. Flight Control servo shutoff switch - Aux OFF. Check for NO jump or kick in the flight controls; maximum allowed is 1/8" in cyclic, and 1/16" in collective and tail rotor pedals. Excessive jump is a grounding discrepancy. Check all flight controls with TRIM RELEASE DEPRESSED for proper operation on primary servo system. Check auxiliary servo hydraulic gage for decrease in pressure. Auxiliary hydraulic pressure caution light should illuminate.

NOTE: With auxiliary servo off, increased friction will be felt in 3 of the 4 servo channels when moving the controls. Pedal forces are less than normal due to pedal damper being off.

   e. Flight control servo shutoff switch - ON (centered). Check auxiliary servo hydraulic pressure gage for increase to normal operating pressure and caution light out.

CAUTION

Inability to secure either servo is a grounding discrepancy.

7. Engine overspeed switch - TEST NO. 1. Perform this test on the first flight of the day.

NOTE: The test will insure that the stator vane actuator primary switch is functioning properly.

8. Engine speed selector - ADVANCE TO OBTAIN TORQUE INCREASE. Note that at 72 ± 3% N_g, overspeed governor trips and N_g oscillates around 72%.

NOTE: Refer to NAVAIR 028-105AHB-2/T.O. 2J-T58-2, Fig. 10-20 operating range of overspeed limiter system primary and accessory switch circuits. Variations in Test #1 greater than 72% PLUS 3 may be within allowable limits due to variations in outside air temperature.

CAUTION

Care should be exercised in advancing engine speed selector to preclude too rapid acceleration of rotor system which may cause slewing of helicopter.

9. Engine overspeed switch - TEST NO. 2. Perform this test on the first flight of the day.

10. Engine speed selector - ADVANCE TO OBTAIN 97% ± 1% N_r. Note that overspeed governor trips and N_f/N_r oscillates around 97%.

NOTE: Gas generator should decrease until rotor speed and power turbine speed fall below 97% or until gas generator speed (N_g) falls below 72 ± 3% at which time N_g will increase again until the rotor speed (N_r) and power turbine speed (N_f) return to overspeed condition.

11. Engine overspeed switch - NORM.

12. Engine speed selector - Advance to check maximum N_f/N_r and return to 100% N_f/N_r.

13. Freewheel unit - CHECK. Rotate speed selector positively to FLT IDLE and when N_f/N_r needles split, increase speed selector to AUTO DETENT. Allow the initial N_g surge to peak and then increase speed selector to 100% N_f/N_r.

14. Chocks - REMOVED.

INSTRUMENT CHECK.

1. Fuel quantity selector switch - Rotate from TOT to AFT and obtain reading. Depress fuel gage test switch to minimum needle reading, release, and insure needle returns to same reading. Rotate switch to FWD.

2. Caution and advisory lights test switch - TEST. All panel lights should illuminate. Then RESET, to turn master caution light off.

3. Select DIM or BRIGHT as desired.

4. Engine and transmisssion system instruments - CHECK FOR NORMAL READINGS.

5. Emergency exit lights - ARM.

6. Engine fire warning light test switch - FIRE TEST. The T-handle lights and panel warning light should illuminate.

7. Dual tachometer - Pilot and copilot cross check.

8. Airspeed - Pilot and copilot cross check.

9. VGI - Check index arrows adjusted to index dots and pilot and copilot cross check.

10. RAD ALT - Both pilots adjust limit control bugs to 140 feet, check bug lights on, and check altimeter readings.

11. Torquemeter - Pilot and copilot cross check.

12. Flight director - Pilot select ASE.

13. MA-1 compass - SET. Pilot set as desired for compass controlled gyro or free gyro indications.

14. Compass acknowledge button - DEPRESS.

CAUTION

During shipboard operation, the MA-1 compass must be reset after becoming airborne when free of local magnetic disturbances created by the ship. Resetting will provide more accurate readouts sooner than if the system were allowed to slave by itself.

15. BAR ALT - Set in field elevation and pilot and copilot cross check.

16. Clock - CHECK.

17. Turn and Slip indicators - Pilot and copilot cross check.

18. RAWS - Pilot turn on if RAD ALT stabilized.

19. Marker beacon - ON. Volume and sensitivity as desired and press to test marker beacon light.

20. Vertical speed indicator - Pilot and copilot cross check.

21. Engine anti-icing system. Perform the following test if flight in icing conditions is possible.

   a. Engine anti-ice switch - TEST.

   b. Engine inlet anti-ice caution light - ON.

NOTE: The light should illuminate when the switch is placed in TEST. At certain low ambient air temperatures the light may already be on. When system controller sense element detects a temperature of 54.4°C (130°F), the light should go out and then come on again when temperature reaches 48.9°C (120°F). The light will continue to cycle as the controller cycles. When the ambient temperature is below -28.9°C (-20°F), there is insufficient heat produced to raise duct temperature above the duct mounted thermal switch setting; therefore, the inlet anti-ice caution light will remain on.

NOTE: Usually at very low temperatures, icing conditions are not encountered due to lack of moisture in the air.

   c. Engine anti-ice switch - AS DESIRED. (On below 10°C OAT.)

22. Hoist - CHECK AS REQUIRED.

23. Heater master switch - AS DESIRED.

TAXIING.

TAXIING PROCEDURE ON LAND.

1. Parking brake - OFF.

2. Speed selector - 100% N_f/N_r.

NOTE: Maintain a minimum of 100% N_f/N_r so that an immediate take-off can be accomplished if necessary.

3. Cyclic stick - AS REQUIRED. Regulate taxiing speed by use of wheel brakes.

NOTE: When taxiing crosswind, hold cyclic stick slightly into the wind. Avoid cyclic stick positions that cause main rotor blade to hit droop stops.

4. Collective pitch lever - Increase collective pitch until forward motion is obtained.

CAUTION

Use minimum collective pitch required for forward motion to prevent the main rotor from developing sufficient lift to cause extension of the landing gear oleo struts.

CAUTION

Caution should be observed when there are light planes within the immediate area as they may be upset by the turbulence from the rotor downwash.

5. Tail wheel - UNLOCKED.

6. Tail rotor pedals - AS REQUIRED. Maintain directional control by use of tail rotor pedals. If necessary, use wheel brakes.

TAXIING PROCEDURE ON WATER (FAMILIAR AREAS).

Taxiing on water in familiar areas may be accomplished with relative ease under ideal water conditions. The helicopter will respond to speed and directional controls in the conventional manner.

TAXIING PROCEDURE ON WATER (UNFAMILIAR AREAS).

When taxiing on water in unfamiliar areas, be alert to preclude striking floating surface objects or floating sub-surface objects which could seriously damage the hull or sponsons. Care should be exercised when taxiing in shallow water where contact with the bottom could cause damage to hull, sponsons, or tail wheel. If damage to the helicopter is suspected, an immediate take-off should be accomplished.

ASE CHECK.

1. Tail wheel - LOCKED.
2. Parking brake - ON.
3. ASE - CHECK.
   a. ASE ENG button (ASE control panel) - DEPRESS. Green light will illuminate when ASE is on. Check flight director OFF flags behind mask.
   b. Pilot move cyclic left and right then fore and aft slightly to check proper movement of mode bars.
   c. Pilot adjust CG control to place the pitch mode bar two units below center index while maintaining a center cyclic position. (Check CG setting in hover for fine adjustment.)
   d. Adjust yaw mode pointer one unit to right then center by depressing left rudder pedal. Reverse this procedure to the left.
   e. Pilot's AUTO STAB release button (cyclic) - DEPRESS. Check that engage light goes out.
   f. ASE ENG button - DEPRESS.
   g. Copilot's AUTO STAB release button (Cyclic) - DEPRESS Check that engage light goes out.

PRE-TAKEOFF.

1. Tail wheel - LOCKED.
2. Parking brake - OFF.
3. ASE - ENGAGED.

CAUTION

Aboard ship, ASE shall be disengaged anytime the ship is turning. If ASE is not disengaged, the turn will be resisted by the automatic stabilization directional channel and cause the helicopter to turn in relation to the deck of the ship.

4. Radios - AS DESIRED.
5. Caution panel lights - OUT.
6. Engine instruments - NORMAL.
7. Engine speed selector - 103% N_f/N_r.
8. Flight instruments - CHECKED.

TAKE-OFF.

1. Use procedures prescribed in Part 2 (Standardization Manual).

CRUISE CHECKS.

1. Landing gear switch - Check DOWN (over land), UP (over water).
2. Engine speed selector - 96% N_f.
3. Fuel quantity - Check at intervals during flight.

PRE-LANDING CHECK.

1. Tail wheel - LOCKED.
2. Parking brake - AS DESIRED.
3. Landing gear switch - DOWN (over land), UP (over water).
4. Caution panel - CHECKED.
5. Speed selector - 100% N_f/N_r (103% in low power descent).
6. Heater switch - AS DESIRED. (Secure 5 minutes prior to shutdown).

LANDING.

1. Use procedures prescribed in Part 2 (Standardization Manual).

CAUTION

The utmost caution is required to avoid contacting the water prematurely when darkness or glassy water makes it difficult to discern the surface. Under these conditions, depth perception is seriously impaired, and an abbreviated "beep to hover" technique should be used.

AFTER LANDING AND TAXIING.

1. Collective pitch - MINIMUM PITCH.
2. Speed selector - ADJUST TO 100% N_f/N_r.
3. ASE - DISENGAGE.
4. Tailwheel - UNLOCKED.

PARKING.

1. Head helicopter into wind.
2. Tailwheel - LOCKED.
3. Parking brake - SET.
4. Emergency exit lights - DISARM.
5. Air crewman - Disembark on signal and check droop stops in.

ROTOR AND ENGINE SHUTDOWN.

1. To provide engine cooling prior to shutdown, determine that the engine has been operated to meet one of the following conditions:

   a. A minimum of one minute of operation with the speed selector in the governing range and collective pitch lever set at minimum pitch.

   b. A minimum of one minute of operation with the speed selector set in FLIGHT IDLE and collective pitch lever set at minimum pitch.

   c. A minimum of one minute taxiing time.

NOTE: If required by emergency conditions, the engine may be shut down from any normal power setting without regard to above conditions.

2. Speed selector - FLIGHT IDLE. (Check for N_f/N_r needle split.)

3. Droop stops - IN.

4. Rotor brake - Apply according to procedures below:

   a. Wind over 25 knots.
      (1) Speed selector - STOPCOCKED.
      (2) When N_r slows to 48 per cent apply full rotor brake using one steady motion. To preclude blade whip, as rotation nears complete deceleration rotor brake pressure should be reduced to ease rotor blades to a stop with one blade at the 12 o'clock position.
      (3) Battery switch - OFF.

   b. Wind 25 knots or less.
      (1) Speed selector - STOP COCKED.
      (2) Battery switch - OFF.
      (3) Allow the rotor to coast down until almost stopped then apply a slight amount of braking to slowly and smoothly bring the rotor to a stop with one blade at the 12 o'clock position.

   c. Any time when engine shutdown is not to be accomplished immediately.
      (1) Speed selector - FLIGHT IDLE.
      (2) Apply full rotor brake after rotor has stabilized at idle RPM using one steady motion.
      (3) Battery switch - OFF.

CAUTION

Whenever the rotor brake is applied, avoid pumping the rotor brake lever as this will result in premature wear of the rotor brake.

NOTE: In an emergency the rotor brake is capable of stopping the rotors from 96% NR in 20 seconds. Place speed selector in FLIGHT IDLE position, allow 5 second delay (NR will coast down to 85%) and apply brake.

5. Power turbine inlet temperature gage - MONITOR for indication of post shutdown fire indicated by continuous 300°C or higher T_5. Be prepared to motor engine with starter to extinguish flame.

BEFORE LEAVING THE HELICOPTER.

1. Switches - OFF. (Normal overhead wipeout sequence.)

2. Power turbine inlet temperature gage - RECHECK.

POST FLIGHT.

1. Overtorque clock and flag - Check and note on appropriate form if time increased and/or flag shows.

2. Perform brief EXTERIOR INSPECTION.

SECTION III

EMERGENCY PROCEDURES

ENGINE EMERGENCIES - GROUND.

These procedures describe the operation of the engine if an abnormal condition occurs. When safe operating limits are not attainable or are exceeded, they shall be recorded on the aircraft flight records. Hot starts and cold hangups are abnormal engine conditions. They provide an early indication that the engine and fuel control combination are not operating properly.

HOT START.

A hot start is defined as a temperature (T5) that rises abnormally fast, or above that normally expected, but below the overtemp range. An overtemp requires maintenance action. A hot start is more likely if the engine lights off after Ng has peaked and is decelerating. If a hot start is evident, abort the start before T5 rises above 700°C. Hot starts may be caused by one or a combination of the following:

1. Weak battery.
2. Malfunction of fuel control system.
3. Hot ambient temperatures.
4. Hot engine.
5. Fuel change/fuel control/flow divider set wrong.
6. High density altitude.
7. Malfunctioning starter.
8. Wind blowing up the exhaust.
9. Clogged combustion drain.
10. Improper starting procedure.

Following the hot start, the pilot should record the type start, the Ng speed when the speed selector was opened and the maximum T5.

COLD HANGUP.

A cold hangup is due to a lean fuel-air ratio. Indications of a cold hangup are N_g acceleration slowing down between 30-50%, and a lower than normal T_5 (350-400°C). A cold hangup can be corrected by opening the emergency throttle and accelerating the engine to the ground idle range. Possible causes of a cold hangup are:

1. Fuel boost pumps not on.
2. Fuel control malfunction.
3. Improper fuel density settings.
4. P_3 system leak or P_3 valve open.
5. Flow divider malfunction.

ENGINE STALL.

An engine stall is caused by an aerodynamic disturbance of the smooth air flow pattern through the compressor. A rapid rise in power turbine inlet temperature and a hangup of gas generator speed, accompanied by an audible rumble and vibration from the engine, are stall symptoms.

CAUTION

If an engine stall occurs, immediately stopcock the speed selector. During coast-down, listen for any unusual noise or for an indication of a possible mechanical failure. Note the maximum T_5.

ENGINE STALL ABOVE IDLE SPEED.

1. ACCELERATION STALL.

   Engine stall, occuring above the idle speed during acceleration, may be caused by incorrect operation of the variable stator vanes.

2. DECELERATION STALL.

   Engine stall, occuring above the idle speed during deceleration, may be caused by incorrect operation of the variable stator vanes.

3. FLAME-OUT.

   An engine flame-out will be indicated by a decrease in T_5, N_g, and fuel pressure. A flame-out due to water ingestion, gives similar indications.

CAUTION

Following a flame-out due to water ingestion, sea conditions will dictate whether a restart should be attempted. If adequate conditions and facilities exist, the helicopter should be towed to a suitable retrieving point and hoisted to land. Internal engine damage may preclude safe air taxi to land although a successful relight has been obtained.

4. OVERTEMPERATURE.

If the power turbine inlet temperature exceeds the temperature/time limitations of figure 1A, it is considered an overtemperature.

EMERGENCY SHUTDOWN.

If an abnormal engine condition occurs, such as engine stall, flame-out, or overtemperature, the engine shall be shut down immediately.

ENGINE EMERGENCIES - FLIGHT.

Engine malfunctions fall into two general categories. The first is a complete power loss. The audible symptoms normally associated with reciprocating engine failures are not characteristic of the T-58. Transmission noise makes engine deceleration difficult to detect. This is particularly true during a fuel control malfunction. There may be an audible warning of imminent engine failure if a forward accessory gear or engine bearing failure occurs. The most probable and common cause of a power loss is compressor stall. It could be caused by ingesting FOD, variable stator vane malfunction, inept application of emergency throttle or a fuel control malfunction. If a complete power failure occurs, an autorotative landing is necessary.

The second category is not a complete power loss but only an interruption, oscillation, decrease or increase from selected power. The fuel control system (fuel contamination), P_3 bleed, Test No. 1, Test No. 2, or N_f flexshaft malfunctions are the primary causes. This power change could be a slow or very rapid loss/increase. The rapid power loss situation requires an immediate entry into autorotation. Analyze the power instruments (N_g, fuel

pressure, T_5, N_f/N_r) and determine if the engine is still operating. This is difficult unless the pilot includes these instruments in his scan during practice autorotations. When in doubt, if the engine is still operating and T_5 is not overtemped, increase emergency throttle to 100% N_f/N_r and recover. If the engine has flamed out, emergency throttle will not correct the situation. It is important to analyze the situation as quickly as possible. If indicated, attempt a restart. In any case, if in autorotation, do not allow attention to be diverted to the detriment of the autorotative landing.

ENGINE MALFUNCTION CAUSING A POWER CHANGE FROM THAT SELECTED (ENGINE OPERATING).

POWER DECREASE CONDITION. (Example - P-3 bleed malfunction, fuel control malfunction or overspeed test N_r 1 switch malfunction).

1. Collective - Lower to maintain N_r.
2. Enter autorotation (if required).
3. Power instruments - analyze.
4. Emergency throttle - advance to regain power.
5. Collective - adjust as required.
6. Speed selector - retard to flight idle.
7. Alert appropriate facilities.
8. Land as soon as practicable.

POWER INCREASE CONDITION. (Example - N_f flex shaft failure).

1. Emergency throttle - advance to control N_r fluctuations.
2. Speed selector - retard to flight idle.
3. Emergency throttle - adjust to 100 percent N_r.
4. Collective - adjust as necessary.
5. Alert appropriate facilities.
6. Land as soon as practicable.

NOTE: An overspeed test N_r 2 malfunction will result in power fluctuations about 97 percent N_f/N_r. Recovery techniques are the same as for an N_f flex shaft failure.

CAUTION

When operating on emergency throttle, there is no automatic 110 percent N_r rotor overspeed protection.

CAUTION

In the event of an N_f flex shaft failure, there is no 122 percent N_f overspeed stopcock feature. (See ENGINE OVERSPEED SYSTEM, Section VI.)

CAUTION

Stopcock function is still controlled by the speed selector even when the engine is being controlled by emergency throttle.

Ice buildup on the windshield can result in engine failure due to FOD. Ice melting on the windshield will slide up and accumulate at the top of the windshield. The ice accumulation will break off and be ingested into the engine intake. If icing conditions are encountered, proceed as follows:

1. Fly helicopter from icing condition as soon as possible.
2. Heater - OFF.
3. Airspeed - 55 knots.
4. Land at first suitable site.

RAIN INGESTION.

Entry into a very heavy rain will cause a slight power loss in the engine. The characteristics of the T-58-8B engine are such that engine flameout is not probable. Engine instruments will indicate the loss of power; the most evident is torque. If the above conditions are experienced and power cannot be regained through use of speed selector, proceed as follows:

1. Emergency throttle - Increase as required to regain desired power.
2. Airspeed - 55 knots.
3. Conditions permitting - Secure emergency throttle and reestablish cruise flight. As rain intensity decreases, power will increase. This will be indicated by an increase in N_f/N_r and engine instruments.

NOTE: A power loss may be experienced utilizing emergency throttle if rain is extremely heavy.

ENGINE FAILURE IN HOVER.

Settling will be so rapid under these conditions that little can be done to avoid a relatively hard landing. Hovering should be accomplished at the lowest practical altitude and at 100% N_r. This will normally allow sufficient inertia to permit a safe landing. The landing can be cushioned somewhat by increasing collective pitch as the helicopter settles to the ground.

Do not reduce collective pitch as you normally would in the event of engine failure at higher altitudes. In this case, a reduction of pitch would cause the helicopter to settle more rapidly. The helicopter should be held in a level attitude, and when contact is made with the ground, the cyclic stick should be moved slightly forward of the neutral position. Regardless of the force with which the helicopter strikes the ground, damage will be much less if it strikes level.

Proceed as follows:

1. Collective - Increase to cushion landing.
2. Wheel brakes (land only) - APPLY.
3. Speed selector - CLOSED.
4. Secure cockpit.

CAUTION

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

ENGINE FAILURE DURING TRANSITION TO FORWARD FLIGHT AND CLIMB.

CAUTION

Between 7900 and 8300 pounds gross weight, no safe area of the flight envelope exists below 140 feet for safe autorotative landing after power failure.

Surface conditions and altitude will dictate the autorotation flare and collective technique. Collective control will vary greatly. At low altitude, collective cannot be lowered. As altitude increases, collective can be lowered proportionately. If the surface is smooth and firm, vary flare to touchdown in a level attitude with 15 to 20 knots IAS. With rough surface condition, flare to touchdown with no forward ground speed. Depending on rotor energy available, use it to cushion touchdown. To prevent early collective pull, scan out far enough to see descent rate and flight path. Do not look down final descent angle to landing spot only.

CAUTION

Do not start collective pull as normally executed for a power recovery as this will result in a high recovery and a subsequent hard landing.

Attain maximum collective at touchdown - not before.

ENGINE FAILURE DURING FLIGHT.

Power-off autorotative landings can be safely accomplished to most any surface if operating in the proper flight envelope. When necessary to autorotate, plan to arrive at the desired landing area lined up into the wind. It is best to look as though you will overshoot rather than undershoot. Excessive altitude can be lost by turning as necessary. The flare and collective technique should be varied slightly for different surface conditions. When conditions permit, it is desirable to land with translational lift. However, it is mandatory to execute the flare so as to have no ground speed at touchdown when landing on water, rough or unprepared terrain. This is a demanding situation and it requires more precise collective use since translational lift normally is not present. When engine failure is experienced, proceed as follows:

1. Collective - Reduce pitch and establish autorotative glide.
2. Landing gear - DOWN (over land) UP (over water).
3. Shoulder harness - LOCKED.
4. Power instruments - ANALYZE.
5. Speed selector - STOPCOCK.
6. Cabin occupants - ALERT.
7. Transmit - MAYDAY.
8. If time and altitude permit - ATTEMPT RESTART IF INDICATED.
9. At 140 feet indicated on radar altimeter, execute a moderate rate of flare to 20 degrees nose up.
10. Maintain the flare until airspeed has slowed to 20 knots or less (landing on water or rough terrain).
11. Smoothly lower the nose to the proper attitude for conditions.
12. Apply collective to control rate-of-descent to cushion landing. Do not stop descent prematurely.
13. If possible, touchdown should be made in a level attitude.
14. Collective - Smoothly lower collective to minimum after positive ground contact and move cyclic slightly forward.
15. Wheel brakes (land only) - APPLY.

NOTE: An autorotation over trees should be planned to arrive at zero ground speed at treetop level, allowing the trees to cushion the descent to ground contact.

RESTARTING ENGINE IN FLIGHT.

It will be left to the pilot's judgement whether to attempt a restart. In normal autorotation, rate-of-descent at 55 knots IAS is approximately 1800 feet-per-minute with 103% rotor speed. Consequently, altitude will dictate whether an inflight engine restart should be attempted. The altitude at which air restart can be safely accomplished depends on pilot proficiency. An autorotative glide must be established immediately following engine failure. An in-flight engine restart may then be attempted. Proceed as follows:

1. Collective - LOWER and establish autorotative glide.
2. Speed selector - STOPCOCK.
3. Emergency throttle - CLOSED.
4. P_3 bleed valve - OPEN.
5. Starter switch - DEPRESS.
6. Speed selector (after N_g reaches 15% indicated) - GRD IDLE.
7. P_3 bleed valve - Closed (after T_5 peaks out).
8. Starter switch (after N_g reaches 45%) - RELEASE.
9. Re-establish level flight by use of emergency throttle.
10. If a restart attempt is unsuccessful, proceed as follows:
    a. Speed selector - STOPCOCK.
    b. Emergency throttle if used - CLOSED.
    c. Starter switch - RELEASE.
    d. Complete autorotation.

AUTOROTATION APPROACH SPEEDS.

1. Maximum glide distance airspeed: 82 knots IAS.
2. 82 knot autorotation rate of descent: approximately 2500 feet per minute.
3. Minimum rate of descent airspeed: 55 knots IAS.
4. 55 knot autorotation rate of descent: approximately 1800 feet per minute.

NOTE: Glide distance in the 82 knot autorotation will depend upon initial altitude, initial airspeed, and pilot technique utilized. A combination of varied airspeeds and/or approach turns may be required to land in the desired area. When possible, a steady state autorotation at 55 knots IAS should be attained prior to 140 feet radar altitude to allow recovery utilizing practiced techniques.

DUAL FAILURE OF ENGINE FUEL CONTROL AND OVERSPEED GOVERNOR.

Failure of fuel control will result in undesired engine output (loss of power or excess power). If N_r reaches 110% and the overspeed governor fails to trip, both power turbine and rotor will attain abnormally high speeds. If possible, simultaneously reduce engine speed selector to FLT IDLE, lower collective and control power with emergency throttle.

NOTE: At a high rate of acceleration, when power turbine speed reaches 122% N_f, fuel is cut off at the fuel control and engine stoppage results (provided N_f flexible shaft is not broken). See ENGINE OVERSPEED SYSTEM, Section VI.

OVERSPEEDING OF THE ROTOR SYSTEM.

Overspeeding of the rotor system imposes a severe overload on the rotor and transmission systems and requires immediate corrective action. Whenever an overspeed condition occurs, the immediate course of action should be determined from the following:

111 to 120 percent N_r - Urgent mission may be completed.

Over 120 per cent N_r - Continue to nearest suitable landing area and land. When an overspeed occurs, the pilot should write up a detailed description including the exact overspeed on the aircraft flight records. The helicopter should not be flown again until the special inspection requirements contained in the HH-52A Maintenance Manual are performed.

NOTE: The most common cause of N_r overspeed is misuse of the emergency throttle. After emergency throttle practice, pilots must ensure that it is fully closed prior to any manuevers. During the power recovery autorotation, pilots must be aware that increasing emergency throttle in lieu of the speed selector will result in a rotor overspeed.

FLIGHT CONTROL EMERGENCY OPERATION.

TAIL ROTOR AND CONTROL MALFUNCTION - GENERAL.

Loss of heading control could be the result of tail rotor blade loss or damage, failure of the tail rotor drive shaft between the transmission and the tail rotor, or a failure in the tail rotor control linkage. Tail rotor loss or failure of the drive shaft will result in a right yaw in powered flight. The amount of yaw being governed by the airspeed and the amount of power being applied to the main rotor. A failure in the control linkage may result in a loss of positive heading control. Direction and amount of yaw in this case will be determined by airspeed, torque, tail rotor rigging, and type of failure. A jammed control would result in a loss of positive heading control. The thrust produced by the tail rotor will be dependent upon the position of the control when it jams.

TAIL ROTOR CONTROL SYSTEM FAILURE.

Tail rotor control system failures will likely fall into two categories: those resulting in loss of tail rotor pedal response and those resulting in a lock-up of tail rotor control linkage. Loss of pedal response could probably result from separation of the control linkage. If the control linkage separates between the pedals and the AUX servo, the ASE yaw channel (with ASE engaged) will continue to maintain heading. In this situation heading can be controlled with the ASE yaw trim knob. If the control linkage separates between the AUX servo and the tail rotor, the tail rotor blade pitch will be controlled by the pre-set counterweights. This will result in a left, neutral or right yaw depending on airspeed, torque, and tail rotor rigging. Controlled flight is normally possible using cyclic for directional control while adjusting torque for minimum yaw. Evaluation of the airspeed, torque and yaw relationship is recommended prior to attempting approach and landing. During this evaluation, which should be conducted at altitude if possible, the following yaw angle limits should be observed to prevent structural damage:

15 degrees at 85 kts
33 degrees at 56 kts

Tail rotor rigging balance will require a low airspeed high power approach, and may permit a vertical landing. Tail rotor control system failures resulting in a lock-up of the mechanical linkage must also be evaluated to determine the airspeed, torque and yaw relationship. Select the optimum airspeed/torque combination for approach and the landing technique best suited to the situation.

TAIL ROTOR AUXILIARY YAW SERVO SYSTEM MALFUNCTION.

A tail rotor control system malfunction of the auxiliary yaw servo could result in a possible hydraulic hardover. This type malfunction can be determined by the displacement of the pedals and/or a "locked" condition. This does not preclude the possibility of a jammed control as a result of FOD, etc. Turning the AUX servo OFF should eliminate the hardover condition. Tail rotor response will be as in a normal flight condition with the exception of slightly increased pedal pressures due to the auxiliary servo system being secured.

TAIL ROTOR ASSEMBLY LOSS.

A complete loss of the tail rotor assembly would result in an excessive yaw right flight condition. Controlled flight may be accomplished by maintaining 60-90 knots airspeed. Final approach should be made in full autorotation with the engine shut down.

APPROACH AND LANDING PROCEDURES - GENERAL.

The varied conditions under which rotor control system failure may occur preclude dictating a technique to be followed under all circumstances. Careful consideration must be given the malfunction/failure to determine the most logical and safest procedure to use.

TAIL ROTOR FAILURE DURING TAKE-OFF, LANDING OR HOVERING (LOW ALTITUDE, SLOW AIRSPEED).

In the event of a tail rotor failure during take-off, landing or while hovering, main rotor torque will cause an immediate clockwise rotation of the fuselage. The following procedure should be followed to minimize further damage to the helicopter:

1. Speed selector - FLIGHT IDLE (STOPCOCK, time permitting).
2. Cyclic
   a. Hover - Maintain level attitude.
   b. Forward speed - Attempt to align flight direction with helicopter heading by use of lateral cyclic.
3. Collective - INCREASE.
4. Wheel brakes (land only) - APPLY.
5. Secure engine and cockpit.

CAUTION

An increase in torque at a slow airspeed will cause the helicopter to rotate more rapidly to the right thus aggravating the situation.

TAIL ROTOR FAILURE DURING FLIGHT.

Tail rotor failure during flight will be indicated by a loss of directional control (yaw right). The first and most important step is to regain directional control by an immediate reduction of power to the main rotor. If immediate landing cannot be accomplished proceed as follows:

1. Reduce power to the main rotor and establish a glide at 60 to 90 knots IAS to regain directional control.
2. Slowly bring in power to reduce rate-of-descent while compensating for yaw with left cyclic.
3. Maintain altitude and an airspeed of 60 to 90 knots IAS until suitable landing site is selected.
4. Alert crew and lock shoulder harness.
5. Alert crash facilities and burn off excess fuel.

APPROACH WITH TAIL ROTOR INOPERATIVE (AUTOROTATION).

1. Complete pre-landing check.
2. Reduce collective pitch to minimum, retard the speed selector to AUTO DETENT and enter autorotation into the wind. Autorotation will be accomplished by a change in yaw from nose right to nose aligned nearly with the runway.
3. Establish a glide at 55 knots IAS.
4. Maintain directional control by lateral movement of cyclic control.
5. When satisfied approach will permit landing in desired area, stopcock the speed selector.

NOTE: If approach is not satisfactory and the decision is made to abort the approach, maintain 55-60 knots and slowly increase torque to that required to permit a controllable wave-off.

LANDING WITH TAIL ROTOR INOPERATIVE (AUTOROTATION TO RUNWAY).

1. At 140 feet indicated on radar altimeter, execute a moderate rate of flare to 20 degrees nose up.
2. Maintain the flare until airspeed has slowed to 20 knots.
3. Smoothly and positively initiate recovery to level the helicopter by application of forward cyclic and simultaneously make a slow, smooth application of the collective pitch lever to control the rate of descent.
4. Use cyclic as necessary to align the helicopter in the direction of flight path.

NOTE: When collective pitch is applied, the helicopter, due to reduced torque and increased transmission drag, will tend to turn to the left. It is at this point cyclic should be used in a positive manner to keep the aircraft aligned in the direction it is traveling over the ground so as to eliminate skid at touchdown.

5. Ground contact speed should be held to a minimum.
6. Collective pitch - Reduce to minimum pitch.
7. Wheel brakes - Apply.
8. Secure cockpit.

RUNNING LANDING (RUNWAY ONLY).

If the tail rotor malfunction results in partial loss of tail rotor control or an uncontrollable yaw to the left is experienced, then a running landing will be more advantageous than the autorotative approach. If the situation warrants this type landing, proceed as follows:

1. Complete pre-landing check.
2. Determine at altitude, the amount of control available and the airspeed, collective power, and speed selector setting required.
3. Make sufficient number of low passes over the selected runway to determine the effectiveness of findings in step (2) with adequate airspeed to maintain aircraft controllability.
4. When satisfied that this type approach can be executed, complete landing.

CAUTION

Maximum touchdown speed is 43 knots in a balanced condition (main landing gear limitation).

5. Wheel brakes - APPLY.
6. Secure engine and cockpit.

AUTOMATIC STABILIZATION EQUIPMENT FAILURE.

In the event that automatic stabilization signals cause the helicopter to oscillate in pitch, roll, or yaw, automatic stabilization equipment (ASE) should be disengaged by depressing button marked AUTO STABE RELEASE, on either cyclic grip. One or more channels may be disengaged by placing the respective channel disengage switch, located on the channel monitor control panel, to OFF. Pressing AUTO STABE RELEASE button on either cyclic stick grip will disengage all three channels of the ASE system. Placing the flight control servo switch in AUX OFF will render the system inoperative. Due to the design authority of ASE, any electrical malfunction can be overridden by the pilot. However, if the malfunction is not corrected by depressing an AUTO STABE RELEASE button, the equipment may be eliminated from the flight control system entirely by turning off the auxiliary servo unit. Cyclic stick forces should be no greater although a slight drag from the auxiliary servos will be detected. The possibility of a failure, which would not be entirely eliminated by depressing an AUTO STABE RELEASE button, is extremely remote. When the automatic stabilization equipment is nulled mechanically, by using the AUTO STABE RELEASE button on either cyclic stick, all valves will be centered immediately. Pushing the engage button will again supply power.

FLIGHT CONTROL MALFUNCTION.

NOTE: On helicopter CG Nos 1449 and subsequent an ASE OFF warning capsule has been added to the caution advisory panel. The capsule illuminates when the essential dc bus is energized and the ASE is disengaged.

ELECTRICAL (ASE).

An electrical malfunction allows the pilot to continue controllable flight by overriding the malfunction. An electrical hardover signal input will cause the helicopter to react adversely without cyclic displacement. A yaw hardover will cause rudder displacement requiring 15 to 25 pounds of pedal pressure to override the condition.

1. With ASE engaged, oscillations in pitch and/or roll:
   a. ASE - Disengage, Light On.
   b. Shift gyros.
   c. ASE - Reengage, Light Off.
2. Hardover associated with an ASE malfunction:
   a. Override hardover. Roll and pitch should require no abnormal force with stick trim released.
   b. If defective channel can be readily determined, disengage affected channel. If defective channel cannot be determined, disengage ASE.

CAUTION

An ASE hardover may occur with ASE disengaged (channel monitor panel malfunction) which will be indicated on the flight director in addition to rotor disc/pedal displacement.

HYDRAULIC.

Normally, a hydraulic hardover malfunction will position the affected control to an extreme position; however, an intermediate control position is possible. Apparent control movement of one quarter total travel in the opposite direction is allowed by the sloppy link and control linkage. The severity of the malfunction will be determined by the amount of associated control displacement. Failure of either servo system may preclude a controlled flight condition. The nature of a hydraulic servo hardover may mask the exact identity of the cause. The pilot must analyze the symptoms and isolate the problem as rapidly as possible.

1. Hydraulic hardover affecting only one control (cyclic, collective, pedals):

   a. Servo switch - AUX OFF.

   NOTE: A malfunction of the auxiliary servo system will be more pronounced in only one channel of the system. A malfunction of the primary servo system might transmit a coupling effect to the cyclic and collective due to the mechanical forces being transmitted through the mixing unit.

2. Hydraulic malfunction affecting two controls (cyclic and collective):

   a. Servo switch - PRI OFF.

3. Increase in control friction accompanied by loss of servo pressure:

   a. Affected servo system - OFF.

4. In addition to above procedures for hydraulic malfunctions, proceed as follows:

   a. Reduce airspeed to 60 knots.

   b. Land as soon as practicable.

CAUTION

When the auxiliary servo system fails, the automatic stabilization equipment is disabled.

MAIN ROTOR BLADE DAMPER MALFUNCTION.

Main rotor blade damper malfunctions, such as loss of hydraulic fluid, damper reservoir or complete loss of the damper will result in a noticeable rough head indication with associated fuselage vibrations. They will be more evident in a high power flight condition. Reduce airspeed to 55 knots and land at the nearest suitable landing site.

CAUTION

Ground resonance could be encountered during or after landing.

ROTOR BLADE DAMAGE

If the main/tail rotor blades have been damaged by a foreign object, the helicopter should not be flown until a thorough inspection has been accomplished by qualified maintenance personnel. Further flight of helicopters with blade damage exceeding negligible and repairable as defined by CGTO-1H-52A-3 shall not be attempted. If the damage was incurred in flight, the helicopter should be landed as soon as practicable at the nearest safe landing site. Possible loss of the aircraft subsequent to a safe landing is not sufficient cause to continue flight.

FIRE.

ENGINE COMPARTMENT FIRE DURING OR AFTER STARTING.

If engine compartment fire should develop during or after starting it may be detected visually or by the fire detector warning light (except with battery switch at BAT START). If fire is detected proceed as follows:

1. Speed selector - STOPCOCK.
2. Fuel fire wall shut-off handle - FIRE EXT ARMED.
3. Battery switch - ON.

   NOTE: Steps 2 and 3 close the engine compartment shutter doors, the fuel shut-off valve, and arm the engine compartment fire extinguisher.

4. Engine compartment fire extinguisher - DISCHARGE.
5. EXT PWR switch - OFF.
6. Battery switch - OFF.
7. Exit aircraft.
8. Fight fire externally.

ENGINE COMPARTMENT FIRE IN FLIGHT.

An engine compartment fire in flight may be the result of an engine malfunction or failure of one of its component systems. Ruptured fuel or oil lines will usually be detected by engine instrument indications.

NOTE: The engine compartment fire warning light may illuminate if the shutter doors are closed or if there is excessive engine blow-by.

NOTE: Severity of the fire, actual flight conditions, and terrain conditions will dictate the immediate procedure to be followed. If it is determined that a fire does exist:

1. Establish autorotative glide.
2. Speed selector - STOPCOCK.
3. Fuel fire wall shut-off handle - FIRE EXT ARMED.
4. Engine compartment fire extinguisher - DISCHARGE.
5. Alert cabin occupants.
6. Complete autorotative landing.
7. Secure cockpit.
8. Exit aircraft.

POST SHUTDOWN FIRE.

Post shutdown fires generally fall into two categories. The first is an internal fire (T_5 - 300°C or greater) and the second a compartment fire (Fire warning light and/or line crew indications). In the event of post shutdown fire, proceed as follows:

1. Speed selector - STOPCOCK.
2. Fuel fire wall shut-off handle - FIRE EXT ARMED.
3. Battery switch-ON.
4. Analyze.
   a. Internal fire (T_5 - 300°C or greater).
      (1) Starter - ENGAGE and motor until fire is extinguished.
      (2) Battery switch - OFF.
      (3) Exit aircraft.
   b. Engine compartment fire.
      (1) Engine compartment fire extinguisher - DISCHARGE.
      (2) Battery switch - OFF.
      (3) Exit aircraft.
5. Fight fire externally.

CABIN FIRE.

1. Cockpit windows - CLOSED.
2. Cabin door - CLOSED.
3. Ventilation switch - OFF.
4. Portable fire extinguisher - USE.

CAUTION

CO_2 is not toxic, however, it does reduce the oxygen content of the air.

5. Ventilate as soon as practicable.

ELECTRICAL FIRE.

Possibilities of electrical fires are very slight because the generator is prevented from generating excessive voltage by the field control relay and each electrical circuit is protected from over load by circuit breakers. However, in event of electrical fire in flight, land as soon as practicable. Comply immediately with the following procedures:

1. Circuit breaker (for affected circuits) - PULL.

If fire persists:

2. Battery switch - OFF.
3. Generator switches - OFF.
4. Portable fire estinguisher - USE.

CAUTION

Severity of the fire and actual flight conditions (night or instrument) will dictate the immediate procedure to be followed. It may be advisable to let the fire burn, if it is isolated, than to secure all electrical power and lose ASE and flight instruments prior to achieving VFR conditions.

SMOKE ELIMINATION.

1. Cockpit windows - OPEN.
2. Cabin door - OPEN.
3. Ventilating blower switch - ON.

FUEL FUME REMOVAL PROCEDURE.

1. Open cockpit windows and cabin door.
2. Complete pre-landing check.
3. Land at first suitable site.
4. Battery switch - OFF.
5. Secure engine and cockpit.

CAUTION

Do not use radios if at all possible. The severity of the situation will determine the necessity for securing all electrical power sources and whether an immediate landing is necessary.

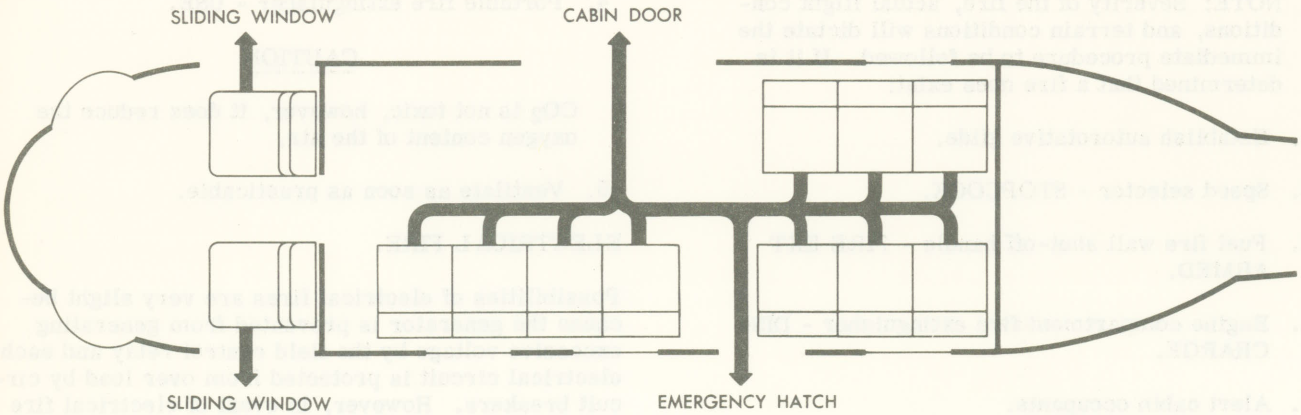

Figure 3.

EMERGENCY EXITS.

(See figure 3.)

COCKPIT EMERGENCY EXITS.

The windows on each side of the cockpit can be jettisoned to provide emergency exits. The windows are jettisoned by turning the release handles, marked EMERGENCY EXIT-PULL forward which are located on the forward lower corner of the window. The windows may also be removed from the outside by depressing the release handle marked EMERGENCY RESCUE-PRESS BUTTON-TWIST HANDLE-PULL OUT WINDOW located at the aft lower corner of the window and allowing the EXIT-TURN handle to pop out.

CABIN EMERGENCY HATCH.

A cabin emergency hatch, containing the third (forward to aft) window on the left side of the cabin, may be jettisoned to provide cabin emergency exit. The emergency release handle, marked EMERGENCY EXIT-TURN HANDLE-PUSH WINDOW is located on the forward lower corner of the hatch. To jettison the cabin emergency hatch, turn the handle forward and push the hatch out. A handle marked EMERGENCY RESCUE-TURN HANDLE-PULL OUT HATCH is also provided to open the hatch from the outside of the helicopter.

POP-OUT WINDOW EXITS.

All remaining cabin windows are of the pop-out type. To release these windows, apply pressure to the window and it will jettison. EMERGENCY EXIT-PUSH OUT WINDOW is stenciled above each window.

CABIN DOOR EMERGENCY EXIT.

The cabin door can be jettisoned by pulling down on the handle marked EMERGENCY EXIT-PULL GUARD LEFT-PULL HANDLE DOWN-PUSH DOOR OUT, located on the forward upper corner of the cabin door. A similar handle marked EMERGENCY RESCUE-TURN HANDLE AND PULL OUT is located on the outside of the door.

CAUTION

Do not jettison windows, hatches, or door in flight.

MAIN GEAR BOX OIL SYSTEM FAILURE.

If main gear box oil pressure should drop below 25 psi, or if main gear box oil temperature should go above 140°C in flight, an immediate landing is advisable as the gear box may not be receiving proper lubrication. Flight should not be resumed until the cause has been determined and corrected. If a landing is not feasible due to terrain or sea conditions proceed as follows:

1. Airspeed - 55 knots.
2. Altitude - 150 feet.

NOTE: Flight at this altitude and airspeed allows a low torque application and safe altitude in event of engine failure.

FUEL SYSTEM FAILURE.

ENGINE DRIVEN FUEL PUMP.

Failure of the engine driven fuel pump will result in immediate flameout. Refer to procedures for Engine Failure in this section.

SINGLE FUEL BOOSTER PUMP FAILURE.

Failure of either fuel booster pump will be indicated by illumination of its warning light on the caution panel. The respective fuel booster pump should then be turned off to prevent fuel system contamination. The remaining fuel booster pump will provide sufficient fuel pressure for normal operation. In the event of failure of either fuel booster pump:

1. Failed booster pump switch - OFF.
2. Abort mission.

DUAL FUEL BOOSTER PUMP FAILURE.

Failure of both fuel booster pumps will be indicated by illumination of their warning lights on the caution panel. The engine driven fuel pump now must draw the fuel from the tanks up to the engine. The possibility of "loss of suction" and flameout must be considered. Plan the flight path to allow for an autorotation in the event of flameout. Maintaining a high power setting will lessen the chance of flameout. In the event of dual pump failure:

1. Booster pump switches - OFF.
2. Abort mission and land at the first suitable site.
3. Plan the approach to avoid rapid power changes.

NOTE: Fuel in the aft tank is not available to the engine with dual fuel booster pump failure.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTION.

AC SYSTEM FAILURE.

Indications of generator malfunction are the illumination of either or both generator failure caution lights. The electrical system is designed to function on one generator. If the No. 1 or No. 2 generator caution light should illuminate, proceed as follows:

1. Move the corresponding GEN switch to OFF-RESET then ON.

NOTE: This will restore generator service if the failure was caused by momentary overvoltage or undervoltage.

NOTE: The loss of either generator will result in the loss of the No. 2 T/R and as a result, the nonessential DC bus which powers the No. 2 fuel pump. Should the reset procedure fail to restore power:

1. DC NON ESS BUS OVRD switch - ON.
2. Monitor ammeter.
3. Abort mission (Unless urgent SAR)

DUAL GENERATOR FAILURE.

Dual generator failure is remote, but if it occurs, proceed as in step 1. of AC System Failure for each generator. If either generator's output is not restored - ABORT MISSION.

Proceed as follows:

1. Generator switches - OFF.
2. Battery switch - ON.
3. DC NON ESS BUS OVRD switch - OFF.
4. Turn off all unnecessary electrical equipment (heater, lighting, etc.). Give highest priority to the #1 fuel booster pump.
5. Land at first suitable site.

CAUTION

The #1 fuel booster pump light will illuminate if landing is not possible within the life of the battery. If this occurs, proceed under Dual Booster Pump Failure.

NOTE: In the event of dual generator failure with the battery switch ON, the ground inverter will power the engine, transmission, hydraulic instruments, torquemeter, fuel quantity, and fire detection system for the start and essential DC buses. However, in this condition ASE will be inoperative, and all flight instruments except needle ball, standby compass, and pressure instruments will be lost. If at night or under IFR conditions, this will produce an extremely critical condition.

DC SYSTEM FAILURE.

Failure of either the No. 1 T/R or the No. 2 T/R will result in the loss of the DC non-essential bus due to the automatic switching feature incorporated in the system. Should a T/R fail:

1. Check and reset circuit breaker.
2. Move the associated generator switch to OFF-RESET then ON.

If this fails to restore power:

1. DC NON ESS BUS OVRD switch - ON.
2. Monitor ammeter.

HEATER FAILURE.

An overheat thermal switch will limit the temperature of heated air in the plenum duct to a maximum of 350°F if a master fuel valve or cycling switch fails. If an overheat condition occurs, an overheat relay will shut off the ignition unit, the master fuel valve, heater fuel pump, and turn on the caution light, marked HEATER HOT, located on the caution panel. The heater blower will continue to operate during an overheat condition and cool the temperature in the plenum duct. The master and heater starter switches will not energize the heating circuit if heater blower fails to operate.

NOTE: If "HEATER HOT" caution light illuminates, do not restart heater until cause of overheat has been determined.

TURBULENCE.

Turbulence can cause blade stall due to sudden high blade loading. If turbulence is encountered, proceed as follows:

1. Airspeed - 55 knots.
2. N_f/N_r - 100%
3. Reverse course if possible.

HOIST EMERGENCY.

If the hoist cable or hook become entangled and cannot be released, endangering the helicopter, actuate the pilot's or the cabin hoist cable shear switch.

HELICOPTER HANDLING ON WATER - POWER OFF.

The helicopter's inherent stability limits may be exceeded in excessively rough water in a power off condition. Use of auxiliary floatation equipment will aid materially in maintaining stability and should be employed as soon as possible after a power off landing. Although the power off helicopter can right itself from a roll up to approximately 16 degrees without aid of auxiliary floatation, a wind of 15 knots or more (creating waves of 2 feet or higher) will probably drive it into the trough of a wave and possibly cause excessive roll. The helicopter is equipped with a sea drogue and a Danforth anchor. Either one should be utilized in maintaining heading in relation to waves. These help to keep the helicopter near the point of descent and also reduces the possibility of drifting.

AUXILIARY FLOAT ACTUATION.

CAUTION

Do not inflate the auxiliary floats until helicopter has settled on water. Power off landing with auxiliary floats inflated may cause damage to the floats.

1. Helicopter on water and no forward motion.
2. Manual release handle - Pull firmly to extended position.

DEPLOYING SEA DROGUE.

1. Cyclic control neutral (stick trim on).
2. Use remaining tail rotor control to hold heading in direction from which wind and waves are coming.
3. Open pilot's window (or copilot's window).
4. Remove sea drogue from stowed position.
5. Pull red hook on end of rip cord line and attach hook around pedal adjuster flexible cable.
6. Unhook bungee outside aircraft below window and attach snap hook to thimble on tow line.

CAUTION

Do not attach snap hook on end of sea drogue line to small hook on end of bungee cord or round ring attached to thimble.

7. Throw sea drogue overboard and forward - Pull ripcord.

CAUTION

Detach sea drogue line before flight.

NOTE: Normally do not use rotor brake. Tail rotor provides directional control and stability while slowing down.

DEPLOYING DANFORTH ANCHOR.

1. Cyclic control neutral (stick trim on).
2. Use of remaining tail rotor control to hold heading in direction from which wind and waves are coming.
3. Open pilot's sliding window (or copilot's window).
4. Remove Danforth anchor from stowed position.
5. Unhook bungee on outside below window and attach snapring in end of anchor line to tow line thimble.

CAUTION

Do not attach snap hook on end of anchor line to small hook on end of bungee.

6. Cast anchor line bundle overboard.
7. Cast Danforth anchor overboard.

CAUTION

Detach anchor from tow line before flight.

TOWING OF HELICOPTER ON WATER.

If the helicopter is on water without power it will usually be desirable to take it in tow. Boat coxswain should be carefully briefed. The recommended attachment point for the tow line is the bow eye on the nose fitting. Use fifty to sixty feet of tow line to prevent surging up on the tow boat. Tow speeds up to 5 knots may be attained depending on sea condition.

CAUTION

Avoid heading parallel to troughs of waves as this may cause excessive roll.

CAUTION

Exercise care to avoid damage to helicopter when tow boat comes alongside to pass a line, as boat handling personnel may not be experienced in towing operations.

Since the helicopter will drift downwind more rapidly than a boat, the boat should stay to windward. If a sea drogue (or Danforth anchor) is or can be streamed, one recommended procedure is run the boat across the line where it is deeply enough submerged and fish it out with a boat hook, using anchor line as a tow line. Additional lengths of line may be required.

SECTION IV
PERFORMANCE INFORMATION
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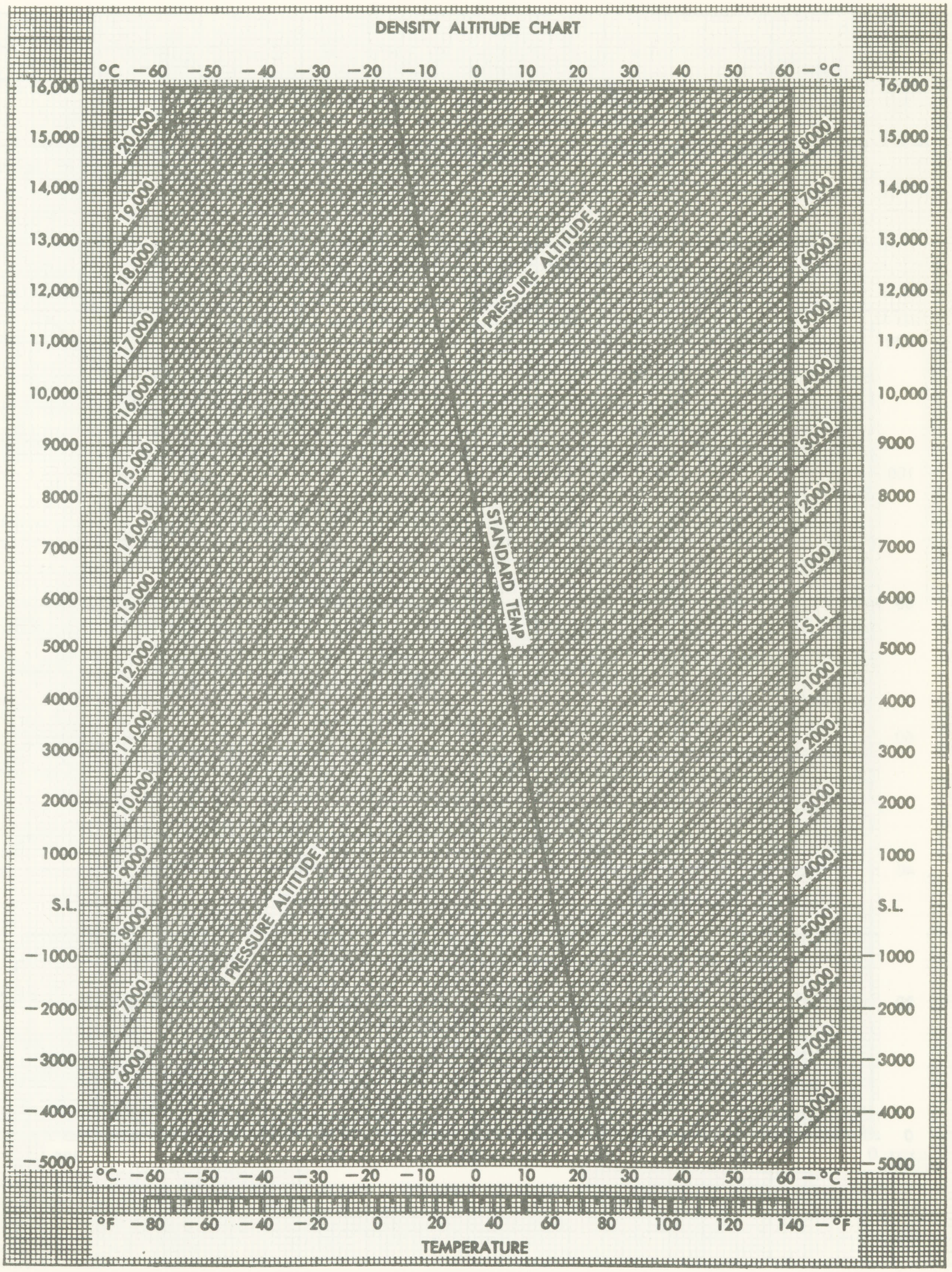

DENSITY ALTITUDE CHART
°C −60 −50 −40 −30 −20 −10 0 10 20 30 40 50 60 −°C
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9000
8000
7000
6000
5000
4000
3000
2000
1000
S.L.
−1000
−2000
−3000
−4000
−5000
DENSITY ALTITUDE ~ FT
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9000
8000
7000
6000
8000
7000
6000
5000
4000
3000
2000
1000
S.L.
−1000
−2000
−3000
−4000
−5000
−6000
−7000
−8000
PRESSURE ALTITUDE
STANDARD TEMP
PRESSURE ALTITUDE
°F −80 −60 −40 −20 0 20 40 60 80 100 120 140 −°F
TEMPERATURE

Figure 4.

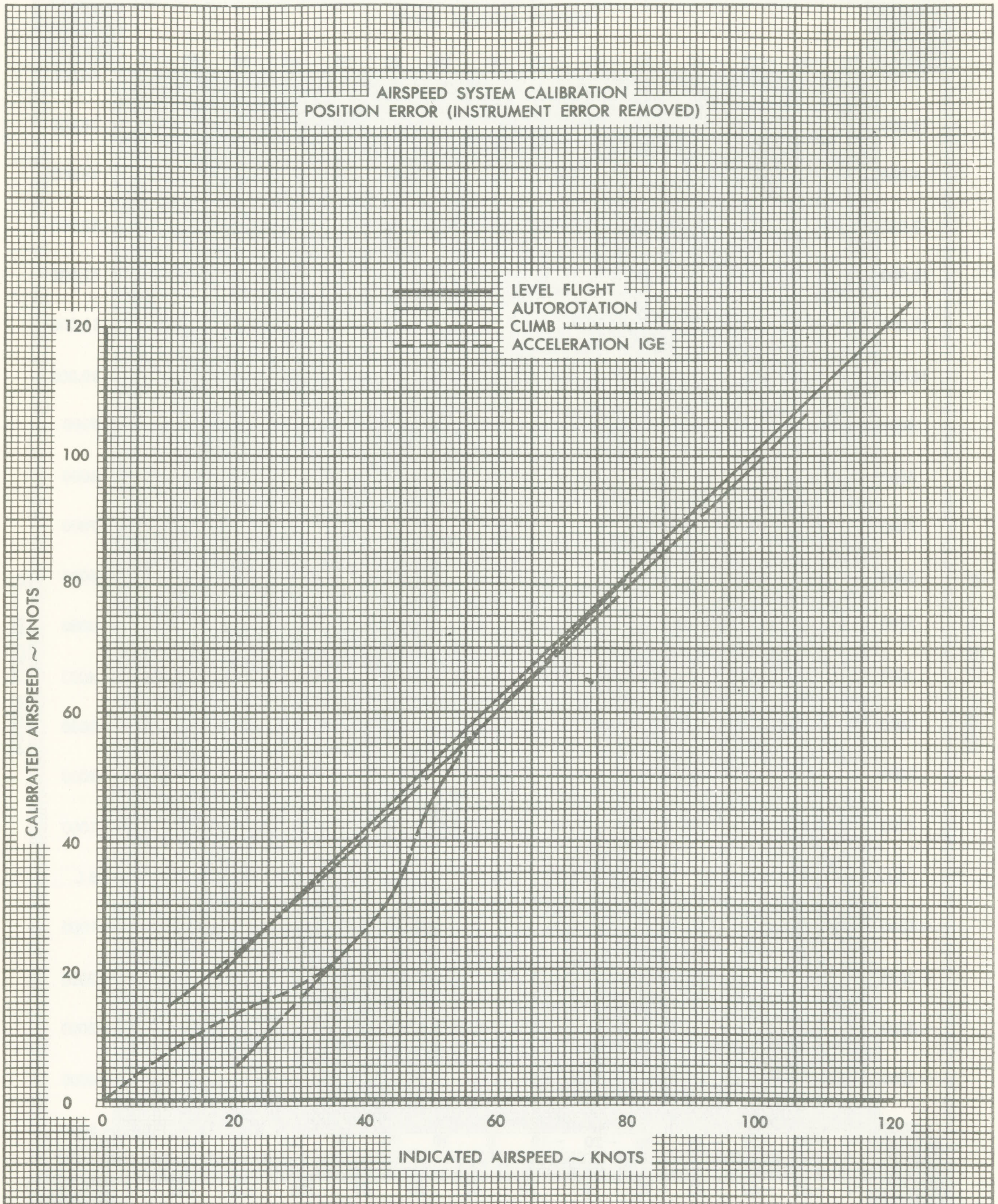

AIRSPEED SYSTEM CALIBRATION
POSITION ERROR (INSTRUMENT ERROR REMOVED)
LEVEL FLIGHT
AUTOROTATION
CLIMB
ACCELERATION IGE
CALIBRATED AIRSPEED ~ KNOTS
0
20
40
60
80
100
120
INDICATED AIRSPEED ~ KNOTS

Figure 5.

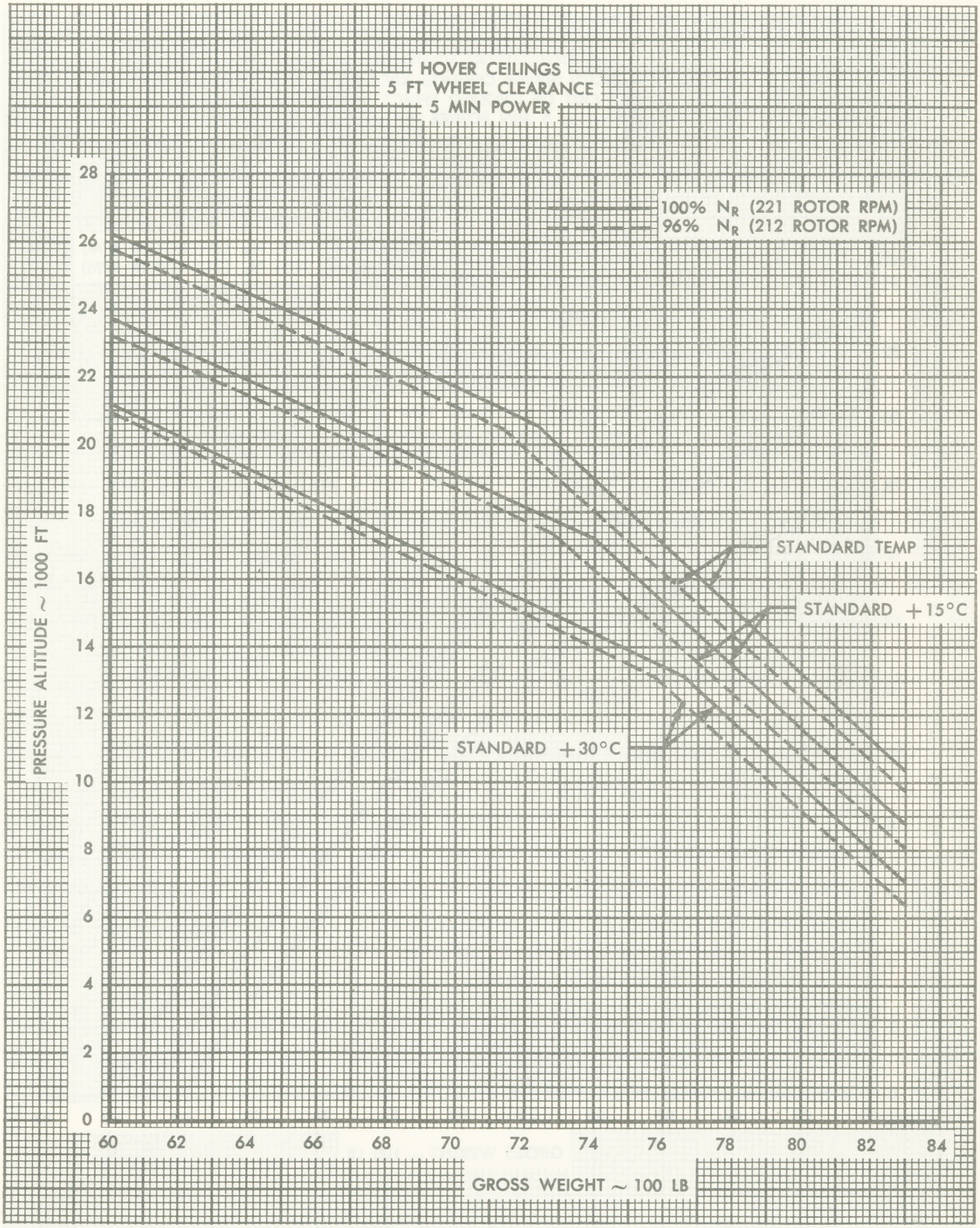

HOVER CEILINGS
5 FT WHEEL CLEARANCE
5 MIN POWER
100% N_R (221 ROTOR RPM)
96% N_R (212 ROTOR RPM)
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FT
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
60
62
64
66
68
70
72
74
76
78
80
82
84
GROSS WEIGHT ~ 100 LB

Figure 6.

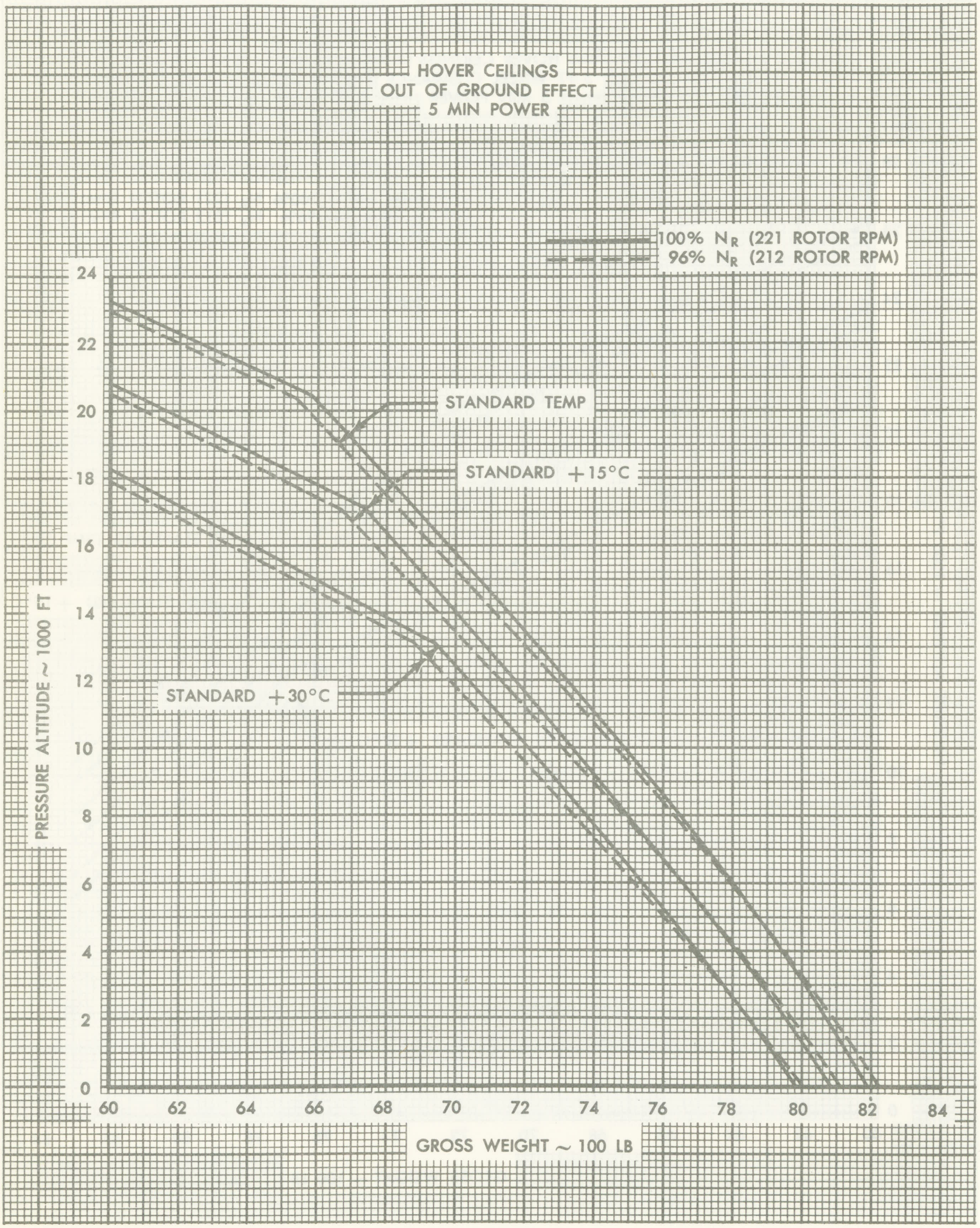

HOVER CEILINGS
OUT OF GROUND EFFECT
5 MIN POWER
100% N_R (221 ROTOR RPM)
96% N_R (212 ROTOR RPM)
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FT
GROSS WEIGHT ~ 100 LB
0
2
4
6
8
10
12
14
16
18
20
22
24
60
62
64
66
68
70
72
74
76
78
80
82
84

Figure 7.

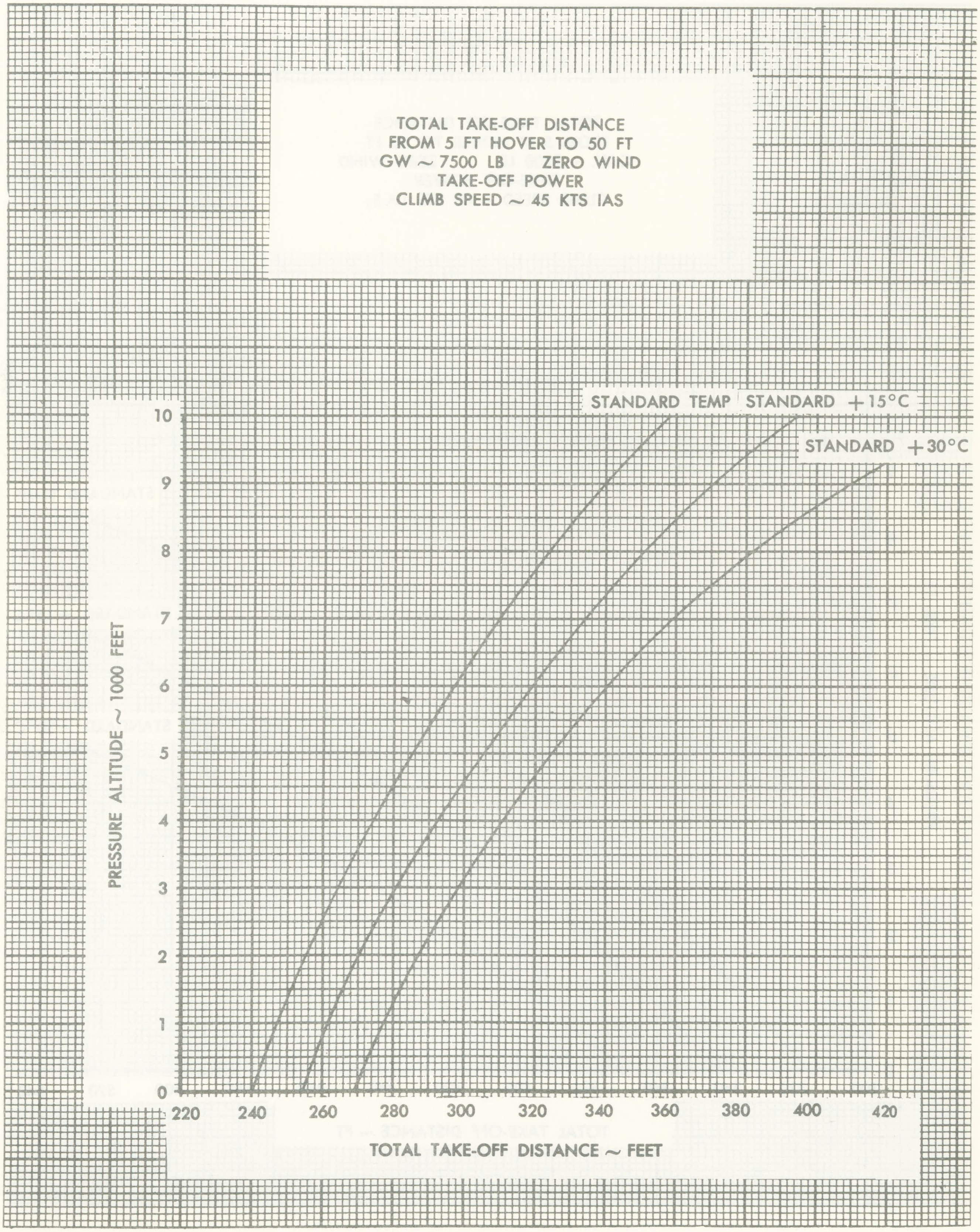

TOTAL TAKE-OFF DISTANCE
FROM 5 FT HOVER TO 50 FT
GW ~ 7500 LB ZERO WIND
TAKE-OFF POWER
CLIMB SPEED ~ 45 KTS IAS
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FEET
0
1
2
3
4
5
6
7
8
9
10
220
240
260
280
300
320
340
360
380
400
420
TOTAL TAKE-OFF DISTANCE ~ FEET

Figure 8.

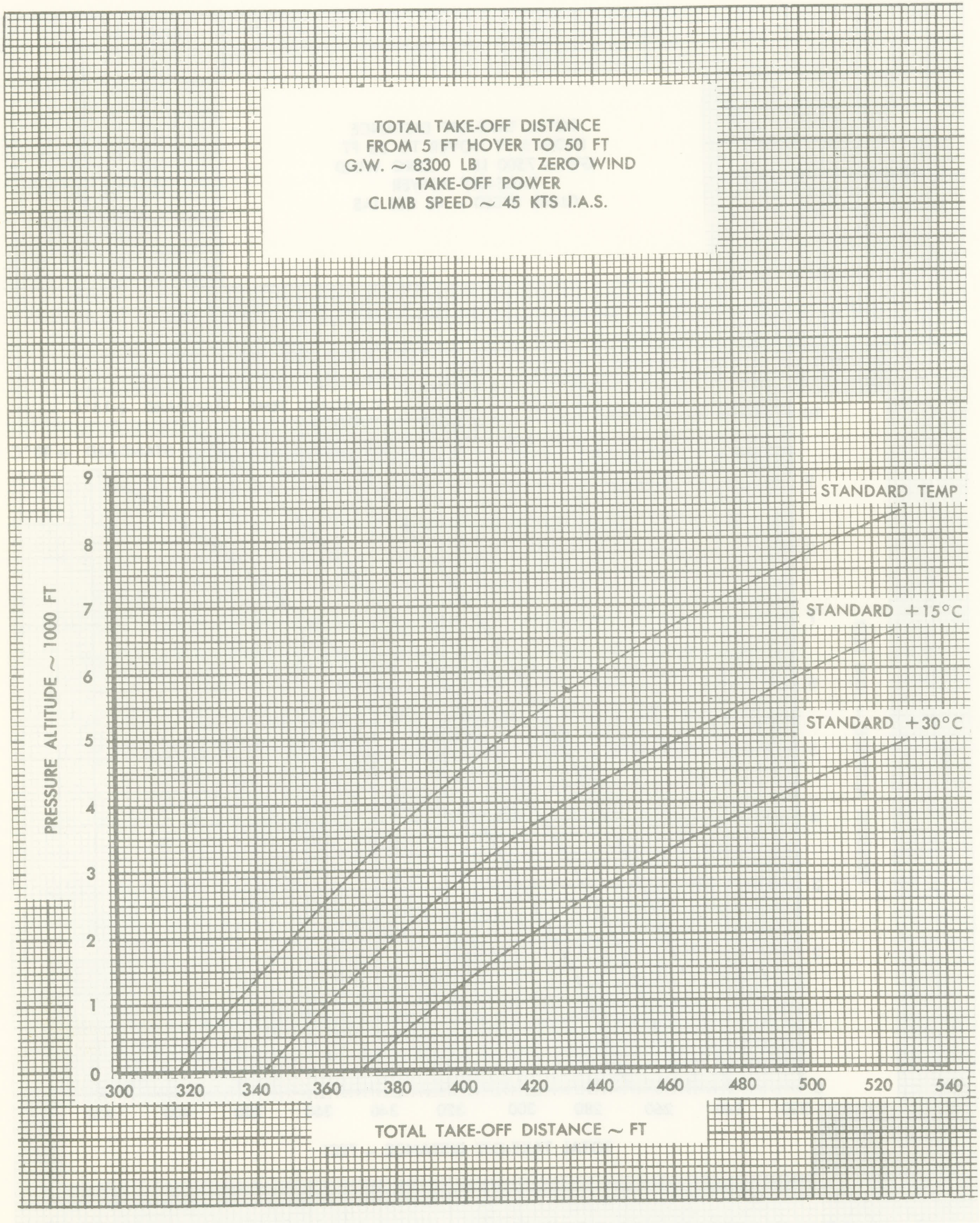

TOTAL TAKE-OFF DISTANCE
FROM 5 FT HOVER TO 50 FT
G.W. ~ 8300 LB ZERO WIND
TAKE-OFF POWER
CLIMB SPEED ~ 45 KTS I.A.S.
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FT
0
1
2
3
4
5
6
7
8
9
300
320
340
360
380
400
420
440
460
480
500
520
540
TOTAL TAKE-OFF DISTANCE ~ FT

Figure 9.

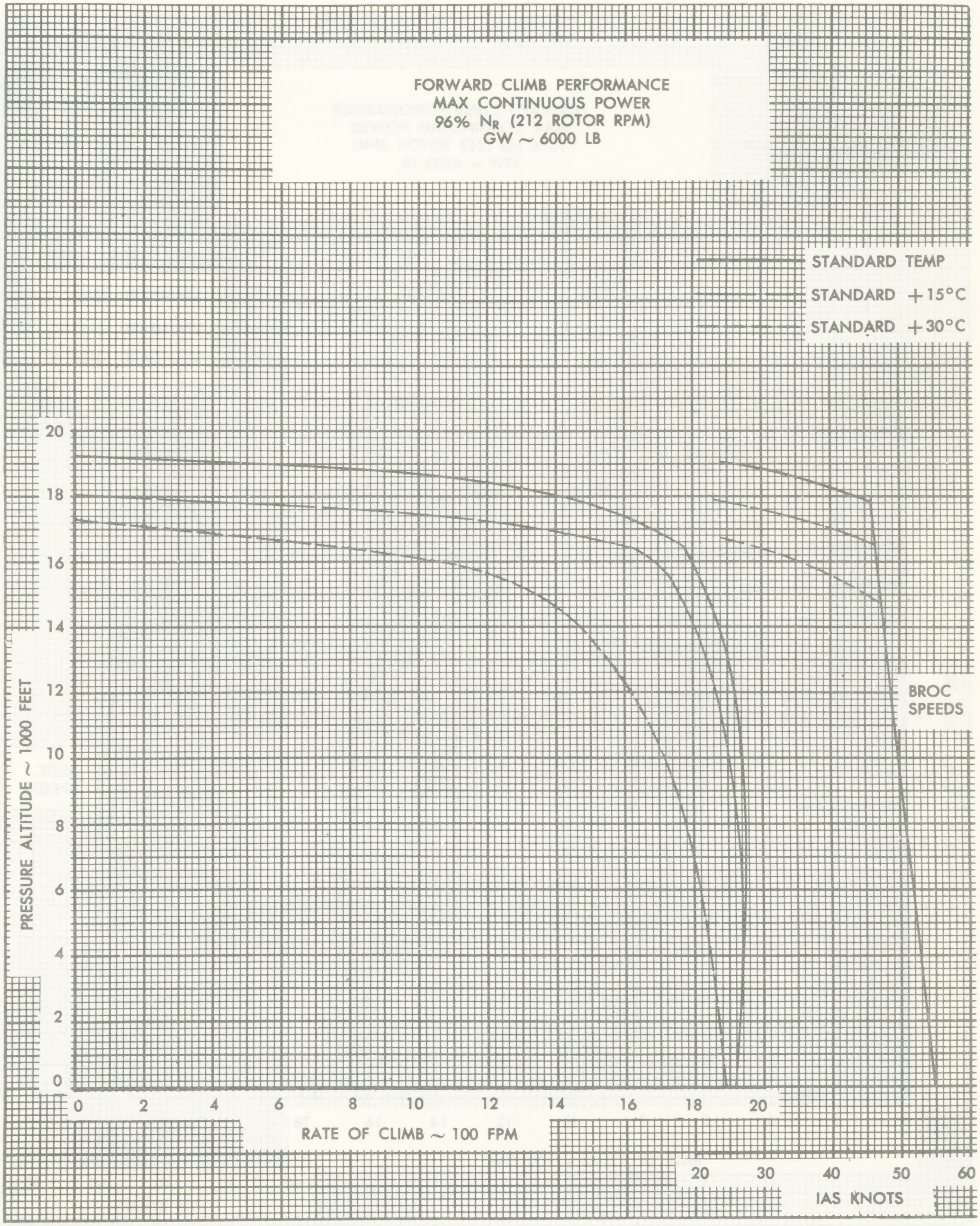

FORWARD CLIMB PERFORMANCE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 6000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
BROC
SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
20
RATE OF CLIMB ~ 100 FPM
20
30
40
50
60
IAS KNOTS

Figure 10.

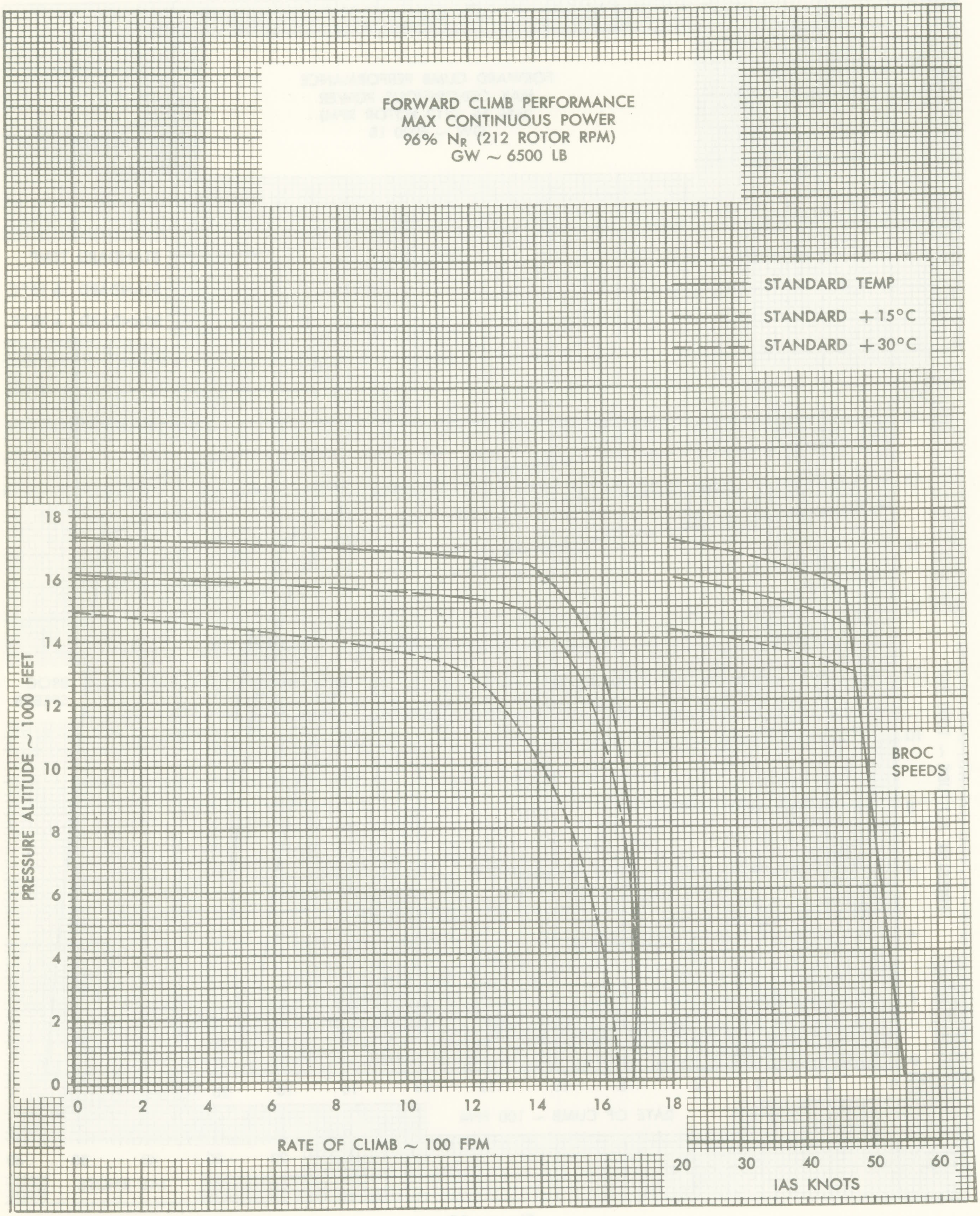

FORWARD CLIMB PERFORMANCE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 6500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
BROC
SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
18
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
12
14
16
18
RATE OF CLIMB ~ 100 FPM
20
30
40
50
60
IAS KNOTS

Figure 11.

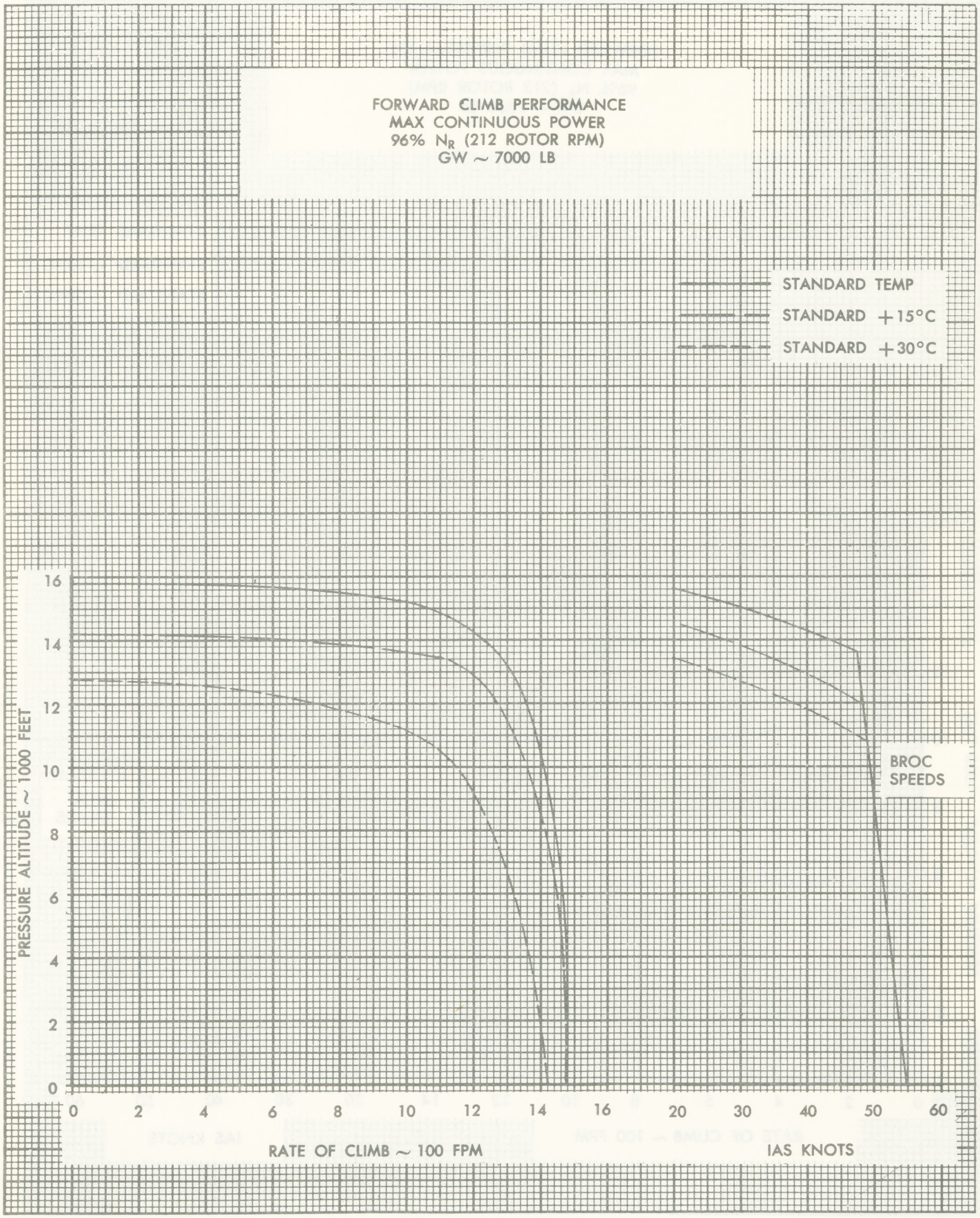

FORWARD CLIMB PERFORMANCE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 7000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
BROC SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
RATE OF CLIMB ~ 100 FPM
20
30
40
50
60
IAS KNOTS

Figure 12.

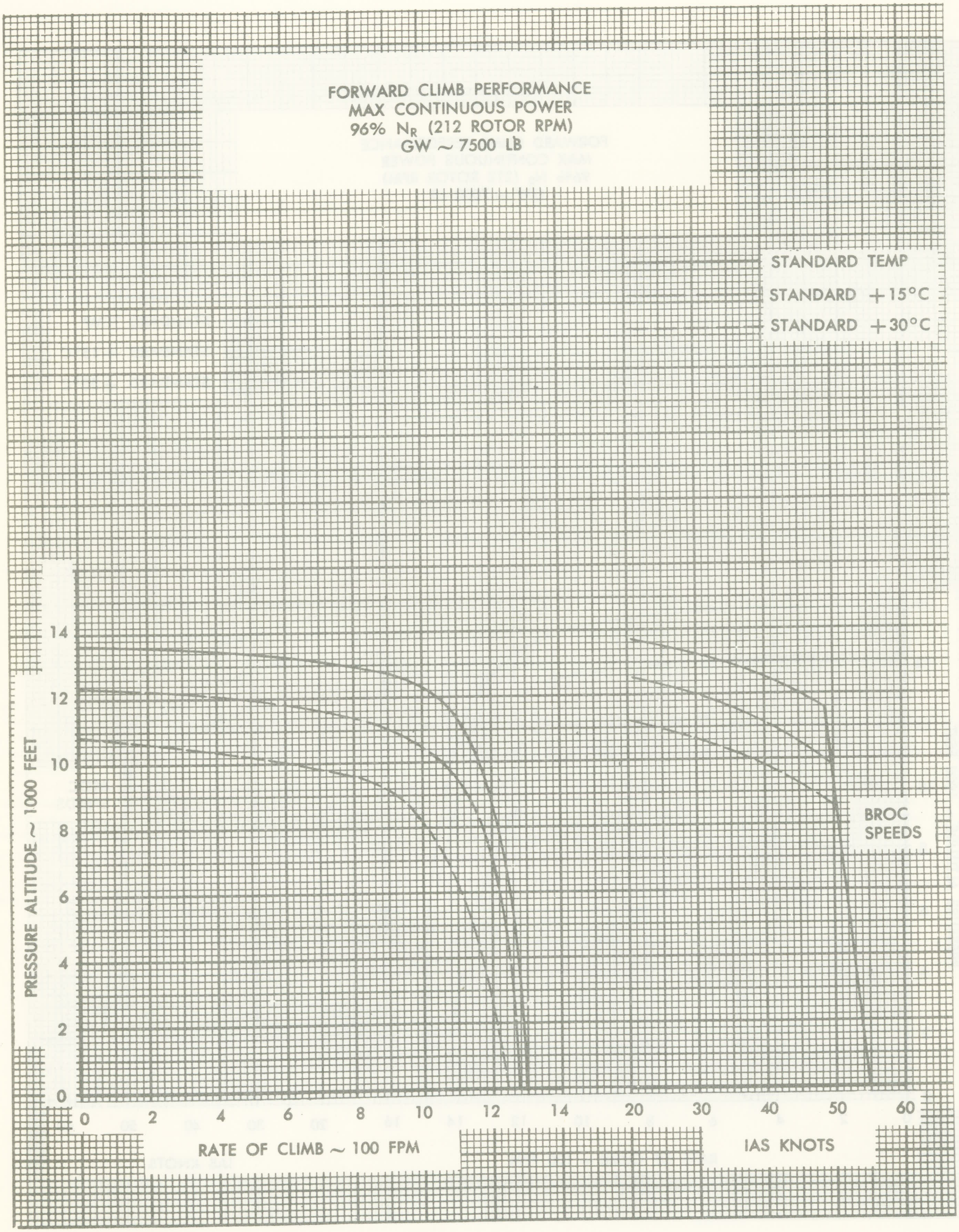

FORWARD CLIMB PERFORMANCE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 7500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
BROC SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
RATE OF CLIMB ~ 100 FPM
IAS KNOTS
20
30
40
50
60

Figure 13.

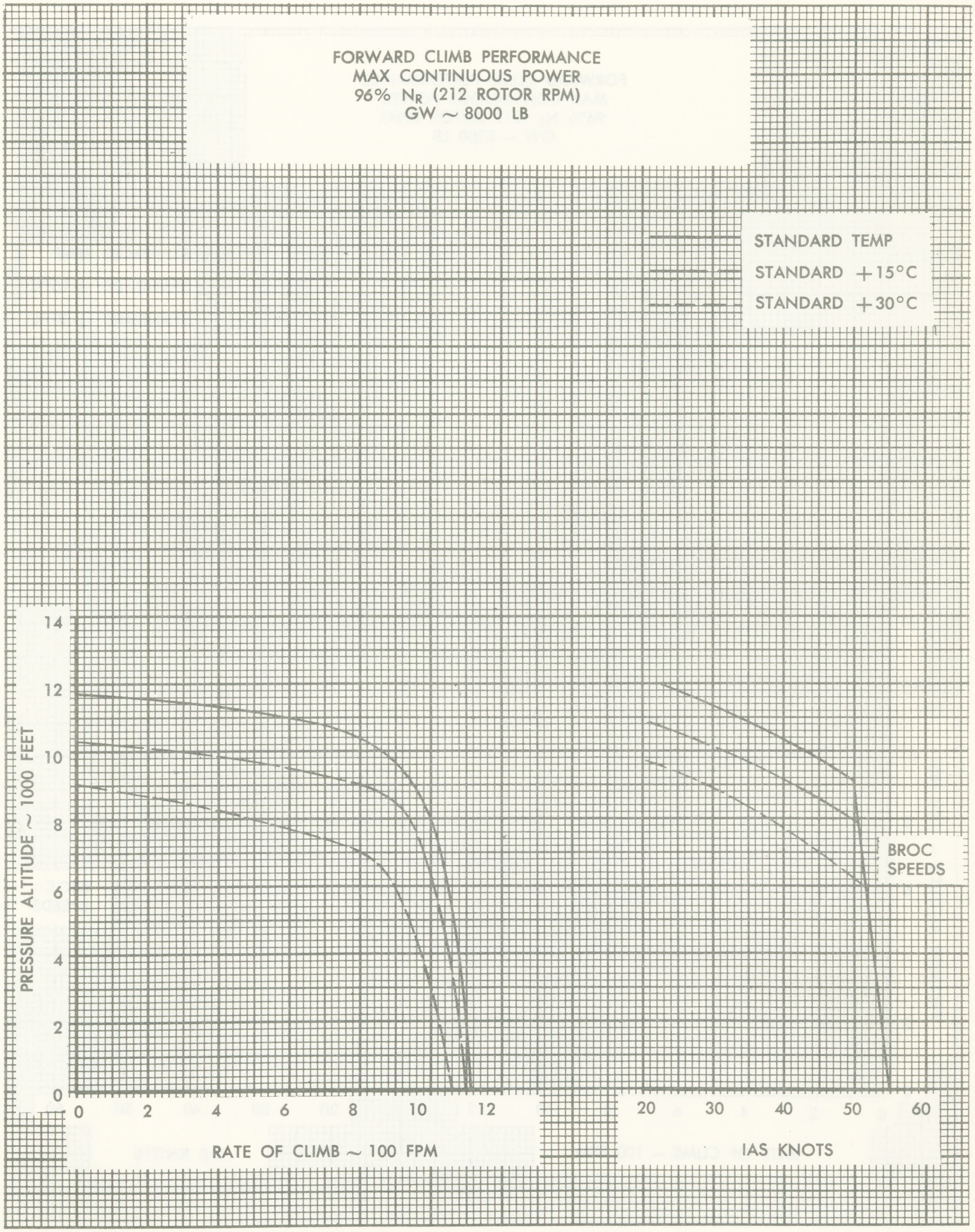

FORWARD CLIMB PERFORMANCE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 8000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
BROC
SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
RATE OF CLIMB ~ 100 FPM
20
30
40
50
60
IAS KNOTS

Figure 14.

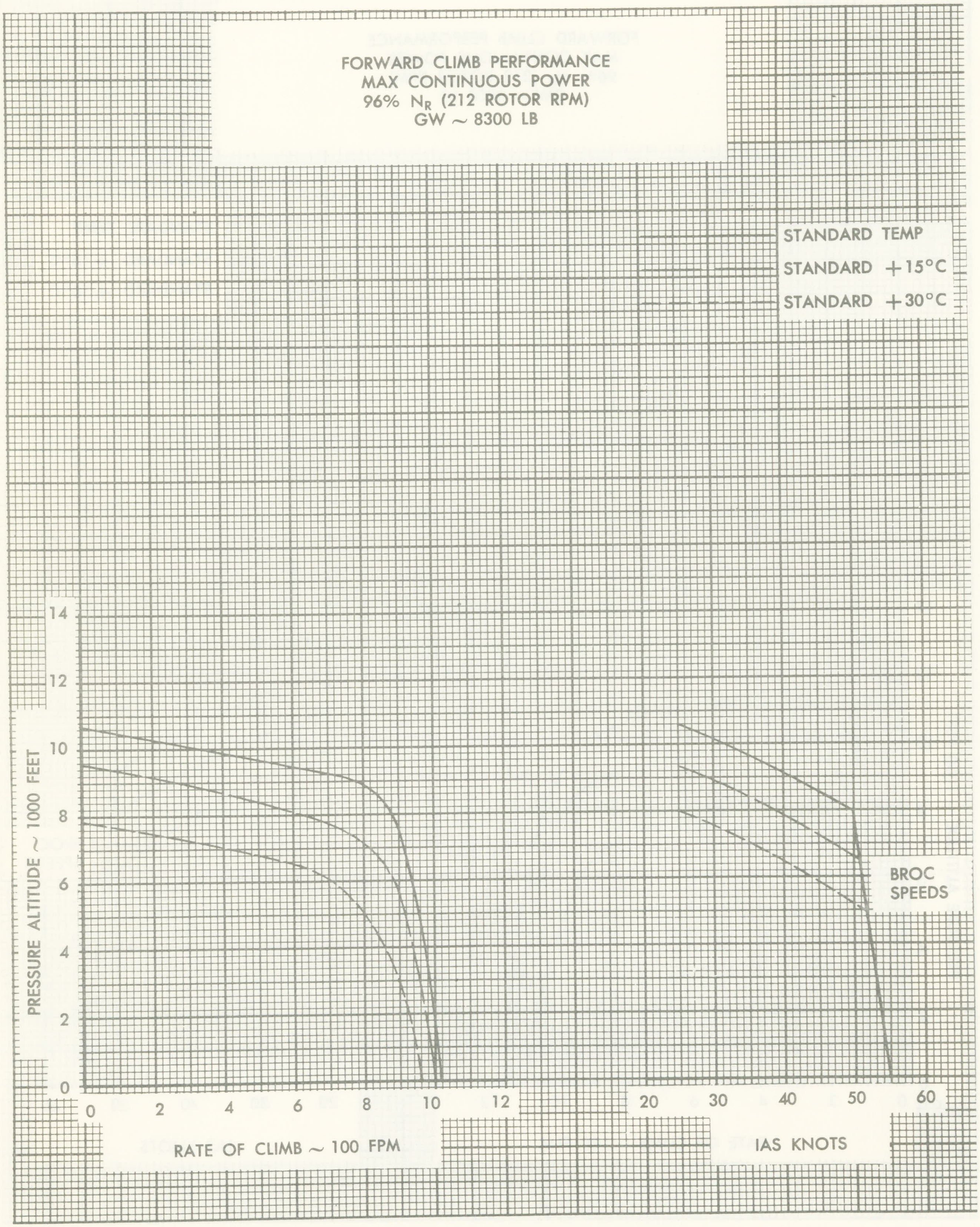


Figure 15.

Amended 15 August 1971

Pages 35, 36 and figures 16 and 17 deleted.

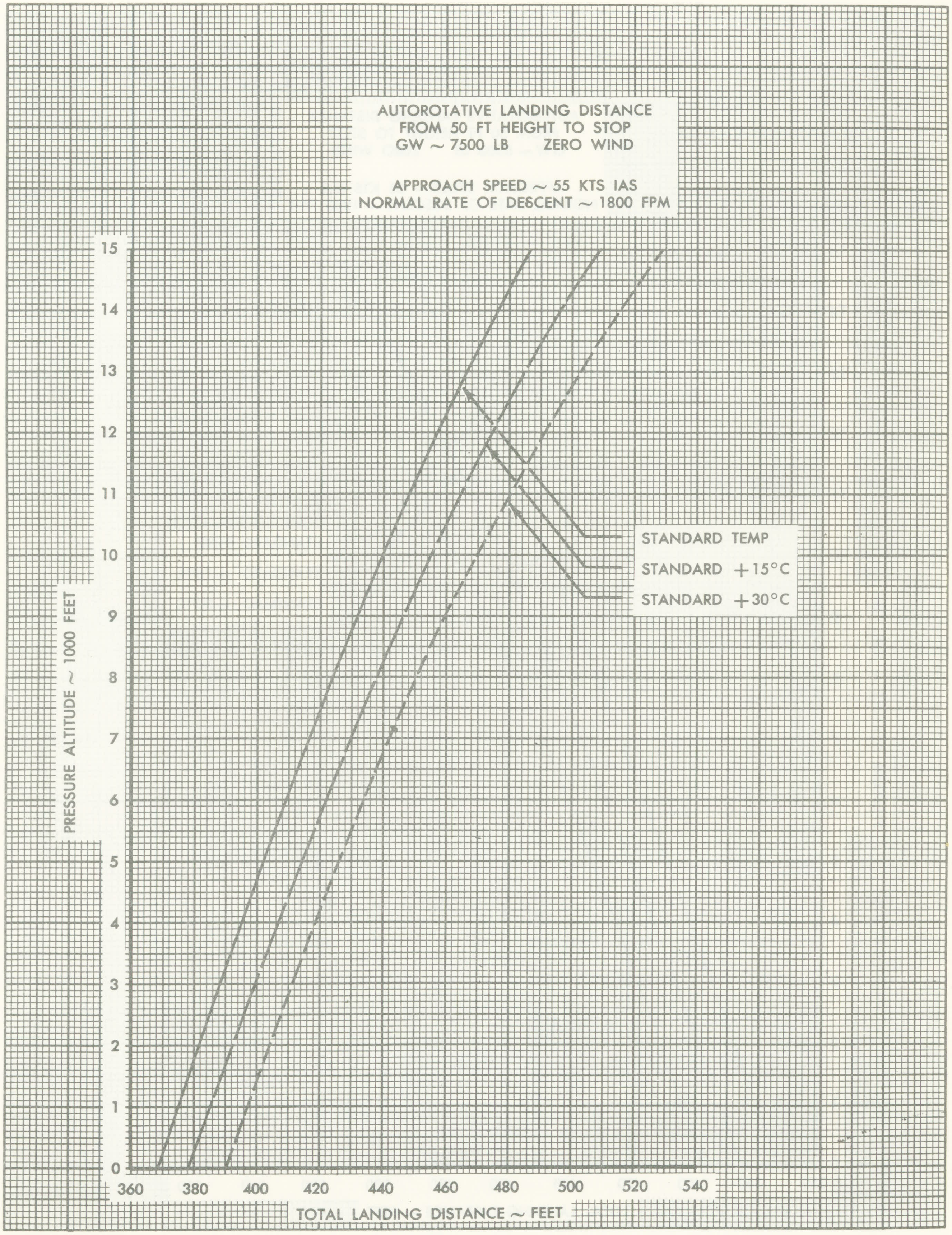

AUTOROTATIVE LANDING DISTANCE
FROM 50 FT HEIGHT TO STOP
GW ~ 7500 LB ZERO WIND
APPROACH SPEED ~ 55 KTS IAS
NORMAL RATE OF DESCENT ~ 1800 FPM
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FEET
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
360
380
400
420
440
460
480
500
520
540
TOTAL LANDING DISTANCE ~ FEET

Figure 16.

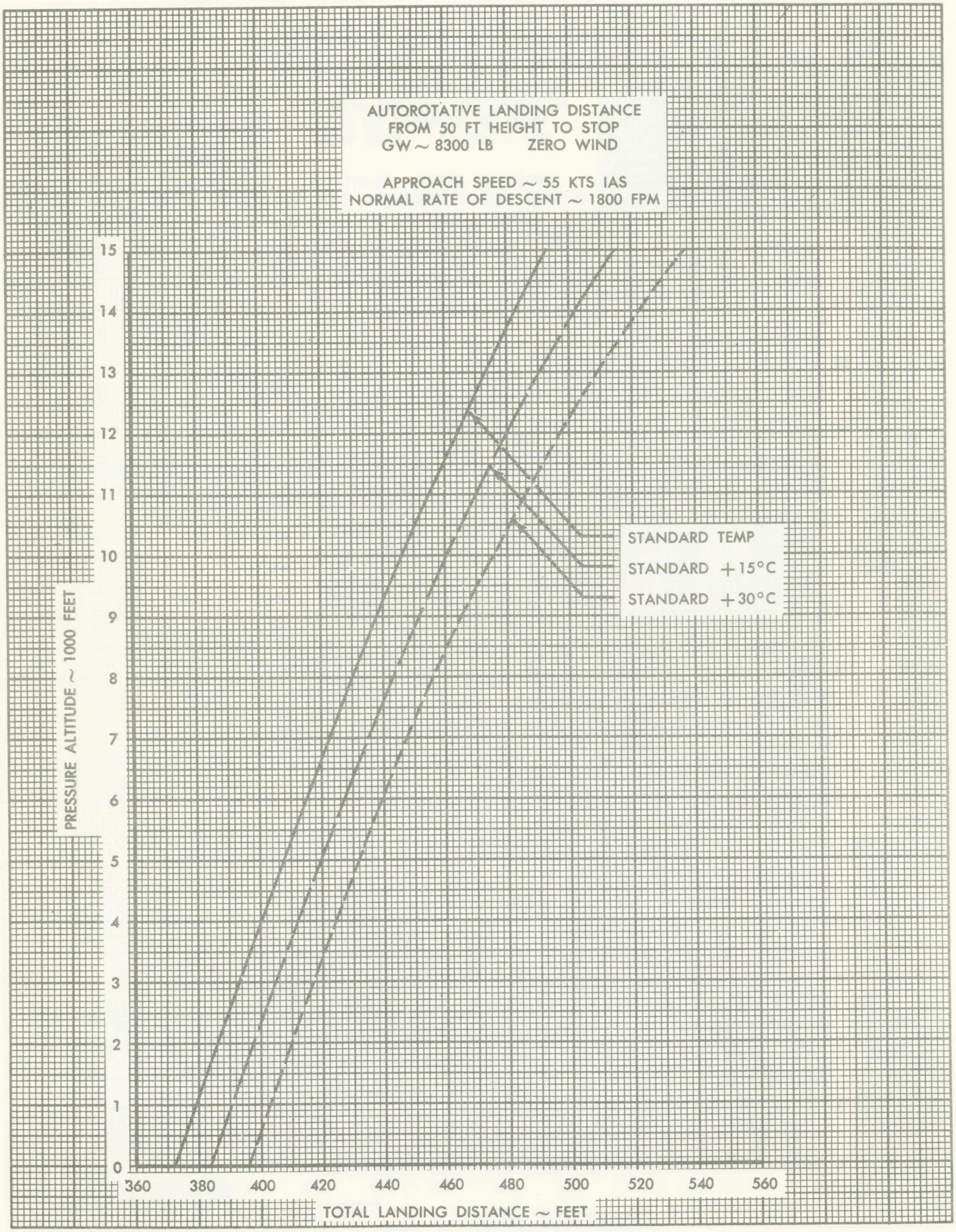

AUTOROTATIVE LANDING DISTANCE
FROM 50 FT HEIGHT TO STOP
GW ~ 8300 LB ZERO WIND
APPROACH SPEED ~ 55 KTS IAS
NORMAL RATE OF DESCENT ~ 1800 FPM
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FEET
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
360
380
400
420
440
460
480
500
520
540
560
TOTAL LANDING DISTANCE ~ FEET

Figure 17.

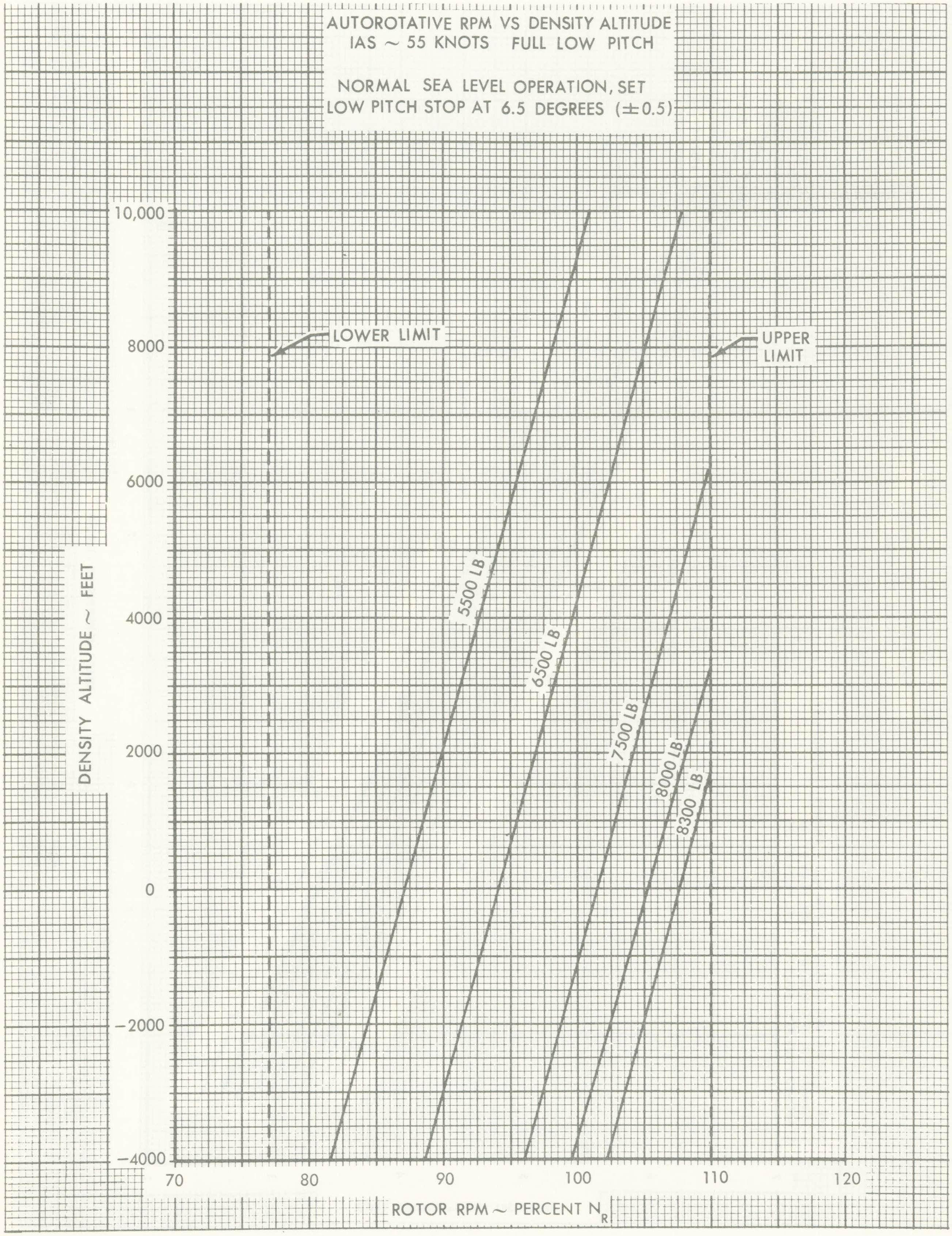

AUTOROTATIVE RPM VS DENSITY ALTITUDE
IAS ~ 55 KNOTS FULL LOW PITCH
NORMAL SEA LEVEL OPERATION, SET
LOW PITCH STOP AT 6.5 DEGREES (±0.5)
LOWER LIMIT
UPPER LIMIT
5500 LB
6500 LB
7500 LB
8000 LB
8300 LB
DENSITY ALTITUDE ~ FEET
10,000
8000
6000
4000
2000
0
−2000
−4000
70
80
90
100
110
120
ROTOR RPM ~ PERCENT N
R

Figure 18.

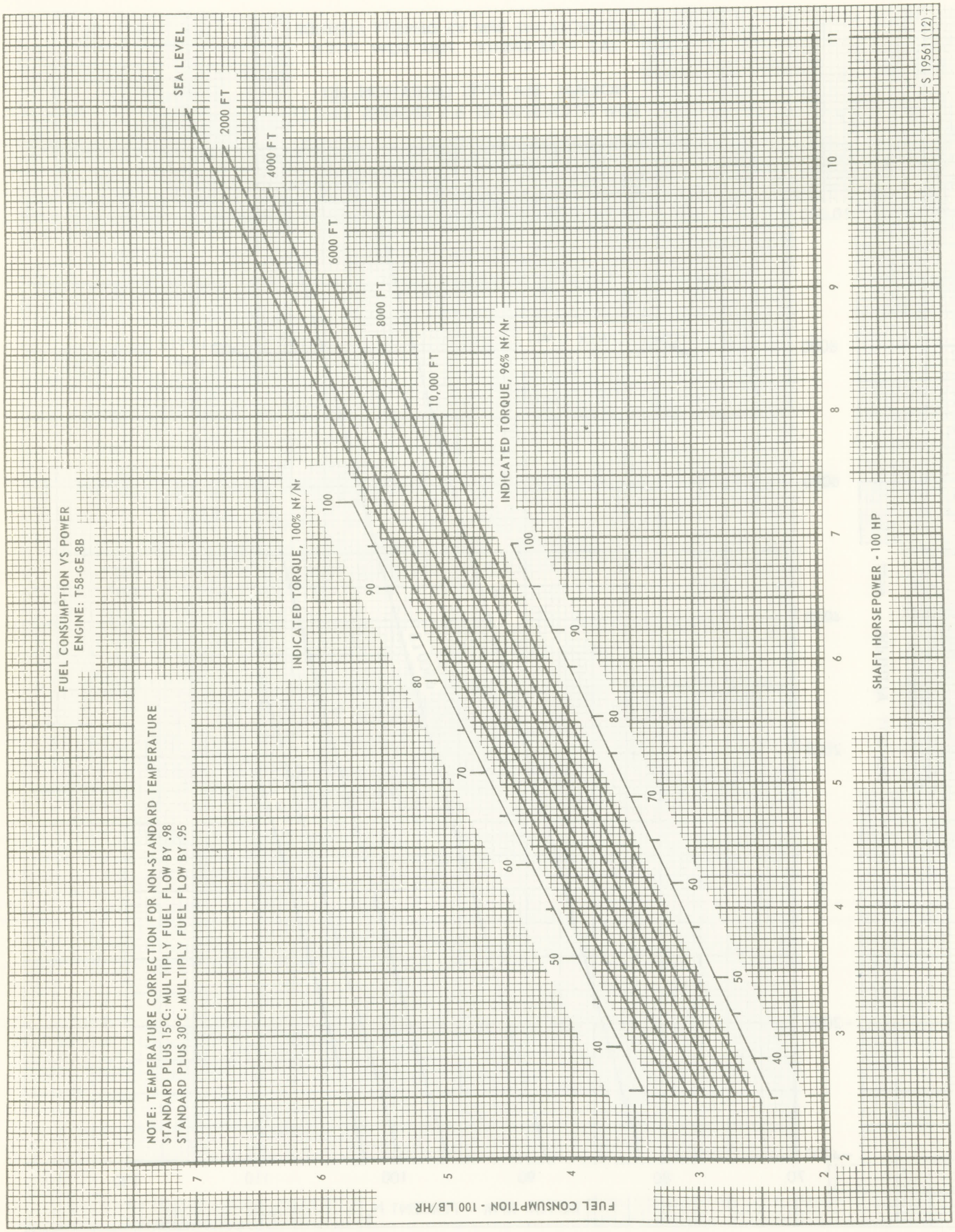

FUEL CONSUMPTION VS POWER
ENGINE: T58-GE-8B
NOTE: TEMPERATURE CORRECTION FOR NON-STANDARD TEMPERATURE
STANDARD PLUS 15°C: MULTIPLY FUEL FLOW BY .98
STANDARD PLUS 30°C: MULTIPLY FUEL FLOW BY .95
SEA LEVEL
2000 FT
4000 FT
6000 FT
8000 FT
10,000 FT
INDICATED TORQUE, 100% Nf/Nr
INDICATED TORQUE, 96% Nf/Nr
SHAFT HORSEPOWER - 100 HP
FUEL CONSUMPTION - 100 LB/HR
S 19561 (12)

Figure 19.

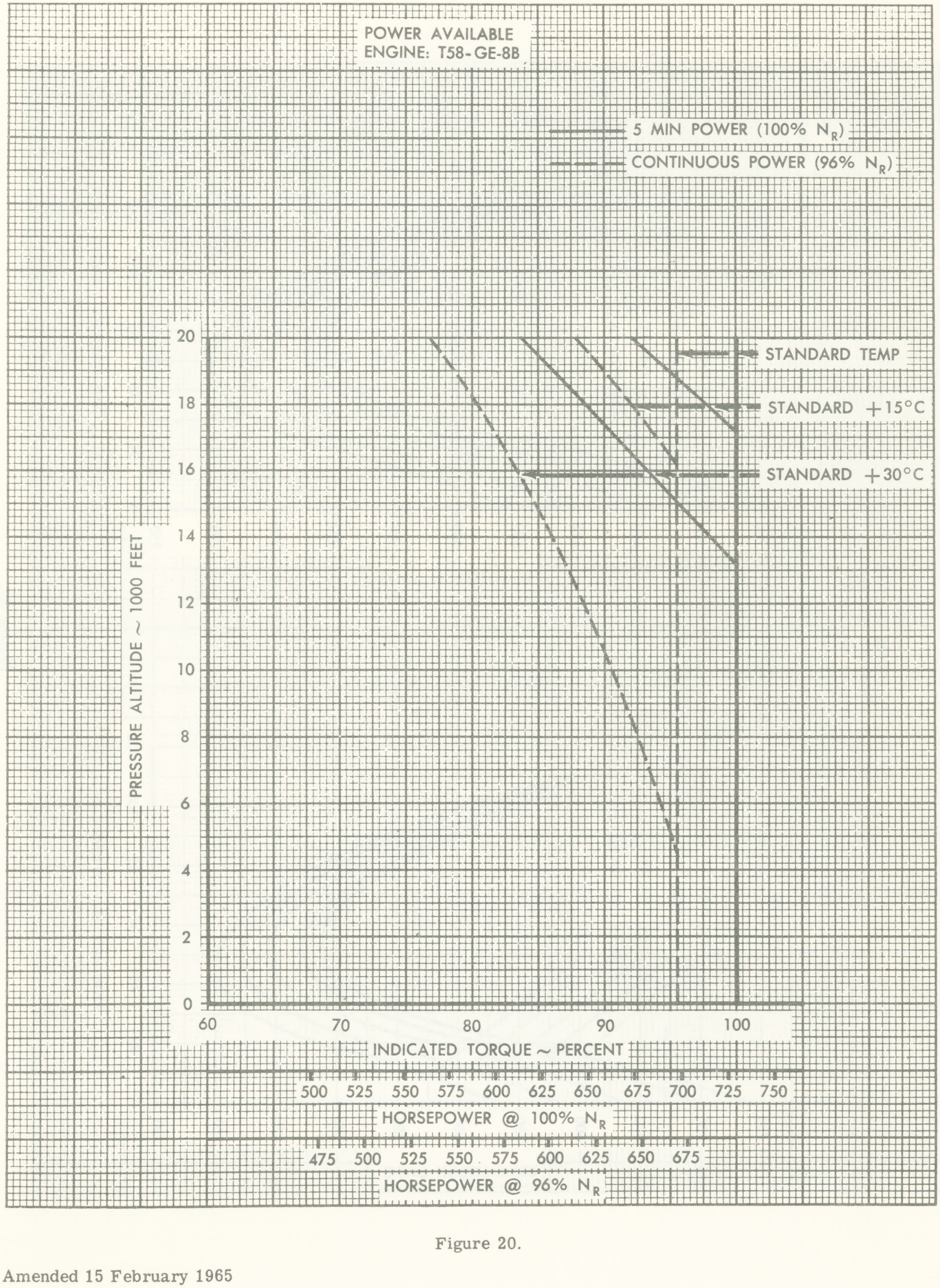

POWER AVAILABLE
ENGINE: T58-GE-8B
5 MIN POWER (100% N_R)
CONTINUOUS POWER (96% N_R)
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
20
60
70
80
90
100
INDICATED TORQUE ~ PERCENT
500 525 550 575 600 625 650 675 700 725 750
HORSEPOWER @ 100% N_R
475 500 525 550 575 600 625 650 675
HORSEPOWER @ 96% N_R

Figure 20.

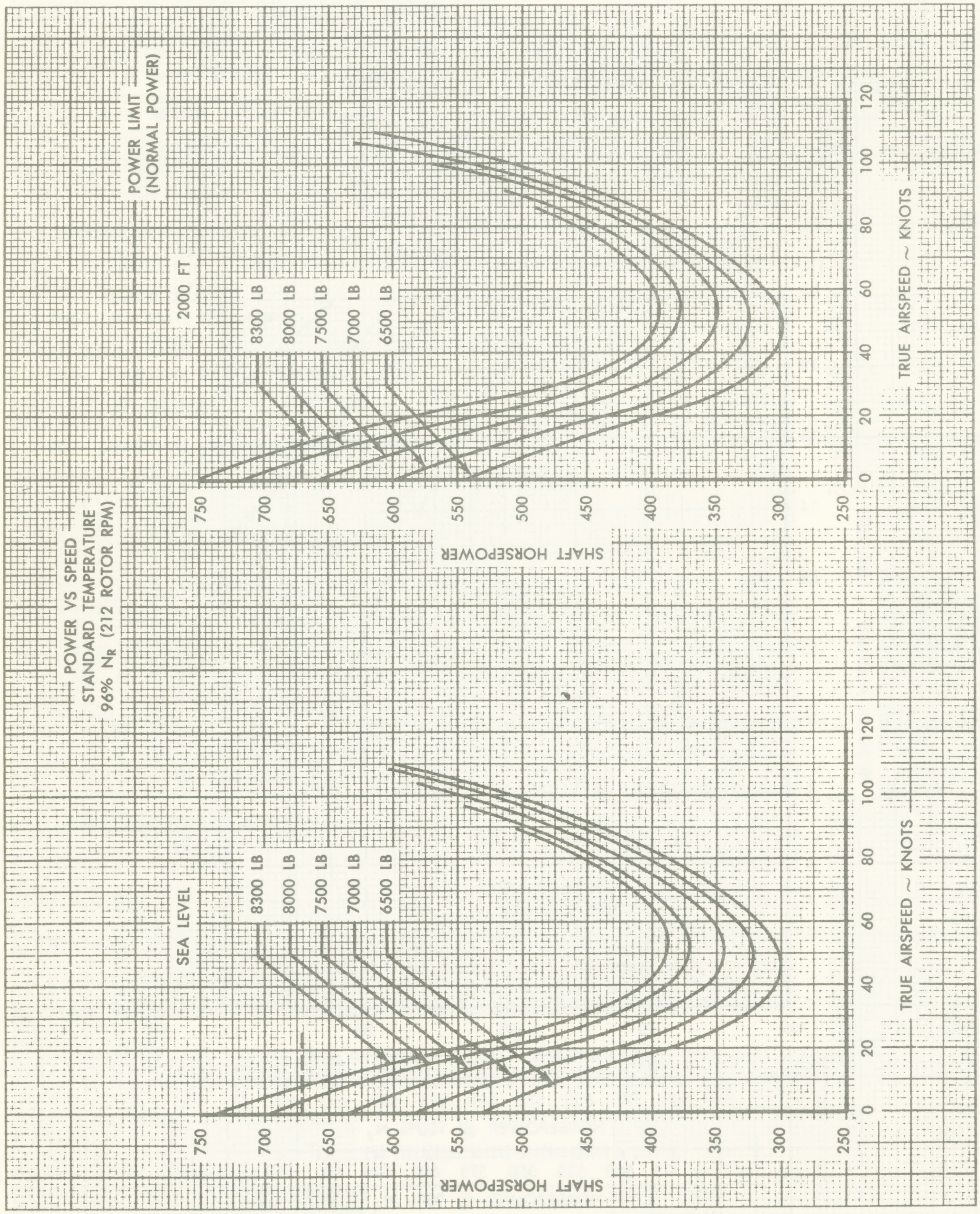

POWER VS SPEED
STANDARD TEMPERATURE
96% N_R (212 ROTOR RPM)
SEA LEVEL
2000 FT
POWER LIMIT
(NORMAL POWER)
8300 LB
8000 LB
7500 LB
7000 LB
6500 LB
SHAFT HORSEPOWER
750
700
650
600
550
500
450
400
350
300
250
TRUE AIRSPEED ~ KNOTS
0
20
40
60
80
100
120

Figure 21.

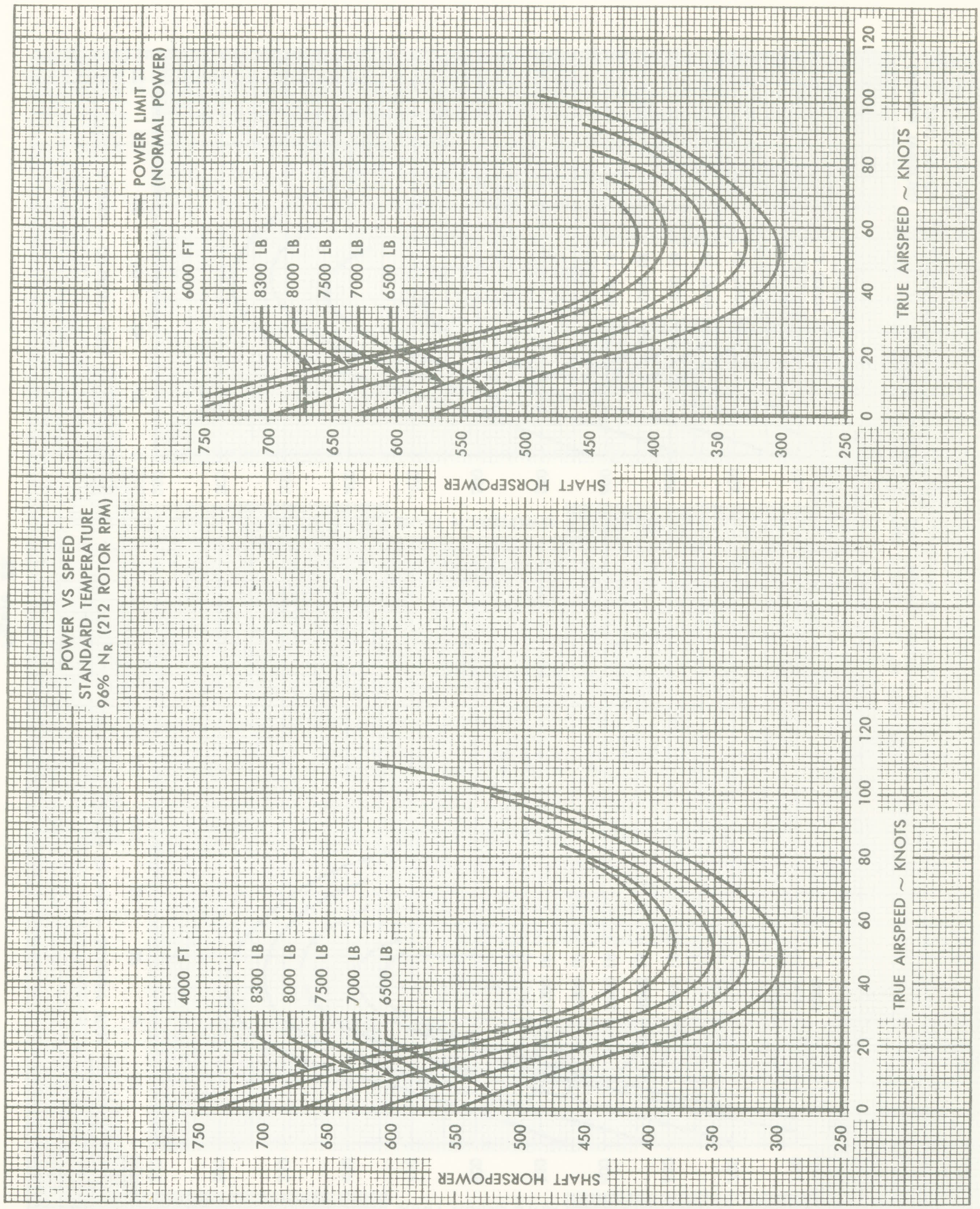

POWER VS SPEED
STANDARD TEMPERATURE
96% N_R (212 ROTOR RPM)
POWER LIMIT
(NORMAL POWER)
6000 FT
8300 LB
8000 LB
7500 LB
7000 LB
6500 LB
4000 FT
8300 LB
8000 LB
7500 LB
7000 LB
6500 LB
SHAFT HORSEPOWER
750
700
650
600
550
500
450
400
350
300
250
TRUE AIRSPEED ~ KNOTS
0
20
40
60
80
100
120

Figure 22.

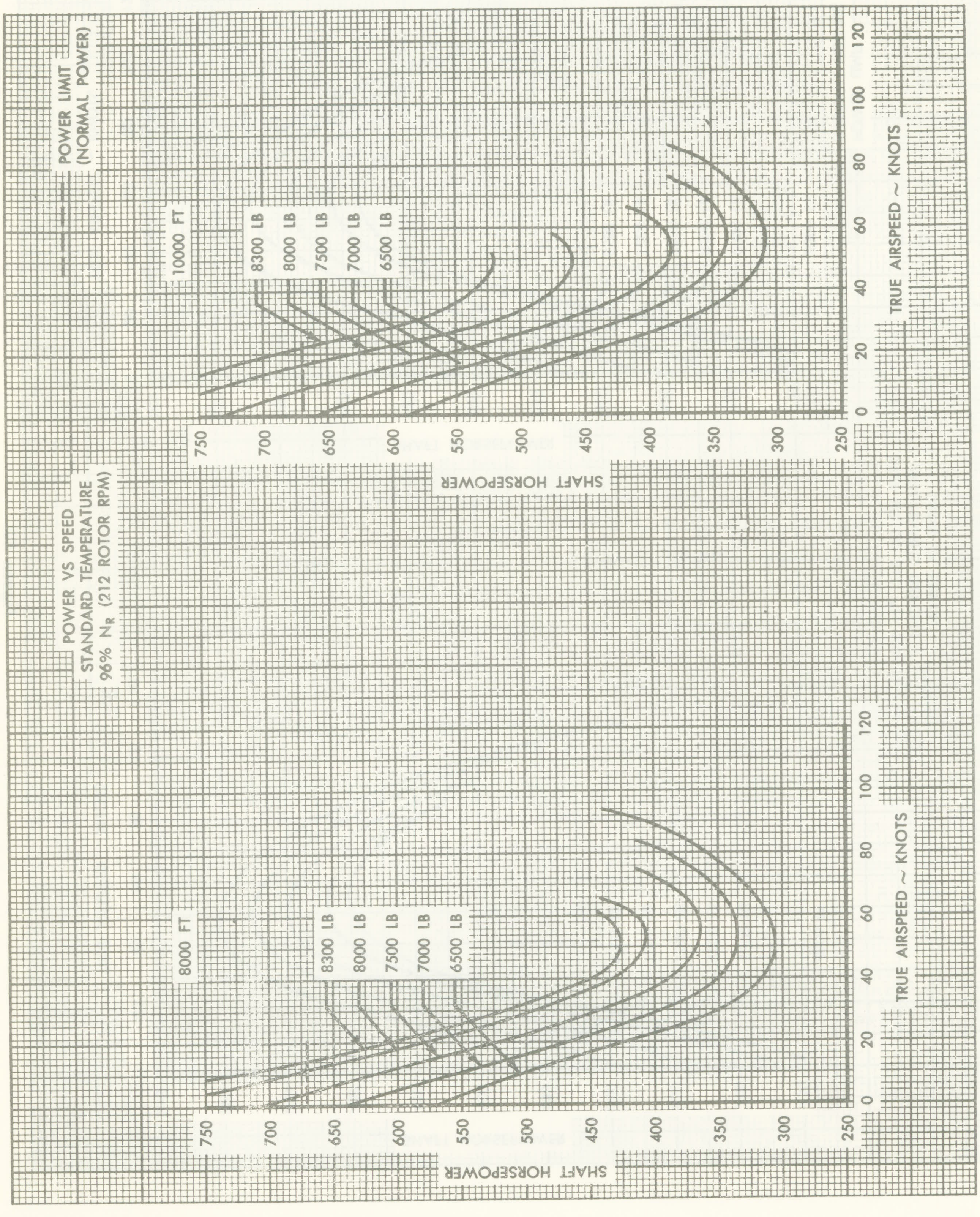

POWER LIMIT
(NORMAL POWER)
POWER VS SPEED
STANDARD TEMPERATURE
96% N_R (212 ROTOR RPM)
10000 FT
8300 LB
8000 LB
7500 LB
7000 LB
6500 LB
SHAFT HORSEPOWER
750 700 650 600 550 500 450 400 350 300 250
TRUE AIRSPEED ~ KNOTS
0 20 40 60 80 100 120
8000 FT
8300 LB
8000 LB
7500 LB
7000 LB
6500 LB
SHAFT HORSEPOWER
750 700 650 600 550 500 450 400 350 300 250
TRUE AIRSPEED ~ KNOTS
0 20 40 60 80 100 120

Figure 23.

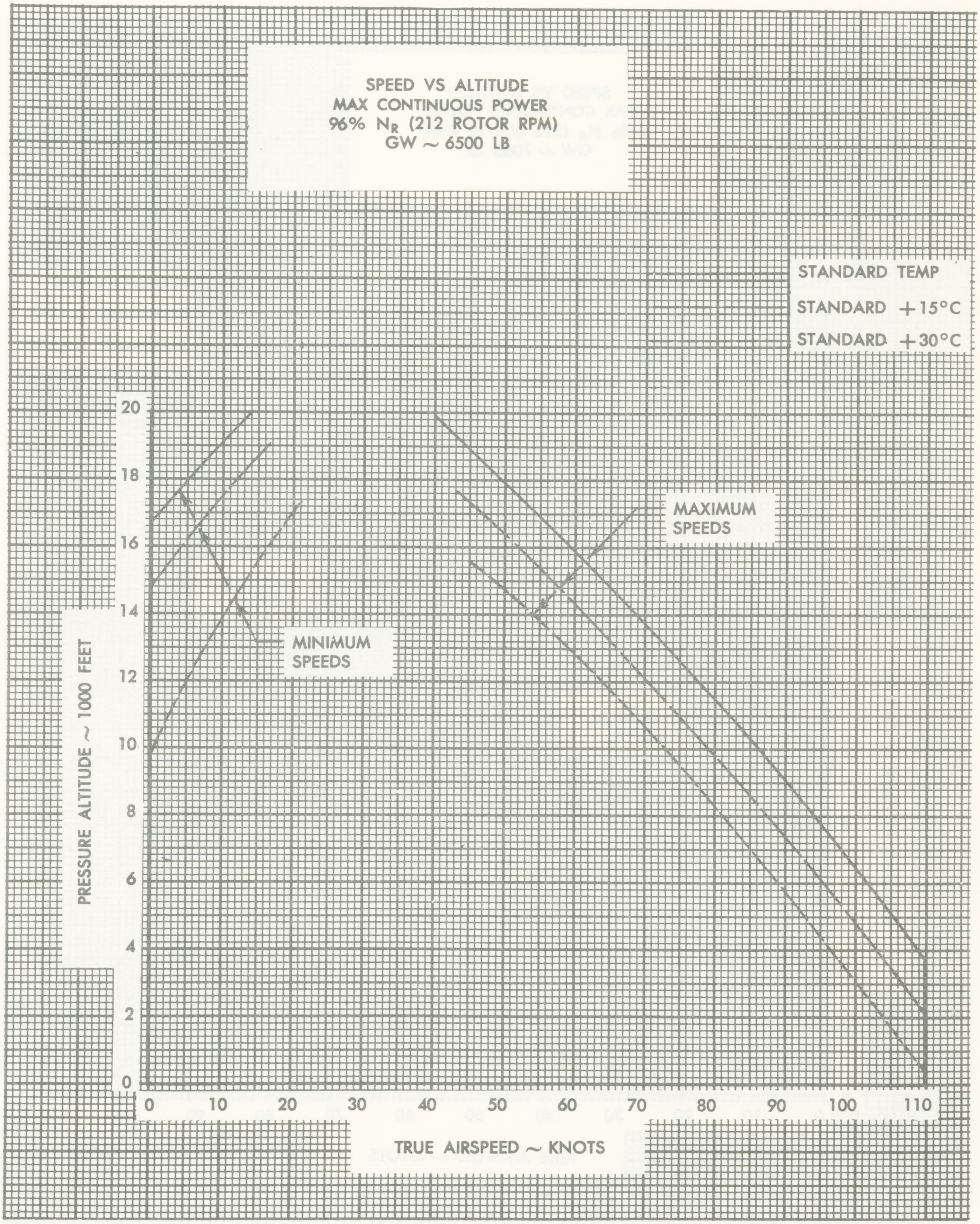

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 6500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
20
TRUE AIRSPEED ~ KNOTS
0
10
20
30
40
50
60
70
80
90
100
110

Figure 24.

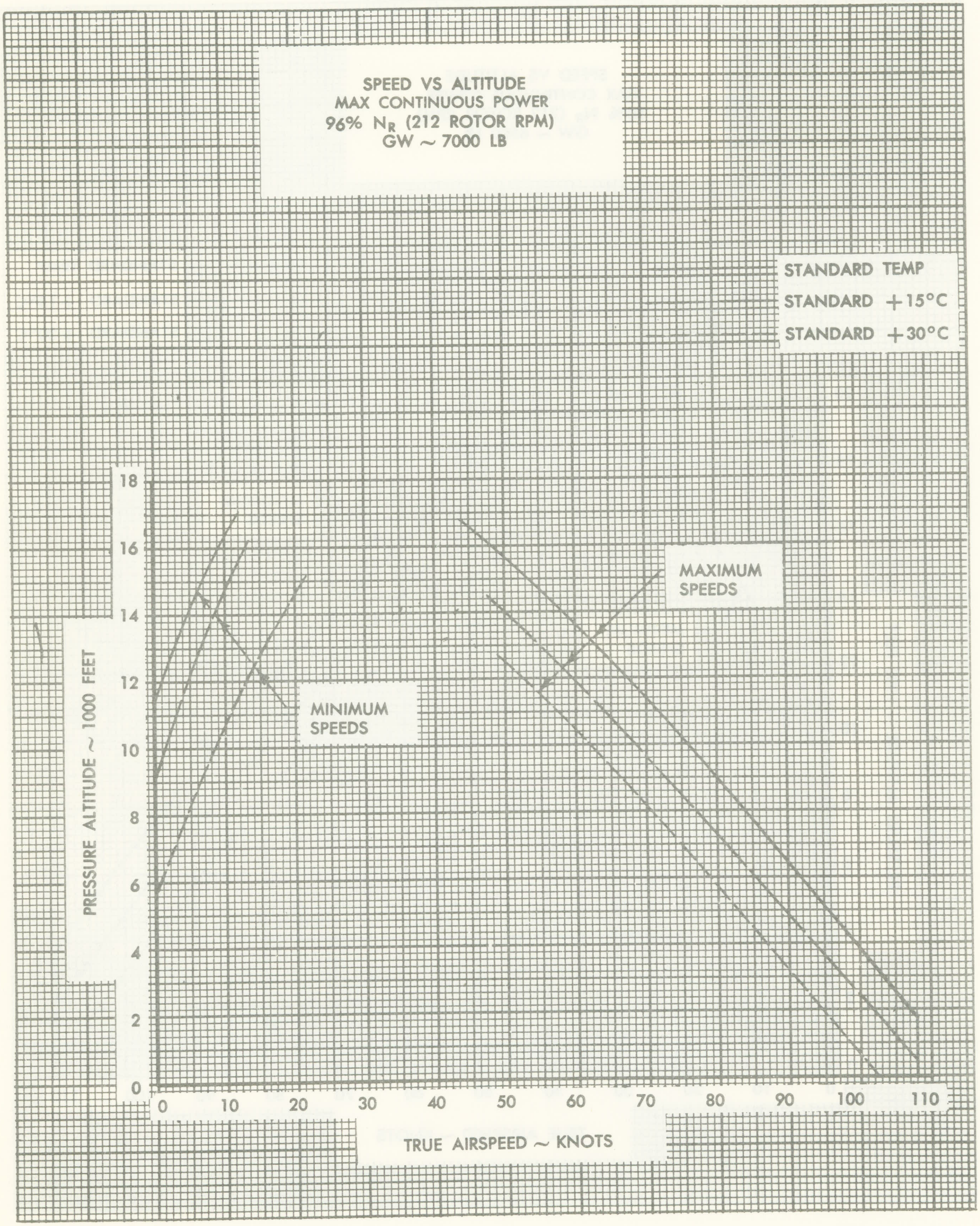

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 7000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
0
10
20
30
40
50
60
70
80
90
100
110
TRUE AIRSPEED ~ KNOTS

Figure 25.

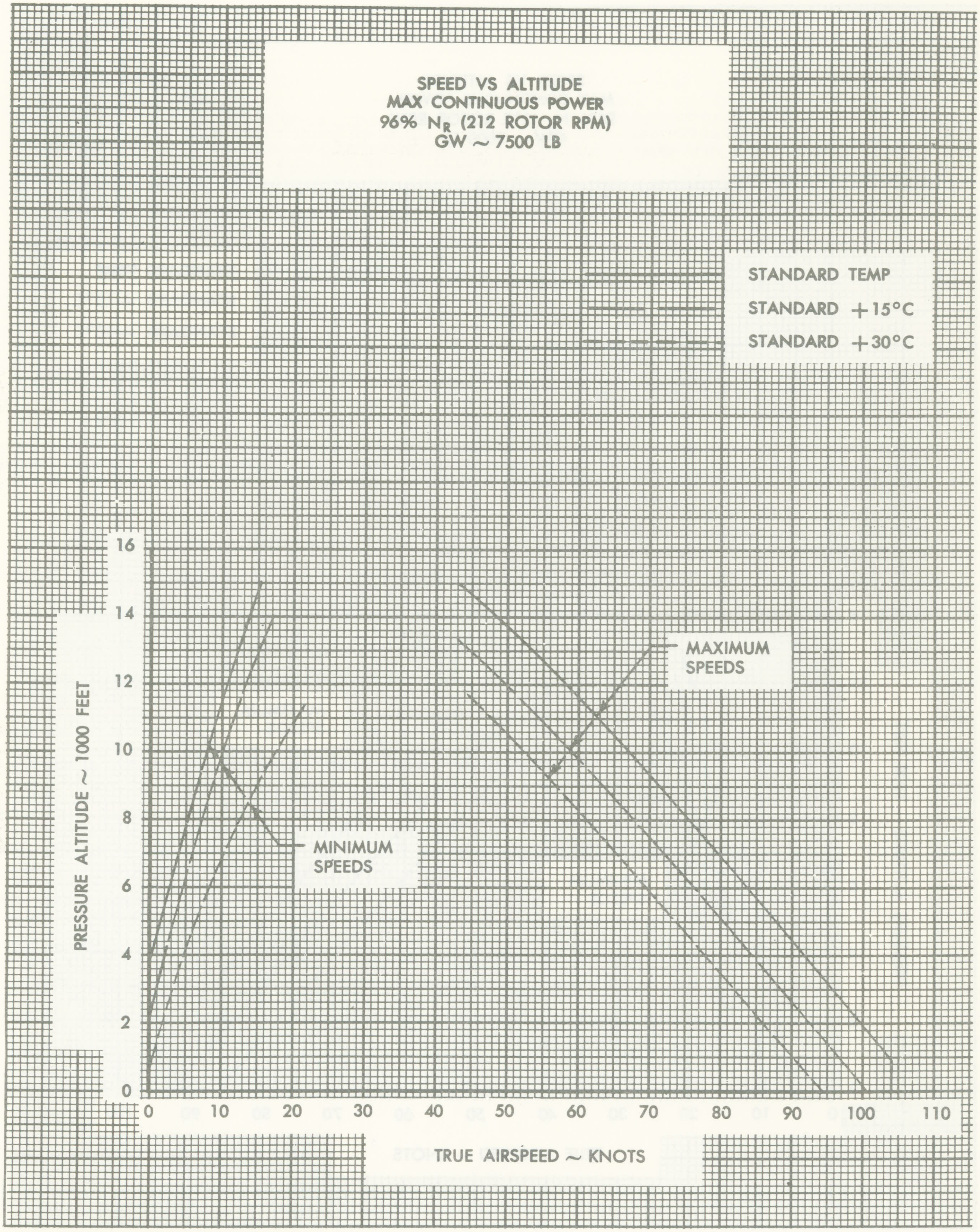

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 7500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60
70
80
90
100
110
TRUE AIRSPEED ~ KNOTS

Figure 26.

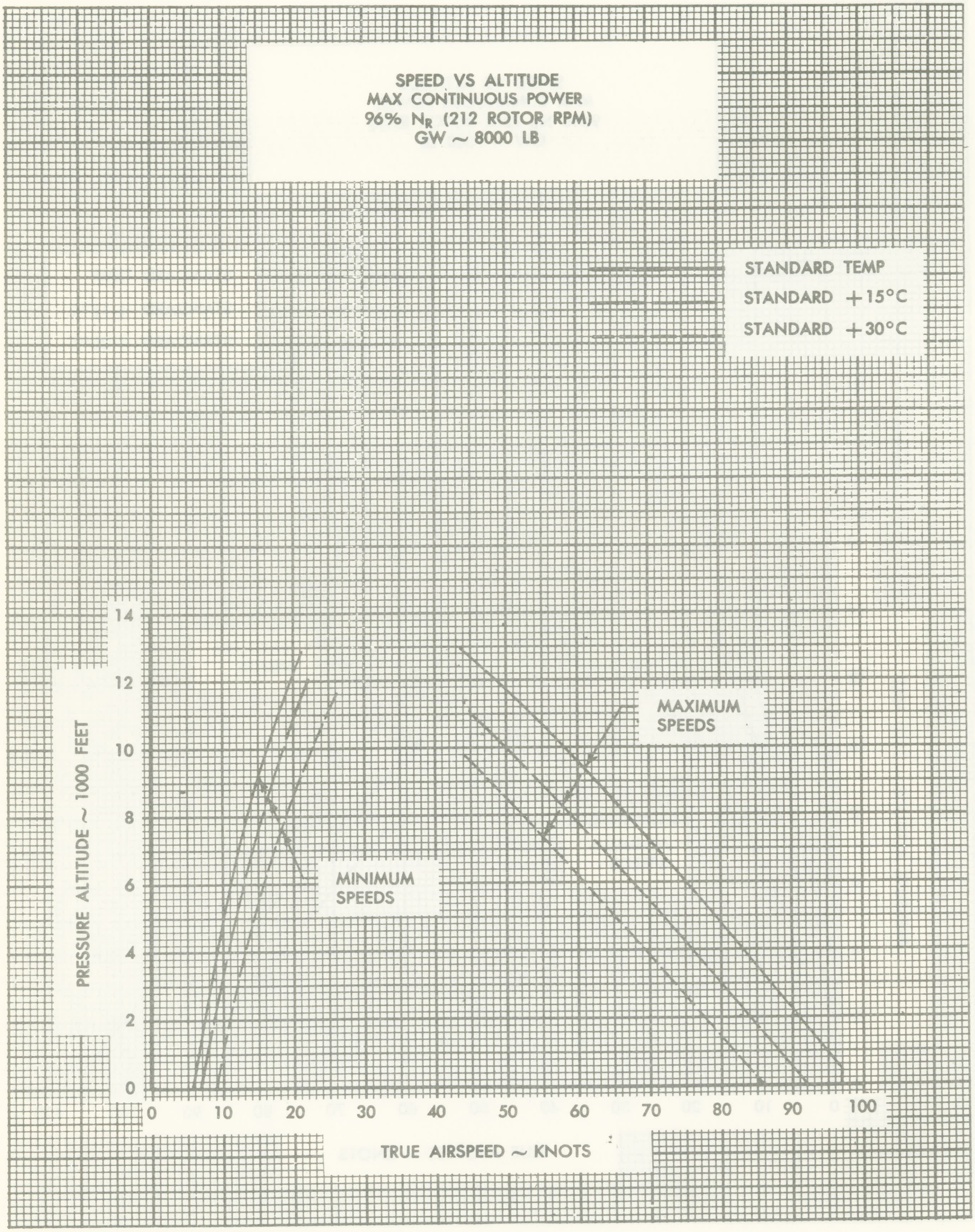

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 8000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
TRUE AIRSPEED ~ KNOTS

Figure 27.

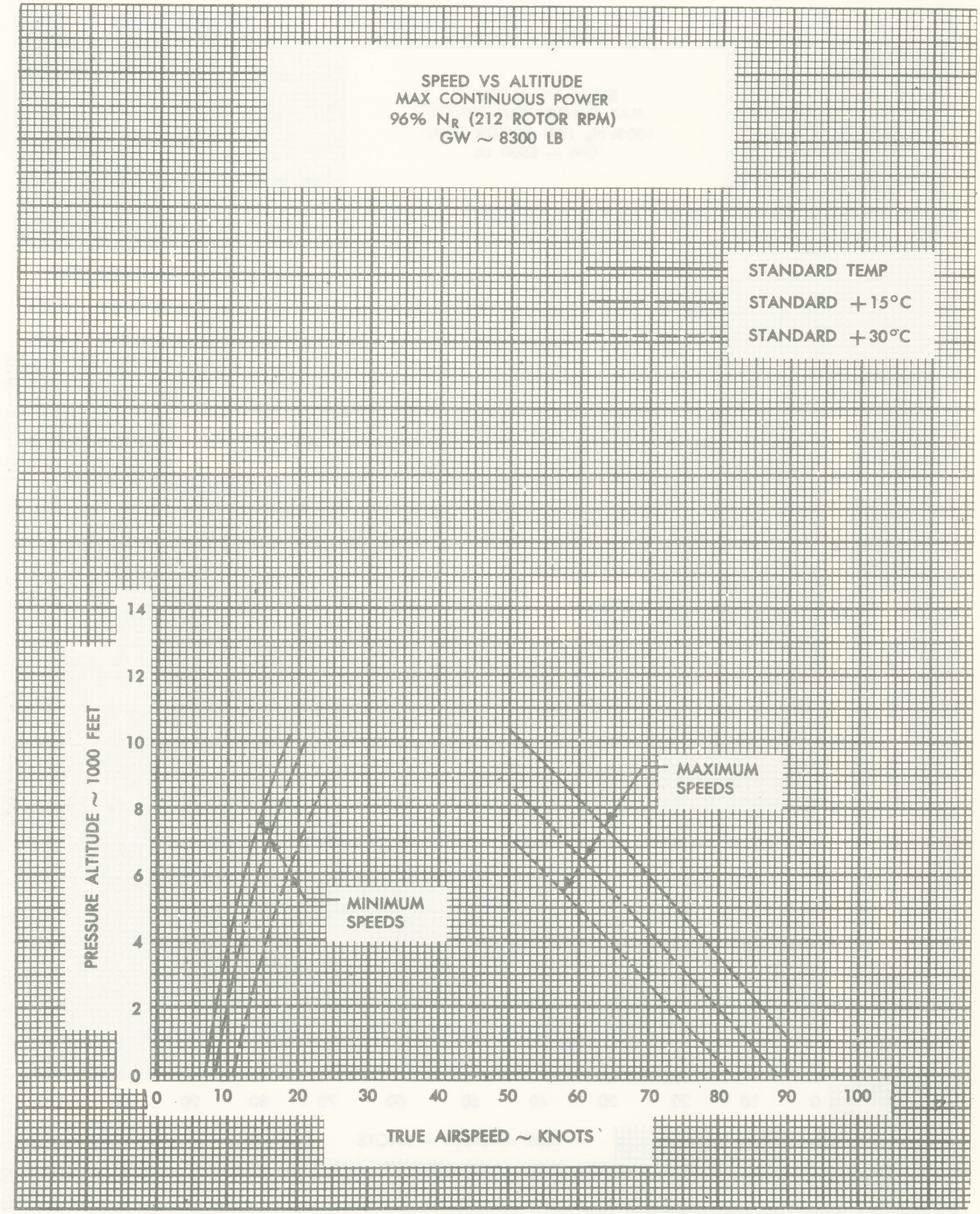

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
96% N_R (212 ROTOR RPM)
GW ~ 8300 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
80
90
100
TRUE AIRSPEED ~ KNOTS

Figure 28.

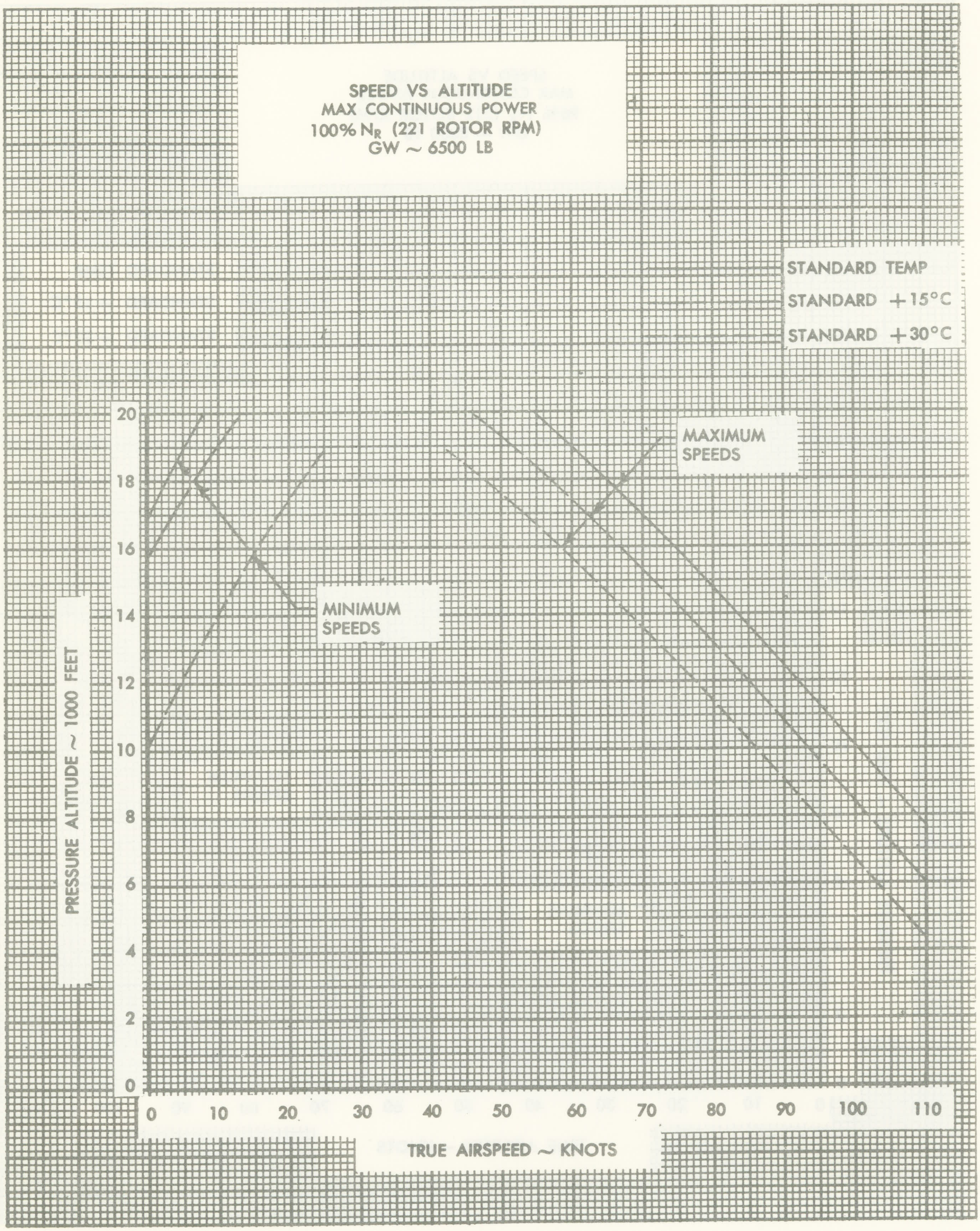

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
100% N_R (221 ROTOR RPM)
GW ~ 6500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
20
TRUE AIRSPEED ~ KNOTS
0
10
20
30
40
50
60
70
80
90
100
110

Figure 29.

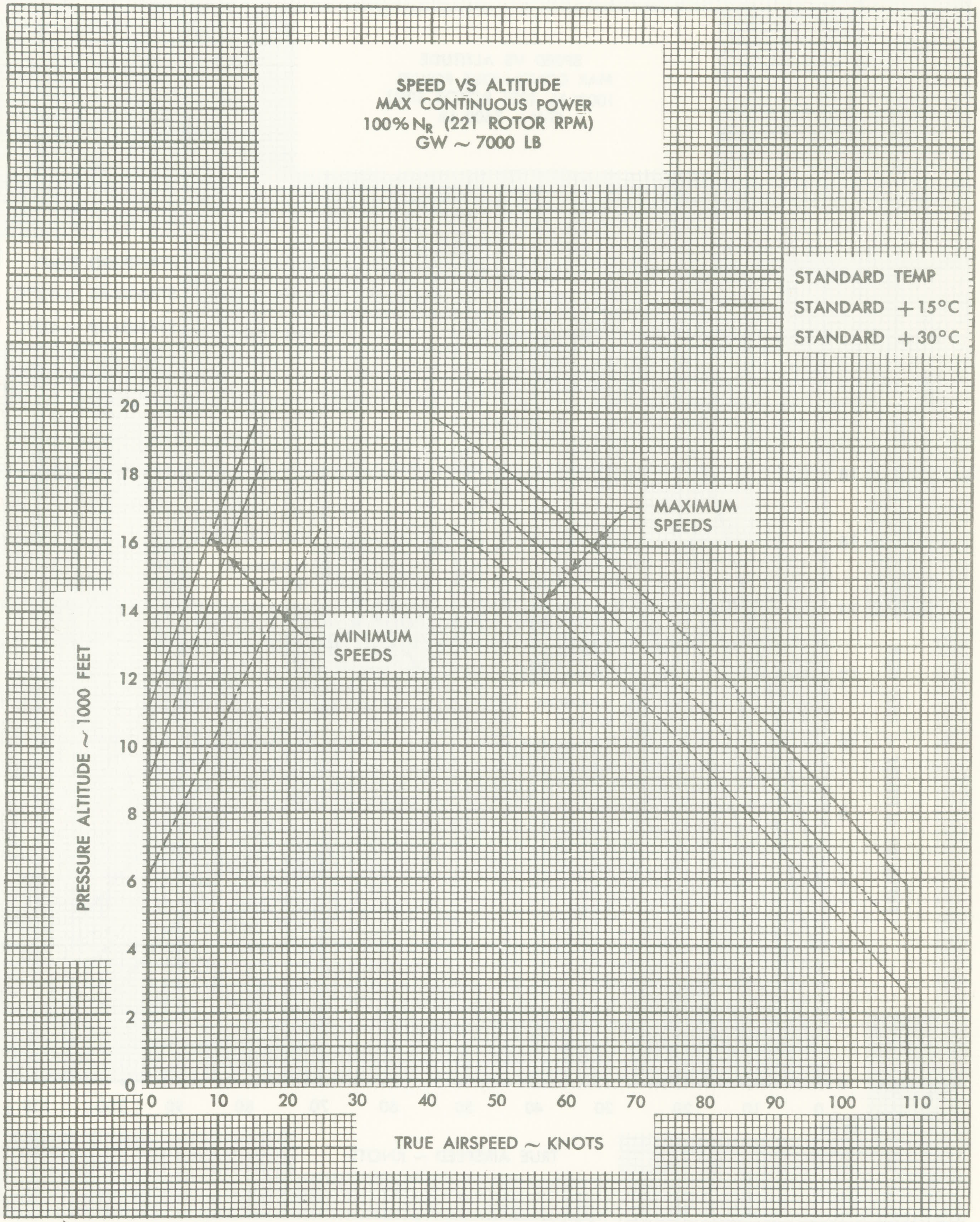

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
100% N_R (221 ROTOR RPM)
GW ~ 7000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
20
0 10 20 30 40 50 60 70 80 90 100 110
TRUE AIRSPEED ~ KNOTS

Figure 30.

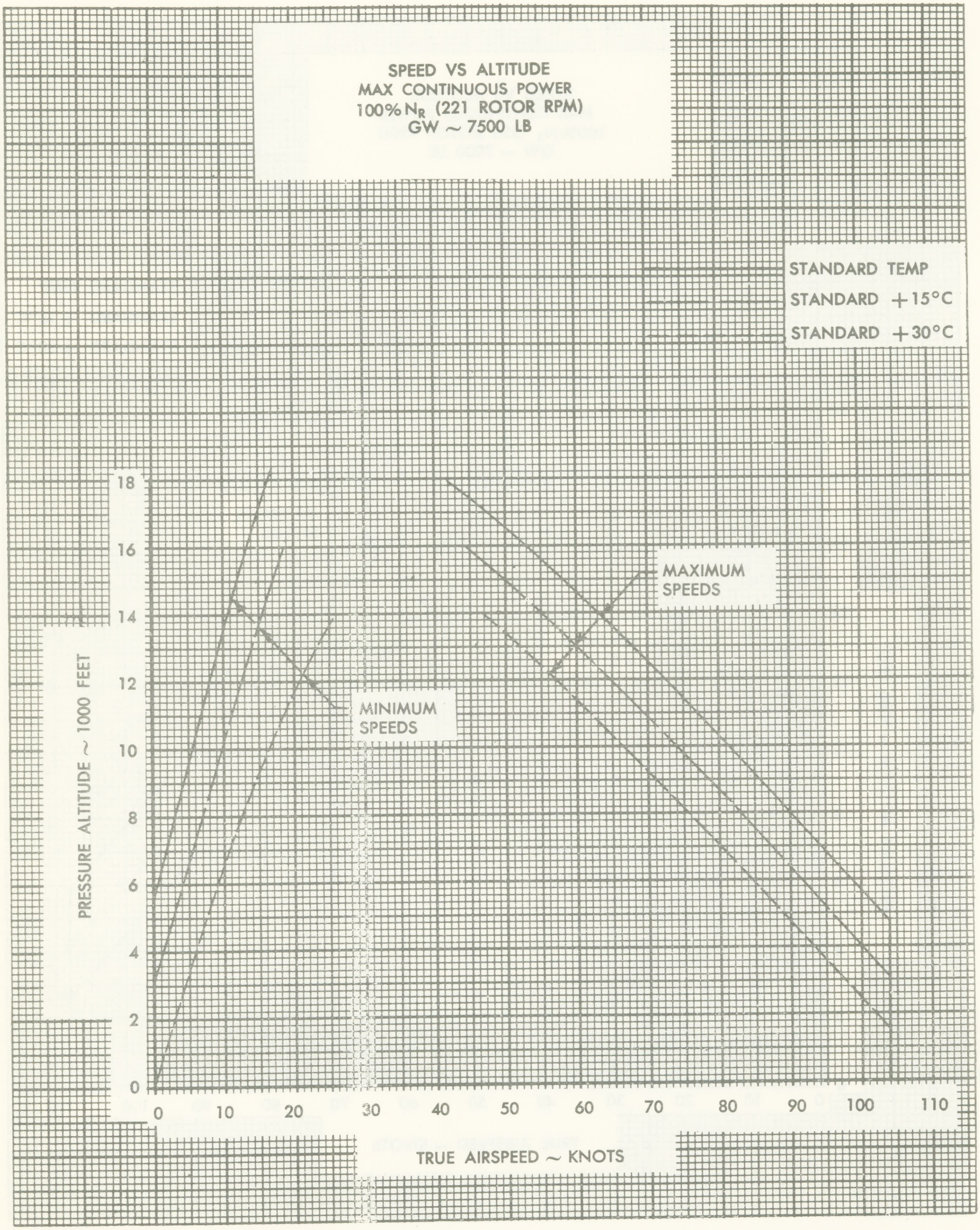

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
100% N_R (221 ROTOR RPM)
GW ~ 7500 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
18
TRUE AIRSPEED ~ KNOTS
0
10
20
30
40
50
60
70
80
90
100
110

Figure 31.

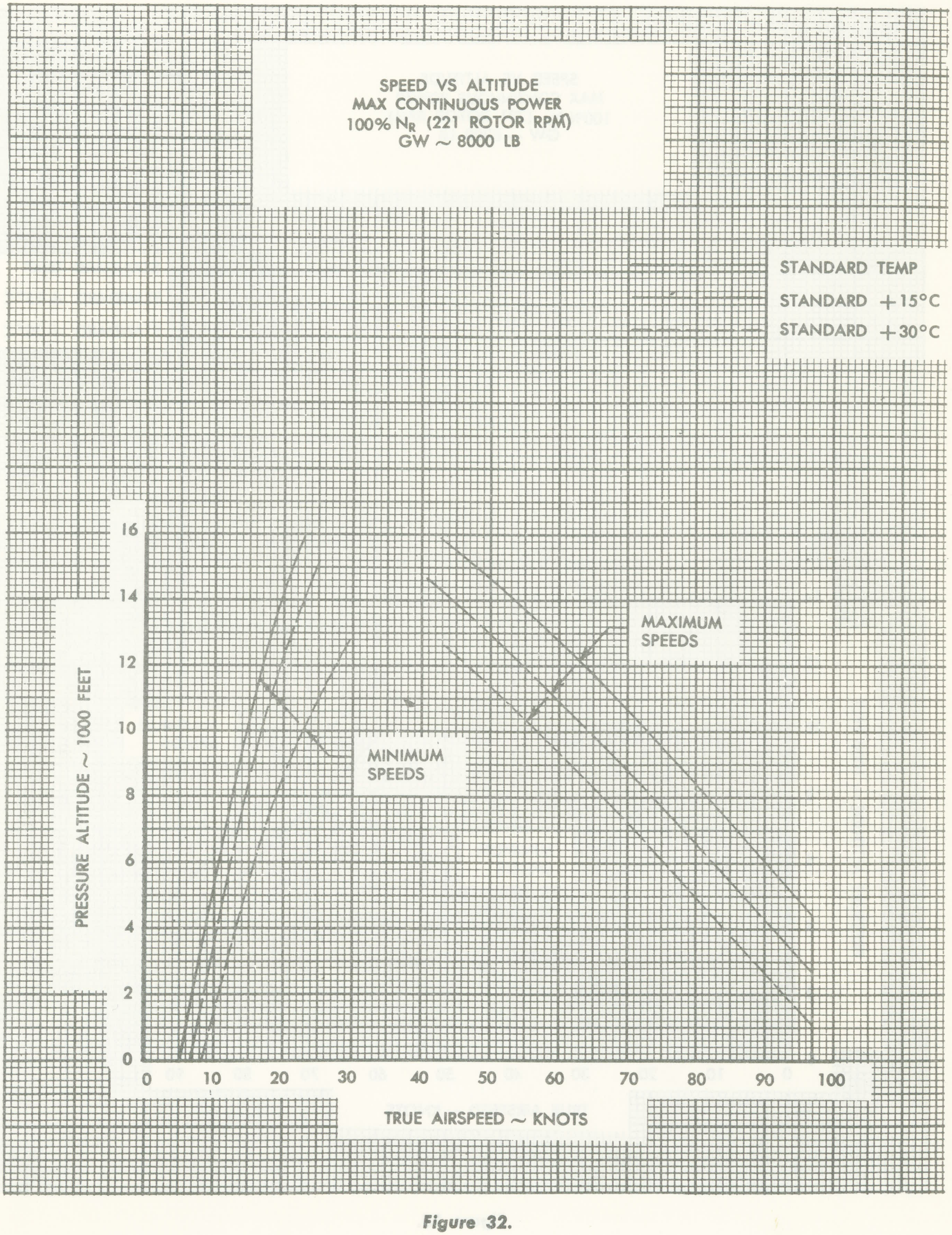

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
100% N_R (221 ROTOR RPM)
GW ~ 8000 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60
70
80
90
100
TRUE AIRSPEED ~ KNOTS

Figure 32.

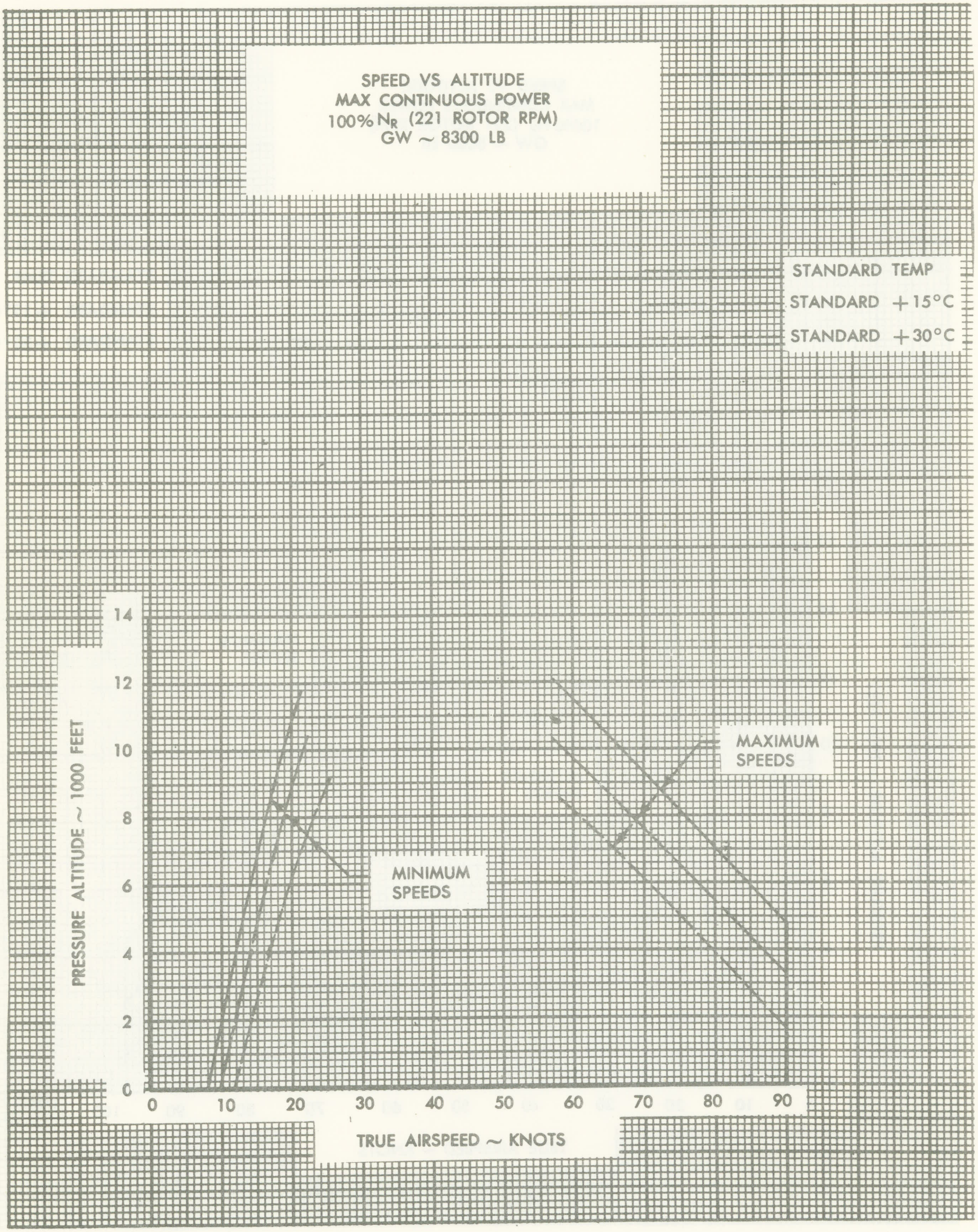

SPEED VS ALTITUDE
MAX CONTINUOUS POWER
100% N_R (221 ROTOR RPM)
GW ~ 8300 LB
STANDARD TEMP
STANDARD +15°C
STANDARD +30°C
MAXIMUM SPEEDS
MINIMUM SPEEDS
PRESSURE ALTITUDE ~ 1000 FEET
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
TRUE AIRSPEED ~ KNOTS

Figure 33.

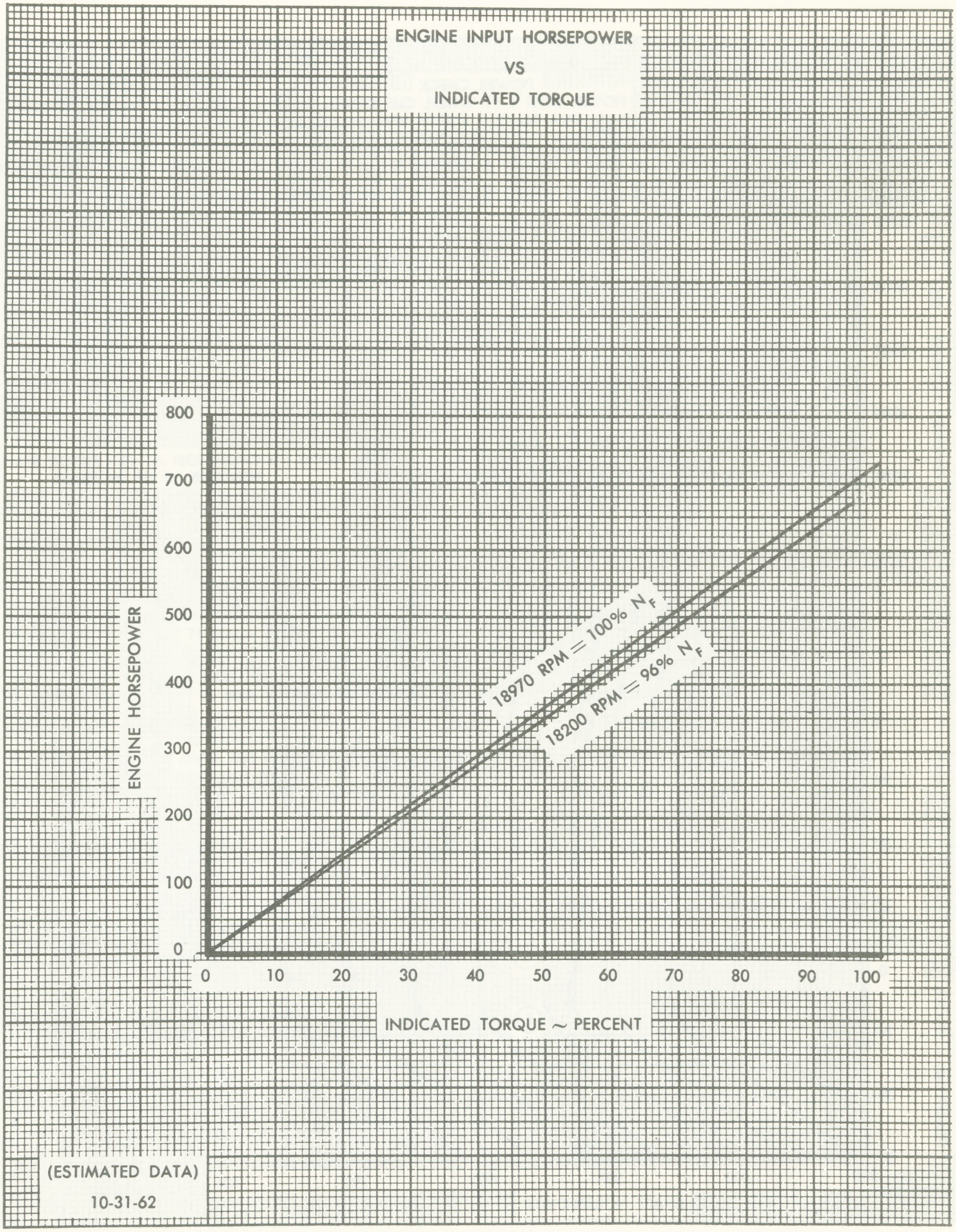

ENGINE INPUT HORSEPOWER
VS
INDICATED TORQUE
ENGINE HORSEPOWER
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
INDICATED TORQUE ~ PERCENT
18970 RPM = 100% N_F
18200 RPM = 96% N_F
(ESTIMATED DATA)
10-31-62

Figure 34.

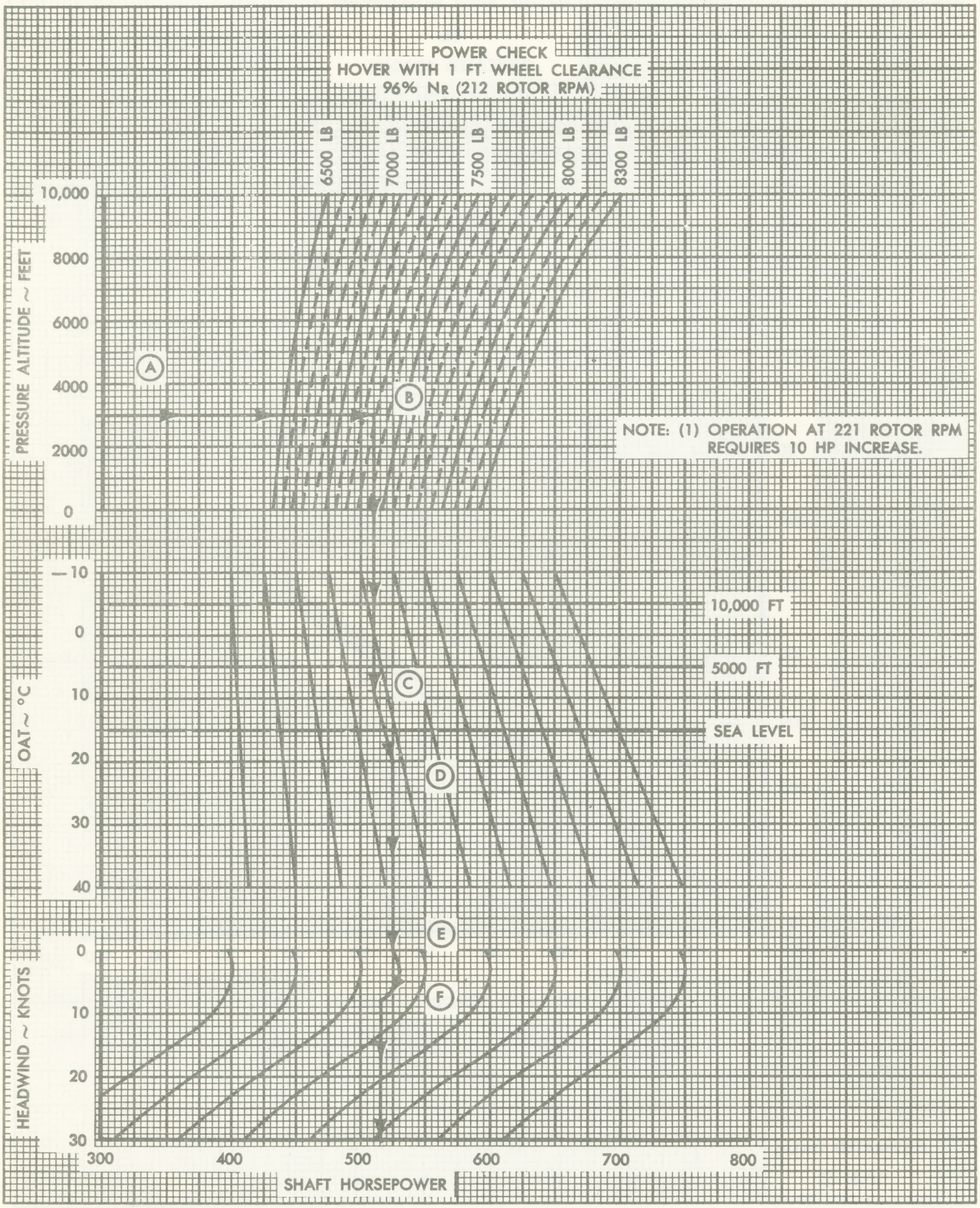

POWER CHECK
HOVER WITH 1 FT WHEEL CLEARANCE
96% NR (212 ROTOR RPM)
6500 LB
7000 LB
7500 LB
8000 LB
8300 LB
10,000
8000
6000
4000
2000
0
PRESSURE ALTITUDE ~ FEET
A
B
C
D
E
F
NOTE: (1) OPERATION AT 221 ROTOR RPM REQUIRES 10 HP INCREASE.
—10
0
10
20
30
40
OAT ~ °C
10,000 FT
5000 FT
SEA LEVEL
0
10
20
30
HEADWIND ~ KNOTS
300
400
500
600
700
800
SHAFT HORSEPOWER

Figure 35.

USE OF POWER CHECK CHART

Problem: Determine the power required to hover at 3000 feet pressure altitude, 20°C OAT., 7300 pounds gross weight, and 8 knot headwind, at a one (1) foot wheel clearance and 96% (212 rpm) rotor speed.

Solution:

1. Enter the chart at 3000 feet, (A).
2. From (A), proceed horizontally to 7300 pounds, (B).
3. From (B), move vertically down to 3000 feet, (C).
4. From (C), follow the temperature influence lines to 20°C (D).
5. From point (D), proceed vertically down to zero headwind, (E).
6. From (E), follow the wind influence curve to 8 knots, (F).
7. From (F), move vertically down to read 518 SHP at (G). To determine corresponding torque, refer to Figure 34, Engine Input Horsepower vs Indicated Torque, using the 96% N_f scale.

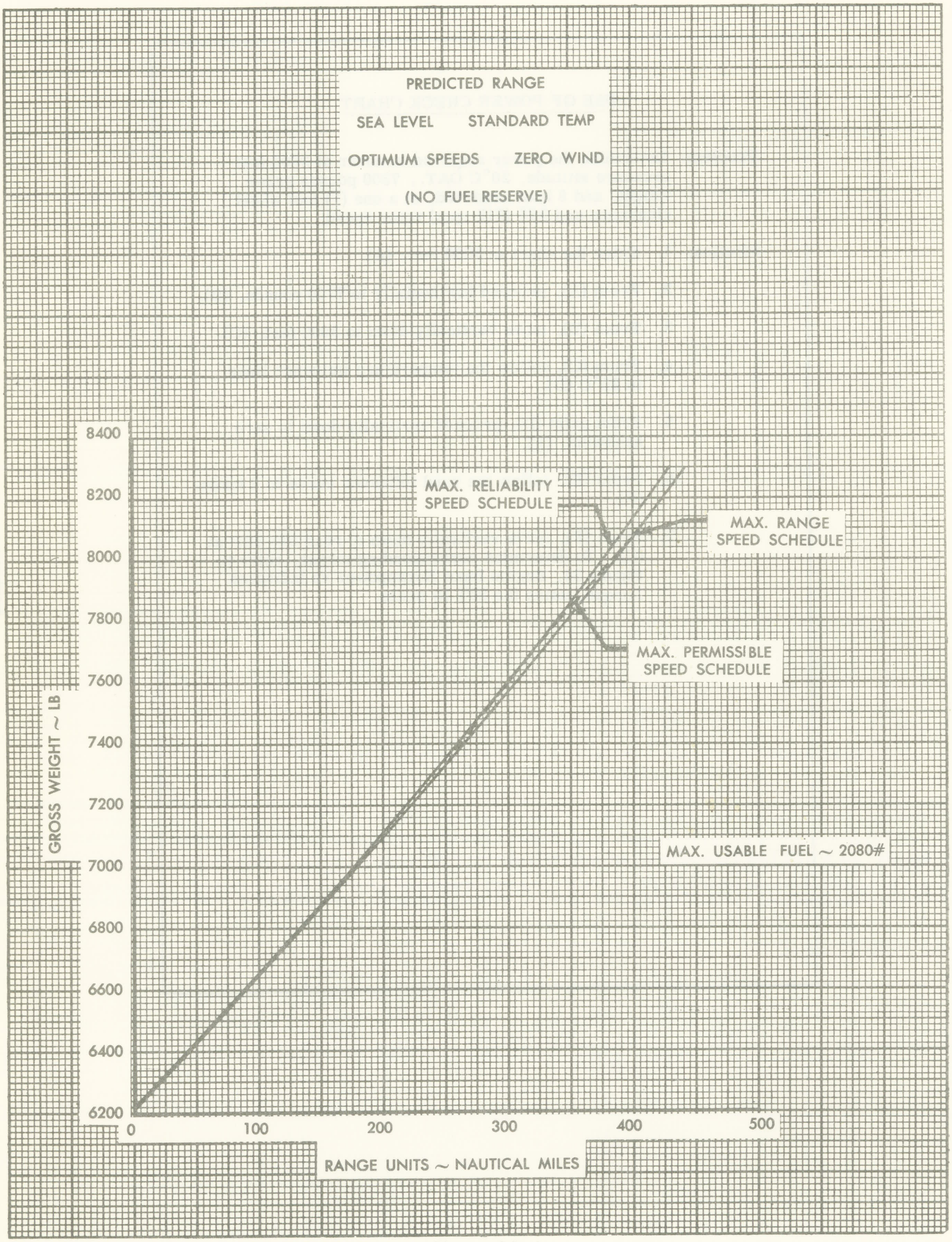

PREDICTED RANGE
SEA LEVEL STANDARD TEMP
OPTIMUM SPEEDS ZERO WIND
(NO FUEL RESERVE)
MAX. RELIABILITY SPEED SCHEDULE
MAX. RANGE SPEED SCHEDULE
MAX. PERMISSIBLE SPEED SCHEDULE
MAX. USABLE FUEL ~ 2080#
GROSS WEIGHT ~ LB
8400
8200
8000
7800
7600
7400
7200
7000
6800
6600
6400
6200
0
100
200
300
400
500
RANGE UNITS ~ NAUTICAL MILES

Figure 36.

RANGE CHARTS

The Range Charts graphically illustrate the cruise performance of the helicopter. The charts present specific range (nautical miles per pound of fuel), approximate torque required and, if desired, fuel flow in pounds per hour. Maximum range and maximum airspeeds are also depicted. Maximum component life airspeeds as stated in Part II (Standardization Manual) should be used when maximum range is not required.

EXAMPLE PROBLEM FOR RANGE CHARTS. (See Figure 36C).

Given:

Gross Weight	8000 lbs
Temperature	Standard
Pressure altitude	2000 feet and flight altitude
Fuel quantity	1000 lbs available for cruise

Determine:

Maximum range.

Solution:

This sample problem is based upon the average gross weight for cruise. 8000 lbs - (1000 ÷ 2) = 7500 lbs. Average gross weight for cruise.

1. Determine maximum specific range by referring to specific range section of chart. Locate curve for average gross weight for cruise (7500 lbs). Follow gross weight curve to the desired airspeed (V max range), point A. Move horizontally to the left and read specific range, .215 nautical miles per pound of fuel.

2. Determine approximate torque by moving vertically from point A up to approximate torque curve for 7500 lbs, point B. Move horizontally to left and read approximate torque required, 74%.

3. Determine fuel flow (optional procedure) by moving vertically down from point A to fuel flow curve for 7500 lbs, point C. Move horizontally to the left and read fuel flow 440 lbs/hr.

4. Determine maximum range by multiplying specific range by useable fuel. Specific range X pounds of fuel available = no wind range .215 X 1000 = 215 NM.

Figure 36A.

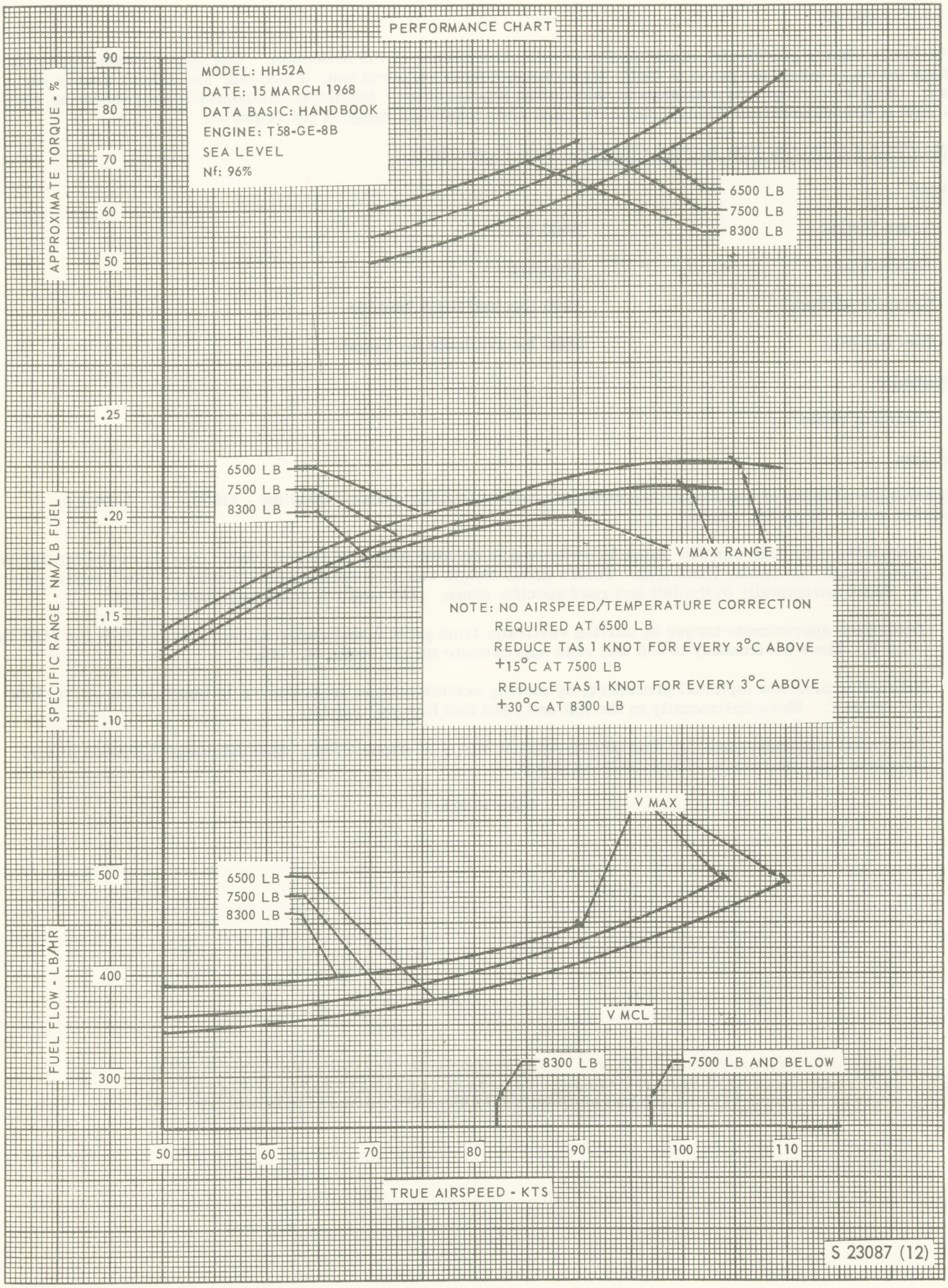

PERFORMANCE CHART
MODEL: HH52A
DATE: 15 MARCH 1968
DATA BASIC: HANDBOOK
ENGINE: T58-GE-8B
SEA LEVEL
Nf: 96%
APPROXIMATE TORQUE - %
90
80
70
60
50
6500 LB
7500 LB
8300 LB
SPECIFIC RANGE - NM/LB FUEL
.25
.20
.15
.10
6500 LB
7500 LB
8300 LB
V MAX RANGE
NOTE: NO AIRSPEED/TEMPERATURE CORRECTION
REQUIRED AT 6500 LB
REDUCE TAS 1 KNOT FOR EVERY 3°C ABOVE
+15°C AT 7500 LB
REDUCE TAS 1 KNOT FOR EVERY 3°C ABOVE
+30°C AT 8300 LB
V MAX
FUEL FLOW - LB/HR
500
400
300
6500 LB
7500 LB
8300 LB
V MCL
8300 LB
7500 LB AND BELOW
50
60
70
80
90
100
110
TRUE AIRSPEED - KTS
S 23087 (12)

Figure 36B.

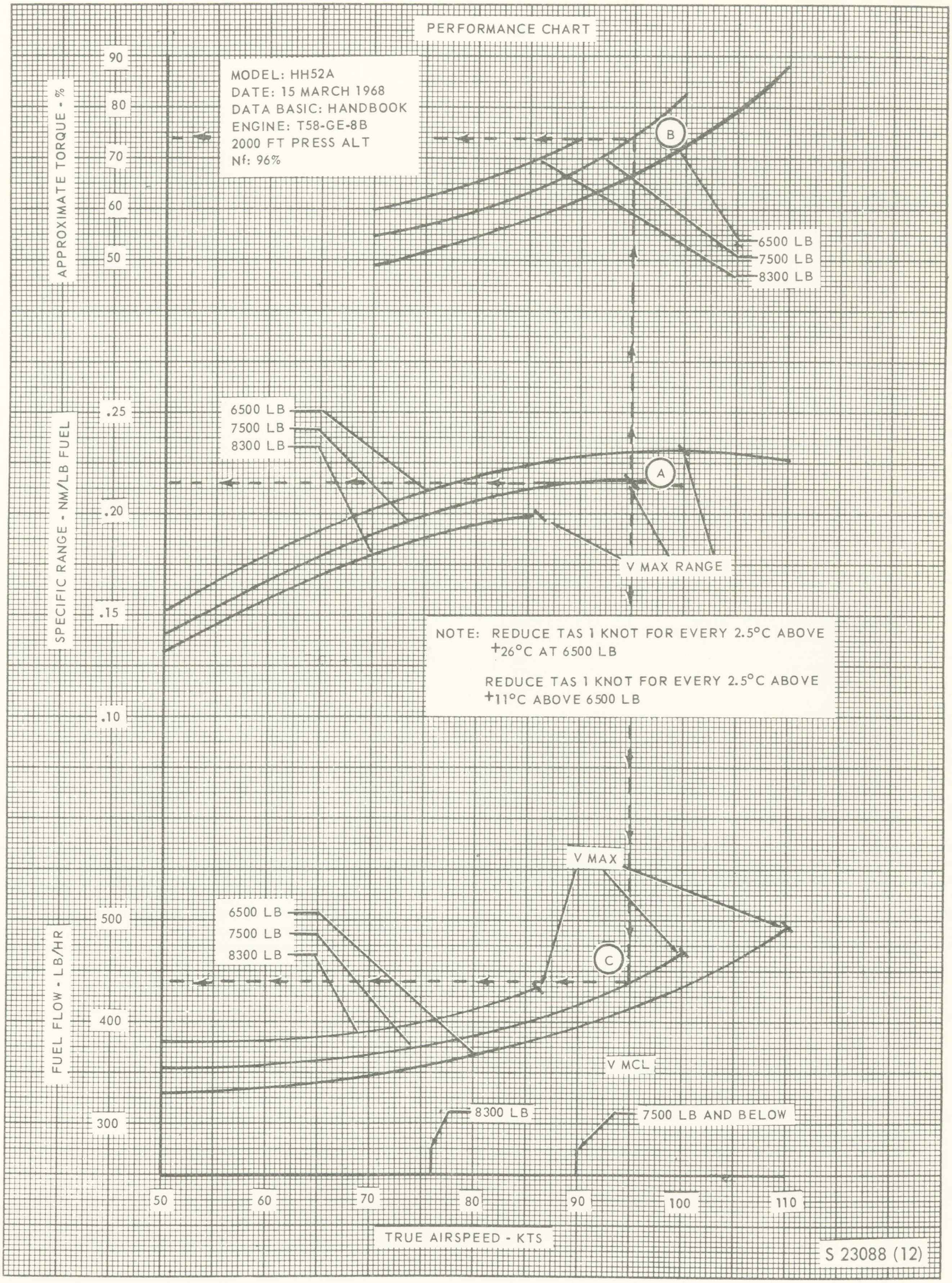

PERFORMANCE CHART
MODEL: HH52A
DATE: 15 MARCH 1968
DATA BASIC: HANDBOOK
ENGINE: T58-GE-8B
2000 FT PRESS ALT
Nf: 96%
APPROXIMATE TORQUE - %
90
80
70
60
50
B
6500 LB
7500 LB
8300 LB
SPECIFIC RANGE - NM/LB FUEL
.25
.20
.15
.10
A
V MAX RANGE
NOTE: REDUCE TAS 1 KNOT FOR EVERY 2.5°C ABOVE +26°C AT 6500 LB
REDUCE TAS 1 KNOT FOR EVERY 2.5°C ABOVE +11°C ABOVE 6500 LB
V MAX
C
FUEL FLOW - LB/HR
500
400
300
V MCL
8300 LB
7500 LB AND BELOW
50
60
70
80
90
100
110
TRUE AIRSPEED - KTS
S 23088 (12)

Figure 36C.

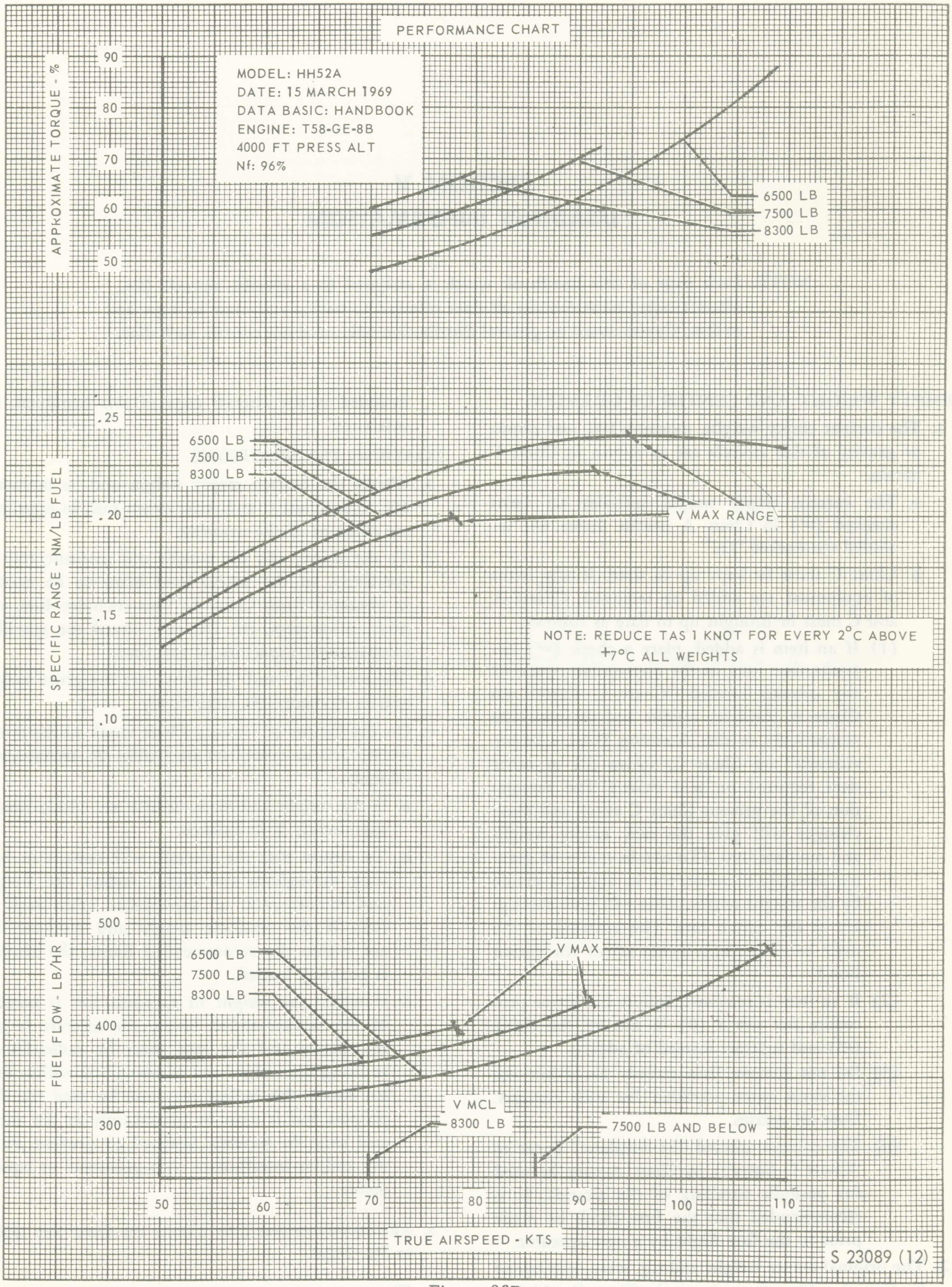

PERFORMANCE CHART
MODEL: HH52A
DATE: 15 MARCH 1969
DATA BASIC: HANDBOOK
ENGINE: T58-GE-8B
4000 FT PRESS ALT
Nf: 96%
APPROXIMATE TORQUE - %
90
80
70
60
50
6500 LB
7500 LB
8300 LB
SPECIFIC RANGE - NM/LB FUEL
.25
.20
.15
.10
6500 LB
7500 LB
8300 LB
V MAX RANGE
NOTE: REDUCE TAS 1 KNOT FOR EVERY 2°C ABOVE +7°C ALL WEIGHTS
FUEL FLOW - LB/HR
500
400
300
6500 LB
7500 LB
8300 LB
V MAX
V MCL
8300 LB
7500 LB AND BELOW
50
60
70
80
90
100
110
TRUE AIRSPEED - KTS
S 23089 (12)

Figure 36D.

SECTION V
LOADING INFORMATION

NOTE: Each copy of this handbook which is assigned to a specific aircraft (i.e., aircraft copy) must contain all data referred to herein and must be kept up to date. Copies issued on general distribution only need not contain such data.

EMPTY WEIGHT AND CENTER OF GRAVITY.

1. The current empty weight, moment/100, and center of gravity of this aircraft are as shown in Chart C herein.
   a. The current empty weight includes all items checked (✓) in Chart A herein. Items not included are marked "O."
   b. Chart C must be kept up to date. If any items of equipment are added or removed, Charts A and C must be brought up to date as follows:
      (1) If an item is added, place a check (✓) opposite that item in the appropriate space of the column labeled "Chart C Entry" on Chart A. Add its weight and moment/100 respectively, to the "Running Total – Empty Aircraft" on Chart C. (Also fill in other data required on said chart.) The summation of the present Chart C entry and these changes will give the new empty weight and moment/100. (To obtain center of gravity, multiply moment/100 by 100 and divide by the weight empty. This will give the c.g. aft of the datum line. The centroid of the main rotor is 252.0 inches aft of the datum line.)
      (2) If an item is removed, follow the above procedure but use a (0) in lieu of the check (✓) and subtract instead of adding.
      (3) Do not remove data already listed but use the extra space provided for such changes. Date all entries.
      (4) The column labeled "In Airplane" (next to "Chart C Entry") in Chart A may be used for periodic checking of the aircraft. It is recommended that the first check be made prior to the first flight by a new operator.
2. The original empty weight and c.g. were determined by Sikorsky Aircraft as shown in Chart B which is included in the aircraft copy of this handbook for reference.

LOADING INSTRUCTIONS.

1. Obtain the current empty weight and its moment/100 from Chart C and write down each in appropriate columns of the manifest.
2. To the above, add the weight and moment/100 respectively, of the useful load items to be carried as obtained from Chart E. This includes fuel, oil, pilot, passengers, etc. Do not exceed the specified compartment capacities at any time.
3. The totals "A" and "B" above are the gross weight and its moment/100, respectively.
4. On the Center of Gravity Chart check to see if the weight and moment/100 are within the recommended limits.
   a. If the weight and moment/100 are within limits, the aircraft is in balance.
   b. To ensure that the aircraft will remain in balance throughout the flight, deduct the weight and moment/100 of expendable items such as fuel. If the resultant weight and moment/100 are within the recommended limits, the aircraft is properly loaded.
   c. If either the weight or moment/100 is outside of the recommended limits, the aircraft is not in balance and the load must be redistributed to bring the weight and moment/100 within limits. Removable ballast may also be used for this purpose but it must be placed only in the cabin and must be securely fastened to prevent shifting and/or interference with personnel or equipment.
5. The recommended C.G. Limits are from Sta. 249.0 to Sta. 262.0.
6. The maximum gross weight is 8300 pounds.

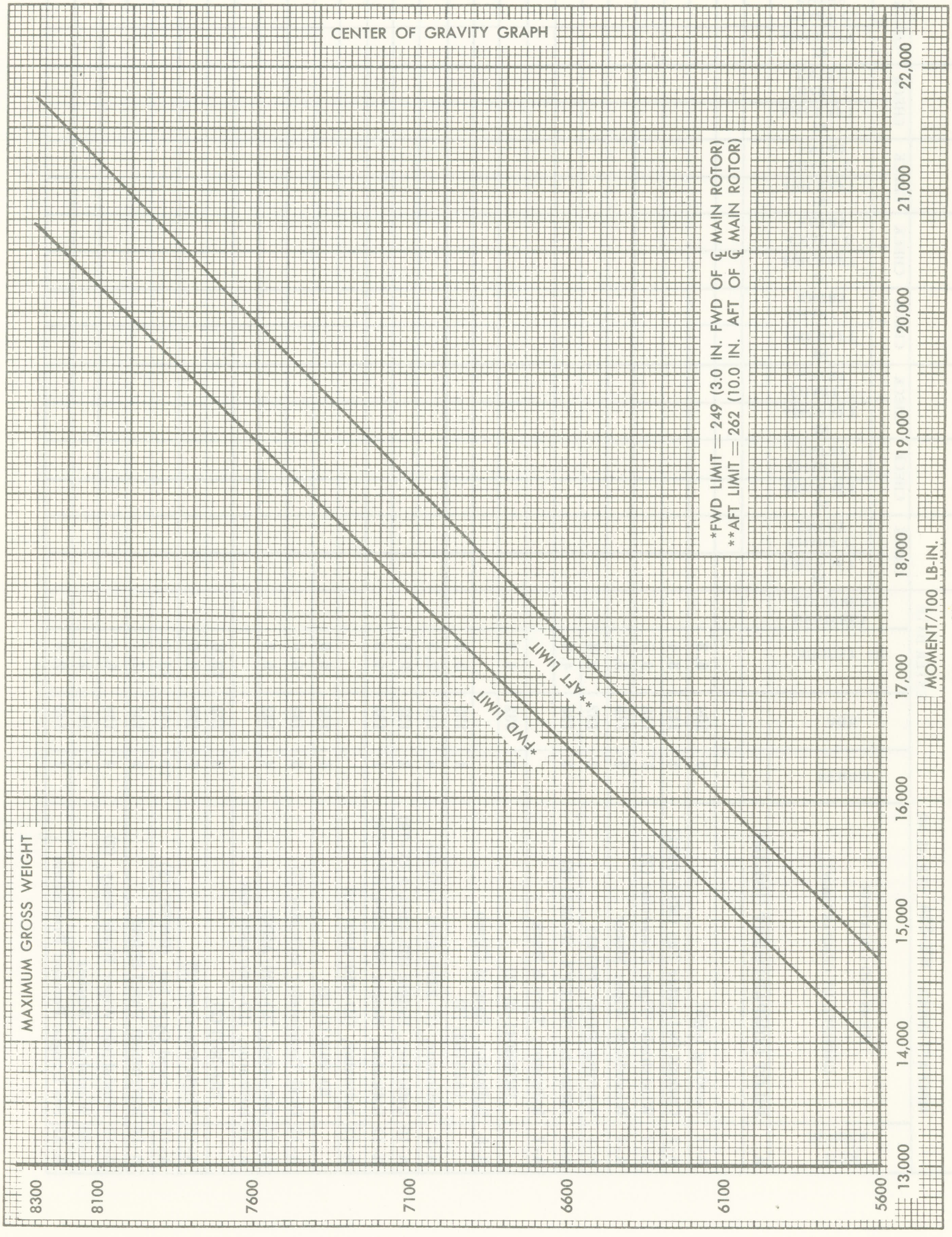

CENTER OF GRAVITY GRAPH
*FWD LIMIT = 249 (3.0 IN. FWD OF ℄ MAIN ROTOR)
**AFT LIMIT = 262 (10.0 IN. AFT OF ℄ MAIN ROTOR)
**AFT LIMIT
*FWD LIMIT
MAXIMUM GROSS WEIGHT
8300
8100
7600
7100
6600
6100
5600
13,000
14,000
15,000
16,000
17,000
18,000
19,000
20,000
21,000
22,000
MOMENT/100 LB-IN.

Figure 37.

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL **HH-52A** SERIAL NO.

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	ENTER DATE MOMENT/100	ENTER DATE DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
A	PILOT COMPARTMENT (100-180)																				
A-1	Landing Light	8	104	8.3																	
A-2	Cockpit Defroster Fan (MSA-9631)	3	113	3.4																	
A-3	Windshield Wiper Converter (2)	3	118	3.5																	
A-4	Windshield Wiper Motor	3	118	3.5																	
A-5	Warning Panel (F6141)	2	132	2.6																	
A-6	Altimeter (671CPX-10-051) (2)	3	132	4.0																	
A-7	Indicator, Turn & Bank																				
	(MS28041-2) (2)	3	132	4.0																	
A-8	Indicator, Rate of Climb																				
	(A25753) (2)	4	132	5.3																	
A-9	Indicator, (C-2236/APN-117) (2)	4	132	5.3																	
A-10	Indicator, Height (ID-1263/ARN-79)	2	132	2.6																	
A-11	Indicator, Height (ID-1264/ARN-79)	1	132	1.3																	
A-12	Indicator, (ID-250/ARN OR																				
	ID-663/U) (2)	5	132	6.6																	
A-13	Dual Tachometer Indicator (2)	5	132	6.6																	
A-14	Indicator, (ID-249/ARN)	4	132	5.3																	
A-15	Indicator, (ID-249/ARN) OR																				
	(ID-387) (2)	8	132	10.6																	
A-16	Flight Director (2)	5	132	6.6																	
A-17	Vertical Gyro Ind. (H005H) (2)	10	132	13.2																	
A-18	Instrument Panel Shield	2	133	2.7																	
A-19	Windshield Wiper Blade Assy. (2)	4	134	5.4																	
A-20	Windshield Washer	2	143	2.9																	
A-21	Sea Drogue Pennant Provisions	2	143	2.9																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO.

ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
A-	PILOT COMPARTMENT (100-180) (Cont.)																				
A-22	Rotor Brake Valve	3	145	4.4																	
A-23	Rearview Mirror & Bracket	2	146	2.9																	
A-24	Control Panel (C1611A/AIC) (2)	6	146	8.8																	
A-25	Receiver (R-1106/ARN-73)	7	146	10.2																	
A-26	Control Panel - ASE Engage	2	153	3.1																	
A-27	Miscellaneous Instruments:	17	156	26.5																	
	Airspeed Indicator (1296U-4D197) (2)																				
	Fuel Quantity (393004-01166)																				
	Fuel Selector (385335-006)																				
	Indicator, Inlet Temp.																				
	Gas Generator Tach. (MU-1)																				
	Torque Meter (6200C64A881) (2)																				
	Clock (A-134) (2)																				
	Indicator, Hyd. Press. (SR-151A)																				
	Indicator, Eng. Oil Press. (SR-151A)																				
	Indicator, Trans. Oil Press.																				
	Indicator, Eng. Oil Temp.																				
	Standby Compass (AN5766T4)																				
	Indicator, Fuel Pressure (SR-151A)																				
	Remote Air Thermometer (162B2)																				
A-28	Belts, (MS-22033-1) (Pilot & Copilot)	6	158	9.5																	
A-29	Control Panel (C-2174/APX-44)	2	163	3.3																	
A-30	Control Panel (C-3044A/ARC-84)	2	163	3.3																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO. ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
A-	PILOT COMPARTMENT (100-180) (Cont.)																				
A-31	Control Panel (C-6476/ARC-51A)	4	163	6.5																	
A-32	Control Panel (C-2010/ARN-52V)	2	163	3.3																	
A-33	Control Panel (714E-2)	2	165	3.3																	
A-34	Shoulder Harness, (Pilot & Copilot) (2)	6	165	9.9																	
A-35	Seat Cushion - (Pilot & Copilot) (2)	6	165	9.9																	
A-36	Pilot Seat (667)	23	165	38.0																	
A-37	Copilot Seat (667)	23	165	38.0																	
A-38	Back Cushion (Pilot & Copilot) (2)	6	170	10.2																	
A-39	Back Cushion (Cut-Out AMC 10) (2)	9	170	15.3																	
A-40	PK-2 Life Raft Pack (Pilot & CP.) (2)	16	170	27.2																	
A-41	Fire Extinguisher (891083)	7	178	12.5																	
A-42	Windshield Washer Fluid	4	179	7.2																	
A-43	First Aid Kit	2	179	3.6																	
A-44	Cords for Headsets (2)	1	179	1.8																	
A-45	Sea Drogue (S6150-62573-2)	10	179	17.9																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO.

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
				ENTER DATE																	
B	ENGINE & TRANSMISSION COMP. (170-336)																				
B-1	Starter & Cover	19	171	32.5																	
B-2	Plug, Air Intake - Installed	3	171	5.1																	
B-3	Oil Tank (S6130-80205)	4	174	7.0																	
B-4	Inlet Anti-Icing Boot (S6230-80108)	2	180	3.6																	
** B-5	Trapped Engine Oil (.4 Gal.)	3	189	5.7																	
B-6	Turbine Engine (T-58-GE-8B)		199																		
B-7	Plug, Engine Exhaust - Installed	3	227	6.8																	
B-8	Rotor Brake Assy.	5	232	11.6																	
B-9	Rotor Brake Disc	9	232	20.9																	
B-10	Airframe Fuel Filter Assy.	2	246	4.9																	
B-11	Primary Servos (S14-40-5000)	13	250	32.5																	
B-12	Main Transmission Oil (3.3 Gal.)	25	254	63.5																	
B-13	Aux. Hyd. Panel Assy. (HP610100-2C10)	3	255	7.7																	
B-14	Rotor Tach., Generator & Speed Switch	2	264	5.3																	
B-15	Pri. Hyd. Panel Assy. (HP610100-1N10)	4	264	10.6																	
B-16	Primary Systems Pump (65W0-1011)	5	266	13.3																	
B-17	Utility Systems Pump (66WAP-200)	9	266	23.9																	
B-18	Generator (28B139) 10 KVA (2)	67	271	181.6																	
**	Undrainable Oil Obtained by Draining at Station 174 In Level Attitude.																				

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL **HH-52A** SERIAL NO. ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
B-	ENGINE & TRANSMISSION COMP.																				
	(170-336) (Cont.)																				
B-19	Engine Fire Bottle (891119)	8	282	22.6																	
B-20	Transmission Oil Cooler Fan Assy.	12	294	35.3																	
B-21	Transmission Oil Cooler (85233534)	15	308	46.2																	
C	PASSENGER OR CARGO COMPARTMENT																				
	(180-348)																				
C-1	Directional Gyro (R88U0191-200)																				
	MA-1	5	184	9.2																	
C-2	Aux. Servo Cylinder Assy.																				
	(S6265-62551)	41	185	75.9																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO. ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
C-	PASSENGER OR CARGO COMPARTMENT (180-348) (Cont.)																				
C-3	Log Amplifier (S6190-61123-1)	2	187	3.7																	
C-4	Mount, Antenna Coupler	2	188	3.8																	
C-5	Antenna Coupler (CU-351/AR)	20	188	37.6																	
C-6	Antenna Coupler (490T-1)	20	188	37.6																	
C-7	Mounting Tray (S6190-61022)	3	188	5.6																	
C-8	Tilt Table	4	188	7.5																	
C-9	ASE Shelves & Relay	4	188	7.5																	
C-10	Vertical Gyros (2)	9	188	16.9																	
C-11	ASE Amplifier (566359)	16	188	30.1																	
C-12	Elec. Rack (88380-4) With Mts. & Wiring	70	210	147.0																	
C-13	Amplifier (AM-3223/ARN-73)	5	205	10.3																	
C-14	Compass Adapter (8KE28EH2)	7	206	14.4																	
C-15	Mount & Shelf (For AN/PRC-59A)	2	209	4.2																	
C-16	Receiver-Transmitter (AN/PRC-59A)	14	209	29.3																	
C-17	Receiver-Transmitter (RT-743/ARC-51A)	31	213	66.0																	
C-18	Marker Beacon (MKA-23A)	2	213	4.3																	
C-19	Receiver, Glidescope (GSA-8A)	8	216	17.3																	
C-20	Receiver-Transmitter (RT-494/APX-44)	23	216	49.7																	
C-21	Receiver-Transmitter (618T-2) (HF-102)	52	216	112.3																	
C-22	OMNI Converter (NVA-22A) (AN/ARN-87V)	9	218	19.6																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO.

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
				ENTER DATE																	
C-	PASSENGER OR CARGO COMPARTMENT (180-348) (Cont.)																				
C-23	Receiver-Transmitter (RT-760/ARN-79)	13	218	28.3																	
C-24	Amplifier (AM-1717/APN-117)	19	218	41.4																	
C-25	Compass Amplifier (8KE8AA2) MA-1	7	221	15.5																	
C-26	Receiver-Transmitter (RT-384/ARN-52V)	43	221	95.0																	
C-27	Transmitter (T-744/ARC-84) & Pwr. Sup.	13	221	28.7																	
C-28	Receiver (R-955/ARC-84) & Pwr. Sup.	11	225	24.8																	
C-29	Receiver-Transmitter (RT-160/APN-22) With Housing and Antenna (In Bilge)	8	222	17.8																	
C-30	Air Bottles - Aux. Floats (TAVCO) (2)	20	188	37.6																	
C-31	PK-2 Life Raft Pack (Crewmans)	8	230	18.4																	
C-32	Belts, Safety (FDC-1650-27MI) (3)	3	230	6.9																	
C-33	Seat (Troop Type) 3-Man (30-S-1)	7	230	16.1																	
C-34	Control, Intercom (C1611A) Stbd.	3	234	7.0																	
C-35	Light, Emergency Exit - Stbd.	1	231	2.3																	
C-36	Cabin Step - Installed	4	252	10.1																	
C-37	Safety Harness (NAF 501234)	6	252	15.1																	
C-38	Fuel Pumps (RG12640T2) (2)	9	252	22.7																	
C-39	Trapped Fuel, Fwd. Tank	9	252	22.7																	
C-40	Rescue Platform - Installed	25	252	63.0																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL **HH-52A** SERIAL NO.

ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
C-	PASSENGER OR CARGO COMPARTMENT																				
	(180-348) (Cont.)																				
C-41	Control, Intercom (C1611A) Port	3	258	7.7																	
C-42	Cabin Soundproofing	40	264	105.6																	
C-43	Seat, Troop Type, 1 Man & Belt	4	269	10.8																	
C-44	Light, Emergency Exit - Port	1	280	2.8																	
C-45	Trapped Fuel Aft. Tank	1	294	2.9																	
C-46	Fire Extinguisher (891083)	7	294	20.6																	
C-47	SAR Package	100	298	298.0																	
C-48	Belts (FDC-1650-27MI) (5)	5	317	15.9																	
C-49	Seat (Troop Type) 3 Man (30-8-1)	7	317	22.2																	
C-50	Seat (Troop Type) 2 Man (S6250-																				
	62302-2)	4	326	13.0																	
C-51	Litter Straps (Stowed) Stbd.	4	327	13.1																	
C-52	Litter Straps (Stowed) Port	4	327	13.1																	
C-53	Danforth Anchor (Stowed) With Line	10	346	34.6																	
C-54	First Aid Kit	2	347	6.9																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO. ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1		CHECK 2		CHECK 3		CHECK 4		CHECK 5		CHECK 6		CHECK 7		CHECK 8	
						IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY
D	TRANSITION SECTION COMPARTMENT																				
	(348-408)																				
D-1	Heater Ignition Unit (A11C30)	5	350	17.5																	
D-2	Tail Drive Shaft Fairing	2	351	7.0																	
D-3	Main Line Contactor (DH-7B) (2)	2	352	5.0																	
D-4	Pressure Switch (75017)	2	351	7.0																	
D-5	Relays, (R. C.) 200 Amps (2)	9	351	31.6																	
D-6	Relay, Battery (A770N)	2	352	7.0																	
D-7	Relay, Bus Tie, 300 Amps	2	352	7.0																	
D-8	Relay, External Power, 300 Amps	2	352	7.0																	
D-9	Heater Blower (MS 5862X-1A)	1	354	42.5																	
D-10	Heater, (52689)	16	354	56.6																	
D-11	Battery Disconnect	2	356	7.1																	
D-12	Battery Support	2	356	7.1																	
D-13	Battery, (24V, 24AH, NI-CAD)	49	356	174.4																	
D-14	Supervisory Panel (24E12) (2)	17	361	61.4																	
D-15	Electrical Shelves and Supports	11	364	40.0																	
D-16	Convertors, 200 Amps (2)	43	364	156.5																	
D-17	Heater, Fuel Control, (54C00)	8	366	29.3																	
D-18	Voltage Regulator (20B56-1) (2)	7	374	26.2																	
D-19	Regulator Panel Assy. (34B26-9-A)																				
	(2)	17	361	61.4																	
D-20	Supervisory/Regulator Panel	6	374	22.4																	
	(21B17-22A) (2) (Ref. AMC #26)																				
D-21	Regulator Base (1B40-2-A) (2)	6	374	22.4																	
	(Ref. AMC #26)																				

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO.

ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1 IN AIRCRAFT	CHECK 1 CHART C ENTRY	CHECK 2 IN AIRCRAFT	CHECK 2 CHART C ENTRY	CHECK 3 IN AIRCRAFT	CHECK 3 CHART C ENTRY	CHECK 4 IN AIRCRAFT	CHECK 4 CHART C ENTRY	CHECK 5 IN AIRCRAFT	CHECK 5 CHART C ENTRY	CHECK 6 IN AIRCRAFT	CHECK 6 CHART C ENTRY	CHECK 7 IN AIRCRAFT	CHECK 7 CHART C ENTRY	CHECK 8 IN AIRCRAFT	CHECK 8 CHART C ENTRY
D-	TRANSITION SECTION COMPARTMENT																				
	(348-408) (Cont.)																				
D-22	Inverter (MS16057-1) (100 VA)	8	378	30.2																	
D-23	Datum Beacon Holder	2	378	7.6																	
D-24	Beacon (T981/SRT)	25	378	94.5																	
D-25	Flux Valve & Compensator MA-1	2	387	7.7																	
D-26	De-icing Control	3	404	12.1																	
E	TAIL CONE AND PYLON (403-637)																				
E-1	Tail Wheel Fairing	6	418	25.1																	
E-2	Tail Drive Shaft Fairing	7	476	33.3																	
E-3	Pylon Fairing	7	601	42.1																	
E-4	Oil, Intermediate & Tail Gear Box	3	618	18.5																	
E-5	Stabilizer	19	618	117.4																	
E-6	Tail Rotor Assy. (105")	62	629	390.0																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL **HH-52A** SERIAL NO. ENTER DATE

ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1		CHECK 2		CHECK 3		CHECK 4		CHECK 5		CHECK 6		CHECK 7		CHECK 8	
						IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY
F	ALIGHTING GEAR & SPONSONS																				
F-1	Landing Lights - Stbd. (42275) (2)	4	180	7.2																	
F-2	Landing Light - Port (42275)	2	180	3.6																	
F-3	Rotating Beacon - Stbd. (42700)	2	193	3.9																	
F-4	Rotating Beacon - Port (42700)	2	193	3.9																	
F-5	Sponsons (2)	162	195	315.9																	
F-6	Auxiliary Float - Inflatable Bags (2)	18	196	35.3																	
F-7	Auxiliary Float Bag Covers (2)	4	196	7.8																	
F-8	Main Strut Assembly (2)	86	206	177.2																	
F-9	Main Wheel Assembly (9531925) (2)	27	206	55.6																	
F-10	Brake Assembly (9531926) (2)	13	206	26.8																	
F-11	Main Tires (6.50 x 10) Tubeless (2)	18	206	37.1																	
F-12	Tail Strut Assembly	44	412	181.3																	
F-13	Tail Wheel (9531952)	5	422	21.1																	
F-14	Tail Wheel Tire & Tube (5.00 x 5)	5	422	21.1																	

CHART A – EMPTY WEIGHT CHECK LIST

AIRCRAFT MODEL HH-52A SERIAL NO. ENTER DATE

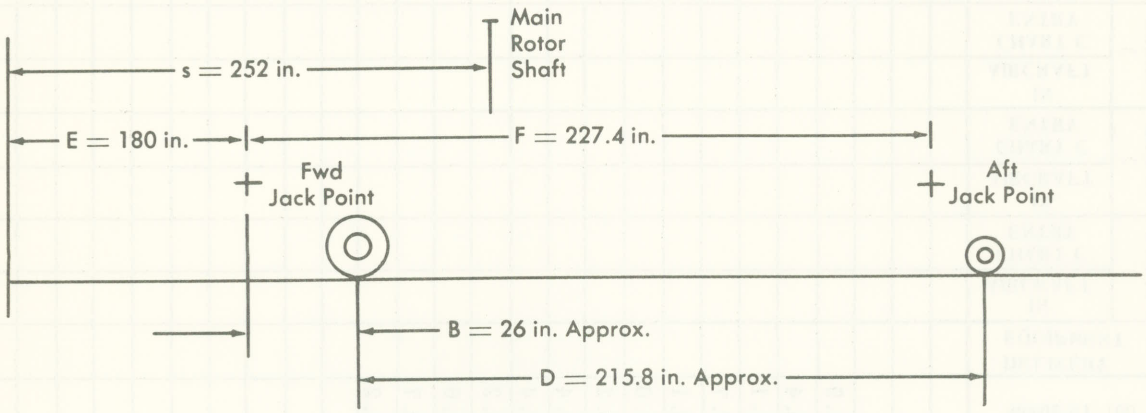
ITEM NUMBER	ITEMS AND LOCATION GROUPED BY COMPARTMENT	WEIGHT	ARM	MOMENT/100	DELIVERY EQUIPMENT	CHECK 1		CHECK 2		CHECK 3		CHECK 4		CHECK 5		CHECK 6		CHECK 7		CHECK 8	
						IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY	IN AIRCRAFT	CHART C ENTRY
G	MISCELLANEOUS EXTERNAL																				
	EQUIPMENT																				
G-1	Antenna (AT-740/APX)	1	186	1.9																	
G-2	Antenna (AS-1728/ARN-79) (2)	2	221	4.4																	
G-3	Hoist Assy. (BL-2330-3)	56	252	141.1																	
G-4	Hoist Support Assy.	11	252	27.7																	
G-5	Hoist Fairing	4	252	10.1																	
G-6	Main Rotor Blades (3)	425	252	1071.0																	
G-7	Antenna (AT-740/ARN)	1	321	3.2																	
G-8	Antenna (WS-25V)	2	420	8.4																	
G-9	Antenna (AT/209/ARR-26)	1	444	4.4																	
G-10	Antenna, Tension (HF-102)	5	463	23.2																	
G-11	Antenna, (ANT-37R2U)	3	488	14.6																	
G-12	Antenna (AT-1094/ARN-73)	4	493	19.7																	
G-13	Antenna (DMN-4-4)	2	558	11.2																	

Load Condition: Aircraft Actual Weight and Horizontal Balance

PREPARED BY: ____________
DATE: ________________

MODEL: ________ REG. NO. ____________________ SERIAL NO. ________________

SCALE POSITION	SCALE NO.	SCALE READING (LB)	TARE	SCALE ERROR	SYMBOL	NET WEIGHT
Left Fwd Jack Point					W_L	
Right Fwd Jack Point					W_R	
Aft Jack Point					W_T	
Total Weight					W	



CENTER OF GRAVITY TO FORWARD DATUM (HORIZ. DIST. — AS WEIGHED)

Weighing on Wheels $E + \frac{B + W_T \times D}{W}$

Weighing on Jack Points $E + \frac{W_T \times F}{W}$

CORRECTED WEIGHT AND HORIZONTAL BALANCE

ITEMS ADDED & SUBTRACTED	WEIGHT (LB)	HORIZONTAL DIST. (in) C. G. TO FWD DATUM	MOMENT (lb in.)
Aircraft as Weighed			
Plus —			
Minus —			
EMPTY TOTAL GROSS WEIGHT			

BALANCE (Corrected)	Horizontal Dist. — s	in. Fwd/Aft of Main Rotor Centroid

Witnessed By ______________________

• BASIC WEIGHT and BALANCE RECORD •

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

CHART C SHEET

AIRPLANE MODEL________________ SERIAL NO.________________

DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE				RUNNING TOTAL BASIC AIRPLANE		
				ADDED (+)		REMOVED (−)				
	IN	OUT		WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	INDEX