CS-61-048

CONVAIR MODEL 30

PROVISIONAL AIRPLANE FLIGHT MANUAL

MODEL 30

The certificate limitations, Operating Procedures and Performance Information included in this Provisional Flight Manual, (as issued under the requirements of special Civil Air Regulation number SR-425C, dated June 6, 1961), do not reflect the final values, data and information that will be effective on a fully type certificated airplane.

GENERAL DYNAMICS | CONVAIR

SAN DIEGO, CALIFORNIA

PROVISIONAL

AIRPLANE FLIGHT MANUAL

For The

CONVAIR 990
(Model 30)

TURBOJET, AFT FAN, TRANSPORT

AIRPLANE

PROVISIONAL

This airplane must be operated in compliance with the Certificate Limitations, Section 1, contained herein. A copy of this Provisional Flight Manual, composed of Sections 1 through 4, or its equivalent, must be carried in each provisionally certificated airplane at all times and be readily available to the flight crew.

Airplane Registration No. ______________

Serial No. ______________

Date ______________

FLIGHT MANUAL FORMAT INFORMATION

The Flight Manual applicable to a specific version of a Model 30 (Convair 990) airplane is composed of basic pages and may also include some pages applicable only to that version. Identification of pages is accomplished as follows:

MODEL	CODE	EXAMPLE
30 (Basic)	K	1-16 Code K

The LIST OF EFFECTIVE PAGES in the front of each Flight Manual itemizes all the currently effective pages required to construct a Flight Manual for the airplanes noted in the page headings.
A solid black line in the page margin indicates the portion of the text affected by the current revision.

LIST OF EFFECTIVE PAGES

MODEL 30 Airplane Serial Numbers: 1 through 55

PAGE	CODE	DATE
i	K	Oct. 20/61
ii	K	Oct. 20/61
iii	K	Nov. 3/61
iv	K	Nov. 3/61
v	K	Oct. 20/61
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PROVISIONAL

LIST OF EFFECTIVE PAGES

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LOG OF REVISIONS

REV NO.	DATE	PAGE NUMBERS	DESCRIPTION
1	Nov. 3/61	iii, iv, vi, 1-25, 1-31, 1-38, ECL-1, and 2-9	Revision for Provisional Type Certificate.

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1 CERTIFICATE LIMITATIONS

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SECTION 1, CERTIFICATE LIMITATIONS

SECTION 1, CERTIFICATE LIMITATIONS (CONT.)

SECTION ONE

CERTIFICATE LIMITATIONS

Operation of this airplane in conformance with the Certificate Limitations contained in Section 1 of this Provisional Airplane Flight Manual is required by law.

TYPE OF AIRPLANE OPERATION

This airplane is provisionally certificated under the appropriate portions of CAR 4b and SR-422B and in accordance with the requirements of Special Civil Air Regulation SR-425C, dated June 6, 1961. Operation is permitted as follows when the required equipment is installed and operating:

1. Night
2. Instrument (IFR)
3. Icing Conditions
4. Overwater (When flares and survival equipment as required by CAR 4b.462, 4b.645 and 4b.646 are installed and approved by F.A.A.)

MAXIMUM OPERATING ALTITUDE

The maximum operating altitude for this airplane is 41,000 feet.

FLIGHT CREW

A minimum flight crew consisting of Pilot, Copilot and Flight Engineer is required.

WEIGHT LIMITATIONS , MAXIMUM STRUCTURAL

This airplane must be operated in accordance with the performance charts included in Section 1, CERTIFICATE LIMITATIONS, of this Provisional Flight Manual.

Ramp Weight............................247,000 pounds

Takeoff Weight.........................246,200 pounds (24 Ply Tires)
240,000 pounds (22 Ply Tires)

Landing Weight.........................202,000 pounds

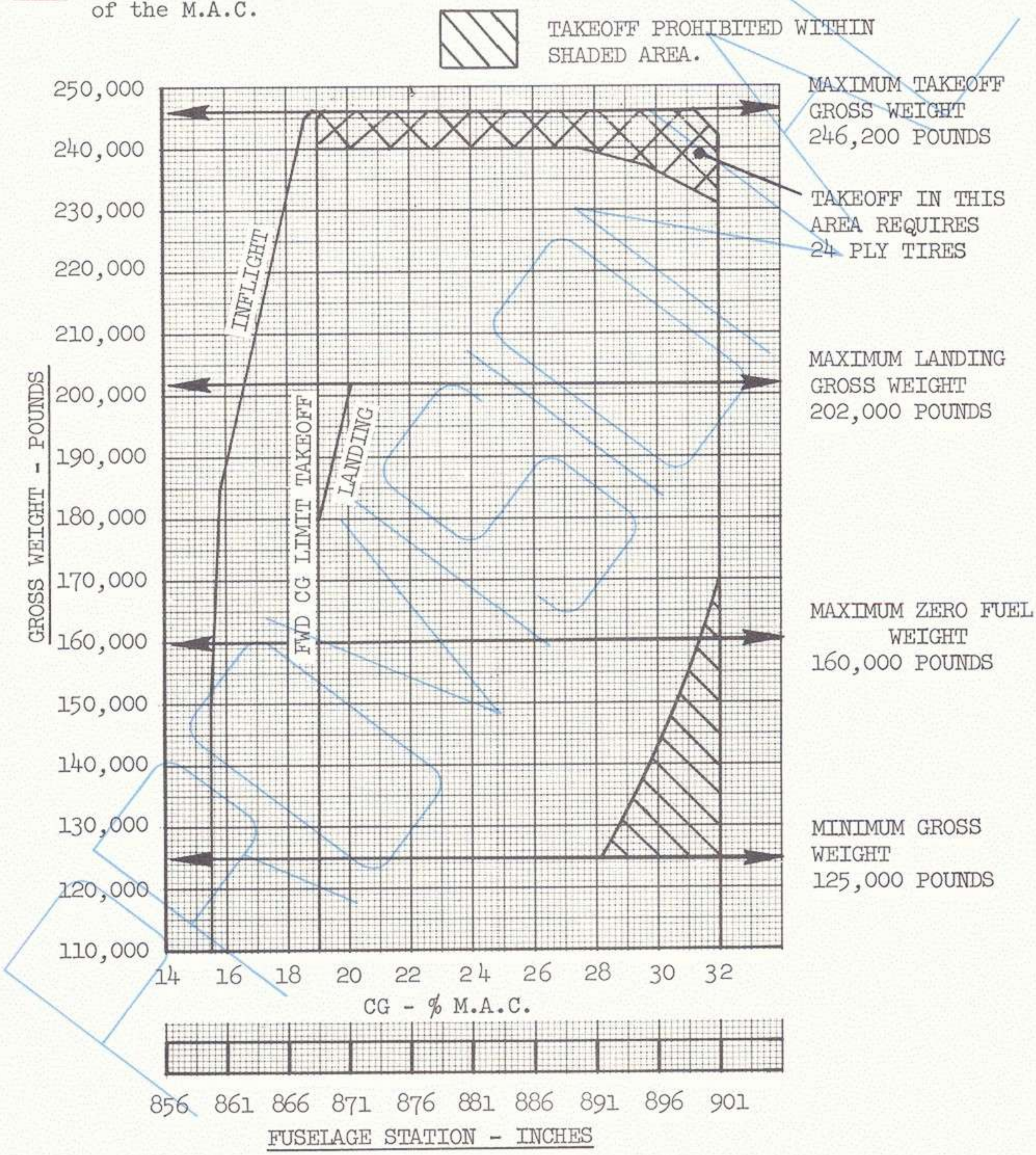
Zero Fuel Weight.......................160,000 pounds

NOTE: All weight in excess of 160,000 pounds must consist of fuel and all weight in excess of 202,000 pounds must consist of jettisonable fuel.

CENTER OF GRAVITY LIMITS

Center of gravity travel due to fuel usage, passenger movement and other items is controlled by the Approved Loading Schedules and Master Equipment List, Convair Reports ZW-30-29, "Weight and Balance Report for Airplane Number (Registration Number)", and ZM-30-069, "Master Equipment List Model 30", the limitations of which must be used for all operations.

NOTE: Retraction of the landing gear moves the CG forward approximately 0.2 % of the M.A.C.



TAKEOFF CLIMB - WEIGHT LIMITS

REGULATION

Paragraph 4T.120(b) of SR-422B.

One Engine Inoperative Climb   Takeoff, landing gear retracted.

The second segment climb is the only weight limiting takeoff climb. See the TAKEOFF WEIGHT LIMITS - SECOND SEGMENT CLIMB chart on the following page.

In the takeoff configuration at the point in the takeoff flight path where the landing gear is fully retracted, the steady gradient of climb, without benefit of ground effect, shall not be less than 3.0 percent.

AIRPLANE CONFIGURATION

1. Landing gear retracted.
2. Takeoff flap position (10°).
3. Any engine inoperative.
4. The remaining engines at takeoff power available at a height of 400 feet above the takeoff surface.
5. Speed = V_2. (See PERFORMANCE INFORMATION Section 4)

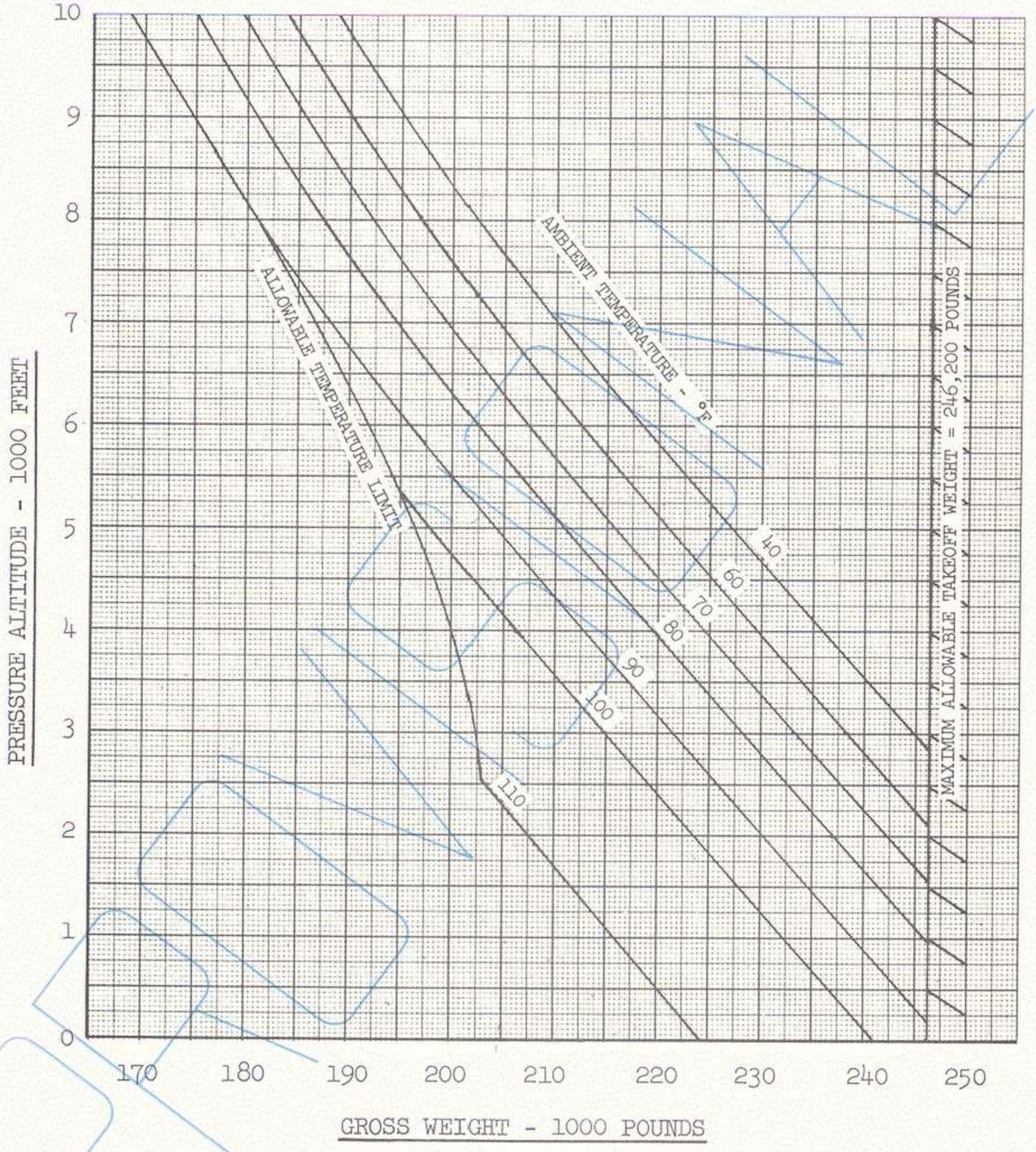
DETERMINATION OF MAXIMUM ALLOWABLE TAKEOFF WEIGHTS

1. Determine what the maximum allowable takeoff gross weight will be as dictated by the amount of available runway length from the data presented in the ALLOWABLE TAKEOFF WEIGHT PERMITTED BY AVAILABLE RUNWAY LENGTH chart, (in this Section). Enter the curve with the amount of runway available and the runway slope, adjust for runway wind component, pressure altitude and temperature, and read the maximum allowable gross weight for takeoff under the governing physical conditions. A numerical example of the procedure is presented on the chart.

2. Determine whether the desired takeoff gross weight is within the climb gradient limits for takeoff climb, with 10° flaps and landing gear retracted, from the TAKEOFF WEIGHT LIMITS - SECOND SEGMENT CLIMB chart on the following page.

TAKEOFF WEIGHT LIMITS
SECOND SEGMENT CLIMB
10 Degree Flaps

NOTE: Based on 3% climb gradient at 1.2 V_S.



APPROACH CLIMB WEIGHT LIMITS

REGULATION

Paragraph 4T.120(d) of SR-422B.

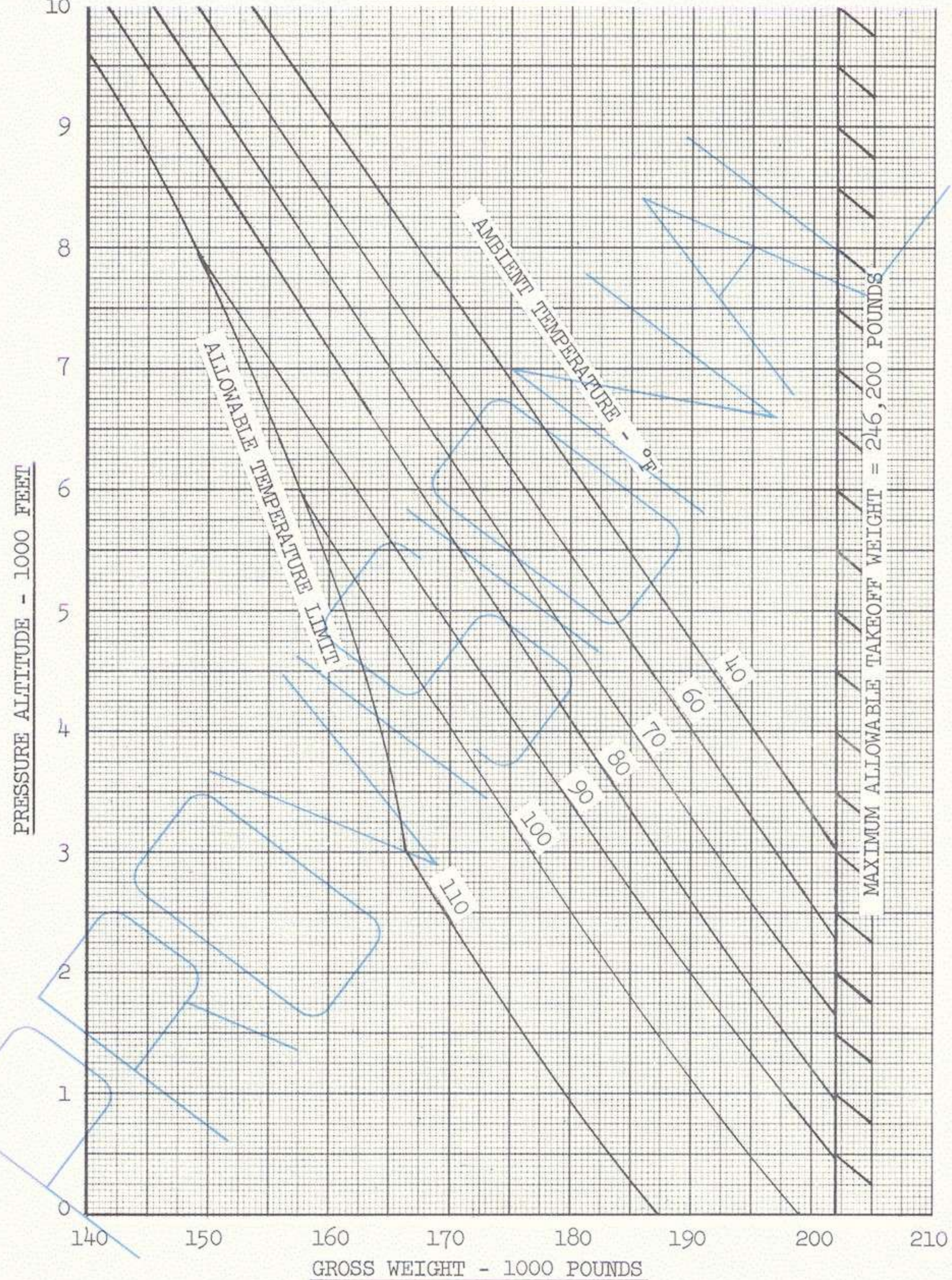
Approach: In the approach configuration corresponding with the normal all engines operating procedure such that V_S related to this configuration does not exceed 110 percent of the V_S corresponding with the related landing configuration, the steady gradient of climb shall not be less than 2.1 percent for two engine airplanes and not less than 2.7 percent for four engine airplanes with:

1. The critical engine inoperative, the remaining engines operating at the available takeoff thrust;
2. The weight equal to the maximum landing weight;
3. A climb speed established by the applicant in connection with normal landing procedures, except that it shall not exceed 1.5 V_S.

AIRPLANE CONFIGURATION

1. Landing gear up.
2. Flaps 36°.
3. Three engines operating at takeoff thrust.

APPROACH CLIMB WEIGHT LIMITS
Three Engines Operating
Gear Up - 36° Flaps



ALLOWABLE TAKEOFF WEIGHT PERMITTED BY AVAILABLE RUNWAY LENGTH

REGULATION

Paragraph 4T.123 (3).

Accelerate-Stop Distance, Takeoff Distance

The minimum distances required for takeoff shall be established at which compliance is shown with the generally applicable provisions of this regulation and with paragraphs 4T.115 and 4T.117(a).

Paragraph 4T.115.

Accelerate-Stop Distance

(a) The accelerate-stop distance shall be the sum of the following:

(1) The distance required to accelerate the airplane from a standing start to the speed V_1.
(2) Assuming the critical engine to fail at the speed V_1, the distance required to bring the airplane to a full stop from the point corresponding with the speed V_1.

Paragraph 4T.117(a).

The takeoff distance shall be the greater of the distances established in accordance with subparagraphs (1) and (2).

(1) The horizontal distance along the takeoff path from the start of the takeoff to the point where the airplane attains a height of 35 feet above the takeoff surface, (one engine assumed to fail at V_1).

(2) A distance equal to 115 percent of the horizontal distance along the takeoff path with all engines operating from the start of takeoff to the point where the airplane attains a height of 35 feet above the takeoff surface.

Airplane Configuration

1. Accelerate-stop distance:

a. From brake release to V_1 speed

(1) Takeoff thrust on four engines
(2) Takeoff flap position (10°)

b. From V_1 speed to stop

(1) Idle power on three engines, one engine inoperative.

(2) Wing spoilers fully extended.
(3) Maximum braking. (Anti-skid operating)

2. Takeoff distance

a. Engine failure at V_1

(1) Takeoff thrust on four engines to V_1 speed. At V_1 speed one outboard engine becomes inoperative and remains so throughout the remaining takeoff distance.
(2) Takeoff flap position (10°).
(3) Landing gear retraction initiated after lift-off.

b. All engines operating

(1) The same configuration as for the engine failure at V_1 case above except that all engines are assumed to be operating at takeoff thrust throughout the takeoff distance.

Procedures

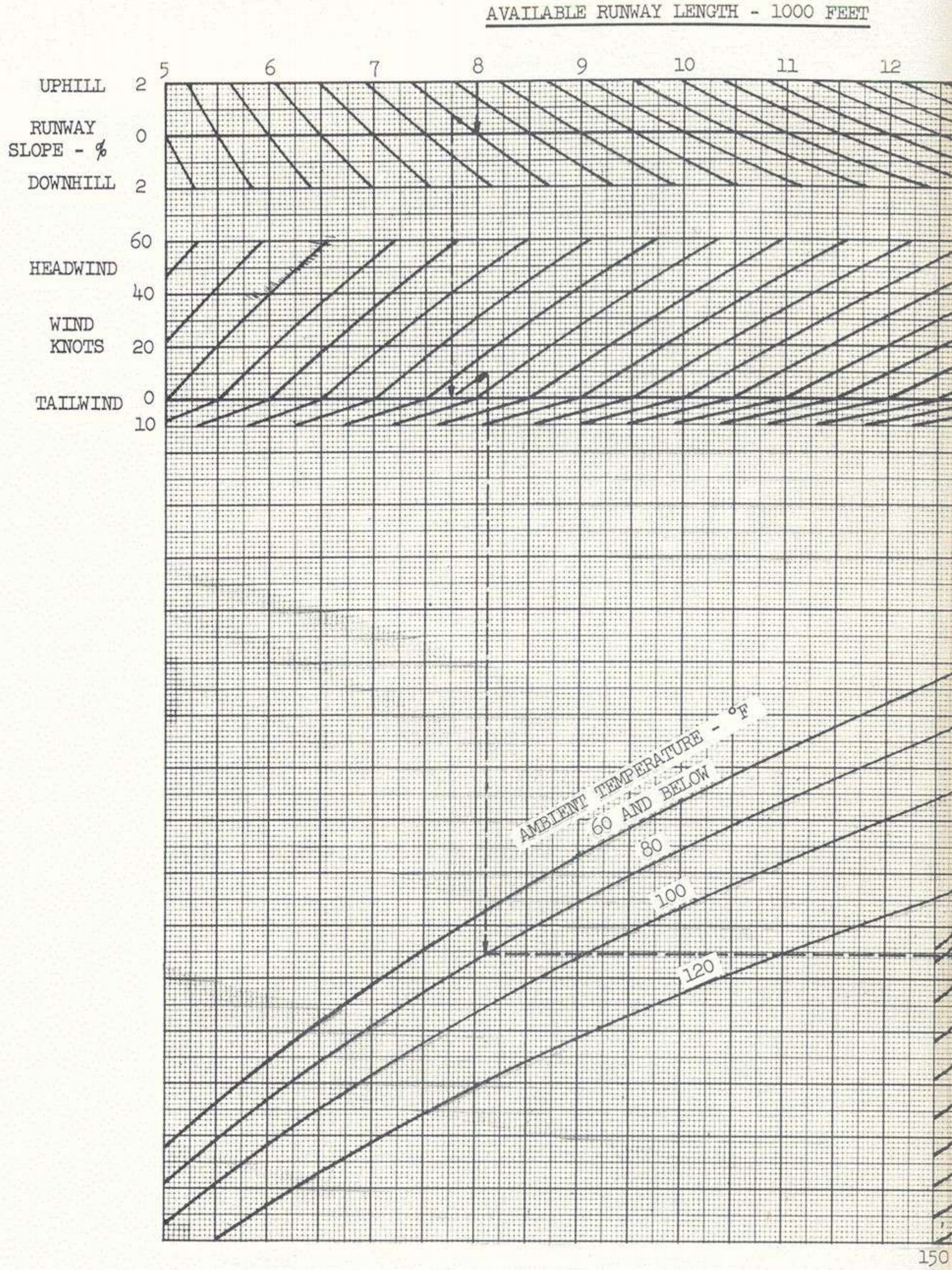
The accelerate-stop and takeoff procedures are described on page

A Chart of the ALLOWABLE TAKEOFF WEIGHT PERMITTED BY AVAILABLE RUNWAY LENGTH is presented on the following page. An example of the use of the chart is presented below and the solution for the example is indicated on the chart.

Example:

Field length = 8000 feet
Runway slope = 1% uphill
Wind Component = 10 knots headwind
Ambient Temperature = 80 degrees F
Pressure altitude = 2000 feet

The maximum allowable gross weight under the above conditions is 190,050 pounds at the start of takeoff, based upon optimum field length.



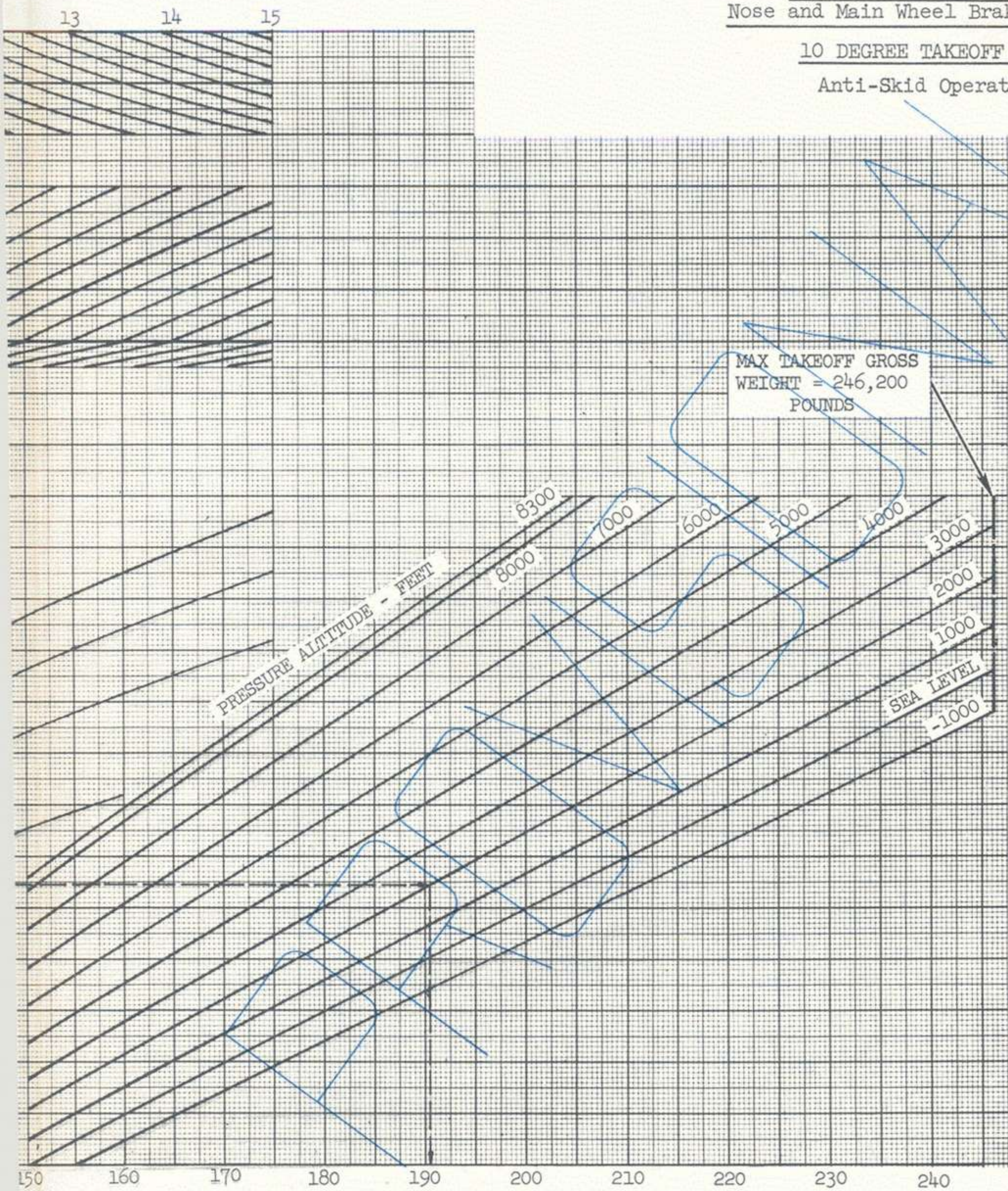
AVAILABLE RUNWAY LENGTH - 1000 FEET
5
6
7
8
9
10
11
12
UPHILL
2
RUNWAY
SLOPE - %
0
DOWNHILL
2
60
HEADWIND
40
WIND
KNOTS
20
TAILWIND
0
10
AMBIENT TEMPERATURE - °F
60 AND BELOW
80
100
120
150

ALLOWABLE TAKEOFF WEIGHT PERMITTED BY AVAILABLE RUNWAY LENGTH

Nose and Main Wheel Brakes Operative

10 DEGREE TAKEOFF FLAPS

Anti-Skid Operative



GROSS WEIGHT AT START OF TAKEOFF - 1000 POUNDS

POWER PLANT LIMITATIONS

This airplane is equipped with four General Electric CJ 805-23 Aft Fan Turbojet engines. A thrust reverser mechanism is installed on each engine.

The power setting charts included in Section 1, CERTIFICATE LIMITATIONS, of this Flight Manual were used to determine airplane performance as noted in Section 4, PERFORMANCE INFORMATION. Engine manufacturers warranty limits for climb and cruise operations, which are not specific F.A.A. limitations, are included in Section 9, POWER PLANT, of the Airplane Operation Manual.

Operating Limits

The engine and fan RPM limits, and EGT and EPR limits, are shown in the charts on the following pages.

NOTE: The climb performance data presented in Section 4, PERFORMANCE INFORMATION, is based on the EPR curves in this Section. Thrust is set by EPR, not a fixed RPM. Therefore, it will be necessary to make periodic adjustments during climb. The EGT limit at maximum continuous power is 590°C. If necessary, the power lever should be retarded to keep within this limit and maintenance personnel should be notified so that corrective action can be initiated.

Airplane takeoff is prohibited when the EPR or FAN RPM for takeoff is below the minimum required.

Engine Starters

The use of engine starters in flight is prohibited.

Fuel Types

The engine may be operated on Commercial Jet Fuel, JP-4 or JP-5 (per G.E. Specification M50T968). The engine will operate satisfactorily with any one of the above fuels or a mixture thereof; no fuel control adjustment is required for these different fuels.

Oil Types

The engine is to be operated with MIL-L-7808C oil. Intermixing of oils produced by different vendors is not permitted.

Engine Thrust Reverser Limitations

The use of the thrust reversers in flight is prohibited.

Thrust reversers can be operated at not to exceed 95.5% engine RPM until a decrease in airplane speed to 60 knots IAS. Below 60 knots IAS, power setting must be reduced to IDLE reverse. Thrust reverser use on landing roll-out should be ceased after 30 seconds of continuous operation.

Thrust Reverser Limitations (Cont.)

Do not exceed 99.4% RPM fan operation or an EGT of 630°C at 95.5% engine RPM during thrust reverser use.

NOTE: Operation as noted above will prevent severe compressor stalls.

Engine Anti-Ice System Limitations

Engine anti-icing may be operated continuously at any power setting when the compressor inlet temperature is below 15°C. Do not operate the engine anti-ice system when the compressor inlet temperature is above 15°C.

NOTE: For ground checking, or when a malfunctioning anti-ice valve is suspected, the engine may be operated with a compressor inlet temperature above 15°C for a period of five minutes at any power setting, including takeoff, and for 20 minutes at IDLE power.

Engine Bleed Air Limits

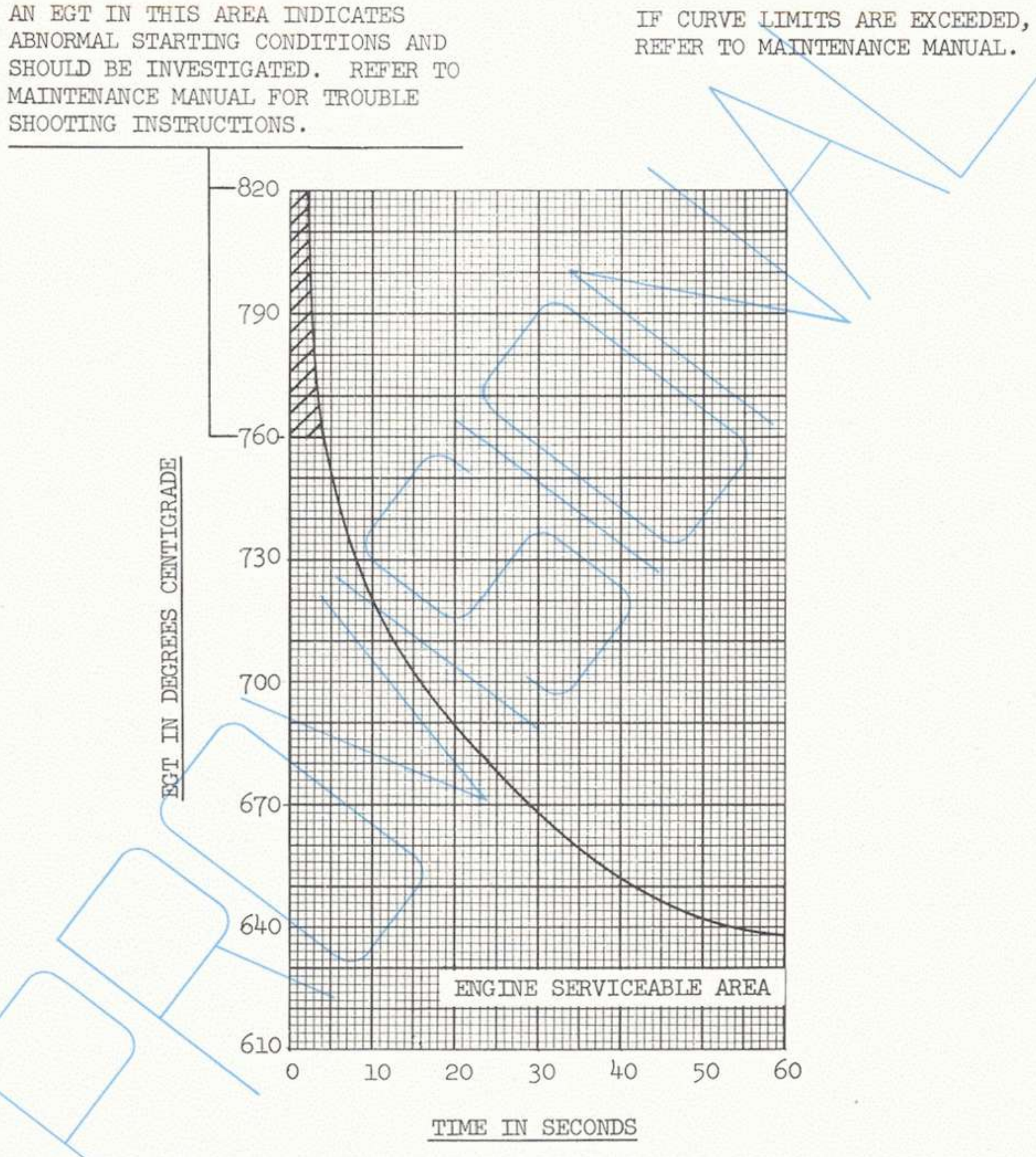
To avoid exceeding maximum allowable engine bleed air limits when anti-icing systems are operating, the following minimums shall be observed: (In all cases, engine anti-icing must be OFF on inoperative engines.)

1. During four engine operation, do not operate engines below 75 percent RPM between 10,000 and 22,500 feet.

2. During three engine operation do not operate engines:
   a. At less than 66 percent RPM below 10,000 feet.
   b. Below 77 percent RPM between 10,000 and 22,500 feet.

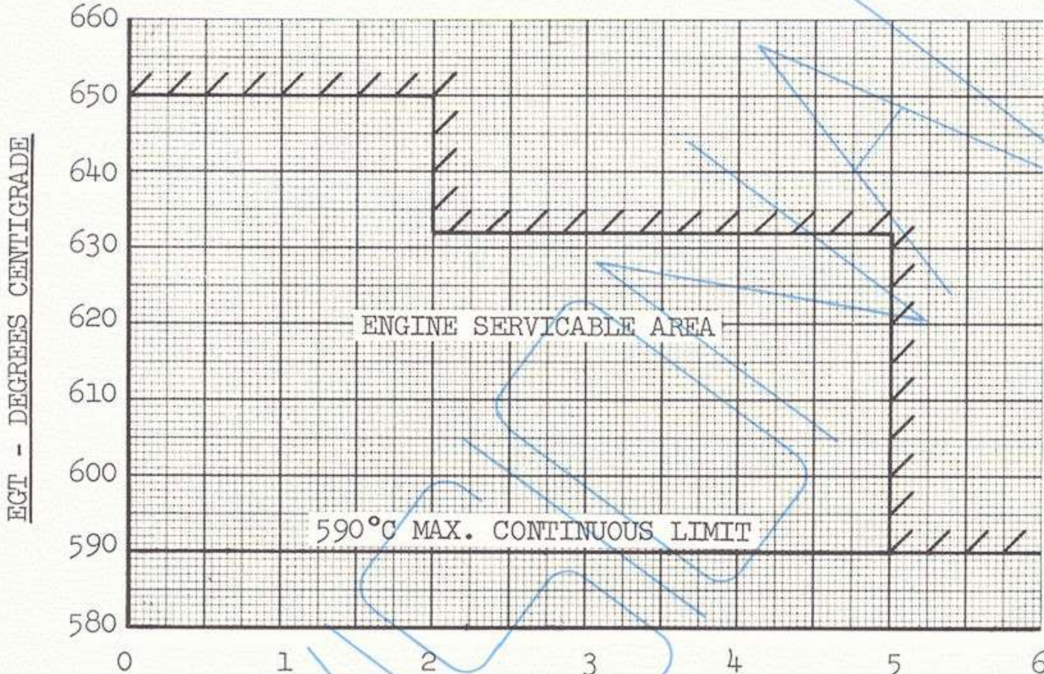
3. During two engine operation do not operate engines:
   a. At less than 73 percent RPM below 10,000 feet.
   b. Below 79 percent RPM between 10,000 and 22,500 feet.
   c. Between 90 and 95 percent RPM (inclusive) from 20,000 to 22,500 feet except in transient conditions.

EXHAUST GAS TEMPERATURE LIMITS
ENGINE STARTING
CJ 805-23



EXHAUST GAS TEMPERATURE LIMITS
ALLOWABLE TRANSIENT EGT FOR TAKEOFF
CJ 805-23

IF CURVE LIMITS ARE EXCEEDED, REFER TO MAINTENANCE MANUAL.



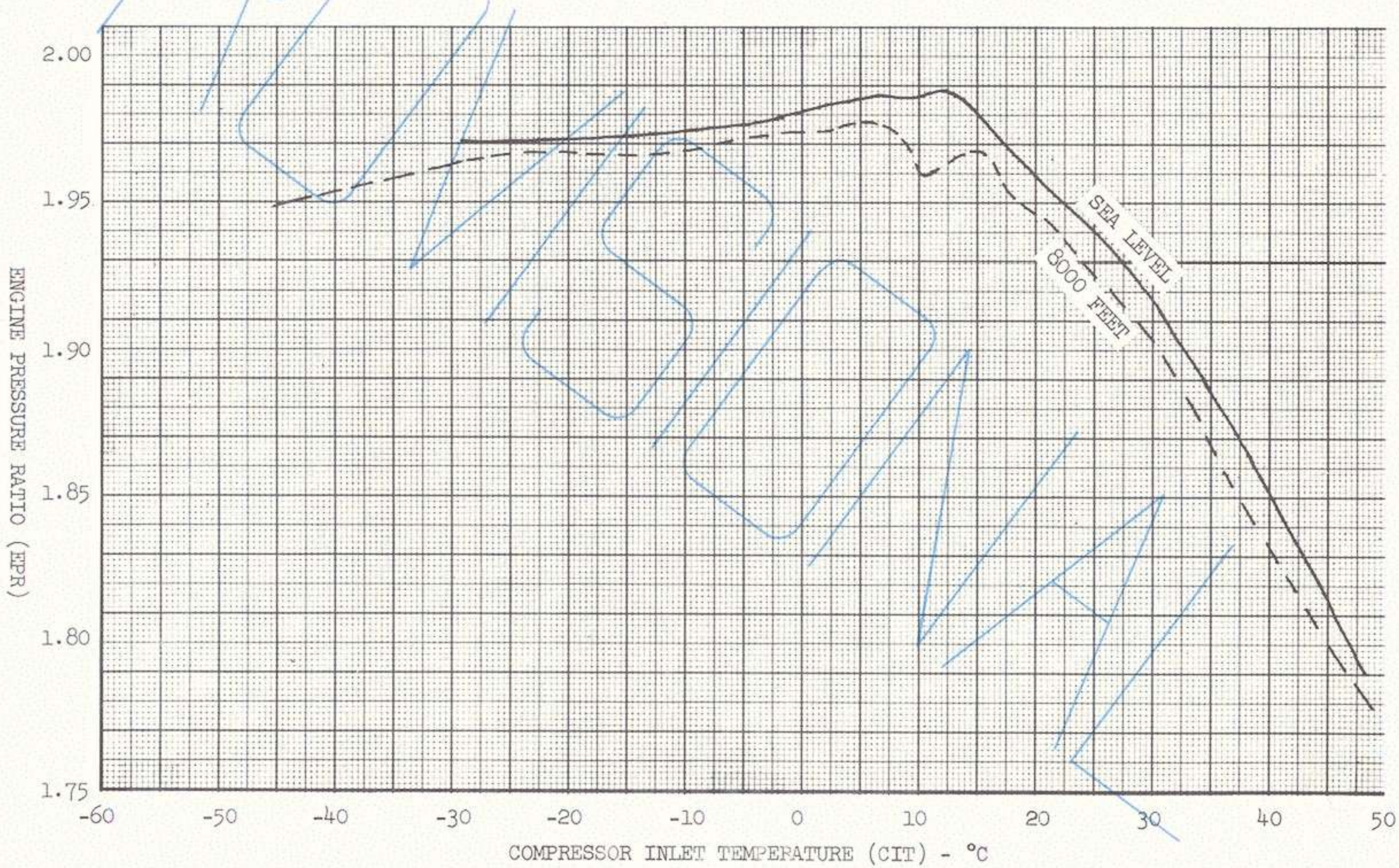
PERMISSIBLE DURATION OF EGT MAXIMUMS - MINUTES

NOTE: This time scale does not represent the chronological time sequence during the takeoff run and flight path. For example, a 650 degree temperature might occur for 2 minutes at a period 30 to 45 seconds after initiating takeoff.

MINIMUM TAKEOFF EPR VS CIT - CJ 805-23

NOTES: 1. EPR must not be less than value indicated for appropriate ambient pressure and temperature prior to brake release. Increase power setting to a higher EPR level only if required to raise fan speed to minimum level.

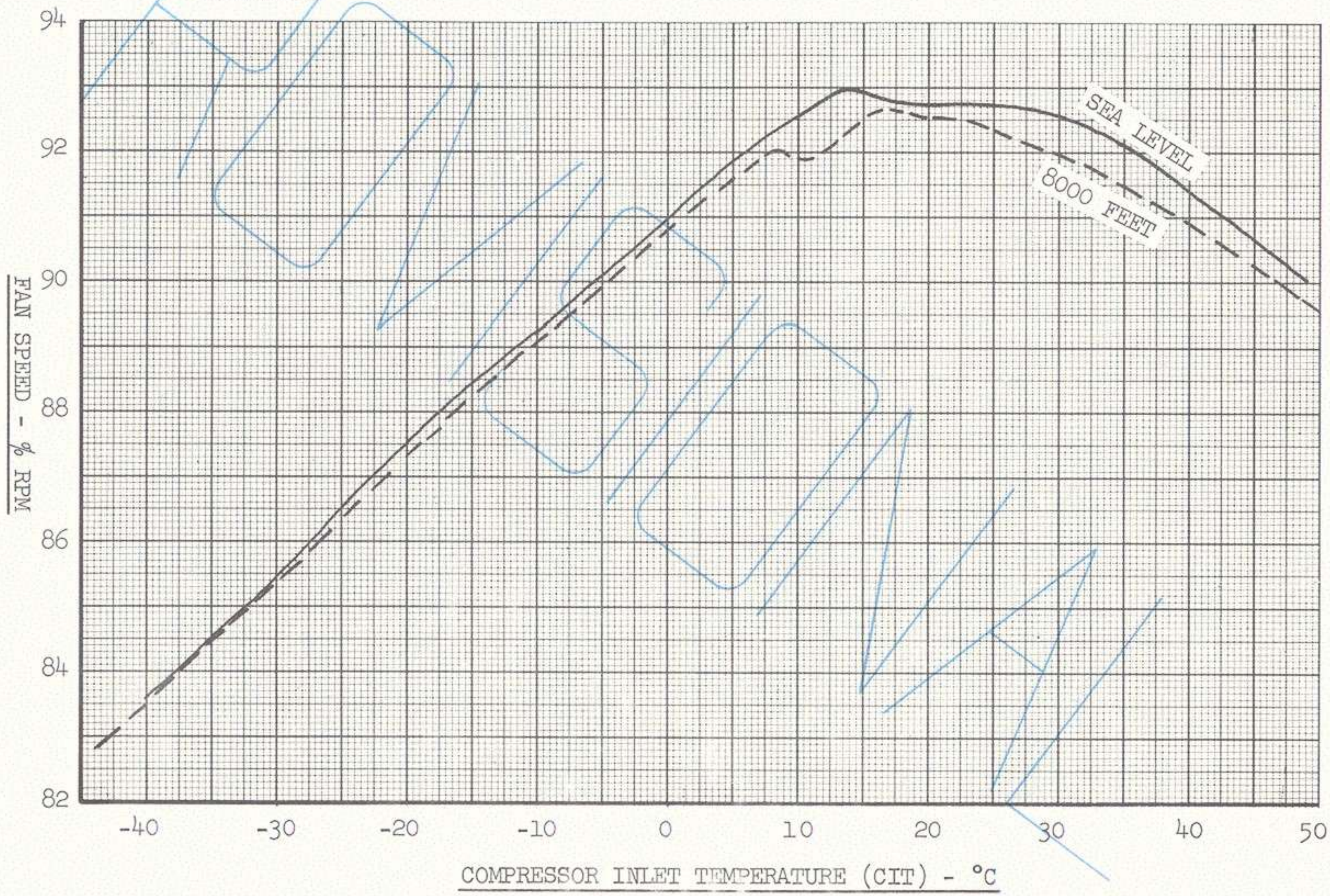
2. If windshield rain clearing is in use, shut down one turbocompressor and, with pneumatic driven Freon packs, one Freon pack. If rain clearing is not required, both turbocompressors and Freon packs can be on.



MINIMUM TAKEOFF FAN SPEED VS COMPRESSOR INLET TEMPERATURE

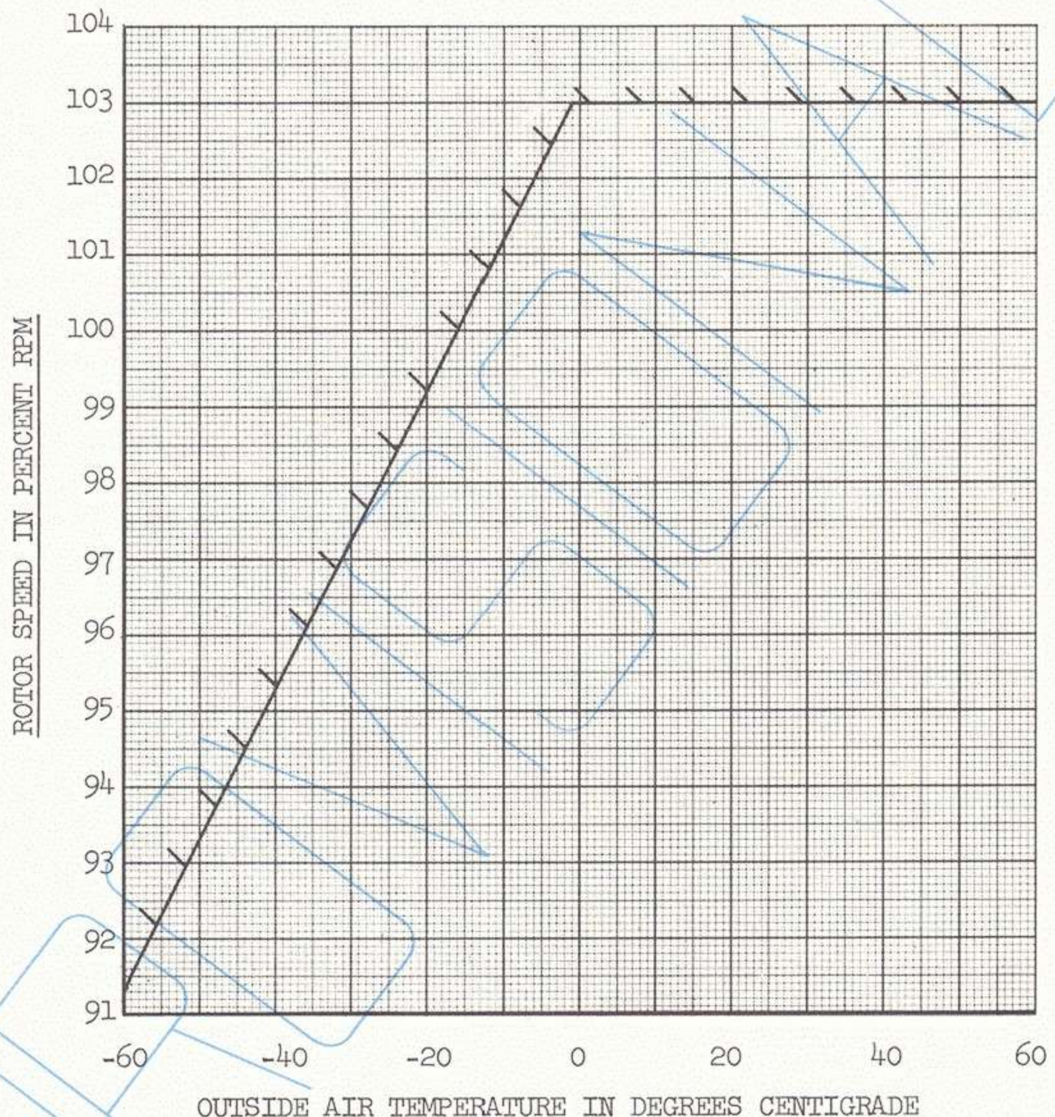
NOTE: 1. Fan speed must be equal to or above the minimum value shown for the appropriate ambient conditions, (but below the maximum fan speed limit), when the minimum EPR value is obtained.

2. If fan speed is below the minimum when EPR minimum is obtained, increase power setting until the fan speed is at minimum.



ENGINE ROTOR SPEED LIMIT
CJ 805-23 Turbojet Engine

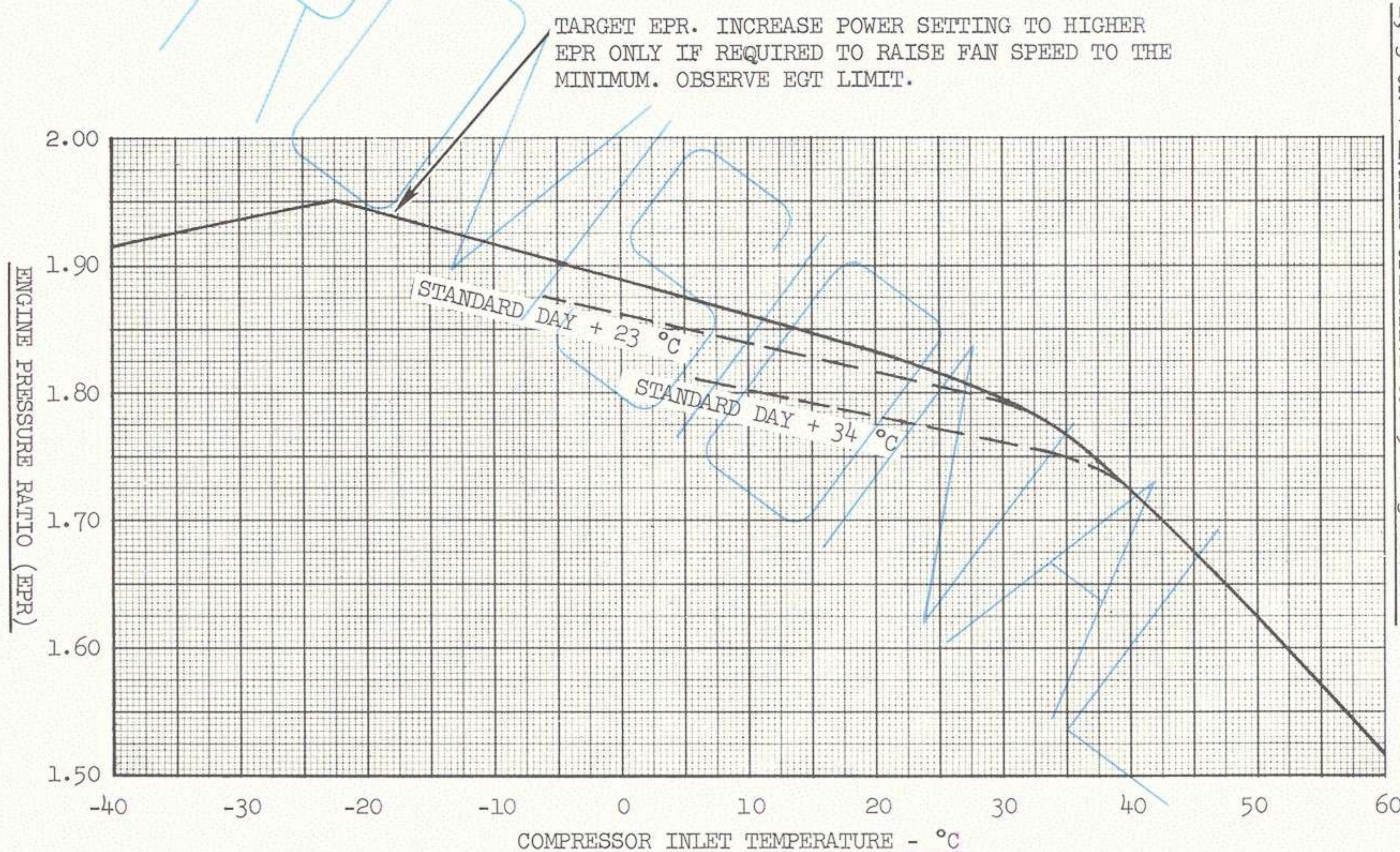
NOTE: Maximum allowable fan speed is 99.4%.



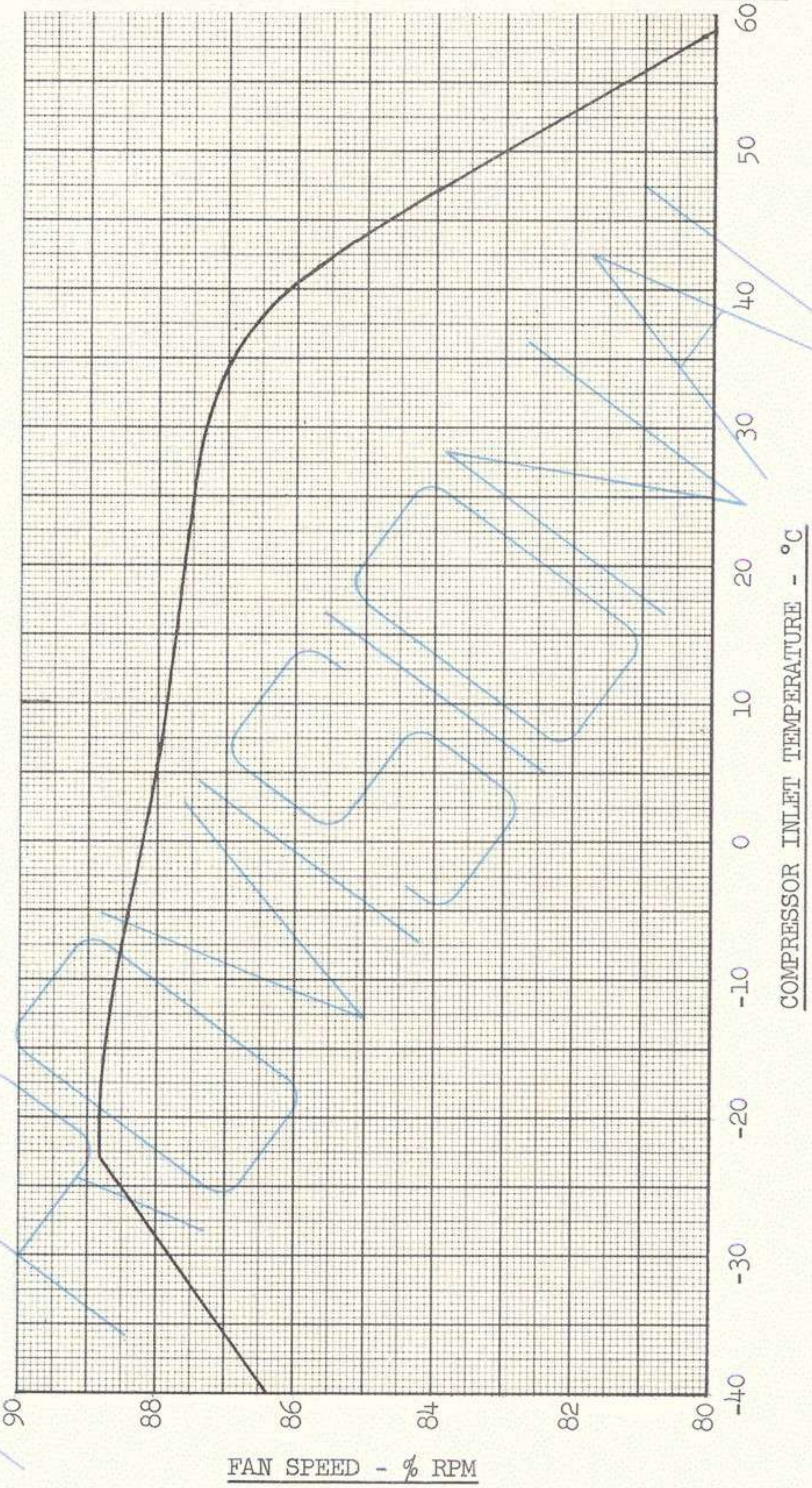
NOTE: Physical rotor speed is determined by power lever setting.

POWER SETTING CHART FOR CLIMB MAXIMUM CONTINUOUS POWER
2, 3 OR 4 ENGINES OPERATIVE CJ805 - 23 ENGINES

NOTE:
1. Maximum continuous EGT limit is 590 °C. Reduce power to avoid exceeding this limit. Dashed lines show EPR levels expected for EGT-limited operation with hot day temperatures indicated.
2. Fan speed must be above minimum when EPR is at minimum except when EPR is reduced in EGT limited operation.
3. All bleed air anti-icing must be off above 22,500 feet.

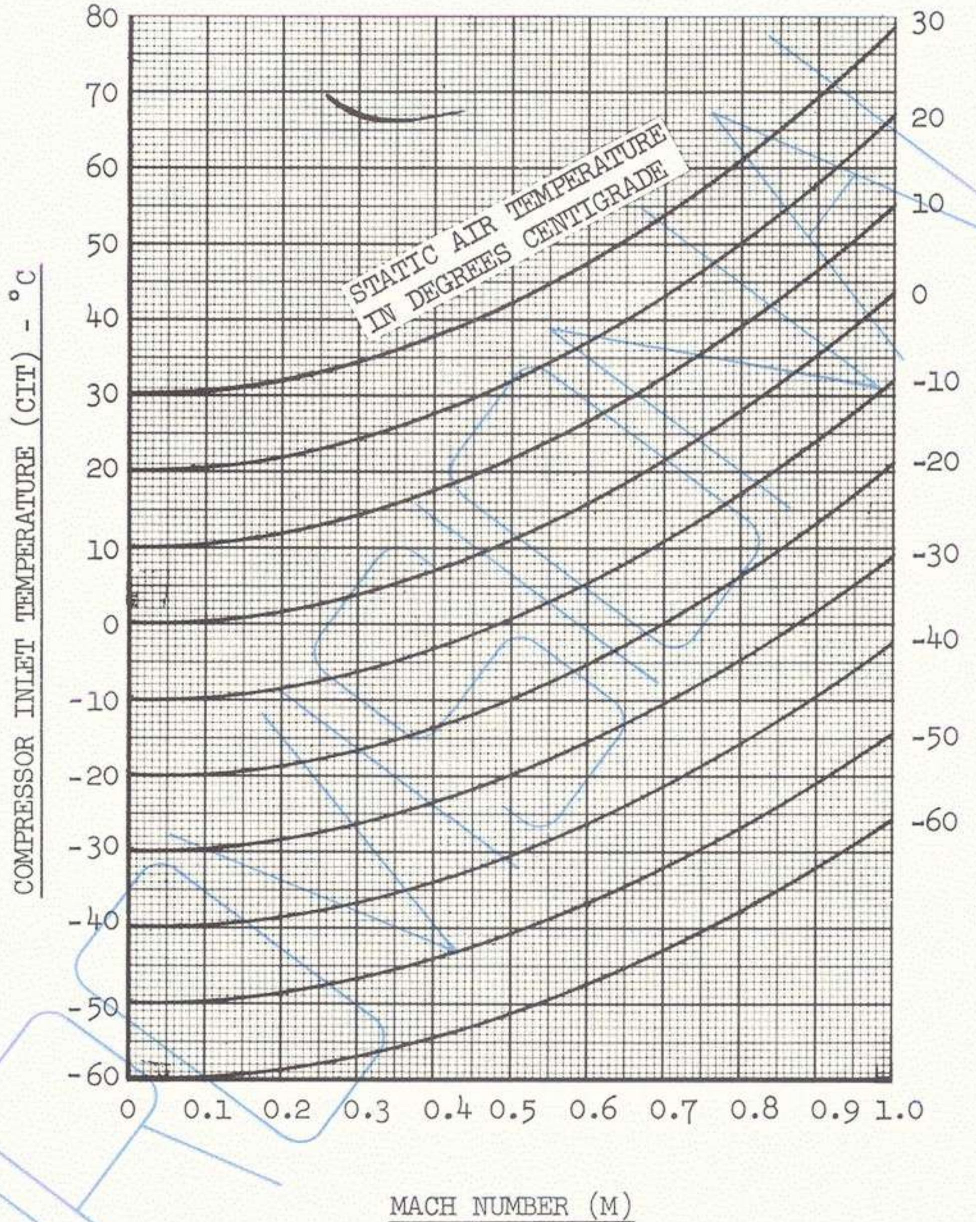


MINIMUM FAN SPEED CHART FOR CLIMB
MAXIMUM CONTINUOUS POWER 2, 3 OR 4 ENGINES OPERATIVE

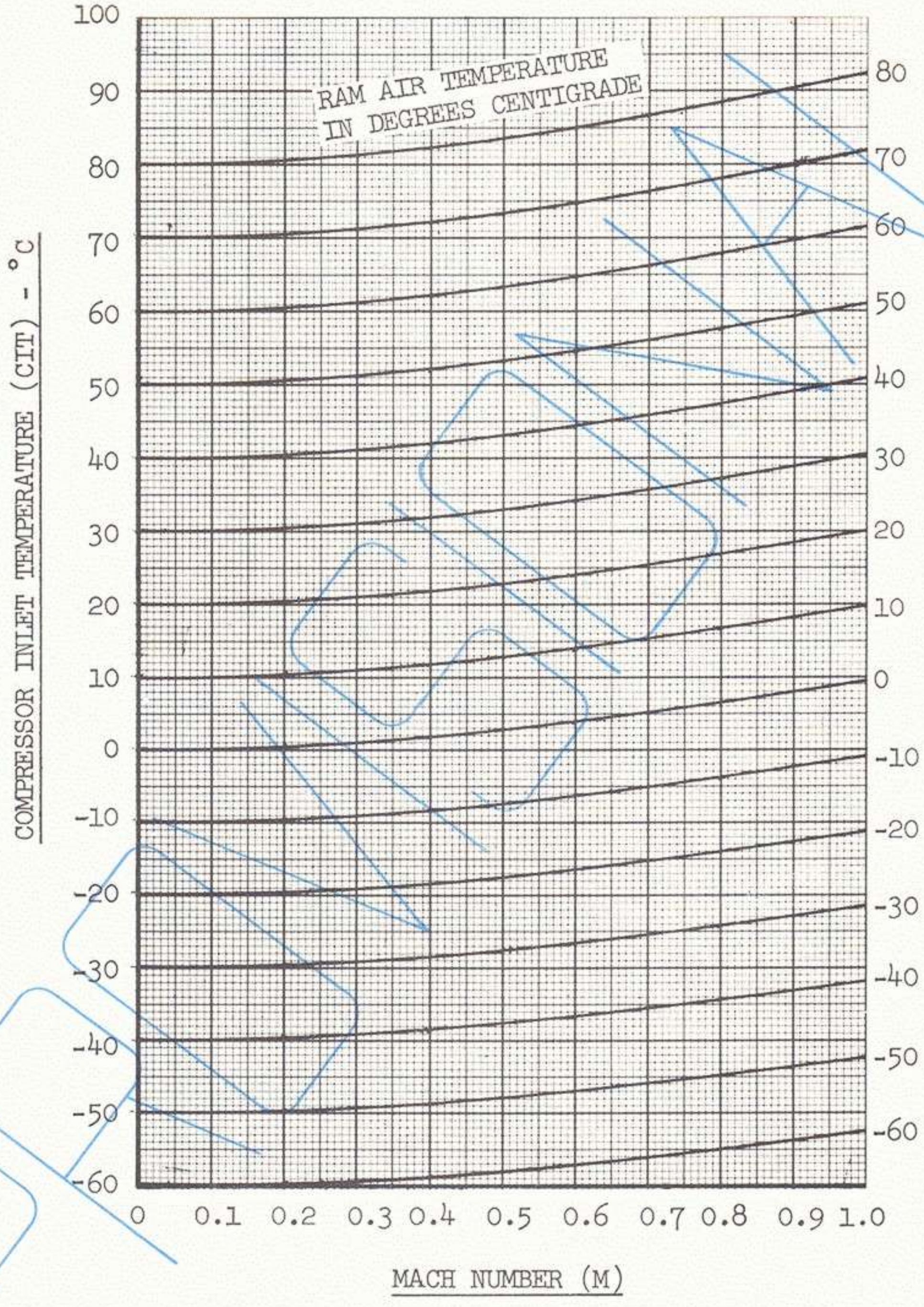


NOTE: Fan speed must be above minimum when EPR is at minimum except when EPR is reduced in EGT limited operation.

CIT CONVERSION
Static Air Temperature (SAT)



CIT CONVERSION
Ram Air Temperature - RAT



FUEL SYSTEM LIMITATIONS

Fuel in the Convair 990, Model 30, airplane is carried in four wing tank systems (two inboard and two outboard) and a five bay center section auxiliary system. The outboard wing systems consist of main, replenish and anti-shock body tanks. The inboard wing system consists of a large tank located between the front spar and the rear spar with a free flow of fuel through the center spar, and an anti-shock body tank. When reference is made to inboard replenish tanks, reference is intended to that portion of the inboard tank located between the front spar and the center spar.

Fuel Temperature Limits

At the engine fuel control inlet................0°C to +71°C (32°F to 159.8°F)

NOTE: If the engine fuel control inlet temperature goes below 0°C, the fuel temperature should be monitored. An increase in engine RPM to maintain minimum temperature may be required.

At the fuel tank........................... -40°C to +54°C (-40°F to 129.2°F)

NOTE: At ambient temperatures below -1°C and altitudes below 15,000 feet, engine RPM must be 70%, or greater, or the fuel control inlet temperature must be monitored and maintained above 0°C.

Fuel Jettison Limitations

Fuel jettison must be accomplished in such a manner as to stay within the requirements of the Takeoff and Landing Fuel Distribution Limits and the Inflight Asymmetric Fuel Distribution Limits included in Section 1, CERTIFICATE LIMITATIONS, of this Flight Manual.

Boost and Transfer Pump Limitations

Single Boost Pump Failure: Power reduction may be required for climb above 26,000 feet if a second pump fails.

Failure of Inboard Main or Outboard Tank Transfer Pumps:

1. With a fuel quantity of 1500 pounds or more per tank (6000 pounds or more total airplane) no action is required.
2. With less than 6000 pounds (total airplane) or less than 1500 pounds in the tank having an inoperative transfer pump, crossfeed the affected engine to the adjacent tank on the same side. Do not shut off the affected tank line valve.

Failure of Anti-Shock Body Tank Transfer Pumps:

Maintain extra fuel in the inboard tanks to balance any fuel trapped in any ASB tank. The difference between the inboard and outboard tanks (main and replenish) should be double the quantity trapped in the anti-shock bodies. Observe speed restrictions if applicable.

Fuel Loading Limitations

FOR AIRPLANE SERIAL NUMBERS: -1, -2, -3, -4, -9, -10, -16, -18, -21, -22, -23, -24, -26, -27, -31, -32, -43, -44, -45, -49, -50, -51, -52, -54, -55

WING TANKS ONLY	U.S. GALLONS	POUNDS
Maximum refuel quantity	10,890	76,230
Usable fuel quantity	10,791	75,537

Note that the limiting value, regardless of fuel density, temperature or type, is 10,890 U.S. Gallons or 76,230 pounds, whichever occurs first in loading.

CENTER SECTION TANK	U.S. GALLONS	POUNDS
Maximum refuel quantity	3,125	21,875
Usable fuel quantity	3,113	21,791

Note that the limiting value, regardless of fuel density, temperature or type, is 3,125 U.S. Gallons or 21,875 pounds, whichever occurs first in loading.

INBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	708	4,956
Usable fuel quantity	705	4,935

Note that the limiting value, regardless of fuel density, temperature or type, is 708 U.S. Gallons or 4,956 pounds, whichever occurs first in loading.

OUTBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	436	3,052
Usable fuel quantity	432	3,024

Note that the limiting value, regardless of fuel density, temperature or type, is 436 U.S. Gallons or 3,052 pounds, whichever occurs first in loading.

OBSERVE SPEED RESTRICTIONS WHEN CARRYING OUTBOARD ANTI-SHOCK BODY FUEL

The total maximum refuel quantity for these serial numbered airplanes is 15,159 U.S. Gallons or 106,113 pounds, whichever occurs first in loading.

Fuel Loading Limitations (Cont.)

FOR AIRPLANE SERIAL NUMBERS: -5, -6, -7, -8, -11, -12, -14, -16, -17

WING TANKS ONLY	U.S. GALLONS	POUNDS
Maximum refuel quantity	10,890	76,230
Usable fuel quantity	10,791	75,537

Note that the limiting value, regardless of fuel density, temperature or type, is 10,890 U.S. Gallons or 76,230 pounds, whichever occurs first in loading.

CENTER SECTION TANK	U.S. GALLONS	POUNDS
Maximum refuel quantity	3,125	21,875
Usable fuel quantity	3,113	21,791

Note that the limiting value, regardless of fuel density, temperature or type, is 3,125 U.S. Gallons or 21,875 pounds, whichever occurs first in loading,

INBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	708	4,956
Usable fuel quantity	705	4,935

Note that the limiting value, regardless of fuel density, temperature or type, is 708 U.S. Gallons or 4,956 pounds, whichever occurs first in loading.

OUTBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	938	6,566
Usable fuel quantity	934	6,538

Note that the limiting value, regardless of fuel density, temperature or type, is 938 U.S. Gallons or 6,566 pounds, whichever occurs first in loading.

OBSERVE SPEED RESTRICTIONS WHEN CARRYING OUTBOARD ANTI-SHOCK BODY FUEL

The total maximum refuel quantity for these serial numbered airplanes is 15,661 U.S. Gallons or 109,627 pounds, whichever occurs first in loading.

Fuel Loading Limitations (Cont.)

FOR AIRPLANE SERIAL NUMBERS: -13, -19, -20

WING TANKS ONLY	U.S. GALLONS	POUNDS
Maximum refuel quantity	10,890	76,230
Usable fuel quantity	10,791	75,537

Note that the limiting value, regardless of fuel density, temperature or type, is 10,890 U.S. Gallons or 76,230 pounds, whichever occurs first in loading.

CENTER SECTION TANK	U.S. GALLONS	POUNDS
Maximum refuel quantity	3,170	22,197
Usable fuel quantity	3,158	22,106

Note that the limiting value, regardless of fuel density, temperature or type, is 3,170 U.S. Gallons or 22,197 pounds, whichever occurs first in loading.

INBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	708	4,956
Usable fuel quantity	705	4,935

Note that the limiting value, regardless of fuel density, temperature or type, is 708 U.S. Gallons or 4,956 pounds, whichever occurs first in loading.

OUTBOARD ANTI-SHOCK BODIES	U.S. GALLONS	POUNDS
Maximum refuel quantity	938	6,566
Usable fuel quantity	934	6,538

Note that the limiting value, regardless of fuel density, temperature or type, is 938 U.S. Gallons or 6,566 pounds, whichever occurs first in loading.

OBSERVE SPEED RESTRICTIONS WHEN CARRYING OUTBOARD ANTI-SHOCK BODY FUEL

The total maximum refuel quantity for these serial numbered airplanes is 15,706 U.S. Gallons or 109,949 pounds, whichever occurs first in loading.

Fuel System Operation Limitations

LOADING OF FUEL IN THE ANTI-SHOCK BODIES IS PROHIBITED. ALL INFORMATION IN THIS FLIGHT MANUAL REGARDING ASB FUEL MANAGEMENT AND LOADING IS TO BE DISREGARDED.

Takeoff must be made tank to engine without utilizing crossfeed systems. Observe outboard ASB speed restrictions.

C.G. Limitations with Trapped Center Section Fuel

If both center section tank boost/jettison pumps are inoperative one of the following two conditions must be met to insure that the airplane is within proper CG limits.

1. With any amount of trapped center section fuel, the takeoff CG must be aft of 24% M.A.C., or, if not aft of 24%;

2. The total outboard fuel must be at least 1000 pounds greater than total inboard fuel plus the center section fuel at time of landing.

Fuel Balance Limitations

The fuel balance limitations for loading and all flight operations are controlled by the loading and fuel usage procedures in the Weight and Balance Report, the limitations and conditions of which must be observed at all times.

Inflight Asymmetric Fuel Distribution Limits

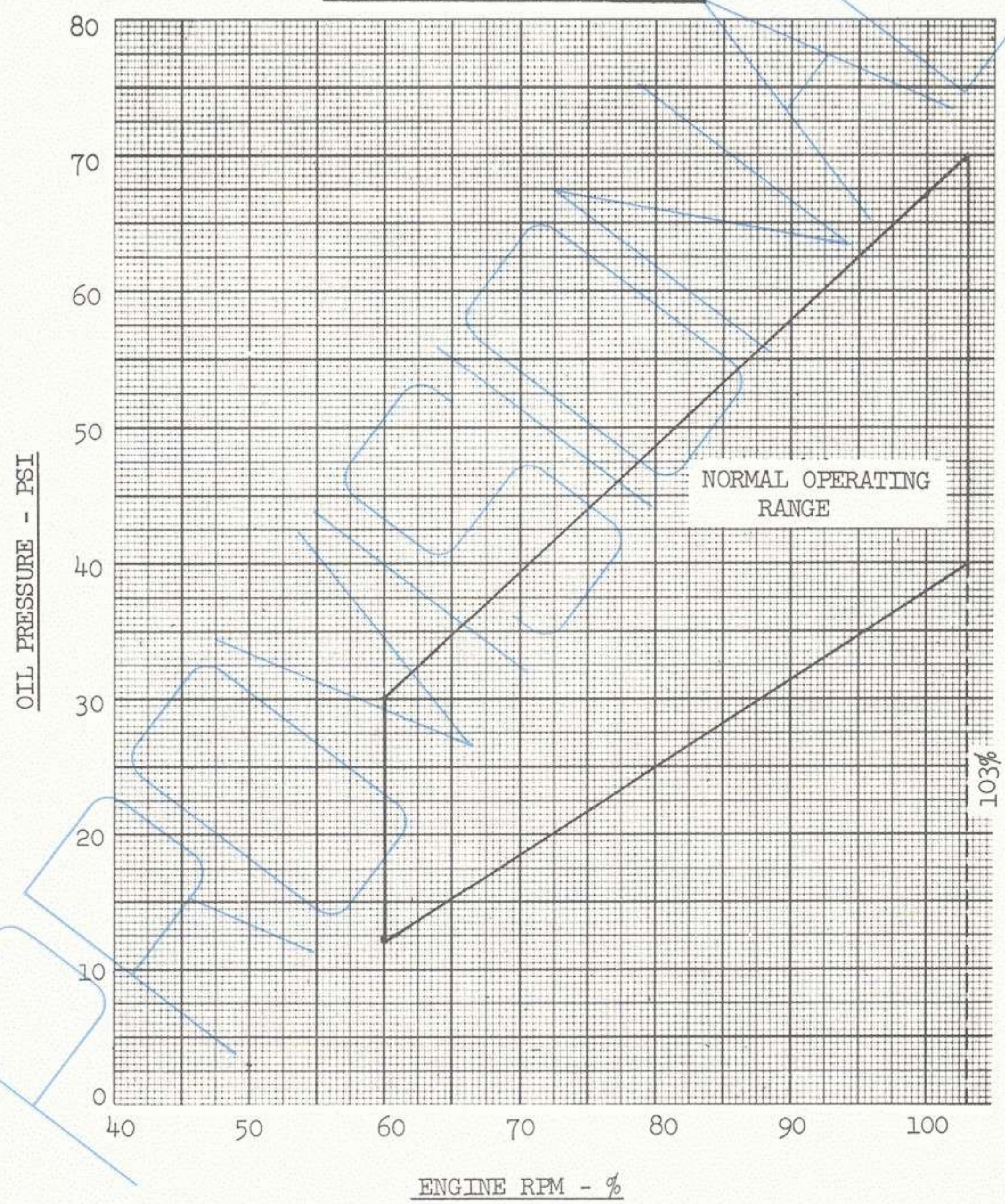
Inflight asymmetric fuel distribution limits must not exceed 150,000 foot pounds, refer to Section 2, EMERGENCY PROCEDURES, for determination of values.

OIL SYSTEM LIMITATIONS

Start pressure........................A positive pressure indication which may peak to 200 psi under extreme cold conditions (-40°C). The actual engine oil pressure may range as high as 500 to 600 psi during such cold starts. The engine oil pressure guages are protected by a by-pass system when pressure exceeds 200 psi.

Oil temperature normal range is 38°C to 149°C. Maximum oil temperature is 149°C.

OIL PRESSURE-ALL OPERATIONS



AIRPLANE TAKEOFF

V_1 Speed Determination

1. Field length limited.

   When the available field length does limit maximum takeoff gross weight, the V_1 speed shown in this Flight Manual for the gross weight and takeoff conditions must be used.

2. Not Field length limited.

   When the available field length does not limit the takeoff grosssweight, a new V_1 speed may be selected which must not exceed either the scheduled V_R speed or a V_1 speed based on the allowable takeoff gross weight for the available field length.

Takeoff Procedure, All Engines Operating During Takeoff

Prior to takeoff, review stabilizer setting, EPR/FAN minimum settings, V_1 speed, V_R speed and V_2 climb speed for actual takeoff conditions. Initiate takeoff by aligning with the runway and apply thrust, prior to brake release, as follows:

1. Advance power levers to obtain required takeoff EPR. If the EPR cannot be attained promptly without exceeding 650°C limit, reject takeoff.
2. Check RPM to determine that RPM does not exceed maximum limit. (Fan and engine)
3. Advance power if necessary to increase fan speed to minimum required.
4. If EGT on any engine exceeds 640°C, retard throttle to 640°C immediately prior to brake release. EPR or fan speed shall not be less than minimum required for takeoff.
5. Release brakes.

   NOTE: Engine must be controlled after takeoff to comply with transient EGT limits. Adherence to transient EGT takeoff limits will insure certificated airplane performance.

During the takeoff run, monitor engine performance and airspeed indicator. Nose wheel steering is used for directional control until the rudder becomes effective at approximately 80 knots. In order to attain the scheduled field lengths and takeoff flight paths, initiate rotation for liftoff at scheduled V_R. With all engines operating, the scheduled V_2 speed will be attained prior to the 35 foot altitude. Allow aircraft to accelerate, using a positive climb gradient which will assure clearance of all obstacles.

Takeoff Procedure, Engine Failure During Takeoff

1. Engine Failure Prior to V_1 Speed

   If the engine failure occurs prior to attaining V_1 speed, apply wheel brakes, retard all engines to IDLE immediately and extend wing spoiler speedbrakes fully. Reverse thrust should be applied; however, the CAR field lengths quoted in this Flight Manual were computed without consideration of the benefits of reverse thrust.

2. Engine Failure After V_1 Speed

   If engine failure occurs after attaining V_1 speed, the takeoff must be continued. At the scheduled V_R speed, rotate the airplane smoothly to liftoff attitude and maintain the scheduled V_2 climb speed.

Three Engine Takeoff Procedure Requirements

In order to attain the scheduled field lengths and takeoff flight paths, the following procedures should be employed:

1. Initiate rotation at the scheduled V_R speed. Adjust rate of rotation to attain V_2 speed at a height 35 feet above the runway surface.

2. Above the 35 foot height, maintain the attained airspeed. Do not allow this to be less than V_2 or greater than V_2 + 10 knots.

3. Follow scheduled flight path procedures, using speeds not in excess of those scheduled, until clear of all obstructions.

AIRSPEED LIMITATIONS		KNOTS CAS	KNOTS IAS	MACH M	MACH Mi
The IAS and Mi values indicated herein are not corrected for the instrument error calibration of the individual instrument and include only the pilot's normal airspeed system position error.					
V_{NE}/M_{NE}	NEVER EXCEED SPEED WITH OUTBOARD ANTI-SHOCK BODIES EMPTY. The maximum glide or dive speed or Mach number. This limit is established to preclude inadvertently exceeding safe speeds or Mach numbers.	430	434	0.92	.916
	NEVER EXCEED SPEED WITH EMPTY TO 218 MAXIMUM GALLONS OF OUTBOARD ANTI-SHOCK BODY FUEL.	380	383	0.78	.789
	NEVER EXCEED SPEED WITH EMPTY TO 500 MAXIMUM GALLONS OF OUTBOARD ANTI-SHOCK BODY FUEL.	347	350	0.715	.723
V_{NO}/M_{NO}	NORMAL OPERATING LIMIT SPEED WITH OUTBOARD ANTI-SHOCK BODIES EMPTY. The maximum level flight or climb speed or Mach number V_{NO}/M_{NO} shall not be deliberately exceeded even during descent because of the possibility of excessive gust loads resulting from unexpected gusts. The range between V_{NO} and V_{NE} is to provide for inadvertent speed increase and shall not be deliberately used in normal operation.	375 at sea level to 415 at 21400 feet	378 419	0.91	.91
	NORMAL OPERATING LIMIT SPEED WITH EMPTY TO 218 MAXIMUM GALLONS OF OUTBOARD ANTI-SHOCK BODY FUEL.	355	358	0.78	.789
	NORMAL OPERATING LIMIT SPEED WITH EMPTY TO 500 MAXIMUM GALLONS OF OUTBOARD ANTI-SHOCK BODY FUEL.	320	323	0.715	.723
V_B	GUST PENETRATION SPEED	300	303	0.91	.91
V_{FE}	FLAPS AND SLATS EXTENDED SPEEDS				
	Flaps, slats and Kruegers extended 10°	245	247	0.60	.606
	Flaps, slats and Kruegers extended 27°	240	242	0.585	.591
	Flaps, slats and Kruegers extended 36°	220	222	0.510	.515
	Flaps DOWN. OPERATING SPEED	195	197	0.40	.403
	EXTENDED SPEED	210	212	0.40	.403

AIRSPEED LIMITATIONS (CONT.)

		KNOTS		MACH	
		CAS	IAS	M	Mi
V_A	MANEUVERING SPEED. Severe maneuvering shall be limited to speeds below those shown on page . Pilot recognition of hazardous flight attitudes and observation of stall warning is required at all speeds.	--	--	--	--
	SPEED STABILITY LIMITATION. The speed stability system must be in operating condition and turned on for all flight operations when observing airspeed limitations shown above. When the speed stability system becomes inoperative or malfunctions during flight, observe these limitations: (Observe ASB Speed Limits)				
	For emergency descent	400	403	0.83	0.84
	For climb, cruise and normal descent	360	363	0.78	0.789
	NOTE: The airplane shall not be operated in Air Carrier Service with an inoperative Speed Stability System beyond the next scheduled stop where repairs can be made.				
V_{LO}	LANDING GEAR OPERATING SPEEDS. The maximum speeds at which the landing gear may be lowered.	270	272	0.70	.708
	The maximum speed at which the landing gear may be retracted.	270	272	0.70	.708
V_{LE}	LANDING GEAR EXTENDED SPEED. The maximum speed at which the airplane can be operated with all landing gear extended.	320	323	0.83	.84
	LANDING LIGHT EXTENSION SPEED. The maximum speed for extending the landing light	250	252	--	--
	FUEL JETTISON SPEED. The maximum speed at which fuel jettison may be accomplished.	V_{NO}	V_{NO}	M_{NO}	M_{NO}

AIRSPEED LIMITATIONS (CONT.)		KNOTS		MACH	
		CAS	IAS	M	Mi
	INBOARD SPOILERS WHEN USED FOR LONGITUDINAL CONTROL. (Jammed horizontal stabilizer procedure.) The maximum speed with the spoilers split so as to use the inboard spoilers for longitudinal control during nose-up jammed stabilizer operation.	245	247	0.60	.606
V_{MCA}	MINIMUM CONTROL SPEED, One engine inoperative. (Sea level, standard day) For other V_{MCA} values, consult the chart in Section 4, PERFORMANCE INFORMATION.	110	111	--	--
	MAXIMUM SPEED WITH WINDSHIELD ANTI-FOG SYSTEM INOPERATIVE. (Effective only when operating below 10,000 feet pressure altitude.)	300	303	--	--
	LANDING GEAR DOOR SPEED LIMITATION. If the landing gear door unlocked warning light illuminates, during gear retracted flight operations, the airspeed must be reduced to:	270	272	0.70	0.70
	POWER RUDDER FAILURE LIMIT SPEED. The M_{NE}/V_{NE} speed when both hydraulic systems are off. ($M_{NE} = M_{NO}$)	375 at sea level to 415 at 21400 feet	378 419	.883	

INSTRUMENT COLOR CODES

Engine Instruments

Red radial line.................................... Limit of operation.
Yellow arc... Caution range.
Green arc.. Normal operating range.

NOTE: Minimum limits may also be marked by a red radial line. White radial lines are alignment check points.

Flight Instruments

Red radial line.................................... Limit of operation.
Yellow arc... Caution range.
Green arc.. Normal operating range.

NOTE: White radial lines are alignment check points.

Flap and Stabilizer Trim Indicators

White arc or radial line indicates landing, takeoff and approved operating range.

Airspeed Instruments

All instrument markings and placards in the airplane are shown as indicated (IAS, M_i) values and are not corrected for the applicable instrument's error.

Airspeed Indicator

V_{NE} = Red radial line with black crosshatch.

V_{NO} = Indicated by limit speed hand with black and yellow upper half and green and white lower half.

Machmeter

M_{NE} = Red radial Line with black crosshatch.

OPERATIONAL LIMITATIONS

Takeoff Limitations

Takeoff Limitations	Ranges
Altitude	-1000 feet to 8300 feet pressure altitude
Runway slope	0 to ± 2%
Tailwind component	0 to 10 knots
Temperature	See Chart on page 1-35.

Landing Limitations

Altitude.........................	-1000 feet to 8300 feet pressure altitude
Runway slope....................	0 to ±2%
Tailwind component.............	0 to 10 knots
Temperature.....................	See Chart on page 1-35

Enroute Limitations

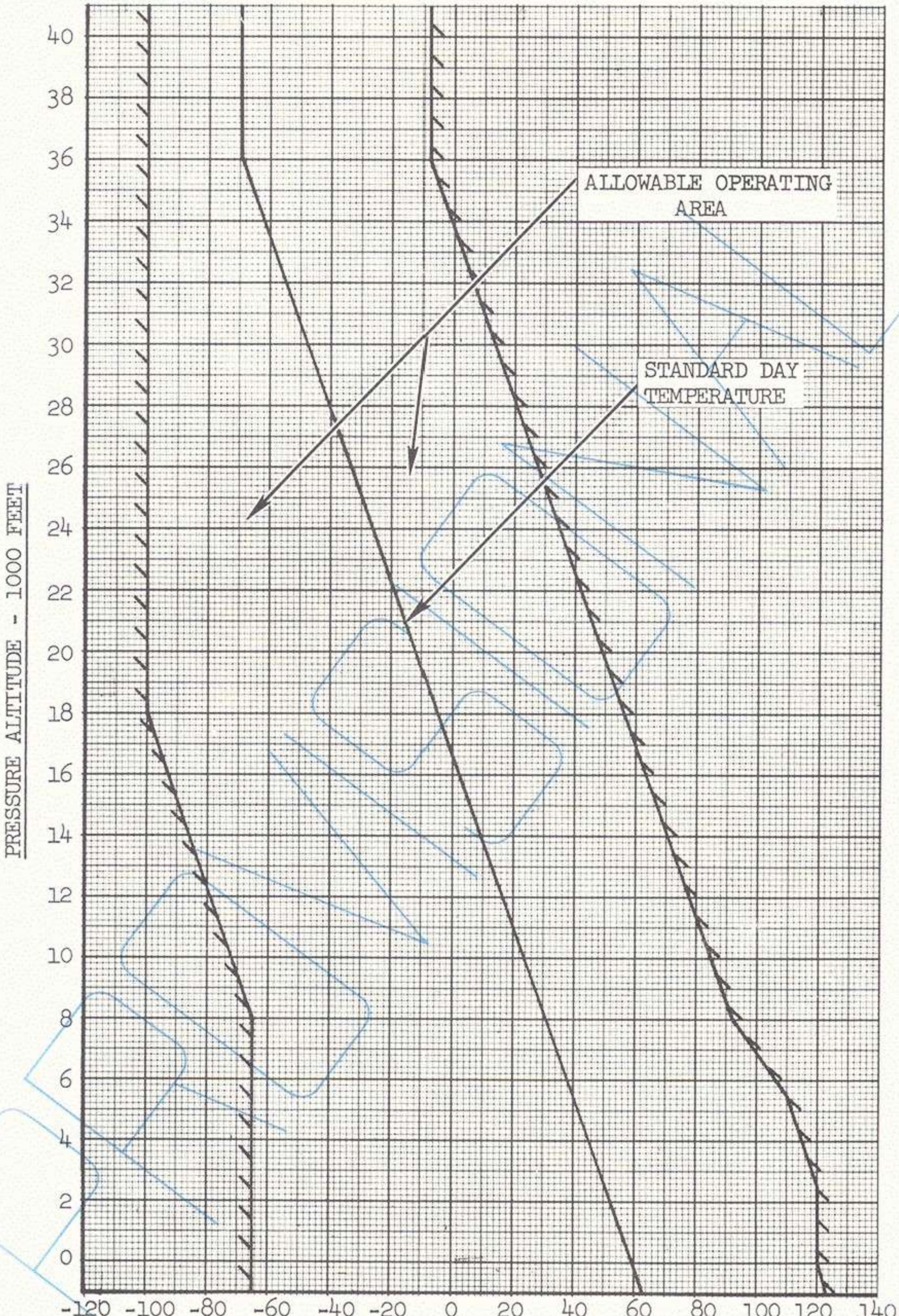
Altitude.........................	0 to 41,000 feet pressure altitude
Temperature.....................	See Chart on page 1-35

NOTE: Airplane operational data, based on various configurations of weight, temperature and field conditions within the above maximum airplane limitations is included in Section 1, CERTIFICATE LIMITATIONS and Section 4, PERFORMANCE INFORMATION, of this Flight Manual.

CRITICAL CROSSWIND LIMITATIONS

The maximum limiting crosswind value has not been determined. Refer to Section 4, PERFORMANCE INFORMATION, for demonstrated crosswind value.

TEMPERATURE OPERATIONAL LIMITS



FLIGHT LOAD ACCELERATION LIMITATIONS

Flaps, slats and Kruegers retracted:

1. At all speeds up to V_{NO}/M_{NO} .... -1.0g to +2.5g
2. At all speeds in excess of V_{NO}/M_{NO} .... 0.0g to +2.5g

Flaps, slats and Kruegers extended:

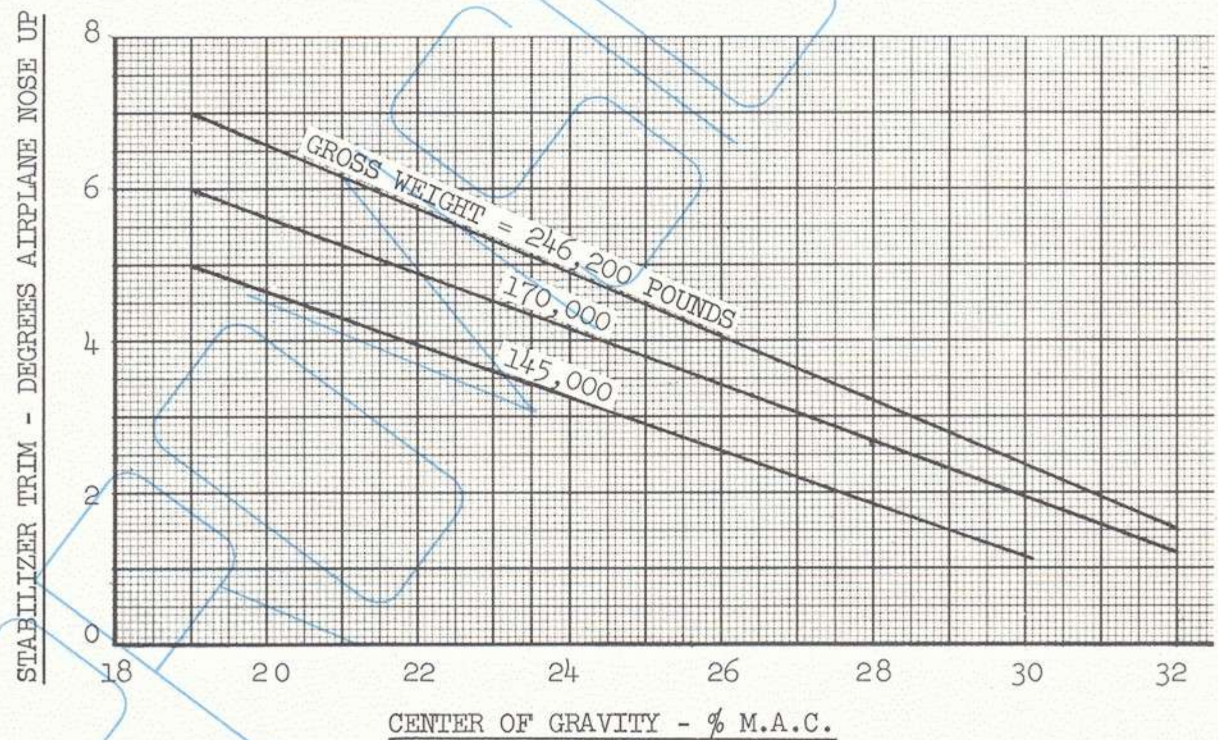
1. At all speeds up to V_{FE} .... 0.0g to +2.0g

Inboard spoilers when used as a longitudinal control device:

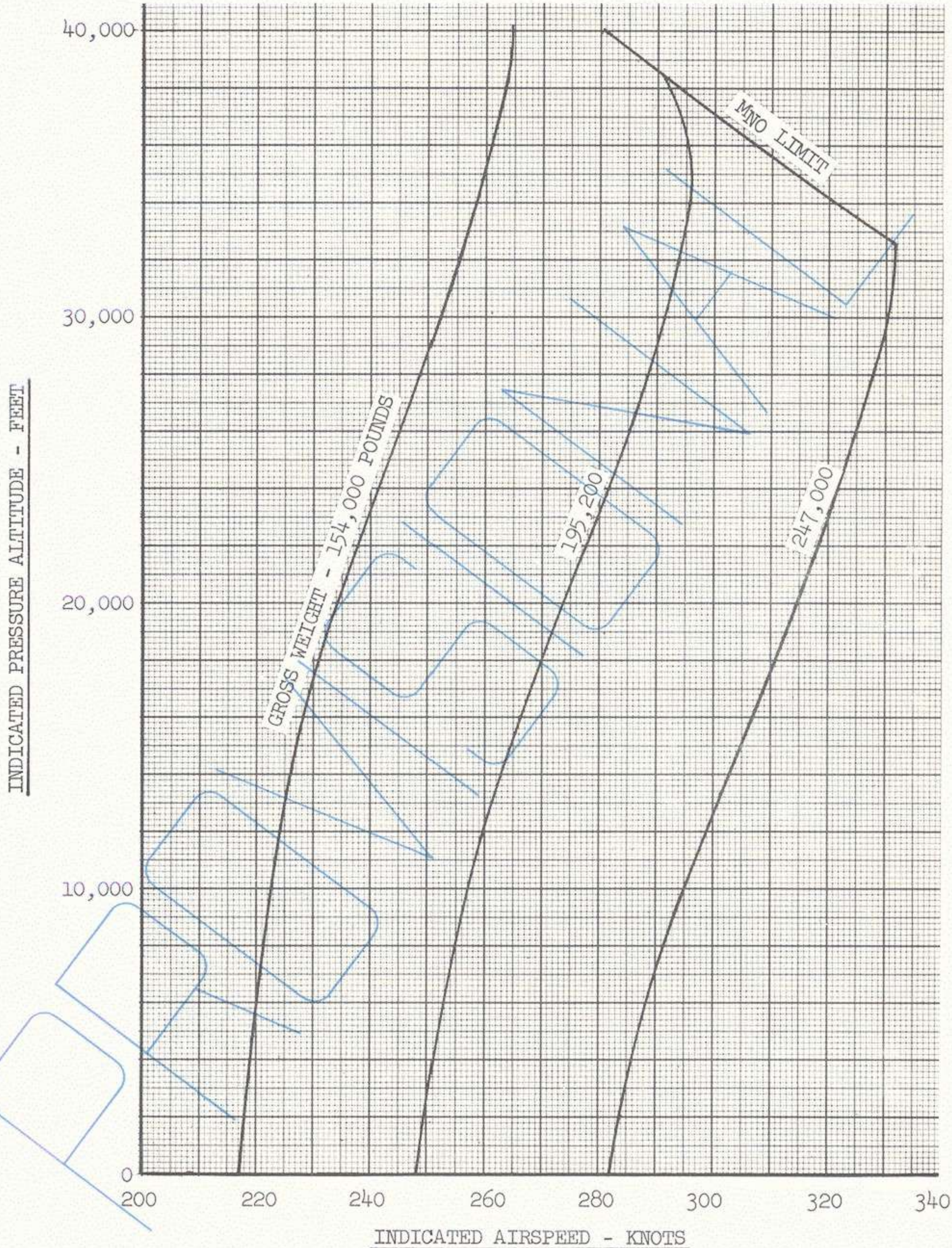
Airspeed limit 245 knots or Mach 0.60 .... 0.0g to +2.0g

HORIZONTAL STABILIZER SETTINGS FOR TAKEOFF (10 Degree Flap Setting)

Stabilizer takeoff settings have been approved as follows:



DESIGN MANEUVERING SPEED (V_A)



HYDRAULIC SYSTEM LIMITATION

The maximum allowable hydraulic fluid temperature is 80°C (180°F). Refer to Section 2, EMERGENCY PROCEDURES, for hydraulic system operation when an overheat condition is encountered.

SPEEDBRAKE/SPOILER SYSTEM LIMITATION

Do not extend the spoilers as speedbrakes beyond the placarded normal operating range. Speedbrake operation in the restricted range as placarded is permissible only for emergency descent, landing roll braking, and split spoiler emergency procedures.

AUTOPILOT AND YAW DAMPER LIMITATIONS

USE PROHIBITED

WINDSHIELD HEAT LIMITATION

To provide birdproof resistance, the windshield anti-ice or anti-fog systems must be ON for all operations. With either pilots' main or center windshield panel anti-fog system inoperative, airspeed must not exceed 303 knots IAS when operating below 10,000 feet pressure altitude.

RAIN CLEARING SYSTEM LIMITATIONS

Do not operate the system on the ground during pre-takeoff engine runup. Turn the system on immediately prior to brake release for takeoff and turn system off following airplane cleanup. System may be operated during normal cruising, approach, landing and taxiing maneuvers as required.

CAUTION: DO NOT USE THE RAIN CLEARING SYSTEM FOR PRE-FLIGHT WINDSHIELD ICE AND SNOW CLEARING ON THE GROUND.

GUST LOCK LIMITATIONS

Disengage gust lock after starting engines and do not re-engage until after engines are shut down.

CABIN PRESSURIZATION LIMITATIONS

Normal Operation................(41,000 foot altitude limit) 8.3 ± 0.1 psi
Relief Valve Setting.................................... 8.5 ± 0.1 psi

Cabin must be depressurized for takeoff and landing.

NORMAL STATIC PRESSURE SYSTEM LIMITATIONS

Failure of Pilot's Normal Static Pressure System

Prior to selecting the pilot's ALTERNATE static pressure system:

1. Deactivate the Speed Stability System circuit breaker.
2. Select pilot's ALTERNATE static system. Observe airspeed limits for Speed Stability System inoperative, Section 1, CERTIFICATE LIMITATIONS. Observe corrected airspeed values shown in the Alternate Airspeed Calibration Chart, Section 4, PERFORMANCE INFORMATION, and use the copilot's flight instruments as an immediate quick reference.

Failure of Copilot's Normal Static Pressure System

Select the copilot's ALTERNATE static source. Observe airspeed limits for Speed Stability System inoperative, Section 1, CERTIFICATE LIMITATIONS. Observe corrected airspeed values shown in the copilot's alternate airspeed chart, Section 4, PERFORMANCE INFORMATION, and use the pilot's flight instruments as a quick and immediate check.

ELECTRICAL SYSTEM LIMITATIONS WITH ELECTRIC DRIVEN FREON UNITS

Three generators operating - ground conditions:

1. The three generators must be paralleled.
2. One Freon compressor must be turned off.

Three generators operating - flight conditions:

1. The three generators must be paralleled when both Freon compressors are turned on.

Two generators operating - flight conditions:

The No. 1 and No. 4 non-essential load busses must be turned off by means of the LOAD REDUCTION switches, which include one Freon compressor.

One generator operative - flight conditions:

1. Both Freon compressors must be turned off.
2. The No. 1 and No. 4 non-essential load buses must be turned off by means of the LOAD REDUCTION switches.

ELECTRICAL SYSTEM LIMITATIONS WITH PNEUMATIC DRIVEN FREON UNITS

Three generators operating - ground conditions:

No limitations.

Three generators operating - flight conditions:

No limitations.

Two generators operating - flight conditions:

No limitations

One generator operating - flight conditions:

The No. 1 and No. 4 non-essential load busses must be turned off by means of the LOAD REDUCTION switches.

Electrical load reduction, as indicated in the various limitations noted above, will not be necessary if the electrical load does not exceed 45 KVA per generator under continuous operation. The generators are rated for a 50% overload for five minutes and a 100% overload for five seconds, based on a 40 KVA rating. These overload ratings must not be exceeded.

2 EMERGENCY PROCEDURES

TABLE OF CONTENTS

SECTION 2, EMERGENCY PROCEDURES

SECTION 2, EMERGENCY PROCEDURES (CONT.)

ENGINE-FIRE-FAILURE-OVERHEAT

FIRE

a. Power lever..................IDLE
b. Fuel shutoff lever............OFF
c. Wing isolation switch.........OFF
d. Fire-Pull "T" handle.........PULL
e. Extinguishing agent..........MAIN
f. Fuel system.................CHECK

NOTES

(1) If warning light extinguishes, re-check by placing Wing Isolation switch in MAN OPEN. If warning light illuminates, place switch to OFF.
(2) After 30 seconds, if fire persists discharge RESERVE agent.
(3) If fire still persists, clean up airplane and accelerate to V_{NO}.
(4) If fire persists, proceed to nearest facility and land.

FAILURE

a. Power lever..................IDLE
b. Fuel shutoff lever............OFF
c. Fire-Pull "T" handle.........PULL

OVERHEAT

a. Power lever..................IDLE
   After 10 seconds, if light still flashing:
b. Fuel shutoff lever............OFF
   After 30 seconds, if light still flashing:
c. Fire-Pull"T" handle..........PULL
d. Extinguishing agent..........MAIN
e. Fuel system.................CHECK

1. Pilots ess bus select........CHECK
2. Electrical power.............CHECK

UNCONTROLLABLE LOSS OF CABIN PRESSURE

1. Initiate emergency descent
2. Oxygen mask & interphone........ON
3. Crew emerg oxygen valves......OPEN
4. Manual Override Sw (Oxygen)...OPEN

EMERGENCY DESCENT

1. Oxygen mask & interphone....AS REQ
2. Power levers.................IDLE
3. Speedbrake handle........FULL AFT
   (.91M or 378 knots IAS)

ADDITIONAL DRAG ITEMS

4. Landing gear..................DOWN
   (.708M or 272 knots IAS)
5. Flaps.......................EXTEND
   (10° = 0.60M or 247 knots IAS)
   (27° = 0.58M or 242 knots IAS)
   (36° = 0.51M or 222 knots IAS)
   (DWN = 0.40M or 197 knots IAS)

AIRCRAFT FIRES

Descend to minimum practical altitude. Determine location and nature of fire. If smoke or fumes present, disconnect oronasal mask, use smoke masks on 100% oxygen and select smoke mask intercom.

Electrical Source (Attempt to isolate faulty circuit as follows:)

a. Pilots ess bus select.......#2 GEN
b. External power switch...........ON
   (All busses now isolated)
c. Generator switches 1, 3 and 4 OPEN to check for trouble source, then to CLOSE if not found.
d. Gen switch No. 2 OPEN to check for trouble source, then CLOSE if not found.
e. External power switch.........PARA
f. Pilots ess bus select......EXT PWR
g. No.'s 1 and 2 T/R units........OFF
h. Battery switch................EMER
i. All T/R's and battery..........OFF

Air Conditioning System (To isolate)

a. Cabin temp. equalizer..........OFF
b. Individual turbocompressors....OFF
c. Individual Freon units.........OFF
d. Alt. pressure sources.........OPEN

Cabin Source

a. Extinguish fire with portable units.
b. Remove smoke.

SMOKE REMOVAL

a. Cockpit air shutoff...........OPEN
b. Cabin altitude set..........10,000
c. Rate control...................MAX

Unpressurized Flight

a. Ram air switch................OPEN
b. Airplane IAS.................V_c/M_c
c. Pressure regulators......BOTH OPEN
   Smoke should clear in 30 seconds. Airspeed can be increased if greater airflow required.

JAMMED STABILIZER

a. Spoiler switch........PITCH MODE REQ
b. Speedbrake (Limited)......AFT AS REQ
(Hold 1.35V_S CAS minimum airspeed during approach to landing. Hold engine power ON during landing flare, then ease power off to IDLE.)

ELECTRICAL SYSTEM FAILURES

Generator Malfunction

a. Generator switch.................OFF
If overheat or drive malfunction warning continues:
b. Generator disconnect............DISC

Bus Malfunction

a. Bus tie switch..................OPEN
b. Generator line switch...........OPEN

T/R Malfunction

a. T/R switch.......................OFF

HYDRAULIC SYSTEM FAILURES

Pump Failure

a. Hyd system pumps............DE-PRESS
b. Landing gear handle..........NEUTRAL
c. Fluid quantity..................CHECK

Fluid Loss

a. Hyd system pumps............DE-PRESS
b. Landing gear handle..........NEUTRAL

Hydraulic Fluid Overheat

a. Fluid quantity..................CHECK

Flap/Slats Selector Sw.............CHECK

EMERGENCY LANDING GEAR EXTENSION

a. Airplane IAS.........170 to 250 KTS
b. LG EMER release handle.........DOWN
Gear lights..................3 green
Door light.........................red
Gear unsafe light..................red
c. Ldg gear hdle (if possible).....DOWN
Gear lights..................3 green
Door light.........................red
Gear unsafe light..................OUT

EMERGENCY BRAKE

a. Hyd system pressure & qty......CHECK
b. Anti-skid.........................OFF
When braking pressure depleted:
c. Emer air brake control........AS REQ

CABIN PRESSURIZATION FAILURE

a. Turbo fail or overheat...........OFF
If both turbocompressors fail, turn both off and:
b. Elect equip cooling valve......CLOSE
c. Alt. press sources............OPEN
d. Elect equip cooling fan.........ON

Freon Failure

a. Freon compressor...............OFF

Pressure Regulator Failure

a. Regulator control switch.....CLOSE
b. Regulate cabin differential pressure with other switch in AUTO position or manually by manual operation.

ANTICIPATED CRASH LANDING

a. Jettison and scavenge fuel
b. Depressurize early
c. Doors and exits: Unlock cabin doors and open emergency exits at pilot's discretion.
d. Emergency lights............AS REQ
e. Flaps...................FULL DOWN
f. Landing gear.................DOWN
g. Just prior to impact:
1. Fire pull "T" handles..ALL PULL
2. Battery switch.............OFF

FOR ANTICIPATED DITCHING, CONSULT THE DITCHING PROCEDURES, PAGE 2-23.

FUEL DUMPING

a. Jettison switches.............OPEN
Monitor fuel quantity and engine fuel supply routing. ASB XFER ON
b. Scavenge switches...........AS REQ
Monitor quantities and crossfeed inboard engines to outboard tanks as required.

Center Section

a. Set wing tank to engine operation
b. C/S crossfeed valves........CLOSED
c. C/S Jettison valves...........OPEN
d. Boost/jettison pumps............ON
(C/S and wing tanks 2 and 3 may be jettisoned simultaneously.)

ENGINE FLIGHT START

a. Windmilling speed........ABOVE 15%
b. Power lever...................IDLE
c. Fuel shutoff lever.............OFF
d. Fuel line valve...............OPEN
e. Boost pumps.....................ON
f. Engine starter switch.......FLIGHT
g. Fuel shutoff lever.............RUN
h. Light off. Monitor fuel flow, EGT and check generator.
i. Engine starter switch.........OFF

SECTION TWO

EMERGENCY PROCEDURES

ENGINE FIRE, FAILURE AND OVERHEAT CONDITIONS

Judgment and precision are as important as speed when proceeding to extinguish an engine fire. Actuating a wrong control could cause more trouble than a few seconds delay in controlling the fire.

ENGINE FIRE

Steady Fire Warning Lights and Steady Sounding Fire Bell

a. Reduce power lever setting to the IDLE position.
b. Place fuel shutoff lever to OFF position.
c. Place the affected wing Excess Heat and Isolation system switch in OFF position.

   If the fire warning has been caused by a break in the engine bleed air line, closing the isolation valve will stop bleed air flow in the affected wing.

d. Fire-Pull "T" handle should be PULLED.

   Actuation of the "T" handle shuts off the fuel supply at the firewall, shuts off the hydraulic suction and the engine bleed air. The hydraulic system low pressure warning lights are also disarmed.

e. Actuate the exposed extinguishing agent switch to the MAIN position.

1. The associated AGENT OUT light will illuminate. If the fire warning light extinguishes by this time, it may be due to steps taken to shut off the bleed air flow. Place the wing isolation switch in the MAIN OPEN position. If the fire warning light returns, the signal has been caused by a break in the bleed air system. If a greater emergency exists, it may be possible to restart and use the engine if the wing isolation switch is left in the closed (OFF) position.

2. If, after 30 seconds, the fire persists, actuate the extinguishing agent switch to the RESERVE position.

   The associated AGENT OUT light will illuminate.

3. If the fire still persists, clean up the airplane and accelerate to V_{NO}.

4. If fire continues, proceed to the nearest facility and land.

WARNING: AFTER THE FIRE HAS BEEN EXTINGUISHED, DO NOT ATTEMPT TO RESTART THE ENGINE UNLESS A GREATER EMERGENCY EXISTS.

NOTE: If the fuel contained in the shutdown engine's fuel tank is not to be used, the appropriate LINE VALVE switch, BOOST PUMP switches and REPLENISH pump switches should be placed in the OFF position. The load on operating generators should be checked. The pilot's essential bus selector switch should be placed on EXT PWR or an operating generator.

ENGINE FIRE ON THE GROUND

(During starting or ground operations)

a. Retard power lever to IDLE position.
b. Place fuel shutoff lever in OFF position.
c. Pull FIRE-PULL "T" handle.
d. Actuate exposed extinguishing agent switch to MAIN position.

NOTE: After the burning engine and adjacent engines have been stopped, ground crew personnel can assist in fire fighting.

After the fire has been extinguished, do not attempt to start the engine without investigation and inspectin as to the fire cause and possible damage.

ENGINE HOT START PROCEDURE

Hot starts (also considered as tail pipe burning) will cause a rapid increase in EGT and usually are readily visible to the ground crew as orange flame extending from the tail pipe.

1. Place fuel shutoff lever in OFF position.
2. Continue operation of the starter by holding the starter switch in the ground position until the flame is out.

ENGINE FAILURE DURING TAKEOFF

If the engine fails prior to reaching the V_1 speed (critical engine failure speed) retard power levers and stop, using reverse thrust of operating engines, spoiler speedbrakes, wheel brakes and nose wheel steering.

If the engine fails at V_1 speed or above, continue the takeoff. Retract landing gear as soon as airplane is definitely airborne.

a. Retard failed engine power lever to IDLE position.
b. Place failed engine fuel shut-off lever in OFF position.
c. Pull FIRE PULL "T" handle for failed engine.

1. Adjust the trim of the airplane.

   NOTE: With one engine inoperative, the aileron and rudder are an effective means of controlling asymmetrical thrust reactions.

2. Adjust power on remaining engines as required.

CAUTION: DO NOT USE THE FIRE PULL "T" HANDLE TO SIMULATE ENGINE FAILURES DURING CREW TRAINING EXERCISES. WINDMILLING OF THE ENGINE WITH THE HANDLE PULLED WILL RESULT IN DAMAGE TO THE HYDRAULIC PUMP. RAPID DIFFERENTIAL COOLING MAY IMPOSE UNDUE WEAR ON THE ENGINE.

3. If takeoff weight is in excess of maximum landing weight, refer to the fuel jettison procedure.

ENGINE FAILURE ENROUTE

a. Reduce power lever setting to the IDLE position.
b. Place fuel shutoff lever to OFF position.
c. Pull fire-pull "T" handle for failed engine.

   1. Adjust the trim of the airplane.
   2. If the fuel contained in the shutdown engine's fuel tank is not to be used, the appropriate LINE VALVE switch, BOOST PUMP switches and REPLENISH pump switches should be placed in the OFF position. The load on operating generators should be checked.

FOUR ENGINE FLAMEOUT - RESTART PROCEDURE

If, through incorrect fuel management, all four engines simultaneously flame out, they may be restarted as follows:

1. Fuel shutoff levers......................all OFF
2. Power levers............................all IDLE
3. Battery switch..........................EMERGENCY
4. Emergency Ignition ....ON (See Note 3)
5. Pilot's Essential Bus Selector...........First engine to be started
6. Bus Tie switches........................all OPEN
7. Use normal air start procedure.

NOTE:
1. Two engines can be started simultaneously.
2. Leave all generators isolated until at least two engines are operating.
3. Inverter use during normal or training operations should not exceed 12 minutes "ON" per hour, whether intermittent or continuous operation.

ENGINE OVERHEAT

Flashing Fire Warning Lights and Steady Sounding Fire Bell.

a. Reduce power lever setting to the IDLE position. If, after 10 seconds, the fire warning lights continue to flash:
b. Place the fuel shutoff lever to the OFF position. If, after 30 seconds, the fire warning light continues to flash; assume a fire and:
c. Pull the FIRE PULL "T" handle.
d. Actuate the exposed extinguishing agent switch to the MAIN position.

The associated AGENT OUT light will illuminate.

1. If, after 30 seconds, the fire persists, actuate the extinguishing agent switch to the RESERVE position.

   The associated AGENT OUT light will illuminate.

2. If the fire still persists, clean up the airplane and accelerate to V_{NO}.

3. If the fire continues, proceed to the nearest facility and land.

NOTE: If the fuel contained in the shutdown engine's fuel tank is not to be used, the appropriate LINE VALVE switch, BOOST PUMP switches and REPLENISH pump switches should be placed in the OFF position. The load on operating generators should be checked.

WHEEL WELL FIRE INDICATION

Flashing Overheat Light and Steady Sounding Fire Bell.

If the wheel well fire and overheat light illuminates, immediately lower the landing gear. Observe landing gear speed limits.

MISSED APPROACH PROCEDURE-FOUR ENGINES OPERATING

Flaps DOWN.
Landing gear extended.
Airplane speed at V=REF (1.3V_S CAS).

1. Power levers.............................. Takeoff power setting
2. Flaps..................................... 27 degrees
3. Landing gear.............................. UP
4. Accelerate to V=REF+ 20 knots. (Five minutes maximum takeoff power.)
5. After accelerating to V=REF + 20 knots, retract flaps.
6. Minimum maneuvering speed = REF + 50 knots.

MISSED APPROACH PROCEDURE - THREE ENGINES OPERATING

Flaps DOWN
Landing gear extended
Airplane speed at V = REF (1.3 V_S CAS)

1. Power levers............................Takeoff power setting
2. Flaps...................................27 degrees
3. Landing gear............................UP
4. After accelerating to V = REF + 20 knots (Five minutes max takeoff power) retract flaps.
5. Use best three engine climb speed. (Consult performance charts, Section 4, PERFORMANCE INFORMATION)

CAUTION: IT IS IMPERATIVE THAT LARGE SIDESLIP ANGLES (YAW ANGLES) ARE NOT ALLOWED TO DEVELOPE. TO MINIMIZE THE PROBABILITY OF LARGE SIDESLIP ANGLES DEVELOPING WHILE OPERATING WITH ONE OR TWO ENGINES OUT ON ONE SIDE, MAINTAIN DIRECTIONAL CONTROL WITH THE RUDDER. KEEP THE BALL APPROXIMATELY CENTERED. DO NOT USE EXCESSIVE BANK ANGLES OR LATERAL CONTROL.

MISSED APPROACH PROCEDURE - TWO ENGINES OPERATING

Flaps 27°
Landing gear extended
Airplane speed 160 knots IAS

NOTE: If numbers 1 and 2 engines are out, the number one hydraulic system will be inoperative. The flap hydraulic system selector switch should be placed in the ALTER #2 position (System #2). If engines 3 and 4 are out, remain on the NORM #1 position of the flap switch. If the number two hydraulic system is inoperative, the main landing gear and main wheel brakes may be inoperative. If the number one system is inoperative, the nose wheel and nose wheel brakes/steering may be inoperative. The power rudder will operate from either system.

1. Power levers......................................Takeoff power setting
2. Landing gear......................................UP (see note above)
3. Retract flaps to 10 degrees.
4. Accelerate to 180 knots.
5. Retract flaps to zero.
6. Speed for best climb angle and best rate of climb is 1.7V_S. Do not exceed a maximum flap setting of 27° until landing is assured.

HYDRAULIC SYSTEM FAILURES

Hydraulic Pump Failure

If a pump low pressure light illuminates, check immediately for fluid loss in the respective Number 1 or Number 2 hydraulic systems. If a fluid loss is apparent in either the Number 1 or Number 2 hydraulic systems or large drop or fluctuations occur in the system pressure, both pump shutoff switches for the affected system may be placed in the DE-PRESS position. The landing gear handle may be placed in the NEUTRAL position. Monitor the hydraulic fluid quantity. If the fluid level stops dropping, the pumps may be individually turned to NORMAL to determine if the level will hold with one pump on.

WARNING: LOSS OF FLUID ON ONE HYDRAULIC SYSTEM WILL CAUSE THE FLUID LEVEL IN THE OTHER HYDRAULIC SYSTEM TO DROP TO THE RESERVOIR INTERCONNECT LEVEL. THE PUMP SHUTOFF VALVES FOR THE OTHER HYDRAULIC SYSTEM SHOULD NOT BE PLACED IN THE DE-PRESS POSITION IF THE FLUID LEVEL STABILIZES AT THE RESERVOIR INTERCONNECT LEVEL.

Hydraulic Fluid Loss

If the Number 1 or Number 2 hydraulic system fluid quantity starts decreasing without the respective low pressure light being illuminated, the hydraulic pumps for the affected system may be deactivated by placing the two pump shutoff switches for that system in the DE-PRESS position. The landing gear handle should be placed in the NEUTRAL position. Monitor the hydraulic fluid quantity.

WARNING: LOSS OF FLUID IN ONE HYDRAULIC SYSTEM WILL CAUSE THE FLUID LEVEL IN THE OTHER HYDRAULIC SYSTEM TO DROP TO THE RESERVOIR INTERCONNECT LEVEL. THE PUMP SHUTOFF VALVES FOR THE OTHER HYDRAULIC SYSTEM SHOULD NOT BE PLACED IN THE DE-PRESS POSITION IF THE FLUID LEVEL STABILIZES AT THE RESERVOIR INTERCONNECT LEVEL.

Hydraulic Fluid Overheat

If the hydraulic fluid temperature gage indicates a sustained overheat condition above permissible limits, both pump shutoff switches for the malfunctioning system only may be placed in the DE-PRESS position.

The pump switches may be individually placed in the NORMAL position to determine which pump may be causing the overheat condition. Monitor the hydraulic fluid temperature indicators.

LANDING WITH BOTH NUMBER 1 AND NUMBER 2 HYDRAULIC SYSTEMS FAILED

The No. 1 hydraulic system furnishes power for nose landing gear operation, nose wheel steering, nose wheel brakes, slats and Kreuger flaps, horizontal stabilizer trim adjustment, fuel scavenge pumps, one center section tank boost/jettison pump, power rudder and one-half of the power for operation of the spoilers. When the flap selector switch is in the NORM #1 position, it supplies power for flap operation.

The No. 2 hydraulic system furnishes power for the main gear operation, main gear brakes, slats and Kreuger flaps, fuel jettison pumps, one center section tank boost/jettison pump, power rudder and one-half the power for spoiler operation. When the flap selector switch is in the ALTER #2 position, it supplies power for flap operation.

If both the hydraulic systems have been turned to the DE-PRESS position to preclude complete depletion of fluid from the systems, both systems should be turned to the NORMAL position during the final stages of approach to provide spoiler operation.

In the event of a complete failure of both hydraulic systems, wing spoilers, fuel jettison and scavenge, both center section boost/jettison pumps, flaps, slats and Kreugers, and power rudder will all be inoperative; therefore, it is recommended that the following procedures be employed: (Amplification of the various emergency procedures can be found under their heading in this section.)

NOTE: Fly from left side and use sufficient wheel force to overcome interconnect spring, thus obtaining full aileron throw.

1. When possible, burn fuel down to a minimum preferably with fuel remaining in the inboard main tanks and maintaining a symmetrical loading. The lighter the fuel load in the outboard tanks the greater the lateral control capability without lateral spoiler action. Center section fuel boost/jettison pumps will be inoperative and CG control should be considered. Some center section burn-off can be accomplished with engine pumps only.
2. Make final approach and landing with zero wing flaps. Use reference speed of 1.35 V_S (CAS) (V_S is defined as the zero flap stall speed.)
3. If the wing flaps cannot be moved from an intermediate position, the reference speed is 1.35 times the stall speed (CAS) for that wing flap setting.
4. Make necessary stabilizer trim adjustments using emergency electric or manual trim systems.
5. Make emergency extension of the landing gear. Turn anti-skid off.
6. Select a long runway and make landing into the wind. Line up with the runway at least three miles out.

   CAUTION: IF BOTH HYDRAULIC SYSTEMS ARE INOPERATIVE, THE RUDDER PEDAL FORCES WILL BE HIGHER THAN NORMAL. RUDDER TRAVEL WILL ALSO BE LIMITED TO APPROXIMATELY ONE-HALF OF THE NORMAL TRAVEL.

7. Make the approach and landing bearing in mind that the lateral control effectivity will be reduced as compared with normal operation. If a wing drops because of a gust, put in an initial strong lateral control wheel input. As the aircraft responds, reduce the throw and use opposite control to stop the aircraft in a wings level attitude. Make minimum use of rudder.

8. Flare out above the runway surface breaking rate of descent, then ease the control column forward, reducing power and touching down main gear before the nose gear.

9. Apply reverse thrust.

10. Use moderate braking for additional deceleration. Avoid pumping brake pedals and depleting the brake accumulator prematurely. Use differential braking for directional control after rudder effectiveness is lost. Engine reverse thrust maniuplation can be used, if needed.

11. Emergency pneumatic brakes can be operated, if needed. Anti-skid and differential braking are not available in this mode. Apply air brakes cautiously to prevent skidding.

FLAP OPERATION - ONE HYDRAULIC SYSTEM INOPERATIVE

Normal operation of the flaps is with the flap selector switch, located on the pilots' overhead switch panel, in the NORM #1 position. This utilizes the No. 1 hydraulic power system for operation of the flaps. Placing the switch in the ALTER #2 position utilizes the No. 2 system in case the No. 1 system has failed.

FUEL JETTISON - NO. 1 HYDRAULIC SYSTEM INOPERATIVE

With the No. 2 hydraulic power system inoperative, the fuel jettison pumps and one boost/jettison pump in the center section tank will be inoperative. The fuel scavenge pumps, operated by hydraulic power system No. 1, and one boost/jettison pump in the center section tank, can be used. The scavenge pumps will scavenge the inboard tanks dry so fuel levels should be carefully monitored.

EMERGENCY LANDING GEAR EXTENSION

Maintain the airplane speed between 170 and 250 IAS. Place the emergency landing gear extension handle in the DOWN position. The landing gear will free-fall into position. The three gear warning lights will indicate green, the door open light will indicate red and the landing gear unsafe light will illuminate red. Place the normal landing gear handle in the DOWN position. The gear unsafe light will extinguish. The door light remains red; the door remains open. (Acceleration to V_{LE} as required after gear extended.)

At approximately station   (the   window aft of the emergency exit), access doors are provided in the floor center aisle so that the main landing gear can be inspected for proper down and locked condition. The nose landing gear can be inspected through a visual port in the electronic compartment.

UNCONTROLLABLE LOSS OF CABIN PRESSURE

This type of emergency will generally be evidenced by actuation of the cabin altitude warning system, loud noises, explosions and indication of rapid ascent of the cabin altimeter. Light to heavy interior fog may develop. The pilot under oxygen should initiate rapid descent. All other crew members should put on the supplemental oxygen masks and select the OXYGEN MASK on the interphone microphone selector at each station. If either or both pressure regulator valve CLOSED lights are extinguished, hold the appropriate regulator switches in the CLOSED position. Passenger oxygen override switch should be opened.

Emergency Descent Procedure

1. Power levers to IDLE position.
2. Initiate moderate bank turn, 30 to 40 degrees.
3. Place spoiler speedbrake handle in full aft position for maximum speedbrake action. (Use first if airspeed is above 272 knots IAS).

Additional Drag Items

4. Place the landing gear handle in the DOWN position at 0.708 M or 272 knots IAS, maximum.
5. Flaps can be extended as follows:
   10 degrees at 0.605M or 247 knots IAS.
   27 degrees at 0.585M or 242 knots IAS.
   36 degrees at 0.510M or 222 knots IAS.
   DOWN at 0.40M or 196 knots IAS.
   After flaps are DOWN, speed can be increased to 0.40M or 212 knots IAS.
6. Start decreasing the rate of descent at least 2000 feet before reaching the desired flight altitude if a high rate of descent is used.

AIRPLANE FIRES

While preparing to descend to a minimum practical altitude, the important step of determing the location and nature of the fire should be accomplished. If smoke or fumes arepresent, use the smoke masks on 100% oxygen. The interphone microphone selector switch must be placed in the SMOKE MASK position.

Smoke or fumes usually result from troubles in two possible sources: an electrical fault, or an air conditioning system failure which involves exposing the passengers and crew to cabin compressor oil fumes. The smell of smoke or fumes from these two sources is quite different and although the electrical odor of burning insulation or hot electrical units is familiar to most crew members, the smell of overheated synthetic oil is not. Over-heated cabin compressor oil has a perfumed ester smell.

Electrical Fire Source

Combatting an electrical fire is accomplished by isolating the source of the trouble.

a. Place the Pilot's Essential Bus Selector switch to #2 generator. This insures that the pilot's ac essential bus will be supplied directly from the generator during the isolation procedures.
b. Place the External Power switch to the ON position. This results in opening the bus tie contactors, thus disconnecting the synch bus and isolating each bus to its respective generator.
c. The generator line switches on Gen 1, 3 and 4 are then opened to attempt isolation of the bus supplying the defective wiring or equipment. Observation of the meters may indicate overload or fluctuating conditions, which will aid in locating the bus concerned. If the bus load and operation appears correct, the generator switches should be closed after checking. The copilot's instruments will be off when the #3 generator is OFF.

NOTE: By opening only the numbers 1, 3 and 4 generator switches in step "c", the pilots essential instruments (running off of number 2 generator) will be operative. If the trouble has not been located on buses 1, 3 or 4, proceed with step "d".

d. Open generator switch number 2. This will result in loss of the pilots essential instruments during the check. If the trouble is not in the No. 2 system, or pilot's essential bus, close the generator switch.
e. If the trouble has still not been isolated, place the External Power switch momentarily to PARA position. This parallels the generators on the synch bus.
f. Place the pilot's essential bus selector switch in the EXTERNAL POWER position.
g. Further isolation procedures involve elimination of the dc circuitry as a source of trouble. Place the No's. 1 and 2 T/R units switches in the OFF position.
h. Place the battery switch in the EMERGENCY position.
i. Place all T/R and battery switches in the OFF position.

NOTE: Consult Electrical Load Distribution chart, Section 3, NORMAL PROCEDURES.

Air Conditioning System

Isolation of a smoke or fire condition in the air conditioning system consists of turning off one turbocompressor at a time and one freon unit at a time until the defective unit is located.

Cabin Fires

The source of the fire should be extinguished with the cabin portable extinguishing units. Water from the buffet can also be used for non-electrical fires.

SMOKE REMOVAL PROCEDURES

NOTE: The normal cabin pressurization and air conditioning system should be capable of removing smoke during emergency conditions other than a fire in the system itself.

During pressurized flight, smoke can usually be removed from the flight compartment by opening the pilot's and copilot's air shutoff valve, setting the cabin altitude selector to 10,000 feet and setting the rate control at maximum.

If smoke persists, descend, depressurize and proceed as follows: The ram air valve should be opened and the airplane speed maintained at normal cruise. Hold the pressure regulator switches in the OPEN position for approximately 30 seconds. Airspeed may be increased if added airflow is required.

LANDING WITH HORIZONTAL STABILIZER JAMMED

If the horizontal stabilizer is jammed in the airplane nose-up condition, place the spoiler switch in the NOSE DOWN position. Activate the inboard spoilers with the speedbrake control handle to effect the desired degree of pitch down. Do not activate the spoilers beyond the double lines in the restricted area of the quadrant.

NOTE: In the event of a go-around, pitch-up tendency can be reduced by reduction from takeoff power.

If the horizontal stabilizer is jammed in the airplane nose-down condition, place the spoiler switch in the NOSE-UP position. Activate the outboard spoilers with the speedbrake control handle to effect the desired degree of pitch up. Do not extend the spoilers beyond the double lines in the restricted area of the quadrant.

Hold engine power ON slightly during landing flare, then reduce power slowly, touching down with some power unless excessive speed dictates otherwise. Slightly higher power settings are required to offset the drag contribution of the extended spoilers and the higher approach speed. Hold $1.35V_S$ CAS minimum approach speed.

When the inboard spoilers are used for longitudinal control, observe the airspeed and flight load acceleration limits in Section 1, CERTIFICATE LIMITATIONS.

ELECTRICAL SYSTEM FAILURES

Generator Malfunction

If the overheat or drive malfunction light illuminates, place the generator control switch in the OFF position. If, after approximately one minute, the overheat or drive malfunction light remains illuminated, lift the guard and disconnect the generator CSD unit.

NOTE: When disconnected, the CSD unit cannot be reset except by mechanical means when on the ground.

Bus Malfunction

A malfunction in a particular bus system can be isolated by opening the bus tie contactor switch. This removes the bus from the synch bus system. Opening the associated generator line contactor will remove power from the isolated bus. If the associated generator is operating properly, it can be used to supply the pilot's ac essential bus system if desired.

In case of a #3 generator system fault which results in opening of the bus tie relays, power to both pilot's and copilot's instruments may be lost. Power can immediately be restored to the pilot's essential bus by switching the pilot's essential bus selector switch to an operating generator.

T/R Malfunction

A Malfunctioning T/R unit is isolated by placing the appropriate switch in the OFF position.

Total Electrical System Failure

Normal engine operation can be maintained without electrical power at 26,000 feet or below.

For failure during flights above 26,000 feet, initiate emergency descent procedure to 26,000 feet or below.

LANDING WITH A JAMMED SPOILER

If a spoiler should jam in an extended position during flight, the resultant roll can be readily controlled by normal pilot reaction. First, by use of opposite lateral control, and second, by use of the wing spoiler speedbrake control to equalize the roll tendency.

The normal system management after establishing steady state conditions is, if possible, to drive a malfunctioning spoiler to the retracted position using the split spoiler feature. Adequate flight control is available using partial spoiler.

JAMMED ELEVATOR CONTROL OPERATION

If the pilot's or copilot's control column is jammed, the opposite control column may be operated by exerting forces in excess of the overload spring preload. (Approximately 100 pounds). Limited pitch control, (one tab and elevator) will be available for flare-out.

JAMMED AILERON-SPOILER CONTROL OPERATION

If the pilot's control wheel should be jammed, the copilot's wheel may be operated by exerting forces in excess of the overload spring preload. (Approximately 38 pounds). Lateral control by spoilers only is then available.

If copilot's control wheel is jammed, the pilot's wheel may be operated by exerting forces in excess of the overload spring preload. (Approximately 38 pounds). Limited (ailerons and tabs only) lateral control will be available.

NOSE LANDING GEAR EXTENSION WITH WHEELS AT A STEERED ANGLE IN WHEEL WELL

If the landing gear operating handle is in the DOWN position, and it is apparent that there is a cocked nose gear in the well, proceed as follows:

1. Maintain gear down pressure (landing gear handle DOWN) and rotate pilot's nose wheel steering control toward the center position. The nose wheel will then extend.

2. Continue holding the steering wheel to the center position and do not release until after the landing roll.

POWER RUDDER SYSTEM FAILURES

The power rudder system control panel consists of a # 1 SYST switch, a # 2 SYST switch, two associated SYST OFF lights, one LOW PWR light and one EXCESS PWR light.

Excess Power Warning

If both systems are operating and the EXCESS PWR light illuminates, turn either system OFF and observe the speed restriction.

Single System Power Failure

If either the # 1 or the # 2 system fails, observe the speed restriction. If the LOW PWR light illuminates, the remaining operating system is not delivering high power (3000 psi) and only approximately 50% of normal rudder power (1800) is available.

EMERGENCY BRAKING PROCEDURE

If normal hydraulic braking pressure is not available, the following procedure in addition to normal reverse thrust will allow use of the hydraulic pressure that is available until depleted.

1. Check the hydraulic system pressure and quantity.
2. Anti-skid system OFF.

NOTE: 1. Hydraulic pressure will be available for pilot controlled manual braking until the brake accumulator has been depleted as indicated by the brake pressure gage on the copilots instrument panel, regardless of the pressure indicated by the hydraulic system #2 gage.

2. Avoid excessive pumping of brake pedals during deceleration roll as this will deplete pressure rapidly. Approximately twelve brake applications are available if anti-skid is not cycling.

When the brake accumulator hydraulic pressure is depleted, use the emergency airbrake system. The emergency airbrake control is spring-loaded to the OFF position. Rotating the control clockwise applies air pressure to the main landing gear brake system. Increasing the rotation in a clockwise direction increases the braking effect. When the control is released, it will return to the OFF position and brake pressure is released. There are no provisions for differential braking. Nose wheel steering is available if hydraulic power system #1 is operating.

CAUTION: 1. APPLY EMERGENCY AIRBRAKE PRESSURE CAREFULLY. ANTI-SKID DEVICES ARE INOPERATIVE WHEN USING THE EMERGENCY AIRBRAKES. DO NOT USE BRAKE PEDALS WHEN USING EMERGENCY AIRBRAKES SINCE WHEELS MAY LOCK, CAUSING EXCESSIVE TIRE WEAR OR BLOWOUTS.

2. THE AIRPLANE HYDRAULIC BRAKE SYSTEMS ARE CONTAMINATED WITH AIR BY USE OF THE AIRBRAKES. WAIT AT LEAST 20 SECONDS AFTER RELEASE OF THE EMERGENCY AIR VALVE HANDLE BEFORE ATTEMPTING TO TAXI THE AIRPLANE.

NOTE: 1. The emergency airbrake system is effective for approximately nine normal type braking operations of the main landing gear wheels.

2. Nose wheel brakes are not applied when using the emergency airbrake system.

3. The air bottle pressure gage reading may indicate below normal if a rapid descent from high altitude is made. This is due to a system temperature soak at altitude.

LANDING WITH FLAPS RETRACTED

Establish a normal rate of descent. The approach speed should be held to $1.35V_S$ (CAS) (Clean configuration). All other operating techniques remain unchanged from those used in a normal landing.

CAUTION: ELEVATOR POWER WILL BE CONSIDERABLY MORE EFFECTIVE DURING THE FLARE WITH THE FLAPS RETRACTED. DO NOT OVER-ROTATE THE AIRPLANE.

INFLIGHT SLAT AND/OR KRUEGER FLAPS FAILING TO RETRACT

1. Observe slat and Krueger speed limitations.

2. Trim as required.

APPROACH AND LANDING WITH ASYMMETRIC SLATS AND KRUEGER FLAPS

(Failure to extend on one side)

1. Determine landing reference speed of $1.35V_S$. (Flaps DOWN configuration) Observe the flap/slat and Krueger airspeed limitations.

2. If trim to compensate for the asymmetric condition has been used, return to neutral prior to entering the final phase of the landing approach.

3. Complete the landing in a normal manner.

CABIN PRESSURIZATION FAILURES

If a turbocompressor fails or overheats, place the appropriate compressor switch in the OFF position. Place the electronic equipment cooling valve switch in the CLOSED position and turn the electronic equipment cooling fan ON. The corresponding bleed air PRESS SOURCE switch may be opened to increase cabin air flow.

Alternate Pressurization

When initiating alternate pressurization operation, the following procedure should be used:

1. Set the temperature control to full cold position and wait 15 seconds.
2. Turn off the turbocompressor.
3. Open the bleed air PRESS SOURCE switch.
4. Reset the temperature control to the desired setting.
5. Repeat the steps for the other turbocompressor.

NOTES: 1. Failure to follow the above procedure can result in light smoke entering the cabin and flight deck under certain conditions. The smoke contains no traces of carbon monoxide and is caused by high bleed temperatures through the heat exchange when the cooling air valve is closed.

2. If desired, steps 1 and 2 may be reversed to enable shutting down the turbocompressor at once.

3. If cabin pressurization cannot be maintained with the electronic equipment cooling valve OPEN, CLOSE the valve and turn the electronic equipment cooling fan ON.

4. Do not use the alternate pressure sources below 10,000 feet at power settings above 85% and do not use during ground operations.

5. If a turbocompressor is manually turned OFF, first CLOSE the electronic equipment cooling valve and turn the cooling fan ON. This sequence will aid in preventing cabin pressurization surge.

Decompression

The following methods of manual depressurization are possible:

1. CLOSE the cabin pressure regulators and turn both turbocompressors OFF.

   a. With the electronic cooling valve at CLOSE, the cabin pressure will decrease at approximately 1000 feet per minute. (Electronics cooling fan should be turned ON to protect equipment when valve is closed.)

   b. With the electronic cooling valve OPEN, cabin pressure will decrease at approximately 2700 feet per minute.

2. Manually OPEN and CLOSE one cabin pressure regulator with the other regulator in the CLOSE position. Both turbocompressors remain ON. Cabin pressure can be decreased as required.

3. OPEN one cabin pressure regulator with the other regulator in the CLOSE position.

   a. With both turbocompressors ON, the cabin pressure will decrease at approximately 16,000 feet per minute.

   b. With both turbocompressors OFF, the cabin pressure will decrease at approximately 24,000 feet per minute.

The effect of electronic cooling system outflow is not appreciable under these conditions.

WARNING: WITH BOTH CABIN PRESSURE REGULATORS OPEN, THE CABIN PRESSURE WILL DECREASE AT RATES APPROACHING EXPLOSIVE DECOMPRESSION. THE MINIMUM RATE OF APPROXIMATELY 36,000 FEET PER MINUTE OCCURS WITH BOTH TURBOCOMPRESSORS ON; 45, 000 FEET PER MINUTE WITH TURBOCOMPRESSORS OFF.

Pressure Regulator Failure

If a pressure regulator fails in the OPEN position, place the failed unit switch in the CLOSED position. When regulator closes, switch can be placed in OFF position. Regulate the pressure either by retaining the other pressure regulator switch in the AUTO position or by manually selecting OPEN, CLOSE, or OFF for desired periods.

HORIZONTAL STABILIZER EMERGENCY TRIM CONTROL SYSTEMS

Two emergency methods of operation are available for horizontal stabilizer trim control setting.

Method 1:

a. Move the STAB TRIM SEL switch from the HYD center position to the forward ELEC STBY position. (Located on pilots' pedestal)

b. Movement of the ELEC STBY STAB CONT switch to the NOSE UP position will cause the horizontal stabilizer to trim the airplane nose up.

c. Movement of the ELEC STBY STAB CONT switch to the NOSE DN position will cause the horizontal stabilizer to trim the airplane nose down.

NOTE: Do not run the stabilizer to the travel limit stops during ground check of the electrical mode.

Method 2:

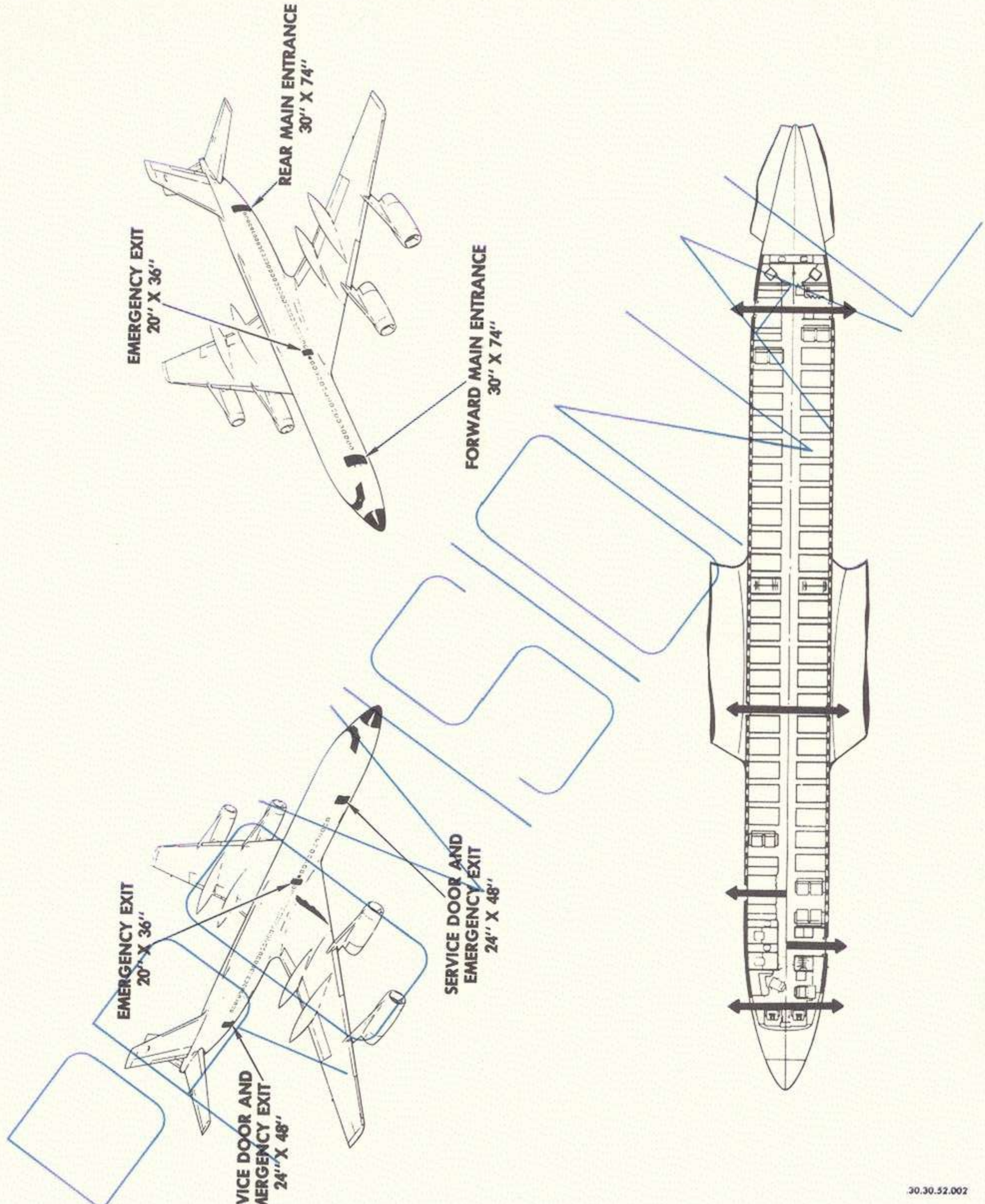
a. Move the STAB TRIM SEL switch from the HYD center position to the aft OFF position. Take the horizontal stabilizer manual crank from it's stowed position in the cockpit. A socket for this crank is provided in the left aft (while looking forward) lavatory. An interphone jack is provided near the crank socket. Approximately 600 turns are required for full travel of the horizontal stabilizer.

NOTE: In case of malfunction of either pilot's control wheel trim switch or associated circuitry, de-activate the STABILIZER TRIM CONTROL circuit breaker on the circuit breaker panel.

When using the horizontal stabilizer emergency trim systems, either electric or manual, it may be necessary for the pilot to unload the elevator forces to allow the trim systems to operate satisfactorily.

EMERGENCY EXITS

There are eight escape routes which can be used as emergency exits by the passengers and crew (see Figure 2-1). The pilots' windows, the forward main entrance door and the service door provide for escape in the forward section of the airplane, while the aft main and service doors provide for escape in the aft section. In addition there is an emergency escape hatch, approximately 20 by 36



Passenger Cabin Doors and Emergency Exits
Figure 2-1

inches in size, located on each side of the cabin, over the wing. Each hatch can be released from inside or outside the airplane. The back of the seat forward of the escape hatch is designed to clear the hatch upon application of 30 to 40 pounds of pressure.

ESCAPE SLIDES

Both inflatable and non-inflatable escape slides are used in Model 30 airplanes.

Inflatable Slides

The inflatable slides can be deployed by one person. Inflation of the slide is accomplished by pulling a placarded "T" handle at each location, releasing compressed air from a 300 cubic inch bottle stored beneath the floor. A relief valve incorporated in the slide protects against over-inflation or rapid pressure rise due to exceptionally high ambient temperatures caused by proximity to airplane fires.

Non-Inflatable Slides

Each non-inflatable slide is secured to a swing-out panel which, when released, allows the slide to be placed directly across the entrance way. Operation of a quick release latch allows the panel mounted slides to swing directly across the doorways. The panels are hinge mounted and may be secured in the extended position by a floor mounted lug which prevents the panel from moving outward when weight is applied to the slide. A quick release PULL handle at the base of the panel is then pulled, releasing the strap securing the slide to the panel (the base of the slide is permanently attached to the panel), and the slide is ejected through the door. The forward and aft upper sections of the slide are then clipped to their respective door frames, completing slide deployment. Depending on the emergency condition, two or more persons are required on the ground to hold each slide away from the airplane at a safe angle for use by the passengers.

ESCAPE ROPES

Escape ropes are installed in a latched compartment over each pilot's sliding window. Two other escape ropes are provided in the passenger cabin, one over each emergency escape hatch on each side of the cabin over the wing.

EMERGENCY AXE

An emergency or fire axe is located in the flight compartment on the forward side of the flight compartment door.

FLARES

Two solenoid operated flare chutes are provided in the aft section of the fuselage at approximately station 1556, one on each side of the airplane centerline. The flares are loaded into the chutes from the outside of the airplane. A three position guarded switch, FLARE REL, located on the pilots' overhead switch panel, controls the flare release mechanism. The switch is labelled No. 1-OFF-No. 2. Actuation of the switch to the No. 1 or No. 2 position releases the appropriate flare.

OXYGEN EQUIPMENT

A high pressure oxygen system (1800 psi) is supplied from cylinders located aft of the pilot's position. The flight crew normally uses oxygen from the forward cylinder, however, the supply of oxygen in the passenger cylinders is available to the flight crew by operation of a standard type line valve.

Flight Crew Oxygen System

From the oxygen cylinder, flight crew oxygen flows to the regulator panels at each crew station. Actuation of the ON-OFF switch to the ON position permits oxygen to flow into the normal oxygen mask, on demand, when connected to the selector valve. When the selector switch on the regulator is in the 100% OXYGEN position and the normal oxygen mask is unplugged, 100% oxygen is delivered to the smoke mask. In EMERGENCY position, the regulator supplies positive pressure directly to the mask in use.

Passenger Oxygen System

Should cabin altitude exceed 14,000±1000 feet (sudden depressurization) cup type masks are released automatically from an overhead panel for passenger use. Pulling down on the mask to position it over the mouth operates a valve that releases oxygen to the mask.

Portable Oxygen Equipment

Portable oxygen cylinders in the cockpit and cabin area provide a source of therapeutic oxygen for passengers, or portable oxygen for crew members, during normal pressurized flight.

HAND FIRE EXTINGUISHERS

One CO_2 hand fire extinguisher is installed in the aft end of the flight compartment just inboard of the circuit breaker panel. Three other H_2O type fire extinguishers are installed throughout the cabin area, one in each main entrance area, and one at the aft end of the passenger area.

SMOKE MASKS

Smoke masks are provided for the pilot, copilot and flight engineer. The smoke masks connect to the airplane flight crew oxygen system.

EMERGENCY LIGHTING SYSTEM OPERATION

The emergency lighting system includes the following lights:

- Forward main entrance lights
- Aft main entrance lights
- Left and right passenger cabin emergency exit lights
- Flight compartment white dome lights

Placing the EMERGENCY LIGHTS switch on either stewardess' control panel to the ON position will illuminate all emergency lights except the flight compartment white dome lights.

An EMER EXIT LT switch, placarded ON RESET-OFF-SHUTDOWN, is located on the pilots' overhead switch panel. Placing this switch in the ON RESET position will illuminate all the emergency lights. In the OFF position, the stewardess' panel switches will override the flight compartment switch and allow the emergency lights to be illuminated. However, when the pilot's switch is in the SHUTDOWN position, the stewardess' switches will not illuminate the emergency lights.

Loss of power on the 28-volt dc emergency bus will result in automatic transfer of the emergency lighting circuit to the battery bus.

EMERGENCY FUEL SYSTEM OPERATION

Single fuel boost or transfer pump failure is not considered an emergency condition.

Fuel Jettison Procedure

Fuel jettison provides emergency gross weight reduction of the airplane. Each fuel tank is equipped with a bellmouth fitting in the jettison system which assures a minimum of 1700 Gallons (approximately 11,050 pounds) of total fuel remaining when complete jettison has been accomplished.

NOTE: The jettison system is a permanently installed system, ready for operation at all times. Fuel can be jettisoned at any configuration of airplane flap and landing gear and at any speed up to V_{NO}/M_{NO} without fuel impingement on any airplane surface.

1. With Center Section Tank in Use: (When any anti-shock body fuel is aboard, turn ON the required ASB transfer pumps.)

   (a) Use wing tank to engine configuration and close center section tank cross-feed valves. Fuel system must remain tank to engine until center section jettison valve is closed.

   (b) Simultaneously jettison center section and tanks 2 and 3 until inboard tank fuel (including inbrd ASB fuel) equals outboard tank fuel (including outbrd ASB fuel). Monitor remaining fuel for proper distribution.

(c) Simultaneously jettison tanks 1, 2, 3 and 4 and center section tank until center section is empty.

(d) Fuel distribution at landing must be in agreement with the requirements of the Weight and Balance Report.

NOTE: The center section tank boost/jettison pumps are hydraulically operated and will scavenge the center section tank.

2. With Wing Fuel Only (Center Section Empty)

(a) Simultaneously jettison tanks 1, 2, 3 and 4 until jettison bellmouths are uncovered or until the maximum landing weight is reached. Monitor remaining fuel for proper distribution. If any ASB fuel is aboard, the ASB transfer pumps should be ON.

(b) Fuel distribution at landing must be in agreement with the requirements of the Weight and Balance Report.

Fuel Scavenge Procedure (Inboard Tanks)

Scavenge pumps in the inboard fuel tanks allow complete removal of fuel in the inboard tank systems in case of a wheels-up landing or other emergency requirement. Center section tank boost/jettison pumps will scavenge the tank dry.

1. Engine 1 and 2 crossfeed valves.................... both OPEN
2. Engine 2 line valve.................................. CLOSED
3. Tank 2 boost pumps................................... OFF
4. Tank 2 transfer pumps................................ REPLENISH
5. Engine 3 and 4 crossfeed valves.................... both OPEN
6. Engine 3 line valve.................................. CLOSED
7. Tank 3 boost pumps................................... OFF
8. Tank 3 transfer pumps................................ REPLENISH
9. Tank 2 scavenge valve switch......................... OPEN
10. Tank 3 scavenge valve switch........................ OPEN

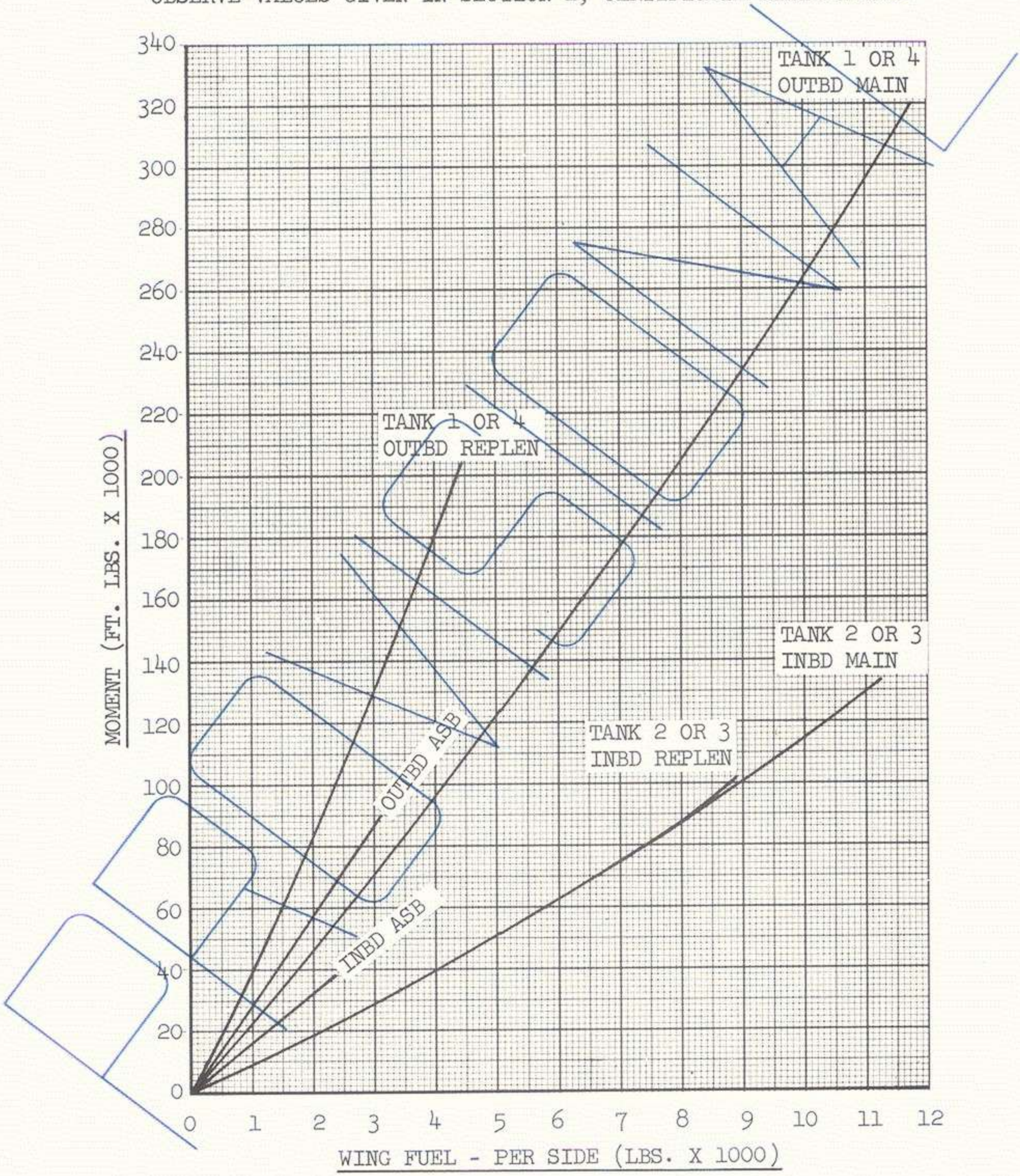
Monitor fuel gages and transfer pump pressure warning lights to determine fuel quantity condition.

NOTE:
1. If fuel levels in tanks No.'s 2 and 3 are low, the transfer pumps should be turned OFF when the warning light illuminates. If the fuel level is high, transfer pumps should be switched to MAIN position. Pumps should be turned OFF when fuel is emptied from the tanks.
2. When tanks No.'s 2 and 3 are scavenged dry, and complete jettisoning of fuel in the outboard tanks has just occurred, approximately 6000 pounds of fuel remain in the outboard tanks for airplane operation. (Combined outboard tank total.)
3. Steps 2 and 6 can be temporarily omitted if engine burn-off is desired to aid in scavenging.

WING FUEL VERSUS ASYMMETRIC MOMENT

1. Read tank quantities.
2. Tabulate moments from graph for LH wing and RH wing.
3. Add moments for LH wing.
4. Add moments for RH wing.
5. Subtract smaller from the larger.
6. Results must not exceed the limit of 150,000 foot pounds.

FOR MAXIMUM INFLIGHT ASYMMETRIC FUEL DISTRIBUTION LIMITS, OBSERVE VALUES GIVEN IN SECTION 1, CERTIFICATE LIMITATIONS.



DITCHING PROCEDURE

The circumstances making an airplane ditching necessary, and the conditions under which ditching may take place, are highly variable factors. Consequently, no definite and unalterable ditching procedure is possible. However, certain basic fundementals must be followed insofar as possible.

1. The fuel load must be reduced to provide maximum buoyancy and least gross weight.

2. All airplane openings must be closed to provide maximum water tight integrity.

3. Precision piloting is required during the approach and ditching to provide a minimum of structural damage.

Survival Equipment

Survival equipment may be installed in several locations in the airplane depending upon the number of passengers and interior configuration utilized by the operator. Survival equipment, compatible for the operating rules for the particular route flown, are installed by the airplane operator. Approval of the equipment and installations is obtained by the operator for the specific life raft, life preserver and other equipment specified in CAR 4b.645.

Fuel System Ditching Requirements

Compatible with immediate conditions, crossfeed engines to outboard fuel tanks. Close inboard fuel tank line valves. Jettison and scavenge all fuel from the inboard tanks. Jettison fuel from the outboard tanks as low as possible yet retaining enough fuel for engine operation through the ditching procedure. Dependent on conditions, care should be taken to obtain equalization of lateral fuel distribution. Equalization will assist in precision control of the airplane during the ditching operation. All jettison and scavenge control valves must be closed prior to impact. Scavenge center section tank dry.

Air Conditioning and Pressurization Ditching Requirements

The airplane must be depressurized. All air conditioning and pressurization system openings must be closed prior to impact.

Passenger Preparation for Ditching

Check that all passengers are wearing life jackets and have been cautioned not to inflate them until they have evacuated the airplane. Seat belts should be securely fastened. Distribute pillows, coats and blankets with instructions to passengers to place these items in front of their faces prior to impact. All loose items are to be collected and stowed in the washrooms prior to ditching. Passengers should remove shoes, eyeglasses, dental plates, hearing aids, etc. and loosen neckwear and collars. Adjust all seats to the upright position. All available survival fluids, food, rafts, flashlights and first aid kits should be cleared and readied for removal. All doors and exits, including pilots windows, should be closed and locked.

Approach and Ditching Technique

The airplane configuration should be with landing gear up, flaps DOWN and a final approach speed of $1.3V_S$ (CAS). Emergency lights, seat belt and no smoking lights, should be on. Flares should be previously set if required. Landing should be made parallel to the major ocean swells, and into the prevailing wind if possible.

When such a condition is impossible, or imprudent, to achieve, major consideration should be given to maintaining zero yaw and zero roll at touchdown. Directional stability must also be maintained as long as possible on the run out. Anything that promotes skidding should be avoided, such as digging a wing tip or an outboard pod. Skidding can be the forerunner of catastrophic waterlooping.

The rate of descent should be 200 to 300 feet per minute. Level off at approximately 8 to 10 feet above the crest of the swell. The power levers should be closed (IDLE), the airplane should be rotated to a normal landing attitude (airspeed approximately $1.25V_S$ CAS), slightly nose up, and contact made with the water with minimum forward speed and at the minimum sink speed.

The airplane should be evacuated as soon as possible after coming to rest. Inflate and man the liferafts after they have been placed outside the airplane. Tie the rafts to the airplane structure to prevent drifting away. The airplane may be expected to remain afloat indefinitely if the fuel load is low and if it does not sustain serious damage on landing. Under satisfactory conditions, the length of the landing run will be approximately 500 to 600 feet, and the airplane will come to rest approximately 7 seconds after initial contact, provided there is no skipping off of a wave crest.

Post Ditching Conditions

Three general flotation conditions are possible after ditching the airplane.

1. Fuselage undamaged. The airplane will float quite high with a slight nose up attitude. Evacuation is possible through all doors and emergency exits.

2. Fuselage damage below the floor from approximately station   forward to the airplane nose. The airplane will float with a slight nose down attitude. Evacuation is possible through all doors and emergency exits.

3. Fuselage damage below the floor from station   to station   The airplane will float with an increasing tail down attitude. Evacuation will probably be best accomplished through the forward doors. Use of the flight compartment windows may be possible, depending on conditions.

Under all circumstances, a responsible crew member should take a quick preliminary check on airplane attitude and should then determine which entrances are to be used for evacuation. Incorrect selection of evacuation routes could result in more rapid flooding of the airplane.

DITCHING CHECK LIST

Fuel System	Crossfeed as required Jettison as required Scavenge as required Equalize lateral distribution CLOSE jettison and scavenge valves
Emergency lights, seat belt & no smoking	ON
Flares	IF REQUIRED
Air Conditioning and Pressurization	DEPRESSURIZE
Turbocompressors	both OFF
Emergency pressure source	both CLOSE
Ram Air source	CLOSE prior to impact
Elect Cooling Valve	CLOSE
Freon Compressors	OFF
Pressure Regulators	both CLOSE prior to impact
Cabin Doors and Exits	CLOSED and locked
Flight Compartment Windows	CLOSED and locked
Passenger briefing	Accomplished
Landing weight/speed	Calculated
Landing Gear	UP and LOCKED
Flaps	APPROACH, then DOWN for impact

It is to be anticipated that all engines will separate from the pylons at impact. Pulling the FIRE PULL "T" handles, under such conditions, is of no value. Equally, loss of all electric and hydraulic power will effectively cease the operation of pumps and other electrically operated equipment. The pilots' attention is best concentrated on precision control of the airplane during approach and ditching.

3 NORMAL PROCEDURES

TABLE OF CONTENTS

SECTION 3, NORMAL PROCEDURES

SECTION 3, NORMAL PROCEDURES (CONT.)

BEFORE STARTING ENGINES

At through stations (no mech. delay or crew change), only boxed items required.

PILOTS

1. Gear lever & lights.........DN & CK
2. Parking brake...................ON
3. Wing flap handle..............SYNC
4. Aux hyd pump....................ON
5. Brake & hyd sys press......3000 PSI
6. Power rudder switches.......CK & ON
7. Fuel, oil, hydraulic............CK
8. Radios.....................ON & CK
9. Flight instruments..............CK
10. Radar..................STNBY OR OFF
11. Start levers...................OFF
12. Transponder..................STNBY
13. Fire controls...................CK
14. Altimeters & clocks..SET & CROSS CK
15. Compasses....................SLAVE
16. Windshield heat.................ON
17. Emergency lights.............ARMED
18. Exterior lights.............AS REQ
19. Nose wheel brake................ON
20. Oxygen sys & masks.........CK & SET
21. Static selectors............NORMAL
22. Pitot static aux equip..........ON
23. Emer brakes & press........OFF & CK
24. Vne & ASB warning.............TEST
25. Flight director............CK & SET
26. KIFIS & speed stab............TEST
27. Spoiler speedbrks......CK & RETRACT
28. Spoiler selector sw.....CK & NORMAL
29. Power levers................CLOSED
30. Autopilot..................CK & OFF
31. Stab control............CK & NORMAL
32. Emerg LG release............STOWED
33. Flight recorder................SET
34. Inlet heaters..............CK & OFF
35. Rain clearing..................OFF
36. Pitot heat.................CK & OFF
37. Excess heat panel.............AUTO
38. Engine bleed..................OPEN
39. Engine anti-ice................OFF
40. Wing & tail anti-ice.......CK & SET
41. Interior lights..............AS REQ
42. Ignition selector....1 OR 2 OR BOTH
43. Emergency ignition.........CK & OFF
44. Wheel well lights...........AS REQ
45. Anti-skid...................CK & ON
46. Takeoff data....................CK

FLIGHT ENGINEERS

1. Battery switch..............NORMAL
2. Ess Bus Relay sw............CLOSED
3. Load reduction sw..........CK & ON
4. Crossfeed & line valves.....AS REQ
5. Defuel valves...............CLOSED
6. Fuel pumps..................AS REQ
7. Recirculation fan...........AS REQ
8. Freon selector..............AS REQ
9. Freon master................AS REQ
10. Gear pins...............3 SIGHTED
11. Main oxygen supply.........ON & CK
12. Circuit bkrs & limiters.........CK
13. D-C power.......................CK
14. TR's............................ON
15. External power.............CK & ON
16. 26-volt a-c power.......CK & MAIN
17. Generator disconnects.......NORMAL
18. Bus tie & line switches......CLOSE
19. Generator control sw............ON
20. Oil temperature.................CK
21. Ignition cutoff...........SAFETIED
22. Water pump............ON OR NORMAL
23. Fuel temperature................CK
24. Oxygen mask & reg.........CK & SET
25. Jettison & scav sw..........CLOSED
26. Press panel.............AUTO & SET
27. Turbocompressors............AS REQ
28. Alt press source............CLOSED
29. Ram air source..............CLOSED
30. Cabin temp equal............AS REQ
31. Equip cooling sw........OFF & OPEN
32. Air cond..............AUTO AND SET
33. Hyd depress valves..........NORMAL
34. Radio override sw...........AS REQ
35. Warning lights..................CK

PILOTS | FLIGHT ENGINEERS

AFTER STARTING ENGINES

PILOTS	FLIGHT ENGINEERS
1. Ess bus selector.......CK - EXT PWR	1. Generators................PARALLEL
2. Exc heat & isolation......CK & AUTO	2. Ess Bus Relay Sw............NORMAL
3. Door lights....................OUT	3. Electrical systems..............CK
4. Gust lock......................OFF	4. Ext pwr & air.........DISCONNECTED
5. Flight controls.................CK	5. Aux pump.......................OFF
6. Flaps, slats...........CK & NORMAL	6. Recirc fan.....................AUTO
7. Windows.....................CLOSED	7. Freon selector..............AS REQ
8. Start levers............RUN DETENT	8. Freon master.....................ON
9. Anticollision lights............ON	9. Crossfeed valves............AS REQ
	10. Static system..................CK

TAXI BEFORE TAKEOFF

PILOTS	FLIGHT ENGINEERS
1. Instruments.....................CK	1. Hyd system.......................CK
2. Pitot heat..................AS REQ	2. Electrical system................CK
3. Brakes..........................CK	3. Air cond & press................SET
4. Flaps & slats..................SET	4. Engines.........................NORMAL
5. Stab & trim tabs...............SET	5. Turbos.........FLT DK AUTO CAB MAN
6. V_1, V_r, & V_2..............CK & SET	6. Recirc fan.....................AUTO

WHEN IN POSITION FOR TAKEOFF

PILOTS	FLIGHT ENGINEERS
1. Transponder.....................ON	1. Fuel system............TANK TO ENG X-FEED OFF
2. Start switches............FLT START	

AFTER TAKEOFF

PILOTS	FLIGHT ENGINEERS
1. Ldg gear lever......NEUTRAL-LTS OUT	1. Engines.........................NORMAL
2. Start switches..................OFF	2. Aid cond & press.................CK
3. Flaps & slats..............RETRACT	3. Hyd quantity.....................CK
4. Yaw damper.......................ON	4. Fuel system.................AS REQ
5. Ldg lights...........RETRACT & OFF	5. Climb power...............COMPUTE
6. Rain clearing...................OFF	
7. Seat belt-No Smoking........AS REQ	

BEFORE LANDING - PRELIMINARY

PILOTS	FLIGHT ENGINEERS
1. Seat bel sign....................ON	1. Cabin alt.......................SET
2. Brake & hyd sys press...........CK	2. Fuel system.....................SET
3. Altimeters..........SET & CROSS CK	3. Fuel qty, gross wt, V_{ref}..COMPUTED
4. Emerg brake press...............CK	4. Elec sys & CB's.................CK
5. V_{ref}...........................CK	

BEFORE LANDING FINAL

PILOTS	FLIGHT ENGINEERS
1. Flaps.......................AS REQ	1. Hyd quantity.....................CK
2. Landing gear DN & SAFE	2. Fuel pumps...............MAINS ON
3. Yaw damper......................OFF	3. Crossfeed valves............CLOSED
4. Hyd press.......................CK	
5. No smoking sign.................ON	
6. Anti-skid...................ON & CK	
7. Spoilers..........NORMAL & RETRACT	

AFTER LANDING - ROLL

PILOTS

1. Brake pressure.............2700 PSI
2. Flaps & slats..............RETRACT
3. Spoilers...................RETRACT
4. Radar..........................OFF
5. Pitot heat.....................OFF
6. Stabilizer trim................SET
7. Transponder....................OFF

FLIGHT ENGINEERS

1. Pressurization.............DUMPED
2. Recirculating fan.......AUTO OR ON
3. Turbocompressors............AS REQ
4. Boost and transfer pumps.......OFF

SECURING AIRPLANE

PILOTS

1. Parking brake..................SET
2. Pilot's ess bus select......EXT PWR
3. Fuel shutoff levers............OFF
4. Collision lights...............OFF
5. Radios.........................OFF
6. Anti-icing & anti-fog.......ALL OFF
7. Emergency exit lights..........OFF
8. Gust lock................IN PLACE
9. Power rudder switch............OFF

FLIGHT ENGINEERS

1. Recirculation fan..............OFF
2. Boost pumps....................OFF
3. Ext power.......................ON
4. Battery switch.................OFF
5. Oxygen supply..................OFF
6. Flight recorder CB.............OUT
7. D-C volt meter.................OFF

PROVISIONAL

SECTION THREE

NORMAL PROCEDURES

ENGINE STARTING PROCEDURE - GROUND

WARNING: DO NOT START ANY ENGINE UNTIL THE ALL CLEAR SIGNAL HAS BEEN RECEIVED FROM THE GROUND CREW.

1. Excess Heat and Isolation System switches....................all AUTO
2. Engine Bleed Air switches....................all OPEN
3. Ignition selector switch....................System #1 or #2
4. Power levers....................all IDLE
5. Fuel line valve switch....................OPEN
6. Fuel boost pumps (Wing Tanks)....................ON
7. Fuel transfer pumps....................AS REQUIRED
8. Engine starter switch....................GROUND
9. Fuel shutoff lever....................RUN AT 15% RPM
10. Monitor engine and fan RPM, EGT, and the oil pressure light while engine accelerates to IDLE speed. At 45 to 47% RPM, the starter switch can be turned off. Check that starter valve is closed. Maintain RPM and EGT within limits specified in Section 1, CERTIFICATE LIMITATIONS, of this Flight Manual.
11. Flight Engineer's report....................RECEIVED

CAUTION: 1. ABORT THE START IF ANY OF THE FOLLOWING CONDITIONS OCCUR:
   a. IF THE EGT EXCEEDS NORMAL STARTING LIMITS.
   b. IF THE OIL PRESSURE WARNING LIGHT FAILS TO EXTINGUISH.
   c. IF THE ENGINE DOES NOT FIRE WITHIN 15 SECONDS AFTER AN INITIAL FUEL FLOW INDICATION, OR IF THE ENGINE CANNOT BE ACCELERATED TO IDLE RPM, (60%), WITHIN 60 SECONDS.

2. DO NOT ATTEMPT TO RE-ENGAGE THE STARTER UNTIL THE ENGINE REVOLUTIONS HAVE CEASED.

3. IF THERE IS EVIDENCE OF TAIL PIPE BURNING, MOVE THE FUEL SHUT-OFF LEVER TO THE OFF POSITION AND CONTINUE HOLDING THE STARTER SWITCH IN THE GROUND POSITION UNTIL THE FLAME IS OUT.

4. DO NOT POSITION THE FUEL SHUTOFF LEVER BETWEEN OFF AND RUN. EXCESSIVE TEMPERATURES AND ENGINE DAMAGE CAN RESULT BY FUEL SUPPLY THROTTLING BY THIS METHOD.

NOTE: If item 1-c above occurs, allow the engine to decelerate to a stop. Select the other ignition system, accelerate the engine starter for a 15 second purge period with the fuel shutoff lever in the OFF position. Then move fuel shutoff lever to the RUN position. After two false starts, the engine drain valve collector tank must be emptied.

ENGINE STARTING PROCEDURE -FLIGHT

NOTE: Consult the Engine Air Starting Envelope chart on the next page Engine must be windmilling above 15% RPM.

1. Power lever, regardless of altitude........................IDLE
2. Ignition selector switch...................................SYSTEM #1 or #2
3. Fuel line valve switch.....................................OPEN
4. Fuel boost pumps...ON
5. Transfer pumps...AS REQUIRED
6. Engine starter switch......................................FLIGHT
7. Fuel shutoff lever...RUN

Hold starter switch in FLIGHT position until the engine has fired and attained IDLE speed.

NOTE: During air starts at 35,000 feet and above, the engine may refuse to accelerate above 68-74% rpm. If this occurs, hold the starter switch in FLIGHT position and momentarily move the fuel shutoff lever to the OFF position, returning to RUN position immediately. The engine should then accelerate normally.

CAUTION: OBSERVE THE SAME PRECAUTIONS REGARDING ENGINE RPM, EGT, ETC. AS REQUIRED FOR ENGINE GROUND STARTING.

ENGINE SHUT-DOWN PROCEDURE - FLIGHT OR GROUND

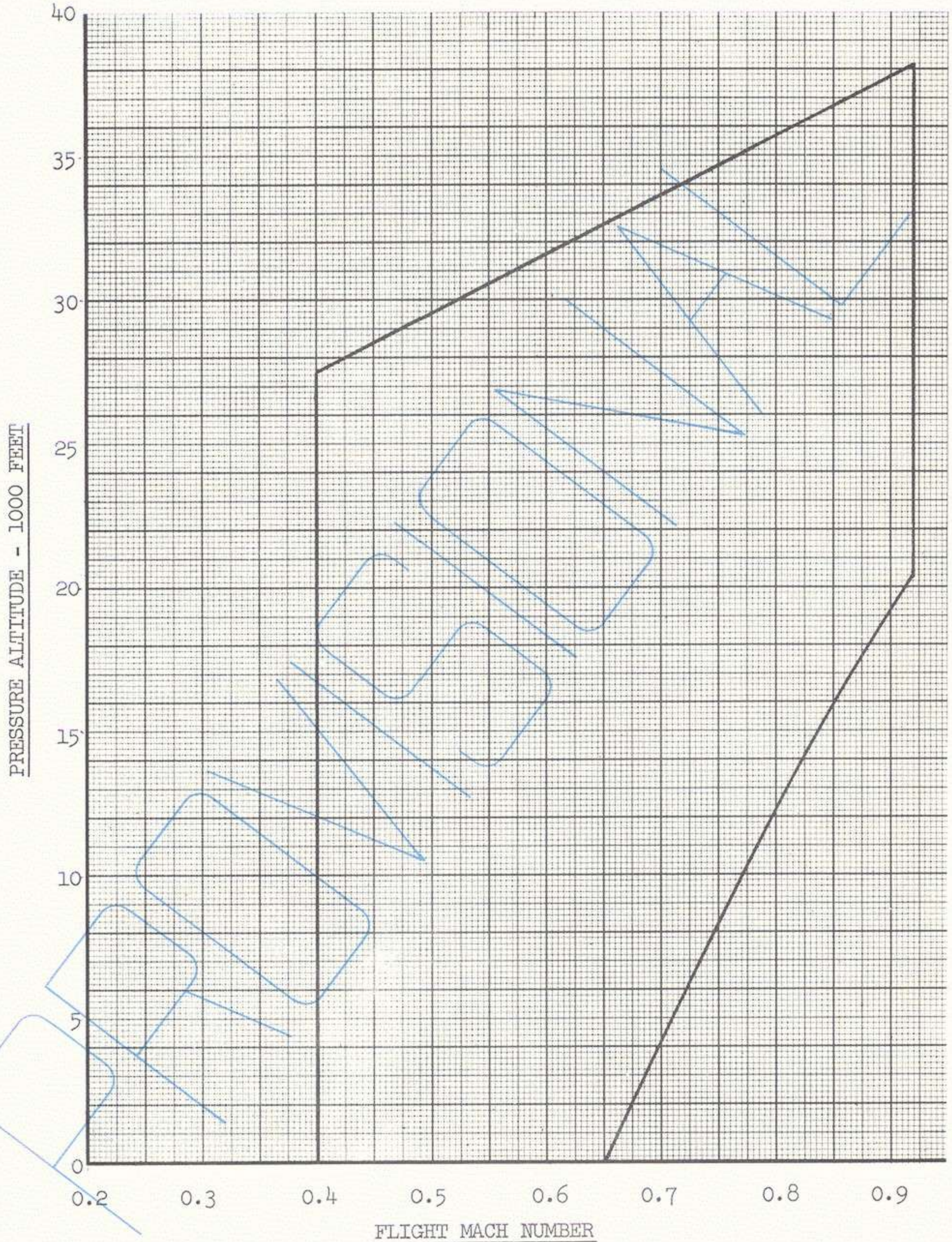
CAUTION: A NORMAL ENGINE SHUT-DOWN ACCOMPLISHED BY PULLING THE FIRE PULL "T" HANDIE IS PROHIBITED. THIS METHOD MUST BE USED ONLY FOR ACTUAL EMERGENCY SHUT-DOWNS, SINCE ENGINE DAMAGE DUE TO DIFFERENTIAL COOLING CAN OCCUR DURING A RAPID HOT ENGINE-HIGH RPM-SHUTDOWN.

IN CASES INVOLVING A VOLUNTARY ENGINE SHUT-DOWN IN FLIGHT, RETARD POWER LEVER TO IDLE AND ALLOW ONE MINUTE OF OPERATION BEFORE SHUTTING DOWN THE ENGINE.

IN GROUND SHUTDOWN, ENGINE SHOULD BE IDLED FOR ONE MINUTE PRIOR TO SHUTDOWN. TAXI TIME BETWEEN 60% RPM AND 80% RPM CAN BE INCLUDED IN THIS REQUIREMENT.

1. Power lever...IDLE
2. Fuel shutoff lever..OFF
3. Transfer pumps..OFF
4. Boost pumps...OFF
5. Fuel line valve switch......................................CLOSED

IN-FLIGHT STARTING ENVELOPE



ELECTRICAL SYSTEM OPERATION

External Power

External Power Switch..EXT PWR

NOTE: During normal ground operation, on airplanes equipped with electric Freon drives, only the main receptacle is connected. The auxiliary receptacle is used only when full ground air conditioning is required. The auxiliary receptacle cannot be used alone since the ground for the control coil in the auxiliary power contactor is connected only after the main contactor is energized.

Generator Paralleling

External Power Switch......................... MOMENTARY TO PARA AND THEN OFF
Bus tie contact OPEN light, usually No. 1, will extinguish first, followed by No.'s 2, 3, and 4. The ac volt meter will read 115 ± 2 volts and the frequency meter 400 ± 4 cps. The essential bus OFF light will extinguish. The 26-volt ac OUT light will extinguish.

CAUTION: DURING ENGINE SHUTDOWN, WITHOUT GROUND POWER, THE LAST GENERATOR DISCONNECTED MUST CARRY THE ENTIRE CONNECTED LOAD. THIS TOTAL LOAD MUST BE LESS THAN 60 KVA AND PREFERABLY LESS THAN 40 KVA.

Circuit Breakers

If a circuit breaker opens, disconnecting power to any circuit, it indicates an overload or a short in that circuit. If the circuit breaker reopens after being reset, do not use that circuit unless the safety of the airplane depends on its continued operation.

Pilot's Essential Bus Selector Switch

The pilot's essential bus selector switch should remain in EXT PWR position for all engine starting, normal ground and takeoff operations. During climb, cruise, approach and landing the switch may be left on the EXT PWR position or placed on GEN #1.

NOTE: The EXT PWR switch position is also the SYNCH BUS position.

HYDRAULIC SYSTEM OPERATION

When the hydraulic oil temperature is at 0°C or lower, movement of hydraulically operated controls should be kept at a minimum until the hydraulic fluid temperature is within normal limits.

The auxiliary hydraulic pump is primarily used for ground checking of some systems in accordance with appropriate MAINTENANCE MANUAL procedures. It can also be used for system pressurization prior to starting engines.

FOR AIRPLANE SERIAL NUMBERS: -1, -2, -3, -4, -9, -10, -16, -18, -21, -22, -23, -24, -26, -27, -31, -32, -43, -44, -45, -49, -50, -51, -52, -54, -55

NO. 2 ESSENTIAL BUS

Tank #1 Inboard Boost Pump
Tank #2 Inboard Boost Pump
Tank #1 Main Outbd Trans Pump
Tank #2 Replen Trans Pump
Number 2 T/R Unit
LH Windshield Anti-Ice System
Cabin Freon Compressor
Cabin Temperature Control
Evaporator Air Manual Shutoff
Ram Air Shutoff Valve
Cabin General Lights
Outbd Landing & Taxi Lights
Cond Ground Cooling-Cabin
Stabilizer Trim Motor
EPR Indicators #1 and 4
#1 Inbd ASB Transfer Pump
Fuel Quantity Indicators
Oil Quantity Indicators #1 and 4
Electronic Compt Cooling Fan

PILOT'S ESSENTIAL BUS

Pilot's Pitot Heater
Pilot's Flight Instruments
Radio
Emergency Lighting System
Fire Detect System #2 and 3
Exhaust Gas Temp #2 and 3
Fuel Flow #2 and 3
Speed Stability System
Ignition/Starting
Altimeter Thumper
Flight Deck Lighting
Standby Instrument Transformer
Fan & Nose Cone A/I Valves 2 & 3
Number 4 T/R Unit
Battery T/R Unit
Pilot's Integrated Flt Nav System

NO. 3 ESSENTIAL BUS

Cabin Temp Equalization
Tank #3 Inboard Boost Pump
Tank #4 Inboard Boost Pump
Tank #3 Replen Trans Pump
Tank #4 Main Outbd Trans Pump
Number 3 T/R Unit
Tail De-Ice System
Radio
Main Instrument Transformer
Center & RH Windshield A/I
Auxiliary Hydraulic Pump
Recirculation Fan
EPR Indicators #2 and 3
Copilot's Flight Instruments
Cabin Freon Condenser Fan
Inboard Landing Lights
Anti-Collision Lights
Structural Temperature Indicator
Overheat Detectors
Fuel Vent Scoop De-Ice
Fan & Nose Cone A/I Valves 1 & 4
Oil Quantity Indicators # 2 and 3
Copilot Integrated Flt Nav Sys
Autopilot System
Flt Deck Panel Lights
#4 Inbd ASB Transfer Pump
EGT Indicator #1 and 4
Fire Detect System #1 and 4
Copilot Pitot Heater
Fuel Flow #1 and 4

NO. 1 NON-ESSENTIAL BUS

Tank #1 Outbd Boost Pump
Tank #2 Outbd Boost Pump
Tank #1 Inbd Trans Pump
Tank #2 Main Trans Pump
Flt Deck Freon Cond Fan
Sliding & Aft Window De-Fog
Number 1 T/R Unit
Fwd Lav Water Htr and Lights
Fwd Commode Water Pump
#2 ASB Trans Pump
#1 Outbd ASB Trans Pump
Buffets

NO. 4 NON-ESSENTIAL BUS

Passenger Reading Lights
Tank #3 Outbd Boost Pump
Tank #4 Outbd Boost Pump
Tank #3 Main Trans Pump
Tank #4 Main Inbd Trans Pump
Flt Deck Freon Compressor
Aft Commode Water Pump
#3 ASB Transfer Pump
#4 Outbd ASB Trans Pump
Aft Lav Water Htr and Lights
Flight Deck Temp Control
Buffets

AC ELECTRICAL SYSTEM - LOAD DISTRIBUTION

FOR AIRPLANE SERIAL NUMBERS: -5, -6, -7, -8, -11, -12, -14, -16, -17

NO. 2 ESSENTIAL BUS

Cabin Temp Equalization
Tank #1 Inboard Boost Pump
Tank #2 Inboard Boost Pump
Tank #1 Main Outbd Trans Pump
Tank #2 Relen Trans Pump
Number 2 T/R Unit
LH Windshield Anti-Ice System
Cabin Temperature Control
Evaporator Air Manual Shutoff
Ram Air Shutoff Valve
Cabin General Lights
Outbd Landing & Taxi Lights
Cond Ground Cooling-Cabin
Stabilizer Trim Motor
EPR Indicators #1 and 4
#1 Inbd ASB Transfer Pump
Fuel Quantity Indicators
Oil Quantity Indicators #1 and 4
Electronic Compt Cooling Fan

NO. 1 NON-ESSENTIAL BUS

Tank #1 Outbd Boost Pump
Tank #2 Outbd Boost Pump
Tank #1 Inbd Trans Pump
Tank #2 Main Trans Pump
Sliding & Aft Window De-Fog
Number 1 T/R Unit
Fwd Lav Water Htr and Lights
Fwd Commode Water Pump
#2 ASB Trans Pump
#1 Outbd ASB Trans Pump
Buffets

PILOT'S ESSENTIAL BUS

Pilot's Pitot Heater
Pilot's Flight Instruments
Radio
Emergency Lighting System
Fire Detect System #2 and 3
Exhaust Gas Temp #2 and 3
Fuel Flows
Speed Stability System
Ignition/Starting
Altimeter Thumper
Flight Deck Lighting
Standby Instrument Transformer
Fan & Nose Cone A/I Valves 2 & 3
Number 4 T/R Unit
Battery T/R Unit
Pilot's Integrated Flt Nav System

NO. 4 NON-ESSENTIAL BUS

Passenger Reading Lights
Tank #3 Outbd Boost Pump
Tank #4 Outbd Boost Pump
Tank #3 Main Trans Pump
Tank #4 Main Inbd Trans Pump
Aft Commode Water Pump
#3 ASB Transfer Pump
#4 Outbd ASB Trans Pump
Aft Lav Water Htr and Lights
Flight Deck Temp Control
Buffets

NO. 3 ESSENTIAL BUS

Tank #3 Inboard Boost Pump
Tank #4 Inboard Boost Pump
Tank #3 Replen Trans Pump
Tank #4 Main Outbd Trans Pump
Number 3 T/R Unit
Tail De-Ice System
Radio
Main Instrument Transformer
Center & RH Windshield A/I
Auxiliary Hydraulic Pump
Recirculation Fan
EPR Indicators #2 and 3
Copilot's Flight Instruments
Inboard Landing Lights
Anti-Collision Lights
Structural Temperature Indicator
Overheat Detectors
Fuel Vent Scoop De-Ice
Fan & Nose Cone A/I Valves 1 & 4
Oil Quantity Indicators #2 and 3
Copilot Integrated Flt Nav Sys
Autopilot System
Flt Deck Panel Lights
#4 Inbd ASB Transfer Pump
EGT Indicator #1 and 4
Fire Detect System #1 and 4
Copilot Pitot Heater

AC ELECTRICAL SYSTEM - LOAD DISTRIBUTION

FOR AIRPLANE SERIAL NUMBERS: -13, -19, -20

NO. 2 ESSENTIAL BUS

Tank #1 Inboard Boost Pump
Tank #2 Inboard Boost Pump
Tank #1 Main Outbd Trans Pump
Tank #2 Replen Trans Pump
Number 2 T/R Unit
LH Windshield Anti-Ice System
Cabin Temperature Control
Evaporator Air Manual Shutoff
Ram Air Shutoff Valve
Cabin General Lights
Outbd Landing & Taxi Lights
Cond Ground Cooling-Cabin
Stabilizer Trim Motor
EPR Indicators #1 and 4
#1 Inbd ASB Transfer Pump
Fuel Quantity Indicators
Oil Quantity Indicators #1 and 4
Electronic Compt Cooling Fan

PILOT'S ESSENTIAL BUS

Pilot's Pitot Heater
Pilot's Flight Instruments
Radio
Emergency Lighting System
Fire Detect System #2 and 3
Exhaust Gas Temp #2 and 3
Fuel Flow #2 and 3
Speed Stability System
Ignition/Starting
Altimeter Thumper
Flight Deck Lighting
Standby Instrument Transformer
Fan & Nose Cone A/I Valves 2 & 3
Number 4 T/R Unit
Battery T/R Unit
Pilot's Integrated Flt Nav System

NO. 3 ESSENTIAL BUS

Cabin Temp Equalization
Tank #3 Inboard Boost Pump
Tank #4 Inboard Boost Pump
Tank #3 Replen Trans Pump
Tank #4 Main Outbd Trans Pump
Number 3 T/R Unit
Tail De-Ice System
Radio
Main Instrument Transformer
Center & RH Windshield A/I
Auxiliary Hydraulic Pump
Recirculation Fan
EPR Indicators #2 and 3
Copilot's Flight Instruments
Inboard Landing Lights
Anti-Collision Lights
Structural Temperature Indicator
Overheat Detectors
Fuel Vent Scoop De-Ice
Fan & Nose Cone A/I Valves 1 & 4
Oil Quantity Indicators #2 and 3
Copilot Integrated Flt Nav Sys
Autopilot System
Flt Deck Panel Lights
#4 Inbd ASB Transfer Pump
EGT Indicator #1 and 4
Fire Detect System #1 and 4
Copilot Pitot Heater
Fuel Flow #1 and 4

NO. 1 NON-ESSENTIAL BUS

Tank #1 Outbd Boost Pump
Tank #2 Outbd Boost Pump
Tank #1 Inbd Trans Pump
Tank #2 Main Trans Pump
Sliding & Aft Window De-Fog
Number 1 T/R Unit
Fwd Lav Water Htr and Lights
Fwd Commode Water Pump
#2 ASB Trans Pump
#1 Outbd ASB Trans Pump
Buffets

NO. 4 NON-ESSENTIAL BUS

Passenger Reading Lights
Tank #3 Outbd Boost Pump
Tank #4 Outbd Boost Pump
Tank #3 Main Trans Pump
Tank #4 Main Inbd Trans Pump
Aft Commode Water Pump
#3 ASB Transfer Pump
#4 Outbd ASB Trans Pump
Aft Lav Water Htr and Lights
Flight Deck Temp Control
Buffets

AC ELECTRICAL SYSTEM - LOAD DISTRIBUTION

GENERAL FUEL SYSTEM MANAGEMENT

NOTE:

1. A schematic diagram of the fuel system circuitry is superimposed on the fuel control panel. The fuel valve switches are controlled from knobs placed across the circuit, representing the corresponding valve locations in the actual system. By aligning the line on a knob with the fuel line, the corresponding valve is OPENED; when the knob reference line is set at an angle of 90 degrees to the fuel line on the panel, the corresponding valve is CLOSED.

2. Usual operation of the fuel system, after tank equalization, is tank to engine with both boost and transfer pumps ON. However, it is not considered mandatory that both boost pumps in any one tank be operating. One operating boost pump in each tank will provide normal fuel flow and pressure.

   On airplanes with center section fuel available, fuel should be used from the center section tank after the outboard ASB tanks have been emptied.

3. Blue VALVE IN TRANSIT lights illuminate to indicate their respective valve transit from one position to another. The lights extinguish when the valve is at rest in either the open or closed position.

4. It is necessary for the Flight Engineer to reset the pilot's instrument panel fuel totalizer as follows to obtain accurate readings:

   The Fuel Quantity Selector switch on the Fuel Control panel must be held in the REPLENISH position until the Fuel Totalizer readout is below the existing actual total fuel quantity. When the selector switch is released to the TOTAL position, the Fuel Totalizer readout will be correct.

Fuel Transfer

Fuel cannot be transferred tank to tank with the valves set in normal operating positions. Check valves prevent such operation.

Fuel Distribution

Airplane is to be fueled in accordance with the Weight and Balance Manual. Fuel usage shall be, outboard anti-shock body, then center section, then inboard anti-shock body, then main wing tanks except for takeoff which shall be tank to engine. The above usage schedule is to be initiated not more than 10 minutes after takeoff. Main wing tanks are to be equalized before landing.

NORMAL FUEL SYSTEM OPERATION

NOTE: Fuel system limitations are included in Section 1, CERTIFICATE LIMITATIONS, of this Flight Manual.

Takeoff Fuel System Operation (Regardless of fuel distribution)

Fuel tank line valves.................................. all OPEN
All boost pumps except center section.................. ON
All transfer pumps, except inboard ASB's............... MAIN/ON
All indicator lights................................... OUT
All jettison/scavenge valves........................... CLOSED
All crossfeed valves................................... CLOSED

If rapid elimination of speed restriction is not required, this configuration can be continued until outboard ASB's are empty. As engines are started, the engine PUMP LOW PRESS light should extinguish for each engine fuel pump. All operating boost and transfer pump PUMP LOW PRESS lights should be extinguished.

Fuel System Operation (To empty ASB outboards rapidly)

Fuel tank line valves.................................. all OPEN
Tank 1 and 4 boost pumps (four)........................ all ON
Tank 1 and 4 main and ASB transfer pumps............... all ON
Engines 1, 2, 3 and 4 crossfeed valves................. OPEN
Center tank and wing crossfeed valves.................. CLOSED
Tanks 2 and 3 boost and transfer pumps................. all OFF

When outboard ASB tanks are empty: Center section fuel to be used as follows:

Fuel tank line valves.................................. all OPEN
Engines 1, 2, 3 and 4 crossfeed valves................. all OPEN
Center tank and wing crossfeed valves.................. both OPEN
Center tank boost/jettison pumps....................... both ON
Inboard boost pump in each inboard tank (2 and 3)...... both ON
Outboard boost pump in each inboard tank (2 and 3)..... both OFF
Tanks 1 and 4 boost and transfer pumps................. all OFF
Tanks 2 and 3 transfer and ASB pumps................... all OFF

When center section tank is empty, empty inboard ASB tanks as follows:

Fuel tank line valves.................................. all OPEN
Engines 1, 2, 3 and 4 crossfeed valves................. all OPEN
Tanks 2 and 3 boost and transfer pumps (ASB also)...... all MAIN/ON
Center section and wing crossfeed valves............... both CLOSED
Tanks 1 and 4 boost and transfer pumps................. all OFF
Center section boost/jettison pumps.................... both OFF

Monitor fuel until inboard ASB tanks are empty, then:

Tanks 2 and 3 ASB transfer pumps....................... both OFF

Monitor fuel until inboard tank fuel equals outboard tank fuel. When this is accomplished, return to tank to engine configuration as noted for takeoff conditions. Do not turn on the ASB transfer pumps.

Fuel Tank Transfer Pump Operation

Normal operation of the outboard fuel tank transfer pumps is with the switches in the ON position.

Normal operation of the inboard fuel tank transfer pumps is with the switches in either MAIN or REPLEN position.(Since the replenish and main tanks are one unit in the Model 30, the operation of these transfer pumps is not as critical as when the tanks were separate units.)

Quick Reference Fuel Sequencing Data

WITH FUEL IN THE OUTBOARD ANTI-SHOCK BODIES AND CENTER SECTION:

1. For engine starting, taxi, takeoff and climb feed tank to engine, using outboard ASB fuel and inboard main/replenish fuel.

2. After takeoff, for rapid elimination of outboard ASB speed restriction, crossfeed outboard tanks to all engines until outboard ASB's are empty.

3. Crossfeed center section tank to all engines until center section tank is empty. Have inboard tanks on standby. Do not use center section tank until landing gear is retracted.

4. Crossfeed inboard tanks to all engines until inboard ASB fuel tanks are empty.

5. Crossfeed inboard tanks to all engines until inboard fuel equals outboard fuel.

6. Use tank to engine to completion of flight, using outboard main and replenish and inboard main and replenish fuels.

WITH NO FUEL IN THE OUTBOARD ASB AND NO CENTER SECTION FUEL:

1. Use steps 1 and 2 above.

2. Continue with steps 5 through 7 of the previous page.

NOTE: Failure of one boost pump in any fuel tank is not considered an emergency situation. A single operating boost pump in any one fuel tank fulfills all fuel system requirements. For operation with failed boost and transfer pumps, consult the Boost and Transfer Pump Limitations, Section 1, CERTIFICATE LIMITATIONS.

When operating above 26,000 feet with one boost pump and a low pressure warning light illuminates or rpm or fuel flow fluctuates, turn ON the other boost pump. At first indication of second pump failure, open the appropriate crossfeed valve. When fuel scheduling requires, descend to 26,000 feet or below to utilize fuel in the tank which has both pumps inoperative. Normal fuel flow is available without any boost pumps operative at 26,000 feet or below.

TAXI PROCEDURE

Ground maneuvering is accomplished similar to other conventional type tricycle geared airplanes. Directional control is best provided by nose wheel steering and asymmetrical engine thrust. Differential braking can also be used as required. Reverse thrust, in accordance with the limitations in Section 1 of this Flight Manual, may be used when necessary.

In the event of hydraulic system failure while taxiing, the emergency air brake, which provides non-differential braking only, and the thrust reversers can be used to stop the airplane. Nose wheel steering and nose wheel brakes will be available if hydraulic power system number 1 is operating.

TAKEOFF PROCEDURE

In addition to the takeoff procedure noted in Section 1, CERTIFICATE LIMITATIONS, the following additional information is recommended:

Controls are arranged so that the left hand can be used for nose wheel steering and the right hand can be on the power levers, thus maintaining good directional control during the takeoff ground run. Under normal runway conditions, nose wheel steering will maintain directional control to approximately 80 knot, at which time the rudder becomes effective. During the takeoff roll, maintain a slight forward pressure on the control column to assure maximum nose wheel steering and to prevent any excessive yaw in the event of an engine failure prior to rotation.

Crosswind Takeoff and Landing Technique

Although no special technique is required for crosswind takeoffs and landings, care should be exercised in the use of lateral control during crosswind takeoff and landing operations.

Excessive lateral control during takeoff or landing ground roll will reduce opposite rudder control capabilities. During the takeoff, this will also result in a lateral oscillation at lift-off.

NORMAL LANDING PROCEDURE

1. Accomplish the normal landing check list.

2. Decrease airspeed as wing flaps are lowered to arrive at the $1.3V_S$ landing flap reference speed prior to starting the landing flare. Monitor the rate of descent during the approach to insure that 800 to 900 feet per minute descent is not exceeded while in close proximity to the ground.

FIRE DETECTION SYSTEM TEST

Actuate the momentary contact TEST switch on the fire control panel to FIRE position. If all fire warning lights illuminate immediately and the fire warning bell sounds, the fire detection circuits are operating properly. Actuate the test switch to O'HEAT position. If all fire warning lights flash intermittently and the fire warning bell sounds, the overheat circuits are operating properly. With the proper circuits energized, pulling a FIRE PULL "T" handle will close the firewall fuel shutoff valve, resulting in the green EMERGENCY VALVE CLOSED light illuminating on the fuel control panel.

POWER RUDDER SYSTEM TEST

The power rudder system tests are conducted as follows: (Two airplane configurations will be found. In one, the power rudder control switches will be found on the pilots' instrument panel; the other will have the control switches on the Flight Engineer's Hydraulic Control Panel.)

To check the LOW PWR circuitry, turn OFF the #1 power rudder hydraulic system. Pull the #1 power rudder system warning light circuit breaker. The LOW PWR light should illuminate, indicating the circuitry is operating correctly.

Return the #1 system to normal operation and repeat the test using the #2 system switch and circuit breaker. The same light should illuminate.

RUDDER GUST LOCK

A rudder flight tab gust lock, operating on the rudder pedals, is provided adjacent to the nose steering wheel. Pulling the gust lock handle aft and rotating the handle across the nose steering wheel rim applies the gust lock. Releasing the handle and stowing clear of the nose steering wheel in the forward position releases the gust lock.

FLAP HYDRAULIC SYSTEM SELECTOR TEST

The wing flaps can be operated from either hydraulic power system number 1 or number 2. Normal operation is from system number 1. The selector switch is located in the pilots' overhead switch panel. To test flap operation on both systems proceed as follows:

After operating the flaps in the usual mode, i.e. with the selector switch in the NORM #1 position, place the switch in the ALTER #2 position. Test the operation with the number 2 hydraulic system and return the switch to the NORMAL position. Do not leave the switch in the ALTER #2 position. Proper normal operation is to use hydraulic system number 1. After flaps have been set to takeoff position, check for free operation of control wheel.

ELEVATOR TEST

While operating the flaps from full DOWN position to the up position, hold the control column in the neutral position and observe that an approximately 35 pound nose down force occurs. This is caused by the elevator "downspring" compensator.

SPEEDBRAKE SYSTEM

The speedbrake system utilizes extension of the wing spoilers. The speedbrakes are used for speed reduction, altering the approach path and as a means of reducing wing lift after landing to aid in increasing brake effectiveness. The speedbrakes can be operated at any airplane speed, however, they are force limited and will blow down according to the airspeed. The landing gear can also be used as a speedbrake if the placard speed for such use is observed.

CAUTION: DURING APPROACH, THE USE OF SPEEDBRAKES FOR ACCOMPLISHING HEIGHT CORRECTION MUST BE CAREFULLY MONITORED TO PREVENT HIGH RATES OF SINK FROM DEVELOPING. SUCH USE OF SPEEDBRAKES SHOULD BE CONFINED TO A MINIMUM ALTITUDE OF AT LEAST 1000 FEET ABOVE THE SURFACE AND IN NO EVENT SHOULD THEY BE USED FOR HEIGHT CORRECTION BELOW 300 FEET ABOVE THE SURFACE. HOWEVER, THIS DOES NOT INCLUDE SPLIT SPOILER OPERATION TO OVERCOME JAMMED HORIZONTAL STABILIZER EFFECTS.

INTEGRATED AIR DATA SYSTEM (KIFIS)

The integrated air data systems perform the following functions:

1. Electro-mechanically corrects altitude indications for altimeter calibrations error.
2. Computes true airspeed.
3. Computes indicated static outside air temperature.
4. Provides a programmed Mach signal for speed stability system.

Power OFF Operation

1. When the power is off to the pilot's or copilot's system, a red flag will appear on the related altimeter.
2. The altimeters function as conventional pressure-actuated instruments (with no correction applied) when power is off.
3. The following indicators are unaffected when the electrical power is off:
   a. Airspeed indicators
   b. Machmeter
4. The following indications may remain at the last "power-on" values when power is turned off:
   a. True airspeed.
   b. Static air temperature.
5. Provides command airspeed indications for the following functions:
   a. Long range cruise)
   b. Maximum endurance) CLEAN CONFIGURATION
   c. Airport boundary speed)
   d. Buffet onset) LANDING CONFIGURATION
   e. Stall)

   CAUTION: CORRECTION IS NOT PROVIDED IN THE ALTIMETER FOR STATIC SOURCE ERROR.

   DO NOT USE THE TRUE AIRSPEED INDICATION TO OBSERVE AIRSPEED LIMITATIONS WHICH ARE PRESENTED IN SECTION 1, CERTIFICATE LIMITATIONS, IN TERMS OF INDICATED (CALIBRATED) AIRSPEEDS.

NOTES: 1. KIFIS correction is not applicable to the alternate system.
2. The KIFIS system is not a primary flight instrument.

KIFIS Test Data:

True Airspeed = 496 ±5 knots
Static Air Temperature = -80°C ±1°
Altimeter = 200 feet ±50 feet added to reading before test switch is actuated.
Angle of Attack Sector = Buffet onset ramp position aligns with the airspeed indicator needle.

SPERRY TYPE R-1 PICTORIAL DEVIATION INDICATOR

The R-1 pictorial deviation indicator provides a representation of the airplane position with respect to a selected VOR radial or to an ILS localizer beam and glide slope. It includes course selection for the autopilot, mode indication, and warning flags. Reciprocal heading can be selected by use of the reciprocal heading knob in the upper right corner of the unit.

VOR Operation

When a VOR station is tuned in, the inbound bearing of the desired radial is selected by means of the SET knob; the bearing appears in a digital counter at the top of the instrument. A "V" pointer appears on the dial, pointing along the radial toward the station, at an angle that represents the direction of the beam relative to the airplane heading. The "V" bar displacement from a fixed reference airplane symbol indicates the position of the airplane relative to the beam and to the station.

As the airplane passes over the station and encounters the radio signal beyond the zone of confusion, a to-from sensor will rotate the "V" bar 180°. The instrument will not give a false to-from reading in VOR operation; whatever course is selected, the "V" bar always points to the station.

ILS Operation

In ILS operation, the course counter is set on the runway inbound bearing. The localizer is a single direction signal and no to-from signal is available. Therefore the "V" will not invert even though the airplane passes over the localizer station. When a glide path signal is received, a glide slope bar appears and is deflected up or down from center to show the deviation of the airplane relative to the glide path.

Near the base of the "V" bar a window shows a flag with three positions, OFF, VOR, and LOC. The LOC flag is blue-yellow; the blue half will be on the right in normal approach. Should the airplane fly over and on past the runway, course setting should be left unchanged for a go-around. The blue-yellow indication and "V" bar will remain as before. When the airplane makes the 180° turn, the "V" bar, being azimuth stabilized, will invert and be displaced toward the beam; the blue-yellow flag will swing around to the top of the dial, so that the blue indication will be on the left, emphasizing that the airplane is now on a reciprocal course. As the airplane turns again into the localizer beam, the "V" bar and blue-yellow flag will resume the normal approach pattern.

Left-Right Deviation Indicator Operation

In event of compass malfunction, the R-1 can be used as a left-right deviation indicator by pulling out the SET knob and rotating the "V" bar until it points vertically. This disengages the compass servo system and leaves the pointer in a vertical position, functioning as a simple right-left deviation bar.

Loss of radio signal will cause the VOR-LOC flag to indicate OFF. A glide slope warning flag marks loss of the glide slope signal.

HORIZONTAL STABILIZER POSITION - AIRPLANE PARKING

The horizontal stabilizer should be positioned at the zero degrees position when parking the airplane. This prevents water collection in the horizontal stabilizer.

AUDIBLE WARNING SYSTEMS

A warning horn, a fire and overheat warning bell, and a mach/airspeed never exceed warning bell are provided to alert the flight crew when corrective action of some nature is required.

Stabilizer Warning Horn

The warning horn will sound if the horizontal stabilizer is outside the minimum or maximum takeoff position and any two power levers are advanced past the 92% rpm position while the main landing gear struts are compressed.

Speedbrake Warning Horn

The warning horn will sound at takeoff if the speed brakes are not retracted and one or more power levers are advanced past 92% rpm.

Flap Warning Horn

At takeoff, the warning horn will sound intermittently if the flaps are not between 8° and 14° and any two power levers are advanced past 92% rpm. During approach, if any landing gear is not down and locked, lowering the flaps past the 47 degree extension point will produce a steady blast on the horn.

Landing Gear Warning Horn

When airborne, the horn will sound when any power lever is positioned below 75% rpm and all landing gears are not down and locked. An interrupter switch is provided to silence the horn if desired. When the power lever (or levers) are advanced, the interrupter circuit is automatically reset.

When on the ground, with ac power on the airplane, the horn will sound if the landing gear control handle is not down and locked, or when the override is actuated. With only airplane battery power available, the horn will sound only when the override is actuated.

Fire and Overheat Warning Bell

A steady sounding bell is provided for both fire and overheat warning.

Mach/Airspeed Warning Bell

A bell is provided on the V_{NE}/M_{NE} warning system. This warning bell also operates when outboard anti-shock body speed restrictions are exceeded.

ADVERSE WEATHER SYSTEM

The adverse weather system is operated in a fully manual mode, turning the system on when the flight crew determines that ice conditions exist.

Although the wing and engine anti-ice systems are primarily designed for anti-icing operations, they also operate satisfactorily as de-icing systems.

Wing Anti-Ice System

The wing anti-ice system uses compressor bleed air controlled by six pressure regulating and shutoff valves. There are two switches on the anti-ice control panel, one for the left wing and one for the right wing. An amber warning light, CLOSED INB'D, CLOSED CENTER and CLOSED OUTB'D is provided for each valve. These indicator lights will illuminate and immediately extinguish as each anti-ice valve opens. If the anti-ice valve is energized but fails to open, or an overheat signal is present, the valve closed lights will illuminate. To check the wing anti-ice system, after starting engines, energize the valves and check for heat rise in the wing leading edge positions of the Leading Edge and Dust Space Temperature System.

NOTES:

1. The wing anti-ice system should be manually turned on prior to entering known icing conditions or if ice is observed on the wing leading edges.

2. One engine failure will cause no reduction in the effectiveness of the wing anti-icing system.

3. With two engines failed on the same side, adequate wing anti-icing is still available.

4. During descent at low engine RPM, ice may form on the aft portion of the leading edges. If icing becomes excessive, engine RPM may be advanced to make more heat available. The wing anti-icing system is completely evaporative at approximately 80% RPM and above.

Leading Edge and Duct Space Temperature System Operation

The leading edge and duct space temperature warning system provides a means of monitoring temperatures at eighteen places. The 18 position switch on the Pilots' Overhead Switch Panel is divided into four major divisions, POD, LH WING LE, RH WING LE and DUCT SPACE TEMP. The POD division has four temperature points, one per pod. The LH WING LE and RH WING LE are divided into three more positions, INBD, SLAT 1 and 3. The DUCT SPACE TEMP divides into four LH WING and four RH WING temperature points. An amber EXCESS HEAT warning light is provided and will illuminate when any point detects a temperature greater than its alarm setting. The position that sent the signal can then be identified by use of the switch and temperature indicator.

Excess Heat and Isolation System Operation

The excess heat and isolation system is a protective system that monitors the ambient temperatures in the wing duct spaces ahead of the front spar and around the rain clearing duct in the fuselage area. Three continuous temperature sensitive loops are provided. Two follow the basic bleed air duct routing, one loop in each wing. The wing loop paths follow the ducting into the engine pylon areas. The wing temperature sensitive loops are set to react to a temperature of 154°C (310°F) or higher. The third temperature sensitive loop follows the fuselage crossover and rain clearing bleed air ducts and is set to react to a temperature of 154°C (310°F) or higher. The system is designed for in-flight operation only. The wing temperature sensitive loops are rendered inoperative while on the ground. The temperatures at which the system will react are set higher than the reaction temperatures of the Leading Edge and Duct Space Temperature system. In normal operation, the latter system will indicate high temperature troubles well in advance of the indications from the excess heat and isolation system. The intent of the design is that the flight crew will be alerted to a high temperature condition, and be able to locate the trouble spot, by using the Leading Edge and Duct Space Temperature system. Should the flight crew miss an over-temperature condition, the Excess Heat and Isolation System will provide warning and automatically isolate the complete area involved in the over-temperature.

The Excess Heat and Isolation System control panel is located on the pilots' overhead instrument panel. Three three-position AUTO - OFF - MAN OPEN switches are located on the panel. Directly above each switch (L. WING - FUS - R. WING) are three amber warning lights labelled EXCESS HEAT. Each warning light is connected to its respective temperature sensing loop. During normal operation, all three switches are placed in the AUTO position. An over-temperature condition in the alarm range of any loop will result in illumination of the associated warning light. If a wing loop is concerned, the engine bleed air valves for both engines in that wing and the emergency isolation valve for that wing will close, thus shutting off bleed air flow through the affected wing.

NOTE: On airplanes equipped with pneumatic driven Freon units, five switches are provided. The two additional loops, one for each Freon drive duct in the under wing plenum chamber, are set to react at 154°C (310°F) and, on overheat, will automatically close the bleed air source valve to the applicable Freon drive duct system.

As a result of such action, the engine bleed air warning lights for the engines concerned will illuminate CLOSED. If the airplane anti-icing systems are operating, the engine anti-ice system will cease operating and the three anti-ice wing valve warning lights for the wing concerned will illuminate.

If an over-temperature condition in the fuselage crossover or rain clearing duct is involved, both wing emergency isolation valves will close. The turbo-compressors, being supplied from outboard of the isolation valves, will remain in operation.

NOTE: As a result of this action, if the rain clearing system is operating, the rain clearing duct shutoff valve will close from lack of pressure, thus stopping the rain clearing system operation and extinguishing the blue rain clearing ON light.

Should icing conditions be such that manual over-ride of the automatic heat isolation system is desirable, the appropriate Excess Heat and Isolation System control switch can be placed in the MAN OPEN position for short periods of time. Placing any of the switches in MAN OPEN will open all associated isolation and engine bleed air regulator valves that have been closed automatically. Placing the switch in the OFF position will extinguish the appropriate warning lights and position the isolation and bleed air valves concerned to the closed position. Thus, in the OFF position, the same valves are closed as are closed in the AUTO position by an overheat condition. However, the EXCESS HEAT light is extinguished.

CAUTION: PLACING AN ISOLATION SWITCH IN THE MAN OPEN POSITION BYPASSES THE AUTOMATIC OVERHEAT PROTECTION AND EXCESS HEATING OF THE AIRPLANE STRUCTURE MAY RESULT. PLACING THE FUSELAGE SWITCH IN THE MAN OPEN POSITION WILL OVER-RIDE BOTH AUTOMATIC AND MANUAL CLOSING OF THE WING ISOLATION VALVES. THIS WILL MAKE IT IMPOSSIBLE TO ISOLATE ONE WING ONLY SINCE CROSSFEED OCCURS FROM THE OTHER WING.

Engine Anti-Ice System Operation

The engine air inlet duct lip, the engine compressor nose cone, and the inlet guide vanes on each engine are anti-iced by hot bleed air from the engines. The engine anti-ice systems are operated by means of the four OFF - ON switches on the ENGINE ANTI-ICE control panel. If the engine anti-ice valves fail to open or close as directed, the associated MAL FUNCT light will illuminate. With the system turned ON, the MAL FUNCT light will illuminate at IDLE engine RPM due to inadequate engine bleed pressure. The light will go off, indicating proper functioning of the valve, when the engine is advanced above 75% RPM.

When engine icing conditions exist prior to takeoff, it is recommended that the engine anti-icing systems be turned ON manually at least 12 seconds before applying takeoff thrust and left on during takeoff. If the flight crew has determined that there is no probability of icing on a given flight, the engine anti-icing system switches may be left in the OFF position.

NOTES: 1. Manual operation of the engine anti-icing system is recommended when O.A.T. is below 10°C (50°F) and there is visible moisture in the air.

2. An abnormal change in EPR or EGT may be an indication of engine icing. If atmospheric conditions are such that icing conditions may exist, turn on engine anti-icing immediately.

3. Always monitor engine cowlings and wing leading edges for ice indications.

4. If descent through icing exceeds 3 minutes in duration, it is recommended that engine RPM be advanced to 80%.

Tail De-Icing System

The tail de-icing system employs integral cyclic-electrical leading edge heating blankets for periodic removal of ice. The heating blankets are separated by parting strips which are heated continuously when the system is energized. The tail de-icing system ON - OFF - TEST switch is located on the pilots' overhead switch panel. In the TEST position, 18 "blinks" occur on the tail de-ice MAL FUNCT warning light if the system is operating satisfactorily. In flight, operation can be checked by isolating the number three bus and observing the cycling load variation on the number three bus ammeter. Operation is as follows:

1. Manual operation. Turn the tail de-ice switch to the ON position.

2. The tail de-ice system cannot be operated on the ground. The landing gear safety switch will prevent operation until airborne.

Windshield Anti-Ice and Anti-Fog Systems

The windshield anti-fog system is designed to operate at all times during ground and flight operations. The heat supplied to the low density coating maintains the aft vinyl layers at approximately 38°C (100°F) and increases the structural integrity of the windshields, making them more resistant to impact. Before opening or closing the pilots' sliding windows, the anti-fog switch for the sliding windows should be in the OFF position.

With the windshield switches in the ANTI-FOG ON position, anti-fog heat is applied to the windshields. When ice is encountered, the anti-ice heating elements may be energized by placing the switches in the ANTI-ICE position. Both the windshield anti-fog and anti-ice coatings are protected by overheat sensors which will automatically maintain a constant temperature.

The windshield anti-ice system may be used as an alternate anti-fog system. Turn the windshield switches to ANTI-ICE. After 15 minutes in the ANTI-ICE position, turn OFF until the windshield starts to fog. Turn switches to ANTI-ICE for another 15 minutes. Repeat these cycles as required.

Rain Clearing System

The operation of the bleed air rain clearing system is controlled by a switch on the pilots' overhead switch panel. Operation must be in accordance with the limitations in Section 1, Certificate Limitations, of this Flight Manual.

WING FLAP ASYMMETRY TEST

The wing flap asymmetric switch can be tested prior to flight as follows: (Test first on NORMAL, then repeat on ALTER #2 position of Flap Selector Switch).

Place the Flap Asymmetric Test switch, located on the pilots' pedestal, to the REL TEST position while the flaps are being operated. The flaps should stop moving and the asymmetric flap light should illuminate.

Place the switch in the SW TEST position for approximately 3 seconds, while the flaps are in motion. The flaps should continue to move and the asymmetry light should illuminate. If the light blinks, or the flaps do not continue to move, a malfunction exists.

CAUTION: OPERATION OF THE FLAPS WITH THE FLAP ASYMMETRY CIRCUIT BREAKER PULLED, OR NO POWER ON THE CIRCUIT, WILL CAUSE BOTH HYDRAULIC SYSTEMS TO OPERATE THE FLAPS. POSSIBLE DAMAGE TO THE FLAP SYSTEM MAY OCCUR.

SPEED STABILITY SYSTEM CHECK PROCEDURE

AIR CONDITIONING AND PRESSURIZATION SYSTEM

The recirculation fan should not be turned ON when the FLIGHT DECK/BOTH/CABIN Freon control switch is placed in either of the OFF positions and one or both turbocompressors are operating.

To maintain airflow to the cain during IDLE descent, flight speed should be held within the speed/altitude limits shown on the charts on the next two pages.

Do not operate the recirculation fan unless the cabin temperature control switch is in either MANUAL or AUTO position and the cabin temperature control circuit breaker is pushed in.

Switching the turbocompressors on manually and the recirculating fan off manually prior to takeoff will prevent any tendency towards cabin pressure fluctuation during takeoff.

Alternate Pressurization System Operation

It is permissible to use the bleed air PRESS. SOURCE system in lieu of turbocompressors as noted below:

1. Set the temperature control to the full cold position and wait for 15 seconds.
2. Turn off the turbocompressor.
3. Open the bleed air PRESS. SOURCE switch.
4. Reset the temperature control to the desired setting.
5. Repeat the steps for the other turbocompressors.

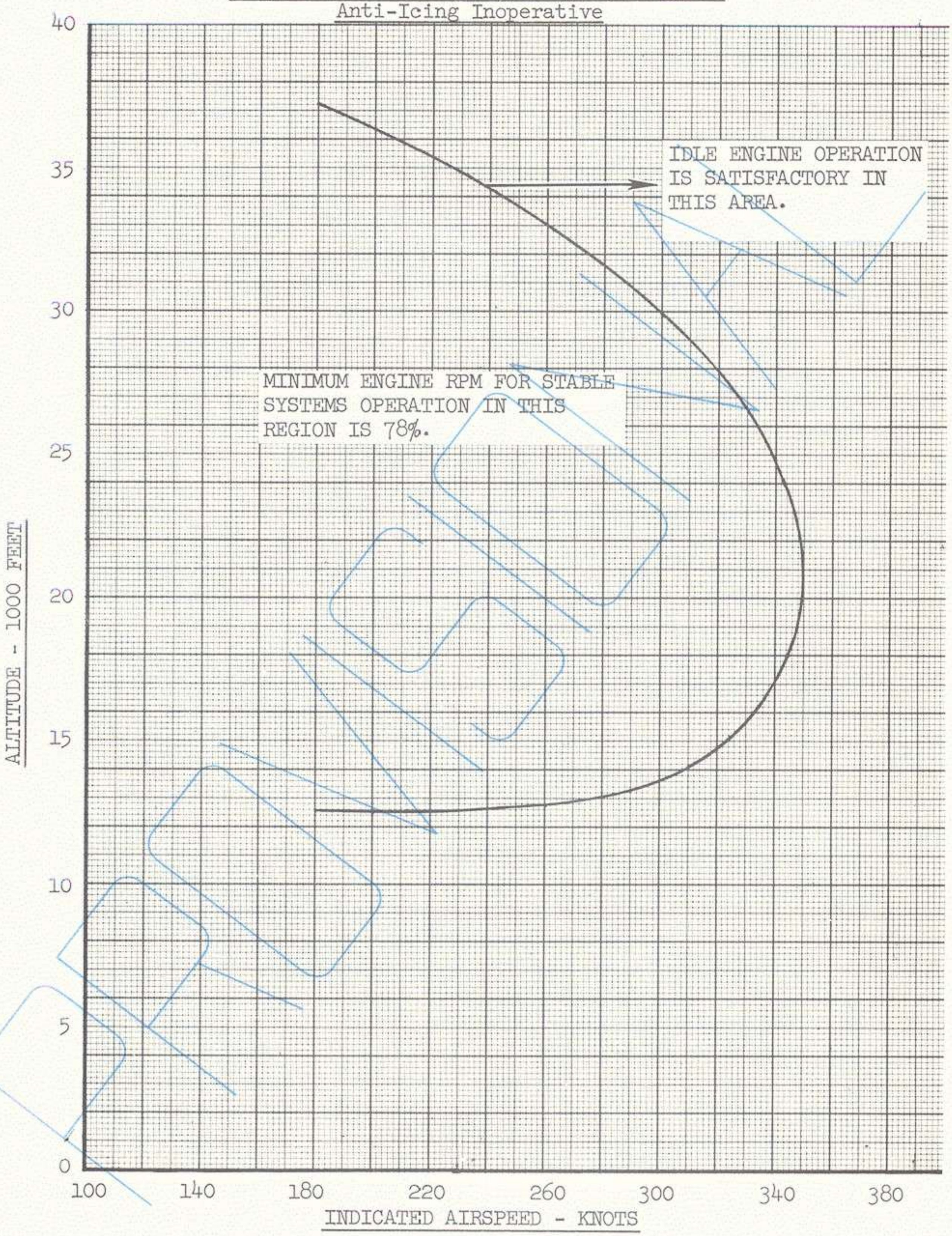
NOTES:

1. Failure to follow the above procedure can result in light smoke entering the cabin and flight deck under certain conditions. The smoke contains no traces of carbon monoxide and is caused by high bleed temperatures through the heat exchange when the cooling air valve is closed.

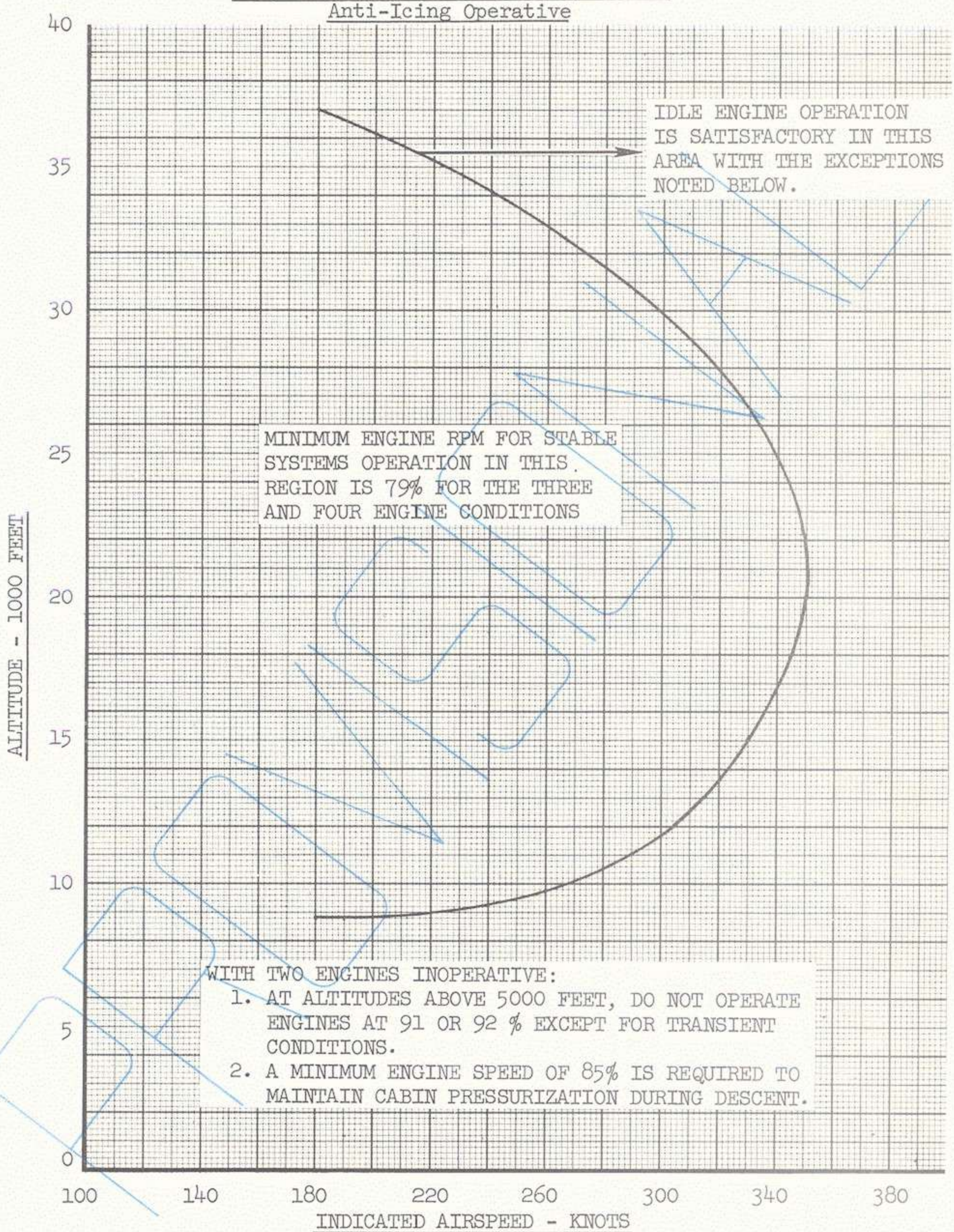
2. If desired, steps 1 and 2 may be reversed to enable shutting down the turbocompressors at once.

AIRSPEED - ENGINE RPM REQUIRED TO MAINTAIN ADEQUATE PRESSURIZATION

Two, Three and Four Engine Operation With Anti-Icing Inoperative



AIRSPEED - ENGINE RPM REQUIRED TO
MAINTAIN ADEQUATE PRESSURIZATION
Two, Three and Four Engine Operation
Anti-Icing Operative



3. If cabin pressurization cannot be maintained with the electronic equipment cooling valve OPEN, CLOSE the valve and turn the electronic equipment cooling fan ON.

4. Do not use alternate pressure sources below 10,000 feet at power settings above 85% and do not use during ground operations.

5. If a turbocompressor is manually turned OFF, first CLOSE the electronic equipment cooling valve and turn the cooling fan ON. This sequence will aid in preventing cabin pressurization surge.

STATIC PRESSURE SYSTEMS

Three NORMAL static pressure systems, and one ALTERNATE static pressure system common to both pilot and copilot are provided as follows:

Two NORMAL systems supply static pressure for the pilot's and copilot's machmeter, airspeed indicator, altimeter and rate of climb indicator. Static pressure is also provided for the flight recorder equipment, cabin differential pressure indicator, landing light pressure switch, mach airspeed warning switch, speed stability Qc transducer, stability rate Q switch and airspeed torque limiting switch.

One NORMAL system supplies static pressure for the autopilot.

Switches on the pilot and copilot auxiliary instrument panels provide for selection of the NORMAL or ALTERNATE system by either pilot.

A PITOT STATIC AUX EQUIP switch is provided on the copilot's auxiliary instrument panel. This enables the copilot to shut off pitot and static lines to the cabin differential pressure indicator, landing light pressure switch, flight recorders and mach/airspeed warning switch, pitot pressure to the autopilot, speed stability Qc transducer and stabilizer rate Q switch.

4 PERFORMANCE INFORMATION

TABLE OF CONTENTS

SECTION 4, PERFORMANCE INFORMATION

SECTION 4, PERFORMANCE INFORMATION (CONT.)

DEFINITIONS

NOTE: Airspeed values in this Airplane Flight Manual are presented in IAS (indicated airspeed), M_i (indicated Mach), M (Mach number) and/or CAS (calibrated airspeed). (The IAS values shown in this Flight Manual are not corrected for the instrument error calibration of the individual instrument and include only the pilot's airspeed system position error.)

Airspeeds

IAS = Observed indicated airspeed corrected for the instrument error calibration characteristic of the individual instrument.

Mi = Indicated machmeter reading as installed in the airplane, corrected for instrument error but not for position error.

CAS = Airspeed indicator reading as installed in the airplane, corrected for instrument error and position error.

M = Machmeter indicator reading as installed in the airplane, corrected for instrument error and position error.

V_1 = Critical engine failure speed (CAS) which is:
1. The maximum speed at which the pilot can recognize an engine failure during the takeoff run and stop within the scheduled runway length, OR,
2. The minimum speed at which a power failure can be experienced and the takeoff safely continued without overrunning the takeoff flight path.

V_1 must not be less than V_{MCG}.

V_2 = Takeoff safety speed (CAS) which is the minimum speed required to permit attainment of the required takeoff climb gradient with one engine inoperative.

V_2 min = V_2 must not be less than:
1. A speed 1.2 times the zero thrust stall speed with wing flaps in the takeoff condition ($1.2V_S$).
2. A speed of 1.1 V_{MCA}.

V_{MU} = The minimum unstick speed (CAS) which is the speed at which the airplane can be made to lift off the ground and continue the takeoff without displaying any hazardous characteristics.

V_R = The rotation speed (CAS) which is the speed at which the pilot starts to rotate the airplane to obtain the V_2 speed at 35 feet above the runway surface. V_R must not be less than:

1. V_1.
2. $1.05V_{MC}$.
3. A speed permitting attainment of V_2 speed at 35 feet above the runway surface.
4. A speed permitting a V_{LOF} not less than:
   a. 1.10 four engine V_{MU}.
   b. 1.05 three engine V_{MU}.

V_{LOF} = The lift-off speed (CAS) which is the speed at which the airplane first becomes airborne.

V_{MCA} = The air minimum control speed (CAS) which is the minimum flight speed at which the airplane is controllable with a maximum allowable bank angle of 5 degrees when one outboard engine suddenly becomes inoperative with the remaining three operating engines at takeoff power.

V_{MCG} = The ground minimum control speed (CAS) which is the minimum speed on the ground at which the takeoff can be continued using only aerodynamic controls to maintain direction when an outboard engine suddently becomes inoperative with the remaining three engines at takeoff power.

MISCELLANEOUS DEFINITIONS

Climb Gradient

The ratio of climb speed to true airspeed is expressed in percent by dividing the rate of climb, expressed in feet per minute, by the true airspeed, expressed in feet per minute:

$$\gamma = \%\ \text{climb gradient} = \frac{\text{Rate of climb (ft/min)}}{\text{True airspeed (kts) (101.34)}}$$

Equivalent and True Airspeed

Additional references are made to the terms Equivalent Airspeed (EAS) and/or True Airspeed (TAS). For explanatory reasons only, the following definitions are given:

EAS = CAS corrected for adiabatic compressible flow.
TAS = True airspeed relative to free air. $TAS = EAS/\sigma^{\frac{1}{2}}$

Speeds

All speeds are given in knots or in Mach number. To obtain statute miles per hour, multiply the speed in knots by 1.152.

Runways

All takeoff and landing distances are given for dry, hard surfaced, smooth runways.

Pressure Altitude

Pressure altitude is the expression of atmospheric pressure in terms of altitude above mean sea level in accordance with internationally accepted standards. It is the altitude read on the altimeter when the sub scale is set to 29.92 inches of mercury.

Wing Flap Positions

Wing flap positions for the various configurations are as follows:

	PLACARD
Takeoff	10°
Enroute	0°
Approach	36°
Landing	DOWN

AIRSPEED CALIBRATIONS

The position error corrections to be made to IAS to obtain CAS, and to M_i to obtain Mach, are presented on the charts on the following pages:

The location of the static source pickups is as follows:

	PILOT	COPILOT
Fuselage	426.715	426.715
Water Line (Left)	12.460	13.125
Water Line (Right)	13.125	12.460

The location of the pitot pickups are as follows:

Fuselage	157.1	157.1
Water Line	20.0	20.0

The conditions shown on the curves are as follows:

CONFIGURATION	LANDING GEAR	SLATS & KREUGERS	WING FLAPS
Clean	UP	IN	UP
Takeoff	UP or DOWN	OUT	10°
Approach	UP or DOWN	OUT	36°
Landing	DOWN	OUT	DOWN

ALTIMETER CALIBRATIONS

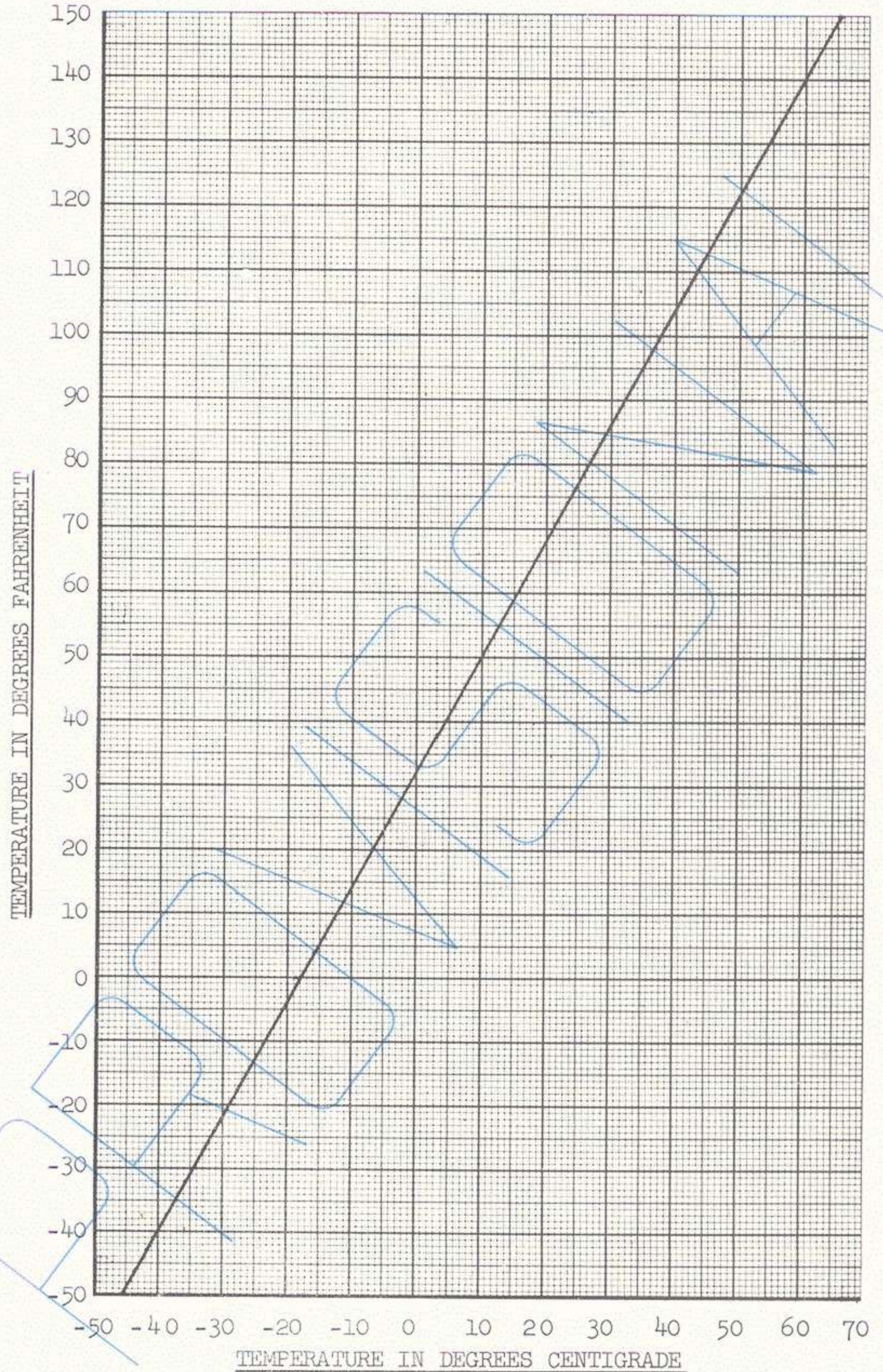
The same conditions and locations apply to the altimeter static source error corrections as was noted above. The charts are presented immediately after the Airspeed Calibration charts.

ALTERNATE STATIC SOURCE

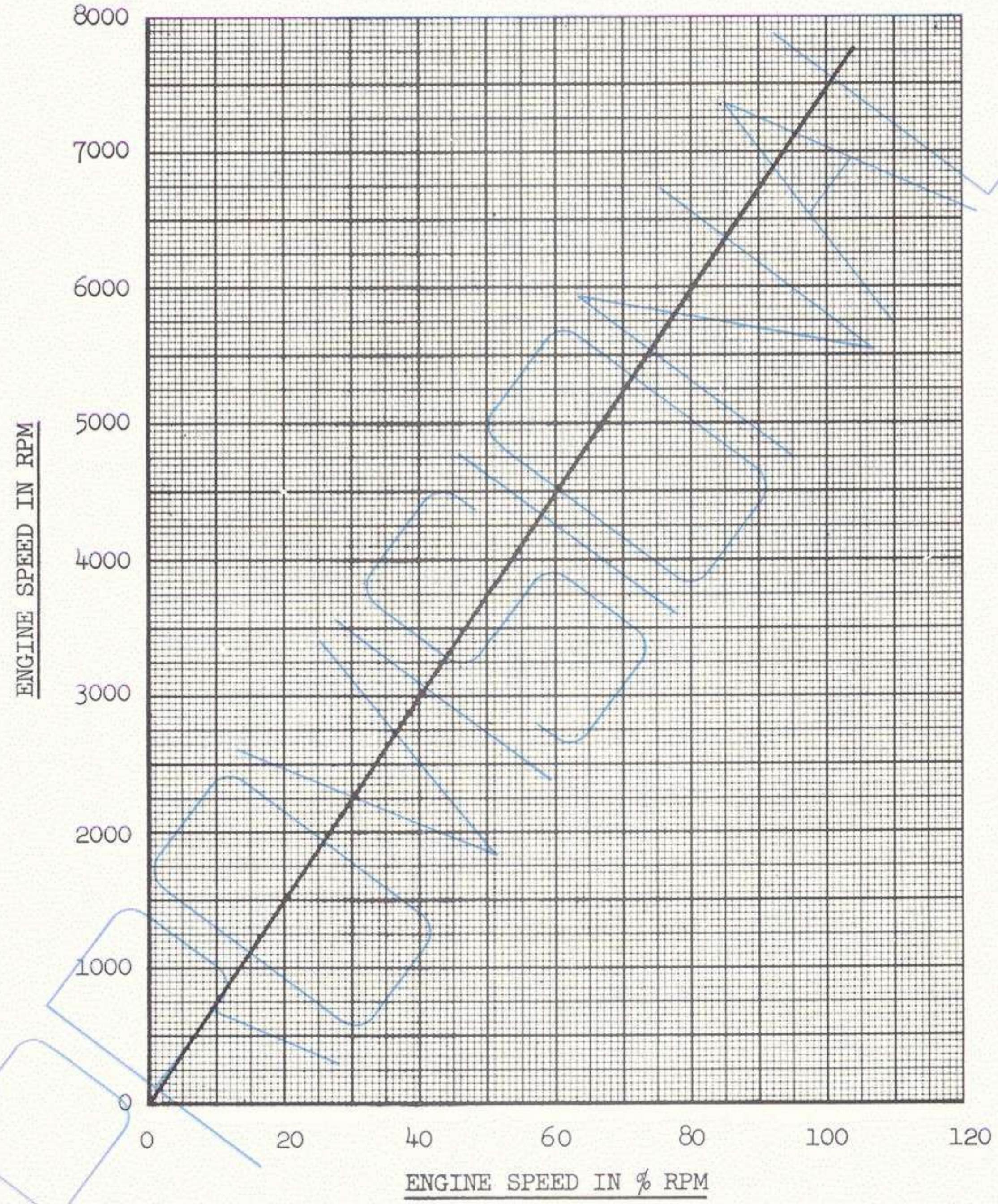
Position error corrections for both airspeed and altitude referred to the alternate static source are presented herein. These curves are to be used only after the alternate static source has been selected. The alternate static source is located inside the vertical stabilizer.

Self explanitory examples will be found on the airspeed, Mach and altimeter charts. In each case where a base line is shown, proceed to the baseline, then to the appropriate gross weight, etc.

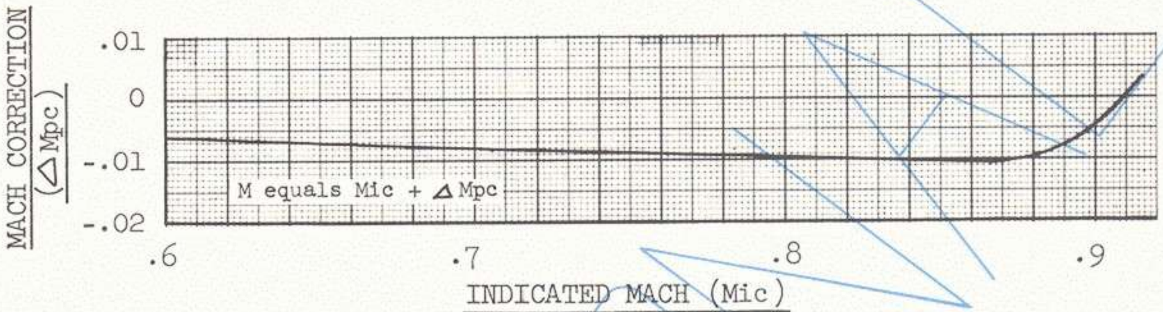
TEMPERATURE CONVERSION CHART



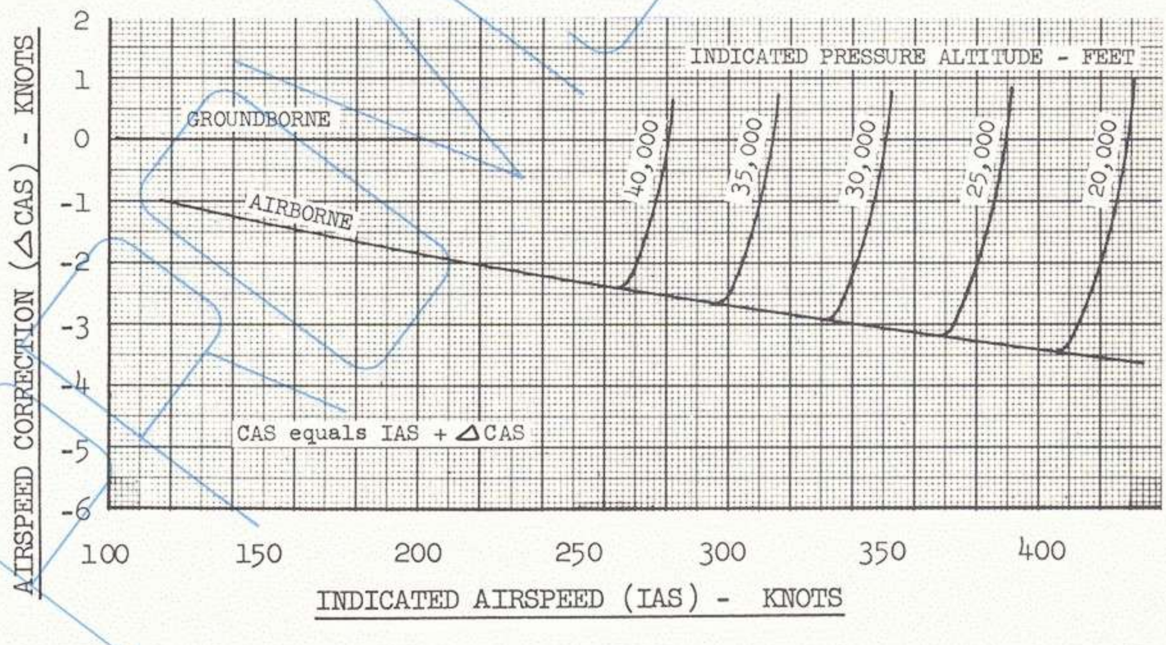
ENGINE SPEED CONVERSION CHART



PILOT AND COPILOT
STATIC PRESSURE SOURCE POSITION ERROR CORRECTION
NORMAL SYSTEM - AIRSPEED AND MACH

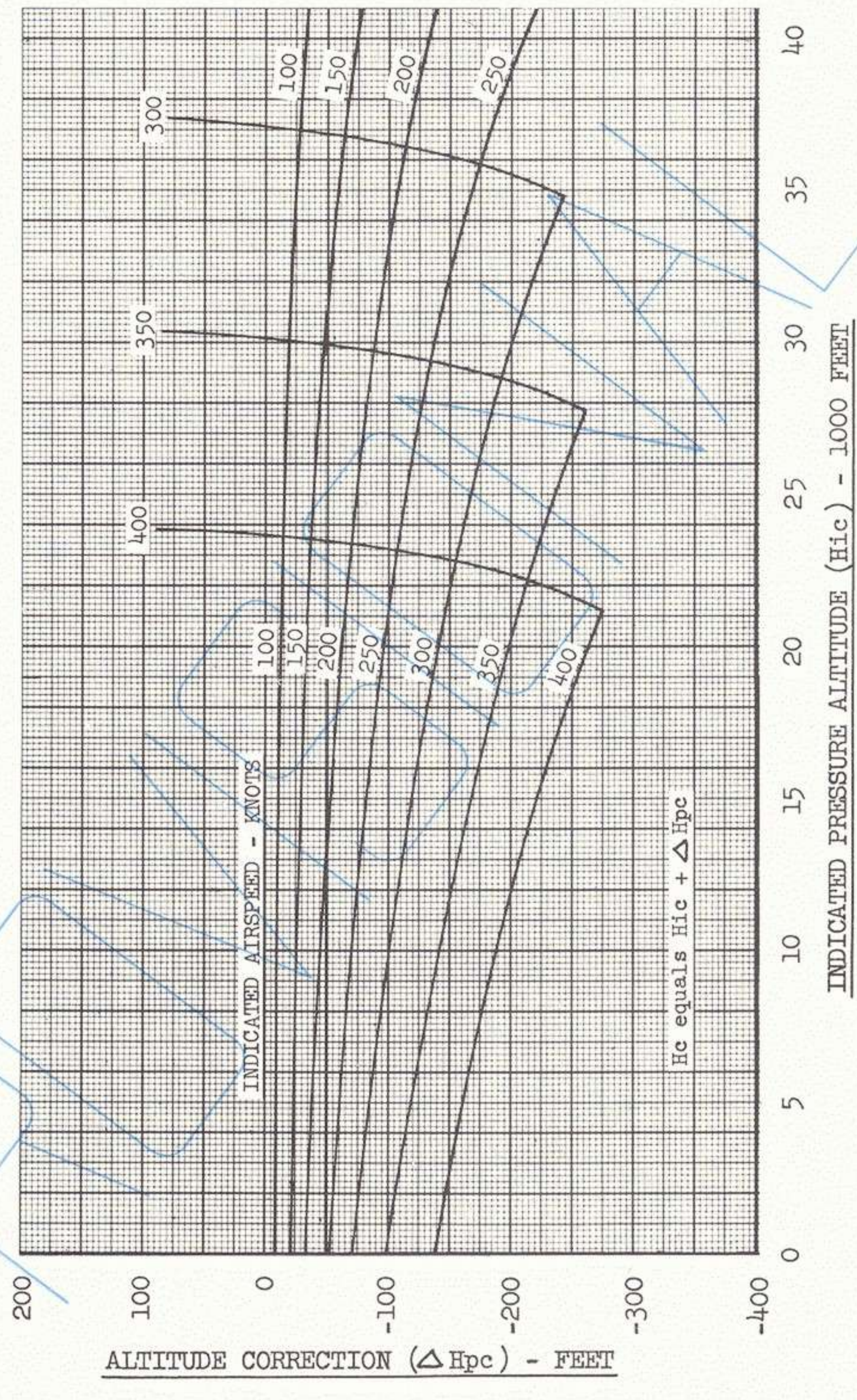


NOTE: 1. These calibrations do not include instrument error.
2. These calibrations are valid for all configurations.



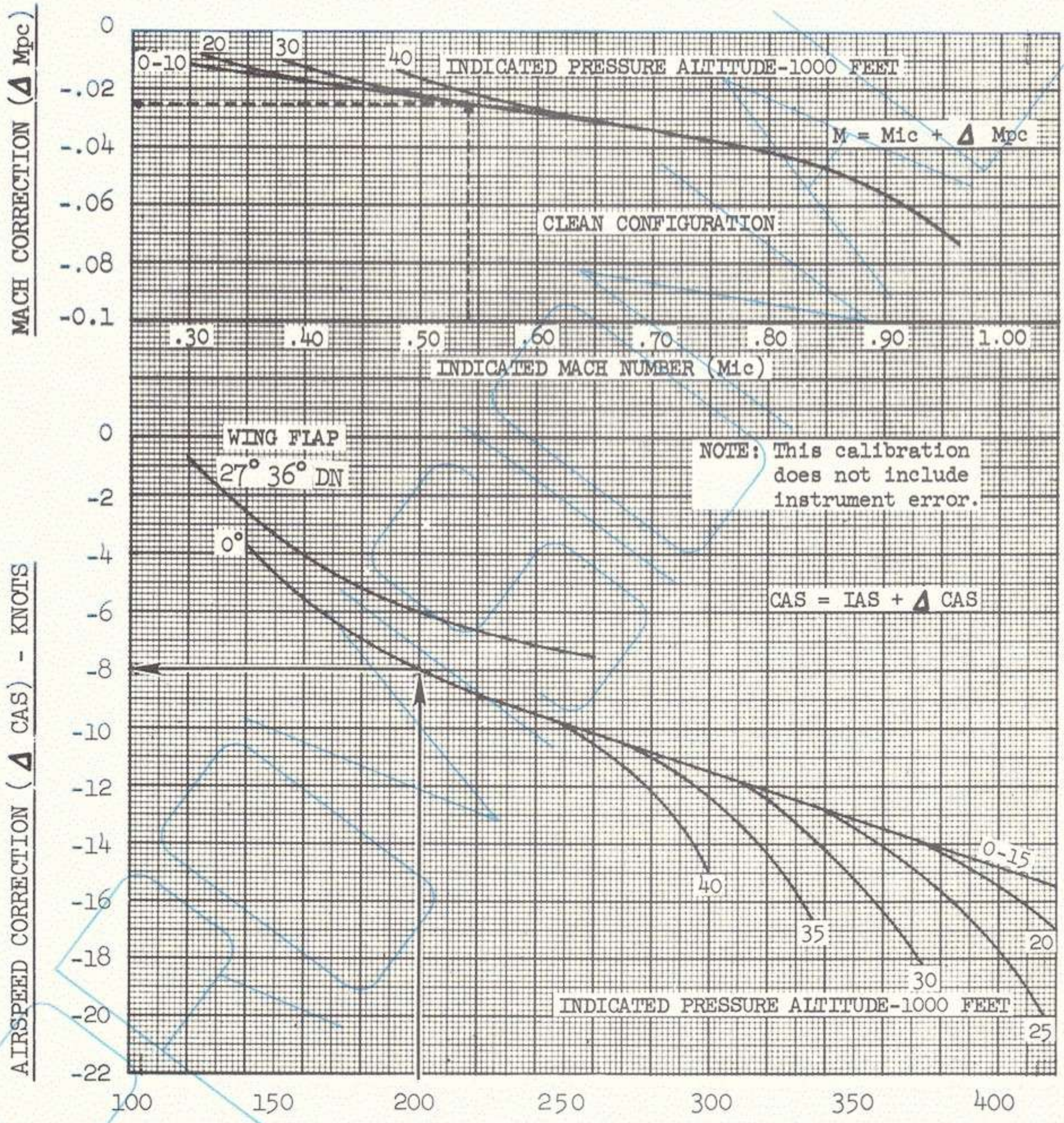
PILOT AND COPILOT
STATIC PRESSURE SOURCE POSITION ERROR CORRECTION
NORMAL SYSTEM - ALTIMETER

NOTE: 1. This calibration does not include instrument error.
2. This calibration is valid for all configurations.

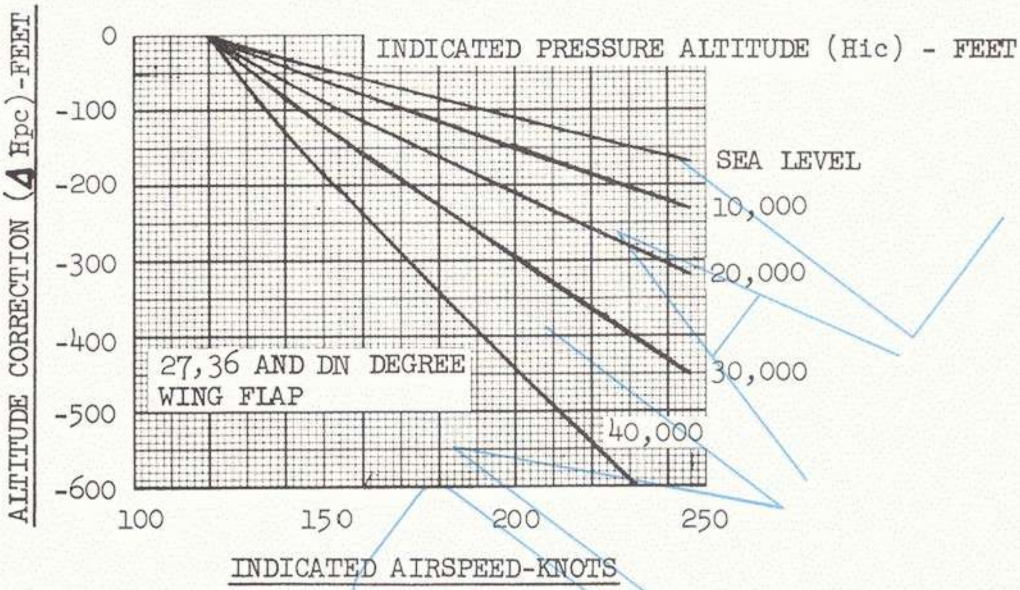


PILOT AND COPILOT
STATIC PRESSURE SOURCE POSITION ERROR CORRECTION
ALTERNATE SOURCE - AIRSPEED AND MACH

NOTE: To be used only when normal static source becomes inoperative.

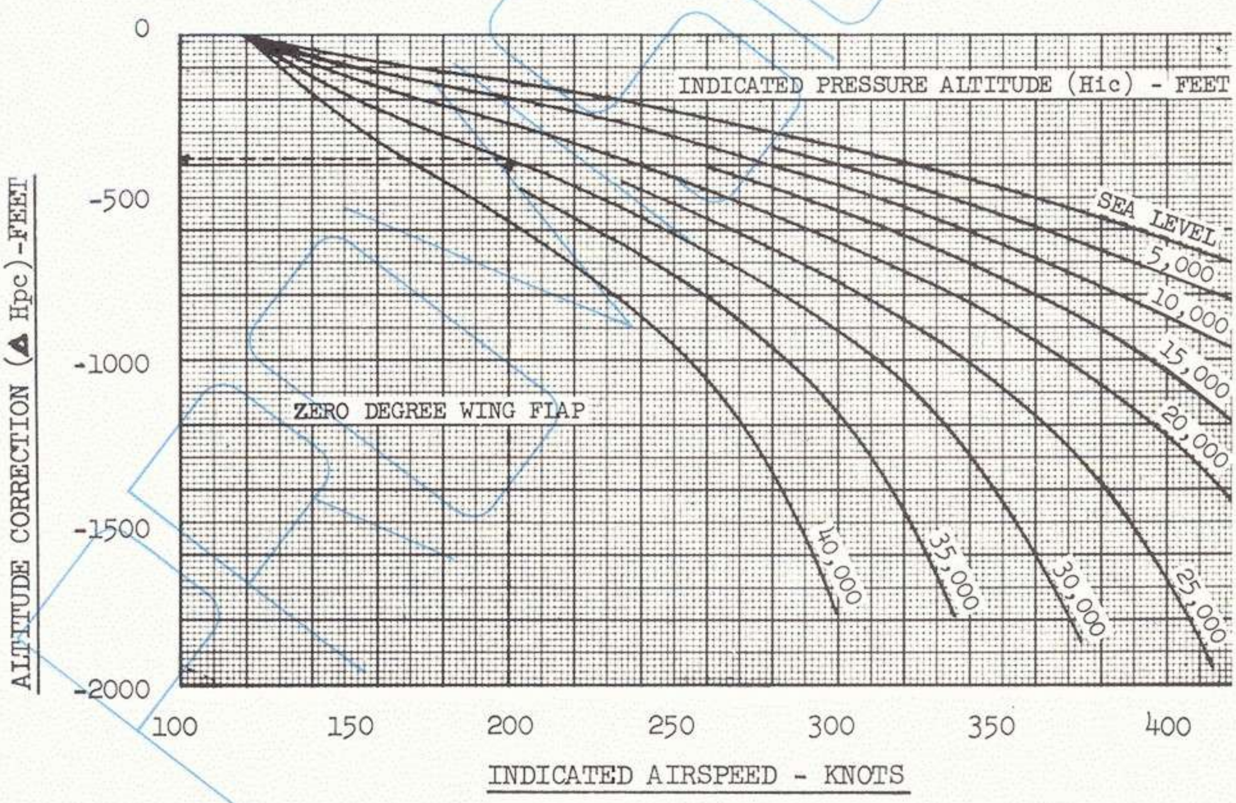


PILOT AND COPILOT
STATIC PRESSURE SOURCE POSITION ERROR CORRECTION
ALTERNATE SOURCE - ALTITUDE



$Hc = Hic + \Delta Hpc$

NOTE: This calibration does not include instrument error.



STALL SPEEDS VS GROSS WEIGHTS

REGULATION

Paragraph 4T.112(a) of SR-422B.

Stalling Speeds

1. The speed V_S shall denote the calibrated stalling speed, CAS, or minimum steady flight speed at which the airplane is controllable, in knots with:

    a. Zero thrust at the stalling speed, or engines idling and throttles closed if it is shown that idle power has no effect upon stalling speed.
    b. The airplane in the particular configuration of flaps and landing gear corresponding with that in connection with which VS is being used.
    c. The airplane weight equal to the weight in connection with which V_S is being used to determine compliance with a particular requirement.

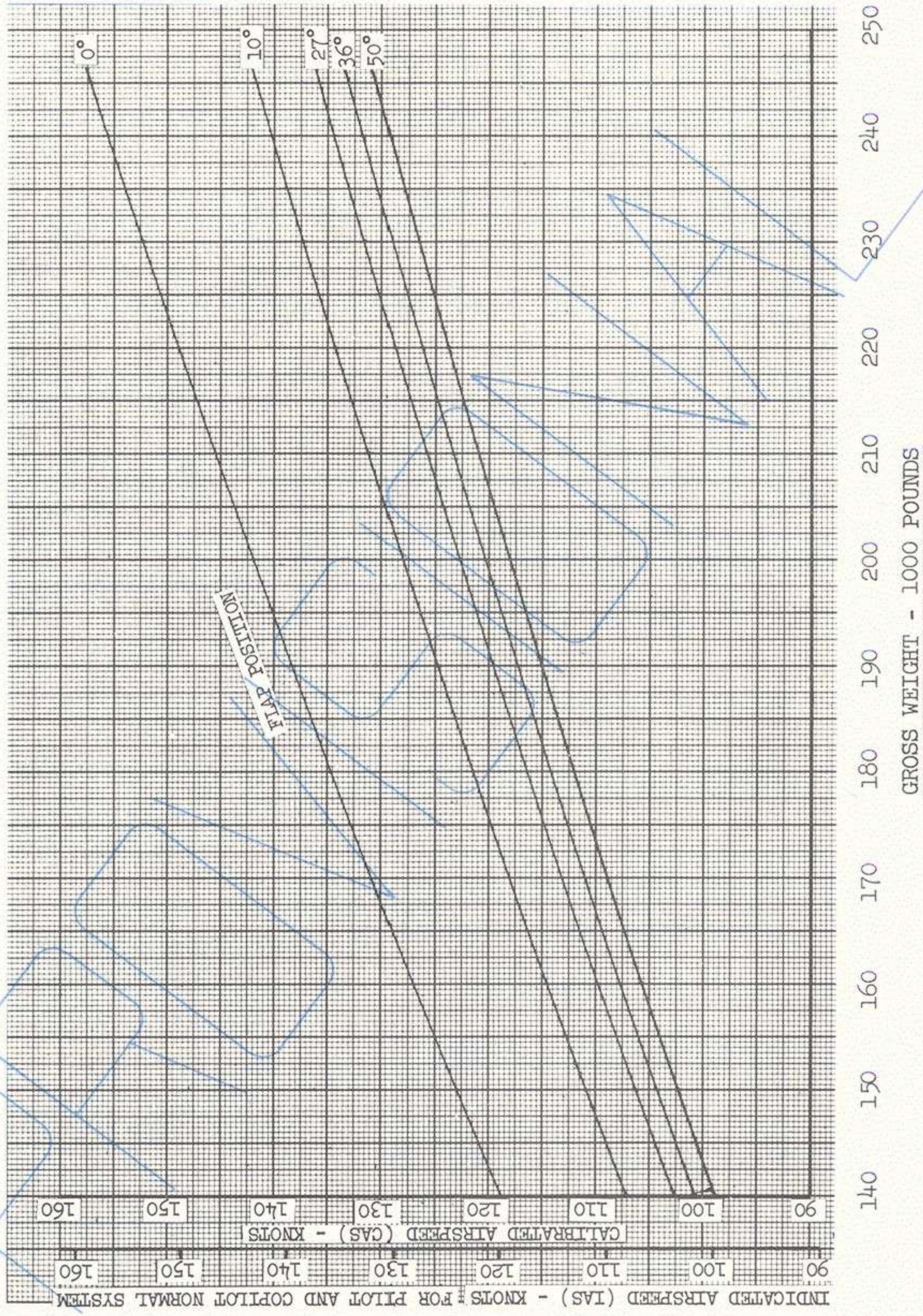
2. The stall speed shall be the minimum speed obtained in flight tests with the airplane trimmed for straight flight at a speed between 1.2 V_S and 1.4 V_S. From a speed sufficiently above the stalling speed, to insure steady conditions, the elevator control shall be applied at a rate such that the airplane speed reduction rate does not exceed one knot per second.

AIRPLANE CONFIGURATION

The center of gravity is at the most forward CG position consistent with the actual airplane weight and external configuration. For the variation of this CG with weight and configuration, consult the CENTER OF GRAVITY LIMITS chart, Section 1, CERTIFICATE LIMITATIONS.

NOTE: Stall speed data presented on the STALL SPEED chart, on the following page, is based upon flight test data with all four engines at idle power and in all cases an actual stall was attained rather than a minimum flying speed. Data are presented both in indicated airspeed for the pilot's normal airspeed system and in calibrated airspeed.

STALL SPEEDS
PILOT AND COPILOT NORMAL AIRSPEED SYSTEM INDICATED AIRSPEED
AND CALIBRATED AIRSPEED



MINIMUM CONTROL SPEED (AIR) V_{MCA}
One Engine Inoperative

REGULATION

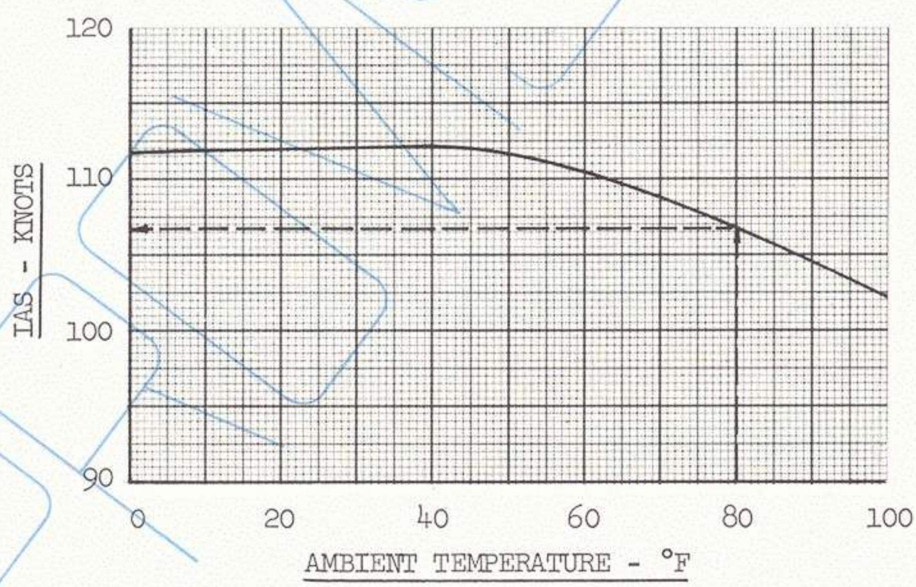
Paragraph 4T.112(c) of SR-422B.

The minimum control speed, V_{MC}, in terms of calibrated airspeed, shall be determined under the conditions specified in this paragraph, so that when the critical engine is suddenly made inoperative at that speed, it is possible to recover control of the airplane with the engine still inoperative and to maintain it in straight flight at that speed with an angle of bank not in excess of five degrees.

V_{MC} shall not exceed 1.2 V_S.

AIRPLANE CONFIGURATION

1. Landing gear retracted.
2. Takeoff flap position (10°).
3. Critical (outboard) engine shut down, remaining engines at takeoff thrust.



NOTE: Curve based on sea level pressure altitude. Decrease speeds 2.9 knots per 1000 feet increase in altitude.

CRITICAL ENGINE FAILURE SPEED, V_1

REGULATION

Paragraph 4T.114(a) of SR-422B.

Takeoff Speeds

The critical engine failure speed, V_1, in terms of CAS shall be selected by the applicant and shall not be less than the minimum speed at which controllability by primary aerodynamic controls alone is demonstrated during the takeoff run.

AIRPLANE CONFIGURATION

1. Landing gear extended.
2. Takeoff flap position (10°).
3. All four engines to takeoff power to V_1 speed. At V_1 number 4 engine becomes inoperative and remains so throughout the remaining takeoff run.

For determination of V_1 speed see the example below and consult the chart on the following page.

Example:

Gross weight	=	220,000 pounds
Pressure altitude	=	2,000 feet
Ambient temperature	=	80°F
Wind component	=	10 knot headwind
Runway slope	=	1% uphill
Nosewheel brakes	=	Operative

1. Enter the lower plot at a pressure altitude of 2,000 feet and proceed horizontally to the intersection with the 80°F ambient temperature line,

2. Move vertically upward from this intersection to the 220,000 pound gross weight line,

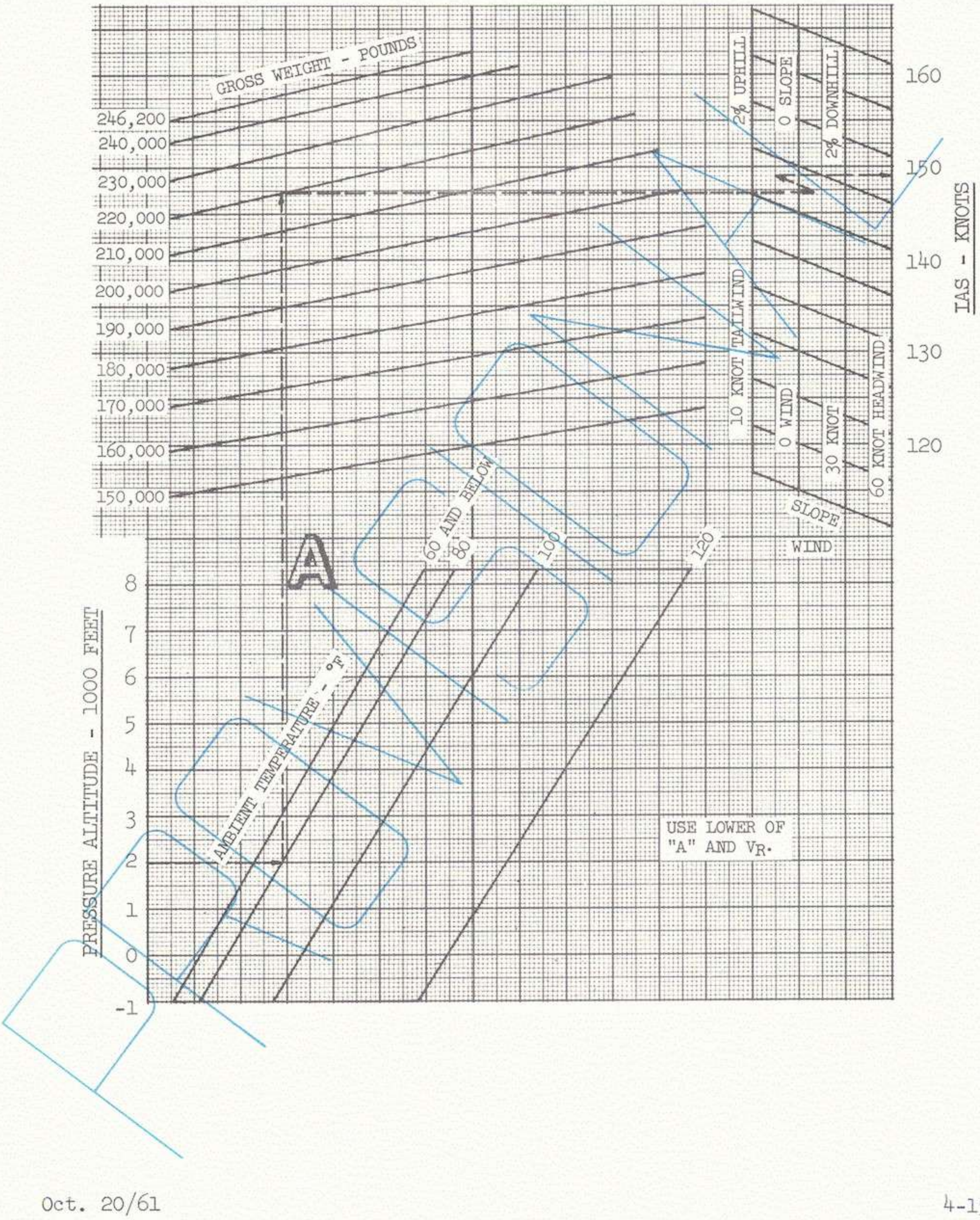
3. From this point proceed horizontally to the 10 knot headwind component,

4. Adjust for runway slope by moving diagonally to the 1% uphill slope line as indicated,

5. Read Solution "A" at the right as 149 knots IAS.

Use the lower of Solution "A" or the V_R speed for the same conditions.

CRITICAL ENGINE FAILURE SPEED (V_1)
10 DEGREE FLAPS - MAIN AND NOSE BRAKES OPERATIVE



ROTATION SPEED, V_R

REGULATION

Paragraph 4T.114(e) of SR-422B.

Takeoff Speeds

The rotation speed, V_R, in terms of CAS shall be selected by the applicant and shall not be less than:

1. The V_1 speed.
2. 1.05 V_{MCA}.
3. A speed which permits attainment of V_2 prior to reaching a height of 35 feet above the runway.
4. A speed which, if the airplane is rotated at its maximum practicable rate, will result in a left-off speed not less than 1.10 V_{MU4} or 1.05 V_{MU3}.

   NOTE: V_{MU4} = Four engine minimum unstick speed.
   V_{MU3} = Three engine minimum unstick speed.

AIRPLANE CONFIGURATION

1. Landing gear extended.
2. Takeoff flap position (10°).
3. All four engines to takeoff power to V_1 speed. At V_1 number 4 engine becomes inoperative and remains so throughout the remaining takeoff run.

NOTE: For determination of V_R speed see example following and consult the ROTATION SPEED chart on the following page.

Example:

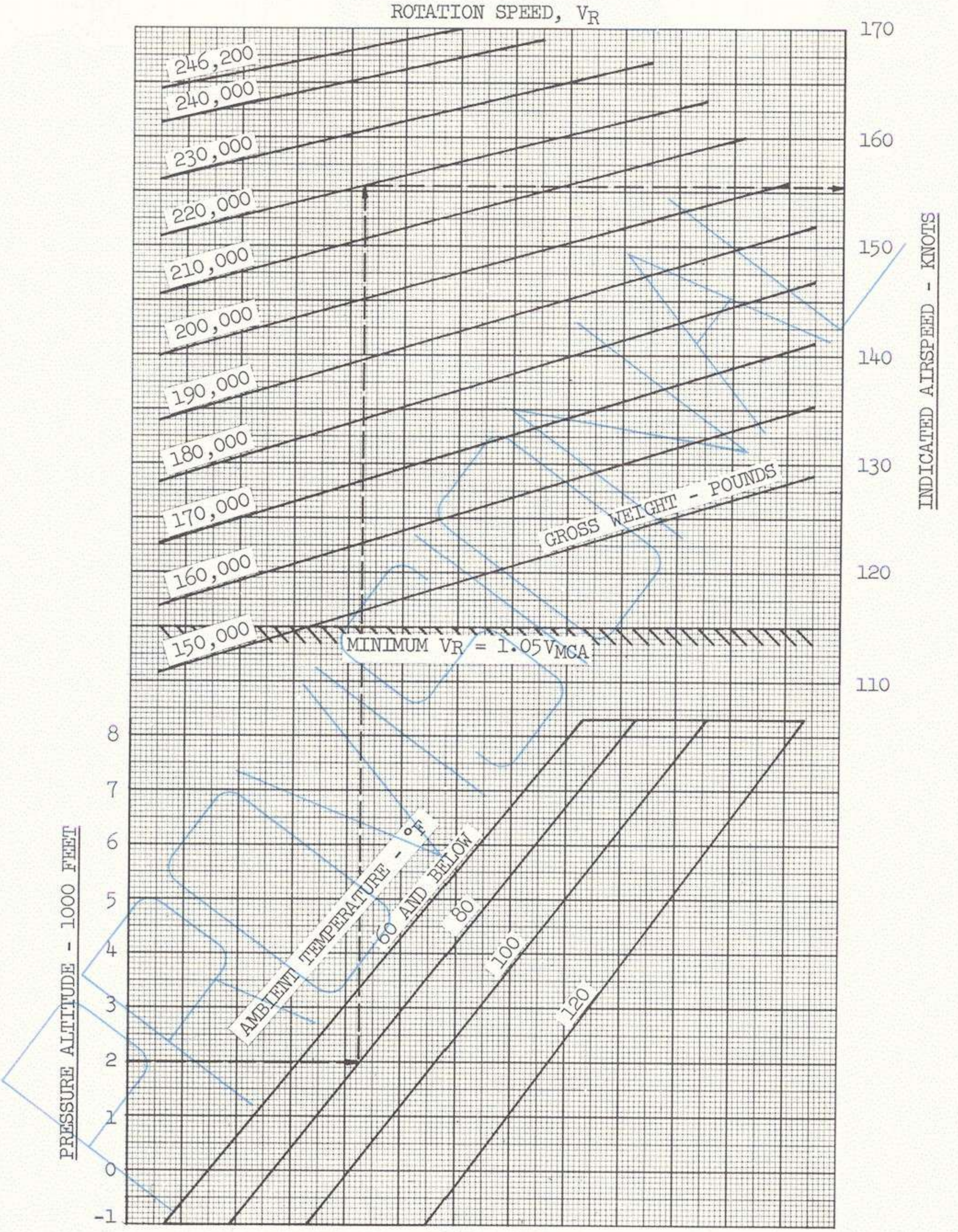
Gross weight	=	220,000 pounds
Pressure altitude	=	2,000 feet
Ambient Temperature	=	80°F

NOTE: Nose wheel brake condition, operative or inoperative, has no effect upon the rotation speed.

1. Enter the lower plot at a pressure altitude of 2,000 feet and proceed horizontally to the intersection with the 80°F ambient temperature line.

2. From this intersection proceed vertically upward to the intersection with the 220,000 pound gross weight line. Proceed horizontally to the right and read V_R equal to 155.5 knots IAS.

PROVISIONAL


ROTATION SPEED, V_R
246,200
240,000
230,000
220,000
210,000
200,000
190,000
180,000
170,000
160,000
150,000
GROSS WEIGHT - POUNDS
MINIMUM V_R = 1.05V_{MCA}
170
160
150
140
130
120
110
INDICATED AIRSPEED - KNOTS
8
7
6
5
4
3
2
1
0
-1
PRESSURE ALTITUDE - 1000 FEET
AMBIENT TEMPERATURE - °F
60 AND BELOW
80
100
120

TAKEOFF SAFETY SPEED, V_2

REGULATION

Paragraph 4T.114(c) of SR-422B.

Takeoff Speeds

The takeoff safety speed, V_2, in terms of CAS shall be selected by the applicant so as to permit the attainment of a minimum climb gradient of 3.0 percent with the airplane out of ground effect with landing gear retracted, flaps in the takeoff position and takeoff power on the operating engines with number 4 engine inoperative. The takeoff safety speed shall not be less than:

1. Minimum takeoff safety speed, V_2 min.
   a. $1.2V_S$.
   b. $1.10V_{MCA}$.
2. V_R + speed increment to 35 feet above runway.

AIRPLANE CONFIGURATION

1. Takeoff flap position (10°).
2. All four engines at takeoff power to V_1 speed. At V_1, number 4 engine becomes inoperative and remains so throughout the remaining takeoff run.

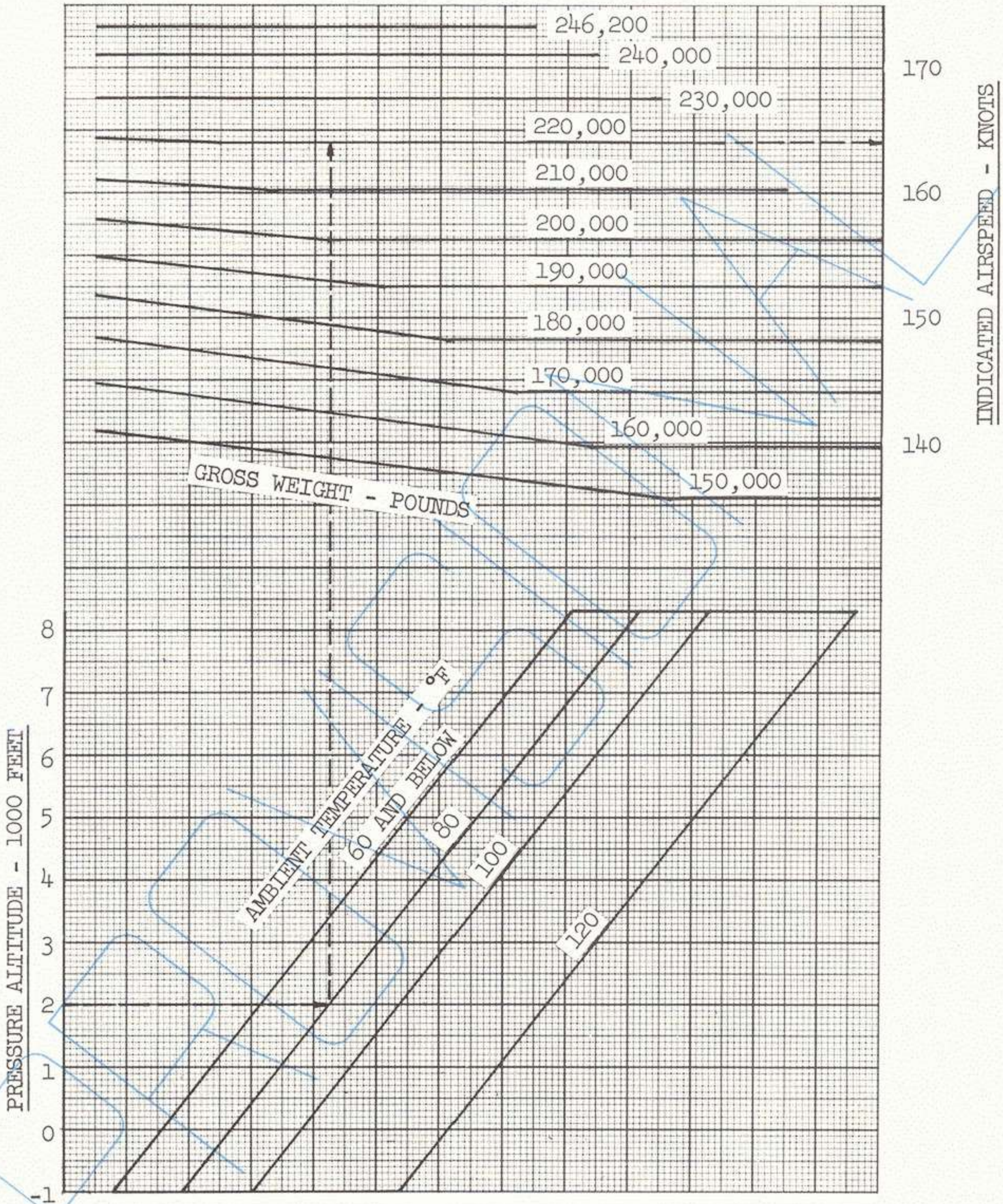
For determination of V_2 speed, consult the chart on the following page.

Example:	Gross weight	=	220,000 pounds
	Temperature	=	80°F
	Altitude	=	2,000 feet

1. Enter the ambient temperature pressure altitude curve at 2,000 feet altitude and proceed horizontally to the intersection with the 80°F temperature line.

2. Proceed vertically to the intersection with the 220,000 pound gross weight line and read takeoff safety speed V_2 equal to 164 knots IAS.

TAKEOFF SAFETY SPEED, V_2



FIRST SEGMENT CLIMB GRADIENT

REGULATION

Paragraph 4T.120(a) of SR-422B.

One Engine Inoperative Takeoff Climb; Landing Gear Extended

In the critical takeoff configuration between V_{LOF} speed and the point in the flight path where the landing gear becomes fully retracted, but without ground effect, the steady gradient of climb shall not be less than 0.5 percent.

AIRPLANE CONFIGURATION

1. Landing gear extended.
2. Takeoff flap position (10°).
3. Number 4 engine inoperative. Remaining engines at takeoff power available at the time landing gear retraction is initiated.
4. Climb speed = V_{LOF}.

First segment climb gradient is determined by reducing the applicable second segment climb gradient by 1.7%.

SECOND SEGMENT CLIMB GRADIENT

REGULATION

Paragraph 4T.120(b) of SR-422B.

One Engine Inoperative Climb Takeoff — Landing gear retracted

In the takeoff configuration existing at the point in the flight path where the airplane's landing gear is fully retracted, but without ground effect, the steady gradient of climb shall not be less than 3.0 percent.

AIRPLANE CONFIGURATION

1. Landing gear retracted.
2. Takeoff flap position (10°).
3. Outboard engine inoperative. Remaining engines at takeoff power available at time landing gear is fully retracted, unless a more critical power condition exists up to a point 400 feet above the runway surface.
4. Speed = (For determination of the takeoff safety speed, consult the TAKEOFF SAFETY SPEED chart in this Section.)

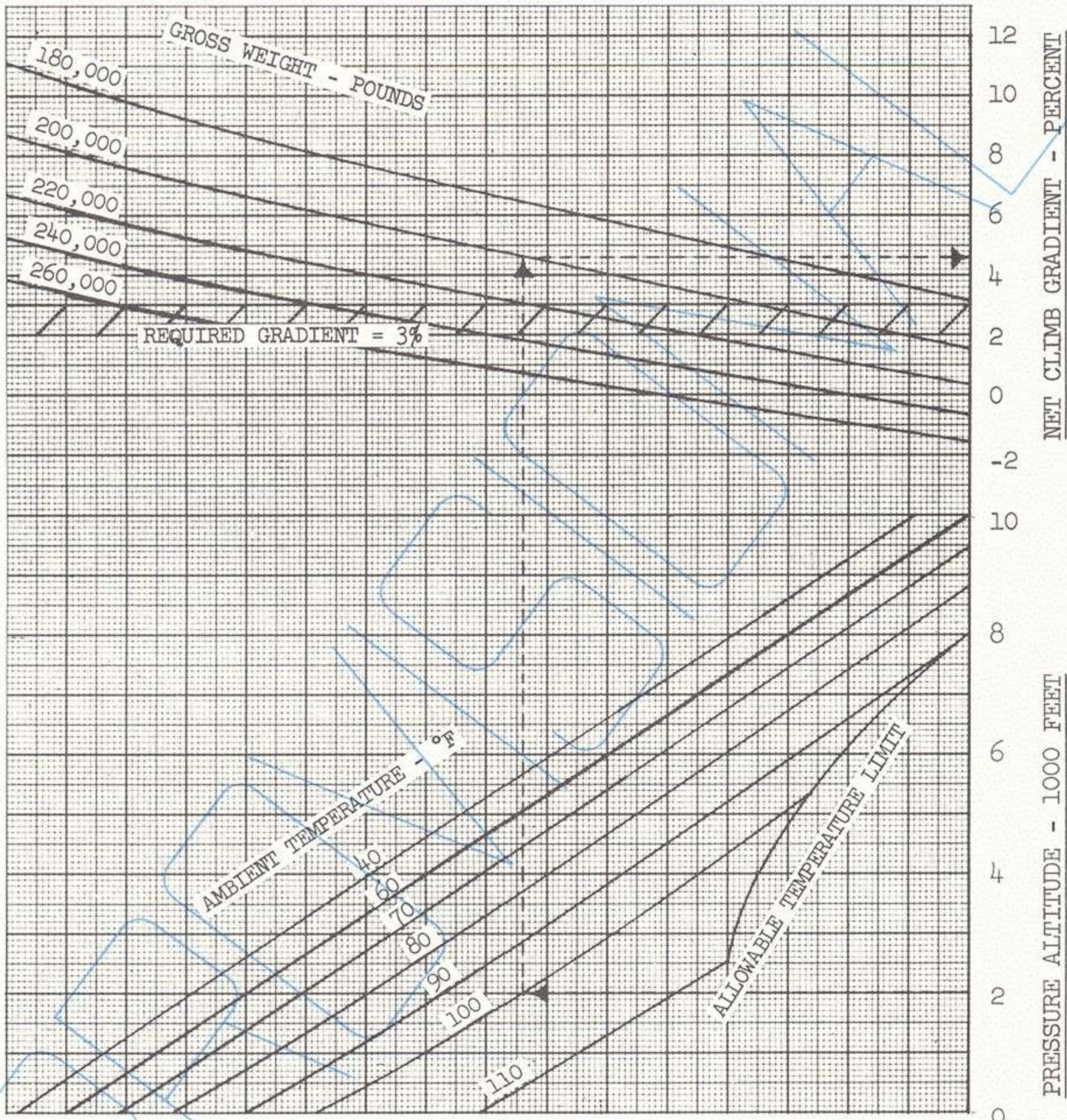
Example:

Gross Weight	=	200,000
Temperature	=	100°F
Altitude	=	2000 feet

Enter the pressure altitude ambient temperature plot on the SECOND SEGMENT CLIMB GRADIENT chart on the following page and find the intersection of 2000 feet pressure altitude and 100°F. Proceed vertically to the intersection with the 200,000 pound gross weight line. The resultant climb gradient is 4.3 percent, which is in excess of the minimum requirement of 3.0 percent.

The V_2 speed for this condition is 156 knots IAS, from the TAKEOFF SAFETY SPEED, V_2 chart in this Section.

SECOND SEGMENT CLIMB GRADIENT
Three Engine
Gear Retracted - 10 Degree Flaps



FINAL TAKEOFF CLIMB GRADIENT

REGULATION

Paragraph 4T.120(c) of SR-422B.

One Engine Inoperative Climb Final Takeoff

In the enroute configuration the steady gradient of climb at the end of the takeoff path, 1500 feet above the runway surface, shall not be less than 1.7 percent.

AIRPLANE CONFIGURATION

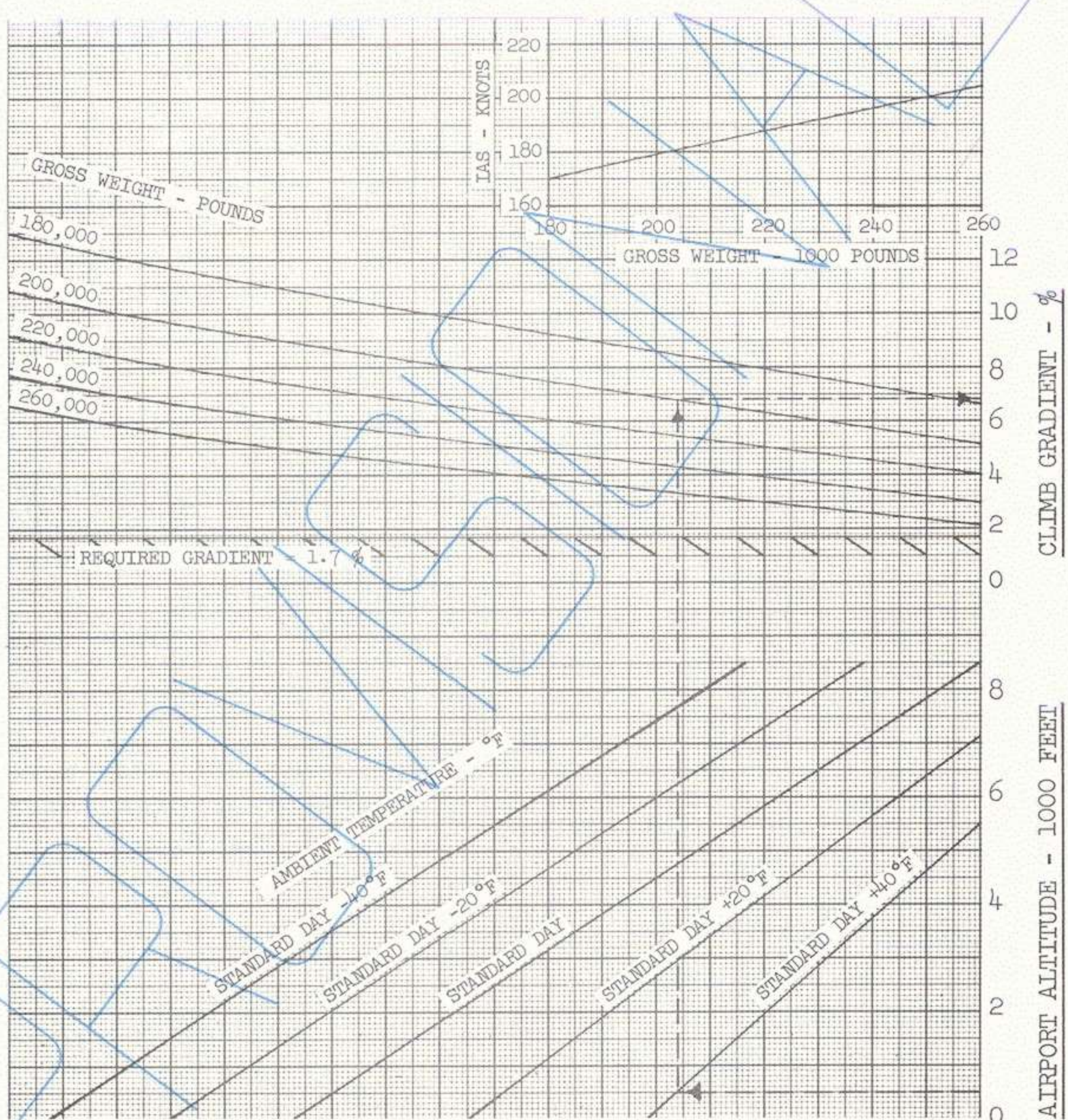
1. Landing gear retracted.
2. Enroute flap position (0°).
3. One outboard engine inoperative. Remaining engines at maximum continuous power.
4. Speed = 1.25 V_S.

Example: Gross weight = 200,000 pounds
Temperature = Standard Day +40°F
Altitude = 500 feet field elevation

Enter the pressure altitude ambient temperature plot on the FINAL TAKEOFF CLIMB GRADIENT chart on the next page and find the intersection of 500 feet pressure altitude and Standard Day +40°F. Proceed vertically to the intersection with the 200,000 pound gross weight line. The resultant climb gradient is 6.8 percent, which is in excess of the minimum requirement of 1.7 percent gradient required 1500 feet above the runway surface.

The speed for this condition is 179 knots IAS from the supplemental plot on the FINAL TAKEOFF CLIMB GRADIENT chart.

FINAL TAKEOFF CLIMB GRADIENTS
(AT 1500 FEET ABOVE AIRPORT ALTITUDE)
0° Flaps - Gear Retracted - 3 Engines Operating
Max Continuous Power



TAKEOFF FLIGHT PATH

REGULATION

Paragraph 4T.117a of SR-422B.

The takeoff flight path shall be considered to begin at a height of 35 feet above the takeoff surface at the end of the takeoff distance as determined under 4T.117a.

AIRPLANE CONFIGURATION

1. Takeoff flap position (10°). Flap retraction to 0° after 1500 feet above the runway.
2. Takeoff power on operating engines.
3. Climb speed = V_2.
4. Accelerate to final takeoff climb speed during flap retraction.

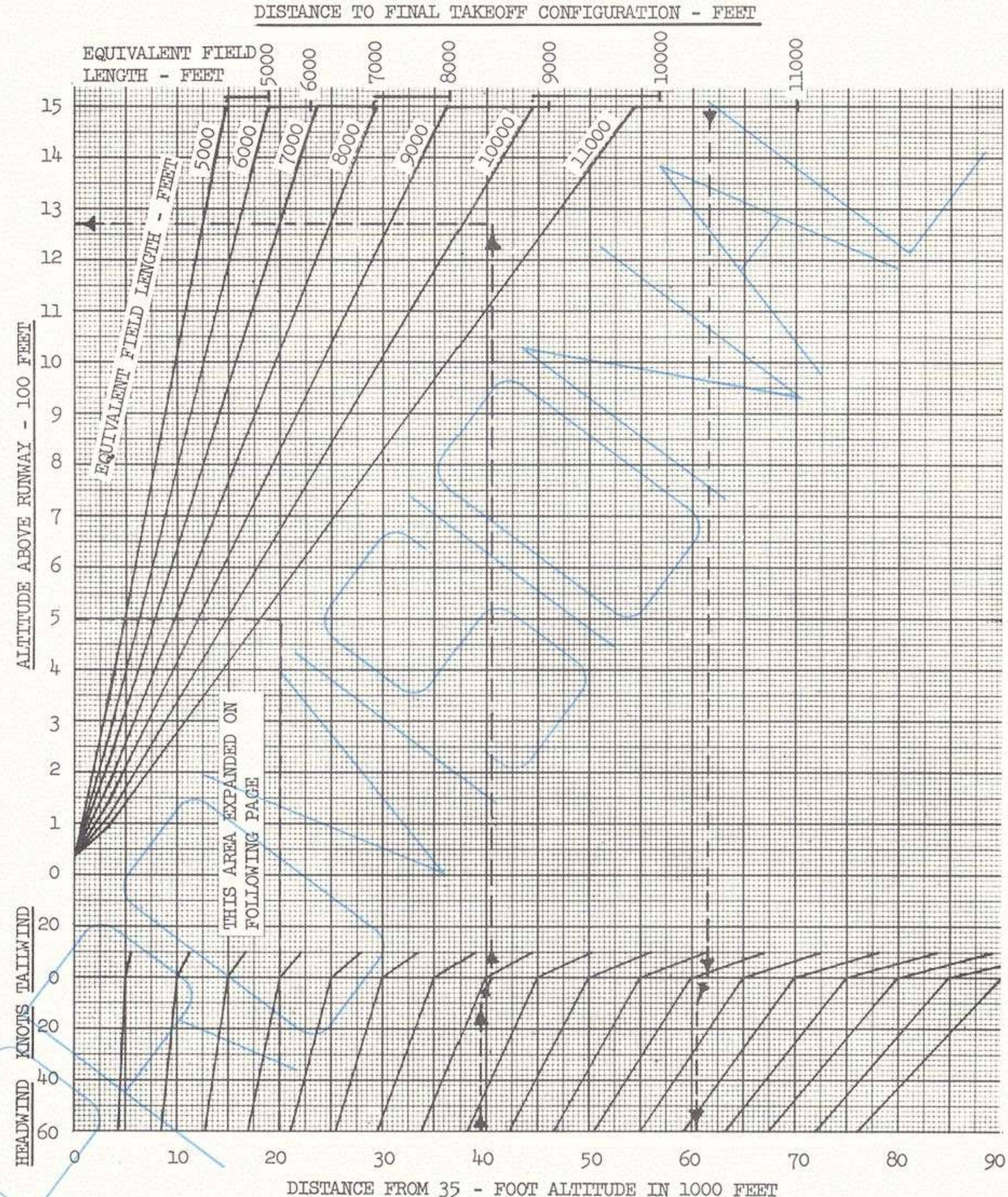
Example:

Pressure altitude	= 2000 feet
Ambient temperature	= 80°F
Runway slope	= 1% uphill
Wind component	= 10 knot headwind
Gross weight	= 220,000 pounds
Obstacle distance	= 50,000 feet from start of runway

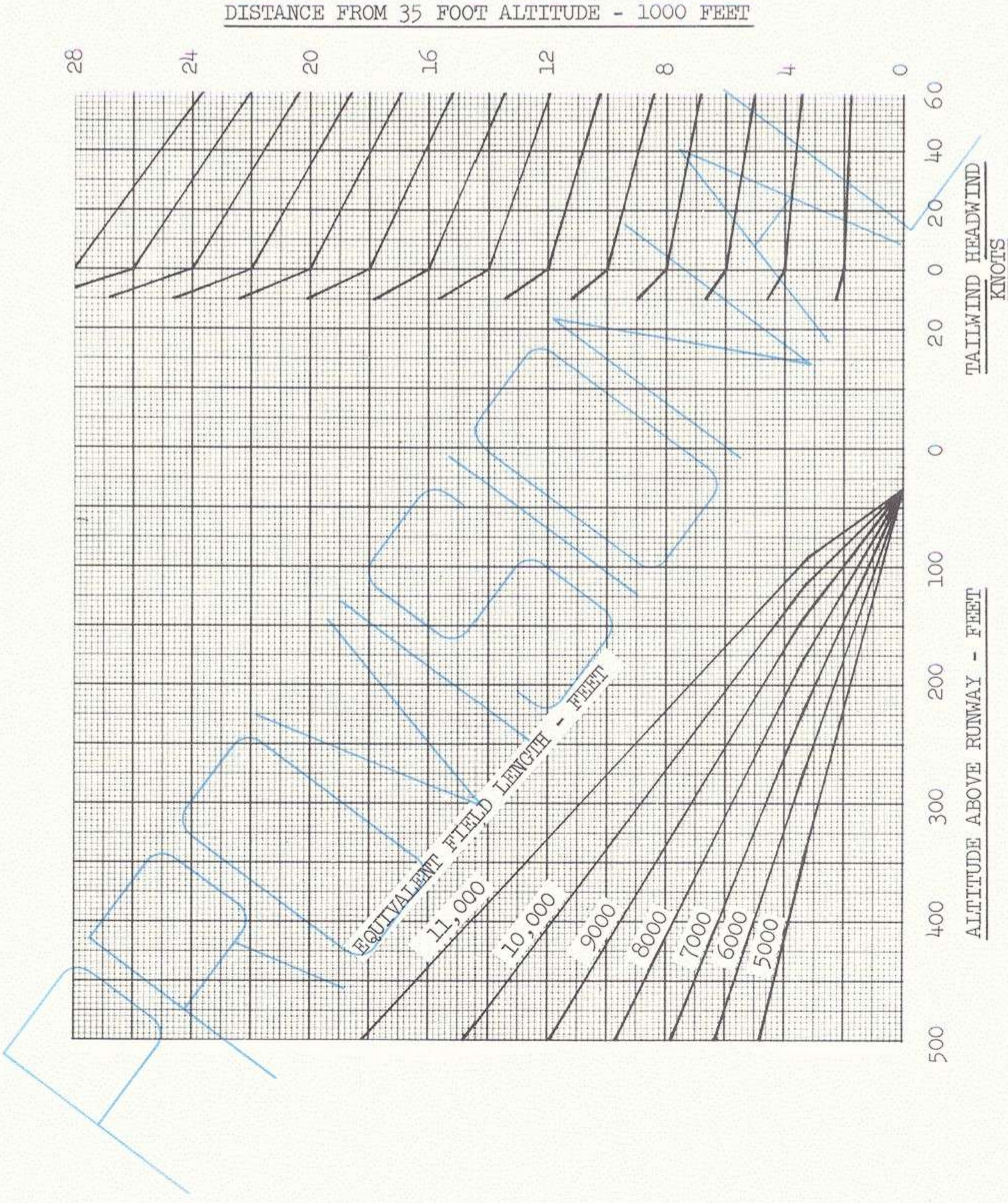
1. From the ALLOWABLE TAKEOFF WEIGHT PERMITTED BY AVAILABLE RUNWAY LENGTH chart in Section 1, CERTIFICATE LIMITATIONS, the following data are determined:
   a. Actual runway length required is 10,500 feet.
   b. Equivalent field length required (zero wind and zero slope) is 10,350 feet.
2. Obstacle distance from start of runway equals 50,000 feet, of which 10,500 feet are ground run to 35 foot height. Distance from 35 foot height reference to obstacle is 50,000 feet minus 10,500 feet; which equals 39,500 feet.
3. Enter distance from 35 foot altitude on the chart on the following page. Correct for wind component and proceed vertically upward to the intersection with the 10,350 equivalent field length line and read the resulting altitude above runway to the left as 1,270 feet.
4. The resulting clearance above the obstacle at a distance of 50,000 feet from the start of the runway is then: 1,270 feet minus the height of the obstacle.
5. The distance required to final takeoff configuration is 60,500 feet from the 35 foot reference point.

The total horizontal distance to final takeoff configuration from the start of the runway is 60,500 feet plus 10,500 feet, which equals 71,000 feet.

TAKEOFF FLIGHT PATH
Three Engine - 10° Flap



TAKEOFF FLIGHT PATH
10° Flaps - Three Engines



ENROUTE CLIMB GRADIENT - THREE ENGINES OPERATING

REGULATION

Paragraph 4T.121(a) of SR-422B.

Enroute Flight Path One Engine Inoperative

With the airplane in the enroute configuration the one engine inoperative net flight path data shall be determined and shall be diminished by a gradient of climb equal to 1.6 percent.

AIRPLANE CONFIGURATION

1. Landing gear retracted.
2. Enroute flap position (0°).
3. An outboard engine inoperative. The remaining engines at maximum continuous power.
4. Speed: $V_{ENR} = 1.7\ V_S$.

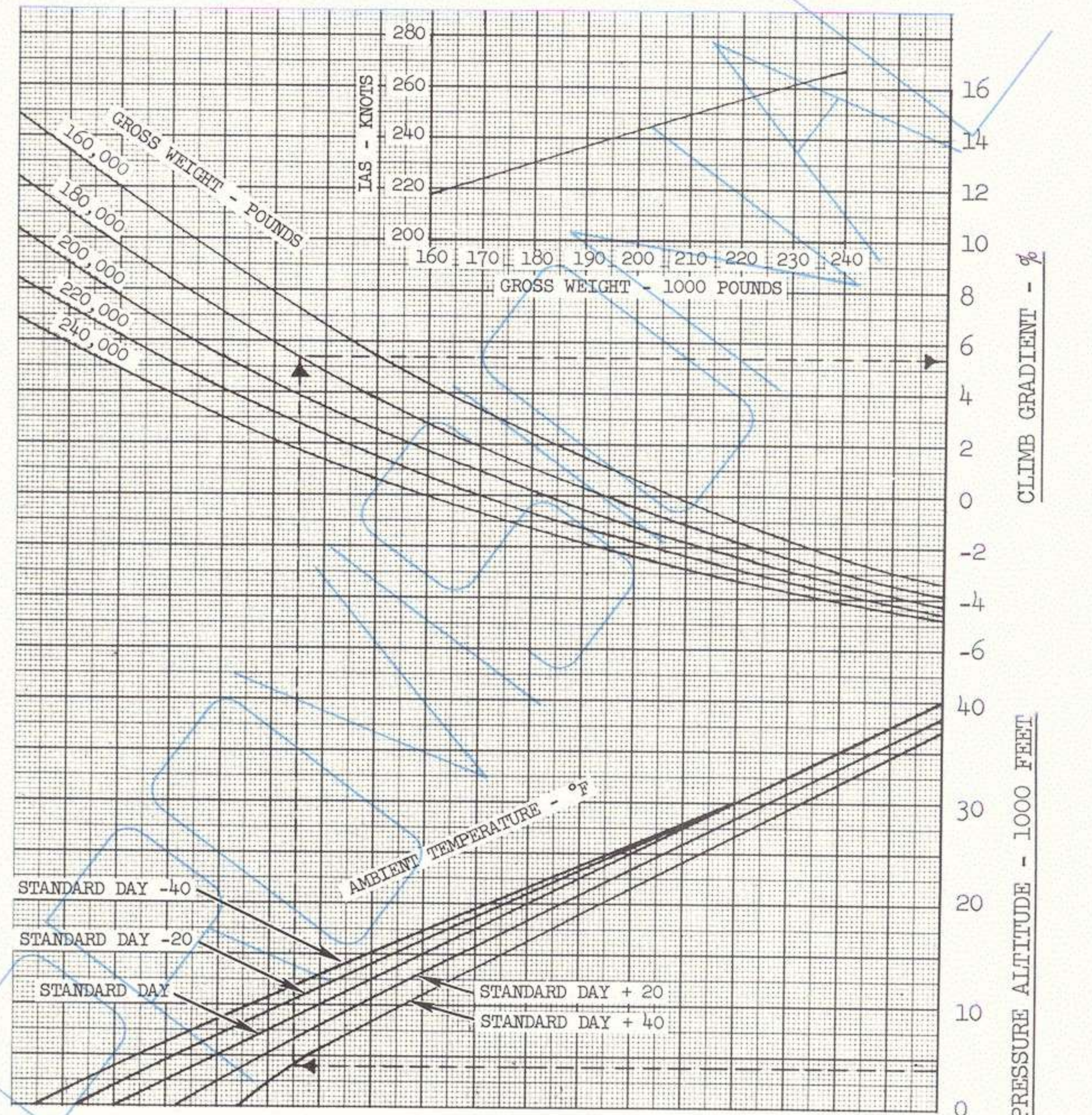
Example:			
	Gross Weight	=	180,000 pounds
	Temperature	=	Standard day + 40°F
	Altitude	=	4,000 feet

Enter the pressure altitude ambient temperature plot on the ENROUTE CLIMB GRADIENT - THREE ENGINES OPERATING chart on the next page and find the intersection of 4,000 feet pressure altitude and the Standard Day +40°F line. Proceed vertically to the intersection with the 180,000 pound gross weight line. The resultant net climb gradient is 5.4 percent.

NOTE: The data presented on the chart have been adjusted to account for the gradient reduction required by the applicable regulation.

The enroute speed for this condition is 231 knots IAS from the supplemental plot on the ENROUTE CLIMB GRADIENT - THREE ENGINES OPERATING chart.

ENROUTE CLIMB GRADIENT
Three Engine
Gear Retracted - Zero Flaps



ENROUTE CLIMB GRADIENTS - TWO ENGINE

REGULATION

Paragraph 4T.121(b) of SR-422B.

Enroute Flight Path Two Engines Inoperative

With the airplane in the enroute configuration the two engines inoperative net flight path data shall be determined and shall be diminished by a gradient of climb equal to 0.5 percent.

AIRPLANE CONFIGURATION

1. Landing gear retracted.
2. Enroute flap position (0°).
3. Two engines on one side inoperative. The remaining engines at maximum continuous power.
4. Speed; $V_{ENR} = 1.7\ V_S$.

Example:			
	Gross weight	=	180,000 pounds
	Temperature	=	Standard Day + 40°F
	Altitude	=	4,000 feet

Enter the pressure altitude ambient temperature plot on the ENROUTE CLIMB GRADIENTS - TWO ENGINE chart on the next page and find the intersection of 4,000 feet pressure altitude and the Standard Day + 40°F line. Proceed vertically to the intersection with the 180,000 pound gross weight line. The resultant net climb gradient is 1.8 percent.

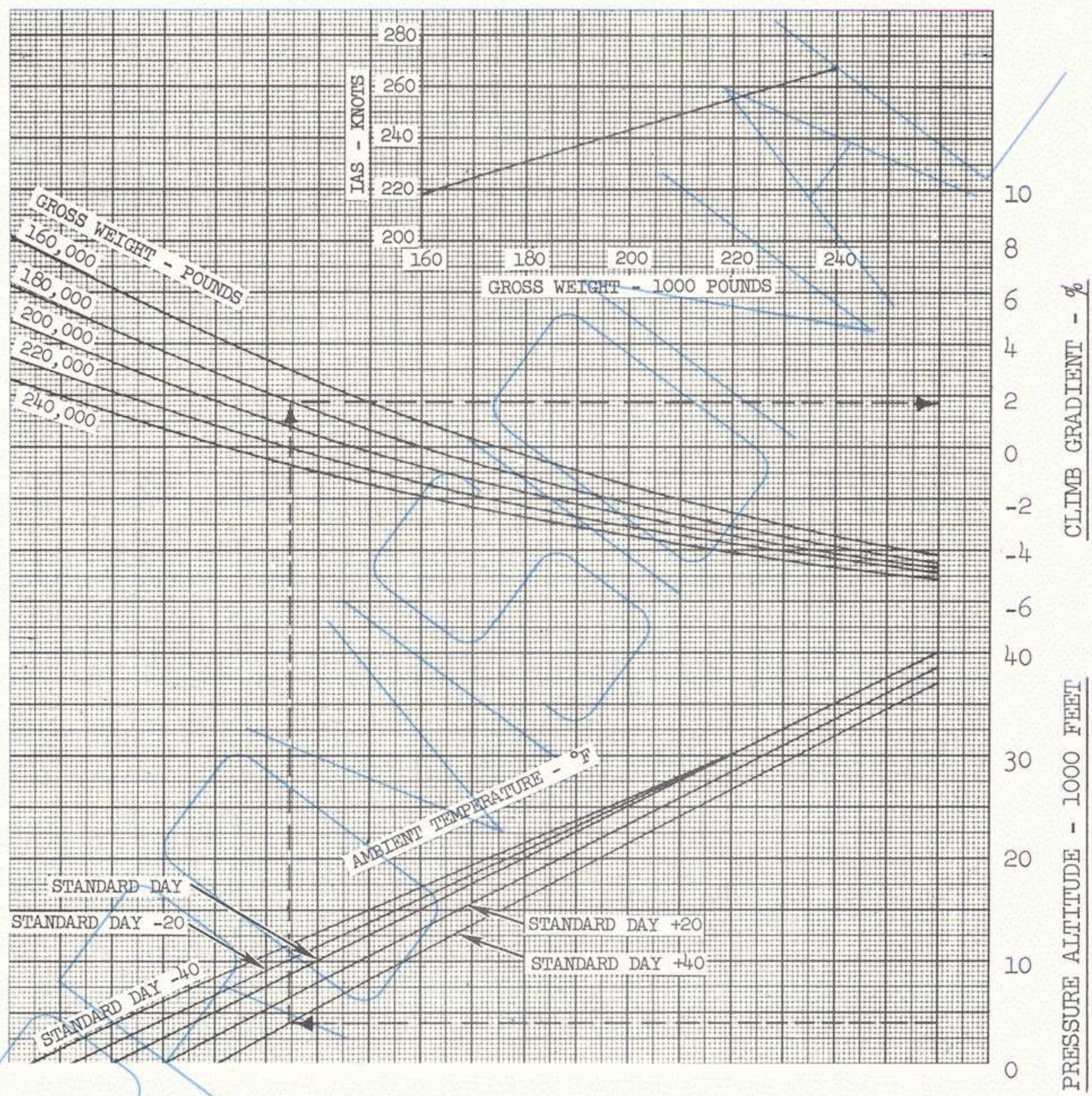
NOTE: The data presented on the chart have been adjusted to account for the gradient reduction required by the applicable regulation.

The enroute speed for this condition is 232 knots IAS from the supplemental plot on the ENROUTE CLIMB GRADIENTS - TWO ENGINE chart.

ENROUTE CLIMB GRADIENT - TWO ENGINES

Gear Retracted - Zero Flaps

Max Continuous Power



APPROACH CLIMB GRADIENT - THREE ENGINE

REGULATION

Paragraph 4T.120(d) of SR-422B.

One Engine Inoperative Approach Climb

In the approach configuration the steady gradient of climb shall not be less than 2.7 percent.

AIRPLANE CONFIGURATION

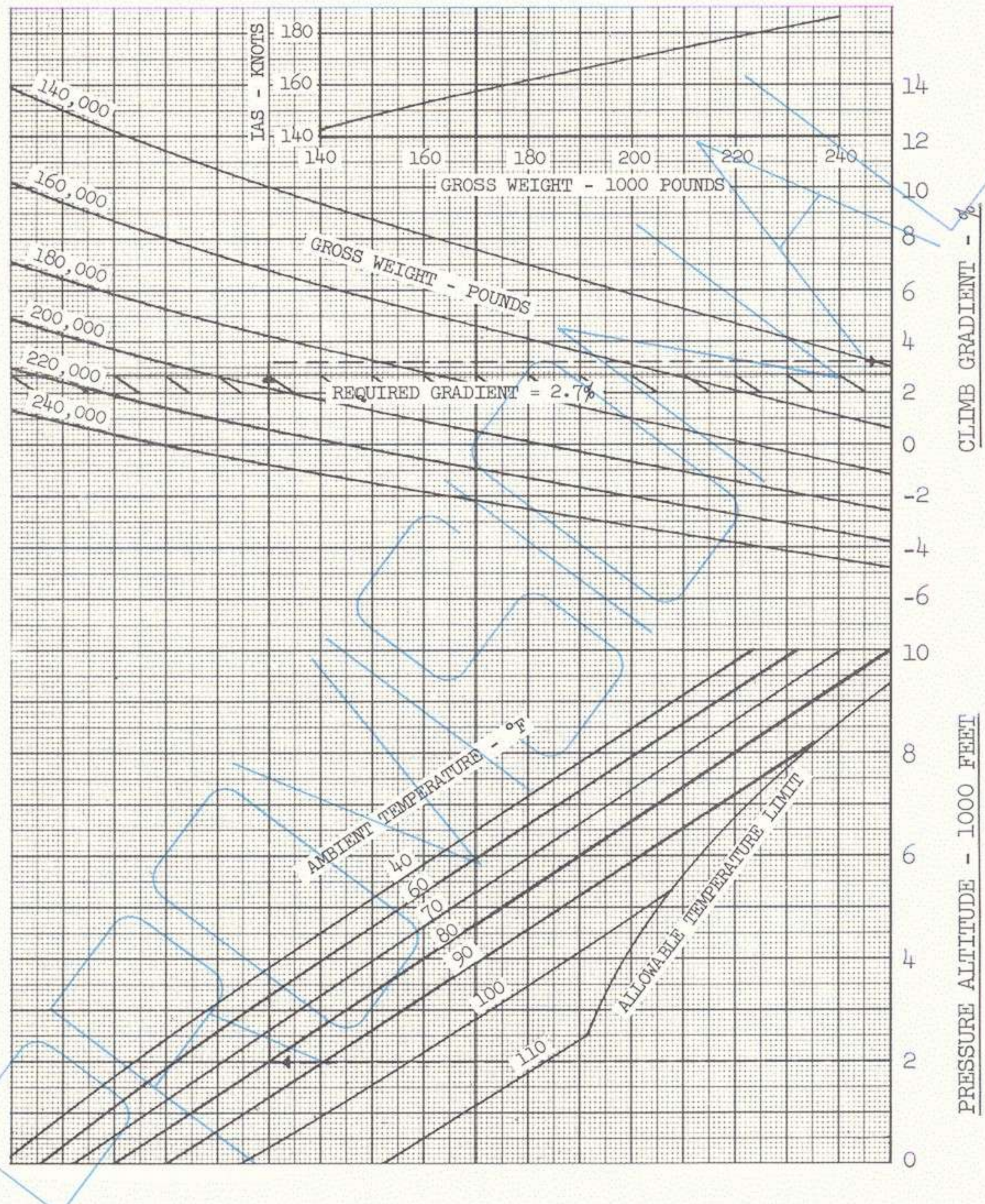
1. Landing gear retracted.
2. Approach flap position (36°).
3. One outboard engine inoperative. Remaining engines operating at the available takeoff power.
4. Speed = 1.4 V_S.

Example:			
	Gross Weight	=	190,000 pounds
	Temperature	=	80°F
	Altitude	=	2,000 feet
	Flaps	=	36 degrees

Enter the pressure altitude ambient temperature plot on the APPROACH CLIMB GRADIENT - THREE ENGINE chart on the following page and find the intersection of 2000 feet pressure altitude and 80°F. Proceed vertically to the intersection with the 190,000 pound gross weight line. The resultant climb gradient is 3.2 percent, which is in excess of the minimum requirement of 2.7 percent.

The speed for this condition is 166 knots IAS from the supplemental speed plot on the APPROACH CLIMB GRADIENT - THREE ENGINE chart.

APPROACH CLIMB GRADIENT
Three Engine
Gear Retracted - 36° Flaps



LANDING CLIMB GRADIENT

REGULATION

Paragraph 4T.119 of SR-422B.

All Engines Operating Landing Climb

In the landing configuration the steady gradient of climb shall not be less than 3.2 percent.

AIRPLANE CONFIGURATION

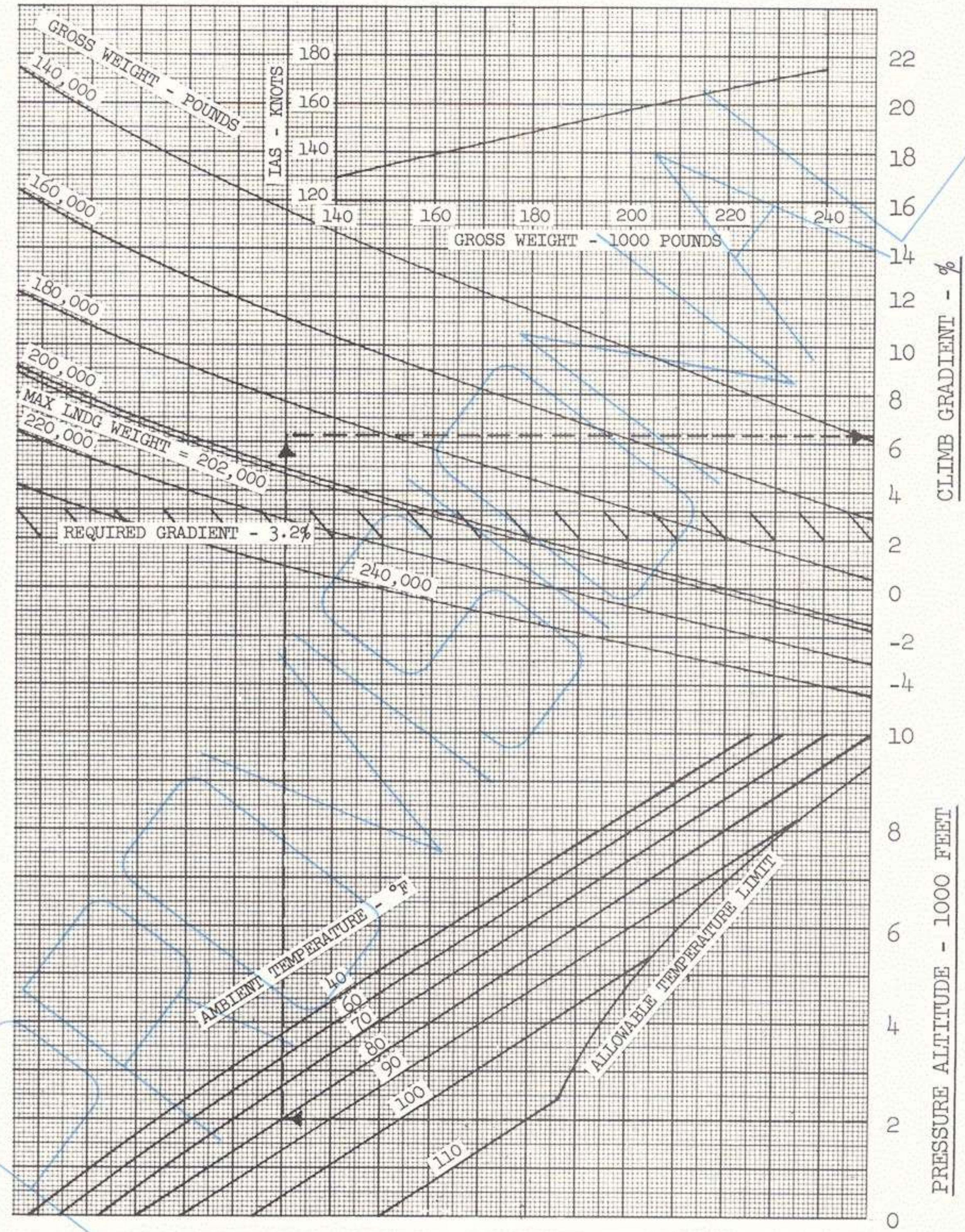
1. Landing gear extended.
2. Landing flap position DOWN.
3. All engines operating at power available 8 seconds after initiation of movement of power levers from minimum flight idle to takeoff position.
4. Speed: Not in excess of $1.3V_S$.

Example:			
	Gross weight	=	190,000 pounds
	Temperature	=	80°F
	Altitude	=	2,000 feet

Enter the pressure altitude ambient temperature plot on the LANDING CLIMB GRADIENT chart on the following page and find the intersection of the 2,000 foot pressure altitude and 80°F. Proceed vertically to the intersection with the 190,000 pound gross weight line. The resultant climb gradient is 6.4 percent, which is in excess of the minimum requirement of 3.2 percent.

The speed for this condition is 154 knots IAS from the supplemental speed plot on the LANDING CLIMB GRADIENT chart.

LANDING CLIMB GRADIENT
Four Engine
Gear Extended - Flaps Down
Takeoff Power



LANDING DISTANCES

REGULATION

Paragraph 4T.122 of SR-422B.

Landing Distance

The landing distance shall be the horizontal distance required to land and to come to a complete stop from a point at a height of 50 feet above the landing surface.

The landing distance data shall be corrected for not more than 50 percent of nominal wind components along the landing path opposite the direction of landing and not less than 150 percent of nominal wind components along the landing path in the direction of the landing.

AIRPLANE CONFIGURATION

1. Landing gear extended.
2. Landing flap position DOWN.
3. All engines at idle power/thrust at touchdown.
4. A time delay of 2.0 seconds was used between main landing gear touchdown and application of wing spoilers.

Example:

Gross Weight	=	160,000 pounds
Field altitude	=	2,000 feet
Reported headwind	=	20 knots

Nose and main wheel brakes operative.

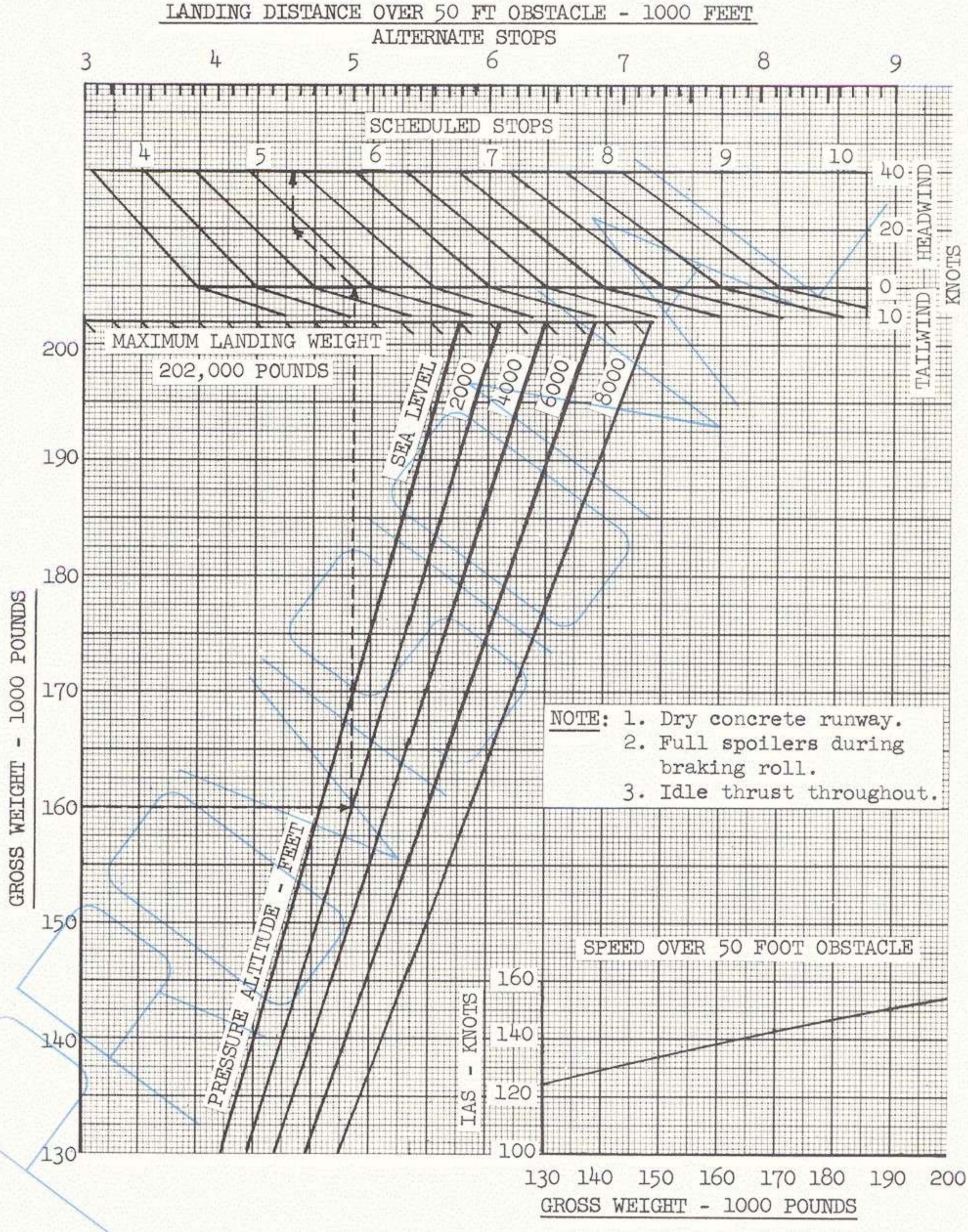
SCHEDULED STOPS

Enter the LANDING DISTANCE chart, on the following page, at a gross weight of 160,000 pounds. Proceed horizontally to the intersection with the 2,000 foot pressure altitude curve. From this intersection, proceed vertically to the zero wind reference line, then follow parallel to the guide reference lines to the intersection with 20 knots headwind. The SCHEDULED landing distance thus obtained is 5,300 feet. The speed over the 50 foot obstacle for these conditions is read from the smaller curve on the chart to be 138 knots IAS.

ALTERNATE STOPS

Follow the same procedure and the landing distance thus obtained on the ALTERNATE scale is 4,550 feet.

LANDING DISTANCE
NOSE AND MAIN WHEEL BRAKES OPERATIVE



DEMONSTRATED CROSSWIND

THE AIRPLANE HAS BEEN FLOWN IN A 15 KNOT CROSSWIND WITH SATISFACTORY RESULTS. THIS IS NOT A LIMITING VALUE BUT IS THE MAXIMUM VALUE AVAILABLE AT THE TIME OF PROVISIONAL CERTIFICATION.