REVISION HIGHLIGHTS

Revision 43 to D6T11321.36N dated 08-15-14.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to provide the capability for airplane serial numbers 29618, 30841, 30853 and 30854 to operate at CF680C2-B6F in addition to CF680C2-B7F upon incorporation of Boeing Service Bulletin 767-71-0148.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	143753	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1,2,3,4	36N	Revised to reflect pages changed in this revision.
ASN & App. Effectivity		
1	36N	Added appendices 29AB, 36K, 39K and 53 and associated notes.
2	36N	This is a continuation of the previous page.
Appendix Applicability		
A	036N	Revised to reflect new applicabilities.

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FAA APPROVED

AIRPLANE FLIGHT MANUAL



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D6T11321

BOEING COMMERCIAL AIRPLANE GROUP, SEATTLE, WASHINGTON, U.S.A.

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 143753** in the code column for the Revision Approval page.

E. K. Mijamot AR-635937 Date 08-15-14

Authorized Representative,
Regulatory Administration
Boeing Commercial Airplanes

Units KG/C

Log of Pages

The following pages comprise the manual for Boeing airplane serial numbers listed on the Airplane Serial Number & Appendix Effectivity Page.

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AIRPLANE SERIAL NUMBER EFFECTIVITY

(Model 767-36N/38A)
The Airplane Flight Manual (AFM) containing this page is applicable to the following airplane serial numbers:

29617, 29618, 29898, 30107, 30109 thru 30111, 30115, 30841, 30843, 30853 and 30854

APPENDIX EFFECTIVITY

The following appendices are applicable to the Airplane Flight Manual (AFM) containing this page. See the Appendix Applicability page for use of these appendices:

3K, 29AB, 36K, 39K, 43K, 49K, 51K, 53, 54, 59K, 64, 68, 709, CDL

NOTES

Appendix 51K is only applicable to airplane serial number 29898.

Appendices 49K and 59K are applicable to airplane serial number 29617.

Appendix 59K is applicable to airplane serial number 29618 only after incorporation of Boeing Service Bulletin 767-34-0461.

Appendix 64 is only applicable to airplane serial numbers 30115, 30841, 30843, 30853 and 30854.

This airplane flight manual is applicable to airplane serial number 29617 after incorporation of Boeing Service Bulletin 767-34-0474.

This airplane flight manual is applicable to airplane serial number 29618 after incorporation of Boeing Service Bulletin 767-34-0416.

Appendix 709 is applicable only to airplane serial number 29617 after incorporation of Boeing Service Bulletin 767-11-0063.

Appendices 29AB, 36K, 39K, 43K and 53 are applicable to airplane serial numbers 30841, 38053 and 30854 only upon incorporation of Boeing Service Bulletin 767-71-0148 work package 1.

ASN & Appendix
Effectivity

Appendices 29AB, 36K, 39K, and 43K are applicable to airplane serial number 29618 only upon incorporation of Boeing Service Bulletin 767-71-0148 work package 1.

A P P E N D I X A P P L I C A B I L I T Y

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For breakdown of major subjects shown above, see the sub-section table of contents listed on right and appearing in the sub-section of this manual.

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SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this manual is required by law.

W E I G H T L I M I T A T I O N S

MAXIMUM WEIGHTS

Airplane Serial Numbers	Taxi	Takeoff	Landing	Zero Fuel	Center of Gravity Limits Page	Notes
30841, 30853, 30854	407,000 lb 184,612 kg	406,000 lb 184,158 kg	316,000 lb 143,335 kg	292,000 lb 132,448 kg	4B	
29898	413,000 lb 187,333 kg	412,000 lb 186,880 kg	320,000 lb 145,149 kg	295,000 lb 133,809 kg	4A	
30107, 30109 thru 30111, 30115, 30843	413,000 lb 187,333 kg	412,000 lb 186,880 kg	300,000 lb 136,077 kg	278,000 lb 126,098 kg	4	
29617, 29618	413,000 lb 187,333 kg	412,000 lb 186,880 kg	320,000 lb 145,149 kg	288,000 lb 130,634 kg	4	

The Maximum Weight Limits may be less as limited by center of gravity. Refer to the applicable Weight and Balance Manual for additional specific airplane loading limitations.

MINIMUM WEIGHTS

Minimum Inflight Weight..... 179,000 lb
81,193 kg

The Minimum Inflight Weight does not include usable fuel.

CERTIFICATE LIMITATIONS

W E I G H T L I M I T A T I O N S
(Continued)

PERFORMANCE OPERATING WEIGHTS

To comply with the performance requirements of Federal Aviation Regulation Part 25, the maximum allowable takeoff and landing weights may be less than structural limits.

The takeoff weight (weight at brake release or at start of takeoff roll) may be limited by the most restrictive of the following:

1. A weight based on the available accelerate-stop distance, takeoff distance, and takeoff run determined from the Field Length Limits, Runway Length Corrections, and Runway Length and V1 Adjustments charts.

2. A weight for the airport altitude and ambient temperature determined from the Takeoff Climb Limits charts.

3. A weight for the airport altitude, ambient temperature and wind component determined from the Tire Speed Limits charts.

4. A weight for the available takeoff distance and ambient conditions, at which V1 does not exceed VMBE from the Brake Energy Limit speeds chart.

5. A weight at which the net takeoff flight path, as determined from the Takeoff Climb, Obstacle Clearance and other charts, clears all obstacles by the required margins.

6. A weight which will be reduced by consumption of fuel such that enroute and landing weight limits will not be exceeded.

The landing weight is limited by the more restrictive of the following:

1. A weight based on the available Landing Field Length determined from the Landing Field Length charts.

2. A weight for the airport altitude and anticipated temperature determined from the Maximum Landing Weight, Climb Limits charts.

CERTIFICATE LIMITATIONS

P E R F O R M A N C E C O N F I G U R A T I O N

The airplane configuration as presented under Performance Configuration, Section 4.1, must be observed.

O P E R A T I O N A L L I M I T S

Runway slope -- ±2%

Maximum Takeoff and Landing Tailwind Component -- 10 knots.
Maximum Takeoff and Landing Tailwind Component -- 15 knots.*

Maximum Operating Altitude -- 43,100 feet pressure altitude.

Maximum Takeoff and Landing Altitude -- 8,400 feet pressure altitude.

Takeoff, Landing, and Enroute Temperature Limits -- use Environment Envelope chart, Section 4.1.

* Applicable to airplane serial numbers 29898, 30841, 30853 and 30854.

CENTER OF GRAVITY LIMITS

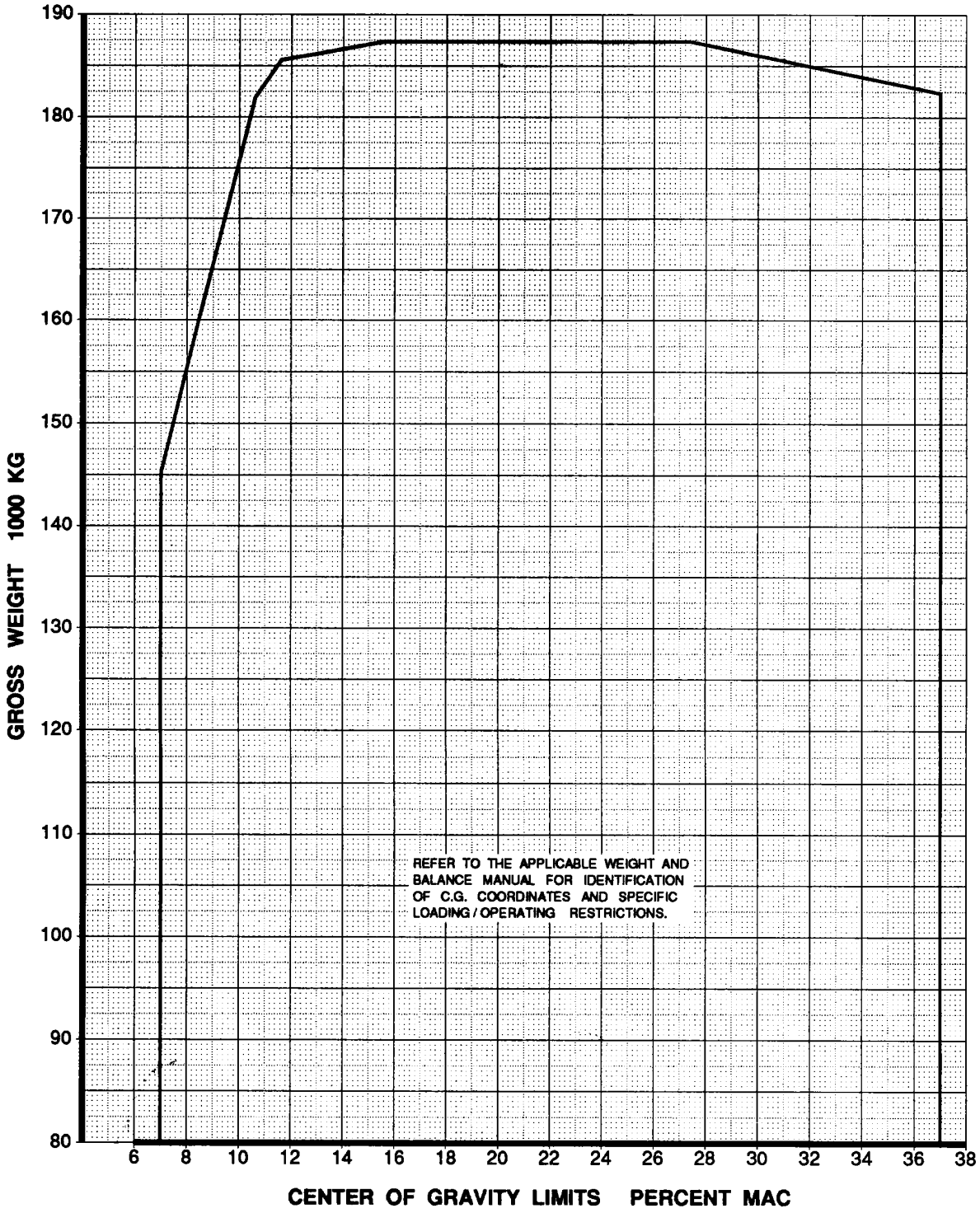


CHART APPLICABLE TO
767-300

APPROVED

DATE

S18958

CENTER OF GRAVITY LIMITS

REFER TO THE APPLICABLE WEIGHT AND BALANCE MANUAL FOR IDENTIFICATION OF C.G. COORDINATES AND SPECFIC LOADING/OPERATING RESTRICTIONS

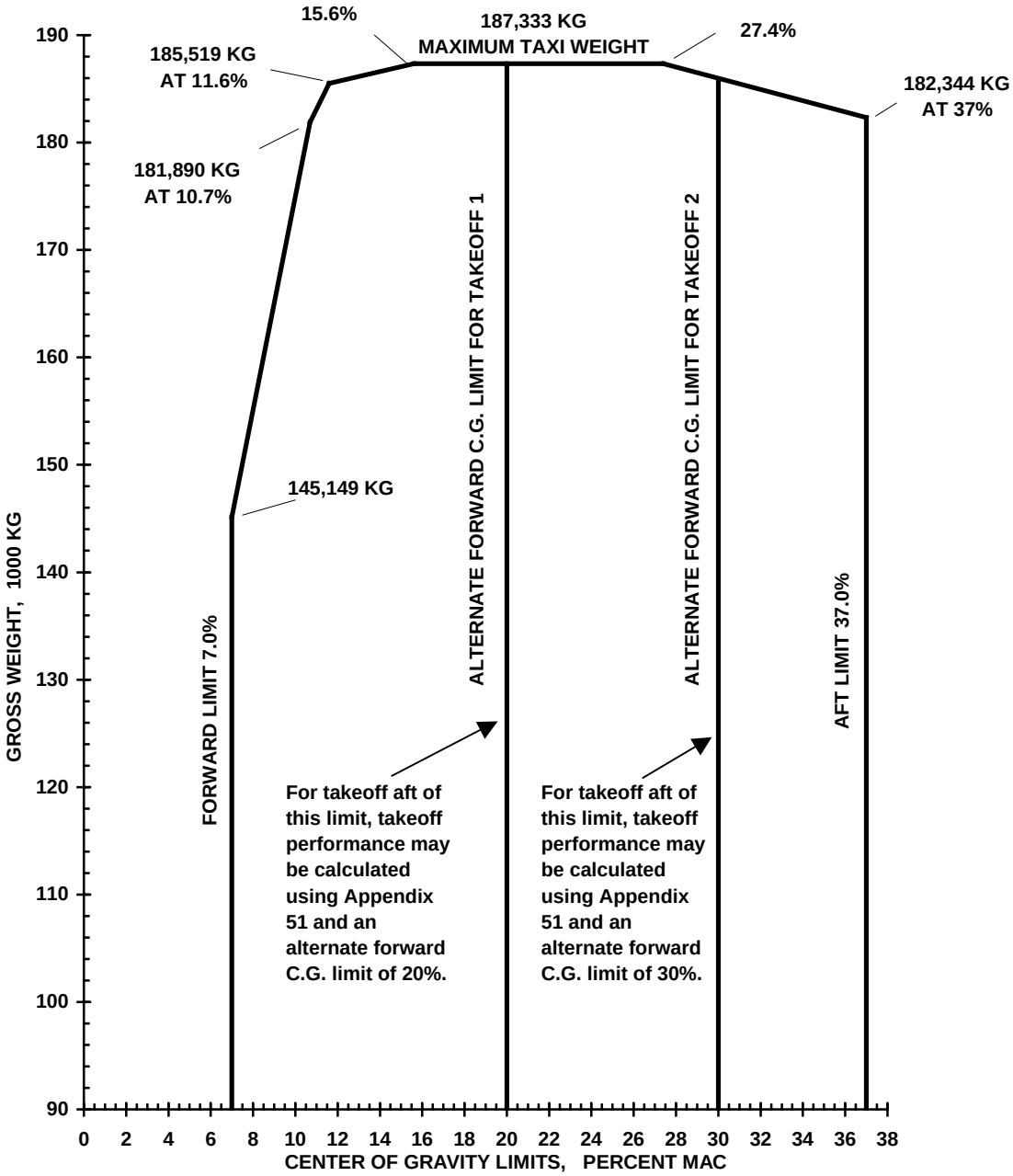


CHART APPLICABLE TO	APPROVED	DATE
767-300	EWD	12-12-01

CENTER OF GRAVITY LIMITS

REFER TO THE APPLICABLE WEIGHT AND BALANCE MANUAL FOR IDENTIFICATION OF C.G. COORDINATES AND SPECFIC LOADING/OPERATING RESTRICTIONS

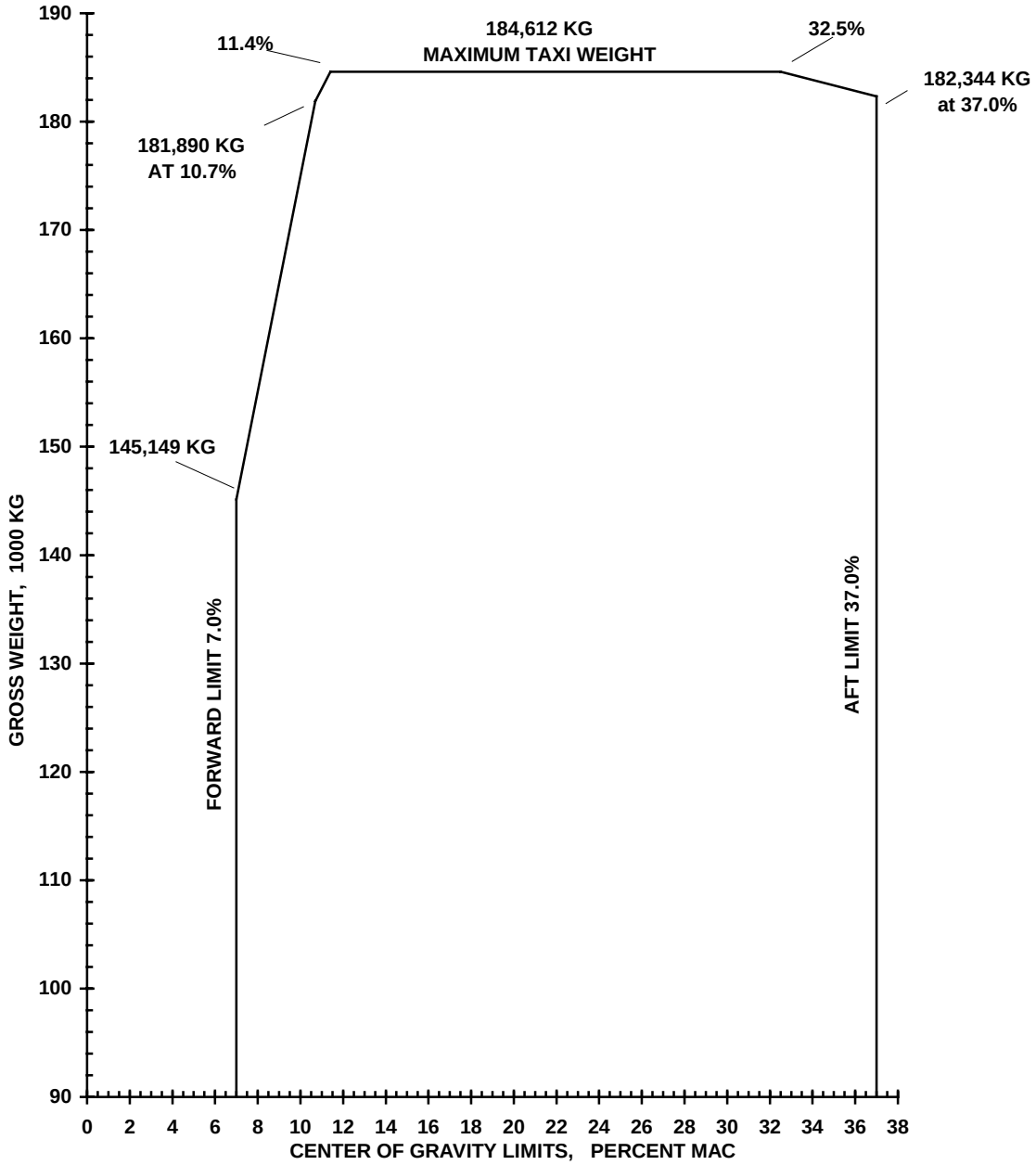


CHART APPLICABLE TO	APPROVED	DATE
767-300	EWD	04-30-01

CERTIFICATE LIMITATIONS

CERTIFICATION STATUS

This airplane is certificated in the Transport Category, FAR Part 25 and FAR Part 36.

KIND OF AIRPLANE OPERATION

The airplane is approved for the following kinds of flight and operation, both day and night, when the required equipment is installed and approved in accordance with the applicable Federal Aviation Regulations.

Visual (VFR)
Instrument (IFR)
Icing Conditions
Extended Over-Water

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Flaps Up. . . . . .+2.5g to -1.0g

Flaps Down. . . . . .+2.0g to 0.0g

NOTE: With flaps 25 and 30, positive limits vary linearly from +2.0 g at maximum landing weight to +1.5 g at maximum takeoff weight.

FLIGHT CREW

Required flight crew: Pilot and Copilot.

S19063

CERTIFICATE LIMITATIONS

MAXIMUM OPERATING LIMIT SPEED (V_{MO}/M_{MO})

The maximum operating limit speed shall not be deliberately exceeded in any regime of flight.

NOTES: 1. All airspeed markings and placards in the airplane are shown as indicated (IAS) values, and are not corrected for instrument error. V_{MO} is indicated by the limit speed hand on the airspeed indicator.

2. V_A is defined as the speed above which maneuvers involving full application of rudder, ailerons or elevator, or maneuvers involving angles of attack near stall, should be avoided.

MAXIMUM AIRSPEED LIMITS

FLAP PLACARD SPEEDS	
FLAP POSITION	V_{FE} - KNOTS IAS
1	250
5	230
15	210
20	210
25	180
30	170

- MAXIMUM TAKEOFF GROSS WEIGHT = 412,000 LB. (186,880 KG.)
- LANDING GEAR OPERATING SPEEDS (V_{LO}, M_{LO}):

  RETRACT: 270 KNOTS IAS, 0.82 MACH.

  *EXTEND : 270 KNOTS IAS, 0.82 MACH.

  LANDING GEAR EXTENDED:

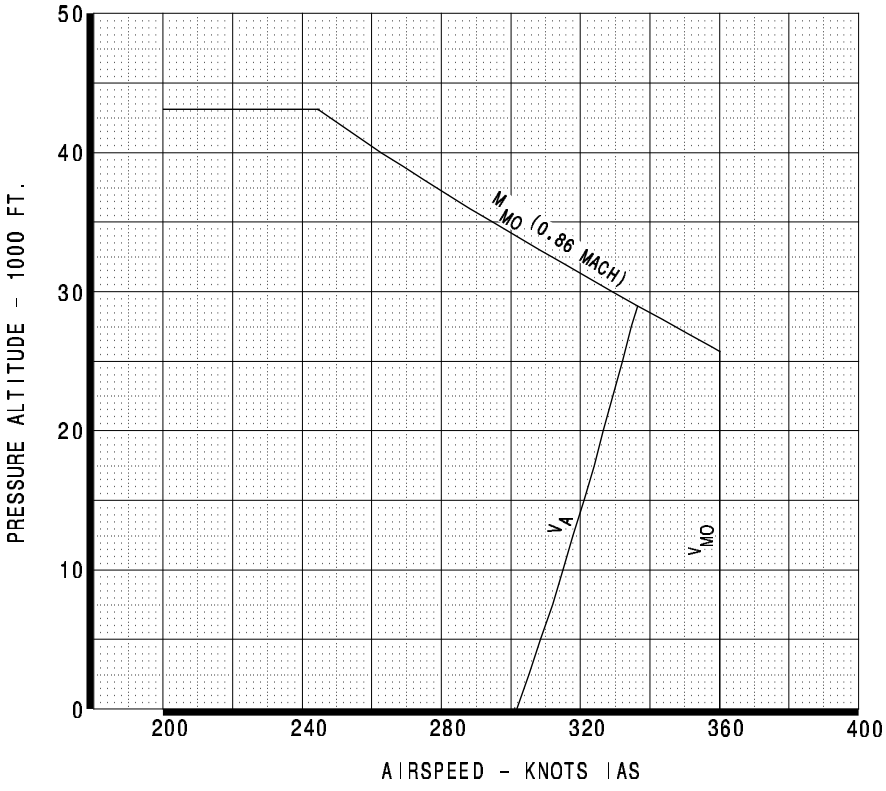
  V_{LE} = 270 KNOTS IAS

  M_{LE} = 0.82 MACH

*LANDING GEAR EXTENDED WITH ALTERNATE SYSTEM:

V_{LO} = 250 KNOTS IAS

M_{LO} = 0.75 MACH



P.C. K600107000
D041T507-1 PG. 1-7

H. LEE
767-300ER
412,000 LB MTOW
(186,880 KG)

APPROVED	DATE
TE AVERY	12-06-01

CERTIFICATE LIMITATIONS

F U E L S Y S T E M

FUEL LOADING

The maximum allowable fuel weight in either the left or right main tank and in the center tank depends on the Fuel Quantity Processor Unit (FQPU) part number installed in the airplane. The maximum weights allowed are listed in the table below.

L or R Main Tanks		Center Tank		FQPU Part #
43,097 lb.	19,548 kg.	85,200 lb.	38,646 kg.	S345T002 (all)
42,671 lb.	19,355 kg.	84,490 lb.	38,324 kg.	S345N001-032,-033
42,671 lb.	19,355 kg.	84,916 lb.	38,517 kg.	S345N001-036

Load main tanks equally. If main tanks are full and more fuel is required, load the center tank.# (Filling of tanks may be done in any sequence.)

\# 22,050 pounds (10,000 kilograms) of fuel may be loaded in the center tank with less than full wing tanks (with fuel jettison system installed and activated no less than 10,300 pounds (4,672 kilograms) of fuel must be in the wing tanks), provided the weight of fuel in the center tank plus actual Zero Fuel Weight does not exceed Maximum Zero Fuel Weight, and balance limits are observed. Fuel must be used in accordance with FUEL USAGE II.

LATERAL FUEL IMBALANCE

The maximum allowable fuel imbalance between the left and right main tanks for all operations is 2,500 pounds (1134 kilograms) when total main tank fuel is 48,000 pounds (21,772 kilograms) or less, with a linear reduction to 1,500 pounds (680 kilograms) when total main tank fuel is 79,800 pounds (36,197 kilograms), and is 1,500 pounds (680 kilograms) when total main tank fuel exceeds 79,800 pounds (36,197 kilograms).

FUEL USAGE I (No center tank fuel)

Use tank-to-engine fuel feed for takeoff and landing with all operable main tank boost pumps on and the crossfeed valve(s) closed**.

FUEL USAGE II (Fuel in center tank)

Use center tank fuel for all operations with all operable boost pumps on and the crossfeed valve(s) closed** until center tank fuel is depleted, then use FUEL USAGE I.

Intentional dry running of a center tank fuel pump (CTR L FUEL PUMP or CTR R FUEL PUMP message displayed on EICAS) is prohibited.

** The crossfeed valve(s) is(are) open for minimum fuel operation, and may be opened to correct fuel imbalance.

FUEL PUMP

Do not reset a tripped fuel pump or fuel pump control circuit breaker.

F U E L J E T T I S O N S Y S T E M (If Installed and Activated)

Do not jettison fuel with flap positions at 25 or 30 unless Boeing Service Bulletin 767-28-0025, 767-28-0027, 767-28-0038, or production equivalent has been incorporated.

CERTIFICATE LIMITATIONS

E N G I N E S GE CF6-80C2B7F

ENGINE THRUST

N1 values for Takeoff and Maximum Continuous Thrust are presented on the appropriate Thrust Setting charts in Section 4.2.

With EEC in Alternate mode (ALTN) takeoff power must be set after brake release. See Takeoff Power Setting procedure, Section 4.2.

ENGINE RPM

The maximum operational limits are:

N1 - Low Pressure Rotor 117.5 percent
N2 - High Pressure Rotor 112.5 percent

ENGINE EGT

Operating Condition	Temperature Limits	Time Limit
Takeoff	960 deg C	5 Minutes
Maximum Continuous	925 deg C	Continuous
Starting	870 deg C	Maximum Transient for 40 seconds
	750 deg C	Unlimited

ENGINE LIMIT DISPLAY MARKINGS

Maximum and minimum limits.....Red
Precautionary range.....Amber

The engine limit display markings on EICAS may be used to determine compliance with the maximum and minimum limits and precautionary ranges.

ENGINE INDICATION AND CREW ALERTING SYSTEM (EICAS)

The flight crew shall not blank engine vibration display during takeoff.

CERTIFICATE LIMITATIONS

E N G I N E S (Continued)

ENGINE FUEL SYSTEM

The following fuels and mixtures thereof are approved for use:

Jet A and Jet A-1 as specified in ASTM D 1655
JP-4 as specified in MIL-DTL-5624 [1][2][3]
Jet B as specified in ASTM D 6615 [1][2][3]
JP-5 as specified in MIL-DTL-5624
JP-8 as specified in MIL-DTL-83133

Fuels produced to other specifications and having properties meeting the requirements of the above specifications are acceptable for use.

Any other fuel conforming to GE Specification No. D50TF2 is acceptable provided that the limitations and requirements specified in GE Specification No. D50TF2 and this AFM are met.

Approved fuel additives are defined in ASTM D 1655, ASTM D 6615, MIL-DTL-5624, MIL-DTL-83133 and GE Specification No. D50TF2.

In-flight tank fuel temperature must be maintained at least 3 degrees C above the fuel freezing point of the fuel being used. The use of Fuel System Icing Inhibitor additives does not change the minimum fuel tank temperature limit.

The maximum tank fuel temperature is 49 deg C (120 deg F) except when using JP-4 or Jet B the maximum is 43 deg C (110 deg F).

Notes:
[1] The use of JP-4 as specified in MIL-DTL-5624, Jet B as specified in ASTM D 6615 or any other wide cut fuel is prohibited upon installation of a center tank override/jettison pumping unit via Boeing Service Bulletin 767-28-0052, or production equivalent.

[2] The use of JP-4 as specified in MIL-DTL-5624, Jet B as specified in ASTM D 6615 or any other wide cut fuel is prohibited in the center tank upon installation of center tank override/jettison pumping unit part number S343T002-29 or center tank override/jettison pumping unit part number S343T002-37.

[3] The use of JP-4 and Jet B fuels is prohibited in revenue operations.

ENGINE IGNITION

On for takeoff and landing.

ENGINE OIL SYSTEM

Minimum oil pressure is 10 psi.

Maximum oil temperature for continuous operation is 160 deg C, and for a maximum period of 15 minutes is 175 deg C.

REVERSE THRUST

Use for ground operation only. Intentional selection of reverse thrust in flight is prohibited.

O P E R A T I O N I N I C I N G C O N D I T I O N S (80C2)

ENGINE ANTI-ICE SYSTEM

The engine anti-ice must be ON during all ground and flight operations when icing conditions exist or are anticipated, except when the temperature is below -40°C SAT.

NOTE: Do not rely on airframe visual icing cues or advisory ice detector, if installed, to turn engine anti-ice on. Use the temperature and visual moisture criteria specified in this section. Delaying the use of engine anti-ice until ice buildup is visible from the cockpit may result in severe engine damage and/or flameout.

Icing conditions exist when the OAT on the ground and for takeoff, or TAT in flight is 10°C or below and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals).

Icing conditions also exist when the OAT on the ground and for takeoff is 10°C or below when operating on ramps, taxiways, or runways where surface snow, ice, standing water, or slush may be ingested by the engines or freeze on engines, nacelles, or engine sensor probes.

PRIMARY ICE DETECTION AND ACTIVATION SYSTEM (if installed)

The engine anti-ice selector must be in the ON position during all ground operations when icing conditions exist or are anticipated. In flight, unless the AUTO position is selected, the engine anti-ice selector must be in the ON position when icing conditions exist or are anticipated.

OPERATION IN ICE CRYSTAL ICING CONDITIONS

Engine anti-ice must be ON when ice crystal icing conditions exist, even when the temperature is below -40 degrees C OAT. For flight in ice crystal icing conditions, the primary ice detection system (if installed) engine anti-ice switches should be in the ON position during flight. The primary ice detection system does not respond to ice crystals. Do not use anti-ice if OAT or TAT exceeds 10 degrees C (50 degrees F).

NOTE: Ice crystal conditions exist when in visible moisture and one or more of the following indications are present:

Amber or red weather radar returns below the airplane

Appearance of liquid water on the windshield at temperatures too cold for rain (the sound is different than rain)

The autothrottle is unable to maintain the selected airspeed

TAT indication on EICAS stays near 0 degrees C.

Note: Erroneous TAT indication may occur as a result of ice crystals blocking the sensor. The erroneous indication may last from one minute to more than 20 minutes. TAT normally should increase approximately 2 degrees Celsius per 1000 ft of descent.

When the conditions described above no longer exist, use engine anti-ice normally.

CERTIFICATE LIMITATIONS

C A B I N P R E S S U R I Z A T I O N

Maximum normal operating cabin pressure is 8.6 ± .05 psi differential.
Maximum operating cabin pressure during climb is 8.6 ± .10 psi differential.

Maximum allowable cabin pressure differential for takeoff and landing is 236 feet below airport pressure altitude (.125 psi).

A U T O P I L O T - F L I G H T D I R E C T O R

On takeoff, do not engage CWS (if installed) or CMD mode below 200 feet AGL.

Maximum allowable wind speeds when landing weather minima are predicated on autoland operations:

Headwind - 25 knots
Tailwind - 10 knots
Tailwind - 15 knots*
Crosswind - 25 knots.

* Applicable to airplane serial numbers 29898, 30841, 30853 and 30854 only.

Use of aileron trim with the autopilot engaged is prohibited.

V H F R A D I O V O I C E C O M M U N I C A T I O N S

Do not use the center VHF for ATC communications with ACARS operational.

A I R C R A F T C O M M U N I C A T I O N S A D D R E S S I N G & R E P O R T I N G S Y S T E M (A C A R S) (if installed)

The ACARS is limited to the transmission and receipt of messages, which will not create an unsafe condition if the message is improperly received, such as the following conditions:

a) the message or parts of the message are delayed or not received,
b) the message is delivered to the wrong recipient, or
c) the message content may be frequently corrupted.

However, Pre-Departure Clearance, Digital Automatic Terminal Information Service, Oceanic Clearances, Weight and Balance and Takeoff Data messages can be transmitted and received over ACARS if they are verified per approved operational procedures.

T R A F F I C A L E R T A N D C O L L I S I O N A V O I D A N C E S Y S T E M (T C A S) (If installed)

Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with a TCAS II resolution advisory.

F L I G H T C O N T R O L S

Avoid rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large side slip angles) as they may result in structural failure at any speed, including below V_A.

CERTIFICATE LIMITATIONS

GROUND PROXIMITY WARNING SYSTEM - (Look-Ahead Terrain Alerting) - If Installed

Do not use the terrain display for navigation.

The use of look-ahead terrain alerting and terrain display functions are prohibited within 15 nm of takeoff, approach, or landing at an airport or runway not contained in the GPWS terrain database. Refer to Honeywell Document 060-4267-000 for airports and runways contained in the installed GPWS terrain database.

If GPS is not installed:

The use of look-ahead terrain alerting and terrain display function are prohibited during QFE operations.

The look-ahead terrain alerting and terrain display functions must be inhibited by selecting the TERR OVRD switch to OVRD if operating outside the United States National Airspace and the FMS database and charts are not referenced to the WGS-84 reference datum, unless the FMS has been found to be suitable for navigation in that airspace.

The look-ahead terrain alerting and terrain display functions must be inhibited by selecting the TERR OVRD switch to OVRD if the FMS is operating in IRS NAV ONLY.

For takeoff and if FMS position updating is not accomplished, verify actual runway position by ensuring that, with the 5 or 10 nm range selected on the EFIS control panel, the aircraft symbol is displayed at the appropriate point on the runway symbol.

If GPS is installed, the following limitation is applicable prior to installation of Ground Proximity Warning Computer, Boeing P/N 965-0976-003-212-212 or later:

The use of look-ahead terrain alerting and terrain display functions are prohibited during QFE operations.

FLIGHT MANAGEMENT COMPUTER SYSTEM (FMCS)

With a single operational FMC, during VOR approaches, one pilot must have raw data from the VOR associated with the approach displayed on the RDMI, RMI or HSI in the VOR mode, no later than the final approach fix.

The following paragraph is applicable to airplanes that have the Air Traffic Services option activated:

ATC clearance data received through the FMC which can only be viewed on the cockpit printer must be independently verified with the originating ground stations.

F L A P O P E R A T I O N

Do not extend flaps above 20,000 feet.

P A S S E N G E R E V A C U A T I O N

DOOR-MOUNTED ESCAPE SLIDES

Main door emergency evacuation slide systems must be armed and engagement of each girt bar with the sill fitting verified, prior to taxi, takeoff, and landing whenever passengers are carried.

N O I S E C H A R A C T E R I S T I C S

All airplanes with serial numbers listed in this document meet FAR Part 36, Appendix C, Stage 3 requirements. Refer to Noise Characteristics in Section 4.2 of this manual for noise levels.

C O N F I G U R A T I O N D E V I A T I O N L I S T (C D L)

When operation is scheduled with certain secondary airframe and engine parts missing, the airplane must be operated in accordance with the limitations specified in the basic Airplane Flight Manual, and as amended by the CDL Appendix.

H F R A D I O C O M M U N I C A T I O N S

The following limitation is applicable to airplanes with the listed HF communications equipment installed.

Flights predicated on the use of the following HF frequencies are prohibited:

HF communications equipment installed	Frequencies, Mhz
Rockwell/Collins Model HFS-700 and/or HFS-900 HF communication transceivers	11.133, 22.434, 22.683, 22.766
HF coupler part numbers 822-0987-001 -002 -003 -004	29.489, 29.490

U N P R E S S U R I Z E D D I S P A T C H

Dispatch in an unpressurized configuration is prohibited.(1)(2)

(1) Applicable to airplane serial numbers 30115, 30841, 30843, 30853 and 30854 only.
(2) Not applicable upon incorporation of Boeing Service Bulletin 767-21-0178 or production equivalent.

F L I G H T D E C K S E C U R I T Y D O O R (If installed)

Verify that an operational check of the Flight Deck Access System has been accomplished according to approved procedures once each flight day.

SECTION 2 - EMERGENCY PROCEDURES

The procedures contained in this section have been developed and recommended by the manufacturer and approved by the FAA for use in the operation of this airplane. These procedures are for guidance only in identifying acceptable operating procedures.

RECALL items are minimum immediate action items.

Silencing of aural warnings will enhance crew coordination in performance of emergency procedures. Pressing either master warning light will silence the bell and reset the master warning system.

F I R E

The flight crew should always go on 100% oxygen whenever a hand held fire extinguisher is to be discharged in the cockpit or required because of smoke accumulation.

Whenever fire is encountered on the airplane, land at the nearest suitable airport unless it can be positively verified that the fire has been extinguished.

F I R E (Continued)

ENGINE FIRE, SEVERE ENGINE DAMAGE, OR SEPARATION

If engine fire, or severe engine damage or engine separation has occurred, or high airframe vibration with abnormal engine indications occurs:

Thrust Lever . . . . . CLOSE
Fuel Control Switch. . . . . CUTOFF
Engine Fire Switch . . . . . PULL

If fire warning light remains illuminated:

Engine Fire Switch. . . . . ROTATE

After 30 seconds, if fire warning light remains illuminated:

Engine Fire Switch. . . . . ROTATE TO REMAINING BOTTLE

APU (if available) . . . . . START

Prepare for one-engine-inoperative landing.

If high airframe vibration occurs and continues after engine is shut down, without delay reduce airspeed and descend to a safe altitude which results in an acceptable vibration level. If high airframe vibration returns and further airspeed reduction and descent is not practical, increasing the airspeed may reduce the vibration.

APU FIRE

APU Fire Switch. . . . . PULL/ROTATE

If APU fire warning light illuminated:

APU Fire Switch. . . . . .ROTATE TO REMAINING BOTTLE (if installed)

EMERGENCY PROCEDURES

F I R E (Continued)

CARGO FIRE - FWD/AFT

Cargo Fire Switch (FWD/AFT) .....ARMED

Cargo Fire Bottle Discharge Switch .....PUSH
Push and hold for 1 second.

Equipment Cooling Selector .....OVRD

If forward cargo fire:
Cargo Heat Fwd Switch.....OFF

If aft cargo fire:
Cargo Heat Aft Switch (and Bulk if installed).....OFF

Flight Deck Temperature Selector .....FULL COOL

If airplane altitude above 10,000 feet:
Landing Altitude Selector.....7,500 ft
Cabin Altitude Auto Rate Control.....MAX

Pack Control Selector (either) .....OFF

If airplane altitude above 35,000 ft:
Descend.....ACCOMPLISH
Descend at or below 35,000 feet.

Landing Altitude Selector .....SET
Set landing field elevation prior to descent for landing

ELECTRICAL SMOKE OR FIRE

Use oxygen masks and smoke goggles, if required, establish crew communications, and select both recirculation fans (if installed) to OFF.

If smoke source is known, remove electrical power from affected equipment.

If smoke source is unknown, select Utility Bus Switches to OFF and Equipment Cooling Selector to STBY.

EMERGENCY PROCEDURES

F I R E (Continued)

WHEEL WELL FIRE

Landing Gear Lever (Maximum 270 KIAS/.82M). . . . . DOWN

If the landing gear must be retracted for airplane performance, the landing gear may be retracted 20 minutes after the FIRE WHEEL WELL message is no longer displayed.

SMOKE REMOVAL (Cockpit or cabin source)

Oxygen Masks and Smoke Goggles (if required) . . . . . ON
Crew Communications (if required). . . . . .ESTABLISH
Flight Deck Door . . . . . CLOSED
Equipment Cooling Selector . . . . . OVRD
Utility Bus Switches (Both). . . . . .OFF
Landing Altitude Selector. . . . . 9,500 FT
Auto Rate Control. . . . . .MAX

D U A L E N G I N E F A I L U R E

Engine Start Selectors (Both) .....FLT

Thrust Levers (Both) .....CLOSE

Fuel Control Switches (Both) .....CUT OFF, then RUN

If engine appears stalled or EGT approaches the Standby Engine Indicator placard limit:

Repeat the above step on affected engine(s)

Ram Air Turbine Switch .....PUSH

Airspeed:
Above 30,000 Ft .....240 Kts
30,000 Ft or below .....220 Kts Minimum

APU Selector (if available) .....START, release to ON

If both engines remain failed:

Thrust Levers (Both).....CLOSE

Fuel Control Switches (Both).....CUT OFF, then RUN
Remain approximately 30 seconds in each position during start attempts. Repeat until engine start achieved. Engine may accelerate to idle slowly.

NOTE: Disregard Inflight Restart Envelope in Section 4.2 for dual engine failure.

A C B U S (E S) O F F

Generator Control Switch(es) . . . . . .OFF THEN ON

APU (If available) . . . . . START

After APU RUN light illuminates and APU GEN OFF light remains extinguished:

Bus Tie Switches (both) . . . . . OFF
Bus Tie Switches (both) . . . . . .AUTO

If both BUS OFF lights remain illuminated:

Equipment Cooling Selector. . . . . .OVRD

Use manual speedbrakes after landing.
Master Caution is inoperative.
Antiskid is inoperative on outboard wheels.

If hydraulic motor driven generator(s) is(are) not installed:

Control Pressurization manually.
Avoid icing conditions.
Flap indicator is inoperative.
Thrust reversers are inoperative.

Flight beyond 30 minutes will result in complete loss of electrical power and inability to extend gear and flaps.

CABIN ALTITUDE WARNING OR RAPID DEPRESSURIZATION

Condition: The CABIN ALT or CABIN ALTITUDE light illuminated indicates cabin altitude is excessive:

RECALL

Oxygen Masks and Regulators. . . . . ON, 100%
Crew Communications. . . . . .ESTABLISH
Passenger Oxygen . . . . . ON

Initiate descent as required.

DESCENT

Thrust Levers. . . . . .CLOSE
Speed Brakes . . . . . EXTEND
Target Speed . . . . . .Vmo/Mmo

Descend to 10,000 ft. or MEA, whichever is higher.

If structural integrity is in doubt, limit airspeed and avoid high maneuvering loads.

D I T C H I N G

Select the GEAR OVRD and TERR OVRD (if installed) switches to OVRD. Turn pack control selectors off and close outflow valve.

Conduct crew and passenger briefing.

For ditching approach, gear is up, full landing flaps, speed V_{REF} with rate of descent approximately 200 to 300 feet per minute.

E V A C U A T I O N

In the event passengers must be rapidly evacuated from the airplane, reduction of personal injury and damage may be enhanced by early notification of the evacuation. Set parking brake, open outflow valve (as required), shut down engines, discharge engine and APU fire bottles (as required) prior to leaving the airplane.

AUTOPILOT ELEVATOR MALFUNCTION

The demonstrated altitude loss due to a simulated hard-over autopilot malfunction is:

LEVEL FLIGHT: 580 feet when recovery was initiated three seconds after pilot recognition.

APPROACH:

(a) 15 feet from airplane glide path when recovery was initiated one second after pilot recognition.

(b) 12 feet from airplane glide path when recovery was without delay after pilot recognition.

SECTION 3 - OPERATING PROCEDURES

Operating Procedures in this section include only those procedures where an action or sequence of actions, or, prohibition of incorrect action(s), which if not observed, could result in a significant adverse effect on the airworthiness of the airplane or the safety of the passengers and crew.

The procedures contained in this section have been developed and recommended by the manufacturer and approved by the FAA for use in the operation of this airplane. These procedures are for guidance only in identifying acceptable operating procedures.

Section 3 is divided into Normal and Non-normal Procedures. Those procedures not primarily associated with system malfunctions or failures are presented in Section 3.1. Procedures associated with malfunctions or failures are presented in Section 3.2.

SECTION 3.1 - NORMAL PROCEDURES

C O N T E N T S

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G E N E R A L

Procedures in this section are those procedures unique to this airplane, not primarily associated with system malfunctions or failures.

F U E L T A N K C A P A C I T Y

	USABLE FUEL*	MAXIMUM FUEL WEIGHT	
TANK	U.S. GALLONS	POUNDS	KILOGRAMS
FQPU part number S345T002 (Honeywell) installed			
L or R Main	6,070	43,097	19,548
Center Tank	12,000	85,200	38,646
Total	24,140	171,394	77,742
FQPU part number S345N001-032, -033 (Simmonds/B.F. Goodrich) installed			
L or R Main	6,010	42,671	19,355
Center Tank	11,900	84,490	38,324
Total	23,920	169,832	77,034
FQPU part number S345N001-036 installed			
L or R Main	6,010	42,671	19,355
Center Tank	11,960	84,916	38,517
Total	23,980	170,258	77,227

Note:

* The usable fuel quantity depends on the Fuel Quantity Processor Unit (FQPU) part number installed. Refer to the applicable Weight and Balance Manual for additional information on the usable fuel quantity of specific airplanes.

F U E L S Y S T E M

Procedures contained on this page are applicable to airplanes equipped with the automatic center tank fuel pump power removal system per Boeing Service Bulletin 767-28A0083 or production equivalent.

CENTER TANK FUEL PUMPS

Center tank fuel pump switches must not be “ON” unless personnel are available in the flight deck to monitor low PRESS lights.

For ground operations prior to engine start:
The center tank fuel pump switches must not be positioned ON unless the center tank contains usable fuel. With center tank fuel pump switches ON, verify both center tank fuel pump low PRESS lights are illuminated and EICAS CTR L FUEL PUMP and CTR R FUEL PUMP messages are displayed.

For ground operations after engine start and flight operations:
The center tank fuel pump switch must be selected OFF when the respective CTR L FUEL PUMP or CTR R FUEL PUMP message displays. Both center tank fuel pump switches must be selected OFF when either the CTR L FUEL PUMP or CTR R FUEL PUMP message displays if the center tank is empty. During cruise flight, both center tank pump switches may be reselected ON whenever center tank usable fuel is indicated.

DE-FUELING AND FUEL TRANSFER

When transferring fuel or de-fueling center or main wing tanks, the center fuel pump low PRESS must be monitored and the fuel pump switches positioned to “OFF” at the first indication of low pressure. Prior to transferring fuel or de-fueling, conduct a lamp test of the respective fuel pump low PRESS lights.

REVERSE THRUST

Apply reverse thrust as required until the airplane decelerates to about 60 knots. Modulate levers to reverse idle detent by taxi speed. Position levers to forward thrust after engines have decelerated to idle.

WINDSHIELD RAIN REPELLENT (If Installed)

Apply repellent only in rain and with wipers operating, on one windshield at a time. Do not apply repellent to a dry windshield. Do not turn on wiper if repellent is inadvertently applied to a dry windshield.

S19785

A I R T R A F F I C C O N T R O L R A D A R B E A C O N S Y S T E M

MODE S TRANSPONDER (If Installed)

Mode A, C and S functions with respect to the Traffic Alert and Collision Avoidance System (TCAS) have been demonstrated for proper operation.

Elementary Surveillance (If Installed)

Elementary Surveillance functions have been demonstrated for proper operation.

Enhanced Surveillance (If Installed)

Enhanced Surveillance functions have been demonstrated for proper operation.

Extended Squitter (If Installed)

Extended Squitter transmissions have been demonstrated for proper operation and non-interference but have not been certified.

The following is applicable only if the extended squitter is installed and the Multi Mode Receivers (MMRs) are interfaced with the ATC Transponders.

Extended Squitter transmission has been demonstrated for proper operation per EASA AMC 20-24 for broadcast of ADS-B related position information, with the following exceptions.

1. The extended squitter transmission system does not take into account the system’s uncompensated latency into its transmitted horizontal quality indicator value.

2. The extended squitter transmission system does not base the transmitted horizontal quality indicator solely on the integrity information from the horizontal position source. The horizontal quality indicator value may be encoded based on the horizontal position source’s accuracy quality information.

3. The extended squitter transmission system does not have the capability to transmit the discrete emergency codes (7500, 7600, 7700). Instead the extended squitter system will transmit a generic emergency indicator when any emergency code is dialed into the control panel.

TURBULENCE AVOIDANCE

Flight through severe turbulence should be avoided if possible.

WEATHER RADAR WITH TURBULENCE DISPLAY (if installed)

Weather Radars equipped with the turbulence detection mode may assist the crew in selection of a flight path to circumvent areas of severe turbulence. The turbulence detection mode has not been fully evaluated by the FAA and has only been certified on a Non-Interference basis. The Weather Mode should be used for evaluating weather conditions and should be the basis for all decisions regarding maneuvering the aircraft to avoid weather.

Some systems provide variable gain in the Turbulence Mode allowing the gain to be adjusted below the calibrated level (CAL or AUTO). When below the calibrated gain level, weather returns may be shown at reduced levels or even removed from the display.

Clear air turbulence and windshear conditions are not detectable with the Weather Radar system.

SEVERE TURBULENT AIR PENETRATION

The recommended procedures for inadvertent flight through severe turbulence are:

1. Air Speed

   Approximately 290 KIAS or approximately 0.78 M, whichever is lower. Severe turbulence will cause large and often rapid variations in indicated air speed. DO NOT CHASE THE AIR SPEED.

2. Yaw Damper - ENGAGED

3. Autothrottle - DISENGAGE

SEVERE TURBULENT AIR PENETRATION
(Continued)

4. Autopilot - OPTIONAL

   Autopilot may remain engaged in CMD mode as long as performance is satisfactory.

   If performance is NOT satisfactory and CWS is installed:

   a. Use CWS mode and set level attitude.

   b. Monitor pitch trim activity and be prepared to disengage if sustained trimming occurs.

   c. Do not aid or resist control motions when autopilot is engaged.

   If performance is NOT satisfactory and CWS is NOT installed:

   DISENGAGE AUTOPILOT AND FLY MANUALLY.

5. Attitude (when flying manually)

   Maintain wings level and the desired pitch attitude. Use attitude indicator as the primary instrument. In extreme drafts, large attitude changes may occur. DO NOT USE SUDDEN LARGE CONTROL INPUTS.

6. Stabilizer (when flying manually)

   Maintain control of the airplane with the elevators. After establishing the trim setting for penetration speed, DO NOT CHANGE STABILIZER TRIM.

7. Altitude

   Allow altitude to vary. Large altitude variations are possible in severe turbulence. Sacrifice altitude in order to maintain the desired attitude and air speed. DO NOT CHASE ALTITUDE.

8. Thrust

   Engine ignition should be on. Make an initial thrust setting for the target airspeed. CHANGE THRUST ONLY IN CASE OF EXTREME AIR SPEED VARIATION.

WINDSHEAR SYSTEM

The Windshear System, when installed, provides detection, alerting and guidance.

AUTOPILOT-FLIGHT DIRECTOR SYSTEM

The automatic flight control system provides airplane stabilization, vertical and horizontal path control, and command information to the flight director bars on both attitude director indicators.

The Autopilot-Flight Director System provides control/guidance in windshear conditions when operating in takeoff and go-around modes.

The system consists of three integrated autopilot-flight director channels suitable for use as a fail passive and fail-operational system for automatic landing with rollout steering, or singly for climb, cruise, descent or approach.

The following path control functions for automatic and/or manual (flight director) control of the airplane are provided:

- Lateral navigation (FMC mode only)
- Vertical navigation (FMC mode only)
- Localizer only
- Approach
- Autoland with flare and rollout control (Automatic only)
- Back Course - Localizer only (if installed)

The following pilot assist functions for automatic and/or manual (flight director) control of the airplane are provided:

- Control Wheel Steering - Autopilot only (if installed)
- Heading select and hold
- Vertical speed select and hold
- IAS/Mach select and hold (Elevator control of speed in flight level change)
- Altitude capture and hold
- Go-around
- Takeoff (Flight director only)

Speed protection is not provided in vertical speed and altitude capture, however, a CAUTION/MODE FAIL and/or flight director bar removal is provided for excessive loss of airspeed.

The expected altitude loss during an automatic go-around initiated below 100 feet AGL is listed below.

GA ALT (Ft)	ALT LOSS (Ft)
50 to 100	39
40	29
30	23
20	15
10	9
5	5

S19793

AUTOPILOT - FLIGHT DIRECTOR SYSTEM (Continued)

DEMONSTRATED CONDITIONS

The system has been demonstrated with and without yaw dampers and autothrottle and with both 25 and 30 landing flaps.

The approach speed selected for automatic approaches using autothrottles was Vref + 5 knots (No wind correction was made).

The automatic landing system has been demonstrated with the following wind conditions (refer to Section 1 for limiting wind conditions):

Headwind - 25 knots
Tailwind - 24 knots
Crosswind - 33 knots

Satisfactory Automatic Landing System performance has been demonstrated on US type II and type III ILS ground facilities.

Rollout performance has been demonstrated on dry runways using each autobrake setting.

MINIMUM MULTICHANNEL ENGAGE ALTITUDE FOR AUTOLAND

On approach for autoland, verify LAND 2 or LAND 3 status, as appropriate, prior to 600 feet AGL.

AFDS SYSTEM CONFIGURATIONS

The AFDS equipment listings in this section do not necessarily denote all of the systems and equipment required for the types of operation specified. Applicable FAR's and advisory circulars may prescribe an operational requirement for such additional systems such as autothrottle, rain removal, or autobrakes. Operators should determine the total systems requirements for each type of operation prior to requesting Operations Specifications authorization.

Demonstrated compliance with the airworthiness performance standards for the autopilot and flight director does not constitute approval to conduct operations in lower weather minimums.

A U T O P I L O T - F L I G H T D I R E C T O R S Y S T E M
(Continued)

AUTOLAND - FAIL OPERATIONAL

The autopilot system has been shown to meet the applicable airworthiness performance and reliability requirements for a fail operational system to comply with FAA AC 120-28C for automatic approach, landing, and rollout, with the following equipment operative and LAND 3 annunciated:

Two engines
Triple channel automatic landing system.
Two Autoland Status Annunciators.
Two EADI Displays supplied by different symbol generators including attitude, radio altitude, ILS deviation, decision height indication, and AFDS mode status information.
Three IRU's in NAV mode.
Three Hydraulic Systems.
Autothrottle.

NOTE: The effect of inadvertent autopilot disconnect by the flight crew during rollout has not been evaluated by the FAA.

S19811

A U T O P I L O T - F L I G H T D I R E C T O R S Y S T E M
(Continued)

AUTOLAND - FAIL PASSIVE

The autopilot system has been shown to meet the applicable airworthiness performance and reliability requirements for a fail passive system to comply with FAA AC120-28C and AC 20-57A for automatic approach and landing with the following equipment operative and LAND 2 or LAND 3 annunciated:

- Dual or Triple channel autopilot engaged.
- Two EADI Displays supplied by different symbol generators including attitude, radio altitude, ILS deviation, decision height indication, and AFDS mode status information.
- Autoland Status Annunciator for the pilot conducting the approach.
- Two or Three IRU's (associated with the engaged autopilots) in NAV mode.
- Three Hydraulic Systems.
- Two sources of electrical power. (The APU generator may be used as an independent power source, if available.)

NOTE: If an engine fails during the approach, the approach may be continued if LAND 2 remains annunciated on the autoland status annunciator.

During a dual channel autopilot go-around the autopilot may disconnect unless a new roll or pitch mode is engaged, or a new airspeed is selected prior to approximately 1000 feet above the go-around altitude.

CAUTION: If the autopilot disconnects during an engine out go-around, loss of autopilot rudder control can result in large yaw and roll excursions.

A U T O P I L O T - F L I G H T D I R E C T O R S Y S T E M
(Continued)

AUTOPILOT - APPROACH

The autopilot system has been shown to meet the applicable airworthiness performance and reliability requirements of FAA AC120-29 Appendix 1 for automatic approach with the following equipment operative:

Single, Dual, or Triple channel autopilot engaged.
Two EADI Displays supplied by different symbol generators including attitude, radio altitude, ILS deviation, decision height indication, and AFDS mode status information.
Two IRU's (associated with the engaged autopilots) in NAV mode.
Two sources of electrical power. (The APU generator may be used as an independent power source, if available.)

Approach - SINGLE ENGINE

The autopilot has been shown to meet the performance requirements of AC120-29 Appendix 1 with one engine initially inoperative, landing flaps 20, and the airplane trimmed for the condition. Disconnect the autopilot at or before initiation of flare.

Performance criteria are not met with the autothrottle engaged.

Two sources of electrical power must be available. (The APU generator may be used as an independent power source, if available.)

AUTOPILOT - FLIGHT DIRECTOR SYSTEM (Continued)

FLIGHT DIRECTOR

The flight director command may be used as supplemental guidance to the primary speed and attitude indications for climb after takeoff to acquire and maintain desired attitudes.

FLIGHT DIRECTOR APPROACH

The flight director system has been shown to meet the applicable airworthiness performance and reliability requirements of FAA AC120-29 Appendix 1 for manual approach with the following equipment operative:

- Two EADI Displays supplied by different symbol generators including attitude, radio altitude, ILS deviation, decision height indication, and AFDS mode status information.
- Only the Left and Right or the Center and Right flight director combinations may be selected.
- Two IRU's in NAV mode.
- Two sources of electrical power. (The APU generator may be used as an independent power source, if available.)

FLIGHT DIRECTOR APPROACH - SINGLE ENGINE

The flight director system has been shown to meet the performance requirements of FAA AC120-29 Appendix 1 with one engine initially inoperative and the airplane trimmed for the condition.

NORMAL PROCEDURES

I N E R T I A L R E F E R E N C E S Y S T E M

Two Inertial Reference Systems (IRS) in conjunction with two Flight Management Computer Systems (FMCS) meet the Inertial Navigation System requirements of FAA Advisory Circular 25-4 as the sole means of navigation for flights of up to 18 hours duration.

OR

Two Inertial Reference Systems (IRS) in conjunction with one Flight Management Computer connected to either two Hybrid Multi-purpose Control Display Units (HMCDU) or two Multi-purpose Control Display Units (MCDU), meet the Inertial Navigation System requirements of FAA Advisory Circular 25-4 as the sole means of navigation for flights of up to 18 hours duration.

A normal 10-minute ground alignment of the IRS has been demonstrated to be satisfactory between 70.2 degrees North and 70.2 degrees South latitudes. An extended 17-minute ground alignment is required between 70.2 degrees and 78.25 degrees North and South latitudes.

In the NAV (navigation) mode the IRS will provide valid magnetic heading and track between 73 degrees North and 60 degrees South latitudes.* #

Insure IRS alignment is complete and all IRUs are in the NAV mode before the airplane is moved.

When an IRU is in the ATT (Attitude) mode magnetic heading will drift after initialization in a manner similar to a directional gyro and requires crew monitoring and periodic manual updates to ensure adequate accuracy.

* When Boeing Service Bulletin 767-34-0206, 767-34-0555 or 767-34-0643 or production equivalent is incorporated, the northern boundary is extended to 82 degrees north latitude, except from 80 degrees west to 130 degrees west longitude the boundary is restricted to 70 degrees north latitude. The southern boundary is extended to 82 degrees south latitude, except from 120 degrees east to 160 degrees east longitude the boundary is restricted to 60 degrees south latitude.

\# When Boeing Service Bulletin 767-34-0649 or 767-34-0650 – INERTIAL REFERENCE SYSTEM – UPDATED AND EXTENDED 2015 MAGNETIC VARIATION TABLE ACTIVATION, or production equivalent is incorporated, the northern boundary is extended to 82 degrees north latitude, except from 80 degrees west to 170 degrees west longitude the boundary is restricted to 73 degrees north latitude. The southern boundary is extended to 82 degrees south latitude, except from 120 degrees east to 160 degrees east longitude the boundary is restricted to 60 degrees south latitude. When flying north of 73 degrees north latitude, set the HEADING REFERENCE SWITCH to TRUE.

F L I G H T M A N A G E M E N T C O M P U T E R S Y S T E M (F M C S)

AIRPLANES WITHOUT FANS 1 FMC INSTALLED

The Flight Management Computer System meets the requirements of AC 90-45A for an area navigation system when operated with radio updating. When operated in this configuration, the FMCS may be used for enroute and terminal area operations and RNAV approaches with the MAP display of the EHSI. In addition, the FMCS may be used in conjunction with the MAP display as a supplement to primary navigation means when conducting other types of approaches. The FMCS will provide navigation, guidance, and map display between 87 degrees North and 87 degrees South latitudes.

The FMCS may be used for vertical navigation (VNAV) for enroute and terminal area operation. VNAV operations must be predicated on use of the primary altimeter system for altitude determination.

When conducting RNAV approaches not obtained from the navigation data base, the navaid associated with the approach should be manually tuned and monitored to verify RNAV waypoint passage with RDMI radial and DME information.

AIRPLANES WITH FANS 1 FMC INSTALLED

The following FMCS demonstration*s* do not constitute operational approval.

The Flight Management Computer System (FMCS) meets the requirements of FAA Advisory Circular (AC) 25-15 for long range navigation with the following equipment operational at dispatch:
One Flight Management computer (FMC); two Hybrid Multipurpose Control Display Units (HMCDUs) or Multipurpose Control Display Units (MCDU); and two Inertial Reference Units (IRU) in NAV mode.

To meet the requirements for RNAV operations (FAA AC 20-130A, JAA AMJ 20X2) the following equipment must be operational at dispatch (unless other appropriate procedures are used):
One FMC, one CDU, one VHF Omni-directional Radio (VOR), one IRU in NAV mode, and either one Distance Measuring Equipment (DME) or Global Positioning System (GPS) (if installed).

The FMCS has been shown to meet the requirements of AC 20-130A for a multi-sensor area navigation system when operated with radio or Global Position System (GPS) updating. When operated in this configuration, the FMCS may be used for enroute, terminal area operations and instrument approach navigation (excluding ILS, LOC, LOC-BC, LDA, SDF, and MLS approach procedures). The FMCS may be used to fly a RNAV approach procedure that overlays an ILS, LOC, LOC-BC, LDA, SDF, or MLS approach procedure when the localizer facility is inoperative subject to appropriate operational considerations, procedures, constraints, and authorizations.
The FMCS will provide navigation, guidance, and map display between 87 degrees North and 87 degrees South latitude.

F L I G H T M A N A G E M E N T C O M P U T E R S Y S T E M (F M C S) (Con't.)

AIRPLANES WITH FANS 1 FMC INSTALLED (Con't.)

The FMCS has been shown to meet the requirements of AC 20-129 for vertical navigation (VNAV) for enroute, terminal area operations, and instrument approaches (excluding ILS G/S approach procedures). The FMCS may be used to fly a VNAV approach procedure that overlays an ILS glideslope approach procedure when the glideslope facility is inoperative subject to appropriate operational considerations, procedures, constraints, and authorizations.

GPS updating must be disabled for approach operations when operating outside the United States National Airspace, if the FMC database and charts are not referenced to WGS-84 reference datum, unless other appropriate procedures are used.

When using the FMCS without GPS updating to conduct a terminal area procedure or an instrument approach, active DME/DME or VOR/DME updating as appropriate for the procedure being flown should be checked to ensure correct navigation. For an instrument approach, this check should be done no later than the final approach fix. As an alternative, it is acceptable to check for correct navigation using VOR or DME data relative to a map.

For flight operations without Required Navigation Performance (RNP), the FMCS has been shown to meet the requirements of AC 20-130A for a multi-sensor area navigation system when operated with radio or Global Positioning System (GPS) updating. When operated in this configuration, the FMCS may be used for enroute, terminal area operations, and instrument approach navigation (excluding ILS, LOC, LOC-BC, LDA, SDF, and MLS approach procedures). The FMCS may be used to fly a RNAV approach procedure that overlays an ILS, LOC, LOC-BC, LDA, SDF, or MLS approach procedure when the localizer facility is inoperative subject to appropriate operational considerations, procedures, constraints, and authorizations.

F L I G H T M A N A G E M E N T C O M P U T E R S Y S T E M (F M C S) (Con't.)

REQUIRED NAVIGATIONAL PERFORMANCE (RNP) OPERATIONS

For RNP operations, the demonstrated RNP capabilities are as follows:

For FMC OP PROGRAM 3419-HNP-02C-09 and prior use the following RNP table and Boeing document:

Demonstrated RNP Flight Capability Versus Mode Of Flight		
Mode of Flight	FMC GPS Operational	FMC GPS Not Operational
LNAV with Autopilot Engaged	0.15 NM	0.28 NM
LNAV with Flight Director	0.28 NM	0.41 NM
Manual Control with MAP display only	0.52 NM	1.16 NM

The demonstrated RNP capabilities are predicated upon the assumptions, definitions, requirements and analysis in Boeing Document D926T0120-1, "757/767 FMCS RNP Navigation Capabilities, Generation 1", revision new, FAA approved version.

For FMC OP PROGRAM 3411-HNP-02C-10 use the following RNP table and Boeing document:

Demonstrated RNP Flight Capability Versus Mode Of Flight		
Mode of Flight	FMC GPS Operational	FMC GPS Not Operational
LNAV with Autopilot Engaged	0.13 NM	0.28 NM
LNAV with Flight Director	0.14 NM	0.28 NM
Manual Control with MAP display only	0.81 NM	1.16 NM

The demonstrated RNP capabilities are predicated upon the assumptions, definitions, requirements and analysis in Boeing Document D926T0120-1, "757/767 FMCS RNP Navigation Capabilities, Generation 1", revision A or later, FAA approved version.

When using the MAP on the ND for manual flight for RNP operations of 2.00 nm or less down to the minimum demonstrated RNP, using a MAP scale of 10 nm or less has been shown to assure acceptable path track performance.

RNP flight operations are subject to GPS satellite availability and/or navaid coverage for the selected route.

The FMCS has been shown to meet the primary means RNP navigation with the following equipment operational at dispatch: two FMCs; two CDUs, HMCDUs, or MCDUs; two IRUs in NAV mode; and two sensors capable of complying with the RNP.

AIRPLANES WITH AIR TRAFFIC SERVICES (ATS) INSTALLED

The FAA has approved the data link system and applications to the criteria contained in FAA Advisory Circular 20-140. This approval was based on the safety and interoperability requirements contained in FAA approved Boeing documents below:

Applicable to installation of FMC OP PROGRAM 3413-HNP-02C-03

D926T0147, “Air Traffic Services Systems Requirements and Objectives.

Applicable to installation of FMC OP PROGRAM 3414-HNP-02C-04

D926T0240, “Air Traffic Services Systems Requirements and Objectives - Generation 1”.

Applicable to installation of FMC OP PROGRAM 3415-HNP-02C-05, 3416-HNP-02C-06 or 3417-HNP-02C-07:

D926T0280, “Air Traffic Services Systems Requirements and Objectives - Generation 2”.

Applicable to installation of FMC OP PROGRAM 3418-HNP-02C-08 or later:

D926T0280-1, “757/767 Air Traffic Services Systems Requirements and Objectives – Generation 3”.

Applicable to installation of FMC OP PROGRAM 3411-HNP-02C-10 or later:

D926T0280-2, “757/767 Air Traffic Services Systems Requirements and Objectives – Generation 4”.

Note: Appendix F of the above documents covers system anomalies which may impact specific uplink and downlink operation/message content.

AIRCRAFT COMMUNICATIONS ADDRESSING & REPORTING SYSTEM (ACARS)
(if installed)

The following procedures are one means which may be used to verify Pre-Departure Clearance, Digital-Automatic Terminal Information Service, Oceanic Clearances, Weight and Balance and Takeoff Data messages transmitted over ACARS:

Pre-Departure Clearance:
The flight crew shall manually verify (compare) the filed flight plan versus the digital pre-departure clearance and shall initiate voice contact with Air Traffic Control if any question/confusion exists between the filed flight plan and the digital pre-departure clearance.

Digital-Automatic Terminal Information Service:
The flight crew shall verify that the D-ATIS altimeter setting numeric value and alpha value are identical. If the D-ATIS altimeter setting numeric value and alpha value are different, the flight crew must not accept the D-ATIS altimeter setting.

Oceanic Clearances:
The flight crew shall manually verify (compare) the filed flight plan versus the digital oceanic clearance and initiate voice contact with Air Traffic Control if any questions/confusion exists between the filed flight plan and the digital oceanic clearance.

Weight and Balance:
The flight crew shall verify that the Weight and Balance numeric and alphabetic values are identical. If the Weight and Balance numeric and alphabetic values are different, the flight crew must not accept the Weight and Balance data.

Takeoff Data:
The flight crew shall verify that the Takeoff Data numeric and alphabetic values are identical. If the Takeoff Data numeric and alphabetic values are different, the flight crew must not accept the Takeoff Data message.

OPERATION IN ICING CONDITIONS

Engine ignition is on (AUTO position).

The primary method of operating the wing anti-ice system is to operate it as a de-icing system. Ice accumulation on the cockpit front window frames, windshield center post, windshield wiper post, or side windows can be used as an indication of airframe icing conditions and the need to turn on the wing anti-ice system.

EXTENDED RANGE OPERATIONS

The type design reliability and performance of this airframe/engine combination have been evaluated in accordance with FAA Advisory Circular 120-42A and found suitable for extended range operations when configured in accordance with Boeing Document D6T11604 "CONFIGURATION, MAINTENANCE AND PROCEDURES FOR EXTENDED RANGE (ER) OPERATION". This finding does not constitute approval to conduct extended range operations.

AUXILIARY POWER UNIT

APU starts may be attempted at any altitude. APU may not start above 35,000 feet.

METRIC ALTITUDE INDICATOR (if installed)

Metric altitude indicators are for reference only and shall not be used as the primary means of altitude indication for flight operations.

REDUCED VERTICAL SEPARATION MINIMUM (RVSM)*

The type design reliability and performance of this airplane/engine combination has been evaluated in accordance with FAA Memorandum 91-RVSM, dated 14 March 1994, "Interim Guidance for Approval of Aircraft for Reduced Vertical Separation Minima (RVSM) Flight" and is qualified for operation in RVSM airspace. This finding does not constitute approval to conduct reduced vertical separation minimum operations.

* Applicable upon incorporation of Boeing Service Bulletin 767-53-0068, FUSELAGE - SECTION 41 SKINS - INITIAL QUALIFICATION OF 767 AIRPLANES FOR REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATION, or production equivalent.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS) (If installed)

Compliance with a TCAS II resolution advisory (RA) is necessary unless the pilot considers it unsafe to do so, or unless the pilot has better information about the cause of the RA and can maintain safe separation from a nearby aircraft, obvious TCAS II system failure, etc.

CAUTION: Once an RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCAS II-to-TCAS II coordination may be in progress with the intruder aircraft, and any change in vertical speed that does not comply with the RA may negate the effectiveness of the other aircraft's compliance with the RA.

NOTE: The consequences of not following an RA may result in additional RAs in which aural alert and visual annunciations may not agree with each other.

The pilot should not initiate evasive maneuvers using information from the traffic display only or on a traffic advisory (TA) only without visually sighting the traffic. These displays and advisories are intended only for assistance in visually locating the traffic and lack flight path trends necessary for use in evasive maneuvering. However, while climbing or descending, modest changes in vertical speed based on traffic display information is not considered evasive maneuvering.

Following a TCAS II "clear of conflict" advisory, the pilot should expeditiously return to the applicable ATC clearance unless otherwise directed by ATC.

All resolution advisory (RA) and traffic advisory (TA) aural messages are inhibited at a radio altitude of less than 1100 feet above ground level (AGL) climbing, and less than 900 feet AGL descending.

The following is applicable upon installation of Change 7 and later compliant TCAS computers:

All traffic advisory (TA) aural messages are inhibited at a radio altitude of less than 600 feet above ground level (AGL) climbing, and less than 400 feet AGL descending.

SECTION 3.2 - NON-NORMAL PROCEDURES

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NON-NORMAL PROCEDURES

G E N E R A L

Procedures in this section are those procedures primarily associated with system malfunctions or failures.

Use the following tabulation to determine Vref flaps 20 for use with procedures in this section. These Vref 20 speeds are ≥ 123% of the 1G stall speed in the flaps 20 configuration, providing adjustment for a desirable landing attitude. They are not the Vref speeds used to establish the performance information presented in Section 4.

GROSS WEIGHT (1000 LB)	Vref 20 (KIAS)
410	177
400	175
380	169
360	164
348	161
340	159
320	154
300	149
280	144
260	139
240	134
220	128
200	122

GROSS WEIGHT (1000 KG)	Vref 20 (KIAS)
190	179
180	174
170	168
160	162
150	157
140	152
130	146
120	140
110	134
100	128
90	121

H Y D R A U L I C S Y S T E M S

PUMP OVERHEAT

If overheat of any hydraulic pump is indicated, turn the affected pump OFF.

PUMP LOW PRESSURE

If primary pump low pressure is indicated, turn the affected pump OFF.

If a demand pump low pressure is indicated, turn that demand pump selector to ON. If low pressure is still indicated, turn the affected demand pump OFF.

SYSTEM(S) LOW PRESSURE

If any primary system low pressure is indicated, turn the affected system demand pump ON. If low pressure is still indicated, turn that system OFF. With hydraulic system(s) off or failed, airplane crosswind capability may be reduced. Alternate gear and flap extension and reduced flap setting may be required, as well as reserve brake and steering use. GPWS flap override may be required.

AUTOMATIC WHEEL BRAKES

Select autobrake setting appropriate to landing runway and stopping distance desired prior to landing. Monitor system performance and apply manual braking if required. If a system fault is indicated or if antiskid is inoperative, use manual braking.

Apply manual brakes to release the autobrakes.

E N G I N E O I L S Y S T E M

LOW OIL PRESSURE

If oil pressure is in the lower amber band and increasing thrust does not increase oil pressure, reduce thrust to minimum required. If oil pressure reaches red line, shut down the engine.

HIGH OIL PRESSURE

If oil pressure is above normal (warm oil) and the other engine indications are within limits, operate the engine normally for the remainder of the flight.

HIGH OIL TEMPERATURE

If oil temperature is in the amber band, attempt to reduce the temperature by gradually decreasing thrust. If oil temperature is in the amber band for 15 minutes or reaches the red line, shut down the engine.

OIL FILTER BYPASS

If the oil filter is bypassed and normal operation can be reestablished by reducing thrust, operate at the reduced thrust. If oil continues to bypass, shut down the engine.

E N G I N E F U E L F I L T E R *

If both EICAS advisory messages L ENG FUEL FILT and R ENG FUEL FILT are displayed, erratic engine operation and flameout may occur due to fuel system contamination.

* Applicable upon installation of EICAS computer hardware part number S242N701-901 or later.

F U E L J E T T I S O N S Y S T E M (If Installed and Activated)

When fuel jettison is complete, select fuel jettison nozzle switches OFF and fuel jettison control selector OFF.

L O W F U E L Q U A N T I T Y

If any low fuel quantity is indicated, open the crossfeed valve(s), turn on all boost pumps, and avoid high nose up attitudes and rapid acceleration.

ENGINE IN-FLIGHT START

Check altitude and airspeed.

If X-BLD is not displayed set Engine Start Selector to FLT. Then set Fuel Control Switch to RUN. Abort start if EGT fails to rise in 45 seconds.

If X-BLD is displayed set either Pack Control Selector to OFF, Isolation switch of affected side to ON, Ignition Selector to BOTH, Engine Start Selector to GND. Then when N2 exceeds minimum fuel on command bug set Fuel Control Switch to RUN. Abort Start if EGT fails to rise in 45 seconds.

FLIGHT MANAGEMENT COMPUTER (FMC) MESSAGE

If the Control Display Unit (CDU) message, "FUEL QTY ERROR--PROG 2/2", "FUEL DISAGREE--PROG 2/2" or "INSUFFICIENT FUEL" is displayed:

Compare the Fuel Quantity Indicating System (FQIS) total fuel quantity and the FMC calculated fuel remaining (based on fuel flow) with estimated fuel usage data.

If a fuel leak is suspected, turn off the center wing pumps and close the crossfeed valve(s)* (tank-to-engine fuel feed configuration). Watch for any unusual decrease in fuel tank quantity and/or a fuel imbalance to determine if fuel is being lost.

If an engine fuel leak is confirmed (either visually or by flight deck indications), shut down the affected engine to stop the leak and retain the remaining fuel. After shutdown of the affected engine, resume normal fuel management procedures. All remaining fuel can be used for the operating engine. Use FQIS to determine fuel remaining.

* if installed

ELECTRONIC ENGINE CONTROL (EEC) NORMAL MODE INOPERATIVE

If either EEC normal mode becomes inoperative and flight conditions permit, retard both thrust levers to a mid position and place both EEC switches to alternate (ALTN) mode.

ENGINE OVERHEAT

If an engine overheat is indicated, turn off that engine bleed air switch and reduce thrust until the ENG OVHT light extinguishes. If the condition cannot be corrected by reducing thrust, shut down the engine.

ENGINE INOPERATIVE LANDING

Use flaps 20 and speed Vref 20 for landing approach. Do not use autothrottles. Use flaps 5 for go-around. Override GPWS flap warning.

INADVERTENT REVERSE THRUST IN FLIGHT

If engine is inadvertently placed in reverse thrust, assure that reverse thrust lever is full down.

With no yaw, loss of airspeed, or buffet, operate engine normally.

With yaw, loss of airspeed, or buffet, shut down the affected engine. Do not extend leading edge slats. Extend trailing edge flaps to flaps 20, and fly Vref 30 + 30 knots for landing.

NON-NORMAL PROCEDURES

STABILIZER TRIM FAULT

If a stabilizer trim light illuminates, trim rate is reduced to one half. Manual trim levers or alternate trim switches (if installed) may provide full rate.

UNSCHEDULED STABILIZER TRIM

If unscheduled stabilizer trim is indicated, place the stabilizer trim cutout switches to CUTOUT and disengage the autopilot. If it can be determined which stab trim is at fault, the other stab trim can be operated normally and the appropriate autopilot engaged.

SPOILERS FAULT

If spoiler fault is indicated, spoiler capability is reduced by at least one panel. The automatic speed brake function is not affected.

RUDDER RATIO

If the rudder ratio fails, avoid large rudder inputs above 160 KIAS. Landing crosswind capability is reduced to approximately 15 knots. Use manual control for landing (flare, touchdown, and rollout).

YAW DAMPER

If either yaw damper becomes inoperative, turn that yaw damper off.

AUTOMATIC SPEED BRAKES

If a fault in the Automatic Speed Brakes system is indicated, do not arm the automatic speed brakes. Use manual speed brake deployment as required.

LEADING EDGE SLAT ASYMMETRY

CAUTION: Do not arm the alternate leading edge flaps.

If leading edge slat asymmetry occurs at flap positions greater than 20, use existing flaps and maintain V_{REF} 30 + 20 for landing. Override the GPWS flap warning.

If leading edge slat asymmetry occurs at flap position 20 or less, set the alternate flap selector to agree with flap lever, and use alternate flap system to extend the trailing edge flaps. Use trailing edge flaps 20 and V_{REF} 30 + 30 knots for landing. Override the GPWS flap warning.

TRAILING EDGE FLAP ASYMMETRY

CAUTION: Do not arm the alternate trailing edge flaps.

If trailing edge flap asymmetry occurs, override the GPWS flap warning.

Use the following speeds for landing:

Indicated flap position	Speed
5 or less	V_{REF} 30 + 30 knots
between 5 and 20	V_{REF} 30 + 20 knots
20 or greater	V_{REF} 20

F L A P / S L A T D I S A G R E E

If flap or slat position disagreement occurs at flap positions greater than 20, use existing flaps for landing and speed V_{REF} 20. Override the GPWS flap warning.

If flap or slat position disagreement occurs at flap positions 20 or less, set alternate flaps selector to agree with flap lever, set the alternate flap switches to ALTN, and extend/retract flaps with the alternate flap selector. Maximum airspeed with slats extended in the alternate mode is 210 knots prior to incorporation of Boeing Service Bulletin 767-27-0108, "FLIGHT CONTROLS - LEADING EDGE SLATS AND TRAILING EDGE FLAPS - HIGH LIFT SYSTEM - PRESSURE SWITCH INSTALLATION, WIRING ADDITION AND RVDT CHANGE", or production equivalent.

CAUTION: If leading edge or trailing edge light is illuminated, position the respective alternate flaps switch off and accomplish the applicable asymmetry procedure.

For landing, use flaps 20 and speed V_{REF} 20. Override the GPWS flap warning.

F L A P L O A D R E L I E F

If a flap load relief fault is indicated, note flap position and maintain appropriate speed.

A L T E R N A T E L A N D I N G G E A R E X T E N S I O N

For alternate landing gear extension, place landing gear lever to OFF and place alternate gear extension switch to DN. When gear is down, position landing gear lever to DN to agree with gear position.

W I N D O W H E A T

Turn window heat on prior to takeoff and operate throughout flight. If window heat fails in flight, cycle the window heat switch OFF for 10 seconds, then back ON. If the window heat will not reset, turn the heater OFF.

If a window fault such as cracking, delamination, shattering, or arcing occurs, shut off the heat to that window.

E Q U I P M E N T C O O L I N G S Y S T E M

If a smoke condition is indicated, select OV_RD.

If an overheat condition is indicated, select STBY.

If an overheat condition reoccurs, select OV_RD.

With EQUIPMENT COOLING MONITOR (visual indicator or pressure switches) installed:

Avionics and electrical equipment will continue to be adequately cooled.

Without EQUIPMENT COOLING MONITOR (visual indicator or pressure switches) installed:

If all equipment cooling is lost, avionics and electrical equipment not on standby buses are subject to failure. Avionics and electrical equipment on standby buses are reliable for 90 minutes. Continued flight beyond 90 minutes can result in loss of avionics and electrical equipment.

G R O U N D P R O X I M I T Y W A R N I N G S Y S T E M (G P W S)

When a ground proximity warning occurs, aggressively pull up, apply engine thrust and climb until the warning ceases or clear of terrain.

When a ground proximity caution occurs, correct the flight path/configuration so that the alert ceases.

The Ground Proximity Warning System (GPWS) Mode 4 function may be deactivated to prevent nuisance warnings when following approved procedures which specify landing with flaps not in normal landing position or landing gear up.

SECTION 4 - PERFORMANCE

Section 4 of this manual contains performance information. It is divided into subsections dealing with specific subjects and flight regimes. Each subsection contains text which describes the various procedures and charts in that subsection. A separate appendix illustrates the use of the charts. It gives the user examples to gain familiarity with the Airplane Flight Manual and to understand the chart reading procedures.

The subsections are as follows:

Subsection	Title
4	Performance
4.1	General
4.2	Engine Data
4.3	Runway Length Corrections
4.4	Field Length Limits
4.5	Takeoff Climb Limits
4.6	Tire Speed Limits
4.7	Takeoff Speeds
4.8	$V_{1(MCG)}$ Limited Takeoff
4.9	Obstacle Clearance
4.10	Improved Climb Performance
4.11	Enroute Climb
4.12	Approach and Landing Climb
4.13	Landing Field Length and Speed

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SECTION 4.1 - GENERAL

C O N T E N T S

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

REGULATORY COMPLIANCE

The information in this section is presented in compliance with the requirements of FAR Part 25, paragraph 25.1581 and FAR Part 36.

STANDARD PERFORMANCE CONDITIONS

All performance in this section is based on the following:

1. Approved engine thrust ratings less installation, airbleed, and accessory losses.

2. Trailing edge flap positions as follows:

	Trailing Edge Flaps
Takeoff	5, 15, 20
Enroute	0
Approach	20
Landing	25, 30
Category IIIb Landing	25, 30

3. Leading edge devices in the appropriate position for trailing edge flap position.

4. Full temperature accountability within the operational limits, except for landing distance, which is based on standard day temperatures.

5. Wind corrections are calculated using not more than 50% of actual headwinds, or not less than 150% of actual tailwinds, in compliance with relevant operating regulations unless otherwise noted. All charts should be entered with actual tower-reported wind components. Tower winds are assumed to be measured at 10 meters (32.8 feet).

6. Humidity has no appreciable effect on the thrust of the engines; therefore, it has not been considered in the performance data.

GENERAL

PERFORMANCE CONFIGURATION

The airplane configuration associated with the performance data in this manual is shown below. Performance conditions not shown below are on the appropriate charts.

	THRUST	FLAPS	GEAR
TAKEOFF	Takeoff on all operating engines.	Takeoff setting. Noted on chart.	Down
1ST SEGMENT CLIMB	Takeoff on operating engine (1)	Same as takeoff.	Down
2ND SEGMENT CLIMB	Same as 1st segment.	Same as takeoff.	Up
3RD SEGMENT	Same as 1st segment.	Takeoff setting to flaps up, according to schedule.	Up
FINAL TAKEOFF CLIMB	Maximum continuous on operating engine (1).	Up	Up
ENROUTE CLIMB	Maximum continuous on operating engine (1)	Up	Up
APPROACH CLIMB	Takeoff on operating engine (1).	Approach setting. Noted on chart.	Up
LANDING CLIMB	Maximum available in 8 seconds on all engines.	Landing setting. Noted on chart.	Down
LANDING	Idle on all engines at touchdown.	Landing setting. Noted on chart.	Down

Antiskid is on for takeoff and landing unless antiskid inoperative braking performance is scheduled.

Corrections are shown on appropriate charts for one brake deactivated (antiskid operative).

Automatic speed brake extension system operative landing performance is scheduled except when automatic speed brakes are inoperative and manual speed brake landing performance is scheduled.

The left and right pneumatic isolation valves are closed except for enroute and approach climb when wing anti-ice is ON.

S199901

P E R F O R M A N C E C O N F I G U R A T I O N (Continued)

Performance is applicable to both APU ON and OFF.

Performance is applicable to both Electronic Engine Control (EEC) operative and inoperative.

Corrections are shown on appropriate charts for anti-ice ON. Anti-ice is OFF when OAT is greater than 10°C (50°F).

If a primary ice detection and activation system is installed:

WING ANTI-ICE PERFORMANCE CORRECTIONS

With the wing anti-ice selector in the AUTO position, wing anti-ice performance corrections must be applied. For certain powersettings and atmospheric and flight conditions, the Thrust Management Computer (TMC) may also decrement target N1.

ENGINE ANTI-ICE PERFORMANCE CORRECTIONS

With the engine anti-ice selector in the AUTO position, engine anti-ice performance corrections must be applied. For certain powersettings and atmospheric and flight conditions, the Thrust Management Computer (TMC) may also decrement target N1.

S19904

GENERAL

P E R F O R M A N C E C O N F I G U R A T I O N (Continued)

Throughout the takeoff flight path, and during approach and landing, performance charts are shown for A/C packs on or A/C packs off. The A/C pack off designation means no engine airbleed is used for Air Conditioning.

The effect of anti-icing systems operation is shown on applicable charts.

D E F I N I T I O N S

AIRSPEEDS

All airspeeds and Mach values in this manual are based on the primary static source position error and assume zero instrument error.

Static Source Position error, ΔV_p, is the error due to the location of the static port within the airplane pressure field.

Indicated Airspeed, V_I, IAS - Airspeed indicator reading, as installed in the airplane, uncorrected for static source position error (assumes zero instrument error).

Calibrated Airspeed, V_C, CAS - Indicated airspeed corrected for static source position error ($V_C = V_I + \Delta V_p$).

Equivalent Airspeed, V_e, EAS - Calibrated airspeed corrected for compressibility ($V_e = V_C - \Delta V_C$).

True Airspeed, V_T, TAS - Equivalent airspeed corrected for atmospheric density effects ($V_T = V_e/\sqrt{\sigma}$).

True Mach Number, M - Machmeter reading, as installed in the airplane, corrected for static source position error.

Critical Engine Failure Speed, VEF - The speed at which, if the most critical engine fails, the engine failure is recognized at Vl, 1 second later.

Takeoff Decision Speed, Vl - Following a failure of the critical engine at V_{EF}, the speed from which a decision to continue the takeoff results in a takeoff distance to a height of 35 feet at V_2 speed that will not exceed the usable takeoff distance and the speed from which a decision to bring the airplane to a full stop will not exceed the accelerate-stop distance available. Vl must not be less than the minimum V_1 for control on the ground, $V_{1(MCG)}$, or greater than the rotation speed, V_R, or greater than the maximum brake energy speed, V_{MBE}.

Rotation Speed, VR - The speed at which rotation from the three-point attitude to the takeoff attitude is initiated.

S19907

GENERAL

D E F I N I T I O N S

AIRSPEEDS (Continued)

Takeoff Decision Speed Ratio, V1/VR - The ratio of the takeoff decision speed, V1, to the rotation speed, VR.

Maximum Brake Energy Speed, VMBE - The highest takeoff decision speed from which the airplane may be brought to a stop without exceeding the maximum energy absorption capability of the brakes. Maximum Brake Energy Speed is compared in takeoff planning to V1 speed.

Takeoff Safety Speed, V2 - The target speed to be attained at the 35 foot height, assuming recognition of an engine failure at or after V1. This speed must be at least 1.13 times the 1G stall speed in the takeoff configuration.

Air Minimum Control Speed, VMCA - The minimum flight speed at which the airplane is controllable with a maximum of 5 degrees bank when the critical engine suddenly becomes inoperative with the remaining engine at takeoff thrust.

Minimum V_1 for Control on the Ground, $V_{1(MCG)}$ - The minimum takeoff decision speed, V_1, at which, when the critical engine suddenly becomes inoperative at V_{EF} with the remaining engine at takeoff thrust, it is possible to control the airplane with primary aerodynamic controls alone and continue the takeoff.

Landing Speed - The minimum speed at the 50 foot height in a normal landing. This speed must be at least 1.23 times the 1G stall speed in the landing configuration.

Reference Speed, VREF - This speed is equal to the landing speed in the flaps 30 landing configuration.

Design Maneuvering Speed, VA - The maximum speed at which application of full available aileron, rudder or elevator will not overstress the airplane.

TEMPERATURE

ISA - International Standard Atmosphere, as accepted by the International Civil Aviation Organization.

OAT - Outside Air Temperature - the free air static (ambient) temperature.

SAT - Static Air Temperature - outside air (ambient) temperature as computed from TAT (see temperature conversion chart this section).

TAT - Total Air Temperature - static air temperature plus adiabatic compression (ram) rise as indicated on the Total Air Temperature indicator.

S19993

SECTION 4.1 - GENERAL

D E F I N I T I O N S (Continued)

WIND

Wind Velocity - The actual wind velocity at a 10 meter height reported from the tower and corrected by the wind component chart to a headwind or tailwind component parallel to the flight path.

TAKEOFF PATH

The takeoff path assumes failure of the most critical engine at VEF and extends from a standing start to a point where the airplane is at least 1,500 feet above the takeoff surface and has achieved the enroute configuration and final climb speed.

The performance charts divide the takeoff path into segments representing distinct changes in airplane configuration, airspeed, and engine thrust as defined below. Some of these definitions are abbreviated versions of those appearing in FAR Parts 1 and 25; the appropriate regulations should be consulted for complete details.

Clearway - An obstacle-free area beyond the takeoff runway which can be used as a part of the takeoff distance available.

Stopway - An area beyond the takeoff runway capable of supporting the airplane in an aborted takeoff which can be used as part of the accelerate-stop distance available. To be applicable for use with this manual, the surface characteristics of the stopway must not differ substantially from those of the runway.

Takeoff Distance Required - The greater of: (1) the distance to takeoff and climb to a height of 35 feet with a failure of the critical engine at VEF, or (2) 115 percent of the distance to takeoff and climb to a height of 35 feet with all engines operating.

GENERAL

D E F I N I T I O N S

TAKEOFF PATH (Continued)

Takeoff Run Required - The greater of: (1) the distance to takeoff and climb to a point equidistant between lift off and the 35 foot height point with a failure of the critical engine at VEF, or (2) 115 percent of the distance to takeoff and climb to a point equidistant between lift off and the 35 foot height point with all engines operating.

Accelerate-Stop Distance Required - The sum of the distances required to: (1) accelerate with all engines operating, and (2) come to a complete stop assuming a critical engine failure at VEF.

TAKEOFF FLIGHT PATH

The takeoff flight path begins 35 feet above the takeoff surface at the end of the takeoff distance and extends to a point where the airplane is at least 1500 feet above the takeoff surface and has achieved the enroute configuration and final climb speed.

Climb Gradient - The ratio, expressed as a percentage, of the change in geometric height divided by the horizontal distance travelled in a given time. Gross gradient is the actual calculated performance of the airplane under specified conditions, while Net gradient is the gross gradient reduced by an increment specified in the regulations.

Gross Height - The geometric height attained at any point in the takeoff flight path using gross climb performance. Gross height is used for calculating actual pressure altitude at which obstacle clearance procedures and wing flap retraction are initiated, and level-off height scheduled.

Net Height - The geometric height attained at any point in the takeoff flight path using net climb performance. Net height is used to determine the net flight path which must clear any obstacle by at least 35 feet to comply with the regulations.

Reference Zero - A point on the runway or clearway plane at the end of the takeoff distance and 35 feet below the flight path to which the height and distance coordinates of other points in the takeoff flight path are referred.

First Segment - Extends from the end of the takeoff distance to the point where the landing gear is assumed to be fully retracted, using takeoff thrust and takeoff flaps at a constant V2 speed.

Second Segment - Extends from the gear up point to a gross height of at least 400 feet, using takeoff thrust and takeoff flaps at a constant V2 speed.

S20047

D E F I N I T I O N S (Continued)

TAKEOFF FLIGHT PATH (Continued)

Third Segment - The horizontal distance required to accelerate, at constant altitude using takeoff thrust, to the final climb speed while retracting flaps in accordance with the recommended speed schedule.

Maximum Level-Off Height - The maximum height at which the third segment can be completed before the time limit on the use of takeoff thrust expires.

Final Takeoff Segment - Extends from the end of the third segment to a gross height of at least 1,500 feet, with flaps up, maximum continuous thrust and at final climb speed.

M A X I M U M C R O S S W I N D C O M P O N E N T

The maximum demonstrated crosswind component for takeoff and landing on dry runways is 33 knots reported wind at a 10 meter height. This crosswind value is not considered to be limiting on a dry runway with all engines operating.

B U F F E T O N S E T C H A R A C T E R I S T I C S

Buffet onset occurs when the airflow starts to separate from the wing. This characteristic is a function of angle of attack and Mach number.

From the Cruise Maneuvering Capability chart it is possible to determine the altitude, low-speed, high-speed, and maneuvering margins before the buffet onset occurs.

A N T I - S K I D I N O P E R A T I V E T A K E O F F P E R F O R M A N C E

With the anti-skid system inoperative, the allowable takeoff weight determined from Section 4.4 must be reduced by the following adjustments:

Actual Runway Length - FT	Takeoff Gross Weight Adjustment
8,200 or less	52,800 LB (23,949 KG)
8,500	44,800 LB (20,320 KG)
8,800	36,800 LB (16,692 KG)
9,100	28,800 LB (13,063 KG)
9,400	20,800 LB (9,434 KG)
9,700	12,800 LB (5,805 KG)
10,000	4,800 LB (2,177 KG)
10,200 or greater	0 LB (0 KG)

S20059

GENERAL

PERFORMANCE CONDITIONS AND PROCEDURES

The conditions and procedures used in establishing the performance data in this manual are presented for each phase of operation. Airplane configuration and engine thrust settings are shown under Performance Configuration. These procedures include only the essential steps which affect airplane performance, and should be considered as guidance material from which more complete operational procedures can be developed.

TAKEOFF

CONDITIONS

Takeoff field length performance shown accounts for the greater of: (1) 115 percent of the all-engines operating distance, or (2) the engine inoperative distance, considering a failure of the critical engine at VEF. These distances are based on a smooth, dry, hard-surfaced runway.

PROCEDURES

Prior to takeoff, review stabilizer, flap and N1 settings, takeoff speeds, and ascertain that sufficient performance is available for the gross weight and ambient conditions. Apply corrections when necessary for significantly altered ambient conditions or loading.

Set 70% N1 prior to brake release or as the airplane is aligned with the runway. As the airplane accelerates, advance the thrust levers to the takeoff N1 setting. Readjust thrust levers, if necessary, prior to 80 knots to obtain target N1. Do not make further adjustments after 80 knots.

Use rudder pedals for directional control through the nose wheel and rudder.

Initiate rotation to takeoff attitude at VR. A speed not less than V2 should be obtained at a height of 35 feet. Retract the landing gear after a positive rate of climb has been established.

Make a smooth positive rotation to the initial climb attitude (approximately 13 to 20 degrees depending upon gross weight and thrust available). Climb after engine failure results in approximately 3 to 6 degrees lower attitude than all engine climb. Make minor attitude variations after liftoff to achieve the initial climb speed.

NOTE: With center of gravity at or near the aft limit, maintain forward pressure on the control column to approximately 80 knots to increase nose wheel steering effectiveness.

S20644

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

REFUSED TAKEOFF

CONDITIONS

Calculated accelerate-stop distances account for demonstrated recognition and reaction times, plus additional time delays.

Antiskid Operative distances are valid with RTO Automatic Wheel Brakes either on or off.

Reverse thrust was not used in calculating these distances.

PROCEDURES

Initiate refused takeoffs at or prior to V1 using the following procedures:

Antiskid Operative

Simultaneously close thrust levers and apply maximum manual wheel braking or verify operation of RTO Automatic Wheel Braking. Raise the speedbrakes.

Antiskid Inoperative

Close thrust levers and raise the speedbrakes. Initiate wheel braking using very light pedal pressure and increase as groundspeed decreases.

GENERAL

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

CLIMB-OUT (1 or 2 Engines)

CONDITIONS

Climb gradient and obstacle clearance flight path performance are based on failure of the most critical engine at VEF.

PROCEDURES

Maintain takeoff flap setting and a speed not less than V2 to the height selected for initiation of flap retraction.

Retract flaps according to the Flap Retraction Speed Schedule, in this section.

Follow enroute procedures after all takeoff flight path obstacles have been cleared or after climbing to at least 1,500 feet above runway elevation.

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

OBSTACLE CLEARANCE

PROCEDURES

When engine failure occurs prior to V_2, and the takeoff weight is obstacle limited, maintain V_2 up to the gross height required for obstacle clearance.

If an engine failure occurs after V_2, maintain speed at engine failure (V_2 + 15 knots maximum) up to the gross height required for obstacle clearance.

When the height selected for initiation of flap retraction is limited due to distant-obstacle considerations, initiate flap retraction and accelerate to final takeoff climb speed while maintaining constant altitude and initial takeoff thrust setting.

Continue final takeoff climb to 1,500 feet above runway elevation, or to the minimum gross height required for obstacle clearance, at final takeoff climb speed and maximum continuous thrust.

NOTES: If an engine failure occurs, the airplane should be leveled off, and flaps retracted at the selected level-off height, only if the limiting obstacle is beyond the Third Segment.

The height selected for initiation of flap retraction may be limited by available performance as described under Takeoff Flight Path. Vertical clearance of either close-in or distant obstacles in the intended flight path must be established by reference to the appropriate obstacle clearance charts.

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

LANDING FIELD LENGTH

CONDITIONS

All landing field lengths shown in this manual are based on standard day temperatures on a smooth, level, hard-surfaced runway. Dry non-autoland field lengths (Section 4.13) are maximum performance landing distances, from a 50 foot height at landing speed, divided by a factor of 0.6. Scheduled WET landing field lengths are determined by multiplying the scheduled DRY landing field lengths by a factor of 1.15. Reverse thrust was not used in establishing these distances. Autoland field lengths are based on the runway field length requirements of AC 120-28C (May 1982 draft).

PROCEDURES

Close thrust levers to idle on all engines at or prior to touchdown.

Antiskid Operative

Raise speedbrakes at touchdown and apply wheel braking.

Antiskid Inoperative

Raise speedbrakes at touchdown. Initiate wheel braking using very light pedal pressure and increase as groundspeed decreases.

S20655

GENERAL

F L A P R E T R A C T I O N S P E E D S C H E D U L E

Maximum level-off heights, Third Segment distances and Final Segment climb performance shown in this manual are based upon retracting the wing flaps during Third Segment acceleration using the schedule below. This schedule is recommended for all flap retraction operations.

During acceleration, select flap positions at the following initiation speeds:

FLAP POSITION	INITIATION SPEED, KNOTS	SELECT FLAP POSITION
20/15	V_{REF} + 20	5
5	V_{REF} + 40	1
1	V_{REF} + 60	0

Final Segment Climb Speed: V_{REF} + 80 KNOTS.

V_{REF} is the reference speed at the scheduled takeoff gross weight (Section 4.7).

When flaps are being retracted at a constant altitude, begin climbing when V_{REF} + 80 knots is achieved, maintaining takeoff thrust setting until flaps are completely retracted.

S20660

GENERAL

TAKEOFF WEIGHT DETERMINATION PROCEDURE

INTRODUCTION

The charts in this manual allow the determination of the maximum takeoff gross weight permitted by the applicable Federal Aviation Regulations (FAR) and the associated takeoff speeds and flight paths for any combination of atmospheric and airport variables. Limitations on takeoff gross weight can be divided into four basic categories: Field Length Limited, Climb Limited, Tire Speed Limited, and Obstacle Limited Gross Weight. A brief discussion of these limitations will give a better understanding of the use of the charts and define the variables involved.

FIELD LENGTH LIMITED PERFORMANCE

The takeoff gross weight is field length limited when the field length required by the FAR is equal to the field length available. The field length required under FAR Part 25 considers both the all-engines-operative and the critical-engine-inoperative cases. The field length to be considered in the all-engines-operative case is defined as the actual takeoff distance to a height of 35 feet multiplied by the factor 1.15. In the critical-engine-inoperative case, the field length required is the greater of the accelerate-go and accelerate-stop distances. These two distances are related by Vl, the takeoff decision speed. By selecting V_1 so that the accelerate-go and the accelerate-stop distances are each equal to the distances available, the resulting takeoff weight is maximized for a particular runway situation. At most airports, the field length available is synonymous with the actual length of the runway; but it may also include clearway, stopway or a combination of both. Clearway is defined as an area extending beyond the end of the runway above which no part of the terrain protrudes. Up to one-half of the air distance may extend over a clearway. A stopway is an area extending beyond the end of the runway which may be used in decelerating the airplane during a refused takeoff (accelerate-stop) and, therefore, must be capable of supporting the airplane without causing structural damage.

CLIMB LIMITED PERFORMANCE

Takeoff weight becomes climb limited when the available climb gradient equals the minimum gradient specified by the FAR. Minimum gradients are defined for the first, second, and final segments of the takeoff flight path; however, the second segment is generally the most limiting on the 767. At climb limited takeoff weight the 2.4% gradient requirement is met at the gear-up height. This performance should not be confused with the takeoff climb gradient at 400 feet gross height which is used as a reference gradient for Obstacle Clearance calculations.

S20663

GENERAL

TAKEOFF WEIGHT DETERMINATION PROCEDURE (Continued)

TIRE SPEED LIMITED PERFORMANCE

The takeoff weight becomes tire speed limited if the weight determined from the Tire Speed Limits chart, Section 4.6, is lower than that determined from all other requirements. When this occurs, the resulting liftoff speed just equals a true ground speed limitation on the tires.

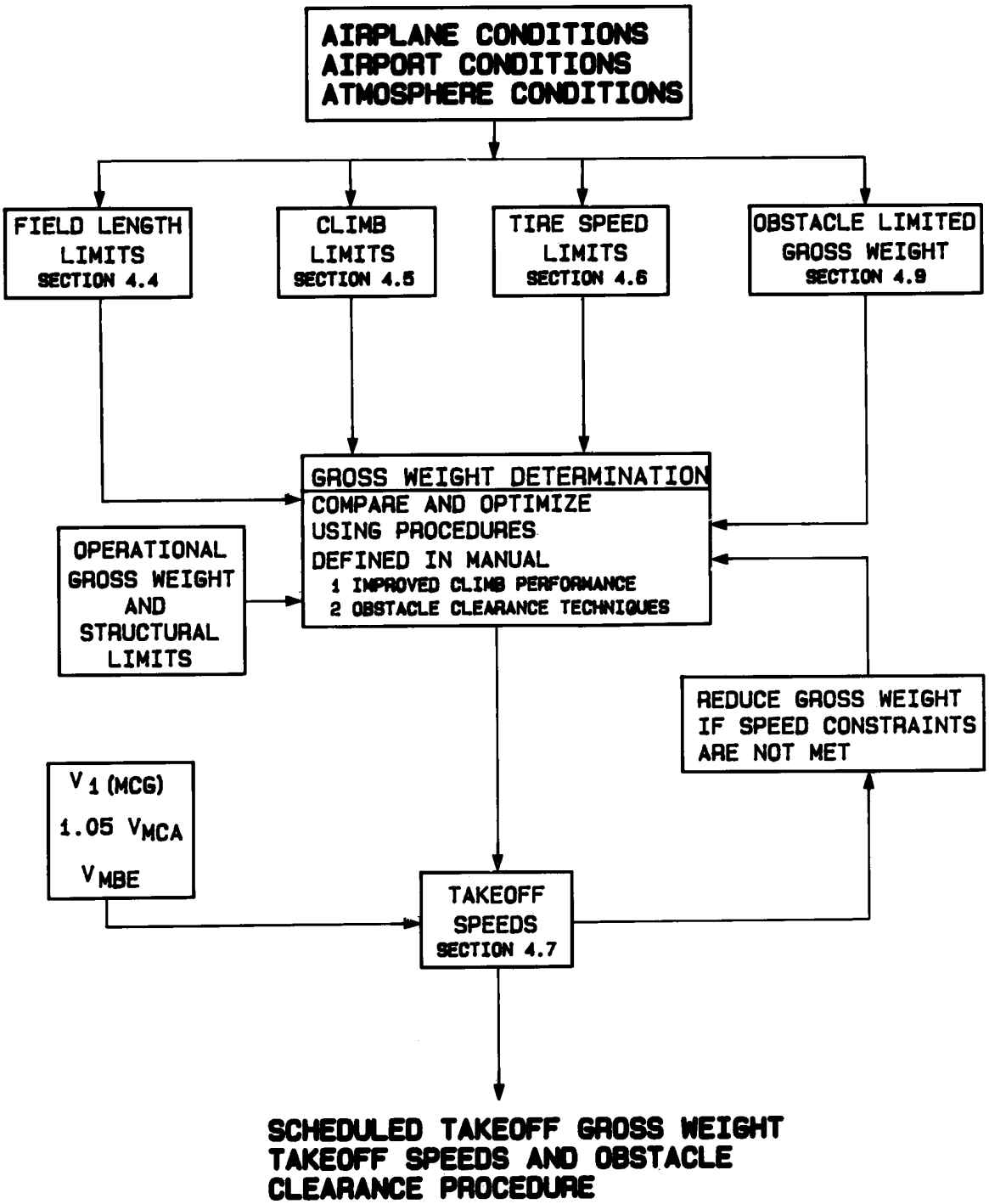
OBSTACLE CLEARANCE LIMITED PERFORMANCE

The takeoff gross weight becomes obstacle limited when the net takeoff flight path just clears an obstacle by the required 35 feet. The takeoff flight path is the calculated height versus distance relationship beginning at the point where the airplane achieves a height of 35 feet. The critical engine is assumed inoperative. The flight path extends to a point where a gross height of 1,500 feet has been attained, and the transition to the enroute configuration is completed unless a distant obstacle requires an extension of the net flight path. The gross or actual flight path is used to determine the actual height at the transition from one segment to another. Net flight path is the gross path reduced by 0.8 percent gradient capability, and the regulations require that the net flight path minus 35 feet be used to demonstrate vertical obstacle clearance.

TAKEOFF WEIGHT DETERMINATION PROCEDURE FLOW DIAGRAM

The flow diagram following shows in simplified steps a procedure to determine the scheduled takeoff gross weight and associated speeds for a given set of airplane, airport, and atmospheric conditions. Basically, the scheduled takeoff gross weight cannot exceed any of the gross weight limits as defined in the flight manual and the corresponding speeds must not violate any of the speed limitations. Any combination of takeoff gross weight and takeoff speeds that meet these two criteria is acceptable to be scheduled for takeoff. The more detailed procedures are defined in the appropriate sections of the manual and numerical examples appear in the example problem appendix.

TAKEOFF WEIGHT DETERMINATION PROCEDURE

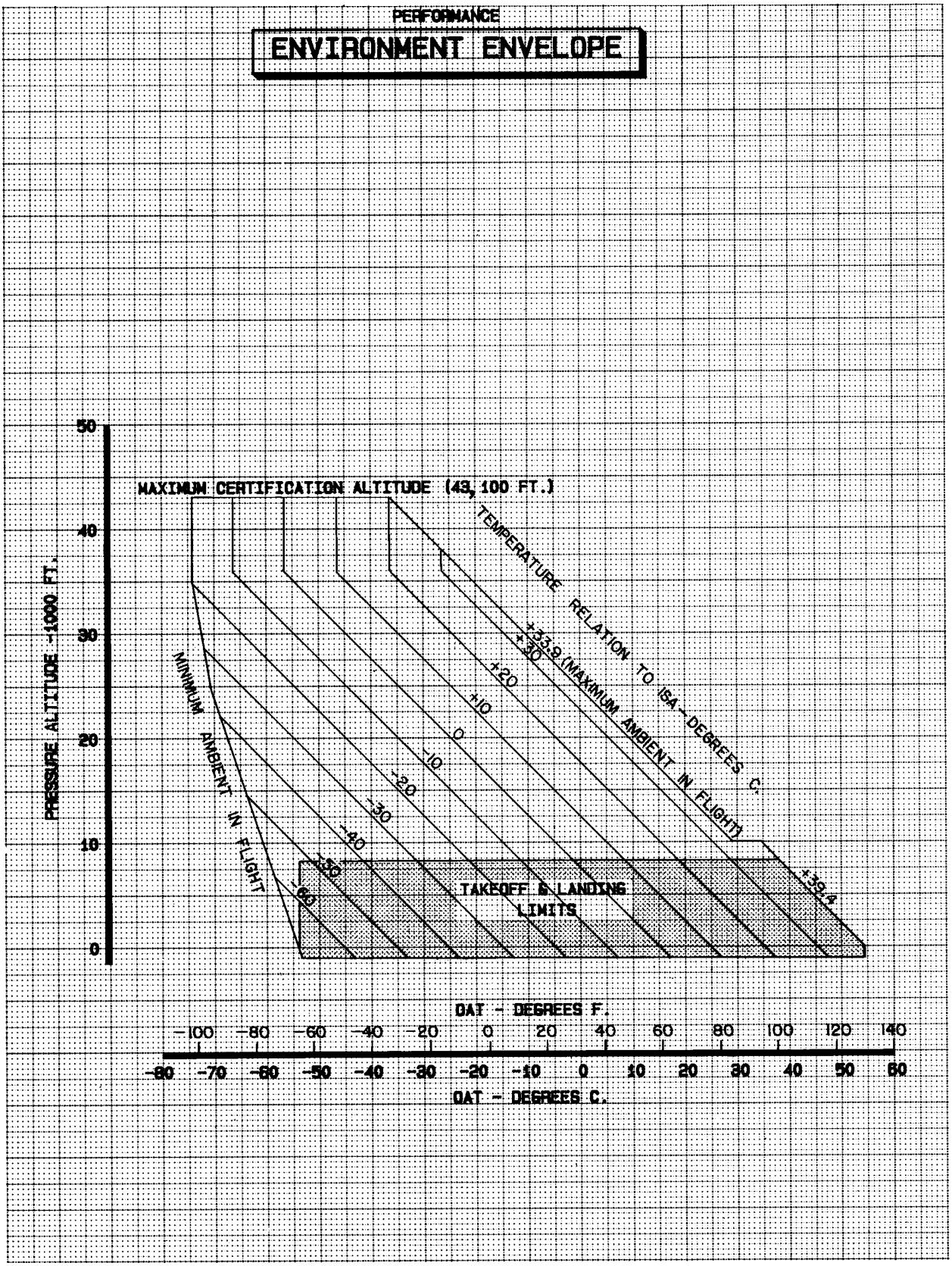


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PERFORMANCE

ENVIRONMENT ENVELOPE



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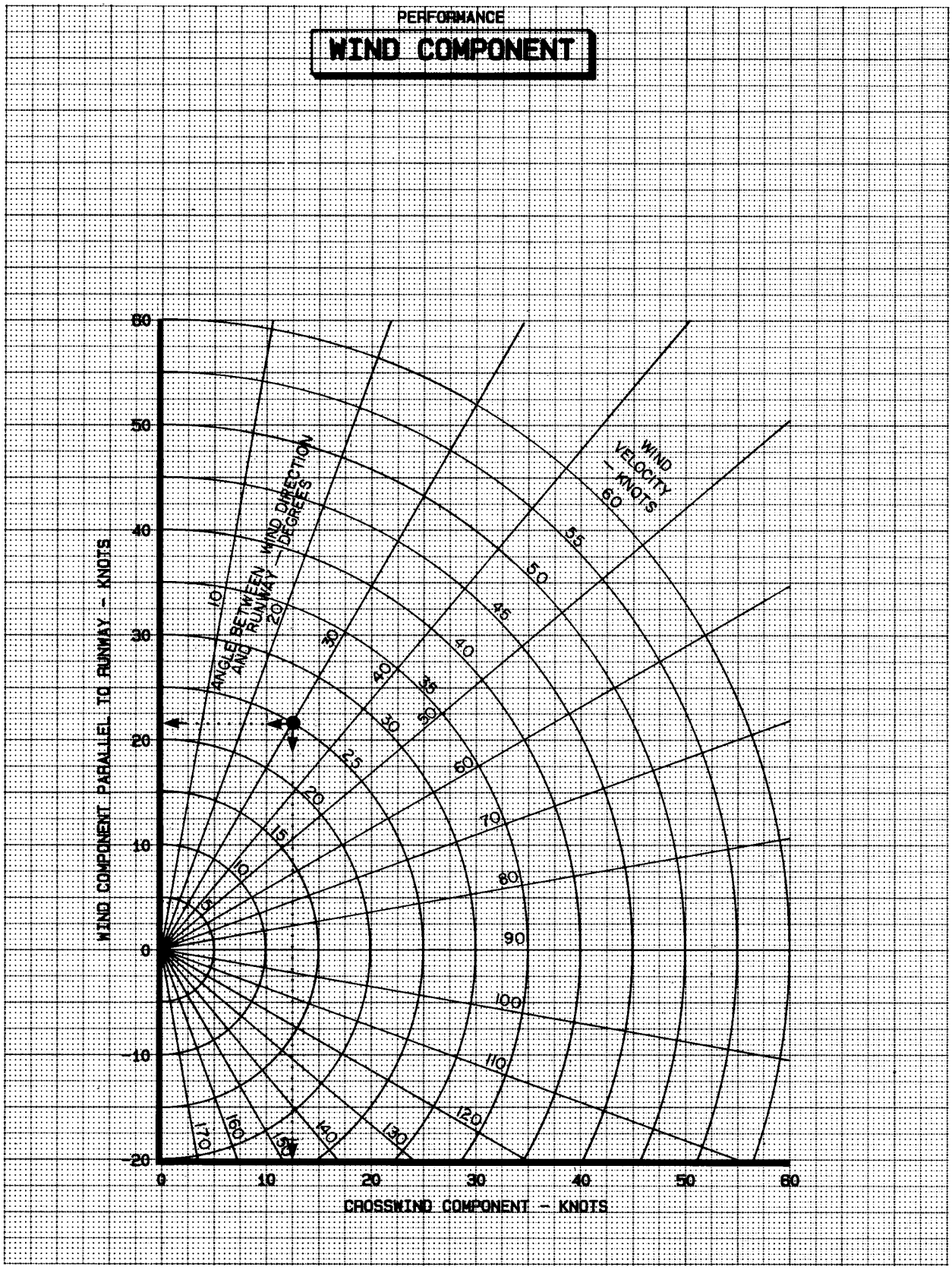
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S28663

PERFORMANCE

WIND COMPONENT



P.C. 6S000082
D041T505 PG 4.1-20

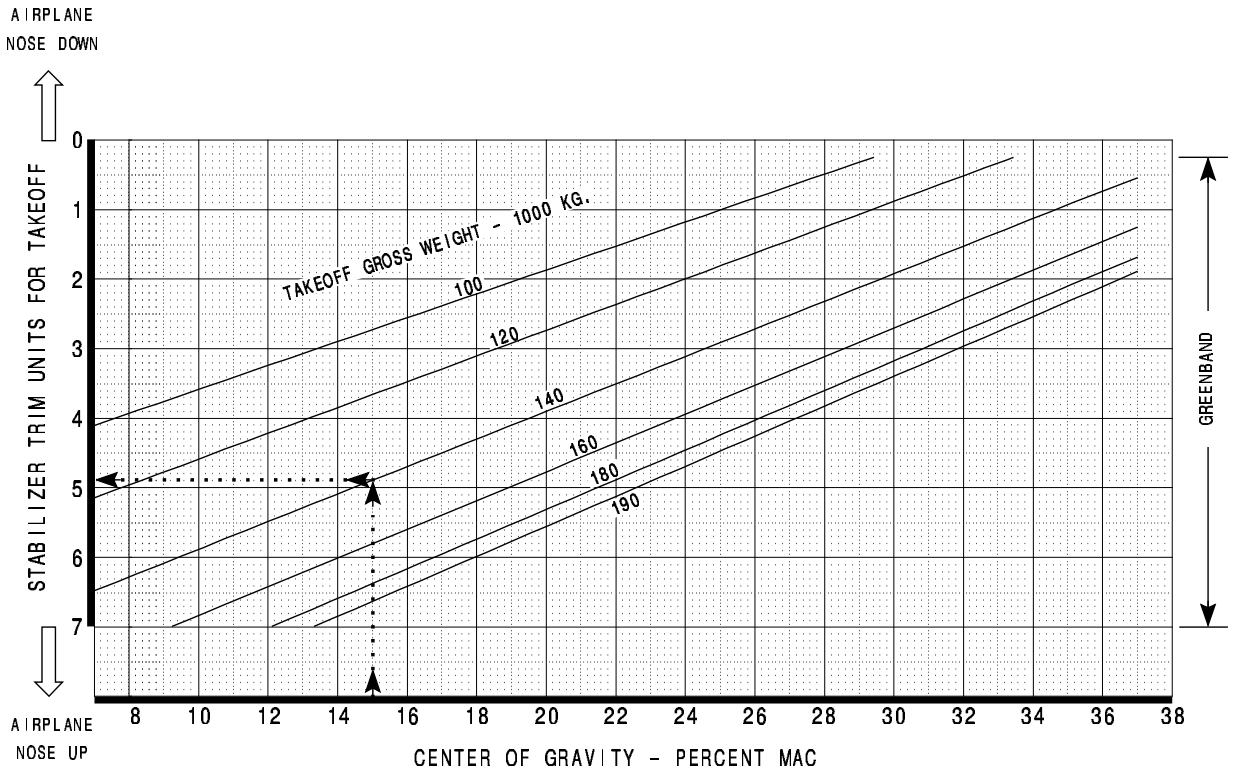
BOWKER	APPROVED	DATE
767-200/300	R. Sugawara NM234	7.1.82
	C.S. Tilli NM364	8.4.86

S28666

RECOMMENDED TAKEOFF STABILIZER SETTING

FLAPS 5, 15, 20

- SET STABILIZER FOR TAKEOFF CENTER OF GRAVITY DETERMINED BY CALCULATED OR GRAPHICAL METHOD.



P.C. d600121003	
D041T513-1	PG. 4.1-21

R. OSWALD	APPROVED	DATE
767-300ER	V.HILL	10-04-00
CF6-80C2B4/B4F /B6/B6F/B7/B7F		

POSITION CORRECTIONS - PRIMARY STATIC SOURCE

Position corrections for speed and altitude using the primary static source are negligible. Existing minor corrections are incorporated into the performance charts where appropriate and further corrections are unnecessary.

PERFORMANCE

POSITION CORRECTIONS

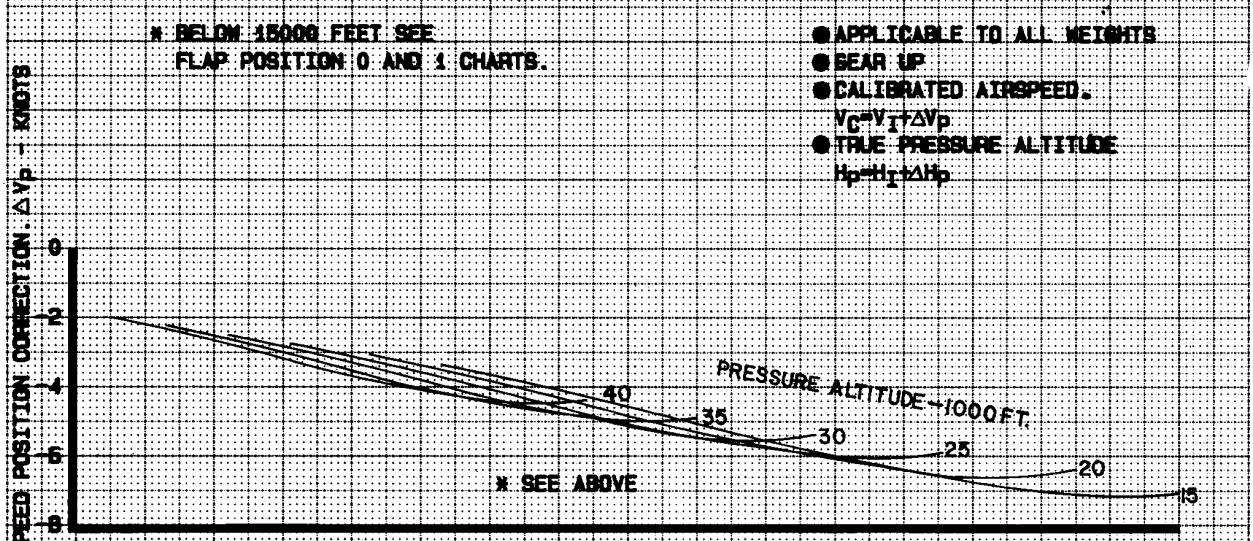
FLAPS UP

ALTERNATE STATIC SOURCE

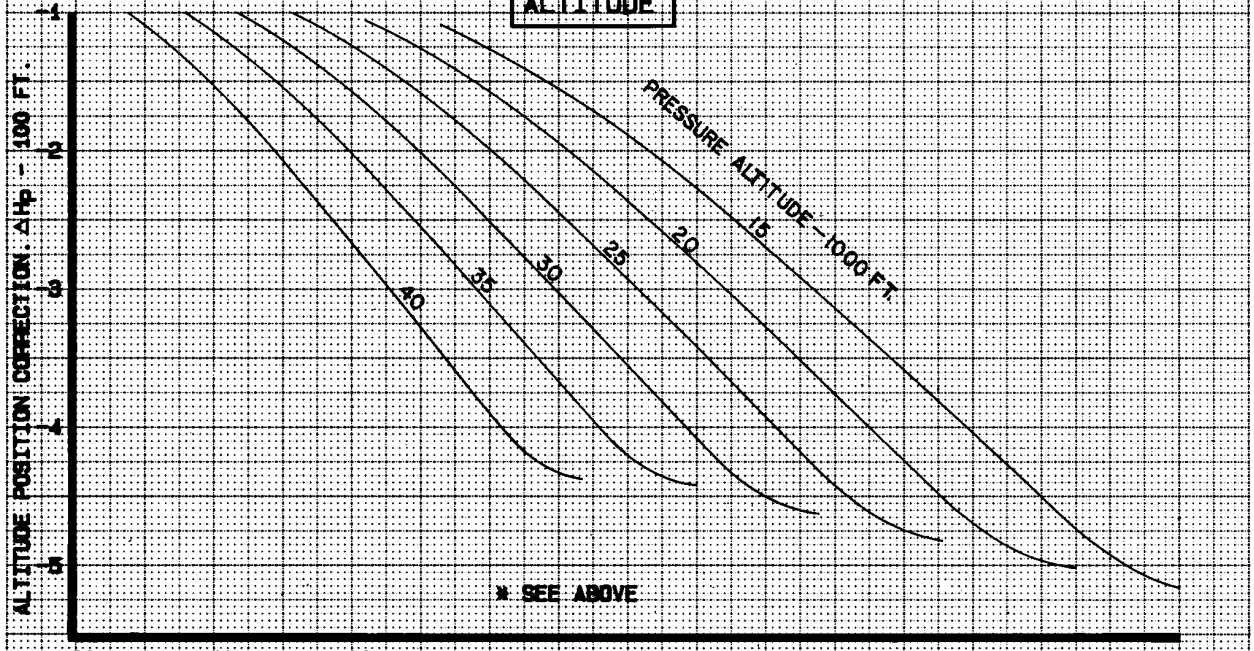
AIRSPEED

* BELOW 15000 FEET SEE FLAP POSITION 0 AND 1 CHARTS.

- APPLICABLE TO ALL WEIGHTS
- GEAR UP
- CALIBRATED AIRSPEED. $V_C = V_I + \Delta V_p$
- TRUE PRESSURE ALTITUDE $H_p = H_I + \Delta H_p$



ALTITUDE



P.C. 85000540	
D041T505	PG.4.1-23

McCONVILLE 767-300	APPROVED	DATE
	C.S.III: WHW	8-4-86

6E6207

S28686

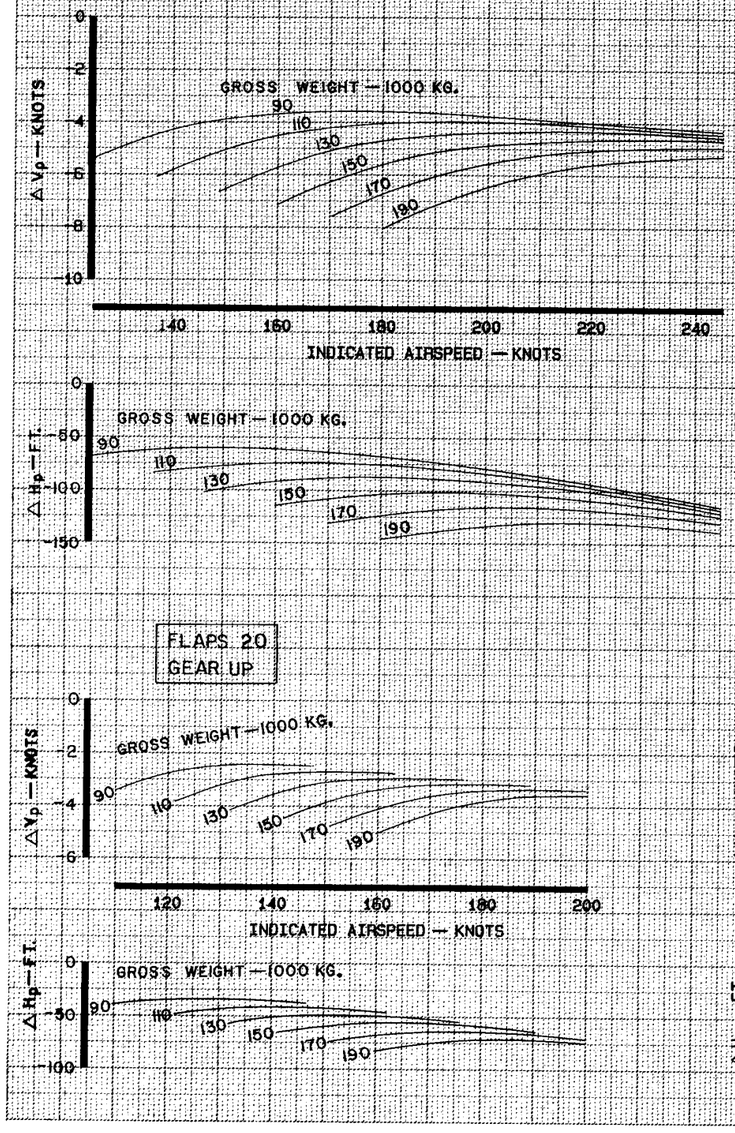
PERFORMANCE

POSITION CORRECTIONS

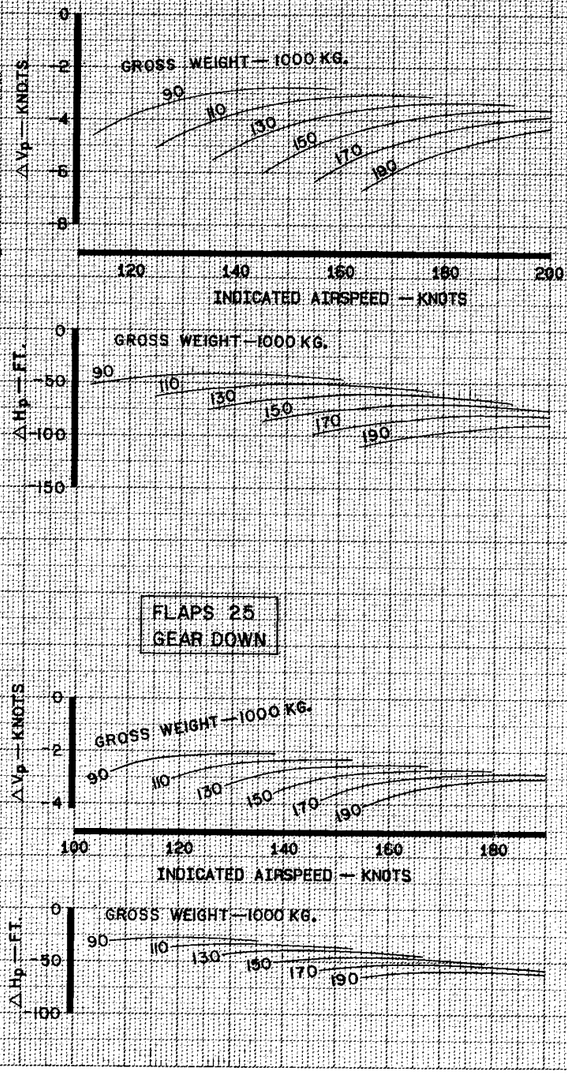
ALTERNATE STATIC SOURCE

- CALIBRATED AIRSPEED
  $V_C = V_I + \Delta V_p$
- TRUE PRESSURE ALTITUDE
  $H_p = H_I + \Delta H_p$
- APPLICABLE TO TAKEOFF AND LANDING ALTITUDES ONLY

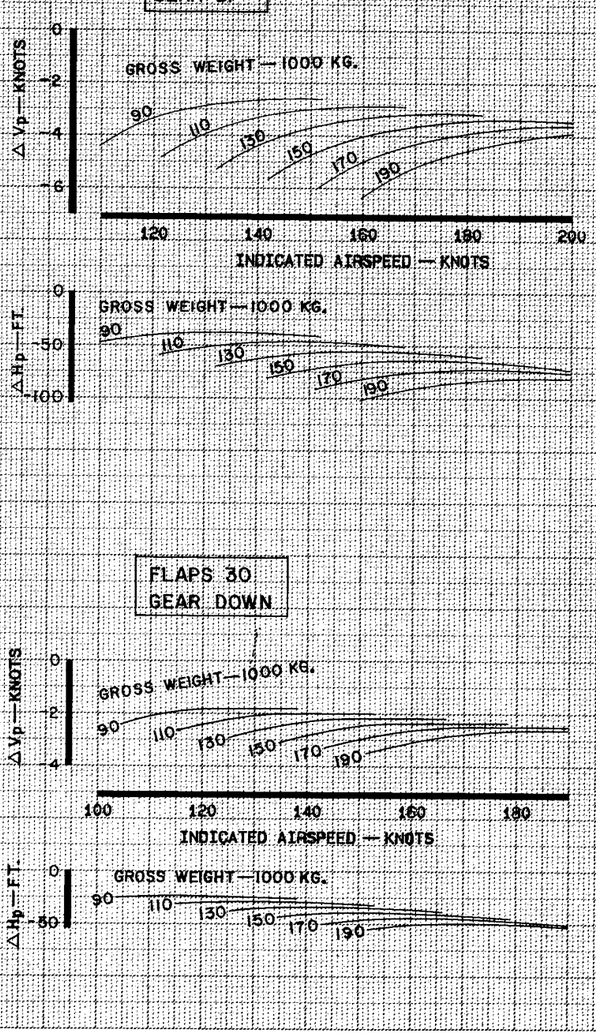
FLAPS 0, 1
GEAR UP



FLAPS 5
GEAR UP



FLAPS 15
GEAR UP



FLAPS 20
GEAR UP

FLAPS 25
GEAR DOWN

FLAPS 30
GEAR DOWN

P.C. 6L001920
D041T507-1 P6.4.1-24

APPROVED	DATE
E.J. Stark MM 268	1/20/88

RUFF
767-300ER

S30009

6E4208

P.C. 6S000086
D041T503 PG. 4.1-25

C FRANK
767-200/300

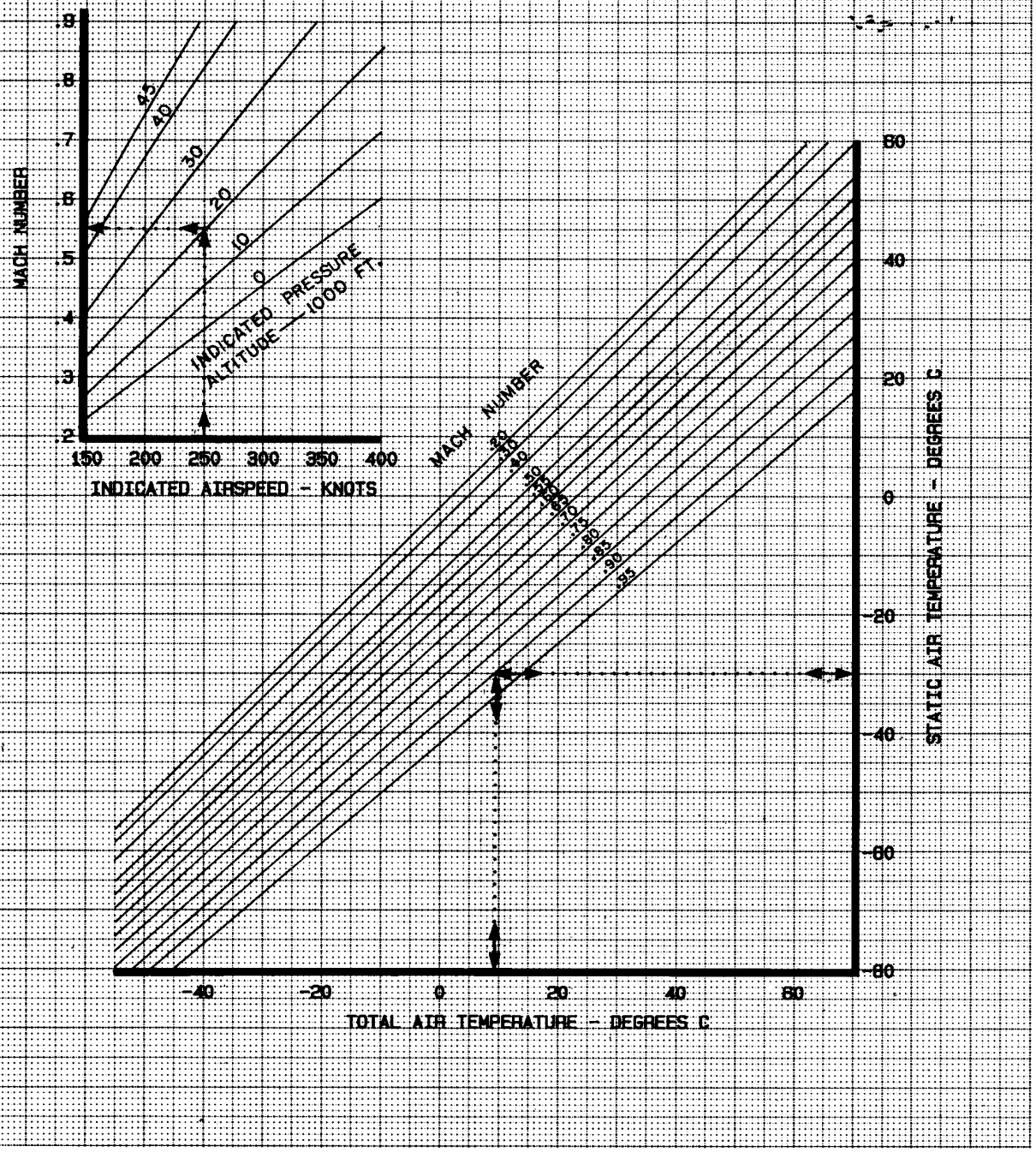
APPROVED	DATE
R. Sugimura NM239	7.2.82
D. Nyhus 288	8 Aug '86
L.P. Bentley	

PERFORMANCE

TEMPERATURE CONVERSION

TOTAL AIR - STATIC AIR

CONVERSION CHART FOR IAS TO MACH NUMBER



S28690

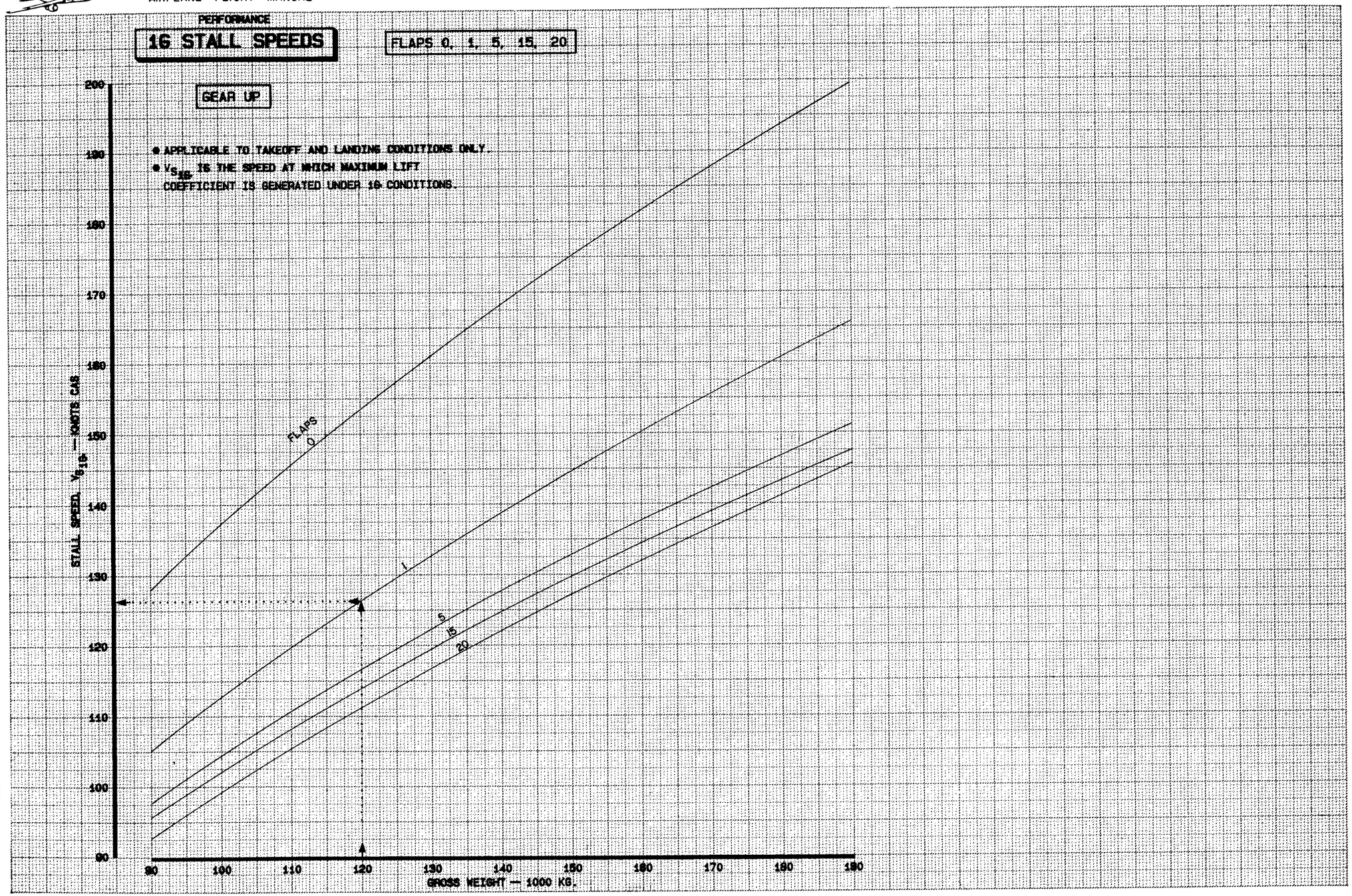
PERFORMANCE

16 STALL SPEEDS

FLAPS 0, 1, 5, 15, 20

GEAR UP

- APPLICABLE TO TAKEOFF AND LANDING CONDITIONS ONLY.
- $V_{S_{1G}}$ IS THE SPEED AT WHICH MAXIMUM LIFT COEFFICIENT IS GENERATED UNDER 1G CONDITIONS.



P.C. BL001788
D041T507-1 PG. 4.1-26

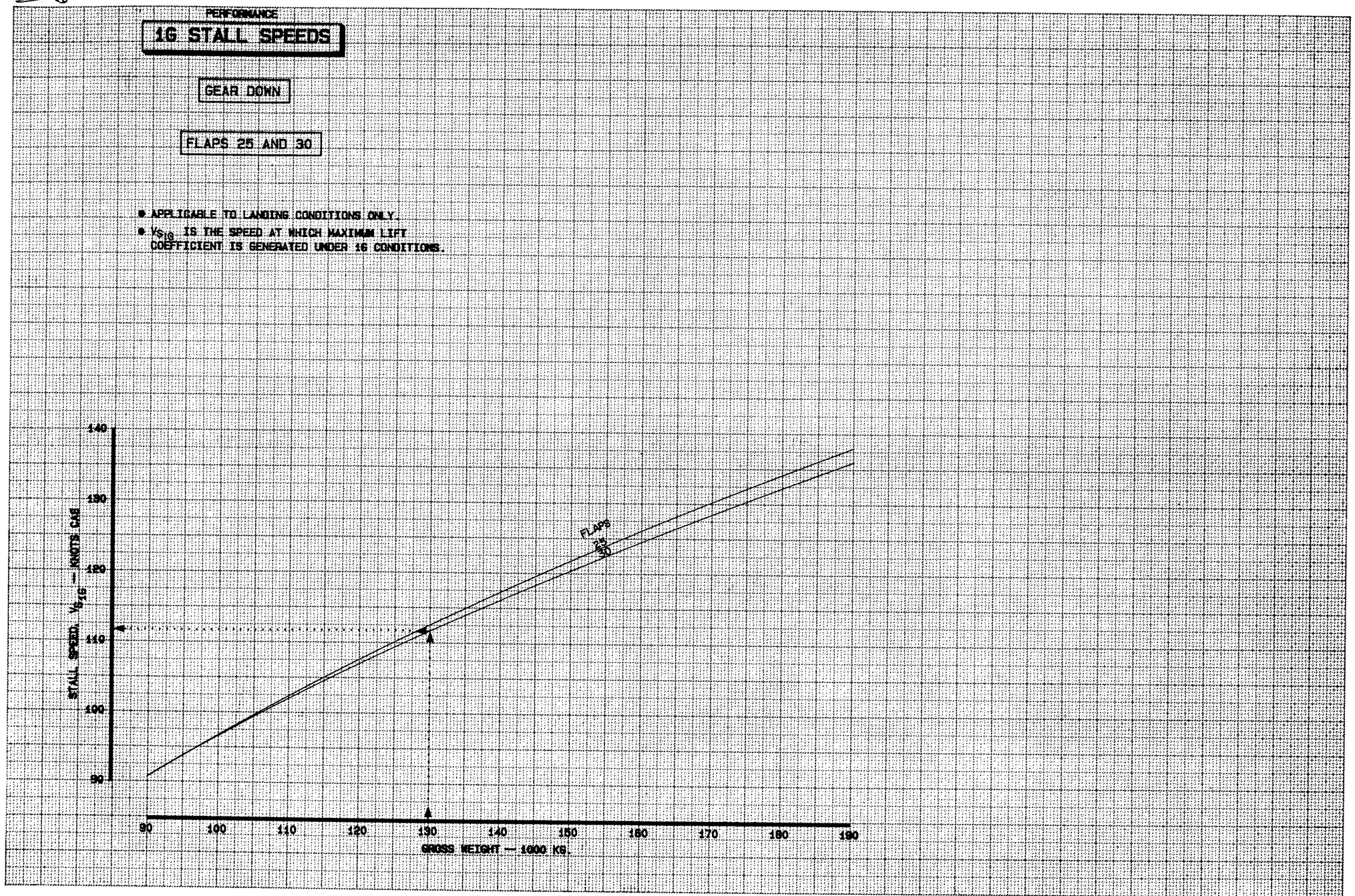
GARDNER	APPROVED	DATE
787-300ER	[signature] NIKRAS	1/25/88

1G STALL SPEEDS

GEAR DOWN

FLAPS 25 AND 30

- APPLICABLE TO LANDING CONDITIONS ONLY.
- V_{S1G} IS THE SPEED AT WHICH MAXIMUM LIFT COEFFICIENT IS GENERATED UNDER 1G CONDITIONS.



P.C.6L001789
D041T507-1 PG. 4.1-27

GARDNER
767-300ER

APPROVED C. J. Bach NM1Sq DATE 1/25/88

PERFORMANCE

CRUISE MANEUVERING CAPABILITY

FLAPS AND GEAR UP

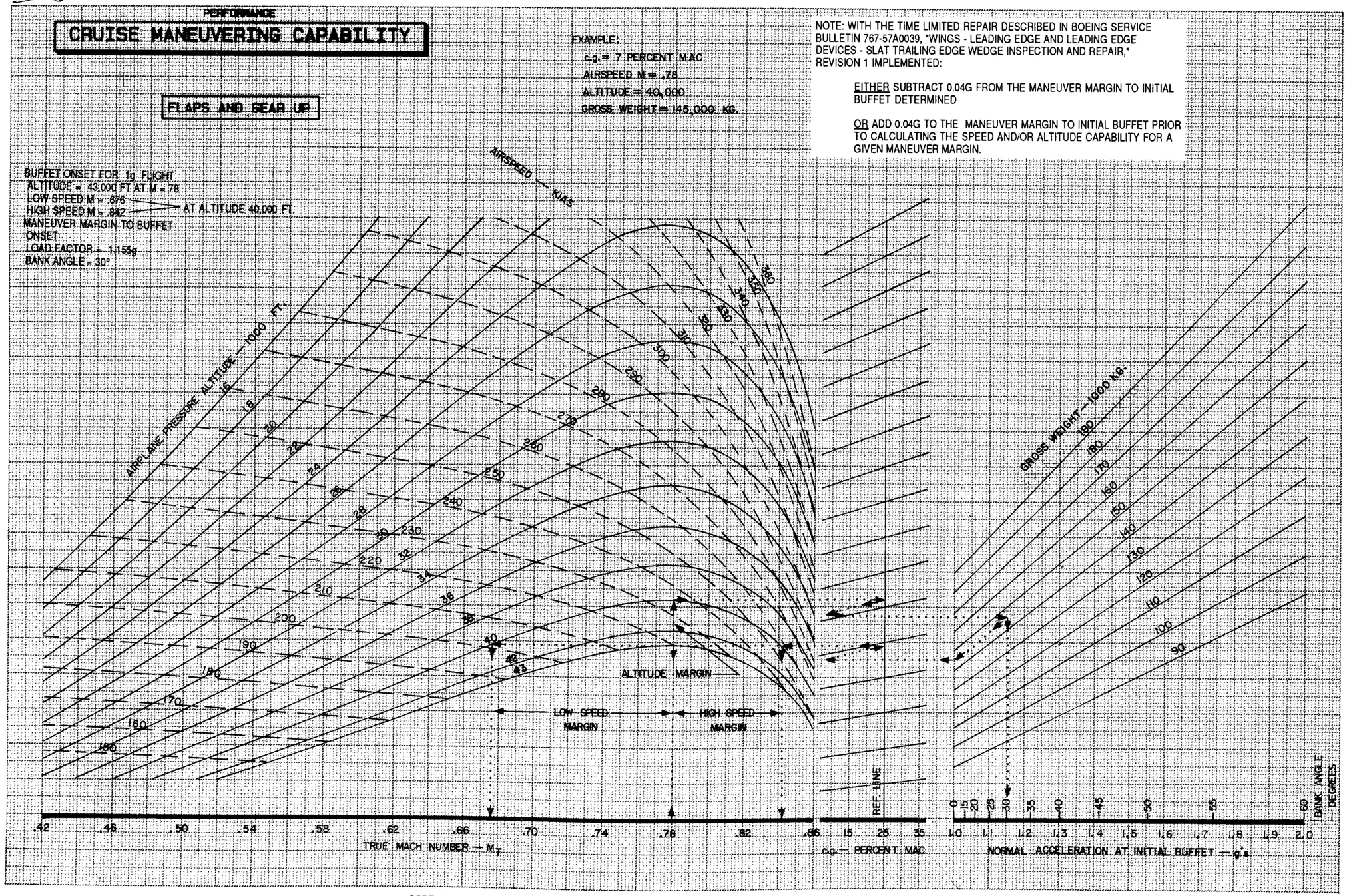
EXAMPLE:
c.g. = 7 PERCENT MAC
AIRSPEED M = .78
ALTITUDE = 40,000
GROSS WEIGHT = 145,000 KG.

NOTE: WITH THE TIME LIMITED REPAIR DESCRIBED IN BOEING SERVICE BULLETIN 767-57A0039, "WINGS - LEADING EDGE AND LEADING EDGE DEVICES - SLAT TRAILING EDGE WEDGE INSPECTION AND REPAIR," REVISION 1 IMPLEMENTED:

EITHER SUBTRACT 0.04G FROM THE MANEUVER MARGIN TO INITIAL BUFFET DETERMINED

OR ADD 0.04G TO THE MANEUVER MARGIN TO INITIAL BUFFET PRIOR TO CALCULATING THE SPEED AND/OR ALTITUDE CAPABILITY FOR A GIVEN MANEUVER MARGIN.

BUFFET ONSET FOR 1g FLIGHT
ALTITUDE = 43,000 FT AT M = .78
LOW SPEED M = .676
HIGH SPEED M = .842
AT ALTITUDE 40,000 FT.
MANEUVER MARGIN TO BUFFET ONSET
LOAD FACTOR = 1.155g
BANK ANGLE = 30°



P.C. BL00192
D041T307-1 PG. 4.1-28

LIEURANCE
767-300

	APPROVED	DATE
	DJM-191	1/23/88
	B Swan	9/22/92

SR 8 2/1988

S39262

6E4208

SECTION 4.2 - ENGINE DATA

C O N T E N T S

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Takeoff Power Setting 2
Go-Around Power Setting 2
Inflight Power Setting. 3
TAKEOFF POWER SETTING 4
GO-AROUND POWER SETTING 5
INFLIGHT POWER SETTING 6
INFLIGHT RESTART ENVELOPE 7
Noise Characteristics 8
Configuration. 8
Certified FAR Part 36, Stage 3 Noise Levels. 8
Supplemental ICAO Annex 16, Chapter 3 Noise Level Information 8
Noise Characteristics Applicability. 8

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

ENGINE DATA

G E N E R A L

This section provides the Engine Power Setting Charts for the CF6-80C2B7F engine. The Inflight Restart Envelope is also provided for the pneumatic starter assist and the windmill start procedures.

For the CF6-80C2B7F engine, power is set with percent fan rotor speed (%N1 gage). This power setting %N1 is a function of engine rating, pressure altitude, airplane velocity, inlet temperature, and air bleeds. This section includes power setting charts for takeoff, go-around, and inflight ratings. These charts provide certified installed thrust levels for a minimum engine. The use of takeoff and go-around ratings are time-limited to five minutes, and the inflight rating may be used continuously.

T A K E O F F P O W E R S E T T I N G

Takeoff power must be set at an airplane velocity between 40 and 80 knots. Takeoff %N1 is determined from the Takeoff Power Setting chart using the procedures specified thereon.

G O - A R O U N D P O W E R S E T T I N G

Go-around %N1 is determined from the Go-Around Power Setting chart using the procedures specified thereon.

ENGINE DATA

INFLIGHT POWER SETTING

The %N1 for maximum continuous thrust rating is determined from the Inflight Power Setting - Maximum Continuous chart using the procedures specified thereon.

TAKEOFF POWER SETTING

P.C. d600204003
D041T513-1 PG. 4.2-4

L. BOVAIRD
767
CF6-80C2B7F
APPROVED
DATE

PROCEDURES

1. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART A.
2. DETERMINE PERCENT N1 GAGE FROM CHART B.
3. ADJUST PERCENT N1 GAGE BY THE Δ%N1 FROM CHART C AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
4. DETERMINE MAXIMUM PERCENT N1 GAGE FROM CHART D.
5. USE THE LOWER PERCENT N1 GAGE FROM STEP 3 OR STEP 4.

CHART A

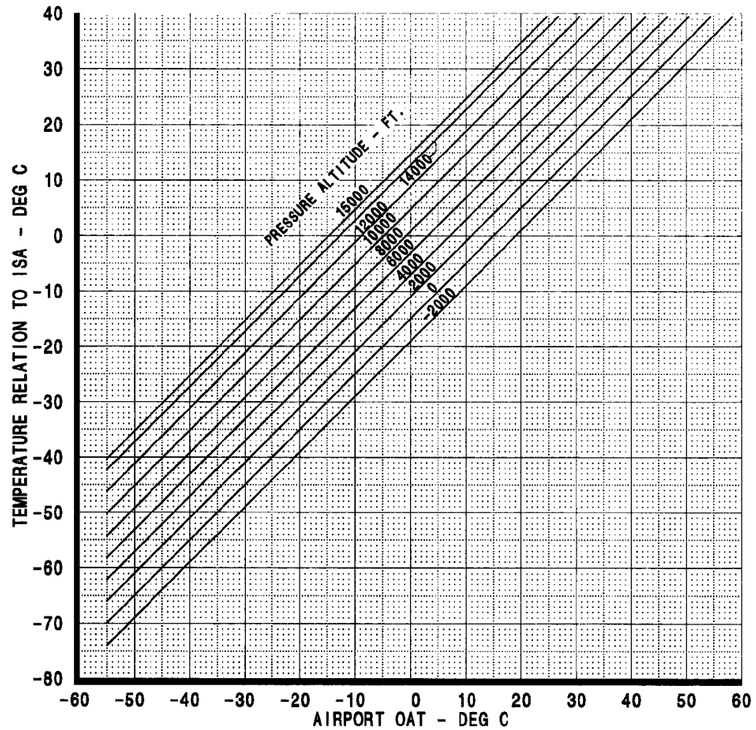


CHART C

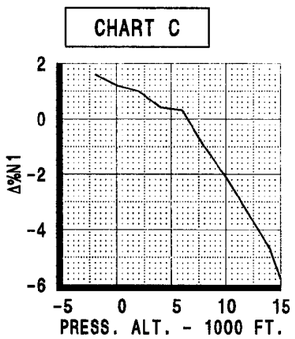
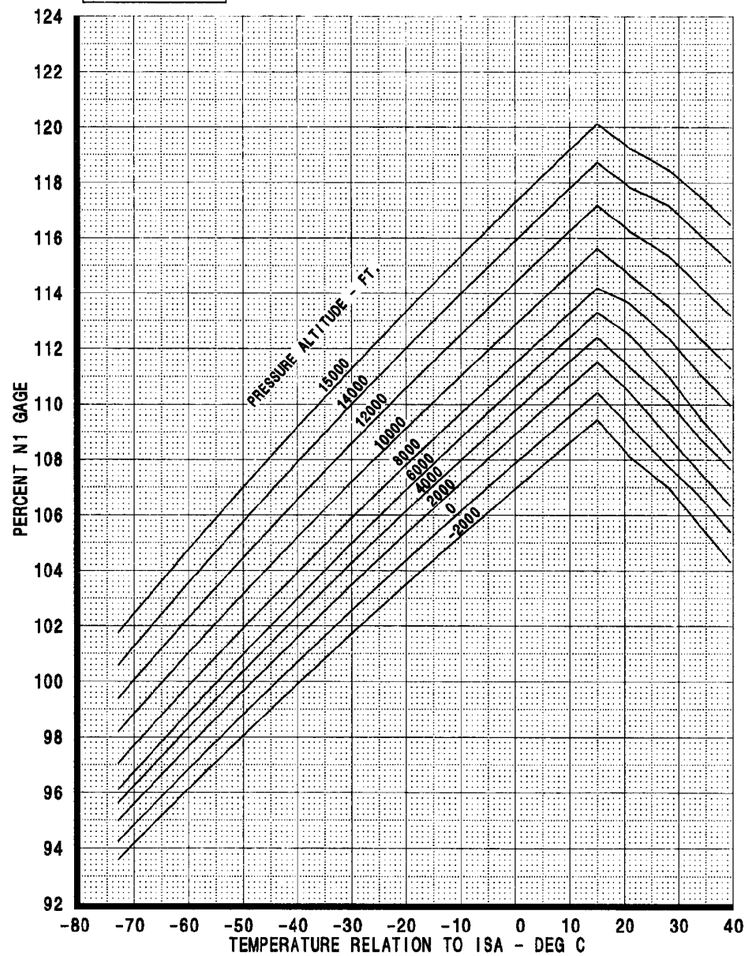
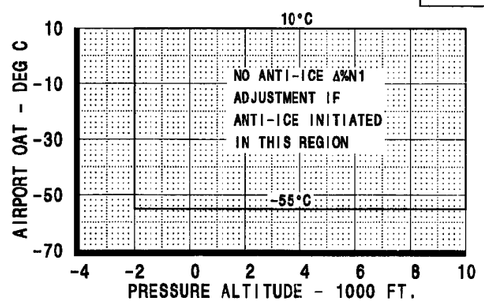


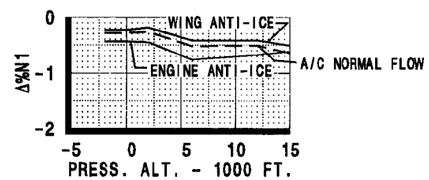
CHART B



BLEED ADJUSTMENTS

■ NO ADJUSTMENT FOR ADP BLEED



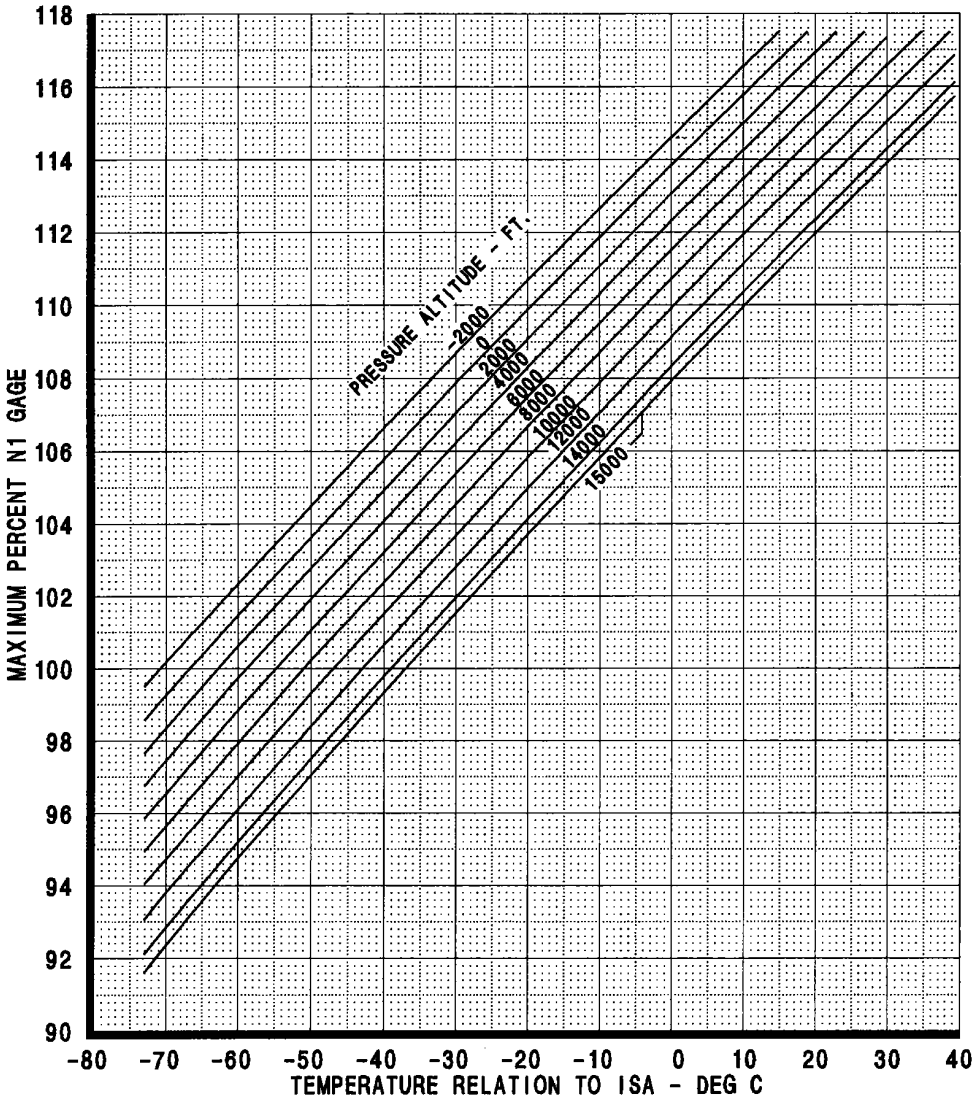


S39268

TAKEOFF POWER SETTING

(CONTINUED)

CHART D



P.C. d6002040A3
D041T513-1 PG. 4.2-4A

L. BOVAIRD
767
CF6-80C2B7F

APPROVED	DATE
[signature]	4/22/93

S20763

P.C. d600205003
D041T513-1 PG. 4.2-5

PERFORMANCE

GO-AROUND POWER SETTING

CHART A

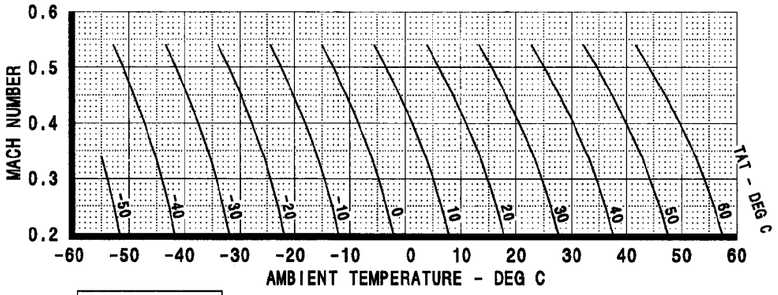


CHART B

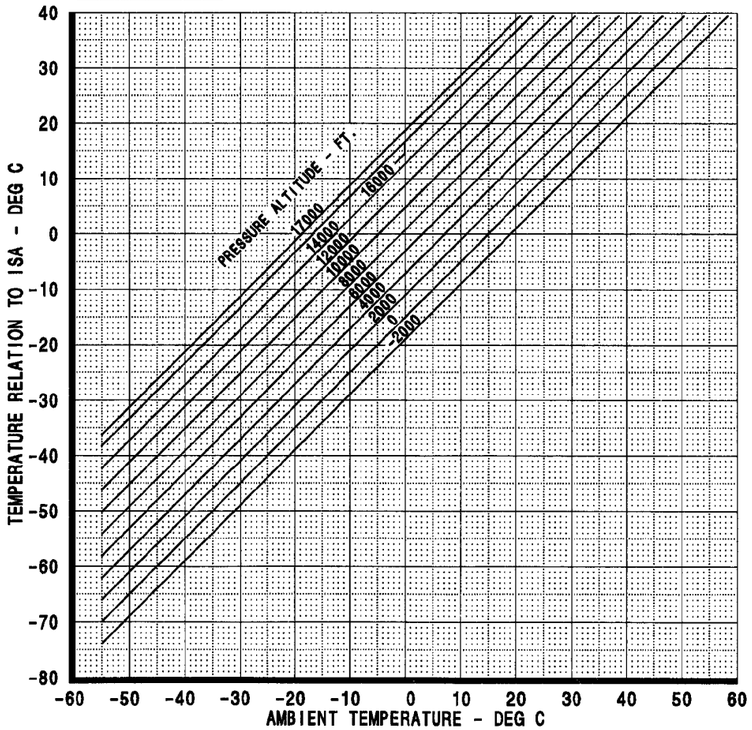
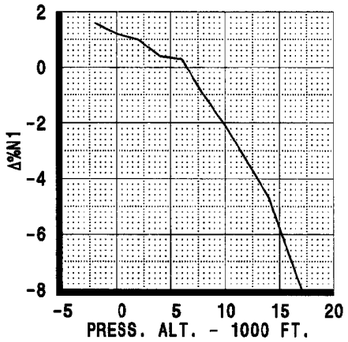


CHART D

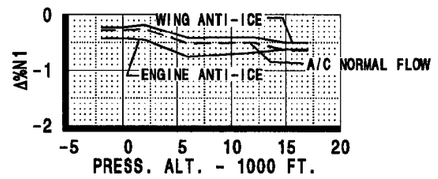


PROCEDURES

1. DETERMINE AMBIENT TEMPERATURE FROM CHART A.
2. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART B.
3. DETERMINE PERCENT N1 GAGE FROM CHART C.
4. ADJUST PERCENT N1 GAGE BY THE Δ%N1 FROM CHART D AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
5. DETERMINE MAXIMUM PERCENT N1 GAGE FROM CHART E.
6. USE THE LOWER PERCENT N1 GAGE FROM STEP 4 OR STEP 5.

BLEED ADJUSTMENTS

- FOR ONE ENGINE INOPERATIVE WITH WING ANTI-ICE ON, MULTIPLY WING ANTI-ICE ADJUSTMENT BY 2
- NO ADJUSTMENT FOR ADP BLEED



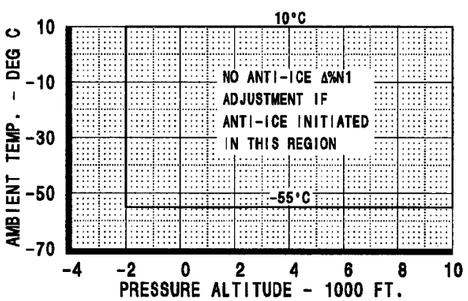
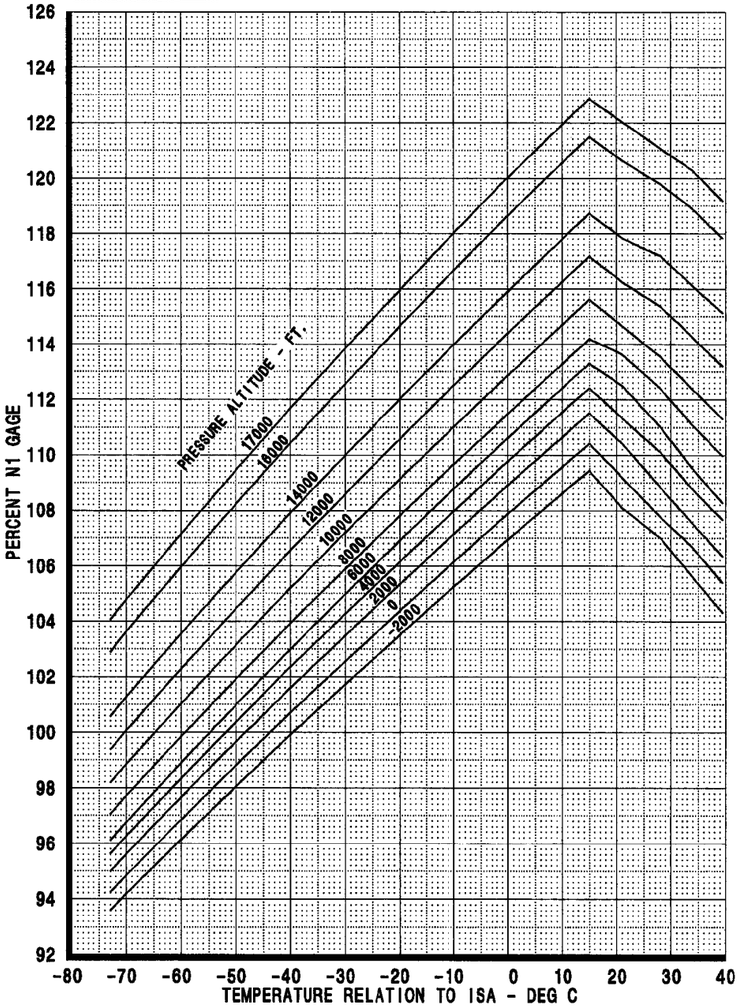


CHART C



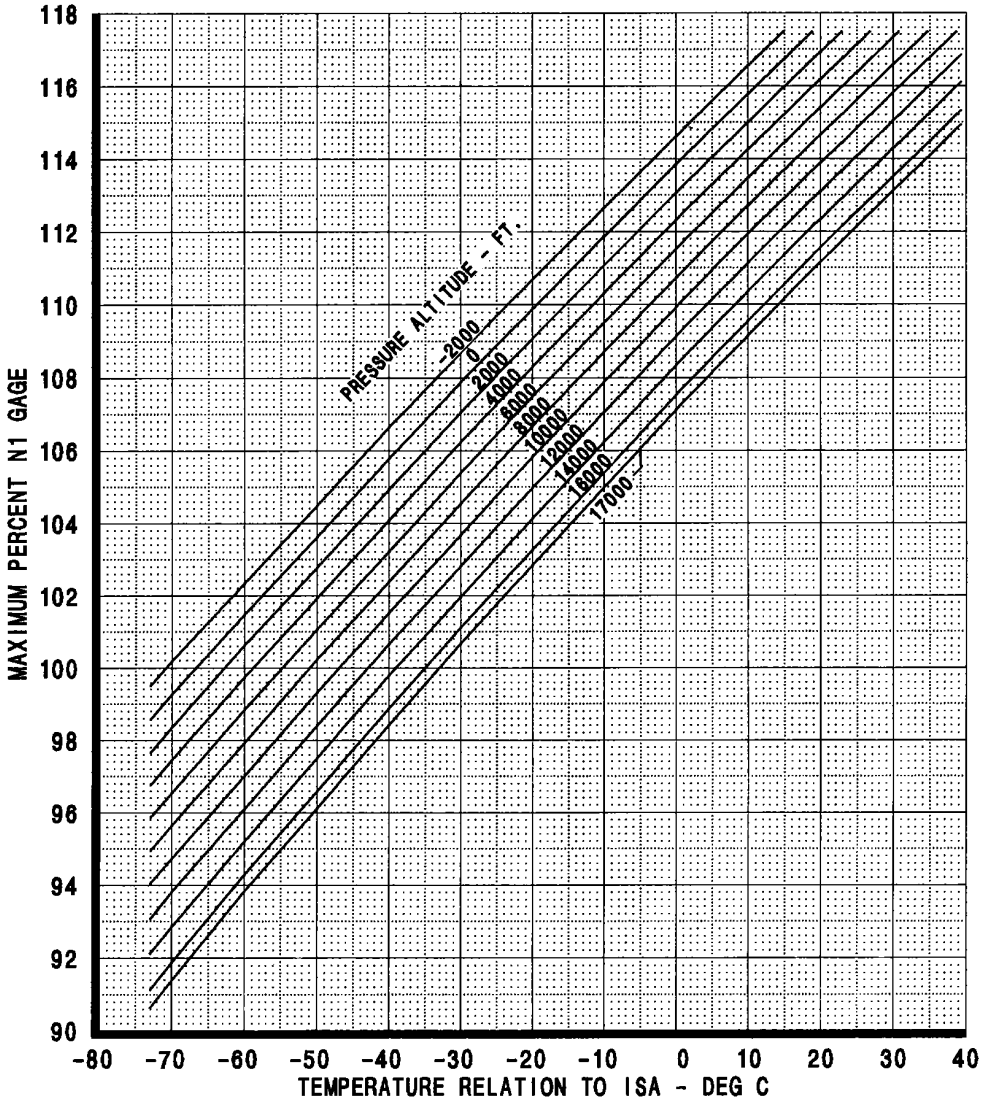
APPROVED	DATE
L. BOVAIRD	4-13-94
767	
CF6-80C2B7F	

S39269

GO-AROUND POWER SETTING

(CONTINUED)

CHART E



P.C. d6002050A3
D041T513-1 PG. 4.2-5A

APPROVED DATE 4/22/93

L. BOVAIRD
767
CF6-80C2B7F

S20764

P.C. K600206003
D041T507-1 PG. 4.2-6

PERFORMANCE

INFLIGHT POWER SETTING

MAXIMUM CONTINUOUS

1 ENGINE INOPERATIVE

PROCEDURES

1. DETERMINE AMBIENT TEMPERATURE FROM CHART A.
2. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART B.
3. DETERMINE PERCENT CORRECTED N1 FROM CHART C.
4. ADJUST PERCENT CORRECTED N1 FROM STEP 3 BY THE Δ% CORR. N1 FROM CHART D.
5. DETERMINE PERCENT N1 GAGE FROM CHART E.
6. ADJUST PERCENT N1 GAGE FROM STEP 5 BY Δ%N1 GAGE FROM CHART F AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
7. DETERMINE PERCENT N1 GAGE FROM CHART G. IF IN THE SHADED REGION SHOWN ON CHART G, USE DASHED LINE TO DETERMINE PERCENT N1 GAGE.
8. USE THE LOWER PERCENT N1 GAGE FROM STEP 6 OR STEP 7.

CHART A

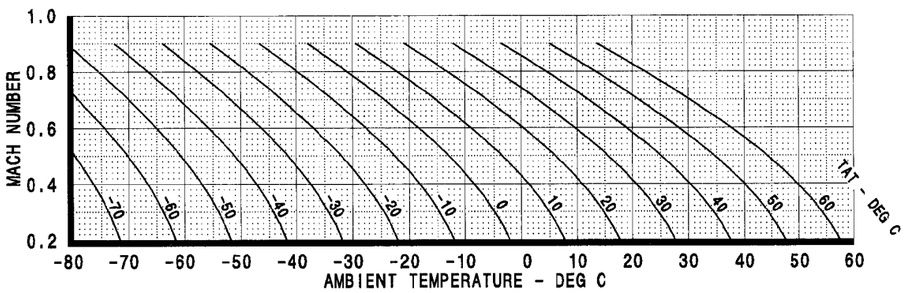


CHART B

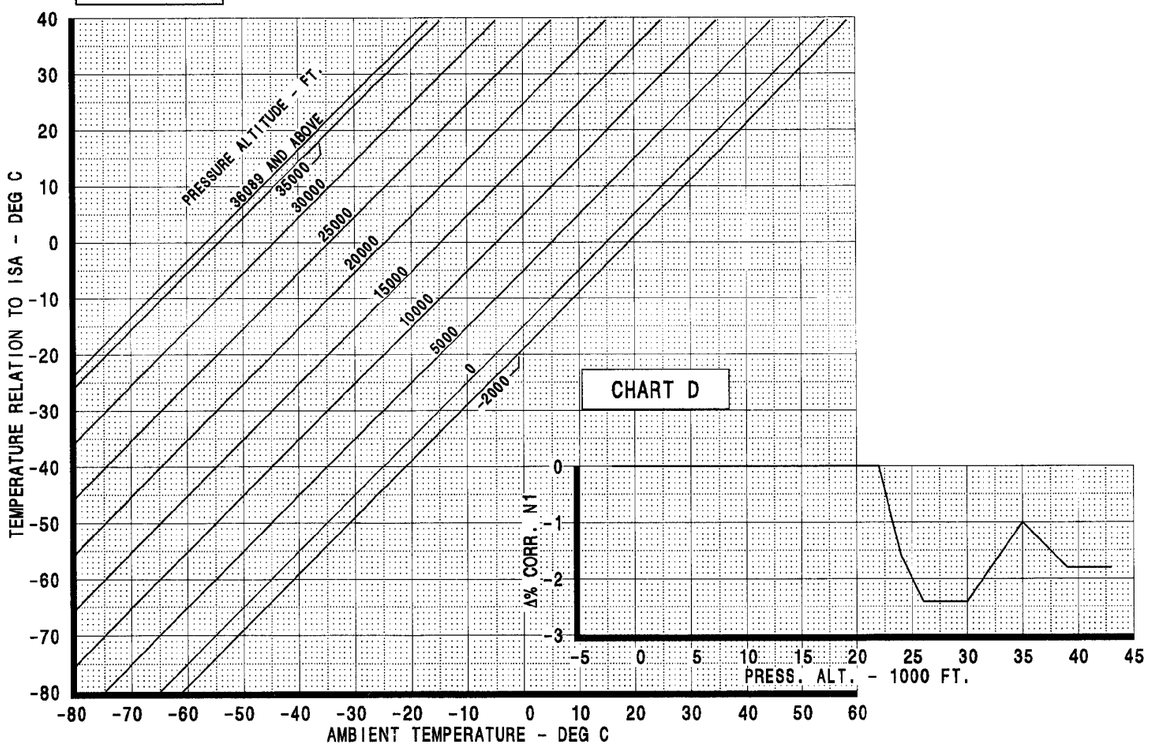
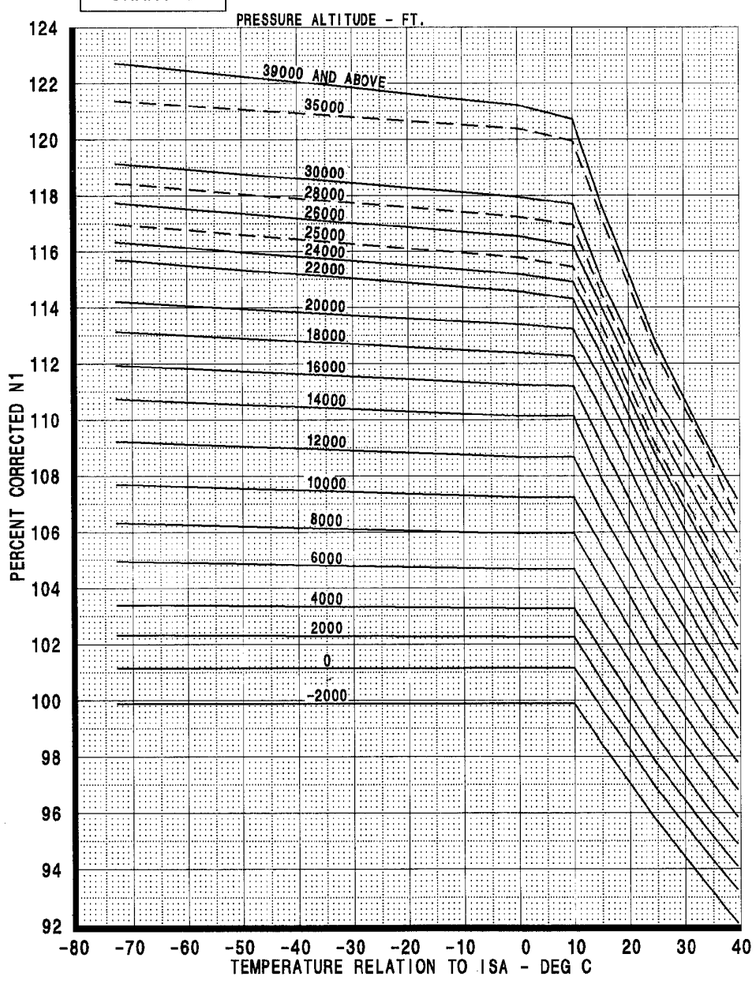


CHART D

CHART C



APPROVED	DATE

L. BOVAIRD
767
CF6-80C2B7F

S39270

PERFORMANCE

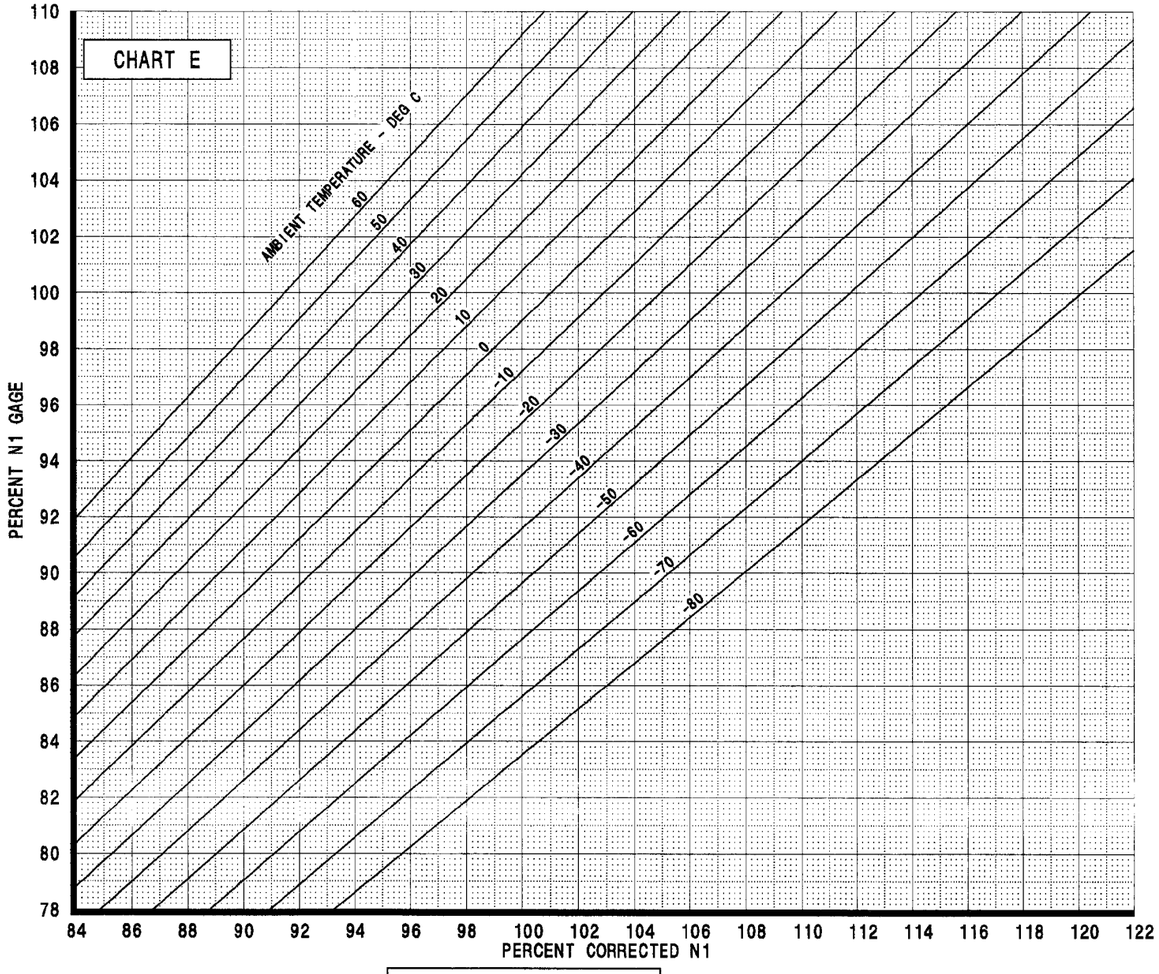
INFLIGHT POWER SETTING

(CONTINUED)

MAXIMUM CONTINUOUS

1 ENGINE INOPERATIVE

CHART E



BLEED ADJUSTMENTS

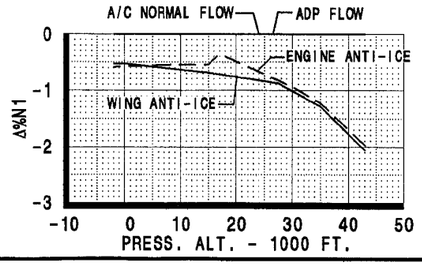


CHART G

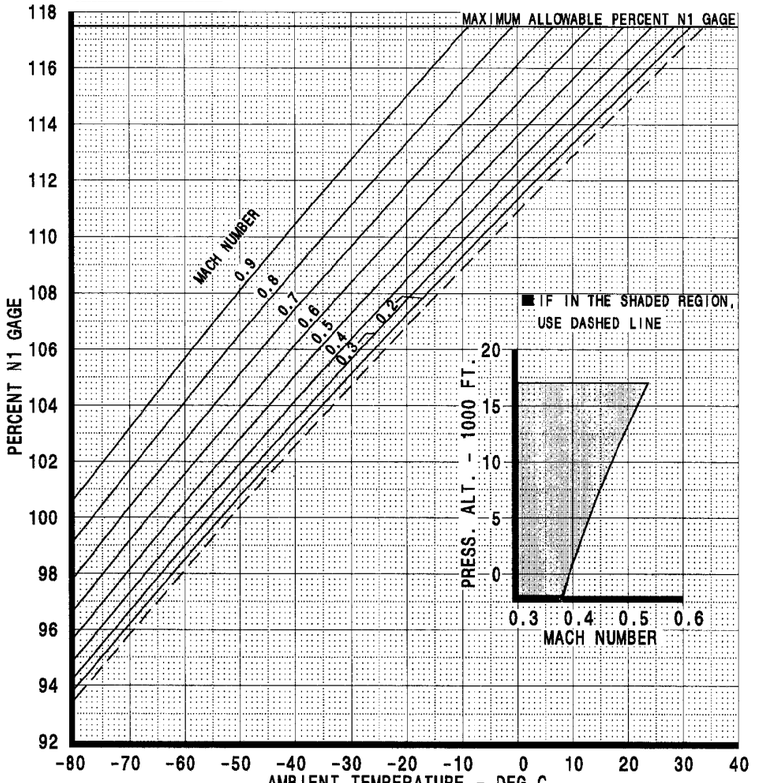
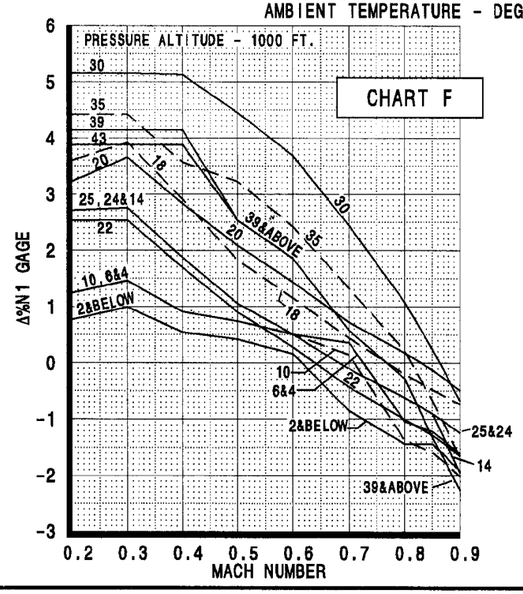


CHART F



P.C. K600206OA3
D041T507-1 PG. 4.2-6A

APPROVED DATE

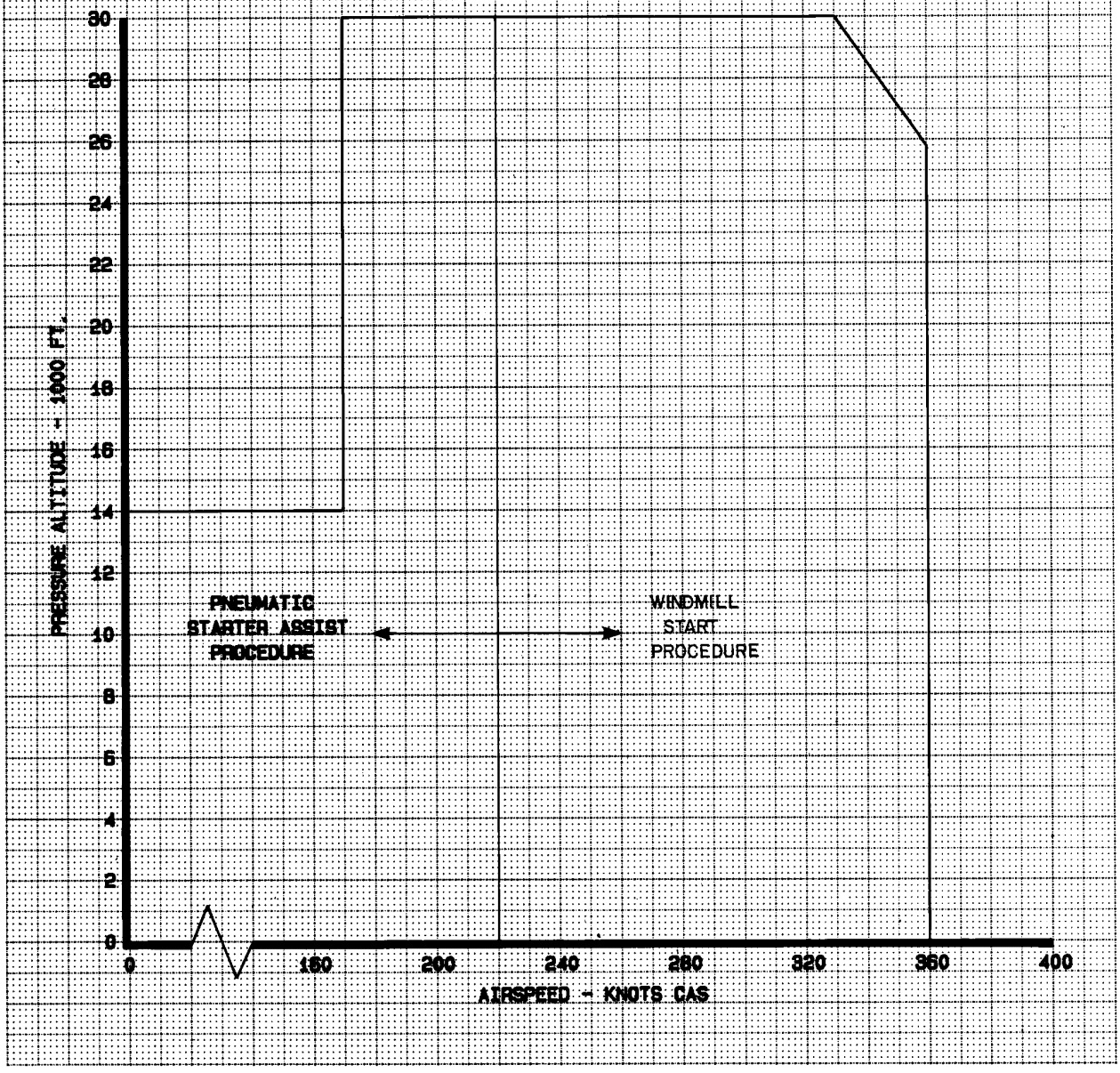
L. BOVAIRD
767
CF6-80C2B7F

S39271

PERFORMANCE

INFLIGHT RESTART ENVELOPE

● SUCCESSFUL STARTS ARE NOT ASSURED ABOVE 30,000 FEET



64207

S28747

NOISE CHARACTERISTICS

CONFIGURATION

Engines: CF6-80C2B7F Basic Rating
Model: 767-300
Nacelle Treatment: Basic Configuration Including Inlet and Fan Duct Treatments

CERTIFICATED FAR PART 36, STAGE 3 NOISE LEVELS

The following noise levels were established using test data obtained and analyzed under procedures of FAR Part 36. This aircraft complies with FAR Part 36, Stage 3 requirements.

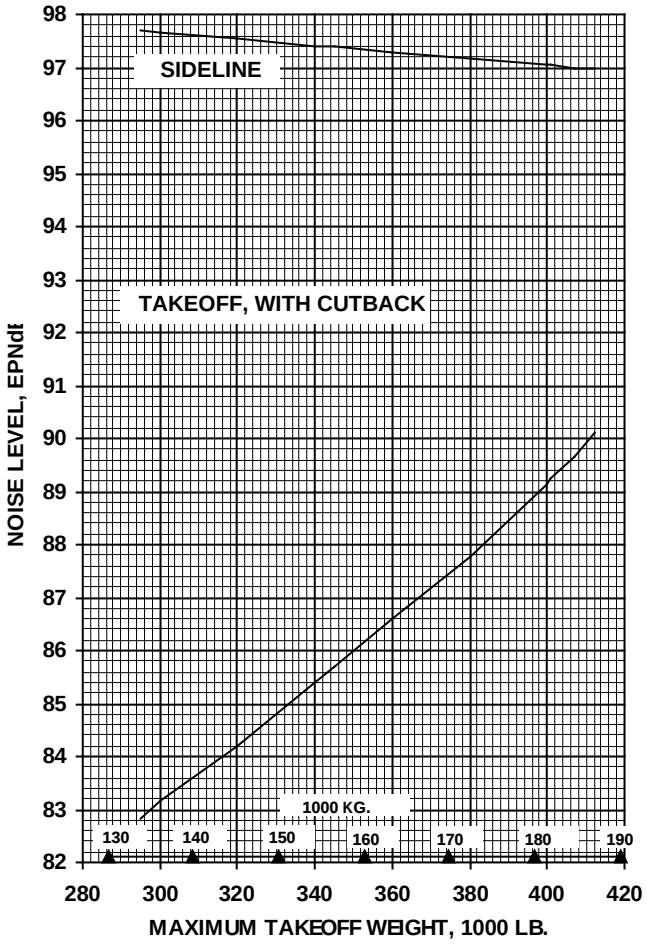
SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

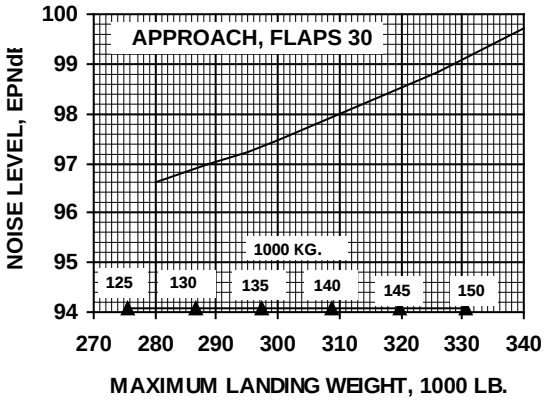
The test and analysis procedures used to obtain the FAR Part 36, Stage 3 noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Chapter 3. The ICAO Annex 16, Chapter 3 data is applicable only after approval by the proper authority of airplane registry, including approval of the equivalent procedures used to demonstrate compliance with FAR Part 36 noise standards.

NOISE CHARACTERISTICS APPLICABILITY

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

Noise levels are determined by entering the graphs at the maximum weights defined under Certificate Limitations in the Airplane Flight Manual.





SECTION 4.3 - RUNWAY LENGTH CORRECTIONS

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

RUNWAY LENGTH CORRECTIONS

GENERAL

This section provides information required to correct the actual runway length available at the actual runway conditions to an equivalent value, corrected runway length. This allows the determination of the field length limited gross weight in Section 4.4. The flow diagram in the Corrected Runway Length Determination procedure, below, demonstrates the use of the charts and defines the various parameters that are obtained in the procedure. See the example problem appendix for a numerical example of this procedure.

CORRECTED RUNWAY LENGTH DETERMINATION

The following steps correspond to the identified points on the Corrected Runway Length Determination flow diagram, this section.

1. All Engines Operating Corrected Runway Length.

   The runway length with zero clearway, slope, and wind that provides, with anti-ice off, the same performance as the actual runway conditions available with the anti-ice configuration selected when all engines are operating during the takeoff.

2. Engine Inoperative Corrected Takeoff Distance.

   The runway length with zero clearway, slope, and wind that provides, with anti-ice off, the same performance as the actual runway conditions available with the anti-ice configuration selected when one engine becomes inoperative at VEF and the takeoff is continued.

3. Accelerate-Stop Distance.

   The sum of the actual runway length and available stopway.

4. Corrected Accelerate-Stop Distance.

   The runway length with zero stopway, slope, and wind that provides, with anti-ice off and all brakes and antiskid operative, the same performance as the actual runway conditions available with the anti-ice, brake, and antiskid configuration selected when one engine becomes inoperative at VEF and the takeoff is aborted.

RUNWAY LENGTH CORRECTIONS

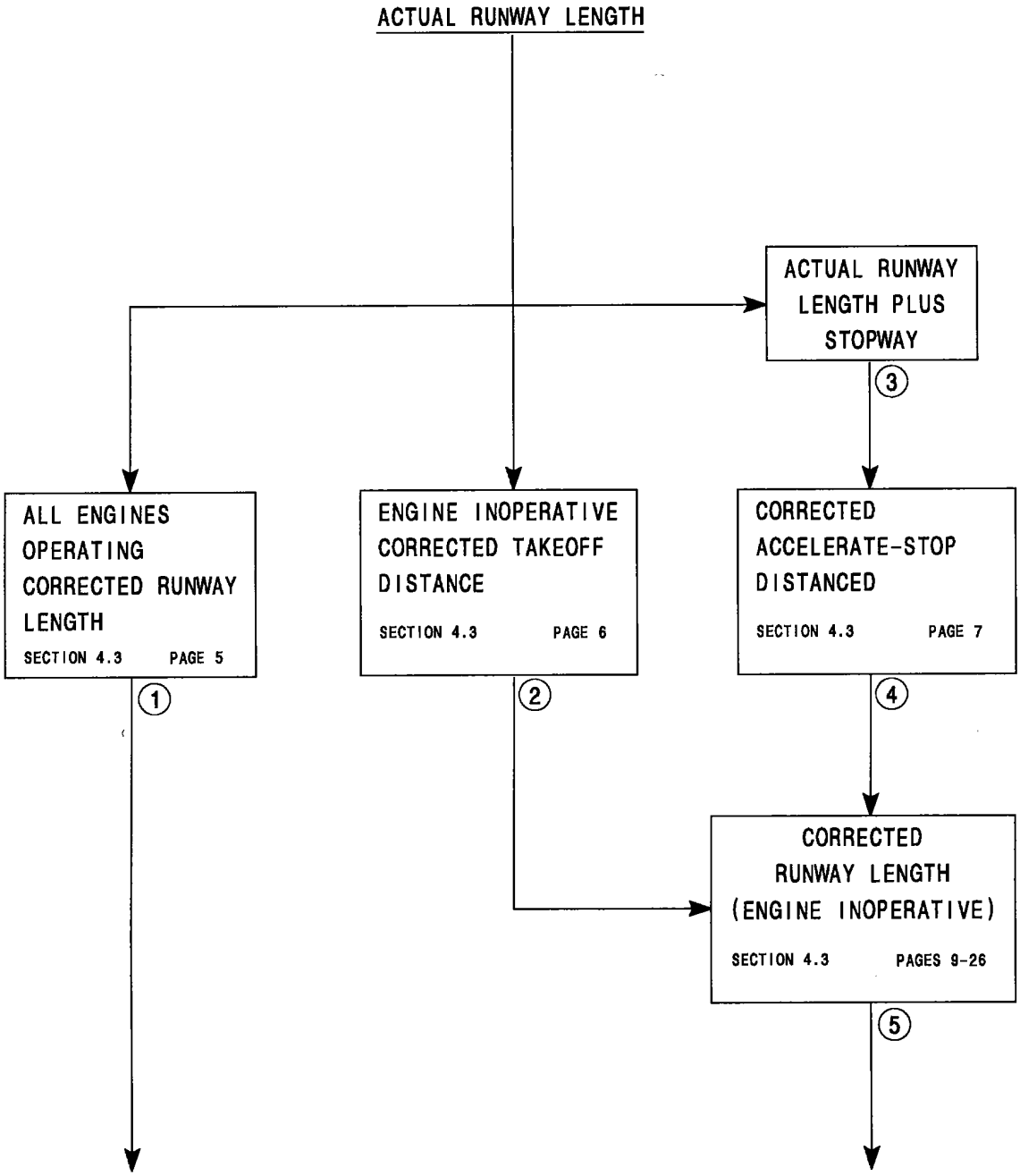
C O R R E C T E D R U N W A Y L E N G T H
D E T E R M I N A T I O N (Continued)

5. One Engine Inoperative Corrected Runway Length.

This step determines the corrected runway length available based on the available engine inoperative corrected takeoff distance, step 2, and the available corrected accelerate-stop distance, step 4. This corrected runway length is used to determine the field length limited gross weight based on engine inoperative considerations only.

CORRECTED RUNWAY LENGTH DETERMINATION PROCEDURE

e600304004

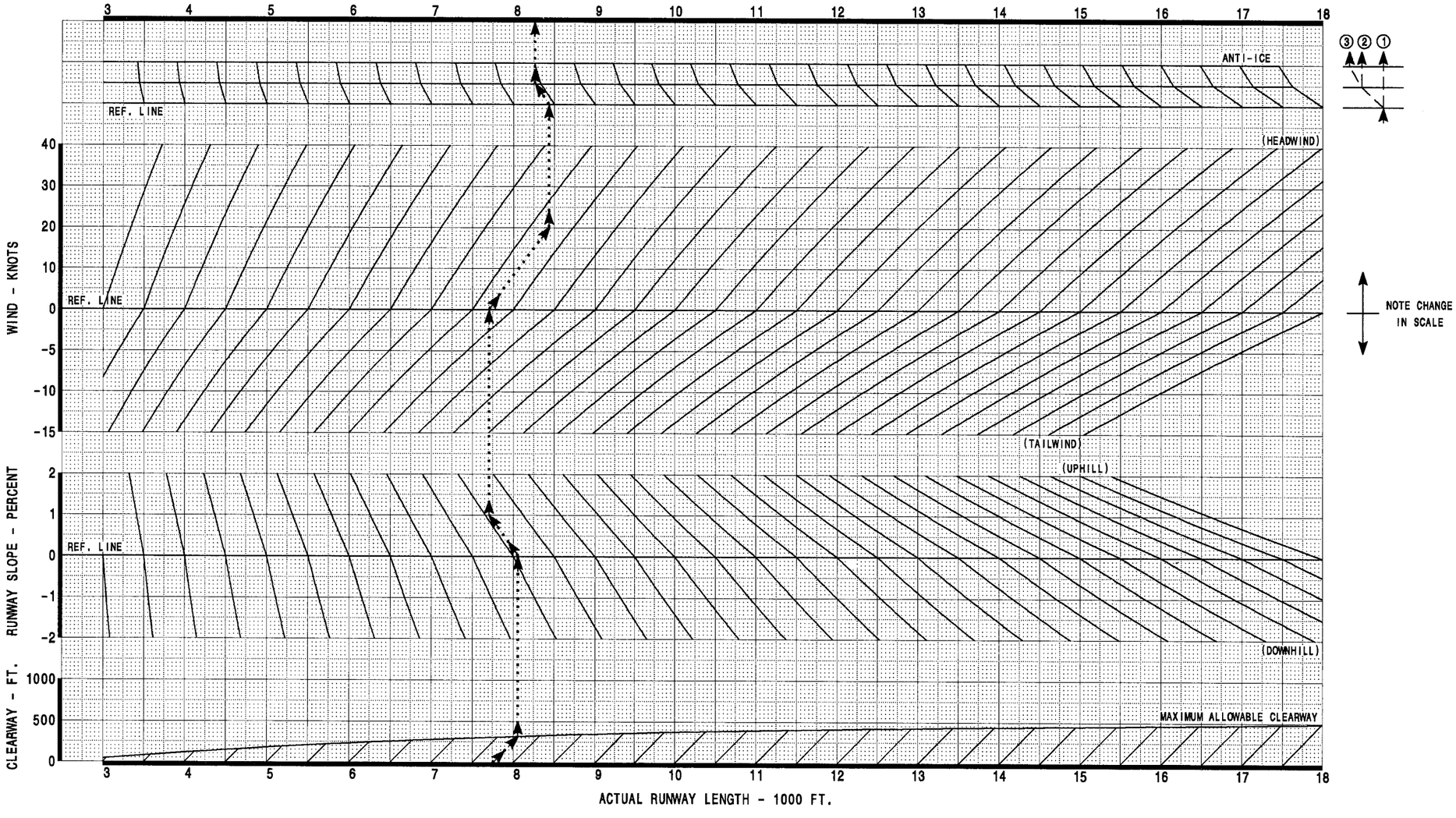


S21356

ALL ENGINES OPERATING CORRECTED RUNWAY LENGTH

FLAPS 5, 15, AND 20

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON



P.C. d600305000 D041T513-1 PG. 4.3-5

APPROVED	DATE
G.LARSON	04-02-96

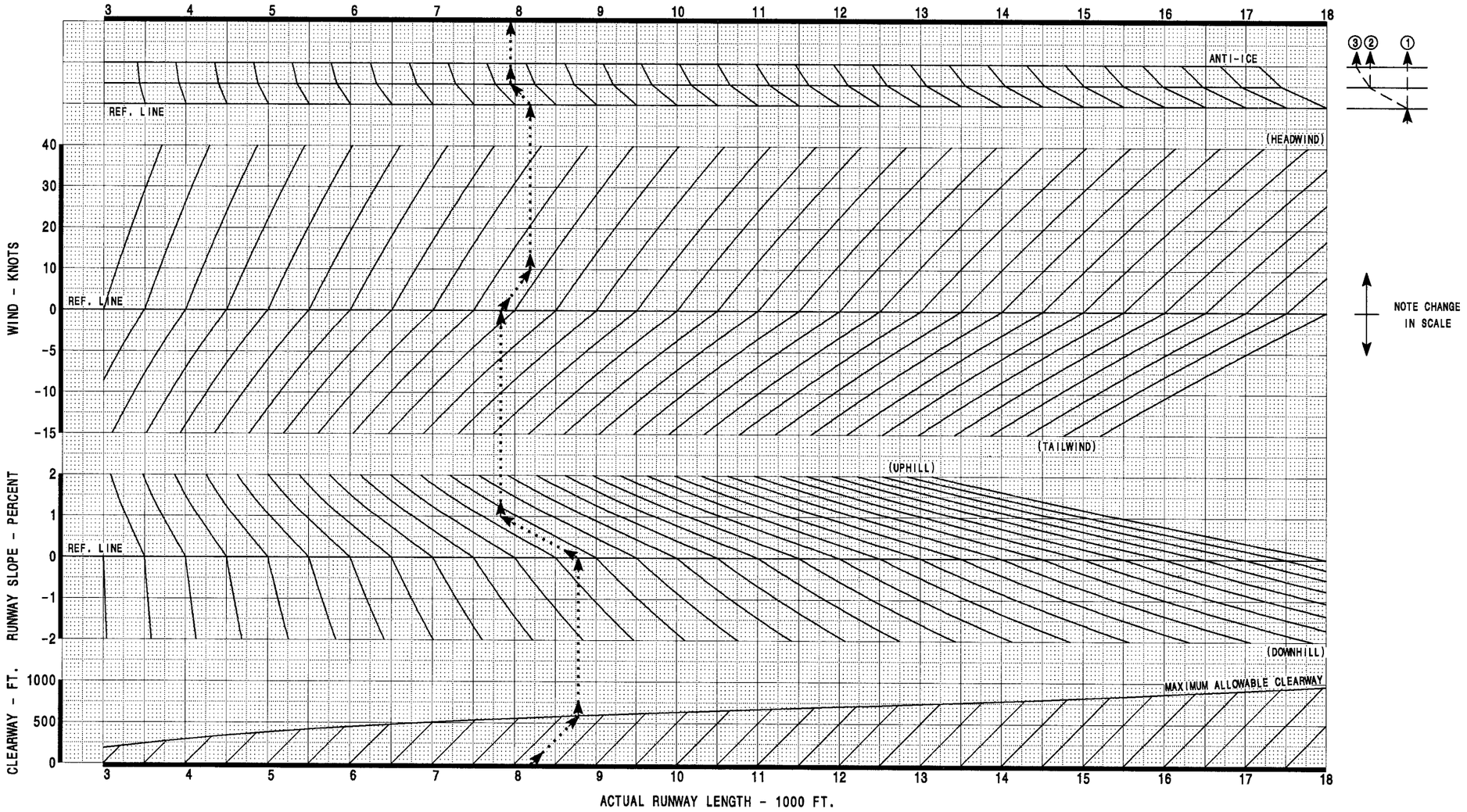
J. NEWELL
767-300ER
CF6-80C2B7/B7F

S39273

ONE ENGINE INOPERATIVE CORRECTED TAKEOFF DISTANCE

FLAPS 5, 15, AND 20

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON



P.C. d600306000 D041T513-1 PG. 4.3-6

APPROVED	DATE
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J. NEWELL
767-300ER
CF6-80C2B7/B7F

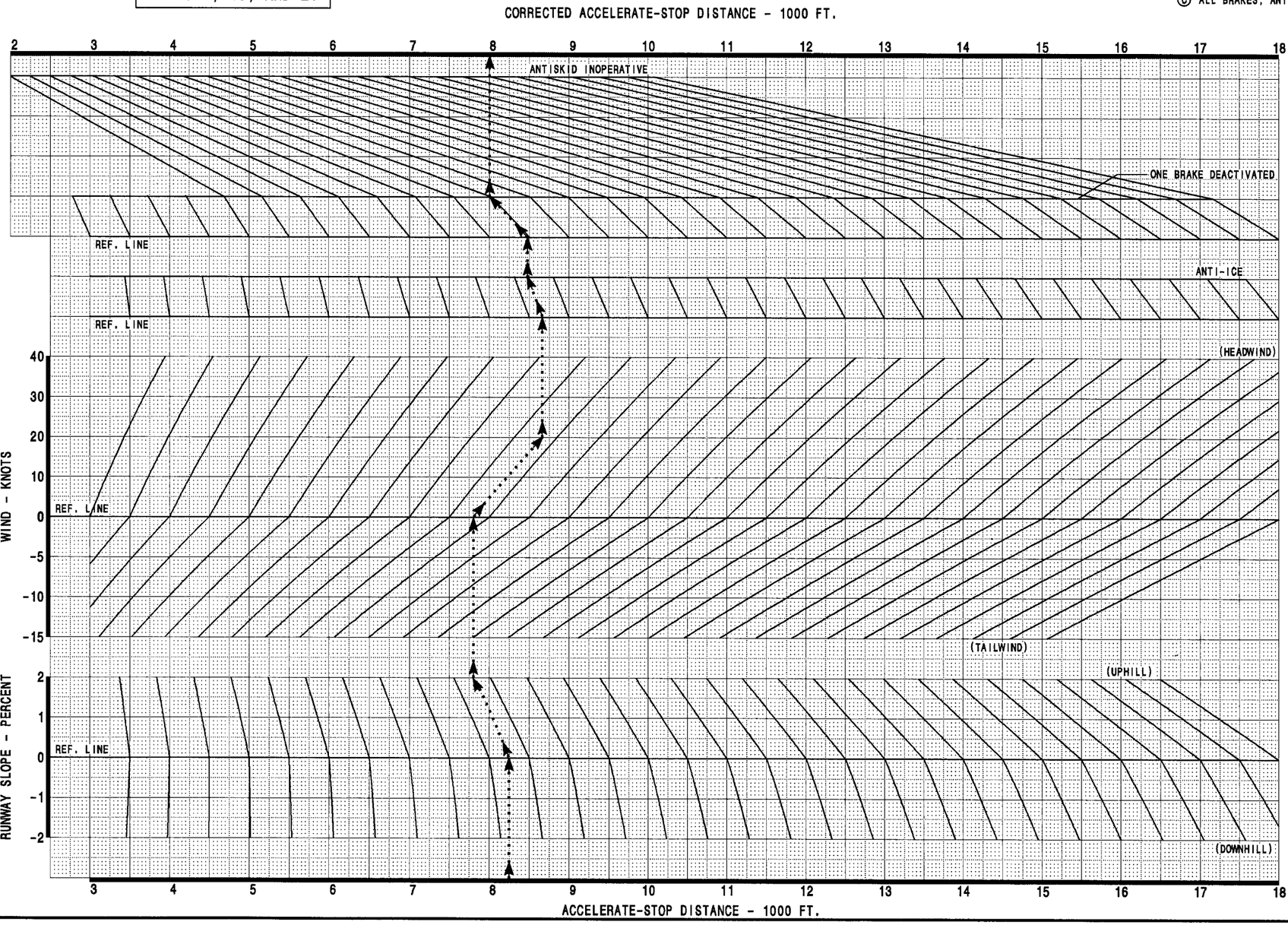
S39277

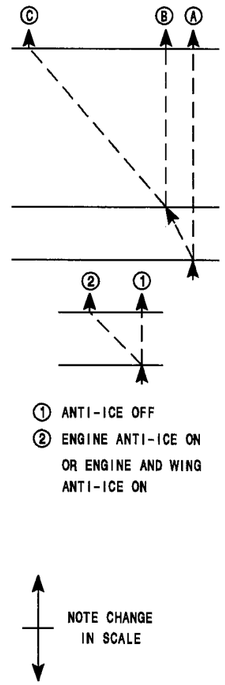
CORRECTED ACCELERATE-STOP DISTANCE

CATEGORY C BRAKES

FLAPS 5, 15, AND 20

Ⓐ ALL BRAKES, ANTISKID OPERATIVE
Ⓑ ONE BRAKE DEACTIVATED, ANTISKID OPERATIVE
Ⓒ ALL BRAKES, ANTISKID INOPERATIVE





① ANTI-ICE OFF
② ENGINE ANTI-ICE ON OR ENGINE AND WING ANTI-ICE ON

NOTE CHANGE IN SCALE

P.C. d600307000
D041T513-1 PG. 4.3-7

APPROVED	DATE
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H. LEE
767-300ER
CF6-80C2B7/B7F

S39281

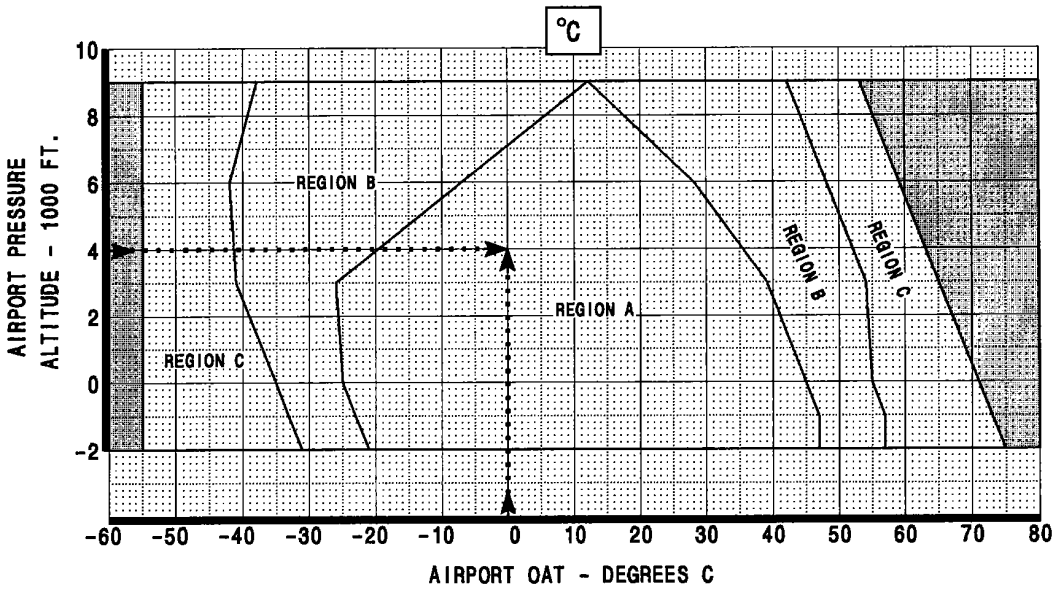
PERFORMANCE

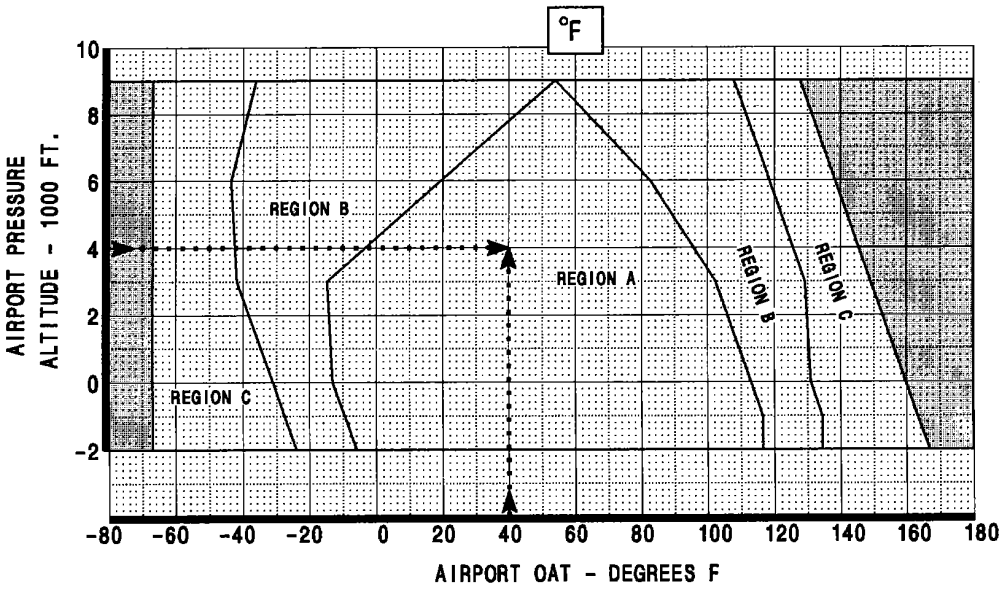
RUNWAY LENGTH AND V_1 ADJUSTMENTS

ALTITUDE-TEMPERATURE REGIONS

CATEGORY C BRAKES

- USE THIS CHART TO DETERMINE WHICH RUNWAY LENGTH AND V_1 ADJUSTMENTS CHARTS ARE APPLICABLE FOR A GIVEN ALTITUDE AND TEMPERATURE CONDITION.





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D041T507-4 PG. 4.3-8

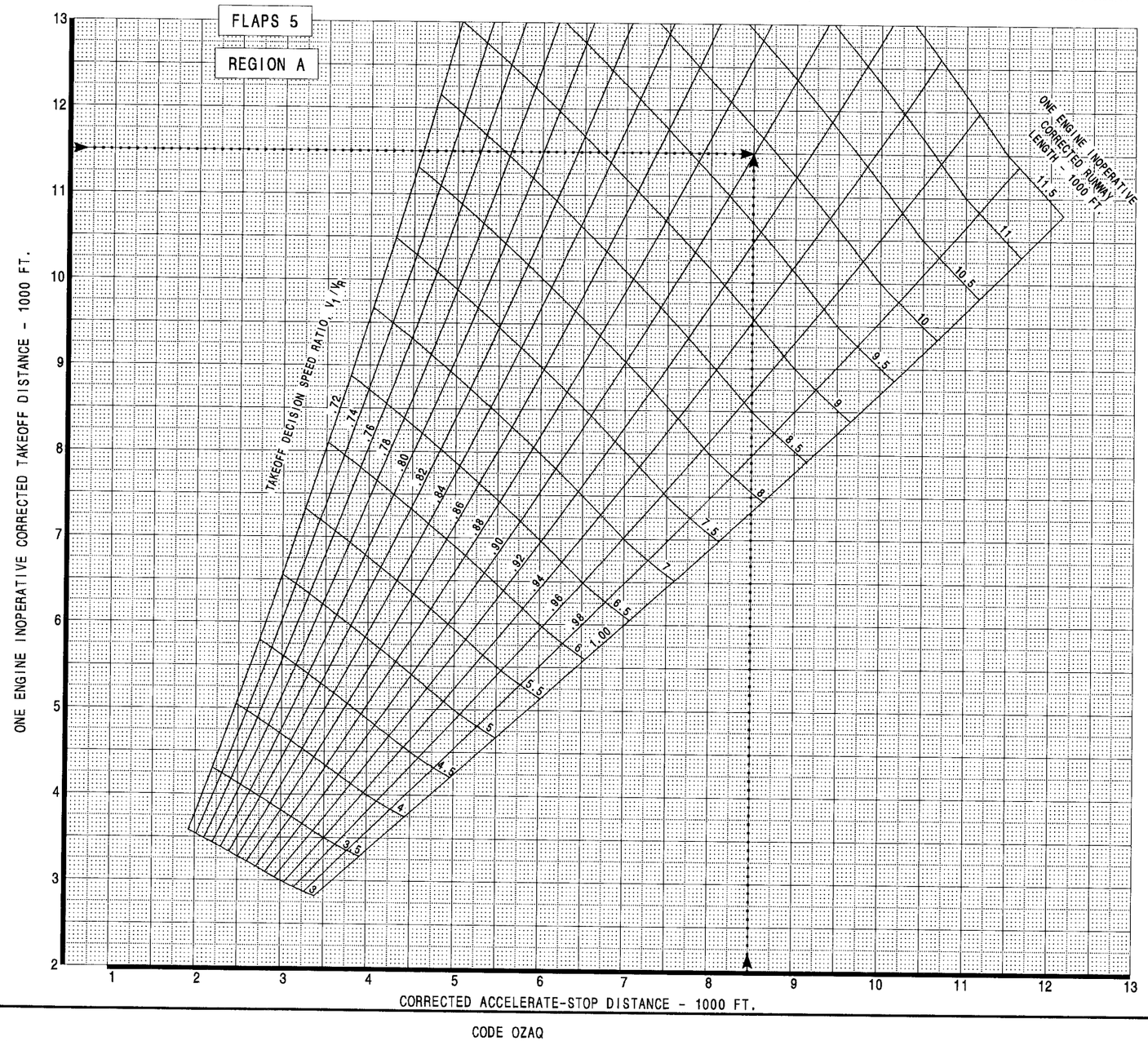
APPROVED L. ENEBRAD DATE 10/31/94

767-300ER
CF6-80C2B7/B7F

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



P.C. d600309000
D041T513-1 PG. 4.3-9

D. BACH
767-300ER
CF6-80C2B7/B7F

APPROVED | DATE
13 NOV 93

S39380

FAA APPROVED 4-13-94 D6T11321

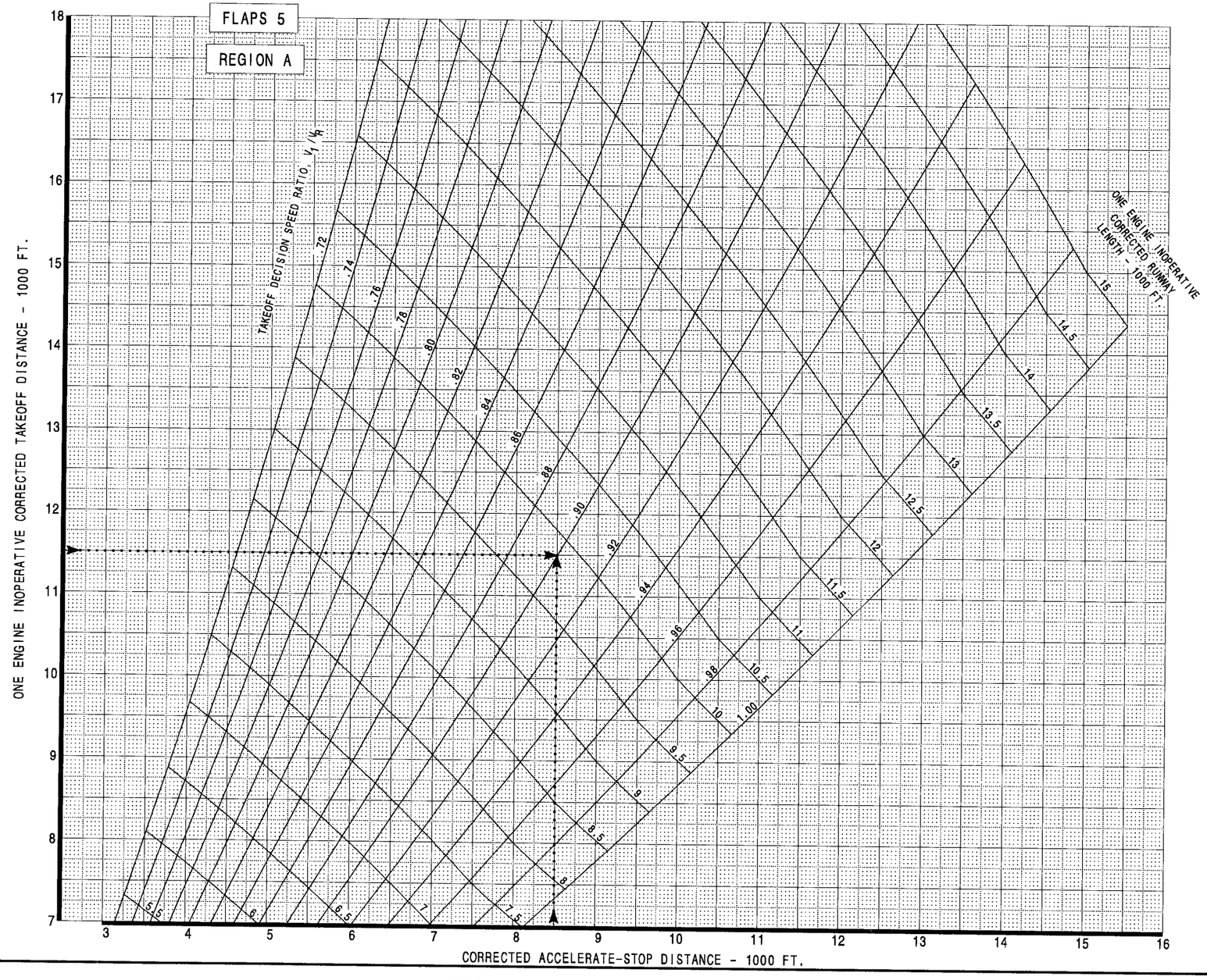
RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.

FLAPS 5

REGION A



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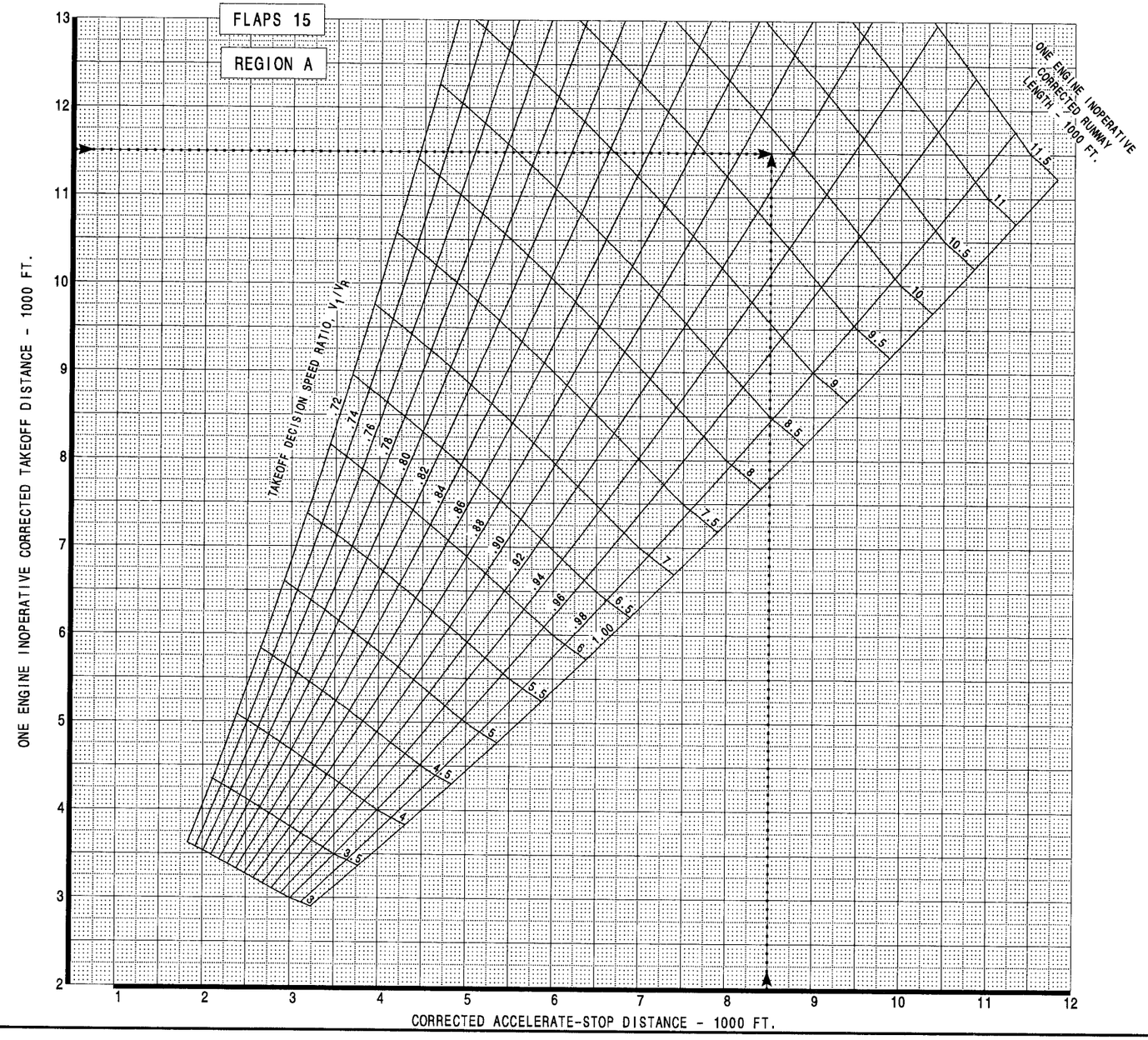
D. BACH
767-300ER
CF6-80C2B7/B7F
APPROVED P. McGRANAGHAN
DATE 12/00/93

S39386

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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767-300ER
CF6-80C2B7/B7F

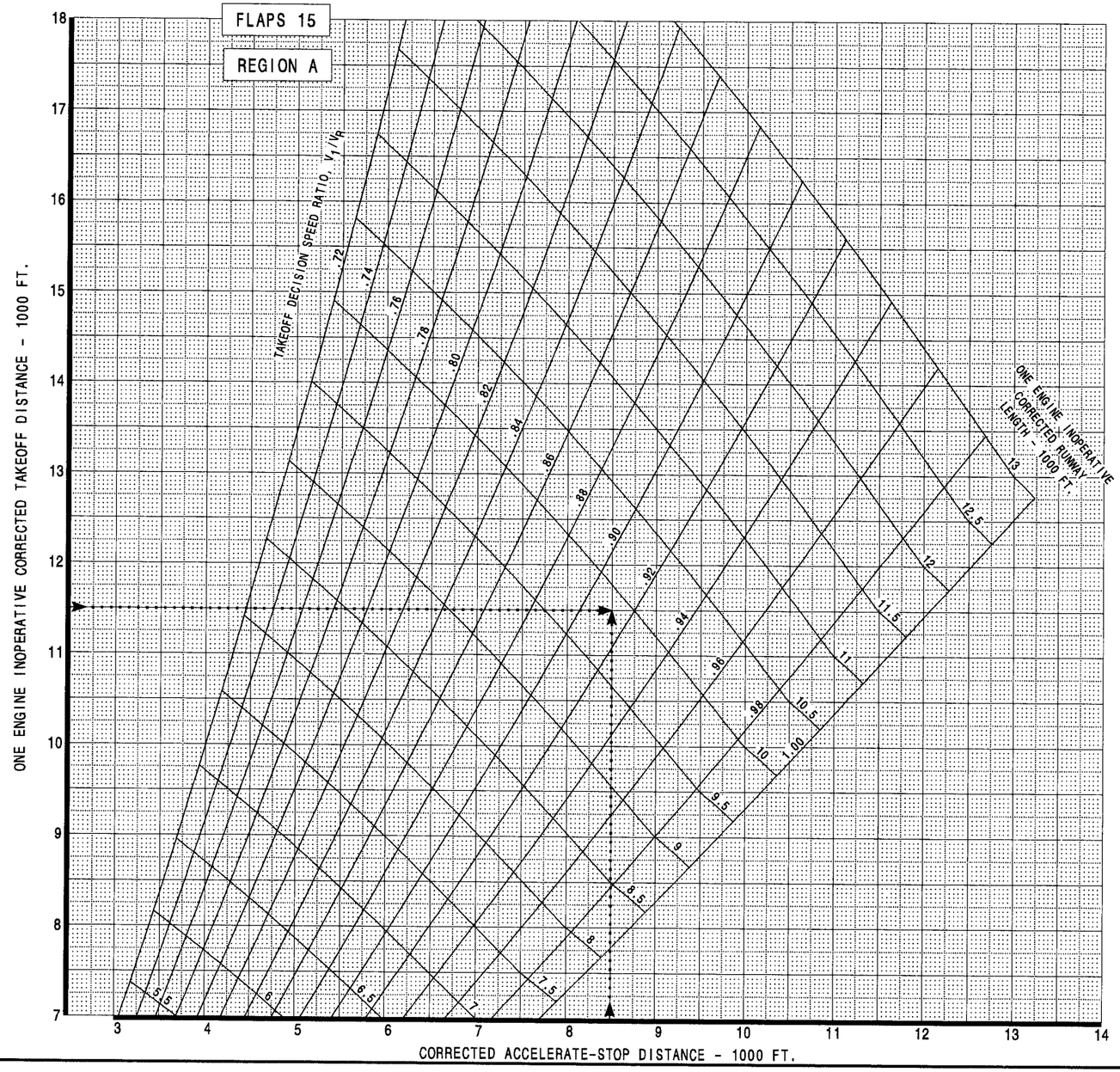
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S39392

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-11

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CF6-80C2B7/B7F

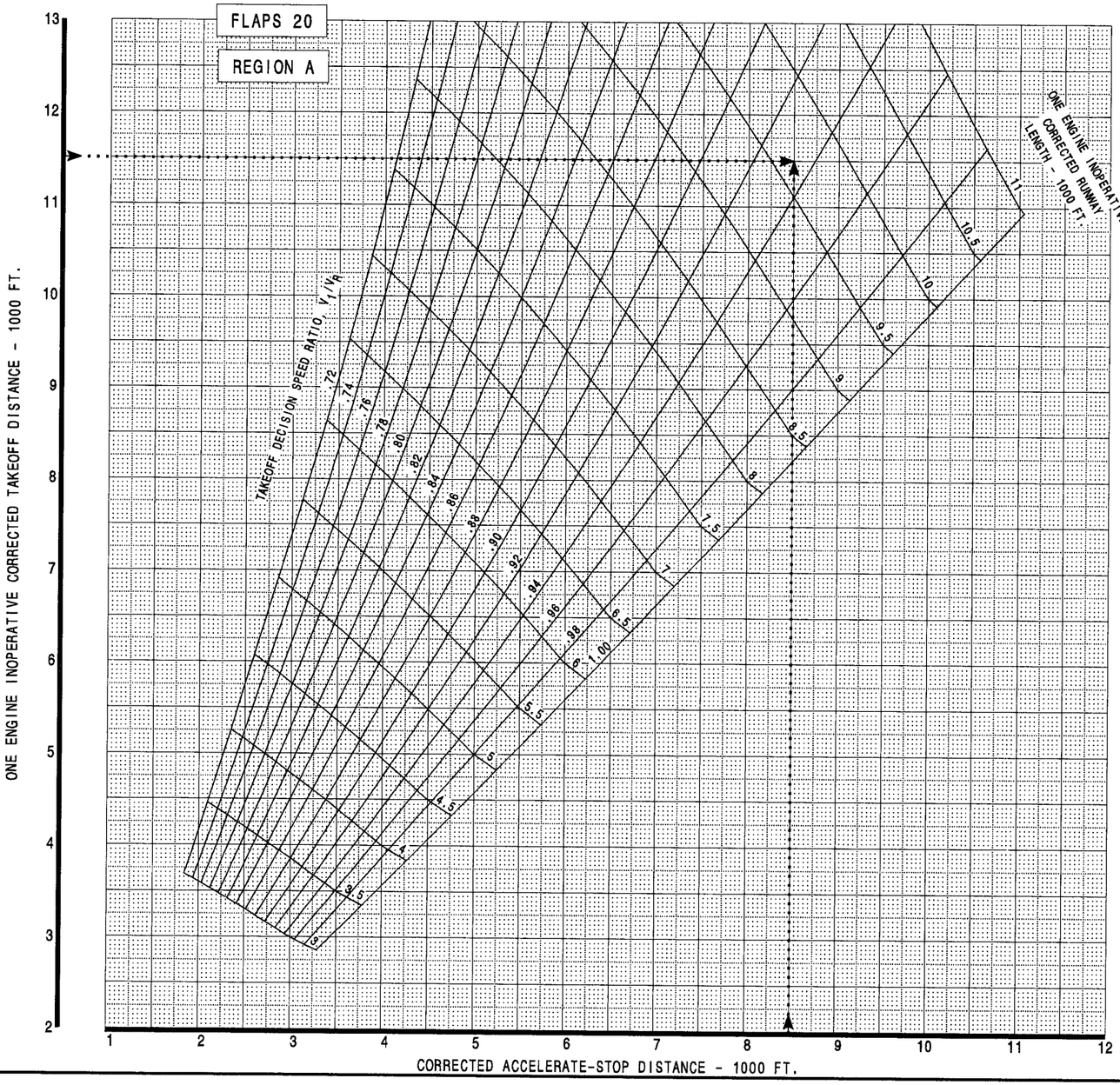
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R. LECHNER	13 NOV 93

S39403

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

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767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	[illegible]	15 NOV 94

S39413

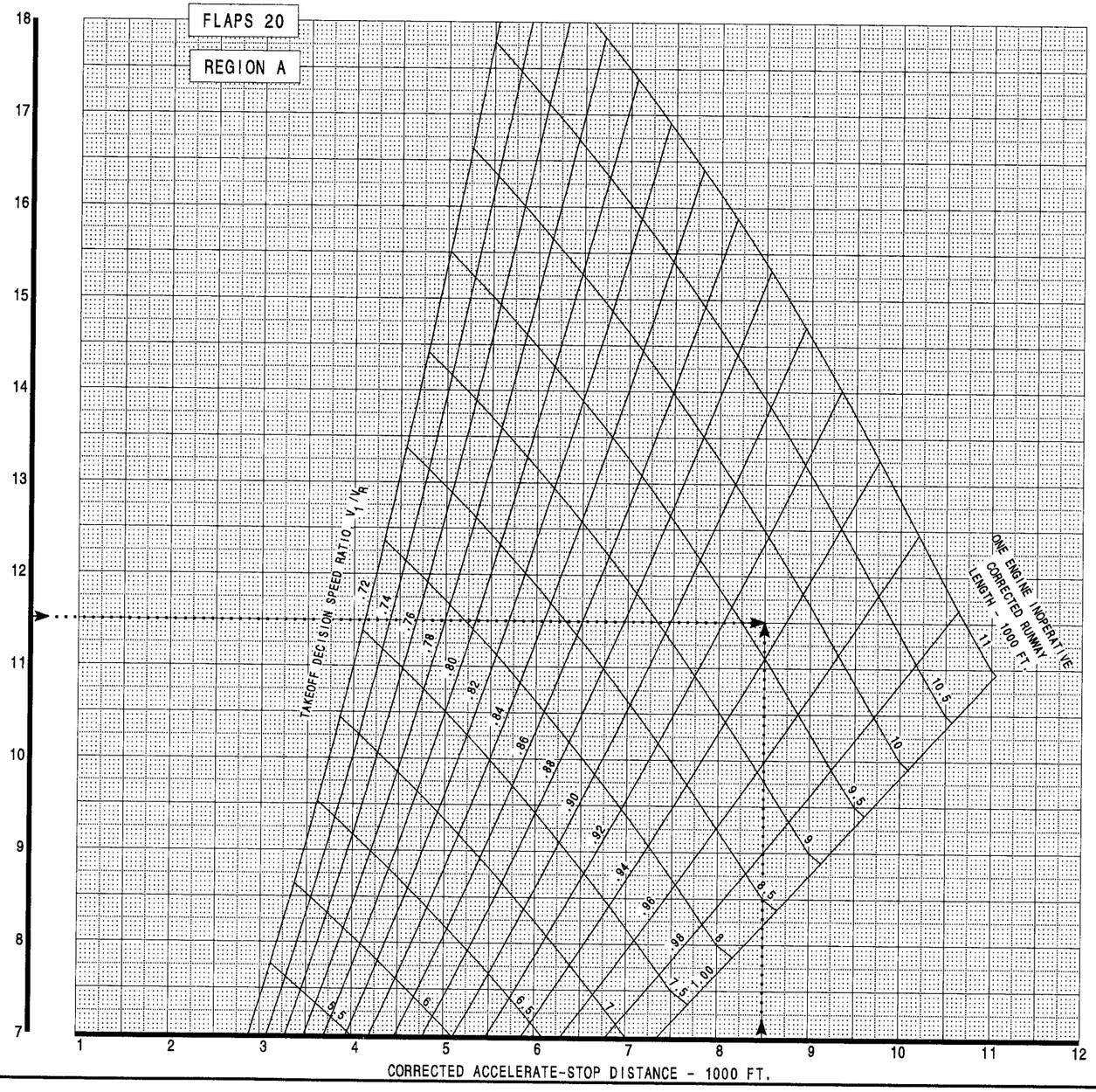
RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.

FLAPS 20

REGION A



P.C. d600314000
D041T513-1 PG. 4.3-13

R. HUGHES
767-300ER
CF6-80C2B7/B7F

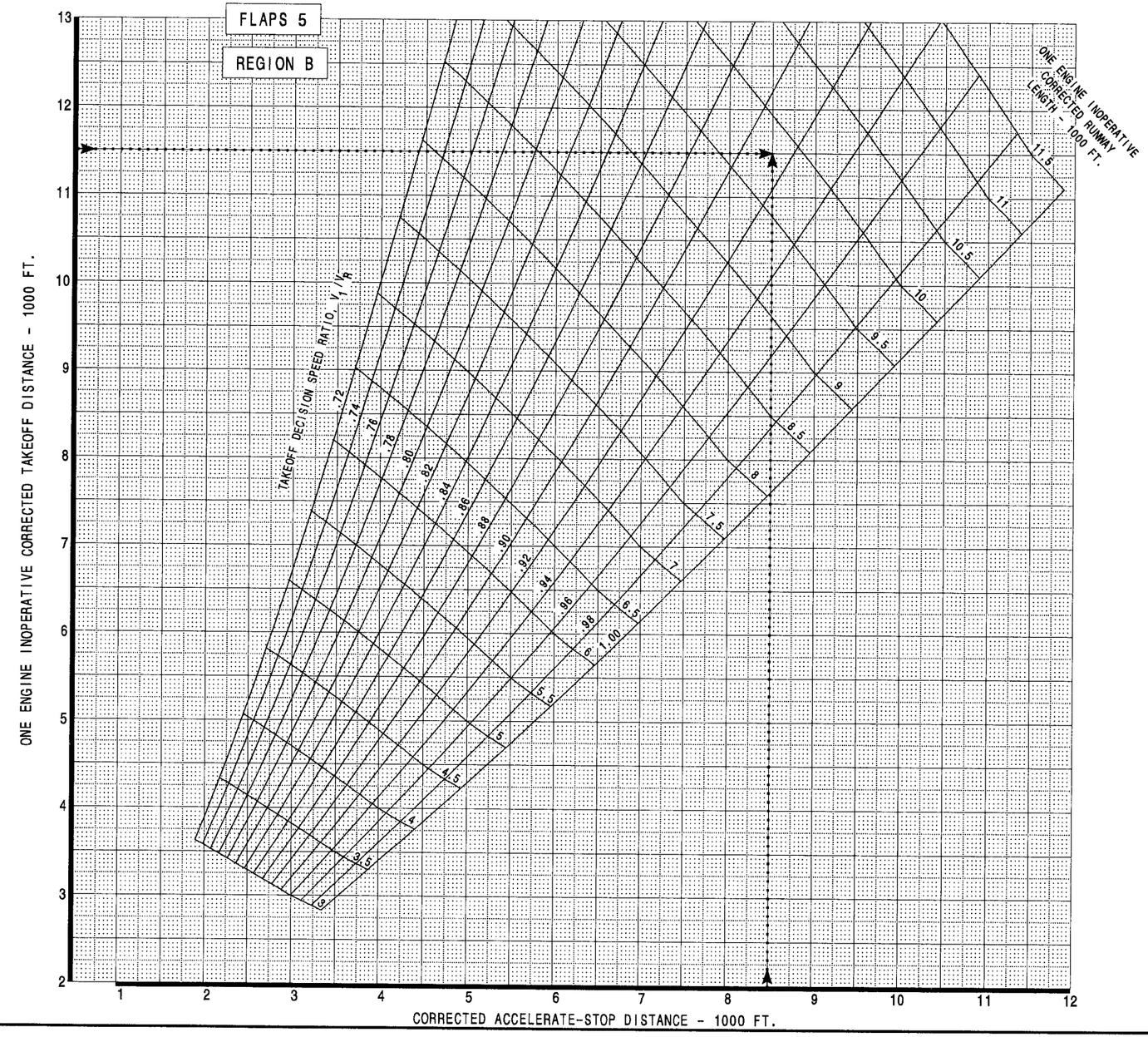
APPROVED	DATE
M. LECHNER	13 JUN 93

S39422

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

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P.C. d600315000
D041T513-1 PG. 4.3-15

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M. LEONARD	13 NOV 92

S39438

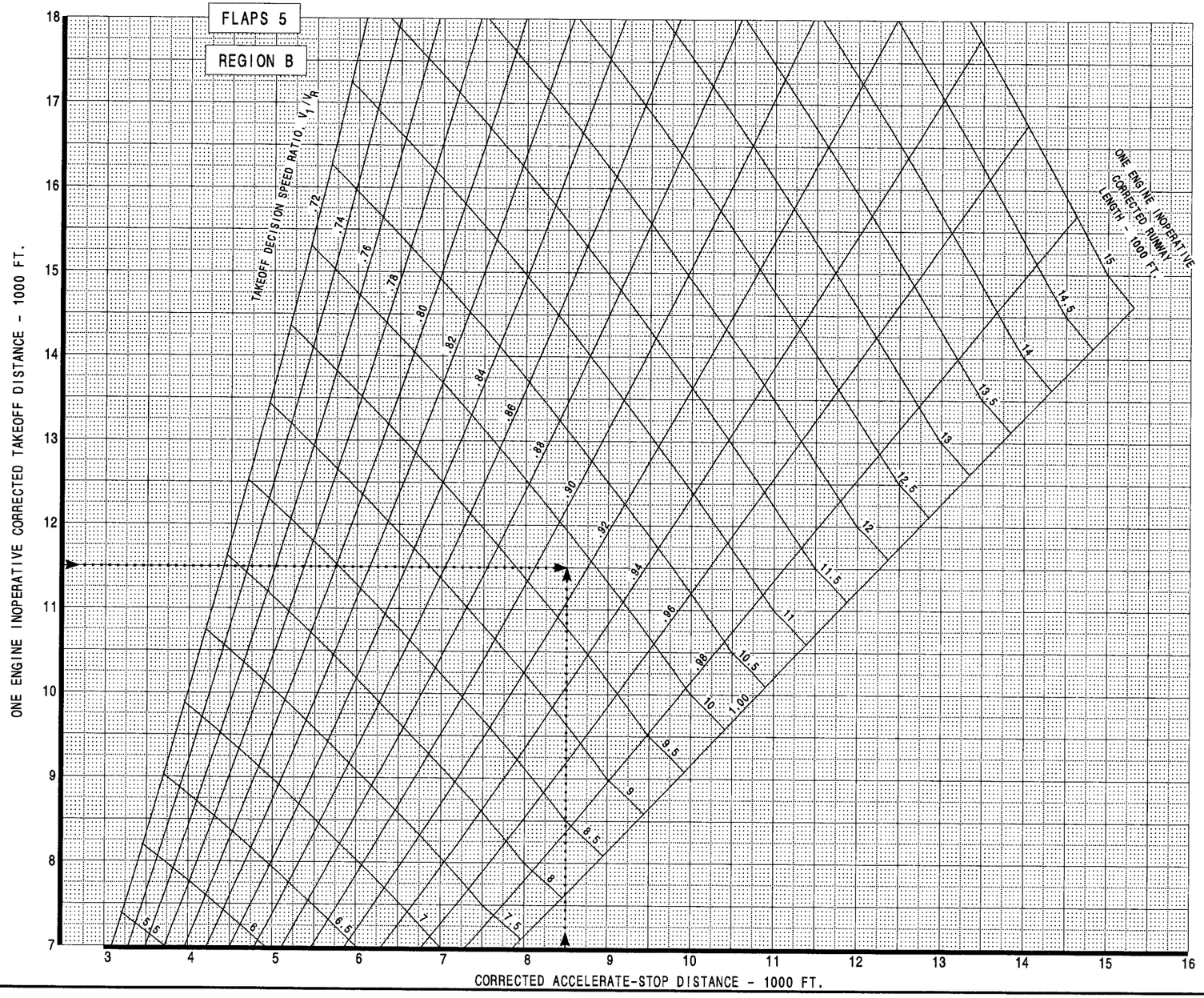
RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.

FLAPS 5

REGION B



P.C. d600316000
D041T513-1 PG. 4.3-15

M. MCGONIGAL

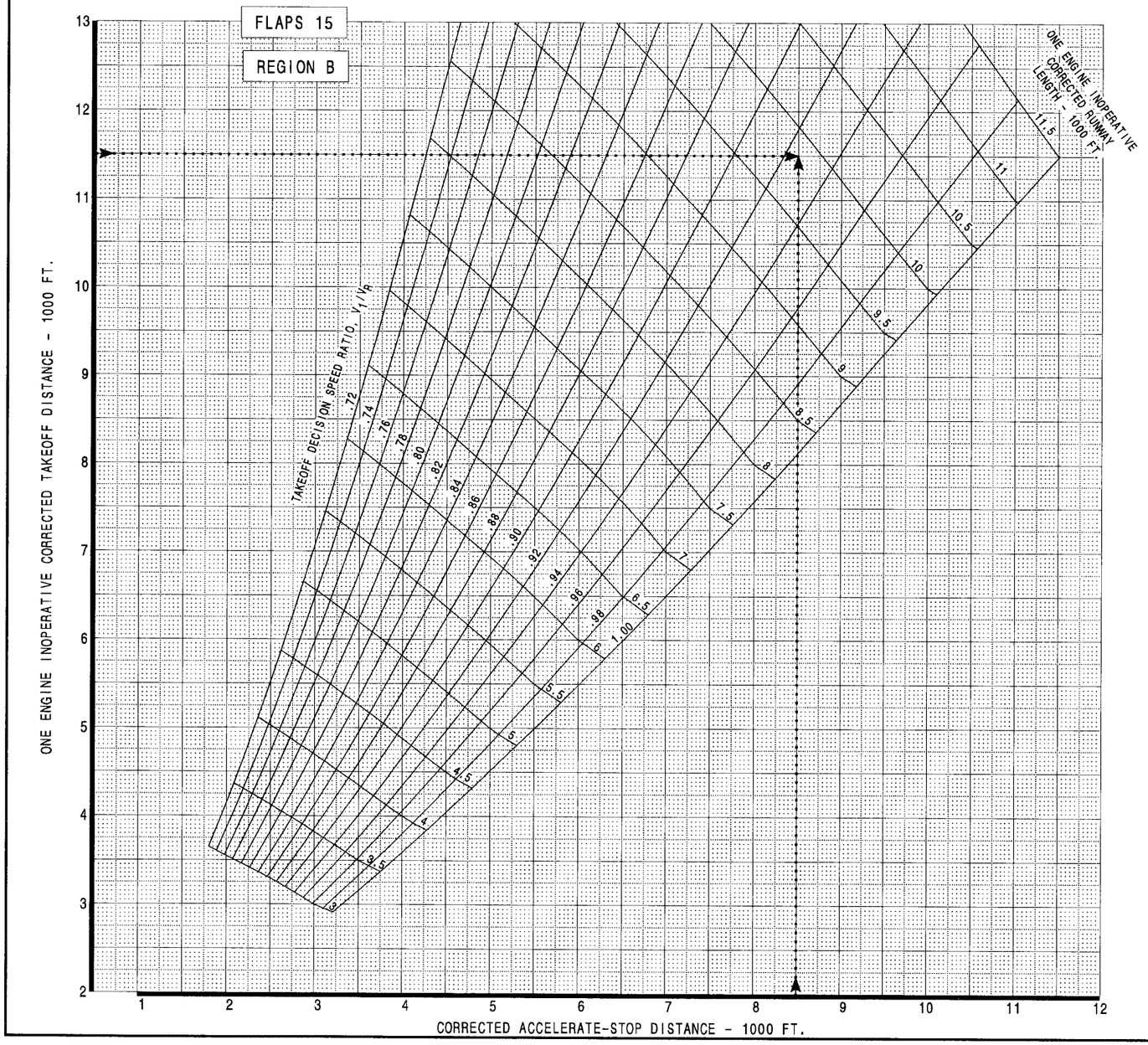
767-300ER	APPROVED	DATE
CF6-80C2B7/B7F	M. McGonigal	13 NOV 93

S39462

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-17

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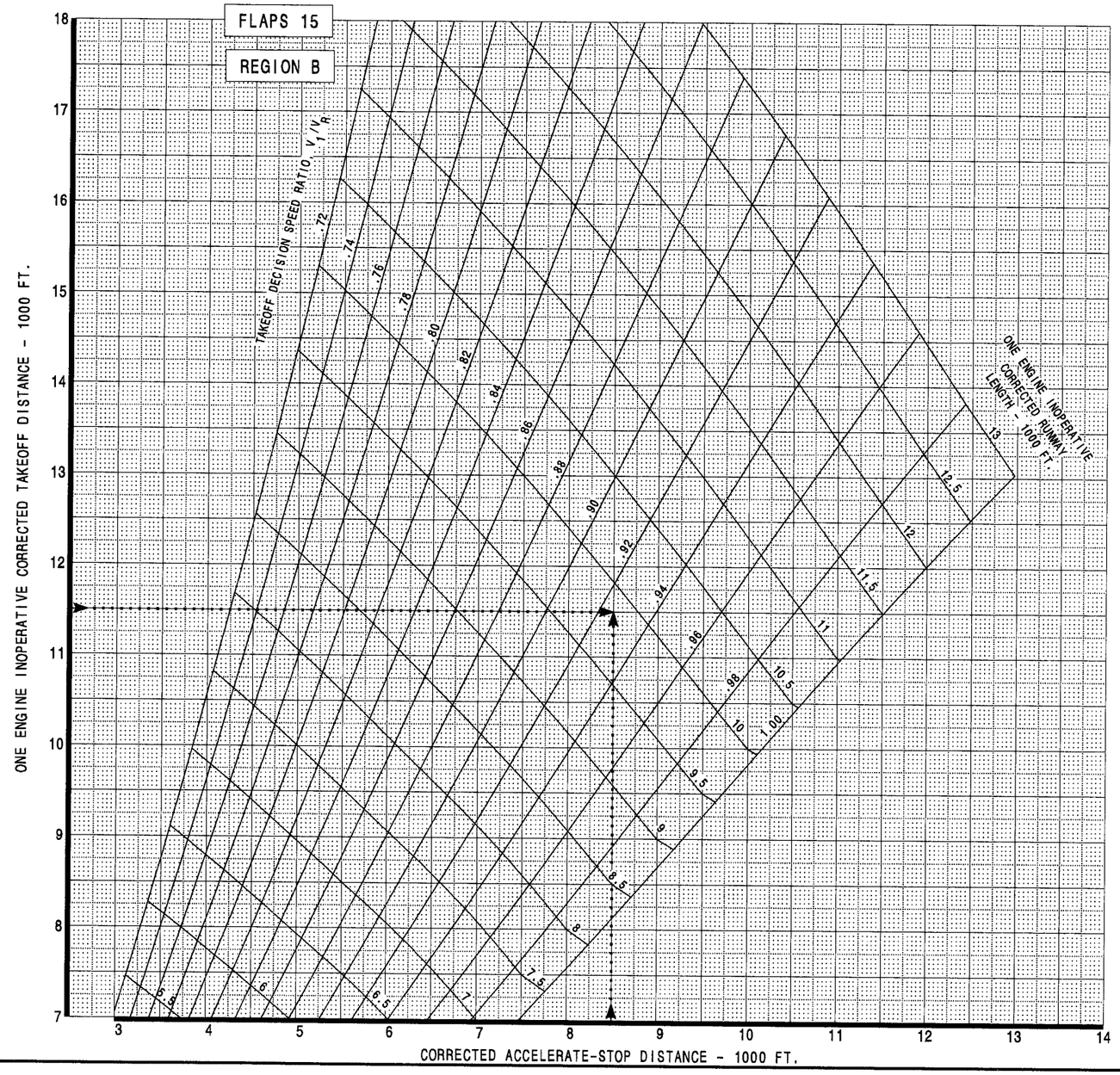
	APPROVED	DATE

S39467

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-17

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767-300ER
CF6-80C2B7/B7F

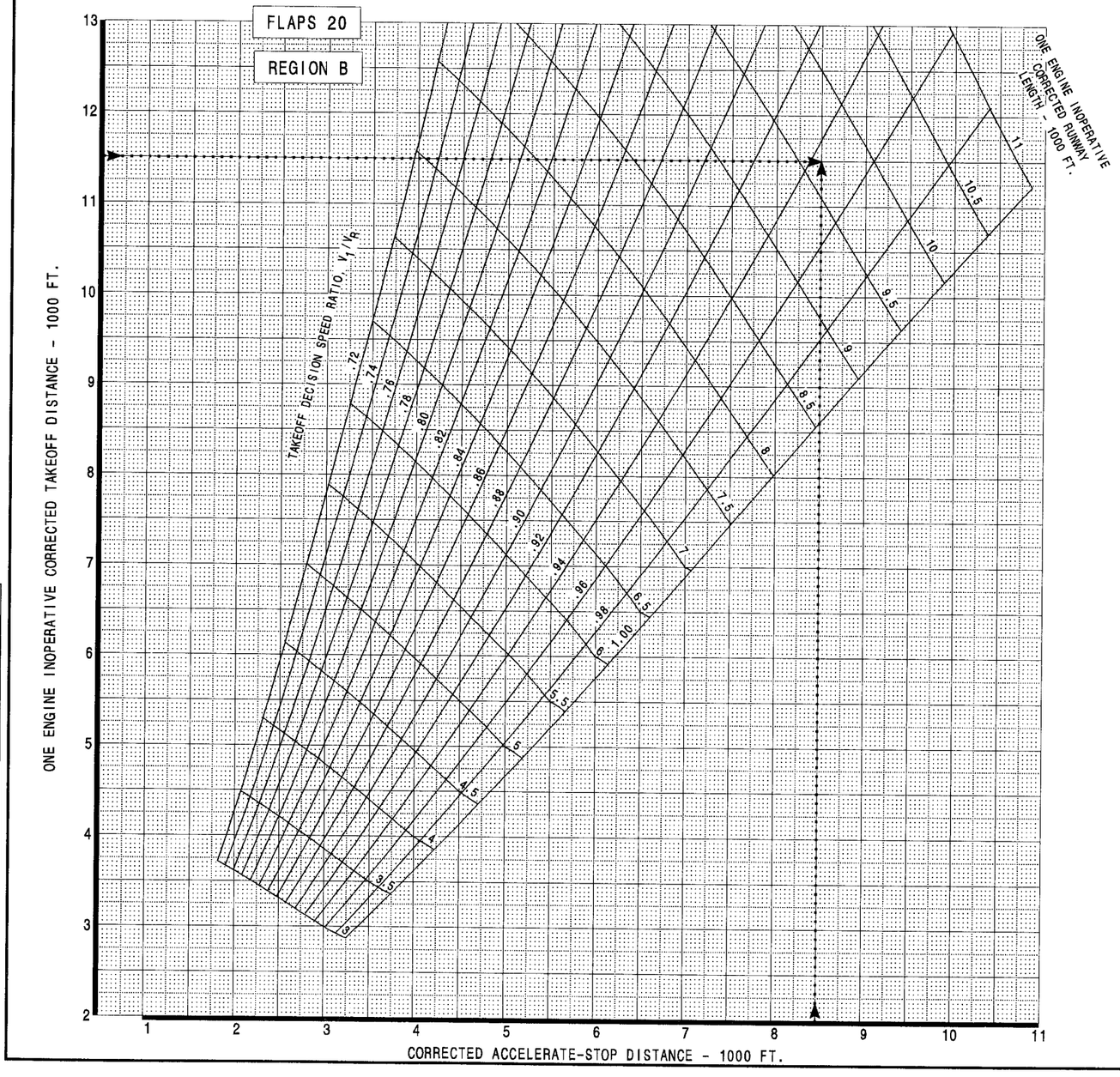
APPROVED M. LECHNER DATE 13 NOV 93

S39507

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

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D041T513-1 PG. 4.3-19

M. MCGONIGAL

APPROVED	DATE
M McGonigal	13 Nov 93

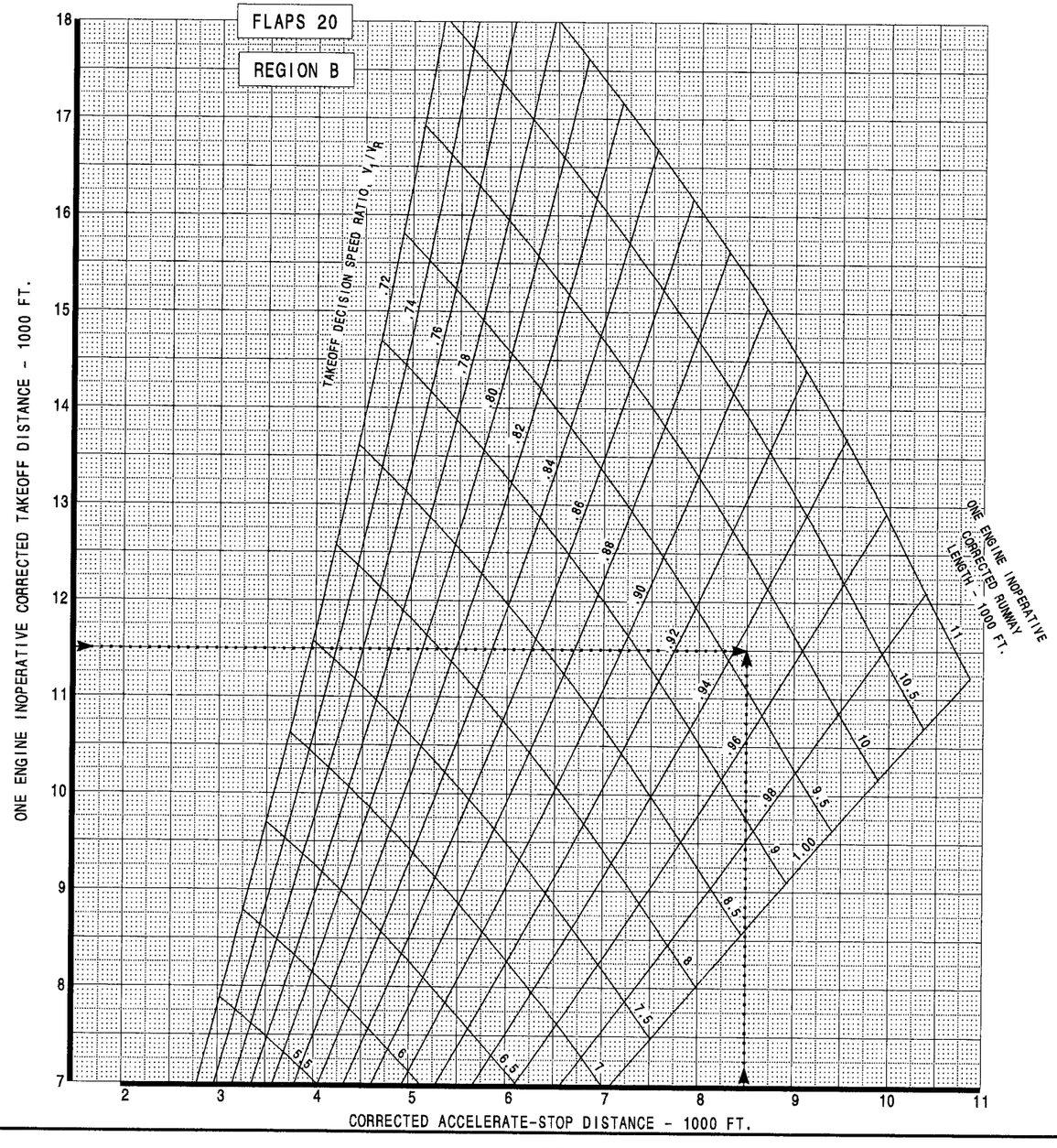
767-300ER
CF6-80C2B7/B7F

S39520

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-19

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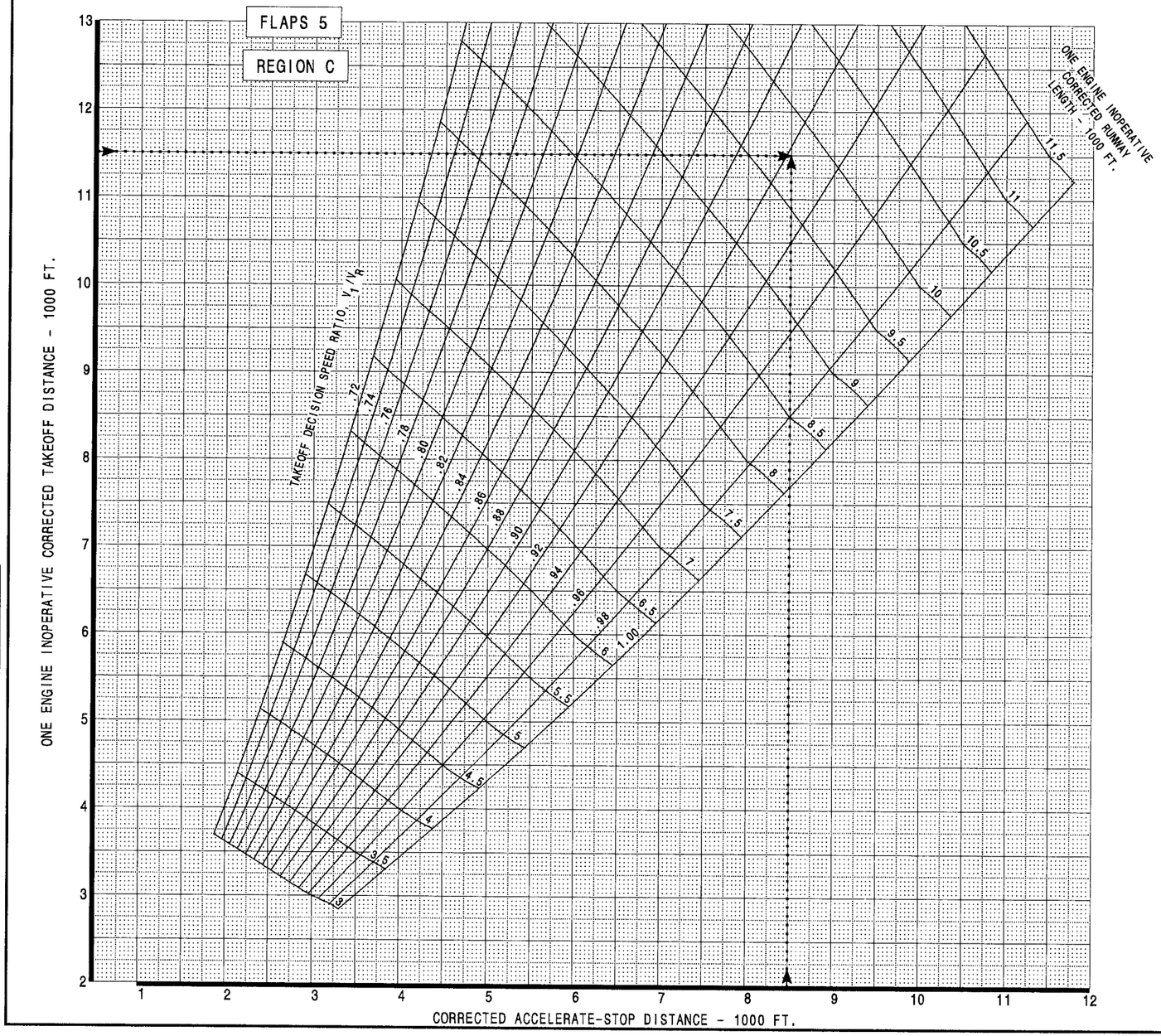
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S39532

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



P.C. d600321000 | D041T513-1 PG. 4.3-21

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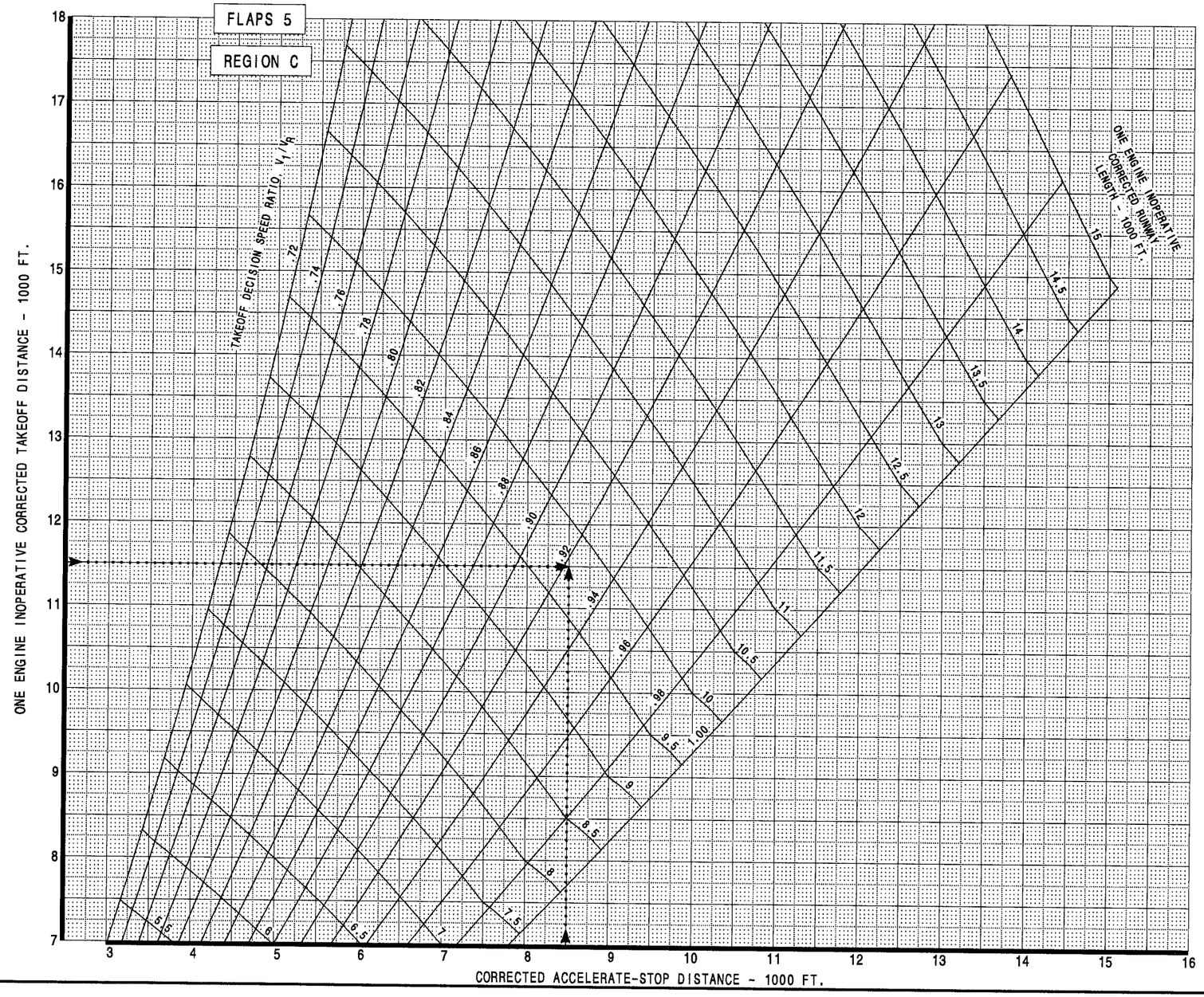
767-300ER	APPROVED	DATE
CF6-80C2B7/B7F		

S39553

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-21

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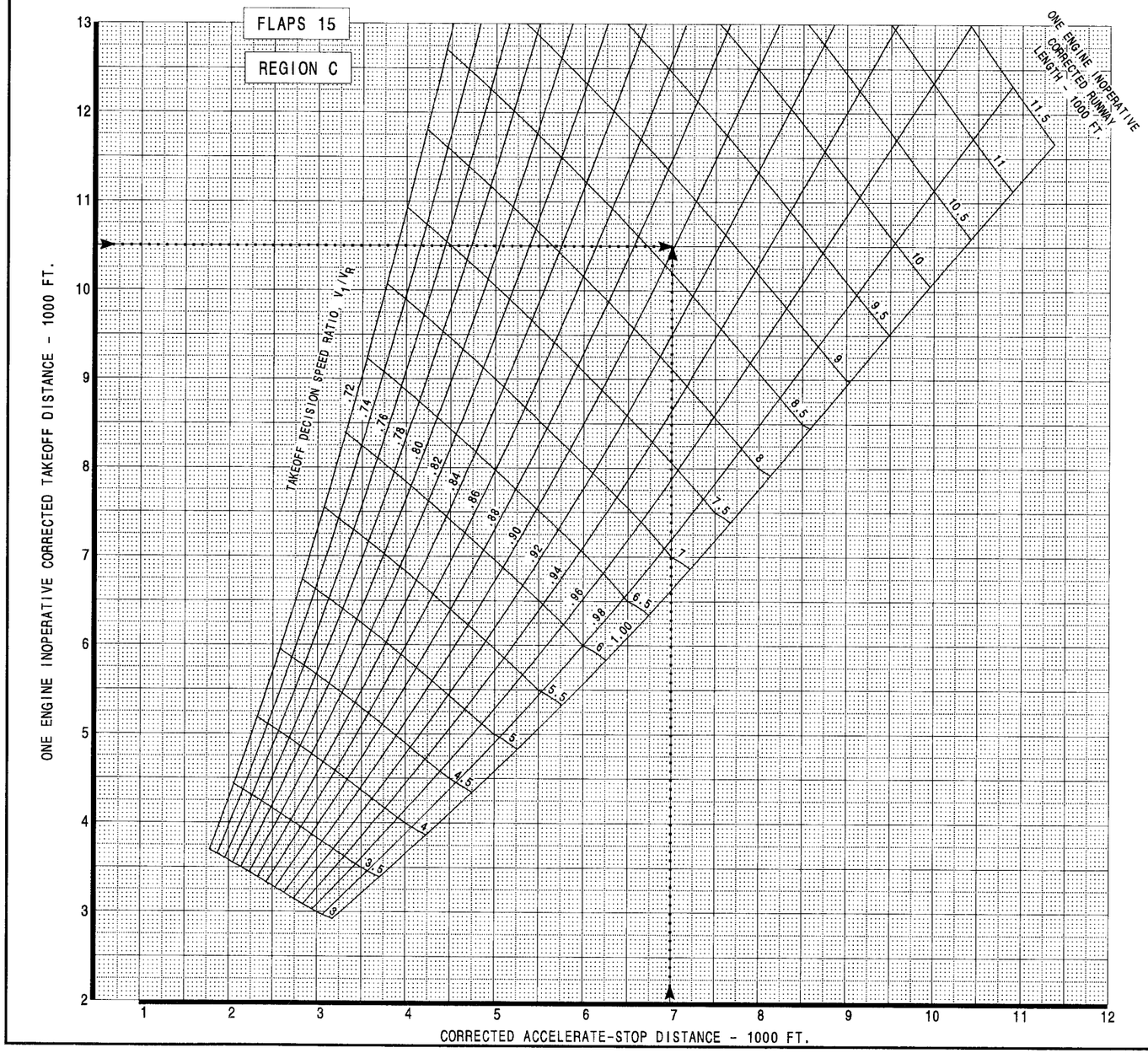
APPROVED	DATE
M. LECHNER	13 NOV 93

S39558

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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M. MCGONIGAL

APPROVED	DATE
M. LEONARD	12 Nov 93

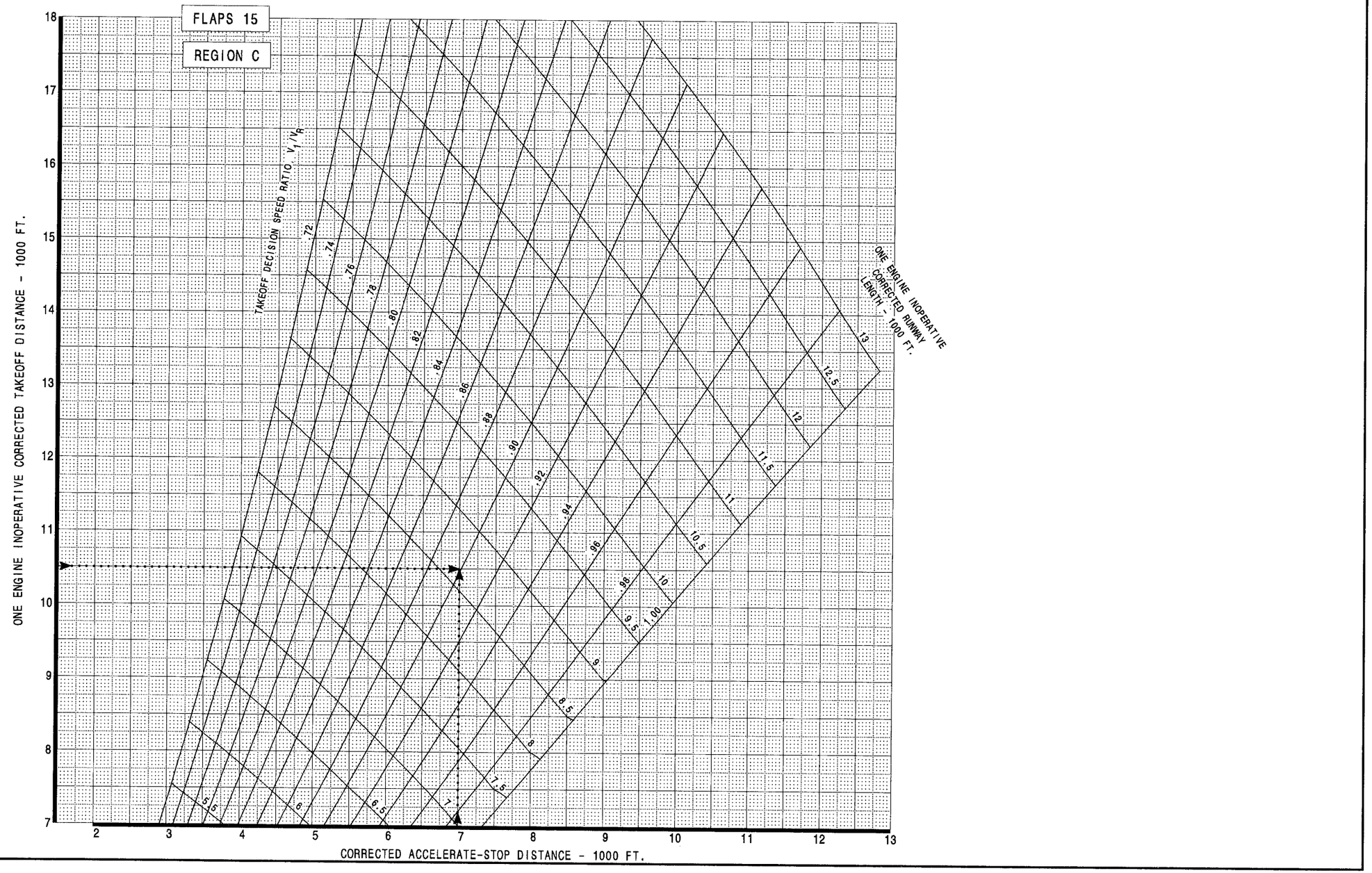
767-300ER
CF6-80C2B7/B7F

S39563

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-23

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CF6-80C2B7/B7F

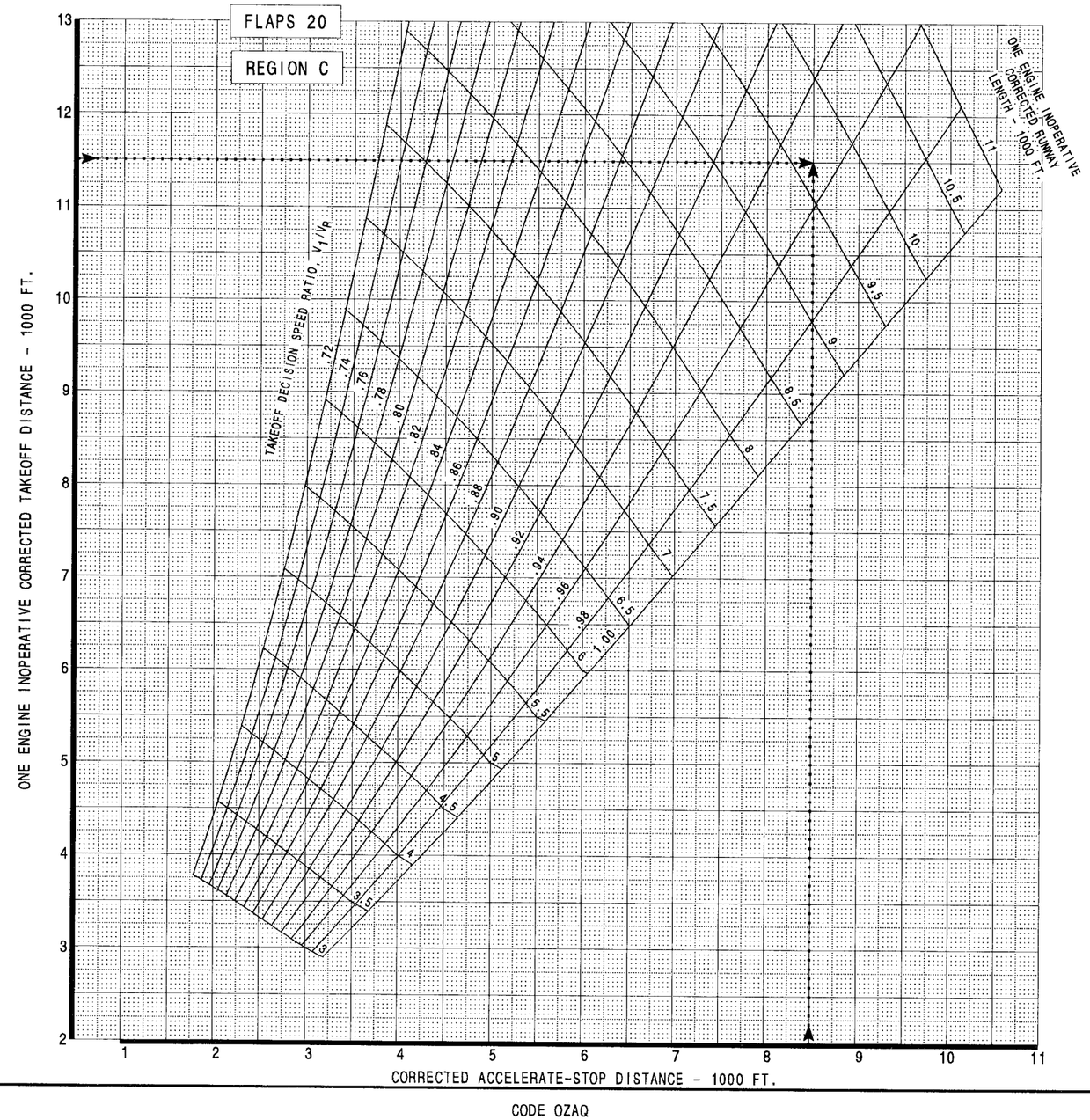
APPROVED M. LECHNER DATE 13 MAY 93

S39568

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



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D041T513-1 PG. 4.3-25

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CF6-80C2B7/B7F

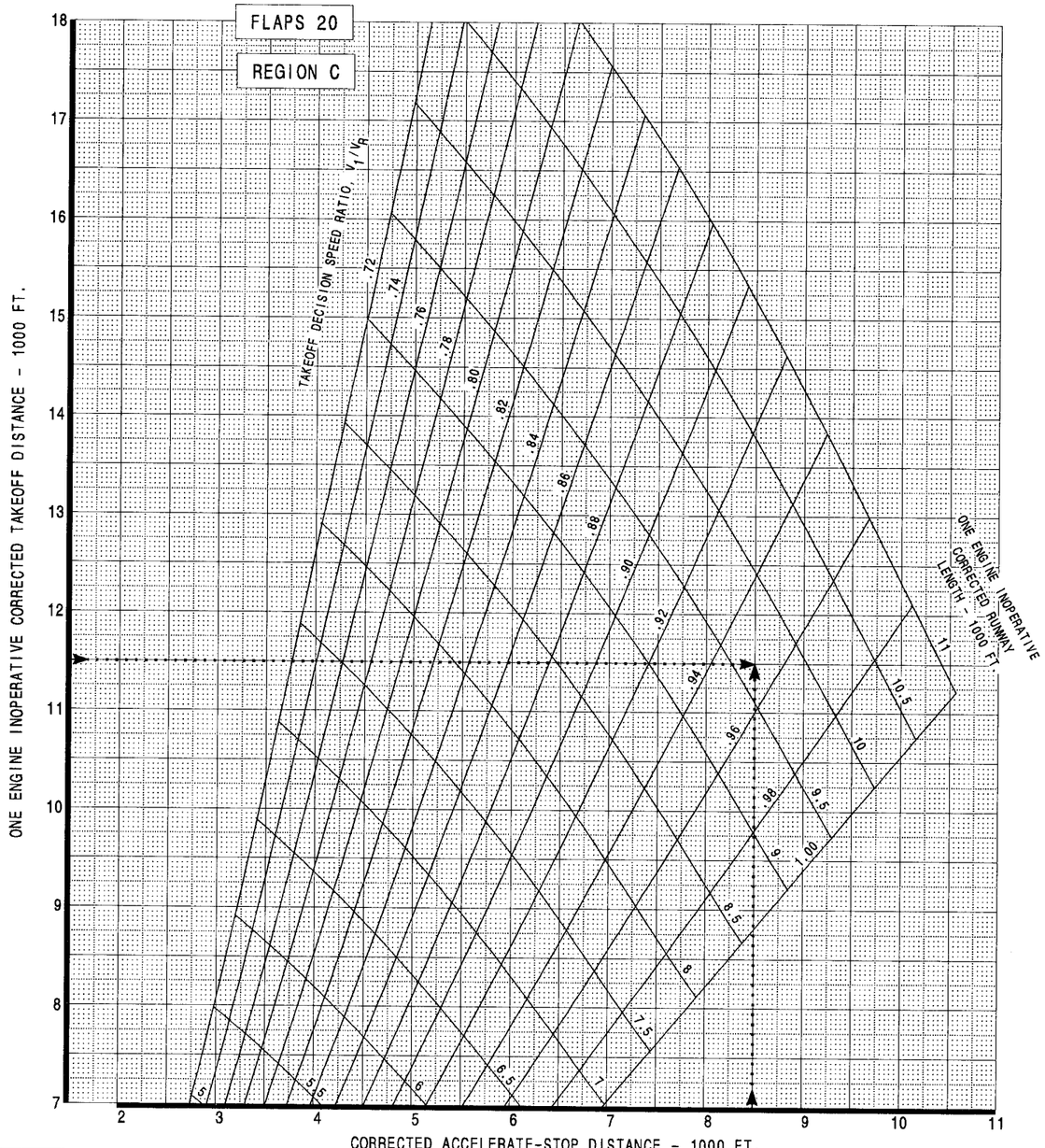
APPROVED	DATE
	13 Dec 93

S39573

RUNWAY LENGTH AND V_1 ADJUSTMENTS

CATEGORY C BRAKES

■ FOR REGION APPLICABILITY, SEE RUNWAY LENGTH AND V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.



P.C. d600326000
D041T513-1 PG. 4.3-25

APPROVED	DATE
M. MCGONIGAL	13 NOV 93

767-300ER
CF6-80C2B7/B7F

S39577

SECTION 4.4 - FIELD LENGTH LIMITS

C O N T E N T S

PAGE

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Takeoff Field Length 2
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A/C ON - FLAPS 15 10
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A/C OFF - FLAPS 20. 13
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A/C OFF - FLAPS 5 16
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A/C OFF - FLAPS 15. 19
A/C ON - FLAPS 20 20
A/C OFF - FLAPS 20. 21

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

FIELD LENGTH LIMITS

G E N E R A L

The charts in this section show the relationship between corrected runway length and takeoff gross weight that satisfies the Federal Aviation Regulations related to field length limited gross weight for one engine inoperative and all engines operating takeoffs. Separate charts are included for air conditioning (A/C) packs on and off and for the different takeoff flaps. The one engine inoperative and the all engines operating corrected runway lengths are obtained from the actual runway length conditions using the charts in Section 4.3. The lesser of the one engine inoperative and the all engines operating field length limited takeoff gross weight is the field length limited takeoff gross weight. The scheduled takeoff gross weight cannot exceed the field length limited gross weight. See the example problem appendix for a numerical example of the use of these charts.

Brake part numbers (P.N.) in the same category produce equal braking performance for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

T A K E O F F F I E L D L E N G T H

Takeoff field length performance shown in this section accounts for: (1) 115 percent of the all-engine operating distance, and (2) the engine inoperative distance, considering a failure of the critical engine at VEF. These distances are based on a smooth, dry hard-surfaced runway, and the following conditions:

1. The configuration outlined under Performance Configuration in Section 4.1 was used.

2. Takeoff thrust was obtained by using the thrust setting procedures outlined under Takeoff Procedures in Section 4.1.

3. Engine failure takeoff distances accounted for a 1 second time delay for engine failure recognition.

4. When a decision to stop was made at or just prior to reaching V_1, the braking procedure outlined under Takeoff Procedures in Section 4.1 was used. Reverse thrust was not used to determine takeoff field lengths.

5. When a decision to continue with a failed engine was made at or after reaching V_1, rotation was initiated at scheduled V_R and scheduled V_2 attained at a height of 35 feet.

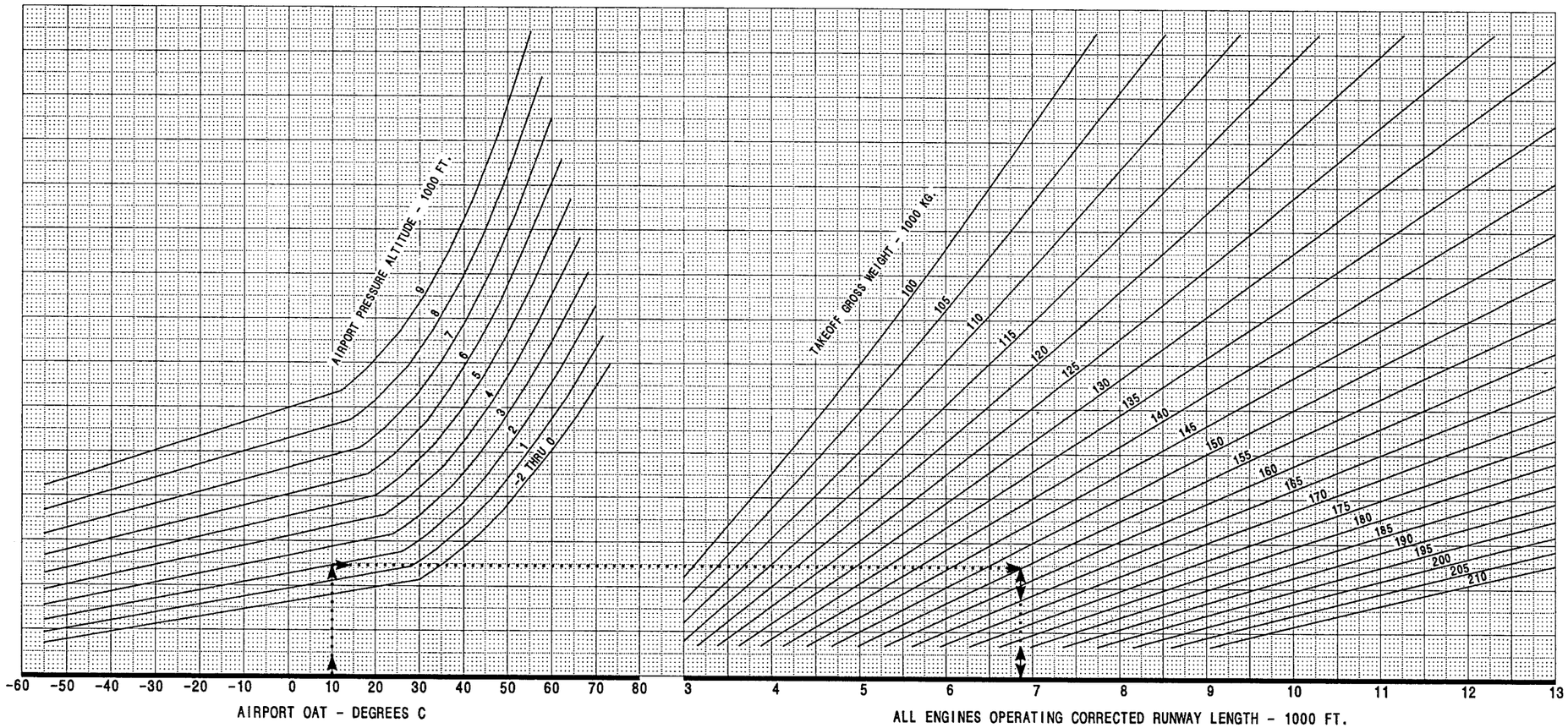
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS ON



P.C. d600406003
D041T513-1 PG. 4.4-6

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED M. MYERS DATE 21 OCT 94

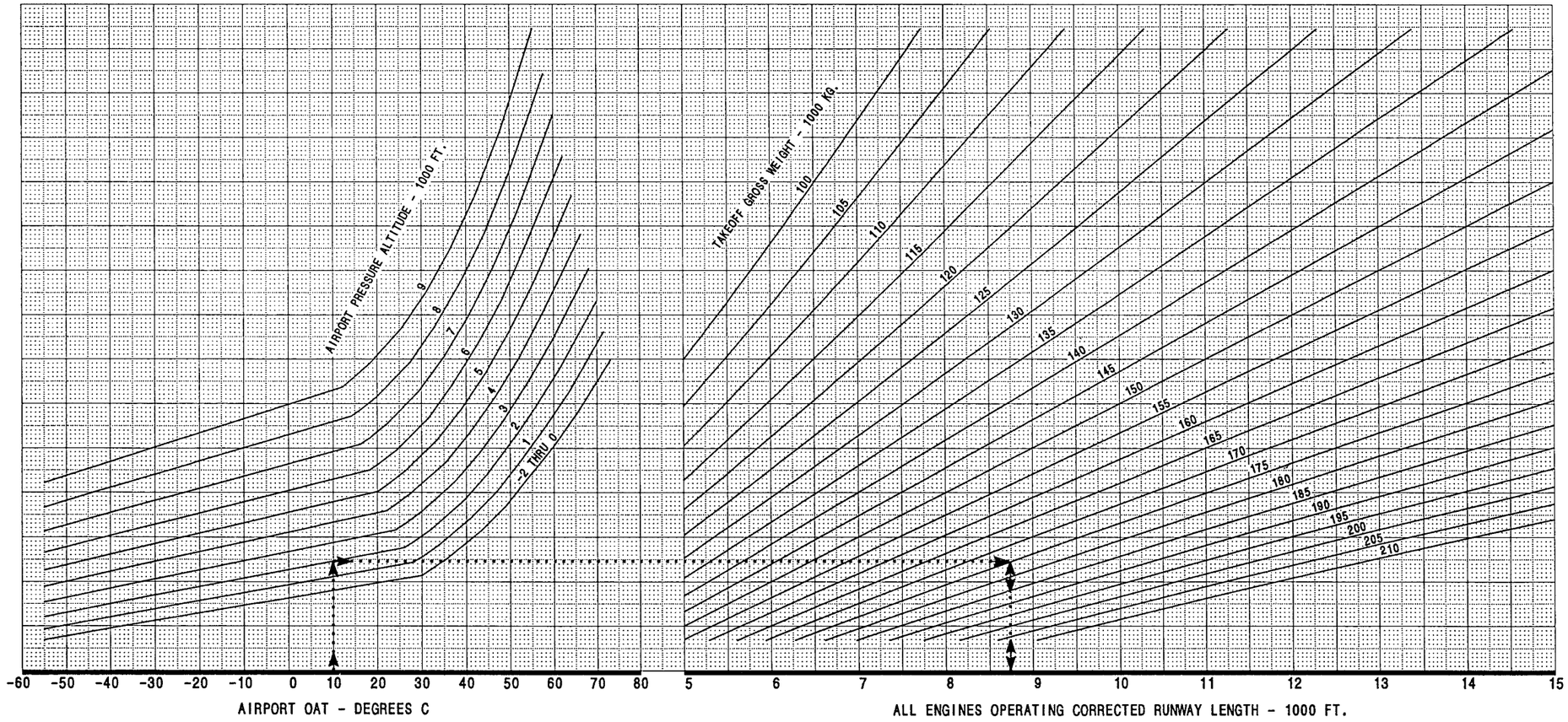
S39963

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS ON



P.C. d600407003
D041T513-1 PG. 4.4-6

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED M.MYERS DATE 21Oct94

S39972

FIELD LENGTH LIMITS

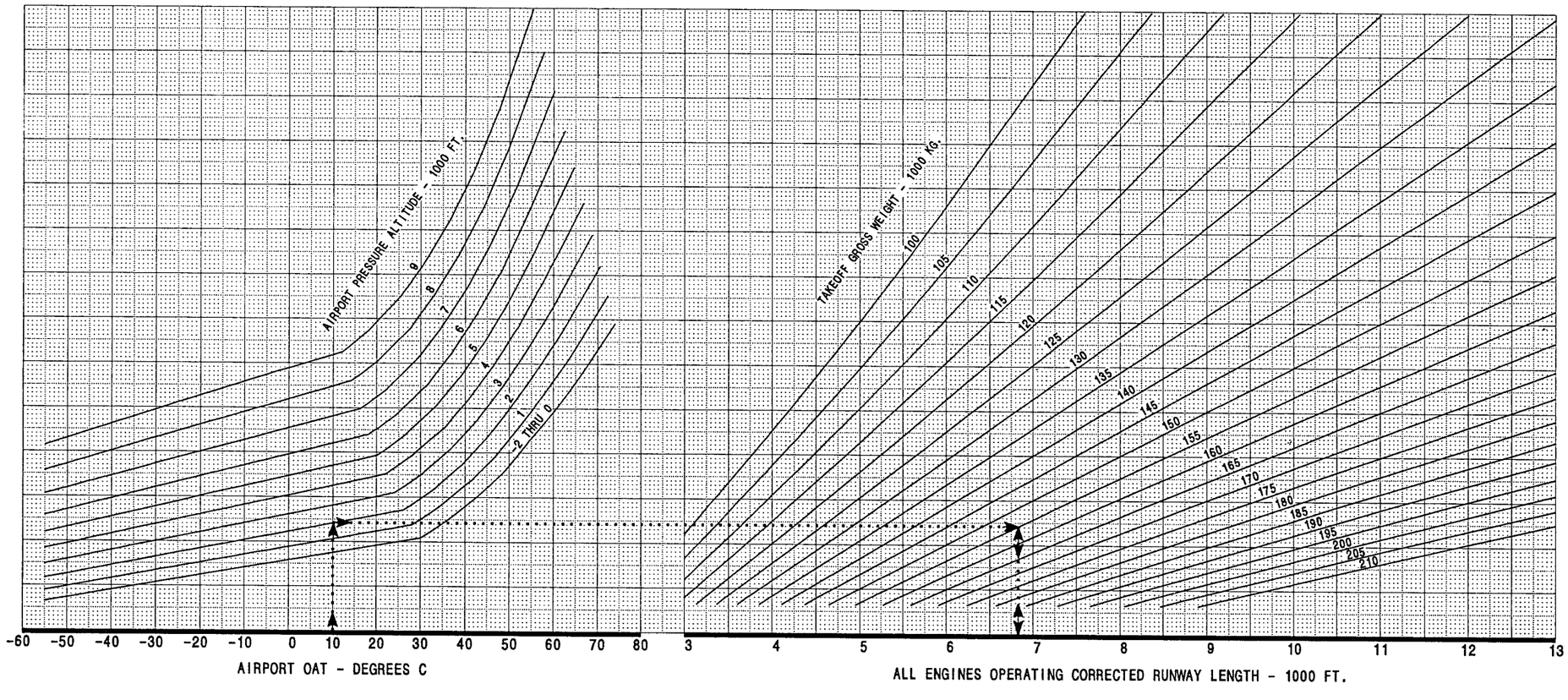
ALL ENGINES OPERATING

FLAPS 5

A/C PACKS OFF

P.C. d600408003
D041T513-1 PG. 4.4-8

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F
APPROVED M.MYERS DATE 21Oct94

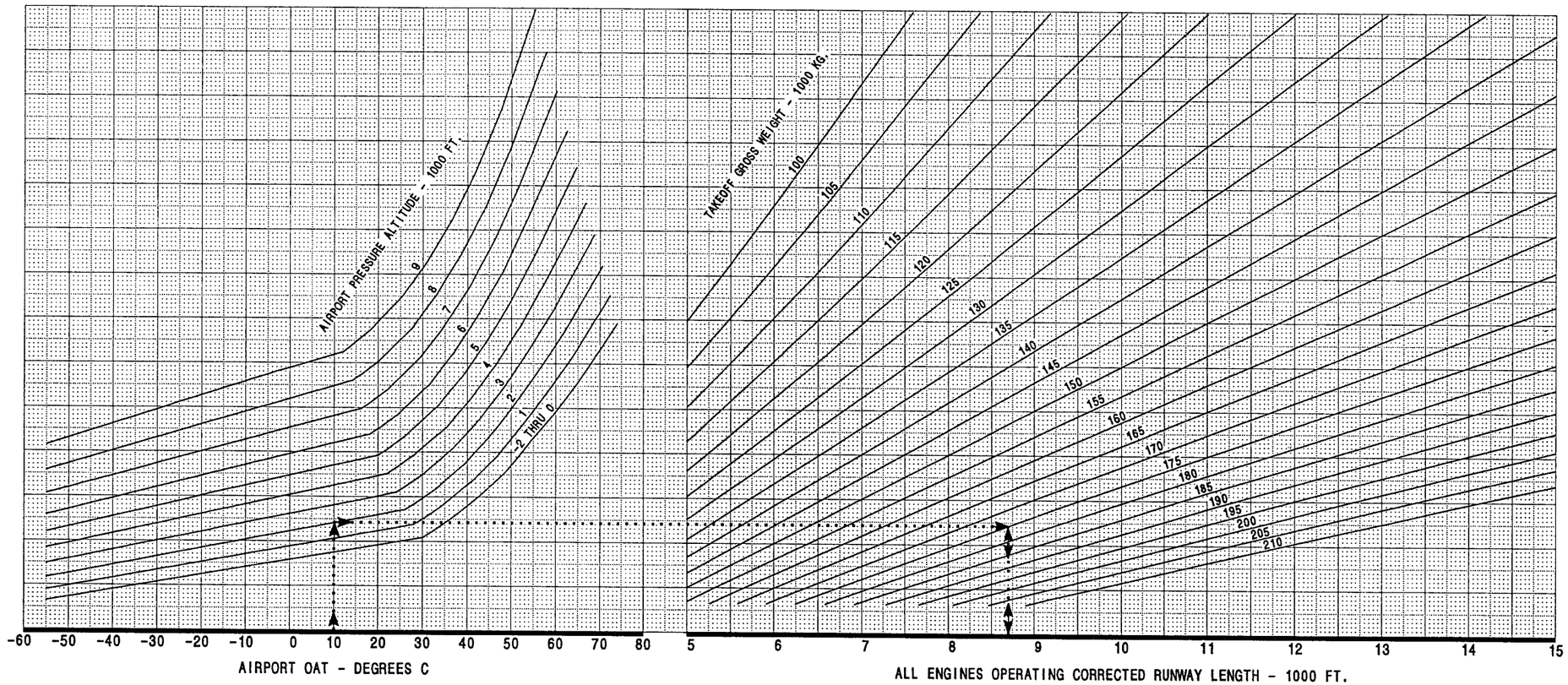


FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS OFF



P.C. d600409003
D041T513-1 PG. 4.4-8

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M.MYERS	20APR

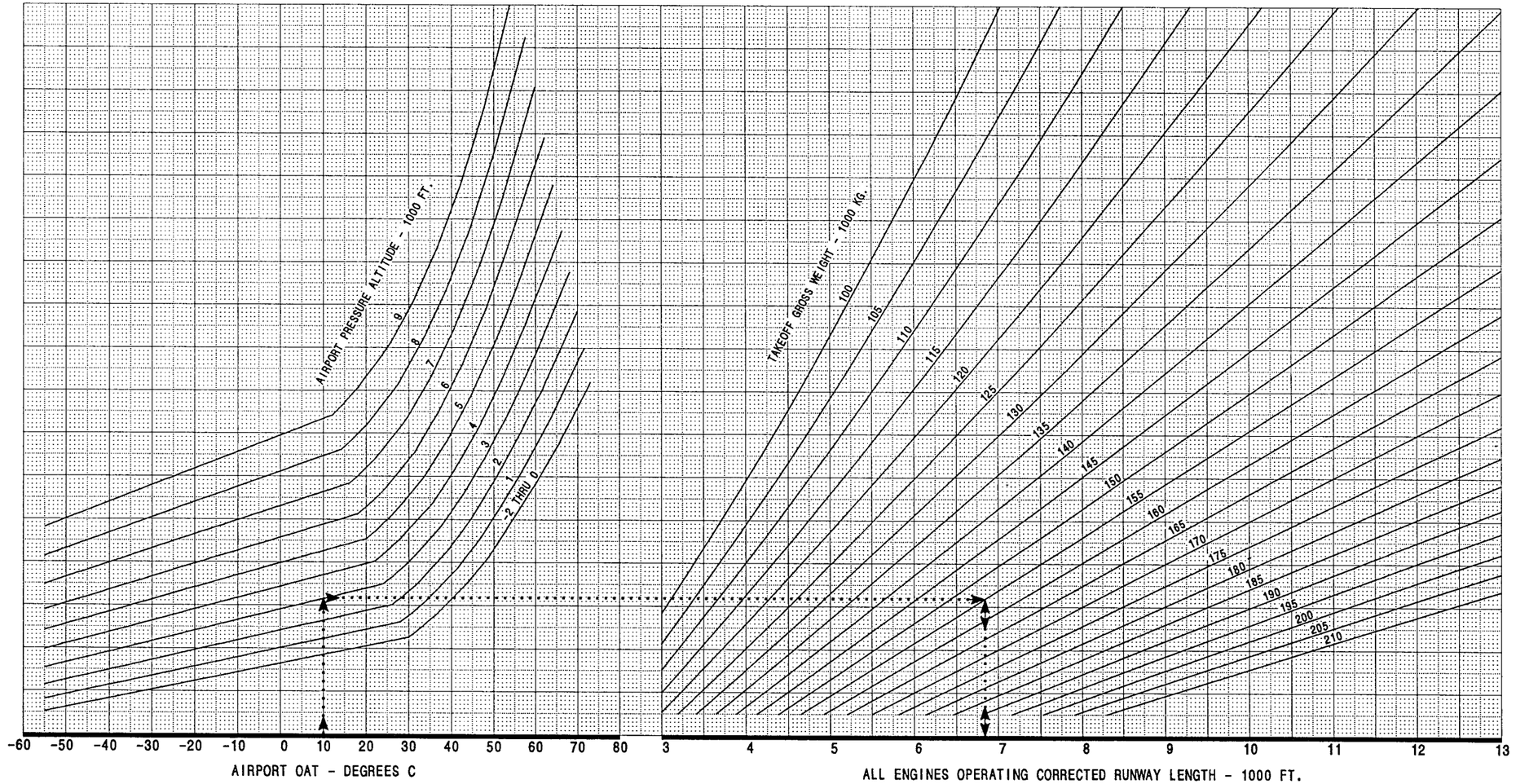
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS ON



P.C. d600410003
D041T513-1 PG. 4.4-10

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

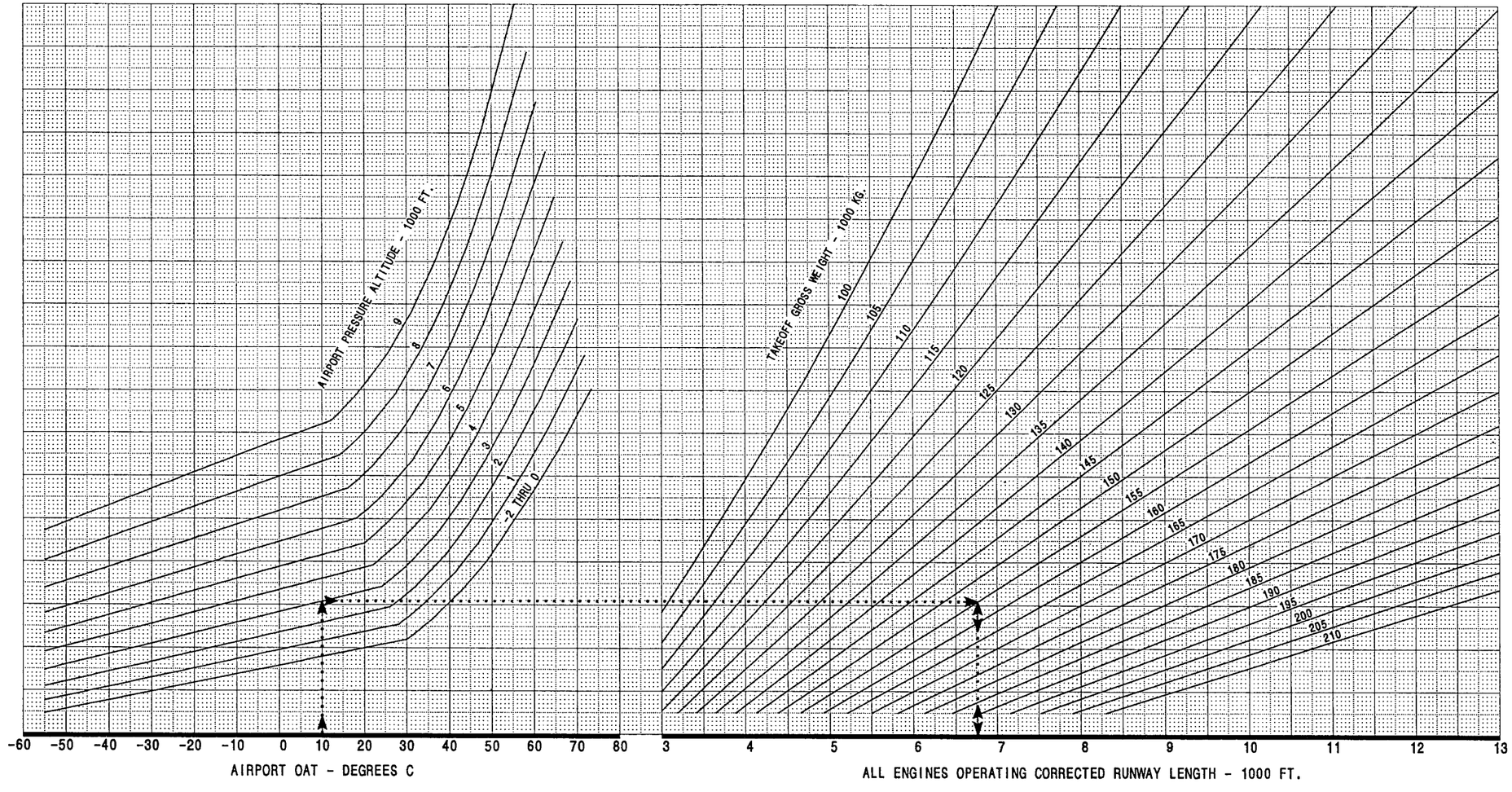
APPROVED M.MYERS DATE 2/06/94

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS OFF



P.C. d600411003
D041T513-1 PG. 4.4-11

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M. Myers	21 Oct 94

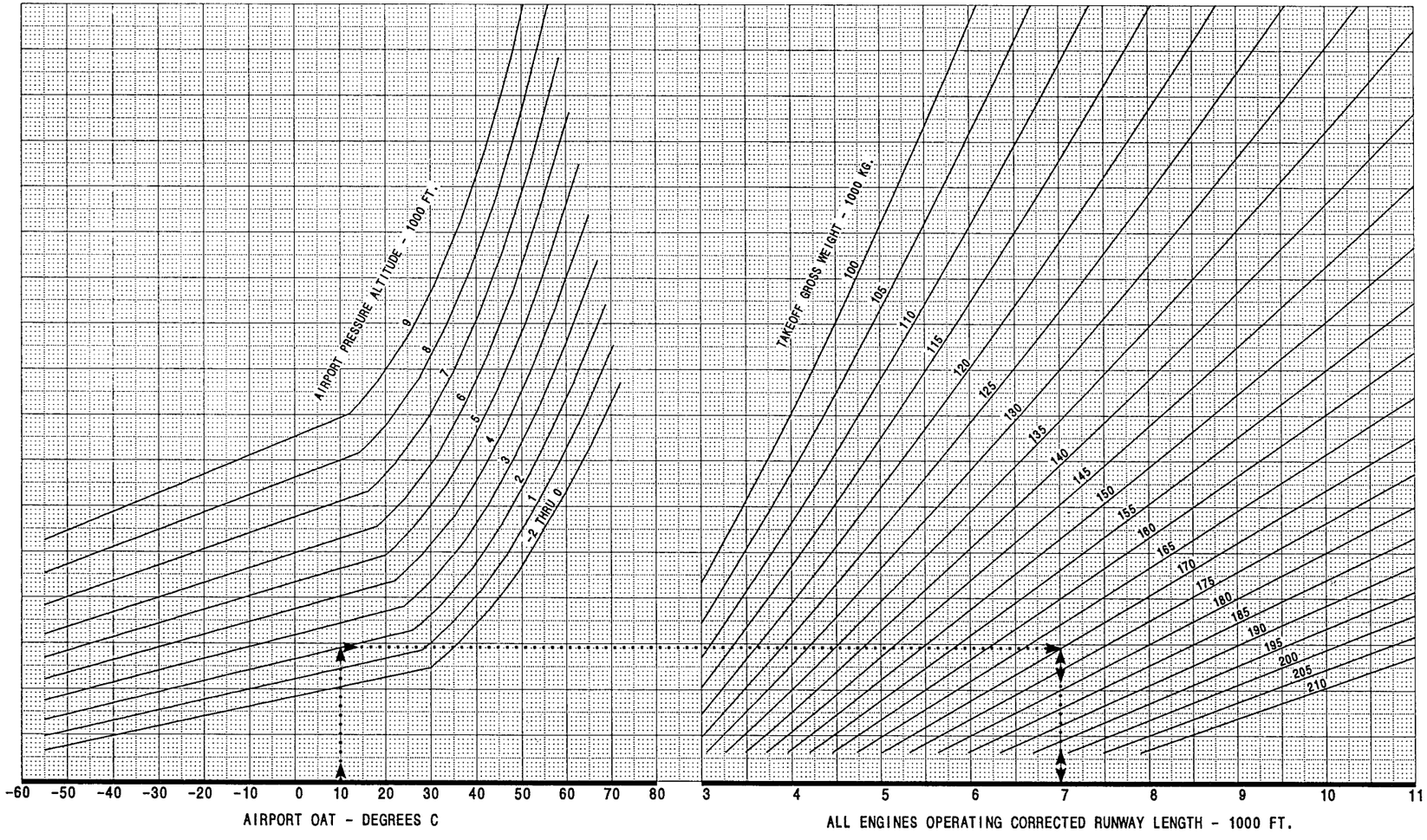
S40275

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS ON



P.C. d600412003
D041T513-1 PG. 4.4-12

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F
APPROVED N. MYERS DATE 2 Oct 94

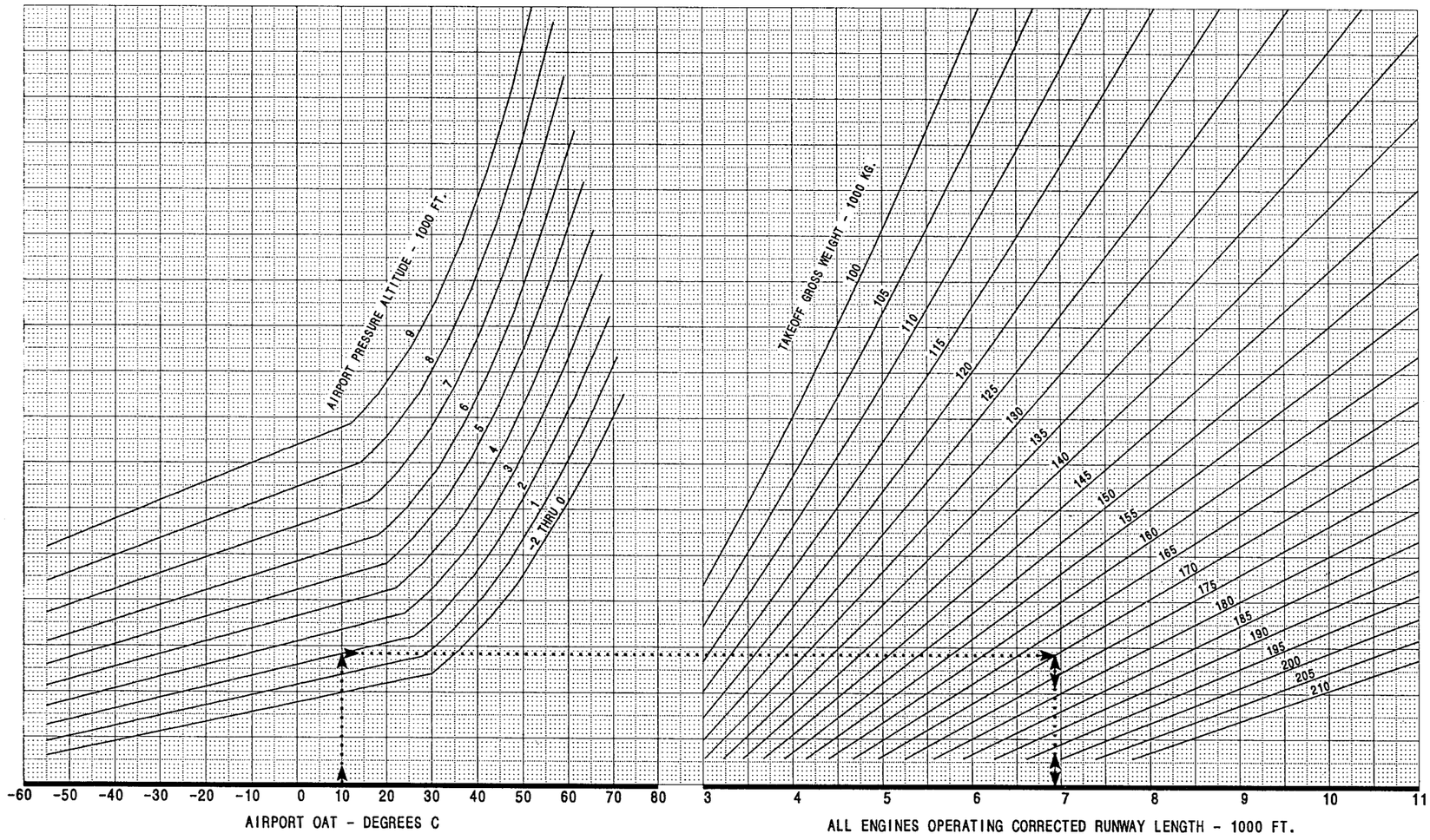
S40287

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS OFF



P.C. 4600413003
D041T513-1 PG. 4.4-13

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M. MYERS	2 Oct 94

S40297

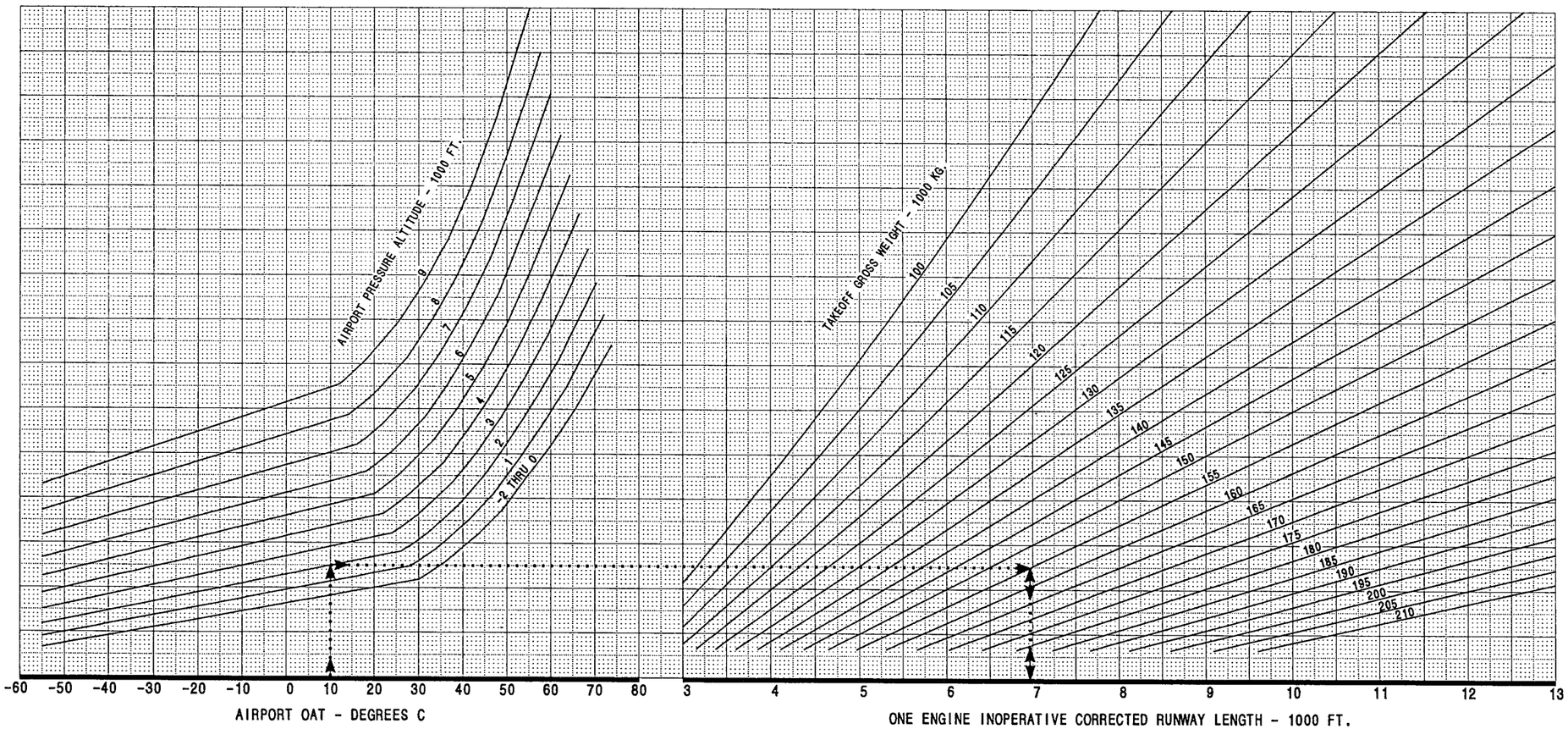
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 5

A/C PACKS ON



P.C. d600414003
D041T513-1 PG. 4.4-14

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED M.MYERS DATE 21 Oct 94

S40304

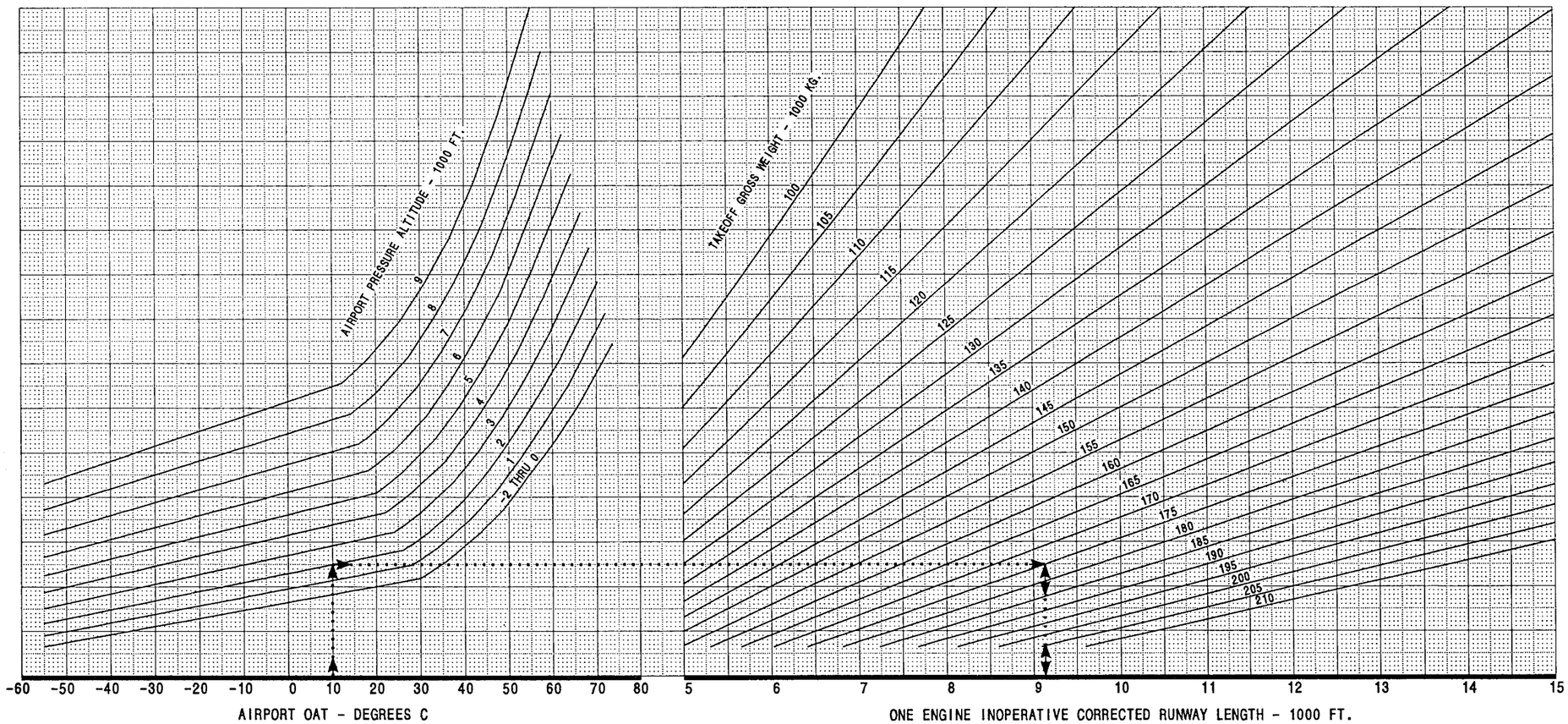
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 5

A/C PACKS ON



P.C. d600415003
D041T513-1 PG. 4.4-14

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED M. MEES DATE 2 OCT 94

PERFORMANCE

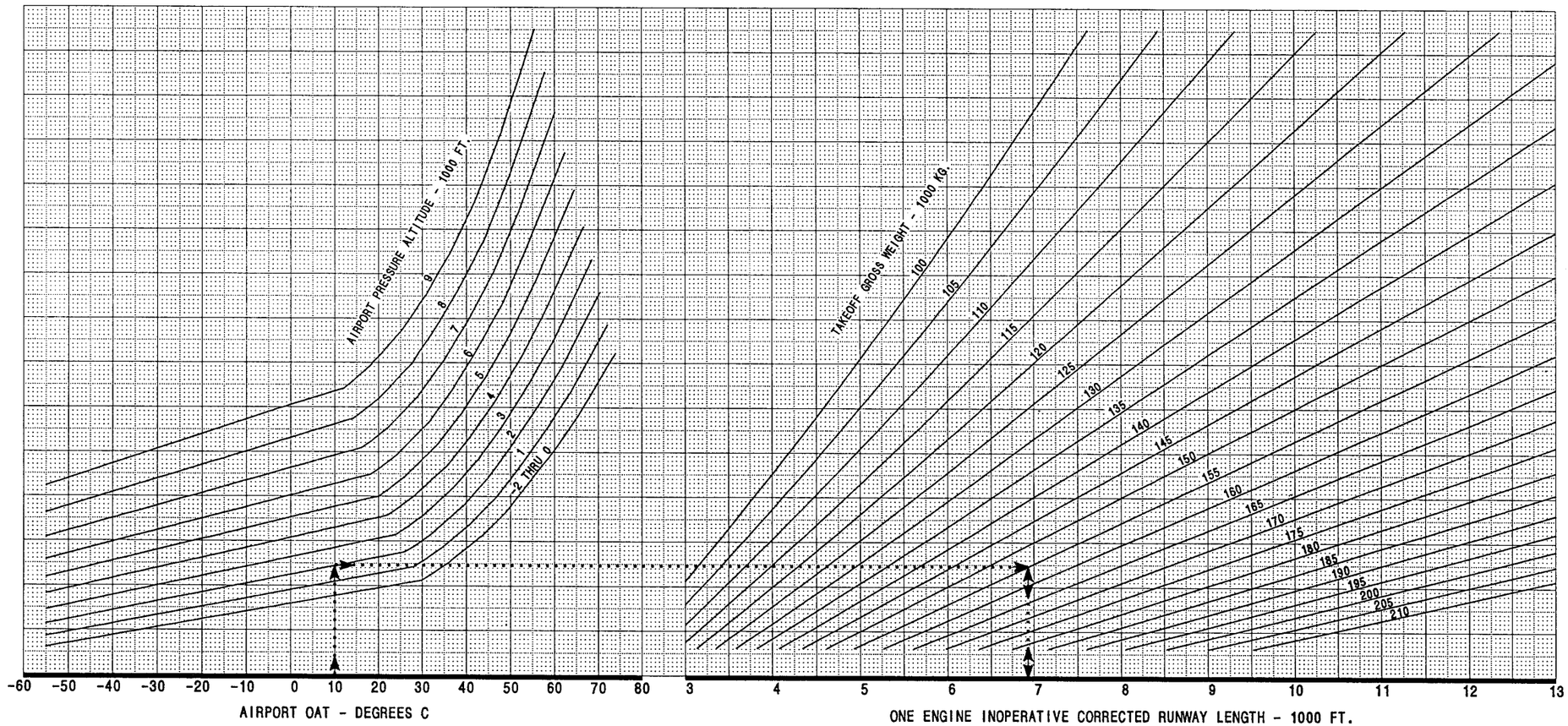
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 5

A/C PACKS OFF



P.C. d6004160003
D041T513-1 PG. 4.4-16

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F
APPROVED H. Myers DATE 21 Oct 94

S40325

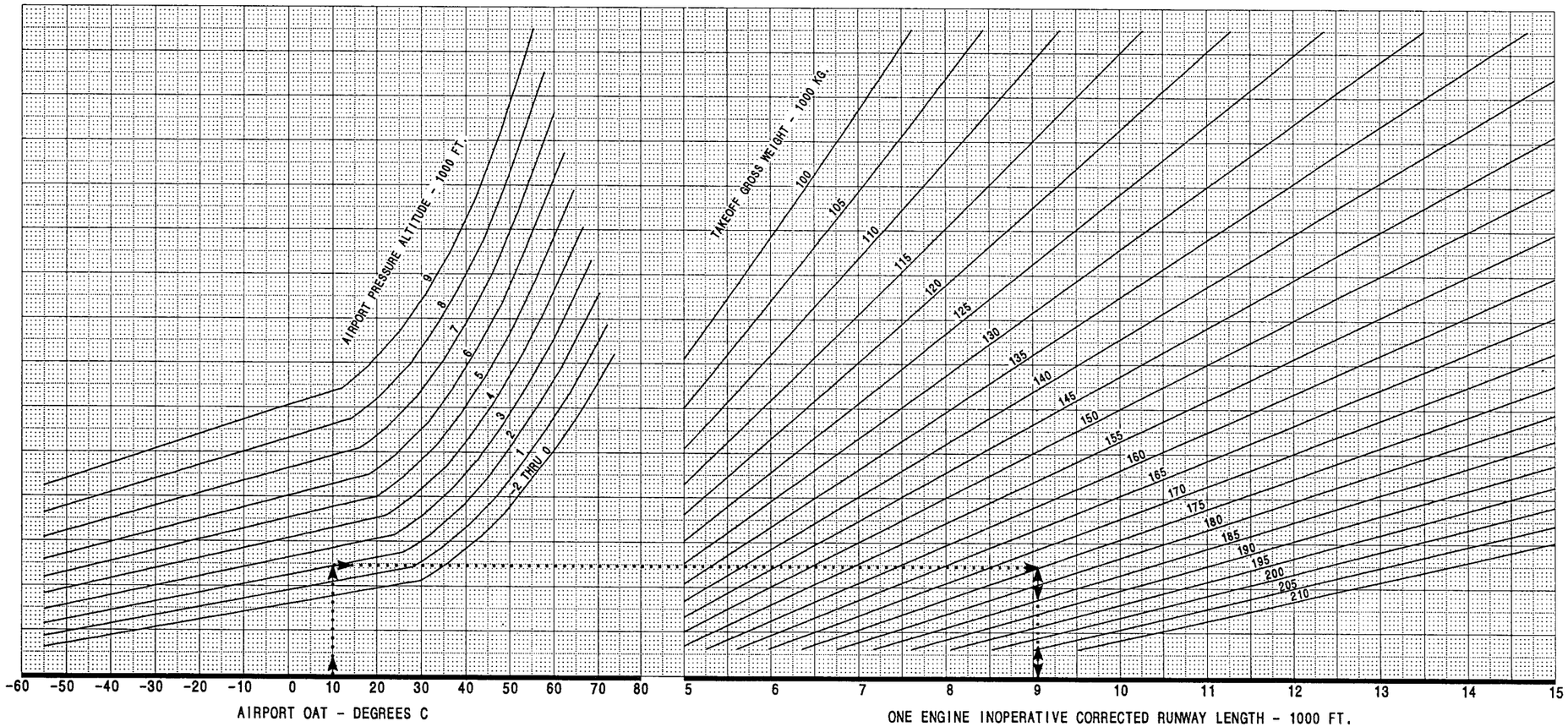
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 5

A/C PACKS OFF



P.C. d600417003
D041T513-1 PG. 4.4-16
M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F
APPROVED A.MYERS DATE 2JOct96
S40334

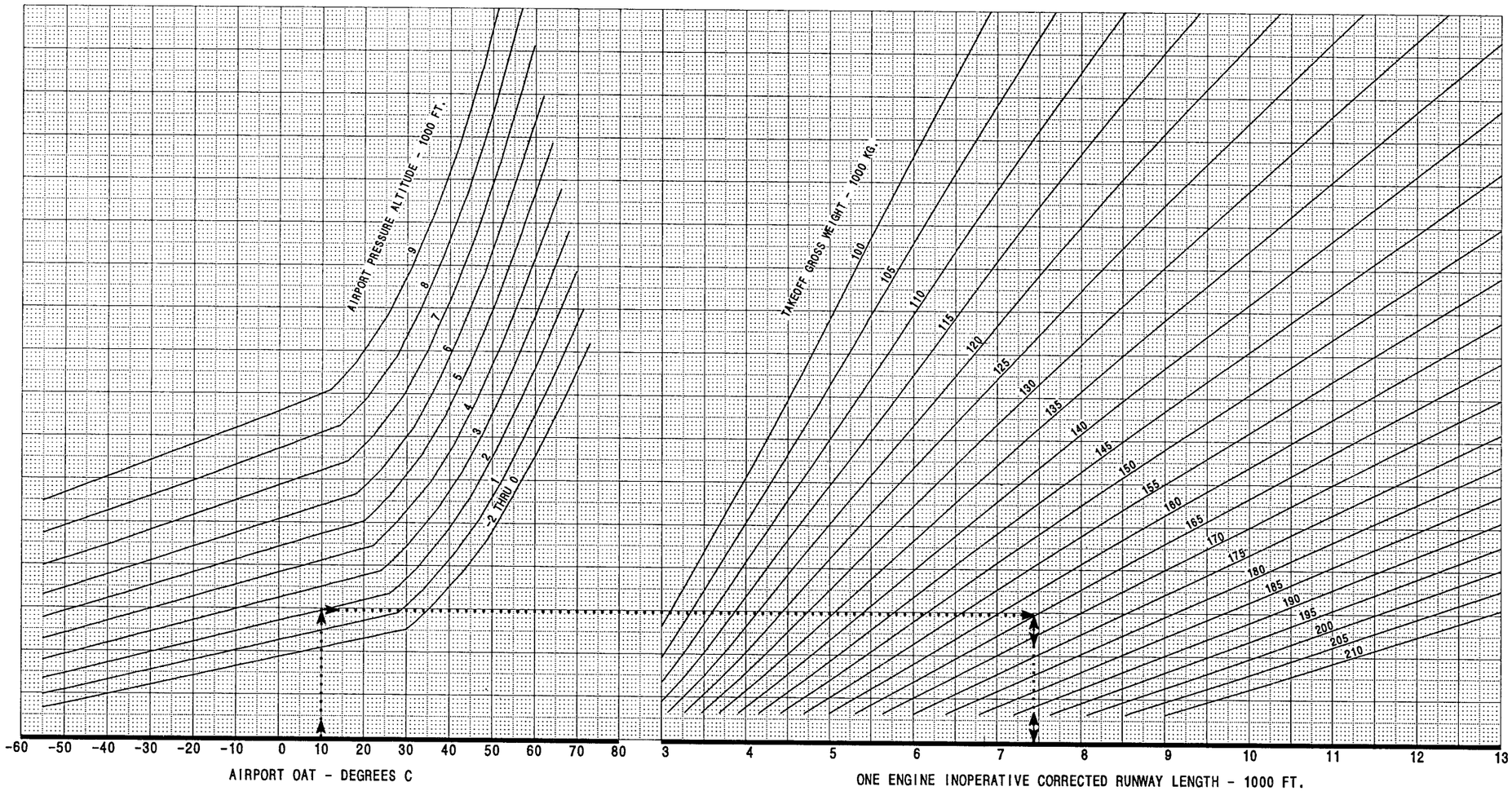
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 15

A/C PACKS ON



P.C. d600418003
D041T513-1 PG. 4.4-18

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M.MYERS	21 Oct 94

S40362

PERFORMANCE

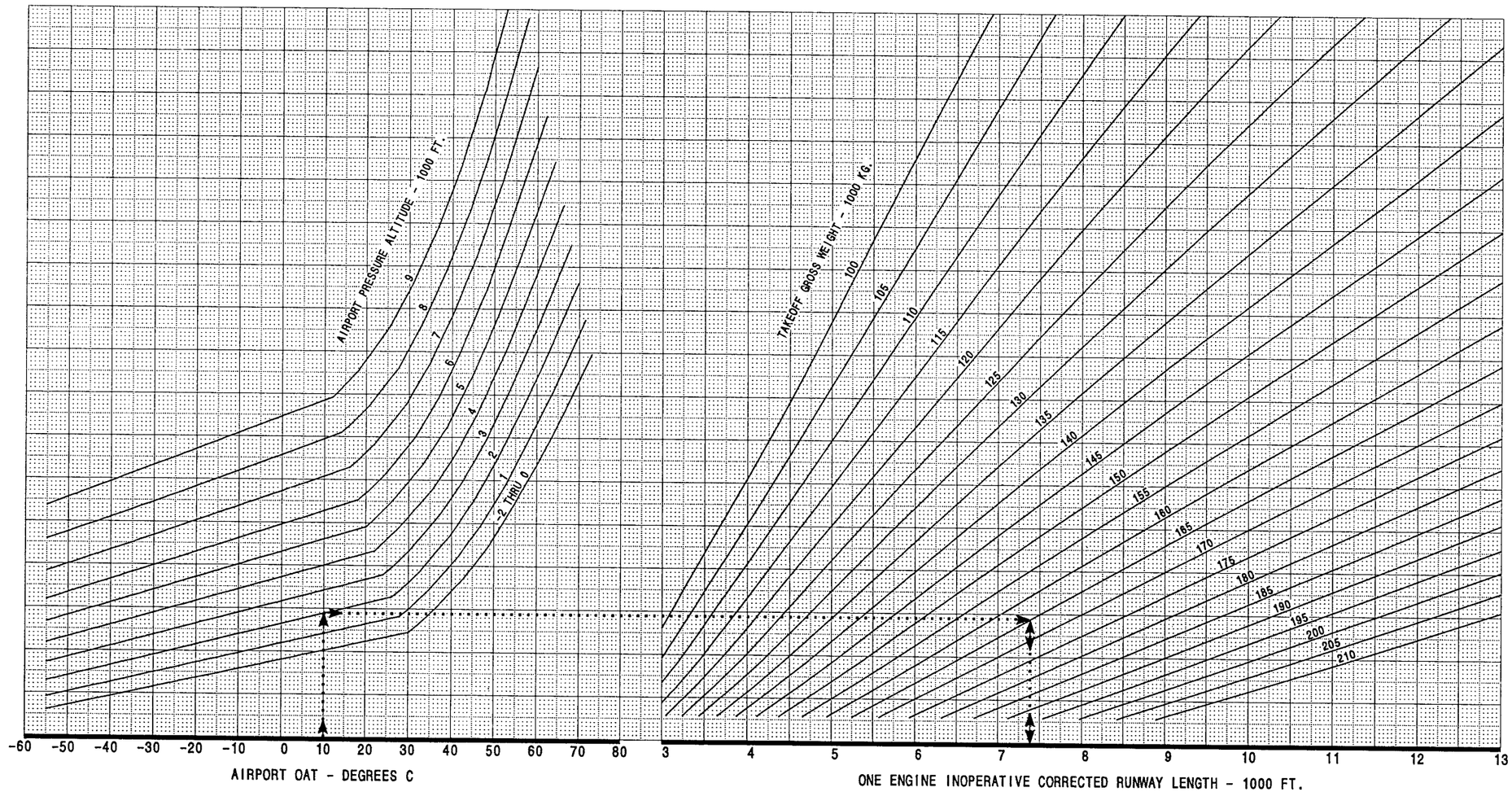
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 15

A/C PACKS OFF



P.C. d600419003
D041T513-1 PG. 4.4-19

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	M. MYERS	11 Oct 94

S40372

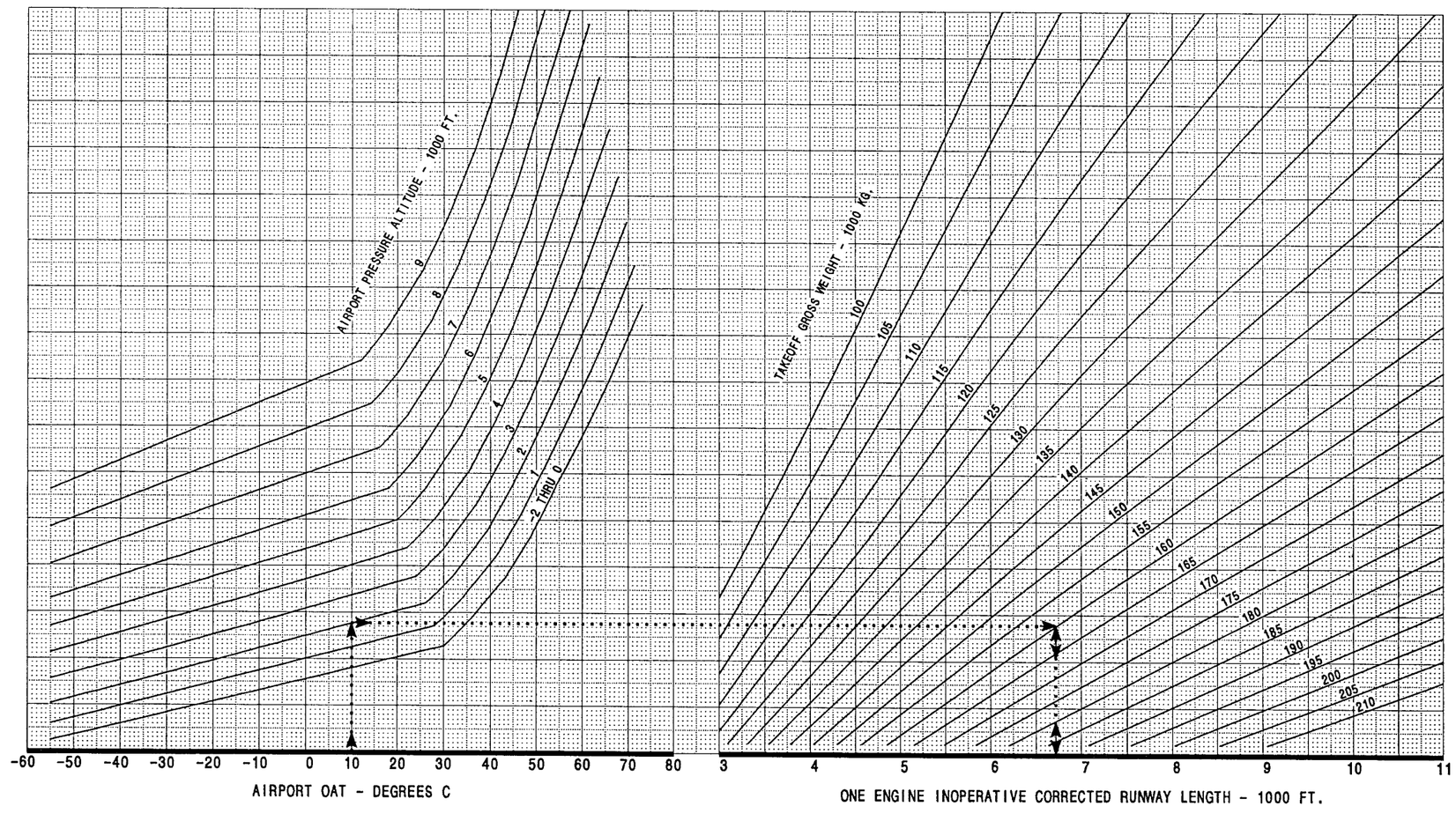
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 20

A/C PACKS ON



P.C. d600420003
D041T513-1 PG. 4.4-20

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED A.MYERS DATE 12 OCT 94

S40383

PERFORMANCE

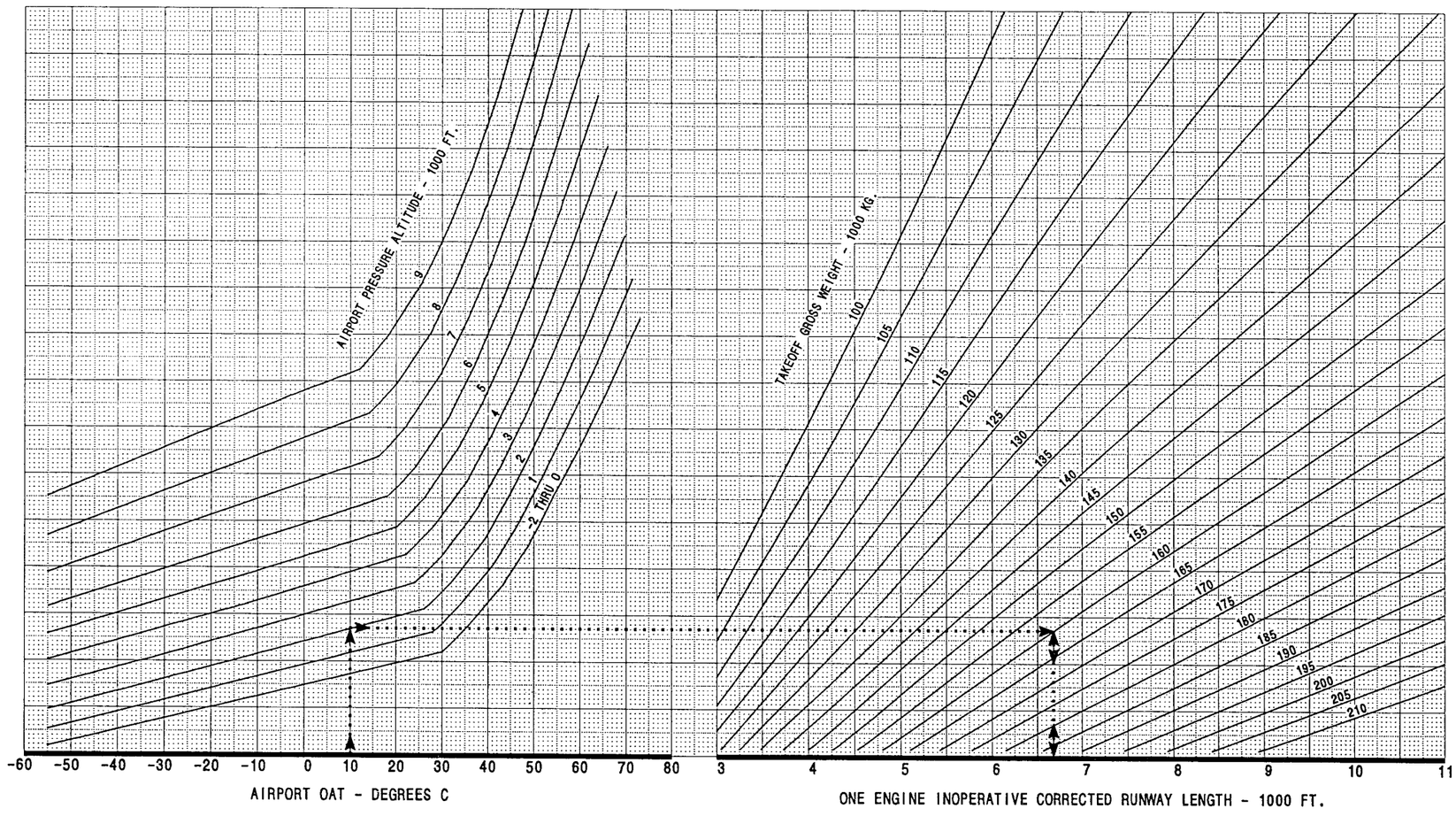
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

CATEGORY C BRAKES

FLAPS 20

A/C PACKS OFF



P.C. d600421003
D041T513-1 PG. 4.4-21

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED M.MYERS DATE 22Oct94

S40456

SECTION 4.5 - TAKEOFF CLIMB LIMITS

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General	2
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TAKEOFF CLIMB LIMITS	
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- A/C PACKS OFF	6
(FLAPS 15) - A/C PACKS ON	7
- A/C PACKS OFF	8
(FLAPS 20) - A/C PACKS ON	9
- A/C PACKS OFF	10

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21554

TAKEOFF CLIMB LIMITS

G E N E R A L

Takeoff Climb Limits

The Takeoff Climb Limits charts in this section show, as a function of airport pressure altitude and temperature, the maximum takeoff gross weights that comply with the 2.4% gradient requirement of FAR 25.121(b). Separate charts are included for air conditioning (A/C) packs on and off and for different takeoff flaps. Higher takeoff climb gross weights are allowed using improved climb performance as described in Section 4.10. The scheduled takeoff gross weight cannot exceed the takeoff climb limited weight. See the example problem appendix for a numerical example of the use of these charts.

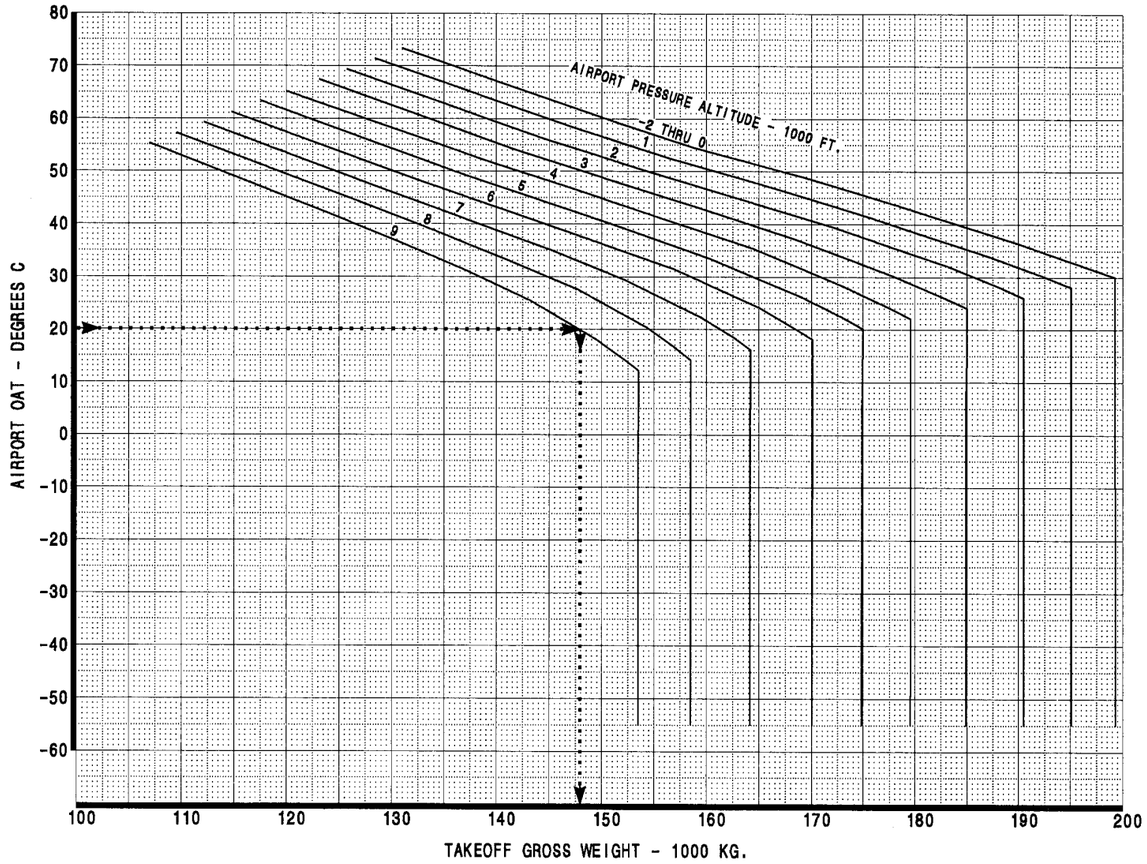
TAKEOFF CLIMB LIMITS

FLAPS 5

A/C PACKS ON

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-2550
ENGINE AND WING ANTI-ICE ON	-3750



P.C. d600505003
D041T513-1 PG. 4.5-5

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED G.LARSON DATE 04-02-96

S40824

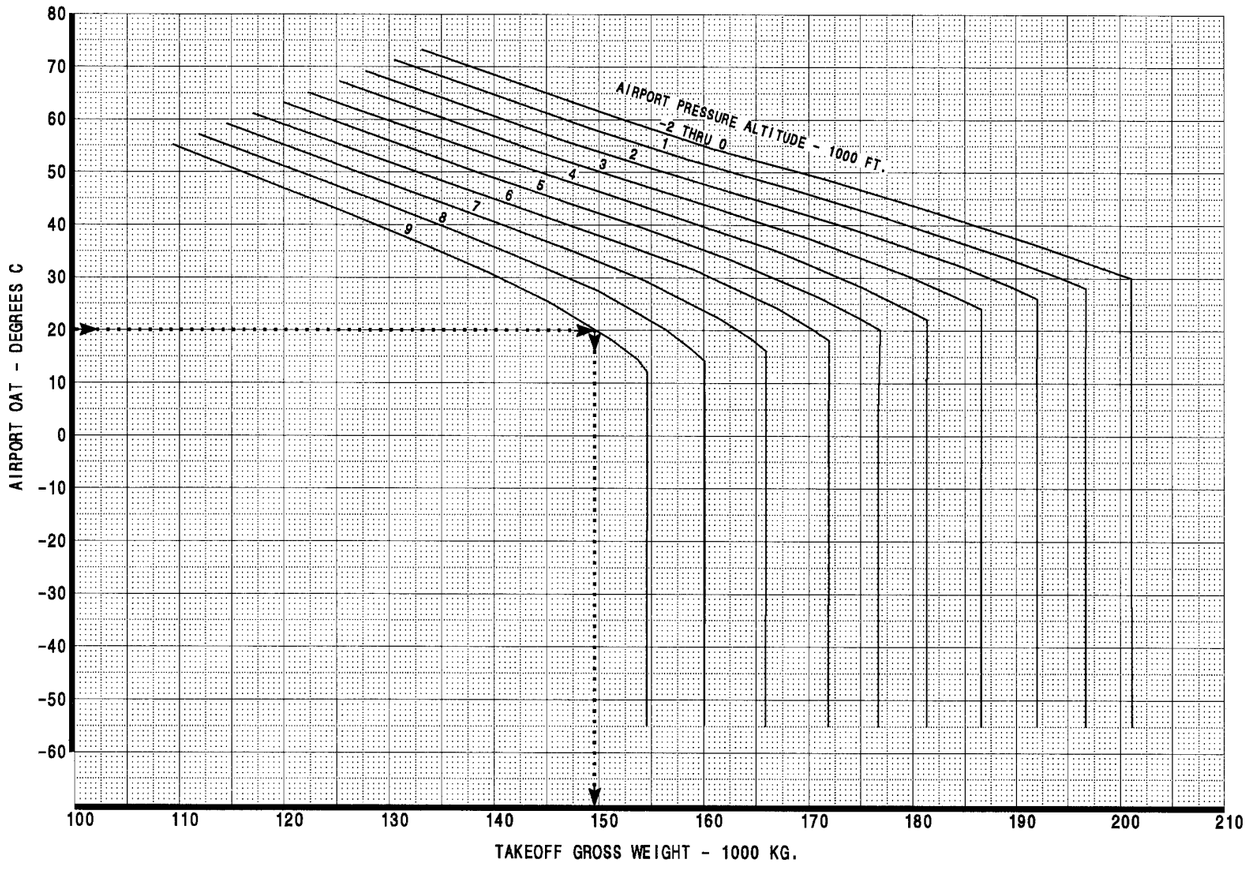
TAKEOFF CLIMB LIMITS

FLAPS 5

A/C PACKS OFF

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-1600
ENGINE AND WING ANTI-ICE ON	-2950



P.C. d600506003
D041T513-1 PG. 4.5-6

M. MCGONIGAL

767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
	G.LARSON	04-02-96

S40841

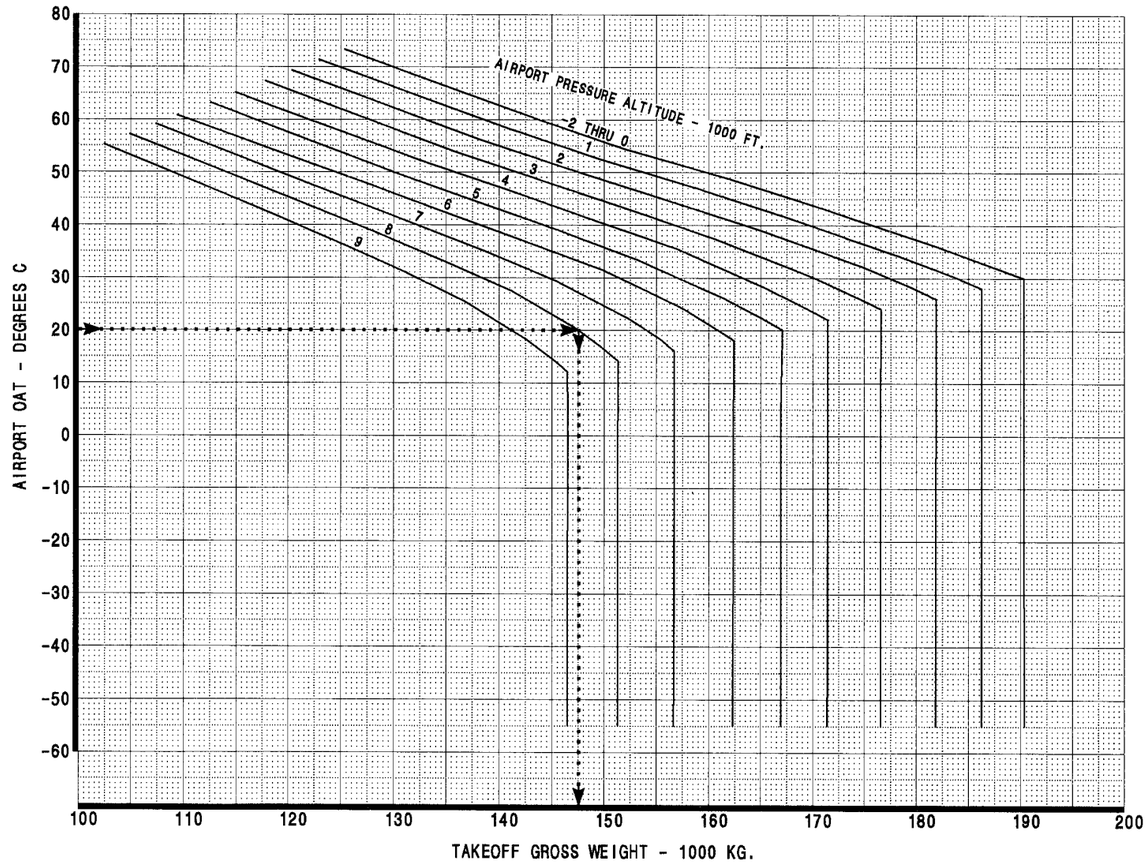
TAKEOFF CLIMB LIMITS

FLAPS 15

A/C PACKS ON

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-2450
ENGINE AND WING ANTI-ICE ON	-3550



P.C. d600507003
D041T513-1 PG. 4.5-7

D. BACH
767-300ER
CF6-80C2B7/B7F

APPROVED G.LARSON DATE 04-02-96

S40848

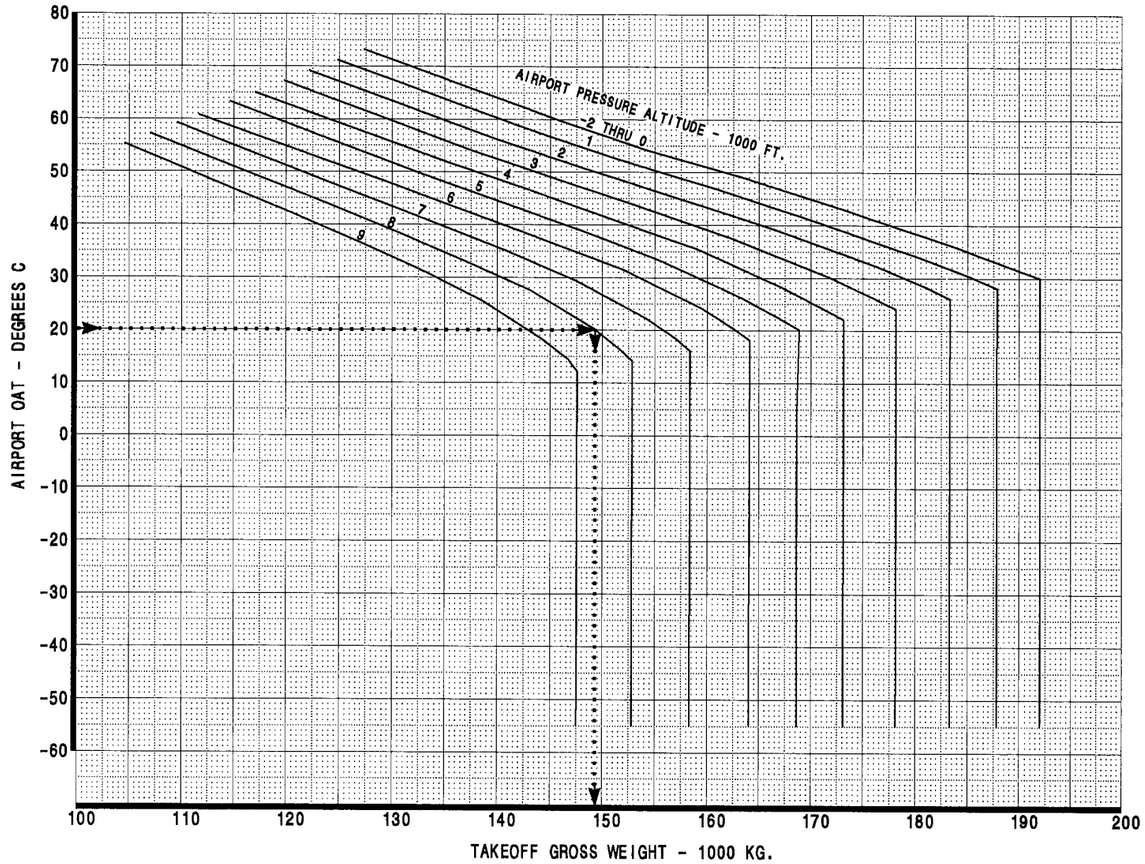
TAKEOFF CLIMB LIMITS

FLAPS 15

A/C PACKS OFF

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-1450
ENGINE AND WING ANTI-ICE ON	-2800



P.C. d600508003
D041T513-1 PG. 4.5-8

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED G.LARSON DATE 04-02-96

S40855

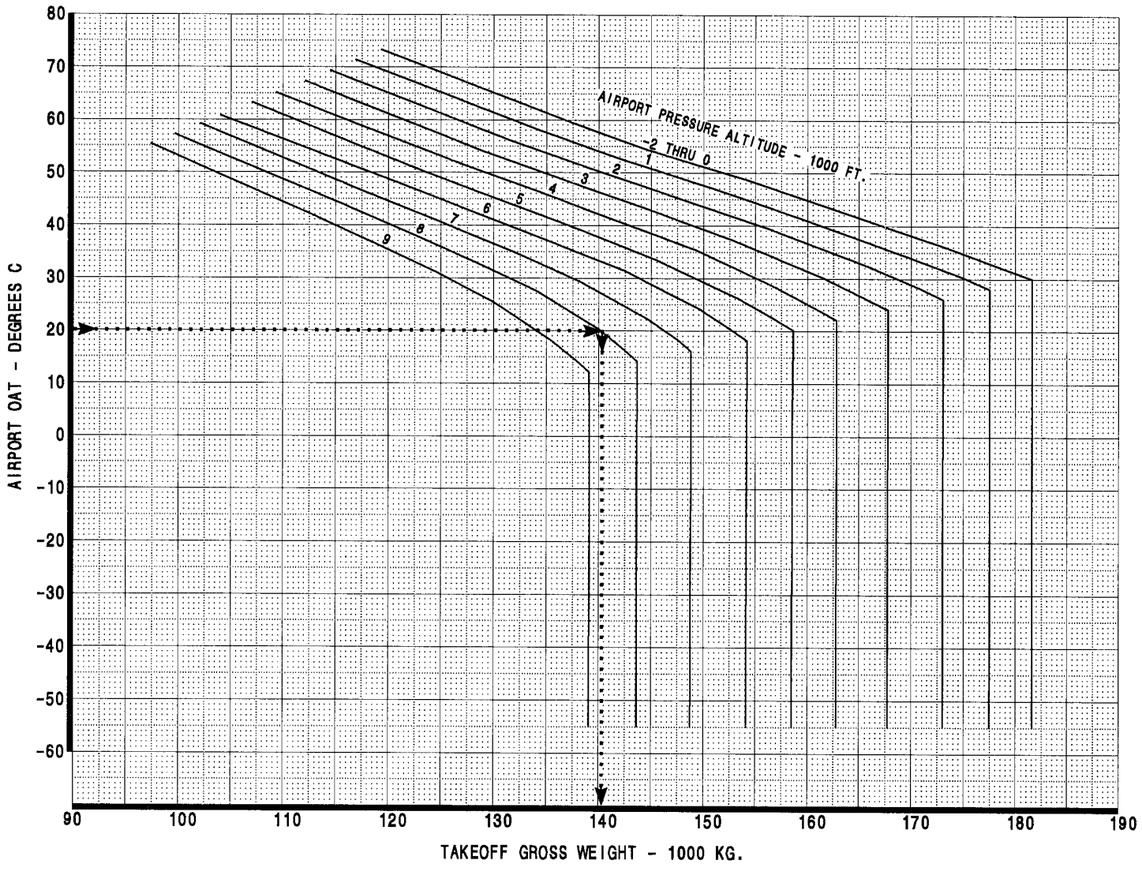
TAKEOFF CLIMB LIMITS

FLAPS 20

A/C PACKS ON

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-2300
ENGINE AND WING ANTI-ICE ON	-3400



P.C. d600509003
D041T513-1 PG. 4.5-9

M. MCGONIGAL

767-300ER	APPROVED	DATE
CF6-80C2B7/B7F	G.LARSON	04-02-96

S40862

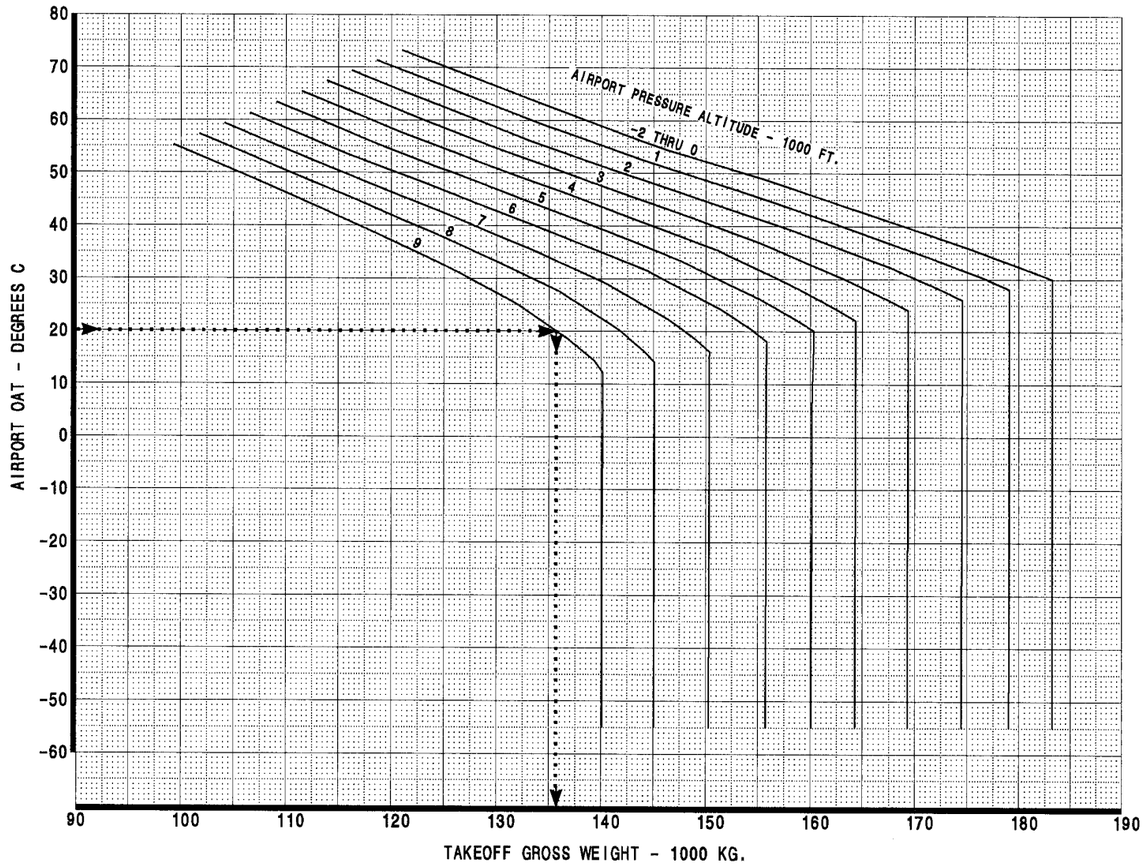
TAKEOFF CLIMB LIMITS

FLAPS 20

A/C PACKS OFF

■ APPLY THE FOLLOWING TAKEOFF GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	-1400
ENGINE AND WING ANTI-ICE ON	-2650



P.C. d600510003
D041T513-1 PG. 4.5-10

H.LEE

767-300ER	APPROVED	DATE
CF6-80C2B7/B7F	G.LARSON	04-02-96

S40869

SECTION 4.6 - TIRE SPEED LIMITS

C O N T E N T S

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General. 2
TIRE SPEED LIMITS (225 MPH TIRES). 3
TIRE SPEED LIMITS (235 MPH TIRES). 4

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21562

TIRE SPEED LIMITS

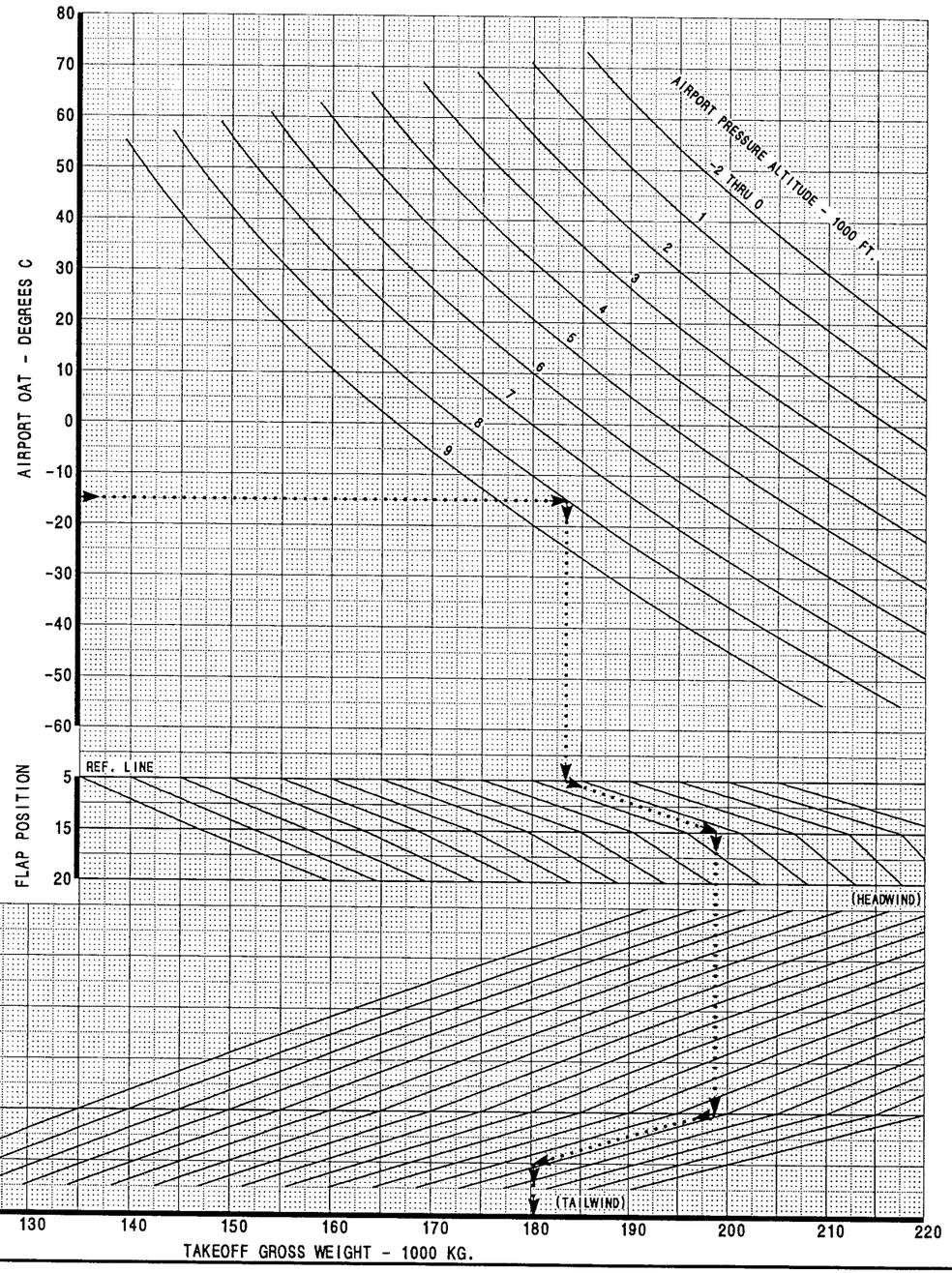
G E N E R A L

This chart shows takeoff weight limits which must be observed to keep the lift-off speed from exceeding maximum true ground speed limitations on the tires. The scheduled takeoff gross weight cannot exceed the tire speed limited weight. See the example problem appendix for a numerical example of the use of this chart.

The improved climb performance procedure, as described in Section 4.10, reduces the allowable tire speed limited takeoff weight obtained in this section and this fact must be considered when the improved climb performance technique is used. The Improved Climb Performance (Takeoff Weight Limits) chart in Section 4.10 shows the trend of tire speed limited takeoff weight with speed increase, up to the maximum speed increase allowed.

TIRE SPEED LIMITS

225 MPH TIRES



P.C. d600603003
D041T513-1 PG. 4.6-3

APPROVED	DATE
M. MYERS	22 OCT 96

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

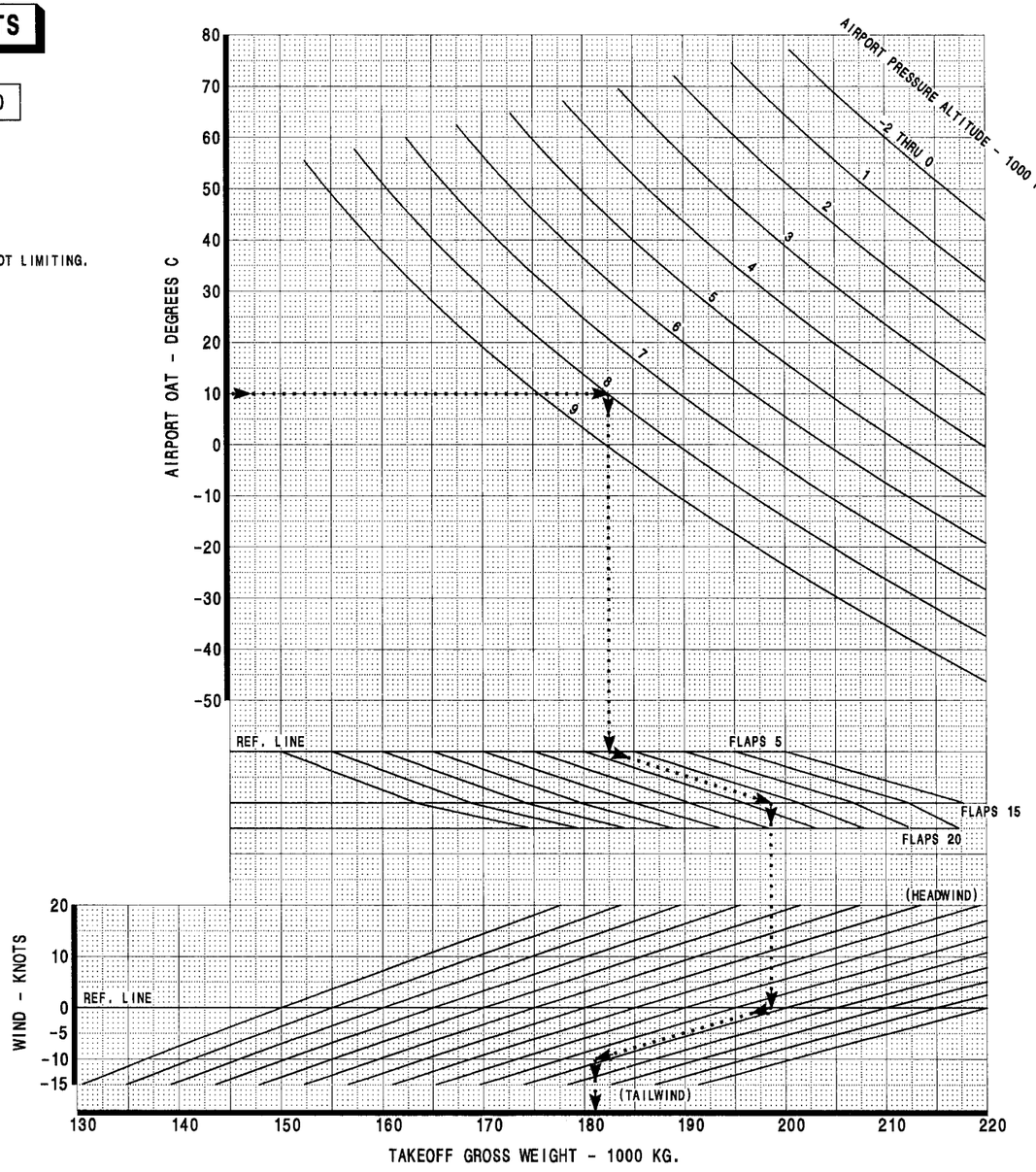
S40875

TIRE SPEED LIMITS

FLAPS 5, 15, AND 20

235 MPH TIRES

■ HEADWINDS GREATER THAN 20 KNOTS ARE NOT LIMITING.



P.C. e600604003
D041TS07-4 PG. 4.6-4

APPROVED	DATE
Chandler	10-10-95

J. PETERS
767-300ER
CF6-80C2B7/B7F

S40876

SECTION 4.7 - TAKEOFF SPEEDS

C O N T E N T S

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General. 2
Takeoff Speed Restrictions 2
  Rotation Speed. 2
  Brake Energy Limits 2
  Minimum V_1 For Control On the Ground. 3
Air Minimum Control Speed. 3
Takeoff Decision Speed, V_1, Determination. 3
V_1 Determination Procedure Flow Diagram. 5
Selection of V_1. 6
  When a High V_1 Is Selected. 6
  When a Low V_1 Is Selected 6
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AIR MINIMUM CONTROL SPEED. 16
REFERENCE SPEED. 17
AIR MINIMUM CONTROL SPEED (FACTORED) 18

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21575

TAKEOFF SPEEDS

G E N E R A L

The charts in this section show the takeoff speeds V_1, V_R, and V_2, as functions of airport temperature/altitude, gross weight, and the ratio of V_1/V_R. Separate charts are included for the different takeoff flaps. The scheduled takeoff speeds must comply with the FAR requirements discussed below. The Reference Speeds, V_{REF}, chart to be used to determine the flap retraction speed and the final takeoff climb speed is also included in this section.

T A K E O F F S P E E D R E S T R I C T I O N S

ROTATION SPEED

The scheduled rotation speed, V_R, must be equal to or greater than V_1 and 1.05 V_{MCA}. The 1.05 V_{MCA} speed is determined from the Air Minimum Control Speed (Factored) chart is this section as a function of altitude and temperature.

BRAKE ENERGY LIMITS

The scheduled takeoff decision speed, V_1, must be equal to or less than the maximum brake energy speed, V_{MBE}. The Brake Energy Limits chart shows V_{MBE} as a function of gross weight, altitude, temperature, runway slope, wind component, and braking configuration. If the upper value in a range of V_1 (see V_1 Determination) should be above V_{MBE}, then the upper limit must be decreased to V_{MBE}. If the entire range of V_1 should be above V_{MBE} for a value of gross weight, then the gross weight must be reduced until V_1 is equal to V_{MBE}. See the example problem appendix for a numerical example of this procedure.

Brake part numbers (P.N.) in the same category produce equal braking performance, and Brake Energy Limits charts that are labeled for one category can be used for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

MINIMUM V_1 FOR CONTROL ON THE GROUND

The scheduled takeoff decision speed, V_1, must be equal to or greater than the minimum V_1 for control on the ground, $V_{1(MCG)}$. The shaded area on the Takeoff Decision Speed chart identifies the area where the $V_{1(MCG)}$ restriction is most likely to occur. The minimum V_1 for control on the ground chart shows $V_{1(MCG)}$ as a function of altitude, temperature, and gross weight. If the lower value in a range of V_1 (see V_1 Determination) should fall below $V_{1(MCG)}$, then the lower limit must be increased to $V_{1(MCG)}$. If the entire range of V_1 should fall below $V_{1(MCG)}$ for a gross weight, see $V_{1(MCG)}$ Takeoff Limits, Section 4.8.

S21583

TAKEOFF SPEEDS

AIR MINIMUM CONTROL SPEED

The Air Minimum Control speed (V_{MCA}) for one engine inoperative is shown on this chart. V_{MCA} is not a limitation on takeoff speeds. An Air Minimum Control Speed (Factored) chart is also provided which gives 1.05 V_{MCA} which may be a limitation on V_R at low takeoff gross weight.

TAKEOFF DECISION SPEED, V_1, DETERMINATION

The flow diagram for the takeoff decision speed determination procedure demonstrates the various steps required in the determination of V_1. See the example problem appendix for a numerical example of this procedure.

S21590

TAKEOFF DECISION SPEED, V_1, DETERMINATION (Continued)

The following steps correspond to the identified points on the V_1 Determination Procedure flow diagram.

1. Determine the engine inoperative corrected takeoff distance available per Section 4.3.

2. Determine the one engine inoperative corrected runway length required to satisfy all the Federal Aviation Regulations related to engine operative field length for the takeoff gross weight.

   Enter the appropriate Field Length Limits (One Engine Inoperative) chart with airport temperature/altitude and takeoff gross weight. Read one engine inoperative corrected runway length required.

3. Determine rotation speed, V_R.

   Enter the appropriate Takeoff Speeds chart with airport temperature/altitude and takeoff gross weight. Read rotation speed, V_R. V_R must be equal to or greater than 1.05 V_{MCA} from the Air Minimum Control Speed (Factored) chart

4. Determine the corrected accelerate-stop distance available per Section 4.3.

5. Determine $(V_1/V_R)_{MIN}$.

   Enter the appropriate Runway Length and V_1 Adjustments chart, Section 4.3, with engine inoperative corrected takeoff distance available, Step 1, and one engine inoperative corrected runway length required, Step 2. Read $(V_1/V_R)_{MIN}$.

6. Determine $(V_1/V_R)_{MAX}$.

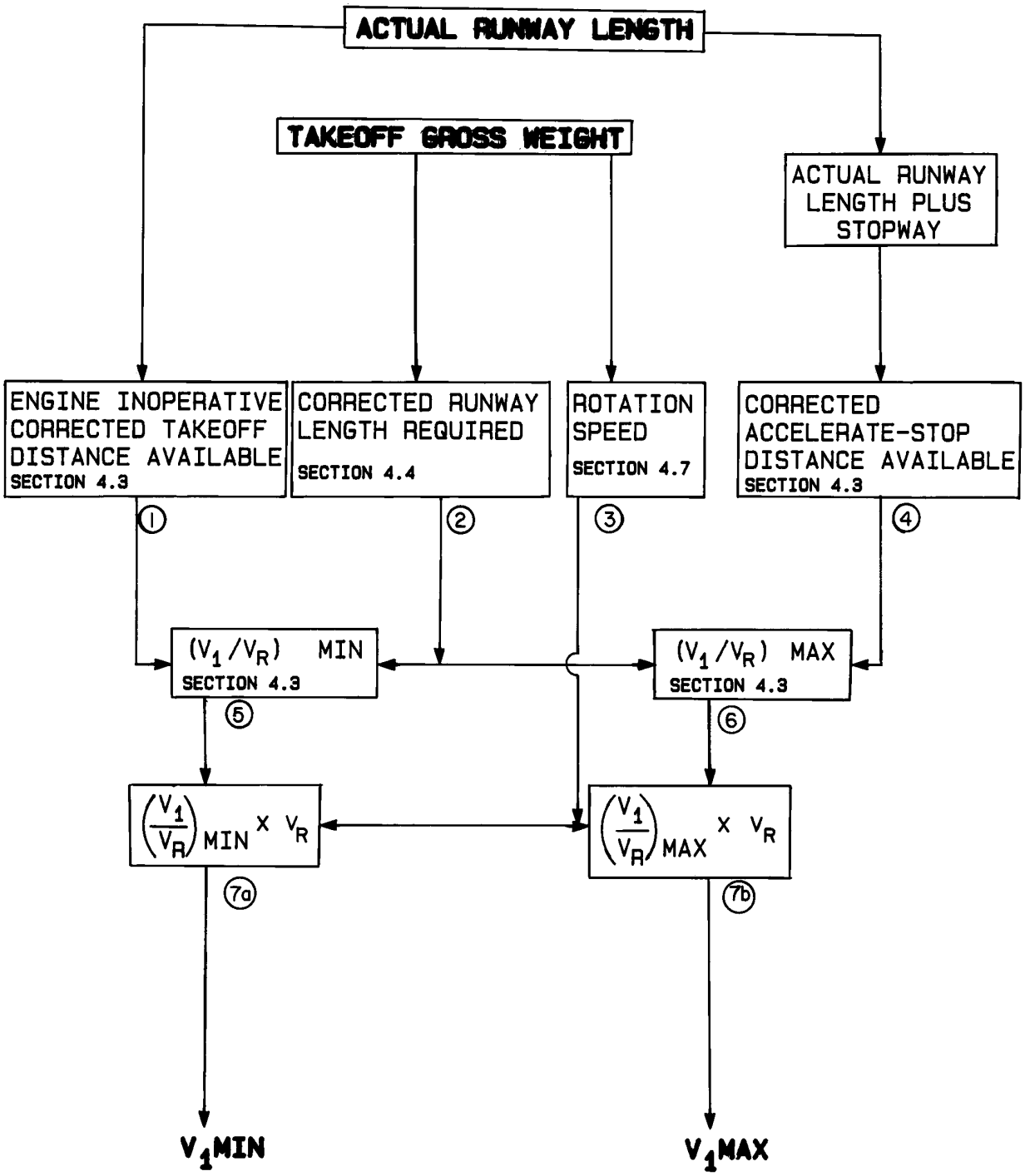
   Enter the appropriate Runway Length and V_1 Adjustments chart, Section 4.3, with corrected accelerate-stop distance available, Step 4, and one engine inoperative corrected runway length required, Step 2. Read $(V_1/V_R)_{MAX}$.

7. Determine V_1 MIN and V_1 MAX, the lowest and highest values of V_1 that will allow a takeoff from the actual runway, at the takeoff gross weight, that satisfies all the Federal Aviation Regulations related to maximum takeoff gross weight, field length limits. See Takeoff Speed Restrictions for other possible limitations.

   a) Multiply $(V_1/V_R)_{MIN}$, Step 5, by V_R, Step 3, to obtain $V_{1\ MIN}$ (or read from chart).
   b) Multiply $(V_1/V_R)_{MAX}$, Step 6, by V_R, Step 3, to obtain $V_{1\ MAX}$ (or read from chart).

S21594

V_1 DETERMINATION PROCEDURE



S29413

TAKEOFF SPEEDS

S E L E C T I O N O F V_1

The selection of the takeoff decision speed, V_1, from an allowable range must be made for each scheduled takeoff. Even though any value in the allowable range is safe and acceptable, a selection must be made. To aid in this selection, the following facts should be considered.

When a High V_1 is Selected:

1. The safety margins are increased for a continued takeoff.
   (a) The required takeoff distance is less for a continued takeoff.
   (b) There is more vertical clearance above an obstacle when the takeoff is continued after an engine failure.
   (c) There is more margin for minimum control speed limits.
2. There will be only the minimum required margins on stopping distance and all or most of the runway will be used if the takeoff is aborted at V_1.

When a Low V_1 is Selected:

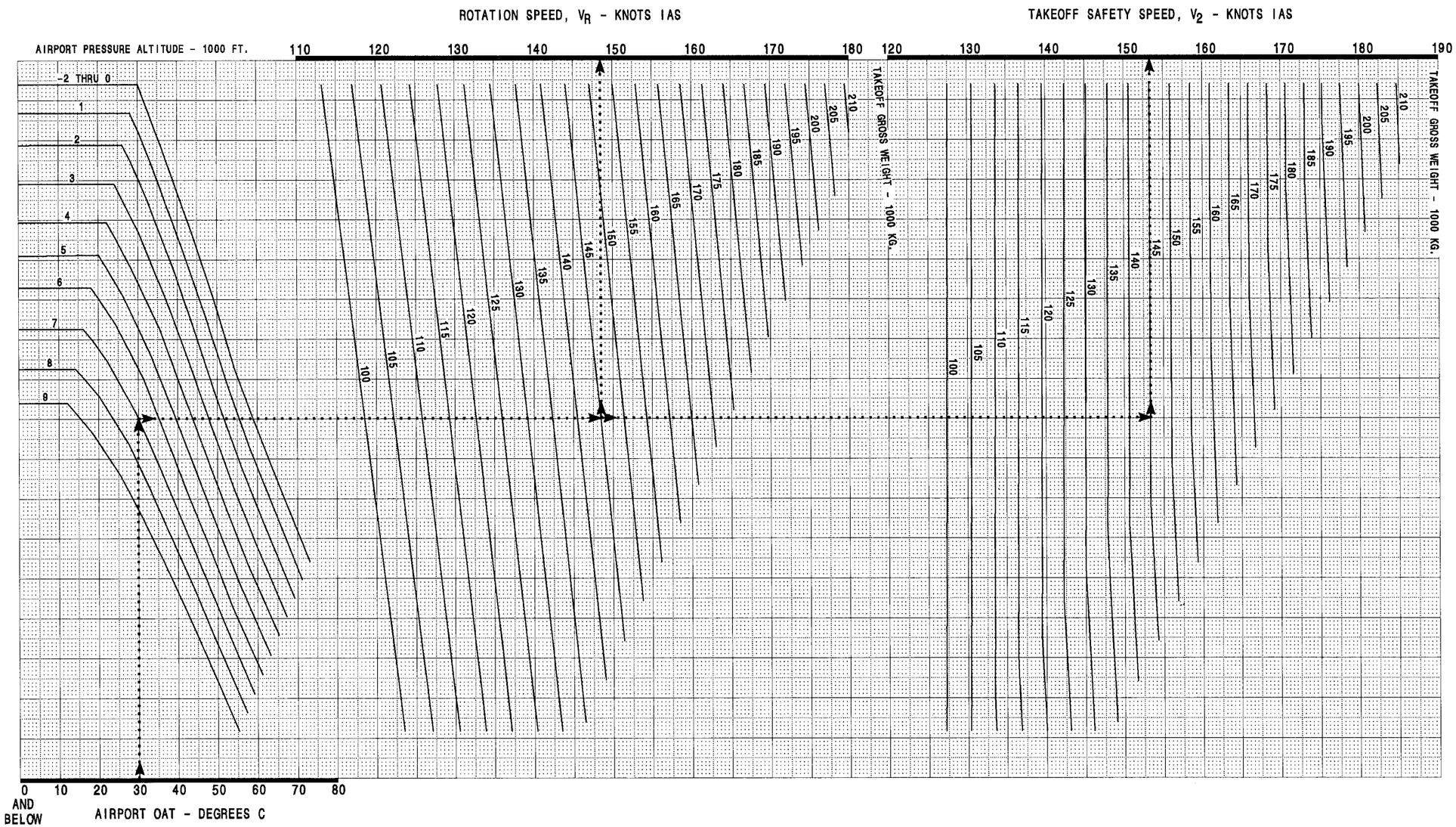
1. The safety margins are increased for an aborted takeoff.
   (a) The increased stopping margin is helpful on runways with adverse braking characteristics.
   (b) There is more margin from brake energy limits.
2. There will be only the minimum required clearance over the end of the runway if it is necessary to continue the takeoff after an engine failure.

S21789

TAKEOFF SPEEDS

FLAPS 5

- OBTAIN V_1 BY MULTIPLYING V_1/V_R BY V_R.
- CHECK $V_{1(MCG)}$, SEE TEXT.
- CHECK 1.05 V_{MCA}, SEE TEXT.



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D041T513-1	PG. 4.7-9

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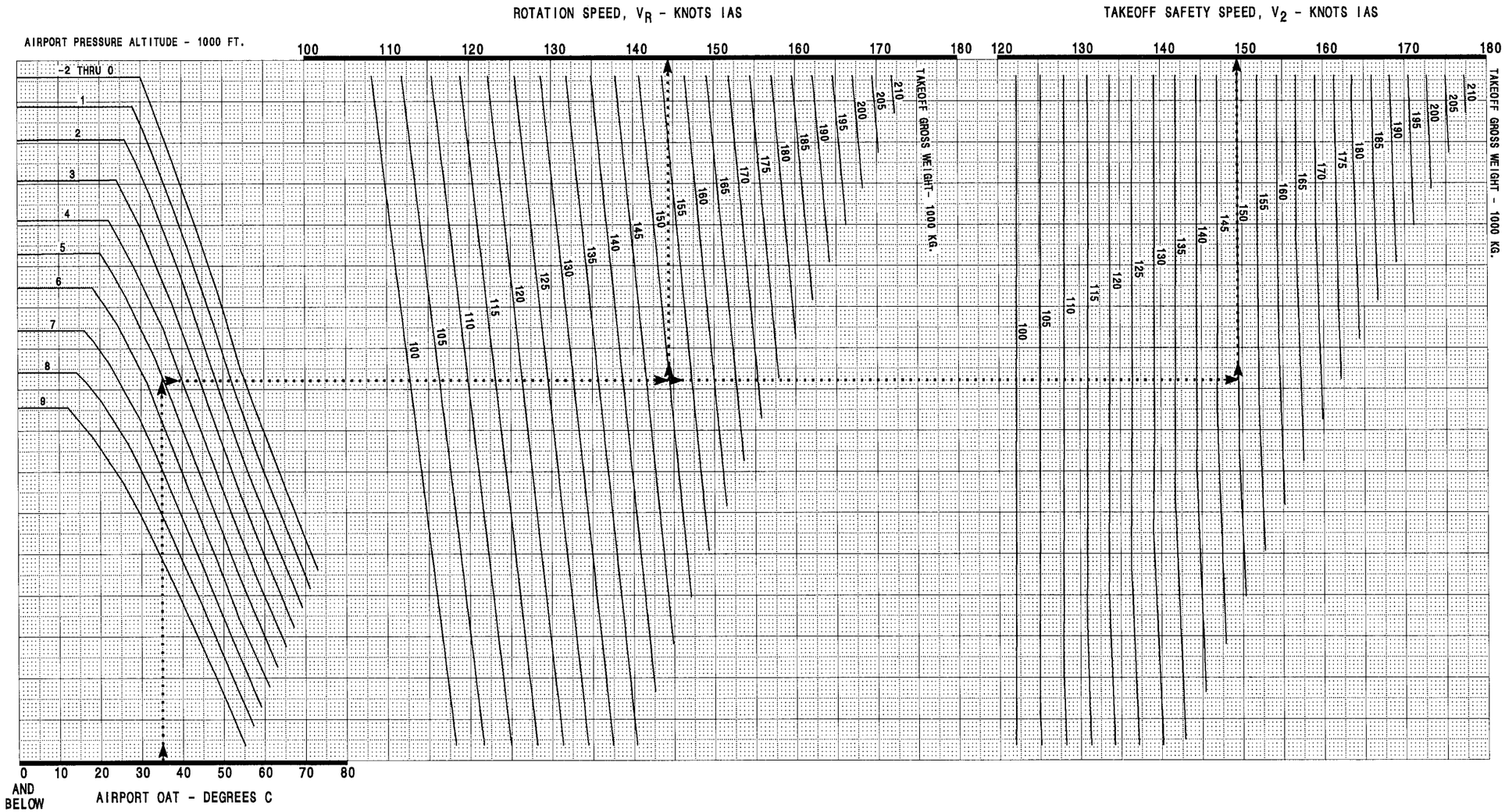
J. PETERS
767-300ER
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S40904

TAKEOFF SPEEDS

FLAPS 15

- OBTAIN V_1 BY MULTIPLYING V_1/V_R BY V_R.
- CHECK $V_{1(MCG)}$, SEE TEXT.
- CHECK 1.05 V_{MCA}, SEE TEXT.



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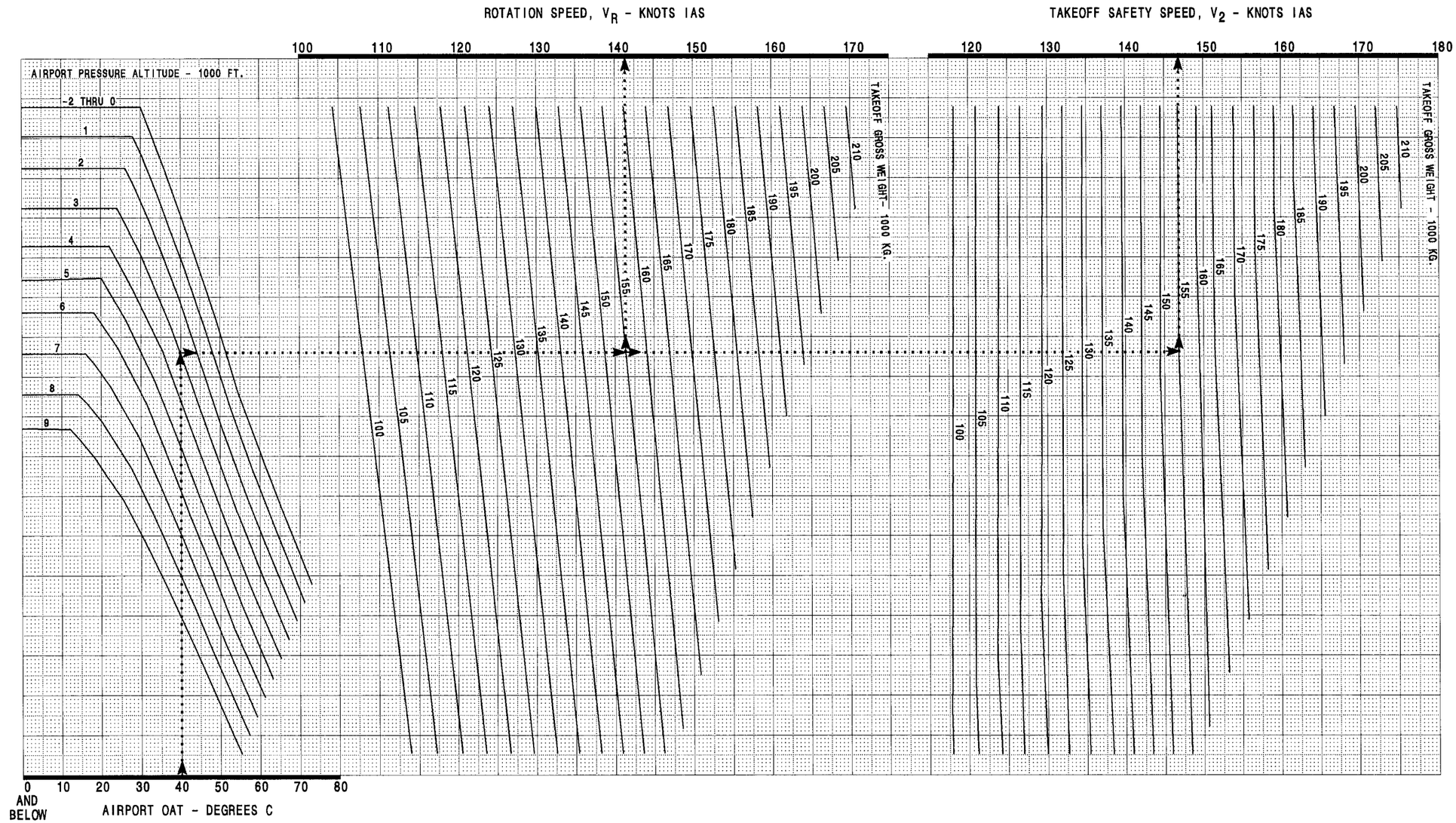
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S40994

TAKEOFF SPEEDS

FLAPS 20

- OBTAIN V_1 BY MULTIPLYING V_1/V_R BY V_R.
- CHECK $V_{1(MCG)}$, SEE TEXT.
- CHECK 1.05 V_{MCA}, SEE TEXT.



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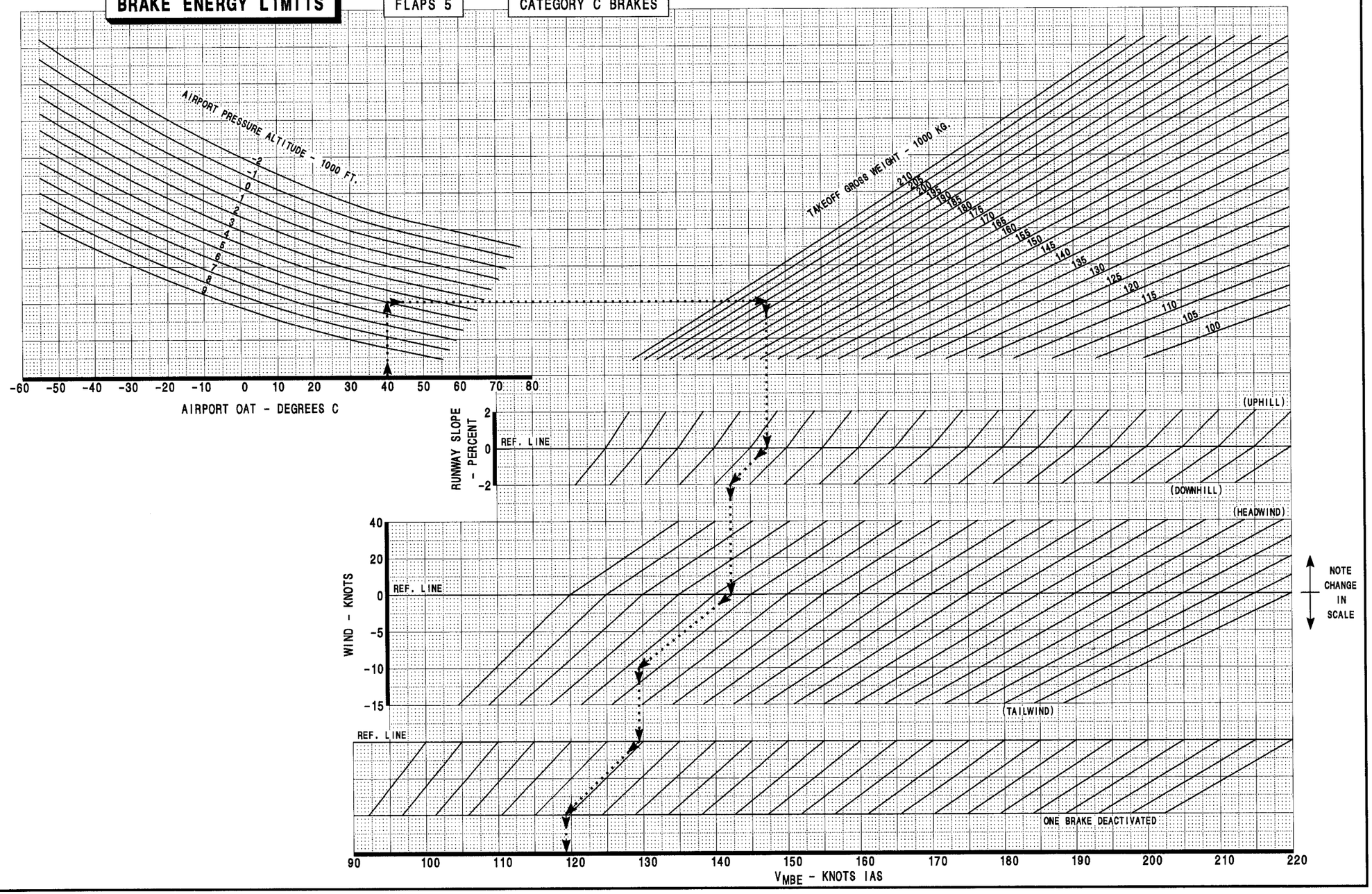
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S41001

BRAKE ENERGY LIMITS

FLAPS 5

CATEGORY C BRAKES



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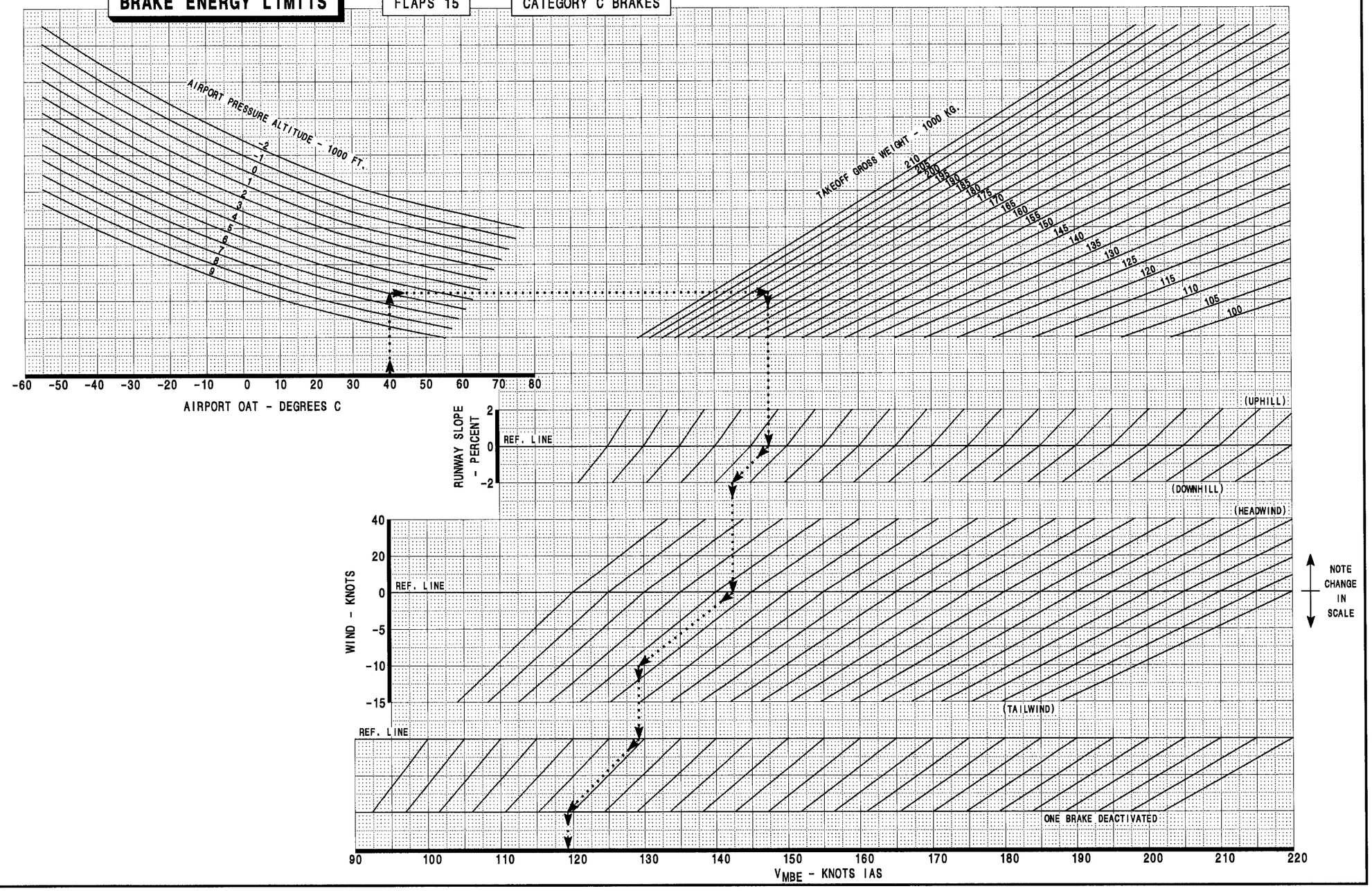
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BRAKE ENERGY LIMITS

FLAPS 15

CATEGORY C BRAKES



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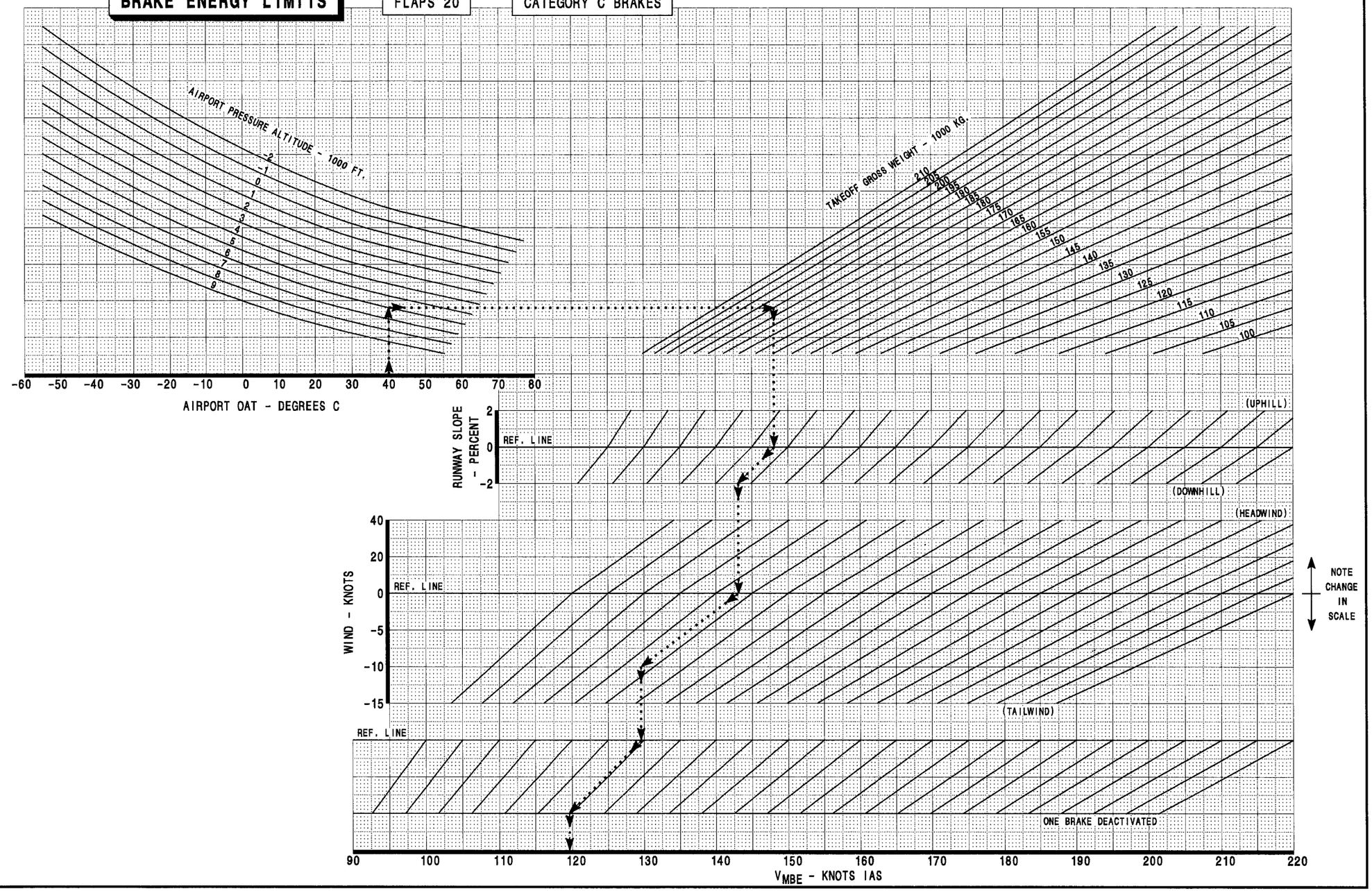
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BRAKE ENERGY LIMITS

FLAPS 20

CATEGORY C BRAKES



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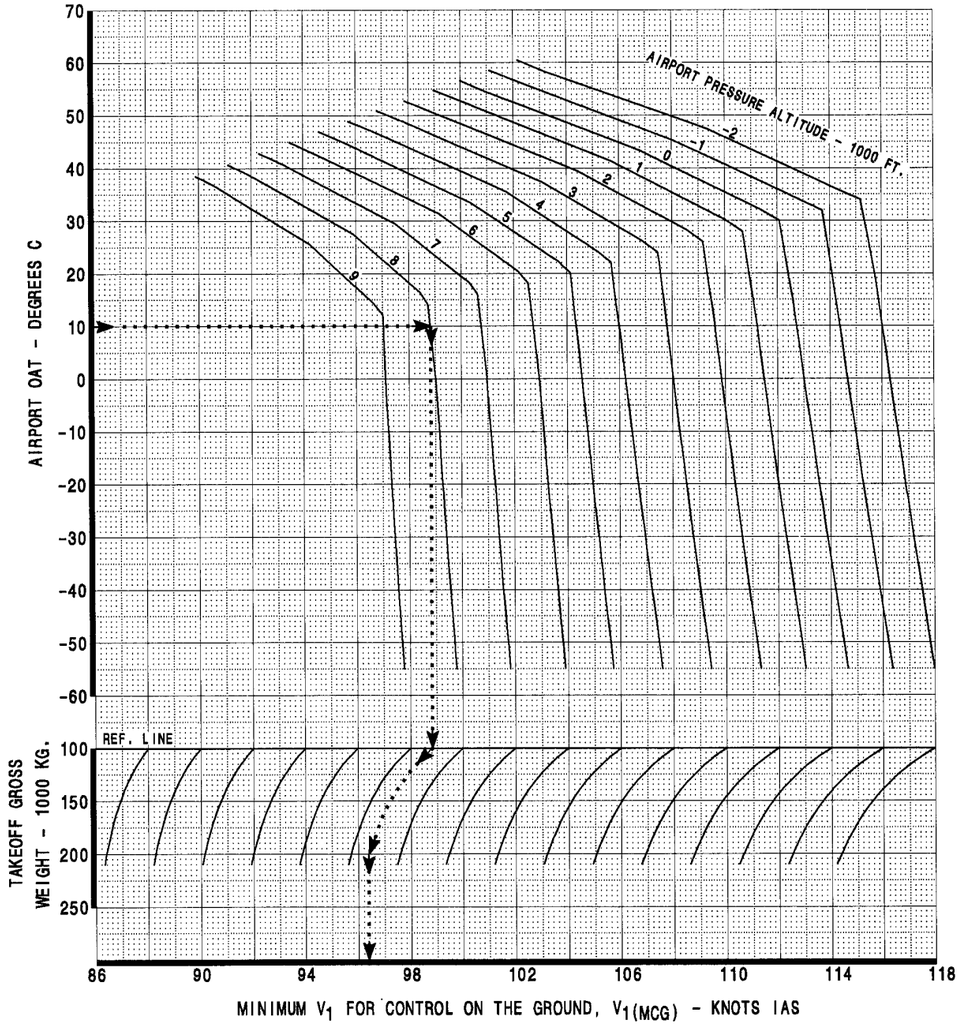
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MINIMUM V_1 FOR CONTROL ON THE GROUND



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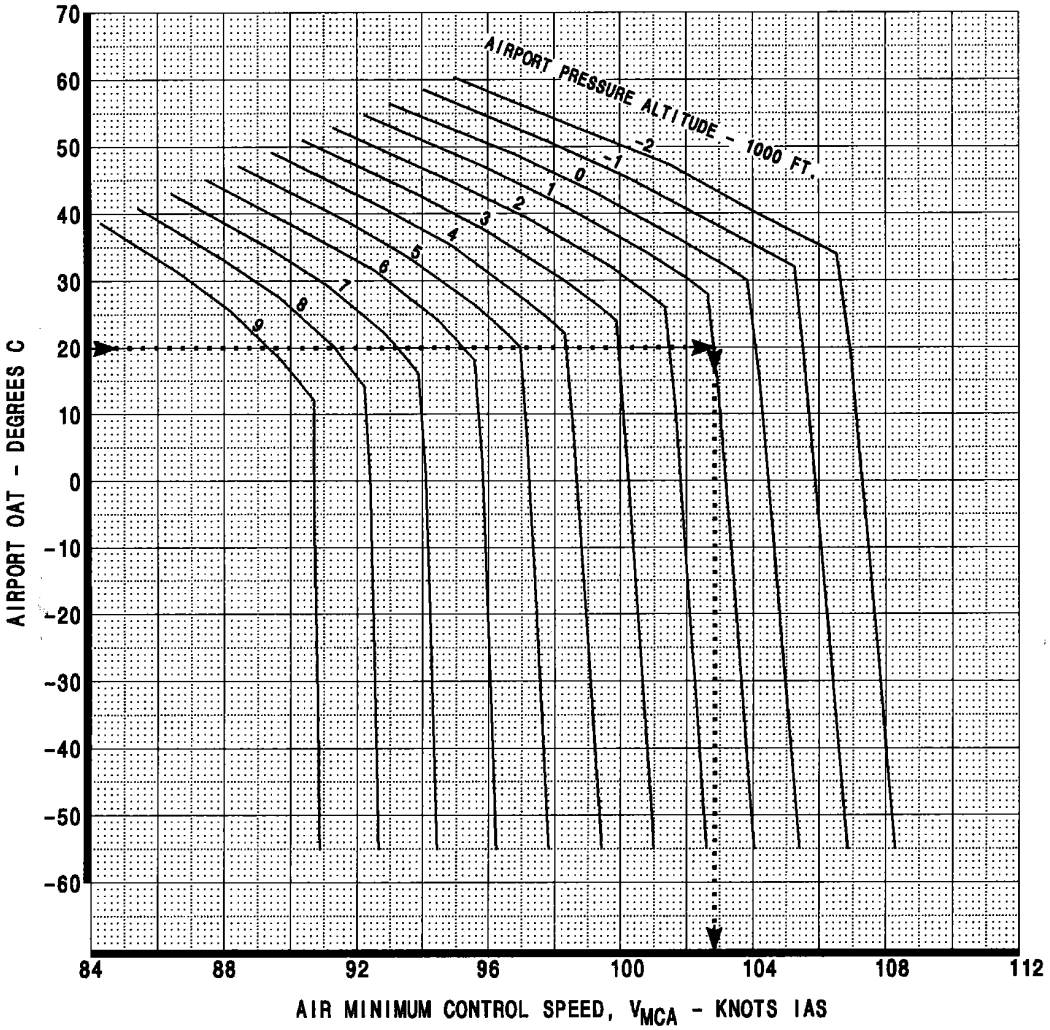
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AIR MINIMUM CONTROL SPEED

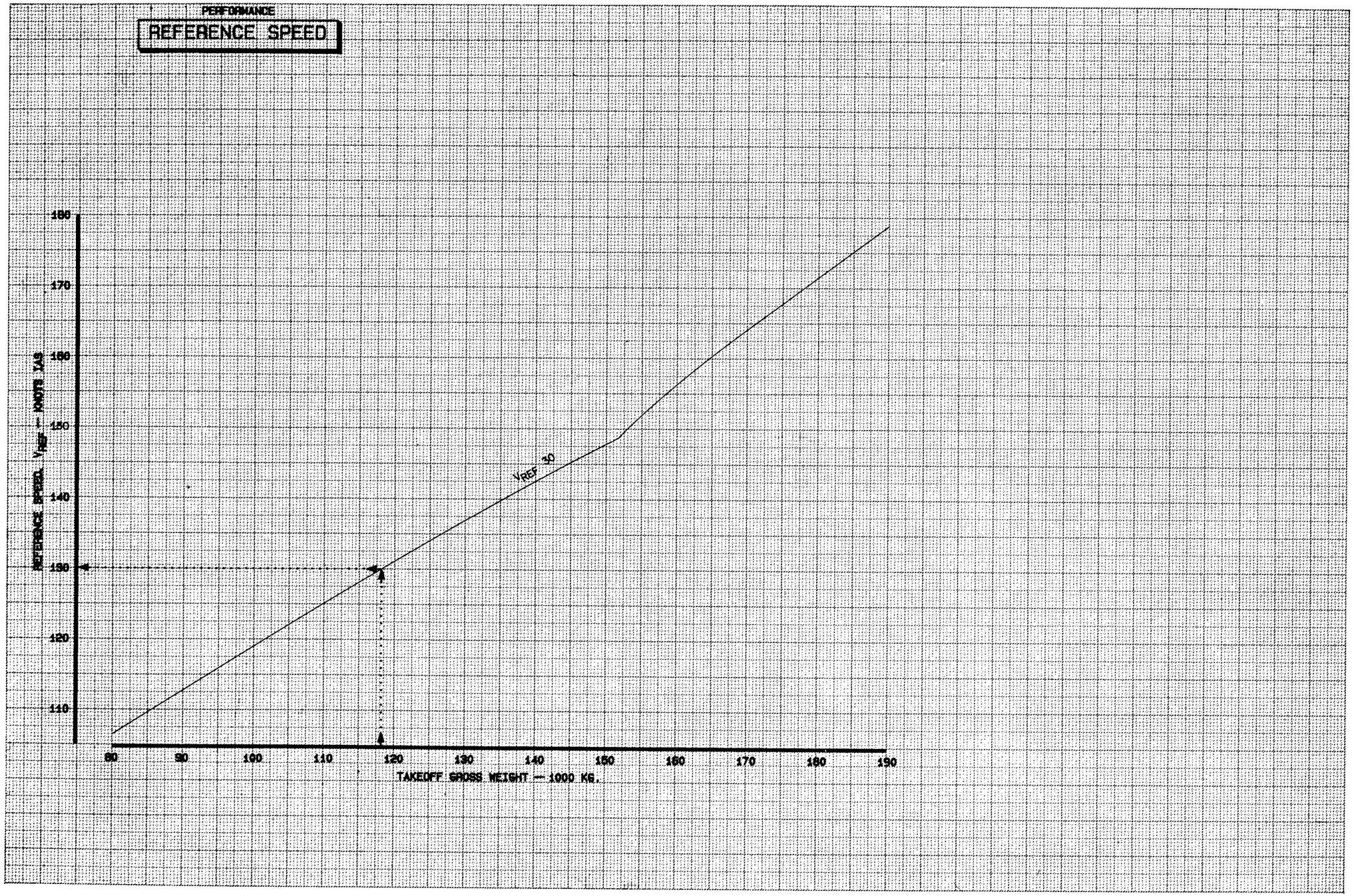
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D041T513-1 PG. 4.7-16

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APPROVED Chandler DATE 10-10-85



S21793

REFERENCE SPEED



P.C. BL001726
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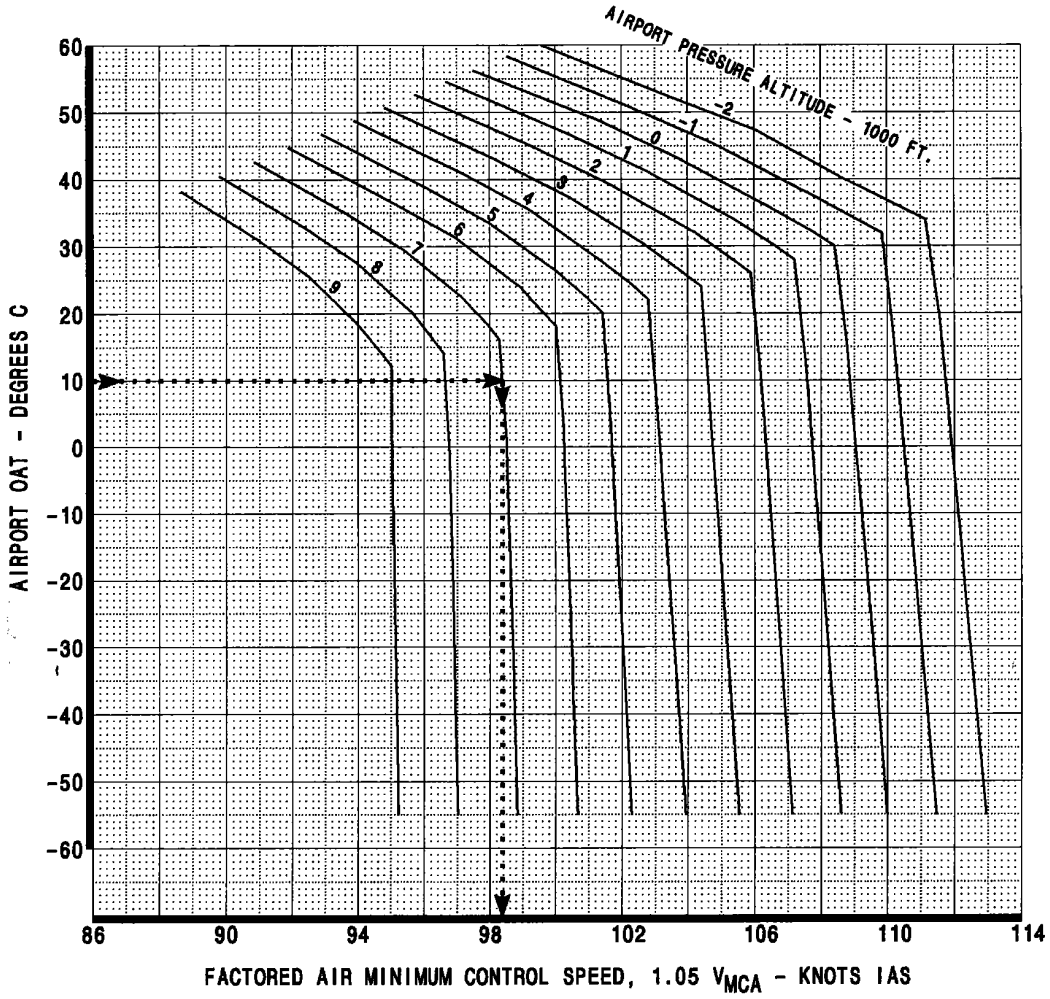
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AIR MINIMUM CONTROL SPEED

FACTORED

1.05 V_{MCA}



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S21799

SECTION 4.8 - $V_{1(MCG)}$ LIMITED TAKEOFF

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Takeoff Speeds	2
Basic Takeoff Speeds	2
Speed Increase Required	3

S21805

$V_{1(MCG)}$ LIMITED TAKEOFF

G E N E R A L

A $V_{1(MCG)}$ limited takeoff results when the entire range of V_1 for a takeoff gross weight falls below $V_{1(MCG)}$ (see V_1 Determination, Section 4.7). If the corrected accelerate-stop distance available equals or exceeds the appropriate reference $V_{1(MCG)}$ limited accelerate-stop distance below, V_1 may be increased to $V_{1(MCG)}$ without resulting in a field length limited takeoff. If the entire range of V_1 for a takeoff gross weight falls below $V_{1(MCG)}$ and the corrected accelerate-stop distance available is less than the reference $V_{1(MCG)}$ limited accelerate-stop distance below, the takeoff is not allowed.

Braking configuration	Reference $V_{1(MCG)}$ limited accelerate-stop distance
All brakes, antiskid on	3650 ft
1 brake deactivated, antiskid on	3700 ft
All brakes, antiskid inoperative	4050 ft

NOTE: Takeoff with a corrected accelerate-stop distance available less than the reference $V_{1(MCG)}$ limited accelerate-stop distance is permissible if any portion of the range of V_1 equals or exceeds $V_{1(MCG)}$ (see V_1 Determination, Section 4.7).

See the example problem appendix for a numerical example of this procedure.

T A K E O F F S P E E D S

The following steps describe the procedure for determining takeoff speeds, when limited by $V_{1(MCG)}$ and the corrected accelerate-stop distance available exceeds the reference $V_{1(MCG)}$ limited accelerate-stop distance.

Basic Takeoff Speeds

If $V_R \geq V_{1(MCG)}$ (Section 4.7), no speed increase is required for V_R and V_2 over the basic speeds obtained in Section 4.7. $V_1 = V_{1(MCG)}$.

V_1 (MCG) TAKEOFF LIMITS

T A K E O F F S P E E D S (Continued)

Speed Increase Required

If $V_R < V_{1(MCG)}$ (Section 4.7), a speed increase is required so that $V_R = V_{1(MCG)}$.

1. Determine Speed Increase Required

   Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart, Section 4.10, with the V_R speed determined in Section 4.7. Follow the guidelines to $V_R = V_{1(MCG)}$ and read speed increase required.

   If $V_R < V_{1(MCG)}$ with maximum speed increase (12 units), select the next lower takeoff flap setting and re-analyze the takeoff. Otherwise, proceed with the analysis to Step 2.

2. Determine Takeoff Safety Speed, V_2

   Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart, Section 4.10, with the V_2 speed determined in Section 4.7. Follow the guidelines to the speed increase required (Step 1) and read takeoff safety speed, V_2.

3. Takeoff Speeds

   (a) $V_1 = V_{1(MCG)}$.
   (b) $V_R = V_{1(MCG)}$.
   (c) V_2 from Step 2.

SECTION 4.9 - OBSTACLE CLEARANCE

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S24204

SECTION 4.9 - OBSTACLE CLEARANCE

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S24219

OBSTACLE CLEARANCE

T A K E O F F F L I G H T P A T H

PRESENTATION

The takeoff flight path is the calculated height versus distance relationship assuming failure of the most critical engine during takeoff, and is used for determining obstacle clearance. It is divided into logical segments defined by changes in airplane configuration, engine thrust, or speed. The assumed flight path is not mandatory for takeoff operations where obstacle clearance is not a problem or where analysis has shown that the clearance required by operating regulations is available using an alternate path or course.

Both the gross and the net takeoff flight paths may be obtained from the charts. The gross flight path governs the time spent in each climb segment, and is used to determine the actual heights at which transition from one segment to another is made. The net flight path is the gross flight path reduced by .8 percent gradient capability. Vertical obstacle clearance must be demonstrated on the basis of the net flight path minus 35 feet. The flight path is completed when a gross height of 1,500 feet has been attained, and transition to the enroute configuration completed, unless obstacle height requires further extension of the flight path.

The obstacle clearance charts show net flight path profiles, reduced by 35 feet, as a function of Takeoff Climb gross gradient at 400 feet. Knowing the distance and elevation difference between an obstacle and "Reference Zero", these dimensions can be spotted on the appropriate obstacle clearance chart to find the required climb gradient. If the flight path for the available gradient at V2 speed is sufficient to clear the obstacle, the takeoff weight determined by other limitations is satisfactory. Otherwise, the following options are available:

1. Reduce the weight to correspond with the required gradient.
2. Use a less limiting flap setting.
3. Use improved climb performance (increased takeoff speeds).

The impact of Options 2 and 3 on obstacle clearance capability depends on the height and location of the critical obstacle.

OBSTACLE CLEARANCE

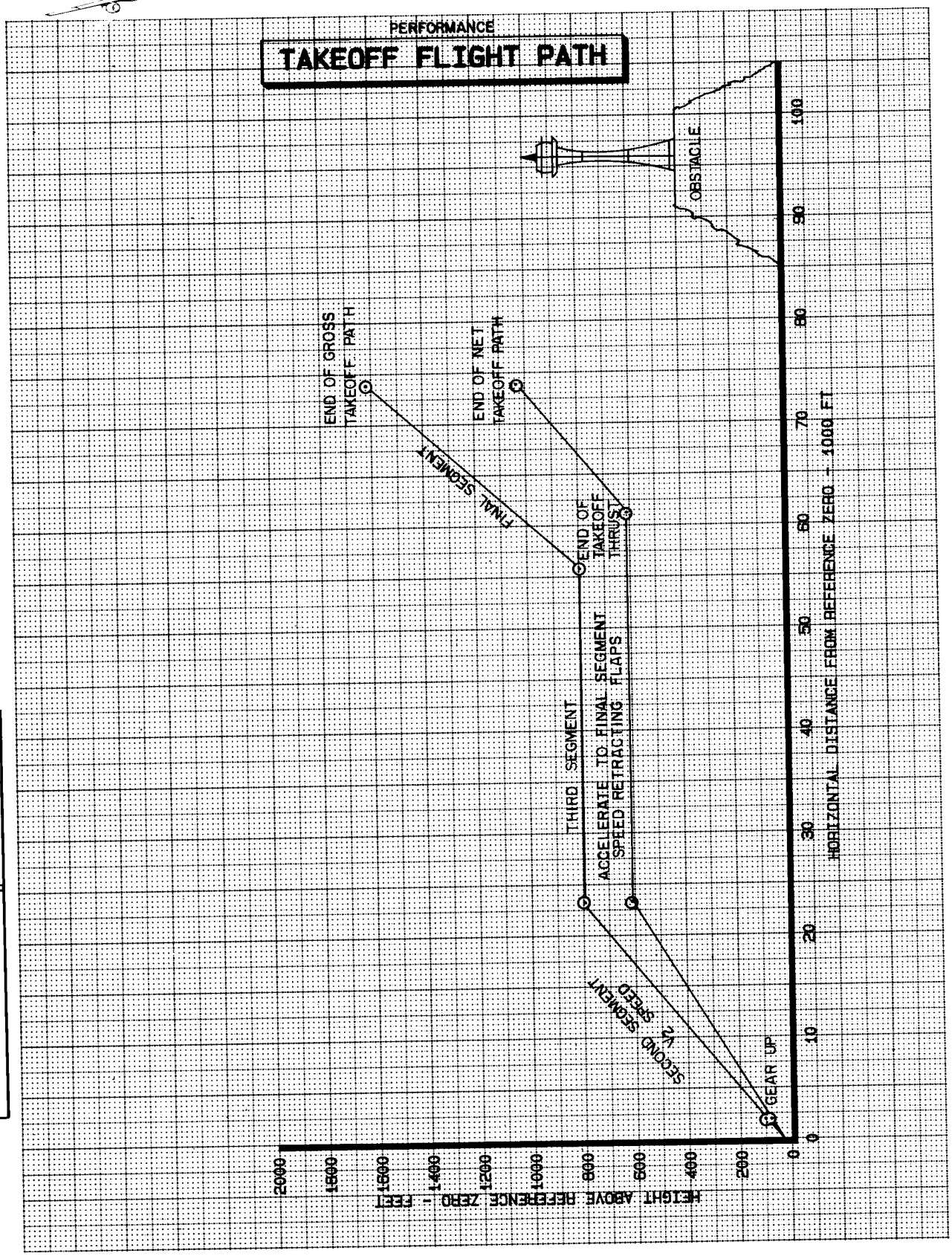
T A K E O F F F L I G H T P A T H

PRESENTATION (Continued)

When weight is reduced to achieve obstacle clearance, note that the horizontal distance between the obstacle and Reference Zero increases, since field length required is less. This can be accounted for on the obstacle clearance charts by using "obstacle distance trade lines". On a sloped runway the obstacle height also changes with respect to Reference Zero; this can be accounted for by varying the obstacle height in proportion to the change in takeoff distance and the runway slope. Where excess field length is available, Improved Climb Performance may be used to increase the takeoff speed and improve the climb gradient available.

Occasionally the flight path analysis must be extended beyond the flap retraction point to show clearance of high and very distant obstacles which cannot be avoided by turning. For this purpose the Third Segment Distance and Final Takeoff Climb charts are included.

The Flight Path charts are referenced to takeoff gross weight, airport temperature, and airport pressure altitude for ease of use. Allowances for fuel burnoff and performance changes with height have been accounted for in the chart construction.



P.C. 6S000111

BOWKER 767	APPROVED	DATE

S29513

OBSTACLE CLEARANCE

A S S U M E D C L I M B T E C H N I Q U E

Performance shown on the takeoff flight path charts is based on the following conditions and assumptions:

The flight path begins (Reference Zero) at the end of the takeoff distance where the airplane has attained a height of 35 feet and a speed of V2. The critical engine is assumed inoperative. Landing gear retraction is completed at the end of the first segment, which is based on demonstrated performance in ground effect. Climb is continued at V2 with takeoff flap setting and takeoff thrust on the operating engine until:

(a) A minimum gross height of 400 feet is attained, or,

(b) The maximum level-off height is attained, or,

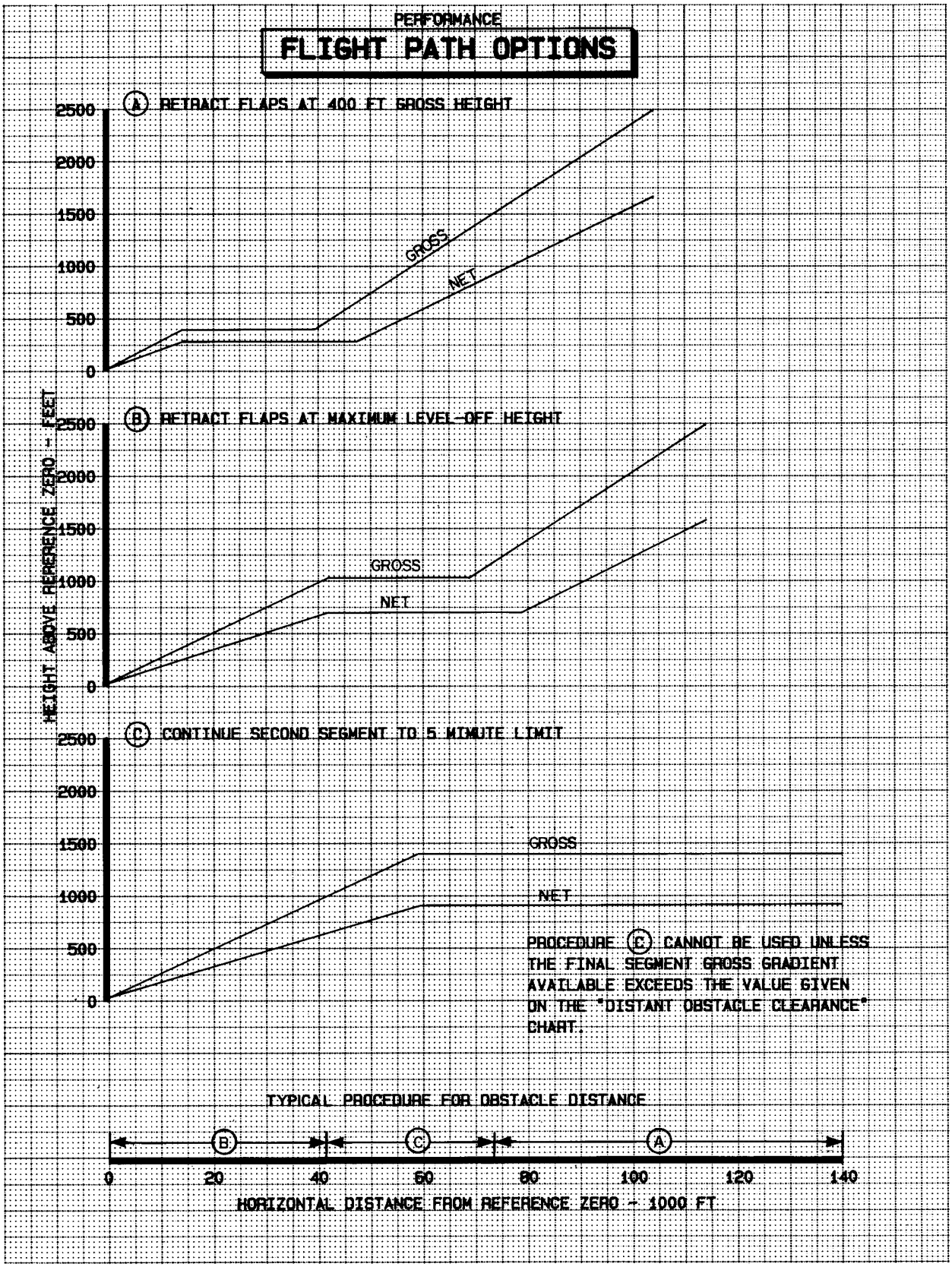
(c) The maximum height is attained which can be reached 5 minutes after setting takeoff thrust.

These flight paths have been illustrated on the Flight Path Options chart.

In cases (a) or (b) above, the airplane is then accelerated in level flight at takeoff thrust through the flap retraction speed schedule to the final segment speed at which time climb is resumed on maximum continuous thrust. Case (c) can only be used when all obstacles are cleared in the second segment and a final segment gross climb gradient greater than that required for a Maximum Continuous thrust cleanup is available (Distant Obstacle Clearance chart insert).

PERFORMANCE

FLIGHT PATH OPTIONS



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S29514

OBSTACLE CLEARANCE

F L I G H T P A T H C H A R T P R E S E N T A T I O N

The various charts used in determining a height versus distance profile of the takeoff flight path for checking obstacle clearance are described below. The flight path segments in which takeoff thrust is used are shown as functions of corrected takeoff climb gradient at 400 feet above airport elevation. Obstacle-limited weights for obstacles which can be cleared in the first or second segments of the takeoff flight path can be determined by direct reference to the charts. For more distant obstacles, it is necessary to construct a flight path diagram from information on the various charts in order to determine the maximum allowable takeoff weight for obstacle clearance.

TAKEOFF CLIMB - These charts show gross climb gradient capability in the second segment configuration as a function of gross weight, airport temperature, and airport pressure altitude. They are based on thrust and temperature conditions 400 feet above airport elevation. This height is higher than the gear retracted height which is why the available gradient at takeoff-climb-limited weights is slightly less than the 2.4 percent minimum specified in FAR 25.121(b).

CLOSE-IN OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for the first and second segments out to a distance of 7,000 feet as a function of the corrected takeoff climb gross gradient at a 400 foot height. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

DISTANT OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for a one-engine-inoperative climb at V2 speed in the takeoff climb (second segment) configuration, as a function of corrected takeoff climb gross gradient at 400 feet. Gross height lines are superimposed on the flight path lines. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

END OF EXTENDED SECOND SEGMENT - This chart shows the horizontal distance from reference zero at 5 minutes from the start of the takeoff as a function of gross weight, altitude, temperature and takeoff flap position. Data from this chart may be used along with the distant obstacle clearance chart when using extended second segment climb.

F L I G H T P A T H C H A R T P R E S E N T A T I O N
(Continued)

OBSTACLE DISTANCE TRADE LINES - When weight is reduced to achieve a higher takeoff climb gradient for obstacle clearance, the required takeoff distance is also reduced. This increases the obstacle distance from Reference Zero. This chart shows the relationship between takeoff distance saved (increased obstacle distance) and takeoff climb gradient as both are affected by gross weight. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart.

MAXIMUM LEVEL-OFF HEIGHT - At low climb gradients, the airplane cannot takeoff, climb to 1,500 feet and accelerate to flaps up within the 5 minute time limit on takeoff thrust. These charts show the maximum gross height at which the acceleration segment can be scheduled at takeoff thrust; the corresponding net height is used to check obstacle clearance.

THIRD SEGMENT DISTANCE - These charts present the gross and net horizontal distances required to accelerate to the final takeoff climb speed, while retracting flaps according to the recommended schedule, as a function of the available corrected takeoff climb gradient. The gradient read from the Takeoff Climb chart must be corrected for level-off height and wind on the Gradient Corrections chart before entering the Third Segment Distance chart.

FINAL TAKEOFF CLIMB CHART - This chart shows the gross and net gradient available upon completion of the flap retraction segment and reduction of thrust to maximum continuous limits. It is used to construct the final segment of the flight path to determine clearance of very high and distant obstacles. It is based on conditions 1,500 feet above airport altitude and 3 degrees C (5.4 degrees F) below airport temperature. The gradients from this chart should be corrected for height and wind on the Gradient Corrections chart as required.

GRADIENT CORRECTIONS - Corrections to takeoff and final takeoff climb gradients are shown on these charts for wind, gross height and for steady turns in the flight path. Wind corrections should be applied to the takeoff climb gradients used in the Obstacle Clearance charts. Both wind and gross height corrections may be required when a flight path analysis extends into the third and final segments. It should be noted that the procedure used to read this chart is different depending on the direction that the correction is to be made. For example, from a zero wind 400 ft. gross gradient (from a Takeoff Climb chart), start with the zero wind gradient on the REF LINE and slide to the required wind to get the wind corrected gradient. However, from a wind corrected gradient (from an Obstacle Clearance chart), start with the wind corrected gradient at the wind value and slide to the REF LINE to get the zero wind gradient.

S24234

OBSTACLE CLEARANCE

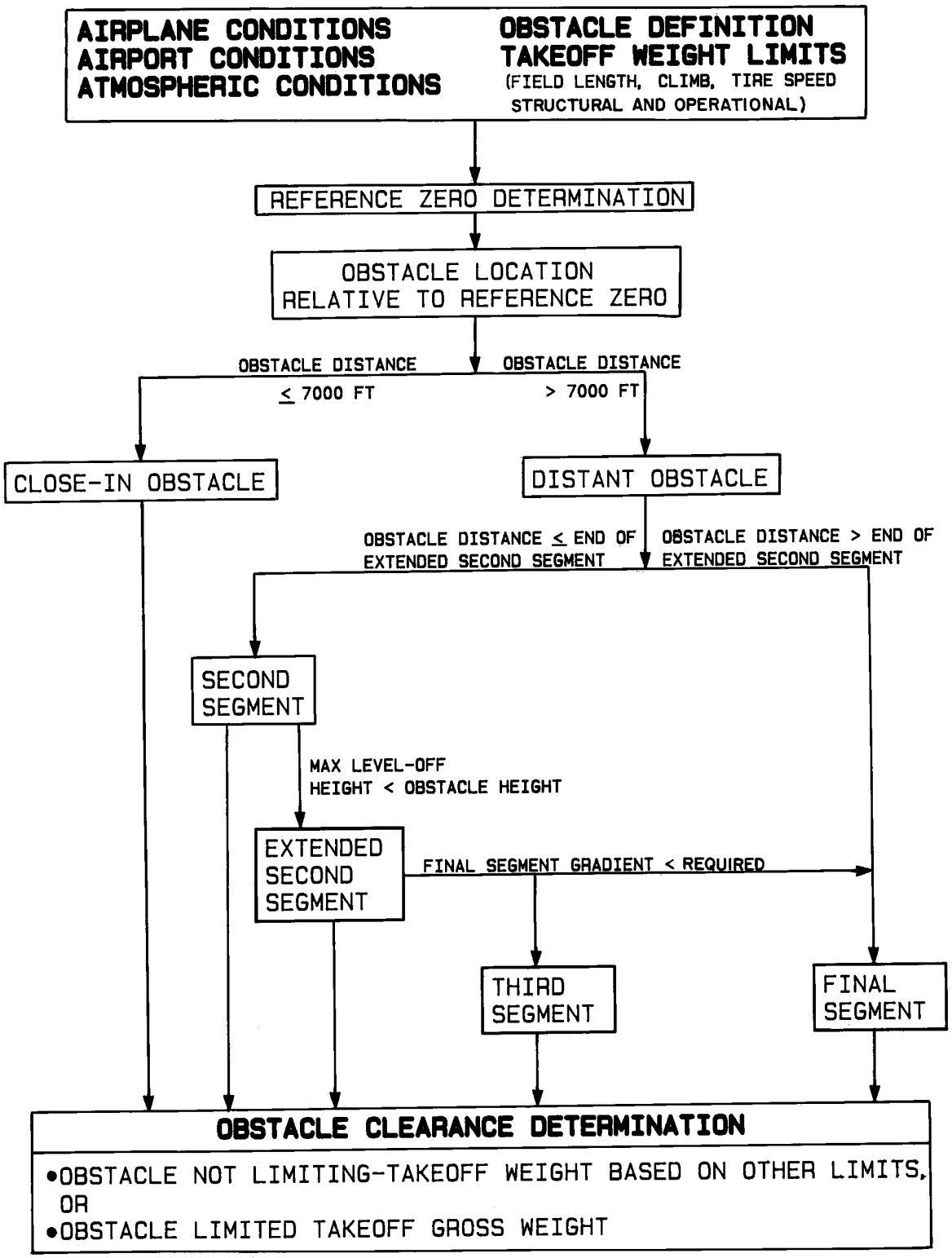
FLIGHT PATH CHART PRESENTATION
(Continued)

GROSS HEIGHT-PRESSURE ALTITUDE CONVERSION - When ambient temperatures are above or below ISA, the altitude change displayed on a pressure altimeter can differ significantly from the geometric heights calculated for the flight path. This chart relates the geometric height increment to a pressure altitude increment so that flight path procedures can be developed with reference to altimeter indications.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE FLOW DIAGRAM

The flow diagram below shows in simplified steps a procedure to determine takeoff obstacle clearance. If the obstacle is limiting, the obstacle limited takeoff gross weight is determined. A detailed description of the procedure follows.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE



S29515

OBSTACLE CLEARANCE ANALYSIS PROCEDURE

The following procedures assume that the allowable takeoff weight based on field length, climb, tire speed, and structural limits has been previously determined (see appropriate sections for procedures). This gross weight is then used in the obstacle clearance analysis to determine if any obstacles are limiting, necessitating a reduction in allowable takeoff gross weight.

See example problem appendix for numerical examples of these procedures.

1. Determine Reference Zero

   This is the starting point in the takeoff flight path analysis and the reference point for locating the obstacles under consideration. Reference Zero is a point on the runway or clearway plane at the end of the takeoff distance required and can be determined as follows:

   (a) Enter appropriate Field Length Limits (One Engine Inoperative) charts with the airport temperature/altitude and the least gross weight* determined by climb limits, tire speed limits, structural limits or operational requirements. Read one engine inoperative corrected runway length required.

   * If the Improved Climb Performance technique is used, enter with the equivalent (same required runway length) takeoff gross weight with zero speed increase determined in the Corrected Runway Length Required with Improved Climb Performance Procedure (Section 4.10).

   (b) Enter the appropriate Runway Length and V_1 Adjustments chart with the one engine inoperative corrected runway length required, Step 1(a), and the corrected accelerate-stop distance available from runway length determination. Honoring the $V_1/V_R \leq 1.0$ restriction, by using less than the corrected accelerate-stop distance available if necessary, read engine inoperative corrected takeoff distance required.

   (c) Enter the Engine Inoperative Corrected Takeoff Distance chart with the corrected takeoff distance required, Step 1(b), and proceed backwards through the chart, excluding the clearway correction. Read actual engine inoperative takeoff distance required.

   (d) Enter appropriate Field Length Limits (All Engines Operating) chart with the airport temperature/altitude and the gross weight used in Step 1(a). Read all engines operating corrected runway length required.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(e) Enter the All Engines Operating Corrected Runway Length chart with the all engines operating corrected runway length required, Step 1(d), and proceed backwards through the chart, excluding the clearway correction. Read actual all engines operating takeoff distance required.

(f) The actual takeoff distance required is the greater of the engine inoperative, Step 1(c), or all engines operating, Step 1(e), takeoff distances required. This is the location of Reference Zero relative to the brake release end of the runway.

2. Adjust Obstacle Distance and Height to Reference Zero.

Subtract the actual takeoff distance required, Step 1(f), from the actual runway length available and add the difference to obstacle distance measured from the end of the runway length available. Note: This can be a reduction in obstacle distance where clearway is used. On a sloped runway, obstacle height should also be corrected for the difference in elevation between Reference Zero and the end of the runway length available. See sloped runway effect on obstacle clearance in this section.

3. Takeoff Climb Gradient Available

(a) Determine takeoff climb gross gradient available.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the actual (not equivalent) gross weight. Read takeoff climb gross gradient available.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the takeoff climb gross gradient, Step 3(a)(1) and takeoff speed increase. Read takeoff climb gross gradient available with Improved Climb Performance.

(b) Enter the Gradient Corrections chart with gross gradient available, Step 3(a). Read corrected gross gradient available.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

4. Close-In Obstacles

Close-in obstacles, within 7,000 feet of Reference Zero, may be in the first or second segment of the takeoff flight path. Use the following analysis procedures:

(a) Enter the Close-In Obstacle Clearance chart with obstacle distance from Reference Zero and corrected gross gradient available, Step 3(b) (or other obstacle clearance requirement). Read height above Reference Zero available.

(b) If height above Reference Zero available, Step 4(a), is greater than or equal to the obstacle height above Reference Zero, the obstacle is cleared and allowable takeoff gross weight is based on other limits. Otherwise, proceed with analysis to Step 4(c).

(c) When the obstacle is not cleared, construct an obstacle distance trade line on the Close-In Obstacle Clearance chart and follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart in this section.

(d) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 4(c), and determine the gross gradient required for obstacle clearance.

(e) Determine obstacle limited takeoff gross weight.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 4(d). Read obstacle limited takeoff gross weight.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 4(d), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increase required for obstacle clearance. Read obstacle limited takeoff gross weight with Improved Climb Performance.

NOTE: Due to conservatisms inherent in the construction of the Obstacle Distance Trade Line chart, an increase in obstacle limited takeoff gross weight may be obtained by reanalyzing the takeoff flight path beginning at Step 1, with the obstacle limited gross weight from Step 4(e). A single iteration will remove the conservatism introduced into the analysis by the Obstacle Distance Trade Line. In general, a significant increase in obstacle limited gross weight may be obtained if the corrected gross gradient available from Step 3(b) is less than the corrected gross gradient required for obstacle clearance from Step 4(c) by .5% or more.

5. Distant Obstacles

Distant obstacles, more than 7,000 feet from Reference Zero, may be in the second, third or final segment of the takeoff flight path. Use the following analysis procedures:

(a) Enter the End of Extended Second Segment chart with temperature, altitude, actual (not equivalent) gross weight from step 1 and flap position. Read the horizontal distance from Reference Zero. If the distance to the obstacle is longer than the end of extended second segment climb distance, analyze the obstacle as a final segment obstacle. See obstacle in final segment. Otherwise, proceed with analysis to Step 5(b).

Second Segment

(b) Enter the Distant Obstacle Clearance chart with obstacle height and corrected gross gradient available, Step 3(b) (or other obstacle clearance requirement). Read gross height required for obstacle clearance.

(c) Enter the appropriate Maximum Level-Off Height chart with airport temperature/altitude and the gross gradient available, Step 3(a) (or other obstacle clearance requirement). Read maximum level-off height.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(d) If maximum level-off height, Step 5(c), is less than the gross height required for obstacle clearance, Step 5(b), see Extended Second Segment. Otherwise, proceed with analysis to Step 5(e).

(e) Enter the Distant Obstacle Clearance chart with obstacle distance from Reference Zero and corrected gross gradient available, Step 3(b). Read height above Reference Zero available.

(f) If height above Reference Zero available, Step 5(e), is greater than or equal to the obstacle height above Reference Zero, the obstacle is cleared and allowable takeoff gross weight is based on other limits. Otherwise, proceed with analysis to Step 5(g).

(g) When obstacle is not cleared, construct an obstacle distance trade line on the Distance Obstacle Clearance chart and follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart in this section.

(h) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 5(g), and determine the gross gradient required for obstacle clearance.

(i) Determine obstacle limited takeoff gross weight

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 5(h). Read obstacle limited takeoff gross weight.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 5(h), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increase required for obstacle clearance. Read obstacle limited takeoff gross weight with Improved Climb Performance.

NOTE: Due to conservatisms inherent in the construction of the Obstacle Distance Trade Line chart, an increase in obstacle limited takeoff gross weight may be obtained by reanalyzing the takeoff flight path beginning at Step 1 with the obstacle limited gross weight from Step 5(i). A single iteration will remove the conservatism introduced into the analysis by the Obstacle Distance Trade Line. In general, a significant increase in obstacle limited gross weight may be obtained if the corrected gross gradient available from Step 3(b) is less than the corrected gross gradient required for obstacle clearance from Step 5(g) by .5% or more.

6. Extended Second Segment

The FAR require a minimum gross climb gradient capability of 1.2 percent at all points in the takeoff flight path above 400 feet gross height.

When this requirement can be met with the most critical combination of speed and flap position encountered, and at maximum continuous thrust instead of takeoff thrust, then maximum level-off height no longer limits the height at which the second segment climb at V_2 speed must be terminated. Instead, the second segment may be extended until the takeoff thrust time-limit is reached.

(a) Check the final segment gradient capability required for extended second segment, as noted on the Distant Obstacle Clearance chart. This gradient capability is necessary to assure 1.2 percent gross gradient in the most critical configuration during flap retraction when using maximum continuous thrust.

(b) Enter the appropriate Final Takeoff Climb chart with airport temperature/altitude and the actual (not equivalent) gross weight. Read final segment gross gradient available.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(c) If final segment gross gradient available, Step 6(b), is greater than or equal to final segment gross gradient required, Step 6(a), an extended second segment climb is permissible. Complete the analysis with Steps 5(e) through 5(i). If final segment gross gradient available is insufficient to allow an extended second segment climb, a reduction in takeoff weight is necessary. The following three possibilities should be checked to achieve minimum weight reduction:

(1) Determine the gross weight at which the minimum final takeoff climb gradient requirement for extended second segment is met. See Maximum Gross Weight for Extended Second Segment.

(2) Determine the gross weight required to achieve the obstacle clearance gross height at the end of second segment (maximum level-off height). See Obstacle in Third Segment.

(3) Analyze the obstacle as a final segment obstacle. See Obstacle in Final Segment.

7. Maximum Gross Weight for Extended Second Segment

(a) Enter the appropriate Final Takeoff Climb chart with the final segment gradient capability required, Step 6(a), and airport temperature/altitude. Read maximum gross weight for extended second segment.

(b) Starting with the maximum gross weight for extended second segment, Step 7(a), complete the analysis with Steps 1, 2, 3, and 5(e) through 5(i). The result is the obstacle limited takeoff gross weight for extended second segment.

8. Obstacle in Third Segment

A third segment obstacle is one which is cleared during the level-flight acceleration and flap retraction segment of the calculated flight path; therefore, the necessary obstacle clearance height must be attained at, or before, the end of the second segment. The maximum gross height attainable in the second segment, unless certain other requirements are met, is indicated on the Maximum Level-Off Height chart.

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OBSTACLE CLEARANCE

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Starting with the corrected gross gradient available, obtained in Step 3(b) (or other obstacle clearance requirement), the maximum level-off height line can be constructed on the Distant Obstacle Clearance chart using the following procedure for each point on the line.

Maximum Level-Off Height Line

(a) Assume a corrected gross gradient.

(b) Enter the Gradient Corrections chart with corrected gross gradient, Step 8(a), and determine the gross gradient.

(c) Enter the appropriate Maximum Level-Off Height chart with airport temperature/altitude and the gross gradient, Step 8(b). Read maximum level-off height.

(d) Plot maximum level-off height, Step 8(c), as a function of corrected gross gradient, Step 8(a), on the Distant Obstacle Clearance chart.

Obstacle Limited Takeoff Gross Weight

(e) After the maximum level-off height line has been constructed, follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance.

(f) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 8(e), and determine the gross gradient required for obstacle clearance.

(g) Determine third segment obstacle limited takeoff gross weight.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 8(f). Read third segment obstacle limited takeoff gross weight.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 8(f), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increases required for obstacle clearance. Read third segment obstacle limited takeoff gross weight with Improved Climb Performance.

9. Obstacle in Final Segment

When distant obstacles cannot be cleared at maximum level-off height, or by using extended second segment, it is necessary to construct the flight path beyond the end of the second segment using the Third Segment Distance and Final Takeoff Climb charts.

(a) Select the minimum allowable gross level-off height.

(1) FAR minimum: 400 feet.

(2) Obstacle clearance requirement.

(3) Operational requirement or procedures.

(b) Enter the Distant Obstacle Clearance chart with the desired gross level-off height, Step 9(a), and the available corrected gross gradient, Step 3(b), (or other obstacle clearance requirement). Read height above Reference Zero and horizontal distance from Reference Zero. This is the end of second segment.

(c) Enter the Takeoff Climb Gradient Corrections chart with the same wind corrected gross gradient used in Step 9(b) and further correct it to the selected gross level-off height if greater than 400 feet.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(d) Enter the appropriate Third Segment Distance chart with airport temperature/altitude and corrected gross gradient available, Step 9(c). Read net and gross third segment distance.

(e) Add the net and gross third segment distances, Step 9(d), to the end of the second segment distance, Step 9(b), to get total net and gross distance from Reference Zero to the end of third segment.

(f) Enter the appropriate Final Takeoff Climb chart with airport temperature/altitude and the gross weight used to determine Reference Zero, Step 1 (or other obstacle clearance requirement). Read final segment gross gradient available.

(g) Calculate the gross height required for obstacle clearance for FAR requirements as follows:

Gross Height = Obstacle Height* + 35 + (.008 x Obstacle Distance*)

*From Reference Zero

(h) Enter the Final Takeoff Climb Gradient Corrections chart with final segment gross gradient available, Step 9(f), and correct it for wind and gross height, Step 9(g), if gross height required for obstacle clearance is greater than 1,500 feet.

(i) Reduce corrected final segment gross gradient available, Step 9(h), by .8 percent to obtain corrected final segment net gradient available.

(j) The remaining net height that must be gained to clear the obstacle, from the end of the third segment distance, is the difference between the obstacle height and the third segment height above Reference Zero, Step 9(b). This net height is gained at the corrected final segment net gradient available, Step 9(i). The horizontal distance traveled, to climb this height, will be:

Final Segment Distance =

$$\frac{\text{Obstacle Height - Third Segment Height}}{\text{Corrected Final Segment Net Gradient Available}}$$

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OBSTACLE CLEARANCE

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(k) Add the final segment distance, Step 9(j), to the net distance from Reference Zero to the end of third segment, Step 9(e), to obtain the total net distance from Reference Zero to clear the obstacle.

(l) If the total distance required to clear the obstacle, Step 9(k), is less than, or equal to, the distance from Reference Zero to the obstacle, the obstacle is not limiting and allowable takeoff gross weight is based on other limits. Otherwise, repeat the entire flight path analysis, Steps 1, 2, 3 and 9, for a lower weight and interpolate these results for the final segment obstacle limited takeoff gross weight.

NOTE: $GW_2 \approx GW_1 \times (D_{OB} \div D_1)^{.3}$

May be used as an approximate estimator in selecting a second gross weight for analysis.

WHERE: GW_2 = Second Gross Weight
GW_1 = First Gross Weight
D_{OB} = Distance to Obstacle from Reference Zero
D_1 = Distance to Clear Obstacle with GW_1, Step 9(k)

SLOPED RUNWAY EFFECT ON OBSTACLE CLEARANCE

Obstacle heights are generally referenced to the elevation at the end of the takeoff distance available. On sloped runways, when the entire takeoff distance is not used because obstacle clearance is critical, the flight path begins at a higher elevation on a downhill runway, and a lower elevation on an uphill runway. The actual obstacle distance is shifted by the amount of takeoff distance saved, when gross weight must be adjusted to obtain an increased gradient. The obstacle height can also be shifted by multiplying the change in obstacle distance by the runway gradient, and adding the product to the obstacle height (reduce obstacle height for downhill runway). For example, if obstacle distance is adjusted 1,000 feet on a 1% uphill runway, add 10 feet to obstacle height and draw a line from the original height-distance coordinates through the adjusted height and distance. See the example problem appendix for a numerical example of this procedure.

S28197

CONSTRUCTION OF OBSTACLE DISTANCE TRADE LINE ON OBSTACLE CLEARANCE CHART

When takeoff gross weight is reduced to achieve a higher gradient capability to clear an obstacle, the required takeoff distance is also reduced. The relationship between gradient and distance (an obstacle distance trade line) can be constructed on an obstacle chart to solve obstacle problems when a gross weight reduction is required. The following procedure describes the steps required to construct such an obstacle distance trade line.

Starting with any point on an obstacle clearance chart, select additional adjoining corrected 400-foot gross gradients shown on the chart. Then find the corresponding uncorrected 400-foot gross gradients using the Gradient Corrections (Takeoff Climb) chart and the Takeoff Climb (Improved Climb Performance) chart, if applicable. Next determine the corresponding takeoff gross weights from the appropriate Takeoff Climb chart at the airport temperature/altitude and uncorrected 400-foot gross gradients. With these gross weights, determine the horizontal distances from Reference Zero using steps 1 and 2 of the Obstacle Clearance Analysis Procedure, this section. By plotting the corrected 400-foot gross gradient and the corresponding horizontal distance from Reference Zero, the required obstacle distance trade line is determined.

OBSTACLE CLEARANCE WITH SPEED INCREASE

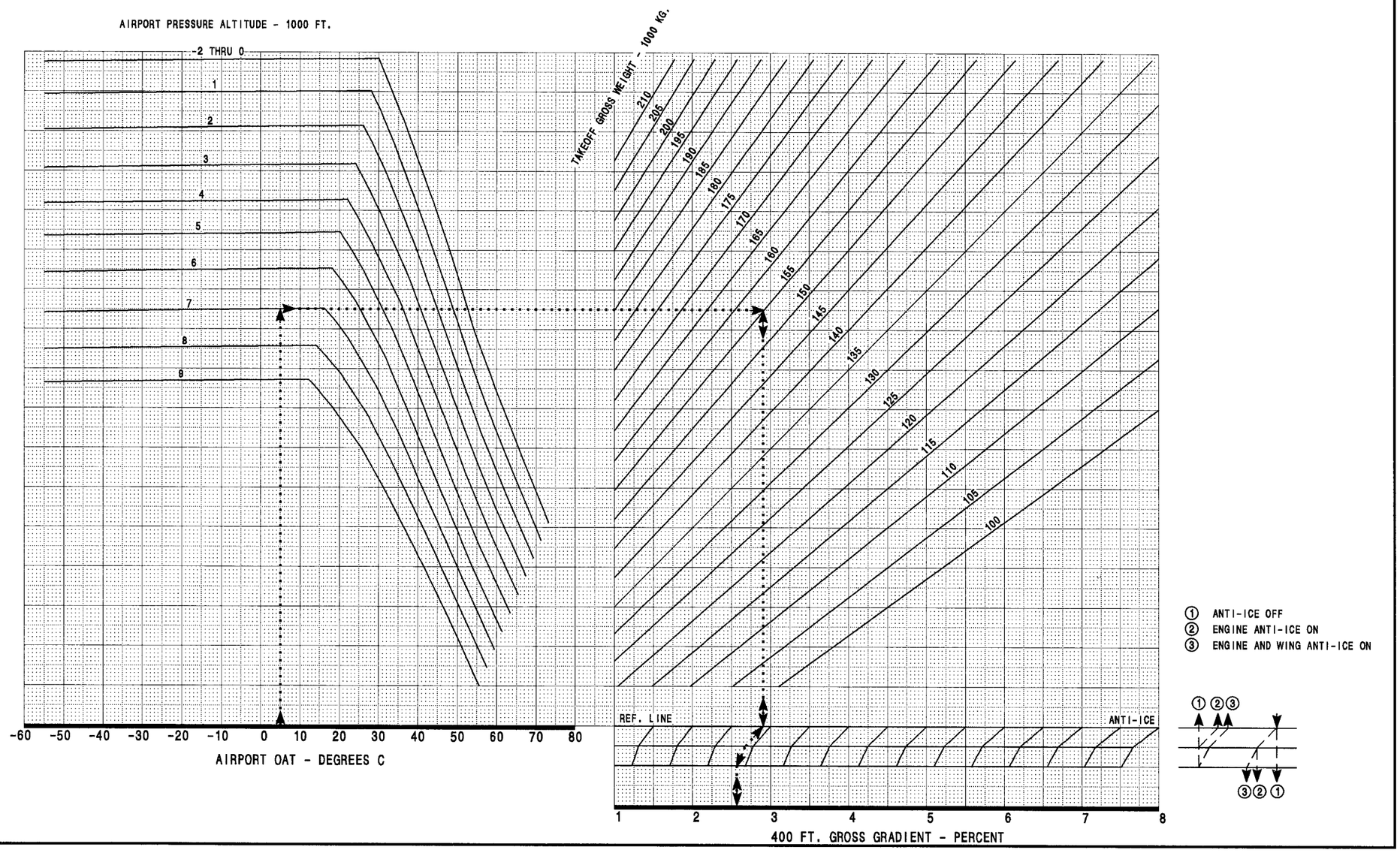
Where excess field length is available, the improved climb performance technique may be used to increase takeoff speeds and improve the climb gradient available. The effect of speed increase on the second segment gradient is shown on the Takeoff Climb (Improved Climb Performance) charts in Section 4.10.

The procedure for finding the maximum obstacle limited takeoff weight when using the improved climb performance technique is a modified version of the Obstacle Clearance Analysis Procedure. The Obstacle Clearance Analysis Procedure should be followed for a series of takeoff speed increases from zero units up to the maximum allowed. The maximum weight obtained from the series is the maximum allowable obstacle limited takeoff gross weight.

TAKEOFF CLIMB

A/C PACKS ON

FLAPS 5



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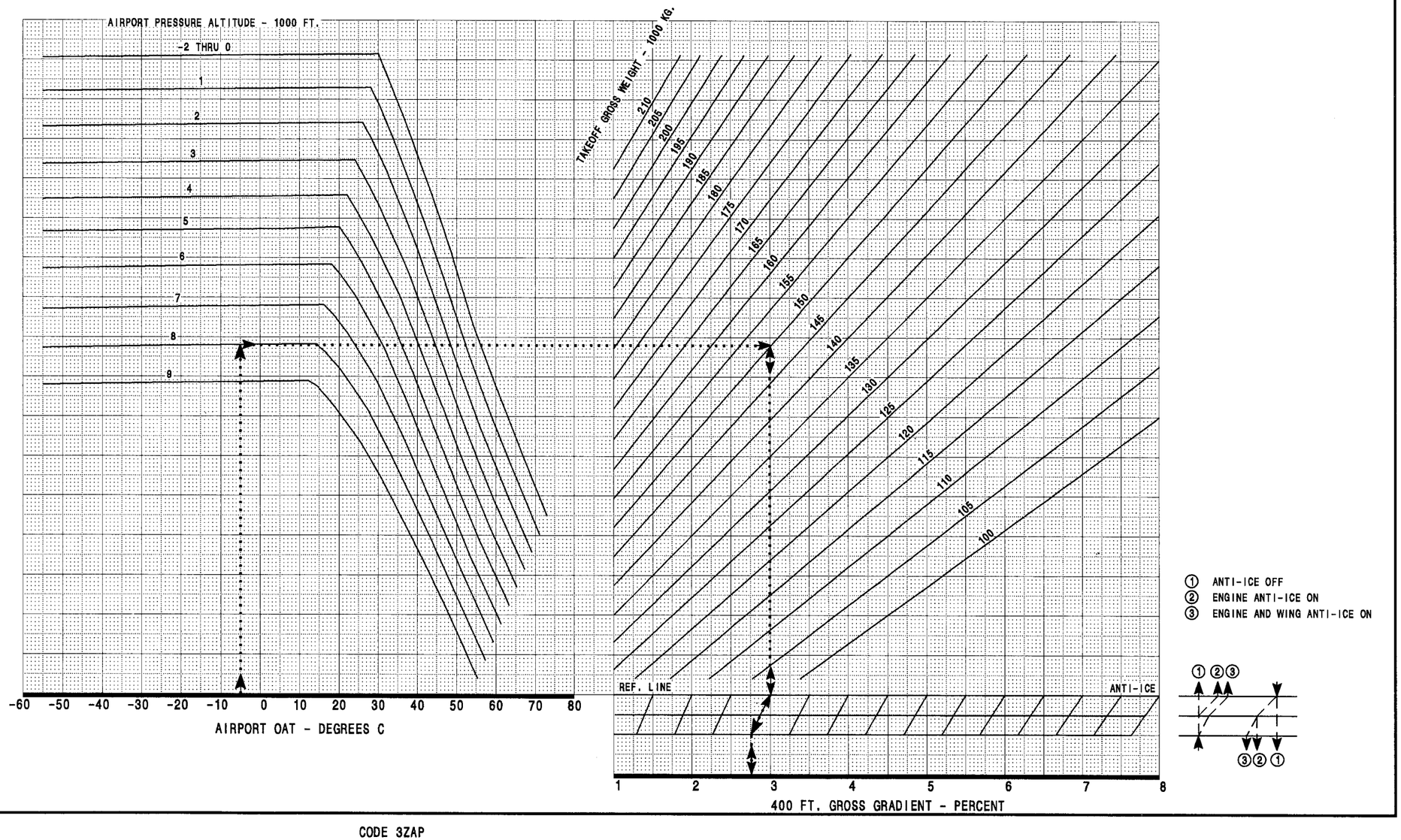
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PERFORMANCE

TAKEOFF CLIMB

A/C PACKS OFF

FLAPS 5



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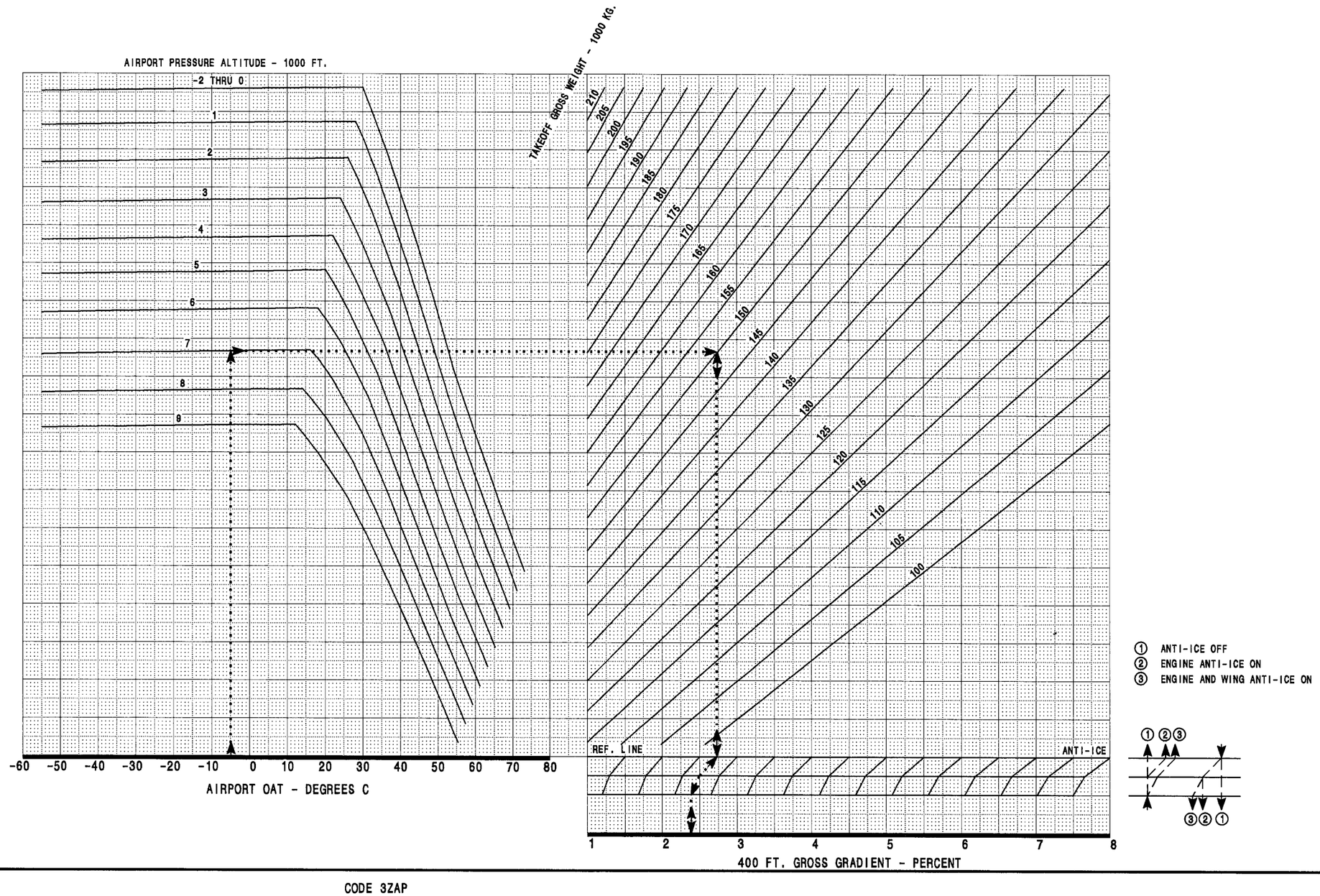
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TAKEOFF CLIMB

A/C PACKS ON

FLAPS 15



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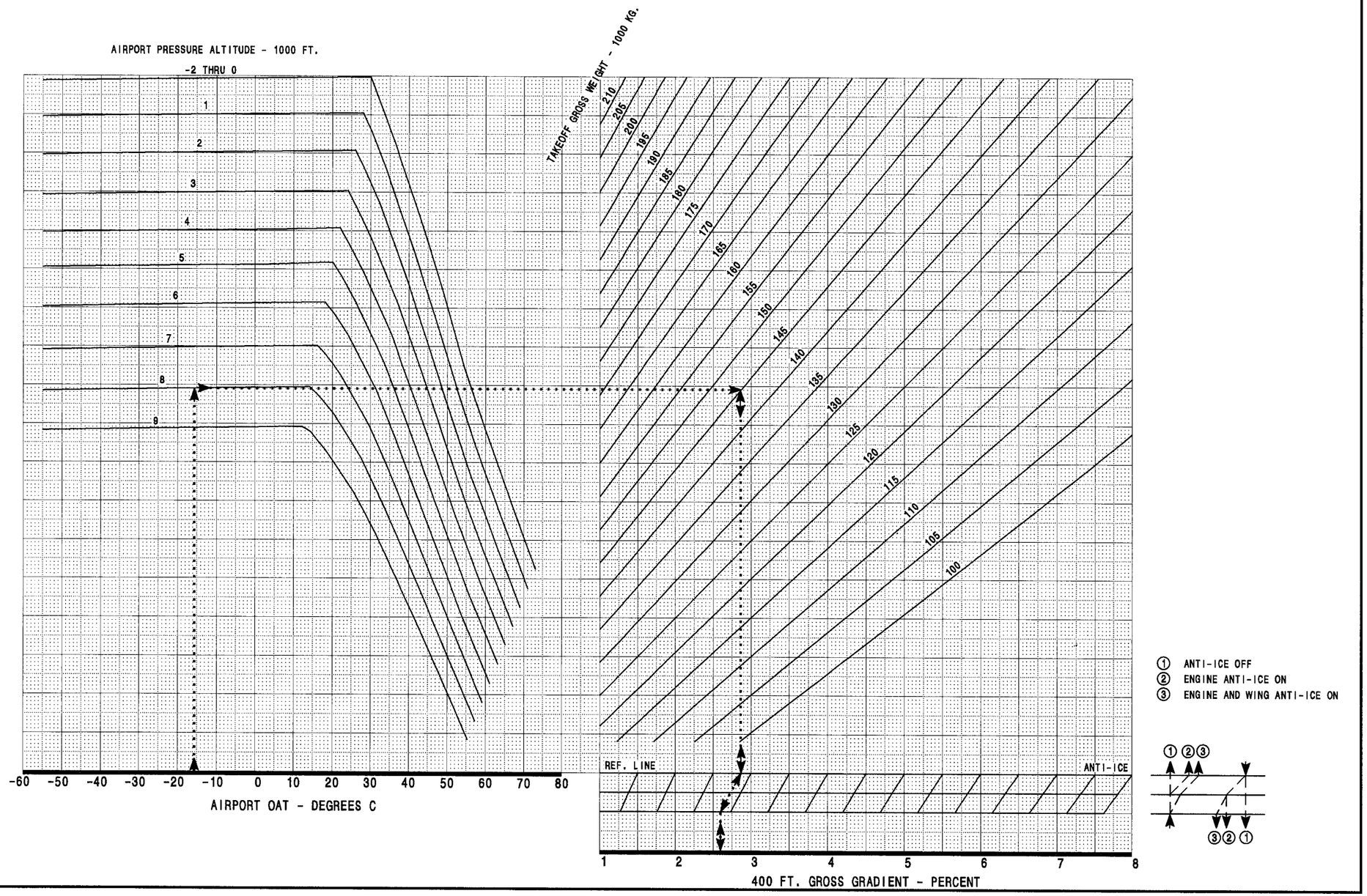
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APPROVED G.LARSON DATE 04-02-96

S41476

TAKEOFF CLIMB

FLAPS 15

A/C PACKS OFF



① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

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D041T513-1 PG. 4.9-30

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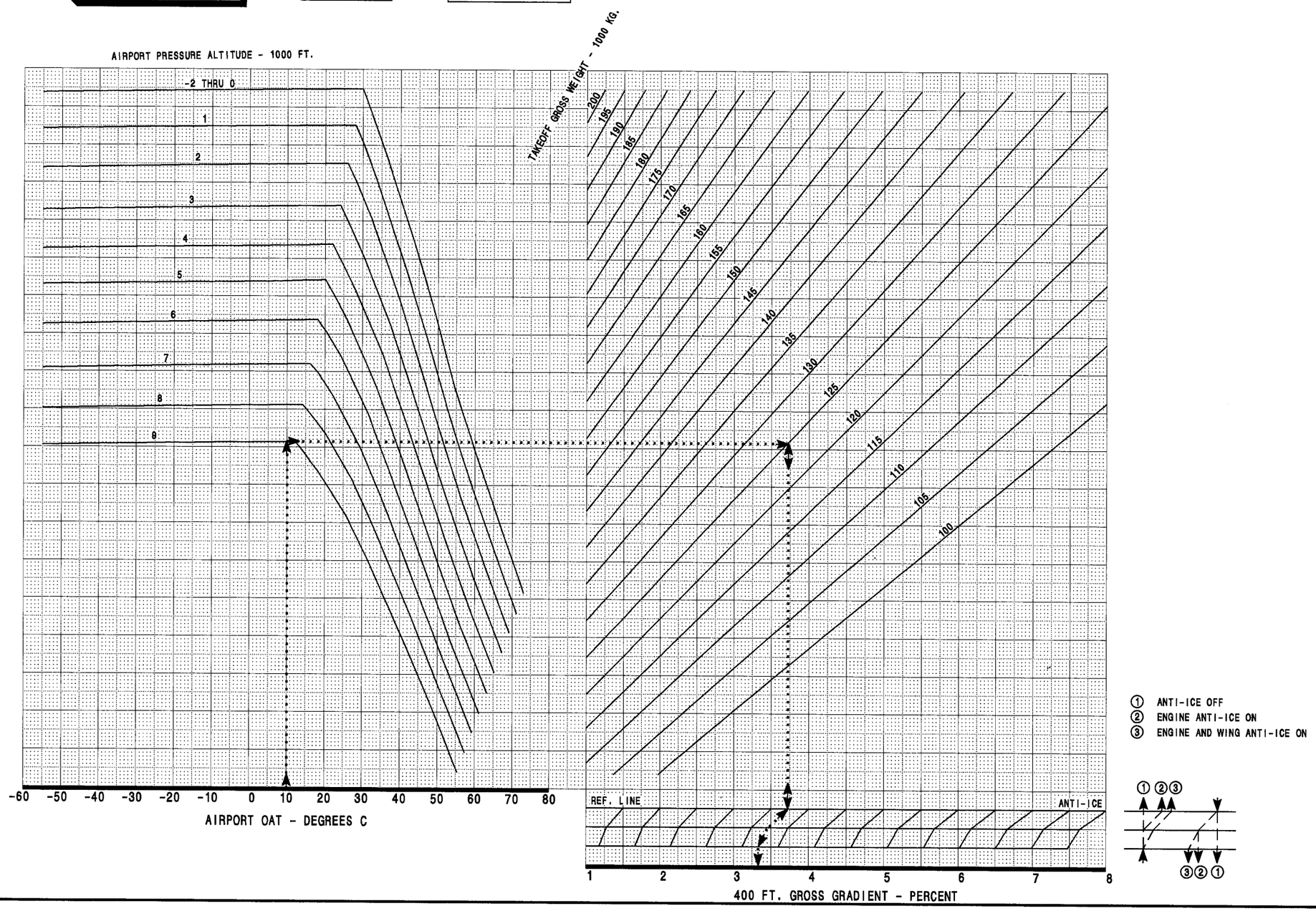
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S41499

TAKEOFF CLIMB

FLAPS 20

A/C PACKS ON



① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

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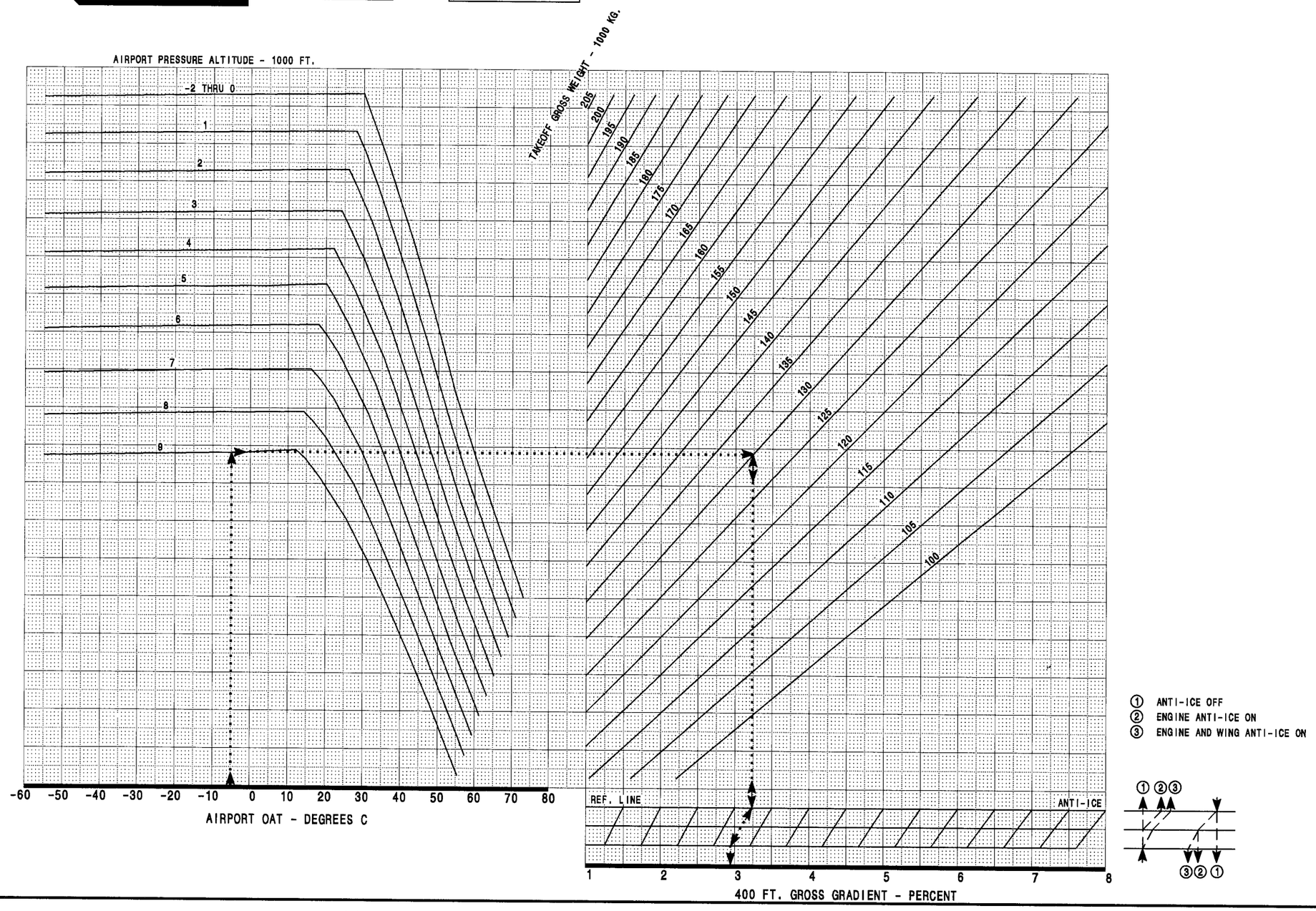
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TAKEOFF CLIMB

FLAPS 20

A/C PACKS OFF



① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

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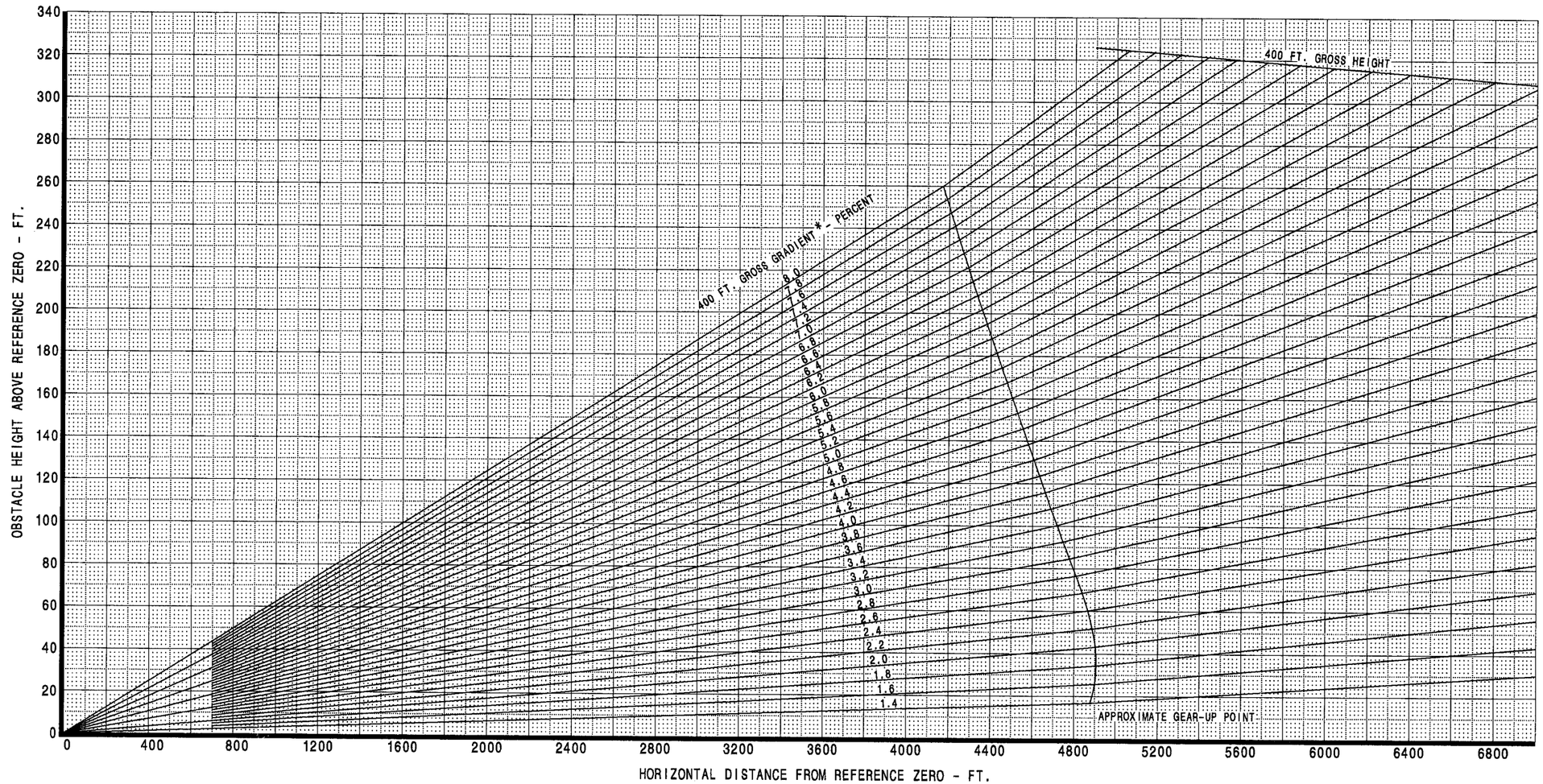
PERFORMANCE

CLOSE-IN OBSTACLE CLEARANCE

FLAPS 5, 15, AND 20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.

* MUST BE CORRECTED FOR WIND AND BANK ANGLE.



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PERFORMANCE

DISTANT OBSTACLE CLEARANCE

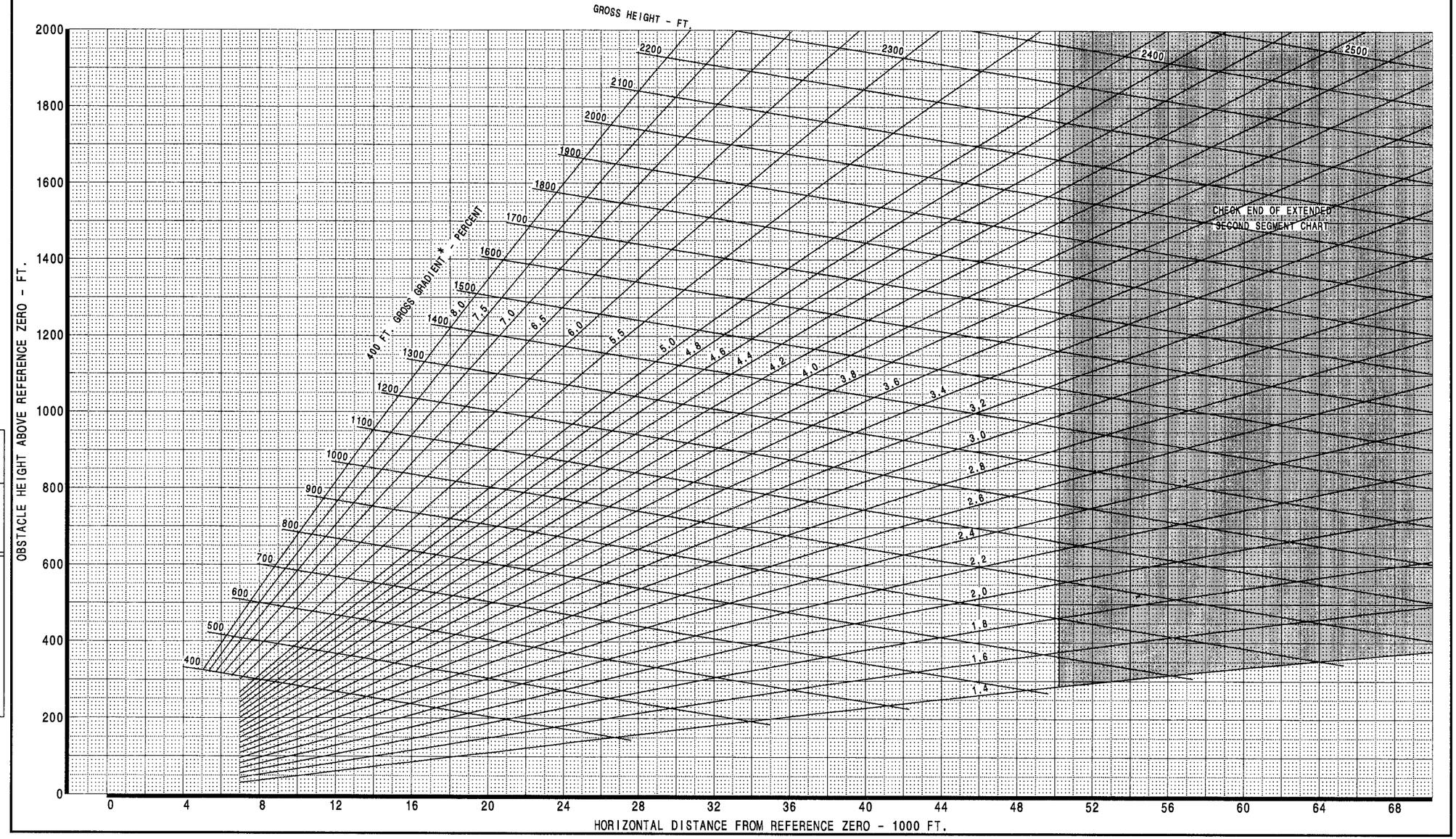
FLAPS 5, 15, AND 20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.
- IN SHADED REGION, CHECK END OF EXTENDED SECOND SEGMENT CHART.

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, AND BANK ANGLE.

- EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10



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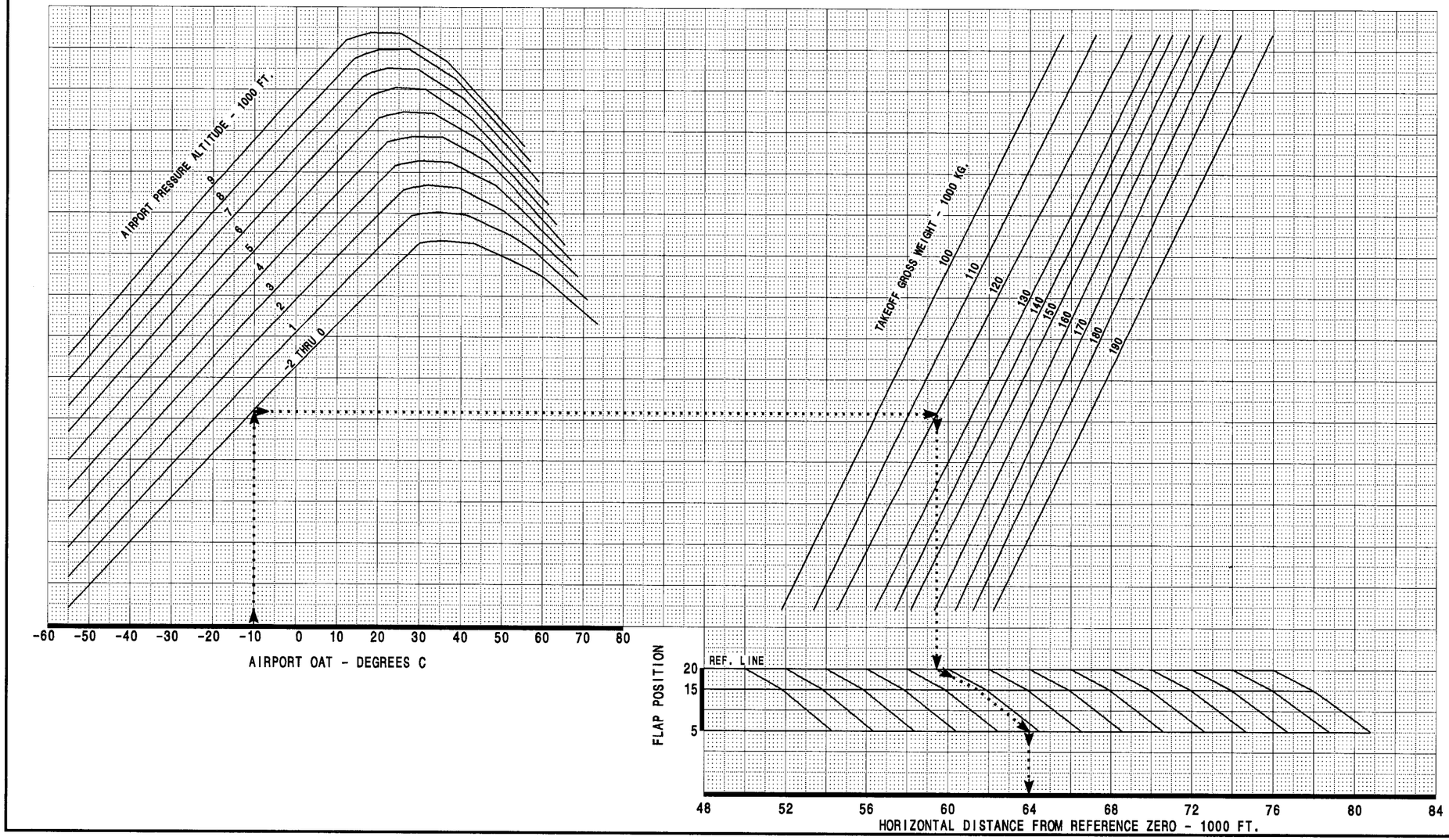
S41571

END OF EXTENDED SECOND SEGMENT

FLAPS 5, 15, AND 20

■ EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10



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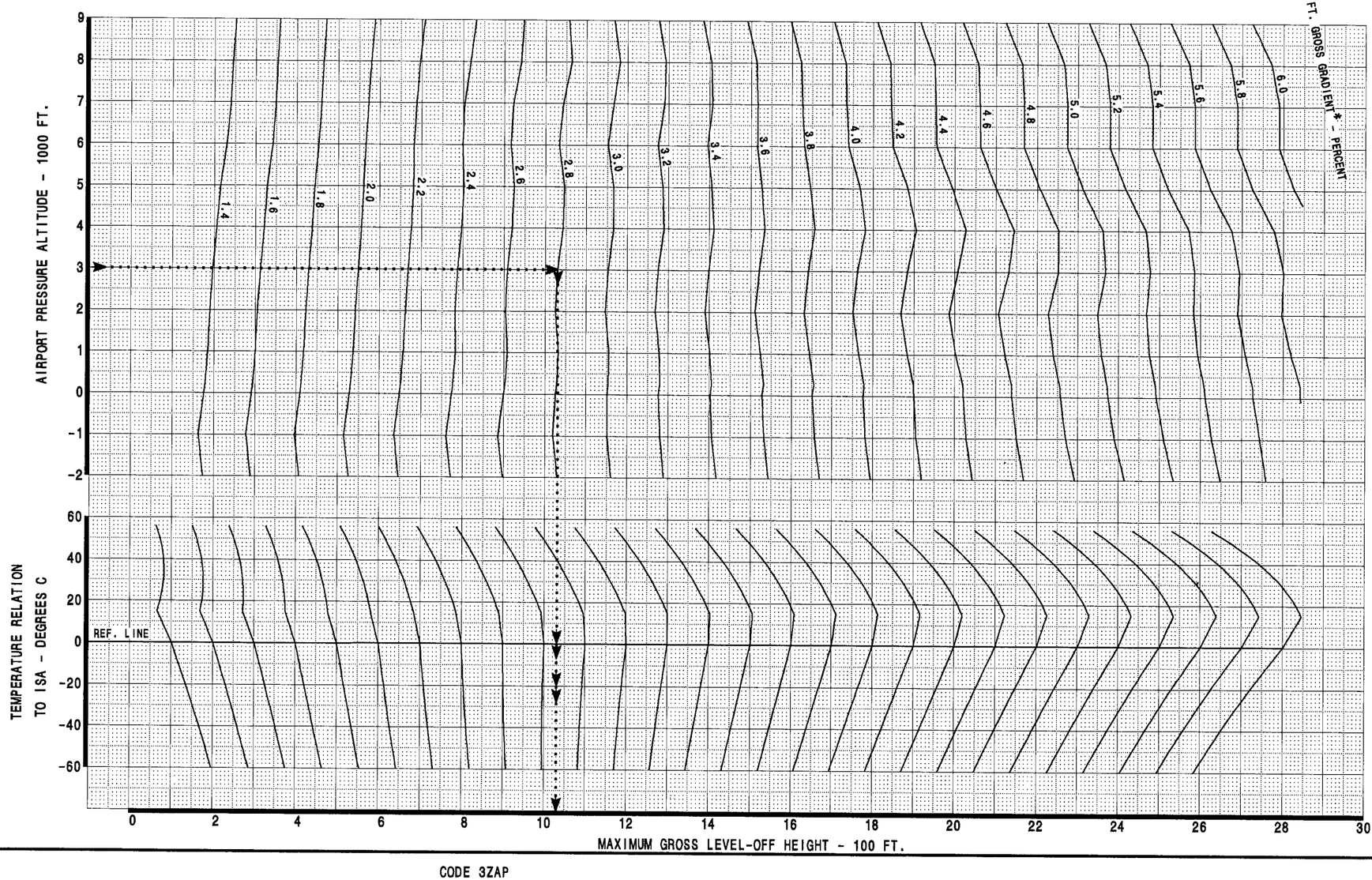
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S41578

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 5

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



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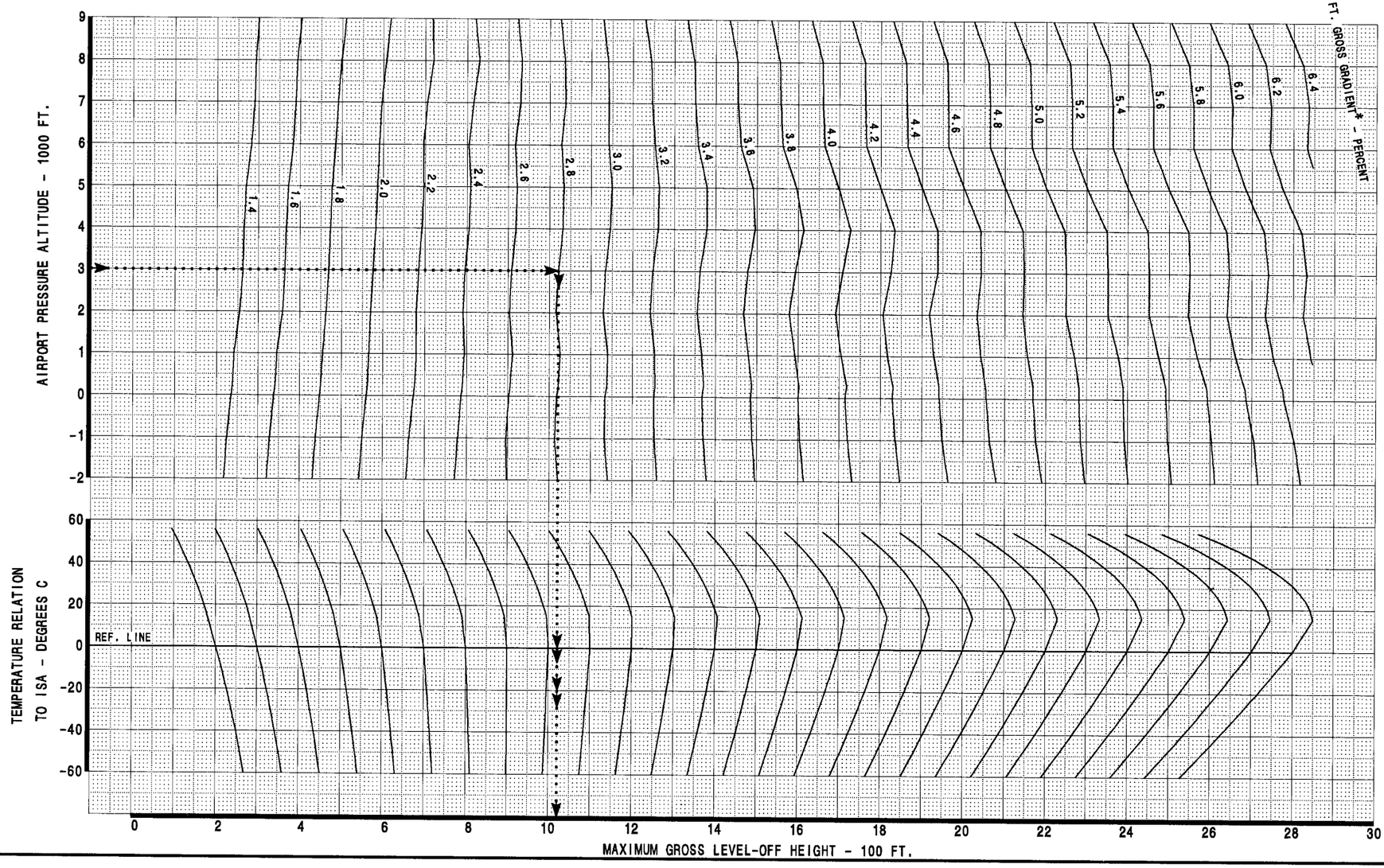
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S41585

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 15

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



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D041T513-1 PG. 4.9-39

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767-300ER
CF6-80C2B7/B7F

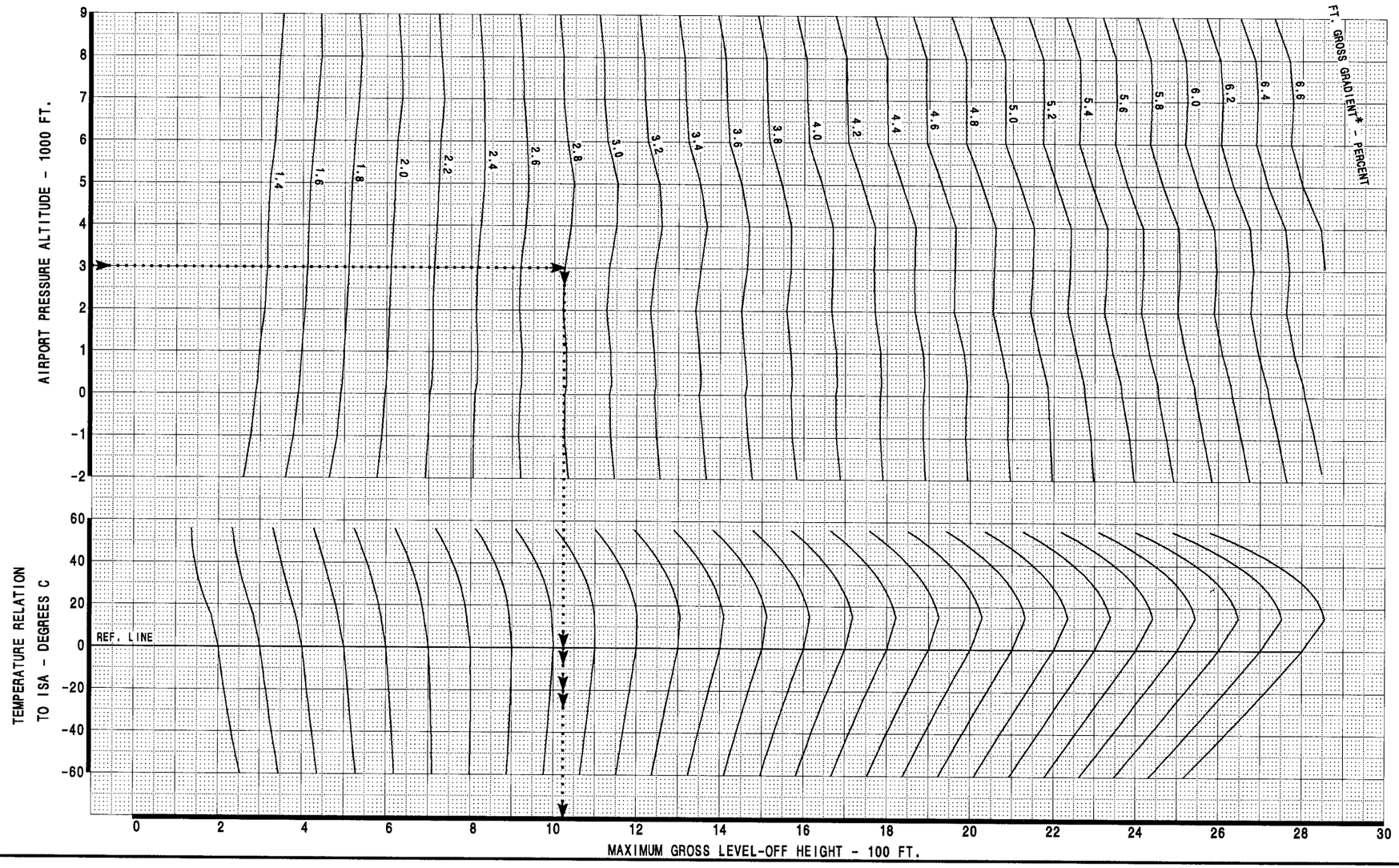
	APPROVED	DATE
	M. McGonigal	2/25/96

S41590

MAXIMUM LEVEL-OFF HEIGHT

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

FLAPS 20



P.C. d600940003
D041T513-1 PG. 4.9-40

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

APPROVED
DATE

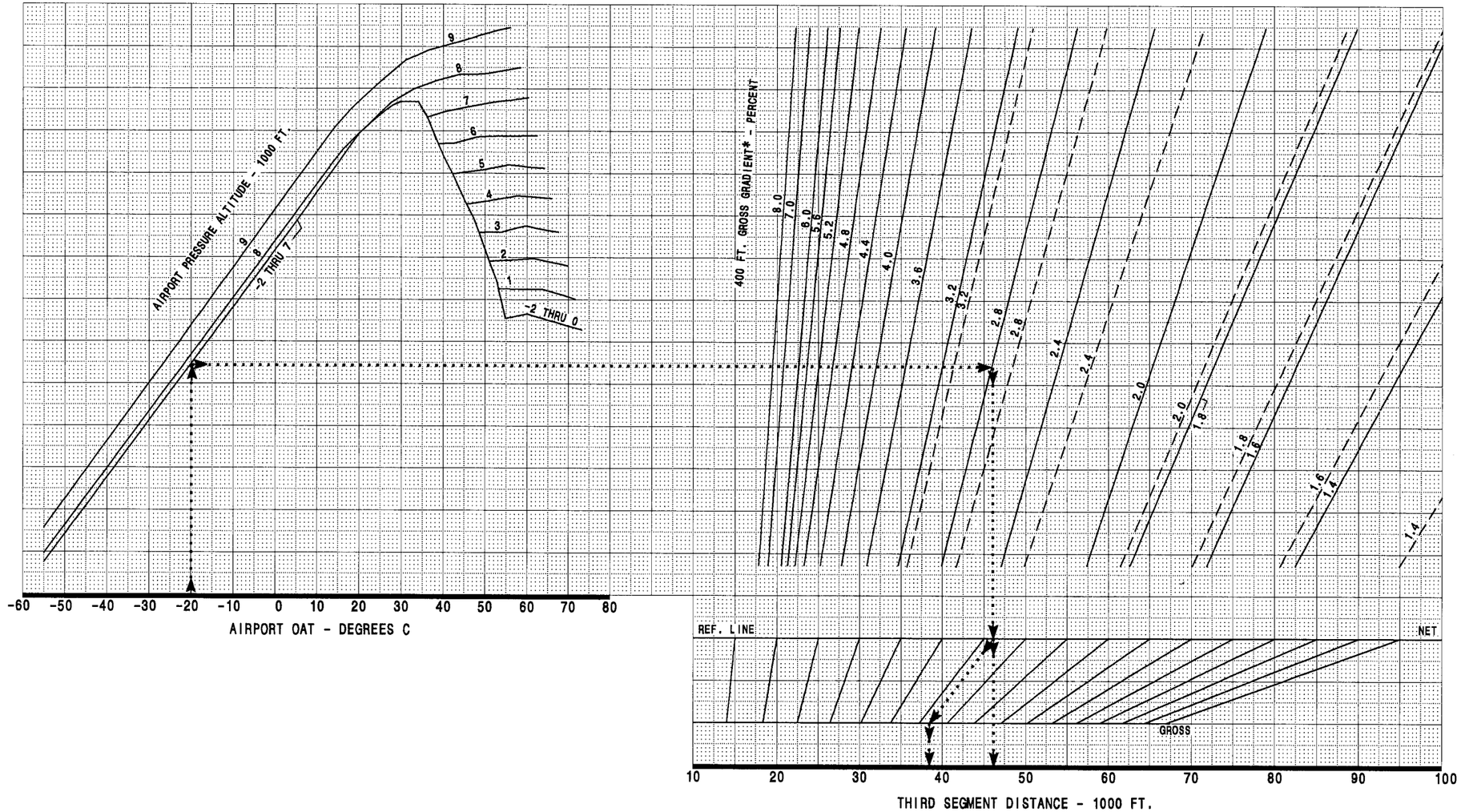
S41595

THIRD SEGMENT DISTANCE

FLAPS 5

■ FOR GROSS WEIGHTS GREATER THAN 151,950 KG., USE DASHED GRADIENT LINES.

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, LEVEL-OFF HEIGHT, AND BANK ANGLE.



P.C. d600941003
D041T513-1 PG. 4.9-41

J. CRAVENER
767-300ER
CF6-80C2B7/B7F

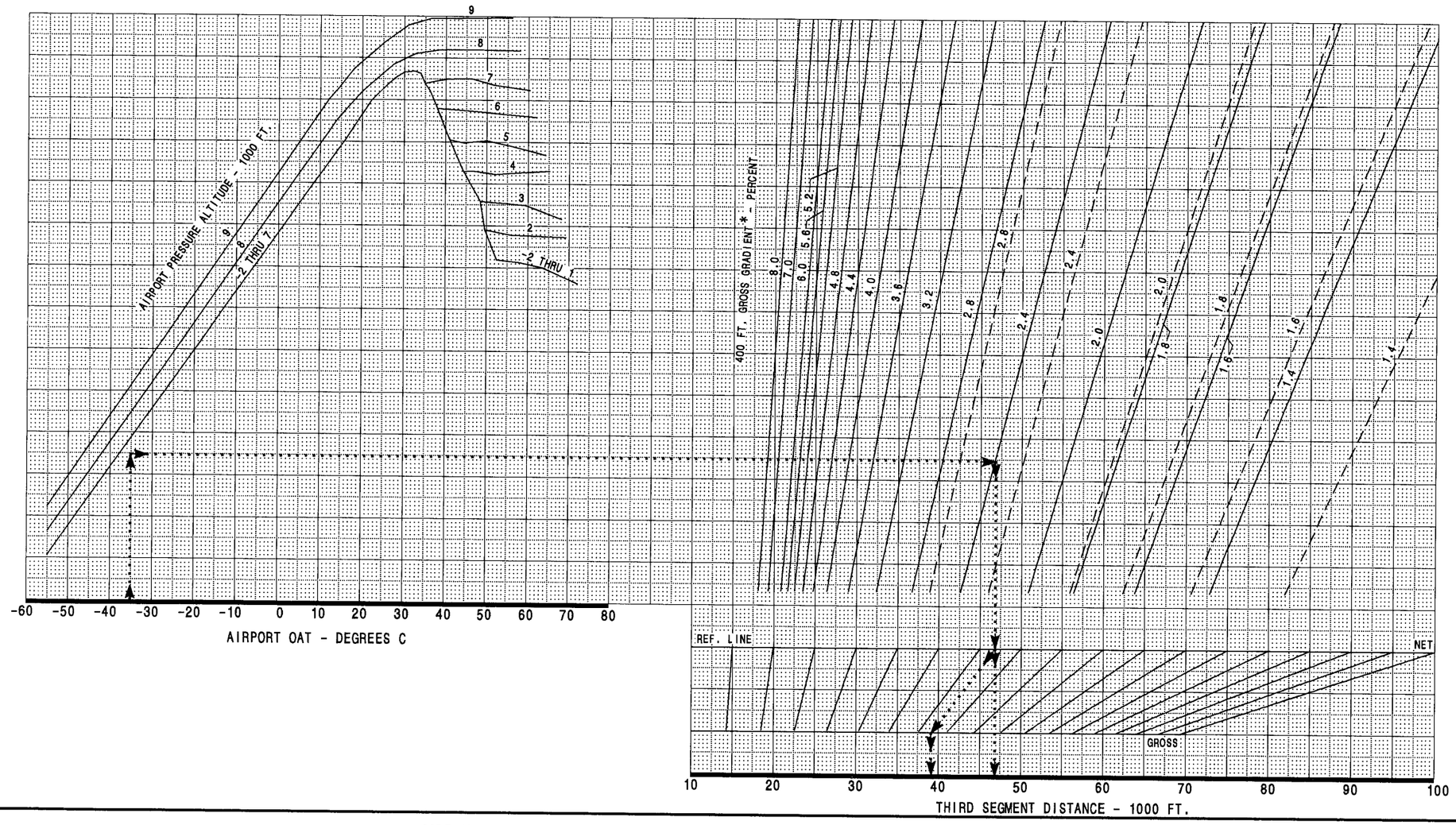
	APPROVED	DATE
	M.MYERS	25 OCT 94

THIRD SEGMENT DISTANCE

FLAPS 15

■ FOR GROSS WEIGHTS GREATER THAN 151,950 KG., USE DASHED GRADIENT LINES.

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, LEVEL-OFF HEIGHT, AND BANK ANGLE.



P.C. d600942003
D041T513-1 PG. 4.9-42

APPROVED	DATE
H.MYERS	25 Oct 94

J. NEWELL
767-300ER
CF6-80C2B7/B7F

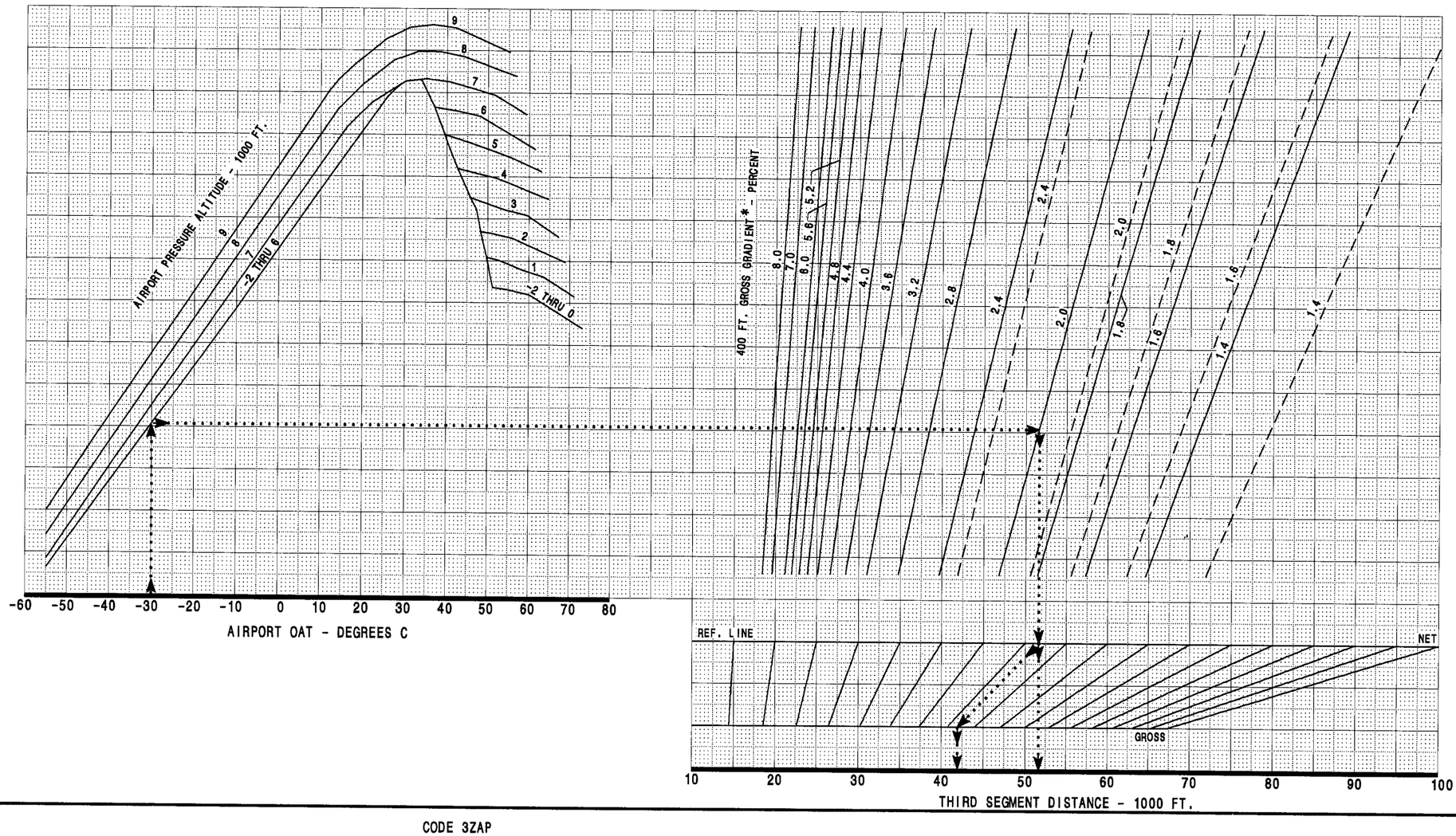
S42003

THIRD SEGMENT DISTANCE

FLAPS 20

■ FOR GROSS WEIGHTS GREATER THAN 151,950 KG., USE DASHED GRADIENT LINES.

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, LEVEL-OFF HEIGHT, AND BANK ANGLE.



P.C. d600943003
D041T513-1 PG. 4.9-43

APPROVED	DATE
M.MYERS	25OCT94

J. NEWELL
767-300ER
CF6-80C2B7/B7F

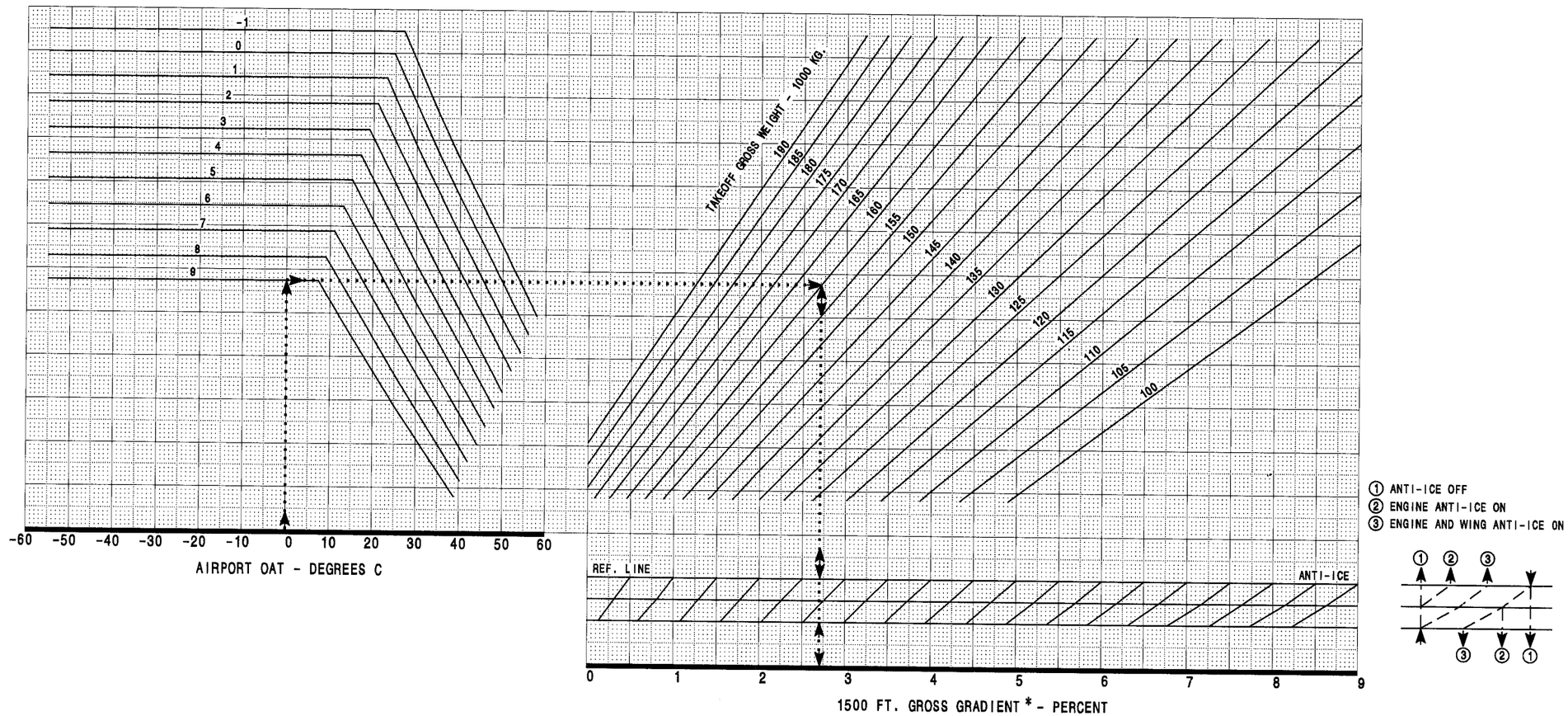
FINAL TAKEOFF CLIMB

A/C PACKS ON AND OFF

FLAPS UP

■ SPEED = V_{REF} + 80 KNOTS IAS

*NET GRADIENT = GROSS GRADIENT - .8 PERCENT



P.C. K600944007
D041T507-1 PG. 4.9-44
ORIGINAL SIGNED BY R. EGGINK 1-16-88

APPROVED	DATE
V. Hall	1-20-94

R. BARBER
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

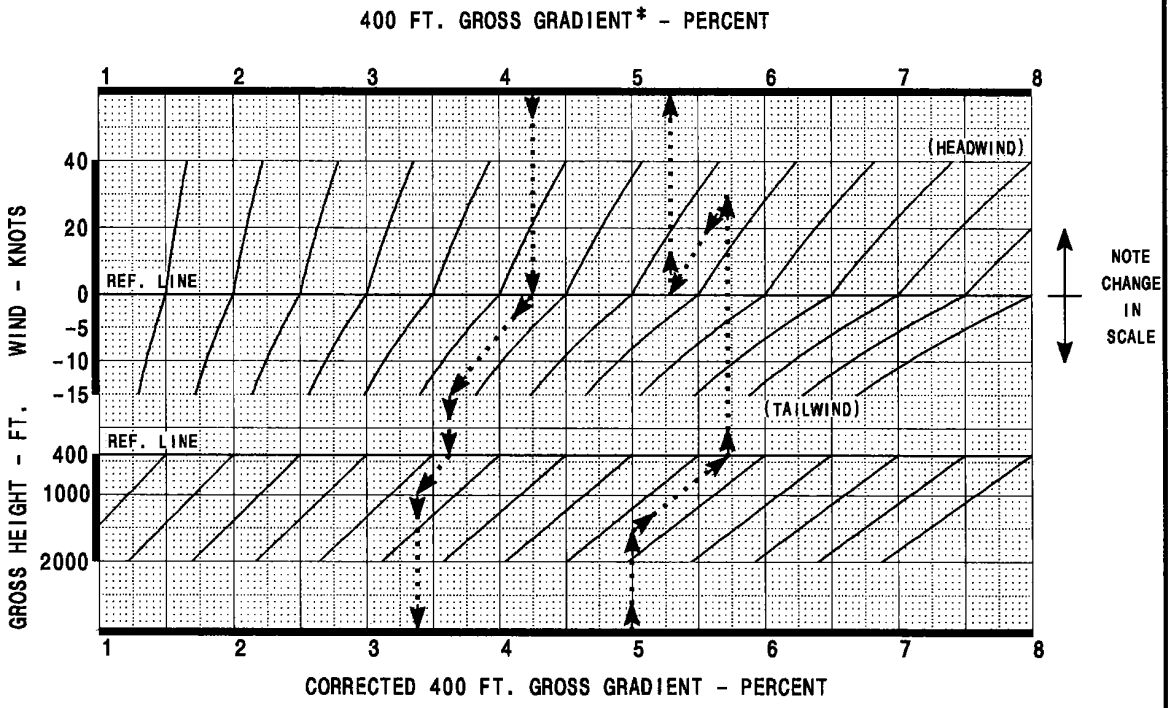
GRADIENT CORRECTIONS

TAKEOFF CLIMB

■ APPLY THE FOLLOWING ADJUSTMENTS TO THE CORRECTED 400 FT. GROSS GRADIENT.

GRADIENT ADJUSTMENT - PERCENT			
BANK ANGLE - DEGREES	FLAPS 5	FLAPS 15	FLAPS 20
5	0.05	0.06	0.06
10	0.21	0.23	0.24
15	0.48	0.52	0.54

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, IF APPLICABLE.



P.C. d600945000
D041T513-1 PG. 4.9-45

APPROVED	DATE
M. MYERS	11/24/93

J. NEWELL
767-300ER
CF6-80C2B7/B7F

S28201

P.C. 6L001553
D041T507-1 PG 4.9-46

PERFORMANCE

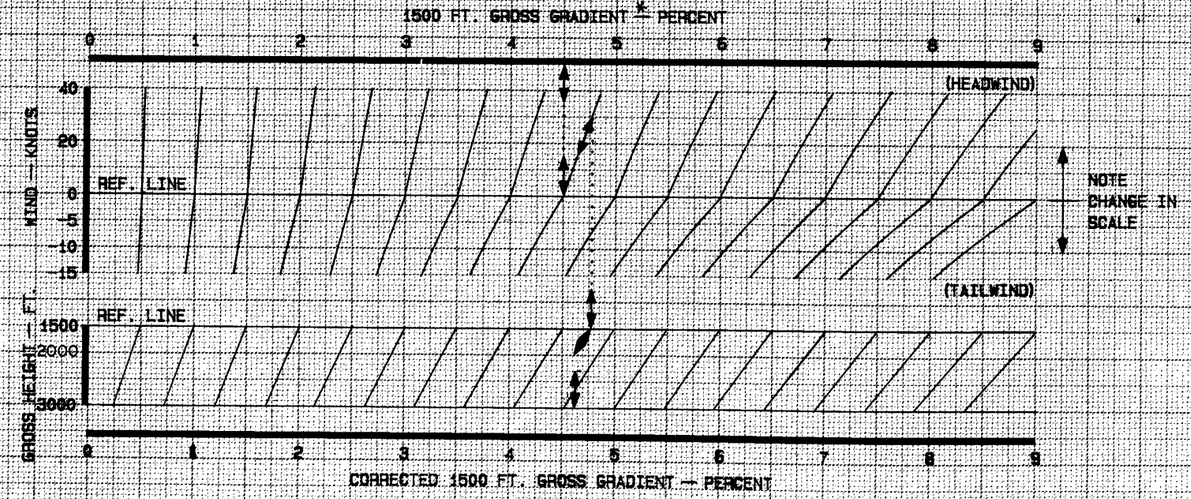
GRADIENT CORRECTIONS

FINAL TAKEOFF CLIMB

●APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT % IN BANKED TURNS	
BANK ANGLE	FLAPS UP
5	0.02
10	0.10
15	0.22

*THIS IS THE 1500 FT. GROSS GRADIENT OBTAINED FROM THE FINAL TAKEOFF CLIMB CHART.

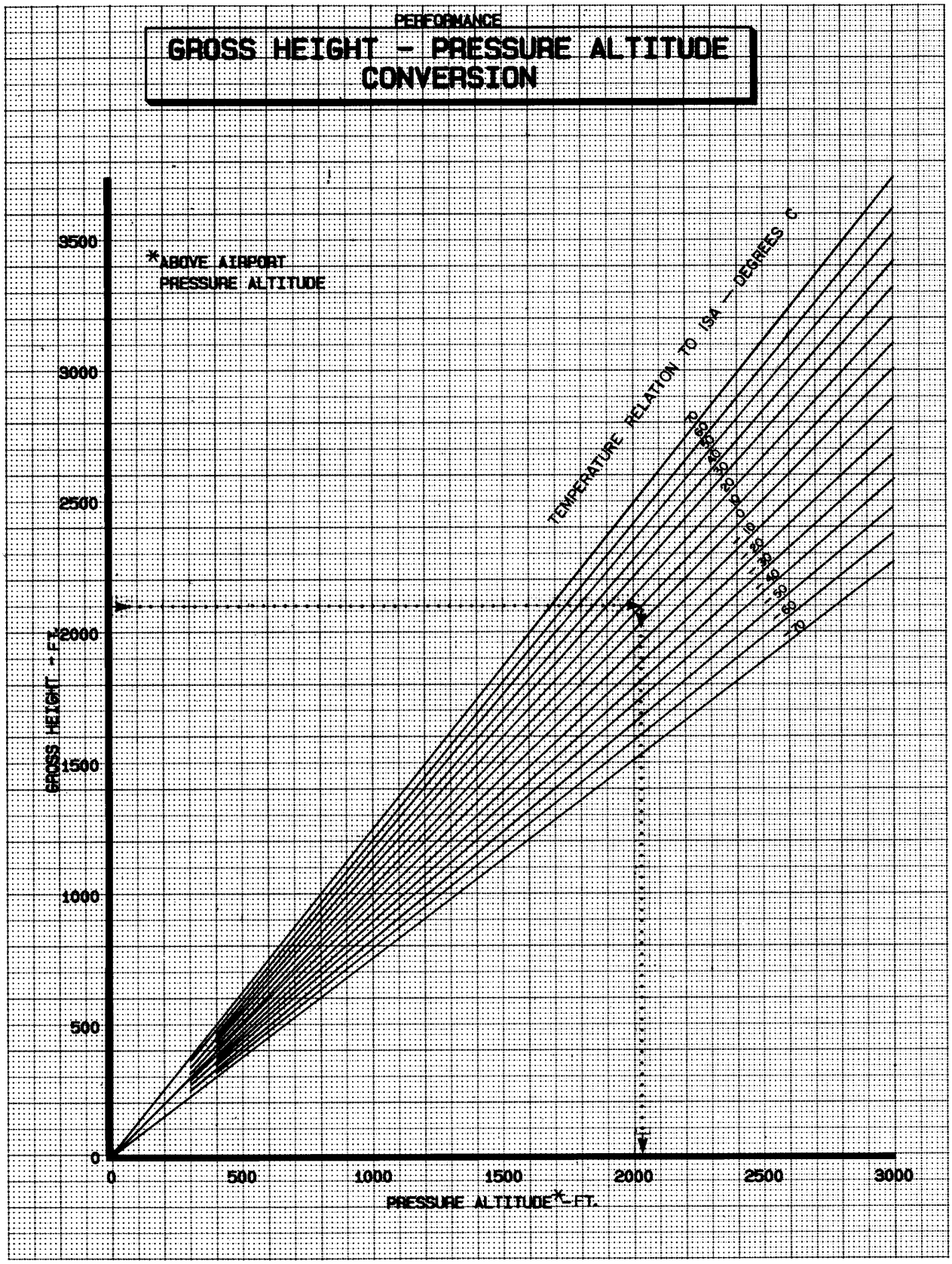


APPROVED	DATE
W.E. Taylor MAS-74	9.24.87

HUGHES
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

PERFORMANCE

GROSS HEIGHT - PRESSURE ALTITUDE CONVERSION



P.C. 6S000152
D041T503 PG 4.9-47

APPROVED	DATE
R.S. Yamamoto NM 234	1.26.82

BOWKER 767

S29565

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

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FLAPS 20	9
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S28212

IMPROVED CLIMB PERFORMANCE

G E N E R A L

A climb-performance-limited takeoff weight results when the available climb gradient with one engine inoperative is equal to any of the minimum gradients required by the regulations for the various segments of the takeoff flight path.

Takeoff speeds are usually minimized to achieve the shortest takeoff distances consistent with the FAR. The resultant minimum V2 speeds fall below the speeds for optimum climb gradient in the takeoff configuration. When excess takeoff distance is available, the climb-limited takeoff weight may be increased by raising the V_2 speed. Vl and VR must also be increased to maintain consistent performance relationships. This technique is called "Improved Climb Performance" in this manual, and may be used when the following conditions are present:

1. The takeoff weight is takeoff climb (Second Segment) limited, or obstacle limited;
2. The takeoff distance available is greater than that required for the climb or obstacle limited weight;
3. The antiskid system is operative and ON.

C H A R T P R E S E N T A T I O N

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT LIMITS

These charts show the effects of increased takeoff speeds on field length, climb and tire speed weight limits when using Improved Climb Performance. Separate charts are included for the different takeoff flaps. The use of these charts is described under the heading: "Takeoff Weight Analysis with Improved Climb Performance."

TAKEOFF SPEEDS

These charts adjust the basic takeoff speeds obtained from the Takeoff Speeds chart (Section 4.7) for the effects of using Improved Climb Performance. The use of these charts is described under the heading: "Takeoff Weight Analysis with Improved Climb Performance."

TAKEOFF CLIMB (IMPROVED CLIMB PERFORMANCE)

This chart shows the effect of increased takeoff speeds on the 400 foot gross gradient. The use of this chart is described in the "Obstacle Clearance Analysis Procedure" (Section 4.9).

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE PROCEDURE

The following steps describe the procedure for finding the maximum allowable takeoff weight when using Improved Climb Performance. Improved Obstacle Clearance with speed increase is considered in Section 4.9. See the example problem appendix for a numerical example of this procedure.

1. Maximum Takeoff Weight and Speed Increase

   a. Enter the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with field-length and takeoff-climb-limited gross weights obtained in Sections 4.4 and 4.5 (based on zero speed increase). Follow the guidelines until they intersect or until the maximum speed increase is reached on the climb limit guidelines and read gross weight and speed increase.

   b. Repeat using the climb limits portion of the chart with tire-speed (Section 4.6) and takeoff-climb limited gross weights.

   c. The allowable takeoff weight and speed increase are the lesser of the values determined in 1(a) and 1(b).

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE PROCEDURE (Continued)

2. Takeoff Speeds

   a. With the gross weight and speed increase determined in Step 1(c), determine the associated field-length limited gross weight that corresponds to zero speed increase. This is obtained by entering the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with the gross weight and speed increase from Step 1(c) and following the field length limits guidelines to zero speed increase and reading gross weight. Enter the V_1 Determination Procedure in Section 4.7 using this gross weight to determine $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$. Determine V_R and V_2 for the gross weight from Step 1(c). Determine $V_{1\ MIN}$ and $V_{1\ MAX}$ based on $(V_1/V_R)_{MIN}$, $(V_1/V_R)_{MAX}$, and V_R determined previously.

   b. Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart with the V_R, V_2, and V_1 speeds determined in Step 2(a). Follow the guidelines to the speed increase determined in Step 1(c) and read the improved climb performance values of V_R, V_2, and V_1. Check brake energy limits (Section 4.7). If V_1 is greater than V_{MBE}, gross weight and speed increase must be reduced until V_1 is equal to V_{MBE}. Results are the scheduled takeoff speeds that correspond to the allowable takeoff gross weight using Improved Climb Performance.

CORRECTED RUNWAY LENGTH REQUIRED WITH IMPROVED CLIMB PERFORMANCE PROCEDURE

The following steps describe the procedure for finding the corrected runway length required when using Improved Climb Performance.

1. Takeoff gross weight with zero speed increase.

   Enter the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with takeoff gross weight and takeoff speed increase. Follow the field length limits guidelines to zero speed increase and read the equivalent (same required runway length) takeoff gross weight with zero speed increase.

S28249

IMPROVED CLIMB PERFORMANCE

CORRECTED RUNWAY LENGTH REQUIRED WITH IMPROVED CLIMB PERFORMANCE PROCEDURE (Continued)

2. Corrected Runway Length

(a) Enter the appropriate Field Length Limits (One Engine Inoperative) chart in Section 4.4 with the equivalent zero speed increase takeoff weight, Step 1, and airport temperature/altitude. Read one engine inoperative corrected runway length required.

(b) Enter the appropriate Field Length Limits (All Engines Operating) chart in Section 4.4 with the equivalent zero speed increase takeoff weight, Step 1, and airport temperature/altitude. Read all engines operating corrected runway length required.

S28251

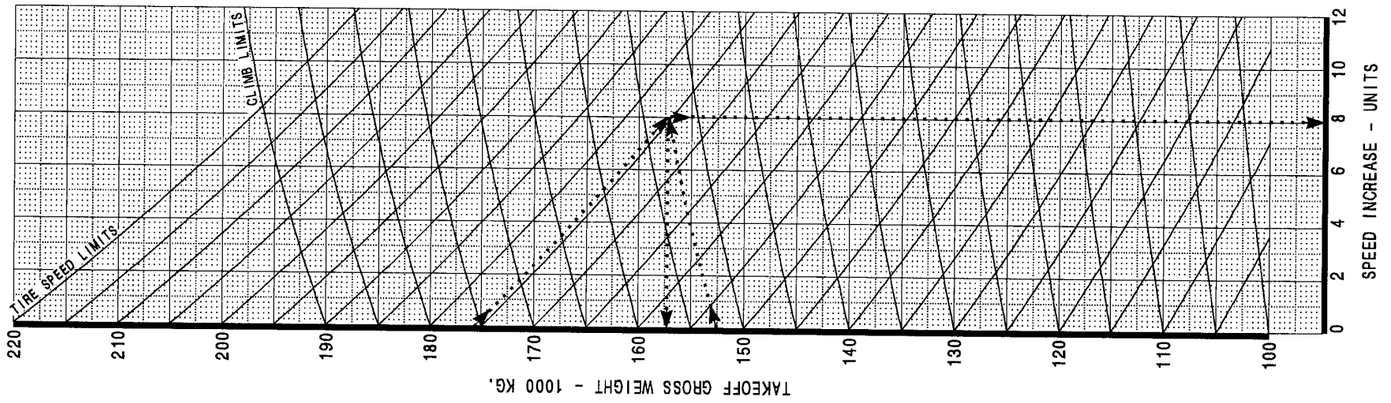
IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT LIMITS

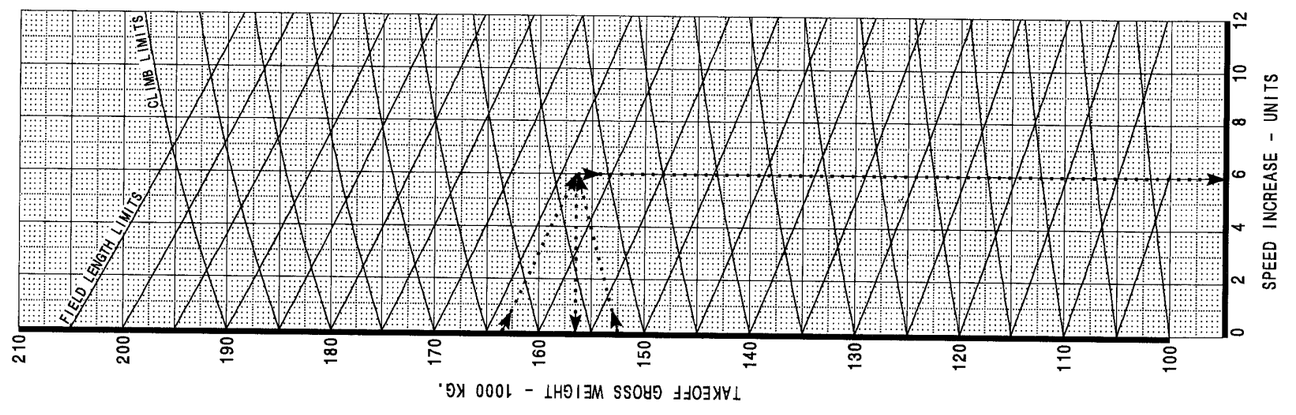
CATEGORY C BRAKES

FLAPS 5

TIRE SPEED/CLIMB LIMITS



FIELD LENGTH/CLIMB LIMITS



P.C. d600A07003
D041T513-1 PG. 4.10-7

L. ENEBRAD

767-300ER	APPROVED	DATE
CF6-80C2B7/B7F	M.L. Fobes	11/09/93

S42053

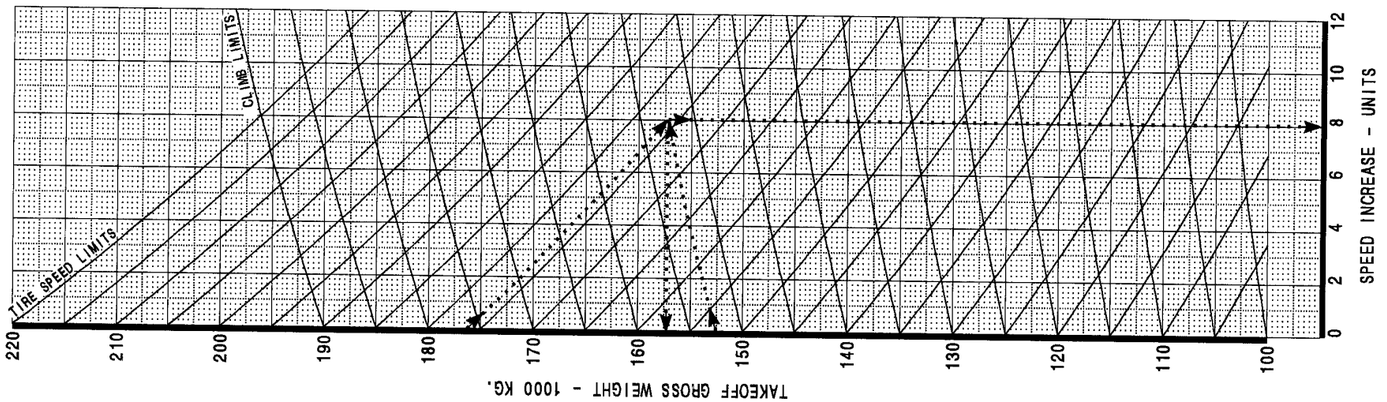
IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT LIMITS

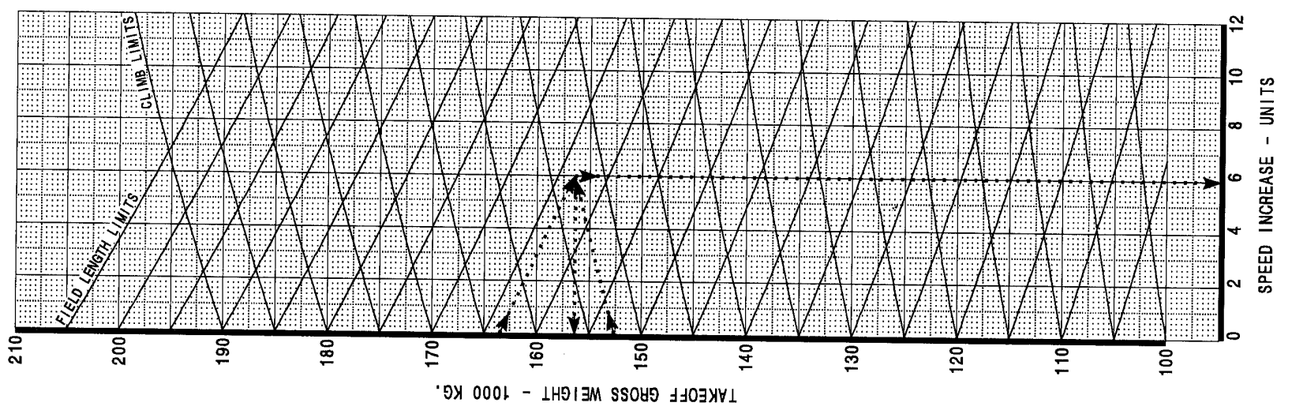
CATEGORY C BRAKES

FLAPS 15

TIRE SPEED/CLIMB LIMITS



FIELD LENGTH/CLIMB LIMITS



P.C. d600A08003
D041T513-1 PG. 4.10-8

L. ENEBRAD

767-300ER	APPROVED	DATE
CF6-80C2B7/B7F	H.L. Hobbs	11/09/93

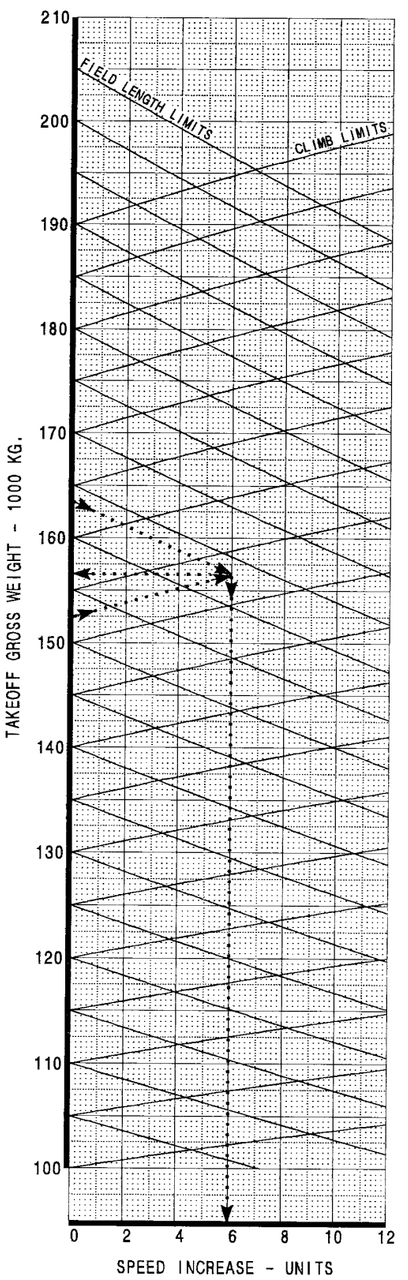
IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT LIMITS

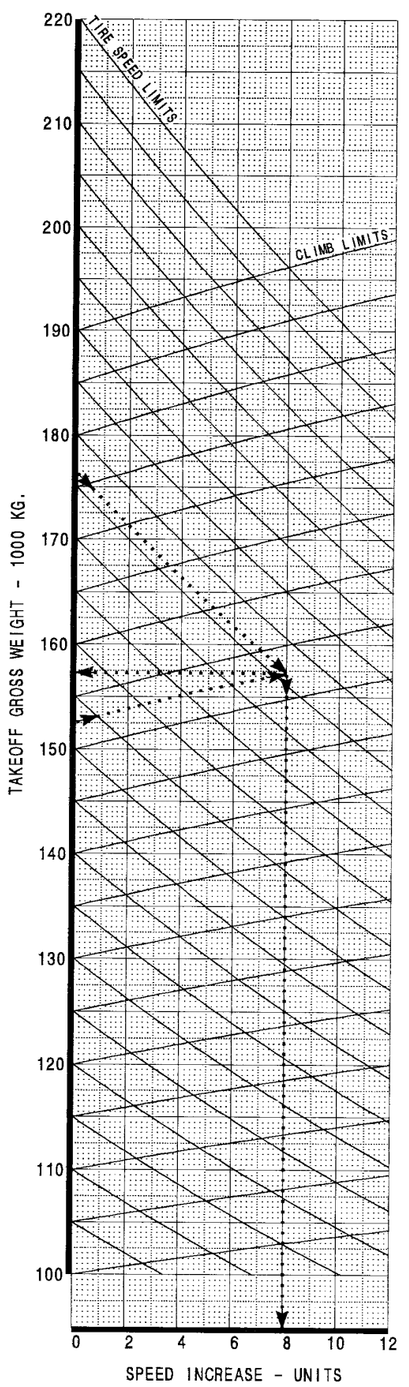
FLAPS 20

CATEGORY C BRAKES

FIELD LENGTH/CLIMB LIMITS



TIRE SPEED/CLIMB LIMITS

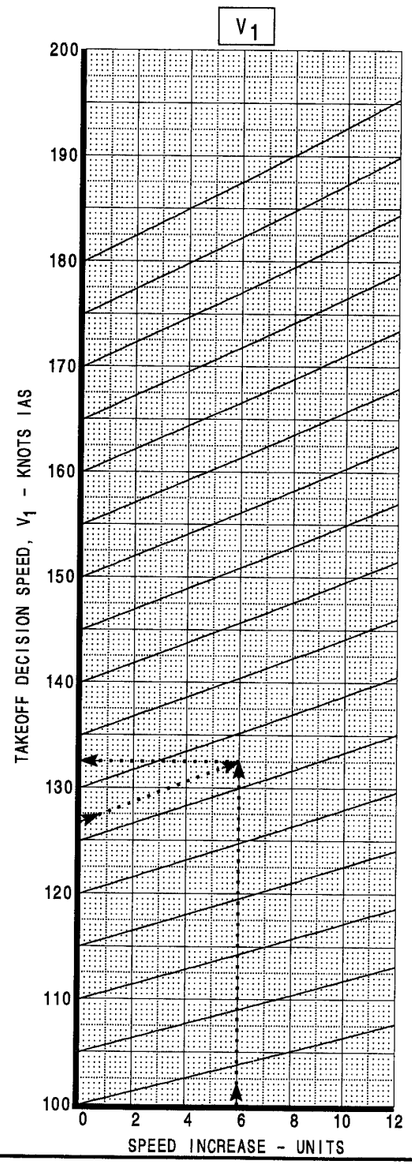


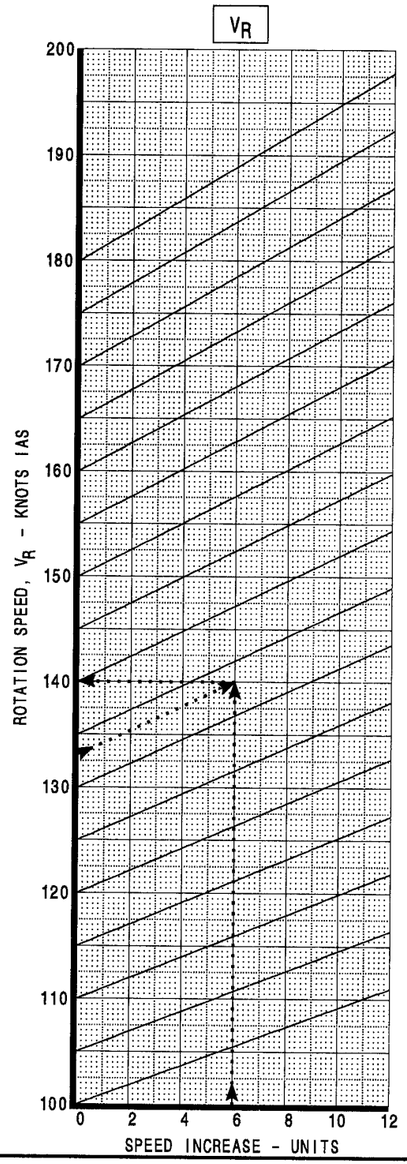
IMPROVED CLIMB PERFORMANCE

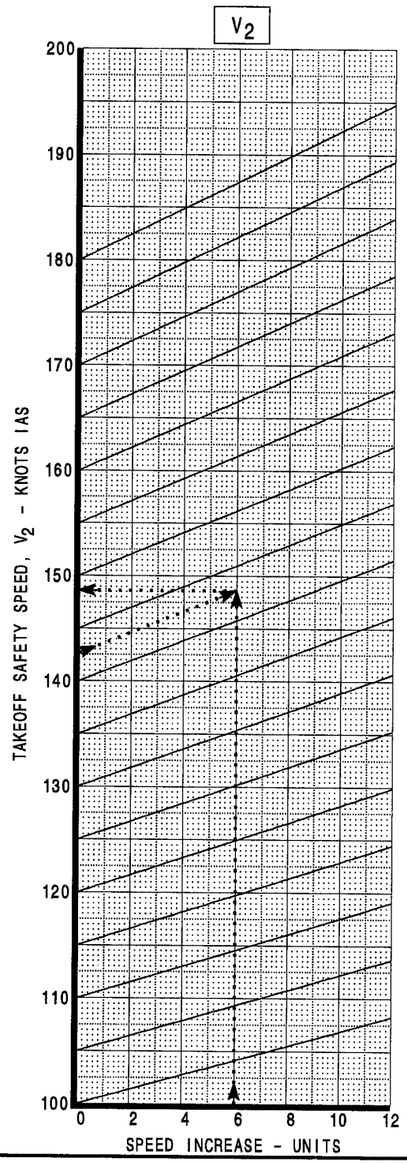
TAKEOFF SPEEDS

CATEGORY C BRAKES

FLAPS 5, 15, AND 20







P.C. d600A10000
D041T513-1 PG. 4.10-10

J. CRAVENER
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE

S42074

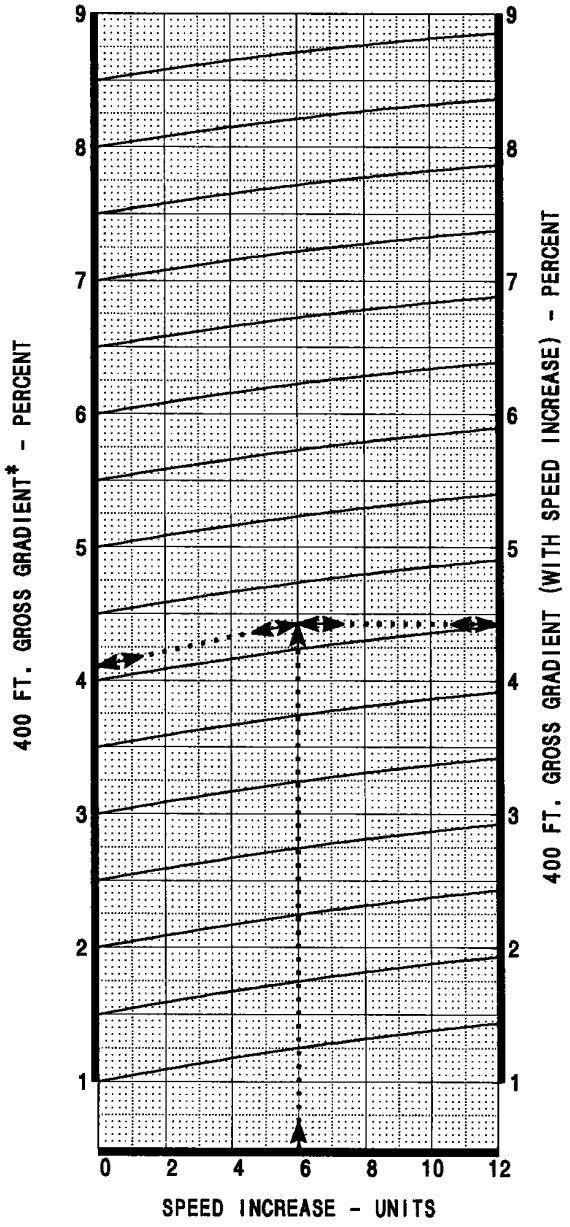
PERFORMANCE

TAKEOFF CLIMB

IMPROVED CLIMB PERFORMANCE

FLAPS 5, 15, AND 20

* UNCORRECTED FOR WIND, GROSS HEIGHT, AND BANK ANGLE.



P.C. e600A11000
D041T507-4 PG. 4.10-11

M. MCGONIGAL
767-300ER
CF6-80C2B7/B7F

	APPROVED	DATE
		10/31/94

S28253

SECTION 4.11 - ENROUTE CLIMB

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ISA + 15 DEG C	5
ISA + 20 DEG C	6
ISA + 35 DEG C	7
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S28266

ENROUTE CLIMB

G E N E R A L

Enroute climb performance information is presented in two forms. The Enroute Climb Weights (For Positive Net Gradients) charts are used to establish enroute requirements compliance with FAR 121 in level flight. Where analysis of the descent path after engine failure is required, Enroute Climb gradient charts are provided. Due to the manner in which enroute climb gradients are used in flight planning, temperature on the charts is expressed as degrees Centigrade above or below ISA temperature.

Performance charts for one-engine-inoperative enroute climb are based on 1 A/C pack on and anti-ice off. Adjustments are shown on the charts for other bleed configurations.

The speed schedules shown on the Enroute Climb Speeds (1 Engine Inoperative) chart are those at which the performance charts were calculated in accordance with FAR 25.123.

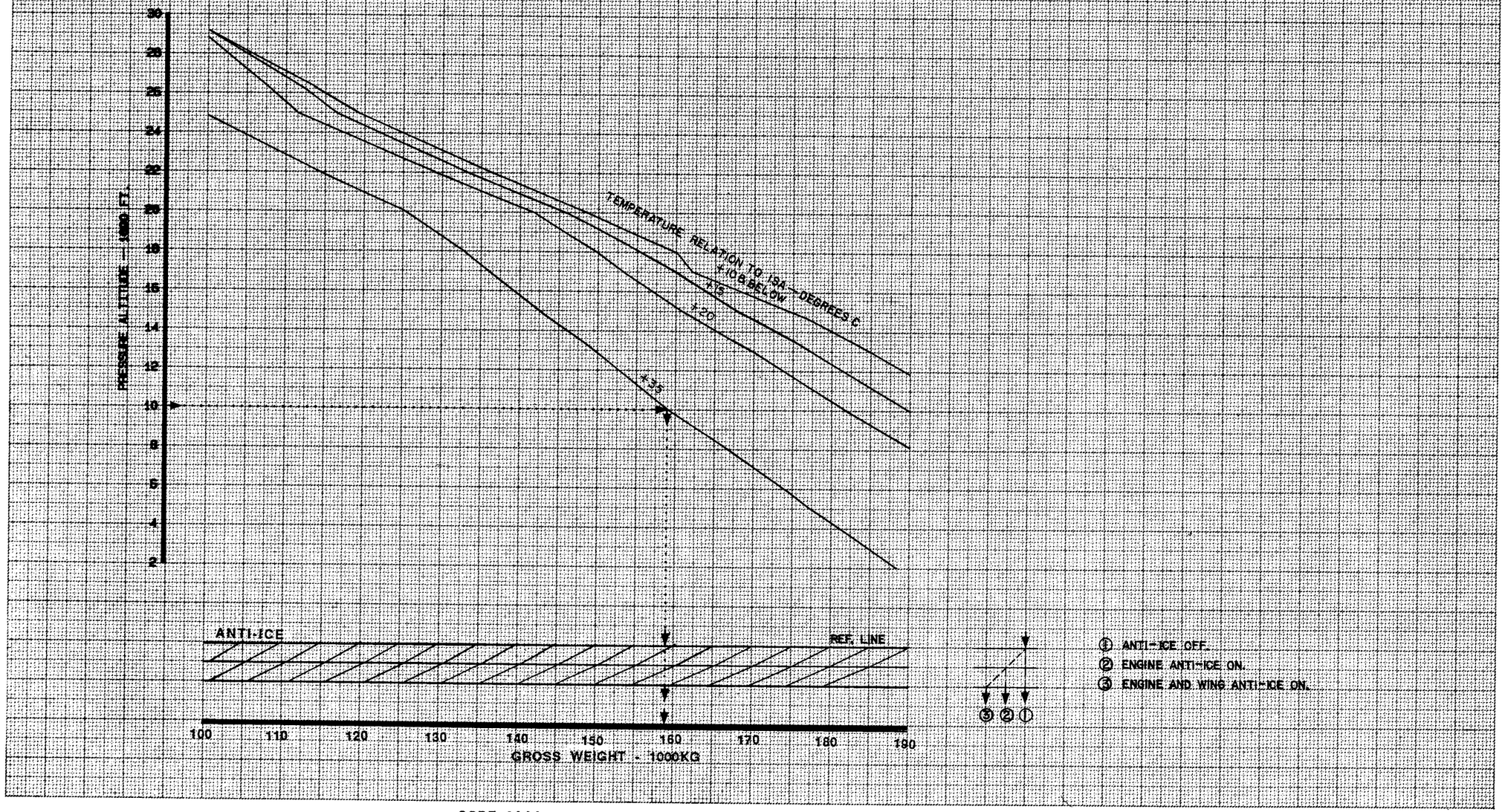
ENROUTE CLIMB WEIGHTS

FOR POSITIVE NET GRADIENTS

A/C ON OR OFF

1 ENGINE INOPERATIVE

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001736
D041T607-1 P6.4.11-3

KREINER	APPROVED	DATE
767-300ER		
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

S42236

6E4208

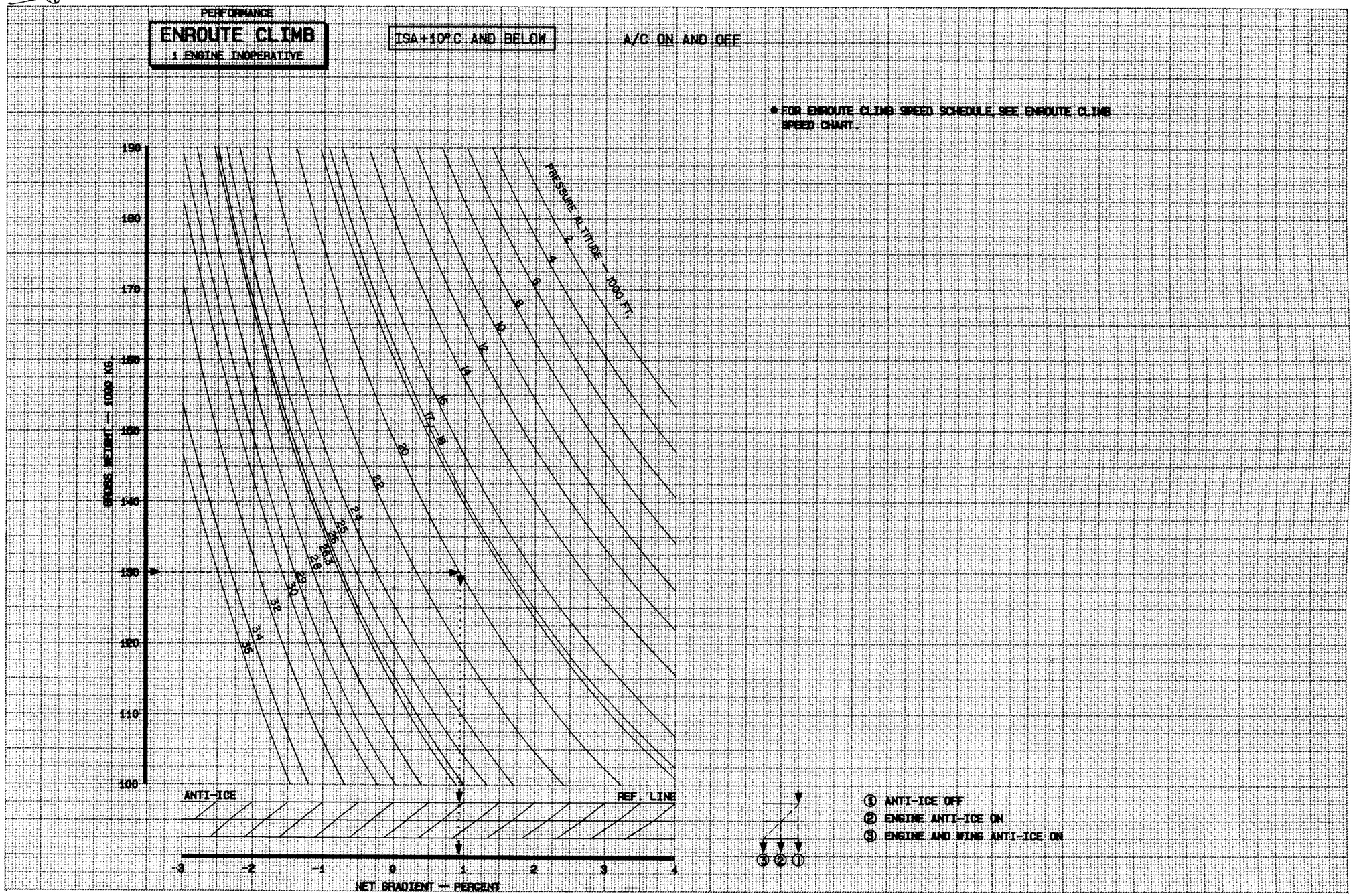
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

TSA+10°C AND BELOW

A/C ON AND OFF

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C.6L001735
D0411T507-1 P6. 4.11-4

GARDNER	APPROVED	DATE
767-300ER	DWP NM-191	2-4-88
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

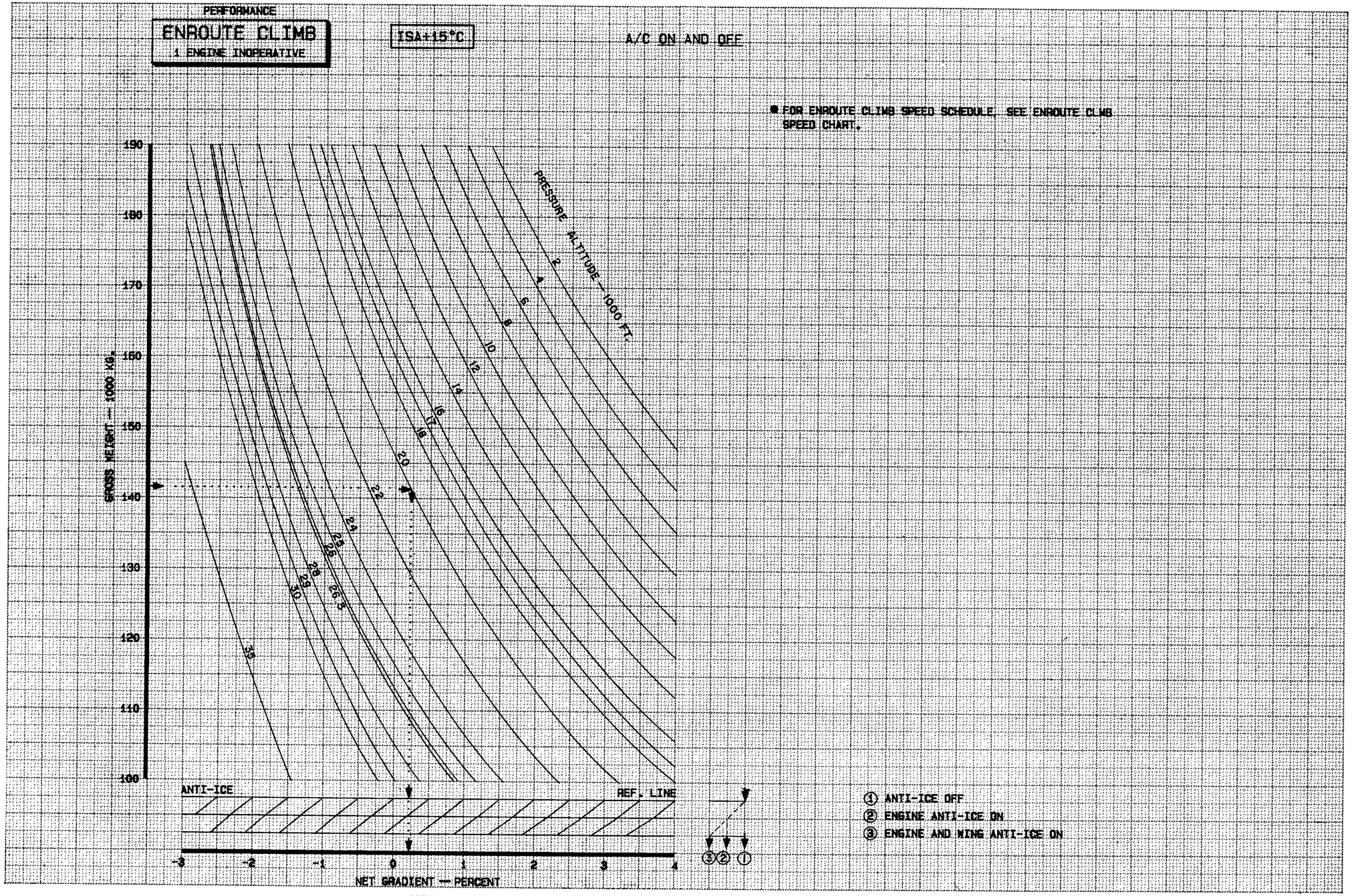
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+15°C

A/C ON AND OFF

● FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001737
D041T507-1 PG. 4.11-5

RUFF
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

APPROVED C. J. Hart NMA2A
DATE 2/4/94

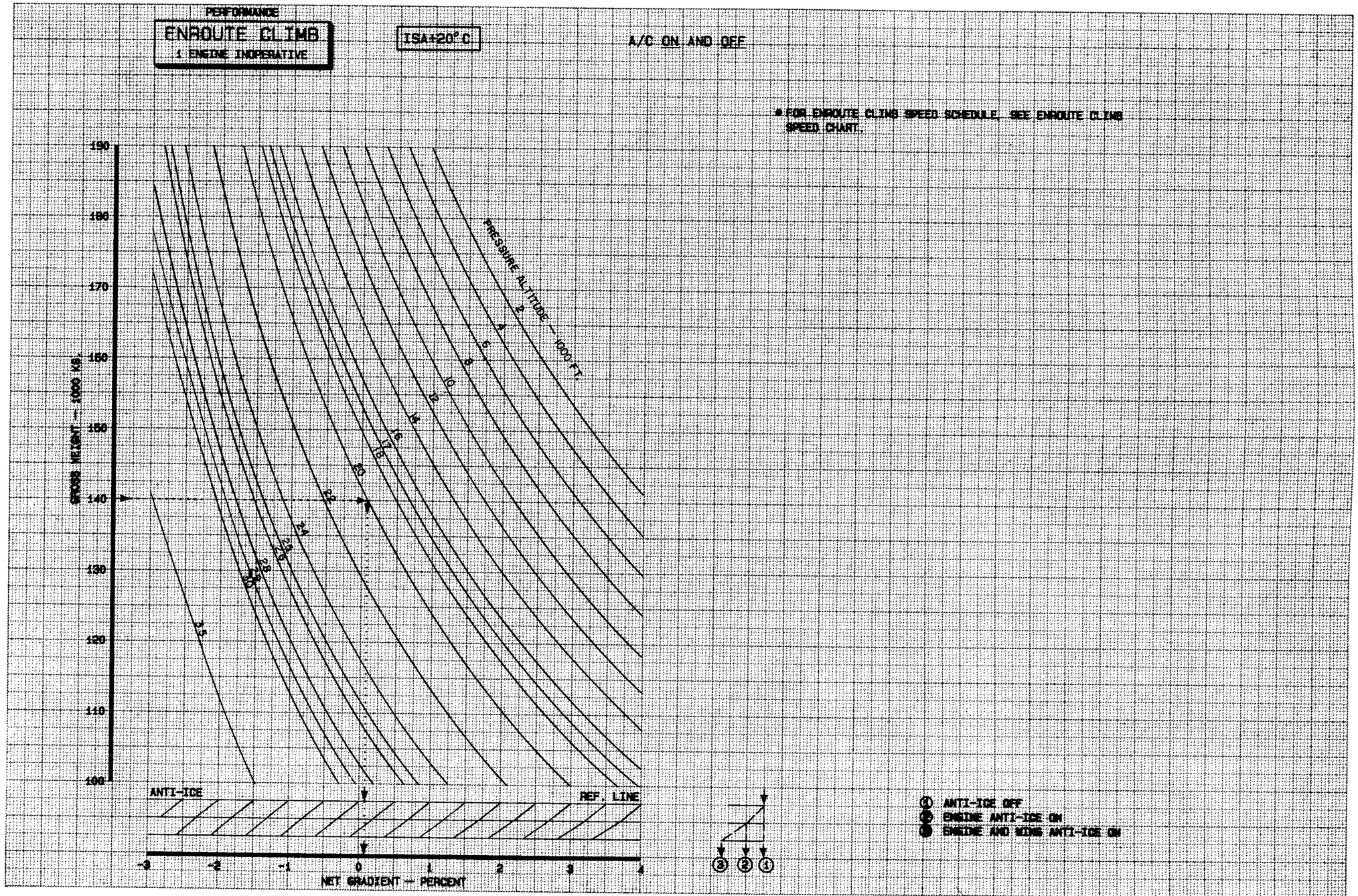
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+20°C

A/C ON AND OFF

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001738
D041T507-1 PG. 4.11-6

SCHMIDT	APPROVED	DATE
767-300ER	C.J. Schmidt	2/4/94
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

S42259

6E4208

P.C. 6L001739
D041T507-1 PG. 4.11-7

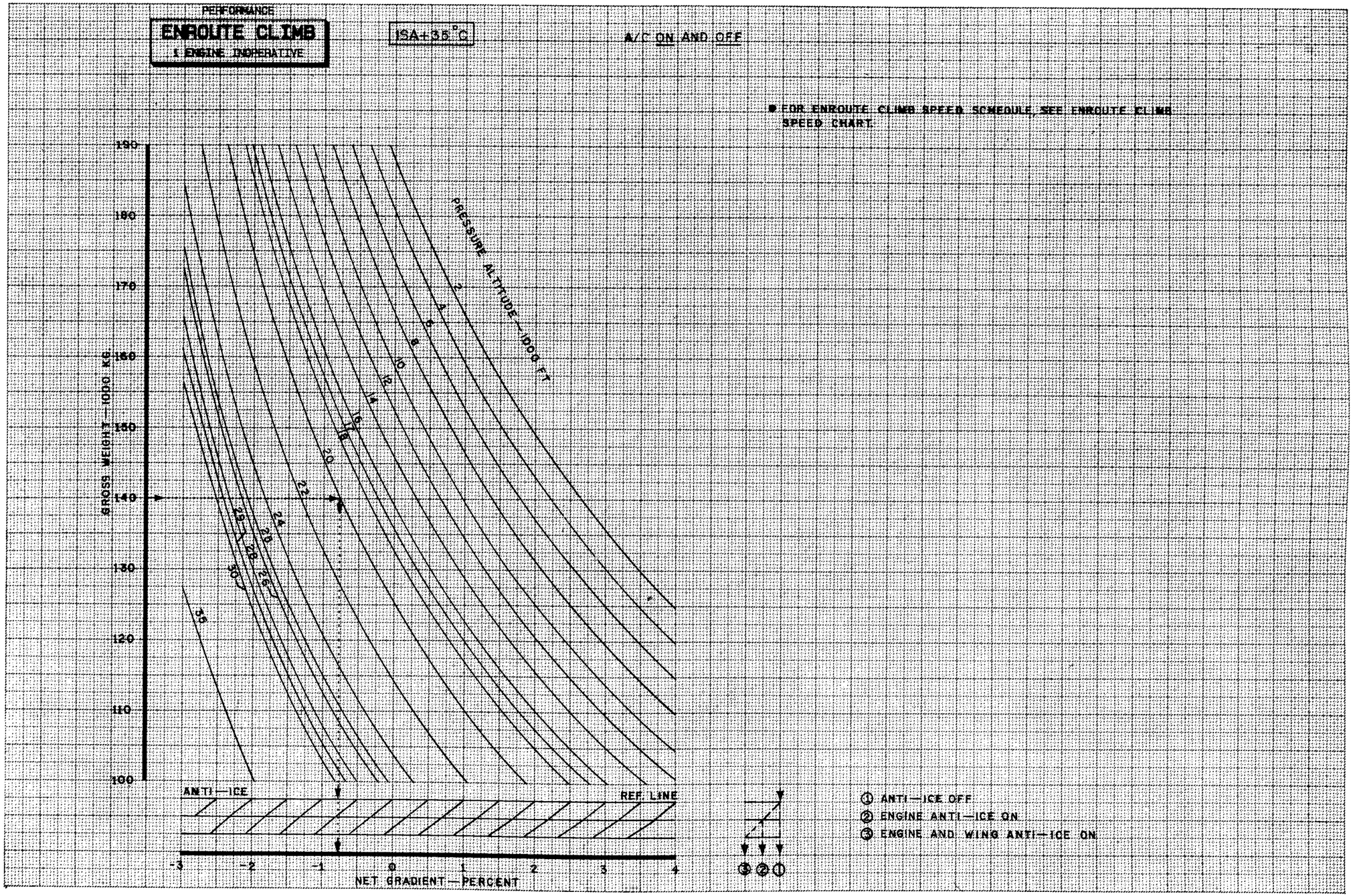
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+35°C

A/C ON AND OFF

● FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



SCHMIDT
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

	APPROVED	DATE
	NM-19	2488

S42390

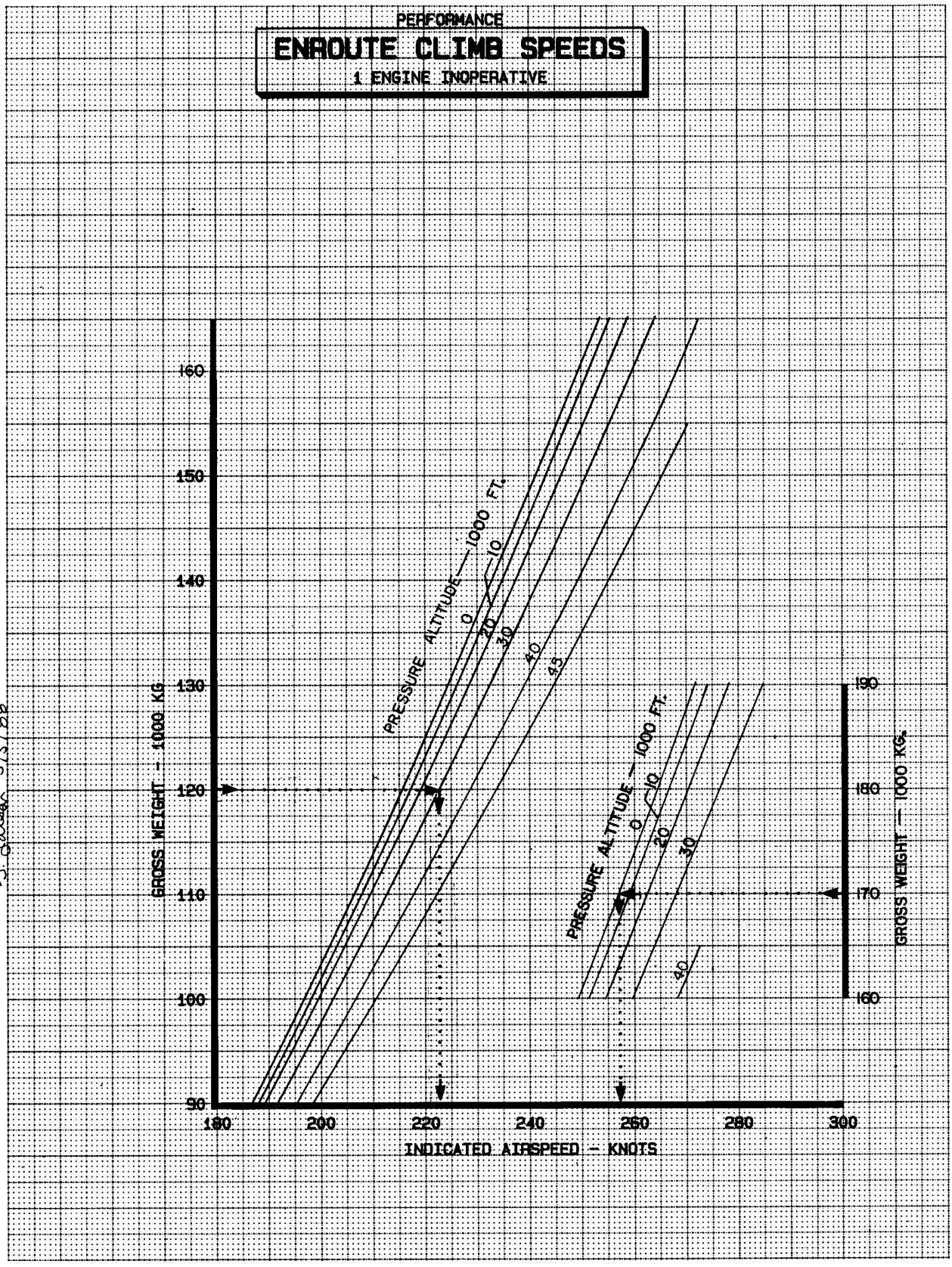
P.C..6S000158	
D041T503	PG. 4.11-8

C. FRANK	APPROVED	DATE
767-200/300	C.S. Ellis	8.7.84
	R. Sorensen	7.1.85
	[illegible]	2.2.88

PERFORMANCE

ENROUTE CLIMB SPEEDS

1 ENGINE INOPERATIVE



S29908

SECTION 4.12 - APPROACH AND LANDING CLIMB

C O N T E N T S

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LANDING CLIMB (FLAPS 25)	7
(FLAPS 30)	8
MAXIMUM LANDING WEIGHT	9A

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

V06991

G E N E R A L

Charts on the following pages present approach and landing climb gradients and maximum landing weights as limited by climb performance.

The speed schedules shown on the Approach and Landing Climb charts are those at which the gradients were calculated in accordance with FAR 25.121(d) and 25.119.

The ice correction on the charts accounts for maximum probable performance effects of ice remaining on the airplane surfaces without anti-ice protection. The correction applies when operating in icing conditions during any part of the flight, unless the forecast temperature at the destination airport is high enough (above 10 deg C or 50 deg F) to ensure that the ice will melt off prior to approach and landing.

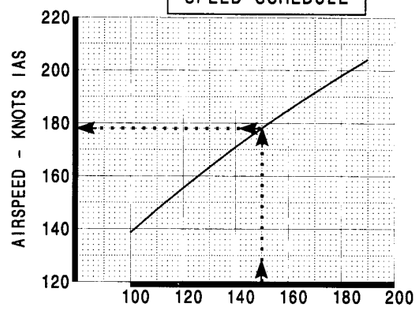
The climb limited landing weight can be increased by operating with A/C packs off. This information is included to permit a showing of compliance with FAR 25.1001(c) and 25.1533(a)(2) when allowable takeoff weights are increased by using A/C packs off for takeoff. This information may also be used to schedule higher allowable landing weights provided approach and landing procedures are modified to assure that A/C packs are turned off prior to the point where a go-around might be initiated. See Normal Procedures.

PERFORMANCE

APPROACH CLIMB

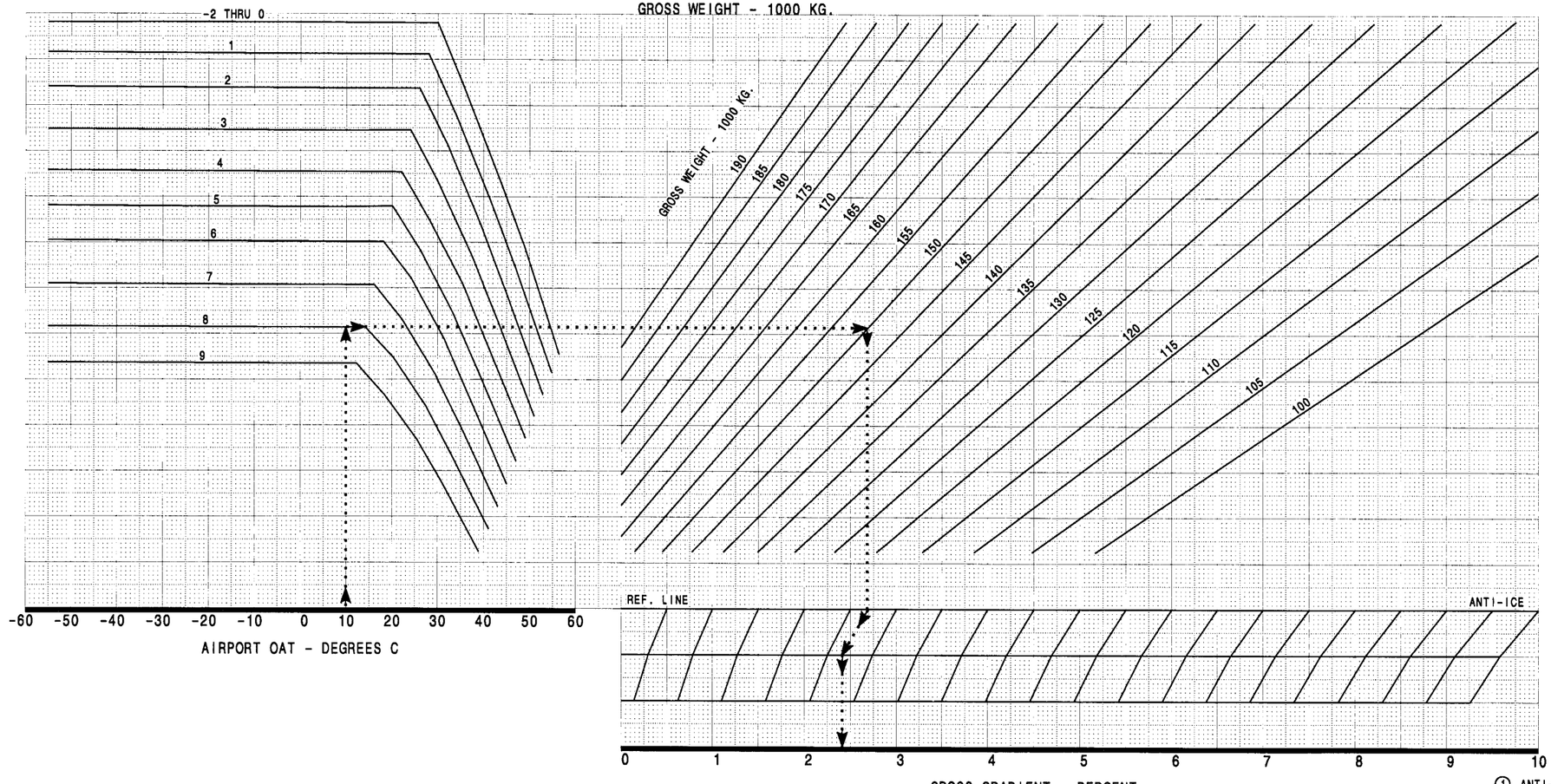
FLAPS 20

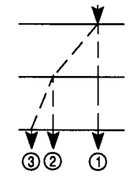
SPEED SCHEDULE



- APPROACH CLIMB GROSS GRADIENT LIMIT = 2.1 PERCENT.
- A/C PACKS ON. FOR A/C PACKS OFF, INCREASE GROSS GRADIENT BY 0.10 PERCENT.
- REDUCE GROSS GRADIENT 1.05 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.

AIRPORT PRESSURE ALTITUDE - 1000 FT.





① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

P.C. e600C04A07
D041T507-4 PG. 4.12-4A

APPROVED	DATE
PRS	07-23-99

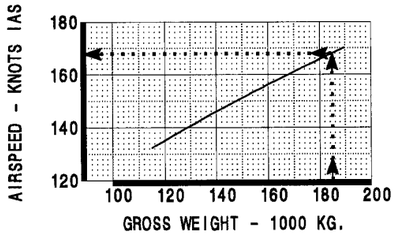
L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

V06992

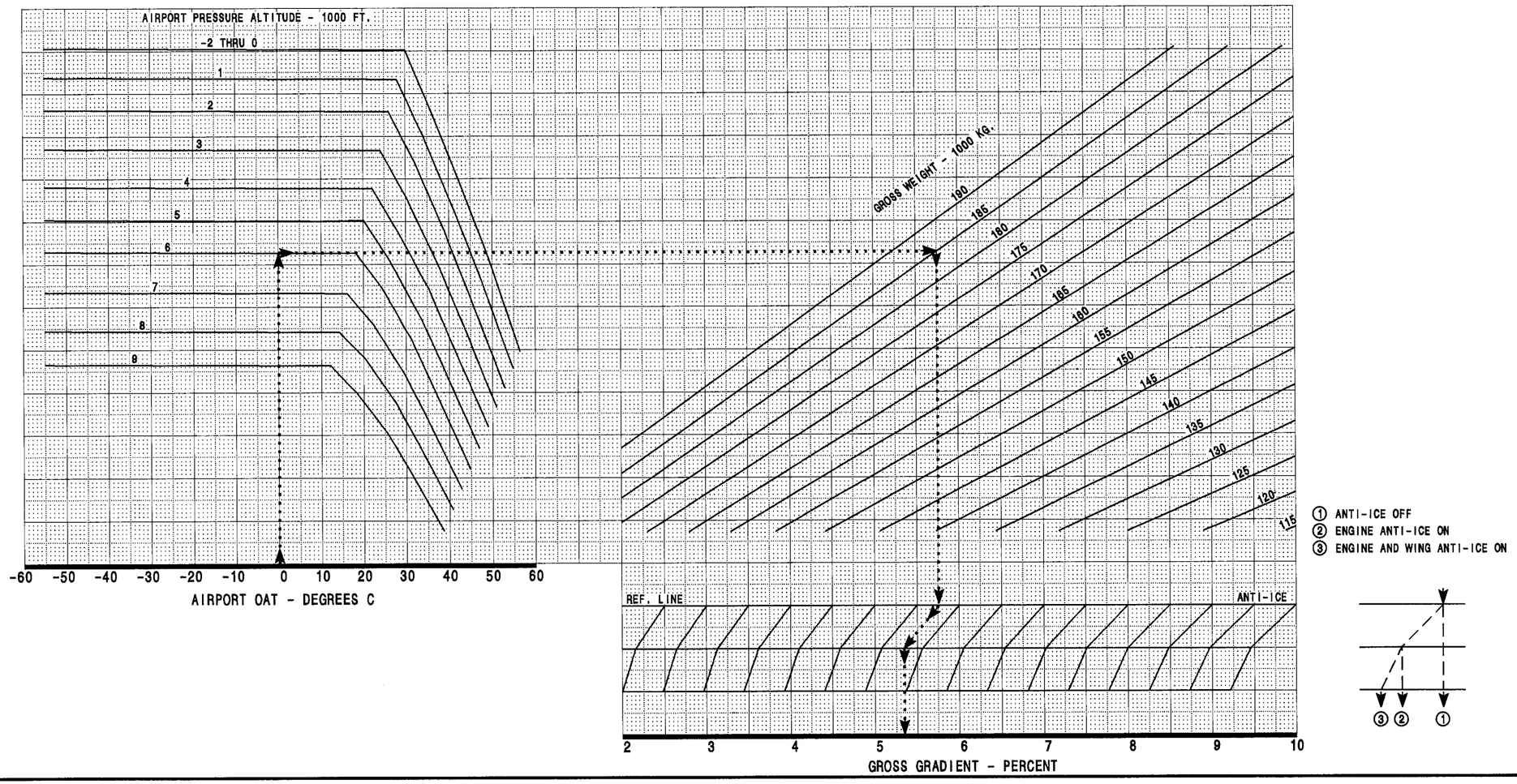
LANDING CLIMB

FLAPS 25

SPEED SCHEDULE



- LANDING CLIMB GROSS GRADIENT LIMIT = 3.2 PERCENT.
- A/C PACKS ON. FOR A/C PACKS OFF, INCREASE GROSS GRADIENT BY 0.20 PERCENT.
- REDUCE GROSS GRADIENT BY 1.25 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.



① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

P.C. d600C07007
D041T513-1 pg. 4.12-7

APPROVED	DATE
Chandler	10-10-95

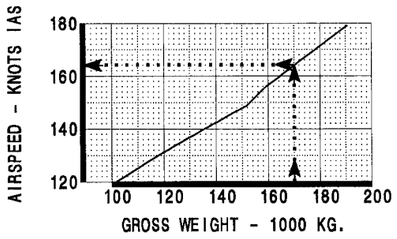
J. PETERS
767-300ER
CF6-80C2B7/B7F

S42437

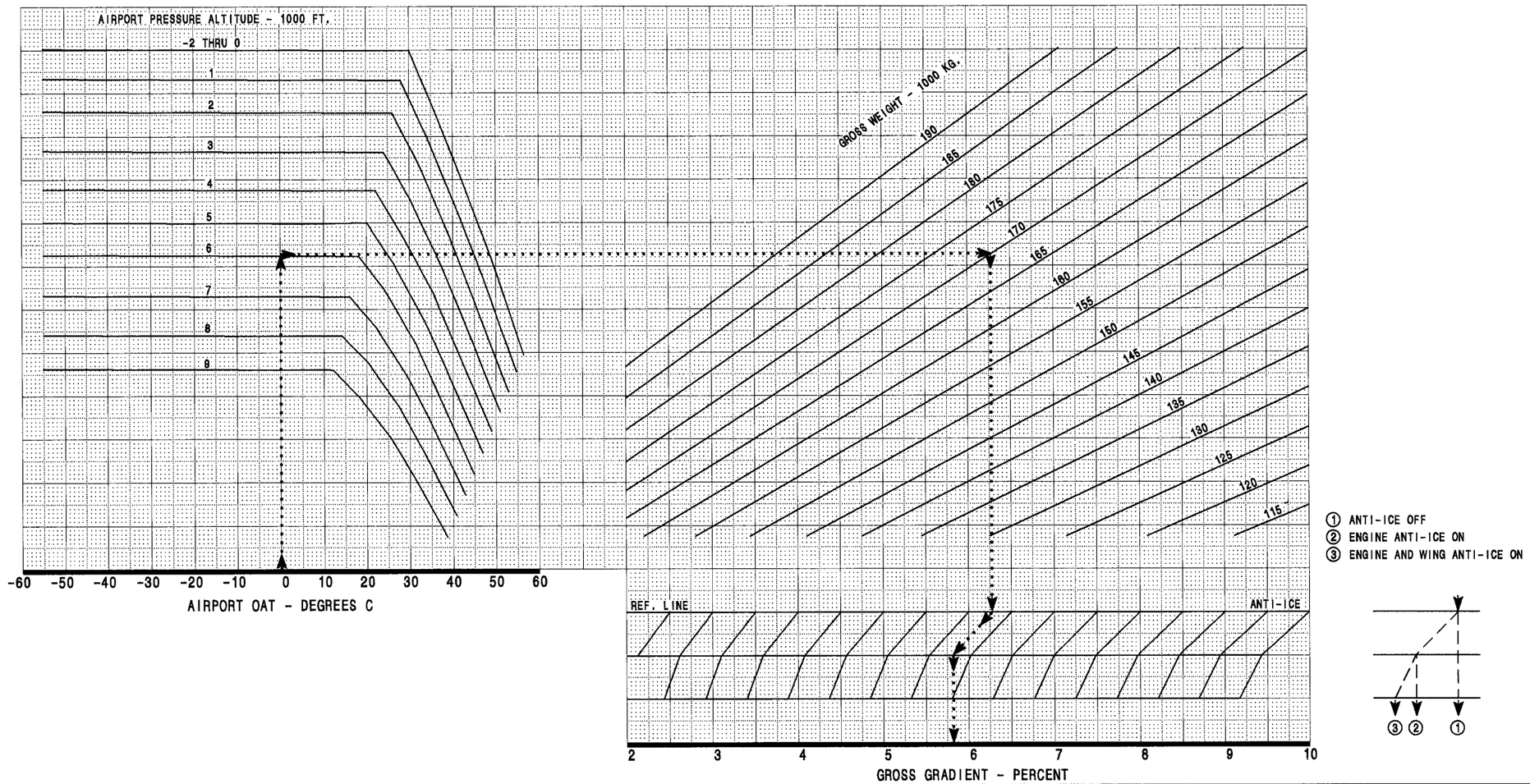
LANDING CLIMB

FLAPS 30

SPEED SCHEDULE



- LANDING CLIMB GROSS GRADIENT LIMIT = 3.2 PERCENT.
- A/C PACKS ON. FOR A/C PACKS OFF, INCREASE GROSS GRADIENT BY 0.20 PERCENT.
- REDUCE GROSS GRADIENT BY 1.65 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.



① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

P.C. d600C08007
D041T513-1 PG. 4.12-8

APPROVED	DATE
Chandler	10-10-95

J. PETERS
767-300ER
CF6-80C2B7/B7F

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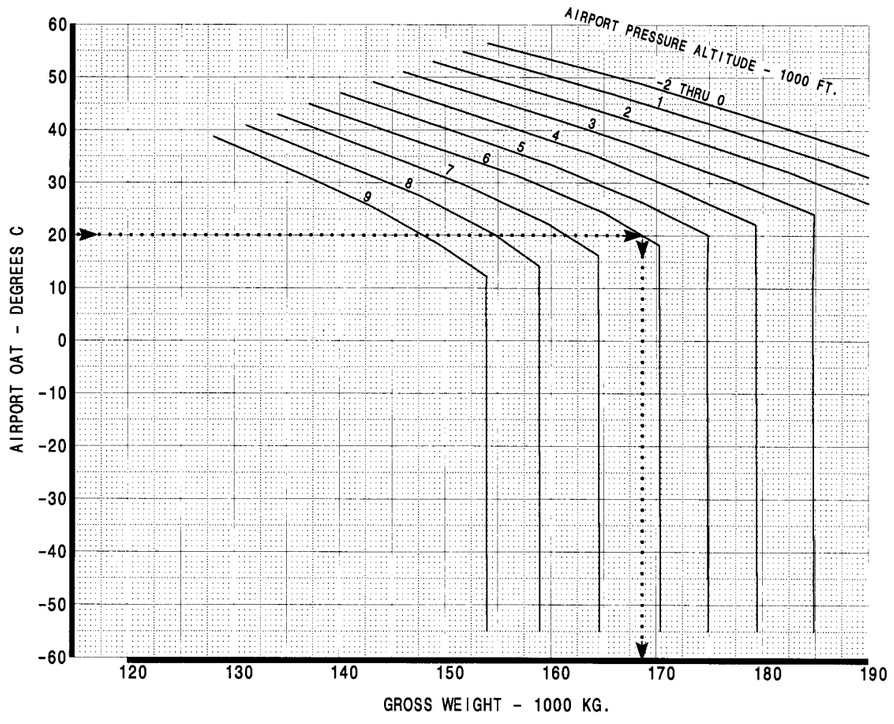
MAXIMUM LANDING WEIGHT

CLIMB LIMITS

APPROACH FLAPS 20
LANDING FLAPS 25 AND 30

- REDUCE GROSS WEIGHT BY 16,300 KG. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.
- APPLY THE FOLLOWING GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.	
	A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+1700	0
ENGINE ANTI-ICE ON	-1400	-3300
ENGINE AND WING ANTI-ICE ON	-4300	-5850



P.C. e600C09A07
D041T507-4 PG. 4.12-9A

APPROVED	DATE
PRS	07-23-99

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767-300ER
CF6-80C2B7/B7F

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SECTION 4.13 - LANDING FIELD LENGTH AND SPEED

C O N T E N T S

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

G E N E R A L

The charts on the following pages present landing speeds, landing field length requirements, landing field length corrections with the antiskid system inoperative, maximum landing weights for the brake energy at which the wheel thermal plugs will remain intact, and stopping distance with automatic wheel brakes. Brake part numbers (P.N.) in the same category produce equal braking performance, and Maximum Quick Turnaround Weight charts that are labeled for one category can be used for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

A U T O M A T I C L A N D I N G

The following is provided as guidance material which may be used for compliance with AC 120-28C or 120-28D when the antiskid system and thrust reversers are operative:

When using autoland during Category III operations, the landing field length is 115 percent of the dry non-autoland landing field length determined from the LANDING FIELD LENGTH charts.

A U T O M A T I C W H E E L B R A K E S

The STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES chart is provided for guidance information only in the selection of the most desirable autobrake setting for the field length available. It is not to be used to determine required landing field length.

The automatic wheel brake system is designed to improve the consistency and smoothness of the landing roll-out by modulating brake pressure to achieve a selected deceleration rate. Use of the system is optional and does not relieve the pilot of the responsibility to assure a safe stop within the available runway length.

The automatic wheel brake system is triggered at touchdown by landing gear truck tilt and main gear wheel spin-up. Therefore, a delay in lowering the nose gear will not delay application of the brakes. The MAX AUTO setting applies a brake pressure necessary to achieve the highest level of fixed deceleration; full antiskid braking pressure is provided by the MAX AUTO setting only if the runway conditions are such that this deceleration level cannot be achieved. Therefore, the MAX AUTO setting may not achieve the minimum stopping distance that is available with maximum manual braking. The use of reverse thrust is demonstrated to have no adverse effects on autobrake stopping distances.

LANDING FIELD LENGTH AND SPEED

AUTOMATIC WHEEL BRAKES (Continued)

The Stopping Distance With Automatic Wheel Brakes chart shows actual (unfactored) distances for settings 1 through MAX AUTO from touchdown to full stop that can be expected when using this system. The stopping distances shown are based on demonstrated deceleration values using automatic speed brakes and are valid for all landing flap settings, with or without reverse thrust. Distance corrections for tail wind and non-standard temperatures are provided.

Recommended use of the stopping distance chart is as follows:

1) Determine the available or desired distance from touchdown to stop (see NOTE for autoland).
2) Estimate approach speed considering approach conditions, flap setting, and operating procedures.
3) Enter the Stopping Distance with Automatic Wheel Brakes chart with approach speed from step 2, correcting for airport altitude to determine stopping distance and setting.

Stopping distances that can be achieved on wet runways depend on the friction characteristics, or slipperiness, of the particular runway. A range of stopping distance for varying slipperiness is shown; the range shown is based on the variation of wet runway friction characteristics expected in service. The wet runway stopping distance that is achieved for a given setting will be the longer of (1) the distance produced by the fixed deceleration of the setting or (2) the distance produced by the runway friction available, as indicated by the shaded region on the chart. A higher setting (MAX AUTO rather than 4, or 4 rather than 3) will produce shorter stopping distances on wet runways if friction characteristics are such to permit the higher deceleration. The use of reverse thrust will decrease wet runway stopping distance when the deceleration is limited by runway friction characteristics. Extremely wet and slippery conditions can result in longer distances than indicated.

NOTE: When using automatic wheel brakes with autoland operations, touchdown should be assumed to occur at 2,500 feet from the runway threshold. Enter chart with the remaining stopping distance available and approach speed, to find the Minimum autobrake setting.

S28314

LANDING FIELD LENGTH AND SPEED

MAXIMUM QUICK TURNAROUND WEIGHT

Use one of the two following methods:

1. After landing at weights exceeding those shown on the Maximum Quick Turnaround Weight charts, this section, wait at least 58 minutes (Category A & B steel brakes) or 75 minutes (Category C carbon brakes). Before making a subsequent takeoff, check that the wheel thermal plugs have not melted.

2. If a Brake Temperature Monitoring System (BTMS) is installed: No sooner than 10 and no later than 15 minutes after parking, check the brake temperature display digits on the EICAS status page and the BRAKE TEMP light. If all the brake temperature values are within a range of 1 through 4 and the BRAKE TEMP light is not on, no further ground waiting period is required. If any brake temperature value is 5 or higher, or the BRAKE TEMP light is on, a minimum ground waiting period of 58 minutes (Category A & B steel brakes) or 75 minutes (Category C carbon brakes) is required. Before making a subsequent takeoff, check that the wheel thermal plugs have not melted.

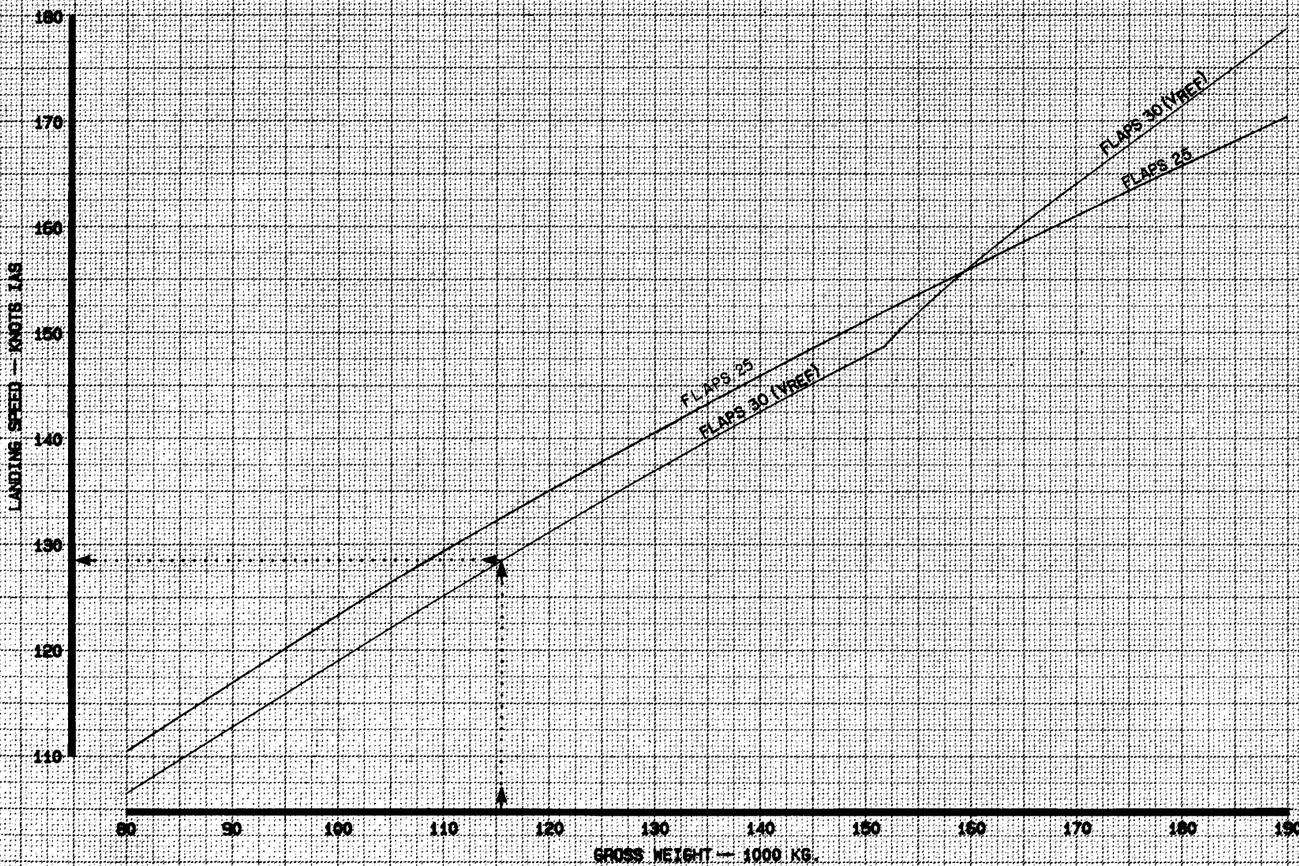
   Note: If any brake temperature display digit is blank or indicates 0, the Maximum Quick Turnaround Weight charts, Method 1, must be used.

S28317

PERFORMANCE

LANDING SPEEDS

● FOR AUTOMATIC LANDING INCREASE SPEED SHOWN BELOW BY 5 KNOTS.



P.C. 6L001744
D041T507-1 P6.4.13-4

KREINER
767-300ER
CF6-80C2 SERIES

	APPROVED	DATE
	RAKER NM	7.4.88

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P.C.BL001802
D041T607-1 PG. 4.13-5

GARDNER
767-300ER
CF6-80C2 SERIES

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	[illegible]	2/10/88
	[illegible]	5/5/88

PERFORMANCE

LANDING FIELD LENGTH

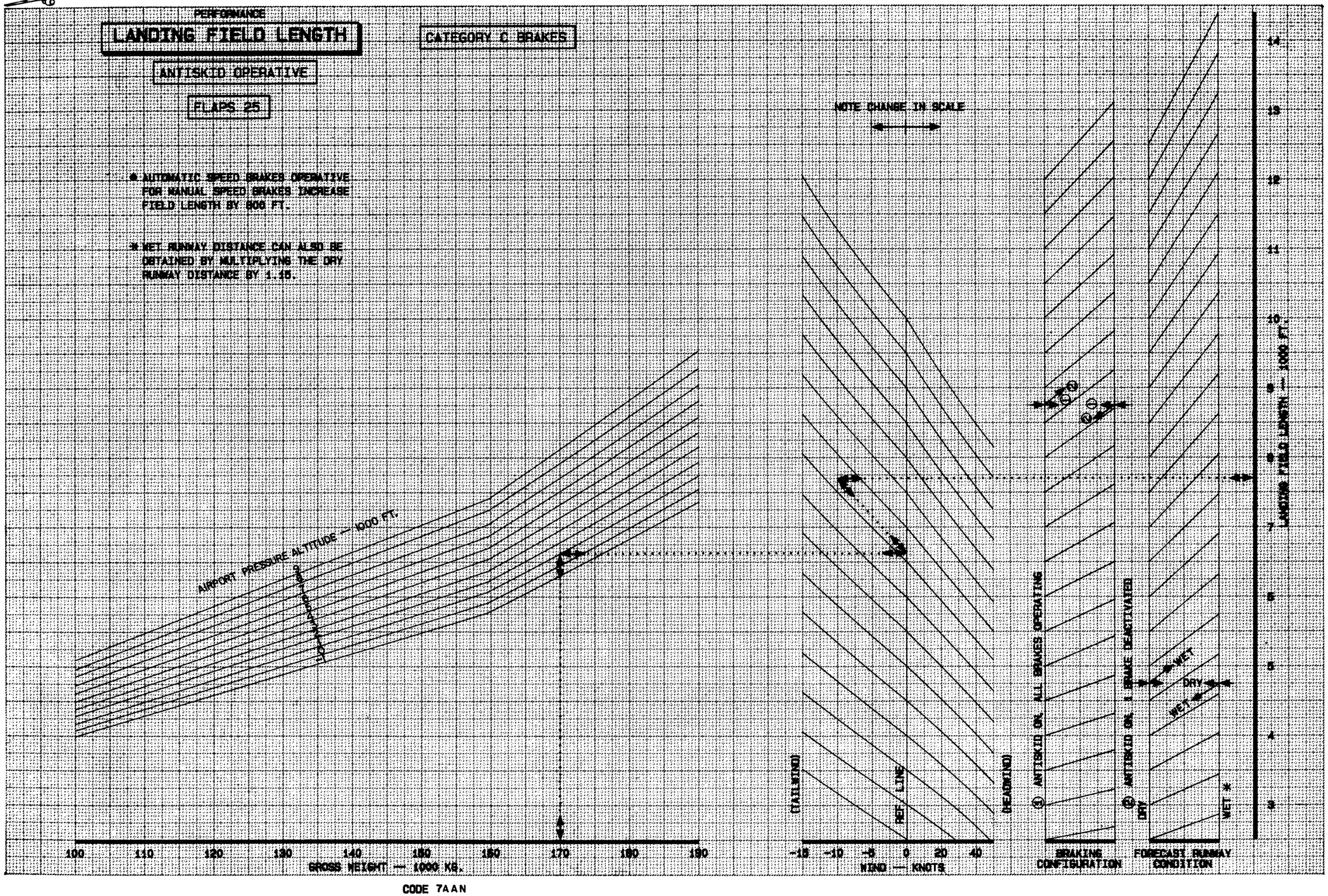
CATEGORY C BRAKES

ANTISKID OPERATIVE

FLAPS 25

* AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES INCREASE FIELD LENGTH BY 800 FT.

* WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



S38476

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P.C. 89000764
D041T607-1 P6.4.13-6

LIEURANCE
787-300ER
CF6-80C2 SERIES

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	[illegible]	9/10/87

LANDING FIELD LENGTH CORRECTIONS

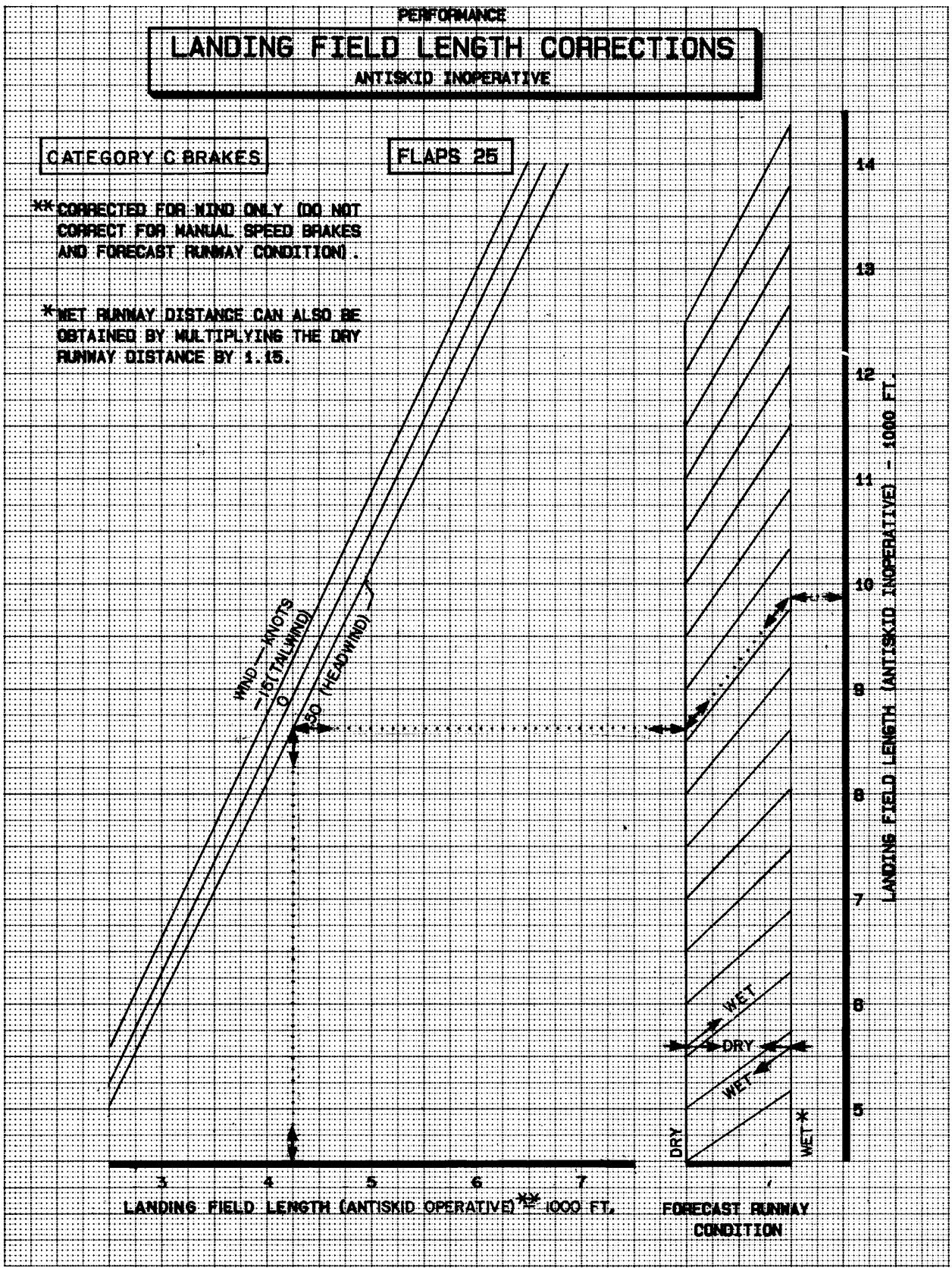
ANTISKID INOPERATIVE

CATEGORY C BRAKES

FLAPS 25

**CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES AND FORECAST RUNWAY CONDITION).

*WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



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S29965

PERFORMANCE

LANDING FIELD LENGTH

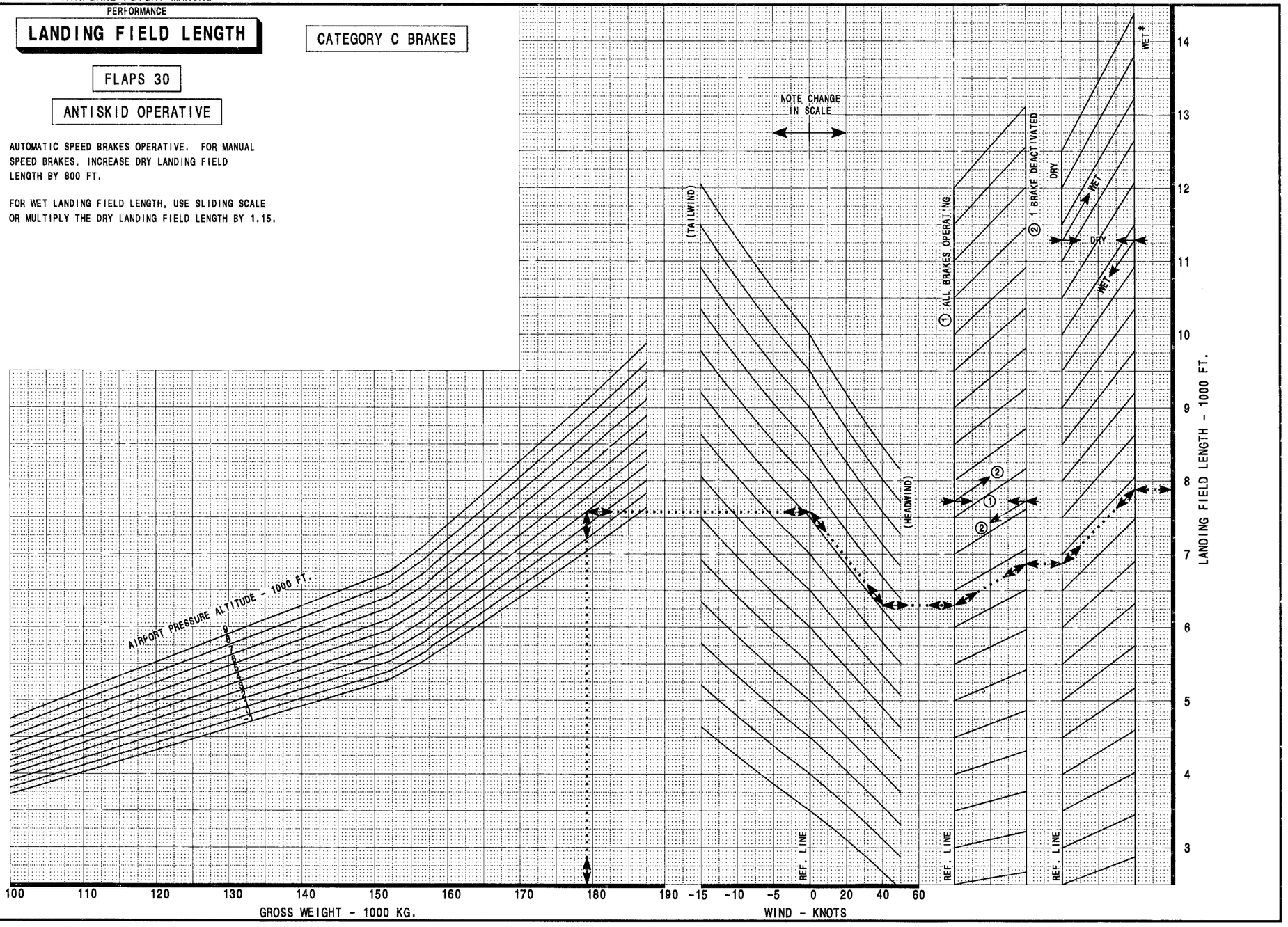
CATEGORY C BRAKES

FLAPS 30

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 800 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. K600D07007
D041T507-1 PG.4.13-7

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D.BACH		

767-300ER
CF6-80C2 SERIES

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PERFORMANCE

LANDING FIELD LENGTH CORRECTIONS

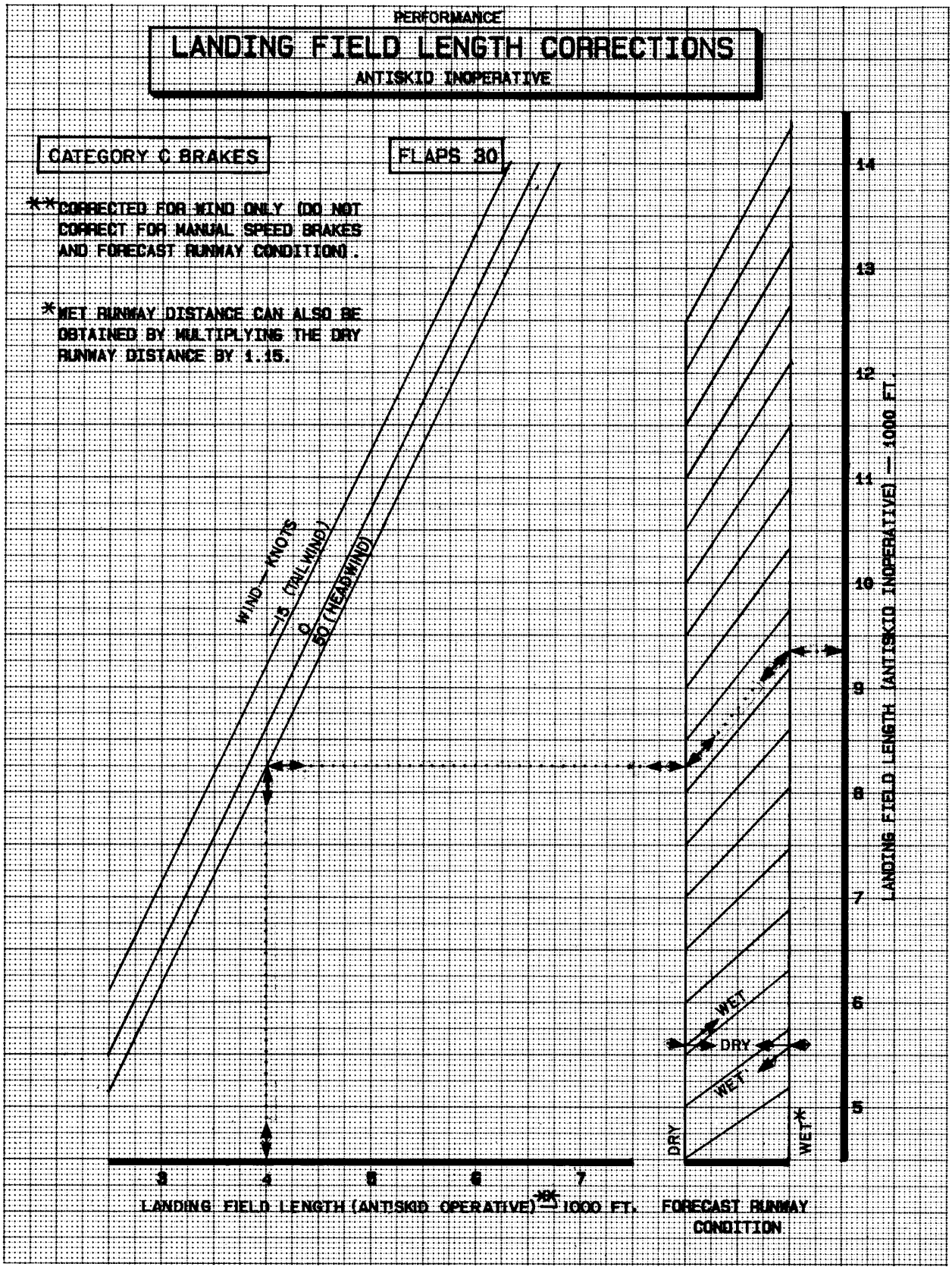
ANTISKID INOPERATIVE

CATEGORY C BRAKES

FLAPS 30

**CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES AND FORECAST RUNWAY CONDITION).

*WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



LIEURANCE		APPROVED	DATE
767-300	IF	C.S. Zill: LM386	9.16.87
CF6-80C2 SERIES			

P.C. BS000788
D041T507-1 P6.4.13-8

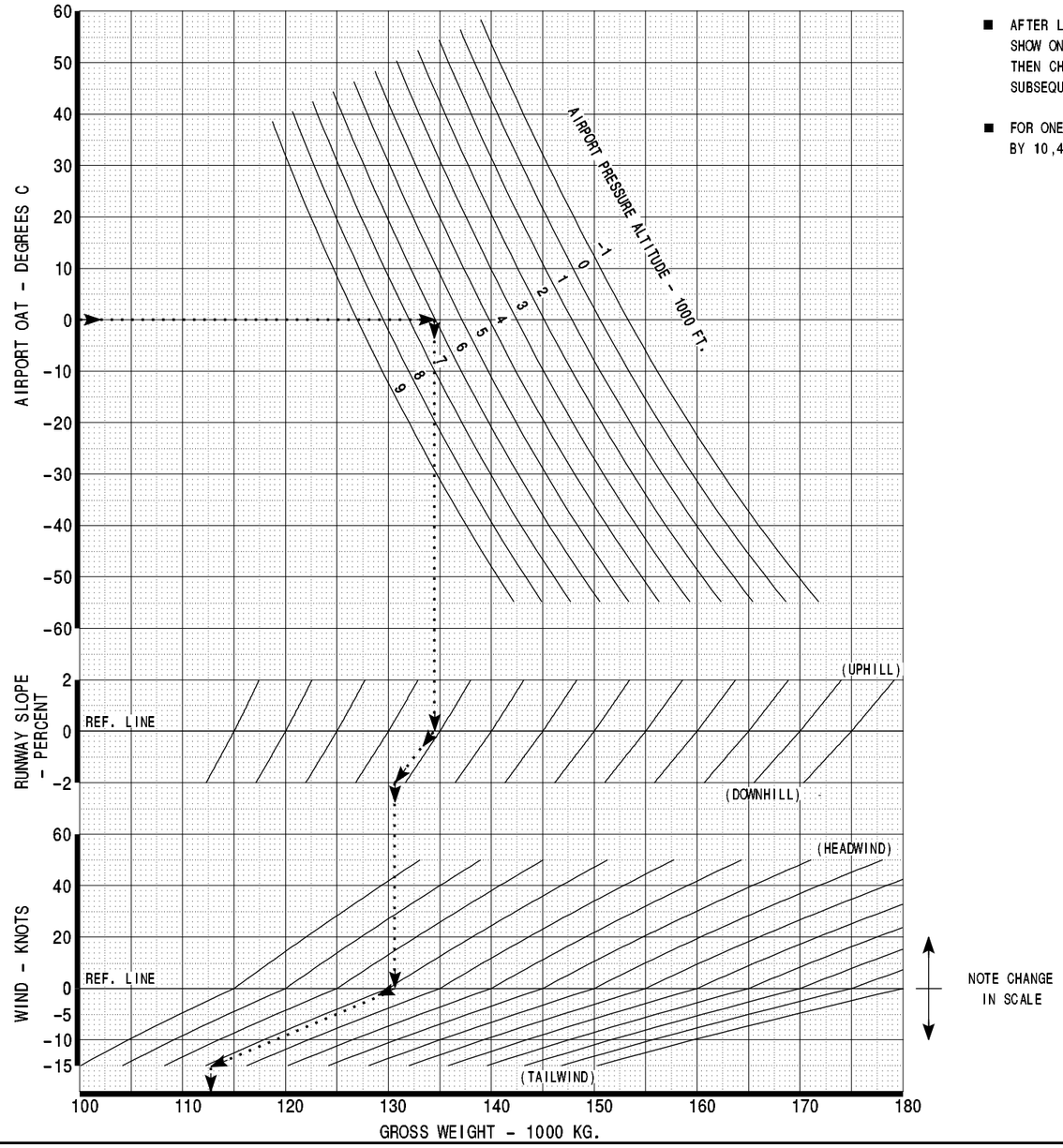
6E420

S29972

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY C BRAKES

FLAPS 25



- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOW ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 10,400 KG.

P.C. e600D09007
D041T507-4 PG. 4.13-9

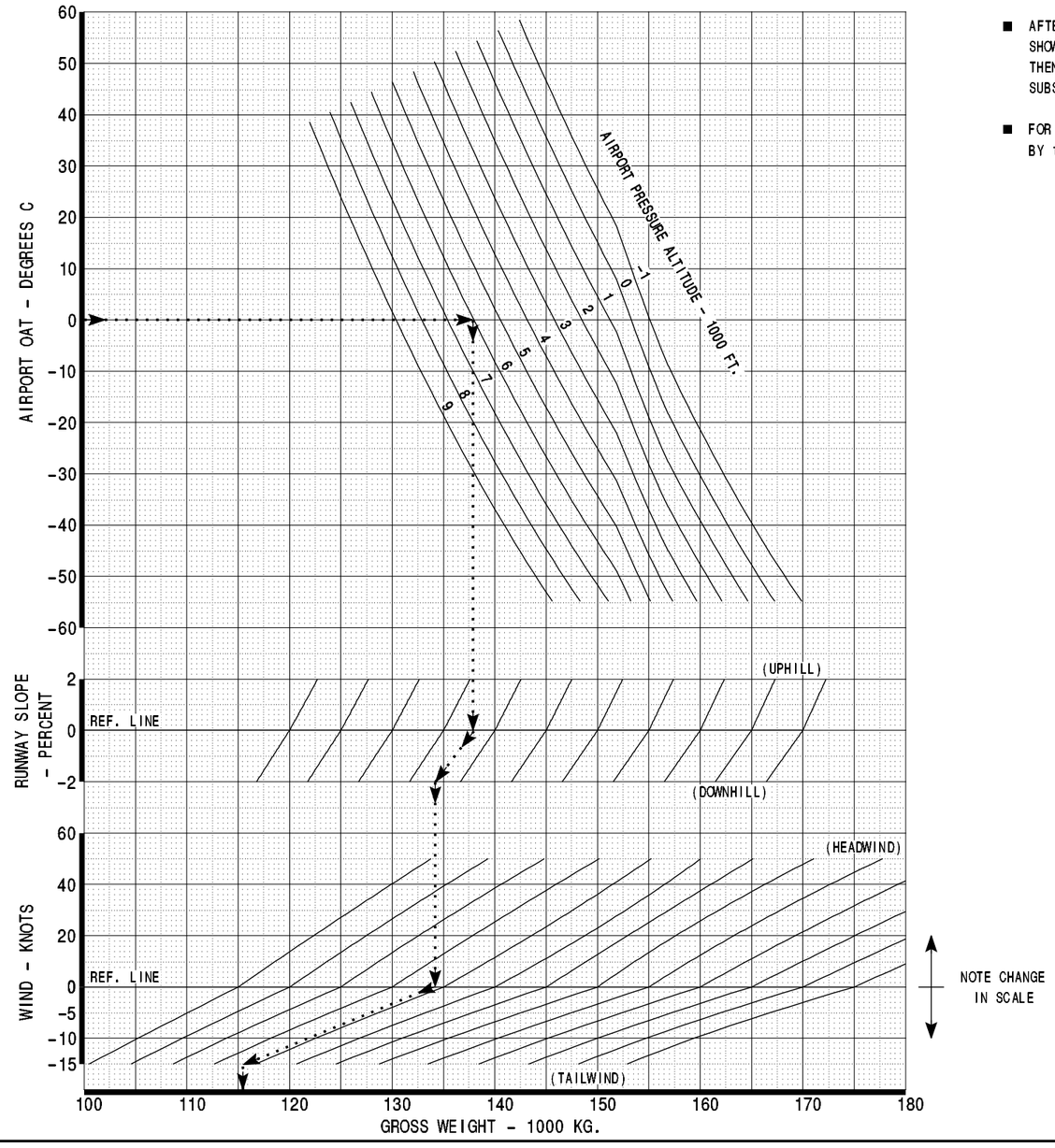
L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

APPROVED SUGAWARA DATE 06-02-05

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY C BRAKES

FLAPS 30



- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 10,000 KG.

P.C. e600D10007
D041T513 PG. 4.13-10

APPROVED SUGAWARA DATE 06-02-05

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

CATEGORY A AND B BRAKES

CATEGORY C BRAKES WITH ANTISKID/AUTOBRAKE CONTROL UNIT S283T001-23 OR S283T001-25 INSTALLED

GUIDANCE INFORMATION ONLY - SEE TEXT

NOTE: VALID FOR ALL FLAPS

CHART ASSUMES ZERO WIND
FOR TAILWIND CORRECT CHART BY ADDING:

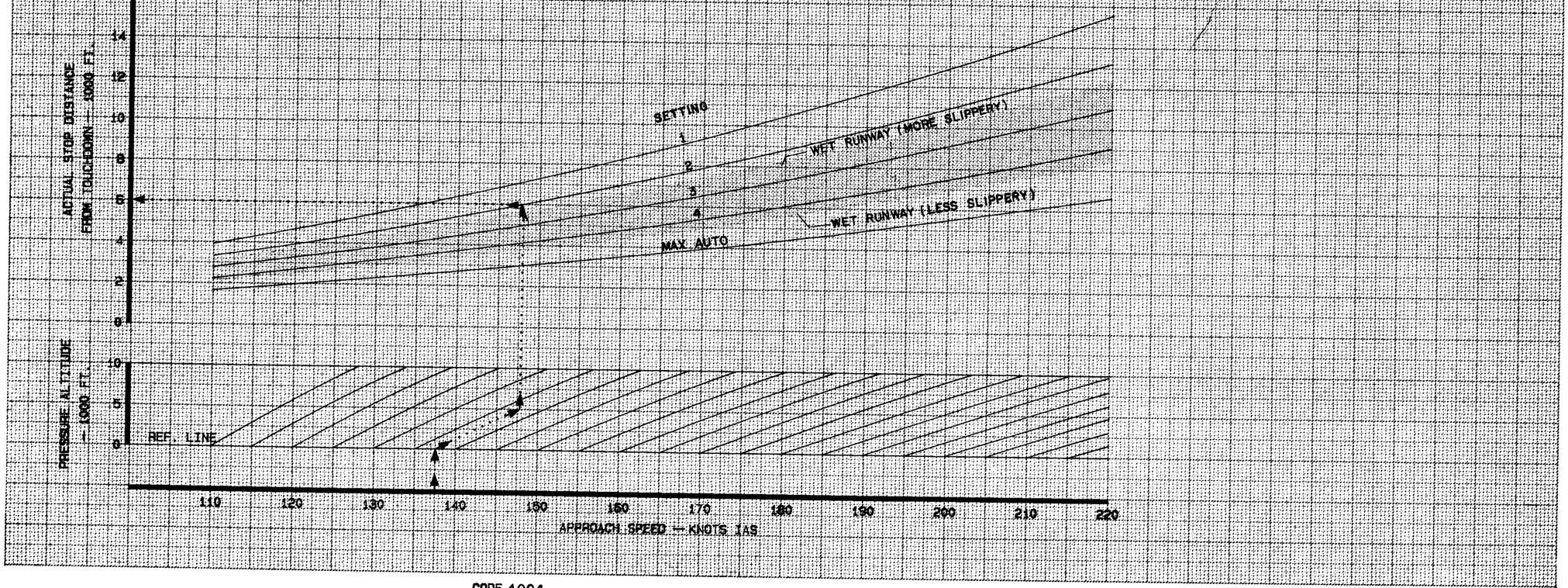
SETTING	FEET PER KNOT OF REPORTED TAILWIND
MAX AUTO	40
4	55
3	70
2	85
1	100

CHART ASSUMES STANDARD DAY TEMPERATURE
FOR HOTTER DAYS CORRECT CHART BY ADDING
FEET PER 2°F (1°C)

SETTING	ABOVE STANDARD DAY
MAX AUTO	10
4	15
3	20
2	25
1	30

WET RUNWAY GUIDANCE

- STOPPING DISTANCE WILL DEPEND ON SELECTED SETTING AND WET RUNWAY FRICTION CHARACTERISTICS. (SEE TEXT)
- EXTREMELY WET AND SLIPPERY CONDITIONS CAN RESULT IN LONGER DISTANCES THAN INDICATED.
- A HIGHER SETTING (MAX AUTO RATHER THAN SETTING 4, OR SETTING 4 RATHER THAN SETTING 3) WILL PRODUCE BETTER STOPPING PERFORMANCE ON WET RUNWAYS IF RUNWAY FRICTION CHARACTERISTICS PERMIT BETTER DECELERATION.
- THE USE OF REVERSE THRUST WILL IMPROVE WET RUNWAY STOPPING PERFORMANCE WHEN THE PERFORMANCE IS LIMITED BY RUNWAY FRICTION CHARACTERISTICS.



P.C.BL#01993 | D041T502 | PG. 4.13-13

	APPROVED	DATE
J. PETERS	J. Peters	7/1/88
767		

S38874

6E4208

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

ADVISORY INFORMATION ONLY

CATEGORY C BRAKES WITH ANTISKID/AUTOBRAKE CONTROL UNIT S283T001-13 INSTALLED

FLAPS 25 AND 30

- WET RUNWAY GUIDANCE.

  STOP DISTANCE DEPENDS ON AUTOBRAKE SETTING AND WET RUNWAY FRICTION CHARACTERISTICS. SEE TEXT.

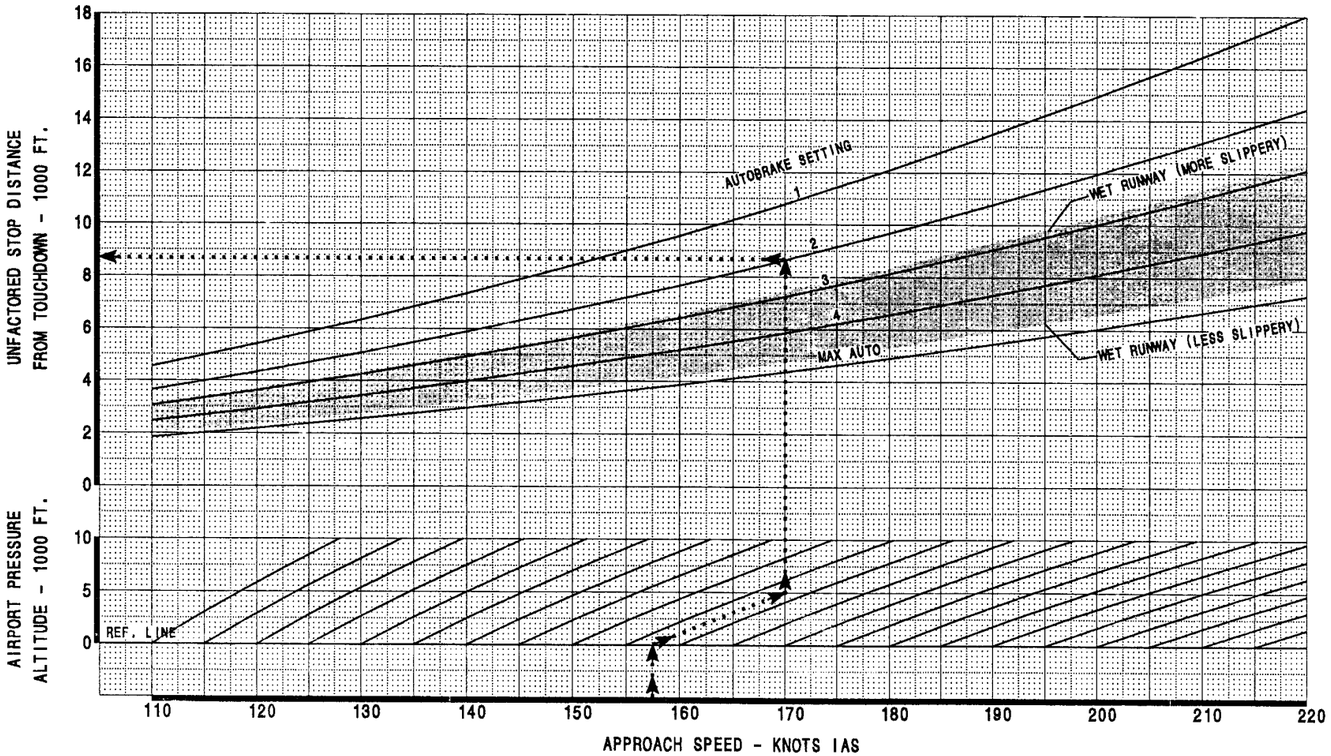
  EXTREMELY WET OR SLIPPERY RUNWAY CONDITIONS MAY RESULT IN LONGER STOP DISTANCES THAN INDICATED.

  HIGHER AUTOBRAKE SETTINGS (MAX AUTO RATHER THAN SETTING 4) RESULT IN SHORTER STOP DISTANCES IF RUNWAY FRICTION CHARACTERISTICS PERMIT BETTER DECELERATION.

  SHORTER STOP DISTANCES WILL RESULT FROM THE USE OF REVERSE THRUST ONLY WHEN PERFORMANCE IS LIMITED BY RUNWAY FRICTION CHARACTERISTICS.

- ZERO WIND. FOR EACH KNOT OF REPORTED TAILWIND, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.
- STANDARD DAY. FOR EACH DEGREE C (2 DEGREES F) ABOVE STANDARD DAY, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.
- MANUAL LANDING. FOR AUTOLAND, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.

AUTOBRAKE SETTING	DISTANCE ADJUSTMENT - FT.		
	FOR TAILWIND	FOR TEMPERATURE	FOR AUTOLAND
1	+ 115	+ 30	+ 0
2	+ 95	+ 25	+ 0
3	+ 80	+ 20	+ 50
4	+ 65	+ 15	+ 100
MAX AUTO	+ 45	+ 10	+ 200



P.C. h600D11A04
D041T509-3 PG.4.13-11

APPROVED	DATE
V.HILL	08-28-96

M. MCGONIGAL
767-200/300

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

FLAPS 25 AND 30

ADVISORY INFORMATION ONLY

CATEGORY C BRAKES WITH ANTISKID/AUTOBRAKE CONTROL UNIT S283T001-27 INSTALLED

■ WET RUNWAY GUIDANCE.

STOP DISTANCE DEPENDS ON AUTOBRAKE SETTING AND WET RUNWAY FRICTION CHARACTERISTICS. SEE TEXT.

EXTREMELY WET OR SLIPPERY RUNWAY CONDITIONS MAY RESULT IN LONGER STOP DISTANCES THAN INDICATED.

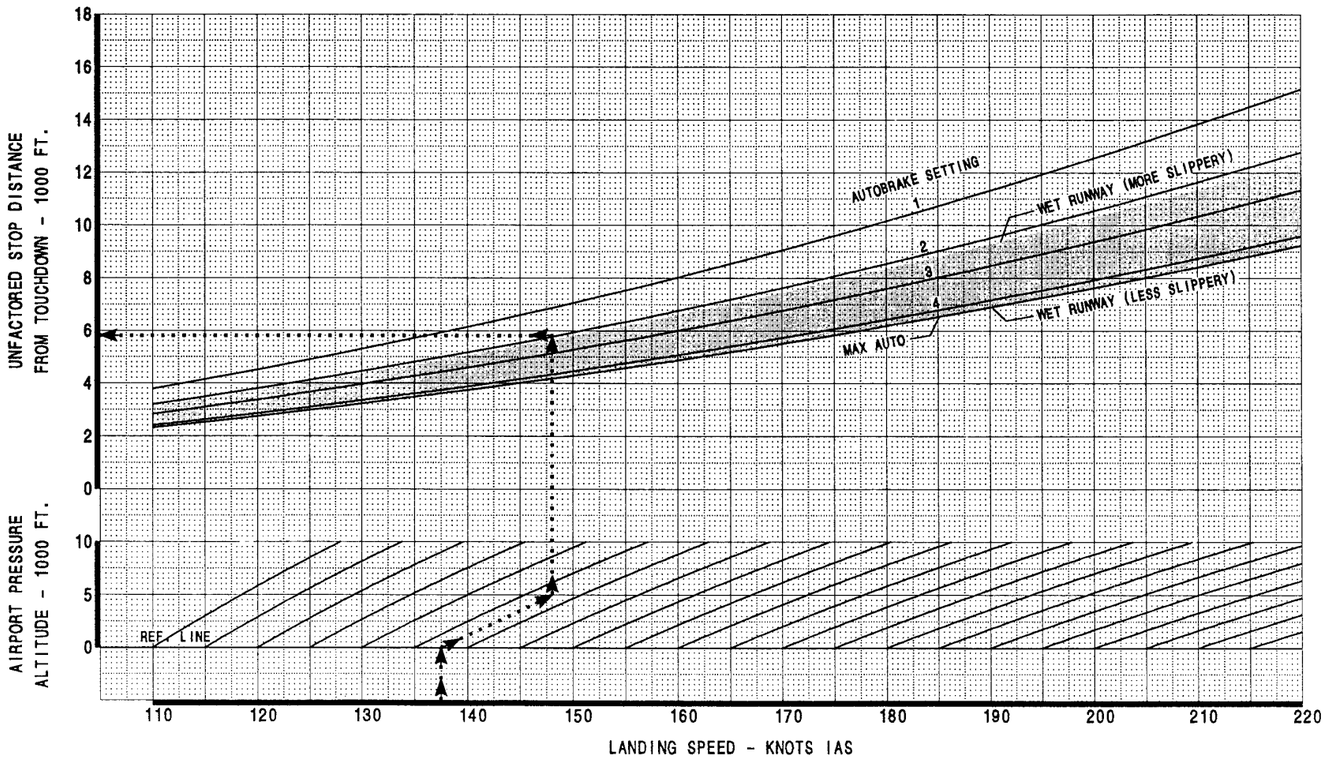
HIGHER AUTOBRAKE SETTINGS (MAX AUTO RATHER THAN SETTING 4) RESULT IN SHORTER STOP DISTANCES IF RUNWAY FRICTION CHARACTERISTICS PERMIT BETTER DECELERATION.

SHORTER STOP DISTANCES WILL RESULT FROM THE USE OF REVERSE THRUST ONLY WHEN PERFORMANCE IS LIMITED BY RUNWAY FRICTION CHARACTERISTICS.

■ ZERO WIND. FOR EACH KNOT OF REPORTED TAILWIND, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.

■ STANDARD DAY. FOR EACH DEGREE C (2 DEGREES F) ABOVE STANDARD DAY, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.

AUTOBRAKE SETTING	DISTANCE ADJUSTMENT - FT.	
	FOR TAILWIND	FOR TEMPERATURE
1	+100	+30
2	+85	+25
3	+70	+20
4	+55	+15
MAX AUTO	+40	+10



P.C. d600D13000
D041T513-1 PG.4.13-13

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767

S42602

APPENDIX 29AB

OPERATION AT REDUCED TAKEOFF THRUST

WITH OR WITHOUT 10% AND 20% DERATED TAKEOFF THRUST

CF6-80C2B6F ENGINES

S16154

LOG OF PAGES

The following pages comprise this appendix applicable to the above series airplanes

REVISION 0

Approved by: Donald B. Wilson **DATE: 07-03-91**

for Manager, Seattle Aircraft Certification Office, FAA Northwest Mountain Region

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S16147

INTRODUCTION

This appendix presents a method for determining takeoff performance with the engines operating at less than a Full Rated Takeoff thrust rating. The method consists of using the performance data at an assumed temperature higher than the actual ambient temperature to determine weight limits, speeds, and takeoff flight path information, and setting a reduced value of takeoff %N1 compatible with the selected assumed temperature.

Use of this appendix is optional; its purpose is to reduce engine wear associated with maximum thrust operation. Its use may result in the airplane operating at or near weight limits due to field length, takeoff climb or net flight path minimums where, under the same conditions and airplane configuration at full takeoff thrust, the airplane would not be limited.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

G E N E R A L L I M I T A T I O N S

This appendix contains the additional limitations, procedures, and performance to schedule takeoff operation at reduced engine thrust.

The allowable thrust reduction is such that:

1. Airplane performance at the reduced thrust meets all applicable performance requirements; and,

2. The takeoff thrust reduction does not exceed 25 percent of the Rated Takeoff thrust.

REDUCED TAKEOFF THRUST PROCEDURES

As a condition to the use of reduced thrust procedures, operators must establish a periodic check system to insure that the engines are capable of producing full takeoff thrust.

Use of reduced thrust procedures is not allowed when the takeoff runway is contaminated with water, ice, slush, or snow.

Use of reduced thrust procedures is not allowed with antiskid inoperative.

O P E R A T I O N A L L I M I T S

Takeoff and landing operational temperature limits are amended by the following addition:

The takeoff performance data associated with a particular ambient temperature is valid or conservative for any lower temperature, within thrust reduction limits established in General Limitations, this appendix.

CERTIFICATE LIMITATIONS

ENGINE LIMITATIONS

Limitations are unchanged except for the following:

ENGINE THRUST

Limitations are unchanged except for the following addition:

The %N1 values used to set takeoff thrust are determined at the selected assumed temperature or as otherwise instructed.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

SECTION 4 - PERFORMANCE

REDUCED THRUST PERFORMANCE LIMITS

In accordance with the limitations on page 1 of this appendix, operation at reduced thrust is only permissible if the airplane meets all applicable performance requirements at the planned takeoff weight and reduced thrust setting, and the amount of thrust reduction does not exceed 25 percent of the Rated Takeoff rating. Rated Takeoff rating is the full takeoff rating of the engines actually installed on the airplane, or any alternate engine rating for which performance data are included in the flight manual. Performance limits are determined by reading the performance charts at an assumed airport temperature higher than the actual ambient temperature. The higher the assumed temperature, the greater the thrust reduction that will be achieved. Therefore, the analysis usually involves determination of the maximum assumed temperature for the actual conditions. The following procedure may be used to determine reduced thrust performance limits.

DETERMINATION OF THE ASSUMED TEMPERATURE

1. Enter the field Length Limits chart using the corrected runway length, airport pressure altitude and the desired takeoff weight and read the airport OAT.

2. Enter the Takeoff Climb Limits chart using the airport pressure altitude and the desired takeoff weight and read the airport OAT.

3. The lower of the temperatures determined from Steps 1 and 2 is the maximum assumed temperature upon which reduced takeoff thrust may be based.

4. Select a desired assumed temperature greater than the actual ambient temperature but not exceed the maximum assumed temperature from Step 3.

5. Complete the takeoff weight analysis using the selected assumed temperature. If other performance considerations such as obstacle clearance, tire speed, etc., become limiting, then a lower assumed temperature must be selected.

6. V_1 and V_R determined using the selected assumed temperature must not be less than the $V_{1(MCG)}$ for the actual airport ambient temperature.

S16152

PERFORMANCE

DETERMINATION OF THE ASSUMED TEMPERATURE TAKEOFF POWER SETTING %N1

The Assumed Temperature Takeoff %N1 is determined from the Takeoff Power Setting Assumed Temperature Reduced Thrust chart using the procedures specified thereon.

NOTE: Use of these procedures will ensure that thrust reduction does not exceed 25 percent.

S16153

TAKEOFF POWER SETTING

ASSUMED TEMPERATURE REDUCED THRUST
WITH OR WITHOUT ADDITIONAL DERATE

PROCEDURES

1. DO NOT USE AN ASSUMED TEMPERATURE IN SHADED REGION OF CHART A.
2. DETERMINE Δ% CORR. N1 FROM CHART B USING THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
3. ENTER CHART C WITH ASSUMED OAT TO DETERMINE TEMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
4. REDUCE THE PERCENT CORRECTED N1 FROM STEP 3 BY THE Δ% CORR. N1 FROM STEP 2.
5. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 4 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 3.
6. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 5 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
7. ENTER CHART C WITH ACTUAL AIRPORT OAT TO DETERMINE TEMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
8. REDUCE THE PERCENT CORRECTED N1 FROM STEP 7 BY THE Δ% CORR. N1 FROM STEP 2.
9. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 8 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 7.
10. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 9 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
11. ENTER CHART E WITH THE PERCENT CORRECTED N1 FROM STEP 10 AND DETERMINE MAXIMUM THRUST REDUCTION Δ% CORRECTED N1. REDUCE PERCENT CORRECTED N1 FROM STEP 10 BY THIS Δ% CORRECTED N1.
12. DETERMINE PERCENT N1 GAGE FROM CHART F USING THE HIGHER PERCENT CORRECTED N1 FROM STEP 6 OR STEP 11.

CHART C

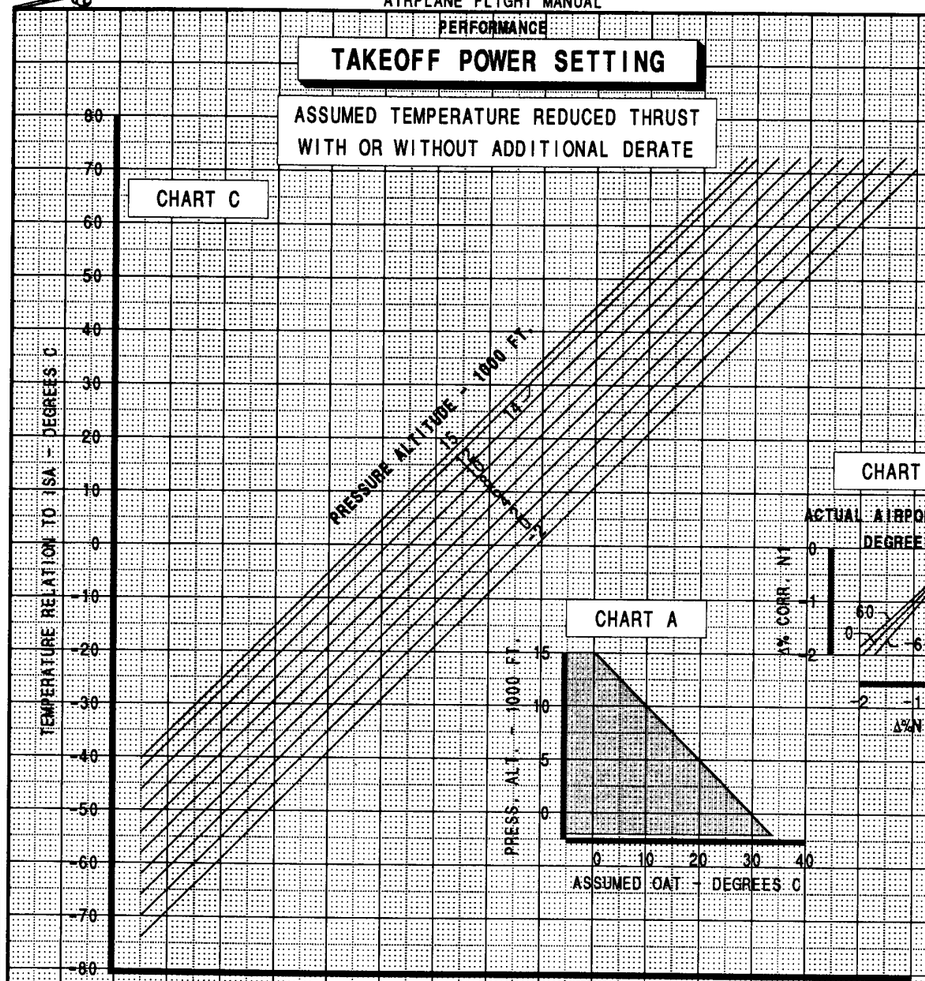


CHART A

CHART B

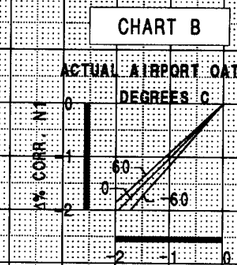
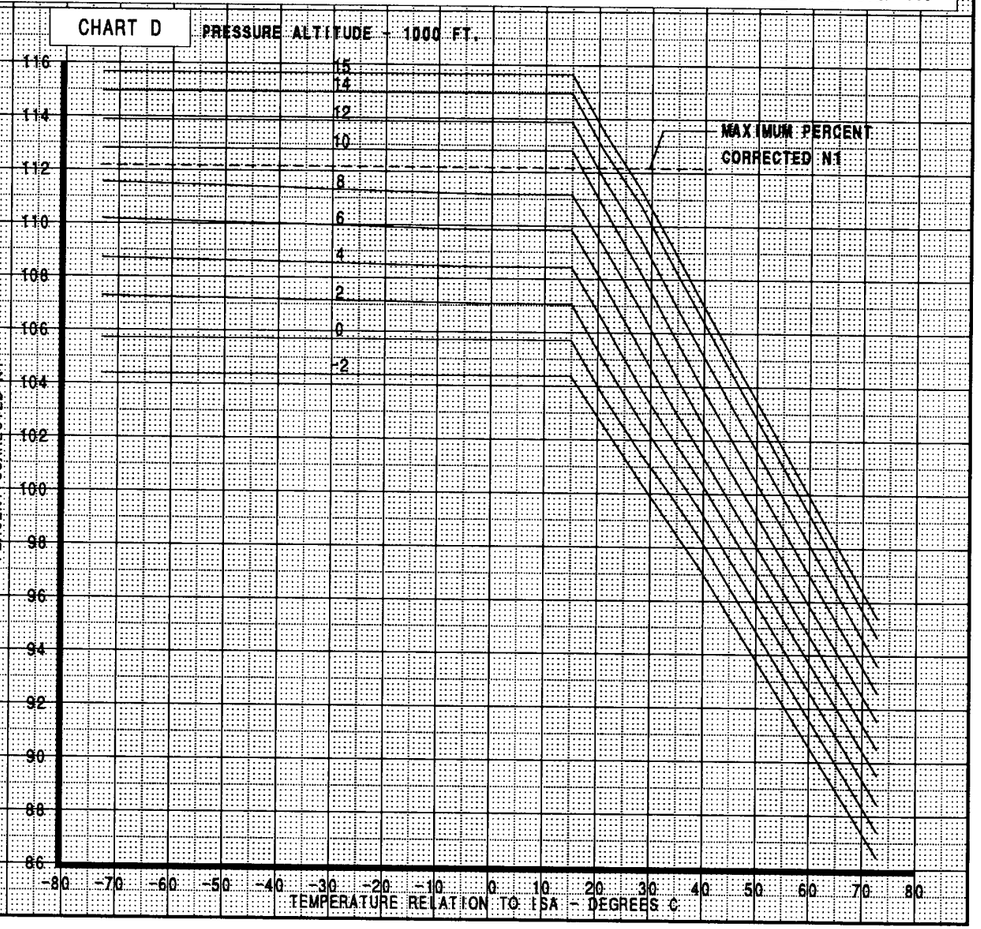
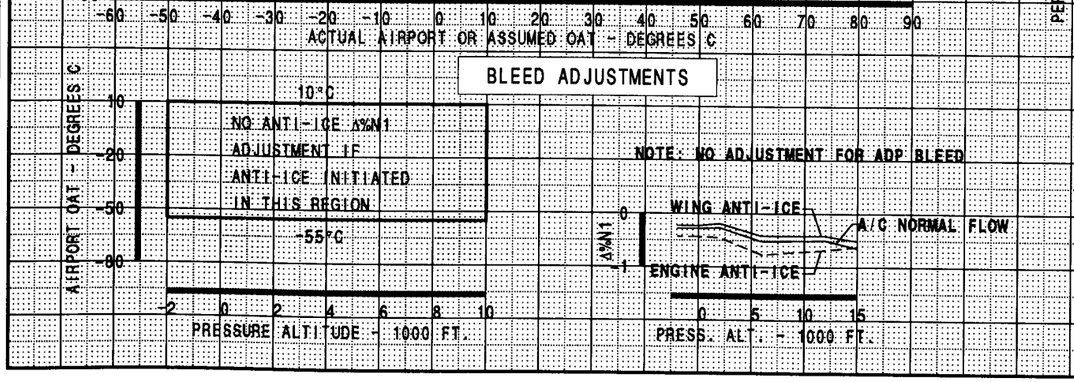


CHART D



BLEED ADJUSTMENTS



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D041T507-1 PG. 6

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TAKEOFF POWER SETTING
(CONTINUED)

ASSUMED TEMPERATURE REDUCED THRUST
WITH OR WITHOUT ADDITIONAL DERATE

CHART E

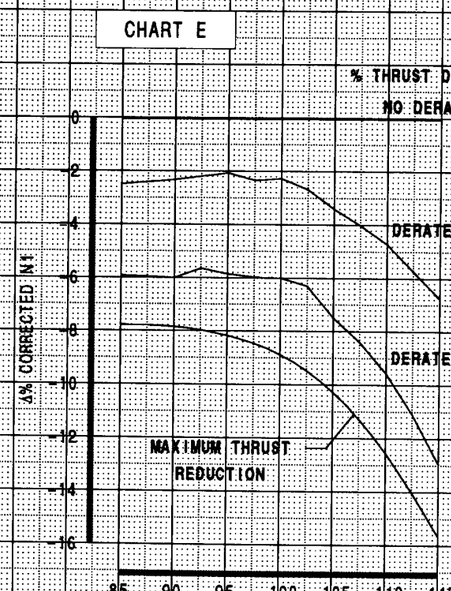
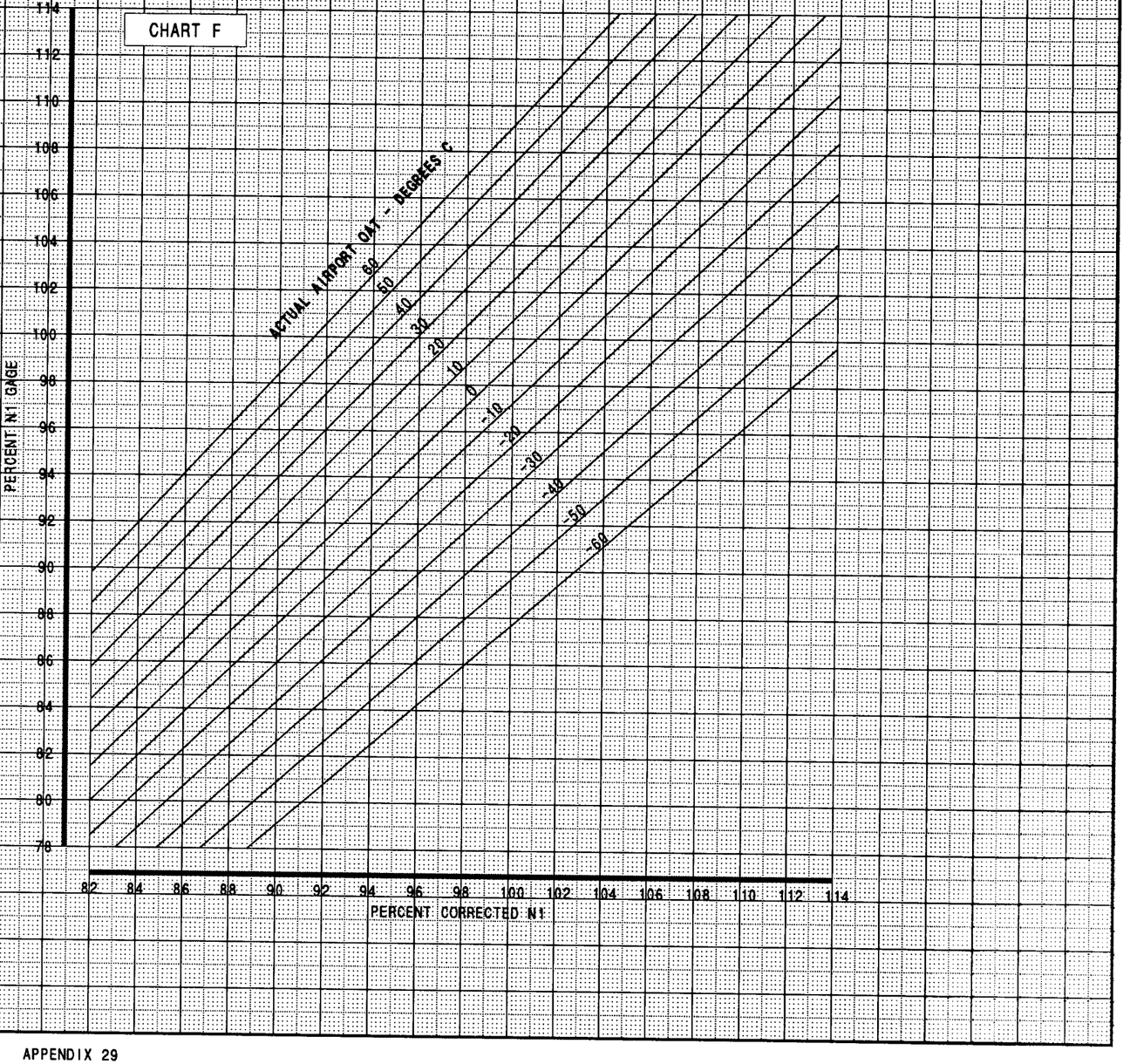


CHART F



P.C. K6290060A3 APP .29
D041T507-1 PG. 6A

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APPENDIX 3K

EXAMPLE PROBLEMS

LOG OF PAGES

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for Manager, Seattle Aircraft Certification Office, FAA Transport Airplane Directorate

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Titles shown in capital letters are charts.
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I N T R O D U C T I O N

GENERAL

This appendix will illustrate the use of the Airplane Flight Manual charts. Its intent is to give the user examples to gain familiarity with the Airplane Flight Manual and to understand the chart reading procedures as outlined in the basic manual. The charts contained in this appendix are for illustrative purposes only and should not be considered as a replacement for a similar chart in the basic manual. In some cases the charts appearing in this appendix have a slightly different format from the basic manual, and this should be accounted for by the user when using the basic manual.

Example arrows shown on the charts will be identified as to problem number and step number and as many examples as possible, without causing confusion on the chart, will be identified.

It is recommended that the examples be followed in numerical order since procedures demonstrated in earlier problems will not necessarily be repeated in later problems making the later problems incomplete by themselves.

The step numbers in the examples do not correspond to any defined procedure, however, the order of these steps follows closely the procedures as defined in the basic manual.

When reference to a step number is used, it will refer to the example being worked, unless identified otherwise.

This appendix is applicable to all document numbers listed on the pages.

I N T R O D U C T I O N (Continued)

PROBLEM SOLVING PROCEDURES

The examples in this appendix illustrate the procedures defined in the basic flight manual. The following tabulation identifies in which problem the various procedures can be located.

Procedure	Manual Section	Example Problem
Takeoff Weight Determination Procedure	4.1	All
Corrected Runway Length Determination	4.3	1, 7, 8
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$V_{1(MCG)}$ Limited Takeoff	4.8	7
Obstacle Clearance Analysis Procedure	4.9	3, 4, 5, 6
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Obstacle Clearance with Speed Increase	4.9	6
Takeoff Weight Analysis with Improved Climb Performance Procedure	4.10	2
Corrected Runway Length Required with Improved Climb Performance Procedure	4.10	6

Performance information in Sections 4.11, 4.12 and 4.13 is considered to be generally self-explanatory, therefore example problems are not presented for those sections.

GENERAL TAKEOFF ANALYSIS

E X A M P L E P R O B L E M 1

Purpose

This example problem illustrates the use of the general charts and analysis procedures required for all takeoff analyses. Maximum allowable takeoff gross weight and corresponding takeoff speeds will be determined.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 5,000 ft.
Actual Runway Length Available = 8,600 ft.
Runway Slope = 1% (Uphill)
Clearway: 07-22-96
Stopway: 50 ft.
Obstacles: 07-22-96

Atmospheric Conditions

Airport OAT = 0 deg. C (ISA - 5.1 deg. C)
Reported Wind at 10 meters (32.8 ft.) = 20 kt. (Headwind)

Airplane Configuration

Flap Position 15
A/C Packs ON
Anti-Ice OFF
All Brakes and Antiskid Operative

Maximum Structural Takeoff Weight Limit

155,000 kgs.

Analysis

Maximum allowable takeoff gross weight is the most limiting (least) of the following:

1) Maximum Structural Takeoff Weight Limit (Section 1).

2) Field Length Limited Takeoff Gross Weight (Section 4.4).

3) Climb Limited Takeoff Gross Weight (Section 4.5).

4) Tire Speed Limited Takeoff Gross Weight (Section 4.6).

5) Obstacle Clearance Limited Takeoff Gross Weight (Section 4.9)

E X A M P L E P R O B L E M 1 (Continued)

The Maximum Structural Takeoff Weight Limit is found in Section 1 and for this example problem is given as 155,000 kgs.

Corrected runway length available is determined based on airport and atmospheric conditions and airplane configuration. Corrected runway length available is used to determine the Field Length Limited Takeoff Gross Weight.

Climb and Tire Speed Limited Takeoff Gross Weight are determined based on airport and atmospheric conditions and airplane configuration.

There are no obstacles given for this example problem, therefore, there is no obstacle clearance limitation on takeoff gross weight.

1. Corrected Runway Length Available Determination (Section 4.3)

   (a) Enter the All Engine Operating Corrected Runway Length chart (page 60) with the actual runway length available (8,600 ft.) and the given conditions of clearway, runway slope, wind and anti-ice. Read the all engines operating corrected runway length available = 8,890 ft.

   (b) Enter the Engine Inoperative Corrected Takeoff Distance chart (page 61) with the actual runway length available (8,600 ft.) and the given conditions of clearway, runway slope, wind and anti-ice. Read the engine inoperative corrected takeoff distance available = 8,785 ft.

   (c) Add the stopway (50 ft.) to the actual runway length available (8,600 ft.) to obtain the actual accelerate-stop distance available (8,650 ft.).

   (d) Enter the Corrected Accelerate-Stop Distance chart (page 62) with the actual accelerate-stop distance available (8,650 ft.) and the given conditions of runway slope, wind, anti-ice and braking. Read the corrected accelerate-stop distance available = 9,115 ft.

E X A M P L E P R O B L E M 1 (Continued)

(e) Enter the Runway Length and V_1 Adjustments chart (page 63) with the engine inoperative corrected takeoff distance (8,785 ft., Step 1(b)), and the corrected accelerate-stop distance available (9,115 ft., Step 1(d)). Read the corrected runway length available (engine inoperative) = 8,990 ft.

NOTE: V_1 may not exceed V_R (V_1/V_R 1.0). Therefore, not all of the corrected accelerate-stop distance available is used in determining the corrected runway length available (engine inoperative).

(f) The lesser of the all engines operating corrected runway length available (8,890 ft., Step 1(a)), and the corrected runway length available (engine inoperative) (8,990 ft., Step 1(e)), is the corrected runway length available (8,890 ft.). The corrected runway length available is used to determine the field length limited takeoff gross weight.

2. Field Length Limited Takeoff Gross Weight Determination (Section 4.4).

Enter the Field Length Limits chart (page 66) with the airport temperature/altitude and corrected runway length available (8,890 ft., Step 1(f)). Read field length limited takeoff gross weight = 161,000 kgs.

3. Climb Limited Takeoff Gross Weight Determination (Section 4.5).

Enter the Takeoff Climb Limits chart (page 68) at the airport temperature/altitude. Read climb limited takeoff gross weight = 148,100 kgs.

4. Tire Speed Limited Takeoff Gross Weight Determination (Section 4.6).

From the Tire Speed Limits chart (page 69), tire speed never limits takeoff gross weight with a headwind.

5. Maximum Allowable Takeoff Gross Weight Determination.

The least of the takeoff gross weight limits from Steps 2, 3, 4, and the Maximum Structural Takeoff Weight Limit is the maximum allowable takeoff gross weight (148,100 kgs.).

E X A M P L E P R O B L E M 1 (Continued)

6. Takeoff Speeds Determination (Section 4.7).

NOTE: The takeoff speeds are calculated using the Takeoff Decision Speed, V_1, Determination procedure in Section 4.7 of the basic manual. Some of the steps in this procedure were completed earlier.

(a) Engine inoperative corrected takeoff distance available (8,785 ft., Step 1(b)).

(b) Enter the Field Length Limits chart (page 66) with airport temperature/altitude and the allowable takeoff gross weight from Step 5. Read the corrected runway length required = 7,440 ft.

(c) Corrected accelerate-stop distance available (9,115 ft., Step 1(d)).

(d) Enter the Runway Length and V_1 Adjustments chart (page 63).

(1) With engine inoperative corrected takeoff distance available (8,785 ft., Step 6(a)), and corrected runway length required (7,440 ft., Step 6(b)). Read V_1/V_R MIN = .94.

(2) With corrected accelerate-stop distance available (9,115 ft., Step 6(c)), and corrected runway length required (7,440 ft., Step 6(b)). Read V_1/V_R MAX = 1.0.

NOTE: V_1 may not exceed V_R, ($V_1/V_R \leq 1.0$). Use less than the corrected accelerate-stop distance available if necessary.

(e) Enter the Takeoff Speeds chart (page 71) with the airport temperature/altitude, allowable takeoff gross weight (148,100 kgs., Step 5), V_1/V_R MIN (.94, Step 6(d)(1)) and V_1/V_R MAX (1.0, Step 6(d)(2)). Read takeoff speeds V_R = 141 kt., V_2 = 145 kt., V_1 MIN = 133 kt., and V_1 MAX = 141 kt.

E X A M P L E P R O B L E M 1 (Continued)

7. Maximum Brake Energy Speed Determination (Section 4.7).

From the Brake Energy Limits chart (page 73), brake energy is never limiting when using flap position 15.

8. Minimum V_1 for Control on the Ground Determination (Section 4.7).

Enter the Minimum V_1 for Control on the Ground chart (page 74) with the airport temperature/altitude and allowable takeoff gross weight (148,100 kgs., Step 5). Read minimum V_1 for control on the ground, $V_{1(MCG)}$ = 117.6 kt.
$V_{1(MCG)}$ is not limiting since the entire range of V_1, Step 6(e), is above 117.6 kt.

9. Decision Speed, V_1, Selection

Choose a single value of V_1 between the limits (133 to 141 kt.) determined in Step 6(e). See Selection of V_1 in Section 4.7 of the basic manual.

Results

Maximum allowable Takeoff Gross Weight (Step 5): 148,100kgs.
Takeoff Speeds (Step 6(e)): V_1 = 133 to 141 kt.
V_R = 141 kt.
V_2 = 145 kt.

TAKEOFF ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 2

Purpose

This example problem illustrates the use of the Improved Climb Performance technique. This technique is added to the procedures illustrated in Example Problem 1. Maximum allowable takeoff gross weight and corresponding takeoff speeds will be determined.

Given

The given conditions and configuration are the same as Example Problem 1.

Analysis

Maximum allowable takeoff gross weight using Improved Climb Performance is the most limiting (least) of the following: (the sections identified are located in the basic manual)

1. Maximum Structural Takeoff Weight Limit (Section 1).
2. Field Length Limited Takeoff Gross Weight using Improved Climb Performance (Sections 4.4 and 4.10).
3. Climb Limited Takeoff Gross Weight using Improved Climb Performance (Sections 4.5 and 4.10).
4. Tire Speed Limited Takeoff Gross Weight using Improved Climb Performance (Sections 4.6 and 4.10).
5. Obstacle Clearance Limited Takeoff Gross Weight using Improved Climb Performance (Section 4.9).

The Maximum Structural Takeoff Weight Limit is found in Section 1 and for this example problem is given as 155,000 kgs.

Corrected runway length available is determined based on airport and atmospheric conditions and airplane configuration. Corrected runway length available is used to determine the Field Length Limited Takeoff Gross Weight without Improved Climb Performance, which is used to determine the Maximum Allowable Takeoff Gross Weight using Improved Climb Performance.

Climb and Tire Speed Limited Takeoff Gross Weight without Improved Climb Performance are determined based on airport and atmospheric conditions and airplane configuration, which are also used to determine the Maximum Allowable Takeoff Gross Weight using Improved Climb Performance.

There are no obstacles given for this example problem, therefore, there is no obstacle clearance limitation on takeoff gross weight.

TAKEOFF ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 2 (Continued)

1. Corrected Runway Length Available Determination (Section 4.3).

   The corrected runway length available is 8,890 ft. (Steps 1(a) - 1(f), Example 1).

2. Field Length Limited Takeoff Gross Weight Determination, Without Improved Climb Performance (Section 4.4).

   The field length limited takeoff gross weight without improved climb performance is 161,000 kgs. (Step 2, Example 1).

3. Climb Limited Takeoff Gross Weight Determination, Without Improved Climb Performance (Section 4.5).

   The climb limited takeoff gross weight without improved climb performance is 148,100 kgs. (Step 3, Example 1).

4. Tire Speed Limited Takeoff Gross Weight Determination (Section 4.6).

   Tire speed never limits takeoff gross weight with a headwind (Step 4, Example 1).

5. Maximum Allowable Takeoff Gross Weight Determination, Without Improved Climb Performance.

   The maximum allowable takeoff gross weight without improved climb performance is 148,100 kgs. (Step 5, Example 1).

NOTE: The three conditions identified in Section 4.10 that must be present to use the Improved Climb Performance technique are satisfied, namely:

1. The takeoff weight is takeoff climb limited. The maximum allowable takeoff gross weight without improved climb performance (148,100 kgs., Step 5) is the takeoff climb limit (Step 3).

2. The takeoff distance available is greater than that required for the climb. (Not field length limited without improved climb performance.)

3. The antiskid system is operative and ON.

TAKEOFF ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 2 (Continued)

6. Maximum Allowable Takeoff Gross Weight Determination, With Improved Climb Performance (Section 4.10).

   a. Enter the Improved Climb Performance chart (page 75) with the field length limited takeoff gross weight (161,000 kgs., Step 2) and the climb limited takeoff gross weight (148,100 kgs., Step 3). Follow the guidelines until they intersect and read the field length/climb limited takeoff gross weight (152,650 kgs.) and the required speed increase (8.75 units).

   b. When tire speed never limits takeoff gross weight with a headwind (Step 4), it is implied that tire limits at maximum speed increase are never limiting.

   c. The maximum allowable takeoff gross weight (152,650 kgs.) and the corresponding required speed increase (8.75 units) are the lesser of the values determined in Steps 6(a) and 6(b) and the Maximum Structural Takeoff Weight Limit.

7. Takeoff Speeds Determination With Improved Climb Performance (Sections 4.7 and 4.10).

   a. With the gross weight and speed increase determined in Step 6(c), determine the associated field-length limited gross weight that corresponds to zero speed increase. This is obtained by entering the Improved Climb Performance chart (page 75) with the field length/climb limited takeoff gross weight (152,650 kgs., Step 6(a)) and the required speed increase (8.75 units, Step 6(a)) and follow the field length limit guidelines to zero speed increase and read gross weight = 161,000 kgs.

NOTE: Enter the V_1 Determination procedure in Section 4.7 using the gross weight determined in Step 7(a).

   b. Engine-inoperative corrected takeoff distance available = 8,785 ft. (Step 1(b), Example 1).

   c. Corrected runway length required = 8,890 ft. (reverse of Step 2, Example 1).

   d. Corrected accelerate-stop distance available = 9,115 ft. (Step 1(d), Example 1).

TAKEOFF ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 2 (Continued)

e. Enter the Runway Length and V_1 Adjustments chart (page 64).

(1) With engine inoperative corrected takeoff distance available (8,785 ft., Step 7(b)), and corrected runway length required (8,890 ft., Step 7(c)). Read $V_1/V_{R\ MIN}$ = .998.

(2) With corrected accelerate-stop distance available (9,115 ft., Step 7(d)), and corrected runway length required (8,890 ft., Step 7(c)), Read $V_1/V_{R\ MAX}$ = 1.0.

NOTE: V_1 may not exceed V_R, (V_1/V_R 1.0).

f. Enter the Takeoff Speeds chart (page 71) with the airport temperature/altitude, allowable takeoff gross weight (152,650 kgs., Step 6(a)), $V_1/V_{R\ MIN}$ (.998, Step 7(e)(1)) and $V_1/V_{R\ MAX}$ (1.0, Step 7(e)(2)). Read takeoff speeds V_R = 143.9 kt., V_2 = 147.3 kt., $V_{1\ MIN}$ = 143.6 kt., and $V_{1\ MAX}$ = 143.9 kt.

g. Enter the Improved Climb Performance chart (page 75) with the V_R, V_2, and V_1 speeds determined in Step 7(f). Follow the guidelines to the speed increase (8.75 units) determined in Step 6(c) and determine that the values of the takeoff speeds with improved climb performance rounded off to the nearest knot are:

V_R = 155 kt., V_2 = 156 kt., $V_{1\ MIN}$ = 153 kt., $V_{1\ MAX}$ = 153 kt.

NOTE: In this case the range of allowable Takeoff Decision Speed, V_1, is limited to a single value (V_1 = 153 kt.).

8. Maximum Brake Energy Speed Determination (Section 4.7).

From the Brake Energy Limits chart (page 73), brake energy is never limiting when using flap position 15.

TAKEOFF ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 2 (Continued)

9. Minimum V_1 for Control on the Ground Determination (Section 4.7).

Enter the Minimum V_1 for Control on the Ground chart (page 74) with the airport temperature/altitude and allowable takeoff gross weight (152,650 kgs., Step 6(c)). Read minimum V_1 for control on the ground, $V_{1(MCG)}$ = 117.5 kt. $V_{1(MCG)}$ is not limiting since the entire range of V_1, Step 7(g), is above 117.5 kt.

RESULTS

Maximum Allowable Takeoff Gross Weight (Step 6(c)): 152,650 kgs.

Takeoff Speeds (Step 7(g)): V_1 = 153 kt.
V_R = 155 kt.
V_2 = 156 kt.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3

Purpose

This example illustrates the use of the obstacle clearance charts. Speed increase procedures will not be used. It will demonstrate the use of the Obstacle Clearance Analysis Procedure, as defined in the basic manual, Section 4.9. Maximum allowable takeoff gross weight and corresponding takeoff speeds will be determined for a takeoff that will clear the defined obstacles.

Given

Same as Example 1 except the following obstacles are added:

Obstacle 1: 100 ft. high at 3,400 ft. from end of actual runway length available.

Obstacle 2: 550 ft. high at 25,000 ft. from end of actual runway length available.

Analysis

The analysis is the same as in Example 1 except that obstacles are present and the Obstacle Clearance Analysis Procedure (Section 4.9) will be followed to determine if the obstacles are limiting, and if so, the Obstacle Limited Takeoff Gross Weight.

NOTE: Steps 1 through 5 of Example 1 are the initial procedure that is followed to determine the limiting takeoff gross weight, before considering the obstacles.

The Obstacle Clearance Analysis Procedure from Section 4.9 of the basic manual will be followed from this point on.

Obstacle 1

1. Determine Reference Zero

   This is the starting point in the takeoff flight path analysis and the reference point for locating the obstacles under consideration. Reference Zero is a point on the runway or clearway plane at the end of the takeoff distance required and can be determined as follows:

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

(a) Since the airplane is not field length limited, enter the Field Length Limits chart (page 66) with the airport temperature/altitude and the least gross weight (148,100 kgs.) determined by climb limits (148,100 kgs., Step 3, Example 1), tire speed limits (not limiting, Step 4, Example 1), structural limits (155,000 kgs.), operational requirements (07-22-96 given), or other obstacle clearance requirements (not yet determined). Read corrected runway length required (7,440 ft.).

(b) Enter the Runway Length and V_1 Adjustments chart (page 63) with the corrected runway length required (7,440 ft., Step 1(a)), and the corrected accelerate-stop distance available (9,115 ft., Step 1(e), Example 1). Honoring the $V_1/V_R \leq 1.0$ restriction, read engine inoperative corrected takeoff distance required (7,280 ft.).

(c) Enter the Engine Inoperative Corrected Takeoff Distance chart (page 61) with the corrected takeoff distance required (7,280 ft., Step 1(b)) and the given conditions of runway slope, wind and anti-ice. Proceed backwards through the chart. Read actual engine inoperative takeoff distance required (7,050 ft.).

(d) Enter the All Engines Operating Corrected Runway Length chart (page 60) with the corrected runway length required (7,440 ft., Step 1(a)) and the given conditions of runway slope, wind and anti-ice. Proceed backwards through the chart. Read actual all engines operating takeoff distance required (7,150 ft.).

(e) The actual takeoff distance required (7,150 ft.) is the greater of the engine inoperative (7,050 ft., Step 1(c)), or all engines operating (7,150 ft., Step 1(d)), takeoff distances required. This is the location of Reference Zero relative to the brake release end of the runway.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

2. Adjust Obstacle Distance and Height to Reference Zero for Obstacle 1

Subtract the actual takeoff distance required (7,150 ft., Step 1(e)) from the actual runway length available (8,600 ft., given) and add the difference to the obstacle distance measured from the end of the runway length available (3,400 ft., given). On a sloped runway, obstacle height must also be corrected for the difference in elevation between Reference Zero and the end of the runway length available. Multiply the difference between the actual takeoff distance required (7,150 ft., Step 1(e)) and the actual runway length available (8,600 ft., given) by the runway slope (.01, given). Add this product to the height of the obstacle measured from the end of the actual runway length available (100 ft., given). See Sloped Runway Effect On Obstacle Clearance in basic manual.

Obstacle 1 distance and height from Reference Zero at gross weight = 148,100 kgs., Step 1(a).

Horizontal Distance from Reference Zero = (8,600 - 7,150) + 3,400 = 4,850 ft.

Height Above Reference Zero = (8,600 - 7,150) (.01) + 100 = 115 ft.

3. Takeoff Climb Gradient Available for Obstacle 1

(a) Enter the Takeoff Climb chart (page 79) with airport temperature/altitude and the gross weight (148,100 kgs.) used to determine Reference Zero, Step 1(a). Read takeoff climb gross gradient available (2.35% zero wind, 400 ft.).

(b) Enter the Gradient Corrections (Takeoff Climb) chart (page 87) with gross gradient available (2.35%, Step 3(a)) and wind. Read corrected gross gradient available (2.46%).

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

Obstacle Clearance

4. Close-In Obstacles

Since obstacle 1 is less than 7,000 ft. from Reference Zero, use the close-in obstacle analysis procedure:

(a) Enter the Close-In Obstacle Clearance chart (page 80) with obstacle distance from Reference Zero (4,850 ft., Step 2) and corrected gross gradient available (2.46%, Step 3(b)). Read height above Reference Zero available (77 ft.).

(b) The height above Reference Zero available (77 ft., Step 4(a)), is not greater than or equal to the obstacle height above Reference Zero (115 ft., Step 2), therefore, the obstacle is not cleared.

Since obstacle 1 is not cleared, takeoff weight must be reduced to achieve a higher gradient capability. The required takeoff distance is also reduced resulting in a new Reference Zero and obstacle heights and distances. A solution to this problem is found by determining the intersection of an obstacle height line (obstacle height vs. distance from Reference Zero) and an obstacle distance trade line (gradient capability vs. distance) on the Close-In Obstacle Clearance chart (page 80).

5. Sloped Runway Effect on Obstacle Clearance (Section 4.9).

Establish an obstacle height line with 1% uphill slope starting from the original obstacle height of 100 ft., and the original obstacle distance of 3,400 ft. This line is constructed such that Δ height/ Δ distance = .01. Therefore, a straight line from height = 100 ft. and distance = 3,400 ft. to height = 130 ft. and distance = 6,400 ft. ((130 - 100) ÷ (6,400 - 3,400) = .01) is the required line.

6. Construction of Obstacle Distance Trade Line (Section 4.9).

Starting with the gradient and distance defined in Step 4(a), construct an obstacle distance trade line. From Obstacle Distance Trade Lines chart (page 82) using the flaps 15 line, construct the following table.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

[1] GROSS GRADIENT AT 400 FT.	[2] REFERENCE DISTANCE	[3] CHANGE IN REFERENCE DISTANCE FROM INITIAL POINT	[4] HORIZONTAL DISTANCE FROM REFERENCE ZERO
%	FT. (page 82)	FT. ([2] - 560)	FT. ([3] + 4,850)
2.46*	560	0	4,850*
2.8	930	370	5,220
3.0	1,130	570	5,420
3.2	1,315	755	5,605
3.4	1,490	930	5,780

*Initial point of obstacle distance trade line (from Step 4(a)).

The construction of the line from the points in columns 1 and 4, from the above table, on the Close-In Obstacles Clearance chart, page 80, is the required obstacle clearance trade line. The intersection of this line and the line from Step 5 determines that the gradient required to clear Obstacle 1 is 3.09% at a distance from Reference Zero of 5,500 ft.

Since the distance from the brake release end of the runway to Obstacle 1 is always 12,000 ft. (the actual runway length available (8,600 ft., given) plus the distance from the end of the actual runway length available to Obstacle 1 (3,400 ft., given)), the distance from the brake release end of the runway to Reference Zero is 6,500 ft. (12,000 - 5,500).

7. Obstacle Limited Takeoff Weight for Obstacle I

(a) Enter the Gradient Corrections (Takeoff Climb) chart (page 87) with corrected gross gradient required for obstacle clearance (3.09%, Step 6) and wind. Read the zero wind gross gradient required for obstacle clearance (2.92%).

(b) Enter the Takeoff Climb chart (page 79) with airport temperature/altitude and the zero-wind gross gradient required for obstacle clearance, (2.92%, Step 7(a)). Read obstacle limited takeoff gross weight (140,900 kgs.).

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

NOTE: Since the difference between the corrected gross gradient available (2.46%, Step 3(b)) is less than the corrected gross gradient required for obstacle clearance (3.09%, Step 6) by more than .5%, a significant increase in obstacle limited gross weight may be obtained by reanalyzing the takeoff flight path beginning at Step 1 with the obstacle limited gross weight (140,900 kgs., Step 7(b)). Since no additional procedures would be demonstrated by this iteration, it will not be performed for this example. At this point the Obstacle Clearance Analysis Procedure will determine if Obstacle 2 further restricts the takeoff gross weight. The limitations that Obstacle 1 has created on the takeoff gross weight will be considered in the analysis of Obstacle 2.

8. Determine Reference Zero For Obstacle 2

Reference Zero for Obstacle 2 is the same as for the final solution of the Obstacle 1 analysis, i.e., 6,500 ft. from the brake release end of the runway (Step 6).

9. Adjust Obstacle Distance and Height to Reference Zero for Obstacle 2

Subtract the actual takeoff distance required (6,500 ft., Step 8), from the actual runway length available (8,600 ft., given) and add the difference to the obstacle distance measured from the end of the runway length available (25,000 ft., given). Obstacle height must also be corrected for the difference in elevation between Reference Zero and the end of the runway length available.

Obstacle 2 distance and height from Reference Zero at gross weight = 140,900 kgs. (Step 7(b)).

Horizontal Distance from Reference Zero = (8,600 - 6,500) + 25,000 = 27,100 ft.

Height Above Reference Zero = (8,600 - 6,500) (.01) + 550 = 571 ft.

10. Takeoff Climb Gradient Available

From Step 6, corrected gross gradient available (required to clear Obstacle 1) is 3.09%. From Step 7(a), zero wind gross gradient available is 2.92%.

E X A M P L E P R O B L E M 3 (Continued)

Obstacle Clearance

Since Obstacle 2 is more than 7,000 ft. from Reference Zero, use the distant obstacle analysis procedure.

11. Obstacle Cleared in Second Segment

(a) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height above reference zero (571 ft., Step 9) and corrected gross gradient available (3.09%, Step 10). Read horizontal distance from Reference Zero (26,000 ft).

(b) Read gross height required for obstacle clearance (815 ft.).

(c) Enter the Maximum Level-Off Height chart (page 83 OR 83A, depending on chart format in the basic manual) with airport temperature/altitude and the zero-wind gross gradient available (2.92%, Step 10). Read maximum level-off height (870 ft.).

(d) Maximum level-off height from Step 11(c) is greater than the gross height required for obstacle clearance, (from Step 11(b)), therefore, the obstacle may be cleared in second segment.

(e) Enter the Distant Obstacle Clearance (page 81) chart with obstacle distance from Reference Zero (27,100 ft., Step 9) and corrected gross gradient available (3.09%, Step 10). Read height above Reference Zero available (593 ft.).

(f) Since the height above Reference Zero available (593 ft., Step 11(e)) is greater than the obstacle height above Reference Zero (571 ft., Step 9), the obstacle is cleared and obstacle 2 is not limiting. The allowable takeoff gross weight is 140,900 kgs. (Step 7(b)).

12. Takeoff Speeds Determination (Section 4.7).

NOTE: The next step is to determine the takeoff speeds. When the takeoff is obstacle limited, use the V_1 Determination procedure in Section 4.7 of the basic manual with the modification of defining the engine inoperative corrected takeoff distance available equal to the corrected runway length required for the obstacle limited takeoff gross weight.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

(a) Enter the Field Length Limits chart (page 66) with airport temperature/altitude and allowable takeoff gross weight (140,900 kgs., Step 11(f)). Read corrected runway length required (6,760 ft.). The engine inoperative corrected takeoff distance available is also 6,760 ft., as dictated by the required obstacle clearance flight path.

(b) The corrected accelerate-stop distance available is 9,115 ft. (Step 1(b)).

(c) From Runway Length and V_1 Adjustments Chart (page 63).

(1) $V_1/V_{R\ MIN}$ = .994. At engine inoperative corrected takeoff distance available (6,760 ft., Step 12(a)) and corrected runway length required (6,760 ft., Step 12(a)).

(2) $V_1/V_{R\ MAX}$ = 1.0. At corrected accelerate-stop distance available (9,115 ft., Step 12(b)) and corrected runway length required (6,760 ft., Step 12(a)). V_1 may not exceed V_R ($V_1/V_R \leq 1.0$).

(d) Enter the Takeoff Speeds chart (page 71) with the airport temperature/altitude, the limiting gross weight of 140,900 kgs. (Step 11(f)), the values of $V_1/V_{R\ MIN}$ and $V_1/V_{R\ MAX}$ (Step 12(c)) and determine that the takeoff speeds rounded off to the nearest knot are: V_R = 137 kt., V_2 = 142 kt., $V_{1\ MIN}$ = 136 kt., $V_{1\ MAX}$ = 137 kt.

13. Maximum Brake Energy Speed Determination (Section 4.7).

From the Brake Energy Limits chart (page 73), brake energy is never limiting when using flap position 15.

14. Minimum V_1 for Control on the Ground Determination (Section 4.7).

Enter the Minimum V_1 for Control on the Ground chart (page 74) with the airport temperature/altitude and allowable takeoff gross weight (140,900 kgs., Step 11(f)). Read minimum V_1 for control on the ground, $V_{1(MCG)}$ = 117.7 kt. $V_{1(MCG)}$ is not limiting since the entire range of V_1, Step 12(d), is above 117.7 kt.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 3 (Continued)

15. Decision Speed, V_1, Selection

Choose a single value of V_1 between the limits (136 to 137 kt.) determined in Step 12(d). See Selection of V_1 in Section 4.7 of the basic manual.

RESULTS

Maximum Allowable Takeoff Gross Weight (Step 11(f)) = 140,900 kgs.

Takeoff Speeds (Step 12(d)) = V_1 = 136 to 137 kt.
V_R = 137 kt.
V_2 = 142 kt.

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4

Purpose

This example problem illustrates the use of the obstacle clearance charts. Speed increase procedures will not be used. It will demonstrate the use of Obstacle Clearance Analysis Procedure, as defined in the basic manual, Section 4.9, specifically the analysis procedures that deal with Distant Obstacles. Maximum allowable takeoff gross weight will be determined.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 5,000 ft.
Runway length is sufficient for a 137,500 kgs. takeoff weight.
Runway Slope = 0
Obstacles: 800 ft. high at 55,000 ft. from reference zero.

Atmospheric Conditions

Airport OAT = 40 deg. C (ISA + 34.9 deg. C).
Reported wind at 10 meters (32.8 ft.) = -5 kt. (Tailwind).

Airplane Configuration

Flap Position 15
A/C Packs ON
Anti-Ice OFF
All brakes and antiskid operative

Allowable takeoff gross weight is 137,500 kgs. before considering the obstacle.

Analysis

It will be determined if obstacle clearance reduces the maximum allowable takeoff gross weight from the 137,500 kgs. takeoff weight given as a starting point for this problem. The solution to this problem will be based on the Obstacle Clearance Analysis Procedure (Section 4.9).

1. Determine Reference Zero and Adjust Obstacle Distance and Height to Reference Zero

   For this problem, runway length available is defined to be equal to the runway length required. Therefore, Reference Zero is at the end of the runway and no adjustment to obstacle distance or height is required.

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4 (Continued)

2. Takeoff Climb Gradient Available

(a) Enter the Takeoff Climb chart (page 78) with airport temperature/altitude and the gross weight (137,500 kgs.) used to determine Reference Zero, Step 1. Read takeoff climb gross gradient available (2.77%, zero wind, 400 ft.).

(b) Enter the Gradient Corrections (Takeoff Climb) chart (page 86) with gross gradient available (2.77%, Step 2(a)) and wind. Read corrected gross gradient available (2.62%).

Obstacle Clearance

Since the obstacle is more than 7,000 feet from Reference Zero, use the distant obstacle analysis procedure.

3. Obstacle Cleared in Second Segment

(a) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height (800 ft) and corrected gross gradient available (2.62%, Step 2(b)). Read horizontal distance from Reference Zero (48,180 ft). Since it is not beyond the end of extended second segment climb, proceed with analysis to Step 3(b).

(b) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height (800 ft) and corrected gross gradient available (2.62%, Step 2(b)). Read gross height required for obstacle clearance (1,220 ft).

(c) Enter the Maximum Level-Off Height chart (page 83 OR 83A, depending on chart format in the basic manual) with airport temperature/altitude and the zero-wind gross gradient available (2.77%, Step 2(a)). Read maximum level-off height (765 ft).

(d) Since maximum level-off height (765 ft, Step 3(c)), is less than the gross height required for obstacle clearance, (1,220 ft, Step 3(b)), proceed with analysis to Step 4.

4. Extended Second Segment

The FAR require a minimum gross climb gradient capability of 1.2 percent at all points in the takeoff flight path above 400 ft. gross height.

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4 (Continued)

When this requirement can be met with the most critical combination of speed and flap position encountered, and at maximum continuous thrust instead of takeoff thrust, then maximum level-off height no longer limits the height at which the second segment climb at V_2 speed must be terminated. Instead, the second segment may be extended until the takeoff thrust time-limit is reached.

(a) The final segment gradient capability requirement is 3.1% for extended second segment at flap position 15, as noted on the Distant Obstacle Clearance chart (page 81). This gradient capability is necessary to assure 1.2 percent gross gradient in the most critical configuration during flap retraction when using maximum continuous thrust.

(b) Enter the Final Takeoff Climb chart (page 85) with airport temperature/altitude and the gross weight (137,500 kgs., given) used to determine Reference Zero, Step 1. Read final segment gross gradient available (2.85%).

(c) The final segment gross gradient available (2.85%, Step 4(b)), is not greater than the final segment gross gradient required (3.1%, Step 4(a)); therefore, an extended second segment climb is not permissible and a reduction in takeoff weight is necessary. The following possibilities will be checked to achieve minimum weight reduction:

(1) Determine the gross weight at which the minimum final takeoff climb gradient requirement for extended second segment is met. See Maximum Gross Weight For Extended Second Segment (Step 5).

(2) Determine the gross weight required to achieve the obstacle clearance gross height at the end of second segment (maximum level-off height). See Obstacle in Third Segment (Step 6).

5. Maximum Gross Weight for Extended Second Segment

(a) Enter the Final Takeoff Climb chart (page 85) with the final segment gradient capability required, (3.1%, Step 4(a)) and airport temperature/altitude. Read maximum gross weight for extended second segment (133,500 kgs.).

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4 (Continued)

NOTE: It is now necessary to determine if the obstacle can be cleared at the maximum gross weight for extended second segment. If this weight does not clear the obstacle, a gross weight reduction is required using the procedures of 7(b) in Section 4.9 of the basic manual. If this weight does clear the obstacle, then the obstacle limited takeoff gross weight for extended second segment is the maximum allowed (133,500 kgs., Step 5(a)).

(b) Since the runway slope = 0, the obstacle height is always 800 feet high from Reference Zero. The obstacle distance from Reference Zero will always be greater than 55,000 ft. if the takeoff gross weight is less than 137,500 kgs. (given).

(c) Enter the Takeoff Climb chart (page 78) with airport temperature/altitude and the maximum gross weight for extended second segment (133,500 kgs., Step 5(a)). Read takeoff climb gross gradient available (3.14%, zero wind, 400 ft.).

(d) Enter the Gradient Corrections (Takeoff Climb) chart (page 86) with gross gradient available (3.14%, Step 5(c)) and wind. Read corrected gross gradient available (2.98%).

(e) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height (800 ft.) and corrected gross gradient available (2.98%, Step 5(d)). Read horizontal distance from Reference Zero required to clear the obstacle (39,800 ft.).

(f) Since the horizontal distance required to clear the 800 ft. obstacle (39,800 ft., Step 5(e)), is less than 55,000 ft. (Step 5(b)), the obstacle is cleared and the obstacle limited takeoff gross weight for extended second segment is the maximum allowed (133,500 kgs., Step 5(a)).

6. Obstacle in Third Segment

A third segment obstacle is one which is cleared during the level-flight acceleration and flap retraction segment of the calculated flight path; therefore, the necessary obstacle clearance height must be attained at, or before, the end of the second segment. The maximum gross height attainable in the second segment, unless certain other requirements are met, is indicated on the Maximum Level-Off Height chart.

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4 (Continued)

Starting with the corrected gross gradient available, obtained in Step 2(b), the maximum level-off height line can be constructed on the Distant Obstacle Clearance chart using the following procedure for each point on the line. The corrected gross gradient required for obstacle clearance is determined by the intersection of the maximum level-off height line and obstacle height.

Maximum Level-Off Height Line

(a) Assume a corrected gross gradient.

(b) Enter the Gradient Corrections (Takeoff Climb) chart (page 86) with corrected gross gradient, (Step 6(a)) and determine the zero-wind gross gradient.

(c) Enter the Maximum Level-Off Height chart (page 83 OR 83A, depending on chart format in the basic manual) with airport temperature/altitude and the zero-wind gross gradient, Step 6(b). Read maximum level-off height.

6(a)	6(b)	6(c)
2.62	2.77	765
3.0	3.16	960
3.2	3.35	1,060
3.4	3.6	1,190
3.6	3.8	1,285

(d) Plot maximum level-off height, Step 6(c), as a function of corrected gross gradient, Step 6(a), on the Distant Obstacle Clearance chart (page 81).

Obstacle Limited Takeoff Gross Weight

(e) After the maximum level-off height line has been constructed, follow it to the obstacle height (800 ft). Read corrected gross gradient required for obstacle clearance (3.29%).

(f) Enter the Gradient Corrections (Takeoff Climb) chart (page 86) with corrected gross gradient required for obstacle clearance (3.29%, Step 6(e)), and determine the zero-wind gross gradient required for obstacle clearance (3.47%).

DISTANT OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 4 (Continued)

(g) Enter the Takeoff Climb chart (page 78) with airport temperature/altitude and the zero-wind gross gradient required for obstacle clearance (3.47%, Step 6(f)). Read third segment obstacle limited takeoff gross weight. (130,175 kgs.)

NOTE: Comparing the takeoff gross weight capabilities obtained using the Extended Second Segment procedure (133,500 kgs., Step 5(f)) and the Obstacle In The Third Segment procedure (130,175 kgs., Step 6(g)), it is clear that the Extended Second Segment procedure produces the better result for this example.

Takeoff Speeds Determination is the same procedure as Example Problem 3 and will not be repeated for this problem.

Results

Maximum Allowable Takeoff Gross Weight (Step 5(f)) = 133,500 kgs.

OBSTACLE LIMITED TAKEOFF WEIGHT WITH OBSTACLE IN FINAL SEGMENT

E X A M P L E P R O B L E M 5

Purpose

This example problem illustrates the use of the obstacle clearance charts. Speed increase procedures will not be used. It will demonstrate the use of Obstacle Clearance Analysis Procedure, Obstacle in Final Segment, as defined in the basic manual, Section 4.9. The example will determine if an obstacle can be cleared at a desired takeoff gross weight. See the Takeoff Flight Path diagram that follows for a description of the net and gross paths calculated in this example.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 2,000 ft.
Obstacle: 1,500 ft. high at 95,000 ft. from Reference Zero.
Minimum desired level-off height is 800 feet above the runway elevation.
Runway length is sufficient for 140,000 kgs. takeoff weight.
Runway Slope = 0

Atmospheric Conditions

Airport OAT = 20 deg. C (ISA + 9 deg. C)
Reported Wind at 10 meters (32.8 ft.) = -5 kt. (Tailwind)

Airplane Configuration

Flap Position 15
A/C Packs ON
Anti-Ice OFF
All brakes and antiskid operative

Allowable takeoff gross weight is 140,000 kgs. before considering the obstacle.

Analysis

It will be determined if obstacle clearance reduces the maximum allowable takeoff gross weight from the 140,000 kgs. takeoff weight given as a starting point for this problem. The solution to this problem will be based on the Obstacle Clearance Analysis Procedure (Section 4.9).

OBSTACLE LIMITED TAKEOFF WEIGHT WITH OBSTACLE IN FINAL SEGMENT

E X A M P L E P R O B L E M 5 (Continued)

1. Determine Reference Zero and Adjust Obstacle Distance and Height to Reference Zero

   For this problem, runway length available is defined to be equal to the runway length required. Therefore, Reference Zero is at the end of the runway and no adjustment to obstacle distance or height is required.

2. Takeoff Climb Gradient Available

   (a) Enter the Takeoff Climb chart (page 79) with airport temperature/altitude and the gross weight (140,000 kgs.) used to determine Reference Zero, Step 1. Read takeoff climb gross gradient available (3.58%, zero wind, 400 ft.).

   (b) Enter the Gradient Corrections (Takeoff Climb) chart (page 87) with gross gradient available (3.58%, Step 2(a)). Read corrected gross gradient available (3.40%).

Obstacle Clearance

Since the obstacle is more than 7,000 ft. from Reference Zero, use the distant obstacle analysis procedure.

3. Obstacle Cleared in Second Segment

   If an End of Extended Second Segment Chart is not included with the basic Manual complete step 3(a) only. If it is included, complete only steps 3(b), 3(c), and 3(d).

   (a) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height (1,500 ft) and corrected gross gradient available (3.40%, Step 2(b)). The horizontal distance from Reference Zero (69,000 ft.) is beyond the end of the second segment 5 minute climb limit of 61,100 ft. for flaps 15 at 3.4% gross gradient and the obstacle cannot be cleared within the second segment. The obstacle will be analyzed as a final segment obstacle.

   (b) Enter the Distant Obstacle Clearance chart (page 88) with obstacle height (1,500 ft.) and corrected gross gradient available (3.40%, Step 2(b)). Read horizontal distance from Reference Zero (69,000 ft.).

OBSTACLE LIMITED TAKEOFF WEIGHT WITH OBSTACLE IN FINAL SEGMENT

E X A M P L E P R O B L E M 5 (Continued)

(c) Enter the End of Extended Second Segment chart (page 89) with airport temperature/altitude the gross weight (140,000 kgs.) used to determine Reference Zero, Step 1. and the appropriate flap position. Read horizontal distance from Reference Zero 66,000 ft.

(d) Since the horizontal distance from Reference Zero required to clear the obstacle (69,000 ft, Step 3(b)) is greater than the horizontal distance from reference zero at the end of extended second segment (66,000 ft, Step 3(c)) the obstacle cannot be cleared within the second segment. The obstacle will be analyzed as a final segment obstacle.

4. Obstacle in Final Segment

When distant obstacles cannot be cleared in the second segment, it is necessary to construct the flight path beyond the end of the second segment using the Third Segment Distance chart (page 84) and Final Takeoff Climb chart (page 85).

(a) Select the minimum allowable gross level-off height.

800 ft., given.

OBSTACLE LIMITED TAKEOFF WEIGHT WITH OBSTACLE IN FINAL SEGMENT

E X A M P L E P R O B L E M 5 (Continued)

(b) Enter the Distant Obstacle Clearance chart (page 81) with the desired gross level-off height (800 ft, Step 4(a)), and the available corrected gross gradient (3.40%, Step 2(b)). Read height above Reference Zero (579 ft) and horizontal distance from Reference Zero (23,300 ft). This is the end of second segment.

(c) Enter the Gradient Corrections (Takeoff Climb) chart (page 87) with the same wind corrected gross gradient used in Step 4(b), (3.40%), and further correct it to the selected gross level-off height (800 ft). The final corrected gross gradient is 3.33%.

(d) Enter the Third Segment Distance chart (page 84) with airport temperature/altitude and corrected gross gradient available (3.33%, Step 4(c)). Read: Net third segment distance = 38,000 ft. Gross third segment distance = 32,500 ft.

(e) Add the net and gross third segment distances, Step 4(d), to the end of the second segment distance (23,300 ft, Step 4(b)), to get total net and gross distance from Reference Zero to the end of third segment.

Total net distance = 61,300 ft. (23,300 + 38,000)
Total gross distance = 55,800 ft. (23,300 + 32,500)

(f) Enter the Final Takeoff Climb chart (page 85) with airport temperature/altitude and the gross weight (140,000 kgs.) used to determine Reference Zero, Step 1. Read final segment gross gradient available (4.19%).

(g) Calculate the gross height required for obstacle clearance per FAR requirements as follows:

Gross Height = Obstacle Height* + 35 + (.008 x Obstacle Distance*)
2,295 ft. = 1500 (Step 1) + 35 + (.008 x 95000 (Step 1)).

*From Reference Zero

(h) Enter the Gradient Corrections (Final Takeoff Climb) chart (page 87) with final segment gross gradient available (4.19%, Step 4(f)), and correct it for wind and gross height (2,295 ft, Step 4(g)), since the gross height required for obstacle clearance is greater than the 1,500 ft. reference altitude on the gross height correction sliding scale, to get corrected final segment gross gradient available (3.90%).

OBSTACLE LIMITED TAKEOFF WEIGHT WITH OBSTACLE IN FINAL SEGMENT

E X A M P L E P R O B L E M 5 (Continued)

(i) Reduce corrected final segment gross gradient available (3.90%, Step 4(h)) by .8 percent to obtain corrected final segment net gradient available (3.10%, (3.90 - .8)).

(j) The remaining net height that must be gained to clear the 1,500 ft obstacle, from the end of the third segment distance, is the difference between the obstacle height and the third segment height above Reference Zero (579 ft, Step 4(b)). This net height is gained at the corrected final segment net gradient available (3.10%, Step 4(i)). The horizontal distance traveled, to climb this height, will be:

Final Segment Distance =

$$\frac{\text{Obstacle Height-Third Segment Height}}{\text{Corrected Final Segment Net Gradient Available}}$$

$$29{,}710 \text{ ft} = \frac{1{,}500 - 579}{.031}$$

(k) Add the final segment distance (29,710 ft., Step 4(j)), to the net distance from Reference Zero to the end of third segment (61,300 ft., Step 4(e)), to obtain the total net distance from Reference Zero to clear the obstacle (91,010 ft.).

(l) Since the total distance required to clear the obstacle (91,010 ft, Step 4(k)), is less than the distance from Reference Zero to the obstacle (95,000 ft, Step 1), the obstacle is not limiting at the 140,000 kgs. (given) takeoff gross weight.

(m) The gross height at the end of the takeoff path is:

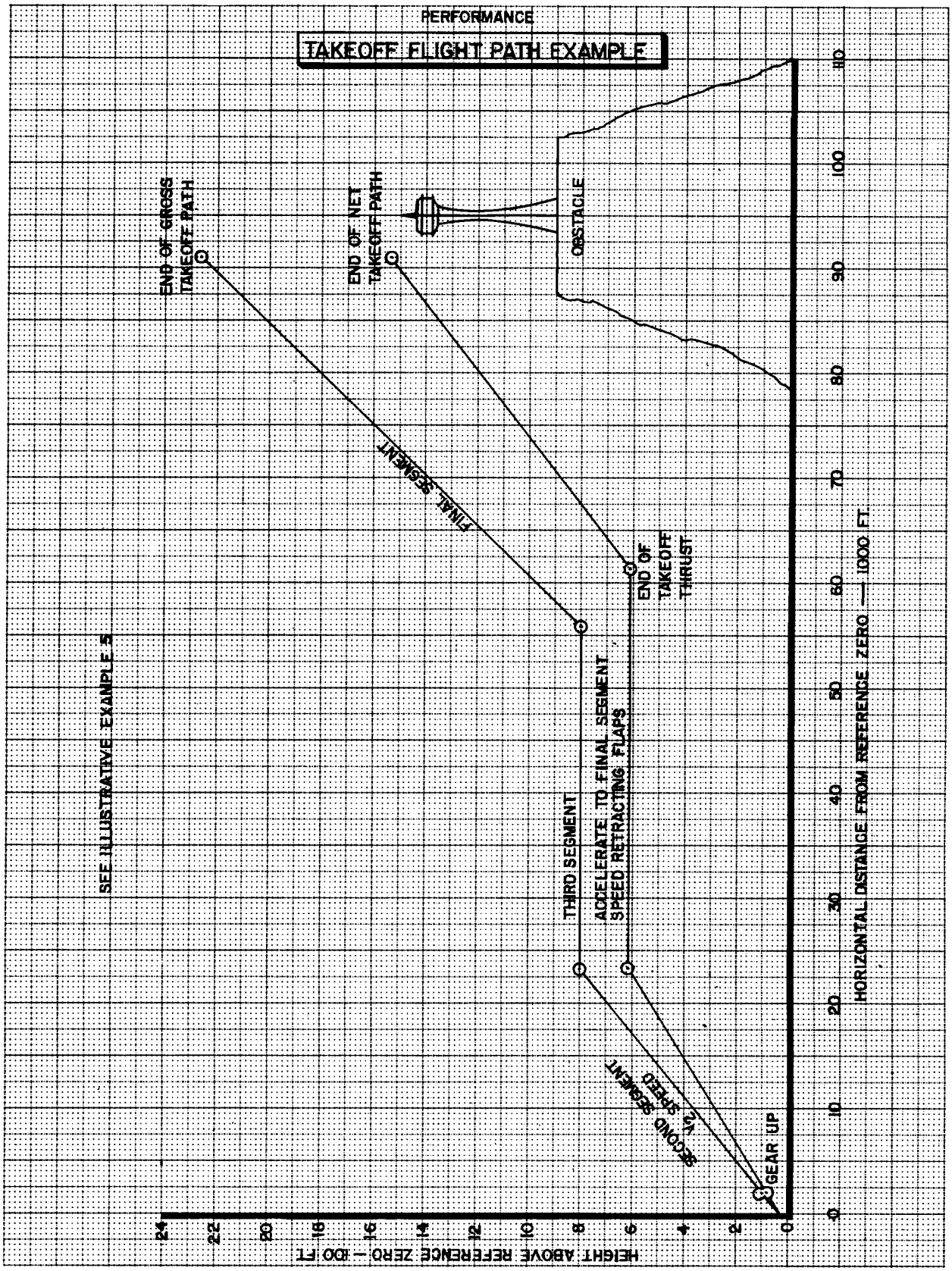
Gross Height = Obstacle Height + 35 + (.008 x Horizontal Distance from Reference Zero)

2,263 ft. = 1,500 + 35 + (.008 x 91,010)

NOTE: Takeoff Speeds Determination is the same procedure as Example Problem 3 and will not be repeated for this problem.

Results

Maximum Allowable Takeoff Gross Weight (Step 4(l)) = 140,000 kgs.



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OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 6

Purpose

This example illustrates the use of the obstacle clearance charts. It will demonstrate the use of the Obstacle Clearance Analysis Procedure using Improved Climb Performance, as defined in the basic manual, Section 4.9. Maximum allowable takeoff gross weight will be determined for a takeoff that will clear the defined obstacle.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 5,000 ft.
Actual Runway Length Available = 10,600 ft.
Runway Slope = 1% (Uphill)
Clearway: 07-22-96
Stopway: 0 ft.
Obstacle: 230 ft. high at 16,000 ft. from end of actual runway length available.

Atmospheric Conditions

Airport OAT = 0 deg. C (ISA - 5.1 deg. C)
Reported Wind at 10 meters (32.8 ft.) = 20 kt. (Headwind)

Airplane Configuration

Flap Position 15
A/C Packs ON
Anti-Ice OFF
All Brakes and Antiskid Operative

Takeoff

Takeoff Gross Weight = 152,650 kgs.
Corrected Accelerate-Stop Distance Available = 11,050 ft.
Takeoff Speed Increase = 8.75 units

Analysis

It will be determined if obstacle clearance reduces the allowable takeoff gross weight from the 152,650 kgs. given. The solution to this problem will be based on the Obstacle Clearance Analysis Procedure from Section 4.9 of the basic manual.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 6 (Continued)

1. Determine Reference Zero

This is the starting point in the takeoff flight path analysis and the reference point for locating the obstacles under consideration. Reference Zero is a point on the runway or clearway plane at the end of the takeoff distance required and can be determined as follows:

(a) Corrected Runway Length Required With Improved Climb Performance Procedure (Section 4.10)

(1) Takeoff gross weight with zero speed increase.

Enter the field length/climb limits portion of the Improved Climb Performance chart (page 75) with takeoff gross weight and takeoff speed increase (152,650 kgs. and 8.75 units, given for this problem). Follow the field length limits guidelines to zero speed increase and read the equivalent (same required runway length) takeoff gross weight with zero speed increase (161,000 kgs.).

(2) Enter the Field Length Limits chart (page 66) with the equivalent zero speed increase takeoff weight (161,000 kgs., Step 1(a)(1)), and airport temperature/altitude. Read corrected runway length required (8,890 ft.).

(b) Enter the Runway Length and V_1 Adjustments chart (page 64) with the corrected runway length required (8,890 ft., Step 1(a)(2)), and the corrected accelerate-stop distance available (11,050 ft., given). Honoring the $V_1/V_R \leq 1.0$ restriction, read engine inoperative corrected takeoff distance required (8,700 ft.).

(c) Enter the Engine Inoperative Corrected Takeoff Distance chart (page 61) with the corrected takeoff distance required (8,700 ft., Step 1(b)) and the given conditions of runway slope, wind and anti-ice. Proceed backwards through the chart. Read actual engine inoperative takeoff distance required (8,510 ft.).

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 6 (Continued)

(d) Enter the All Engines Operating Corrected Runway Length chart (page 60) with the corrected runway length required (8,890 ft., Step 1(a)(2)) and the given conditions of runway slope, wind and anti-ice. Proceed backwards through the chart. Read actual all engines operating takeoff distance required (8,600 ft.).

(e) The actual takeoff distance required (8,600 ft.) is the greater of the engine inoperative (8,510 ft., Step 1(c)), or all engines operating (8,600 ft., Step 1(d)), takeoff distances required. This is the location of Reference Zero relative to the brake release end of the runway.

2. Adjust Obstacle Distance and Height to Reference Zero

Subtract the actual takeoff distance required (8,600 ft., Step 1(e)) from the actual runway length available (10,600 ft., given) and add the difference to the obstacle distance measured from the end of the runway length available (16,000 ft., given). On a sloped runway, obstacle height must also be corrected for the difference in elevation between Reference Zero and the end of the runway length available. Multiply the difference between the actual takeoff distance required (8,600 ft., Step 1(e)) and the actual runway length available (10,600 ft., given) by the runway slope (.01, given). Add this product to the height of the obstacle measured from the end of the actual runway length available (230 ft., given). See Sloped Runway Effect On Obstacle Clearance in Section 4.9 of the basic manual.

Obstacle distance and height from Reference Zero at gross weight = 152,650 kgs.

Horizontal Distance from Reference Zero = (10,600 - 8,600) + 16,000 = 18,000 ft.

Height Above Reference Zero = (10,600 - 8,600) (.01) + 230 = 250 ft.

3. Takeoff Climb Gradient Available

(a) Enter the Takeoff Climb chart (page 78) with airport temperature/altitude and the gross weight (152,650 kgs.) used to determine Reference Zero, Step 1. Read takeoff climb gross gradient available = 1.98%.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 6 (Continued)

(b) Since the Improved Climb Performance technique is used, enter the Takeoff Climb (Improved Climb Performance) chart (page 76) with the takeoff climb gross gradient (1.98%, Step 3(a)) and takeoff speed increase (8.75 units, given). Read takeoff climb gross gradient available with Improved Climb Performance = 2.32%.

(c) Enter the Gradient Corrections chart (page 86) with the takeoff climb gross gradient available with Improved Climb Performance (2.32%, Step 3(b)). Read corrected gross gradient available = 2.44%.

Obstacle Clearance

Since the obstacle is more than 7,000 ft. from Reference Zero, use the distant obstacle analysis procedure.

4. Obstacle Cleared in Second Segment

(a) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height above Reference Zero (250 ft., Step 2) and corrected gross gradient available (2.44%, Step 3(b)). Read horizontal distance from Reference Zero (15,600 ft). Since it is not beyond the end of extended second segment climb, proceed with analysis to Step 4(b).

(b) Enter the Distant Obstacle Clearance chart (page 81) with obstacle height above Reference Zero (250 ft., Step 2) and corrected gross gradient available (2.44%, Step 3(b)). Read gross height required for obstacle clearance (420 ft.).

(c) Enter the Maximum Level-Off Height chart (page 83 or 83A depending on chart format in the basic manual) with airport temperature/altitude and the gross gradient available (2.32%, Step 3(b)). Read maximum level-off height (550 ft).

(d) Maximum level-off height from Step 4(c) is greater than the gross height required for obstacle clearance, (from Step 4(b)), therefore, the obstacle may be cleared in second segment.

OBSTACLE LIMITED TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE

E X A M P L E P R O B L E M 6 (Continued)

(e) Enter the Distant Obstacle Clearance chart (page 81) with the obstacle horizontal distance from Reference Zero (18,000 ft., Step 2) and corrected gross gradient available (2.44%, Step 3(c)). Read height above Reference Zero available (290 ft.).

(f) Since the height above Reference Zero available (290 ft., Step 4(e)) is greater than the obstacle height above Reference Zero (250 ft., Step 2), the obstacle is cleared and not limiting. The allowable takeoff gross weight is 152,650 kgs. at a speed increase of 8.75 units as given.

$V_{1(MCG)}$ LIMITED TAKEOFF

E X A M P L E P R O B L E M 7

Purpose

This example problem illustrates the use of the general charts and analysis procedures required when the takeoff decision speed, V_1, is less than minimum allowable V_1 for control on the ground, $V_{1(MCG)}$ and the corrected accelerate-stop distance available exceeds the reference $V_{1(MCG)}$ limited accelerate-stop distance. Takeoff speeds will be determined for the required takeoff gross weight.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 4,000 ft.
Corrected Accelerate-Stop Distance = 10,000 ft.
Engine Inoperative Corrected Takeoff Distance = 10,000 ft.
Runway Slope = 0
Obstacles: 07-22-96
Reference $V_{1(MCG)}$ Limited Accelerate-Stop Distance = 4,400 ft.

Atmospheric Conditions

Airport OAT = 30 deg. C (ISA +22.9 deg. C)
Reported Wind at 10 meters (32.8 ft.) = 0 kt.

Airplane Configuration

Required Takeoff Gross Weight = 110,000 kgs.
Flap Position 15
A/C Packs ON
Anti-Ice OFF
All Brakes Operative
Antiskid ON

Maximum Structural Takeoff Weight Limit

155,000 kgs.

E X A M P L E P R O B L E M 7 (Continued)

Analysis

It will be assumed that the 110,000 kgs. required takeoff gross weight is below the most limiting takeoff gross weight based on airport, atmospheric and airplane configurations. After the corresponding takeoff speeds have been determined, it must be established that 07-22-96 of the Takeoff Speed Restrictions identified in Section 4.7 of the basic manual have been violated. This example examines the case when the takeoff decision speed, V_1, is exceeded by the Minimum V_1 for Control on the Ground, $V_{1(MCG)}$, for the given conditions. The $V_{1(MCG)}$ Limited Takeoff procedure (Section 4.8) in the basic manual will be incorporated to solve this problem.

The takeoff speeds are calculated using the Takeoff Decision Speed, V_1, Determination procedure in Section 4.7 of the basic manual.

1. Takeoff Speeds Determination (Section 4.7).

   (a) Engine inoperative corrected takeoff distance available (10,000 ft., given).

   (b) Enter the Field Length Limits chart (page 66) with airport temperature/altitude and the required takeoff gross weight (110,000 kgs., given). Read the corrected runway length required = 4,450 ft.

   (c) Corrected accelerate-stop distance available (10,000 ft., given).

   (d) Enter the Runway Length and V_1 Adjustments chart (page 64).

      (1) With engine inoperative corrected takeoff distance available (10,000 ft., Step 1(a)), and corrected runway length required (4,450 ft., Step 1(b)). Read V_1/V_R MIN = .62.

      (2) With corrected accelerate-stop distance available (10,000 ft., Step 1(c)), and corrected runway length required (4,450 ft., Step 1(b)). Read V_1/V_R MAX = 1.0.

E X A M P L E P R O B L E M 7 (Continued)

(e) Enter the Takeoff Speeds chart (page 71) with the airport temperature/altitude, required takeoff gross weight (110,000 kgs., given), V_1/V_R MIN (.62, Step 1(d)(1)) and V_1/V_R MAX (1.0, Step 1(d)(2)). Read takeoff_speeds V_R = 115.4 kt., V_2 = 124.9 kt., V_1 MIN = 71.5_kt., and V_1 MAX = 115.4 kt.

2. Maximum Brake Energy Speed Determination (Section 4.7).

From the Brake Energy Limits chart (page 73), brake energy is never limiting when using flap position 15.

3. Minimum V_1 for Control on the Ground Determination (Section 4.7).

Enter the Minimum V_1 for Control on the Ground chart (page 74) with the airport temperature/altitude and required takeoff gross weight (110,000 kgs., given). Read minimum V_1 for control on the ground, $V_{1(MCG)}$ = 119.4 kt. $V_{1(MCG)}$ is limiting since the entire range of V_1 and V_R, Step 1(e), is below 119.4 kt.

4. $V_{1(MCG)}$ Limited Takeoff (Section 4.8)

(a) Since the corrected accelerate-stop distance available (10,000 ft., given) exceeds the reference $V_{1(MCG)}$ limited accelerate-stop distance (4,400 ft., given), V_1 and V_R may be increased to $V_{1(MCG)}$ without resulting in a field length limited takeoff. Since $V_R < V_{1(MCG)}$, Step 3, a speed increase is required so that $V_R = V_{1(MCG)}$.

(b) Speed Increase Required

Enter the Improved Climb Performance chart (page 75) with the V_R speed (115.4 kt., Step 1(e)). Follow the guidelines to $V_R = V_{1(MCG)}$ (119.4 kt., Step 3) and read speed increase required = 3.7 units.

E X A M P L E P R O B L E M 7 (Continued)

(c) Determine Takeoff Safety Speed, V_2

(1) Enter the Takeoff Climb chart (page 79) with airport temperature/altitude and takeoff gross weight (110,000 kgs., given) and read takeoff climb gross gradient available (6.56%, zero wind, 400 ft.).

(2) Enter the Takeoff Safety Speed chart (page 77) with speed increase required (3.7 units, Step 4(b)), 400 ft. gross gradient (6.56%, Step 4(c)(1)) and basic V_2 speed (124.9 kt., Step 1(e)). Read Takeoff Safety Speed, V_2 = 127.4 kt.

Results

(a) $V_1 = V_{1(MCG)}$ = 119.4 kt. (Step 3).

(b) $V_R = V_{1(MCG)}$ = 119.4 kt. (Step 3).

(c) V_2 = 127.4 kt. (Step 4(c)(2)).

BRAKE ENERGY LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 8

Purpose

This example problem illustrates the procedure to be followed when the maximum speed for brake energy limits, V_{MBE}, is exceeded by the engine failure recognition speed, V_1, for the given conditions. Maximum allowable takeoff gross weight and corresponding takeoff speeds will be determined.

Given

Airport Conditions

Airport Elevation (Pressure Altitude) = 0 ft.
Actual Runway Length Available = 11,000 ft.
Runway Slope = -2% (Downhill)
Clearway: Maximum Allowed
Stopway: 0
Obstacles: 07-22-96

Atmospheric Conditions

Airport OAT = 40 deg. C (ISA + 25 deg. C)
Reported Wind at 10 meters (32.8 ft.) = -15 kt. (Tailwind)

Airplane Configuration

Flap Position 1
A/C Packs ON
Anti-Ice OFF
1 Brake Deactivated

Maximum Structural Takeoff Weight Limit

165,000 kgs.

Analysis

Maximum allowable takeoff gross weight is the most limiting (least) of the following:

1) Maximum Structural Takeoff Weight Limit (Section 1).

2) Field Length Limited Takeoff Gross Weight (Section 4.4).

3) Climb Limited Takeoff Gross Weight (Section 4.5).

BRAKE ENERGY LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 8 (Continued)

4) Tire Speed Limited Takeoff Gross Weight (Section 4.6).

5) Obstacle Clearance Limited Takeoff Gross Weight (Section 4.9).

The Maximum Structural Takeoff Weight Limit is found in Section 1 and for this example problem is given as 165,000 kgs.

Corrected runway length available is determined based on airport and atmospheric conditions and airplane configuration. Corrected runway length available is used to determine the Field Length Limited Takeoff Gross Weight.

Climb and Tire Speed Limited Takeoff Gross Weight are determined based on airport and atmospheric conditions and airplane configuration.

There are no obstacles given for this example problem, therefore, there is no obstacle clearance limitation on takeoff gross weight.

After the most limiting takeoff gross weight and the corresponding takeoff speeds have been determined, it must be established that none of the Takeoff Speed Restrictions identified in Section 4.7 of the basic manual have been violated. This example examines the case when the Brake Energy Speed, V_{MBE}, is exceeded by the entire range of allowable Takeoff Decision Speed, V_1, requiring a reduction in Takeoff Gross Weight determined by the Brake Energy Limited Takeoff Gross Weight.

1. Corrected Runway Length Available Determination (Section 4.3).

(a) Enter the All Engine Operating Corrected Runway Length chart (page 60) with the actual runway length available (11,000 ft.) and the given conditions of clearway, runway slope, wind and anti-ice. Read the all engines operating corrected runway length available = 10,835 ft.

(b) Enter the Engine Inoperative Corrected Takeoff Distance chart (page 61) with the actual runway length available (11,000 ft.) and the given conditions of clearway, runway slope, wind and anti-ice. Read the engine inoperative corrected takeoff distance available = 11,410 ft.

(c) Add the stopway (0 ft.) to the actual runway length available (11,000 ft.) to obtain the actual accelerate-stop distance available (11,000 ft.).

BRAKE ENERGY LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 8 (Continued)

(d) Enter the Corrected Accelerate-Stop Distance chart (page 62) with the actual accelerate-stop distance available (11,000 ft.) and the given conditions of runway slope, wind, anti-ice and braking. Read the corrected accelerate-stop distance available = 8,885 ft.

(e) Enter the Runway Length and V_1 Adjustments chart (page 63) with the engine inoperative corrected takeoff distance (11,410 ft., Step 1(b)), and the corrected accelerate-stop distance available (8,885 ft., Step 1(d)). Read the corrected runway length available (engine inoperative) = 9,740 ft.

(f) The lesser of the all engines operating corrected runway length available (10,835 ft., Step 1(a)), and the corrected runway length available (engine inoperative) (9,740 ft., Step 1(e)), is the corrected runway length available (9,740 ft.). The corrected runway length available is used to determine the field length limited takeoff gross weight.

2. Field Length Limited Takeoff Gross Weight Determination (Section 4.4).

Enter the Field Length Limits chart (page 65) with the airport temperature/altitude and corrected runway length available (9,740 ft., Step 1(f)). Read field length limited takeoff gross weight = 163,050 kgs.

3. Climb Limited Takeoff Gross Weight Determination (Section 4.5).

Enter the Takeoff Climb Limits chart (page 67) at the airport temperature/altitude. Read climb limited takeoff gross weight = 172,000 kgs.

4. Tire Speed Limited Takeoff Gross Weight Determination (Section 4.6).

Enter the Tire Speed Limits chart (page 69) at the airport temperature/altitude, flap position and runway slope. Read tire speed limited takeoff gross weight = 173,500 kgs.

5. Maximum Allowable Takeoff Gross Weight Determination.

The least of the takeoff gross weight limits from Steps 2, 3, 4, and the Maximum Structural Takeoff Weight Limit is the maximum allowable takeoff gross weight (163,050 kgs.).

BRAKE ENERGY LIMITED TAKEOFF WEIGHT ANALYSIS

E X A M P L E P R O B L E M 8 (Continued)

6. Takeoff Speeds Determination (Section 4.7).

NOTE: The takeoff speeds are calculated using the Takeoff Decision Speed, V_1, Determination procedure in Section 4.7 of the basic manual. Some of the steps in this procedure were completed earlier.

(a) Engine inoperative corrected takeoff distance available (11,410 ft., Step 1(b)).

(b) Enter the Field Length Limits chart (page 65) with airport temperature/altitude and the allowable takeoff gross weight from Step 5. Read the corrected runway length required = 9,740 ft.

(c) Corrected accelerate-stop distance available (8,885 ft., Step 1(d)).

(d) Enter the Runway Length and V_1 Adjustments chart (page 63).

(1) With engine inoperative corrected takeoff distance available (11,410 ft., Step 6(a)), and corrected runway length required (9,740 ft., Step 6(b)). Read $V_1/V_{R\ MIN}$ = .958.

(2) With corrected accelerate-stop distance available (8,885 ft., Step 6(c)), and corrected runway length required (9,740 ft., Step 6(b)). Read $V_1/V_{R\ MAX}$ = .958.

(e) Enter the Takeoff Speeds chart (page 70) with the airport temperature/altitude, allowable takeoff gross weight (163,050 kgs., Step 5), $V_1/V_{R\ MIN}$ (.958, Step 6(d)(1)) and $V_1/V_{R\ MAX}$ (.958, Step 6(d)(2)). Read takeoff speeds V_R = 162 kt., V_2 = 166 kt., $V_{1\ MIN}$ = 155 kt., and $V_{1\ MAX}$ = 155 kt.

NOTE: In this case the range of allowable Takeoff Decision Speed, V_1, is limited to a single value (V_1 = 155 kt.).

7. Minimum V_1 for Control on the Ground Determination (Section 4.7).

Enter the Minimum V_1 for Control on the Ground chart (page 74) with the airport temperature/altitude and allowable takeoff gross weight (163,050 kgs., Step 5). Read minimum V_1 for control on the ground, $V_{1(MCG)}$ = 121.5 kt. $V_{1(MCG)}$ is not limiting since the entire range of V_1, Step 6(e), is above 121.5 kt.

S94659

BRAKE ENERGY LIMITED TAKEOFF WIGHT ANALYSIS

E X A M P L E P R O B L E M 8 (Continued)

8. Maximum Brake Energy Speed Determination (Section 4.7).

(a) Enter the Brake Energy Limits chart (page 73) with the airport temperature/altitude, allowable takeoff gross weight (163,050 kgs., Step 5) and the given conditions of runway slope, wind and braking configuration. Read maximum brake energy speed, V_{MBE} = 136.3 kt.

(b) The entire range of V_1 from Step 6(e) is greater than V_{MBE}, making the airplane V_{MBE} limited. The takeoff gross weight must be reduced until a value of V_1 exists that is equal to the value of V_{MBE} for the gross weight. To find this gross weight, construct the following table and plot the V_{MBE} limit on the Runway Length and V_1 Adjustments chart (page 63) from the resulting V_1/V_R ratios and the corresponding corrected runway length.

GROSS WEIGHT	V_R	V_{MBE}	$\frac{V_1}{V_R} = \frac{V_{MBE}}{V_R}$	CORRECTED RUNWAY LENGTH
KG.	KT.	KT.		FT.
	(Page 70)	(Page 73)		(Page 65)
150,000	153.6	143.8	.9362	8,090
152,500	155.2	142.4	.9175	8,380
155,000	156.9	140.9	.8980	8,675
157,500	158.4	139.3	.8794	9,000
160,000	160.0	137.6	.8600	9,335

(c) From Runway Length and V_1 Adjustments chart (page 63), solutions for this example problem can be identified. Solutions must satisfy the V_{MBE} limit such that the engine inoperative corrected takeoff distance required is not greater than that available (11,410 ft., from Step 1(b)) and the corrected accelerate-stop distance required must not be greater than that available (8,885 ft., from Step 1(d)). For this example there is a solution at a corrected runway length of 8,630 ft. and V_1/V_R = .901.

BRAKE ENERGY LIMITED TAKEOFF WIGHT ANALYSIS

E X A M P L E P R O B L E M 8 (Continued)

(d) Enter the Field Length Limits chart (page 65) with the airport temperature/altitude and the corrected runway length of 8,630 ft. (from Step 8(c)) and determine that the maximum allowable V_{MBE} limited takeoff gross weight is 154,750 kgs.

(e) Enter the Takeoff Speeds chart (page 70) with the airport temperature/altitude, the limiting gross weight of 154,750 kgs. (from Step 8(d)), and V_1/V_R of .901 (from Step 8(c)) and determine that the takeoff speeds rounded off to the nearest knot are:

V_R = 157 kt. V_1 = 141 kt. V_2 = 161 kt.

Results

Flap position 1 was selected for illustration purposes. Maximum Allowable Takeoff Gross Weight may be greater for increased flap deflection due to lower associated takeoff speeds.

Maximum Allowable Takeoff Gross Weight (Step 8(d)): 154,750 kgs.

Takeoff Speeds (Step 8(e)): V_1 = 141 kt.
V_R = 157 kt.
V_2 = 161 kt.

PERFORMANCE

ALL ENGINES OPERATING
CORRECTED RUNWAY LENGTH

NOTE: USE FOR SAMPLE PROBLEMS ONLY

FLAPS 1, 5, 15, 20

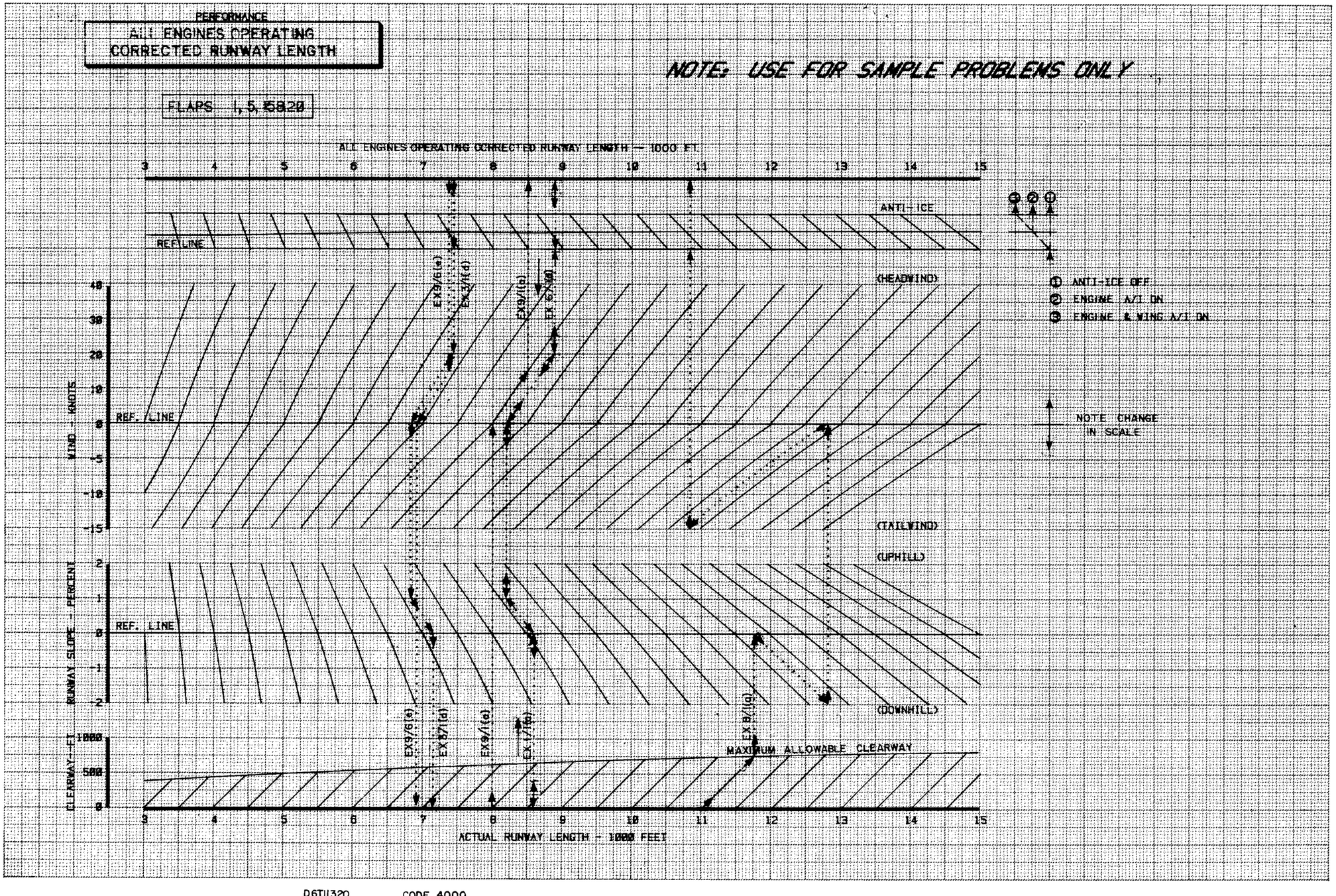


CHART APPLICABLE TO	APPROVED	DATE

6L0000G7

S95181

PERFORMANCE

ENGINE INOPERATIVE CORRECTED TAKEOFF DISTANCE

NOTE: USE FOR SAMPLE PROBLEMS ONLY

FLAPS 1, 5, 15&20

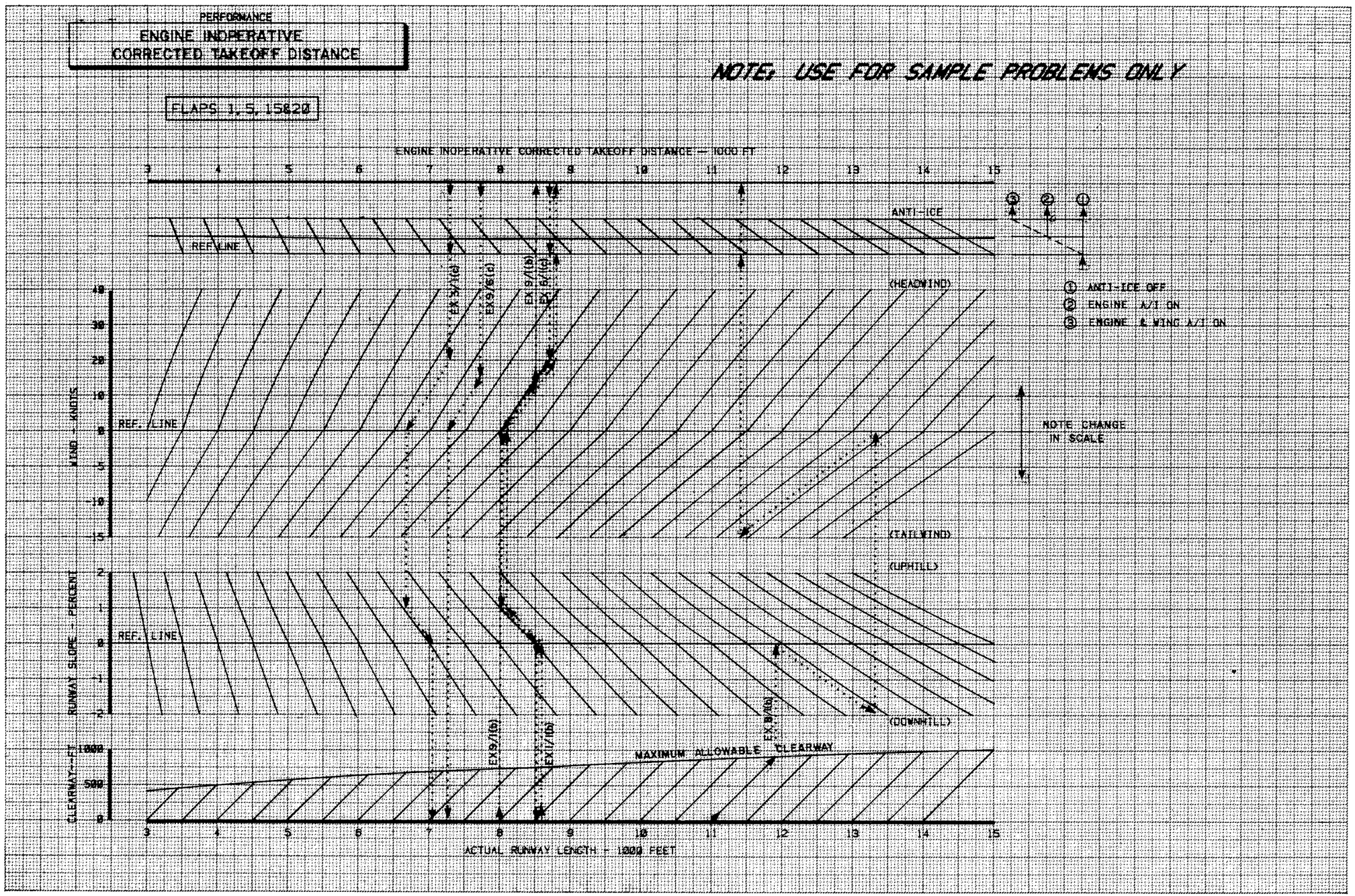


CHART APPLICABLE TO	APPROVED	DATE

6L000068

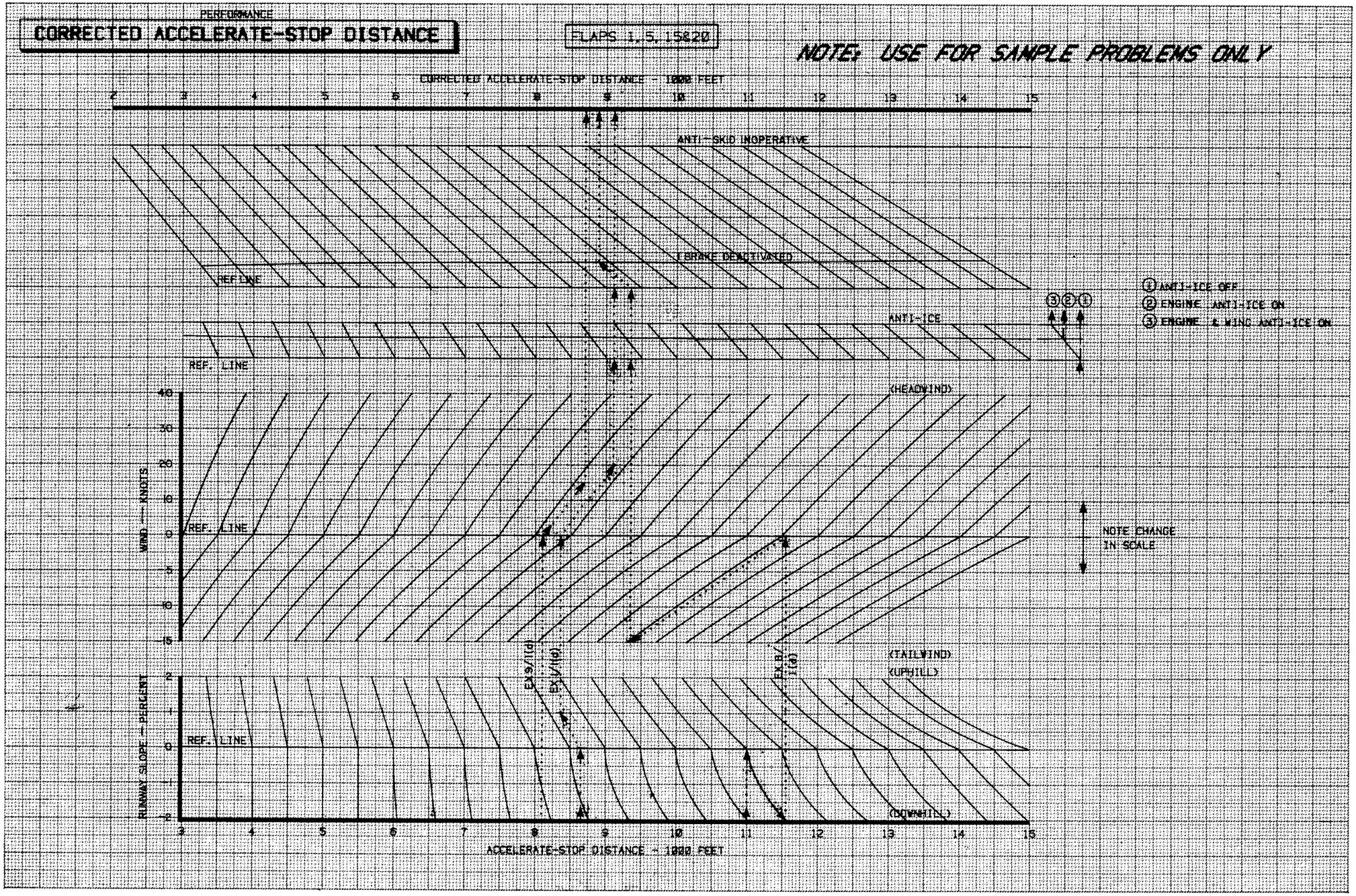
S95182

PERFORMANCE

CORRECTED ACCELERATE-STOP DISTANCE

FLAPS 1, 5, 15&20

NOTE: USE FOR SAMPLE PROBLEMS ONLY



FREDERICK

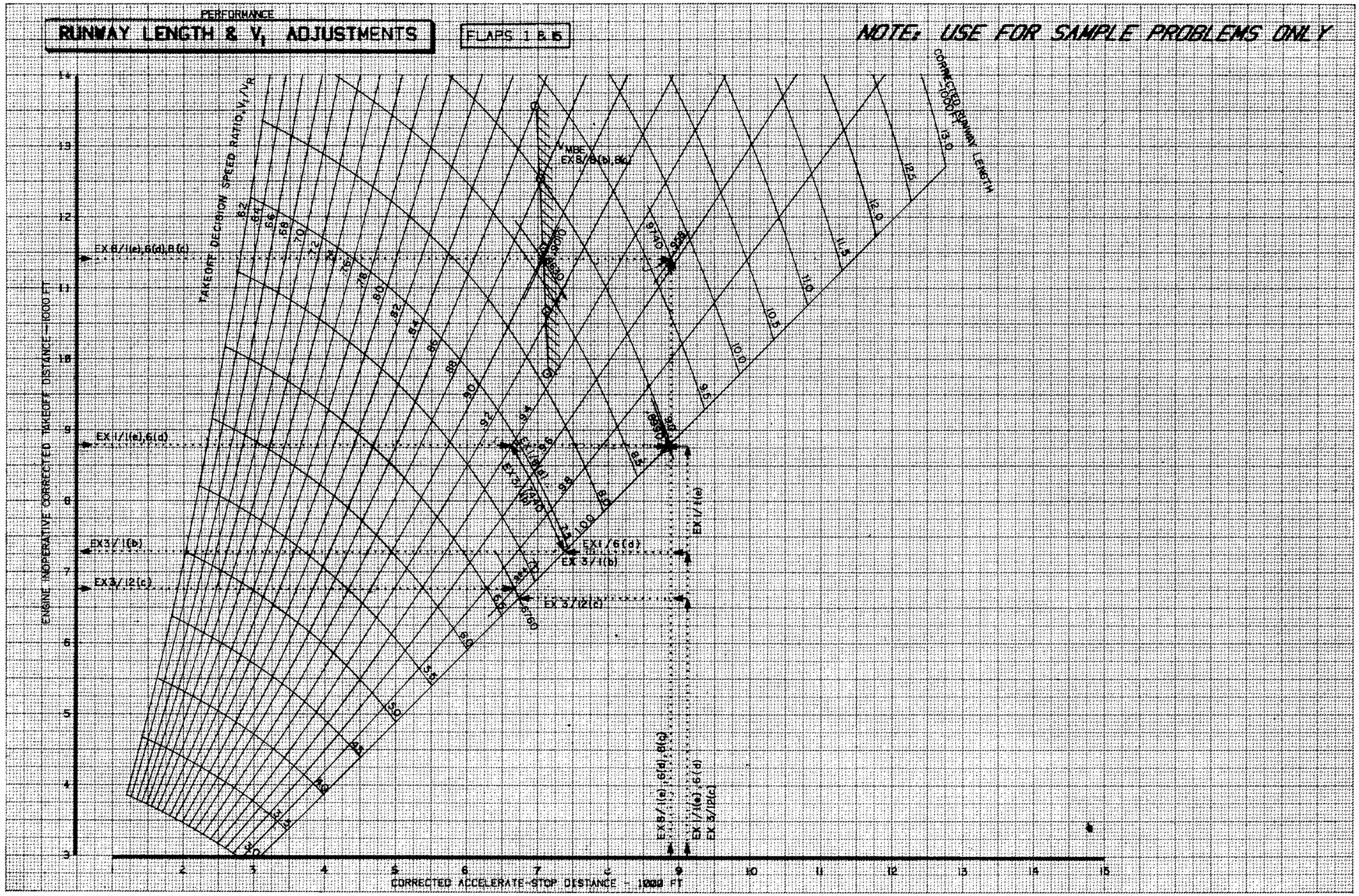
CHART APPLICABLE TO	APPROVED	DATE

PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1 & 15

NOTE: USE FOR SAMPLE PROBLEMS ONLY



BAUERMEISTER

CHART APPLICABLE TO	APPROVED	DATE

6L000070

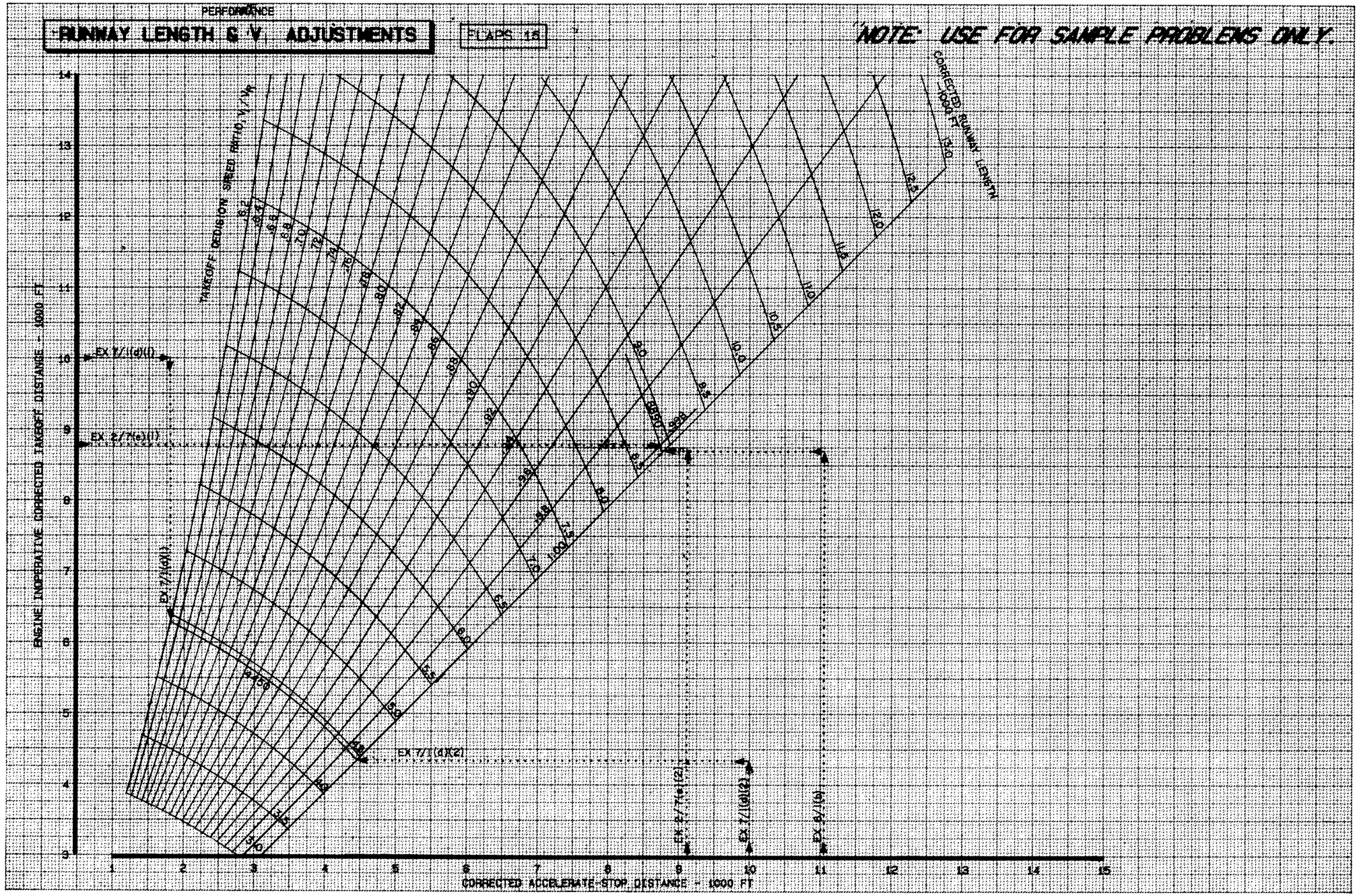
S95187

PERFORMANCE

RUNWAY LENGTH & V1 ADJUSTMENTS

FLAPS 15

"NOTE" USE FOR SAMPLE PROBLEMS ONLY.



P.C. 6L000071

APPROVED	DATE

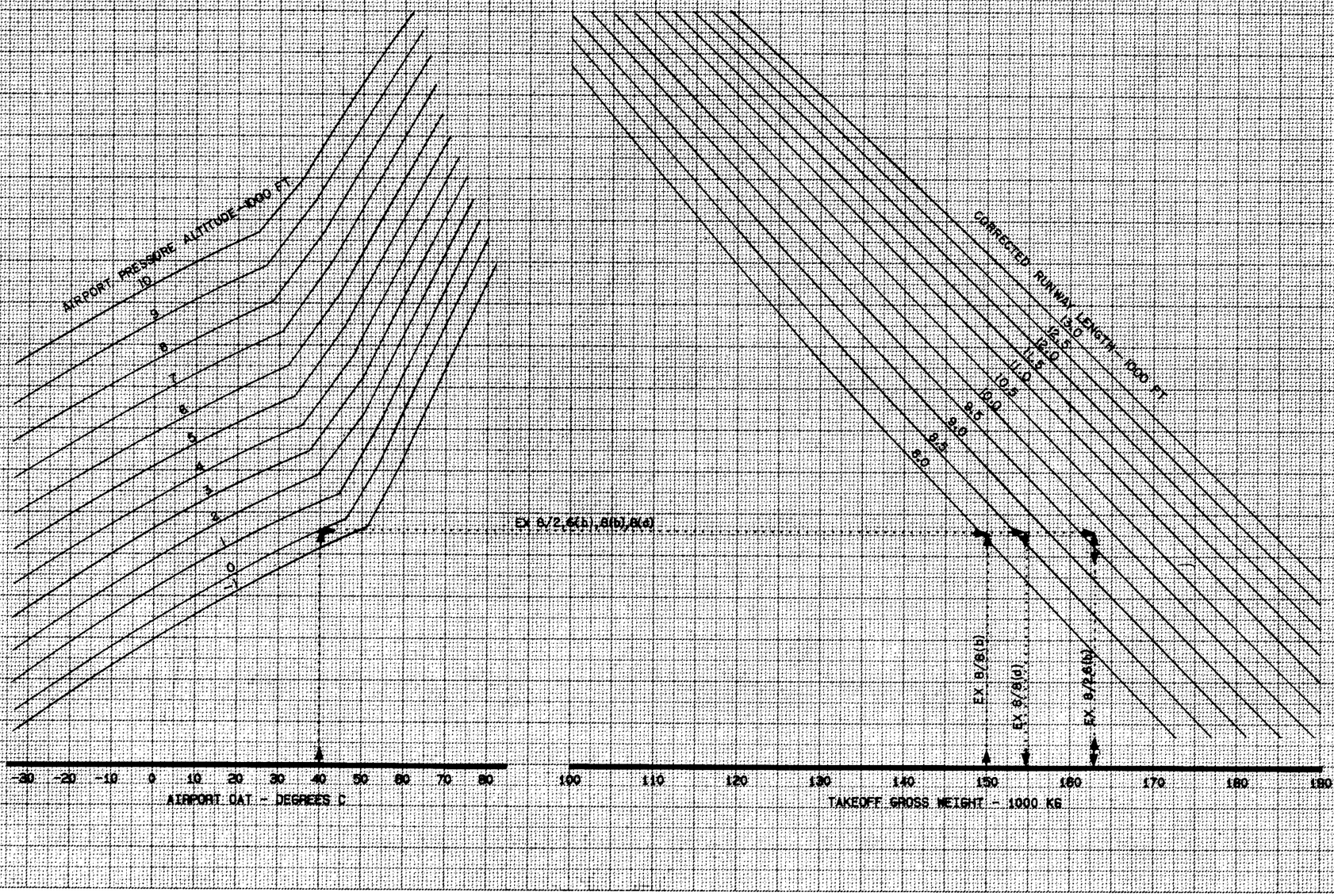
PERFORMANCE

FIELD LENGTH LIMITS

A/C PACKS ON

FLAPS 1

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



P.C. 6L000088

APPROVED	DATE

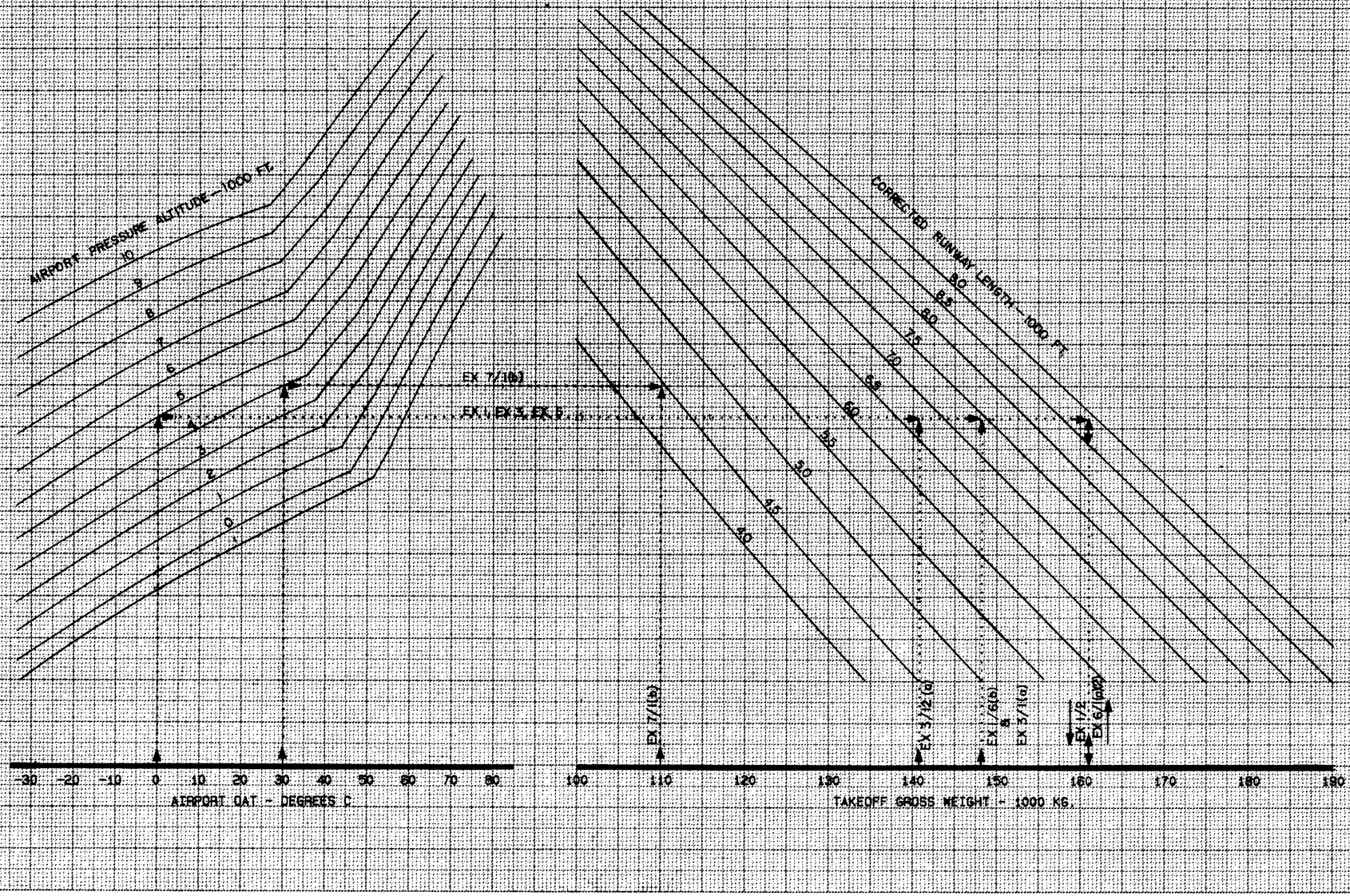
PERFORMANCE

FIELD LENGTH LIMITS

A/C PACKS ON

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

FLAPS 15



P.C. 6L000090

APPROVED	DATE

PERFORMANCE

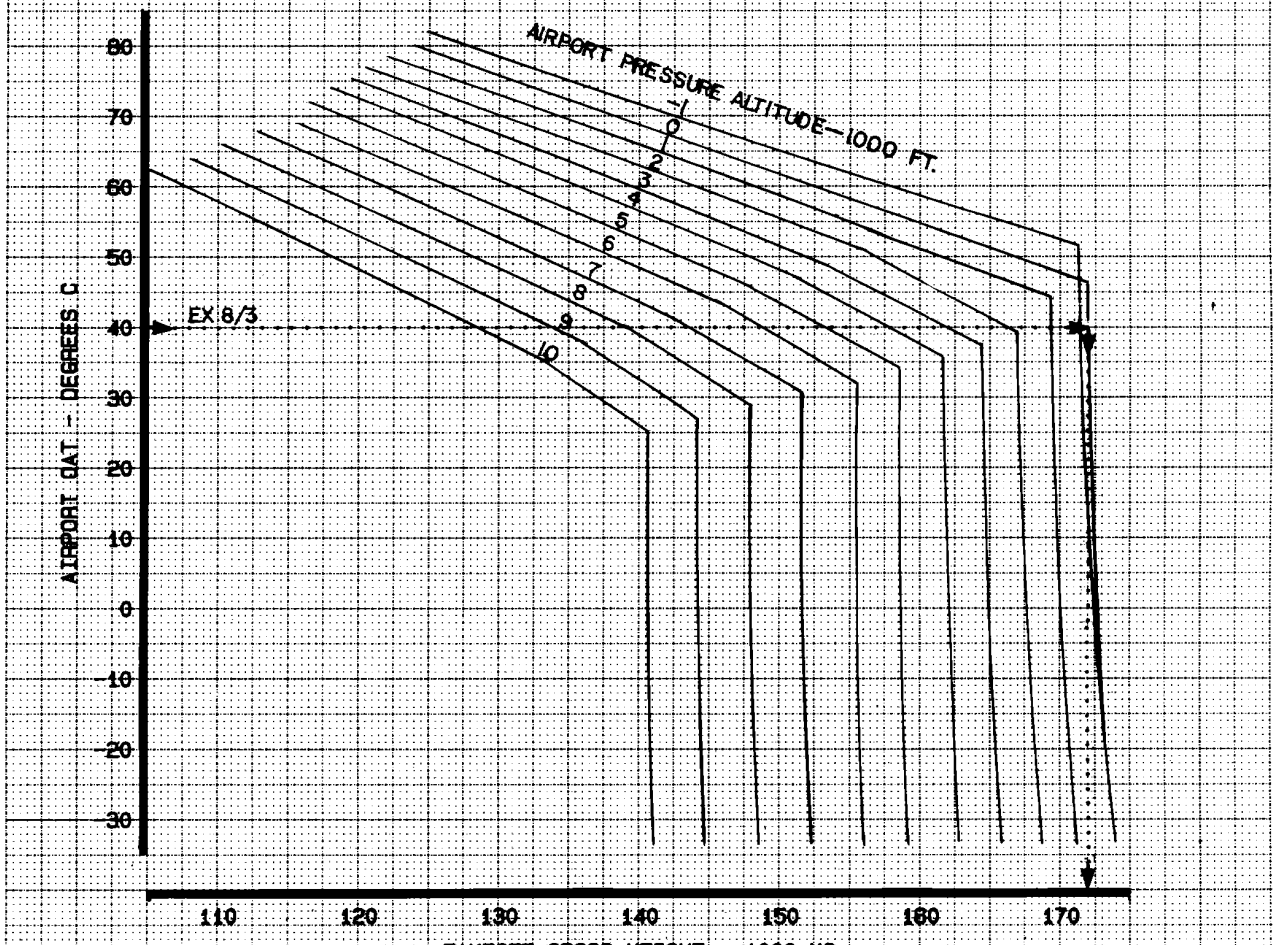
TAKEOFF CLIMB LIMITS

A/C PACKS ON

FLAPS 1

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT - KG
ANTI-ICE OFF OR ENGINE ANTI-ICE ON BELOW 8000 FT ALT.	0
ENGINE & WING ANTI-ICE ON BELOW 8000 FT. ALT	1550
ENGINE ANTI-ICE ON AT 8000 FT. ALT & ABOVE	2850
ENGINE & WING ANTI-ICE ON AT 8000 FT ALT & ABOVE	4350



P.C. 6S000072

APPROVED	DATE

S94662

PERFORMANCE

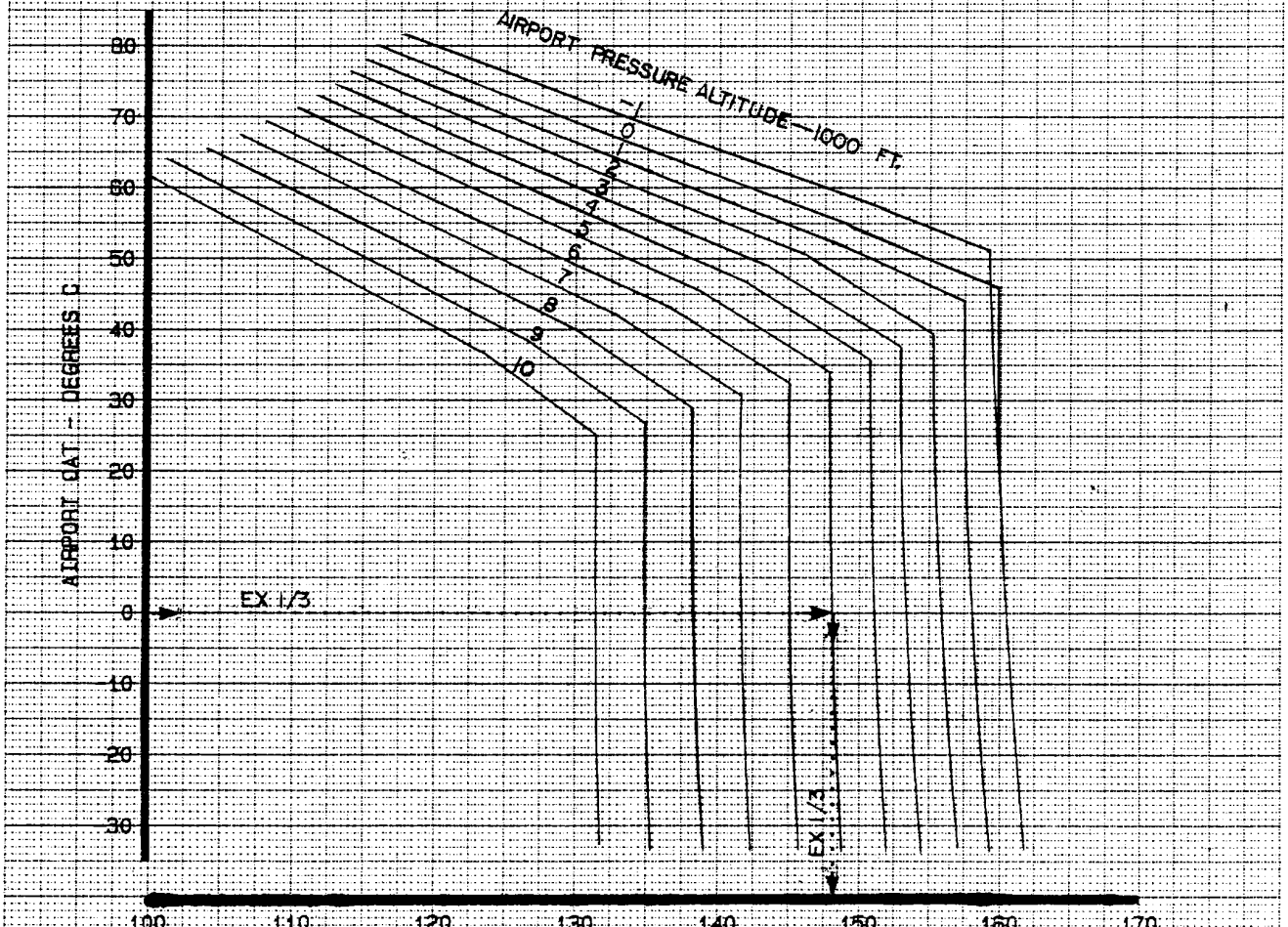
TAKEOFF CLIMB LIMITS

A/C PACKS ON

FLAPS 15

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT - KG
ANTI-ICE OFF OR ENGINE ANTI-ICE ON BELOW 8000 FT ALT	0
ENGINE & WING ANTI-ICE ON BELOW 8000 FT ALT	680
ENGINE ANTI-ICE ON AT 8000 FT ALT & ABOVE	1235
ENGINE & WING ANTI-ICE ON AT 8000 FT ALT & ABOVE	1885



P.C. 6S000074

APPROVED	DATE

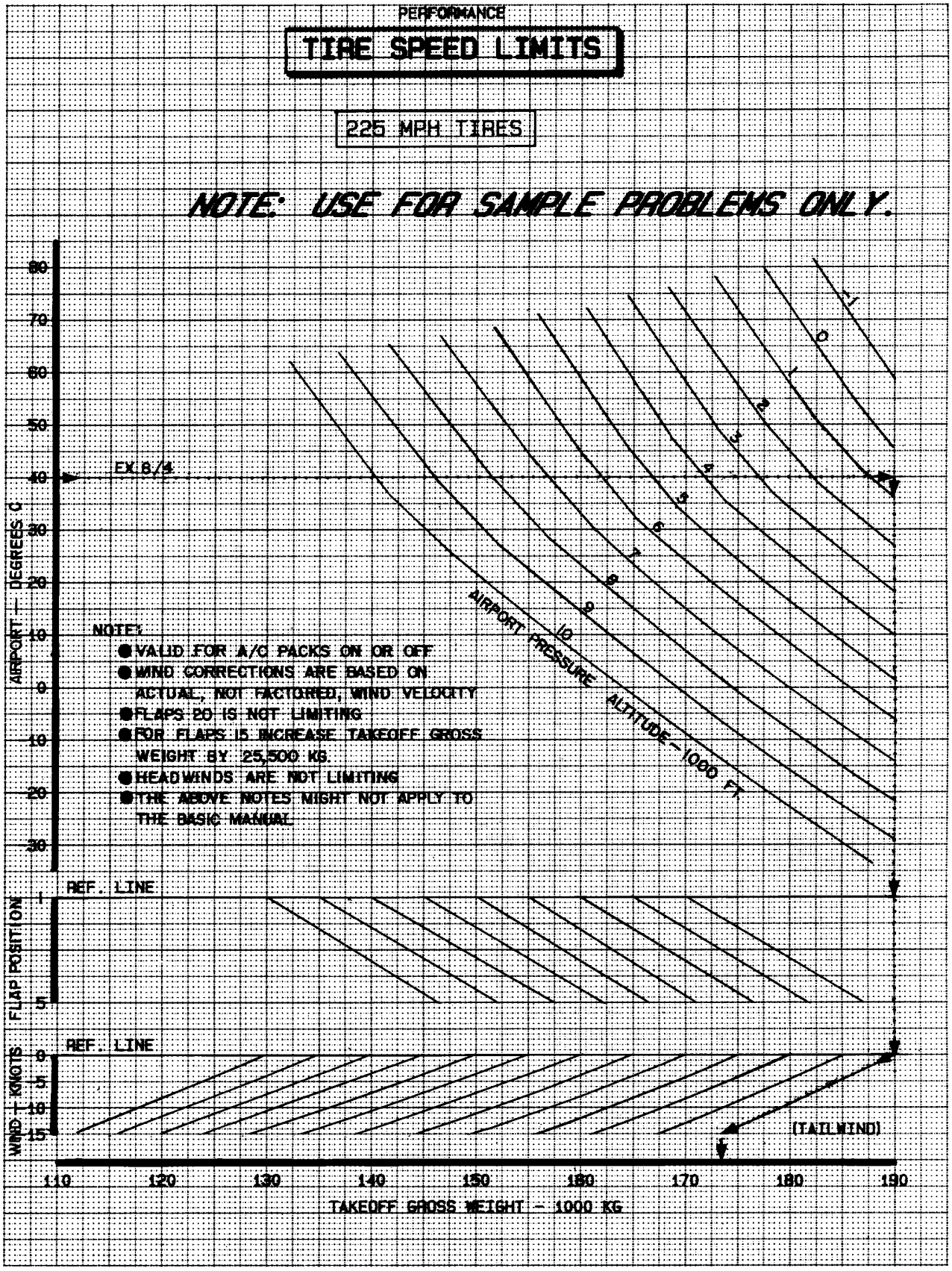
S94663

PERFORMANCE

TIRE SPEED LIMITS

225 MPH TIRES

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



P.C. 6S000076

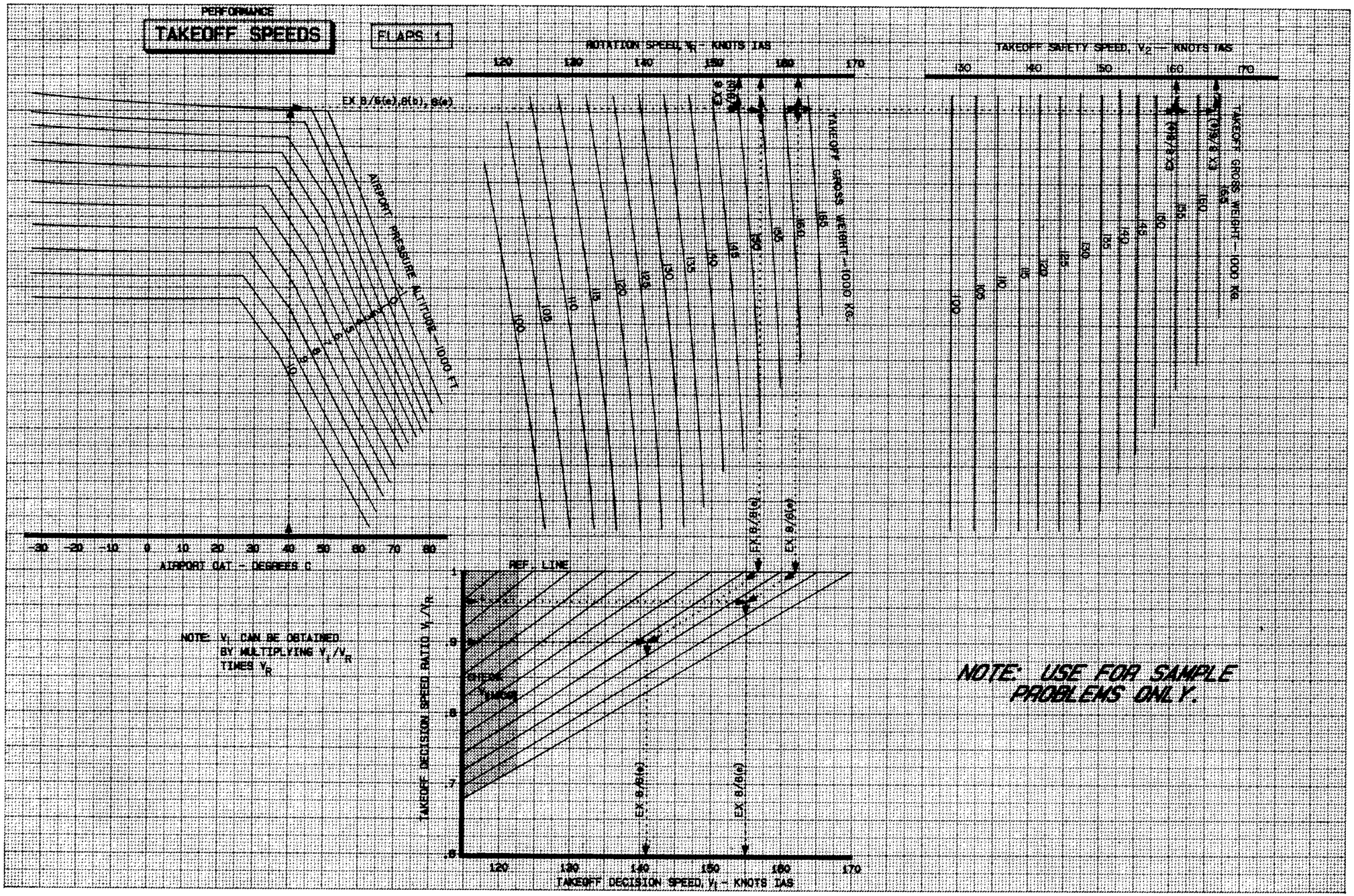
APPROVED	DATE

S94758

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 1



NOTE: USE FOR SAMPLE PROBLEMS ONLY.

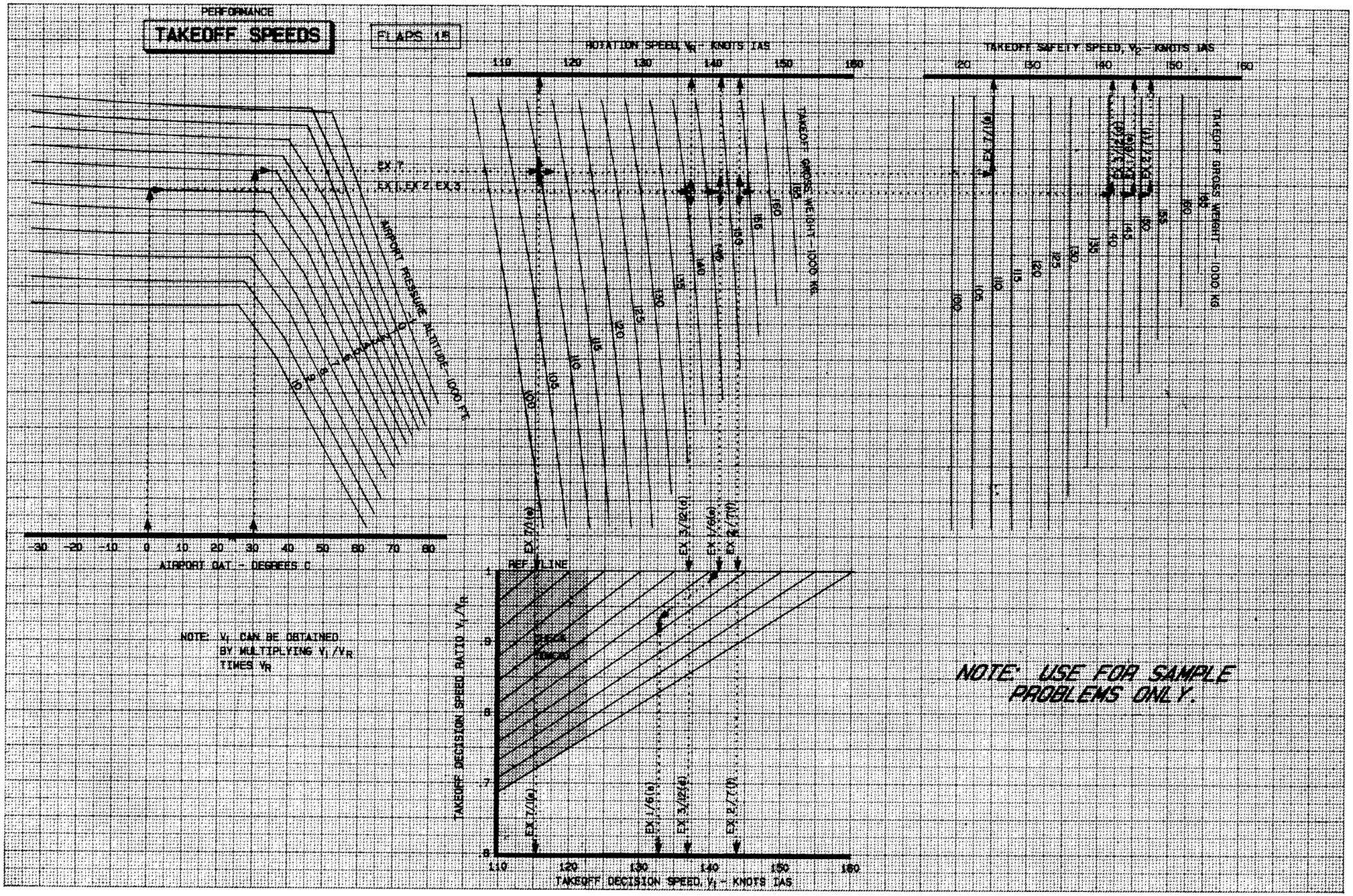
P.C. 6L000092

APPROVED	DATE

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 15



NOTE: USE FOR SAMPLE PROBLEMS ONLY.

P.C. 6L000094

APPROVED	DATE

PERFORMANCE

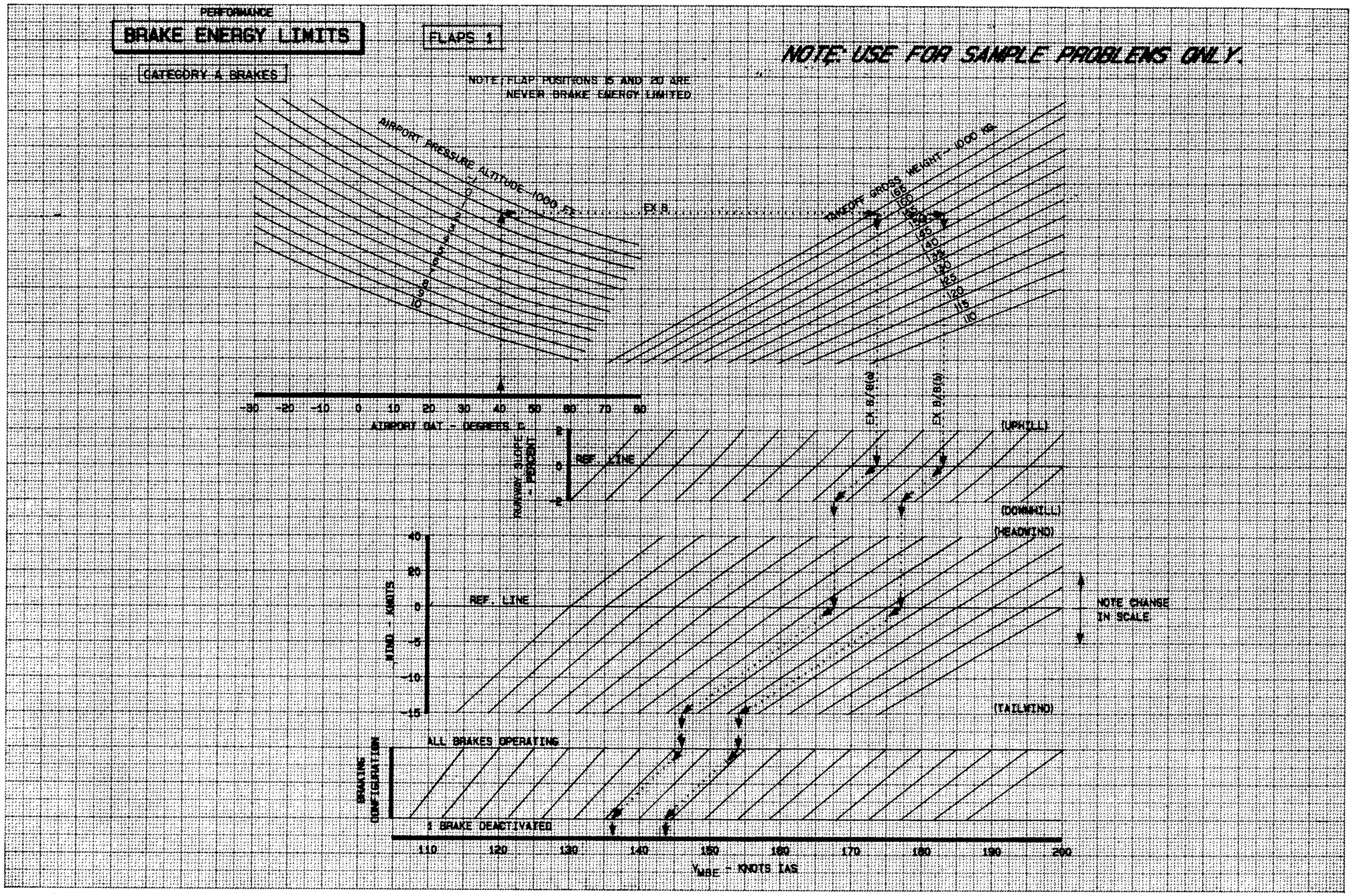
BRAKE ENERGY LIMITS

FLAPS 1

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

CATEGORY A BRAKES

NOTE: FLAP POSITIONS 15 AND 20 ARE NEVER BRAKE ENERGY LIMITED



P.C. 6L0000097

APPROVED	DATE

PERFORMANCE

MINIMUM V_1 FOR CONTROL ON THE GROUND

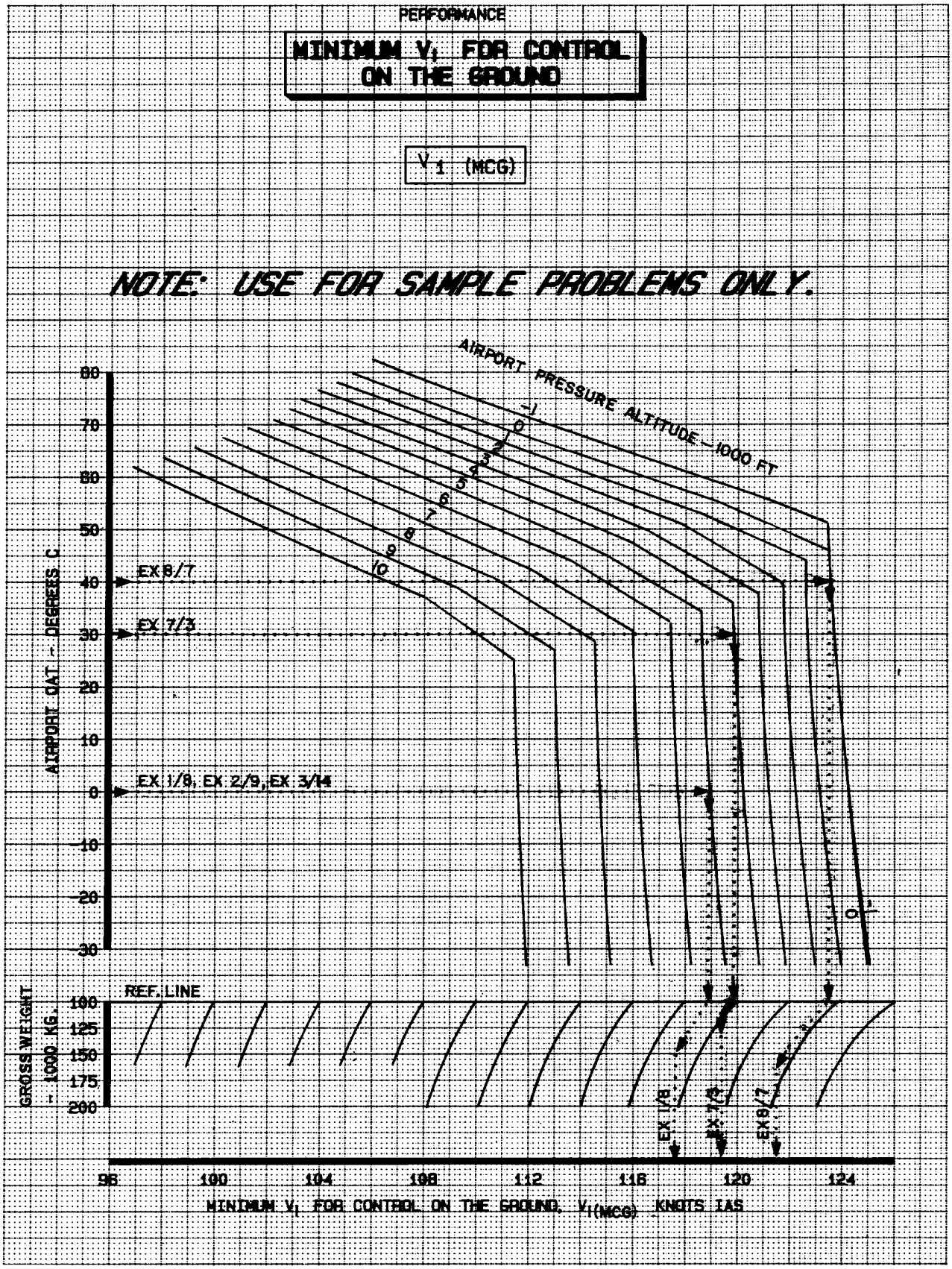
V_1 (MCG)

P.C. 6S000078

SLEMKO

	APPROVED	DATE

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



S94763

PERFORMANCE

IMPROVED CLIMB PERFORMANCE

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

FLAPS 15

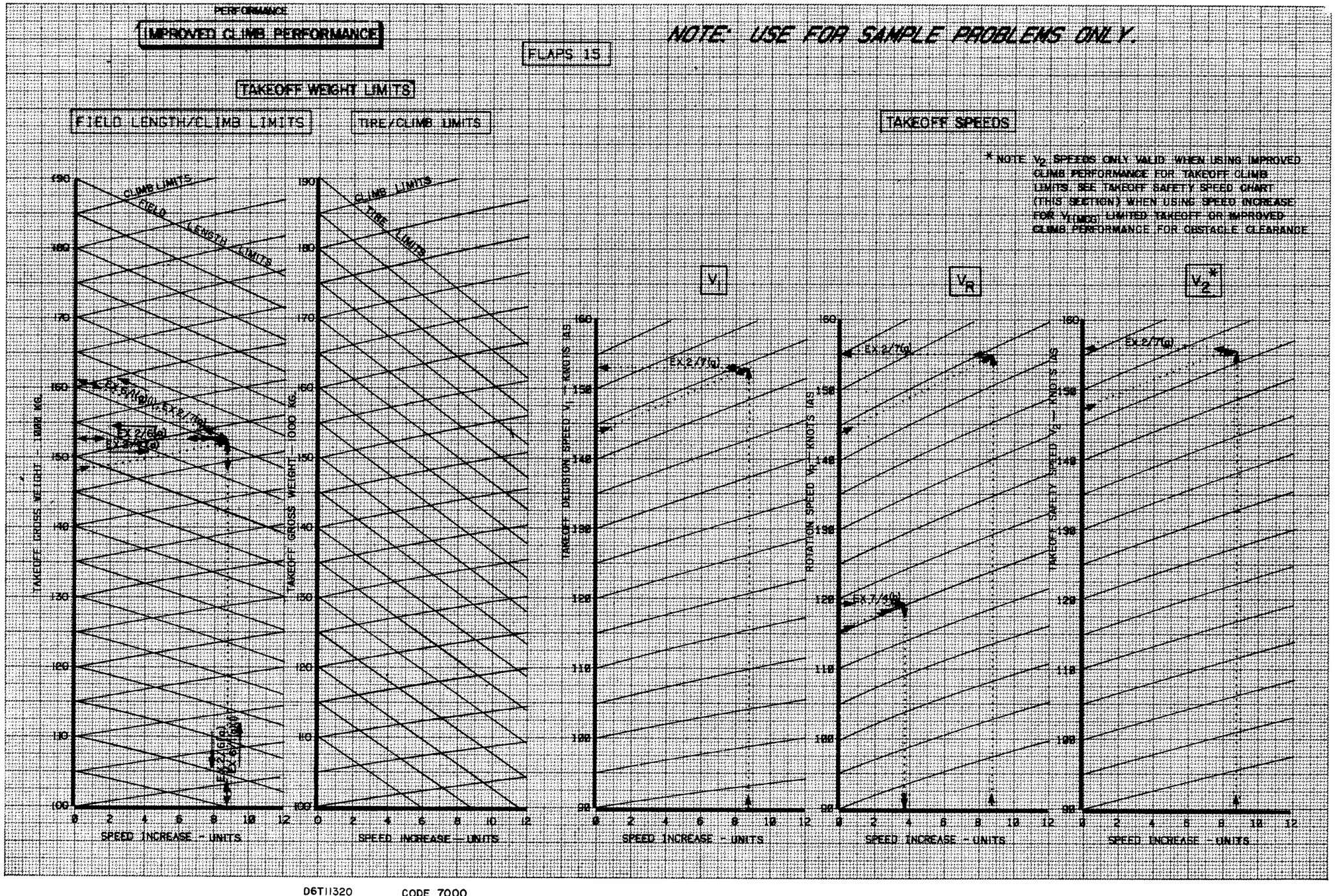
TAKEOFF WEIGHT LIMITS

FIELD LENGTH/CLIMB LIMITS

TIRE/CLIMB LIMITS

TAKEOFF SPEEDS

* NOTE: V_2 SPEEDS ONLY VALID WHEN USING IMPROVED CLIMB PERFORMANCE FOR TAKEOFF CLIMB LIMITS. SEE TAKEOFF SAFETY SPEED CHART (THIS SECTION) WHEN USING SPEED INCREASE FOR V_1(MCG) LIMITED TAKEOFF OR IMPROVED CLIMB PERFORMANCE FOR OBSTACLE CLEARANCE.



BAUERMEISTER

CHART APPLICABLE TO	APPROVED	DATE

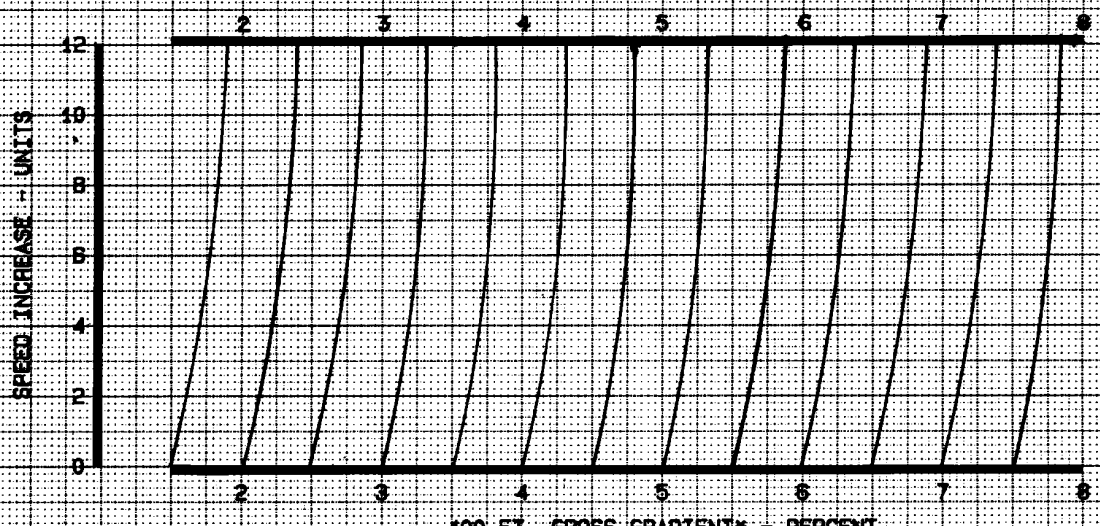
PERFORMANCE

TAKEOFF CLIMB
IMPROVED CLIMB PERFORMANCE

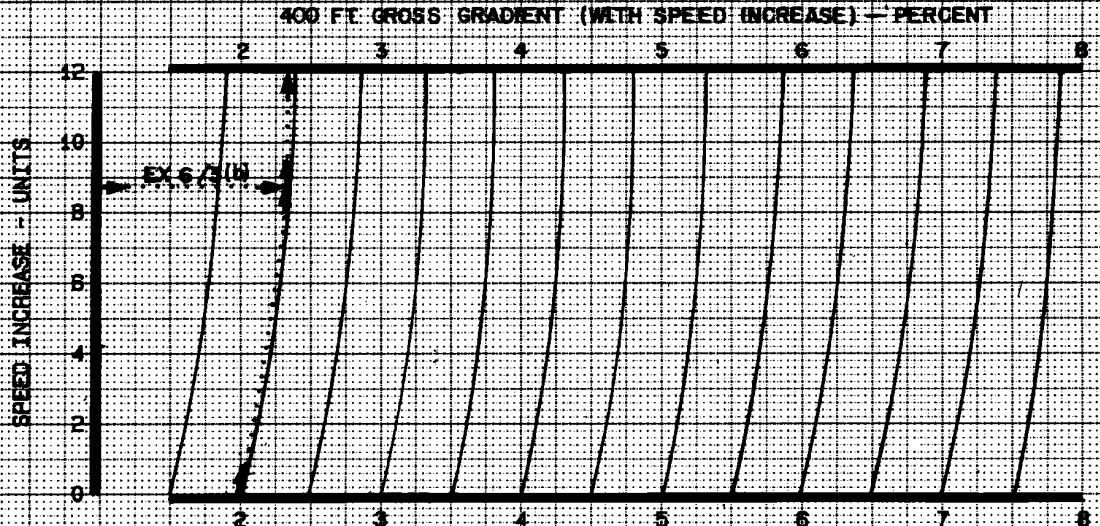
NOTE: USE FOR SAMPLE PROBLEMS ONLY.

*THIS IS THE ZERO SPEED INCREASE 400 FT. GROSS GRADIENT OBTAINED FROM THE TAKEOFF CLIMB CHART IT IS UNCORRECTED FOR WIND, GROSS HEIGHT, OR BANK ANGLE

FLAPS 1 & 20



FLAPS 5 & 15



P.C. 63000064

APPROVED	DATE

S94767

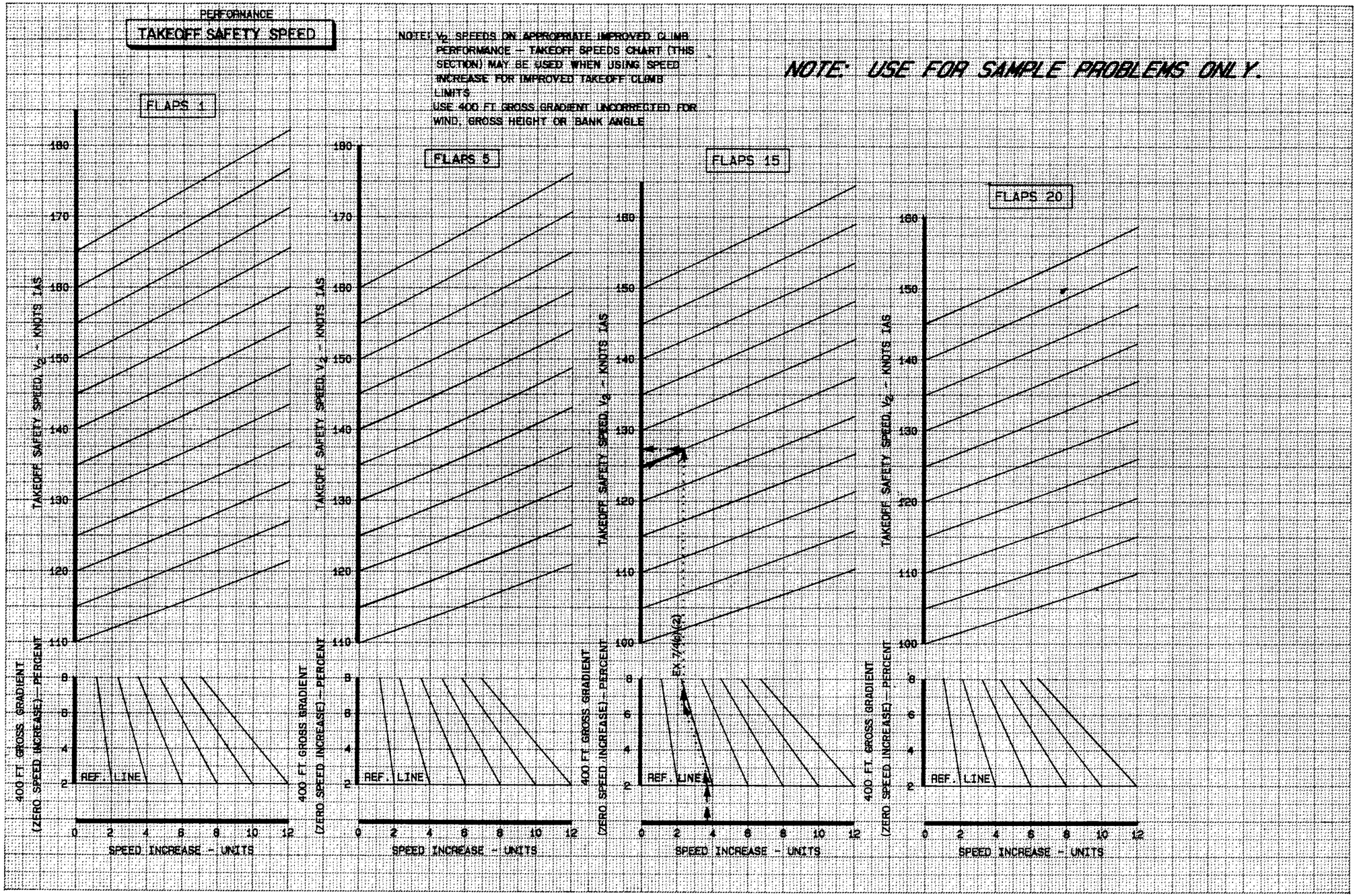
PERFORMANCE

TAKEOFF SAFETY SPEED

NOTE: V_2 SPEEDS ON APPROPRIATE IMPROVED CLIMB PERFORMANCE — TAKEOFF SPEEDS CHART (THIS SECTION) MAY BE USED WHEN USING SPEED INCREASE FOR IMPROVED TAKEOFF CLIMB LIMITS

USE 400 FT GROSS GRADIENT UNCORRECTED FOR WIND, GROSS HEIGHT OR BANK ANGLE

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



P.C.6L000078

APPROVED	DATE

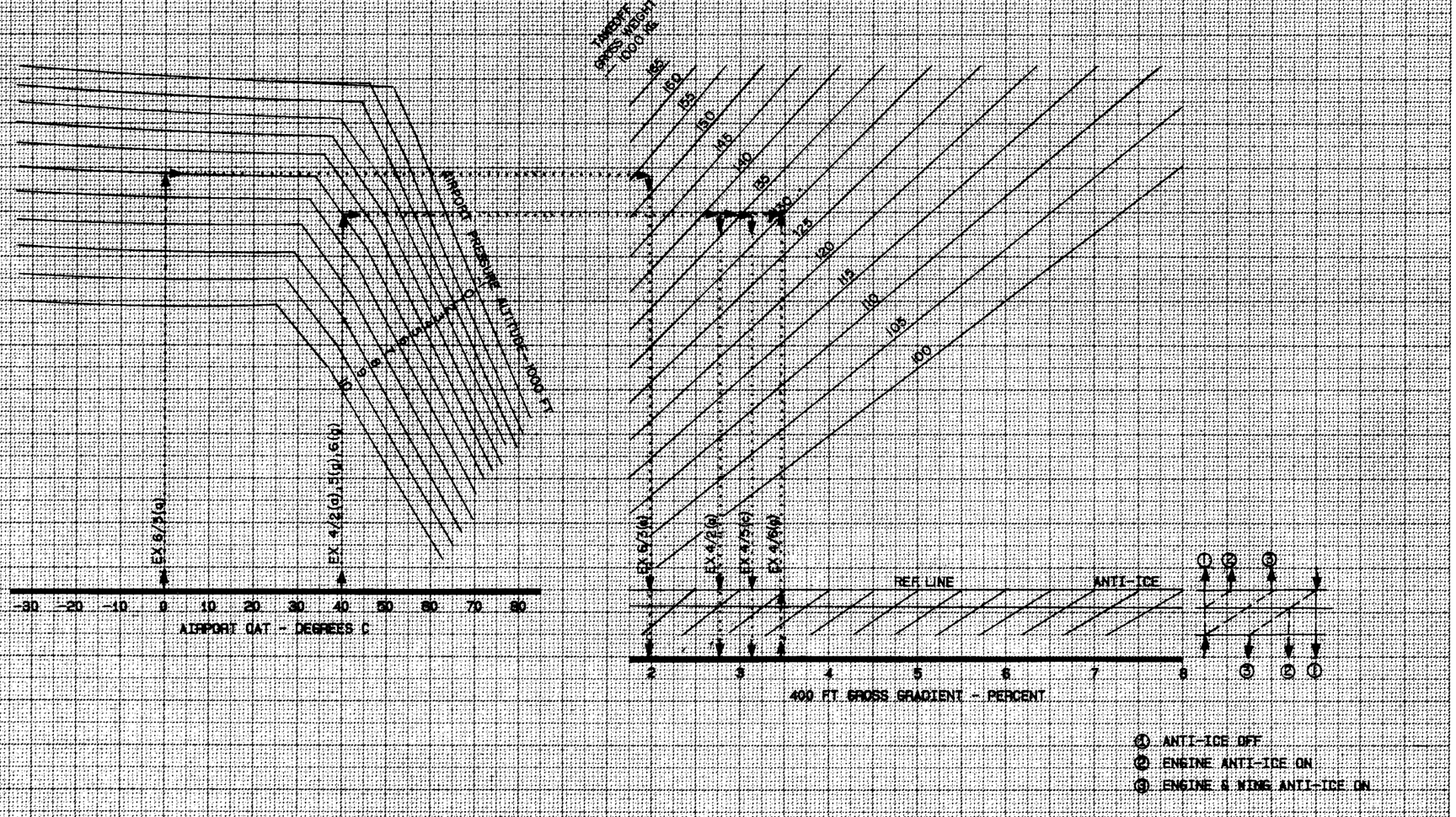
PERFORMANCE

TAKEOFF CLIMB

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

A/C PACKS ON

FLAPS 15



P.C. 6L000109

APPROVED	DATE

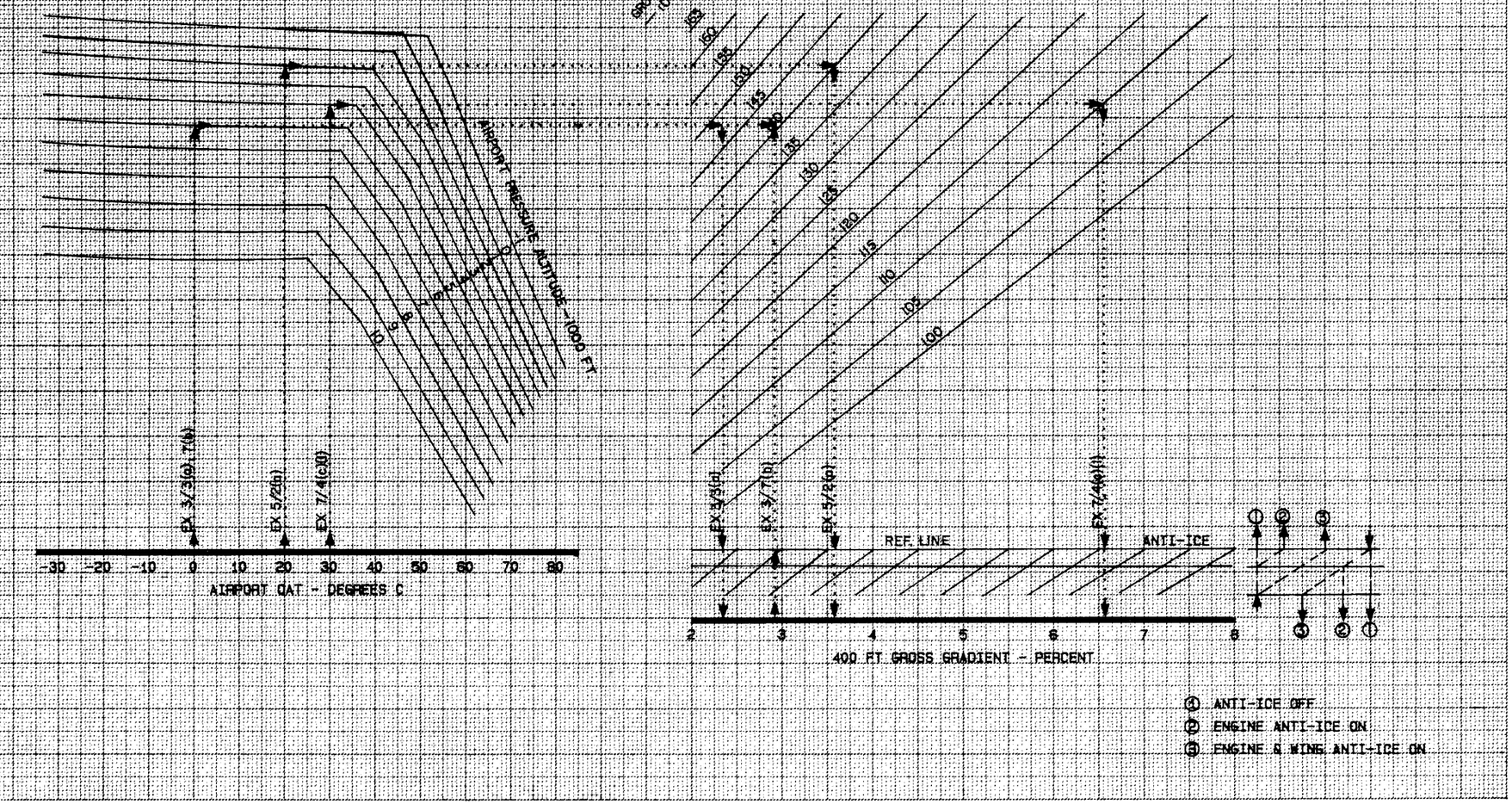
PERFORMANCE

TAKEOFF CLIMB

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

A/C PACKS ON

FLAPS 15



P.C. 6L00011

APPROVED	DATE

PERFORMANCE

CLOSE — IN OBSTACLE CLEARANCE

VALID FOR ALL FLAPS

NOTE: USE FOR SAMPLE PROBLEMS ONLY

NOTES
- USE WIND CORRECTED GRADIENT.
- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO

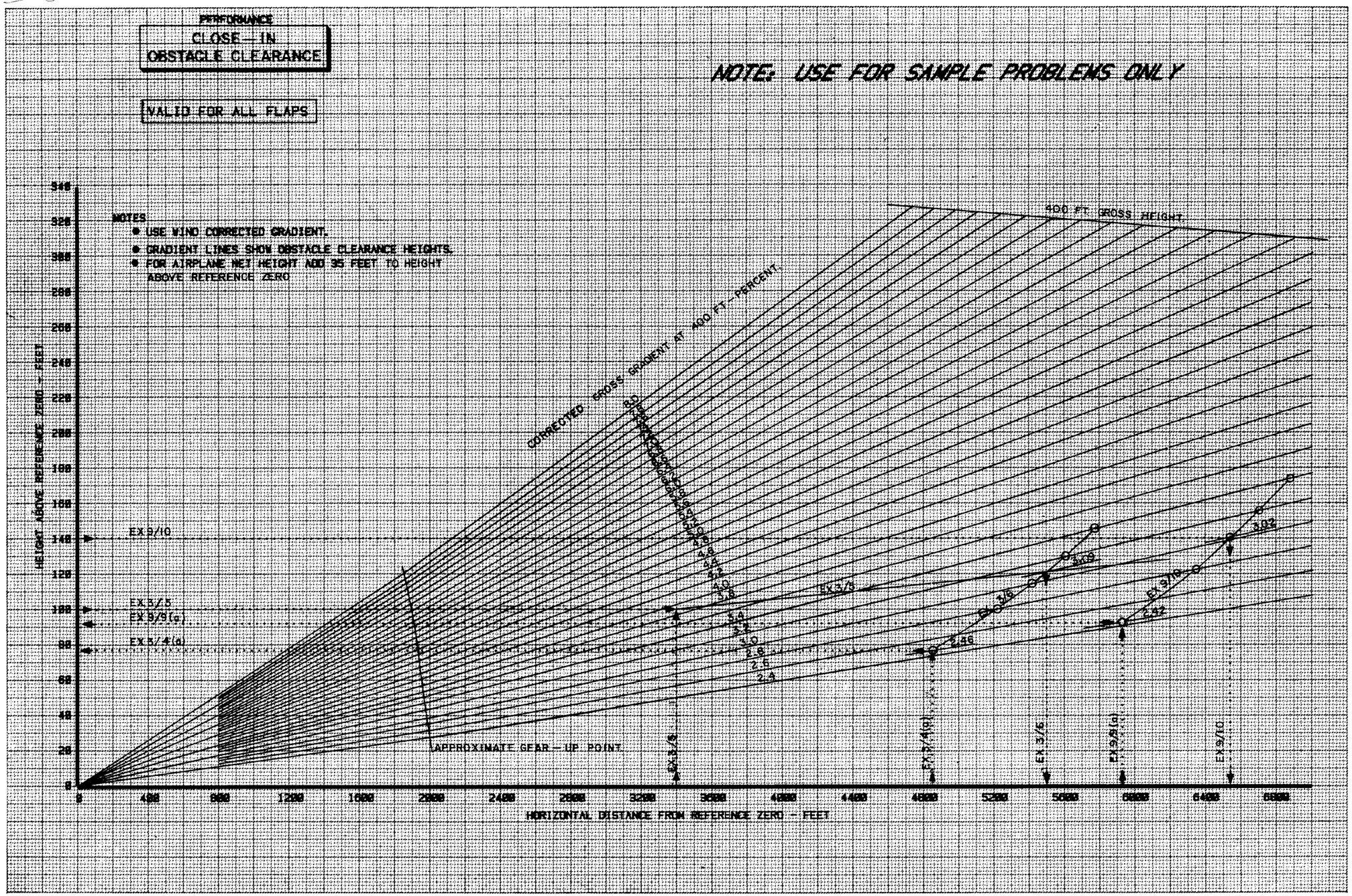


CHART APPLICABLE TO	APPROVED	DATE

6L000081

S952D7

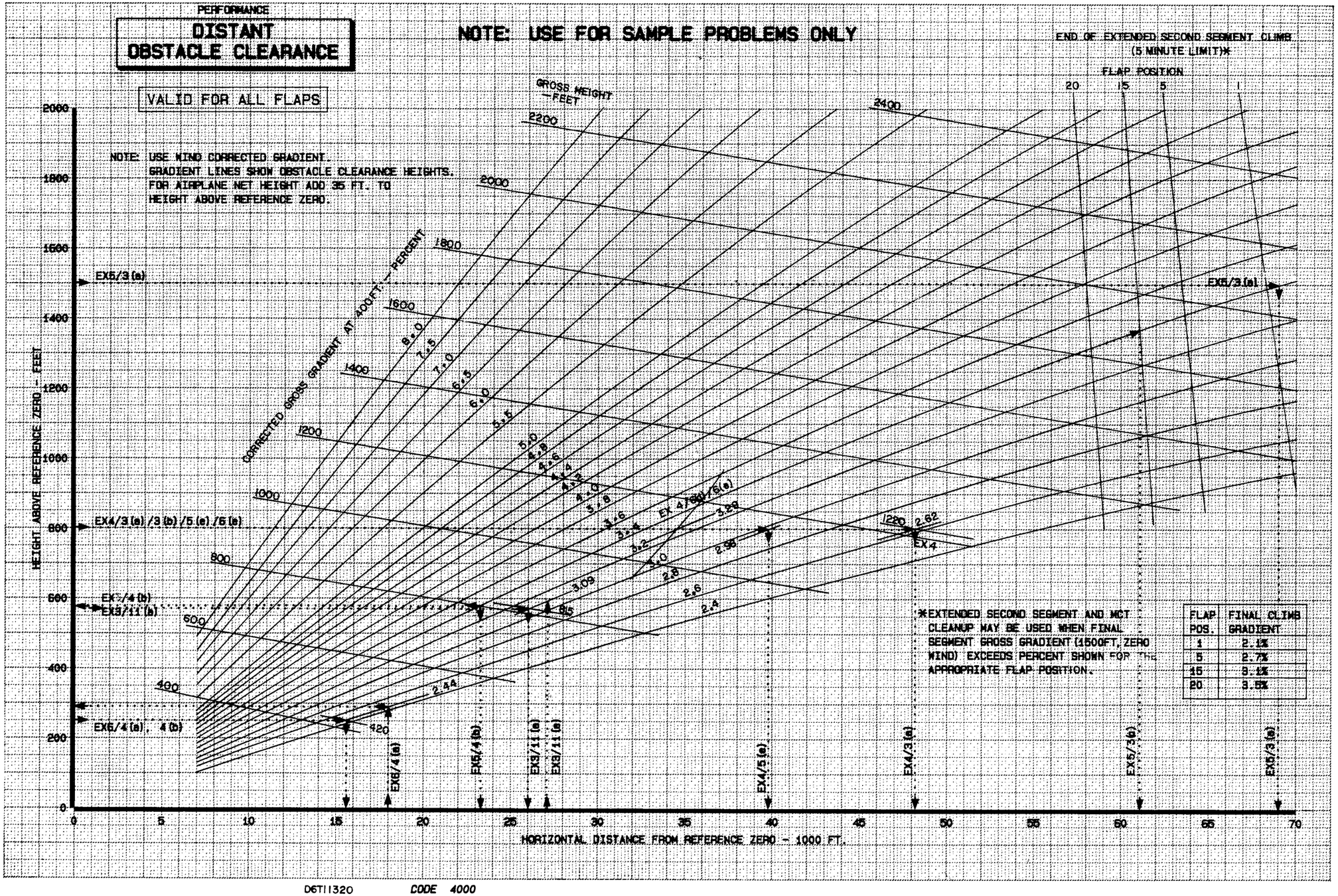
PERFORMANCE

DISTANT OBSTACLE CLEARANCE

NOTE: USE FOR SAMPLE PROBLEMS ONLY

VALID FOR ALL FLAPS

NOTE: USE WIND CORRECTED GRADIENT.
GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
FOR AIRPLANE NET HEIGHT ADD 35 FT. TO
HEIGHT ABOVE REFERENCE ZERO.



*EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL SEGMENT GROSS GRADIENT (1500FT, ZERO WIND) EXCEEDS PERCENT SHOWN FOR THE APPROPRIATE FLAP POSITION.

FLAP POS.	FINAL CLIMB GRADIENT
1	2.1%
5	2.7%
15	3.1%
20	3.5%

P.C. 6L000082

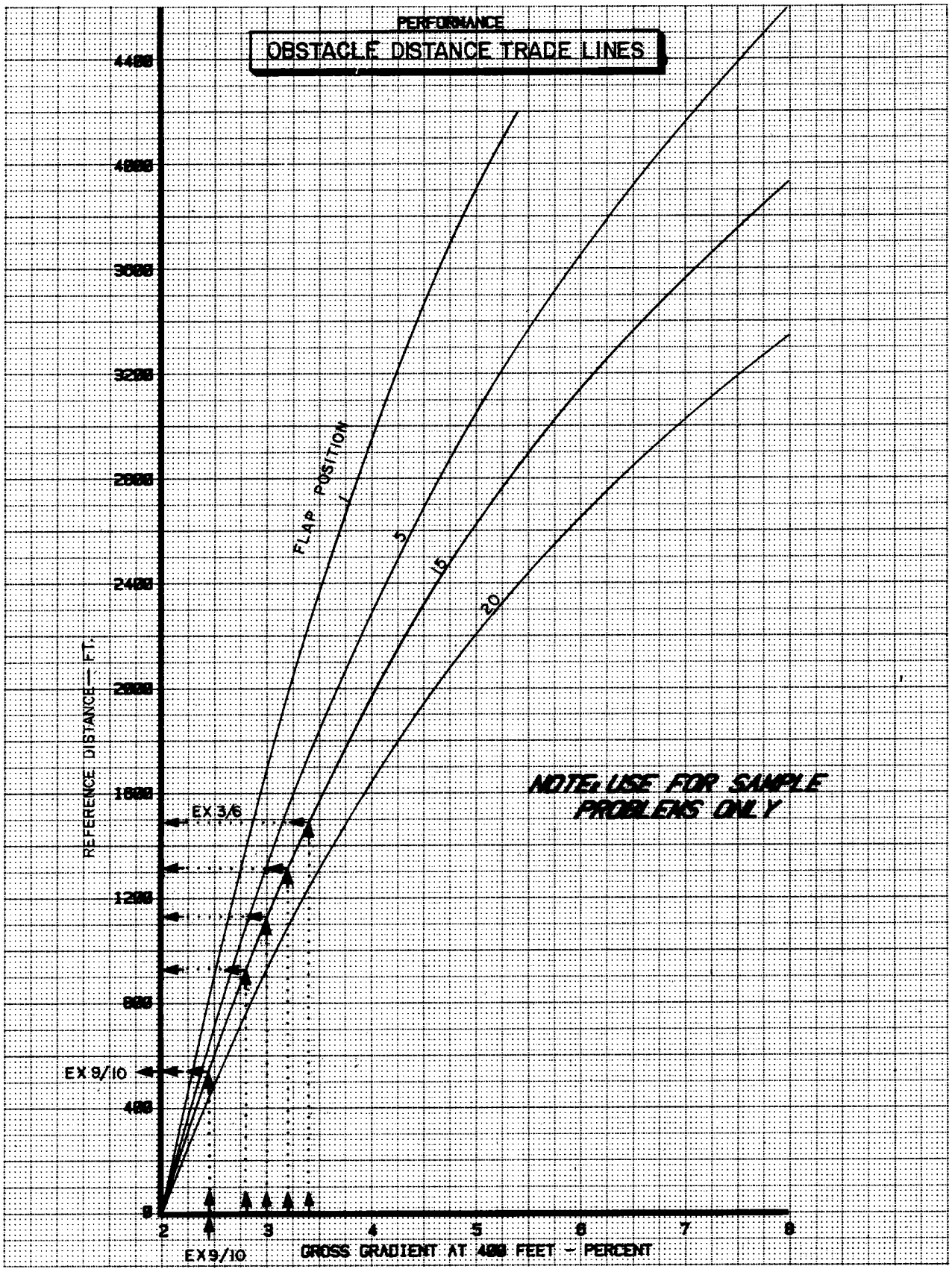
APPROVED	DATE

P.C. 6S000065

APPROVED | DATE

PERFORMANCE

OBSTACLE DISTANCE TRADE LINES



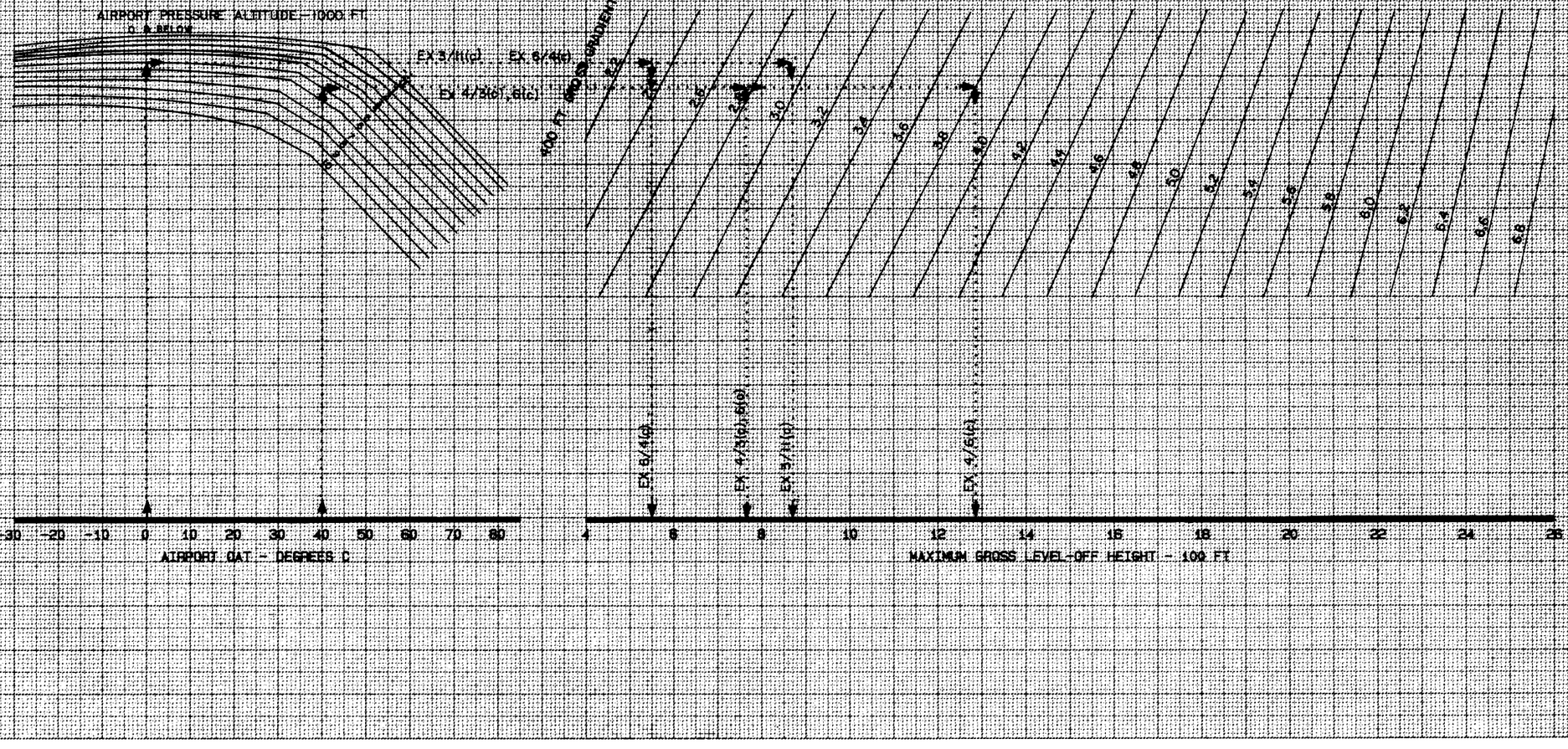
S94772

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

FLAPS 15



*NOTE: USE 400 FT GROSS GRADIENT UNCORRECTED FOR WIND OR LEVEL-OFF HEIGHT.

P.C. 6L000112

APPROVED	DATE

S95219

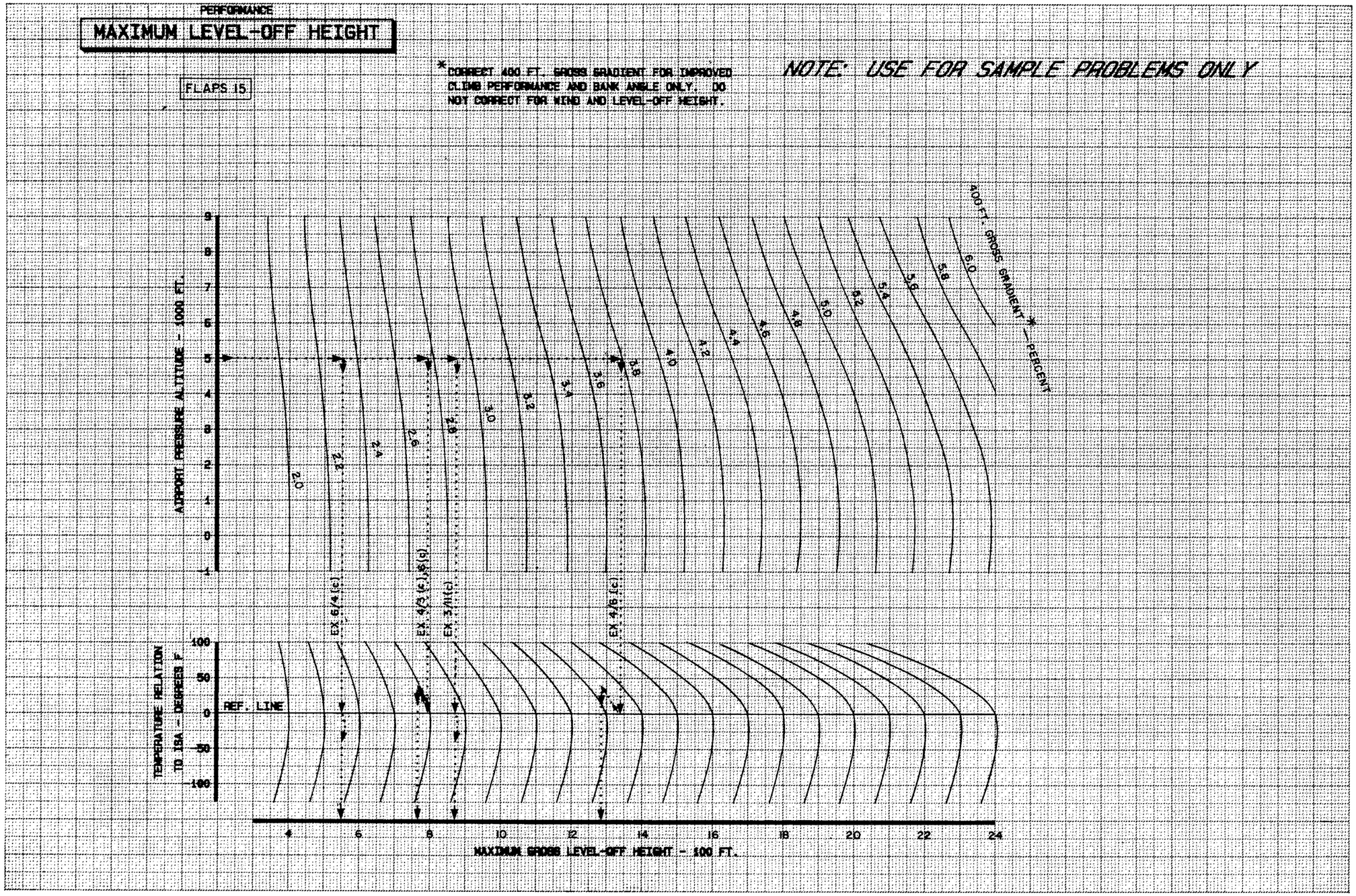
PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 15

*CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE ONLY. DO NOT CORRECT FOR WIND AND LEVEL-OFF HEIGHT.

NOTE: USE FOR SAMPLE PROBLEMS ONLY



P.C. 6L001480

APPROVED	DATE

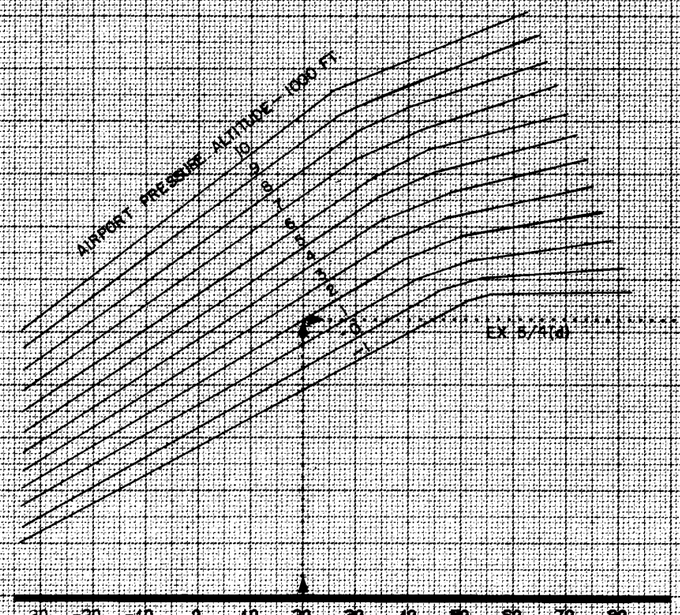
PERFORMANCE

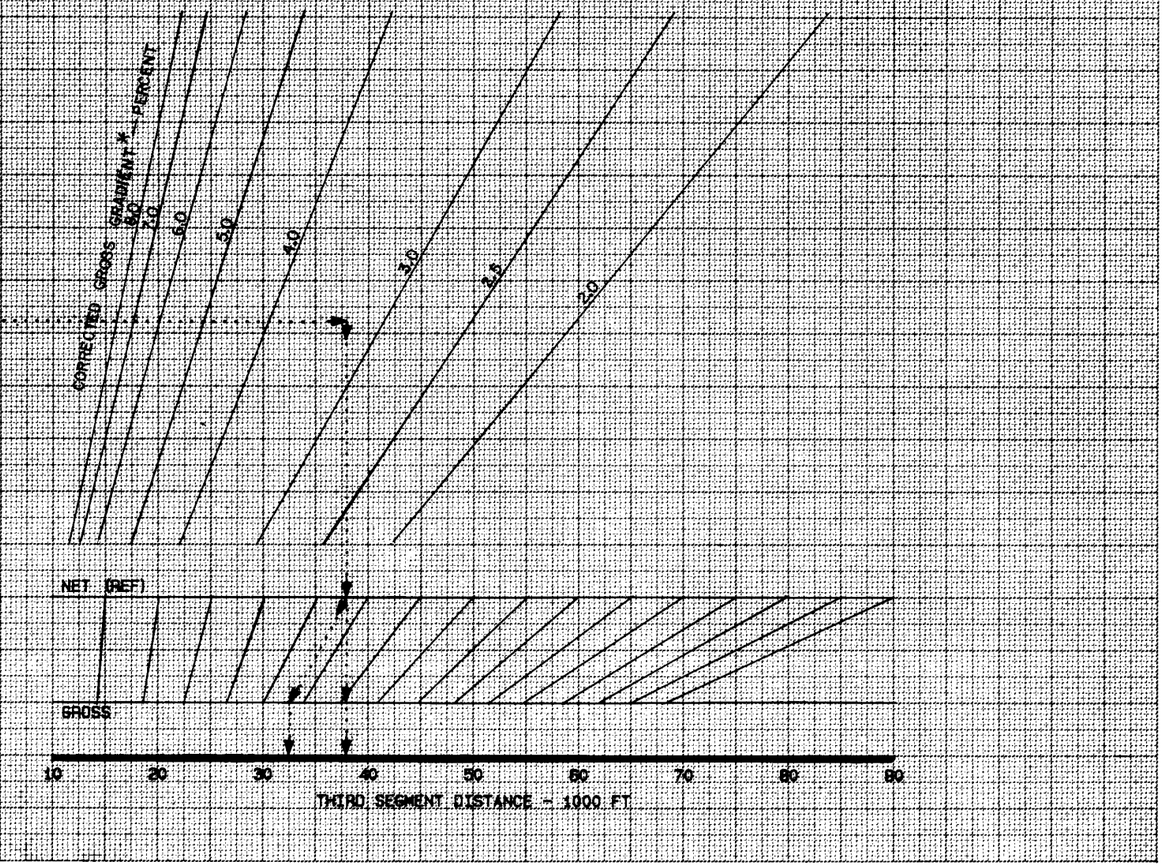
THIRD SEGMENT DISTANCE

FLAPS 15

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

*NOTE: USE 400 FT GROSS GRADIENT CORRECTED FOR WIND AND LEVEL-OFF HEIGHT ABOVE 400 FT.





P.C.6L000113

APPROVED	DATE

P.C. 6L00011S

APPROVED	DATE

PERFORMANCE

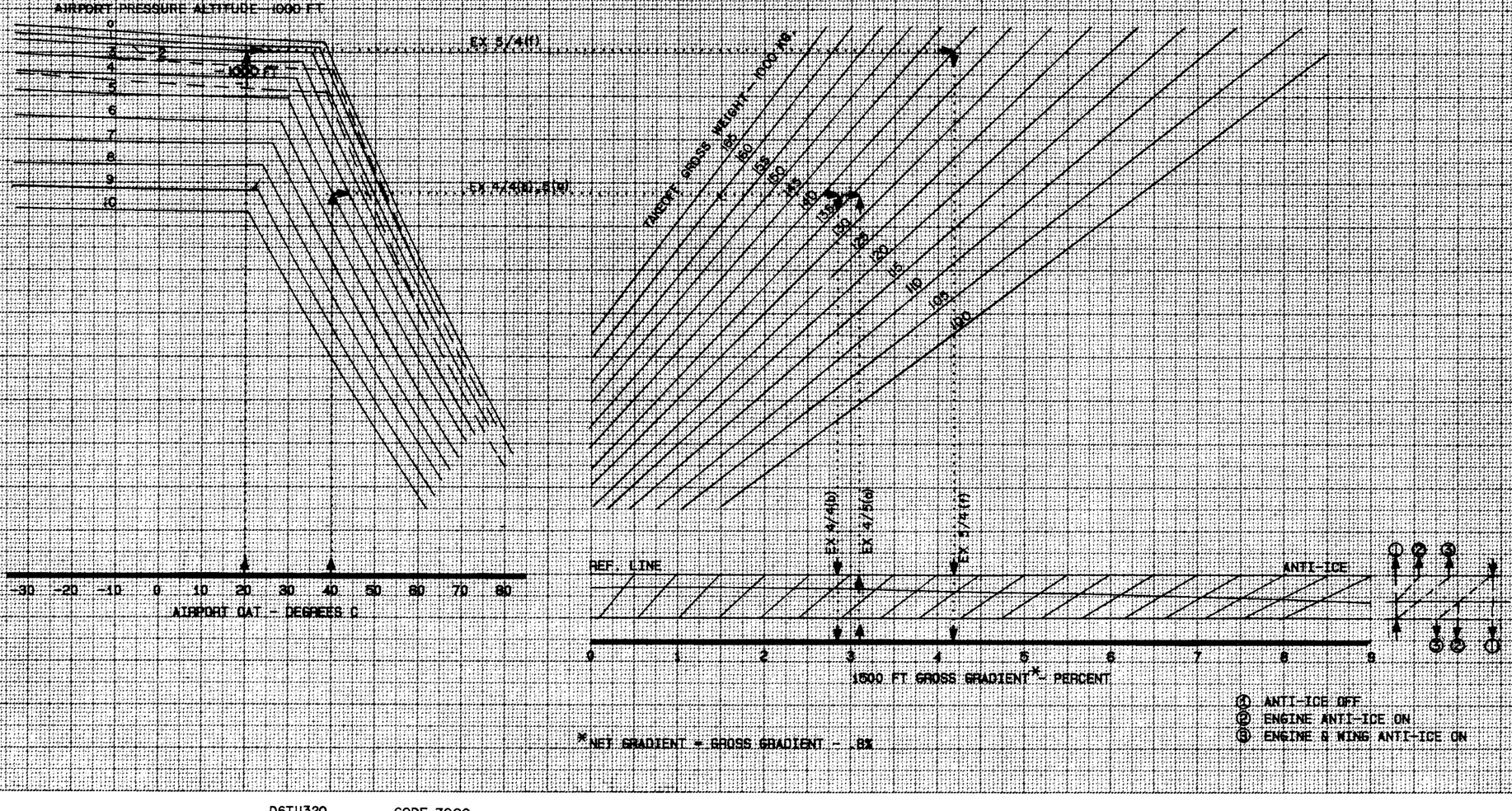
FINAL TAKEOFF CLIMB

A/C PACKS ON

FLAPS UP

SPEED V_{REF}+80 KIAS

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



*NET GRADIENT = GROSS GRADIENT - .8%

PERFORMANCE

GRADIENT CORRECTIONS

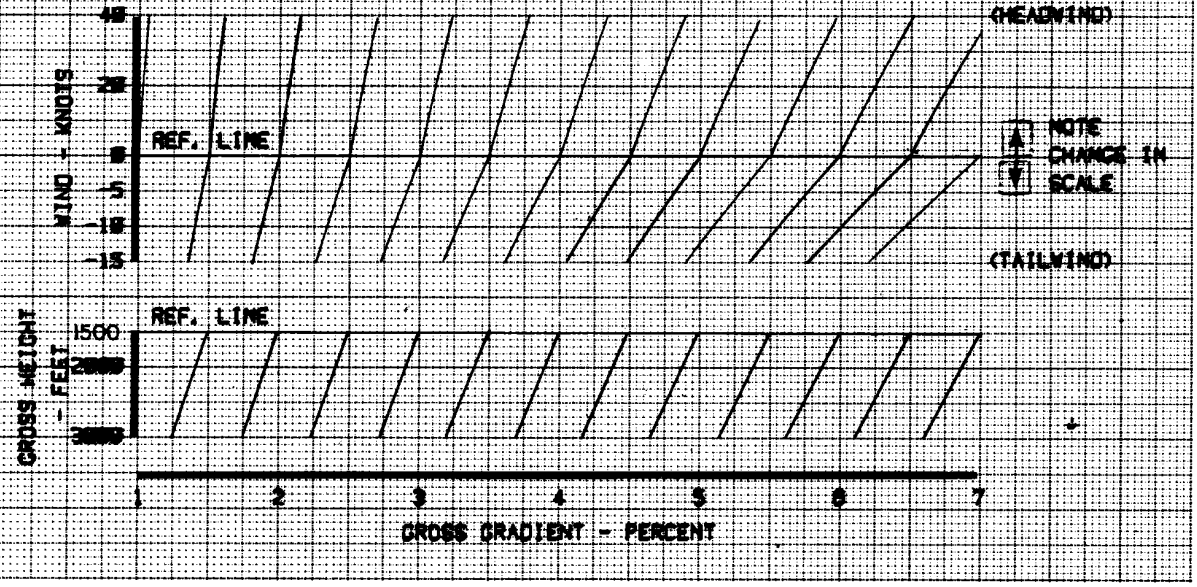
NOTE: USE FOR SAMPLE PROBLEMS ONLY

GRADIENT DECREMENT (ΔG) IN BANKED TURNS		
BANK ANGLE DEGREES	FLAP POS. 0	FLAP POS. 1, 5, 15&20
5	.02	.05
10	.08	.20
15	.16	.49

TAKEOFF CLIMB



FINAL TAKEOFF CLIMB



6S000066

CHART APPLICABLE TO	APPROVED	DATE

S94776

P.C. 6S000067

APPROVED | DATE

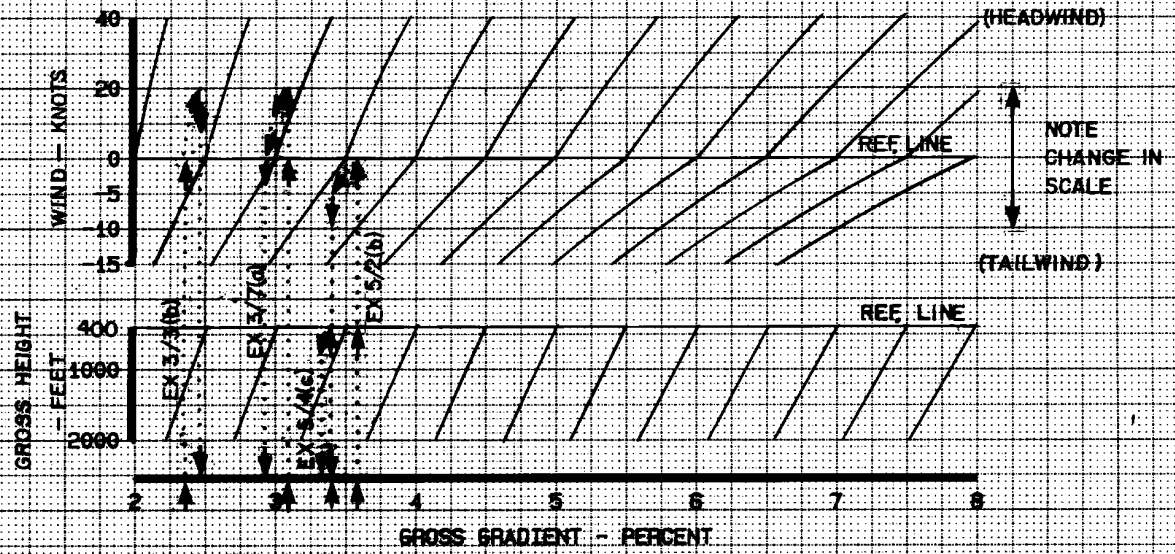
PERFORMANCE

GRADIENT CORRECTIONS

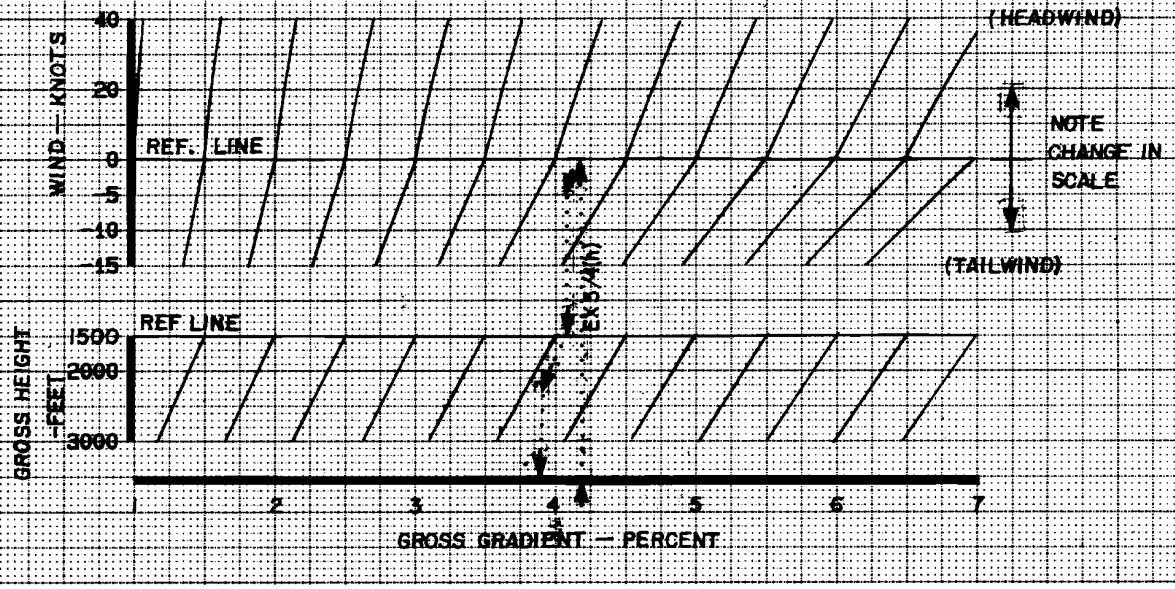
NOTE: USE FOR SAMPLE PROBLEMS ONLY.

GRADIENT DECREMENT (%) IN BANKED TURNS		
BANK ANGLE DEGREES	FLAP POS 0	FLAP POS 1, 5, 15&20
5	.02	.05
10	.08	.20
15	.16	.49

TAKEOFF CLIMB



FINAL TAKEOFF CLIMB



S94777

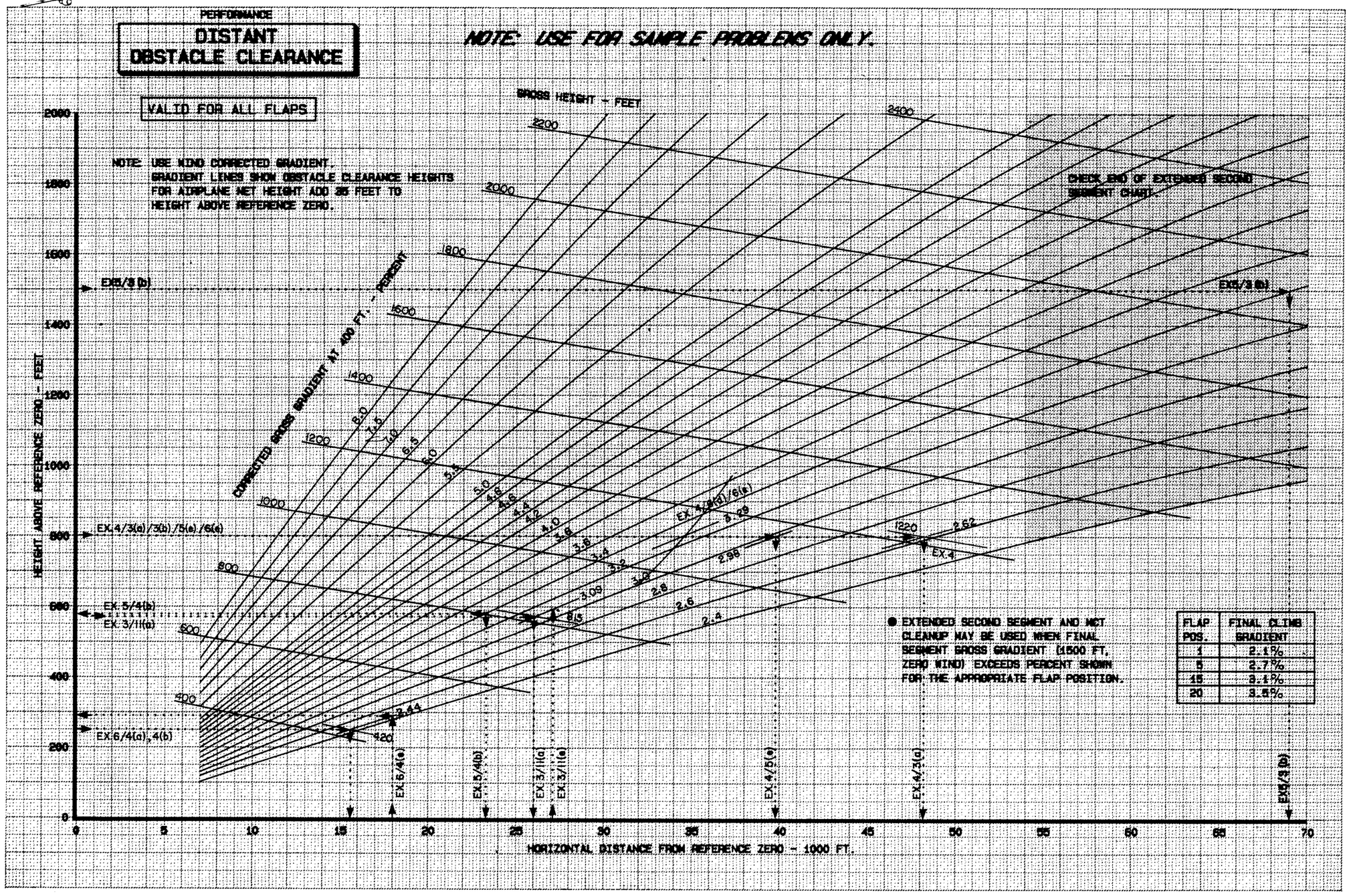
PERFORMANCE

DISTANT OBSTACLE CLEARANCE

NOTE: USE FOR SAMPLE PROBLEMS ONLY.

VALID FOR ALL FLAPS

NOTE: USE WIND CORRECTED GRADIENT.
GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO.



● EXTENDED SECOND SEGMENT AND NCT CLEANUP MAY BE USED WHEN FINAL SEGMENT GROSS GRADIENT (1500 FT, ZERO WIND) EXCEEDS PERCENT SHOWN FOR THE APPROPRIATE FLAP POSITION.

FLAP POS.	FINAL CLIMB GRADIENT
1	2.1%
5	2.7%
15	3.1%
20	3.5%

P.C. 6L000937

APPROVED	DATE

PERFORMANCE

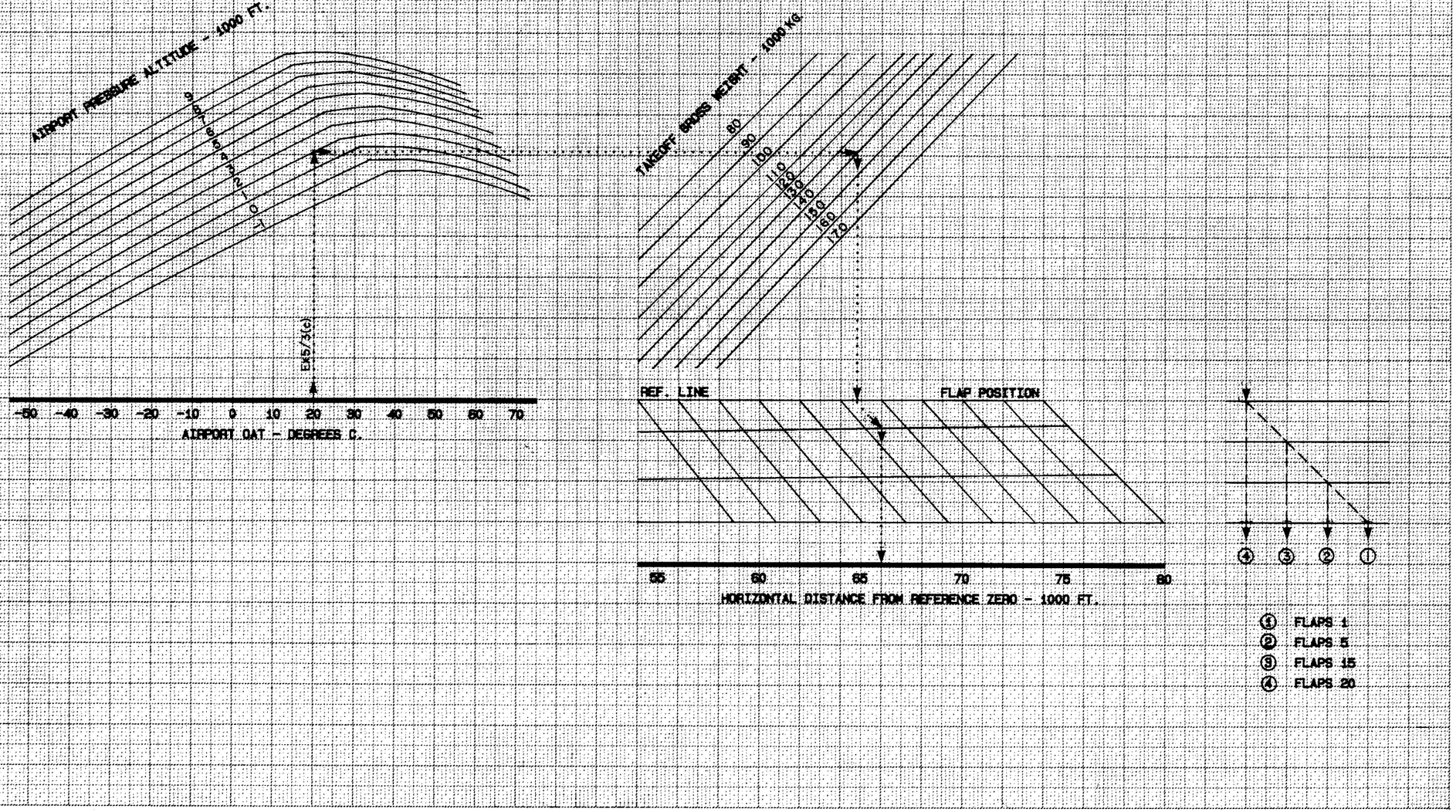
END OF EXTENDED SECOND SEGMENT

5 MINUTE LIMIT

● EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL SEGMENT GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS PERCENT SHOWN FOR THE APPROPRIATE FLAP POSITION, SEE TEXT.

FLAP POS.	FINAL CLIMB GRADIENT
1	2.10 %
5	2.70 %
15	3.10 %
20	3.50 %

NOTE: USE FOR SAMPLE PROBLEMS ONLY.



P.C. BL000936

DATE
APPROVED

REVISION HIGHLIGHTS

Revision 5 to Appendix 36K to D6T11321 dated 10-01-03.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to remove performance data for Approach Climb with flaps 5 and 15 and replace it with data with flaps 20. This performance more accuratly reflects actual airplane operations.

Additionally, Section 4.12 ice correction forecast temperatures at the destination airport have been changed from above "8 deg C or 46 deg F" to "10 deg C or 50 deg F" to be consistent with the definition of icing conditions in the Certificate Limitations section.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	034325	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Section 4.12		
1	A36	Deleted information regarding gradient corrections on approach for flaps 5 and 15 and replaced with greadient corrections for approach flaps 20.

REVISION HIGHLIGHTS

Revision 5 to Appendix 36K to D6T11321 dated 10-01-03.

PAGE	CODE	EXPLANATION
Section 4.12		
7	7FAP	This page replaces page code 7AAM. This chart provides maximum Landing Weight Climb data for approach flaps 20 and landing flaps 25 and 30.
8	7AAM	This page has been deleted.

APPENDIX 36K

LANDING GEAR
EXTENDED

CF6-80C2B6/B6F
767-300

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 034325** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 10-01-03

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Log of Pages
Appendix 36K

The following pages comprise this appendix applicable to the above series airplanes.

Revision 5 Date 10-01-03

Page	Code	Date
Title		
1	A36K	07-20-01
Revision Approval		
* 1	034325	10-01-03
Log of Pages		
* 1		10-01-03
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* 7	7FAP	10-01-03

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

I N T R O D U C T I O N

This appendix contains Certificate Limitations, Procedures and Performance for operation with landing gear extended. Airplane performance with CF6-80C2B6/B6F engine rating is the base to which the performance adjustments in this appendix are applied.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

GENERAL

This appendix is used when operating with the landing gear down. Flight data is based on drag associated with all-gear-down performance.

Limitations, procedures, and performance are unchanged except as amended herein.

Airplane performance with CF6-80C2B6/B6F engine rating is the base to which the performance adjustments in this appendix are applied.

The use of speed increase for improved climb performance in order to increase maximum takeoff weight is prohibited.

Takeoff is limited to flap position 5.

TYPE OF AIRPLANE OPERATION

Limitations are unchanged except the airplane is not eligible for extended over-water operation.

OPERATIONAL LIMITS

Operational limits are unchanged.

S16397

CERTIFICATE LIMITATIONS

M A X I M U M O P E R A T I N G L I M I T S P E E D

Limitations are unchanged except:

VMO and MMO are reduced to 270 KIAS and .73 Mach.

The airspeed indicator and Mach-airspeed warning switch must be reprogrammed for VMO and MMO.

SECTION 2 - EMERGENCY PROCEDURES

Emergency Procedures are unchanged except as amended herein.

E M E R G E N C Y D E S C E N T

Procedures are unchanged except:

Target Speed - 270 KIAS.

SECTION 3 - OPERATING PROCEDURES

Operating Procedures are unchanged except as amended herein.

S E V E R E T U R B U L E N T A I R P E N E T R A T I O N

The conditions for severe turbulent air penetration are unchanged except the recommended airspeed for flight in severe turbulence is V_{REF} +70 knots IAS.

F L I G H T M A N A G E M E N T C O M P U T E R S Y S T E M (FMCS)

The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), and maximum altitude, and compute overly shallow descent path.

To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CRZ page of the Control and Display Unit (CDU). Appropriate gear down speeds should also be entered on the CLB and DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of the VNAV during descent, under these circumstances is not recommended.

S T A B I L I Z E R T R I M

For flight at center of gravity positions near the aft limit with the gear down, the nose down stabilizer trim authority available through the control wheel stabilizer trim switch may be insufficient to trim flaps up flight. Consequently, the use of the manual trim levers may be required to accomplish trim.

PERFORMANCE ADJUSTMENTS

The performance adjustments in this appendix are applicable to the CF6-80C2B6/B6F performance level.

SECTION 4.1 - GENERAL

G E N E R A L

When operating with the landing gear extended, the performance adjustments and the amended performance configuration in this appendix are used.

P E R F O R M A N C E C O N F I G U R A T I O N

Performance configuration is unchanged except the landing gear configuration for each phase of operation will be "Down".

P E R F O R M A N C E C O N D I T I O N S A N D P R O C E D U R E S

TAKEOFF

The conditions for flight performance are unchanged except the landing gear will not be retracted after liftoff.

FLAP RETRACTION SPEED SCHEDULE (Takeoff Flap Position 5)

During acceleration, select flap positions at the following speeds:

Initiation Speed, Knots	Select Flap Position
V_{REF} + 40	1
V_{REF} + 60	0

Final Segment Climb Speed: V_{REF} + 70 knots

TAKEOFF WEIGHT DETERMINATION PROCEDURE

The maximum allowable takeoff weights for landing gear extended operation are determined by the procedures in the basic manual. Only flap position 5 with no improved climb performance is allowed. The charts in this appendix are used in place of similar charts in the basic manual. In some cases, decrements are applied to the values obtained from the basic manual. Only information in the subsections tabulated below are revised in this appendix and the remaining subsections are unchanged from the basic manual.

Subsection	Title
4.5	Takeoff Climb Limits
4.9	Obstacle Clearance
4.11	Enroute Climb
4.12	Approach and Landing Climb

S16401

SECTION 4.5 - TAKEOFF CLIMB LIMITS

G E N E R A L

None of the charts in the basic manual in the Takeoff Climb Limits subsection are applicable for gear extended operation. The scheduled takeoff gross weight cannot exceed the takeoff gross weights obtained from the Final Takeoff Climb Limits charts in this subsection. The Final Takeoff Climb Limits chart did not appear in the basic manual since climb limits in the final segment were never limiting in the gear retracted operation. A/C packs ON and OFF information can be obtained from the chart in this subsection.

PERFORMANCE

FINAL TAKEOFF CLIMB LIMITS

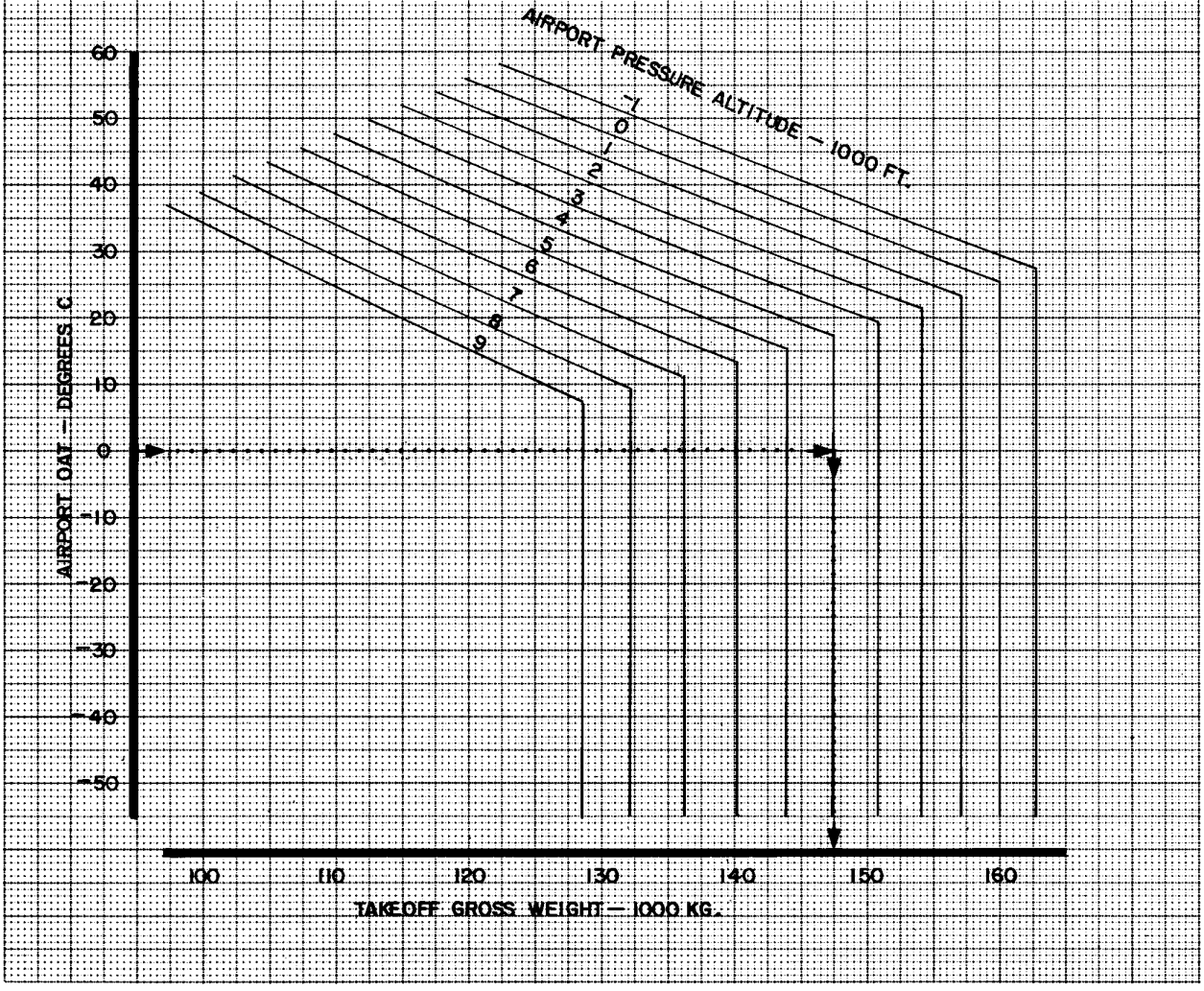
FLAPS UP

APPENDIX 36
LANDING GEAR EXTENDED

A/C PACKS ON AND OFF

● SPEED V_{REF} +70 KNOTS IAS

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT – KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	3700
ENGINE AND WING ANTI-ICE ON	7600



P.C. 6S000834
D041T507-1 APPENDIX 36 PG.4.5-11

APPROVED	DATE
[signature]	2/5/90

A. SACHS
767-300ER
CF6-80C2B6/B6F

6E4207

S27193

SECTION 4.9 - OBSTACLE CLEARANCE

ASSUMED CLIMB TECHNIQUE

The definitions of the first and second segments are modified. The first segment extends to the point where the landing gear would normally be retracted and is based on demonstrated performance in ground effect. The second segment is based on gear extended performance out of ground effect.

FLIGHT PATH CHART PRESENTATION AND OBSTACLE CLEARANCE ANALYSIS PROCEDURE

GENERAL

The charts in the Obstacle Clearance subsection of the basic manual are not applicable for gear extended operation except the Takeoff Climb charts, flaps 5, A/C packs ON and OFF, to which a decrement is applied when used in this appendix. The obstacle clearance analysis procedures in the basic manual still apply using the charts in this appendix with the exception that improved climb performance techniques are not permitted for gear extended operations.

TAKEOFF CLIMB

For obstacle clearance, the available 400 ft. gross gradients are obtained by reducing the gradients read from the basic flap position 5 Takeoff Climb chart by 1.70 percent. This decrement applies to both the (A/C) packs ON and OFF condition.

The corrected gear down gradients are then used in the obstacle clearance charts in this appendix. If obstacle clearance is limiting, the required gradients from the obstacle clearance charts must be increased by 1.70 percent to find the limiting takeoff weights.

NOTE: For landing gear extended operations, extended second segment and maximum continuous thrust flap retraction may be used for all conditions.

PERFORMANCE

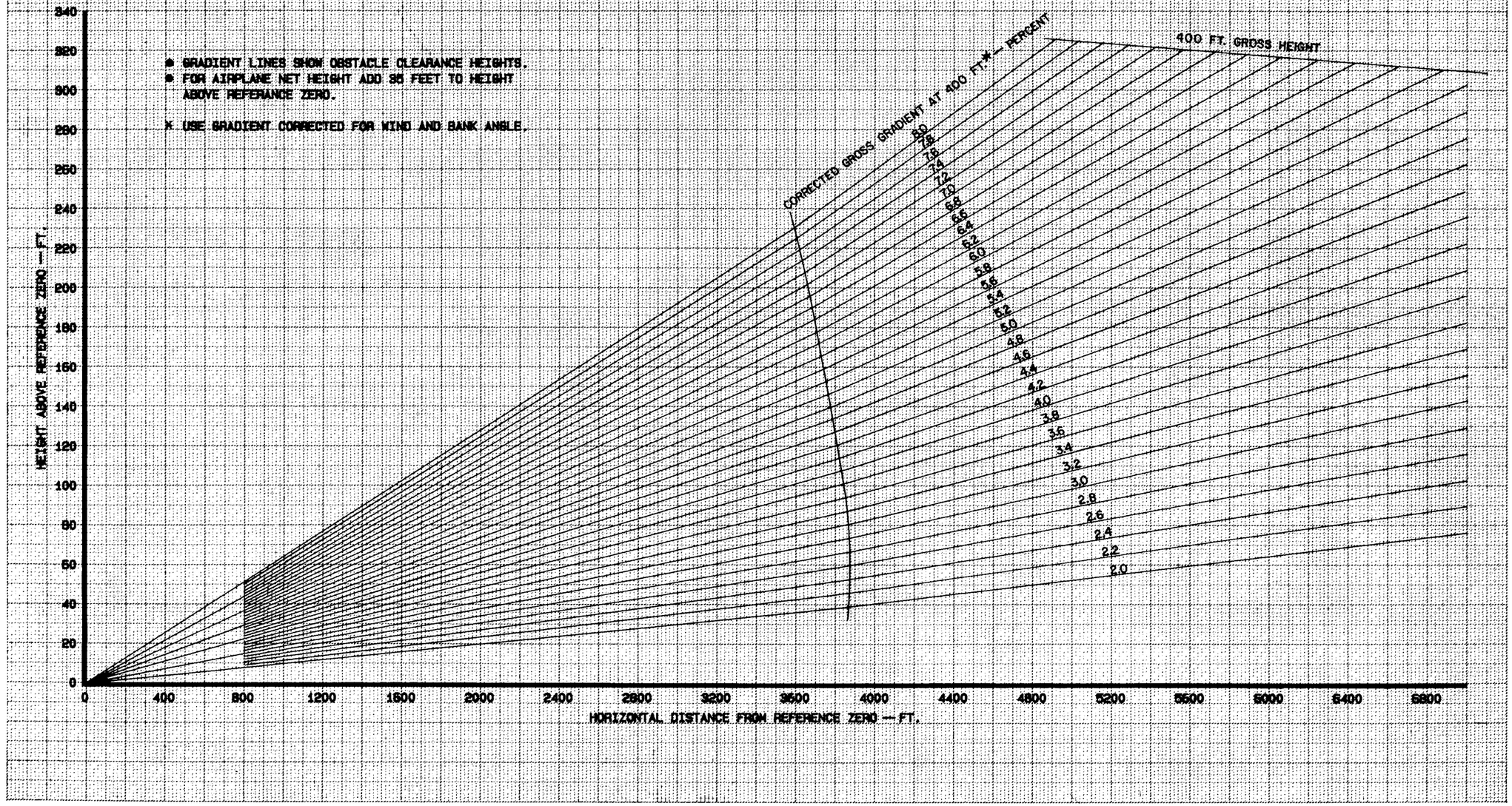
CLOSE-IN OBSTACLE CLEARANCE

APPENDIX 36
LANDING GEAR EXTENDED

FLAPS 5

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO.

X USE GRADIENT CORRECTED FOR WIND AND BANK ANGLE.



P.C. 6L001578
D041T507-1 APP. 36 PG. 4.9-33

GARDNER	APPROVED	DATE
767-300ER	VJM-TKJ SHIELDS	10/30/87
CF6-80C2B6/B6F		

PERFORMANCE

DISTANT OBSTACLE CLEARANCE

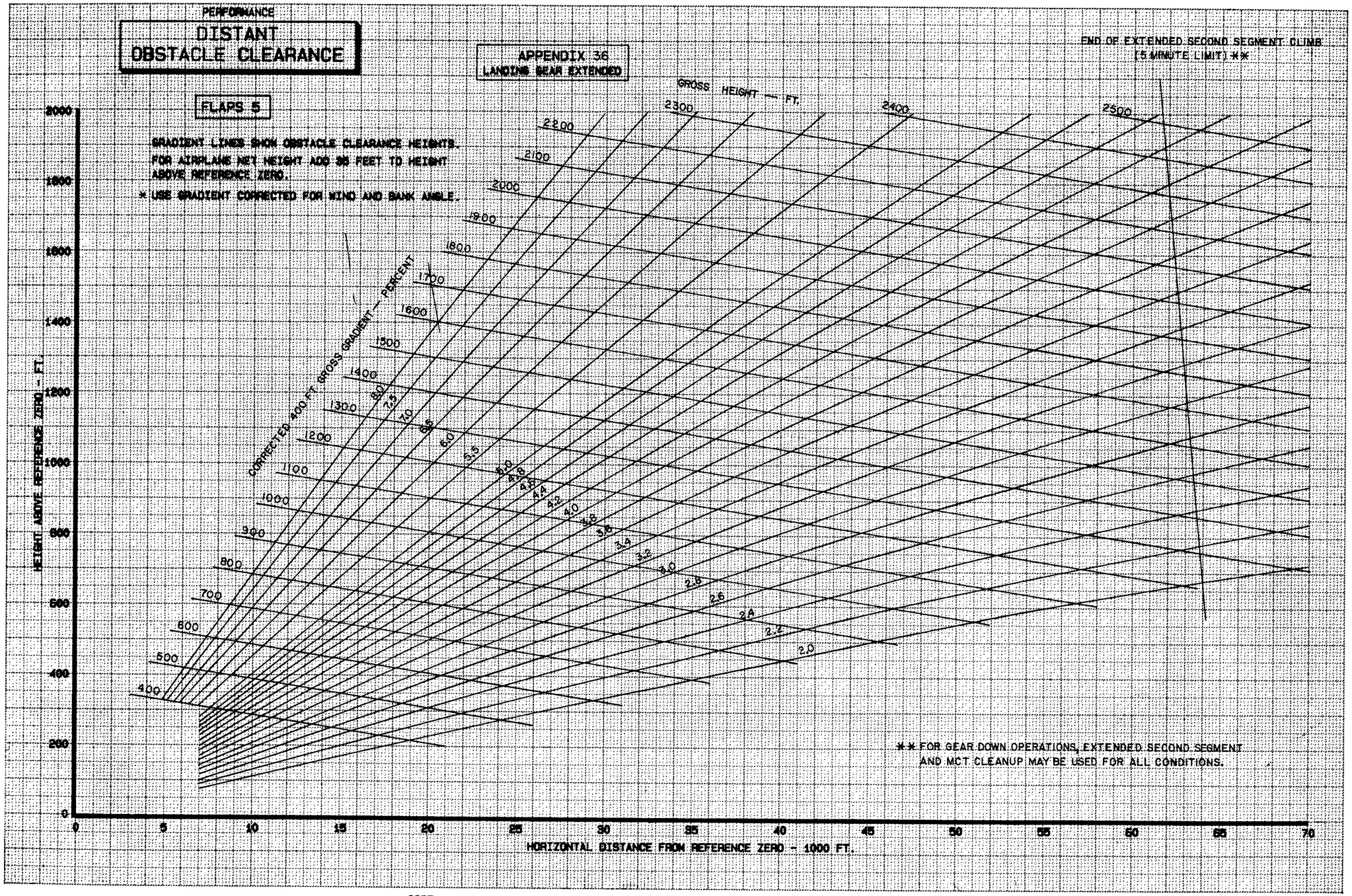
APPENDIX 36
LANDING GEAR EXTENDED

END OF EXTENDED SECOND SEGMENT CLIMB
(5 MINUTE LIMIT) **

FLAPS 5

GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO.

* USE GRADIENT CORRECTED FOR WIND AND BANK ANGLE.



** FOR GEAR DOWN OPERATIONS, EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED FOR ALL CONDITIONS.

P.C. GL001579
D0417B07-1 APP.36 P6.4.9-34

KREINER
767-300 ER
CF6-80C2B6/B6F

	APPROVED	DATE
	Kim-Ney Shields	10/10/97

S24123

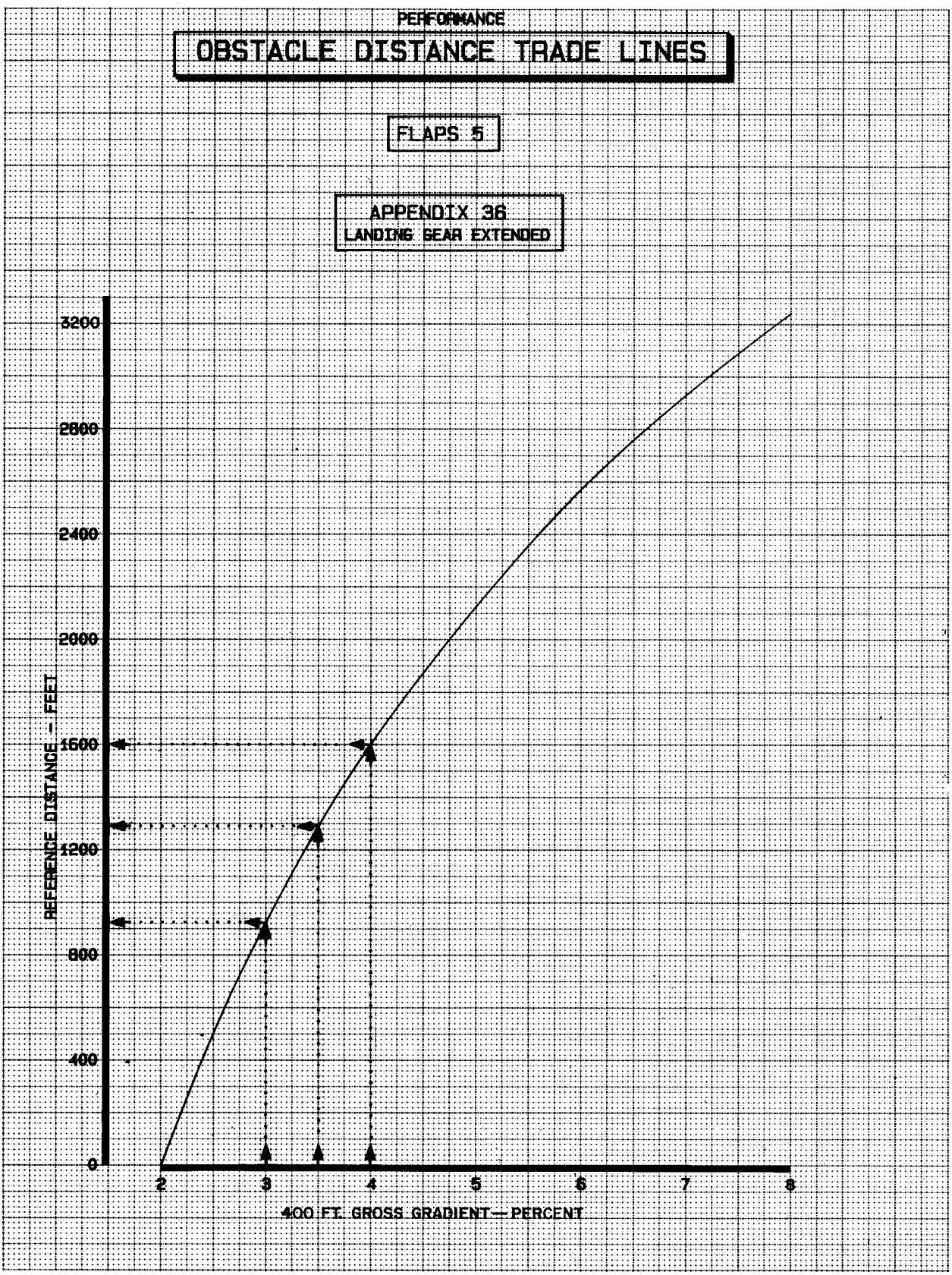
6E4208

PERFORMANCE

OBSTACLE DISTANCE TRADE LINES

FLAPS 5

APPENDIX 36
LANDING GEAR EXTENDED



P.C. 6S000771	
D041T507-1	APP 36 PG 4.9-37

APPROVED	DATE
P.S. Zilz NMSA	10-10-87

HUGHES
767-300ER
CF6-80C2B6/B6F

6E4207

S26867

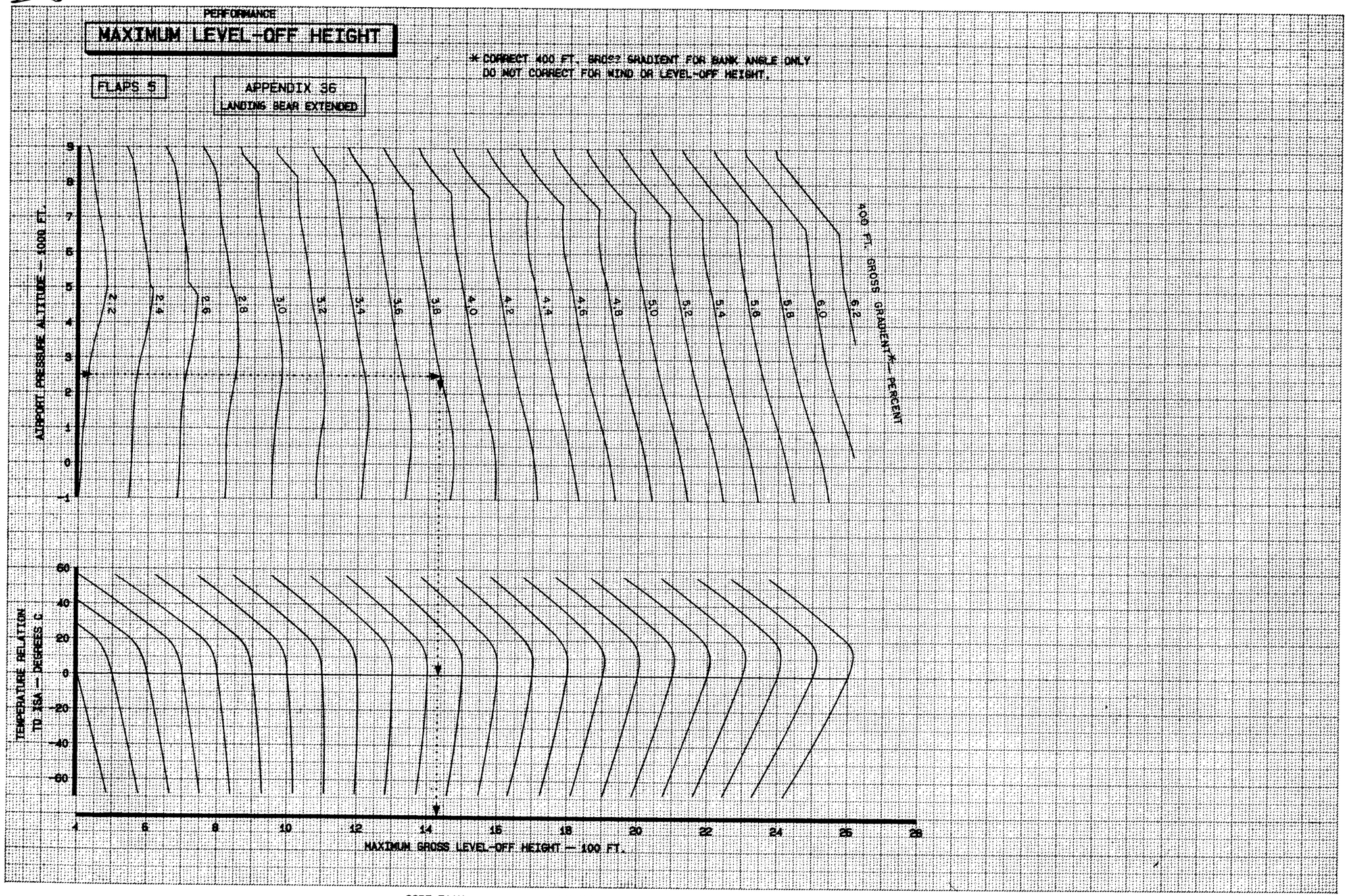
PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 5

APPENDIX 36
LANDING GEAR EXTENDED

* CORRECT 400 FT. GRADIENT FOR BANK ANGLE ONLY. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C.GL001746
D0417607-1 APP. 36 PG. 4.9-38

NEWELL	APPROVED	DATE
767-300ER	M. DEHNER 2W-308	30JAN89
CF6-80C2B6/B6F		

S24124

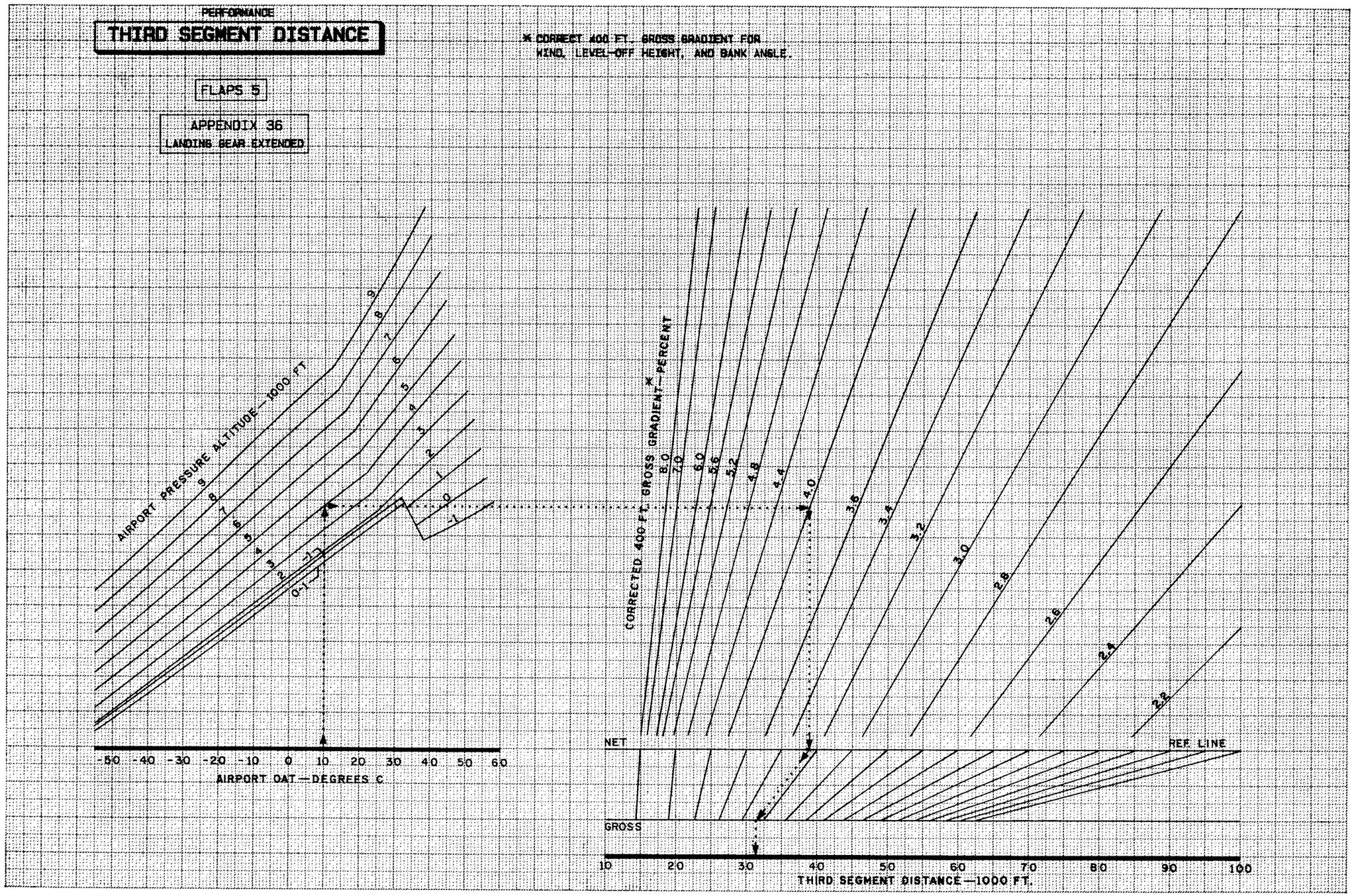
PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 5

APPENDIX 36
LANDING GEAR EXTENDED

* CORRECT 400 FT. GROSS GRADIENT FOR WIND, LEVEL-OFF HEIGHT, AND BANK ANGLE.



P.C. 6L001747
D04T507-1 APP. 36 PG. 4.9-41

SCHMIDT
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
M. LEHMANN FAA DOS	10 Feb 89

S24138

6E4208

PERFORMANCE

FINAL TAKEOFF CLIMB

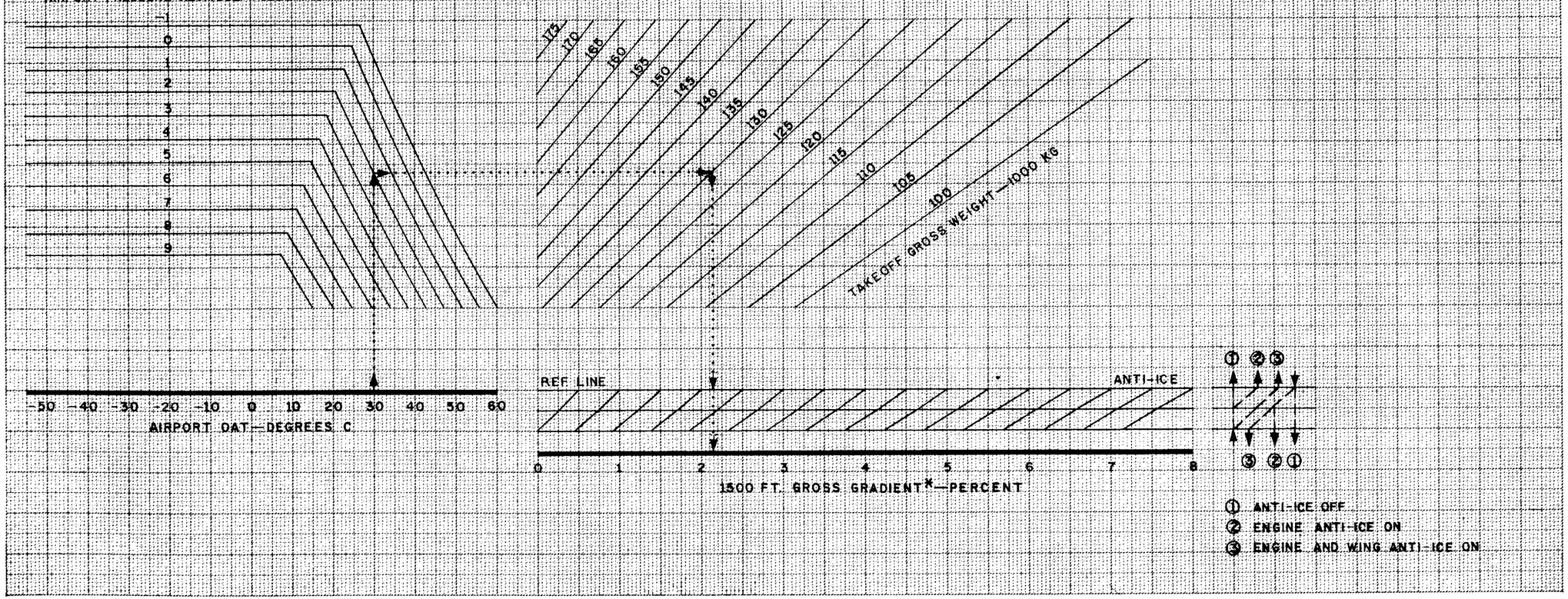
A/C PACKS ON AND OFF

APPENDIX 36
LANDING GEAR EXTENDED

FLAPS UP

● SPEED V_{REF} + 70 KIAS

✱ NET GRADIENT = GROSS GRADIENT -0.8 PERCENT



GRADIENT CORRECTIONS

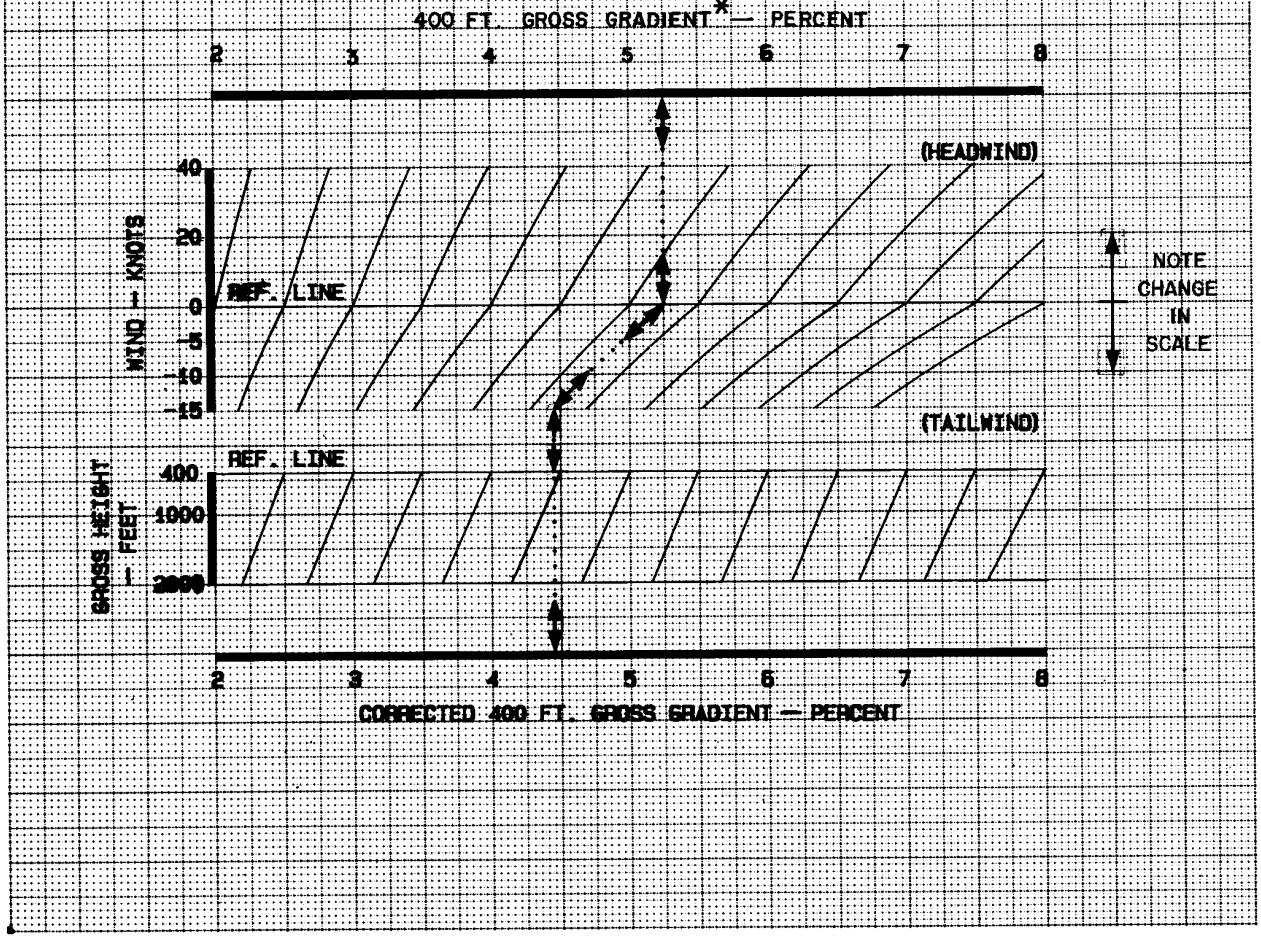
TAKEOFF CLIMB

APPENDIX 36
LANDING GEAR EXTENDED

● APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT (%) IN BANKED TURNS	
BANK ANGLE DEGREES	FLAP POS. 5
5	0.05
10	0.20
15	0.47

* THIS IS THE 400 FT. GROSS GRADIENT OBTAINED FROM THE TAKEOFF CLIMB CHART IN THE BASIC MANUAL ADJUSTED FOR LANDING GEAR EXTENDED.



P.C. 6S000772
D041T507-1 APP. 35 PG. 4.8-46

APPROVED	DATE
	10/17/87

TERRY
767-300ER
CF6-80C2B6/B6F

6E4207

S26868

GRADIENT CORRECTIONS

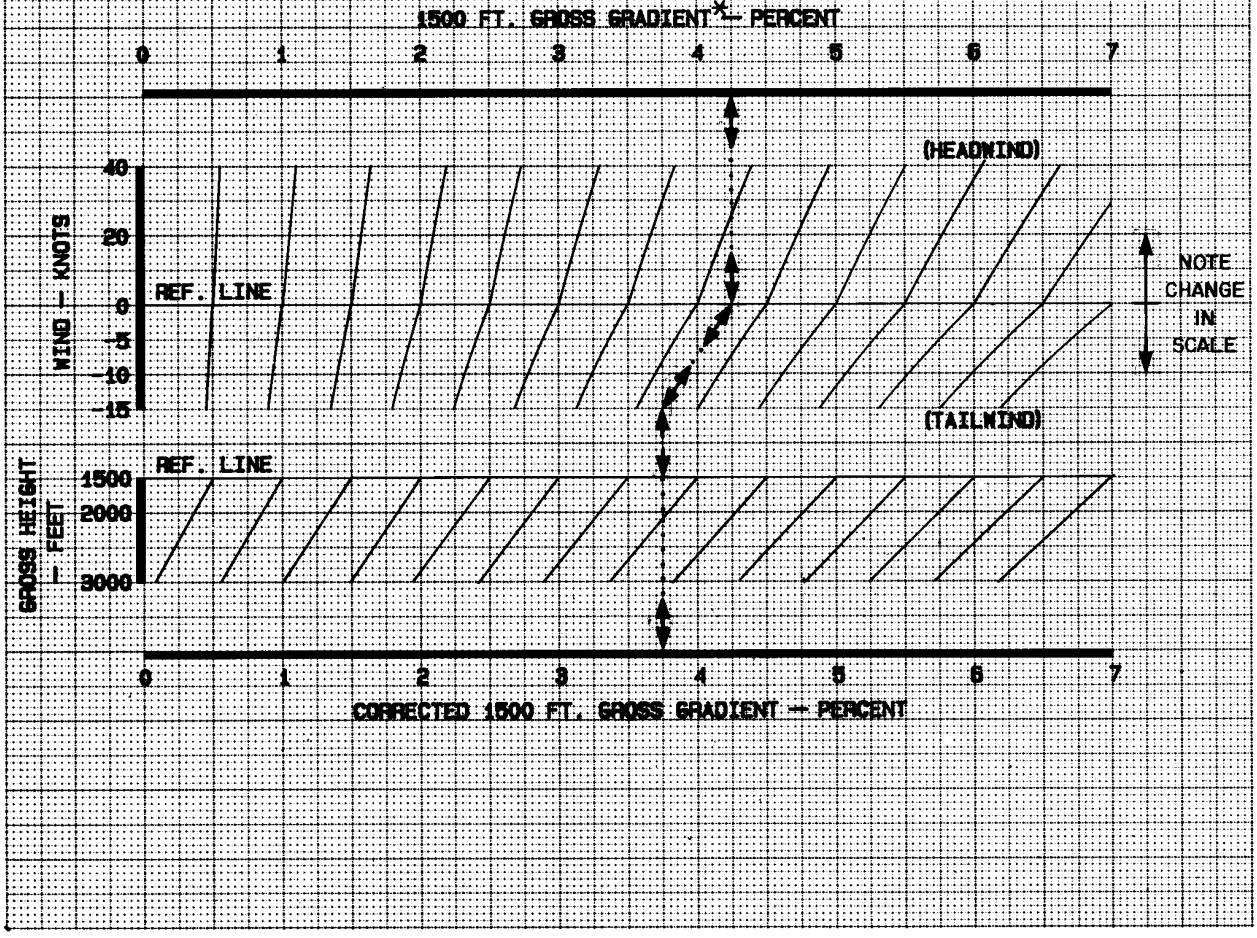
FINAL TAKEOFF CLIMB

APPENDIX 36
LANDING GEAR EXTENDED

● APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT (%) IN BANKED TURNS	
BANK ANGLE DEGREES	FLAPS UP
5	0.02
10	0.09
15	0.21

* THIS IS THE 1500 FT. GROSS GRADIENT OBTAINED FROM THE FINAL TAKEOFF CLIMB CHART.



P.C. 65000773
D041T507-1 APP. 36 PG. 4.9-47

APPROVED	DATE
ARS NM-13S	10/20/87

TERRY
767-300ER
CF6-80C2B6/B6F

664207

S26911

SECTION 4.11 - ENROUTE

G E N E R A L

Enroute climb weight limits with landing gear extended are determined from the Enroute Climb Weights chart in this appendix. To obtain enroute climb gradients with landing gear extended, adjust the gradients read from the charts in the basic manual by -3.55 percent. This applies to A/C packs ON and OFF conditions and Anti-Ice ON and OFF conditions.

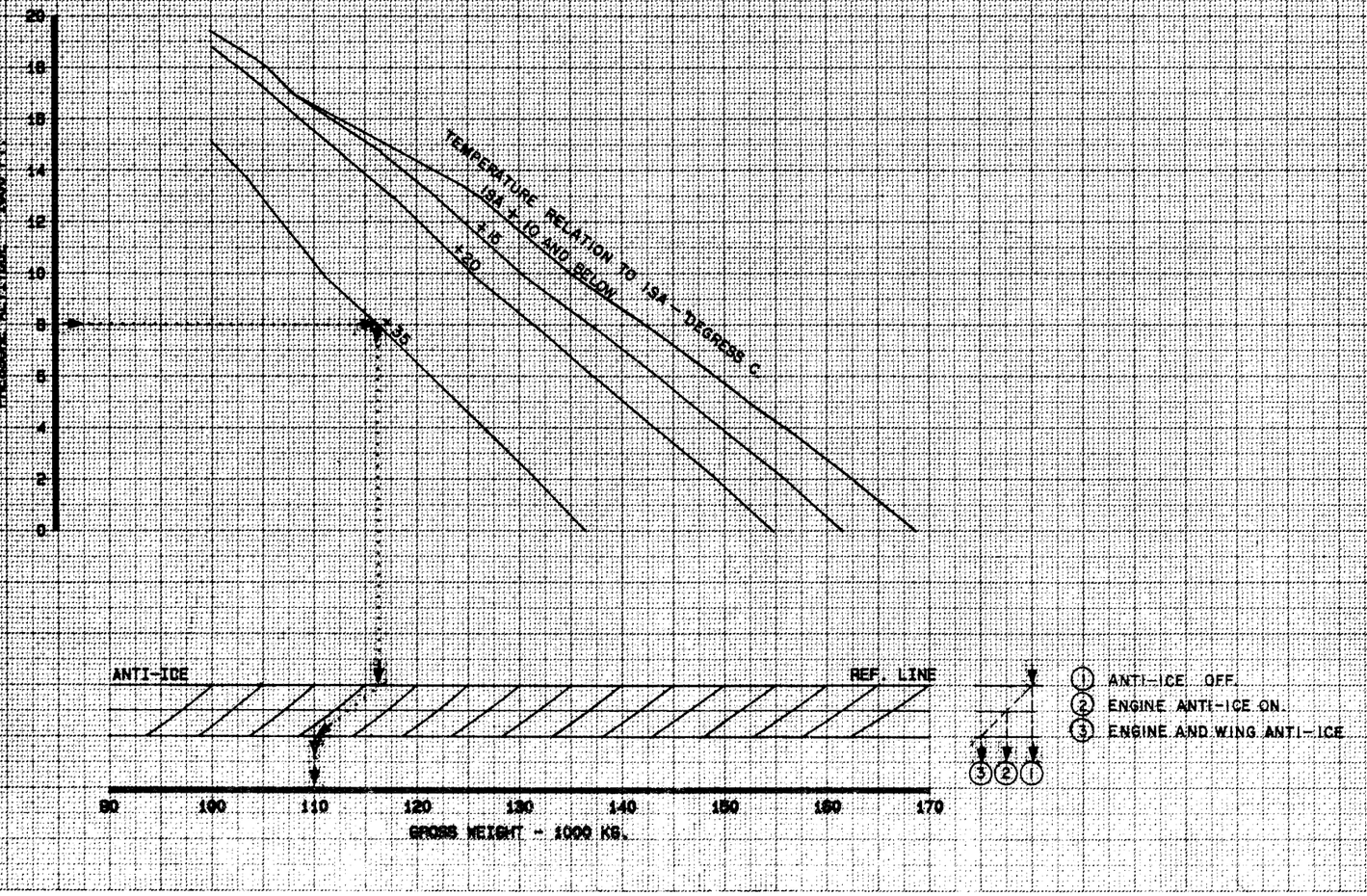
PERFORMANCE

ENROUTE CLIMB WEIGHTS
FOR POSITIVE NET GRADIENTS

A/C ON AND OFF

1 ENGINE INOPERATIVE

APPENDIX 36
LANDING GEAR EXTENDED



P.C. 6L001901
D041T507-1 APP. 36 4.11-3

APPROVED	DATE
KB NM65	FEB88

G. SAUNDERS
767-300ER
CF6-80C2B6/B6F

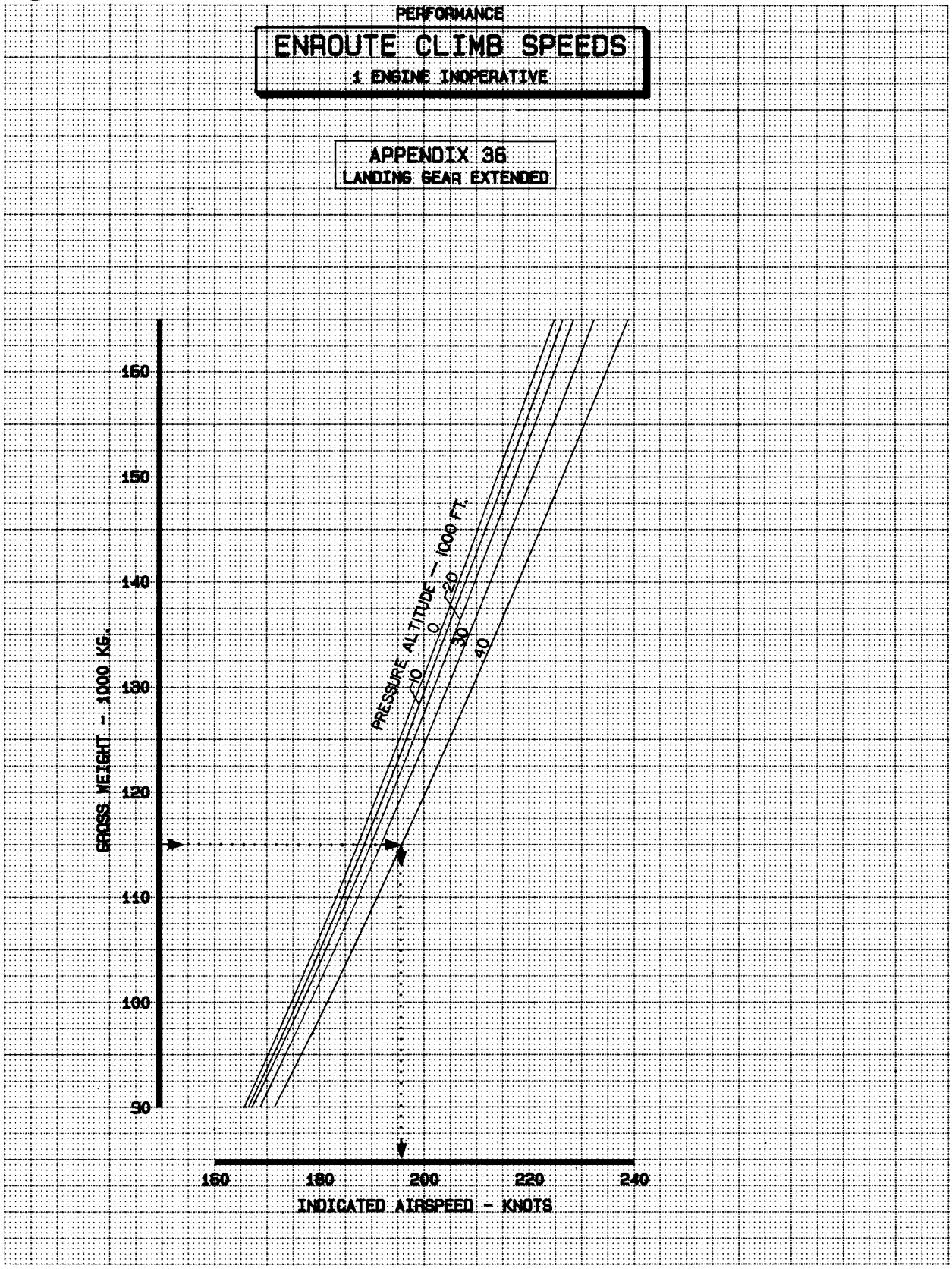
S51233

PERFORMANCE

ENROUTE CLIMB SPEEDS

1 ENGINE INOPERATIVE

APPENDIX 36
LANDING GEAR EXTENDED



GARDNER	APPROVED	DATE
767	KB NM 6S	9FEB88

P.C. 65000837
D041T607-1 APP. 36 PG. 4.11-8

6E4207

S27195

SECTION 4.12 - APPROACH AND LANDING CLIMB

G E N E R A L

Maximum landing weight climb limits with landing gear extended are determined from the appropriate Maximum Landing Weights Climb Limits chart (this section). To obtain approach and landing climb gradients with landing gear extended, adjust the gradients read from the charts in the basic manual by the values listed below.

Condition	Flaps	Gradient Correction (%)
Approach	20	-1.95
Approach (Icing Conditions)	20	-2.35*
Landing	25	- .60*
(Icing Conditions)	30	- .55*

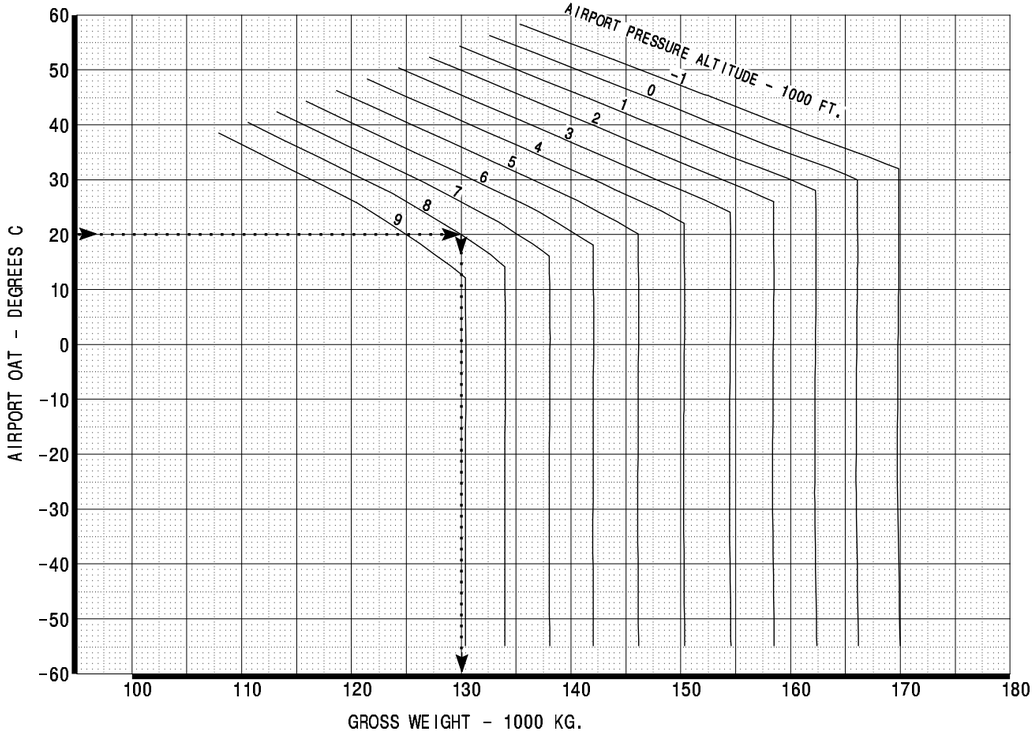
* These corrections account for maximum ice accumulation on the extended landing gear and are in addition to the ice accumulation decrements shown on the Approach and Landing Climb charts.

MAXIMUM LANDING WEIGHT

CLIMB LIMITS

APPROACH FLAPS 20
LANDING FLAPS 25 AND 30

LANDING GEAR EXTENDED



- REDUCE GROSS WEIGHT BY 16,400 KG. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.

- APPLY THE FOLLOWING GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.	
	A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+1500	0
ENGINE ANTI-ICE ON	-850	-2200
ENGINE AND WING ANTI-ICE ON	-2800	-3950

P.C. K636C07A07 APP. 36
D041T507-1 PG. 4.12-7A

APPROVED	DATE
DUTTON	02-26-03

R. Oswald
767-300
CF6-80C2B6/B6F

REVISION HIGHLIGHTS

Revision 13 to Appendix 39K to D6T11321 dated 05-19-06.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to update the manual.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	066882	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
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6	0000	Revised the definition of "stopway".

APPENDIX 39K

CF6-80C2B6F PERFORMANCE

767-300

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 066882** in the code column for the Revision Approval page.

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FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Units KG/C

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The following pages comprise this appendix applicable to the above series airplanes.

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INTRODUCTION

This appendix provides the additional Certificate Limitations and Performance for operation of the 767-300 series airplanes with CF6-80C2B6F engines for Airplane Flight Manual units of kilograms - degrees centigrade.

Section 1 pages in this appendix replace corresponding pages in the basic flight manual. Pages not replaced in the basic flight manual are still applicable. There are no changes to Sections 2 and 3. Section 4 in this appendix replaces Section 4 in the basic flight manual in its entirety. Content should be carefully checked against the Log of Pages.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law.

G E N E R A L

The limitations in Section 1 of the basic Airplane Flight Manual are applicable except as amended herein.

MAXIMUM AIRSPEED LIMITS

FLAP PLACARD SPEEDS	
FLAP POSITION	V_{FE} - KNOTS IAS
1	250
5	230
15	210
20	210
25	180
30	170

- MAXIMUM TAKEOFF GROSS WEIGHT = 412,000 LB. (186,880 KG.)
- LANDING GEAR OPERATING SPEEDS (V_{LO}, M_{LO}):

  RETRACT: 270 KNOTS IAS, 0.82 MACH.

  *EXTEND : 270 KNOTS IAS, 0.82 MACH.

  LANDING GEAR EXTENDED:

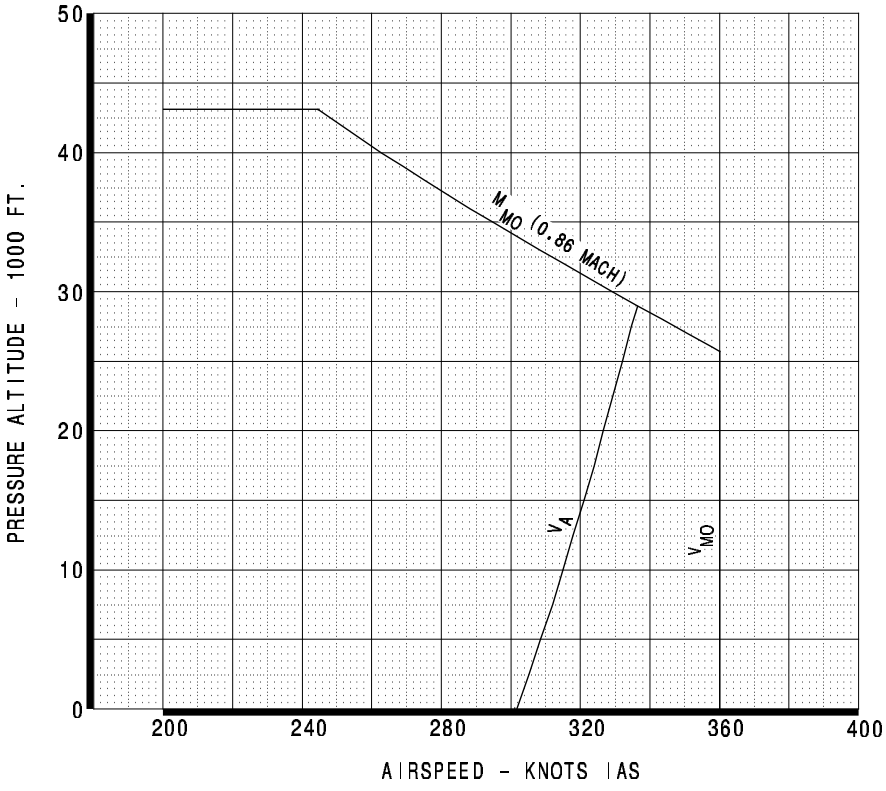
  V_{LE} = 270 KNOTS IAS

  M_{LE} = 0.82 MACH

*LANDING GEAR EXTENDED WITH ALTERNATE SYSTEM:

V_{LO} = 250 KNOTS IAS

M_{LO} = 0.75 MACH



P.C. K600107000
D041T507-1 PG. 1-7

H. LEE
767-300ER
412,000 LB MTOW
(186,880 KG)

APPROVED	DATE
TE AVERY	12-06-01

CERTIFICATE LIMITATIONS

E N G I N E S GE CF6-80C2 SERIES

ENGINE THRUST

N1 values for Takeoff and Maximum Continuous Thrust are presented on the appropriate Thrust Setting charts in Section 4.2.

ENGINE RPM

The maximum operational limits are:

N1 - Low Pressure Rotor 117.5 percent
N2 - High Pressure Rotor 112.5 percent

ENGINE EGT

Operating Condition	Temperature Limits	Time Limit
Takeoff	960 deg C	5 Minutes
Maximum Continuous	925 deg C	Continuous
Starting	870 deg C	Maximum Transient for 40 seconds
	750 deg C	Unlimited

ENGINE LIMIT DISPLAY MARKINGS

Maximum and minimum limits.....Red
Precautionary range.....Amber

The engine limit display markings on EICAS may be used to determine compliance with the maximum and minimum limits and precautionary ranges.

ENGINE INDICATION AND CREW ALERTING SYSTEM (EICAS)

The flight crew shall not blank engine vibration display during takeoff.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged from the basic Airplane Flight Manual.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged from the basic Airplane Flight Manual.

SECTION 4.1 - GENERAL

C O N T E N T S

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

REGULATORY COMPLIANCE

The information in this section is presented in compliance with the requirements of FAR Part 25, paragraph 25.1581 and FAR Part 36.

STANDARD PERFORMANCE CONDITIONS

All performance in this section is based on the following:

1. Approved engine thrust ratings less installation, airbleed, and accessory losses.

2. Trailing edge flap positions as follows:

	Trailing Edge Flaps
Takeoff	5, 15, 20
Enroute	0
Approach	20
Landing	25, 30
Category IIIb Landing	25, 30

3. Leading edge devices in the appropriate position for trailing edge flap position.

4. Full temperature accountability within the operational limits, except for landing distance, which is based on standard day temperatures.

5. Wind corrections are calculated using not more than 50% of actual headwinds, or not less than 150% of actual tailwinds, in compliance with relevant operating regulations unless otherwise noted. All charts should be entered with actual tower-reported wind components. Tower winds are assumed to be measured at 10 meters (32.8 feet).

6. Humidity has no appreciable effect on the thrust of the engines; therefore, it has not been considered in the performance data.

GENERAL

PERFORMANCE CONFIGURATION

The airplane configuration associated with the performance data in this manual is shown below. Performance conditions not shown below are on the appropriate charts.

	THRUST	FLAPS	GEAR
TAKEOFF	Takeoff on all operating engines.	Takeoff setting. Noted on chart.	Down
1ST SEGMENT CLIMB	Takeoff on operating engine (1)	Same as takeoff.	Down
2ND SEGMENT CLIMB	Same as 1st segment.	Same as takeoff.	Up
3RD SEGMENT	Same as 1st segment.	Takeoff setting to flaps up, according to schedule.	Up
FINAL TAKEOFF CLIMB	Maximum continuous on operating engine (1).	Up	Up
ENROUTE CLIMB	Maximum continuous on operating engine (1)	Up	Up
APPROACH CLIMB	Takeoff on operating engine (1).	Approach setting. Noted on chart.	Up
LANDING CLIMB	Maximum available in 8 seconds on all engines.	Landing setting. Noted on chart.	Down
LANDING	Idle on all engines at touchdown.	Landing setting. Noted on chart.	Down

Antiskid is on for takeoff and landing unless antiskid inoperative braking performance is scheduled.

Corrections are shown on appropriate charts for one brake deactivated (antiskid operative).

Automatic speed brake extension system operative landing performance is scheduled except when automatic speed brakes are inoperative and manual speed brake landing performance is scheduled.

The left and right pneumatic isolation valves are closed except for enroute and approach climb when wing anti-ice is ON.

S199901

P E R F O R M A N C E C O N F I G U R A T I O N (Continued)

Performance is applicable to both APU ON and OFF.

Performance is applicable to both Electronic Engine Control (EEC) operative and inoperative.

Corrections are shown on appropriate charts for anti-ice ON. Anti-ice is OFF when OAT is greater than 10°C (50°F).

If a primary ice detection and activation system is installed:

WING ANTI-ICE PERFORMANCE CORRECTIONS

With the wing anti-ice selector in the AUTO position, wing anti-ice performance corrections must be applied. For certain powersettings and atmospheric and flight conditions, the Thrust Management Computer (TMC) may also decrement target N1.

ENGINE ANTI-ICE PERFORMANCE CORRECTIONS

With the engine anti-ice selector in the AUTO position, engine anti-ice performance corrections must be applied. For certain powersettings and atmospheric and flight conditions, the Thrust Management Computer (TMC) may also decrement target N1.

S19904

GENERAL

P E R F O R M A N C E C O N F I G U R A T I O N (Continued)

Throughout the takeoff flight path, and during approach and landing, performance charts are shown for A/C packs on or A/C packs off. The A/C pack off designation means no engine airbleed is used for Air Conditioning.

The effect of anti-icing systems operation is shown on applicable charts.

D E F I N I T I O N S

AIRSPEEDS

All airspeeds and Mach values in this manual are based on the primary static source position error and assume zero instrument error.

Static Source Position error, ΔV_p, is the error due to the location of the static port within the airplane pressure field.

Indicated Airspeed, V_I, IAS - Airspeed indicator reading, as installed in the airplane, uncorrected for static source position error (assumes zero instrument error).

Calibrated Airspeed, V_C, CAS - Indicated airspeed corrected for static source position error ($V_C = V_I + \Delta V_p$).

Equivalent Airspeed, V_e, EAS - Calibrated airspeed corrected for compressibility ($V_e = V_C - \Delta V_C$).

True Airspeed, V_T, TAS - Equivalent airspeed corrected for atmospheric density effects ($V_T = V_e/\sqrt{\sigma}$).

True Mach Number, M - Machmeter reading, as installed in the airplane, corrected for static source position error.

Critical Engine Failure Speed, VEF - The speed at which, if the most critical engine fails, the engine failure is recognized at Vl, 1 second later.

Takeoff Decision Speed, Vl - Following a failure of the critical engine at V_{EF}, the speed from which a decision to continue the takeoff results in a takeoff distance to a height of 35 feet at V_2 speed that will not exceed the usable takeoff distance and the speed from which a decision to bring the airplane to a full stop will not exceed the accelerate-stop distance available. Vl must not be less than the minimum V_1 for control on the ground, $V_{1(MCG)}$, or greater than the rotation speed, V_R, or greater than the maximum brake energy speed, V_{MBE}.

Rotation Speed, VR - The speed at which rotation from the three-point attitude to the takeoff attitude is initiated.

S19907

GENERAL

D E F I N I T I O N S

AIRSPEEDS (Continued)

Takeoff Decision Speed Ratio, V1/VR - The ratio of the takeoff decision speed, V1, to the rotation speed, VR.

Maximum Brake Energy Speed, VMBE - The highest takeoff decision speed from which the airplane may be brought to a stop without exceeding the maximum energy absorption capability of the brakes. Maximum Brake Energy Speed is compared in takeoff planning to V1 speed.

Takeoff Safety Speed, V2 - The target speed to be attained at the 35 foot height, assuming recognition of an engine failure at or after V1. This speed must be at least 1.13 times the 1G stall speed in the takeoff configuration.

Air Minimum Control Speed, VMCA - The minimum flight speed at which the airplane is controllable with a maximum of 5 degrees bank when the critical engine suddenly becomes inoperative with the remaining engine at takeoff thrust.

Minimum V_1 for Control on the Ground, $V_{1(MCG)}$ - The minimum takeoff decision speed, V_1, at which, when the critical engine suddenly becomes inoperative at V_{EF} with the remaining engine at takeoff thrust, it is possible to control the airplane with primary aerodynamic controls alone and continue the takeoff.

Landing Speed - The minimum speed at the 50 foot height in a normal landing. This speed must be at least 1.23 times the 1G stall speed in the landing configuration.

Reference Speed, VREF - This speed is equal to the landing speed in the flaps 30 landing configuration.

Design Maneuvering Speed, VA - The maximum speed at which application of full available aileron, rudder or elevator will not overstress the airplane.

TEMPERATURE

ISA - International Standard Atmosphere, as accepted by the International Civil Aviation Organization.

OAT - Outside Air Temperature - the free air static (ambient) temperature.

SAT - Static Air Temperature - outside air (ambient) temperature as computed from TAT (see temperature conversion chart this section).

TAT - Total Air Temperature - static air temperature plus adiabatic compression (ram) rise as indicated on the Total Air Temperature indicator.

S19993

SECTION 4.1 - GENERAL

D E F I N I T I O N S (Continued)

WIND

Wind Velocity - The actual wind velocity at a 10 meter height reported from the tower and corrected by the wind component chart to a headwind or tailwind component parallel to the flight path.

TAKEOFF PATH

The takeoff path assumes failure of the most critical engine at VEF and extends from a standing start to a point where the airplane is at least 1,500 feet above the takeoff surface and has achieved the enroute configuration and final climb speed.

The performance charts divide the takeoff path into segments representing distinct changes in airplane configuration, airspeed, and engine thrust as defined below. Some of these definitions are abbreviated versions of those appearing in FAR Parts 1 and 25; the appropriate regulations should be consulted for complete details.

Clearway - An obstacle-free area beyond the takeoff runway which can be used as a part of the takeoff distance available.

Stopway - An area beyond the takeoff runway capable of supporting the airplane in an aborted takeoff which can be used as part of the accelerate-stop distance available. To be applicable for use with this manual, the surface characteristics of the stopway must not differ substantially from those of the runway.

Takeoff Distance Required - The greater of: (1) the distance to takeoff and climb to a height of 35 feet with a failure of the critical engine at VEF, or (2) 115 percent of the distance to takeoff and climb to a height of 35 feet with all engines operating.

GENERAL

D E F I N I T I O N S

TAKEOFF PATH (Continued)

Takeoff Run Required - The greater of: (1) the distance to takeoff and climb to a point equidistant between lift off and the 35 foot height point with a failure of the critical engine at VEF, or (2) 115 percent of the distance to takeoff and climb to a point equidistant between lift off and the 35 foot height point with all engines operating.

Accelerate-Stop Distance Required - The sum of the distances required to: (1) accelerate with all engines operating, and (2) come to a complete stop assuming a critical engine failure at VEF.

TAKEOFF FLIGHT PATH

The takeoff flight path begins 35 feet above the takeoff surface at the end of the takeoff distance and extends to a point where the airplane is at least 1500 feet above the takeoff surface and has achieved the enroute configuration and final climb speed.

Climb Gradient - The ratio, expressed as a percentage, of the change in geometric height divided by the horizontal distance travelled in a given time. Gross gradient is the actual calculated performance of the airplane under specified conditions, while Net gradient is the gross gradient reduced by an increment specified in the regulations.

Gross Height - The geometric height attained at any point in the takeoff flight path using gross climb performance. Gross height is used for calculating actual pressure altitude at which obstacle clearance procedures and wing flap retraction are initiated, and level-off height scheduled.

Net Height - The geometric height attained at any point in the takeoff flight path using net climb performance. Net height is used to determine the net flight path which must clear any obstacle by at least 35 feet to comply with the regulations.

Reference Zero - A point on the runway or clearway plane at the end of the takeoff distance and 35 feet below the flight path to which the height and distance coordinates of other points in the takeoff flight path are referred.

First Segment - Extends from the end of the takeoff distance to the point where the landing gear is assumed to be fully retracted, using takeoff thrust and takeoff flaps at a constant V2 speed.

Second Segment - Extends from the gear up point to a gross height of at least 400 feet, using takeoff thrust and takeoff flaps at a constant V2 speed.

S20047

D E F I N I T I O N S

TAKEOFF FLIGHT PATH (Continued)

Third Segment - The horizontal distance required to accelerate, at constant altitude using takeoff thrust, to the final climb speed while retracting flaps in accordance with the recommended speed schedule.

Maximum Level-Off Height - The maximum height at which the third segment can be completed before the time limit on the use of takeoff thrust expires.

Final Takeoff Segment - Extends from the end of the third segment to a gross height of at least 1,500 feet, with flaps up, maximum continuous thrust and at final climb speed.

M A X I M U M C R O S S W I N D

The maximum demonstrated crosswind component for takeoff and landing is 33 knots reported wind at 10 meter height. This component is not considered to be limiting on a dry runway with all engines operating.

B U F F E T O N S E T C H A R A C T E R I S T I C S

Buffet onset occurs when the airflow starts to separate from the wing. This characteristic is a function of angle of attack and Mach number.

From the Cruise Maneuvering Capability chart it is possible to determine the altitude, low-speed, high-speed, and maneuvering margins before the buffet onset occurs.

A N T I - S K I D I N O P E R A T I V E T A K E O F F P E R F O R M A N C E (767-300ER, CF6-80C2B6(F), category C brakes)

With the anti-skid system inoperative, the allowable takeoff weight determined from Section 4.4 must be reduced by the following adjustments:

Actual runway length - FT	Takeoff Gross Weight Adjustment
10,400 or greater	0 lb (0 kg)
10,200	4,800 lb (2,177 kg)
10,000	9,600 lb (4,354 kg)
9,800	14,400 lb (6,532 kg)
9,600	19,200 lb (8,709 kg)
9,400	24,000 lb (10,886 kg)
9,200	28,700 lb (13,018 kg)
9,000	33,500 lb (15,195 kg)
8,800	38,300 lb (17,373 kg)
8,600	43,100 lb (19,550 kg)
8,400	47,900 lb (21,727 kg)
8,200 or less	52,600 lb (23,859 kg)

S20053

GENERAL

PERFORMANCE CONDITIONS AND PROCEDURES

The conditions and procedures used in establishing the performance data in this manual are presented for each phase of operation. Airplane configuration and engine thrust settings are shown under Performance Configuration. These procedures include only the essential steps which affect airplane performance, and should be considered as guidance material from which more complete operational procedures can be developed.

TAKEOFF

CONDITIONS

Takeoff field length performance shown accounts for the greater of: (1) 115 percent of the all-engines operating distance, or (2) the engine inoperative distance, considering a failure of the critical engine at VEF. These distances are based on a smooth, dry, hard-surfaced runway.

PROCEDURES

Prior to takeoff, review stabilizer, flap and N1 settings, takeoff speeds, and ascertain that sufficient performance is available for the gross weight and ambient conditions. Apply corrections when necessary for significantly altered ambient conditions or loading.

Set 70% N1 prior to brake release or as the airplane is aligned with the runway. As the airplane accelerates, advance the thrust levers to the takeoff N1 setting. Readjust thrust levers, if necessary, prior to 80 knots to obtain target N1. Do not make further adjustments after 80 knots.

Use rudder pedals for directional control through the nose wheel and rudder.

Initiate rotation to takeoff attitude at VR. A speed not less than V2 should be obtained at a height of 35 feet. Retract the landing gear after a positive rate of climb has been established.

Make a smooth positive rotation to the initial climb attitude (approximately 13 to 20 degrees depending upon gross weight and thrust available). Climb after engine failure results in approximately 3 to 6 degrees lower attitude than all engine climb. Make minor attitude variations after liftoff to achieve the initial climb speed.

NOTE: With center of gravity at or near the aft limit, maintain forward pressure on the control column to approximately 80 knots to increase nose wheel steering effectiveness.

S20644

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

REFUSED TAKEOFF

CONDITIONS

Calculated accelerate-stop distances account for demonstrated recognition and reaction times, plus additional time delays.

Antiskid Operative distances are valid with RTO Automatic Wheel Brakes either on or off.

Reverse thrust was not used in calculating these distances.

PROCEDURES

Initiate refused takeoffs at or prior to V1 using the following procedures:

Antiskid Operative

Simultaneously close thrust levers and apply maximum manual wheel braking or verify operation of RTO Automatic Wheel Braking. Raise the speedbrakes.

Antiskid Inoperative

Close thrust levers and raise the speedbrakes. Initiate wheel braking using very light pedal pressure and increase as groundspeed decreases.

GENERAL

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

CLIMB-OUT (1 or 2 Engines)

CONDITIONS

Climb gradient and obstacle clearance flight path performance are based on failure of the most critical engine at VEF.

PROCEDURES

Maintain takeoff flap setting and a speed not less than V2 to the height selected for initiation of flap retraction.

Retract flaps according to the Flap Retraction Speed Schedule, in this section.

Follow enroute procedures after all takeoff flight path obstacles have been cleared or after climbing to at least 1,500 feet above runway elevation.

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

OBSTACLE CLEARANCE

PROCEDURES

When engine failure occurs prior to V_2, and the takeoff weight is obstacle limited, maintain V_2 up to the gross height required for obstacle clearance.

If an engine failure occurs after V_2, maintain speed at engine failure (V_2 + 15 knots maximum) up to the gross height required for obstacle clearance.

When the height selected for initiation of flap retraction is limited due to distant-obstacle considerations, initiate flap retraction and accelerate to final takeoff climb speed while maintaining constant altitude and initial takeoff thrust setting.

Continue final takeoff climb to 1,500 feet above runway elevation, or to the minimum gross height required for obstacle clearance, at final takeoff climb speed and maximum continuous thrust.

NOTES: If an engine failure occurs, the airplane should be leveled off, and flaps retracted at the selected level-off height, only if the limiting obstacle is beyond the Third Segment.

The height selected for initiation of flap retraction may be limited by available performance as described under Takeoff Flight Path. Vertical clearance of either close-in or distant obstacles in the intended flight path must be established by reference to the appropriate obstacle clearance charts.

PERFORMANCE CONDITIONS AND PROCEDURES (Continued)

LANDING FIELD LENGTH

CONDITIONS

All landing field lengths shown in this manual are based on standard day temperatures on a smooth, level, hard-surfaced runway. Dry non-autoland field lengths (Section 4.13) are maximum performance landing distances, from a 50 foot height at landing speed, divided by a factor of 0.6. Scheduled WET landing field lengths are determined by multiplying the scheduled DRY landing field lengths by a factor of 1.15. Reverse thrust was not used in establishing these distances. Autoland field lengths are based on the runway field length requirements of AC 120-28C (May 1982 draft).

PROCEDURES

Close thrust levers to idle on all engines at or prior to touchdown.

Antiskid Operative

Raise speedbrakes at touchdown and apply wheel braking.

Antiskid Inoperative

Raise speedbrakes at touchdown. Initiate wheel braking using very light pedal pressure and increase as groundspeed decreases.

S20655

GENERAL

F L A P R E T R A C T I O N S P E E D S C H E D U L E

Maximum level-off heights, Third Segment distances and Final Segment climb performance shown in this manual are based upon retracting the wing flaps during Third Segment acceleration using the schedule below. This schedule is recommended for all flap retraction operations.

During acceleration, select flap positions at the following initiation speeds:

FLAP POSITION	INITIATION SPEED, KNOTS	SELECT FLAP POSITION
20/15	V_{REF} + 20	5
5	V_{REF} + 40	1
1	V_{REF} + 60	0

Final Segment Climb Speed: V_{REF} + 80 KNOTS.

V_{REF} is the reference speed at the scheduled takeoff gross weight (Section 4.7).

When flaps are being retracted at a constant altitude, begin climbing when V_{REF} + 80 knots is achieved, maintaining takeoff thrust setting until flaps are completely retracted.

S20660

GENERAL

TAKEOFF WEIGHT DETERMINATION PROCEDURE

INTRODUCTION

The charts in this manual allow the determination of the maximum takeoff gross weight permitted by the applicable Federal Aviation Regulations (FAR) and the associated takeoff speeds and flight paths for any combination of atmospheric and airport variables. Limitations on takeoff gross weight can be divided into four basic categories: Field Length Limited, Climb Limited, Tire Speed Limited, and Obstacle Limited Gross Weight. A brief discussion of these limitations will give a better understanding of the use of the charts and define the variables involved.

FIELD LENGTH LIMITED PERFORMANCE

The takeoff gross weight is field length limited when the field length required by the FAR is equal to the field length available. The field length required under FAR Part 25 considers both the all-engines-operative and the critical-engine-inoperative cases. The field length to be considered in the all-engines-operative case is defined as the actual takeoff distance to a height of 35 feet multiplied by the factor 1.15. In the critical-engine-inoperative case, the field length required is the greater of the accelerate-go and accelerate-stop distances. These two distances are related by Vl, the takeoff decision speed. By selecting V_1 so that the accelerate-go and the accelerate-stop distances are each equal to the distances available, the resulting takeoff weight is maximized for a particular runway situation. At most airports, the field length available is synonymous with the actual length of the runway; but it may also include clearway, stopway or a combination of both. Clearway is defined as an area extending beyond the end of the runway above which no part of the terrain protrudes. Up to one-half of the air distance may extend over a clearway. A stopway is an area extending beyond the end of the runway which may be used in decelerating the airplane during a refused takeoff (accelerate-stop) and, therefore, must be capable of supporting the airplane without causing structural damage.

CLIMB LIMITED PERFORMANCE

Takeoff weight becomes climb limited when the available climb gradient equals the minimum gradient specified by the FAR. Minimum gradients are defined for the first, second, and final segments of the takeoff flight path; however, the second segment is generally the most limiting on the 767. At climb limited takeoff weight the 2.4% gradient requirement is met at the gear-up height. This performance should not be confused with the takeoff climb gradient at 400 feet gross height which is used as a reference gradient for Obstacle Clearance calculations.

S20663

GENERAL

TAKEOFF WEIGHT DETERMINATION PROCEDURE (Continued)

TIRE SPEED LIMITED PERFORMANCE

The takeoff weight becomes tire speed limited if the weight determined from the Tire Speed Limits chart, Section 4.6, is lower than that determined from all other requirements. When this occurs, the resulting liftoff speed just equals a true ground speed limitation on the tires.

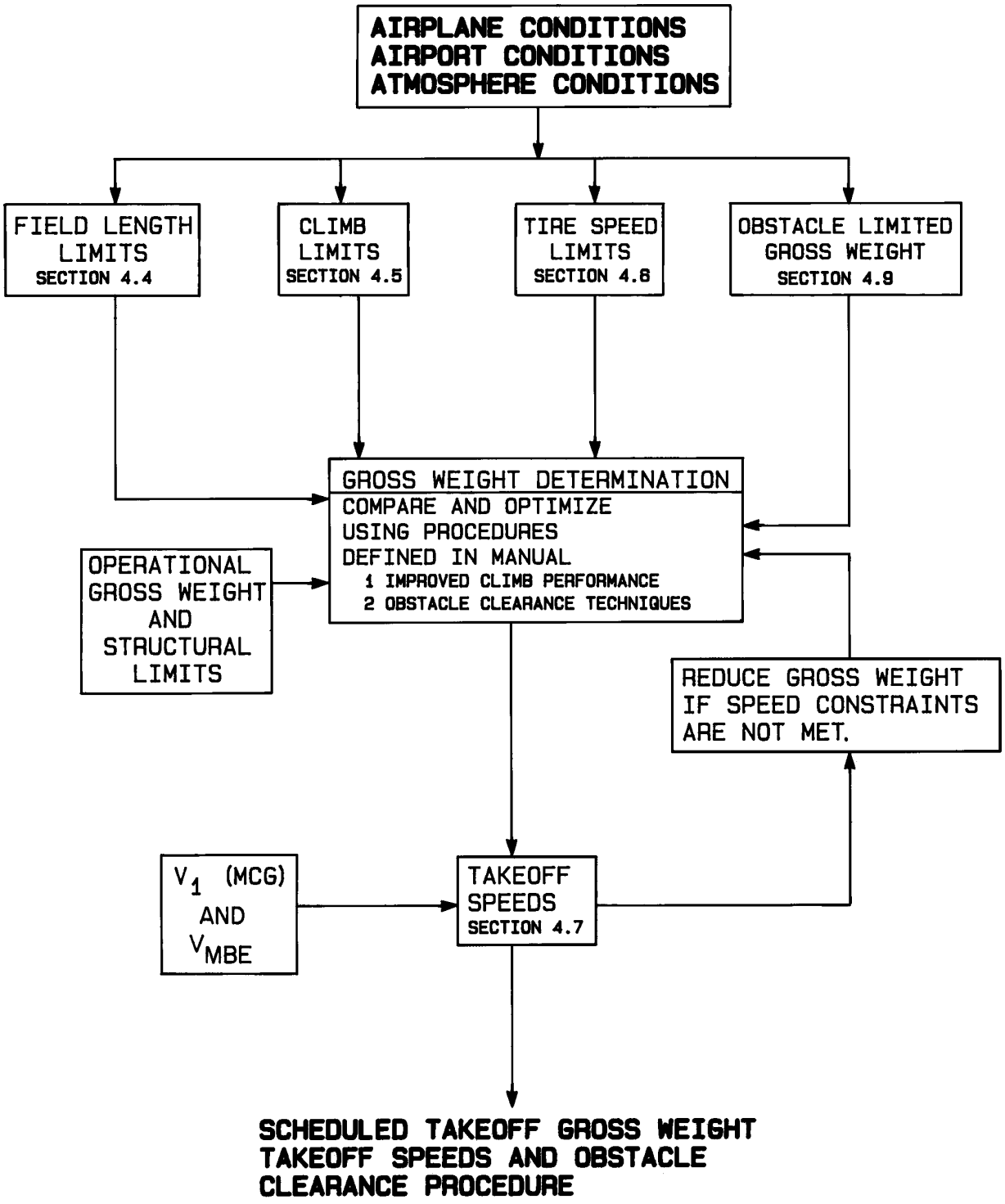
OBSTACLE CLEARANCE LIMITED PERFORMANCE

The takeoff gross weight becomes obstacle limited when the net takeoff flight path just clears an obstacle by the required 35 feet. The takeoff flight path is the calculated height versus distance relationship beginning at the point where the airplane achieves a height of 35 feet. The critical engine is assumed inoperative. The flight path extends to a point where a gross height of 1,500 feet has been attained, and the transition to the enroute configuration is completed unless a distant obstacle requires an extension of the net flight path. The gross or actual flight path is used to determine the actual height at the transition from one segment to another. Net flight path is the gross path reduced by 0.8 percent gradient capability, and the regulations require that the net flight path minus 35 feet be used to demonstrate vertical obstacle clearance.

TAKEOFF WEIGHT DETERMINATION PROCEDURE FLOW DIAGRAM

The flow diagram following shows in simplified steps a procedure to determine the scheduled takeoff gross weight and associated speeds for a given set of airplane, airport, and atmospheric conditions. Basically, the scheduled takeoff gross weight cannot exceed any of the gross weight limits as defined in the flight manual and the corresponding speeds must not violate any of the speed limitations. Any combination of takeoff gross weight and takeoff speeds that meet these two criteria is acceptable to be scheduled for takeoff. The more detailed procedures are defined in the appropriate sections of the manual and numerical examples appear in the example problem appendix.

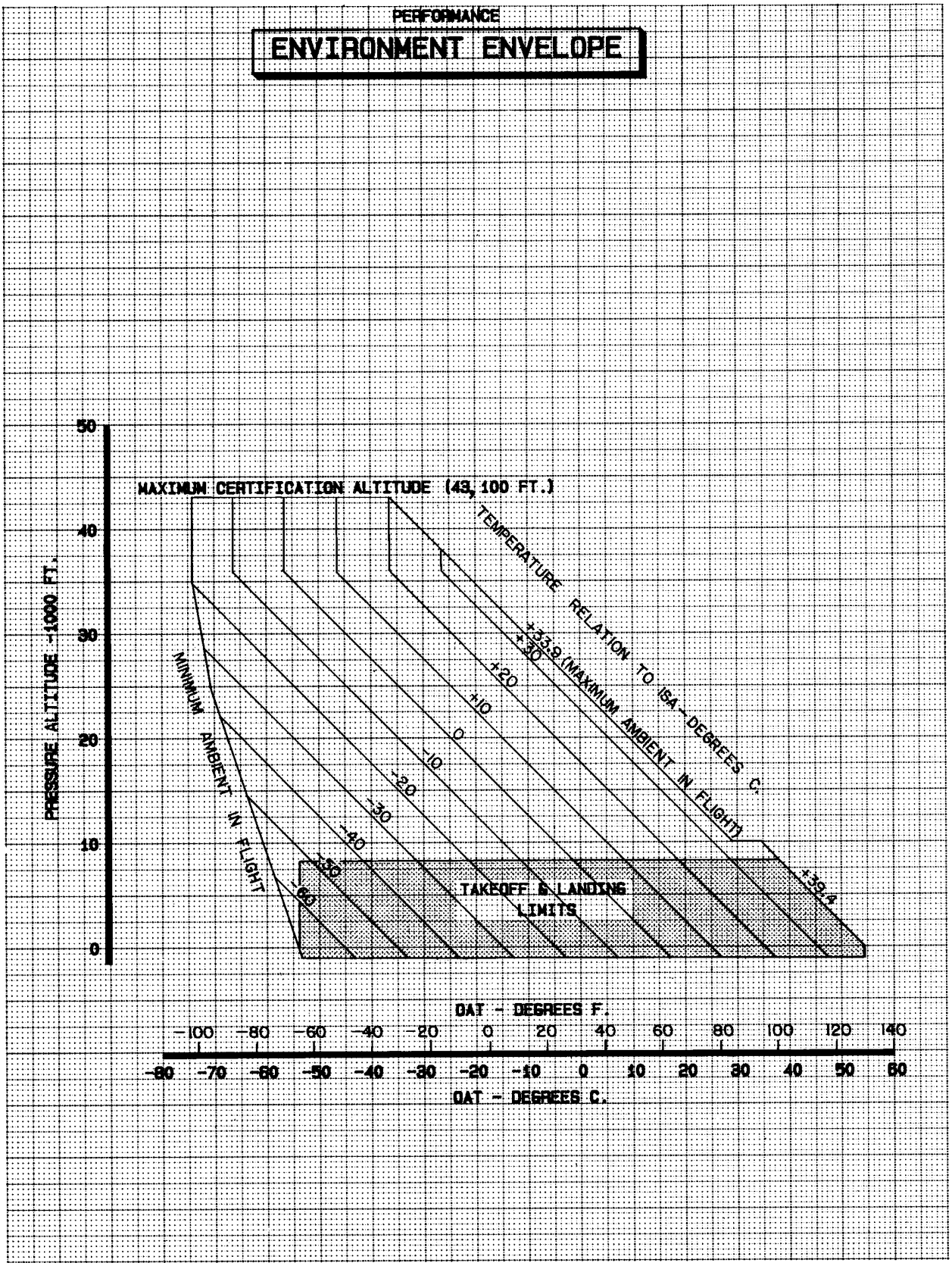
TAKEOFF WEIGHT DETERMINATION PROCEDURE



S28661

PERFORMANCE

ENVIRONMENT ENVELOPE



P.C. 63000081	
D041T503	PG. 4.1-19

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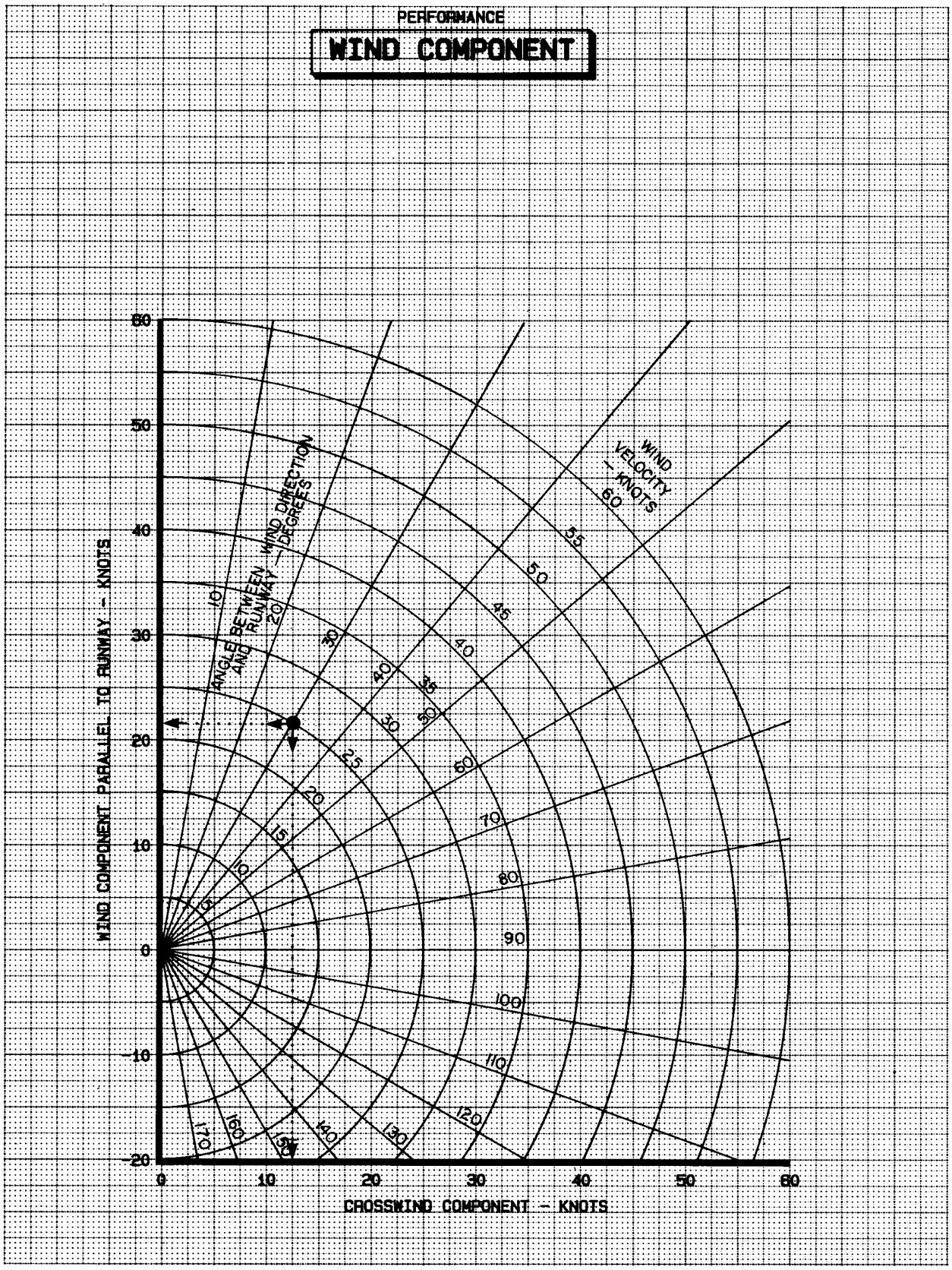
767-200/300

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PERFORMANCE

WIND COMPONENT



P.C. 6S000082
D041T505 PG 4.1-20

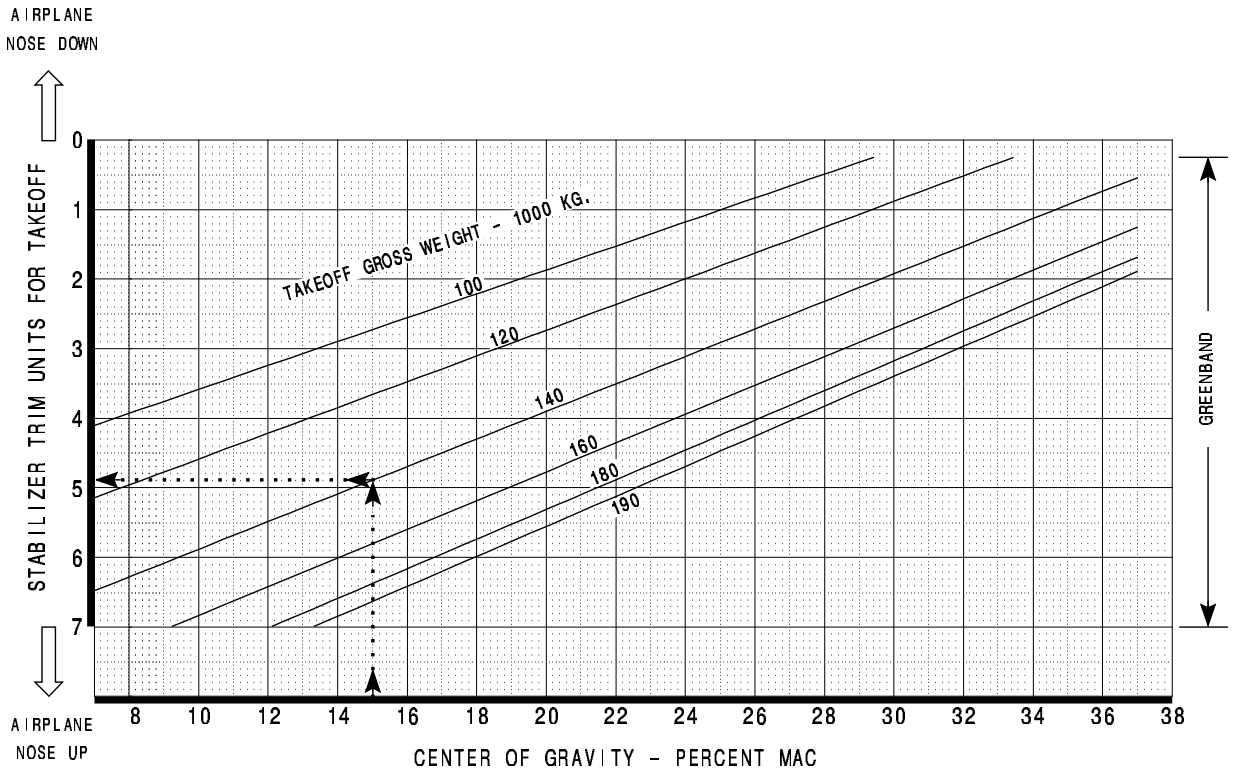
BOWKER	APPROVED	DATE
767-200/300	R. Sugawara NM234	7.1.82
	C.S. Tilli NM364	8.4.86

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RECOMMENDED TAKEOFF STABILIZER SETTING

FLAPS 5, 15, 20

- SET STABILIZER FOR TAKEOFF CENTER OF GRAVITY DETERMINED BY CALCULATED OR GRAPHICAL METHOD.



P.C. d600121003	
D041T513-1	PG. 4.1-21

R. OSWALD	APPROVED	DATE
767-300ER	V.HILL	10-04-00
CF6-80C2B4/B4F /B6/B6F/B7/B7F		

POSITION CORRECTIONS - PRIMARY STATIC SOURCE

Position corrections for speed and altitude using the primary static source are negligible. Existing minor corrections are incorporated into the performance charts where appropriate and further corrections are unnecessary.

PERFORMANCE

POSITION CORRECTIONS

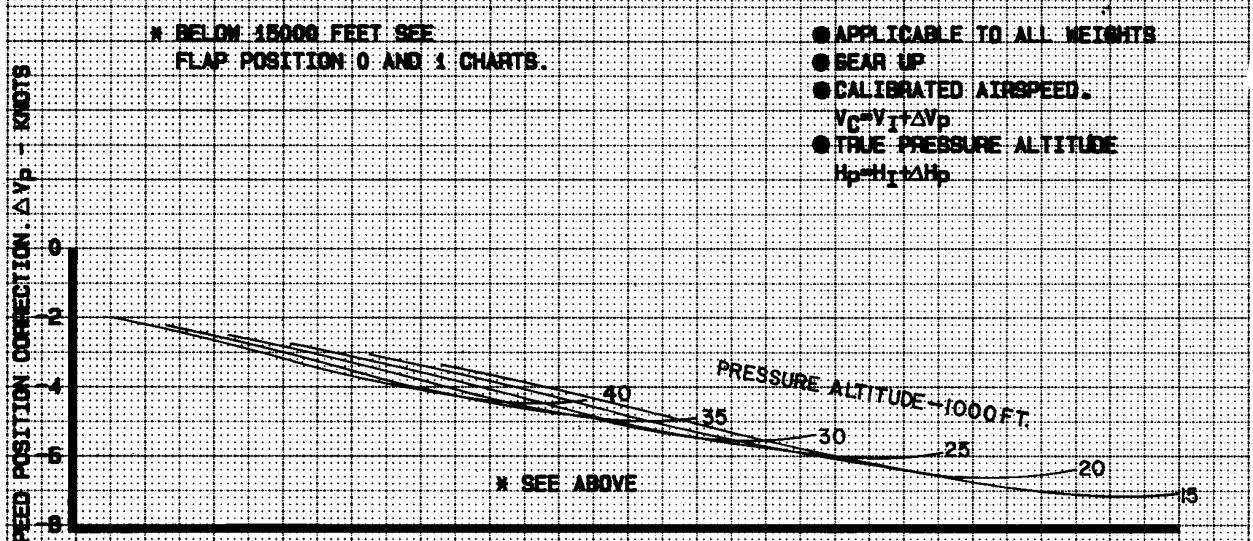
FLAPS UP

ALTERNATE STATIC SOURCE

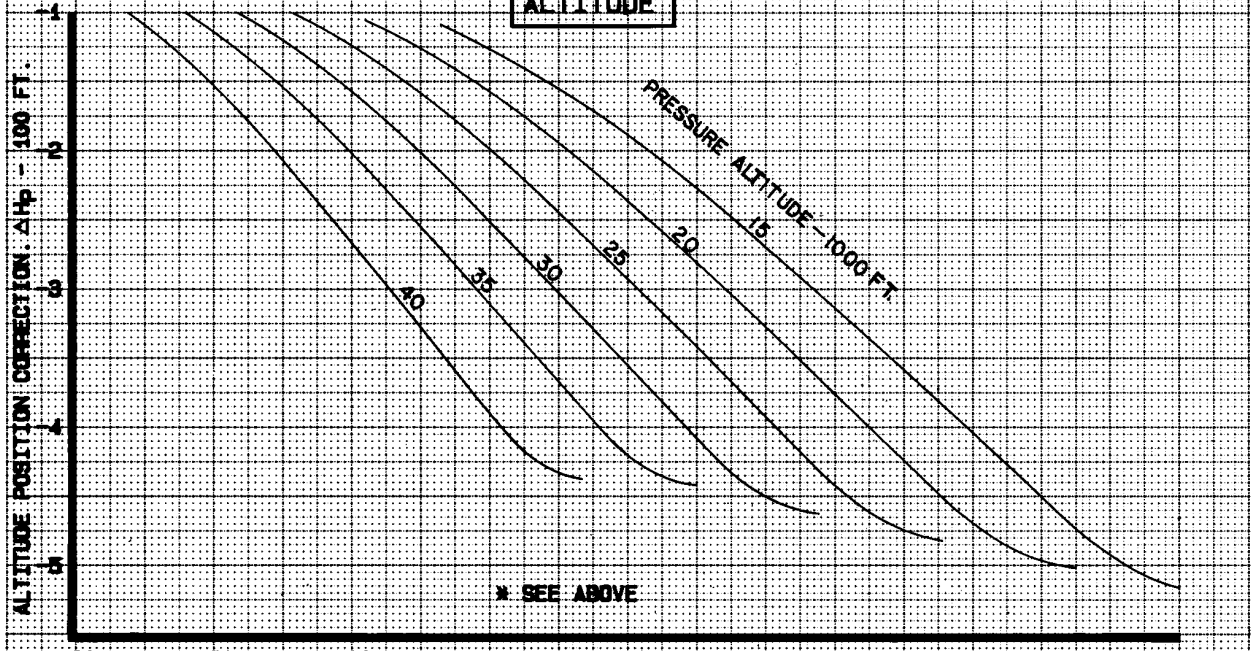
AIRSPEED

* BELOW 15000 FEET SEE FLAP POSITION 0 AND 1 CHARTS.

- APPLICABLE TO ALL WEIGHTS
- GEAR UP
- CALIBRATED AIRSPEED. $V_C = V_I + \Delta V_p$
- TRUE PRESSURE ALTITUDE $H_p = H_I + \Delta H_p$



ALTITUDE



P.C. 85000540	
D041T505	PG.4.1-23

McCONVILLE 767-300	APPROVED	DATE
	C.S.III: WHW	8-4-86

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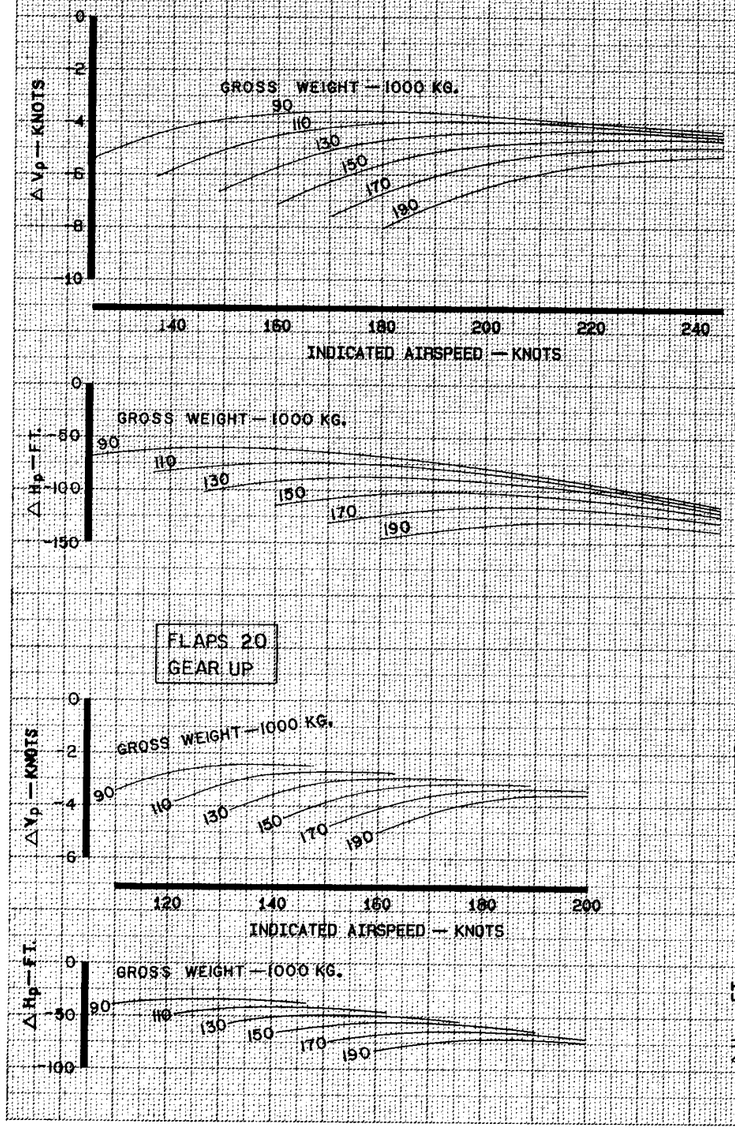
PERFORMANCE

POSITION CORRECTIONS

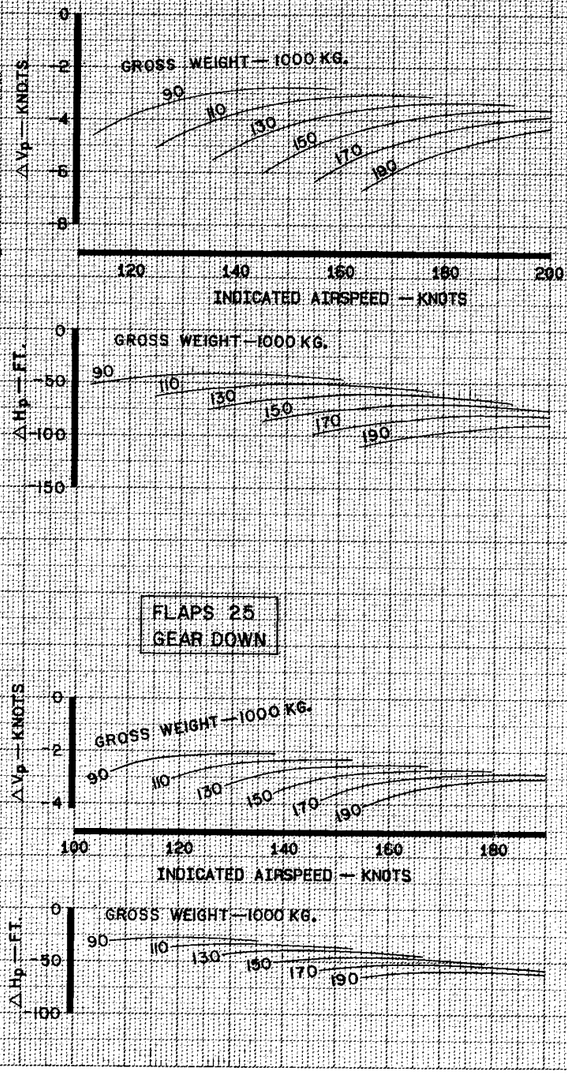
ALTERNATE STATIC SOURCE

- CALIBRATED AIRSPEED
  $V_C = V_I + \Delta V_p$
- TRUE PRESSURE ALTITUDE
  $H_p = H_I + \Delta H_p$
- APPLICABLE TO TAKEOFF AND LANDING ALTITUDES ONLY

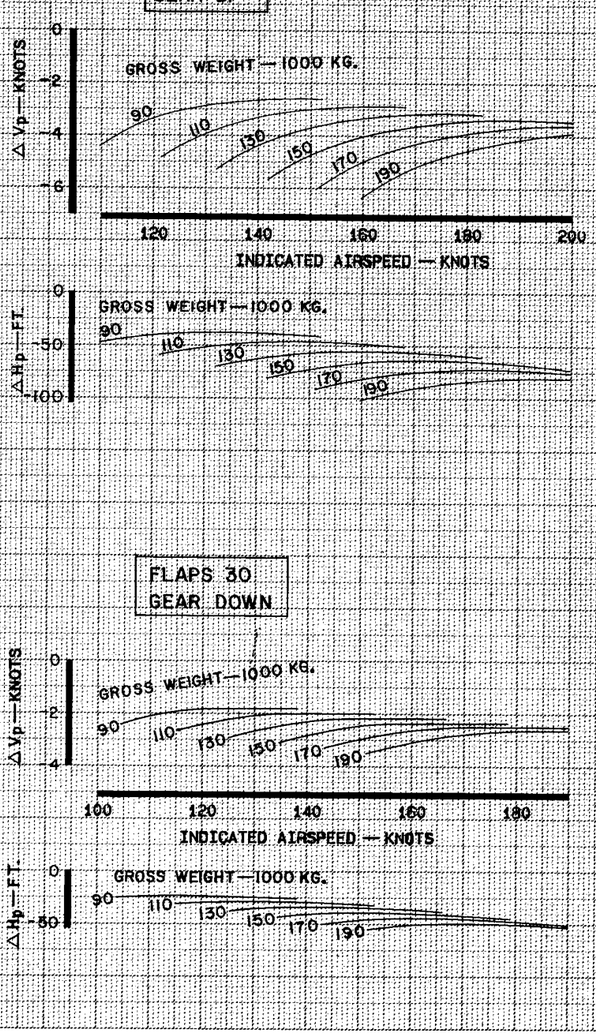
FLAPS 0, 1
GEAR UP



FLAPS 5
GEAR UP



FLAPS 15
GEAR UP



FLAPS 20
GEAR UP

FLAPS 25
GEAR DOWN

FLAPS 30
GEAR DOWN

P.C. 6L001920
D041T507-1 P6.4.1-24

APPROVED	DATE
E.J. Stark MM 268	1/20/88

RUFF
767-300ER

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P.C. 6S000086
D041T503 PG. 4.1-25

C FRANK
767-200/300

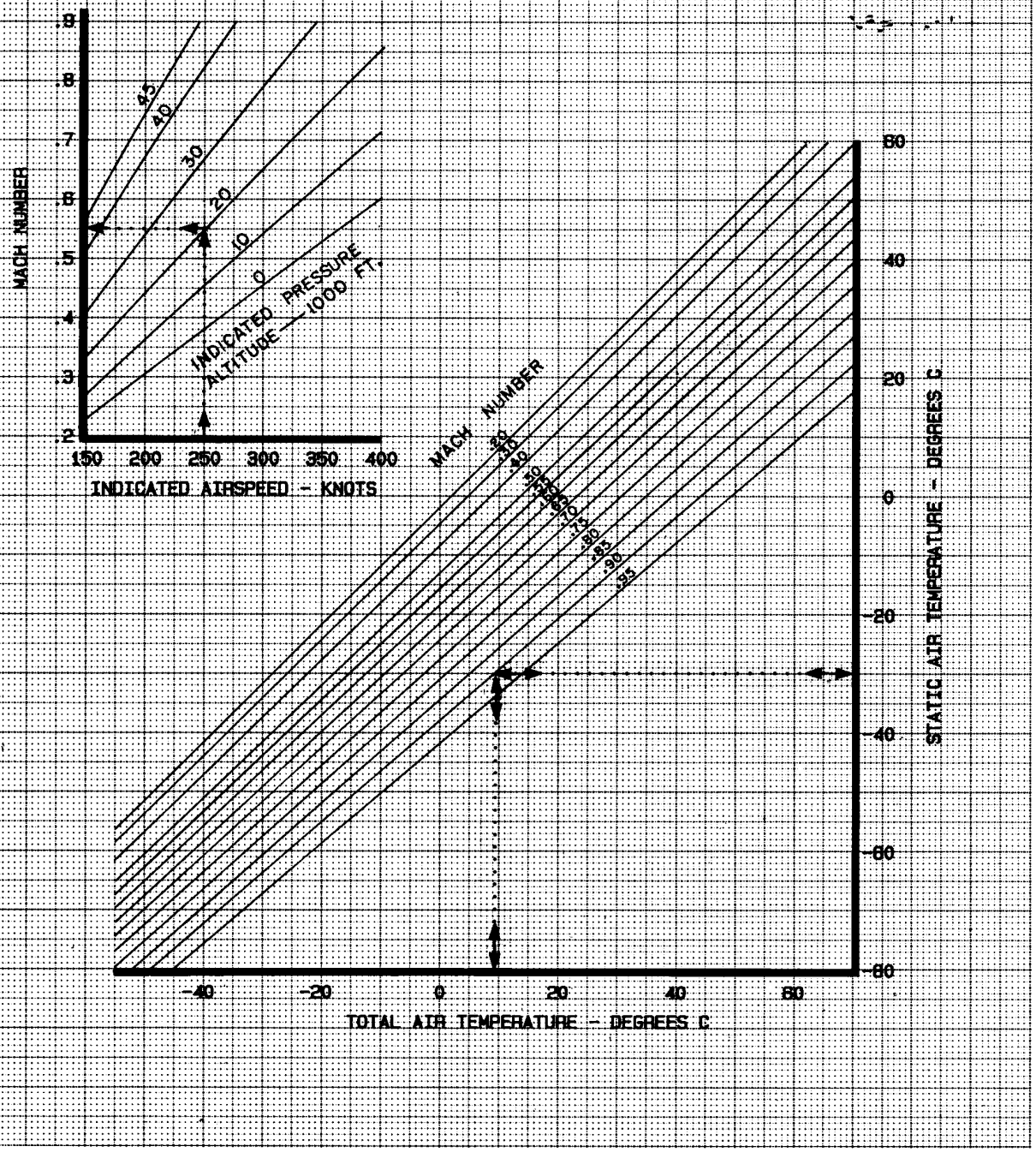
APPROVED	DATE
R. Sugimura NM239	7.2.82
D. Nyhus 288	8 Aug '86
L.P. Bentley	

PERFORMANCE

TEMPERATURE CONVERSION

TOTAL AIR - STATIC AIR

CONVERSION CHART FOR IAS TO MACH NUMBER



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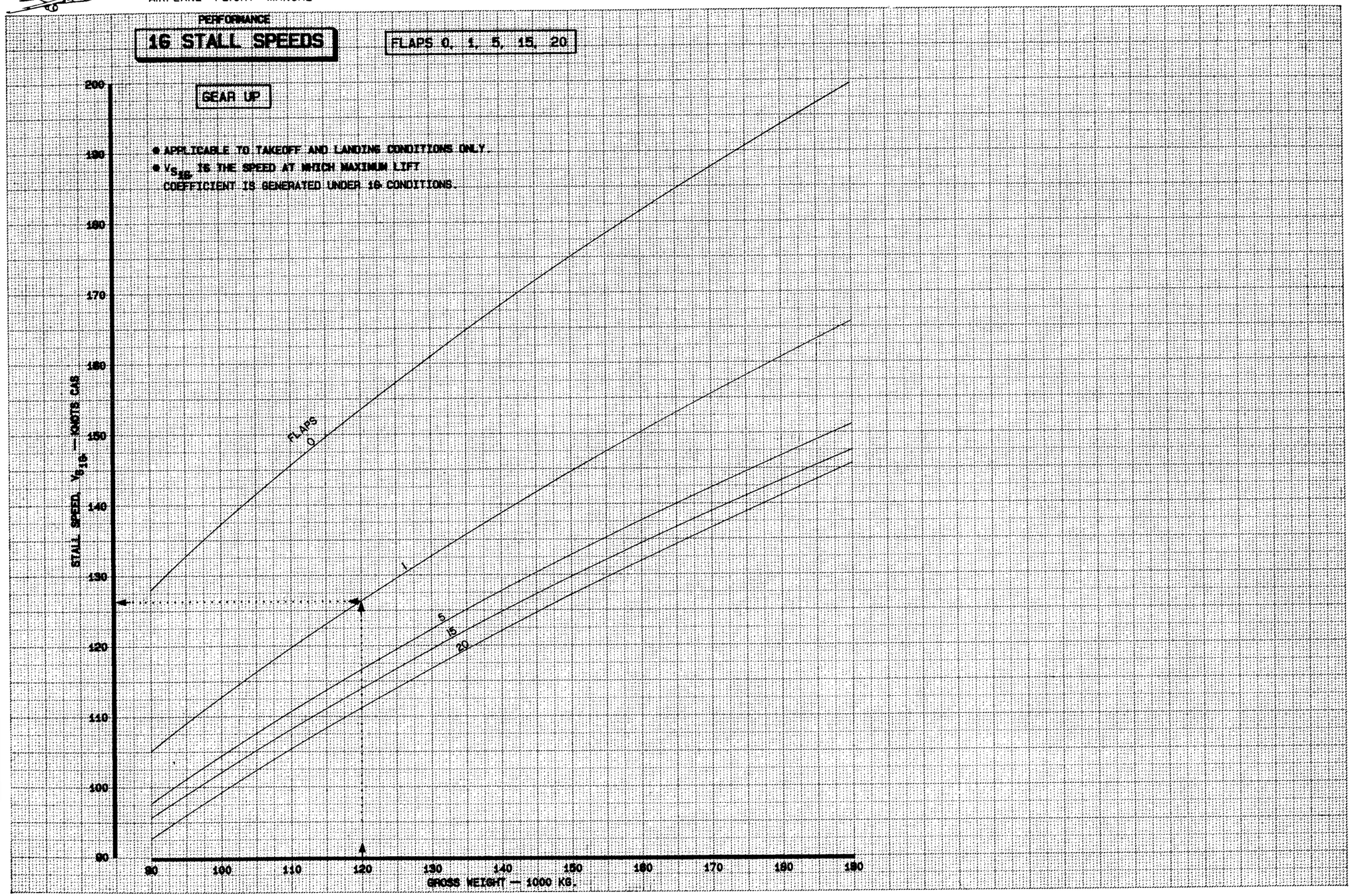
PERFORMANCE

16 STALL SPEEDS

FLAPS 0, 1, 5, 15, 20

GEAR UP

- APPLICABLE TO TAKEOFF AND LANDING CONDITIONS ONLY.
- $V_{S_{1G}}$ IS THE SPEED AT WHICH MAXIMUM LIFT COEFFICIENT IS GENERATED UNDER 1G CONDITIONS.



P.C. BL001788
D041T507-1 PG. 4.1-26

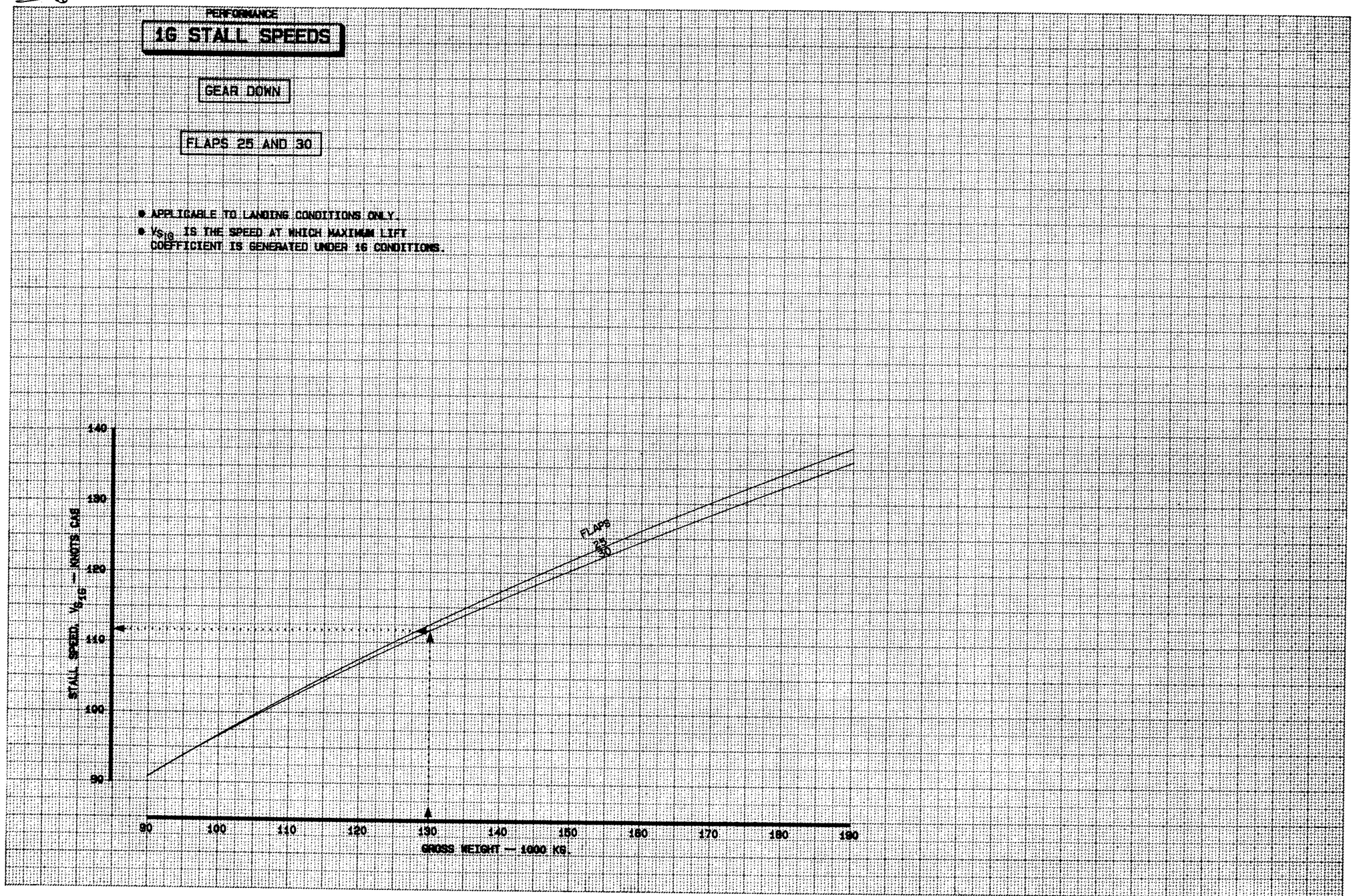
GARDNER	APPROVED	DATE
787-300ER	[signature] NIKRAS	1/25/88

1G STALL SPEEDS

GEAR DOWN

FLAPS 25 AND 30

- APPLICABLE TO LANDING CONDITIONS ONLY.
- V_{S1G} IS THE SPEED AT WHICH MAXIMUM LIFT COEFFICIENT IS GENERATED UNDER 1G CONDITIONS.



P.C.6L001789
D041T507-1 PG. 4.1-27

GARDNER
767-300ER

APPROVED C. J. Bach NM1Sq DATE 1/25/88

PERFORMANCE

CRUISE MANEUVERING CAPABILITY

FLAPS AND GEAR UP

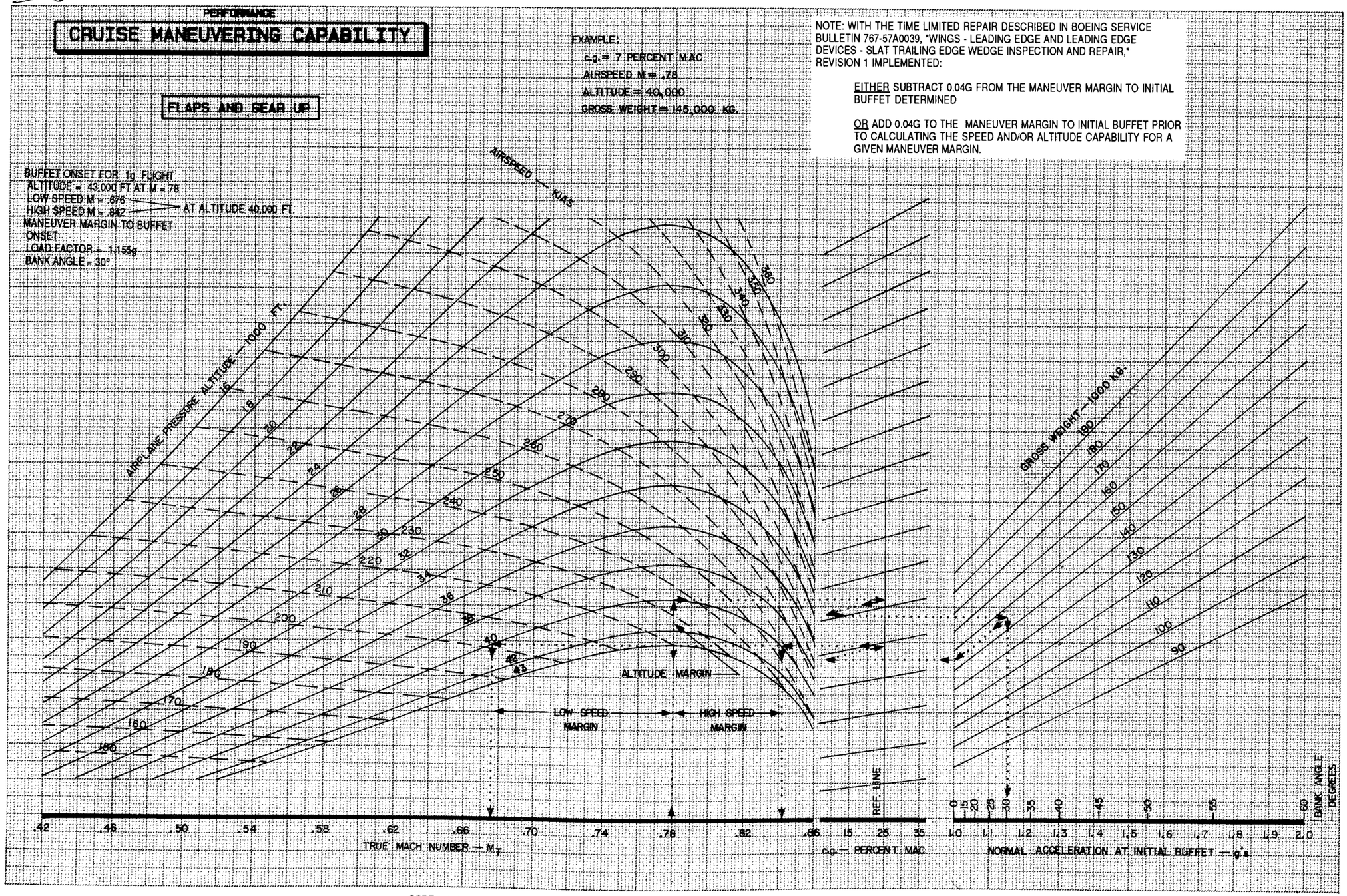
EXAMPLE:
c.g. = 7 PERCENT MAC
AIRSPEED M = .78
ALTITUDE = 40,000
GROSS WEIGHT = 145,000 KG.

NOTE: WITH THE TIME LIMITED REPAIR DESCRIBED IN BOEING SERVICE BULLETIN 767-57A0039, "WINGS - LEADING EDGE AND LEADING EDGE DEVICES - SLAT TRAILING EDGE WEDGE INSPECTION AND REPAIR," REVISION 1 IMPLEMENTED:

EITHER SUBTRACT 0.04G FROM THE MANEUVER MARGIN TO INITIAL BUFFET DETERMINED

OR ADD 0.04G TO THE MANEUVER MARGIN TO INITIAL BUFFET PRIOR TO CALCULATING THE SPEED AND/OR ALTITUDE CAPABILITY FOR A GIVEN MANEUVER MARGIN.

BUFFET ONSET FOR 1g FLIGHT
ALTITUDE = 43,000 FT AT M = .78
LOW SPEED M = .676
HIGH SPEED M = .842
AT ALTITUDE 40,000 FT.
MANEUVER MARGIN TO BUFFET ONSET
LOAD FACTOR = 1.155g
BANK ANGLE = 30°



P.C. BL00192
D041T307-1 PG. 4.1-28

LIEURANCE
767-300

	APPROVED	DATE
	DJM-191	1/23/88
	B Swan	9/22/92

SR 8 2/1988

S39262

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SECTION 4.2 - ENGINE DATA

C O N T E N T S

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Go-Around Power Setting 2
Inflight Power Setting. 3
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INFLIGHT POWER SETTING 6
INFLIGHT RESTART ENVELOPE 7
Noise Characteristics 8
Configuration. 8
Certified FAR Part 36, Stage 3 Noise Levels. 8
Supplemental ICAO Annex 16, Chapter 3 Noise Level Information 8
Noise Characteristics Applicability. 8

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

ENGINE DATA

G E N E R A L

This section provides the Engine Power Setting Charts for the CF6-80C2B6F engine. The Inflight Restart Envelope is also provided for the pneumatic starter assist and the windmill start procedures.

For the CF6-80C2B6F engine, power is set with percent fan rotor speed (%N1 gage). This power setting %N1 is a function of engine rating, pressure altitude, airplane velocity, inlet temperature, and air bleeds. This section includes power setting charts for takeoff, go-around, and inflight ratings. These charts provide certified installed thrust levels for a minimum engine. The use of takeoff and go-around ratings are time-limited to five minutes, and the inflight rating may be used continuously.

T A K E O F F P O W E R S E T T I N G

Takeoff power must be set at an airplane velocity between 40 and 80 knots. Takeoff %N1 is determined from the Takeoff Power Setting chart using the procedures specified thereon.

G O - A R O U N D P O W E R S E T T I N G

Go-around %N1 is determined from the Go-Around Power Setting chart using the procedures specified thereon.

ENGINE DATA

INFLIGHT POWER SETTING

The %N1 for maximum continuous thrust rating is determined from the Inflight Power Setting - Maximum Continuous chart using the procedures specified thereon.

P.C. K600204003
D0411507-1 PG 4.2-4

PERFORMANCE

TAKEOFF POWER SETTING

PROCEDURES

1. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART A.
2. DETERMINE PERCENT N1 GAGE FROM CHART B.
3. ADJUST PERCENT N1 GAGE BY THE Δ%N1 FROM CHART C AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
4. DETERMINE MAXIMUM PERCENT N1 GAGE FROM CHART D
5. USE THE LOWER PERCENT N1 GAGE FROM STEP 3 OR STEP 4.

CHART A

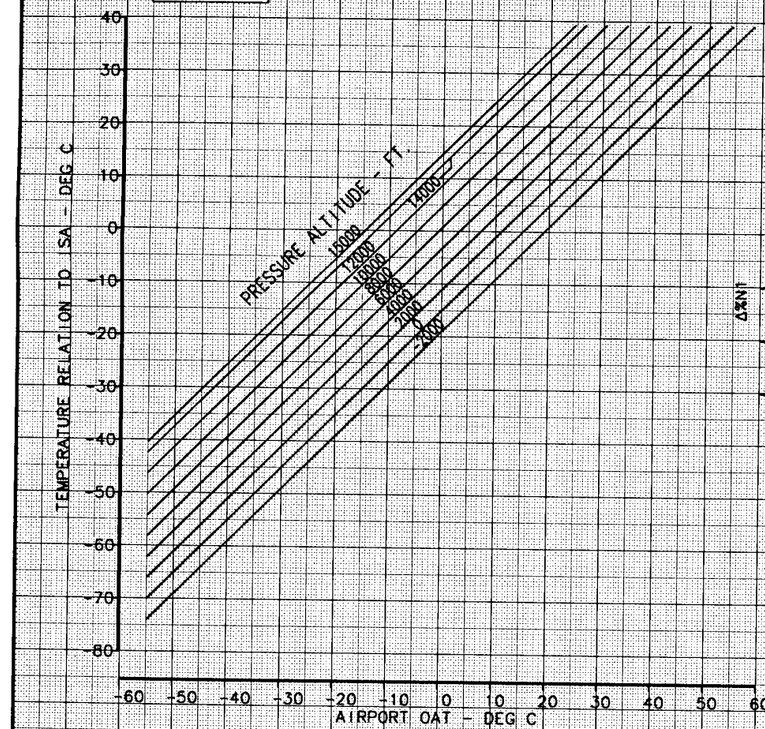


CHART C

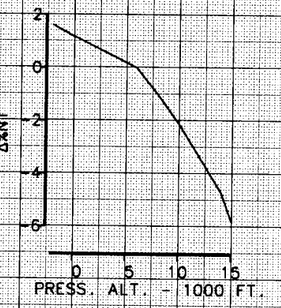
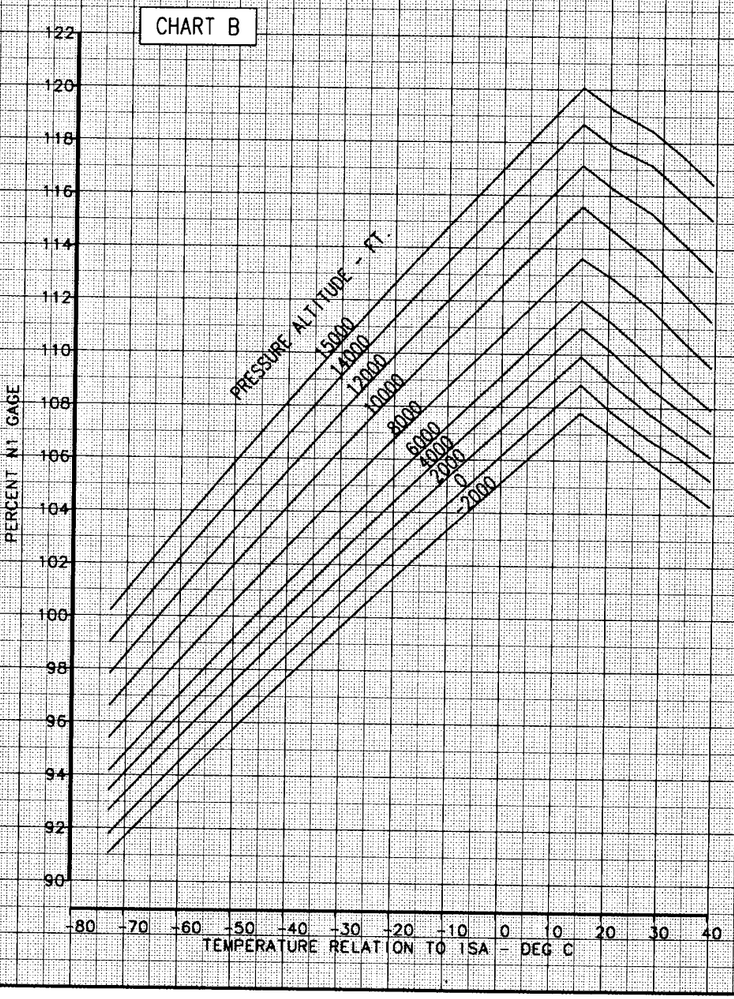
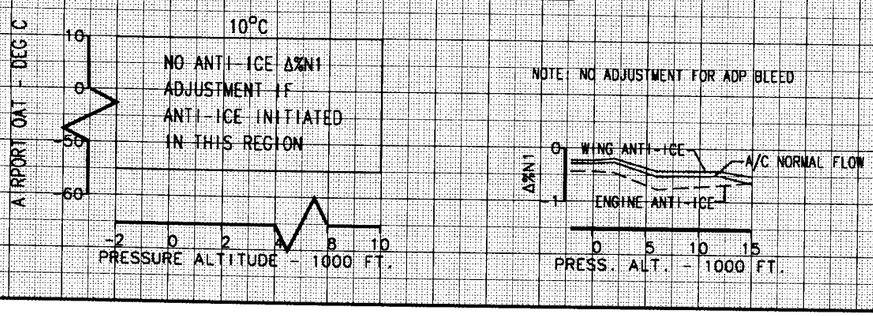


CHART B



BLEED ADJUSTMENTS



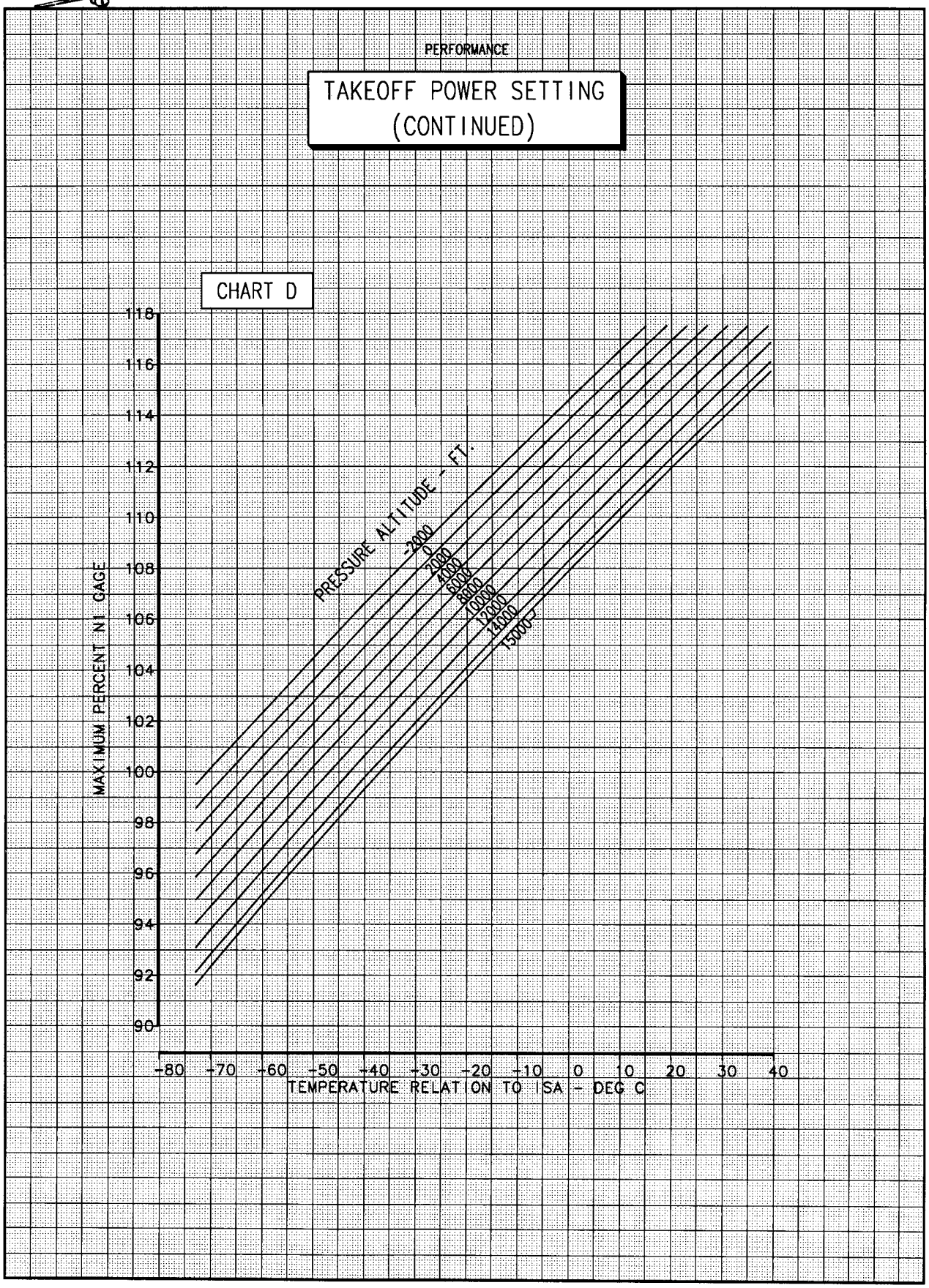
NOTE: NO ADJUSTMENT FOR ADP BLEED

APPROVED DATE 2-28-89
767
CF6-80C2B6F

TAKEOFF POWER SETTING (CONTINUED)

P.C.K6002040A3
D041T507-1 PG 4.2-4A

CHART D



APPROVED	DATE
	2/23/89

767
CF6-80C2B6F

S28715

GO-AROUND POWER SETTING

P.C.K600205003
D041T507-1 PG 4.2-5

APPROVED DATE 04/28/17
767
CF6-80C2B6F

PROCEDURES

1. DETERMINE AMBIENT TEMPERATURE FROM CHART A.
2. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART B.
3. DETERMINE PERCENT N1 GAGE FROM CHART C.
4. ADJUST PERCENT N1 GAGE BY THE Δ%N1 FROM CHART D AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
5. DETERMINE MAXIMUM PERCENT N1 GAGE FROM CHART E.
6. USE THE LOWER PERCENT N1 GAGE FROM STEP 4 OR STEP 5.

CHART A

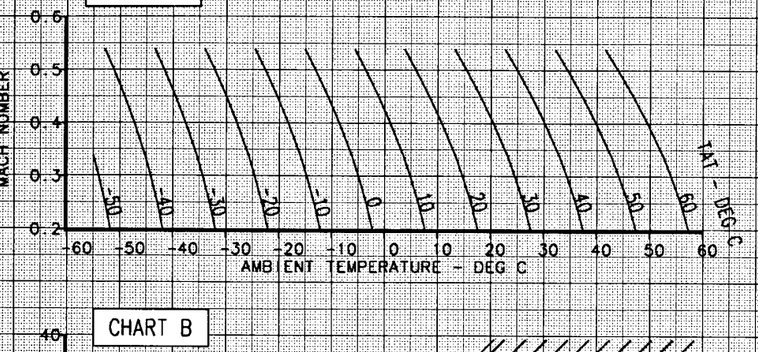


CHART B

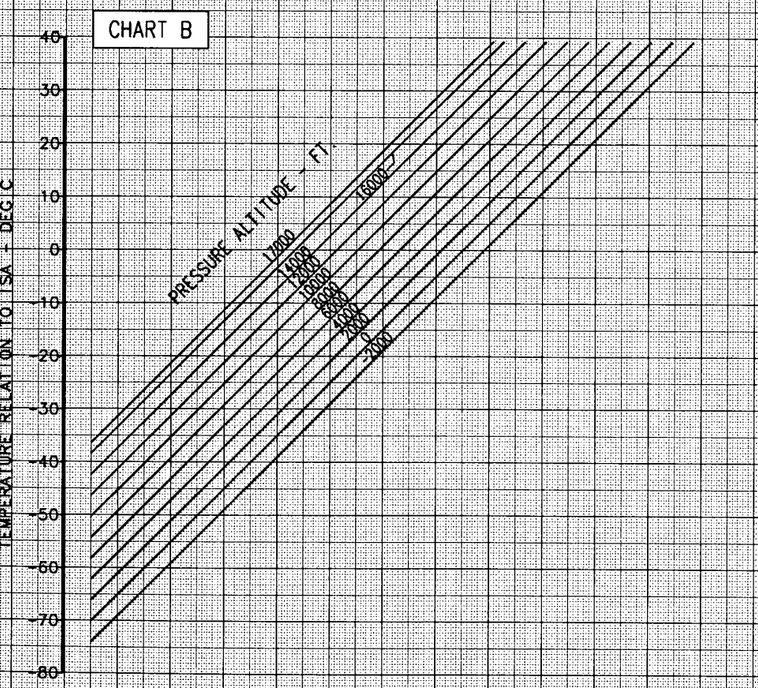
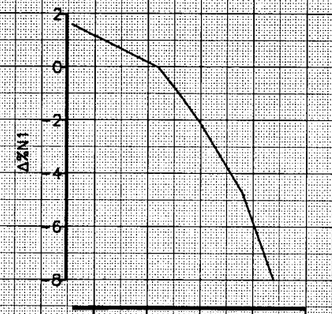
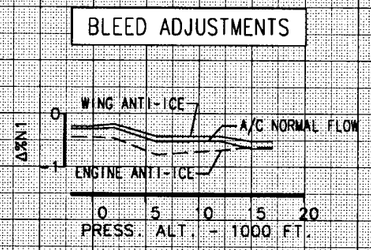


CHART D



BLEED ADJUSTMENTS



NOTE: 1. FOR ONE ENGINE INOPERATIVE WITH WING ANTI-ICE ON, MULTIPLY WING ANTI-ICE ADJUSTMENT BY 2.
2. NO ADP ADJUSTMENT.

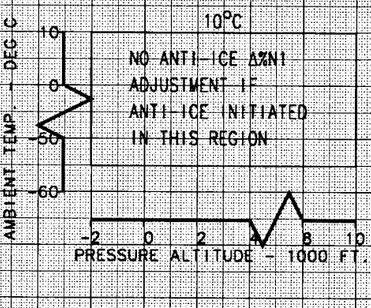
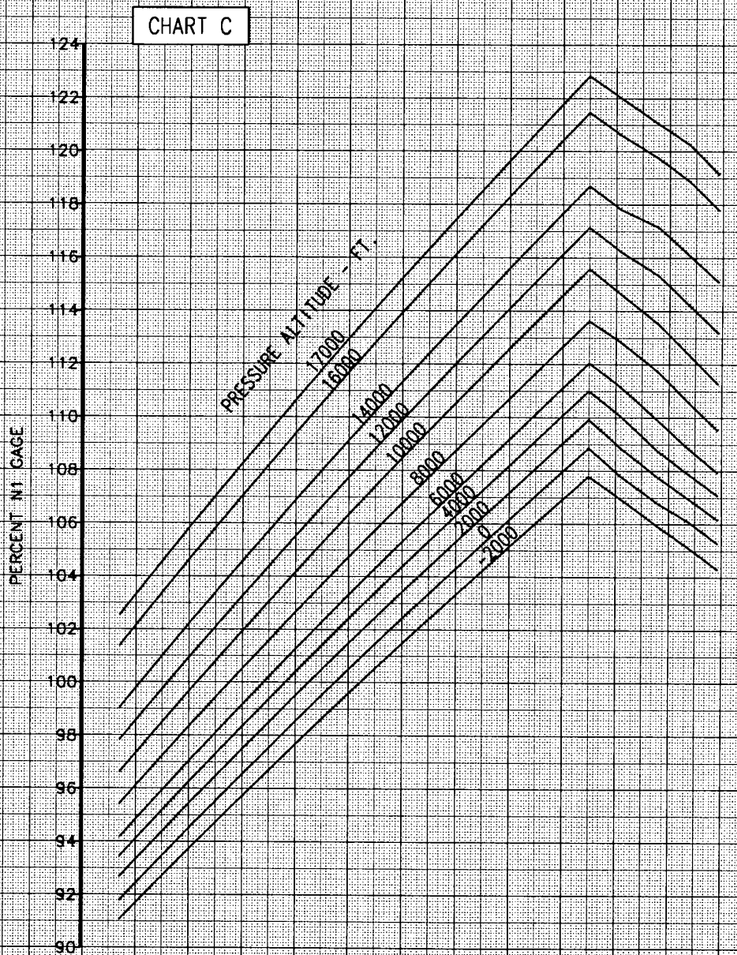


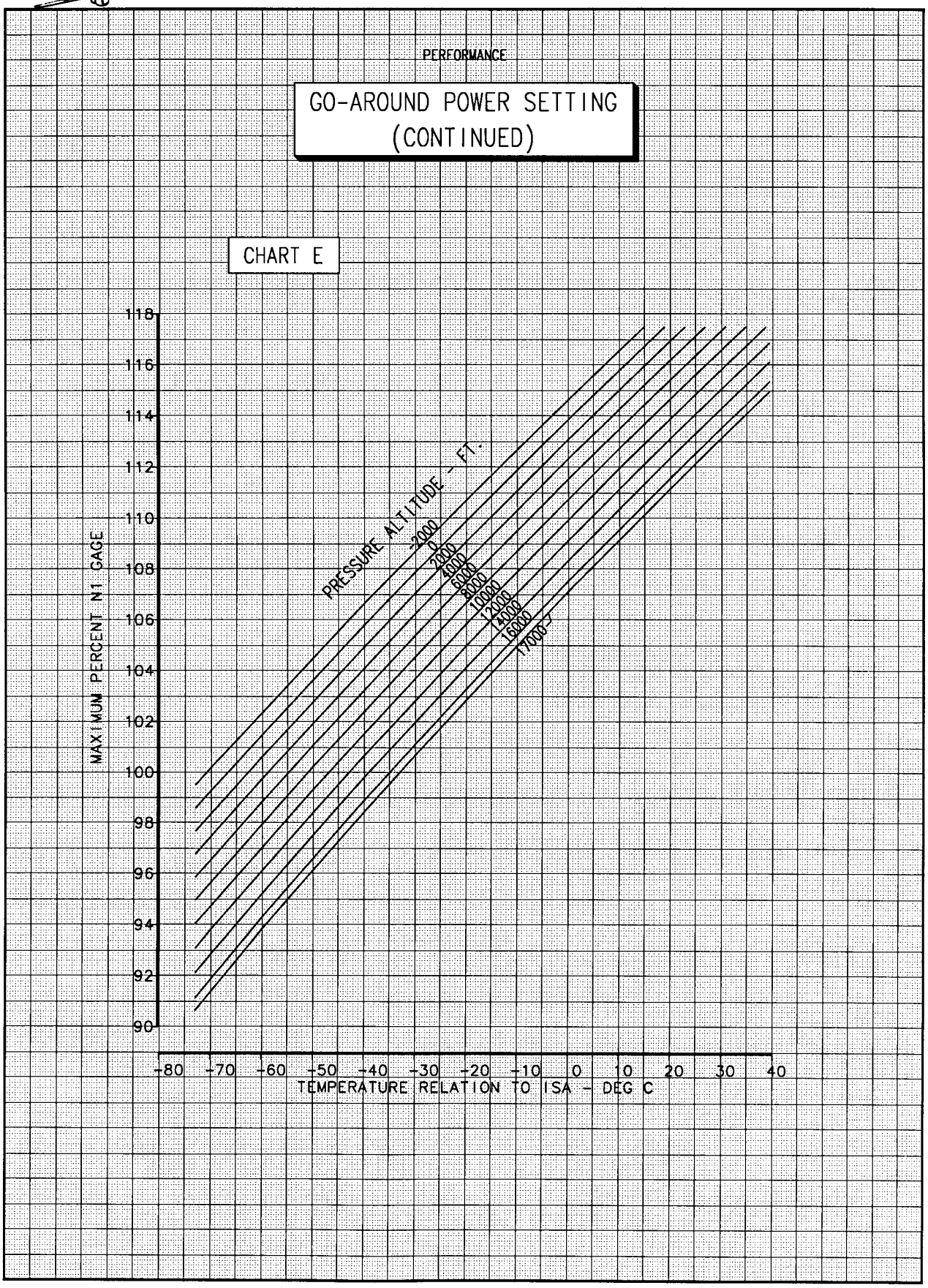
CHART C



PERFORMANCE

GO-AROUND POWER SETTING (CONTINUED)

CHART E



P.C. K6002050A3
D041T507-1 PG 4.2-5A

APPROVED DATE 2/23/89

767
CF6-80C2B6F

S28729

P.C. K600206003
D041T507-1 PG 4.2-6

PERFORMANCE

INFLIGHT POWER SETTING

MAXIMUM CONTINUOUS

1 ENGINE INOPERATIVE

PROCEDURES

1. DETERMINE AMBIENT TEMPERATURE FROM CHART A.
2. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART B.
3. DETERMINE PERCENT CORRECTED N1 FROM CHART C AND SUBTRACT Δ% CORR. N1 FROM CHART D.
4. DETERMINE PERCENT N1 GAGE FROM CHART E.
5. ADJUST PERCENT N1 GAGE FROM STEP 4 BY Δ%N1 GAGE FROM CHART F AND BY THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
6. DETERMINE PERCENT N1 GAGE FROM CHART G. IF IN THE SHADED REGION SHOWN ON CHART G, USE DASHED LINE TO DETERMINE PERCENT N1 GAGE.
7. USE THE LOWER PERCENT N1 GAGE FROM STEP 5 OR STEP 6.

CHART A

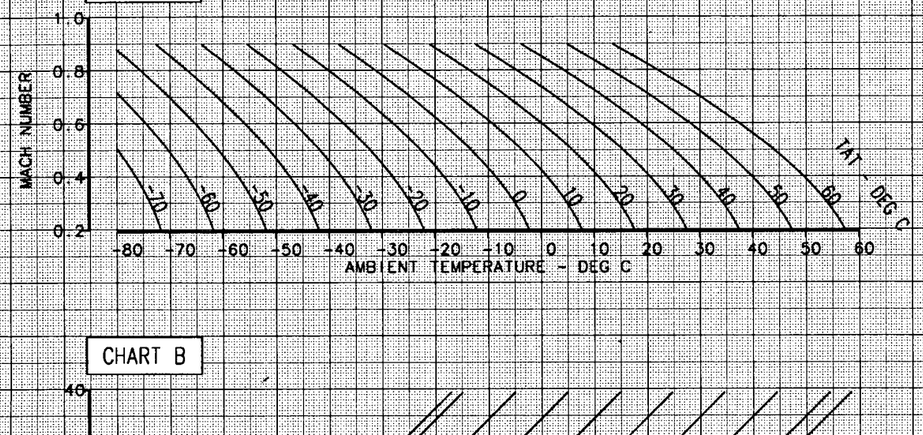


CHART B

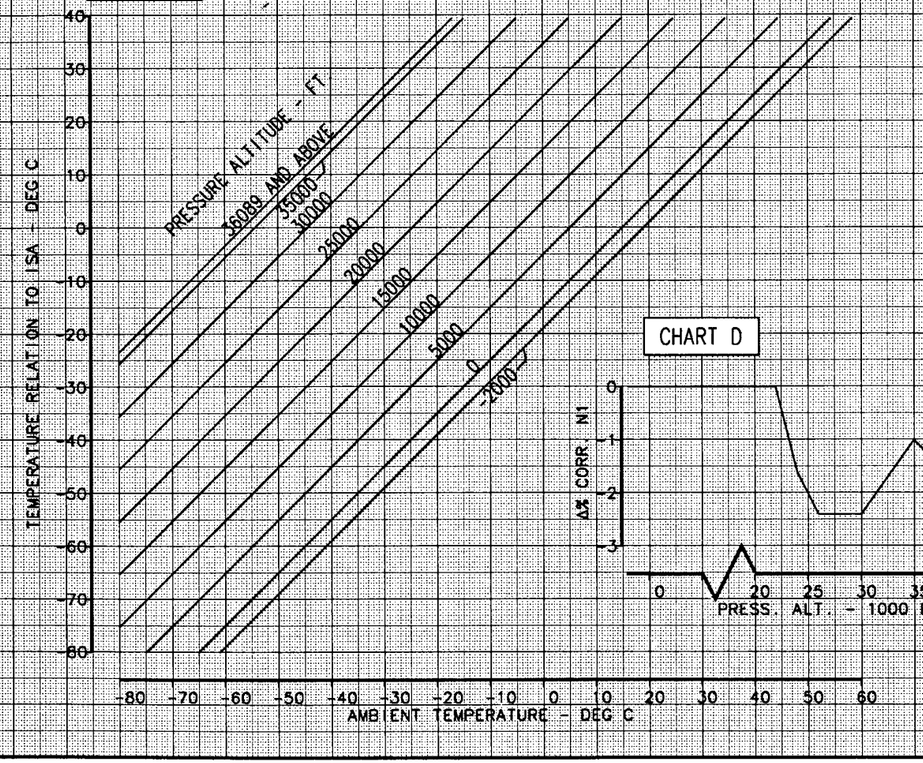


CHART C

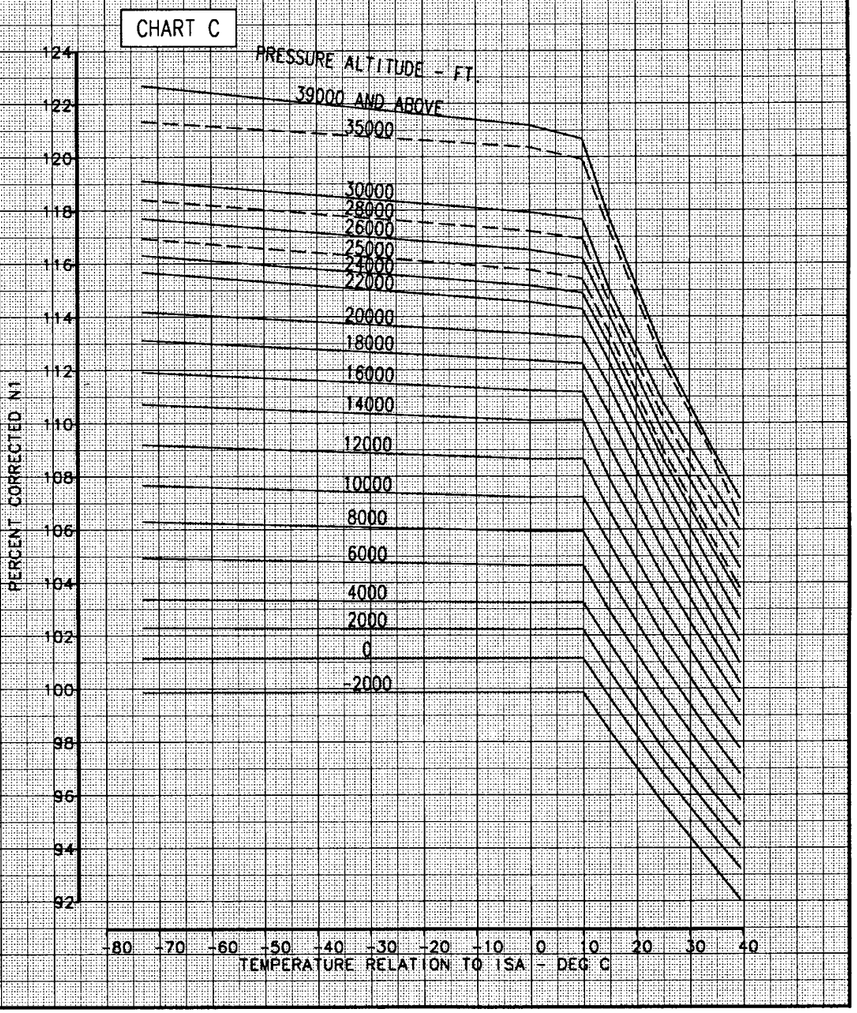
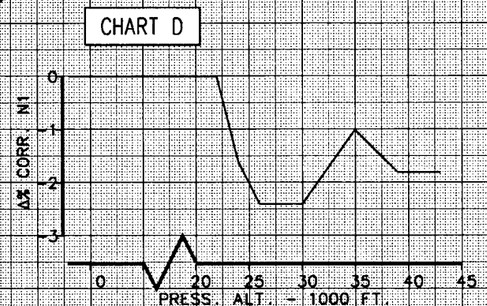


CHART D



APPROVED	DATE
	4/25/07

767
CF6-80C2B6F

S30432

P.C.K6002060A3
D041T507-1 PG 4.2-6A

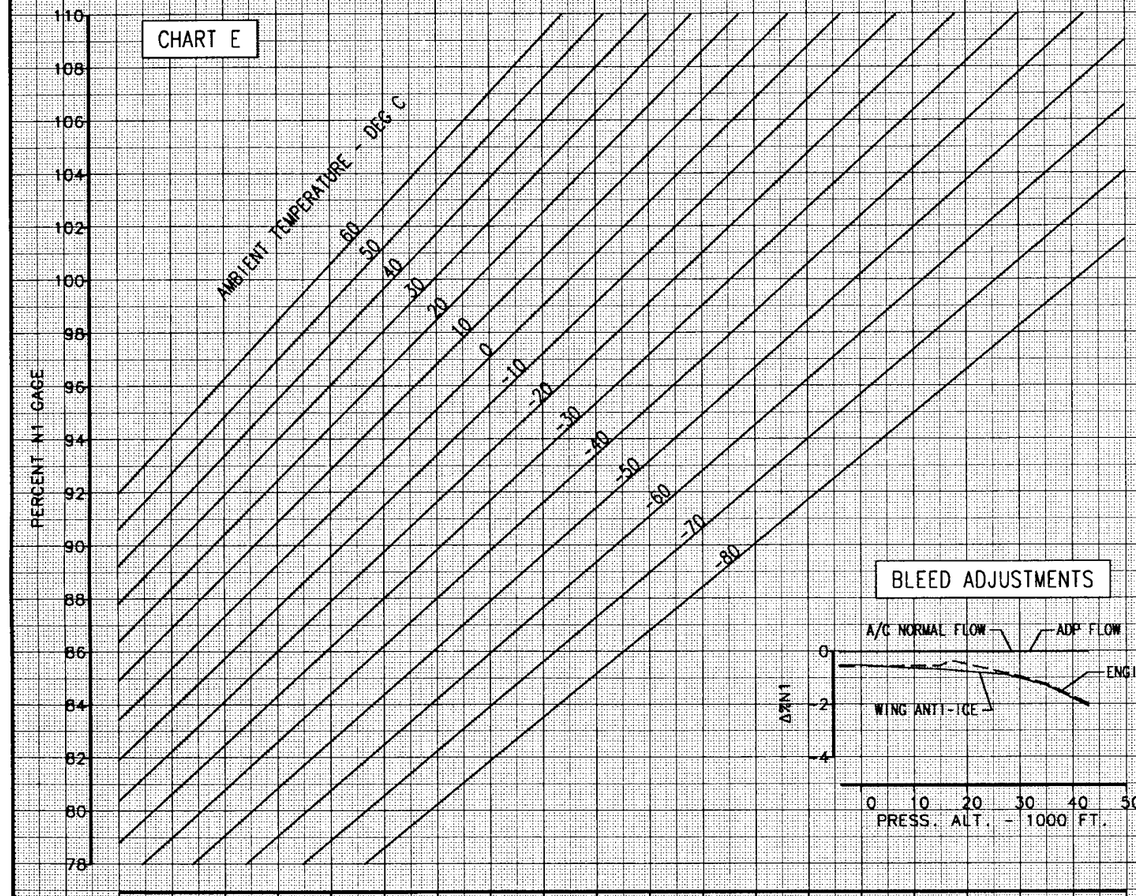
PERFORMANCE

INFLIGHT POWER SETTING (CONTINUED)

MAXIMUM CONTINUOUS

1 ENGINE INOPERATIVE

CHART E



BLEED ADJUSTMENTS

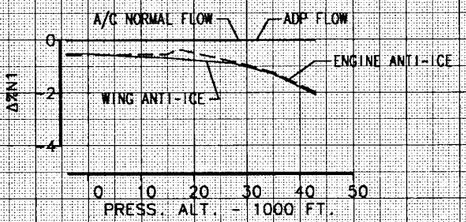


CHART G

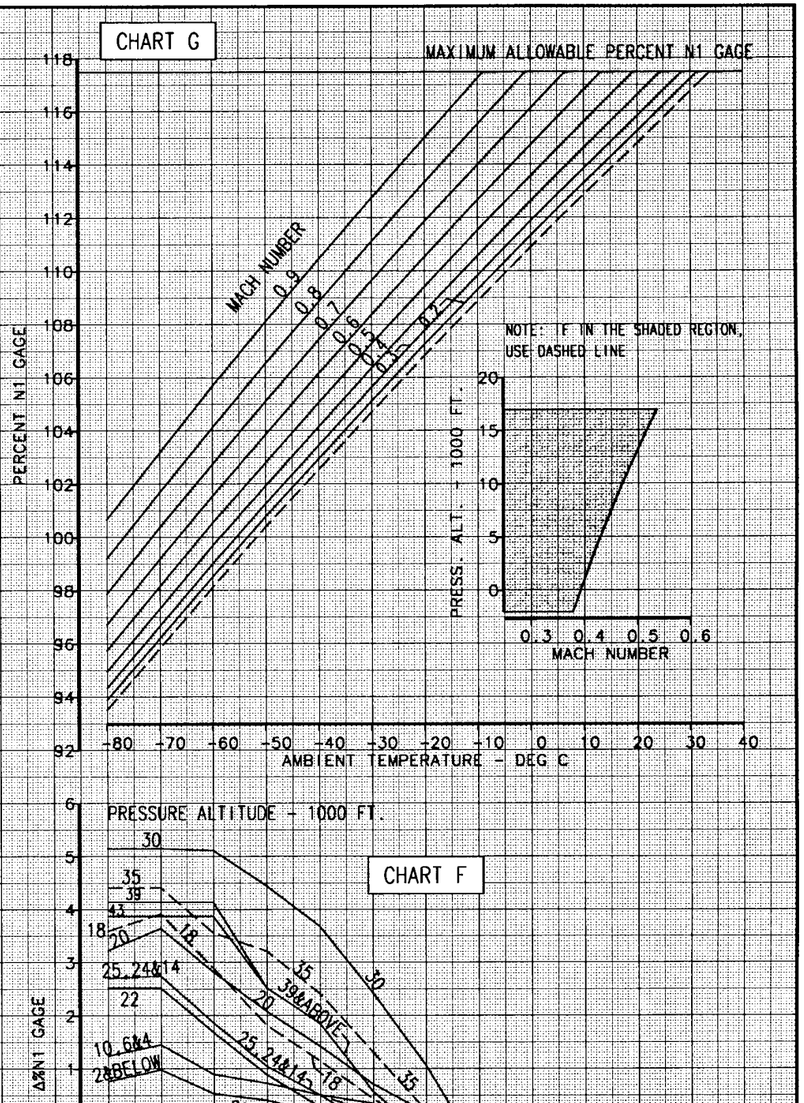
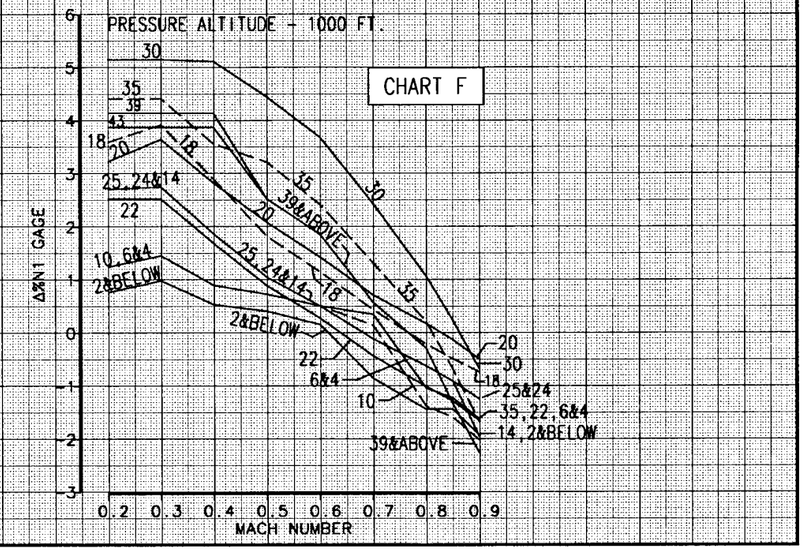


CHART F



APPROVED	DATE
	3/23/89

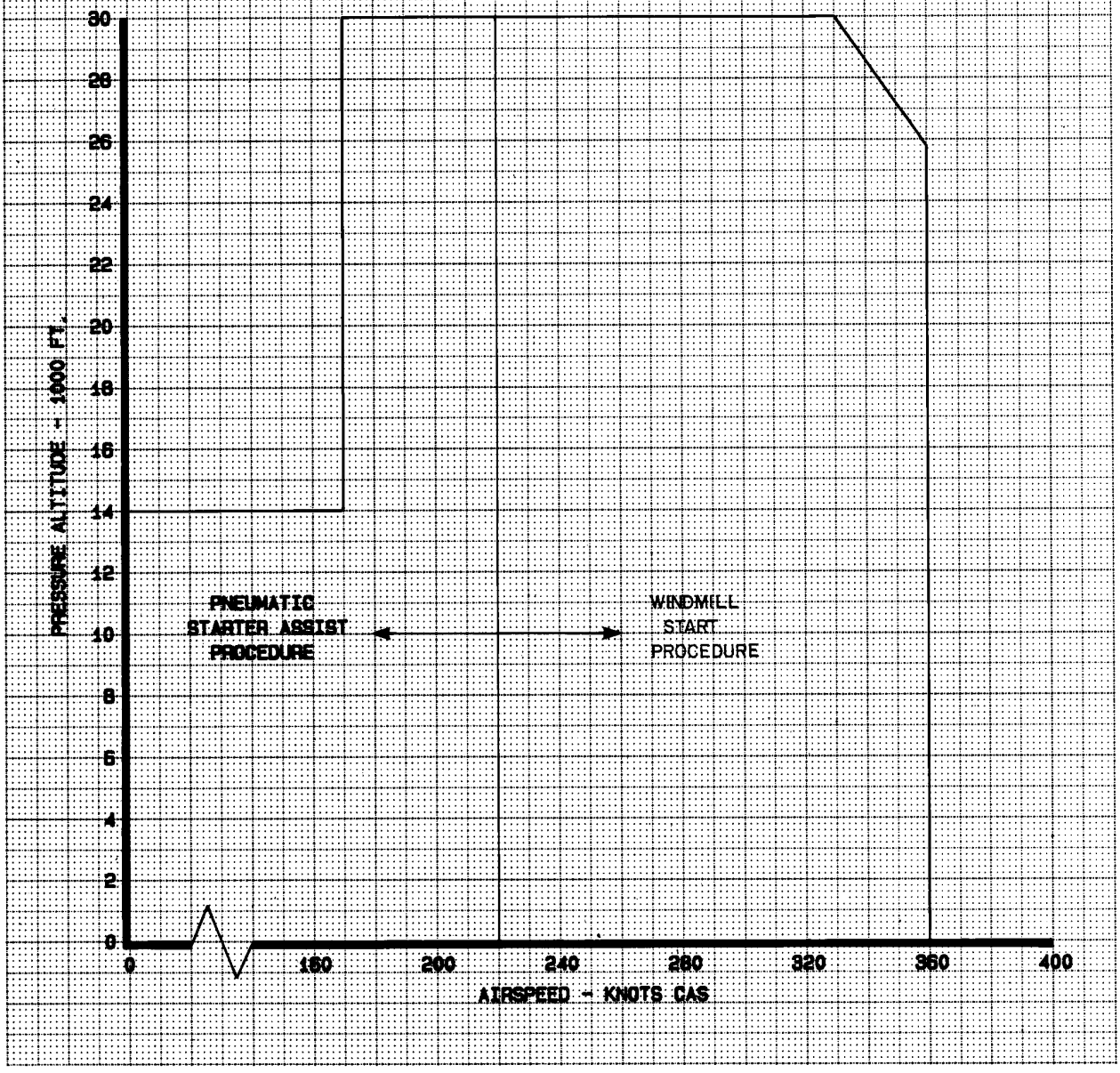
767
CF6-80C2B6F

S30494

PERFORMANCE

INFLIGHT RESTART ENVELOPE

● SUCCESSFUL STARTS ARE NOT ASSURED ABOVE 30,000 FEET



64207

S28747

NOISE CHARACTERISTICS

CONFIGURATION

Engines:	CF6-80C2B6F Basic Rating 61,500 LB. S.L.S.T.
Model:	767-300
Nacelle Treatment:	Basic Configuration Including Inlet and Fan Duct Treatments

CERTIFICATED FAR PART 36, STAGE 3 NOISE LEVELS

The following noise levels were established using test data obtained and analyzed under procedures of FAR Part 36. This aircraft complies with FAR Part 36, Stage 3 requirements.

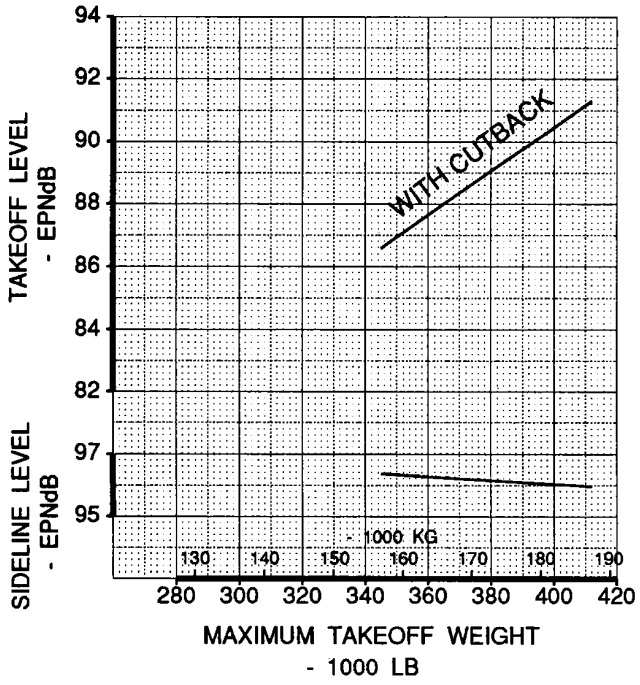
SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

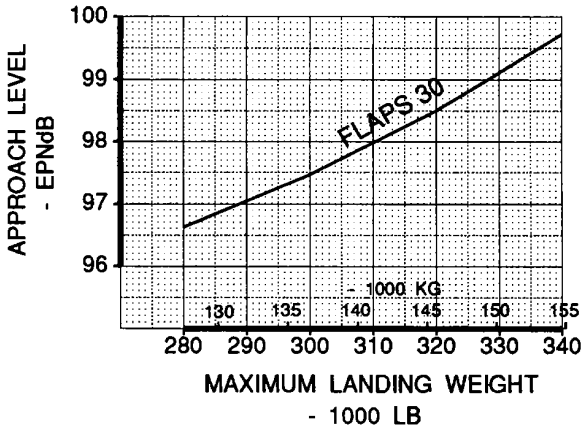
The test and analysis procedures used to obtain the FAR Part 36, Stage 3 noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Chapter 3. The ICAO Annex 16, Chapter 3 data is applicable only after approval by the proper authority of airplane registry, including approval of the equivalent procedures used to demonstrate compliance with FAR Part 36 noise standards.

NOISE CHARACTERISTICS APPLICABILITY

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

Noise levels are determined by entering the graphs at the maximum weights defined under Certificate Limitations in this Airplane Flight Manual.





S16508

NOISE CHARACTERISTICS

CONFIGURATION

Engines:	CF6-80C2B6F with N1 Modifier, Basic Rating 61,500 LB. S.L.S.T.
Model:	767-300
Nacelle Treatment:	Basic Configuration Including Inlet and Fan Duct Treatments

CERTIFICATED FAR PART 36, STAGE 3 NOISE LEVELS

The following noise levels were established using test data obtained and analyzed under procedures of FAR Part 36. This aircraft complies with FAR Part 36, Stage 3 requirements.

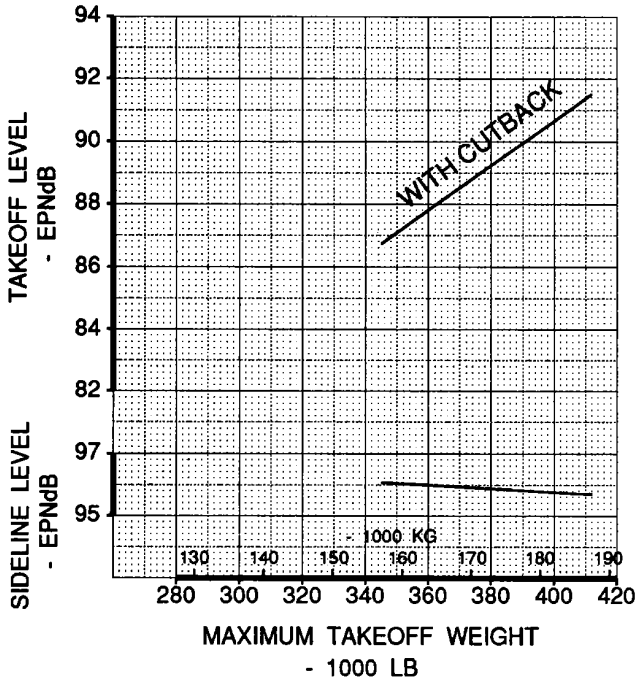
SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

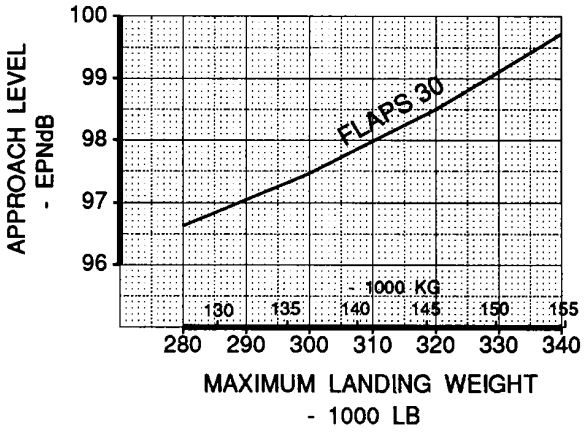
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S16509

SECTION 4.3 - RUNWAY LENGTH CORRECTIONS

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Corrected Runway Length Determination Procedure Flow Diagram	4
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ENGINE INOPERATIVE CORRECTED TAKEOFF DISTANCE (FLAPS 5, 15, 20)	6
CORRECTED ACCELERATE-STOP DISTANCE (FLAPS 5, 15, 20)	7
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(REGION C)	13
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21333

RUNWAY LENGTH CORRECTIONS

GENERAL

This section provides information required to correct the actual runway length available at the actual runway conditions to an equivalent value, corrected runway length. This allows the determination of the field length limited gross weight in Section 4.4. The flow diagram in the Corrected Runway Length Determination procedure, below, demonstrates the use of the charts and defines the various parameters that are obtained in the procedure. See the example problem appendix for a numerical example of this procedure.

CORRECTED RUNWAY LENGTH DETERMINATION

The following steps correspond to the identified points on the Corrected Runway Length Determination flow diagram, this section.

1. All Engines Operating Corrected Runway Length.

   The runway length with zero clearway, slope, and wind that provides, with anti-ice off, the same performance as the actual runway conditions available with the anti-ice configuration selected when all engines are operating during the takeoff.

2. Engine Inoperative Corrected Takeoff Distance.

   The runway length with zero clearway, slope, and wind that provides, with anti-ice off, the same performance as the actual runway conditions available with the anti-ice configuration selected when one engine becomes inoperative at VEF and the takeoff is continued.

3. Accelerate-Stop Distance.

   The sum of the actual runway length and available stopway.

4. Corrected Accelerate-Stop Distance.

   The runway length with zero stopway, slope, and wind that provides, with anti-ice off and all brakes and antiskid operative, the same performance as the actual runway conditions available with the anti-ice, brake, and antiskid configuration selected when one engine becomes inoperative at VEF and the takeoff is aborted.

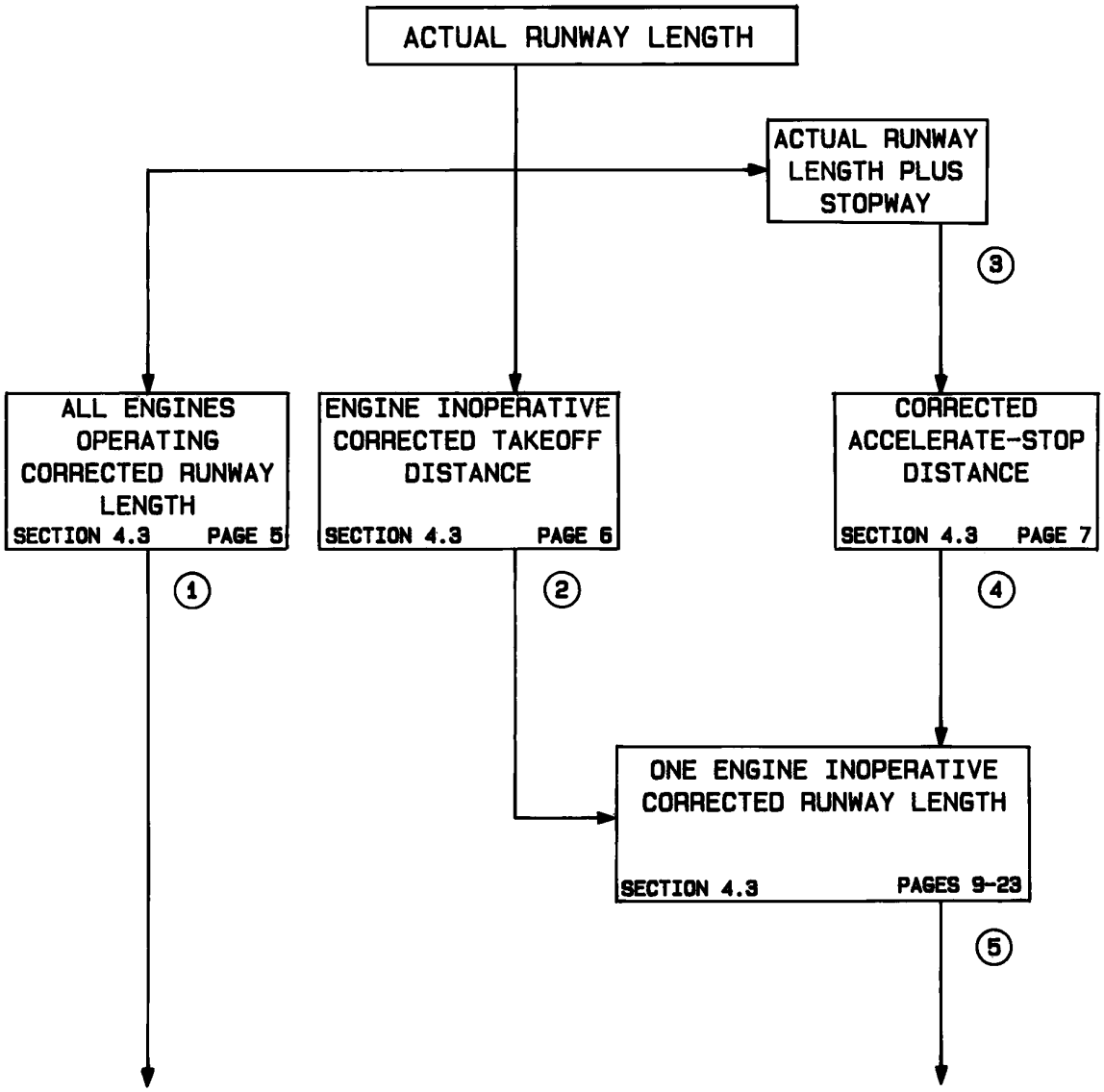
RUNWAY LENGTH CORRECTIONS

C O R R E C T E D R U N W A Y L E N G T H
D E T E R M I N A T I O N (Continued)

5. One Engine Inoperative Corrected Runway Length.

This step determines the corrected runway length available based on the available engine inoperative corrected takeoff distance, step 2, and the available corrected accelerate-stop distance, step 4. This corrected runway length is used to determine the field length limited gross weight based on engine inoperative considerations only.

CORRECTED RUNWAY LENGTH DETERMINATION PROCEDURE



S28767

ALL ENGINES OPERATING CORRECTED RUNWAY LENGTH

FLAPS 5, 15, 20

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON
③ ENGINE AND WING ANTI-ICE ON

ALL ENGINES OPERATING CORRECTED RUNWAY LENGTH — 1000 FT.

3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

ANTI-ICE ③ ② ①

REF. LINE

(HEADWIND)

WIND — KNOTS: 40 30 20 10 0 -5 -10 -15

REF. LINE

NOTE CHANGE IN SCALE

(TAILWIND)

RUNWAY SLOPE — PERCENT: 2 1 0 -1 -2

(UPHILL)

REF. LINE

(DOWNHILL)

CLEARWAY — FT.: 1000 500 0

MAXIMUM ALLOWABLE CLEARWAY

3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

ACTUAL RUNWAY LENGTH — 1000 FT.

P.C. 6L001507
D041T507-1 PG 4.3-5

APPROVED	DATE
C.S. Fitz MH46	9-21-87

HUGHES
767-300ER
CF6-80C2B6/B6F

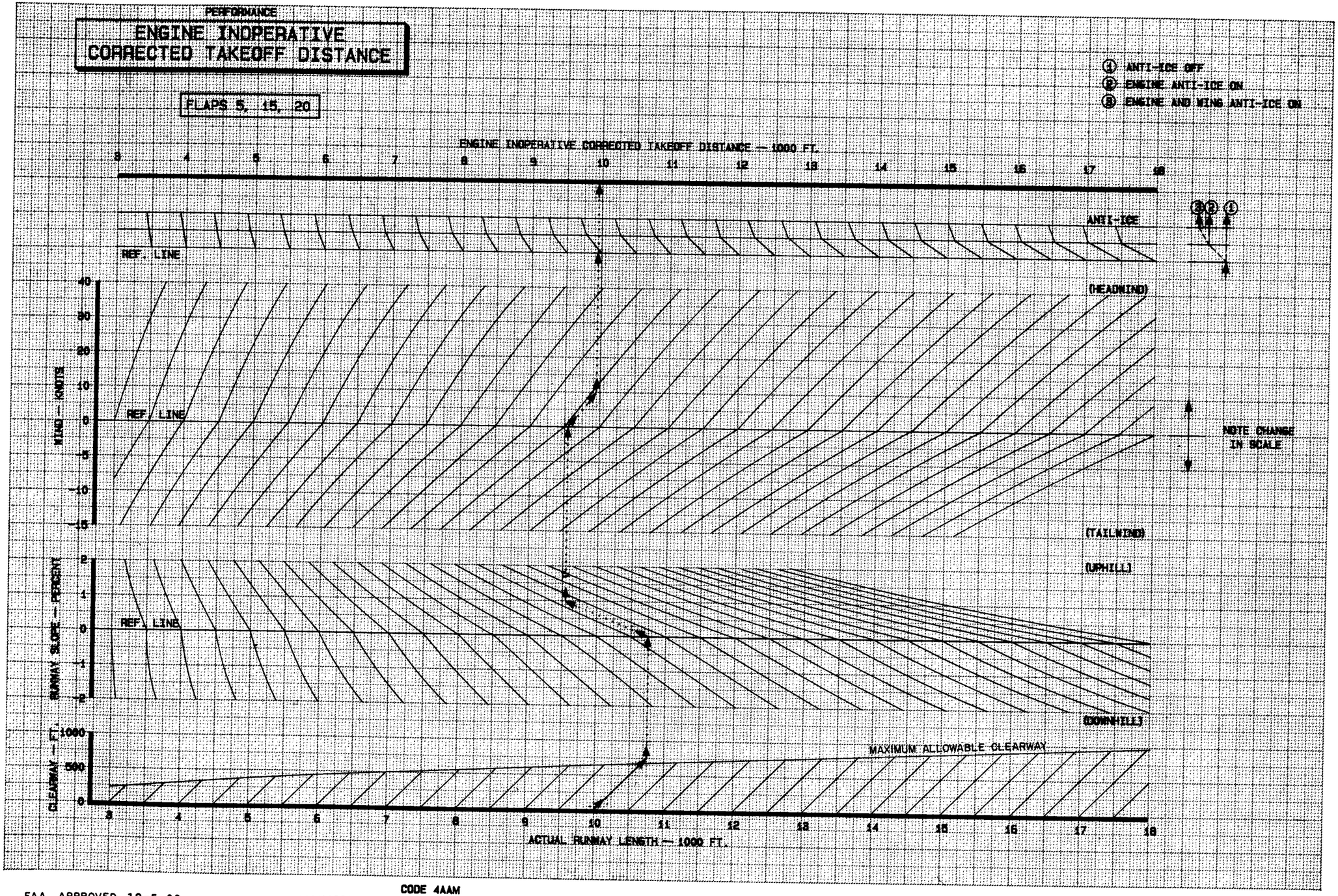
S30504

6E4208

PERFORMANCE

ENGINE INOPERATIVE CORRECTED TAKEOFF DISTANCE

FLAPS 5, 15, 20



P.C. BL001908
D041T507-1 PG. 4.3-6

APPROVED	DATE
M.M. TAY SHIELDS	9-21-87

MINN/RISING
787-300ER
CF6-80C2B6/B6F

PERFORMANCE

CORRECTED ACCELERATE-STOP DISTANCE

FLAPS 5, 15, 20

① ANTI-ICE OFF.
② ENGINE ANTI-ICE ON.
③ ENGINE AND WING ANTI-ICE ON.

CORRECTED ACCELERATE-STOP DISTANCE — 1000 FT.

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

ANTI-SKID INOPERATIVE

OBSERVE PERFORMANCE ADJUSTMENTS IN SECTION 4.1 FOR ANTI-SKID INOPERATIVE

ONE BRAKE DEACTIVATED

REF. LINE

ANTI-ICE

②&③ ①

REF. LINE

(HEADWIND)

KIND — KNOTS: 40 30 20 10 0 -5 -10 -15

REF. LINE

NOTE CHANGE IN SCALE

(TAILWIND)

(UPHILL)

RUNWAY SLOPE — PERCENT: 2 1 0 -1 -2

REF. LINE

(DOWNHILL)

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

ACCELERATE-STOP DISTANCE — 1000 FT.

P.C. BL001509
D041T607-1 PG. 4.3-7

APPROVED	DATE
C.S. Jr. MMG	9-21-87

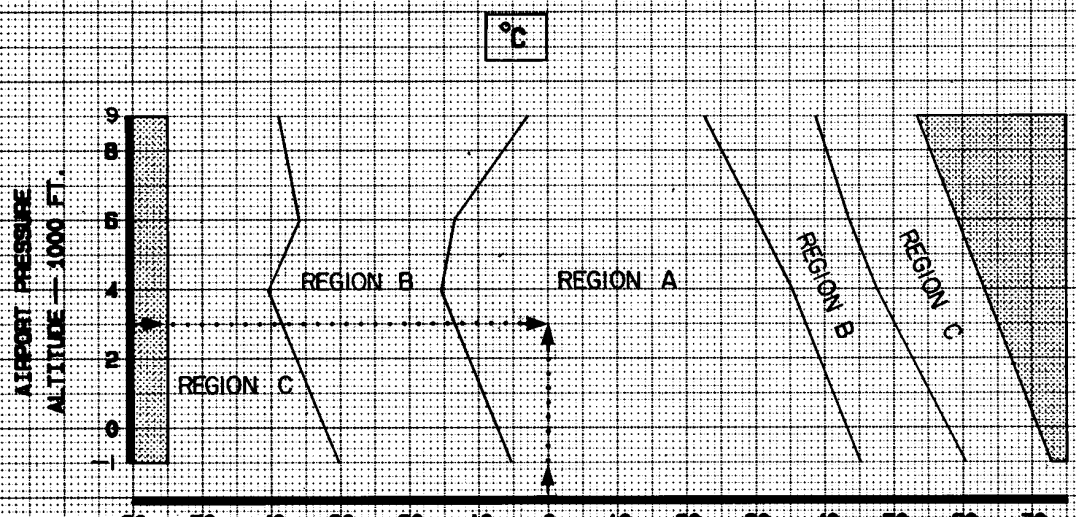
A. WINN
787-300ER
CF8-80C2B6/B6F

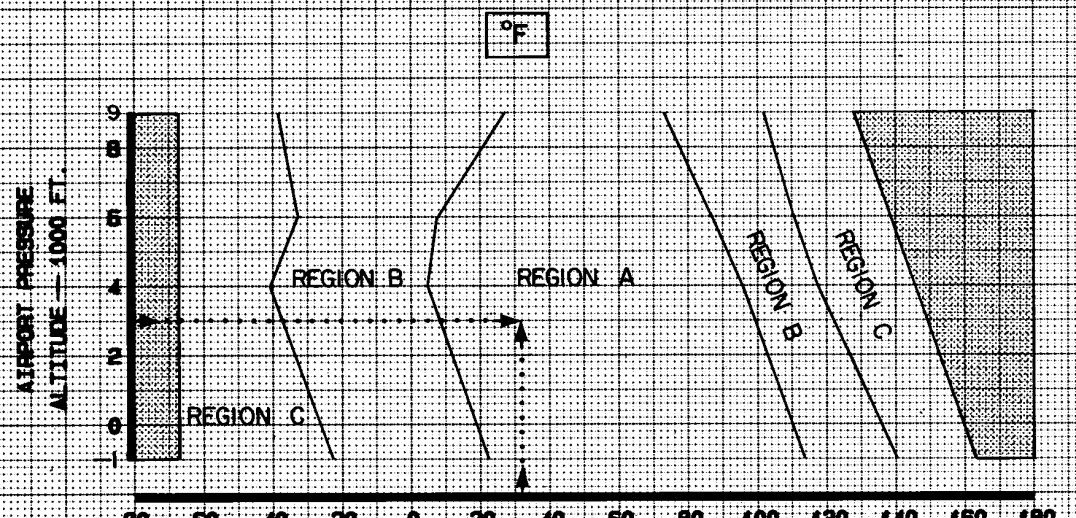
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

ALTITUDE-TEMPERATURE REGIONS

● USE THIS CHART TO DETERMINE WHICH RUNWAY LENGTH & V_1 ADJUSTMENTS CHARTS ARE APPLICABLE FOR A GIVEN ALTITUDE AND TEMPERATURE CONDITION.





P.C. 65000749
D041T507-1 P6.4.3-8

DAVIS
767-300
CF6-80C2B6/86F

	APPROVED	DATE
	PASNET 220	9.4.87

64207

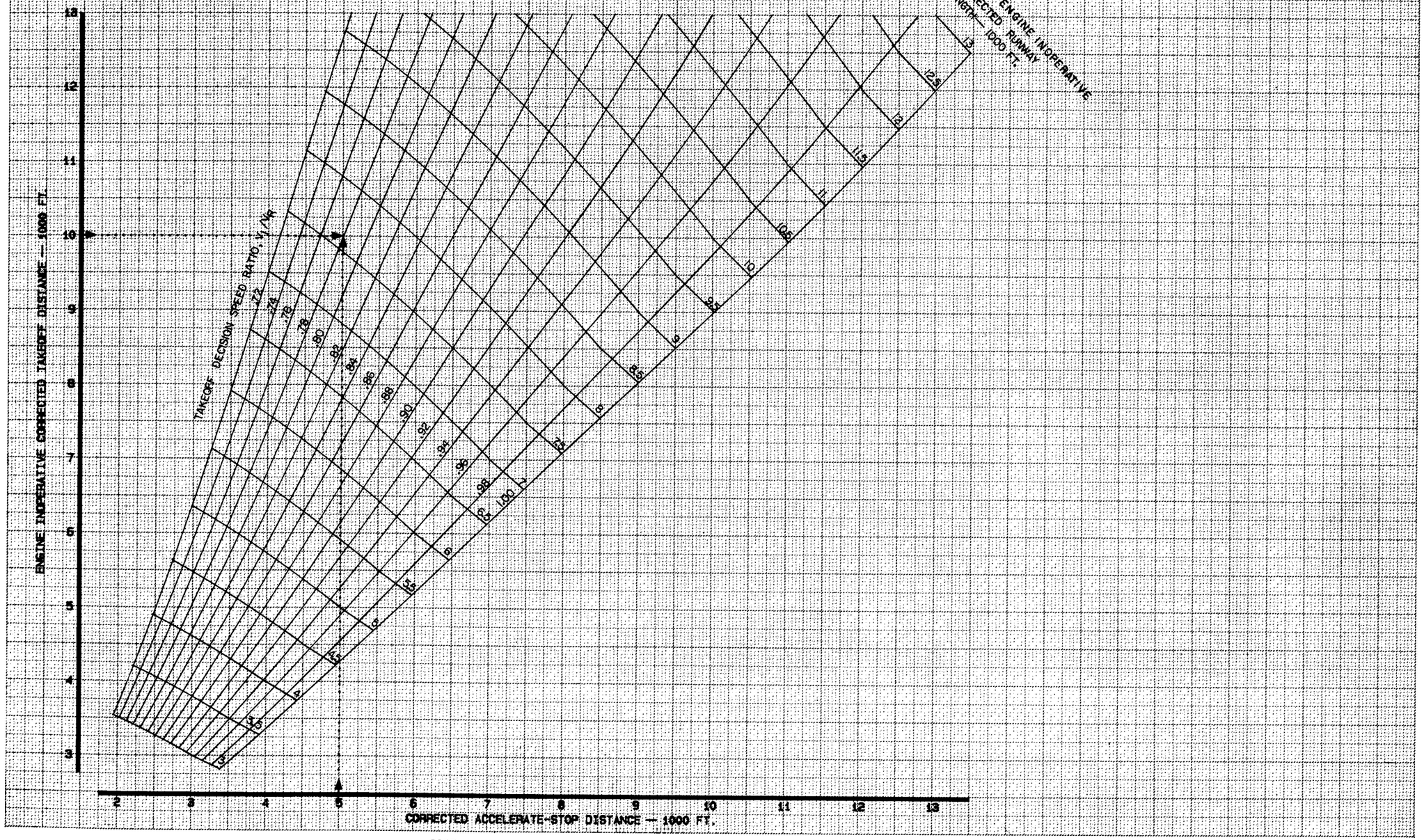
S28772

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C. BL001510
D0417507-1 PG. 4.3-9

APPROVED	DATE
FAA KT 220	7.9.87

A. MINN
767-300ER
CF6-80C2B6/B6F

PERFORMANCE

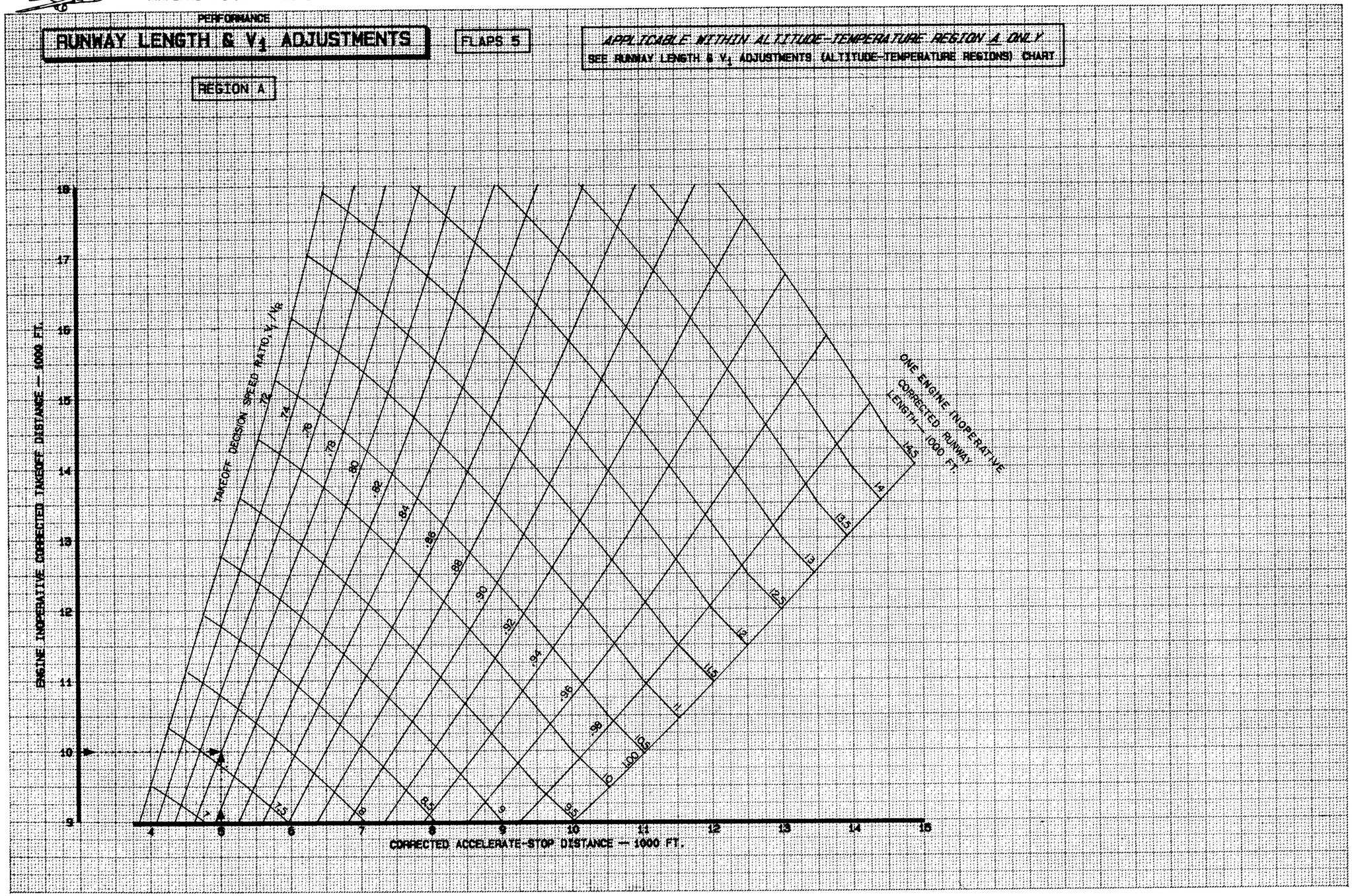
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C. BL0018511
D041T007-1 PG. 4.3-10

A. WINN
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	PMS 220	9.4.87

S30894

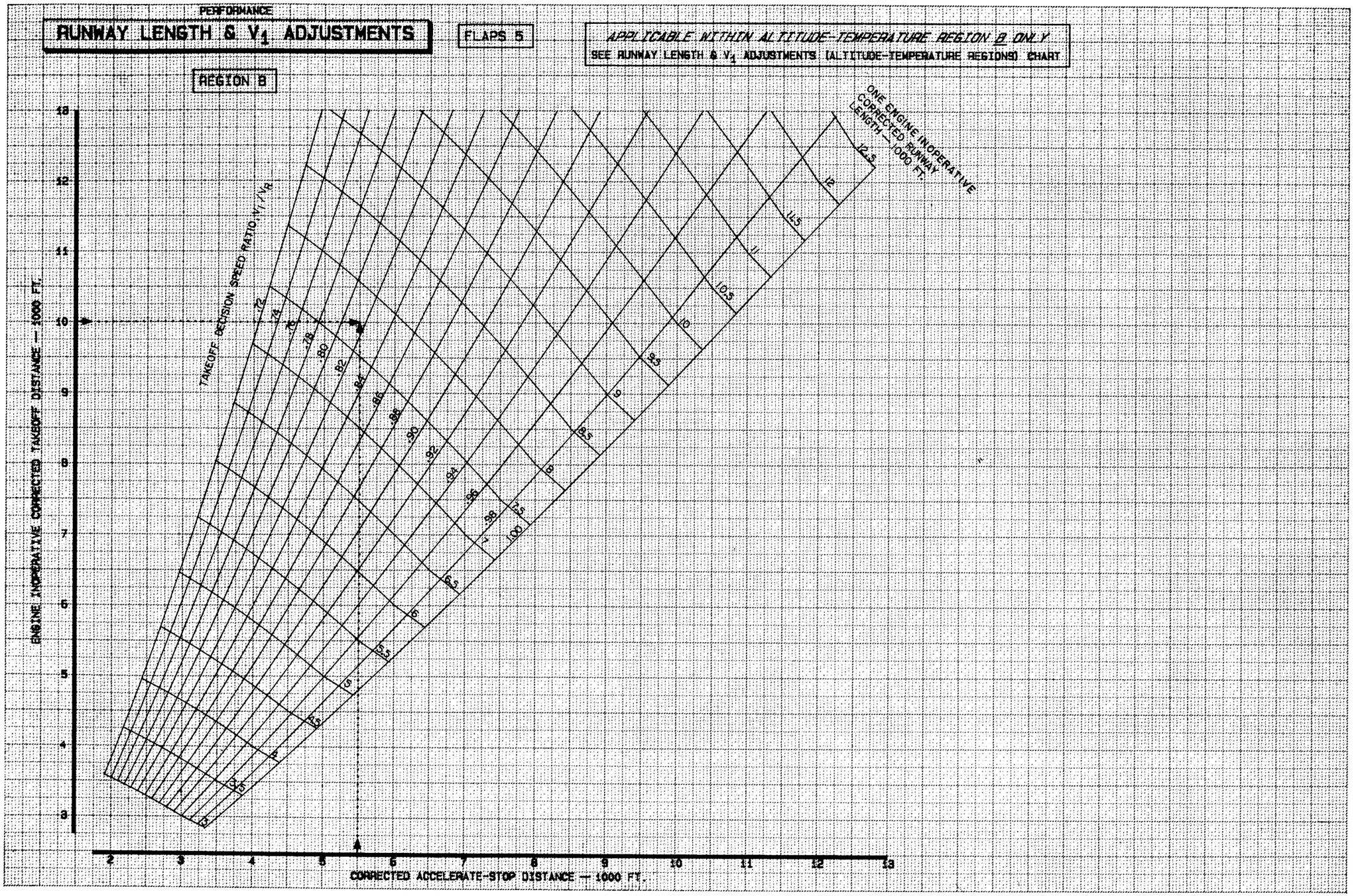
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION B



P.C. BL001512
D041T507-1 PG. 4.3-11

A. WINN
787-300ER
CF8-80C2B6/B6F

APPROVED	DATE
BAS NT 220	7.4.8T

S30944

6E4208

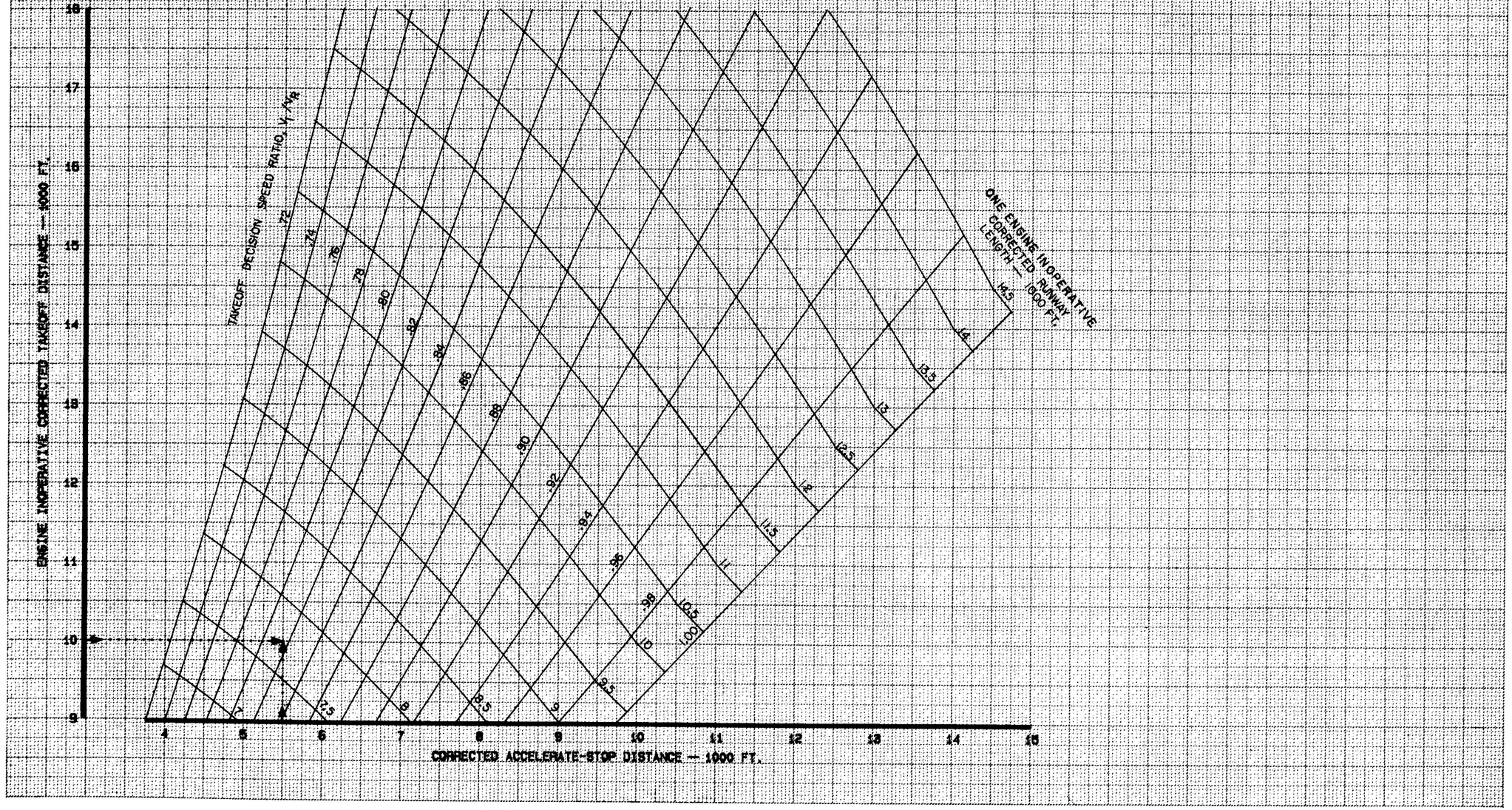
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION 2 ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION 2



P.C. BL001513
D041T607-1 P6. 4.8-12

A. WINN	APPROVED	DATE
787-300ER	FAS MT 220	9.4.87
CF6-80C2B8/B6F		

S30986

6E4208

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C

P.C. 6L001514
D041T507-1 P6. 4.3-13

APPROVED	DATE
FAS 777-220	9.1.87

A. MINN
787-300ER
CF6-80C2B6/B6F

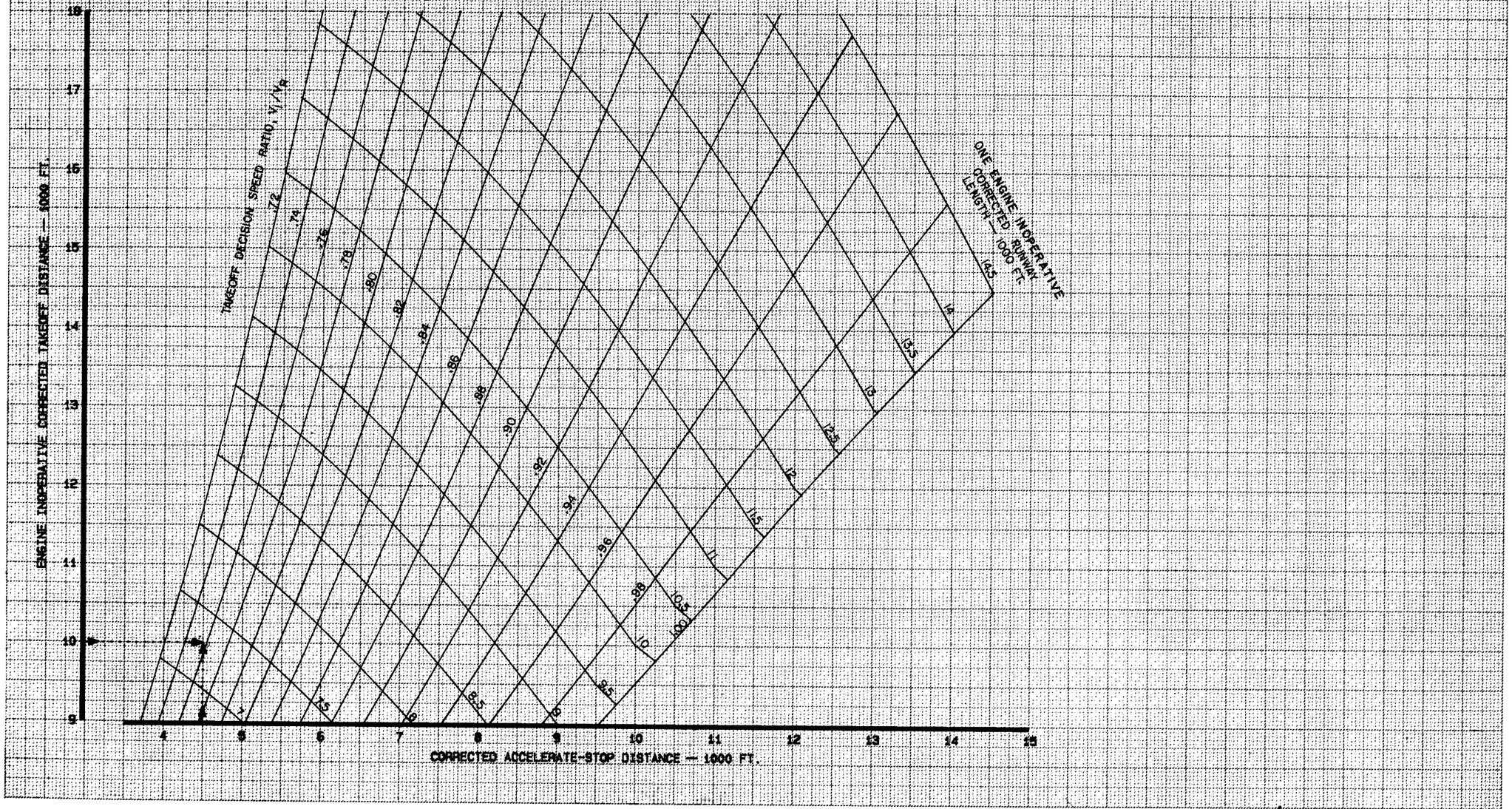
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. 6L001515
D041T507-1 PG. 4.3-14

A. WINN
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	FAS 1447 220	9.4.87

S31006

6E4208

PERFORMANCE

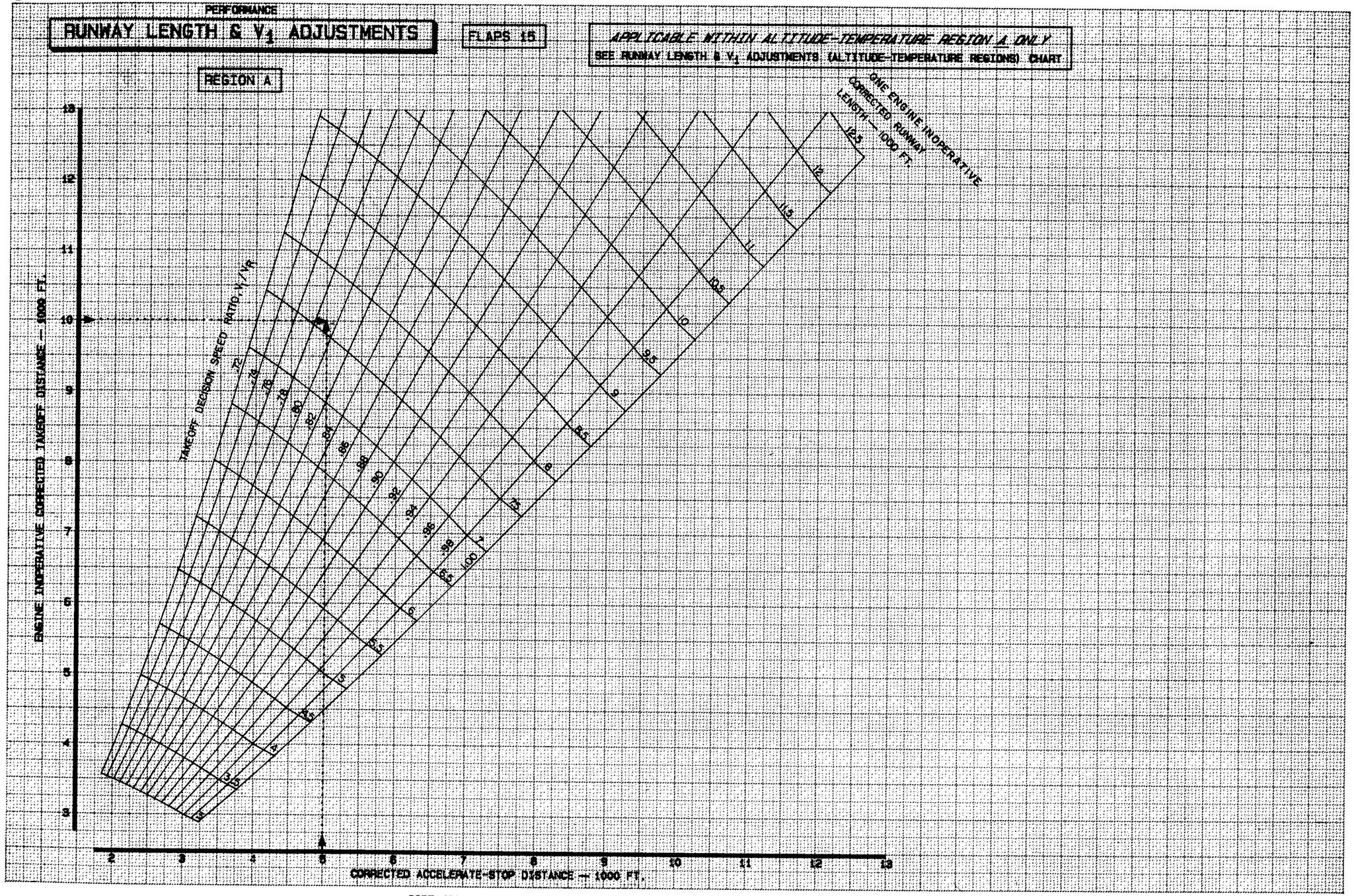
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C.GL001818
D041T907-1 PG. 4.3-17

A. WINN	APPROVED	DATE
767-300ER	C.S. Winn	9-10-87
CF6-80C2B6/B6F		

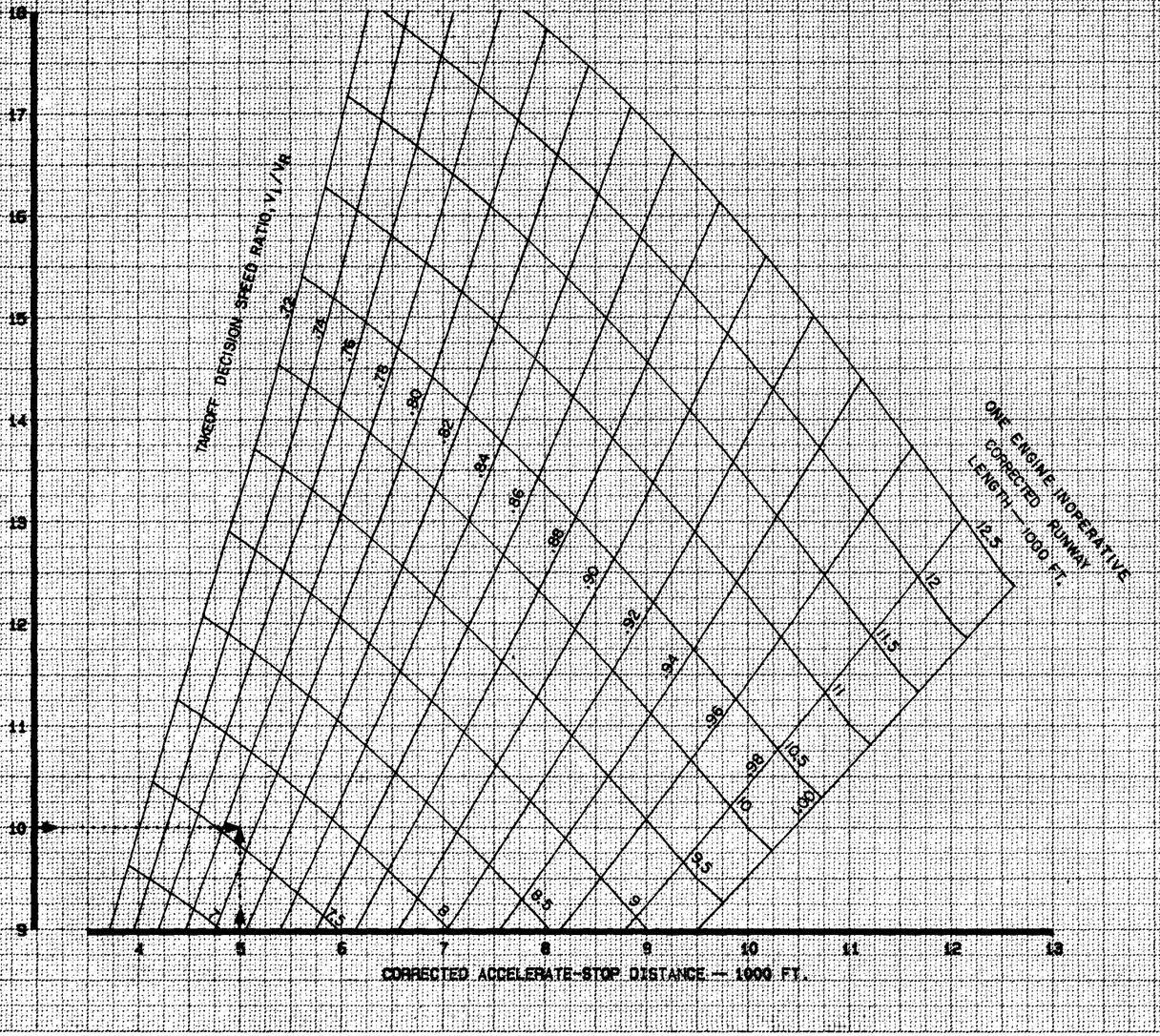
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C.B. 0011519
D041T507-1 PG. 4.3-18

A. WINN
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
C.S. Tilli WINN	4.10.87

PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION B

P.C. 6L001520
D041T507-1 P6. 4.3-17

A. WINN	APPROVED	DATE
767-300ER	C.S. Dawkins	9/10/87
CF6-80C2B6/B6F		

S31087

6E4208

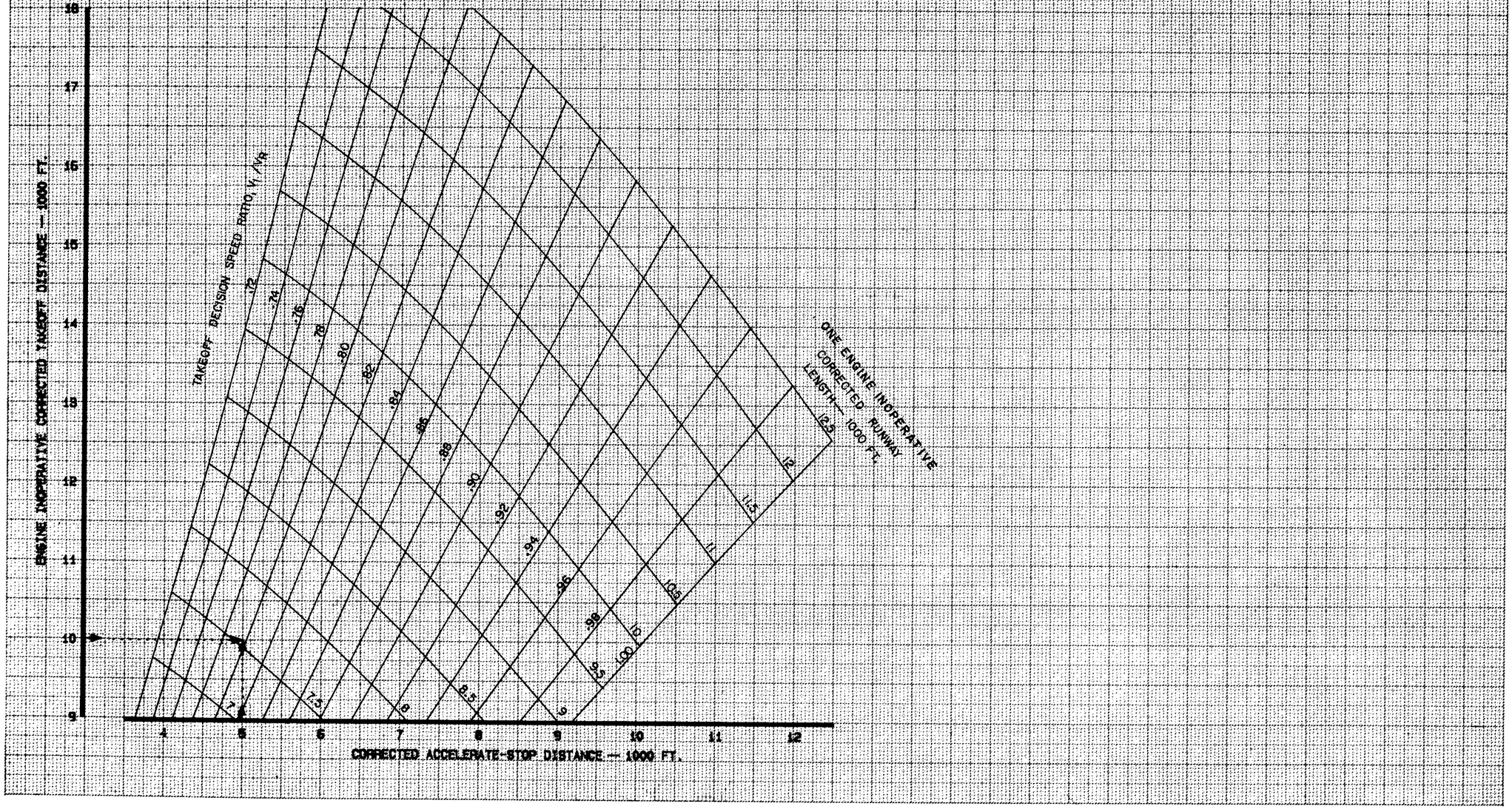
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION B



P.C. 6L001521
D041T607-1 P6. 4.3-18

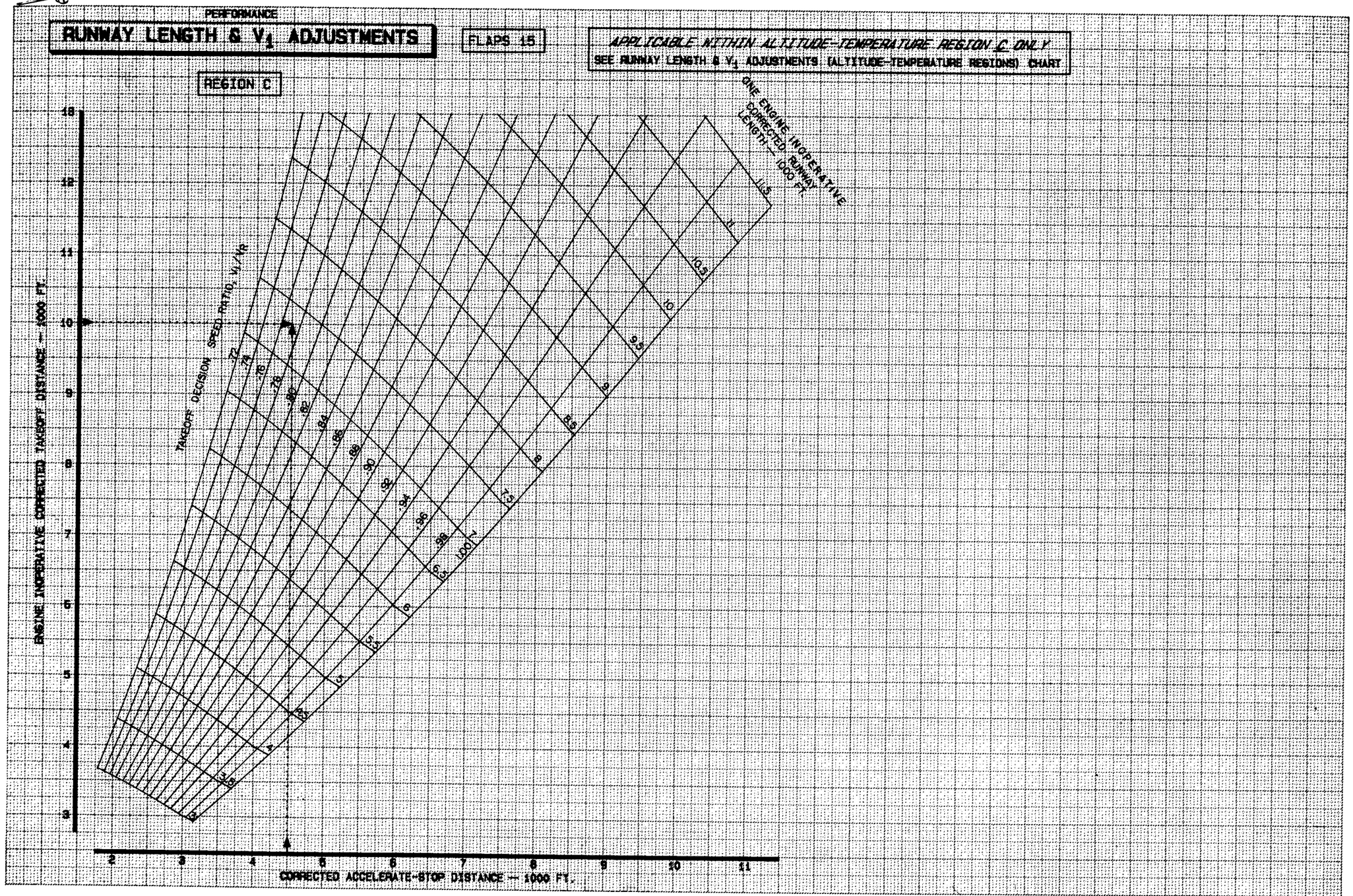
A. MINN	APPROVED	DATE
767-300ER	C.S. Zilli MAW	9-10-87
CF6-80C2B6/B6F		

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C.GL001522
D041T507-1 P6. 4.3-19

APPROVED	DATE
A.S.Z.// #1446	9-8-87

A. WINN
767-300ER
CF6-80C2B6/B6F

S32381

6E4208

PERFORMANCE

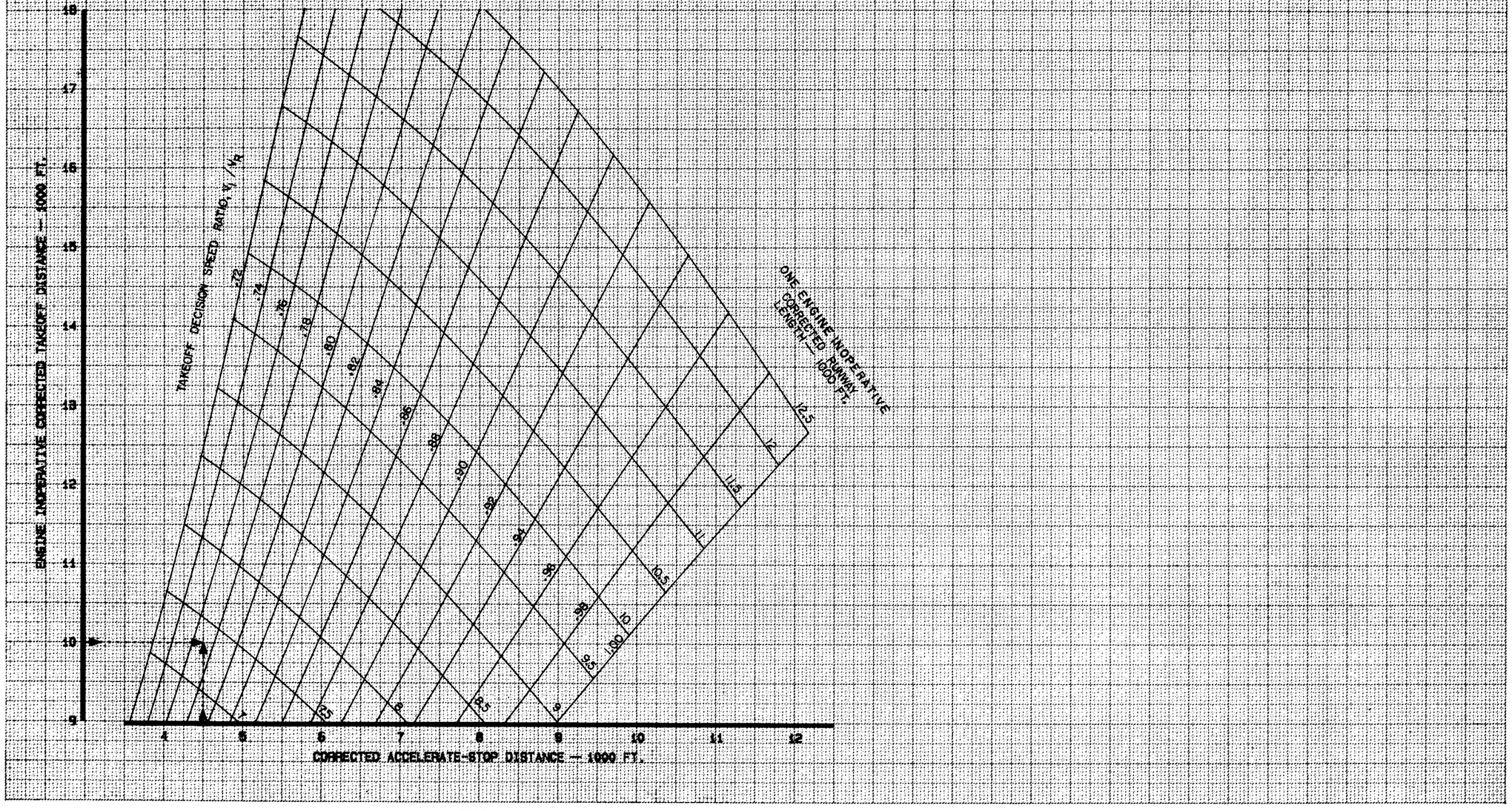
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. GL001523
D041T507-1 PG. 4.3-20

APPROVED	DATE
C.S. Ellis/MSG	7-10-87

A. WINN
767-300ER
CF6-80C2B6/B6F

S32389

6E4208

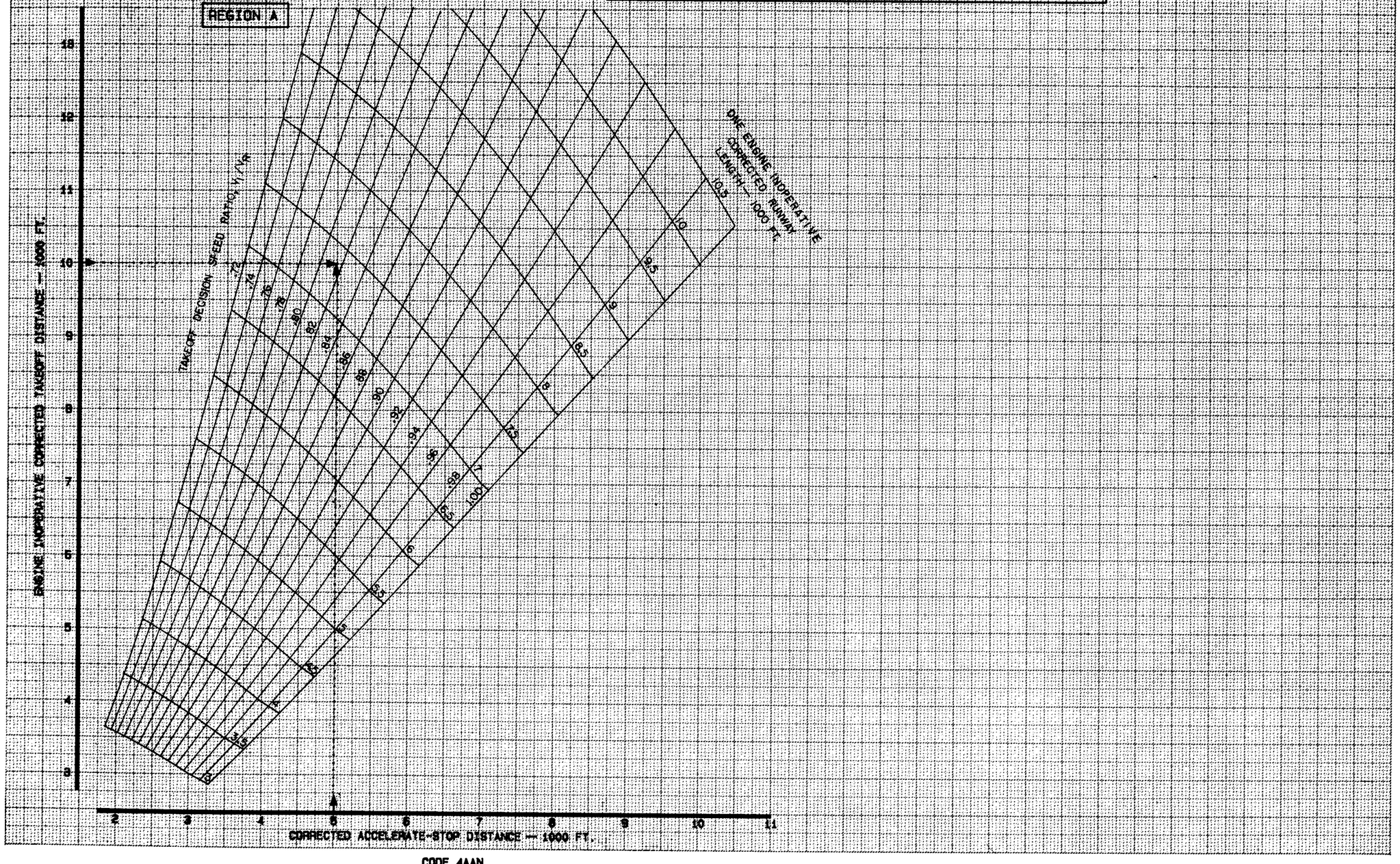
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 20

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C. BL001826
D041T607-1 Pg. 4.3-21

A. WINN
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
AMI-787 SHIELDS	7/4/97

S32397

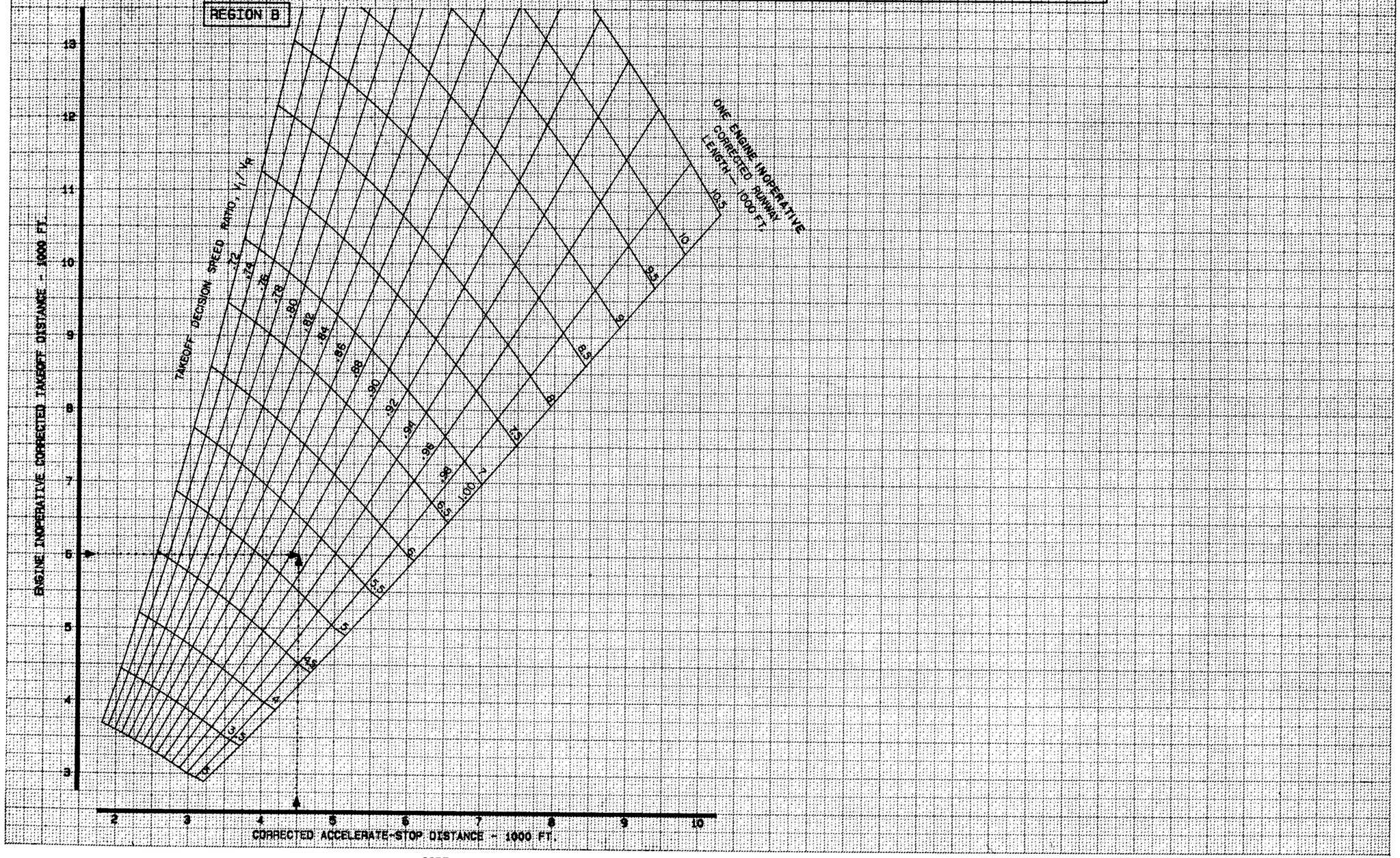
6E4208

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 20

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION B



P.C.	6L001527
D041T507-1	P6. 4.3-22

A. WINN	APPROVED	DATE
767-300ER	JM 1/27 SHIELDS	9/9/87
CF6-80C2B6/B6F		

S32584

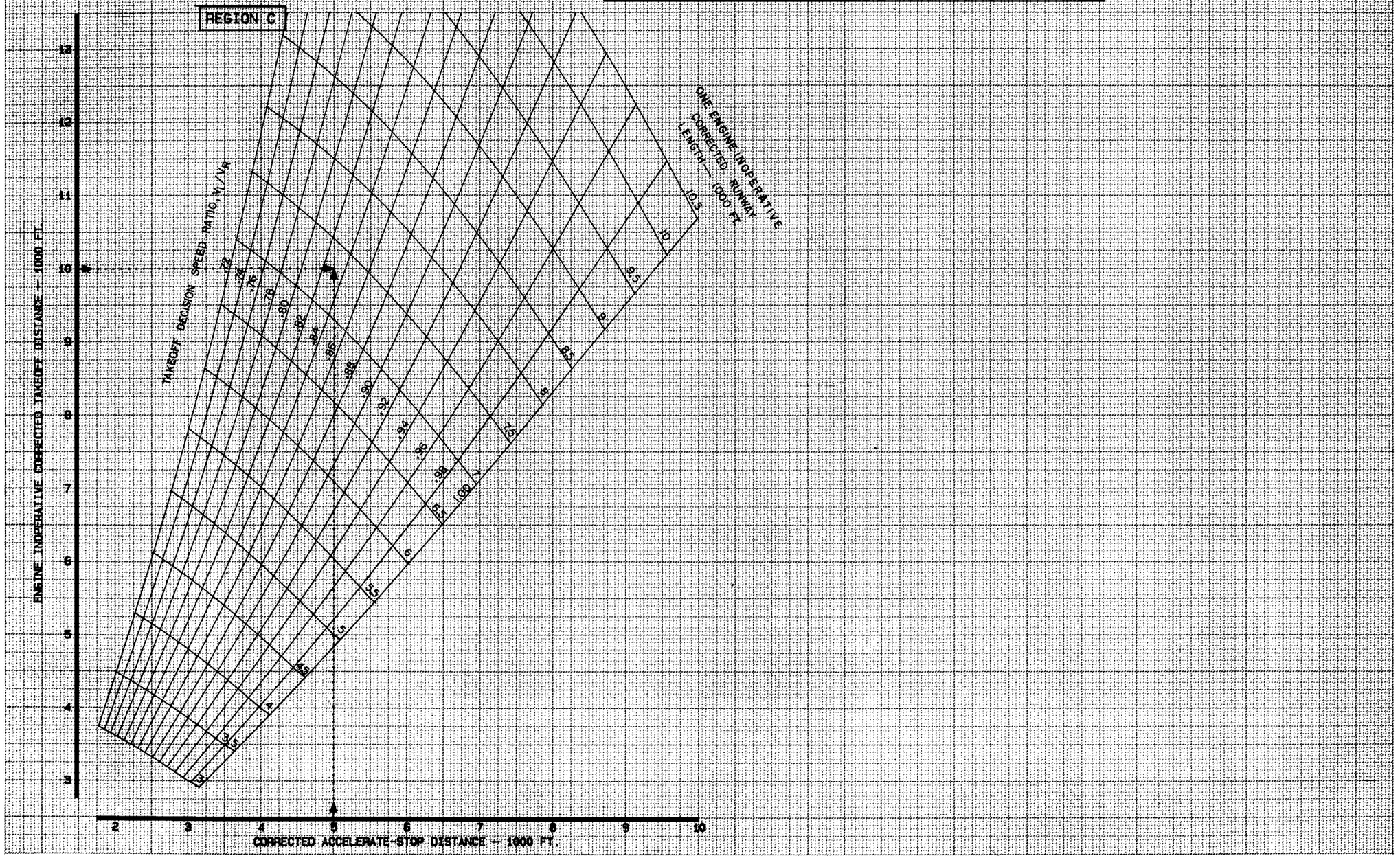
6E4208

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 20

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. 6L001528	
D0417507-1	PG. 4.3-23

A. WINN	APPROVED	DATE
787-300ER	MM-127 SHIELDS	9/1/87
CFB-80C2B6/B6F		

S32592

6E4208

SECTION 4.4 - FIELD LENGTH LIMITS

C O N T E N T S

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A/C PACKS OFF 17

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21384

FIELD LENGTH LIMITS

G E N E R A L

The charts in this section show the relationship between corrected runway length and takeoff gross weight that satisfies the Federal Aviation Regulations related to field length limited gross weight for one engine inoperative and all engines operating takeoffs. Separate charts are included for air conditioning (A/C) packs on and off and for the different takeoff flaps. The one engine inoperative and the all engines operating corrected runway lengths are obtained from the actual runway length conditions using the charts in Section 4.3. The lesser of the one engine inoperative and the all engines operating field length limited takeoff gross weight is the field length limited takeoff gross weight. The scheduled takeoff gross weight cannot exceed the field length limited gross weight. See the example problem appendix for a numerical example of the use of these charts.

Brake part numbers (P.N.) in the same category produce equal braking performance for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

T A K E O F F F I E L D L E N G T H

Takeoff field length performance shown in this section accounts for: (1) 115 percent of the all-engine operating distance, and (2) the engine inoperative distance, considering a failure of the critical engine at VEF. These distances are based on a smooth, dry hard-surfaced runway, and the following conditions:

1. The configuration outlined under Performance Configuration in Section 4.1 was used.

2. Takeoff thrust was obtained by using the thrust setting procedures outlined under Takeoff Procedures in Section 4.1.

3. Engine failure takeoff distances accounted for a 1 second time delay for engine failure recognition.

4. When a decision to stop was made at or just prior to reaching V_1, the braking procedure outlined under Takeoff Procedures in Section 4.1 was used. Reverse thrust was not used to determine takeoff field lengths.

5. When a decision to continue with a failed engine was made at or after reaching V_1, rotation was initiated at scheduled V_R and scheduled V_2 attained at a height of 35 feet.

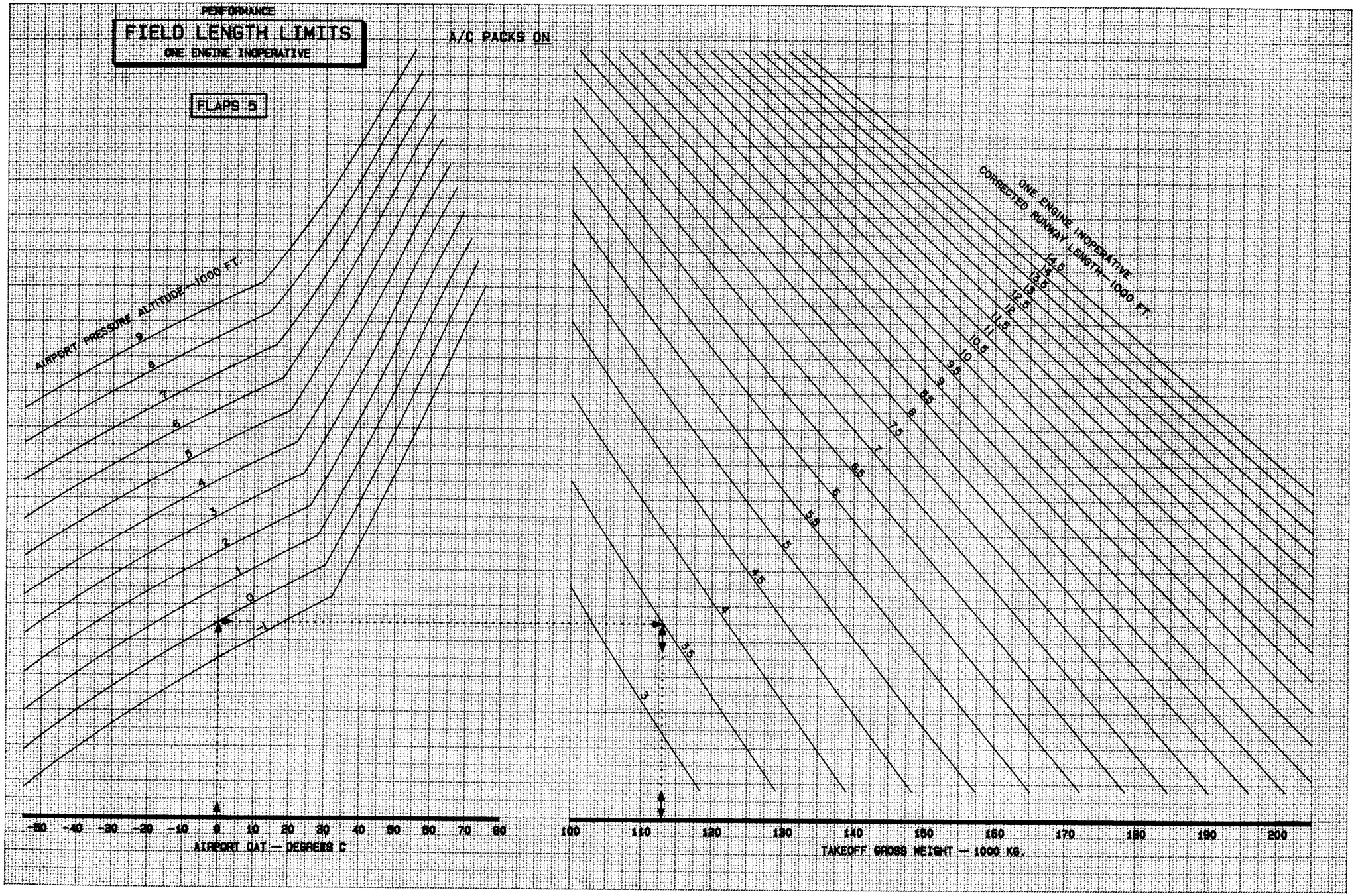
P.C.6L001790
D0417E607-1 P6. 4.4-6

PERFORMANCE

FIELD LENGTH LIMITS
ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 5



DUTTON	APPROVED	DATE
787-300ER	M. LECHNAR ANA-308	10 Feb 89
CF6-80C2B6/B6F		

P.C. BL001791
D041T907-1 PG. 4.4-7

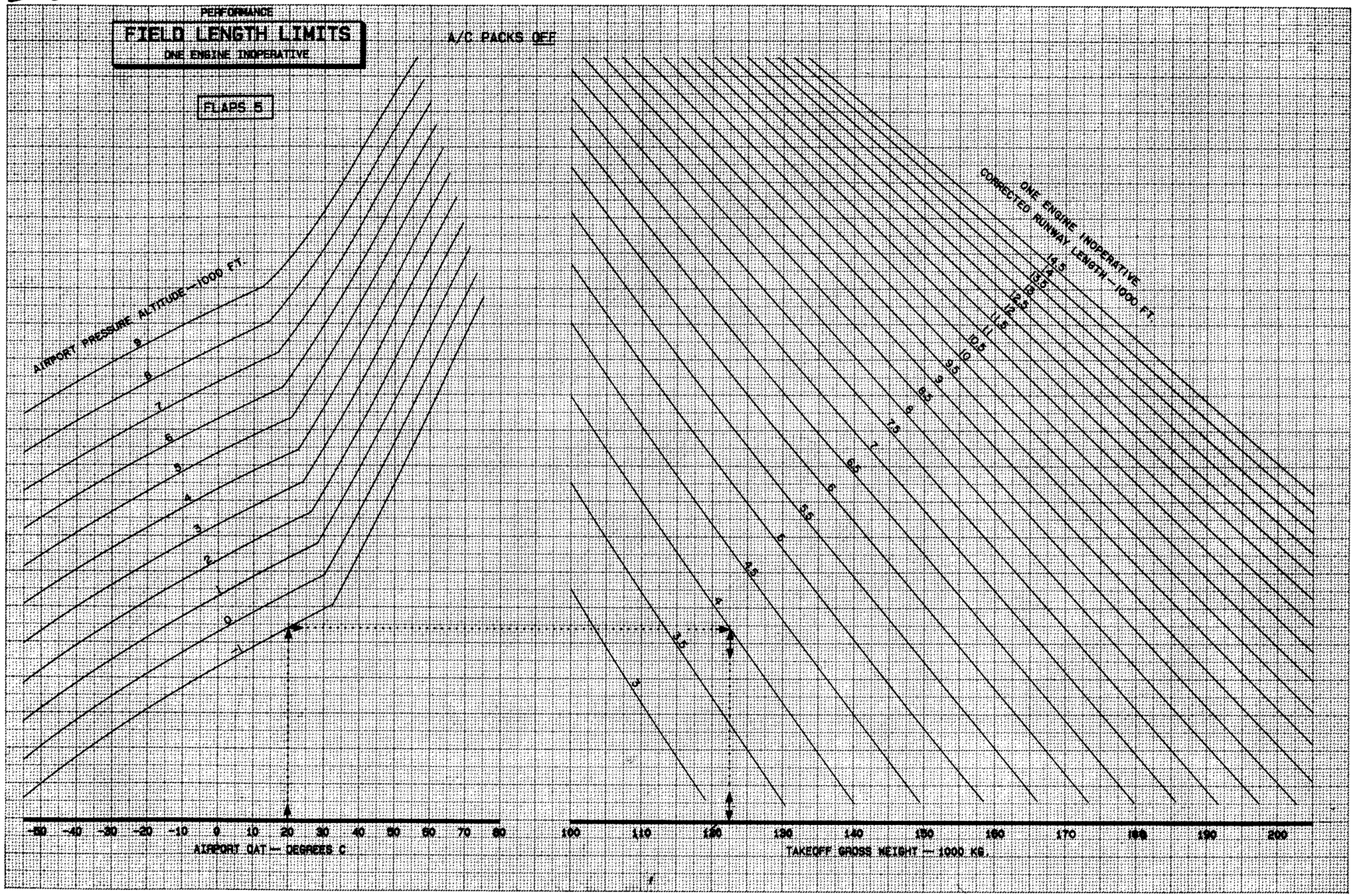
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 5



DUTTON
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	M. LEICHMAN AVM-308	10 Feb 88

P.C.6L001792
D0411T507-1 P6. 4.4- 8

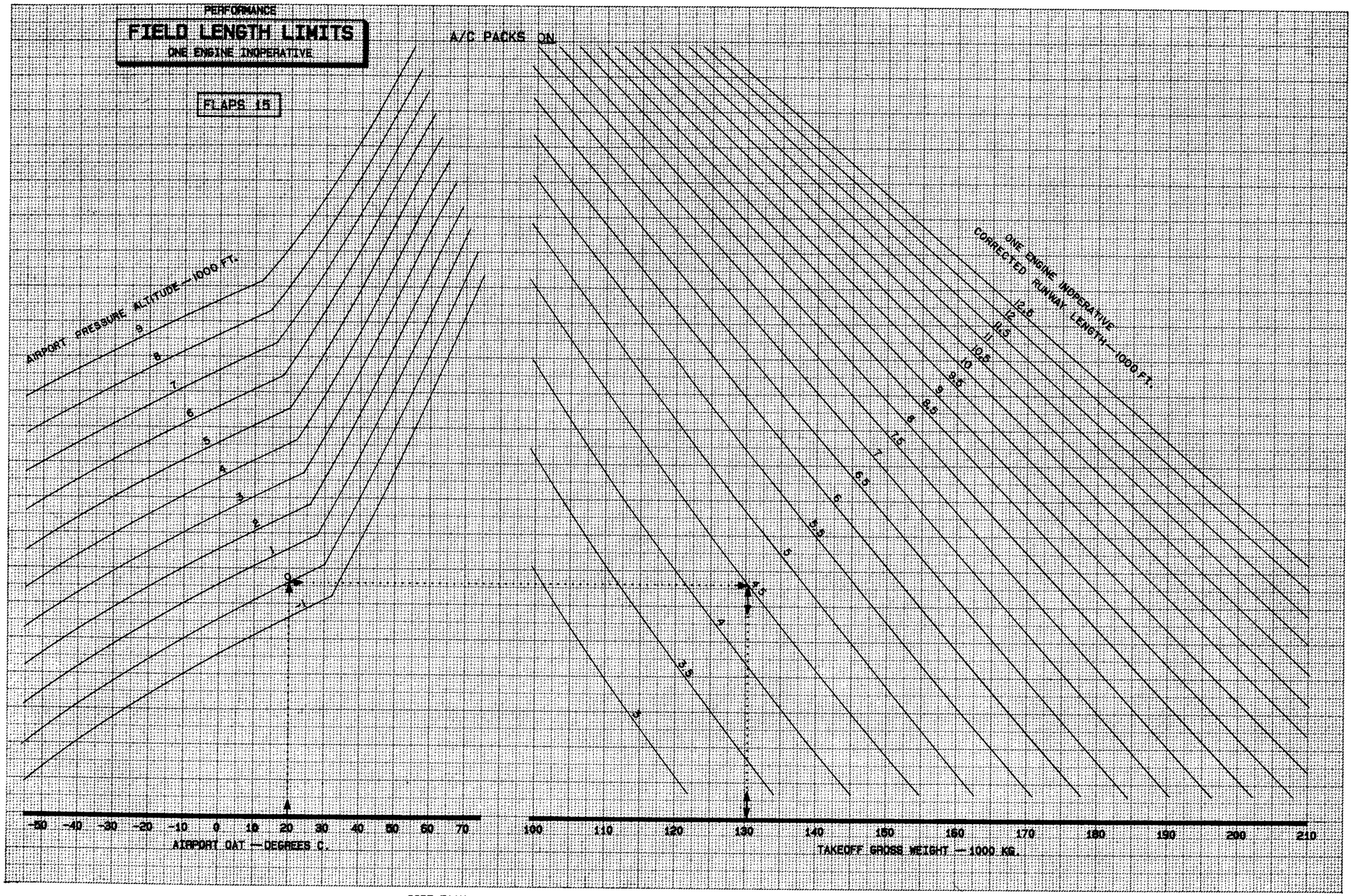
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

FLAPS 15

A/C PACKS ON



RUFF	APPROVED	DATE
767-300ER	K8 NMGS	FEB 28
CF6-80C2B6/B6F		

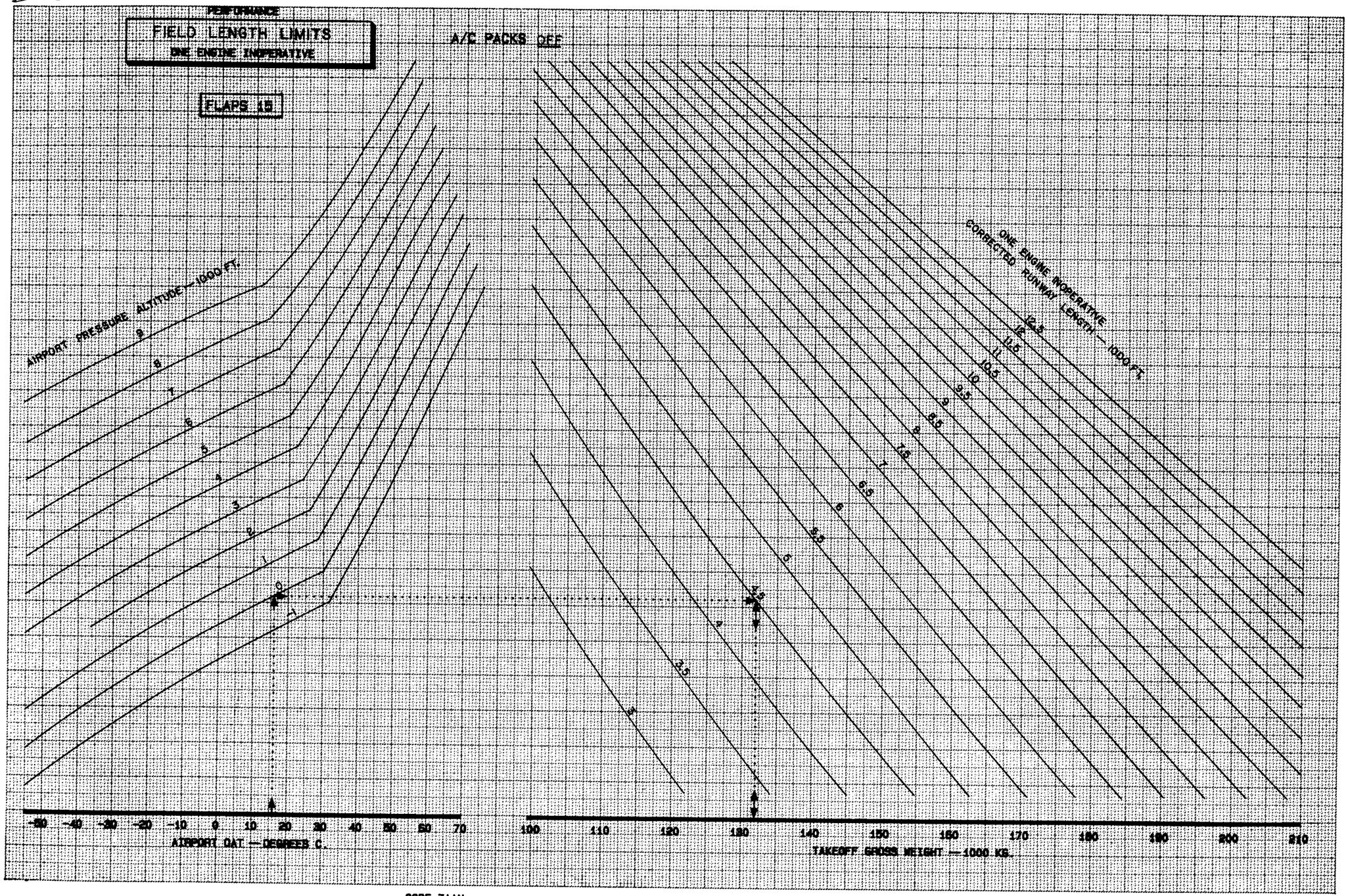
P.C. 6L001793
D041T507-1 P6. 4.4-9

PERFORMANCE

FIELD LENGTH LIMITS
ONE ENGINE INOPERATIVE

FLAPS 15

A/C PACKS OFF



RUFF	APPROVED	DATE
767-300ER	KB JAMES	9 FEB 88
CF6-80C2B6/B6F		

S33746

6E4208

P.C. BL001794
D041T907-1
PG. 4.4-10

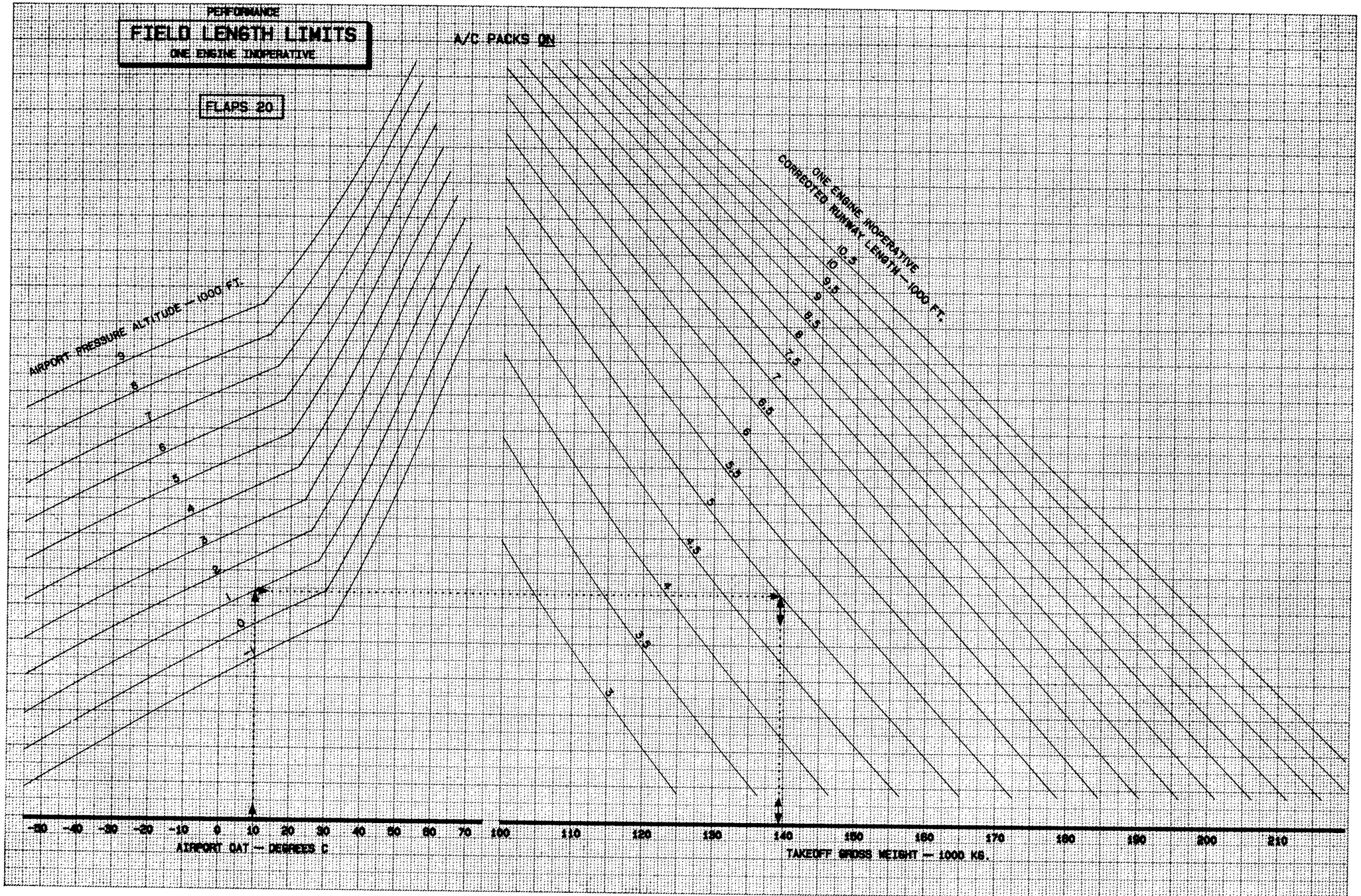
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

FLAPS 20

A/C PACKS ON



J. PETERS	APPROVED	DATE
767-300ER	C. J. Stark NM422A	2/11/88
CF6-80C2B6/B6F		

S33759

6E4208

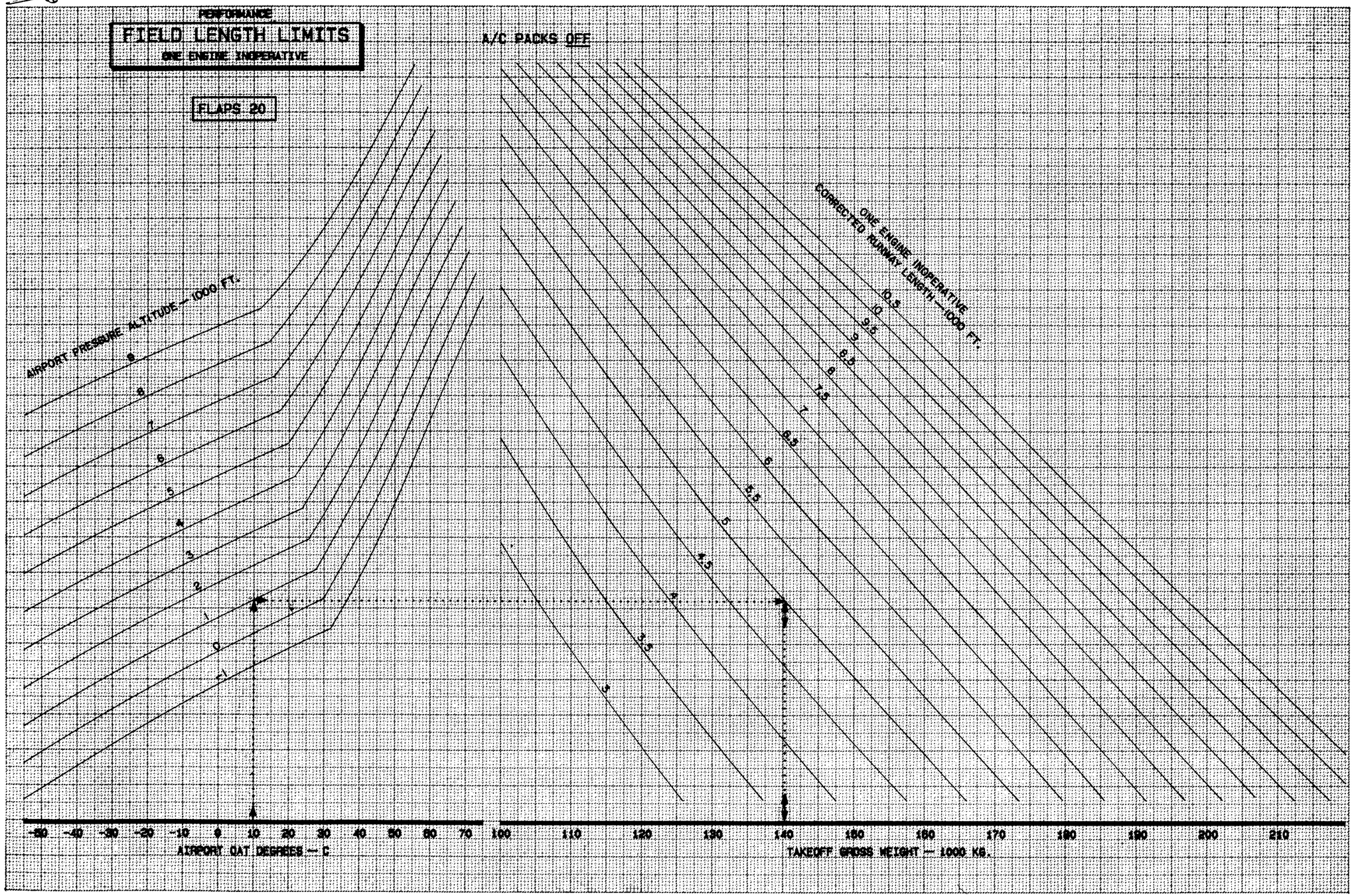
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

FLAPS 20

A/C PACKS OFF



P.C. 6L001786
D041T607-1
PG. 4.4-11

APPROVED	DATE
C.T. Bart for NM2Bs	2/11/88

J. PETERS
767-300ER
CF6-80C2B6/B6F

S33820

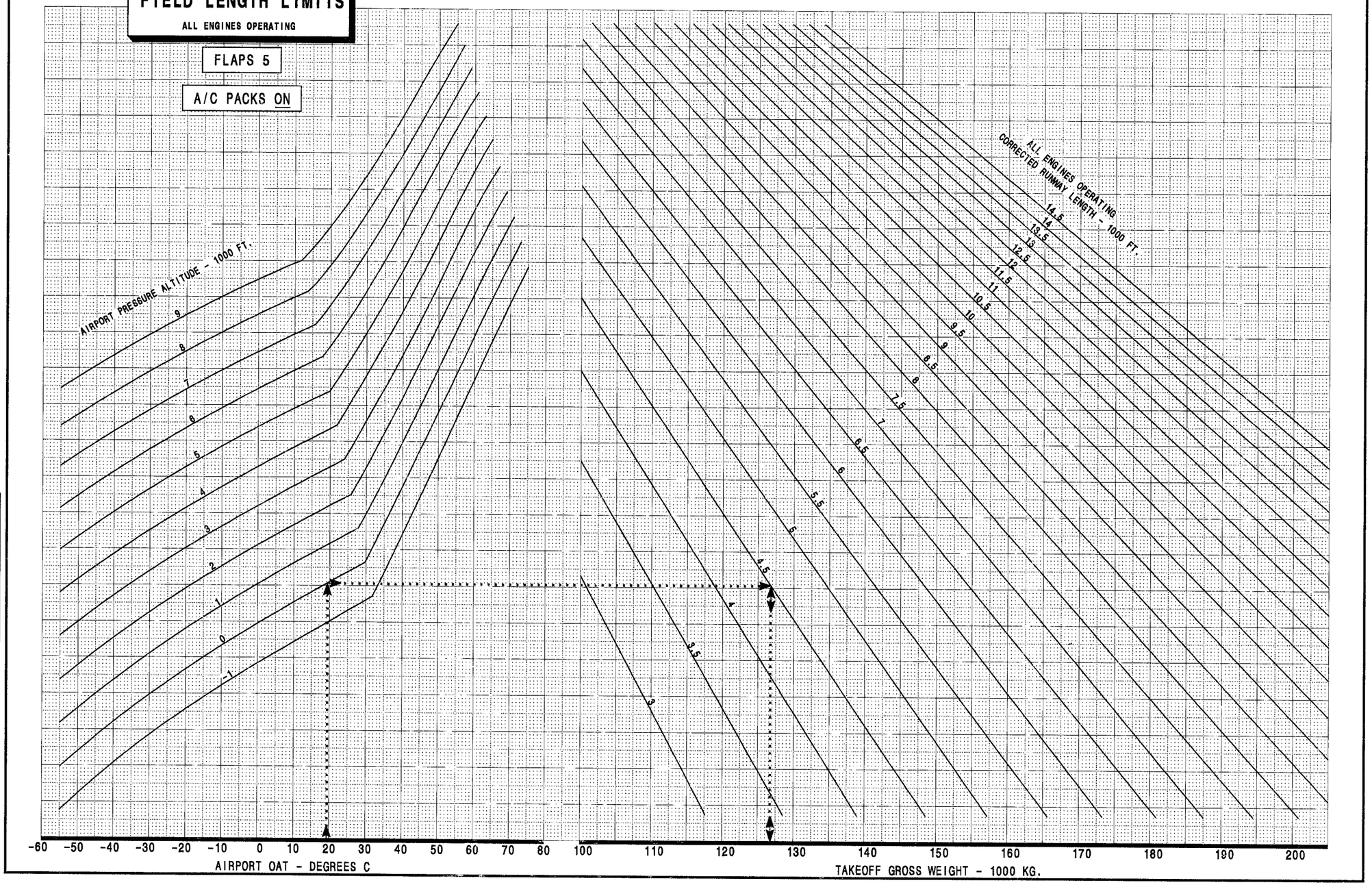
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS ON



P.C. K600412007
D041T507-1 PG. 4.4-12

APPROVED	V. Hall
DATE	2 Jun 93

D. BACH
767-300ER
CF6-80C2B6/B6F

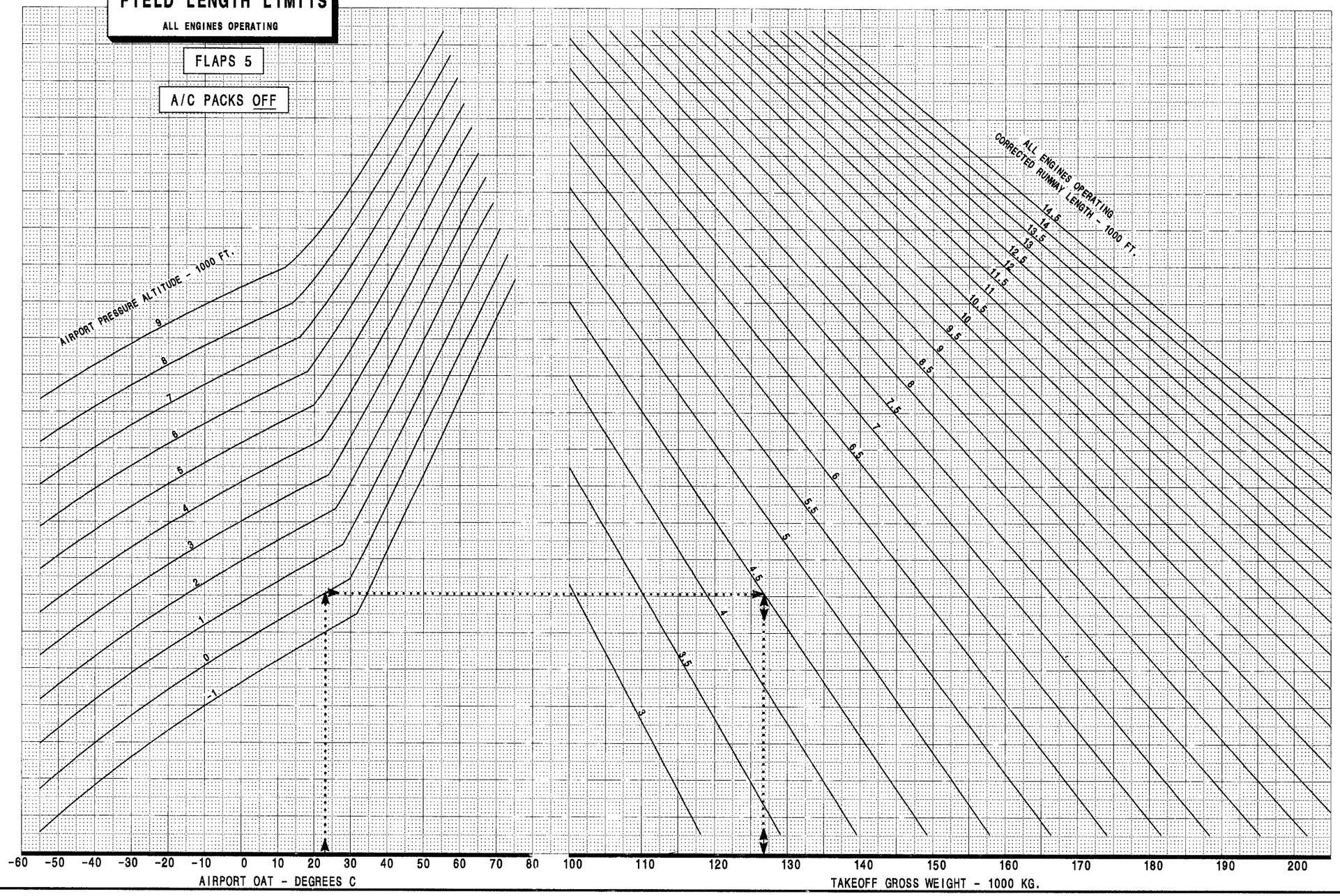
S40289

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS OFF



P.C. K600413007 PG. 4.4-13
D041T507-1

APPROVED	DATE
V thil	23Jun93

D. BACH
767-300ER
CF6-80C2B6/B6F

S40299

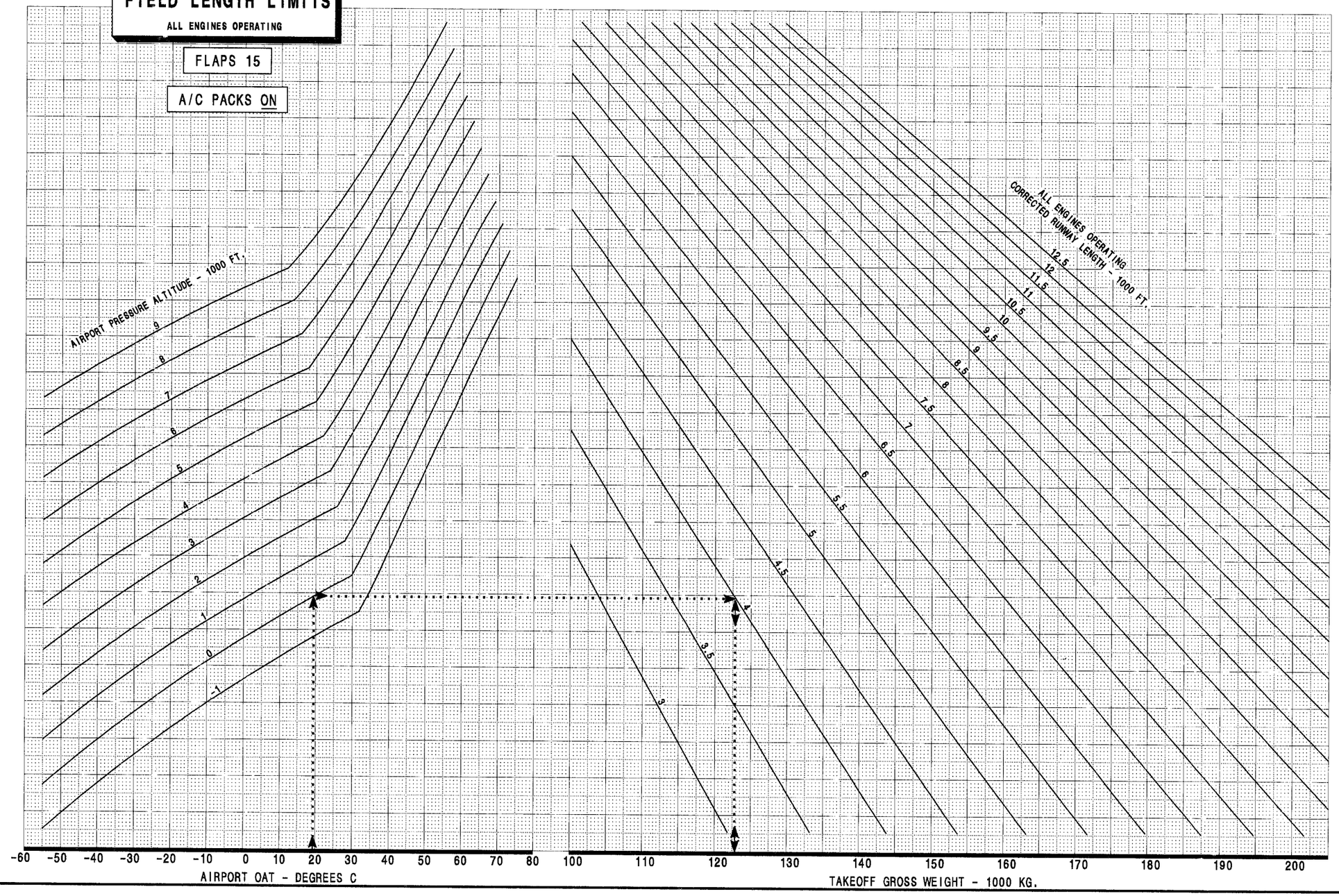
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS ON



P.C. K690414007
D041T507-1 PG. 4.4-14

D. BACH
767-300ER
CF6-80C2B6/B6F

APPROVED V. Hill DATE 2Jun95

S40308

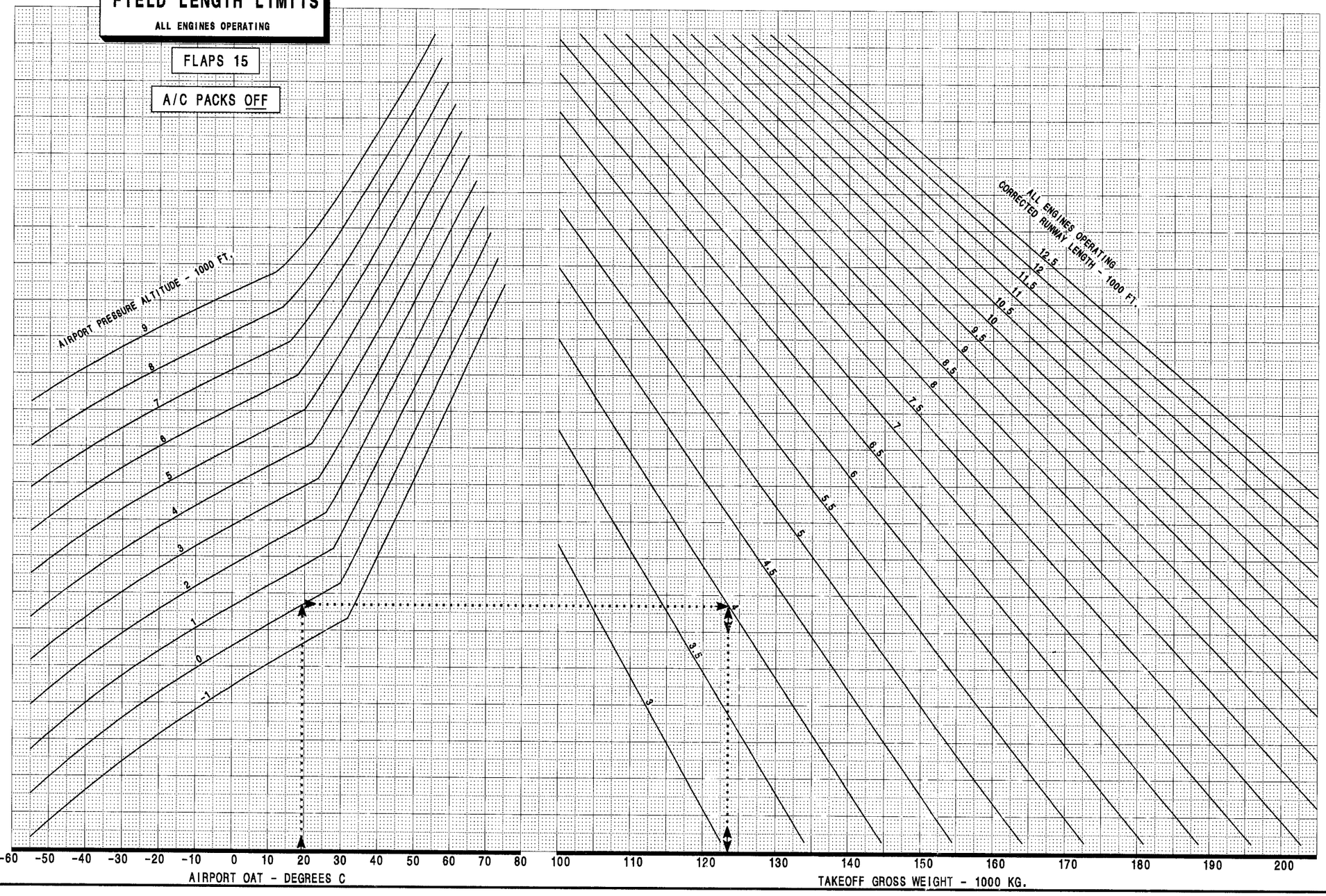
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS OFF



P.C. K600415007
D041T507-1 PG. 4.4-15

D. BACH
767-300ER
CF6-80C2B6/B6F
APPROVED L'Hill DATE 2Jun93

S40318

P.C. K600416007
D041T507-1 PG. 4.4-16

D. BACH

767-300ER	APPROVED	DATE
CF6-80C2B6/B6F		

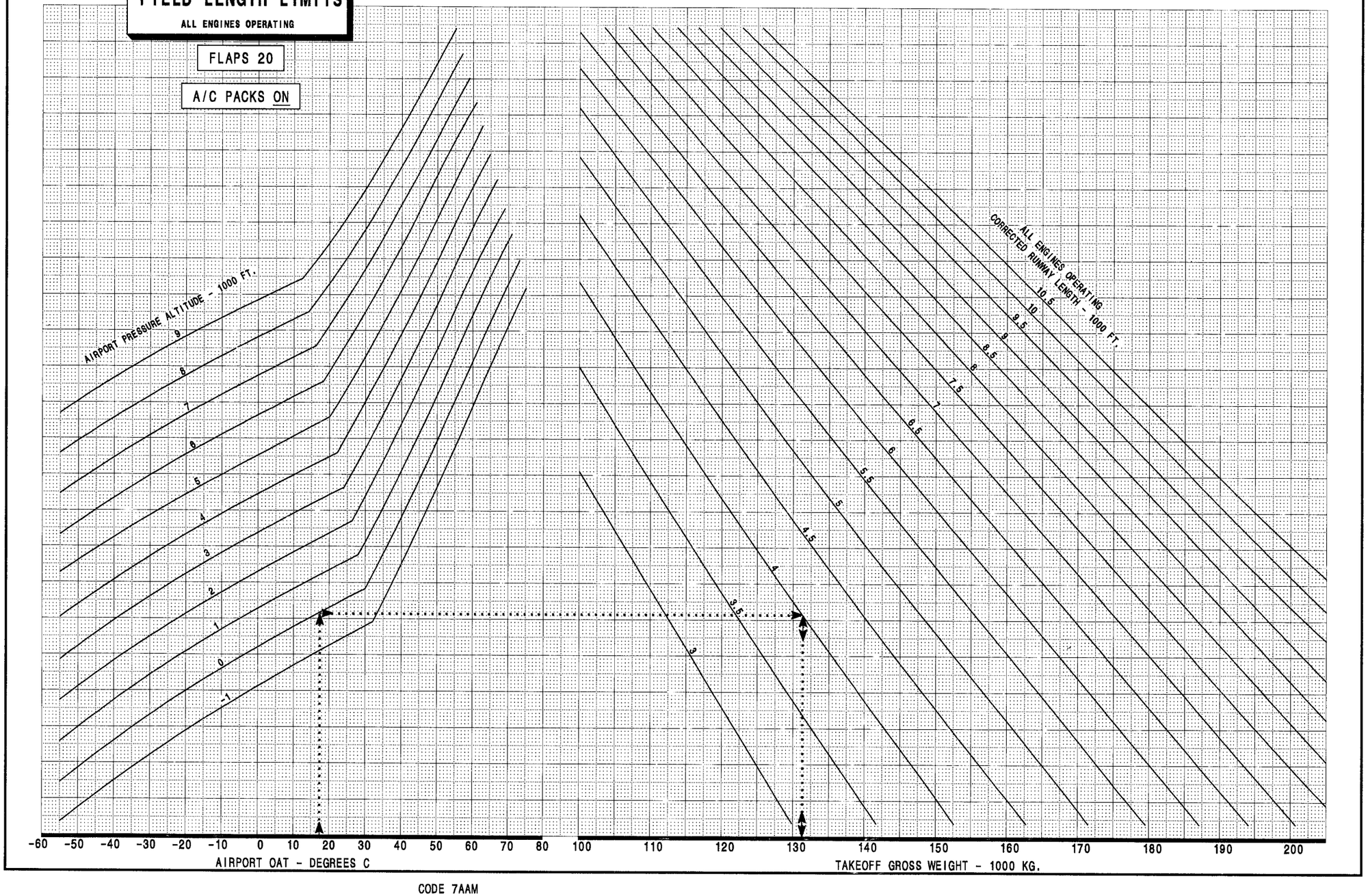
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS ON



S40327

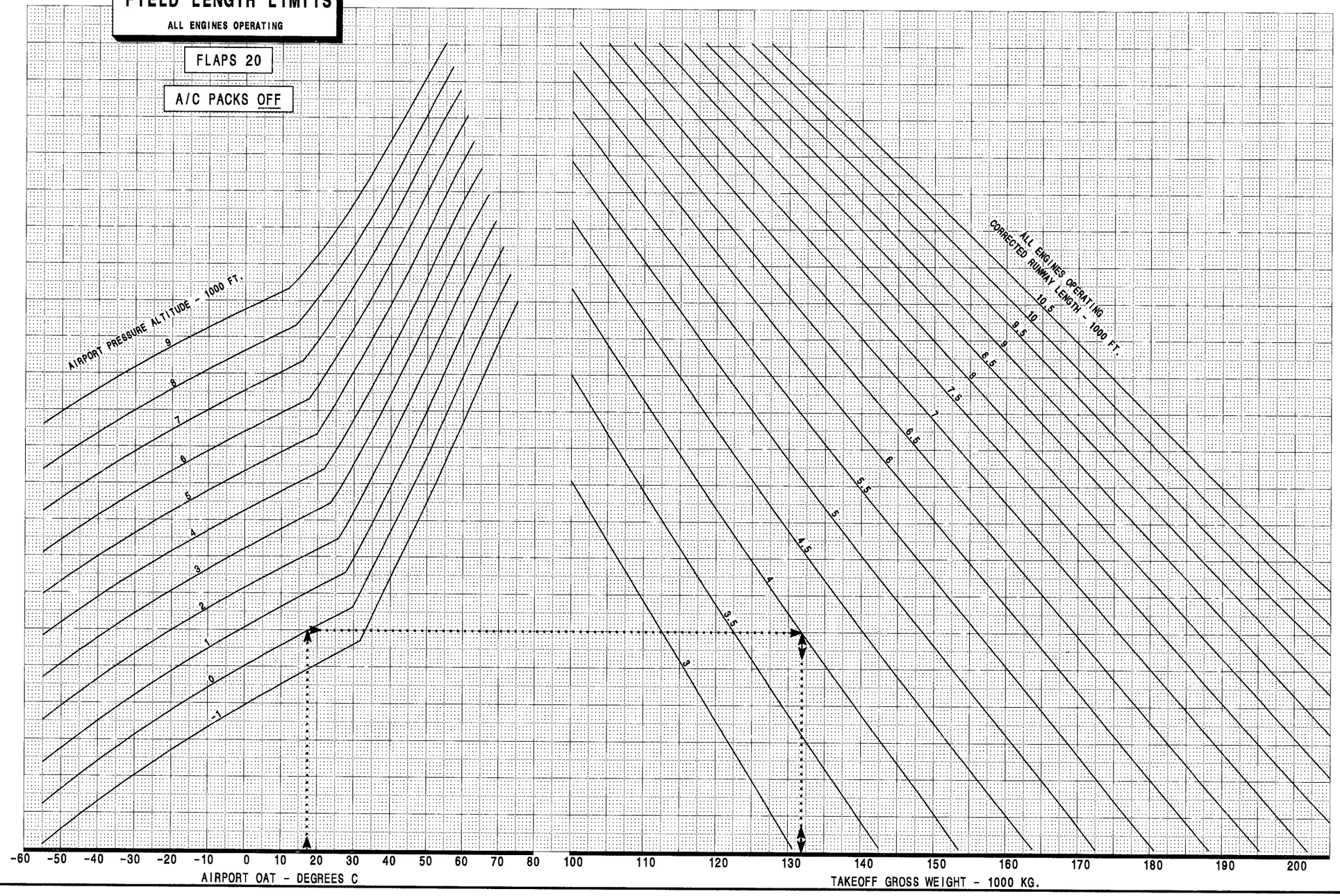
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS OFF



P.C. K600417007
D041T507-1 PG. 4.4-17

D. BACH
767-300ER
CF6-80C2B6/B6F

APPROVED V. Ihl DATE 2Jun93

S40338

SECTION 4.5 - TAKEOFF CLIMB LIMITS

C O N T E N T S

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Takeoff Climb Limits	2
TAKEOFF CLIMB LIMITS	
(FLAPS 5) - A/C PACKS ON	5
- A/C PACKS OFF	6
(FLAPS 15) - A/C PACKS ON	7
- A/C PACKS OFF	8
(FLAPS 20) - A/C PACKS ON	9
- A/C PACKS OFF	10

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21554

TAKEOFF CLIMB LIMITS

G E N E R A L

Takeoff Climb Limits

The Takeoff Climb Limits charts in this section show, as a function of airport pressure altitude and temperature, the maximum takeoff gross weights that comply with the 2.4% gradient requirement of FAR 25.121(b). Separate charts are included for air conditioning (A/C) packs on and off and for different takeoff flaps. Higher takeoff climb gross weights are allowed using improved climb performance as described in Section 4.10. The scheduled takeoff gross weight cannot exceed the takeoff climb limited weight. See the example problem appendix for a numerical example of the use of these charts.

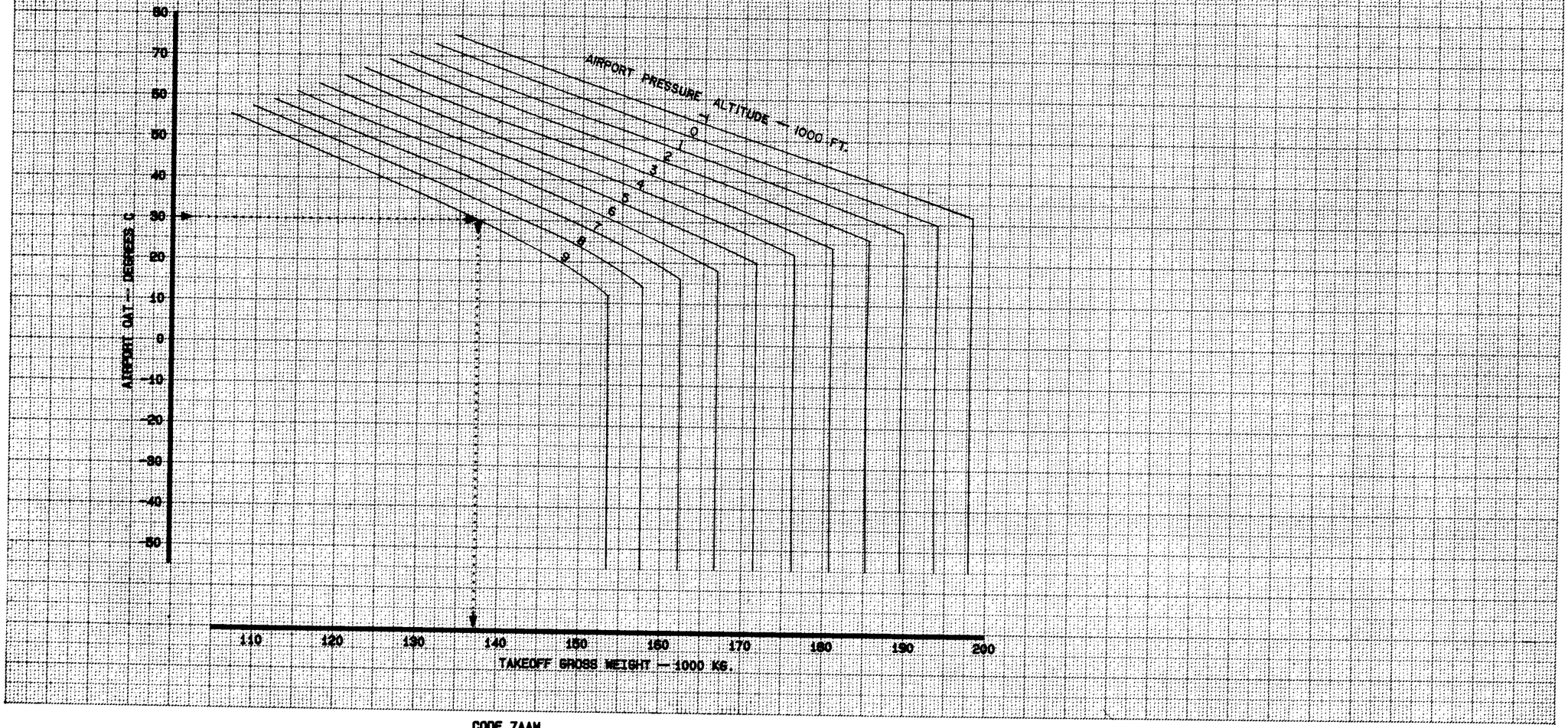
PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 5

A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	2030
ENGINE AND WING ANTI-ICE ON	2450



P.C. 6L001749
D041T607-1 PG.4.5-5

APPROVED	DATE
[signature] MD-90	11/13/98

GARDNER
767-300ER
CF6-80C2B6/B6F

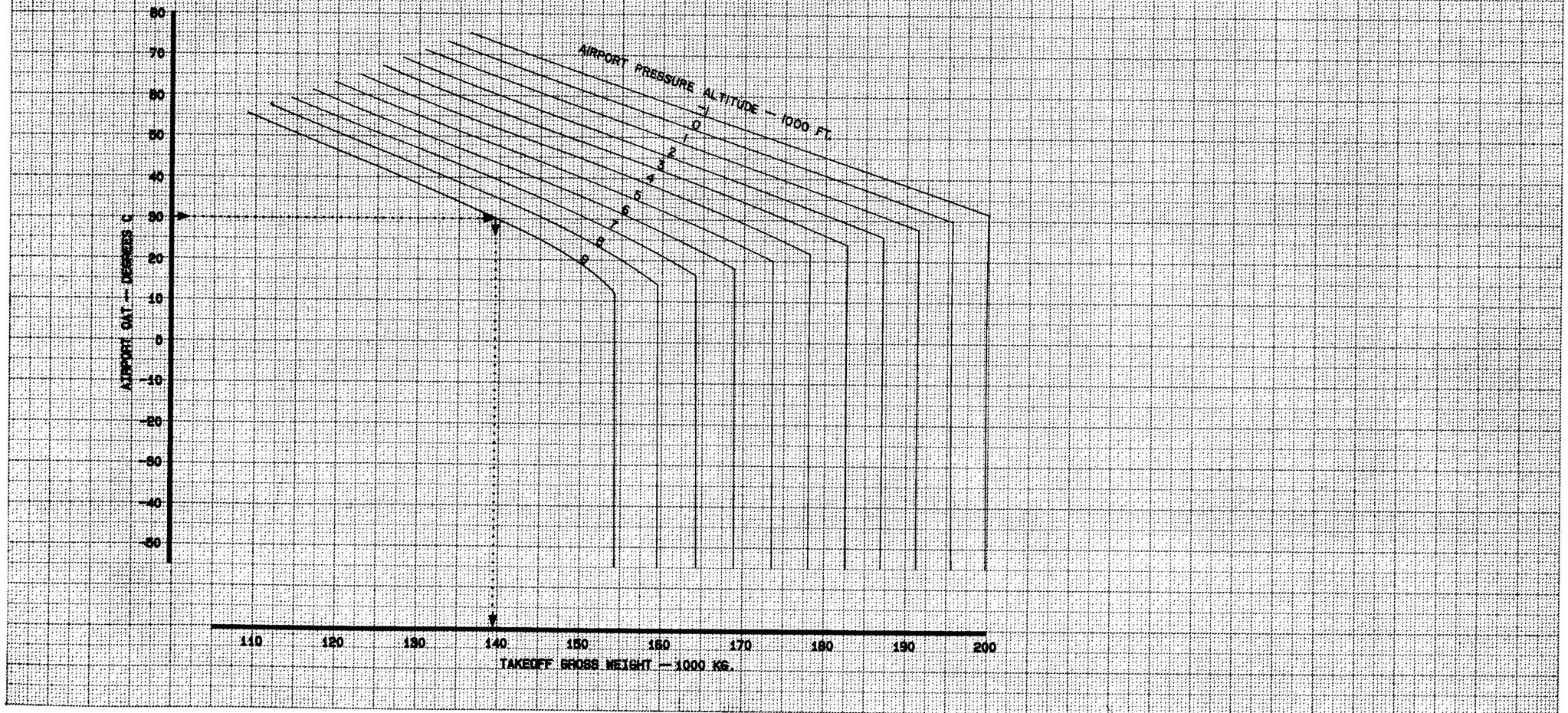
S34147

6E4208

TAKEOFF CLIMB LIMITS

FLAPS 5 A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT — KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	1850
ENGINE AND WING ANTI-ICE ON	2690



P.C. 6L001750
D041T607-1 PG. 4.5-6

GARDNER
787-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	[signature] Jan-Co	11/13/88

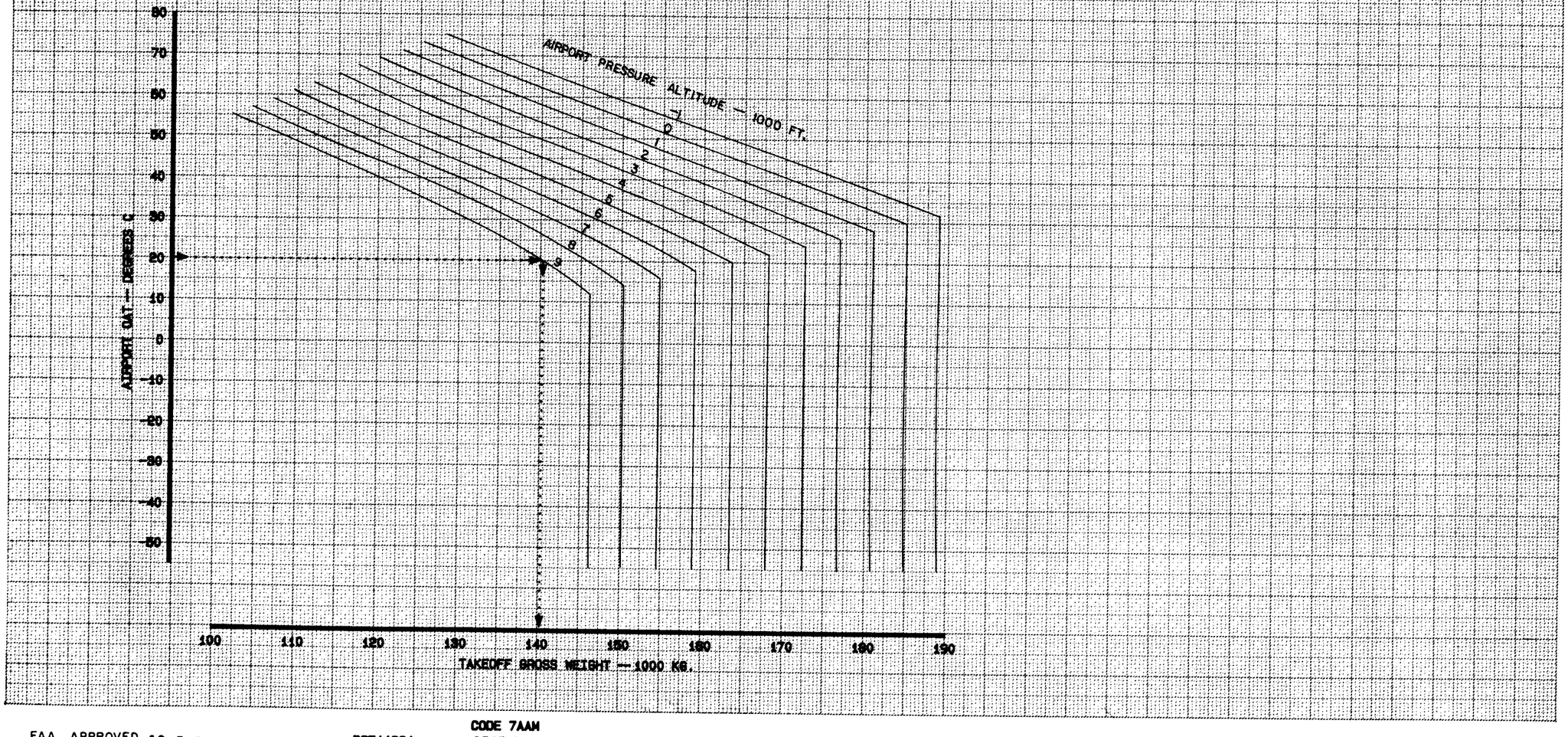
S34181

TAKEOFF CLIMB LIMITS

FLAPS 15

A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	1950
ENGINE AND WING ANTI-ICE ON	2370



P.C. 6L001751
D041T607-1 P6. 4.5-7

GARDNER	APPROVED	DATE
767-300ER	[signature] MER-41	11/13/89
CF6-80C2B6/B6F		

S34188

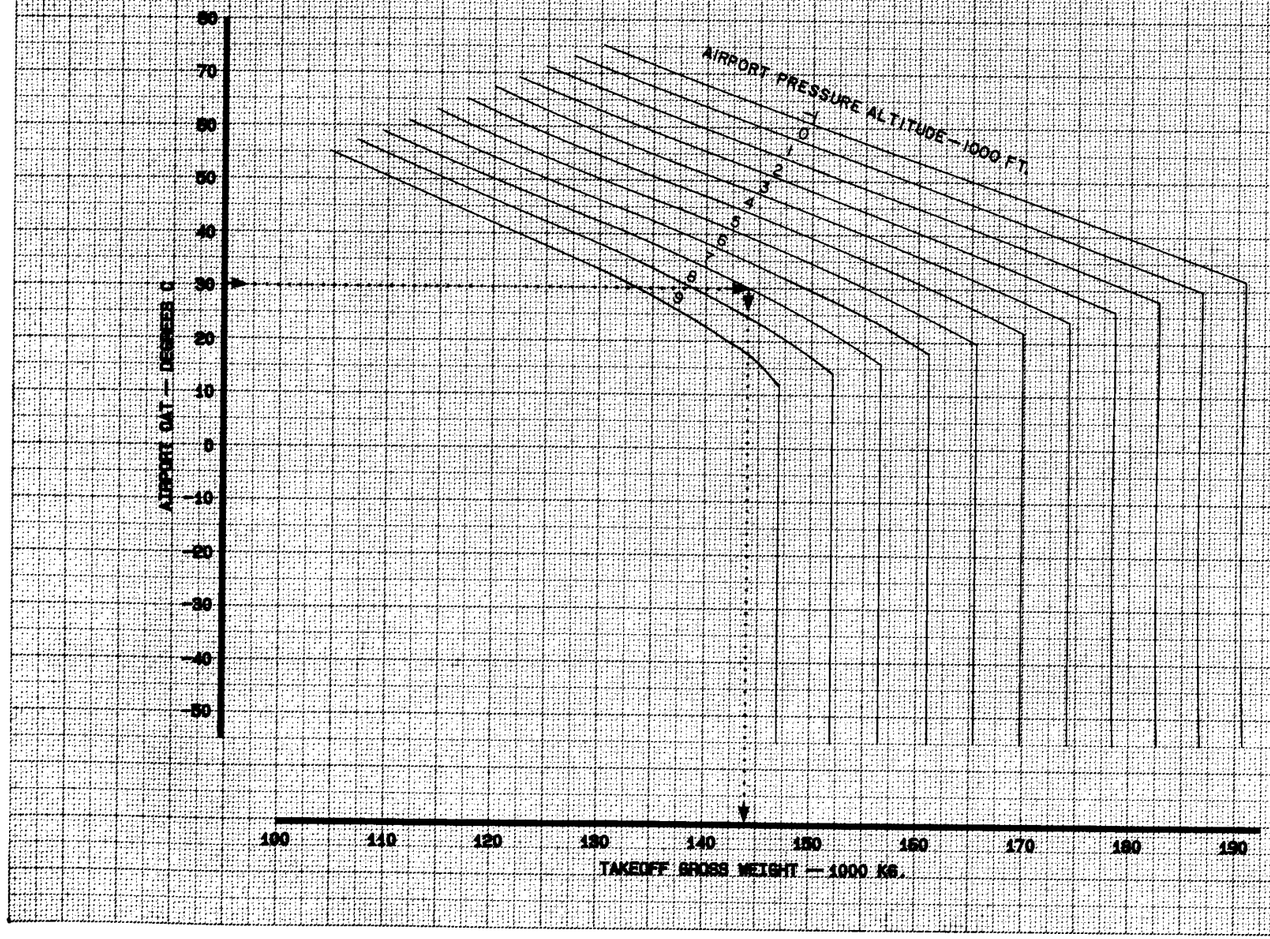
6E4208

PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 15 A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT – KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	1700
ENGINE AND WING ANTI-ICE ON	2570



P.C.6L001752
D6041T507-1 P6.4.5-8

KREINER
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
	11/1/02

S34200

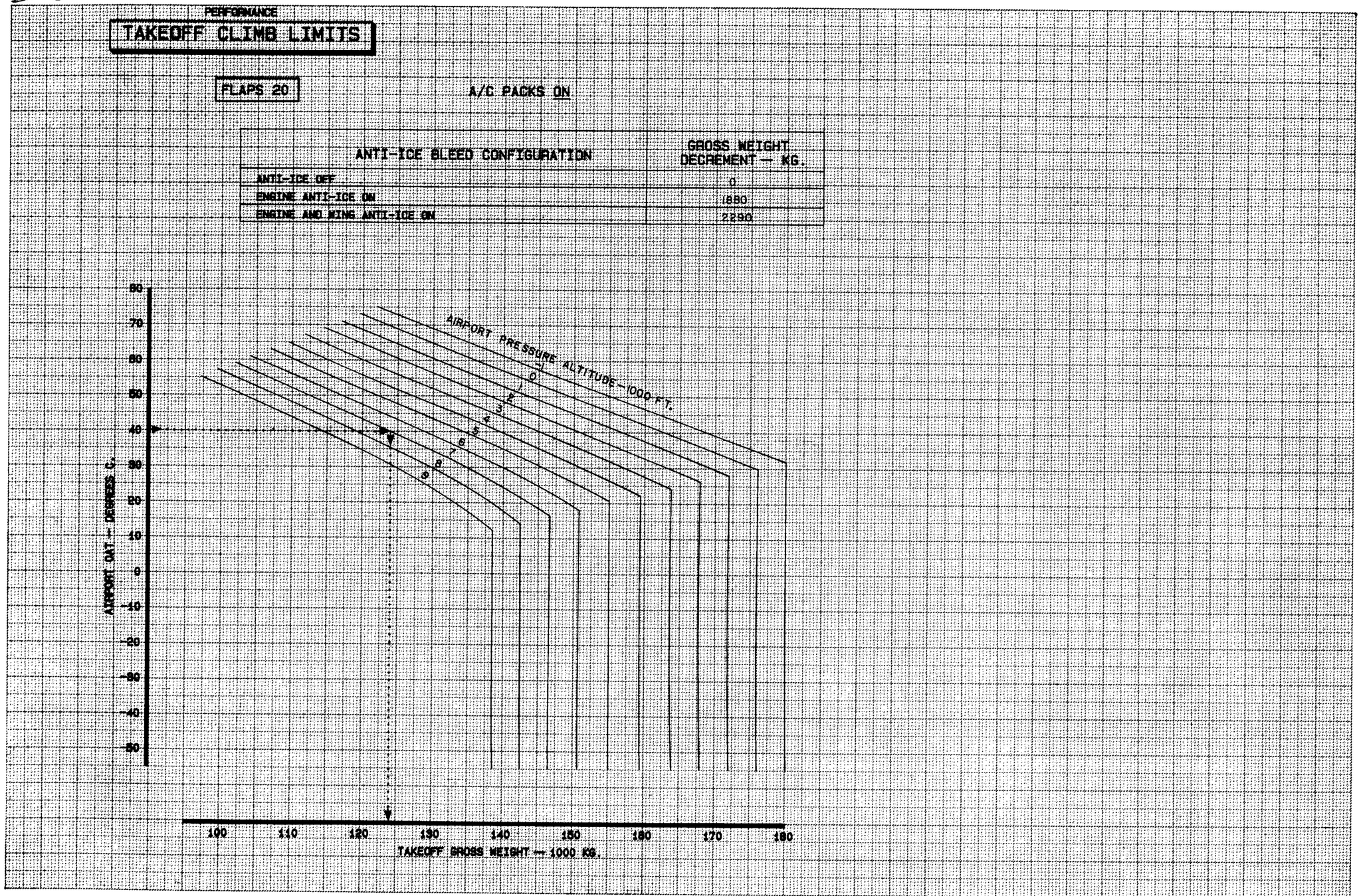
6E4208

PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 20 A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT — KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	1880
ENGINE AND WING ANTI-ICE ON	2290



P.C. 6L001753
D041T607-1 P6.4.5-9

KREINER
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
NM-4	1/13/89

S34231

6E4208

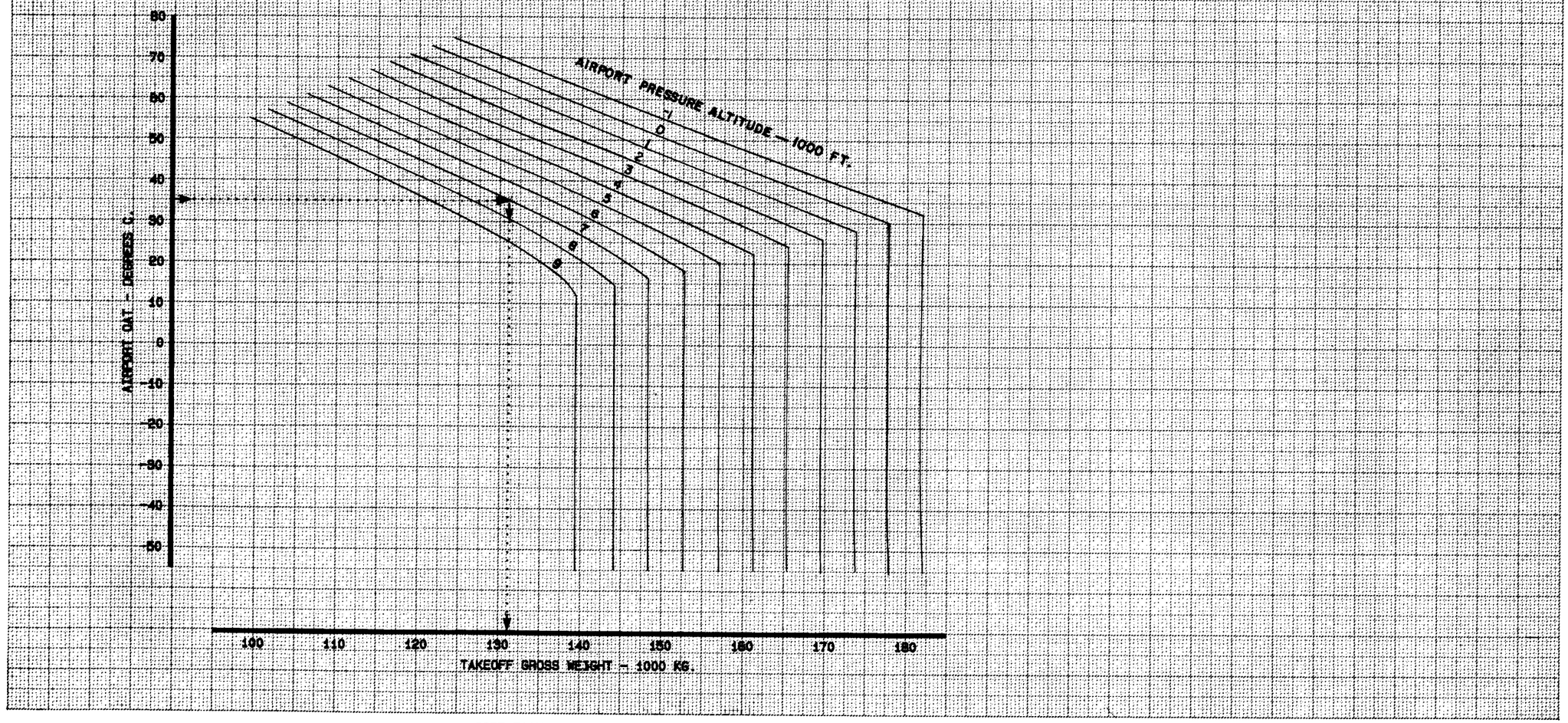
PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 20

A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT - KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	1680
ENGINE AND WING ANTI-ICE ON	2450



P.C. BL001754
D041T607-1 PG. 4.5-10

J. SHIPMAN
787-300ER
CF6-80C2B6/B6F

APPROVED	DATE
[signature]	11/13/89

S34240

6E4208

SECTION 4.6 - TIRE SPEED LIMITS

C O N T E N T S

PAGE

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General. 2
TIRE SPEED LIMITS (225 MPH TIRES). 3
TIRE SPEED LIMITS (235 MPH TIRES). 4

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21562

TIRE SPEED LIMITS

G E N E R A L

This chart shows takeoff weight limits which must be observed to keep the lift-off speed from exceeding maximum true ground speed limitations on the tires. The scheduled takeoff gross weight cannot exceed the tire speed limited weight. See the example problem appendix for a numerical example of the use of this chart.

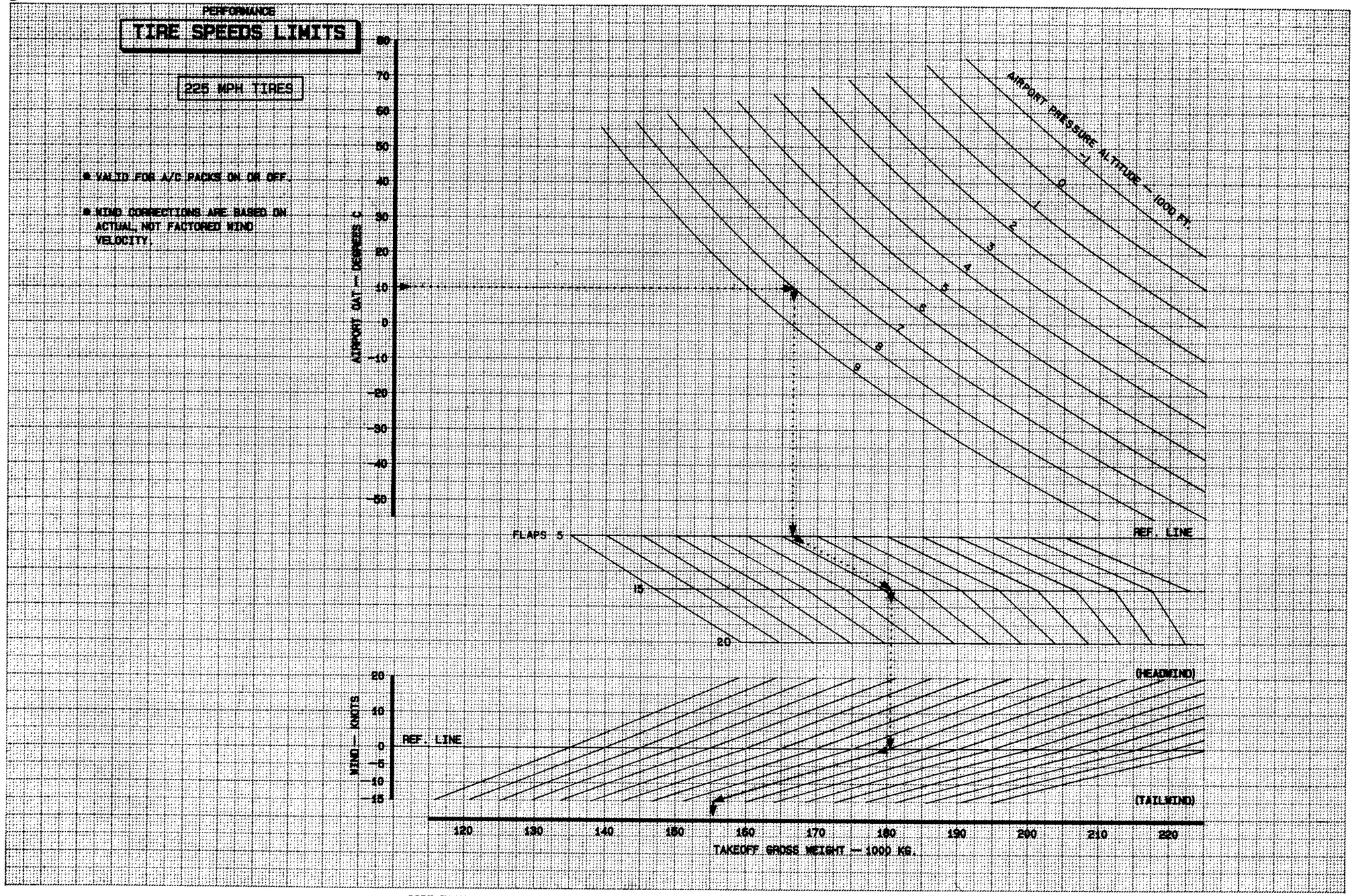
The improved climb performance procedure, as described in Section 4.10, reduces the allowable tire speed limited takeoff weight obtained in this section and this fact must be considered when the improved climb performance technique is used. The Improved Climb Performance (Takeoff Weight Limits) chart in Section 4.10 shows the trend of tire speed limited takeoff weight with speed increase, up to the maximum speed increase allowed.

PERFORMANCE

TIRE SPEEDS LIMITS

225 MPH TIRES

- VALID FOR A/C PACKS ON OR OFF.
- WIND CORRECTIONS ARE BASED ON ACTUAL, NOT FACTORED WIND VELOCITY.



P.C. 6L001722
D0417B07-1 P6. 4.6-3

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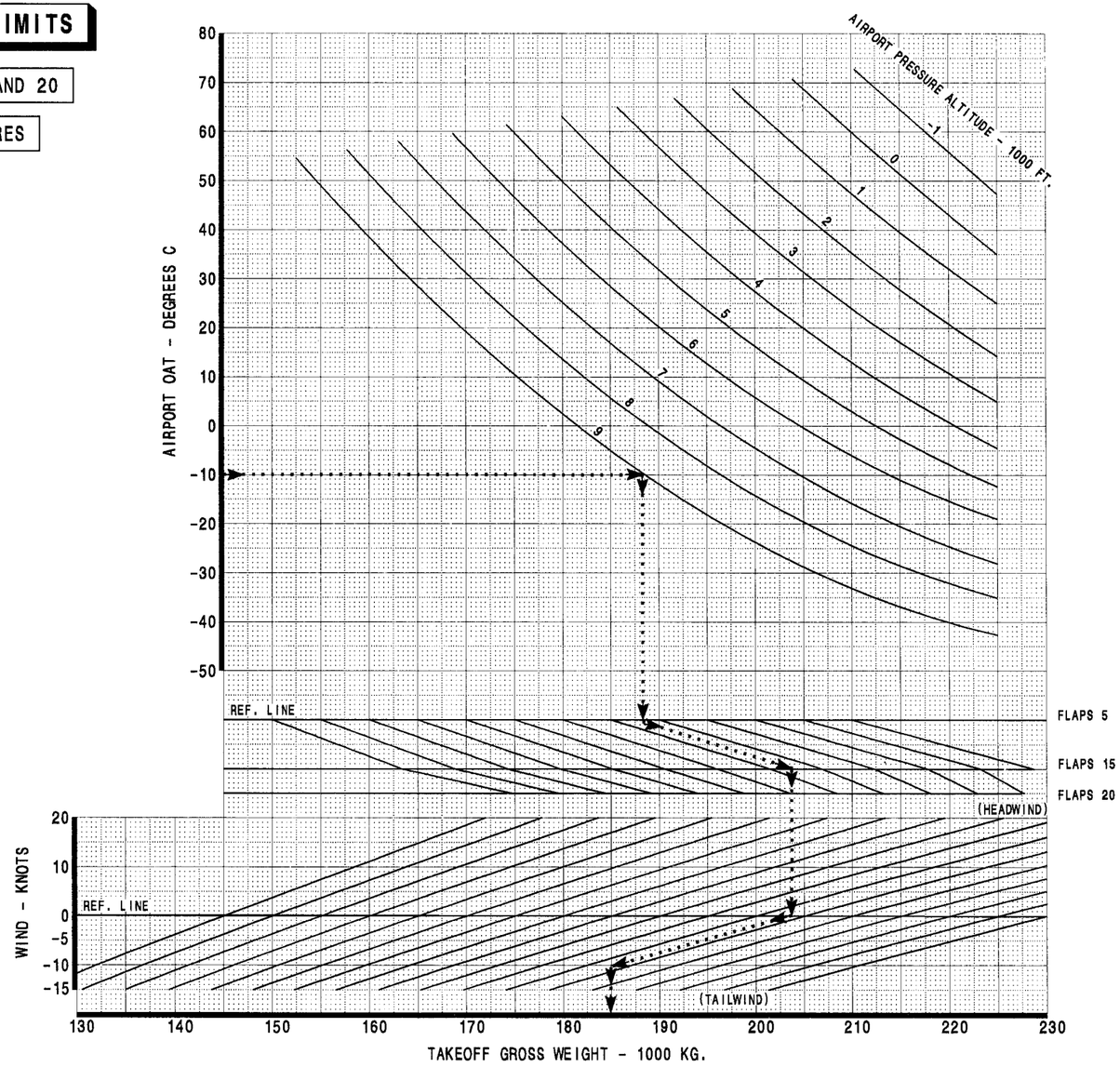
S34265

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TIRE SPEED LIMITS

FLAPS 5, 15, AND 20

235 MPH TIRES



P.C. K600604007
D041T507-1 PG. 4.6-4

APPROVED	DATE
V.HILL	05-02-97

S. WESTGOR
767-300ER
CF6-80C2B6/B6F

S43091

SECTION 4.7 - TAKEOFF SPEEDS

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S21574

TAKEOFF SPEEDS

GENERAL

The charts in this section show the takeoff speeds V_1, V_R, and V_2, as functions of airport temperature/altitude, gross weight, and the ratio of V_1/V_R. Separate charts are included for the different takeoff flaps. The scheduled takeoff speeds must comply with the FAR requirements discussed below. The Reference Speeds, V_{REF}, chart to be used to determine the flap retraction speed and the final takeoff climb speed is also included in this section.

TAKEOFF SPEED RESTRICTIONS

ROTATION SPEED

The scheduled rotation speed, V_R, must be equal to or greater than the takeoff decision speed, V_1.

BRAKE ENERGY LIMITS

The scheduled takeoff decision speed, V_1, must be equal to or less than the maximum brake energy speed, V_{MBE}. The Brake Energy Limits chart shows V_{MBE} as a function of gross weight, altitude, temperature, runway slope, wind component, and braking configuration. If the upper value in a range of V_1 (see V_1 Determination) should be above V_{MBE}, then the upper limit must be decreased to V_{MBE}. If the entire range of V_1 should be above V_{MBE} for a value of gross weight, then the gross weight must be reduced until V_1 is equal to V_{MBE}. See the example problem appendix for a numerical example of this procedure.

Brake part numbers (P.N.) in the same category produce equal braking performance, and Brake Energy Limits charts that are labeled for one category can be used for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

MINIMUM V_1 FOR CONTROL ON THE GROUND

The scheduled takeoff decision speed, V_1, must be equal to or greater than the minimum V_1 for control on the ground, $V_{1(MCG)}$. The shaded area on the Takeoff Decision Speed chart identifies the area where the $V_{1(MCG)}$ restriction is most likely to occur. The minimum V_1 for control on the ground chart shows $V_{1(MCG)}$ as a function of altitude, temperature, and gross weight. If the lower value in a range of V_1 (see V_1 Determination) should fall below $V_{1(MCG)}$, then the lower limit must be increased to $V_{1(MCG)}$. If the entire range of V_1 should fall below $V_{1(MCG)}$ for a gross weight, see $V_{1(MCG)}$ Takeoff Limits, Section 4.8.

TAKEOFF SPEEDS

AIR MINIMUM CONTROL SPEED

The Air Minimum Control speeds (V_{MCA}) for this airplane are shown on this chart. V_{MCA} is not a limitation on takeoff speeds.

TAKEOFF DECISION SPEED, V_1, DETERMINATION

The flow diagram for the takeoff decision speed determination procedure, below, demonstrates the use of the Takeoff Speeds charts and defines the various parameters that are obtained in the procedure. See the example problem appendix for a numerical example of this procedure.

S21587

TAKEOFF DECISION SPEED, V_1, DETERMINATION (Continued)

The following steps correspond to the identified points on the V_1 Determination Procedure flow diagram.

1. Determine the engine inoperative corrected takeoff distance available per Section 4.3.

2. Determine the one engine inoperative corrected runway length required to satisfy all the Federal Aviation Regulations related to engine operative field length for the takeoff gross weight.

   Enter the appropriate Field Length Limits (One Engine Inoperative) chart with airport temperature/altitude and takeoff gross weight. Read one engine inoperative corrected runway length required.

3. Determine rotation speed, V_R.

   Enter the appropriate Takeoff Speeds chart with airport temperature/altitude and takeoff gross weight. Read rotation speed, V_R.

4. Determine the corrected accelerate-stop distance available per Section 4.3.

5. Determine $(V_1/V_R)_{MIN}$.

   Enter the appropriate Runway Length and V_1 Adjustments chart, Section 4.3, with engine inoperative corrected takeoff distance available, Step 1, and one engine inoperative corrected runway length required, Step 2. Read $(V_1/V_R)_{MIN}$.

6. Determine $(V_1/V_R)_{MAX}$.

   Enter the appropriate Runway Length and V_1 Adjustments chart, Section 4.3, with corrected accelerate-stop distance available, Step 4, and one engine inoperative corrected runway length required, Step 2. Read $(V_1/V_R)_{MAX}$.

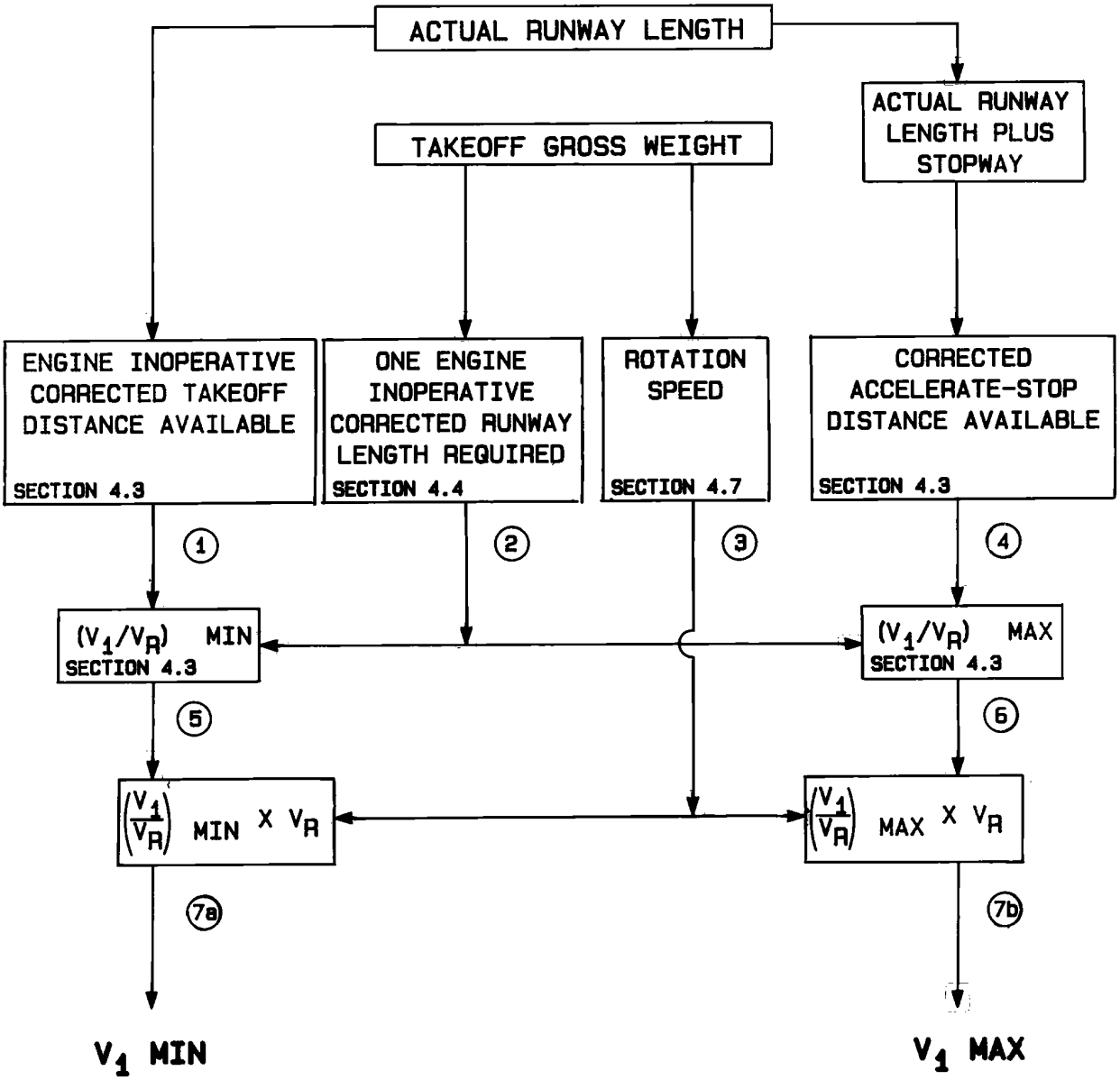
7. Determine $V_{1\ MIN}$ and $V_{1\ MAX}$, the lowest and highest values of V_1 that will allow a takeoff from the actual runway, at the takeoff gross weight, that satisfies all the Federal Aviation Regulations related to maximum takeoff gross weight, field length limits. See Takeoff Speed Restrictions for other possible limitations.

   a) Multiply $(V_1/V_R)_{MIN}$, Step 5, by V_R, Step 3, to obtain $V_{1\ MIN}$ (or read from chart).

   b) Multiply $(V_1/V_R)_{MAX}$, Step 6, by V_R, Step 3, to obtain $V_{1\ MAX}$ (or read from chart).

S21593

V_1 DETERMINATION PROCEDURE



TAKEOFF SPEEDS

S E L E C T I O N O F V_1

The selection of the takeoff decision speed, V_1, from an allowable range must be made for each scheduled takeoff. Even though any value in the allowable range is safe and acceptable, a selection must be made. To aid in this selection, the following facts should be considered.

When a High V_1 is Selected:

1. The safety margins are increased for a continued takeoff.
   (a) The required takeoff distance is less for a continued takeoff.
   (b) There is more vertical clearance above an obstacle when the takeoff is continued after an engine failure.
   (c) There is more margin for minimum control speed limits.
2. There will be only the minimum required margins on stopping distance and all or most of the runway will be used if the takeoff is aborted at V_1.

When a Low V_1 is Selected:

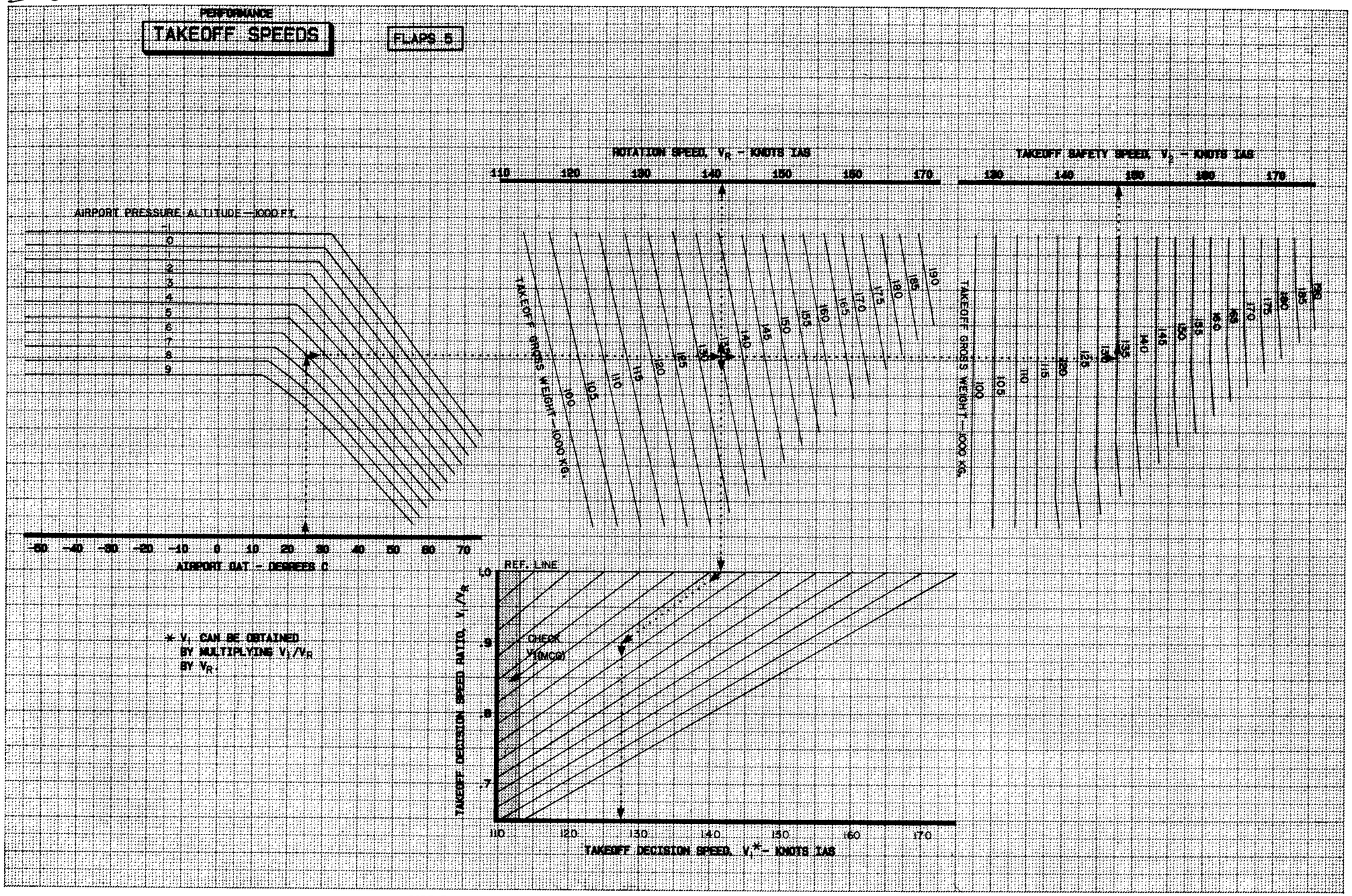
1. The safety margins are increased for an aborted takeoff.
   (a) The increased stopping margin is helpful on runways with adverse braking characteristics.
   (b) There is more margin from brake energy limits.
2. There will be only the minimum required clearance over the end of the runway if it is necessary to continue the takeoff after an engine failure.

S21789

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 5



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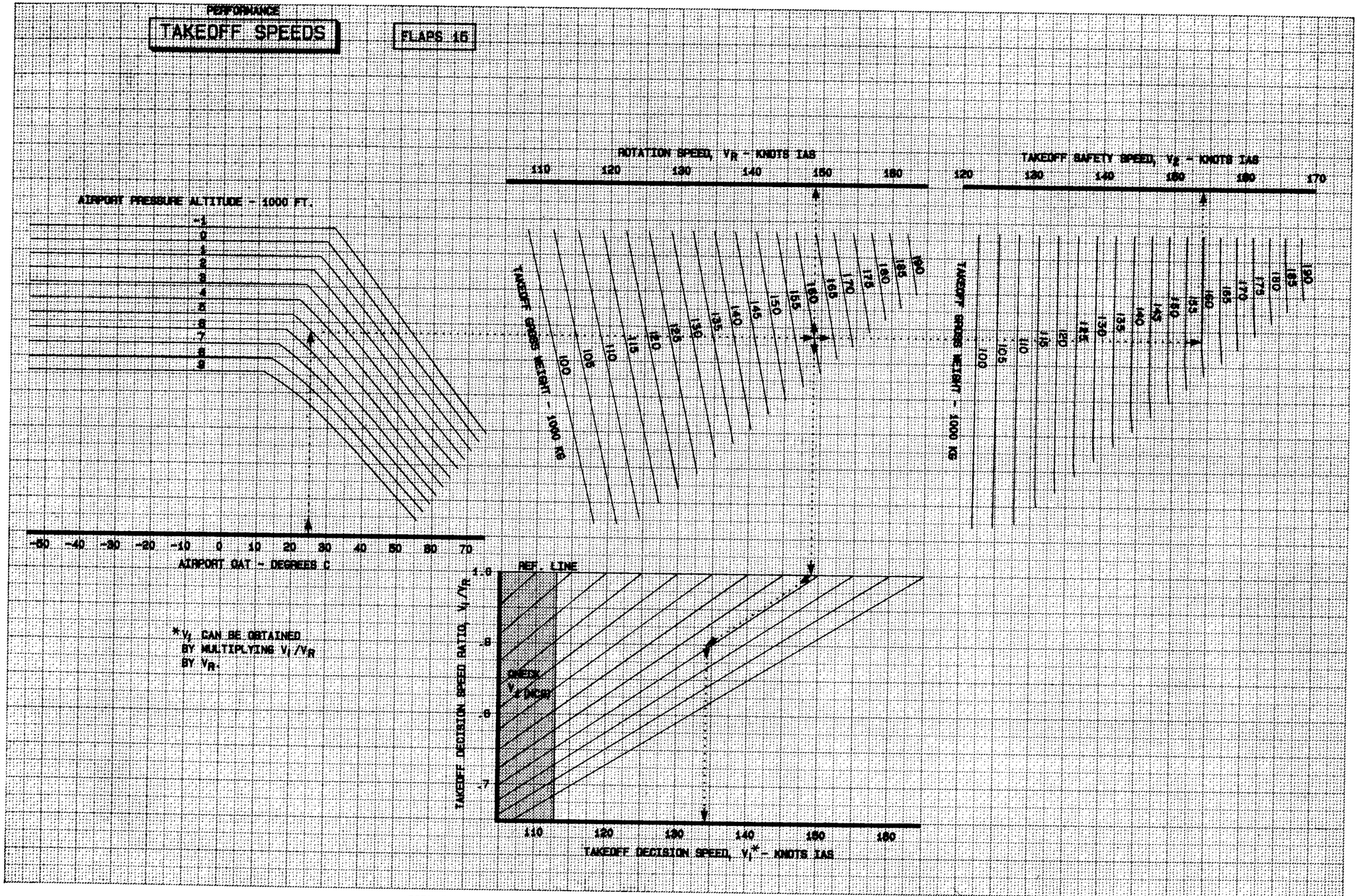
6E4208

P.C. BL001724
D041T607-1 PG 4.7-10

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 16

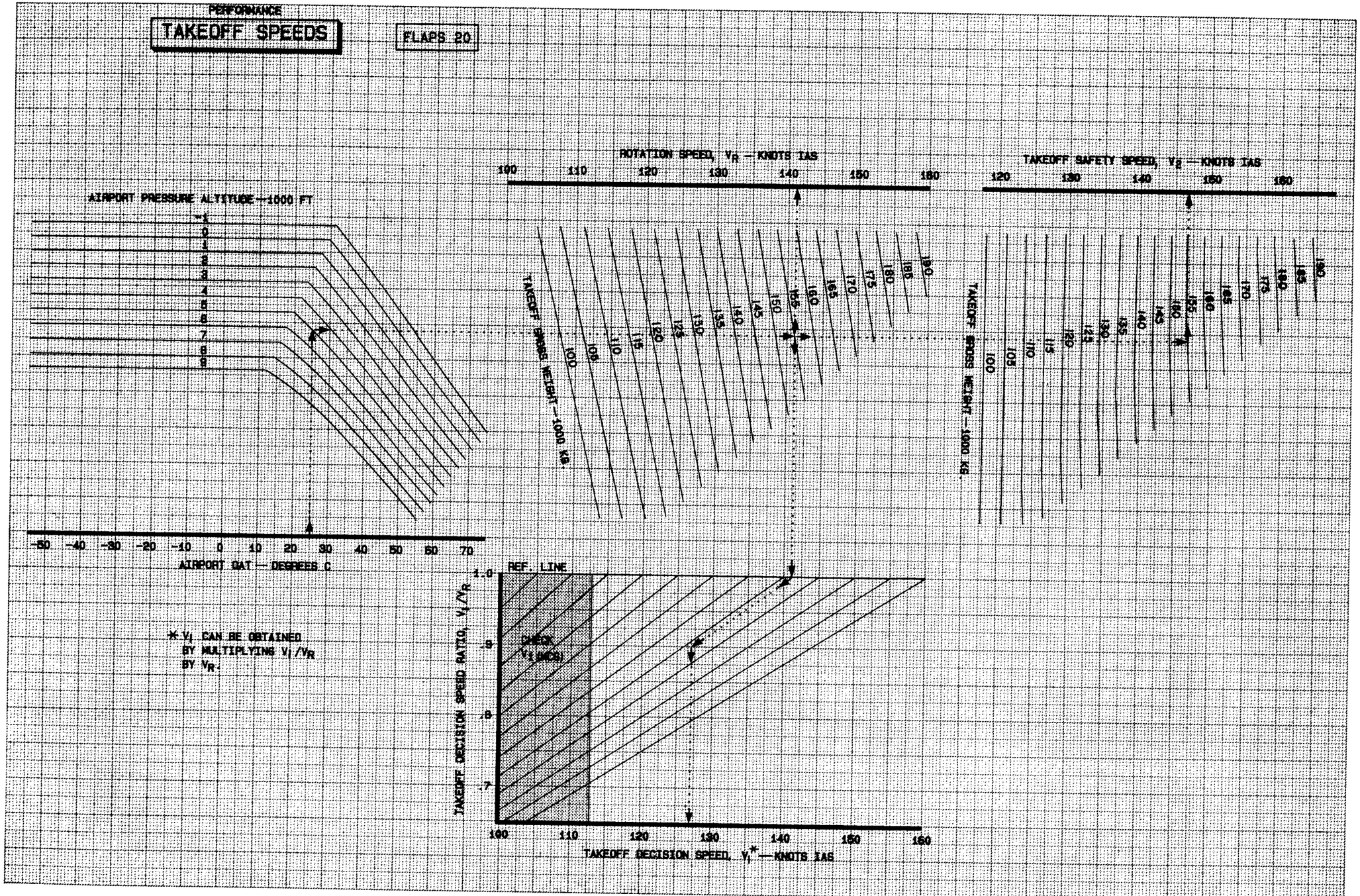


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787-300ER		
CF6-80C2B6/B6F		

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 20



P.C. BL001725
D0417B07-1 PG. 4.7-11

SHIPMAN
787-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	NMC	11/13/88

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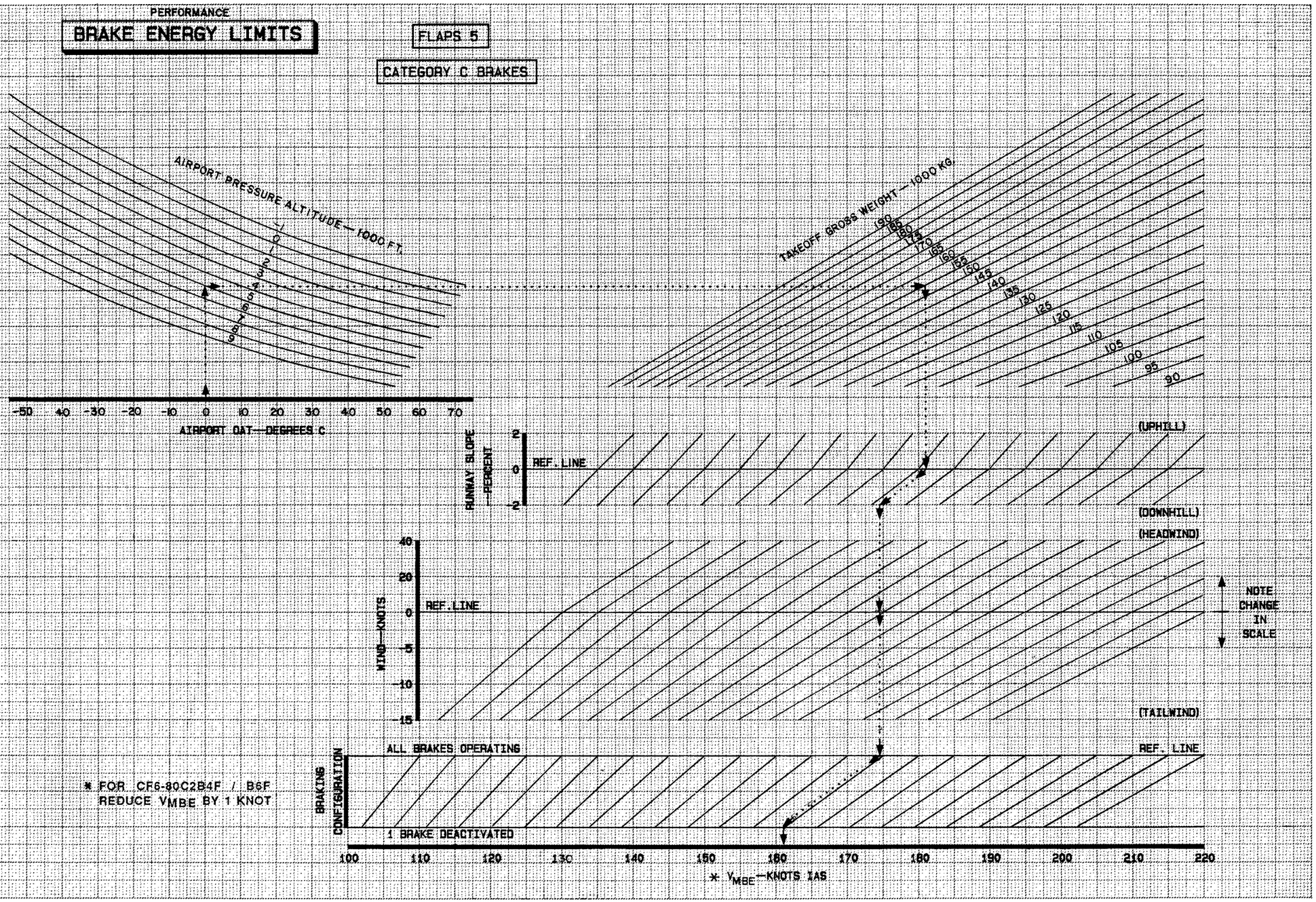
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PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 5

CATEGORY C BRAKES



* FOR CF6-80C2B4F / B6F REDUCE V_{MBE} BY 1 KNOT

PSTRAK	APPROVED	DATE
767-300ER	MM/18 S. ICHIKAWA	15 FEB 88
CF6-80C2B4 / B4F	[signature]	31 JUL 89
CF6-80C2B6 / B6F	[signature]	2-25-97

V4.11 19May94

P.C. 6L001796
D041T507-1 PG. 4.7-12

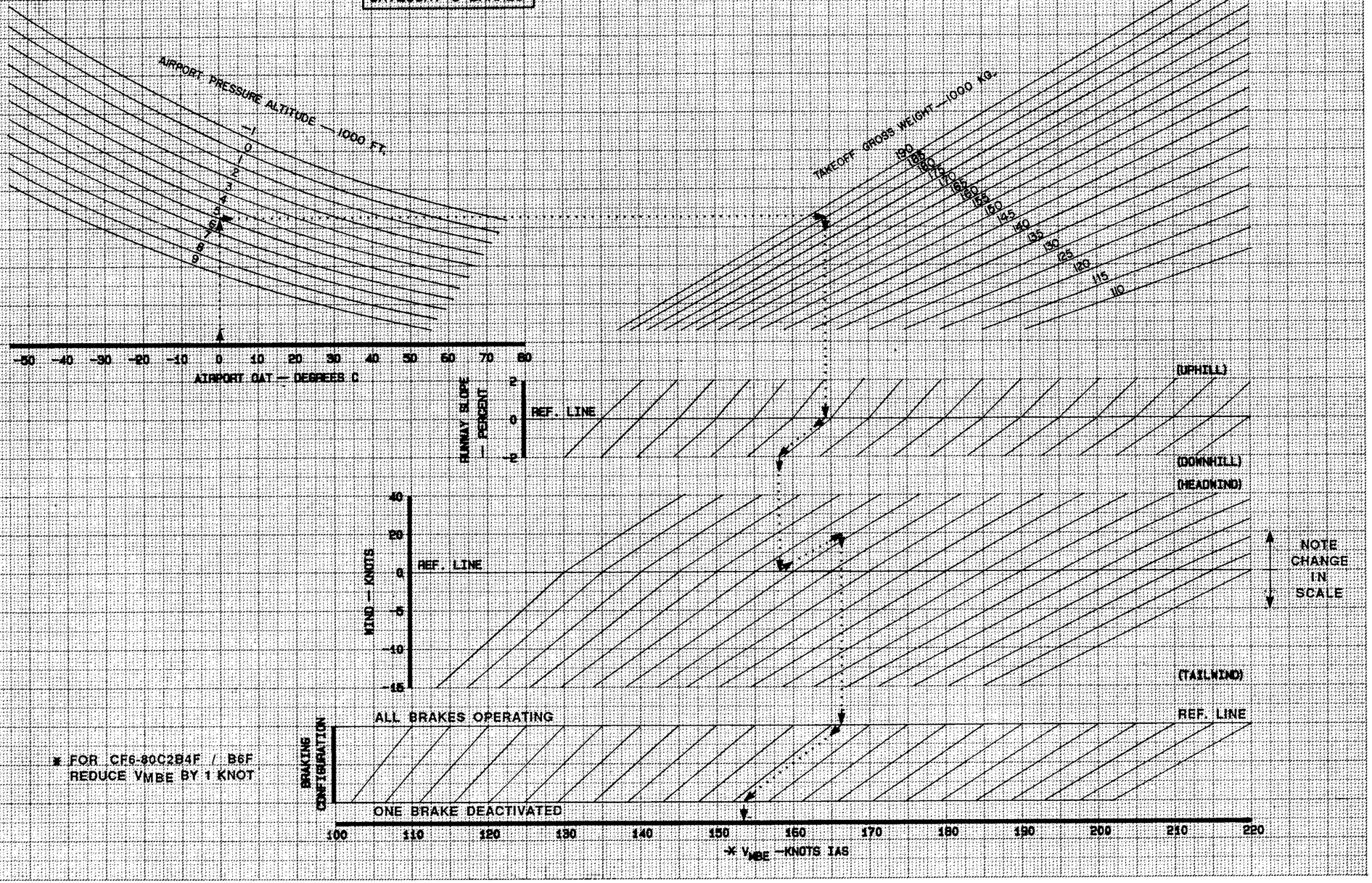
S41033

PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 15

CATEGORY C BRAKES



* FOR CF6-80C2B4F / B6F REDUCE V_{MBE} BY 1 KNOT

P.C. 6L001797	
D041T607-1	PG. 4.7-13

APPROVED	DATE
C. T. Bair NM1269	2/4/88
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[illegible]	2-29-88

V-REL 19May94

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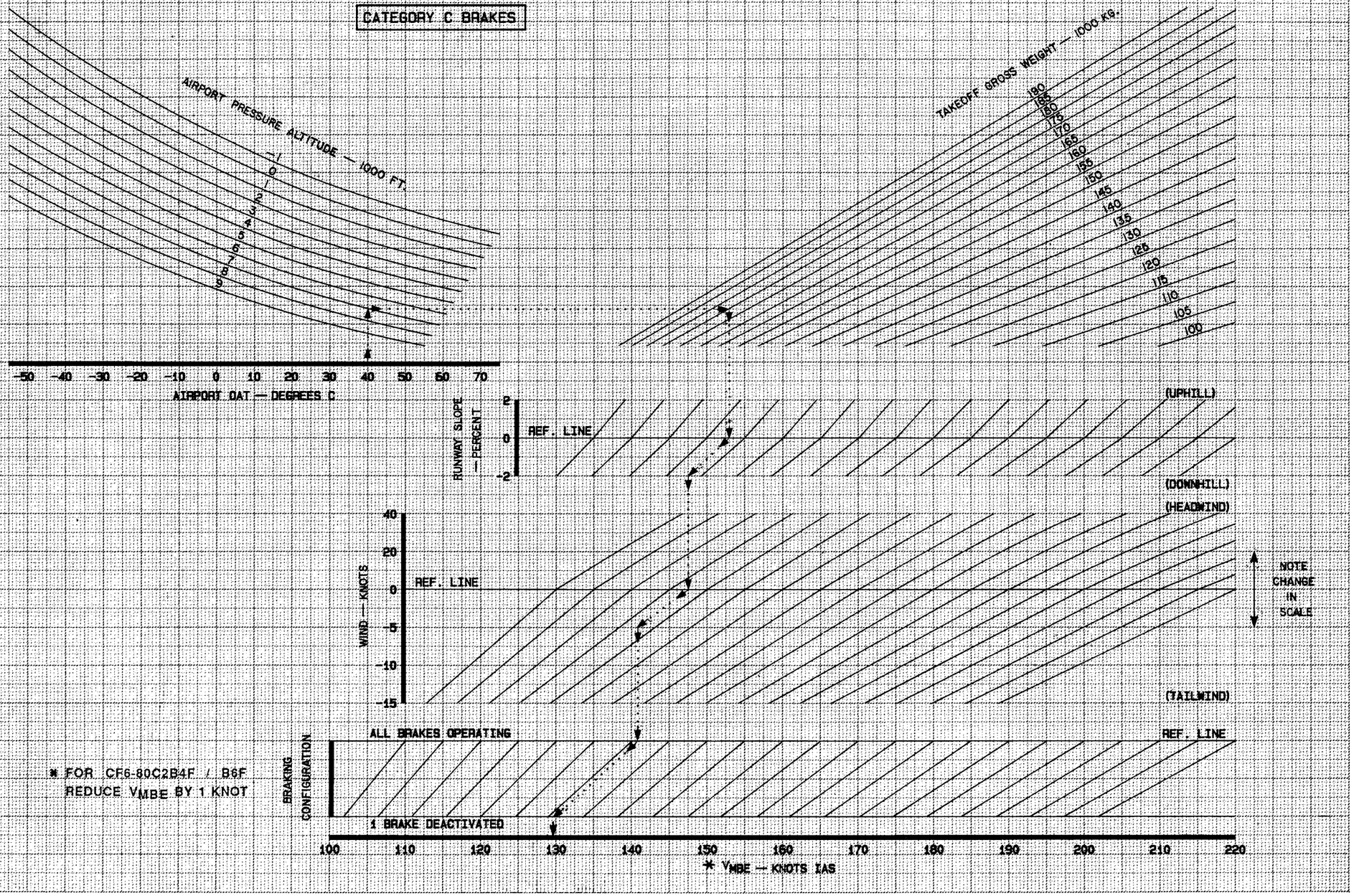
767-300ER	
CF6-80C2B4 / B4F	
CF6-80C2B6 / B6F	

PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 20

CATEGORY C BRAKES



* FOR CF6-80C2B4F / B6F
REDUCE V_{MBE} BY 1 KNOT

A. RISING

767-300ER	APPROVED	DATE
CF6-80C2B4 / B4F	C.J. Ward NMA22	2/5/88
CF6-80C2B6 / B6F	RCY Larson NMA22 PASchmid	3/18/88 2.28.89

V1 Rll 19May94

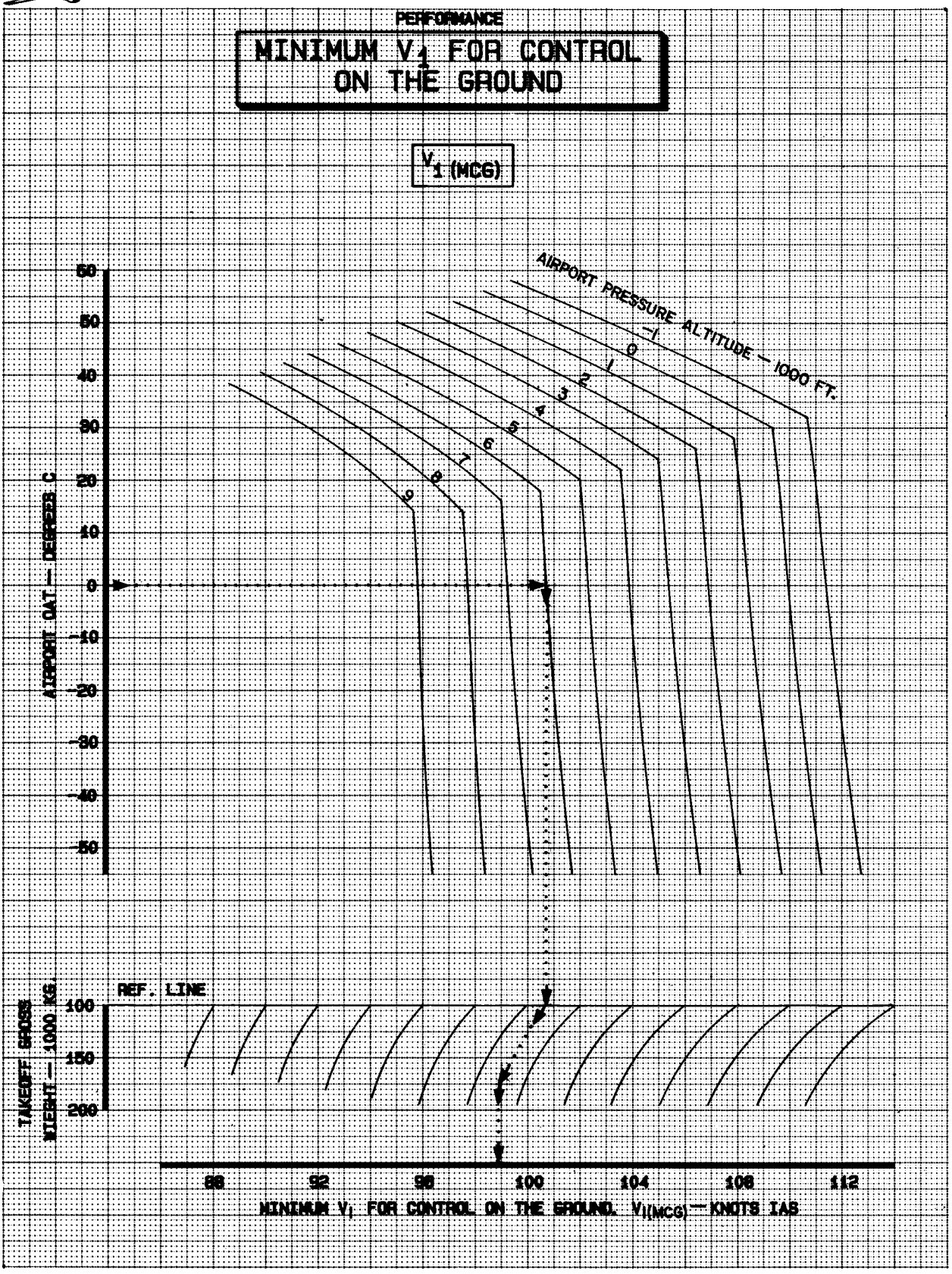
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S41081

PERFORMANCE

MINIMUM V_1 FOR CONTROL ON THE GROUND

V_1 (MCG)



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D041T607-1 P6. 4.7-15

GARDNER
767-300ER
CF6-80C2B6/B6F

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		11/9/88

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P.C. 89000621	
D041T607-1	PAGE 4.7-16

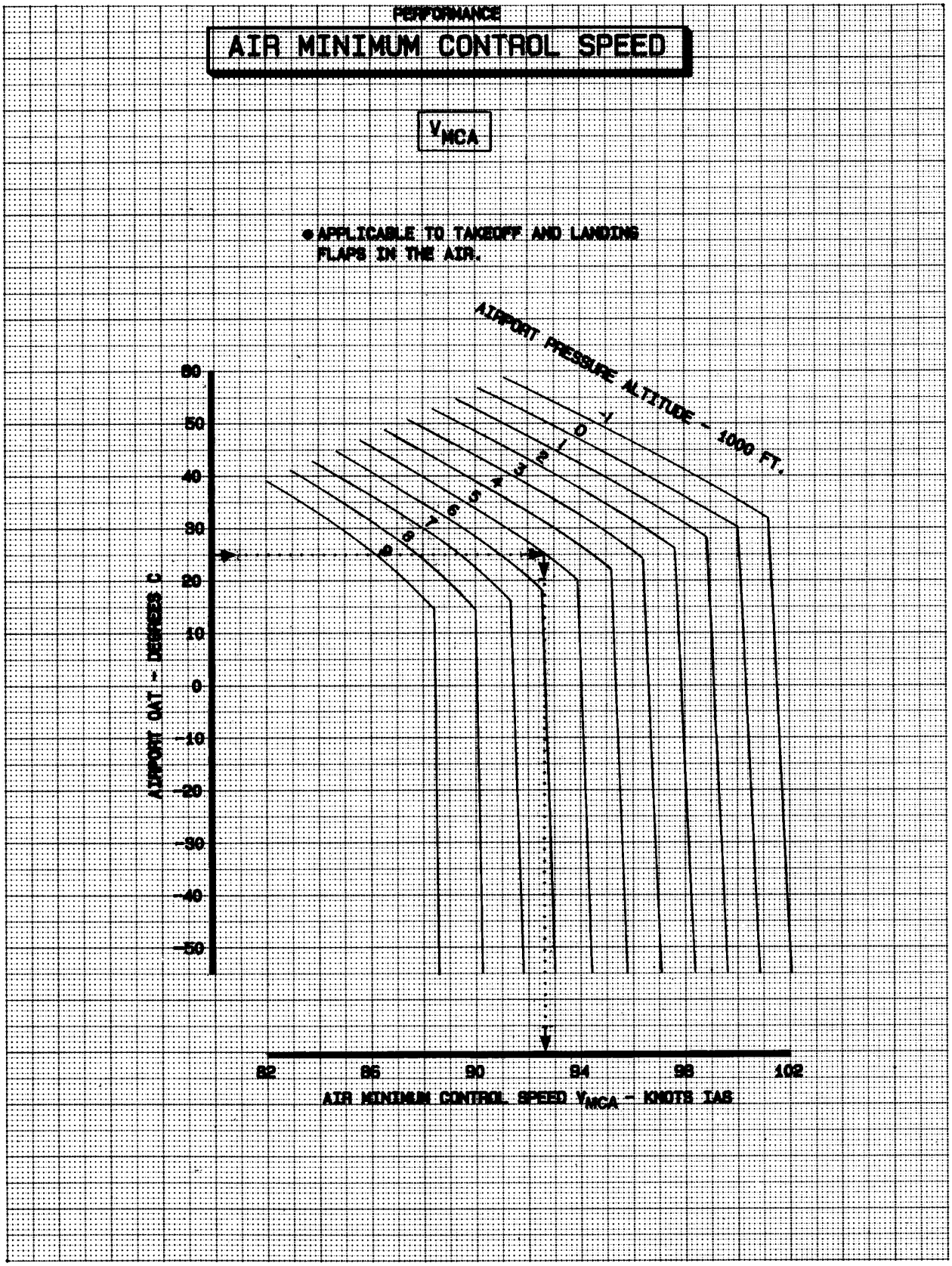
SHIPMAN	APPROVED	DATE
767-300ER		
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PERFORMANCE

AIR MINIMUM CONTROL SPEED

V_{MCA}

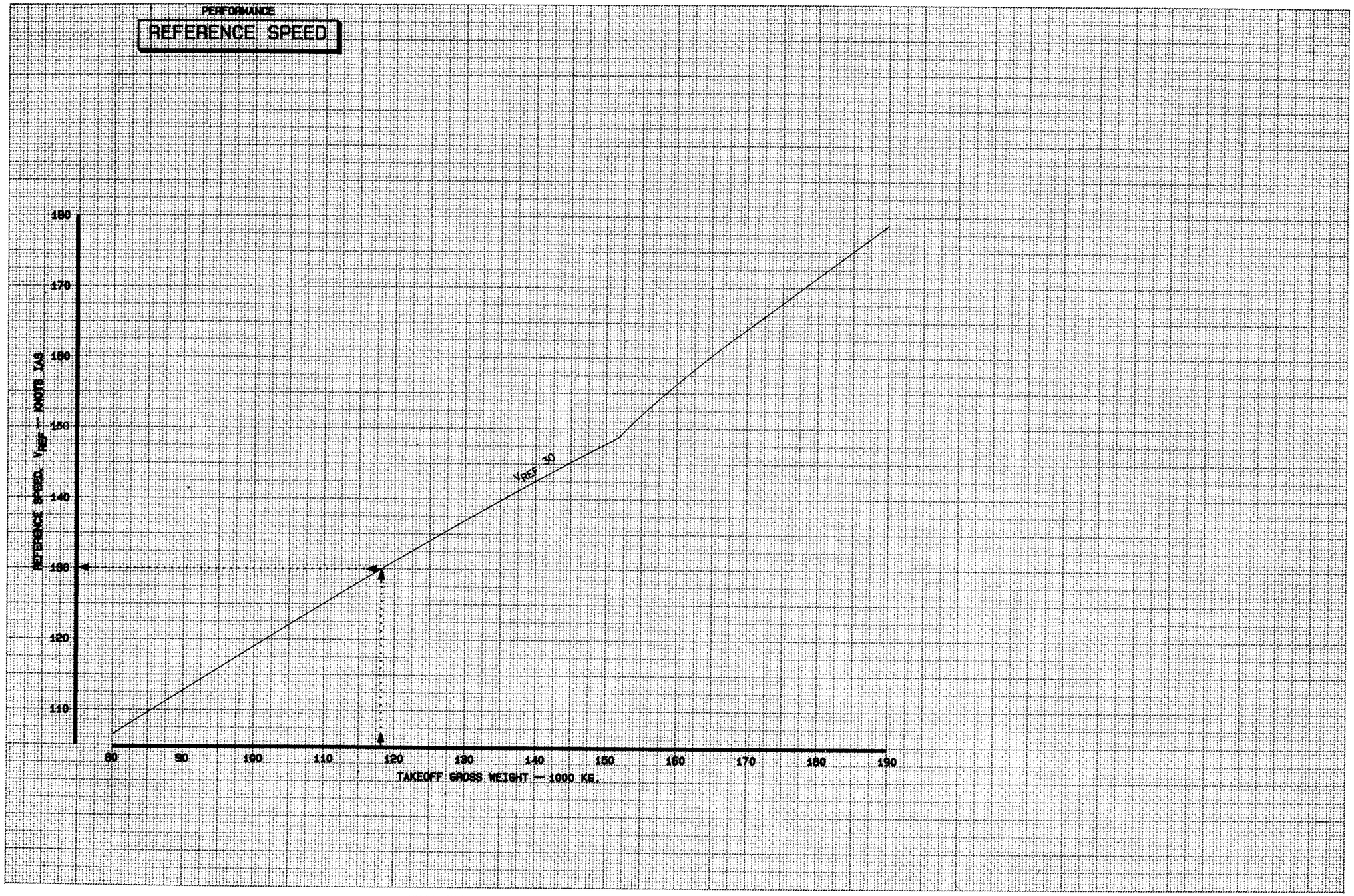
● APPLICABLE TO TAKEOFF AND LANDING FLAPS IN THE AIR.



6E4207

S29437

REFERENCE SPEED



P.C. BL001726
D041T607-1 P6.4.7-17

GARDNER
767-300ER

APPROVED	DATE
	11/8/88

SECTION 4.8 - $V_{1(MCG)}$ LIMITED TAKEOFF

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Basic Takeoff Speeds	2
Speed Increase Required	3

S21805

$V_{1\,(MCG)}$ LIMITED TAKEOFF

G E N E R A L

A $V_{1(MCG)}$ limited takeoff results when the entire range of V_1 for a takeoff gross weight falls below $V_{1(MCG)}$ (see V_1 Determination, Section 4.7). If the corrected accelerate-stop distance available equals or exceeds the appropriate reference $V_{1(MCG)}$ limited accelerate-stop distance below, V_1 may be increased to $V_{1(MCG)}$ without resulting in a field length limited takeoff. If the entire range of V_1 for a takeoff gross weight falls below $V_{1(MCG)}$ and the corrected accelerate-stop distance available is less than the reference $V_{1(MCG)}$ limited accelerate-stop distance below, the takeoff is not allowed.

Braking configuration	Reference $V_{1(MCG)}$ limited accelerate-stop distance
All brakes, antiskid on	3600 ft.
1 brake deactivated, antiskid on	3600 ft.
All brakes, antiskid inoperative	3850 ft.

NOTE: Takeoff with a corrected accelerate-stop distance available less than the reference $V_{1(MCG)}$ limited accelerate-stop distance is permissible if any portion of the range of V_1 equals or exceeds $V_{1(MCG)}$ (see V_1 Determination, Section 4.7).

See the example problem appendix for a numerical example of this procedure.

T A K E O F F S P E E D S

The following steps describe the procedure for determining takeoff speeds, when limited by $V_{1(MCG)}$ and the corrected accelerate-stop distance available exceeds the reference $V_{1(MCG)}$ limited accelerate-stop distance.

Basic Takeoff Speeds

If $V_R \geq V_{1(MCG)}$ (Section 4.7), no speed increase is required for V_R and V_2 over the basic speeds obtained in Section 4.7 and set $V_1 = V_{1(MCG)}$.

V_1 (MCG) TAKEOFF LIMITS

T A K E O F F S P E E D S (Continued)

Speed Increase Required

If $V_R < V_{1(MCG)}$ (Section 4.7), a speed increase is required so that $V_R = V_{1(MCG)}$.

1. Determine Speed Increase Required

   Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart, Section 4.10, with the V_R speed determined in Section 4.7. Follow the guidelines to $V_R = V_{1(MCG)}$ and read speed increase required.

   If $V_R < V_{1(MCG)}$ with maximum speed increase (12 units), select the next lower takeoff flap setting and re-analyze the takeoff. Otherwise, proceed with the analysis to Step 2.

2. Determine Takeoff Safety Speed, V_2

   Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart, Section 4.10, with the V_2 speed determined in Section 4.7. Follow the guidelines to the speed increase required (Step 1) and read takeoff safety speed, V_2.

3. Takeoff Speeds

   (a) $V_1 = V_{1(MCG)}$.
   (b) $V_R = V_{1(MCG)}$.
   (c) V_2 from Step 2.

SECTION 4.9 - OBSTACLE CLEARANCE

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S24204

SECTION 4.9 - OBSTACLE CLEARANCE

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- A/C PACKS OFF. 30
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S24217

OBSTACLE CLEARANCE

T A K E O F F F L I G H T P A T H

PRESENTATION

The takeoff flight path is the calculated height versus distance relationship assuming failure of the most critical engine during takeoff, and is used for determining obstacle clearance. It is divided into logical segments defined by changes in airplane configuration, engine thrust, or speed. The assumed flight path is not mandatory for takeoff operations where obstacle clearance is not a problem or where analysis has shown that the clearance required by operating regulations is available using an alternate path or course.

Both the gross and the net takeoff flight paths may be obtained from the charts. The gross flight path governs the time spent in each climb segment, and is used to determine the actual heights at which transition from one segment to another is made. The net flight path is the gross flight path reduced by .8 percent gradient capability. Vertical obstacle clearance must be demonstrated on the basis of the net flight path minus 35 feet. The flight path is completed when a gross height of 1,500 feet has been attained, and transition to the enroute configuration completed, unless obstacle height requires further extension of the flight path.

The obstacle clearance charts show net flight path profiles, reduced by 35 feet, as a function of Takeoff Climb gross gradient at 400 feet. Knowing the distance and elevation difference between an obstacle and "Reference Zero", these dimensions can be spotted on the appropriate obstacle clearance chart to find the required climb gradient. If the flight path for the available gradient at V2 speed is sufficient to clear the obstacle, the takeoff weight determined by other limitations is satisfactory. Otherwise, the following options are available:

1. Reduce the weight to correspond with the required gradient.
2. Use a less limiting flap setting.
3. Use improved climb performance (increased takeoff speeds).

The impact of Options 2 and 3 on obstacle clearance capability depends on the height and location of the critical obstacle.

OBSTACLE CLEARANCE

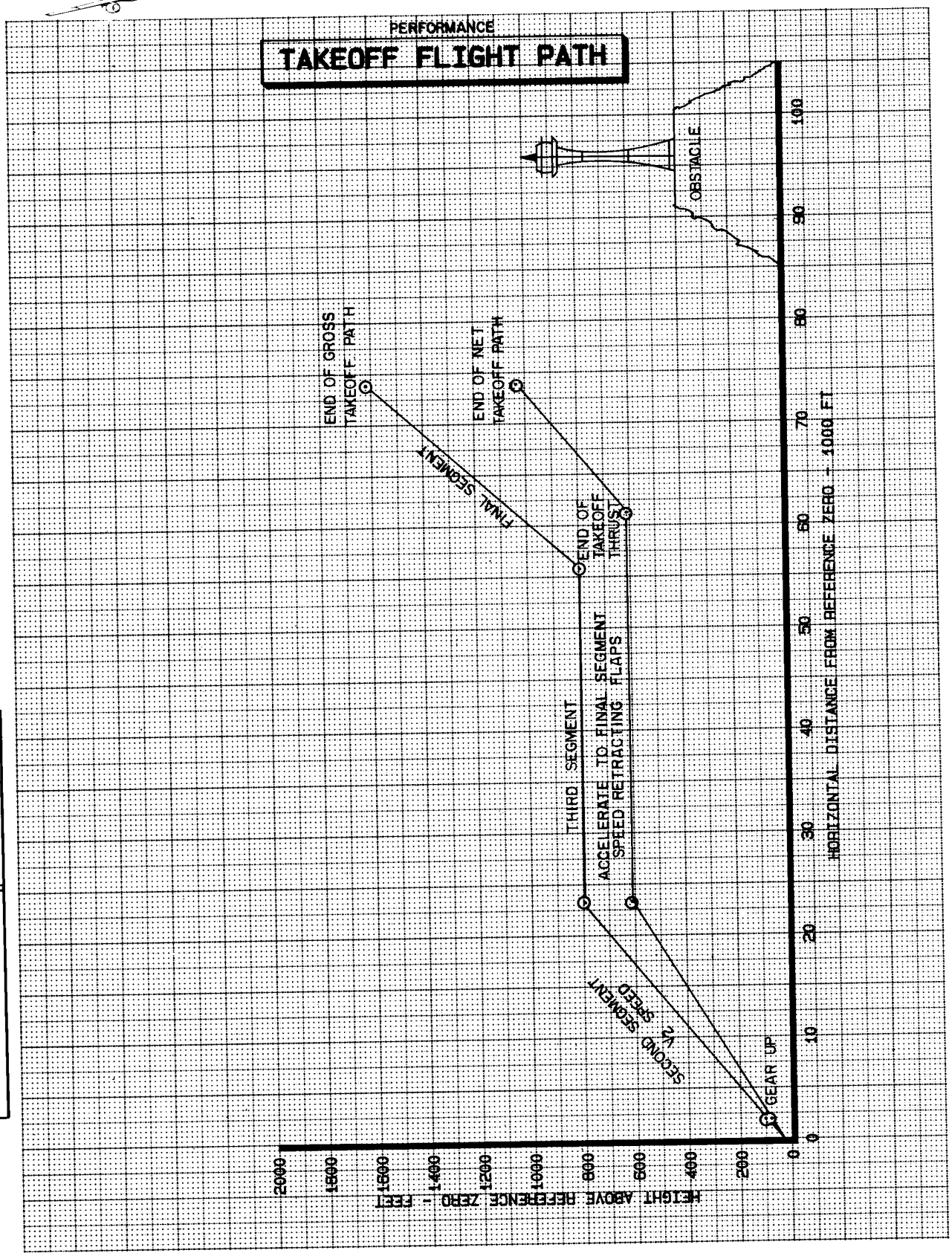
T A K E O F F F L I G H T P A T H

PRESENTATION (Continued)

When weight is reduced to achieve obstacle clearance, note that the horizontal distance between the obstacle and Reference Zero increases, since field length required is less. This can be accounted for on the obstacle clearance charts by using "obstacle distance trade lines". On a sloped runway the obstacle height also changes with respect to Reference Zero; this can be accounted for by varying the obstacle height in proportion to the change in takeoff distance and the runway slope. Where excess field length is available, Improved Climb Performance may be used to increase the takeoff speed and improve the climb gradient available.

Occasionally the flight path analysis must be extended beyond the flap retraction point to show clearance of high and very distant obstacles which cannot be avoided by turning. For this purpose the Third Segment Distance and Final Takeoff Climb charts are included.

The Flight Path charts are referenced to takeoff gross weight, airport temperature, and airport pressure altitude for ease of use. Allowances for fuel burnoff and performance changes with height have been accounted for in the chart construction.



P.C. 6S000111

BOWKER 767	APPROVED	DATE

S29513

OBSTACLE CLEARANCE

A S S U M E D C L I M B T E C H N I Q U E

Performance shown on the takeoff flight path charts is based on the following conditions and assumptions:

The flight path begins (Reference Zero) at the end of the takeoff distance where the airplane has attained a height of 35 feet and a speed of V2. The critical engine is assumed inoperative. Landing gear retraction is completed at the end of the first segment, which is based on demonstrated performance in ground effect. Climb is continued at V2 with takeoff flap setting and takeoff thrust on the operating engine until:

(a) A minimum gross height of 400 feet is attained, or,

(b) The maximum level-off height is attained, or,

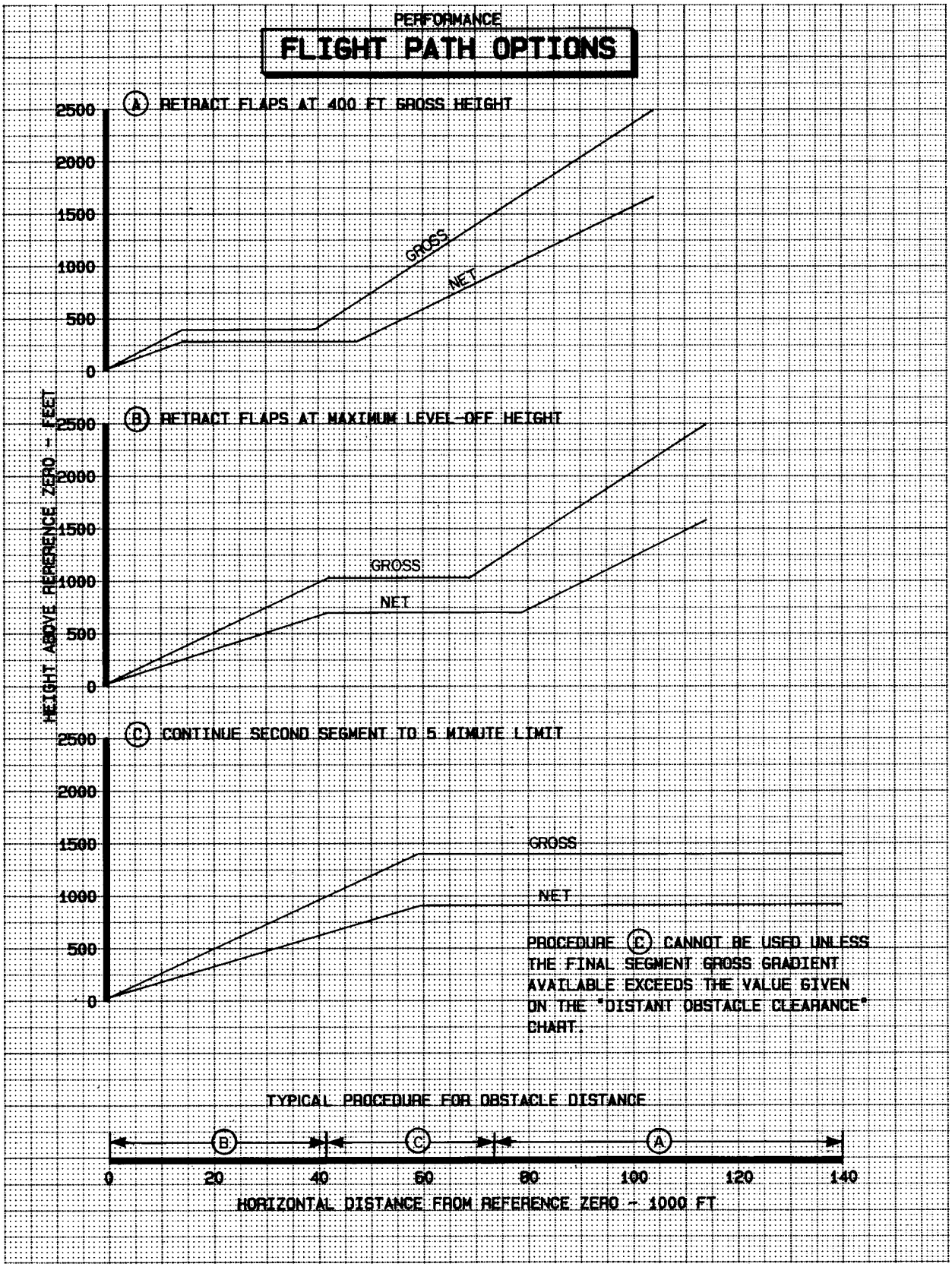
(c) The maximum height is attained which can be reached 5 minutes after setting takeoff thrust.

These flight paths have been illustrated on the Flight Path Options chart.

In cases (a) or (b) above, the airplane is then accelerated in level flight at takeoff thrust through the flap retraction speed schedule to the final segment speed at which time climb is resumed on maximum continuous thrust. Case (c) can only be used when all obstacles are cleared in the second segment and a final segment gross climb gradient greater than that required for a Maximum Continuous thrust cleanup is available (Distant Obstacle Clearance chart insert).

PERFORMANCE

FLIGHT PATH OPTIONS



P.C. 6S000112

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BOWKER 767	

S29514

OBSTACLE CLEARANCE

F L I G H T P A T H C H A R T P R E S E N T A T I O N

The various charts used in determining a height versus distance profile of the takeoff flight path for checking obstacle clearance are described below. The flight path segments in which takeoff thrust is used are shown as functions of corrected takeoff climb gradient at 400 feet above airport elevation. Obstacle-limited weights for obstacles which can be cleared in the first or second segments of the takeoff flight path can be determined by direct reference to the charts. For more distant obstacles, it is necessary to construct a flight path diagram from information on the various charts in order to determine the maximum allowable takeoff weight for obstacle clearance.

TAKEOFF CLIMB - These charts show gross climb gradient capability in the second segment configuration as a function of gross weight, airport temperature, and airport pressure altitude. They are based on thrust and temperature conditions 400 feet above airport elevation. This height is higher than the gear retracted height which is why the available gradient at takeoff-climb-limited weights is slightly less than the 2.4 percent minimum specified in FAR 25.121(b).

CLOSE-IN OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for the first and second segments out to a distance of 7,000 feet as a function of the corrected takeoff climb gross gradient at a 400 foot height. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

DISTANT OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for a one-engine-inoperative climb at V2 speed in the takeoff climb (second segment) configuration, as a function of corrected takeoff climb gross gradient at 400 feet. Gross height lines are superimposed on the flight path lines. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

END OF EXTENDED SECOND SEGMENT - This chart shows the horizontal distance from reference zero at 5 minutes from the start of the takeoff as a function of gross weight, altitude, temperature and takeoff flap position. Data from this chart may be used along with the distant obstacle clearance chart when using extended second segment climb.

F L I G H T P A T H C H A R T P R E S E N T A T I O N
(Continued)

OBSTACLE DISTANCE TRADE LINES - When weight is reduced to achieve a higher takeoff climb gradient for obstacle clearance, the required takeoff distance is also reduced. This increases the obstacle distance from Reference Zero. This chart shows the relationship between takeoff distance saved (increased obstacle distance) and takeoff climb gradient as both are affected by gross weight. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart.

MAXIMUM LEVEL-OFF HEIGHT - At low climb gradients, the airplane cannot takeoff, climb to 1,500 feet and accelerate to flaps up within the 5 minute time limit on takeoff thrust. These charts show the maximum gross height at which the acceleration segment can be scheduled at takeoff thrust; the corresponding net height is used to check obstacle clearance.

THIRD SEGMENT DISTANCE - These charts present the gross and net horizontal distances required to accelerate to the final takeoff climb speed, while retracting flaps according to the recommended schedule, as a function of the available corrected takeoff climb gradient. The gradient read from the Takeoff Climb chart must be corrected for level-off height and wind on the Gradient Corrections chart before entering the Third Segment Distance chart.

FINAL TAKEOFF CLIMB CHART - This chart shows the gross and net gradient available upon completion of the flap retraction segment and reduction of thrust to maximum continuous limits. It is used to construct the final segment of the flight path to determine clearance of very high and distant obstacles. It is based on conditions 1,500 feet above airport altitude and 3 degrees C (5.4 degrees F) below airport temperature. The gradients from this chart should be corrected for height and wind on the Gradient Corrections chart as required.

GRADIENT CORRECTIONS - Corrections to takeoff and final takeoff climb gradients are shown on these charts for wind, gross height and for steady turns in the flight path. Wind corrections should be applied to the takeoff climb gradients used in the Obstacle Clearance charts. Both wind and gross height corrections may be required when a flight path analysis extends into the third and final segments. It should be noted that the procedure used to read this chart is different depending on the direction that the correction is to be made. For example, from a zero wind 400 ft. gross gradient (from a Takeoff Climb chart), start with the zero wind gradient on the REF LINE and slide to the required wind to get the wind corrected gradient. However, from a wind corrected gradient (from an Obstacle Clearance chart), start with the wind corrected gradient at the wind value and slide to the REF LINE to get the zero wind gradient.

S24234

OBSTACLE CLEARANCE

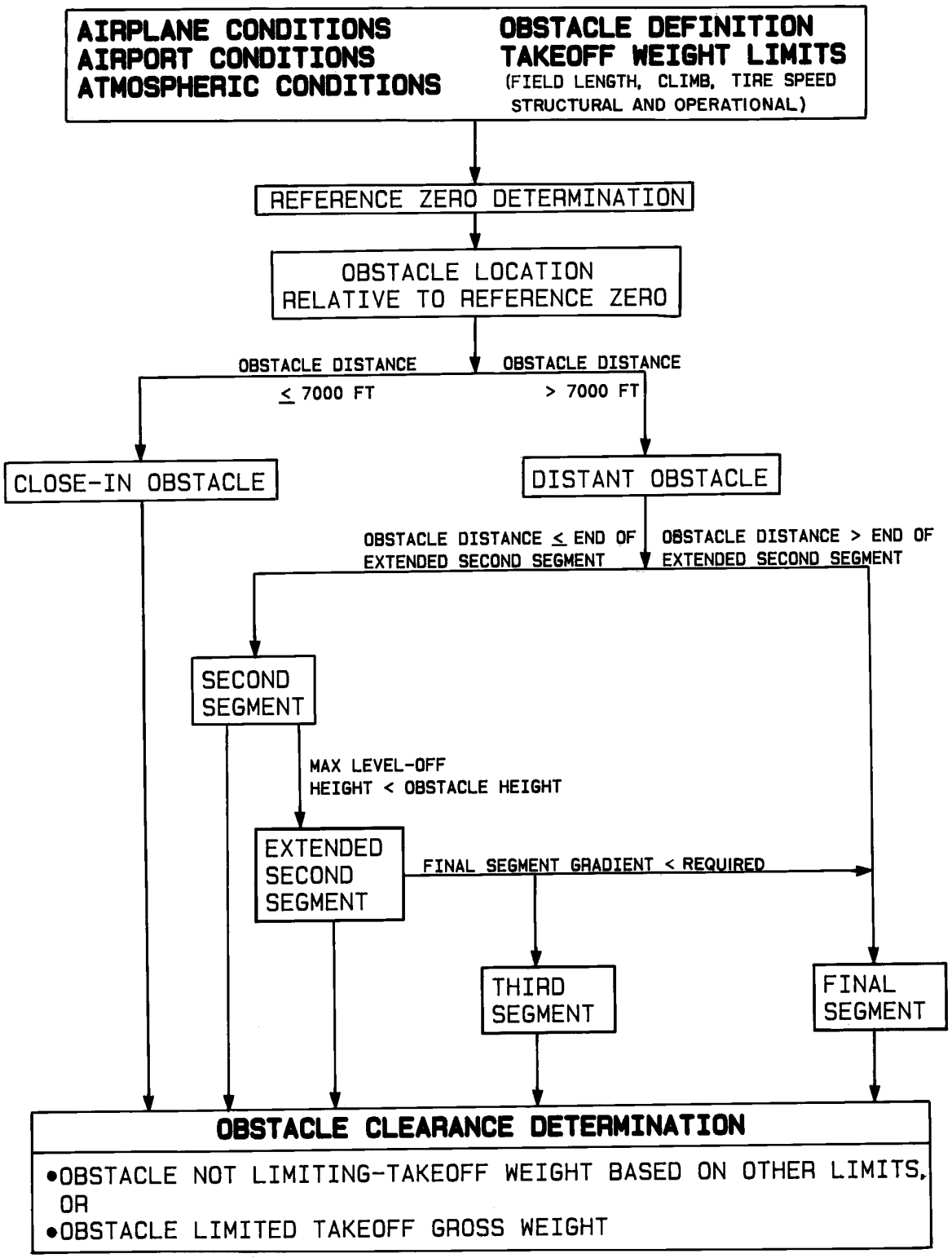
FLIGHT PATH CHART PRESENTATION
(Continued)

GROSS HEIGHT-PRESSURE ALTITUDE CONVERSION - When ambient temperatures are above or below ISA, the altitude change displayed on a pressure altimeter can differ significantly from the geometric heights calculated for the flight path. This chart relates the geometric height increment to a pressure altitude increment so that flight path procedures can be developed with reference to altimeter indications.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE FLOW DIAGRAM

The flow diagram below shows in simplified steps a procedure to determine takeoff obstacle clearance. If the obstacle is limiting, the obstacle limited takeoff gross weight is determined. A detailed description of the procedure follows.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE



S29515

OBSTACLE CLEARANCE ANALYSIS PROCEDURE

The following procedures assume that the allowable takeoff weight based on field length, climb, tire speed, and structural limits has been previously determined (see appropriate sections for procedures). This gross weight is then used in the obstacle clearance analysis to determine if any obstacles are limiting, necessitating a reduction in allowable takeoff gross weight.

See example problem appendix for numerical examples of these procedures.

1. Determine Reference Zero

   This is the starting point in the takeoff flight path analysis and the reference point for locating the obstacles under consideration. Reference Zero is a point on the runway or clearway plane at the end of the takeoff distance required and can be determined as follows:

   (a) Enter appropriate Field Length Limits (One Engine Inoperative) charts with the airport temperature/altitude and the least gross weight* determined by climb limits, tire speed limits, structural limits or operational requirements. Read one engine inoperative corrected runway length required.

   * If the Improved Climb Performance technique is used, enter with the equivalent (same required runway length) takeoff gross weight with zero speed increase determined in the Corrected Runway Length Required with Improved Climb Performance Procedure (Section 4.10).

   (b) Enter the appropriate Runway Length and V_1 Adjustments chart with the one engine inoperative corrected runway length required, Step 1(a), and the corrected accelerate-stop distance available from runway length determination. Honoring the $V_1/V_R \leq 1.0$ restriction, by using less than the corrected accelerate-stop distance available if necessary, read engine inoperative corrected takeoff distance required.

   (c) Enter the Engine Inoperative Corrected Takeoff Distance chart with the corrected takeoff distance required, Step 1(b), and proceed backwards through the chart, excluding the clearway correction. Read actual engine inoperative takeoff distance required.

   (d) Enter appropriate Field Length Limits (All Engines Operating) chart with the airport temperature/altitude and the gross weight used in Step 1(a). Read all engines operating corrected runway length required.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(e) Enter the All Engines Operating Corrected Runway Length chart with the all engines operating corrected runway length required, Step 1(d), and proceed backwards through the chart, excluding the clearway correction. Read actual all engines operating takeoff distance required.

(f) The actual takeoff distance required is the greater of the engine inoperative, Step 1(c), or all engines operating, Step 1(e), takeoff distances required. This is the location of Reference Zero relative to the brake release end of the runway.

2. Adjust Obstacle Distance and Height to Reference Zero.

Subtract the actual takeoff distance required, Step 1(f), from the actual runway length available and add the difference to obstacle distance measured from the end of the runway length available. Note: This can be a reduction in obstacle distance where clearway is used. On a sloped runway, obstacle height should also be corrected for the difference in elevation between Reference Zero and the end of the runway length available. See sloped runway effect on obstacle clearance in this section.

3. Takeoff Climb Gradient Available

(a) Determine takeoff climb gross gradient available.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the actual (not equivalent) gross weight. Read takeoff climb gross gradient available.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the takeoff climb gross gradient, Step 3(a)(1) and takeoff speed increase. Read takeoff climb gross gradient available with Improved Climb Performance.

(b) Enter the Gradient Corrections chart with gross gradient available, Step 3(a). Read corrected gross gradient available.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

4. Close-In Obstacles

Close-in obstacles, within 7,000 feet of Reference Zero, may be in the first or second segment of the takeoff flight path. Use the following analysis procedures:

(a) Enter the Close-In Obstacle Clearance chart with obstacle distance from Reference Zero and corrected gross gradient available, Step 3(b) (or other obstacle clearance requirement). Read height above Reference Zero available.

(b) If height above Reference Zero available, Step 4(a), is greater than or equal to the obstacle height above Reference Zero, the obstacle is cleared and allowable takeoff gross weight is based on other limits. Otherwise, proceed with analysis to Step 4(c).

(c) When the obstacle is not cleared, construct an obstacle distance trade line on the Close-In Obstacle Clearance chart and follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart in this section.

(d) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 4(c), and determine the gross gradient required for obstacle clearance.

(e) Determine obstacle limited takeoff gross weight.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 4(d). Read obstacle limited takeoff gross weight.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 4(d), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

S28156

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increase required for obstacle clearance. Read obstacle limited takeoff gross weight with Improved Climb Performance.

NOTE: Due to conservatisms inherent in the construction of the Obstacle Distance Trade Line chart, an increase in obstacle limited takeoff gross weight may be obtained by reanalyzing the takeoff flight path beginning at Step 1, with the obstacle limited gross weight from Step 4(e). A single iteration will remove the conservatism introduced into the analysis by the Obstacle Distance Trade Line. In general, a significant increase in obstacle limited gross weight may be obtained if the corrected gross gradient available from Step 3(b) is less than the corrected gross gradient required for obstacle clearance from Step 4(c) by .5% or more.

5. Distant Obstacles

Distant obstacles, more than 7,000 feet from Reference Zero, may be in the second, third or final segment of the takeoff flight path. Use the following analysis procedures:

(a) Enter the End of Extended Second Segment chart with temperature, altitude, actual (not equivalent) gross weight from step 1 and flap position. Read the horizontal distance from Reference Zero. If the distance to the obstacle is longer than the end of extended second segment climb distance, analyze the obstacle as a final segment obstacle. See obstacle in final segment. Otherwise, proceed with analysis to Step 5(b).

Second Segment

(b) Enter the Distant Obstacle Clearance chart with obstacle height and corrected gross gradient available, Step 3(b) (or other obstacle clearance requirement). Read gross height required for obstacle clearance.

(c) Enter the appropriate Maximum Level-Off Height chart with airport temperature/altitude and the gross gradient available, Step 3(a) (or other obstacle clearance requirement). Read maximum level-off height.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(d) If maximum level-off height, Step 5(c), is less than the gross height required for obstacle clearance, Step 5(b), see Extended Second Segment. Otherwise, proceed with analysis to Step 5(e).

(e) Enter the Distant Obstacle Clearance chart with obstacle distance from Reference Zero and corrected gross gradient available, Step 3(b). Read height above Reference Zero available.

(f) If height above Reference Zero available, Step 5(e), is greater than or equal to the obstacle height above Reference Zero, the obstacle is cleared and allowable takeoff gross weight is based on other limits. Otherwise, proceed with analysis to Step 5(g).

(g) When obstacle is not cleared, construct an obstacle distance trade line on the Distance Obstacle Clearance chart and follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart in this section.

(h) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 5(g), and determine the gross gradient required for obstacle clearance.

(i) Determine obstacle limited takeoff gross weight

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 5(h). Read obstacle limited takeoff gross weight.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 5(h), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increase required for obstacle clearance. Read obstacle limited takeoff gross weight with Improved Climb Performance.

NOTE: Due to conservatisms inherent in the construction of the Obstacle Distance Trade Line chart, an increase in obstacle limited takeoff gross weight may be obtained by reanalyzing the takeoff flight path beginning at Step 1 with the obstacle limited gross weight from Step 5(i). A single iteration will remove the conservatism introduced into the analysis by the Obstacle Distance Trade Line. In general, a significant increase in obstacle limited gross weight may be obtained if the corrected gross gradient available from Step 3(b) is less than the corrected gross gradient required for obstacle clearance from Step 5(g) by .5% or more.

6. Extended Second Segment

The FAR require a minimum gross climb gradient capability of 1.2 percent at all points in the takeoff flight path above 400 feet gross height.

When this requirement can be met with the most critical combination of speed and flap position encountered, and at maximum continuous thrust instead of takeoff thrust, then maximum level-off height no longer limits the height at which the second segment climb at V_2 speed must be terminated. Instead, the second segment may be extended until the takeoff thrust time-limit is reached.

(a) Check the final segment gradient capability required for extended second segment, as noted on the Distant Obstacle Clearance chart. This gradient capability is necessary to assure 1.2 percent gross gradient in the most critical configuration during flap retraction when using maximum continuous thrust.

(b) Enter the appropriate Final Takeoff Climb chart with airport temperature/altitude and the actual (not equivalent) gross weight. Read final segment gross gradient available.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(c) If final segment gross gradient available, Step 6(b), is greater than or equal to final segment gross gradient required, Step 6(a), an extended second segment climb is permissible. Complete the analysis with Steps 5(e) through 5(i). If final segment gross gradient available is insufficient to allow an extended second segment climb, a reduction in takeoff weight is necessary. The following three possibilities should be checked to achieve minimum weight reduction:

(1) Determine the gross weight at which the minimum final takeoff climb gradient requirement for extended second segment is met. See Maximum Gross Weight for Extended Second Segment.

(2) Determine the gross weight required to achieve the obstacle clearance gross height at the end of second segment (maximum level-off height). See Obstacle in Third Segment.

(3) Analyze the obstacle as a final segment obstacle. See Obstacle in Final Segment.

7. Maximum Gross Weight for Extended Second Segment

(a) Enter the appropriate Final Takeoff Climb chart with the final segment gradient capability required, Step 6(a), and airport temperature/altitude. Read maximum gross weight for extended second segment.

(b) Starting with the maximum gross weight for extended second segment, Step 7(a), complete the analysis with Steps 1, 2, 3, and 5(e) through 5(i). The result is the obstacle limited takeoff gross weight for extended second segment.

8. Obstacle in Third Segment

A third segment obstacle is one which is cleared during the level-flight acceleration and flap retraction segment of the calculated flight path; therefore, the necessary obstacle clearance height must be attained at, or before, the end of the second segment. The maximum gross height attainable in the second segment, unless certain other requirements are met, is indicated on the Maximum Level-Off Height chart.

S28177

OBSTACLE CLEARANCE

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

Starting with the corrected gross gradient available, obtained in Step 3(b) (or other obstacle clearance requirement), the maximum level-off height line can be constructed on the Distant Obstacle Clearance chart using the following procedure for each point on the line.

Maximum Level-Off Height Line

(a) Assume a corrected gross gradient.

(b) Enter the Gradient Corrections chart with corrected gross gradient, Step 8(a), and determine the gross gradient.

(c) Enter the appropriate Maximum Level-Off Height chart with airport temperature/altitude and the gross gradient, Step 8(b). Read maximum level-off height.

(d) Plot maximum level-off height, Step 8(c), as a function of corrected gross gradient, Step 8(a), on the Distant Obstacle Clearance chart.

Obstacle Limited Takeoff Gross Weight

(e) After the maximum level-off height line has been constructed, follow it to the obstacle height. Read corrected gross gradient required for obstacle clearance.

(f) Enter the Gradient Corrections chart with corrected gross gradient required for obstacle clearance, Step 8(e), and determine the gross gradient required for obstacle clearance.

(g) Determine third segment obstacle limited takeoff gross weight.

(1) Minimum Takeoff Speeds

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the gross gradient required for obstacle clearance, Step 8(f). Read third segment obstacle limited takeoff gross weight.

S28179

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, enter the appropriate Takeoff Climb (Improved Climb Performance) chart (Section 4.10) with the gross gradient required for obstacle clearance, Step 8(f), and takeoff speed increase. Read the equivalent gross gradient with zero speed increase.

Enter the appropriate Takeoff Climb chart with airport temperature/altitude and the equivalent gross gradient with zero speed increases required for obstacle clearance. Read third segment obstacle limited takeoff gross weight with Improved Climb Performance.

9. Obstacle in Final Segment

When distant obstacles cannot be cleared at maximum level-off height, or by using extended second segment, it is necessary to construct the flight path beyond the end of the second segment using the Third Segment Distance and Final Takeoff Climb charts.

(a) Select the minimum allowable gross level-off height.

(1) FAR minimum: 400 feet.

(2) Obstacle clearance requirement.

(3) Operational requirement or procedures.

(b) Enter the Distant Obstacle Clearance chart with the desired gross level-off height, Step 9(a), and the available corrected gross gradient, Step 3(b), (or other obstacle clearance requirement). Read height above Reference Zero and horizontal distance from Reference Zero. This is the end of second segment.

(c) Enter the Takeoff Climb Gradient Corrections chart with the same wind corrected gross gradient used in Step 9(b) and further correct it to the selected gross level-off height if greater than 400 feet.

S28180

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(d) Enter the appropriate Third Segment Distance chart with airport temperature/altitude and corrected gross gradient available, Step 9(c). Read net and gross third segment distance.

(e) Add the net and gross third segment distances, Step 9(d), to the end of the second segment distance, Step 9(b), to get total net and gross distance from Reference Zero to the end of third segment.

(f) Enter the appropriate Final Takeoff Climb chart with airport temperature/altitude and the gross weight used to determine Reference Zero, Step 1 (or other obstacle clearance requirement). Read final segment gross gradient available.

(g) Calculate the gross height required for obstacle clearance for FAR requirements as follows:

Gross Height = Obstacle Height* + 35 + (.008 x Obstacle Distance*)

*From Reference Zero

(h) Enter the Final Takeoff Climb Gradient Corrections chart with final segment gross gradient available, Step 9(f), and correct it for wind and gross height, Step 9(g), if gross height required for obstacle clearance is greater than 1,500 feet.

(i) Reduce corrected final segment gross gradient available, Step 9(h), by .8 percent to obtain corrected final segment net gradient available.

(j) The remaining net height that must be gained to clear the obstacle, from the end of the third segment distance, is the difference between the obstacle height and the third segment height above Reference Zero, Step 9(b). This net height is gained at the corrected final segment net gradient available, Step 9(i). The horizontal distance traveled, to climb this height, will be:

Final Segment Distance =

$$\frac{\text{Obstacle Height - Third Segment Height}}{\text{Corrected Final Segment Net Gradient Available}}$$

S28187

OBSTACLE CLEARANCE

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

(k) Add the final segment distance, Step 9(j), to the net distance from Reference Zero to the end of third segment, Step 9(e), to obtain the total net distance from Reference Zero to clear the obstacle.

(l) If the total distance required to clear the obstacle, Step 9(k), is less than, or equal to, the distance from Reference Zero to the obstacle, the obstacle is not limiting and allowable takeoff gross weight is based on other limits. Otherwise, repeat the entire flight path analysis, Steps 1, 2, 3 and 9, for a lower weight and interpolate these results for the final segment obstacle limited takeoff gross weight.

NOTE: $GW_2 \approx GW_1 \times (D_{OB} \div D_1)^{.3}$

May be used as an approximate estimator in selecting a second gross weight for analysis.

WHERE: GW_2 = Second Gross Weight
GW_1 = First Gross Weight
D_{OB} = Distance to Obstacle from Reference Zero
D_1 = Distance to Clear Obstacle with GW_1, Step 9(k)

SLOPED RUNWAY EFFECT ON OBSTACLE CLEARANCE

Obstacle heights are generally referenced to the elevation at the end of the takeoff distance available. On sloped runways, when the entire takeoff distance is not used because obstacle clearance is critical, the flight path begins at a higher elevation on a downhill runway, and a lower elevation on an uphill runway. The actual obstacle distance is shifted by the amount of takeoff distance saved, when gross weight must be adjusted to obtain an increased gradient. The obstacle height can also be shifted by multiplying the change in obstacle distance by the runway gradient, and adding the product to the obstacle height (reduce obstacle height for downhill runway). For example, if obstacle distance is adjusted 1,000 feet on a 1% uphill runway, add 10 feet to obstacle height and draw a line from the original height-distance coordinates through the adjusted height and distance. See the example problem appendix for a numerical example of this procedure.

S28197

OBSTACLE CLEARANCE

CONSTRUCTION OF OBSTACLE DISTANCE TRADE LINE ON OBSTACLE CLEARANCE CHART

When takeoff gross weight is reduced to achieve a higher gradient capability to clear an obstacle, the required takeoff distance is also reduced. The relationship between gradient and distance (an obstacle distance trade line) can be constructed on an obstacle chart to solve obstacle problems when a gross weight reduction is required. The following procedure describes the steps required to construct such an obstacle distance trade line. See the example problem appendix for a numerical example of this procedure.

Starting with any point on an obstacle clearance chart, an obstacle distance trade line can be constructed using the Obstacle Distance Trade Lines chart. The change in horizontal distance from Reference Zero is exactly equal to the change in reference distance for a given change in gross gradient at 400 feet. As an example of this procedure, if the initial gradient is 3% at a horizontal distance from Reference Zero of 15,000 feet and the Obstacle Distance Trade Lines chart shows reference distance values of 1,050 feet* and 1,775 feet for gross gradients of 3% and 4%, respectively, then the first point of an obstacle distance trade line on the obstacle chart is at 3% gradient and 15,000 feet from Reference Zero and the second point is at 4% gradient and 15,000 + (1,775 - 1,050) = 15,725 feet. As many points as desired can be calculated to construct an obstacle distance trade line. Wind effects on the gradients can be ignored in the construction of these lines.

* The numbers used in this explanation are for illustrative purposes only and do not correspond to values obtained from an actual chart.

OBSTACLE CLEARANCE WITH SPEED INCREASE

Where excess field length is available, the improved climb performance technique may be used to increase takeoff speeds and improve the climb gradient available. The effect of speed increase on the second segment gradient is shown on the Takeoff Climb (Improved Climb Performance) charts in Section 4.10.

The procedure for finding the maximum obstacle limited takeoff weight when using the improved climb performance technique is a modified version of the Obstacle Clearance Analysis Procedure. The Obstacle Clearance Analysis Procedure should be followed for a series of takeoff speed increases from zero units up to the maximum allowed. The maximum weight obtained from the series is the maximum allowable obstacle limited takeoff gross weight.

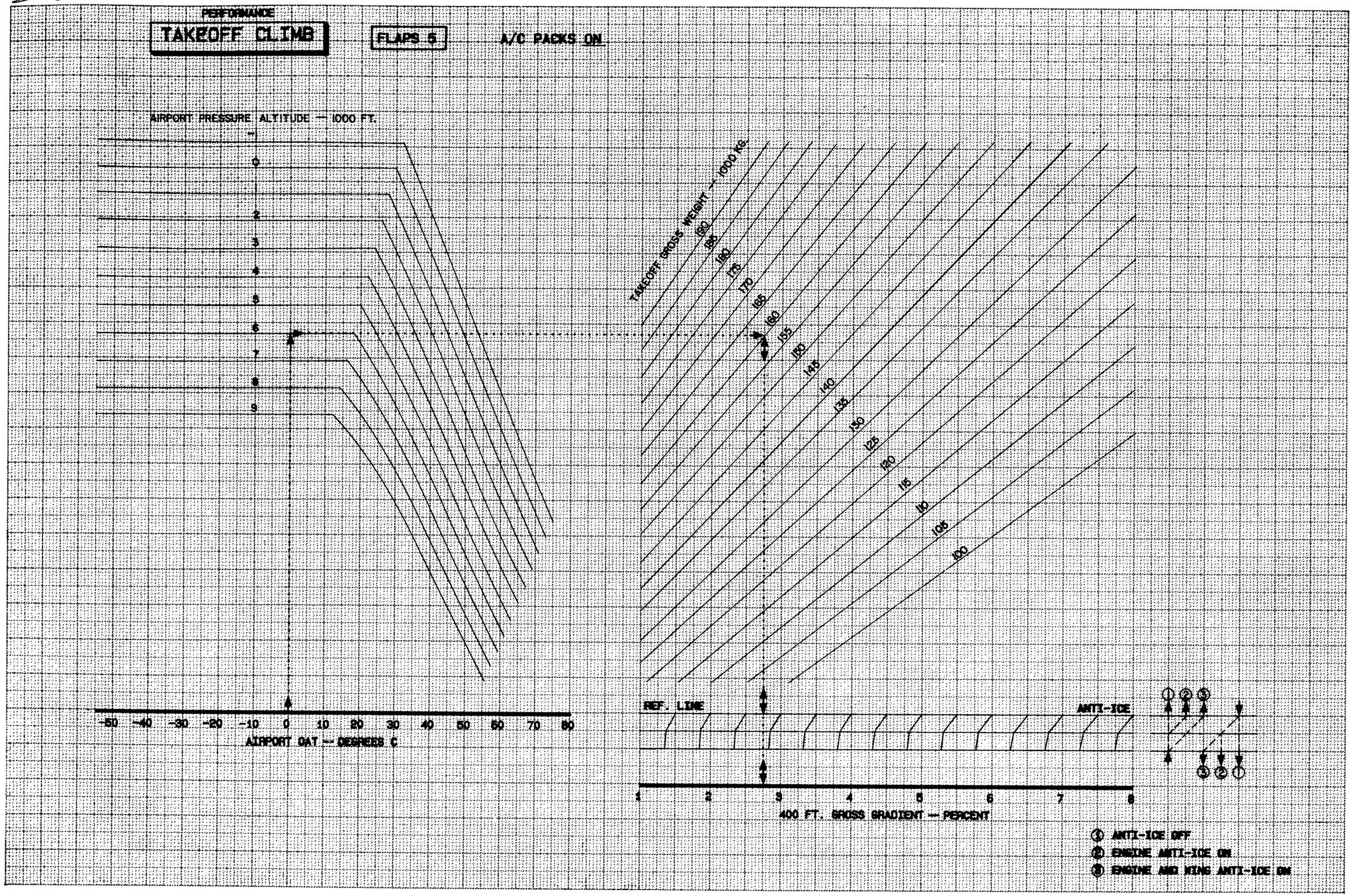
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PERFORMANCE

TAKEOFF CLIMB

FLAPS 5

A/C PACKS ON



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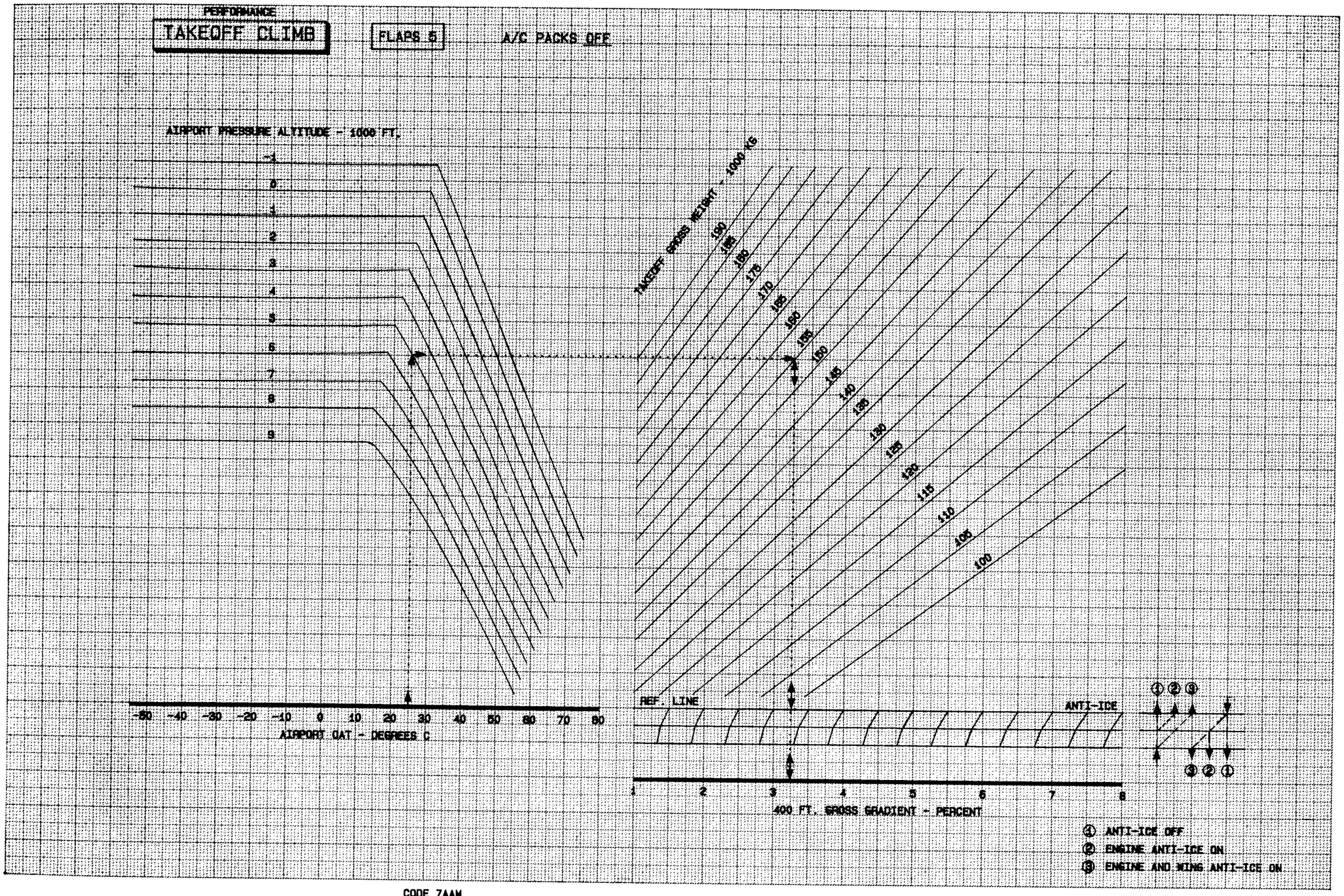
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PERFORMANCE

TAKEOFF CLIMB

FLAPS 5

A/C PACKS OFF



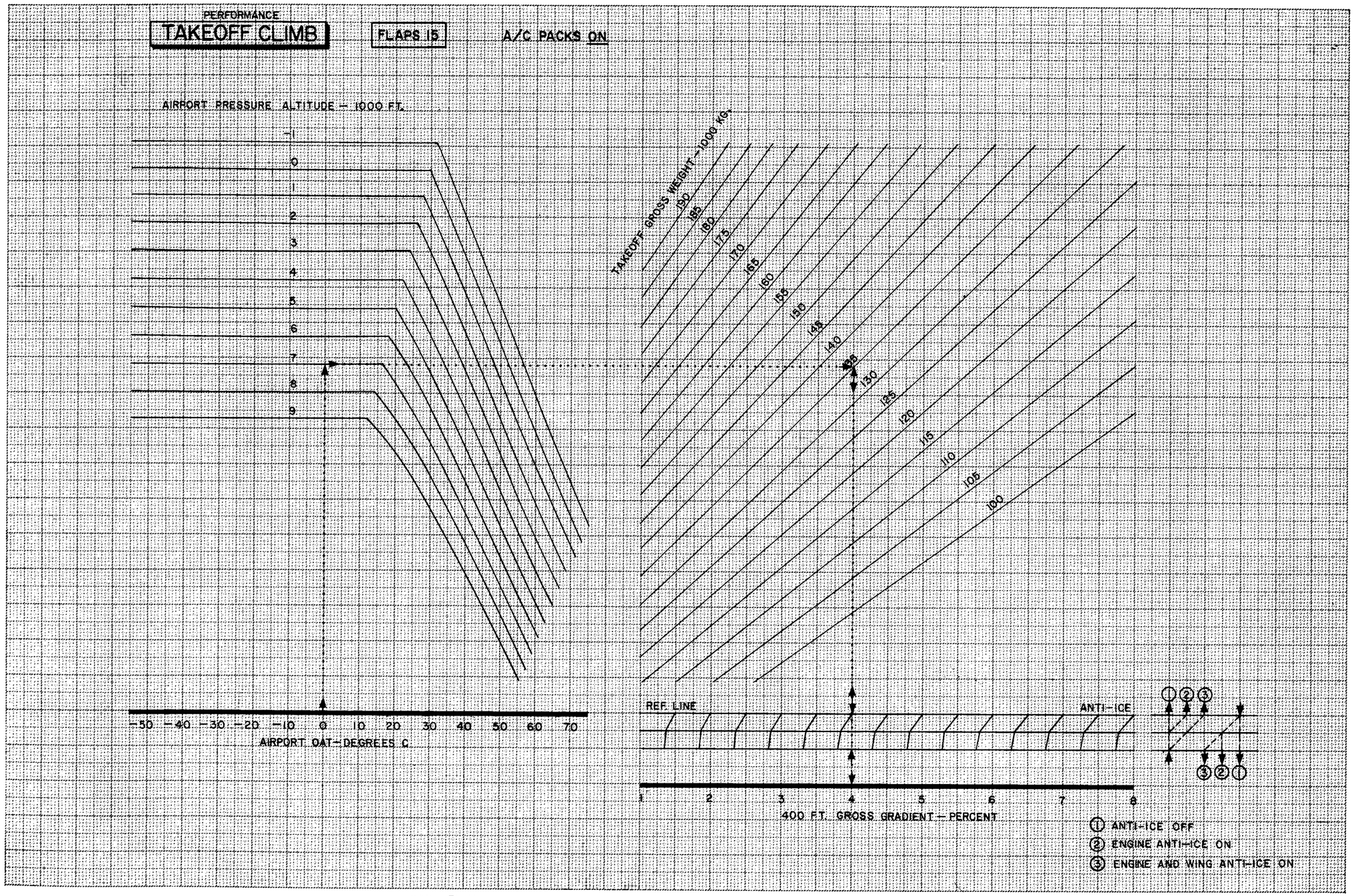
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PERFORMANCE

TAKEOFF CLIMB

FLAPS 15

A/C PACKS ON



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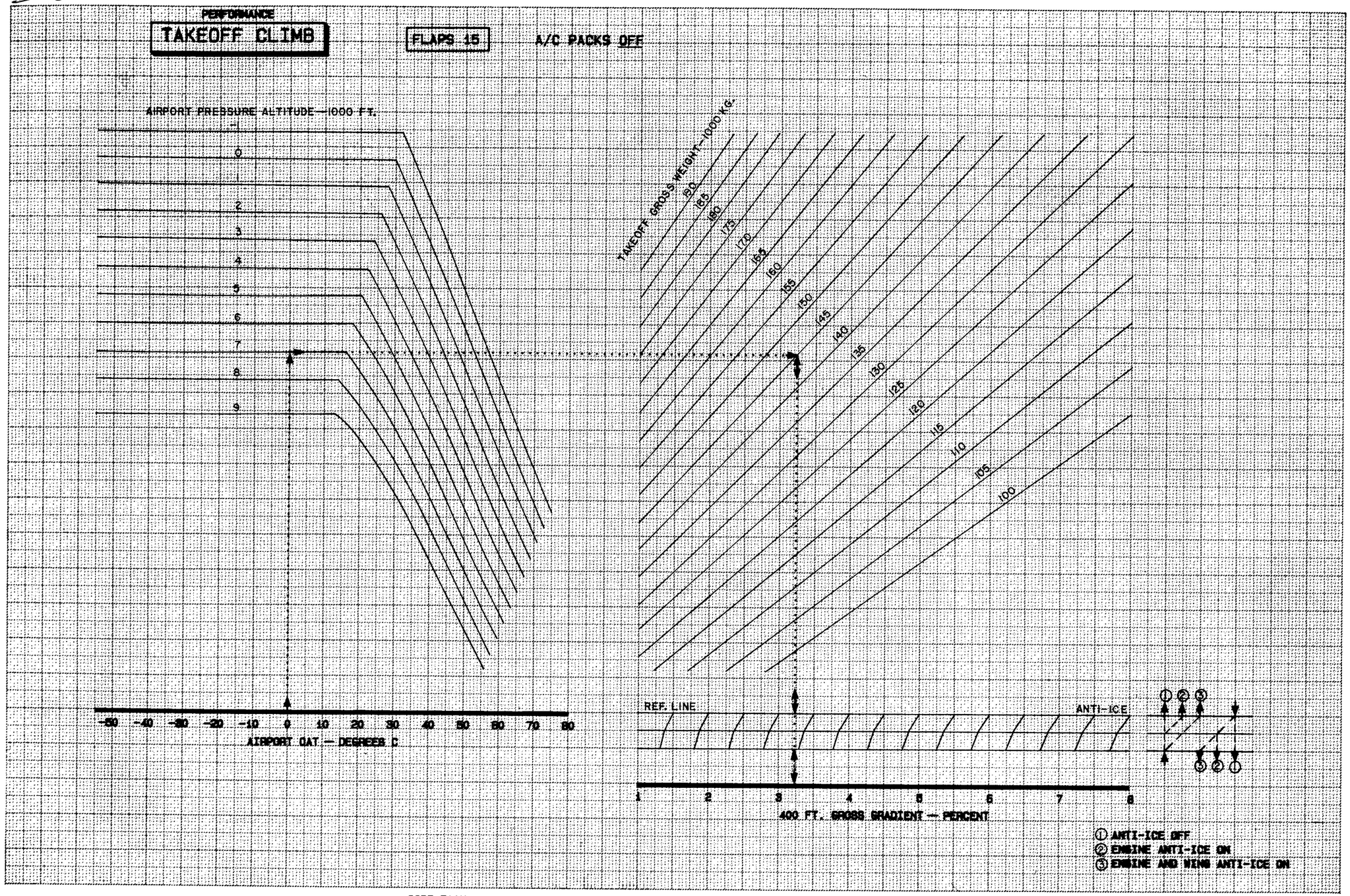
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PERFORMANCE

TAKEOFF CLIMB

FLAPS 15

A/C PACKS OFF



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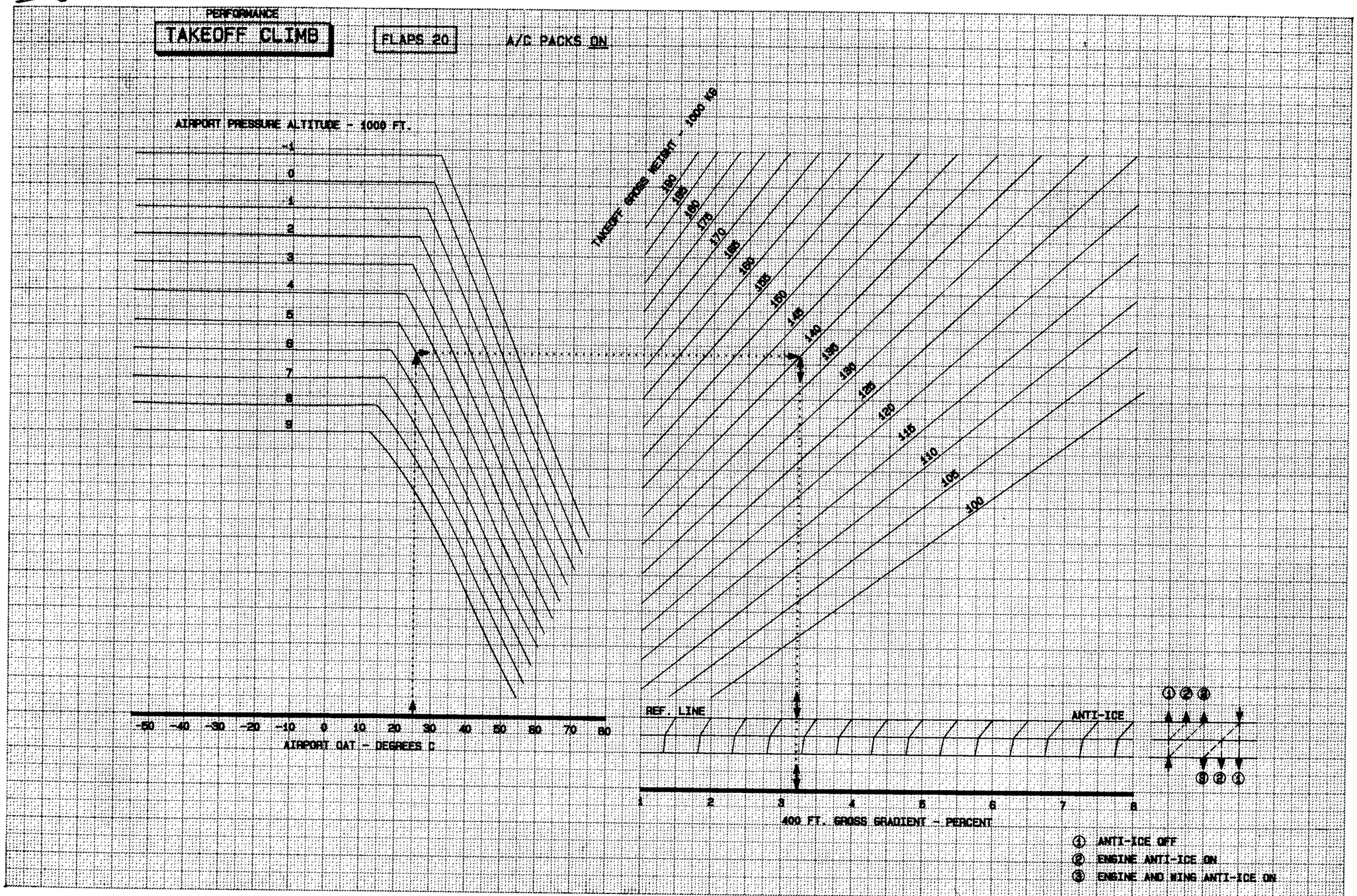
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PERFORMANCE

TAKEOFF CLIMB

FLAPS 20

A/C PACKS ON

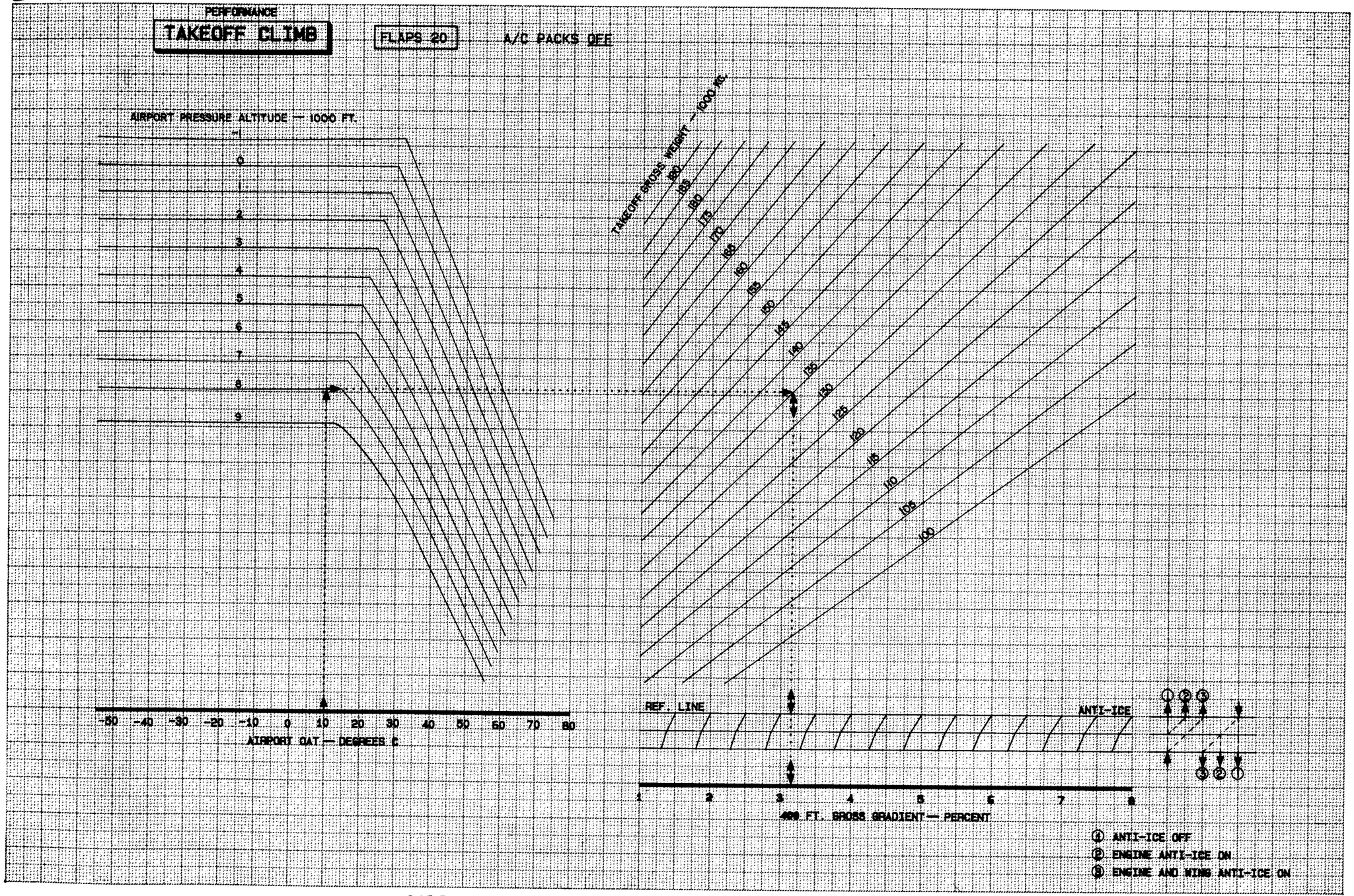


PERFORMANCE

TAKEOFF CLIMB

FLAPS 20

A/C PACKS OFF



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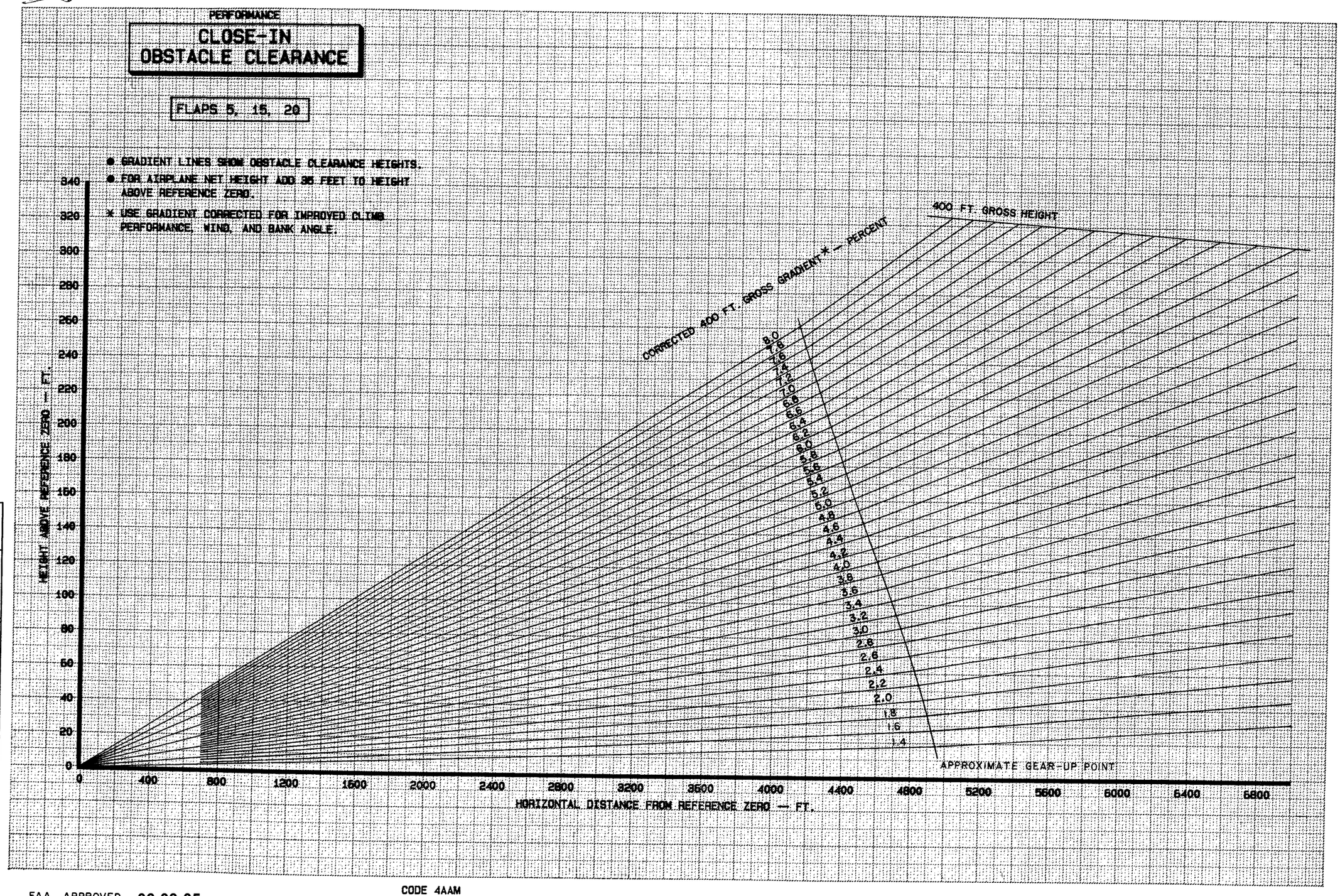
PERFORMANCE

CLOSE-IN OBSTACLE CLEARANCE

FLAPS 5, 15, 20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO.

× USE GRADIENT CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, AND BANK ANGLE.



P.C.6L0011542
D041T507-1 PG. 4.9-33

A. RISING
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	C.S. Zhi: 10136	9/10/87
	E. Goelink NR-41	7/30/91

6E4208

PERFORMANCE

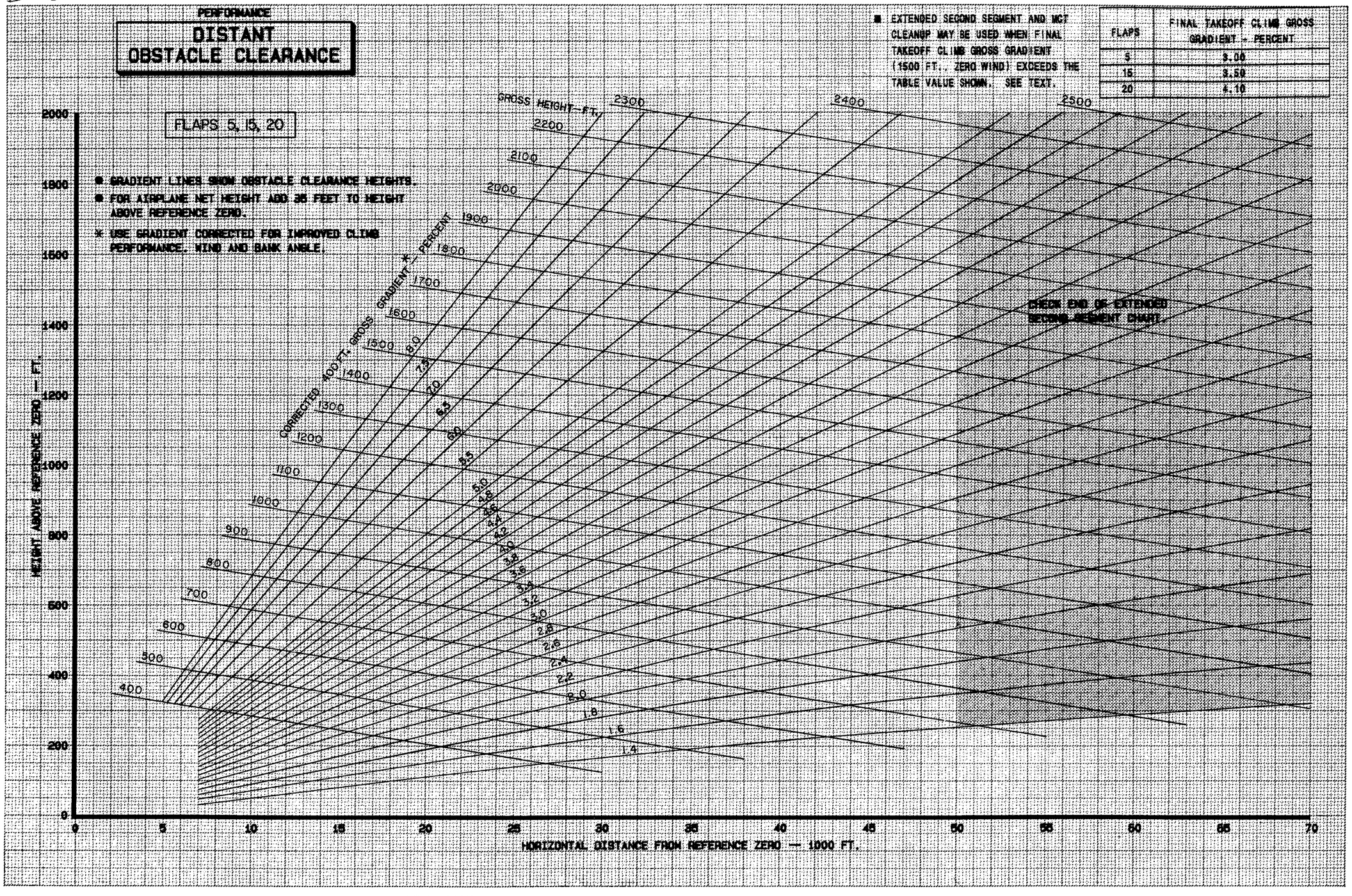
DISTANT OBSTACLE CLEARANCE

FLAPS 5, 15, 20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO HEIGHT ABOVE REFERENCE ZERO.
- * USE GRADIENT CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND AND BANK ANGLE.

■ EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10



TERRY	APPROVED	DATE
767-300ER	C.S. Ellis (writ)	9.10.87
CF6-80C2B6/B6F	2SR8	1/26/88
	E.Gelink (writ)	7/30/96

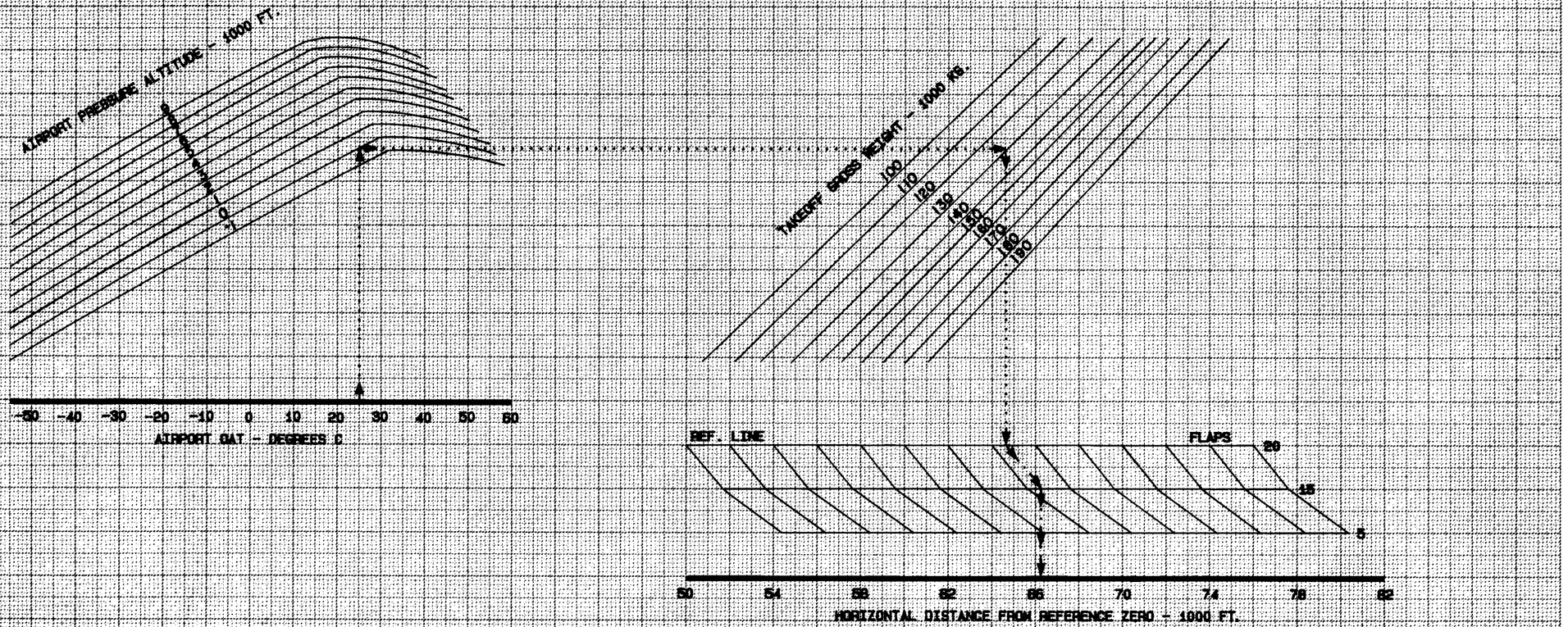
P.C. 6L001543
D041T507-1 P6 4.9-34

END OF EXTENDED SECOND SEGMENT

5 MINUTE LIMIT

● EXTENDED SECOND SEGMENT AND NOT CLEANUP MAY BE USED WHEN FINAL SEGMENT GROSS GRADIENT (1500 FT. ZERO WIND) EXCEEDS PERCENT SHOWN FOR THE APPROPRIATE FLAP POSITION. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GRADIENT - %
5	3.00
15	3.50
20	4.10



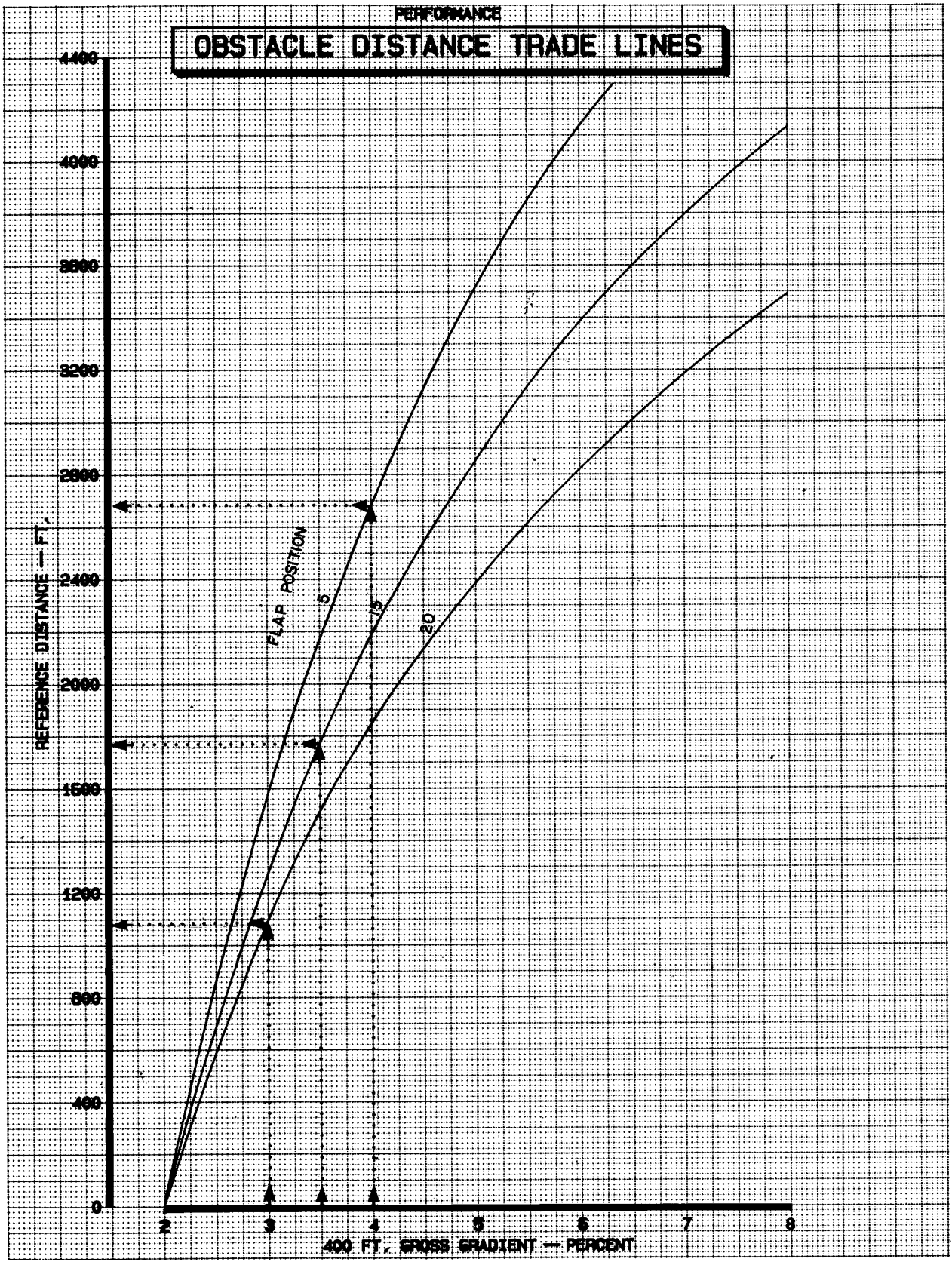
P.C. 6L001727
D041T807-1 PG. 4.9-86

SHIPMAN
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	NMT	1/14/88
		1/28/88

PERFORMANCE

OBSTACLE DISTANCE TRADE LINES



P.C. 6S000758
D041T807-1 P6.4.9-37

LIEURANCE	APPROVED	DATE
767—300ER	C.S. Zill NM366	9.11.87
CF6—80C2B6/B6F		

6E420

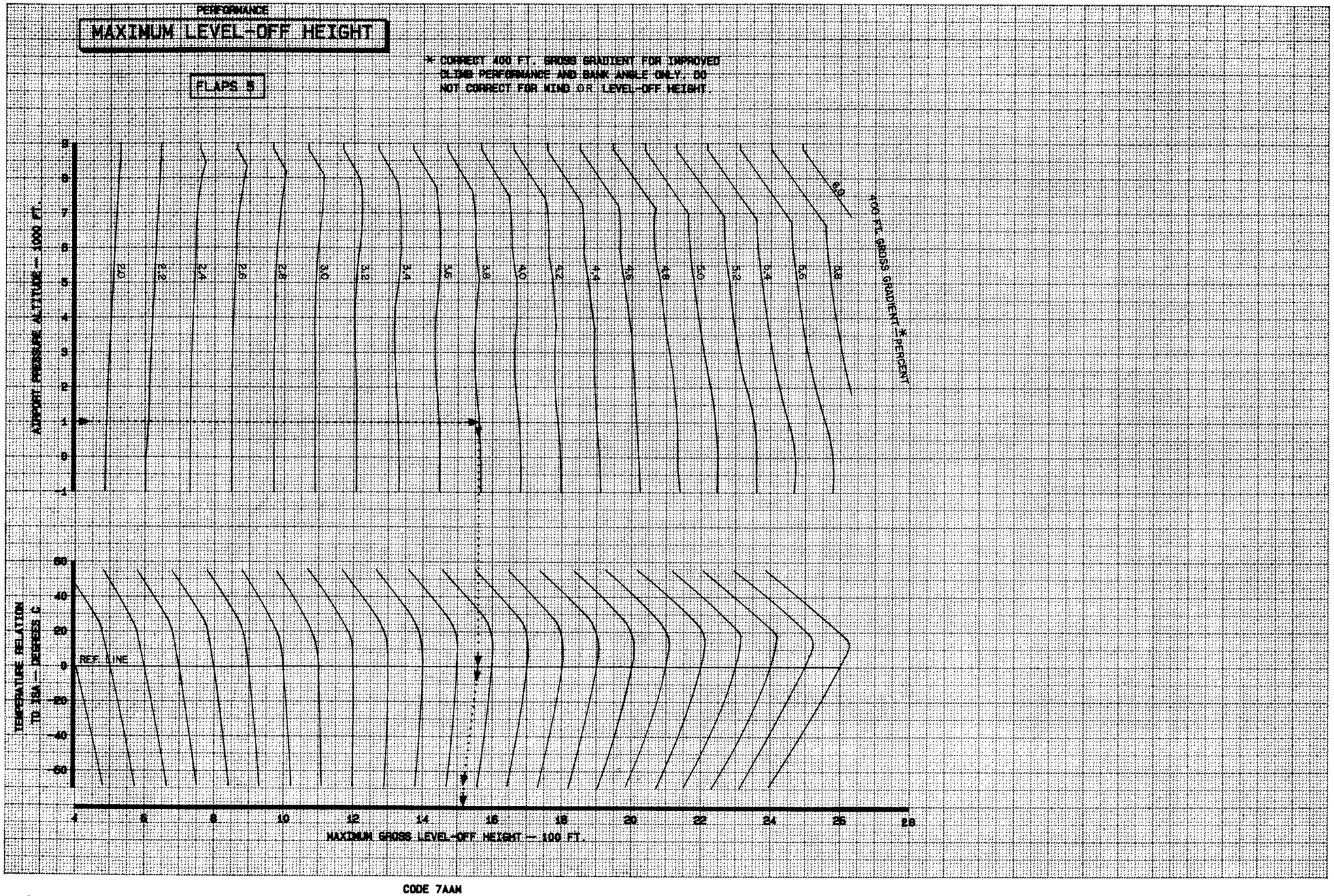
S29526

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 5

* CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE ONLY. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. 6L001726
D041T507-1 P6.4.9-38

KREINER
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
NA-S1	11/14/89

S36757

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 15

*CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE ONLY. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

P.C. BL001729
D041T607-1 PG. 4.9-39

SHOPMAN
767-300ER
CF6-80C2B6/B6F

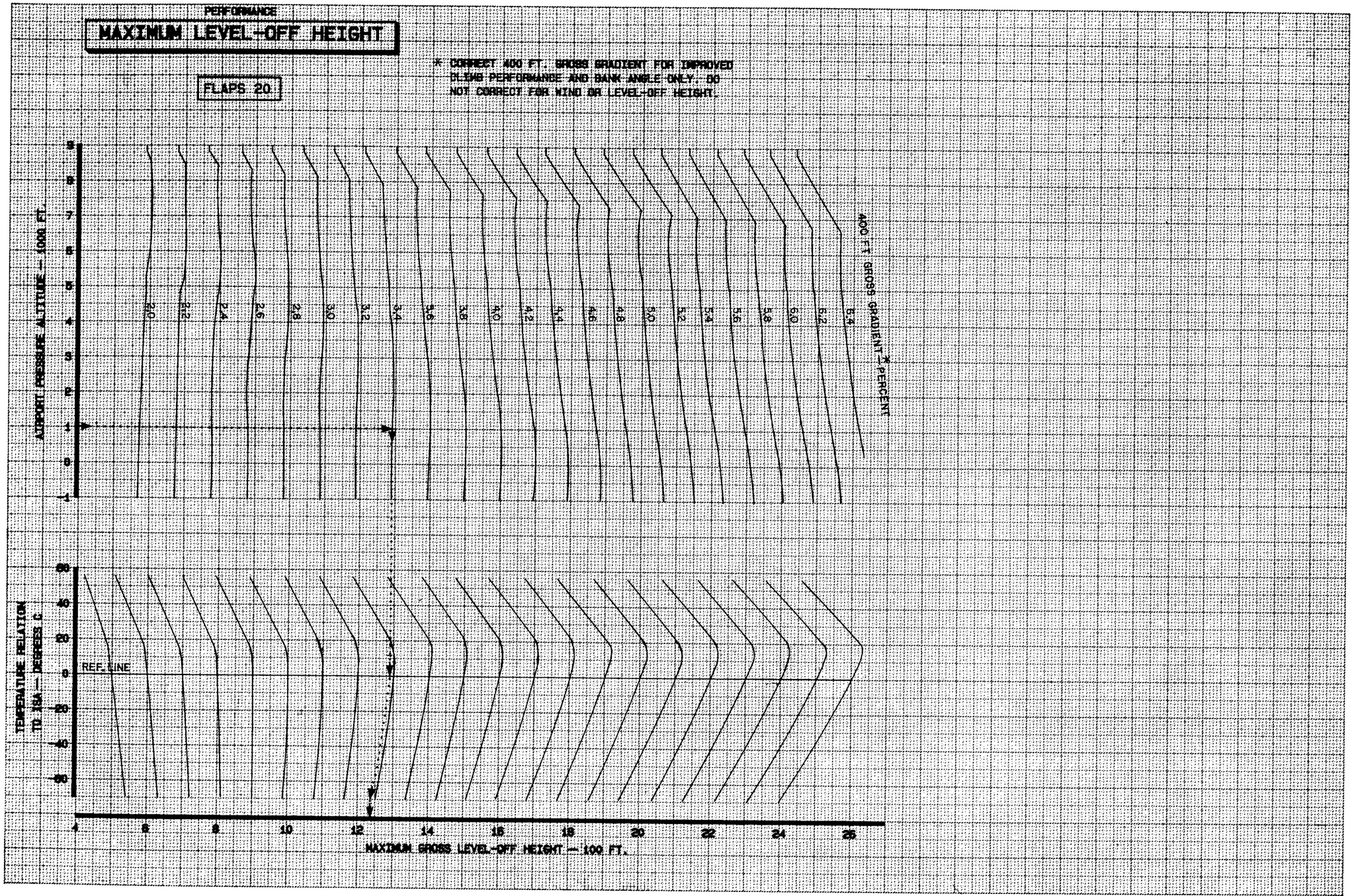
	APPROVED	DATE
	NMT-61	4/4/88

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 20

* CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE ONLY. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. BL001780
D041T607-1 P6.4.9-40

KREINER	APPROVED	DATE
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CF6-80C2B6/BGF		

S36793

6E4208

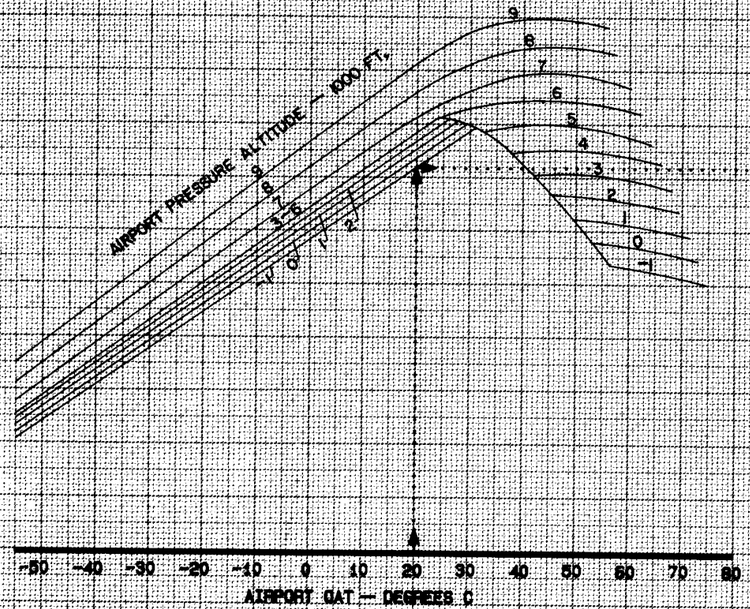
P.C.GL001781
D04175007-1 PG. 4.9-41

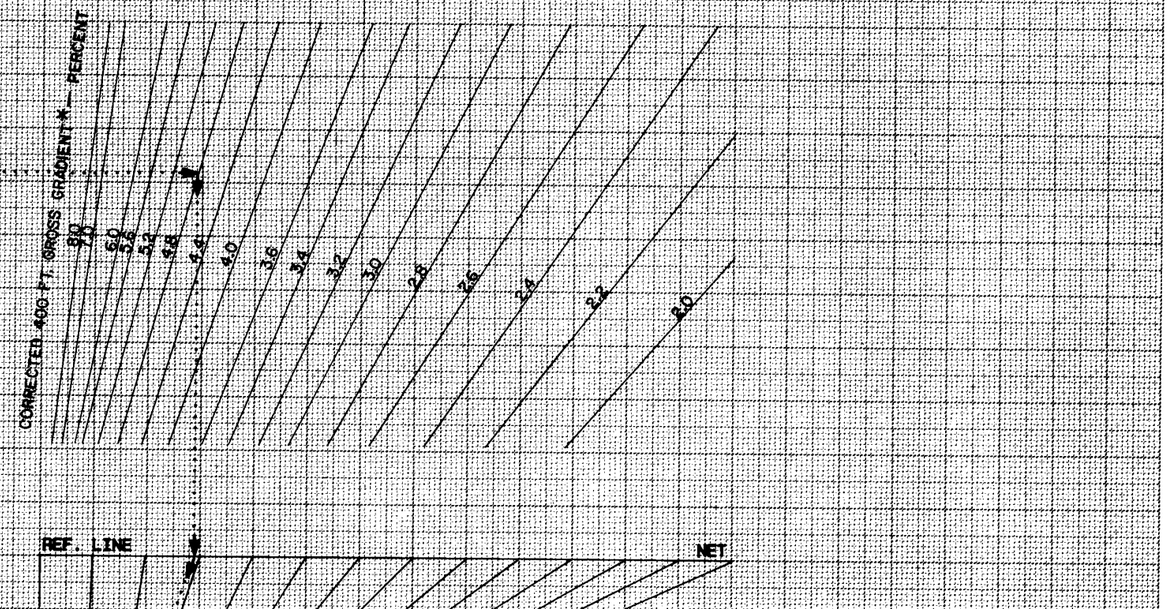
PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 5

* CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE, WIND, LEVEL-OFF HEIGHT AND BANK ANGLE.





GARDNER

767-300ER
CF6-80C2B6/B6F

APPROVED	DATE

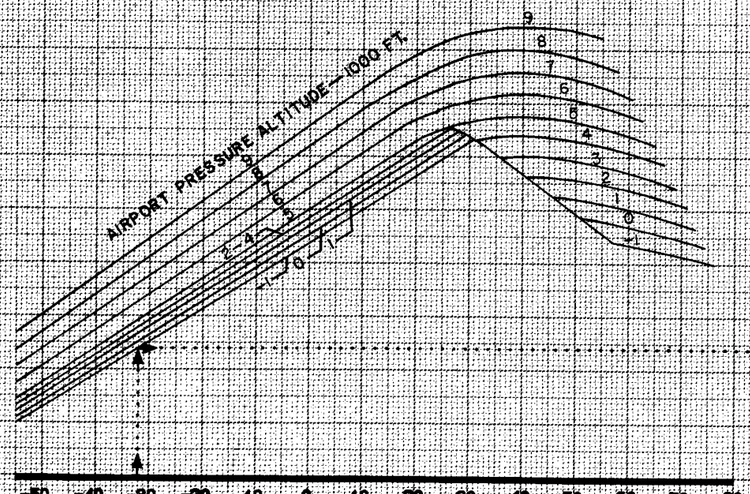
P.C. BL001722
D041T607-1 P6.4.9-42

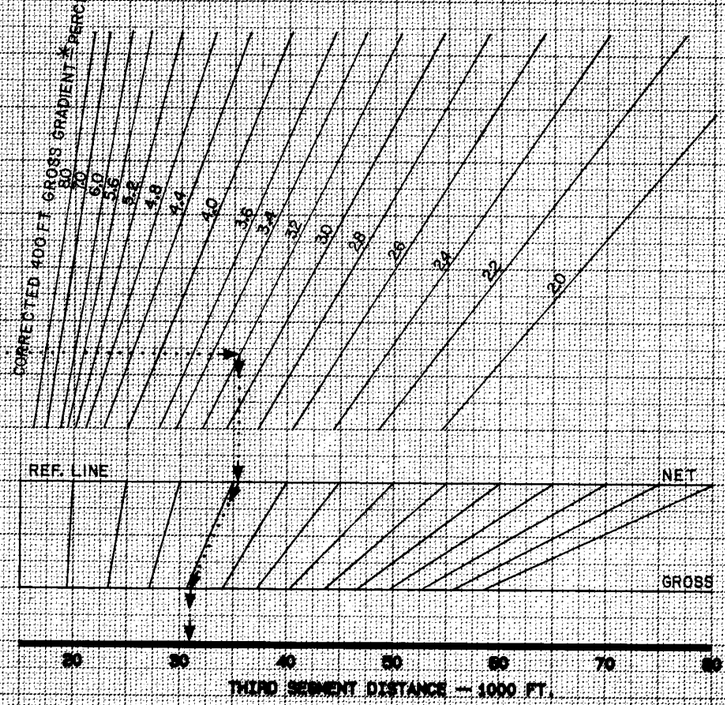
PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 15

* CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE, WIND, LEVEL-OFF HEIGHT AND BANK ANGLE.





KREINER	APPROVED	DATE
767-300ER		
CF6-80C2B6/B6F		

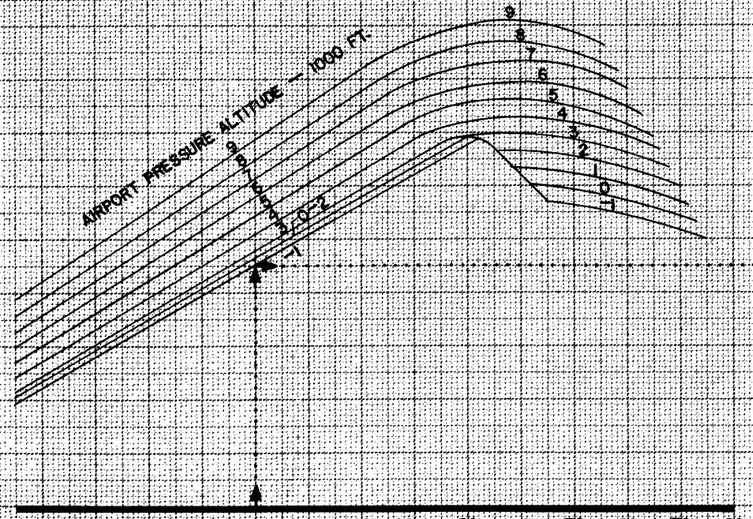
P.C. BL001738
D041T507-1 PG. 4.9-48

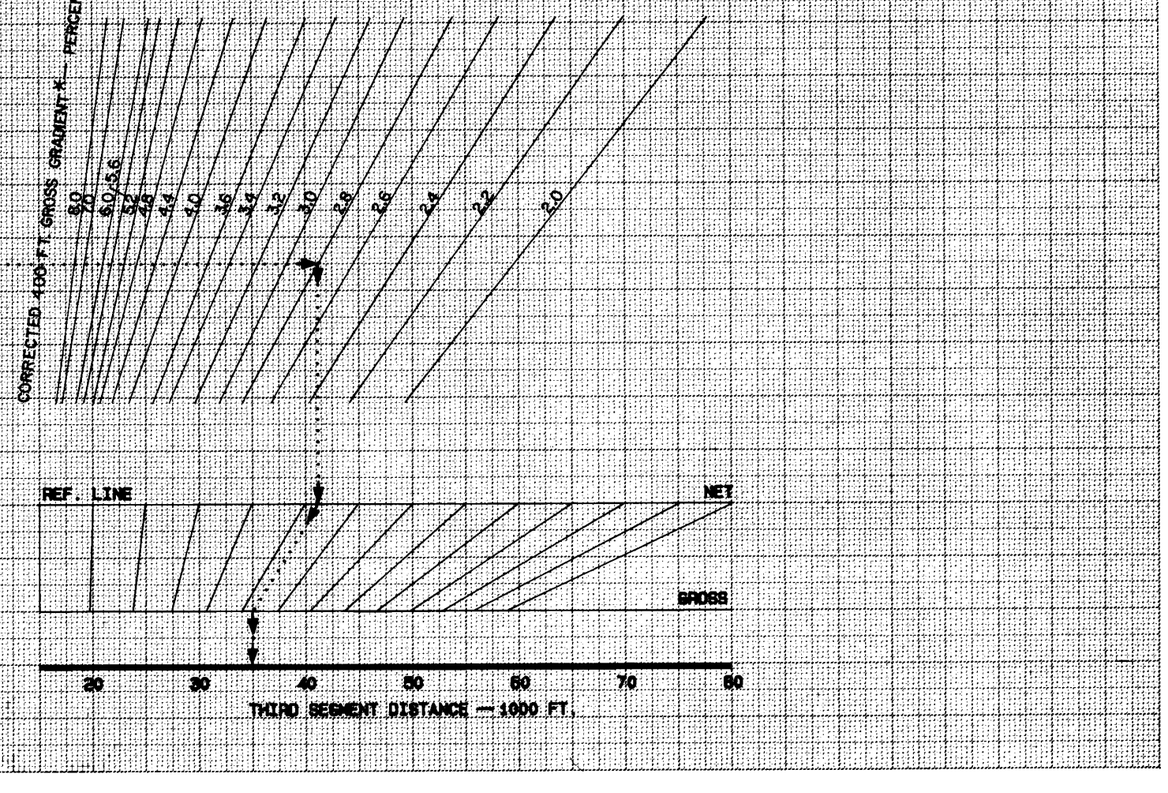
PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 20

* CORRECT 400 FT. GROSS GRADIENT FOR IMPROVED CLIMB PERFORMANCE, MIND, LEVEL-OFF HEIGHT AND BANK ANGLE.





APPROVED	DATE
A.R. Bauer	3/21/89

GARDNER
767-300ER
CF6-80C2B6/B6F

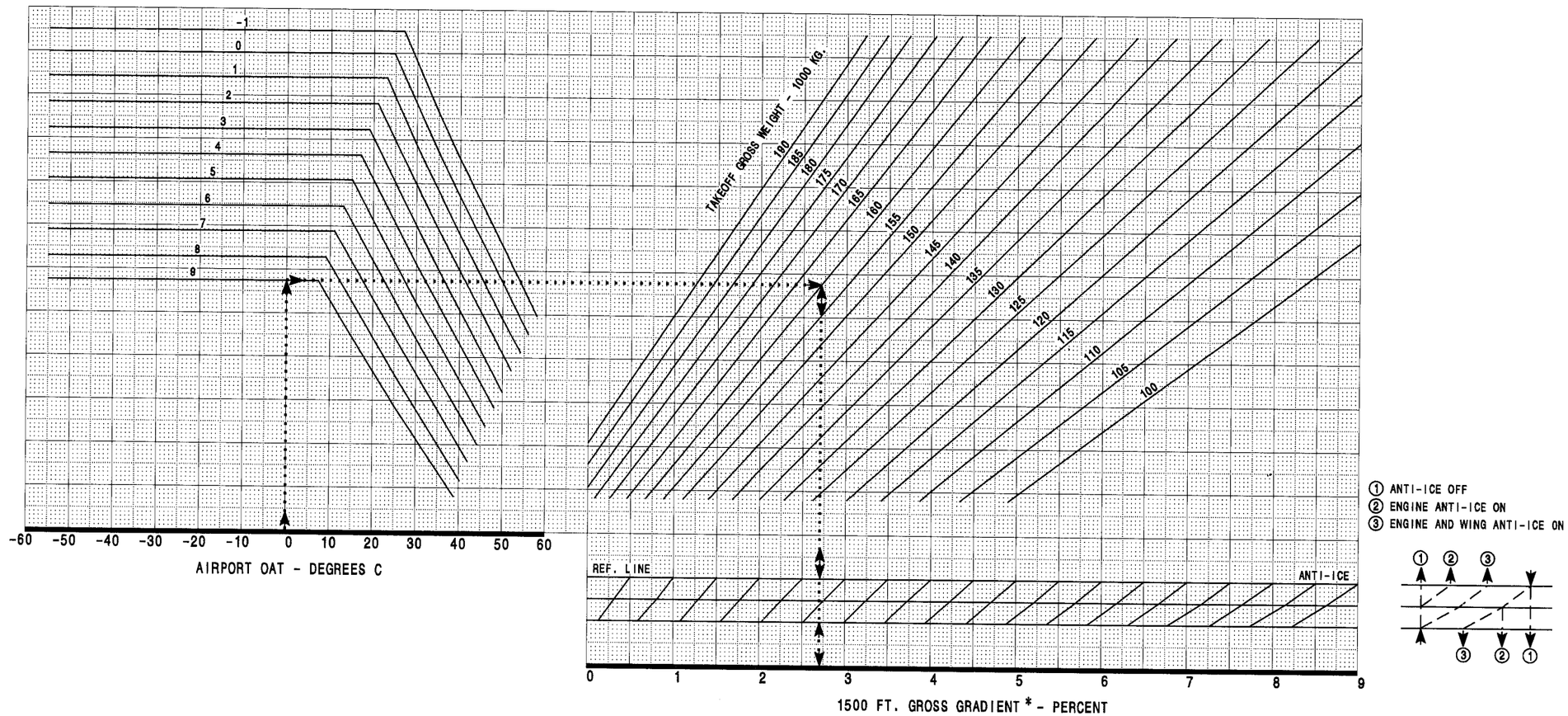
FINAL TAKEOFF CLIMB

A/C PACKS ON AND OFF

FLAPS UP

■ SPEED = V_{REF} + 80 KNOTS IAS

*NET GRADIENT = GROSS GRADIENT - .8 PERCENT



P.C. K600944007
D041T507-1 PG. 4.9-44
ORIGINAL SIGNED BY R. EGGINK 1-16-88

APPROVED	DATE
V. Hall	1-20-94

R. BARBER
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

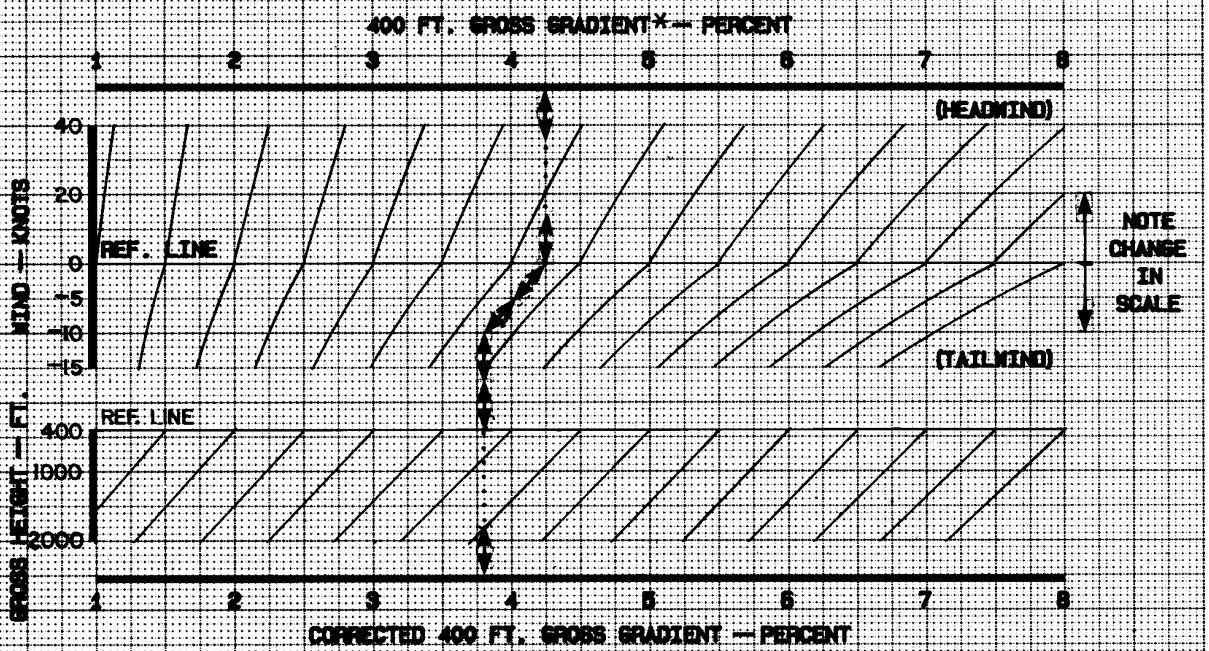
GRADIENT CORRECTIONS

TAKEOFF CLIMB

● APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT (%) IN BANKED TURNS			
BANK ANGLE DEGREES	FLAPS 5	FLAPS 15	FLAPS 20
5	0.05	0.06	0.06
10	0.21	0.23	0.24
15	0.48	0.52	0.54

* THIS IS THE 400 FT. GROSS GRADIENT OBTAINED FROM THE TAKEOFF CLIMB CHART CORRECTED FOR IMPROVED CLIMB PERFORMANCE IF APPLICABLE.



P.C. 68000759
D0417B507-1 P6. 4.9-45

GARDNER	APPROVED	DATE
767-300ER	W. E. Peabody	1.14.88
CF6-80C2B6/B6F	C.S.Lin NW1346	3.28.89

6E4207

S29551

P.C. 6L001553
D041T507-1 PG 4.9-46

PERFORMANCE

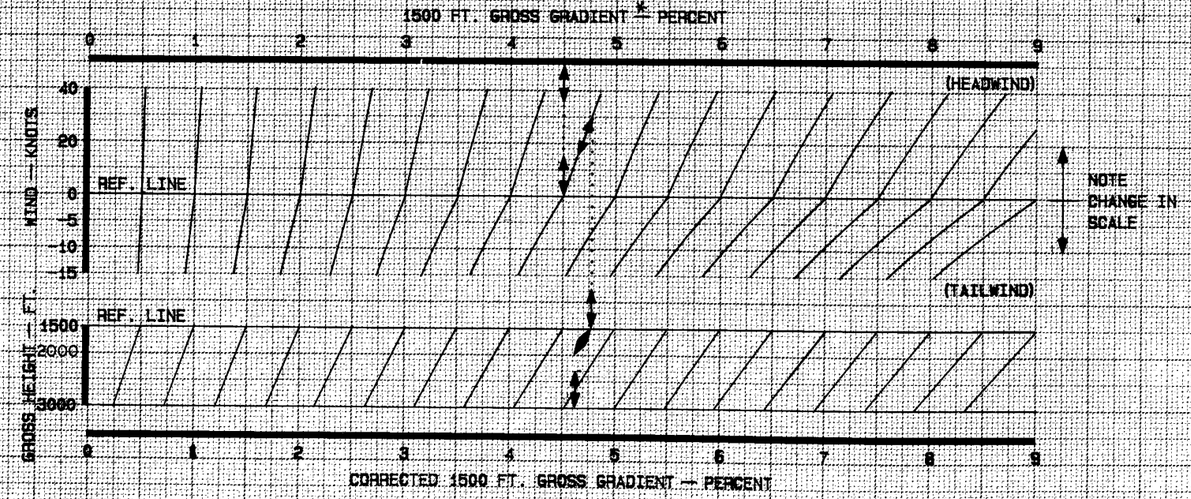
GRADIENT CORRECTIONS

FINAL TAKEOFF CLIMB

●APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT % IN BANKED TURNS	
BANK ANGLE	FLAPS UP
5	0.02
10	0.10
15	0.22

*THIS IS THE 1500 FT. GROSS GRADIENT OBTAINED FROM THE FINAL TAKEOFF CLIMB CHART.

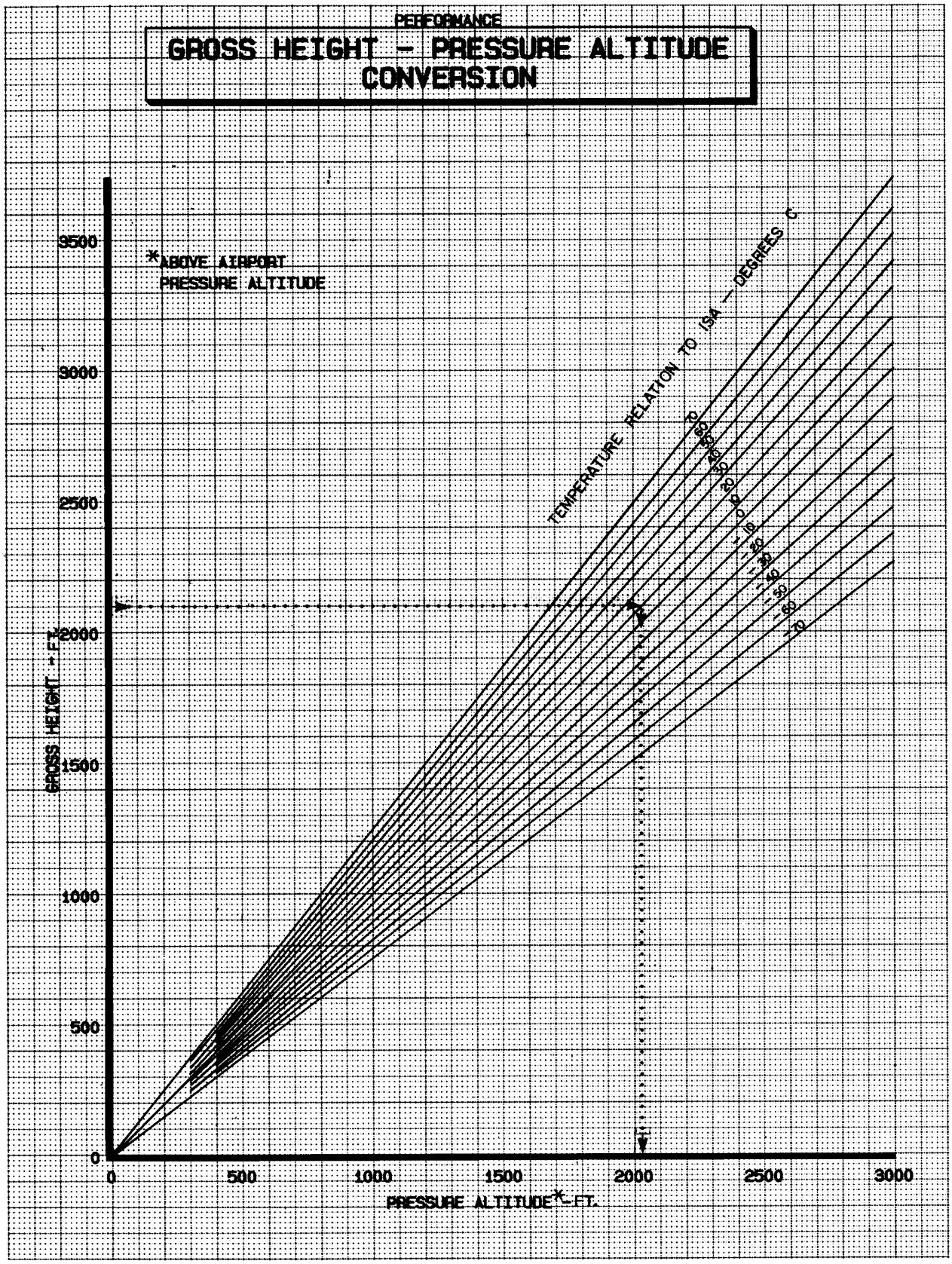


APPROVED	DATE
W.E. Taylor MAS-74	9.24.87

HUGHES
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

PERFORMANCE

GROSS HEIGHT - PRESSURE ALTITUDE CONVERSION



P.C. 6S000152
D041T503 PG 4.9-47

APPROVED	DATE
R.S. Yamamoto NM 234	1.26.82

BOWKER 767

S29565

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

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FLAPS 15	8
FLAPS 20	9
TAKEOFF SPEEDS	
FLAPS 5	10
FLAPS 15	11
FLAPS 20	12
TAKEOFF CLIMB, IMPROVED CLIMB PERFORMANCE	13

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S28211

IMPROVED CLIMB PERFORMANCE

G E N E R A L

A climb-performance-limited takeoff weight results when the available climb gradient with one engine inoperative is equal to any of the minimum gradients required by the regulations for the various segments of the takeoff flight path.

Takeoff speeds are usually minimized to achieve the shortest takeoff distances consistent with the FAR. The resultant minimum V2 speeds fall below the speeds for optimum climb gradient in the takeoff configuration. When excess takeoff distance is available, the climb-limited takeoff weight may be increased by raising the V_2 speed. Vl and VR must also be increased to maintain consistent performance relationships. This technique is called "Improved Climb Performance" in this manual, and may be used when the following conditions are present:

1. The takeoff weight is takeoff climb (Second Segment) limited, or obstacle limited;
2. The takeoff distance available is greater than that required for the climb or obstacle limited weight;
3. The antiskid system is operative and ON.

C H A R T P R E S E N T A T I O N

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT LIMITS

These charts show the effects of increased takeoff speeds on field length, climb and tire speed weight limits when using Improved Climb Performance. Separate charts are included for the different takeoff flaps. The use of these charts is described under the heading: "Takeoff Weight Analysis with Improved Climb Performance."

TAKEOFF SPEEDS

These charts adjust the basic takeoff speeds obtained from the Takeoff Speeds chart (Section 4.7) for the effects of using Improved Climb Performance. The use of these charts is described under the heading: "Takeoff Weight Analysis with Improved Climb Performance."

TAKEOFF CLIMB (IMPROVED CLIMB PERFORMANCE)

This chart shows the effect of increased takeoff speeds on the 400 foot gross gradient. The use of this chart is described in the "Obstacle Clearance Analysis Procedure" (Section 4.9).

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE PROCEDURE

The following steps describe the procedure for finding the maximum allowable takeoff weight when using Improved Climb Performance. Improved Obstacle Clearance with speed increase is considered in Section 4.9. See the example problem appendix for a numerical example of this procedure.

1. Maximum Takeoff Weight and Speed Increase

   a. Enter the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with field-length and takeoff-climb-limited gross weights obtained in Sections 4.4 and 4.5 (based on zero speed increase). Follow the guidelines until they intersect or until the maximum speed increase is reached on the climb limit guidelines and read gross weight and speed increase.

   b. Repeat using the climb limits portion of the chart with tire-speed (Section 4.6) and takeoff-climb limited gross weights.

   c. The allowable takeoff weight and speed increase are the lesser of the values determined in 1(a) and 1(b).

IMPROVED CLIMB PERFORMANCE

TAKEOFF WEIGHT ANALYSIS WITH IMPROVED CLIMB PERFORMANCE PROCEDURE (Continued)

2. Takeoff Speeds

   a. With the gross weight and speed increase determined in Step 1(c), determine the associated field-length limited gross weight that corresponds to zero speed increase. This is obtained by entering the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with the gross weight and speed increase from Step 1(c) and following the field length limits guidelines to zero speed increase and reading gross weight. Enter the V_1 Determination Procedure in Section 4.7 using this gross weight to determine $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$. Determine V_R and V_2 for the gross weight from Step 1(c). Determine $V_{1\ MIN}$ and $V_{1\ MAX}$ based on $(V_1/V_R)_{MIN}$, $(V_1/V_R)_{MAX}$, and V_R determined previously.

   b. Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart with the V_R, V_2, and V_1 speeds determined in Step 2(a). Follow the guidelines to the speed increase determined in Step 1(c) and read the improved climb performance values of V_R, V_2, and V_1. Check brake energy limits (Section 4.7). If V_1 is greater than V_{MBE}, gross weight and speed increase must be reduced until V_1 is equal to V_{MBE}. Results are the scheduled takeoff speeds that correspond to the allowable takeoff gross weight using Improved Climb Performance.

CORRECTED RUNWAY LENGTH REQUIRED WITH IMPROVED CLIMB PERFORMANCE PROCEDURE

The following steps describe the procedure for finding the corrected runway length required when using Improved Climb Performance.

1. Takeoff gross weight with zero speed increase.

   Enter the field length/climb limits portion of the appropriate Improved Climb Performance (Takeoff Weight Limits) chart with takeoff gross weight and takeoff speed increase. Follow the field length limits guidelines to zero speed increase and read the equivalent (same required runway length) takeoff gross weight with zero speed increase.

S28249

IMPROVED CLIMB PERFORMANCE

CORRECTED RUNWAY LENGTH REQUIRED WITH IMPROVED CLIMB PERFORMANCE PROCEDURE (Continued)

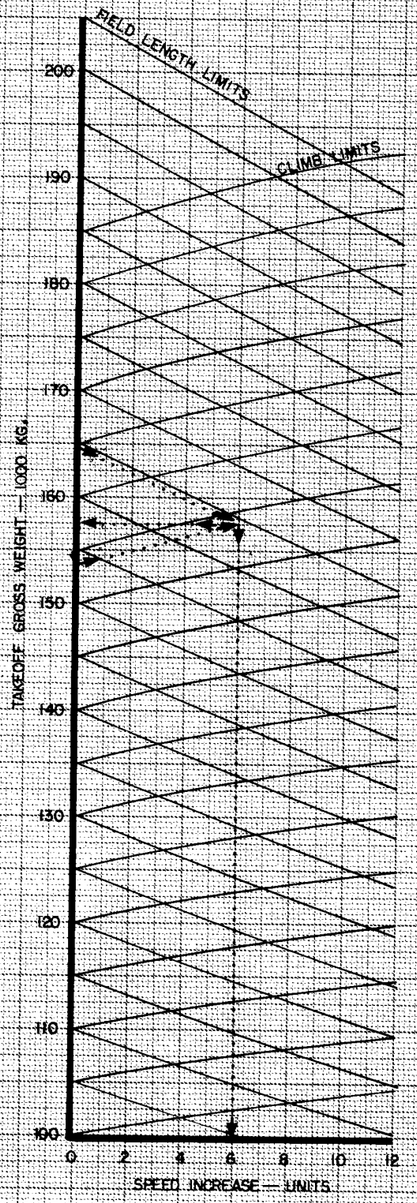
2. Corrected Runway Length

(a) Enter the appropriate Field Length Limits (One Engine Inoperative) chart in Section 4.4 with the equivalent zero speed increase takeoff weight, Step 1, and airport temperature/altitude. Read one engine inoperative corrected runway length required.

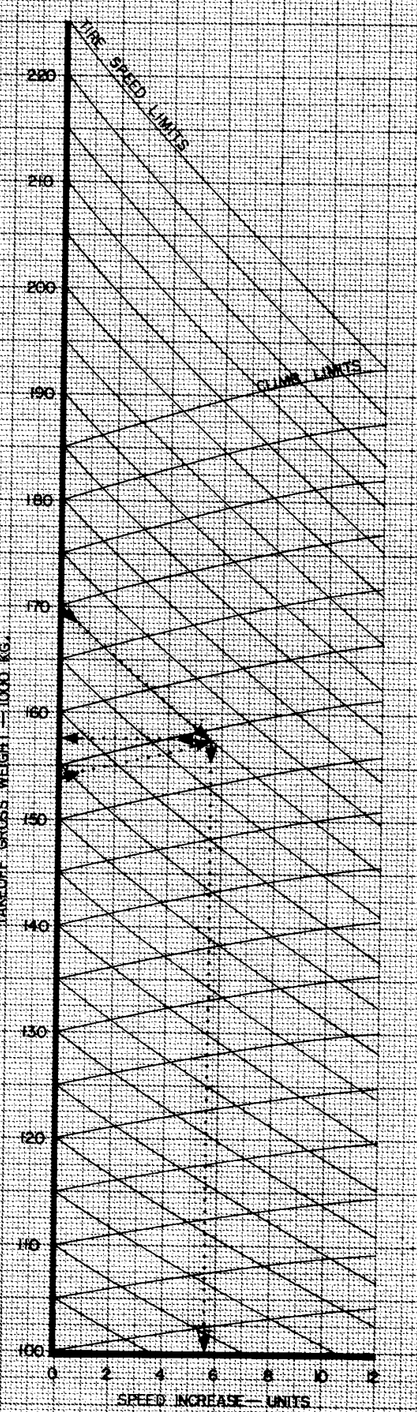
(b) Enter the appropriate Field Length Limits (All Engines Operating) chart in Section 4.4 with the equivalent zero speed increase takeoff weight, Step 1, and airport temperature/altitude. Read all engines operating corrected runway length required.

S28251

FIELD LENGTH/CLIMB LIMITS



TIRE SPEED/CLIMB LIMITS



S37676

KIRK BIERMAN	APPROVED	DATE
767-300ER	C.J. Stark NM269	2/10/88
CF6-80C2B6/B6F		

P.C. 6L001800
D041T507-1 PG. 4.10-8

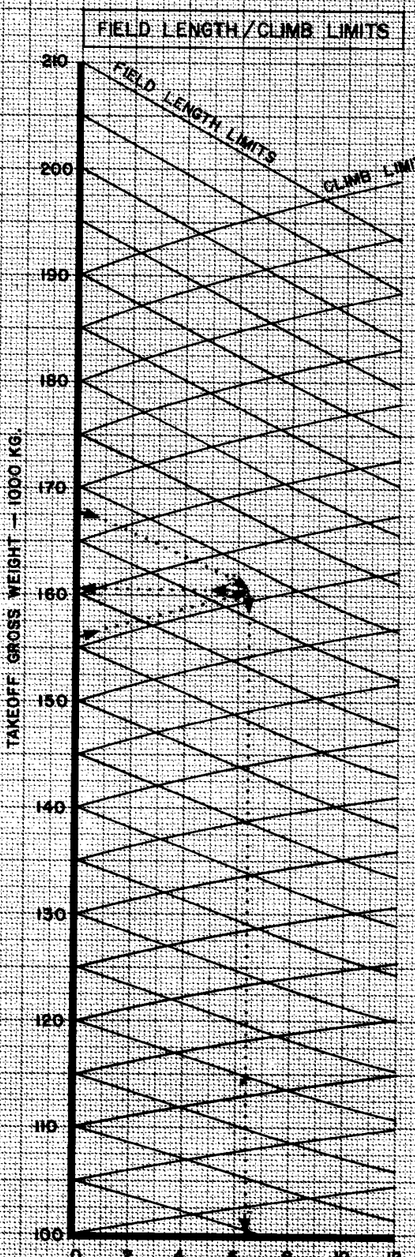
IMPROVED CLIMB PERFORMANCE

PERFORMANCE

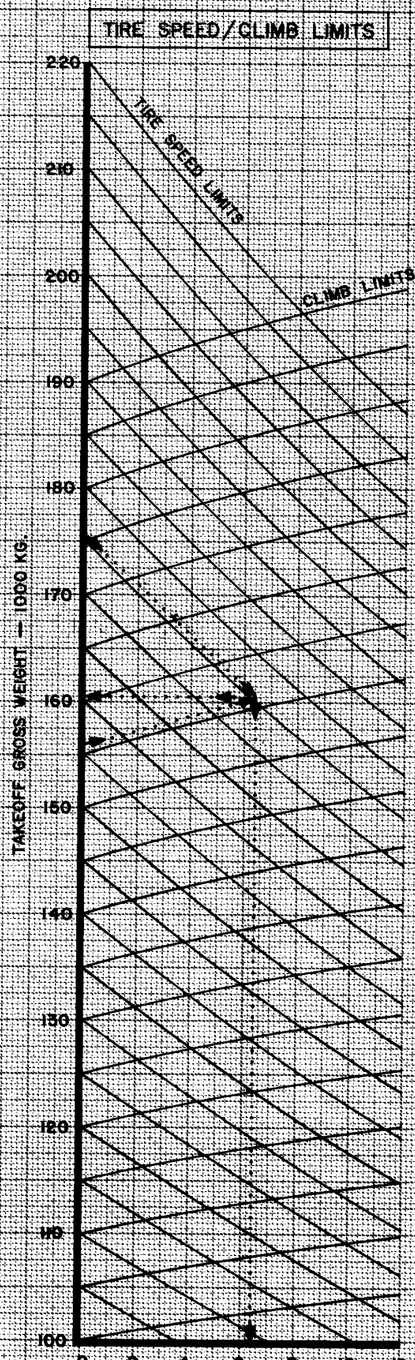
TAKEOFF WEIGHT LIMITS

FLAPS 15

FIELD LENGTH/CLIMB LIMITS



TIRE SPEED/CLIMB LIMITS



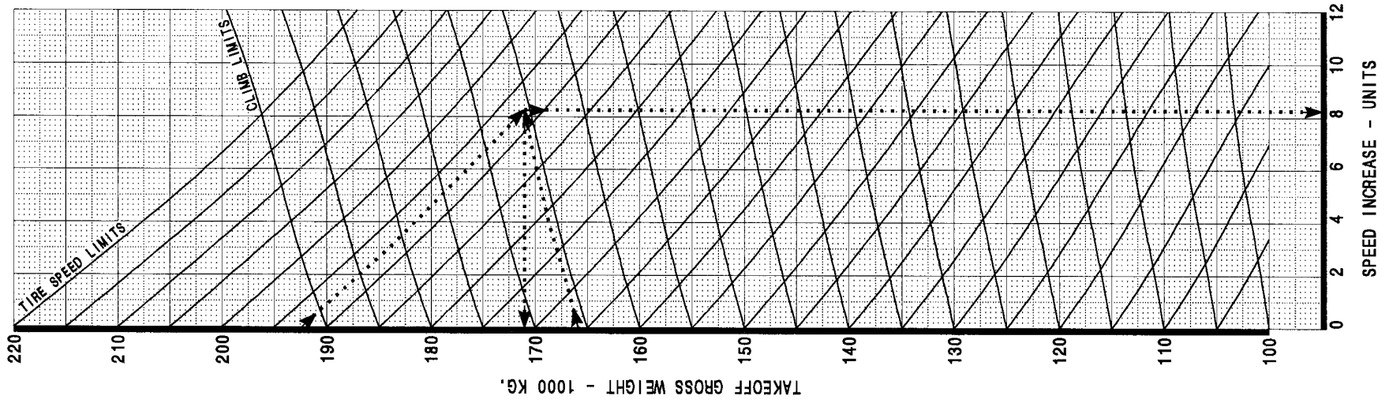
PERFORMANCE

IMPROVED CLIMB PERFORMANCE

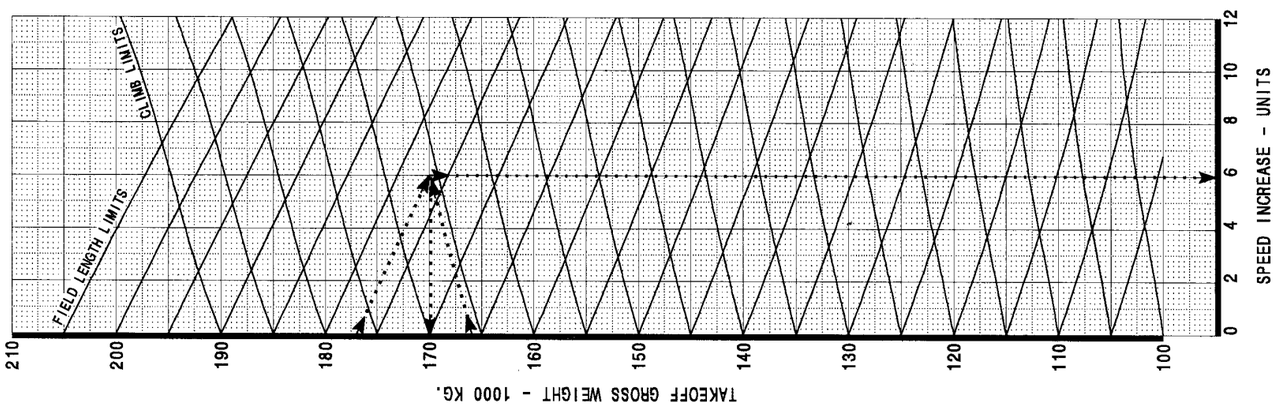
TAKEOFF WEIGHT LIMITS

FLAPS 20

TIRE SPEED/CLIMB LIMITS



FIELD LENGTH/CLIMB LIMITS



P.C. K600A09007
D041T507-1 PG.4.10-9

D. BACH
767-300ER
CF6-80C2B6/B6F

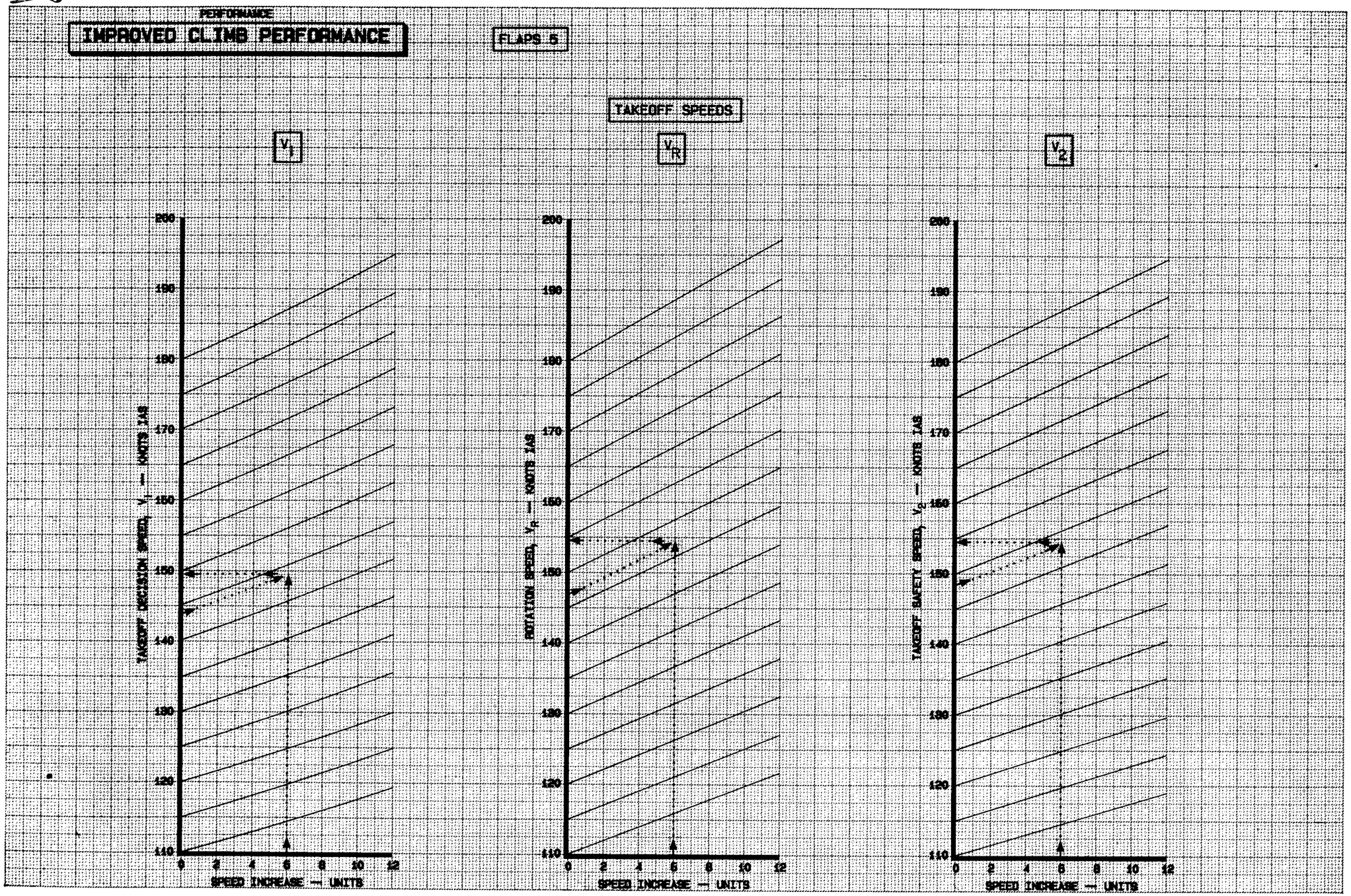
APPROVED	DATE
[signature]	3JUN93

S42070

IMPROVED CLIMB PERFORMANCE

FLAPS 5

TAKEOFF SPEEDS



P.C. BL001821
D041T507-1 PG. 4.10-10

APPROVED	DATE
A.S. Ellis 44986	9-22-87

TERRY
767 — 300ER
CF6-80C2B6/B6F

S37723

6E4208

IMPROVED CLIMB PERFORMANCE

FLAPS 15

TAKEOFF SPEEDS

P.C. 6L001593
D0417507-1 P6. 4.10-11

NEWELL
767-300ER
CF6-80C2B6/B6F

APPROVED: MM-127 SH18L05
DATE: 10/3/87

V_1

V_R

V_2

IMPROVED CLIMB PERFORMANCE

FLAPS 20

TAKEOFF SPEEDS

P.C. BL001594
D041T507-1 PG. 4.10-12

NEMELL
767-300ER
CF6-80C2B6/B6F

	APPROVED	DATE
	NMA/AT SHIELDS	10/5/87

S37884

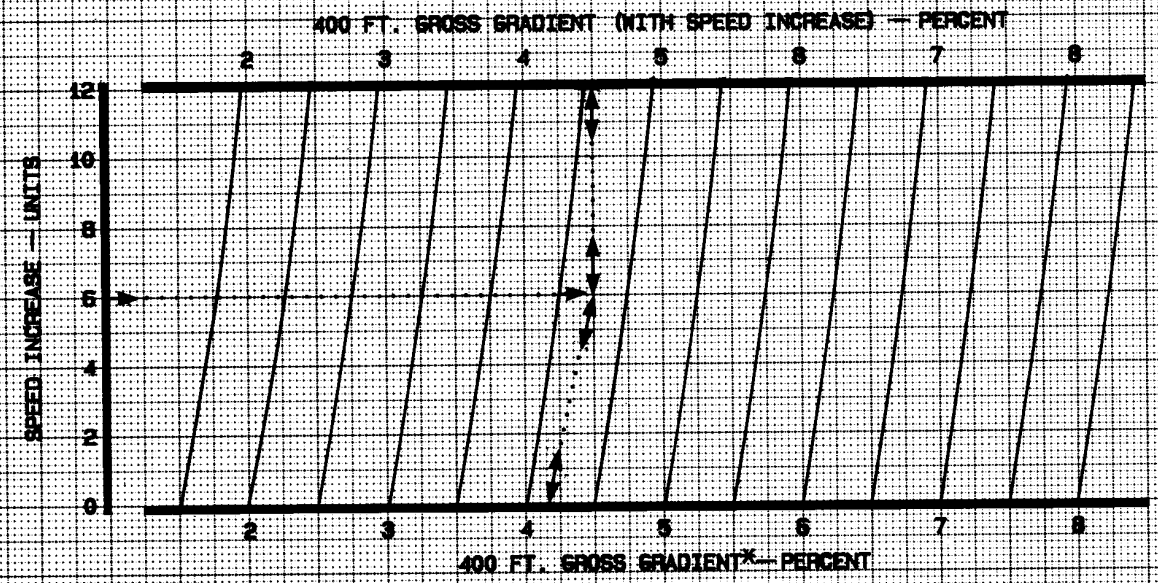
PERFORMANCE

TAKEOFF CLIMB

IMPROVED CLIMB PERFORMANCE

*THIS IS THE GRADIENT UNCORRECTED FOR WIND, GROSS HEIGHT, OR BANK ANGLE, AS SHOWN ON THE TAKEOFF CLIMB CHART.

FLAPS 5, 15, 20



P.C. 63000761
D041T507-1 PG. 4.10-13

LIEURANCE	APPROVED	DATE
767-300ER	C.S. Tilli 9446	9-10-87
CF6-80C2B6/B6F		

6E207

S29894

SECTION 4.11 - ENROUTE CLIMB

C O N T E N T S

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ISA + 15 DEG C	5
ISA + 20 DEG C	6
ISA + 35 DEG C	7
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S28266

ENROUTE CLIMB

G E N E R A L

Enroute climb performance information is presented in two forms. The Enroute Climb Weights (For Positive Net Gradients) charts are used to establish enroute requirements compliance with FAR 121 in level flight. Where analysis of the descent path after engine failure is required, Enroute Climb gradient charts are provided. Due to the manner in which enroute climb gradients are used in flight planning, temperature on the charts is expressed as degrees Centigrade above or below ISA temperature.

Performance charts for one-engine-inoperative enroute climb are based on 1 A/C pack on and anti-ice off. Adjustments are shown on the charts for other bleed configurations.

The speed schedules shown on the Enroute Climb Speeds (1 Engine Inoperative) chart are those at which the performance charts were calculated in accordance with FAR 25.123.

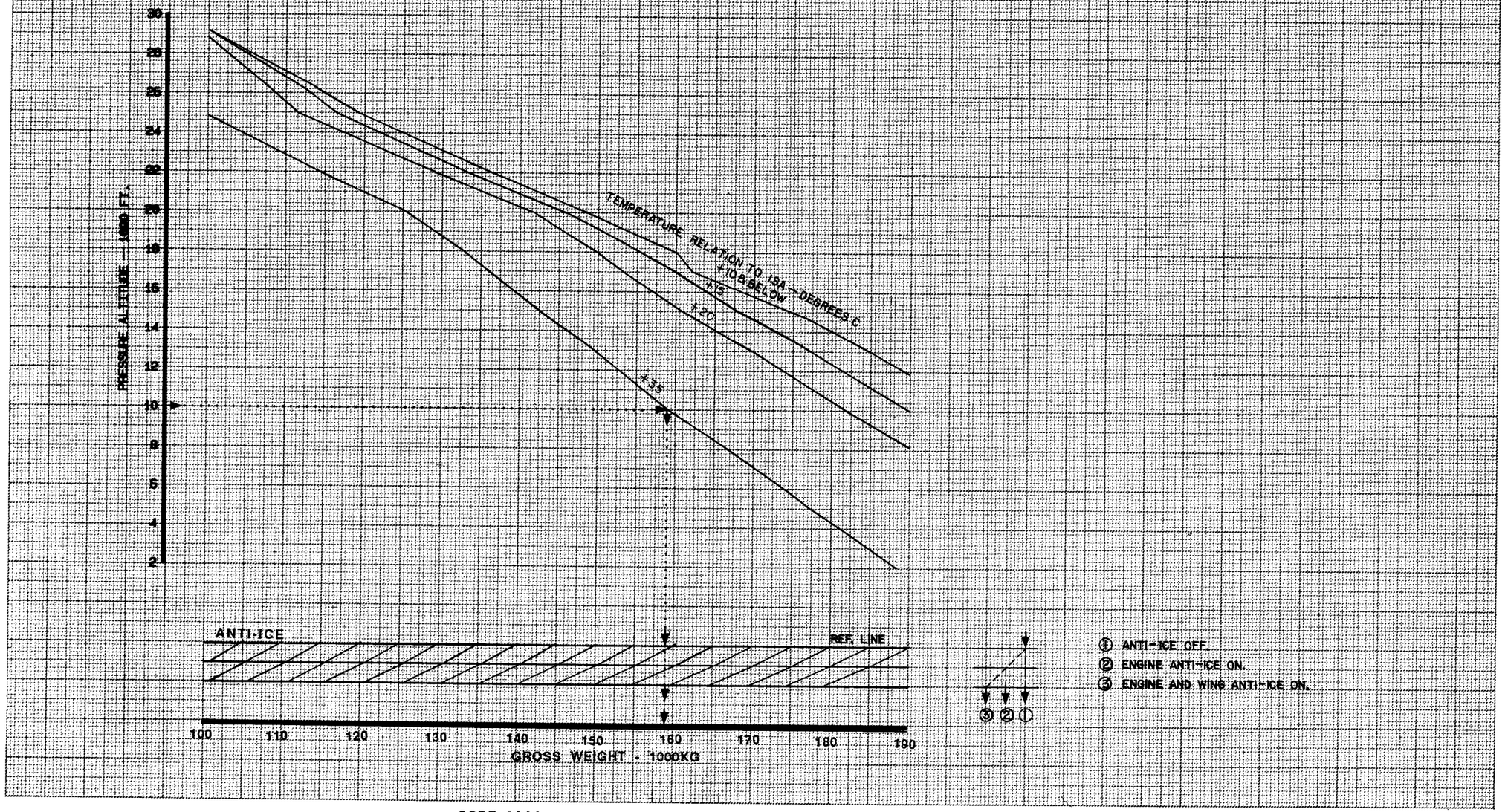
ENROUTE CLIMB WEIGHTS

FOR POSITIVE NET GRADIENTS

A/C ON OR OFF

1 ENGINE INOPERATIVE

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001736
D041T607-1 P6.4.11-3

KREINER	APPROVED	DATE
767-300ER		
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

S42236

6E4208

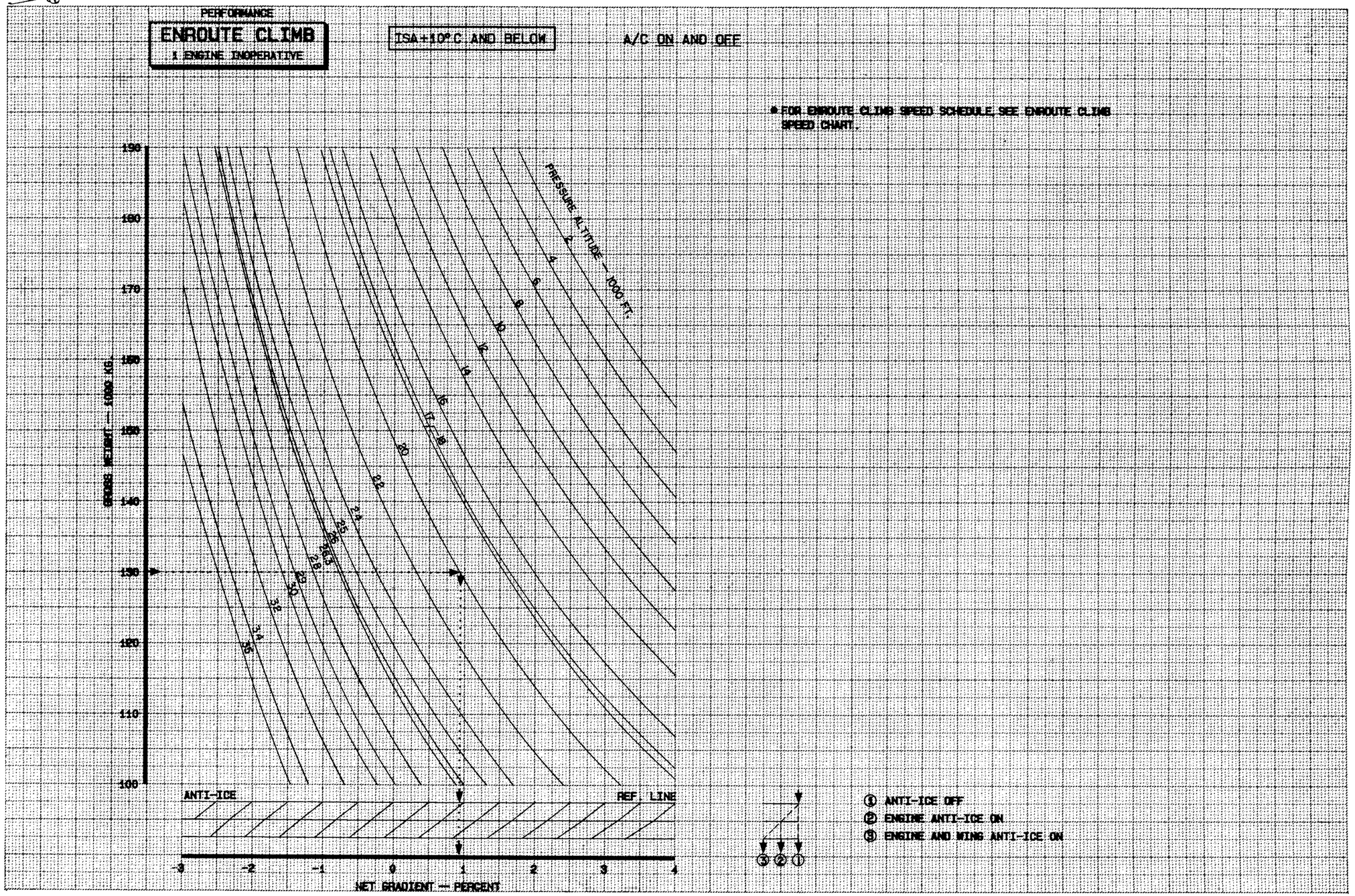
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

TSA+10°C AND BELOW

A/C ON AND OFF

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C.6L001735
D0411T507-1 P6. 4.11-4

GARDNER	APPROVED	DATE
767-300ER	DWP NM-191	2-4-88
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

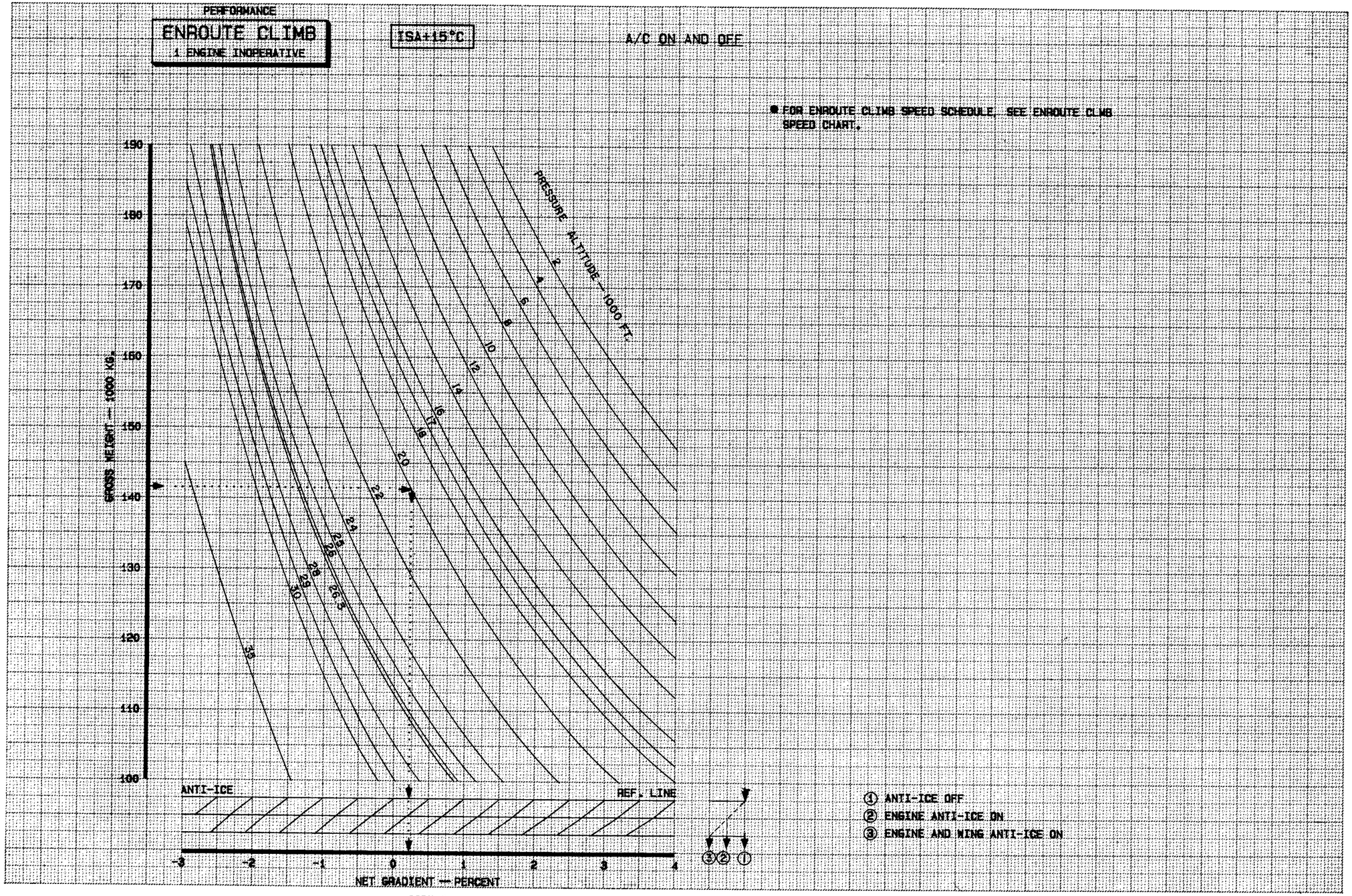
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+15°C

A/C ON AND OFF

● FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001737
D041T507-1 PG. 4.11-5

RUFF
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

APPROVED C. J. Hart NMA2A
DATE 2/4/94

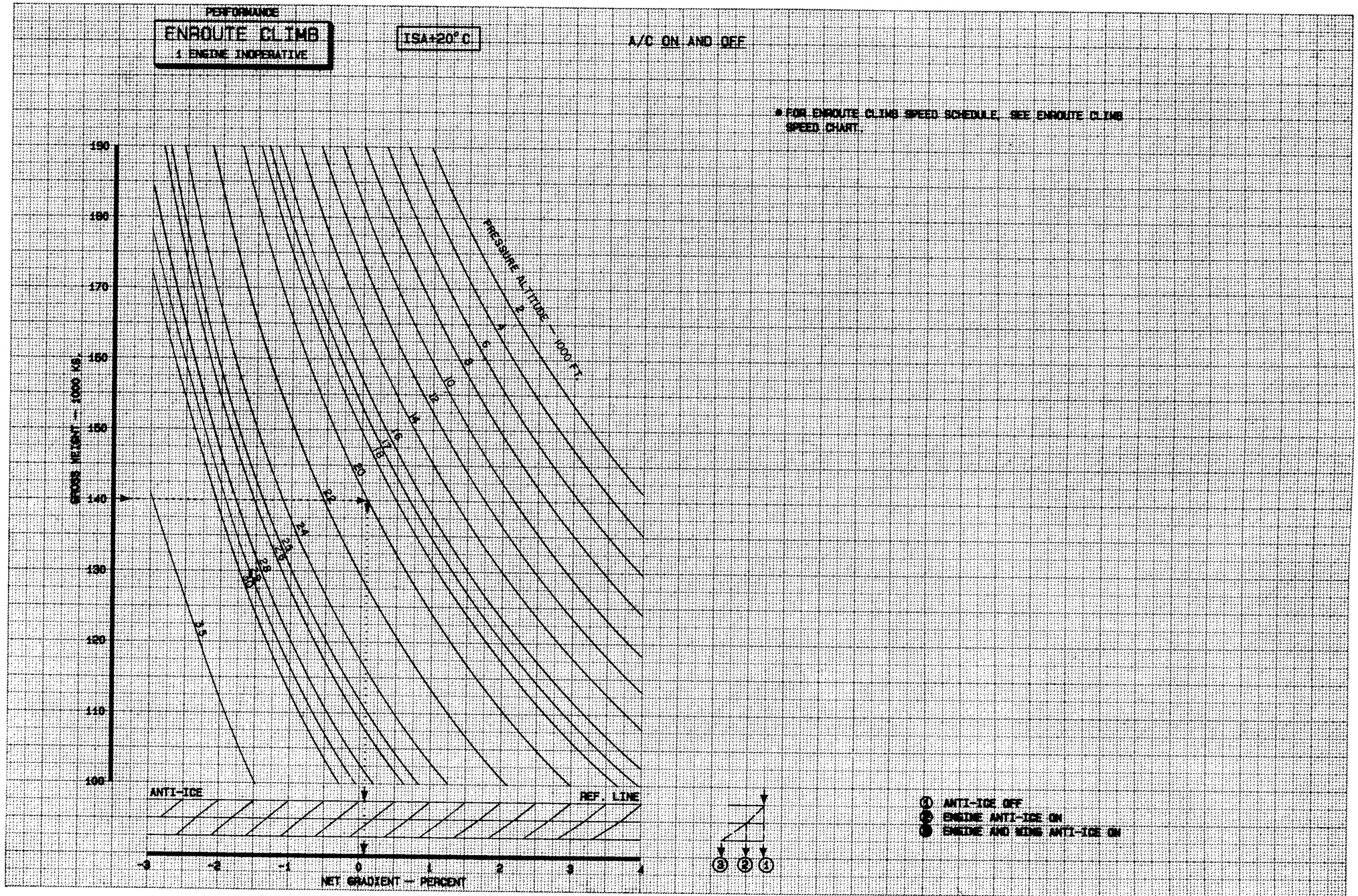
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+20°C

A/C ON AND OFF

* FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



P.C. 6L001738
D041T507-1 PG. 4.11-6

SCHMIDT	APPROVED	DATE
767-300ER	C.J. Schmidt	2/4/94
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

S42259

6E4208

P.C. 6L001739
D041T507-1 PG. 4.11-7

SCHMIDT
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F
APPROVED DMP NM-19 DATE 2488

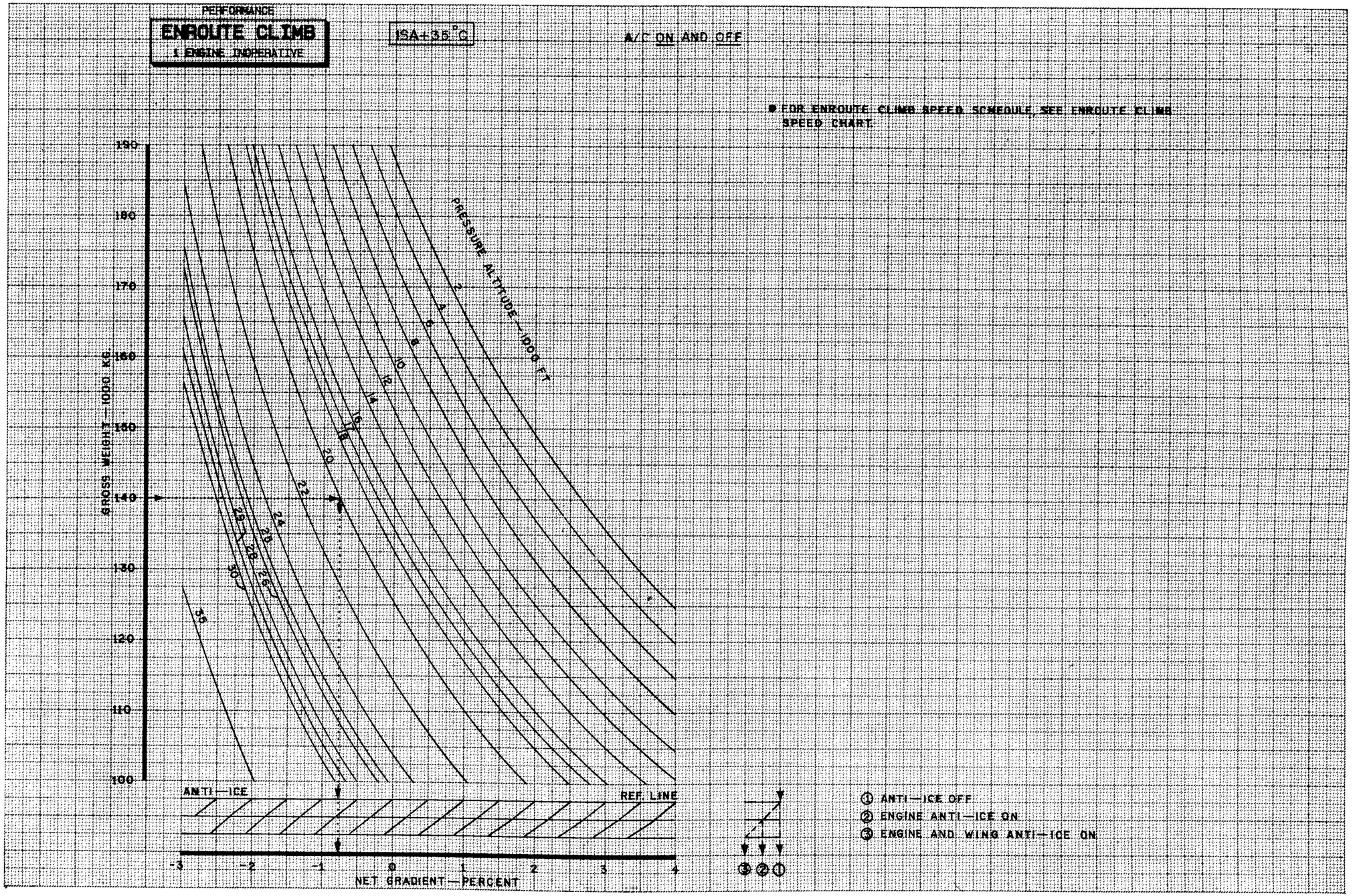
PERFORMANCE

ENROUTE CLIMB
1 ENGINE INOPERATIVE

ISA+35°C

A/C ON AND OFF

● FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEED CHART.



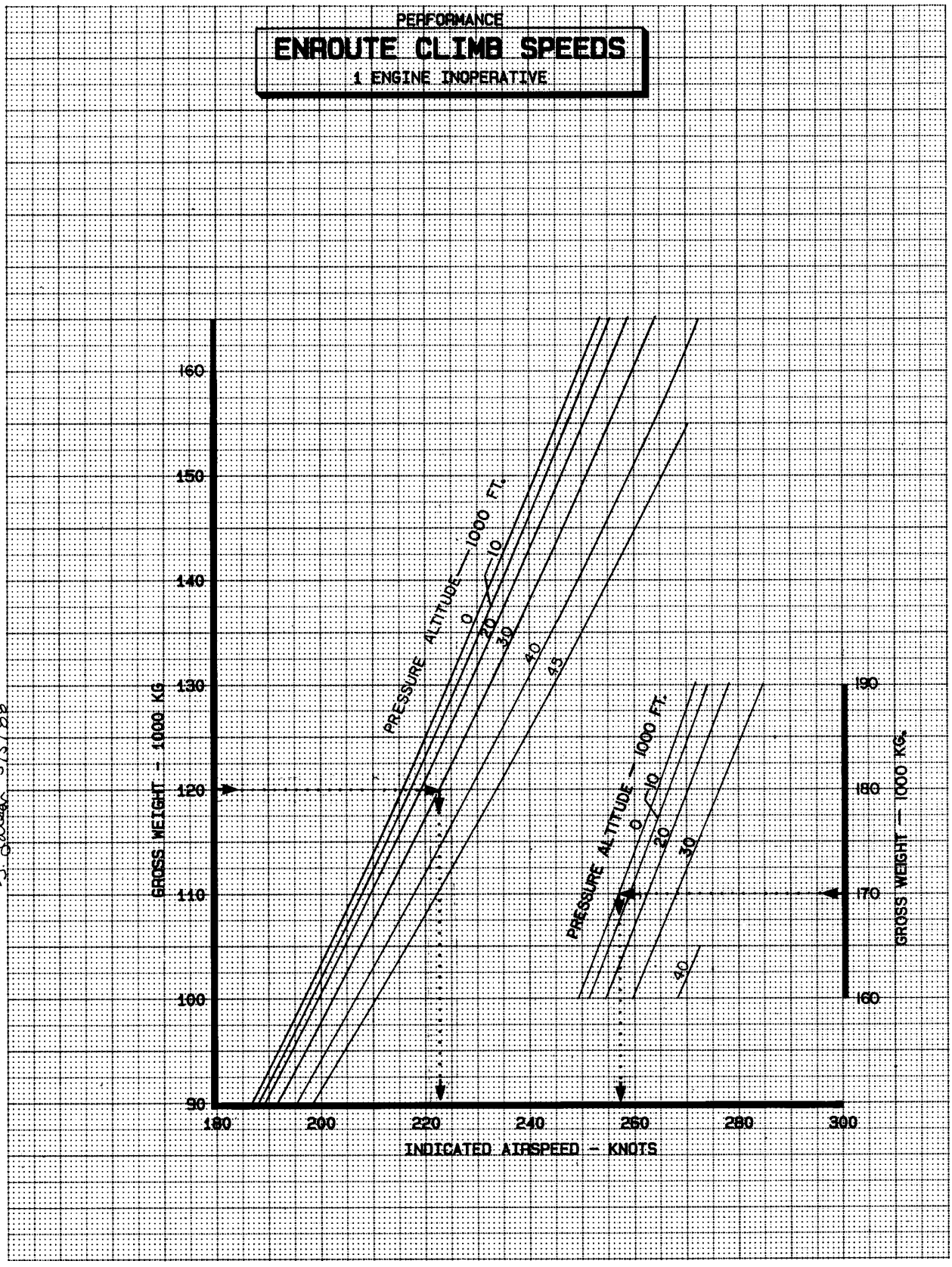
P.C..6S000158	
D041T503	PG. 4.11-8

C. FRANK	APPROVED	DATE
767-200/300	C.S. Ellis	8.7.84
	R. Sorensen	7.1.85
	[illegible]	2.2.88

PERFORMANCE

ENROUTE CLIMB SPEEDS

1 ENGINE INOPERATIVE



S29908

SECTION 4.12 - APPROACH AND LANDING CLIMB

C O N T E N T S

PAGE

Contents 1
General. 2
APPROACH CLIMB
(FLAPS 20) 4
LANDING CLIMB
(FLAPS 25). 5
(FLAPS 30). 6
MAXIMUM LANDING WEIGHT, CLIMB LIMITS
APPROACH FLAPS 20, LANDING FLAPS 25 and 30. 9

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

G E N E R A L

Charts on the following pages present approach and landing climb gradients and maximum landing weights as limited by climb performance.

The speed schedules shown on the Approach and Landing Climb charts are those at which the gradients were calculated in accordance with FAR 25.121(d) and 25.119.

The ice correction on the charts accounts for maximum probable performance effects of ice remaining on the airplane surfaces without anti-ice protection. The correction applies when operating in icing conditions during any part of the flight, unless the forecast temperature at the destination airport is high enough (above 10 deg C or 50 deg F) to ensure that the ice will melt off prior to approach and landing.

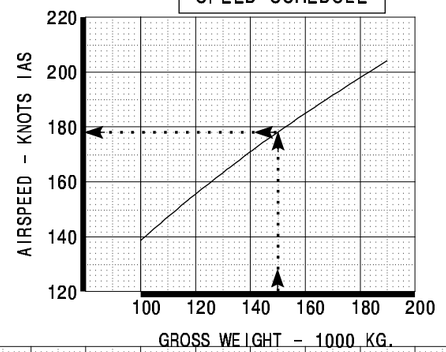
The climb limited landing weight can be increased by operating with A/C packs off. This information is included to permit a showing of compliance with FAR 25.1001(c) and 25.1533(a)(2) when allowable takeoff weights are increased by using A/C packs off for takeoff. This information may also be used to schedule higher allowable landing weights provided approach and landing procedures are modified to assure that A/C packs are turned off prior to the point where a go-around might be initiated. See Normal Procedures.

PERFORMANCE

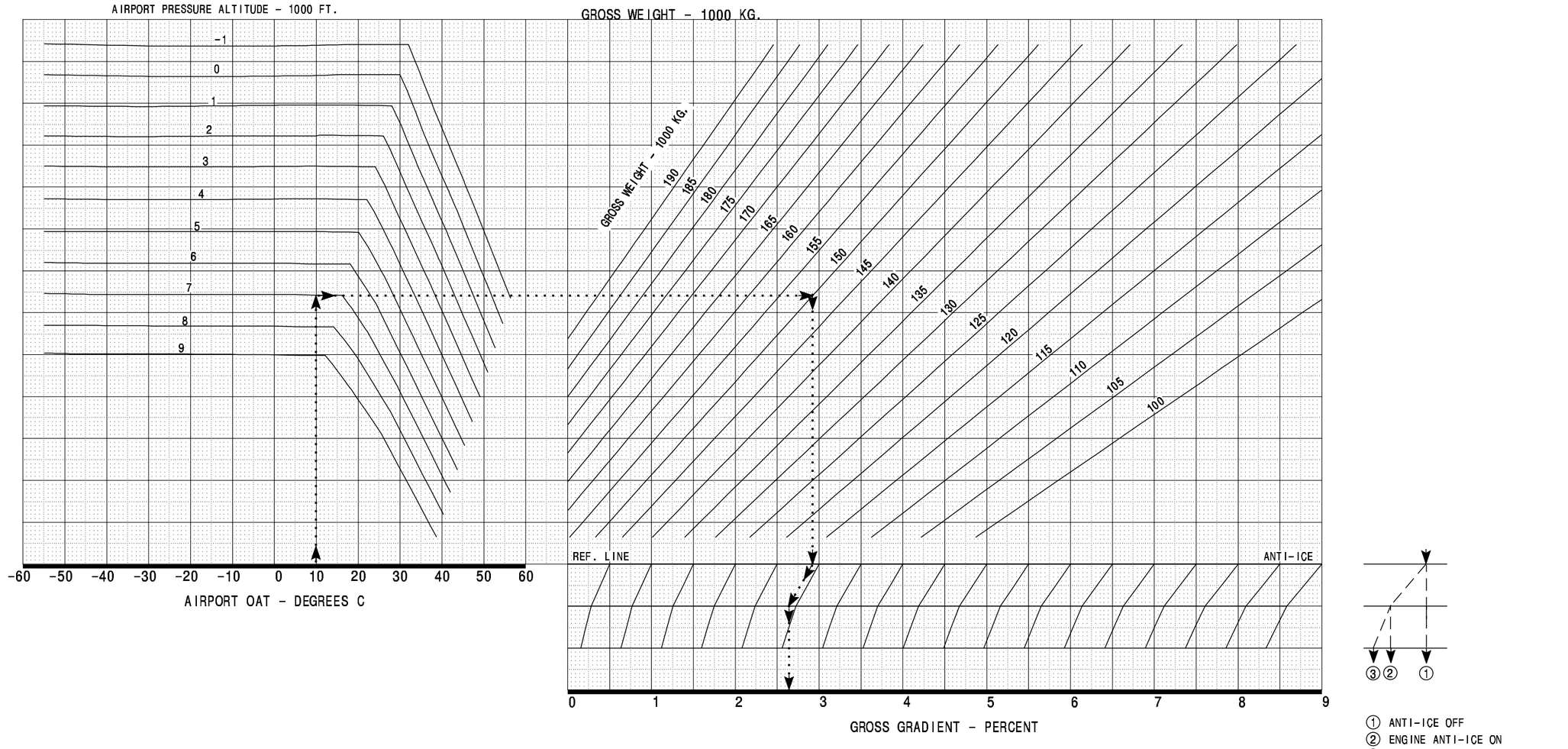
APPROACH CLIMB

FLAPS 20

SPEED SCHEDULE



- APPROACH CLIMB GROSS GRADIENT LIMIT = 2.1 PERCENT.
- A/C PACKS ON. FOR A/C PACKS OFF, INCREASE GROSS GRADIENT BY 0.10 PERCENT.
- REDUCE GROSS GRADIENT 1.05 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.



P.C. K600C04A07 D041T507-1 PG. 4.12-4A

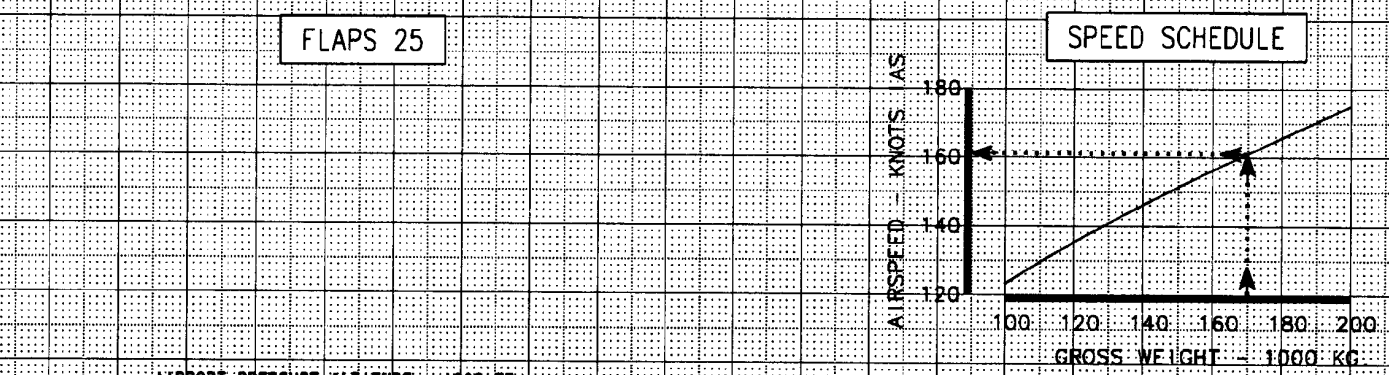
L. ENEBRAD 767-300ER CF6-80C2B6/B6F

APPROVED DUTTON DATE 02-27-03

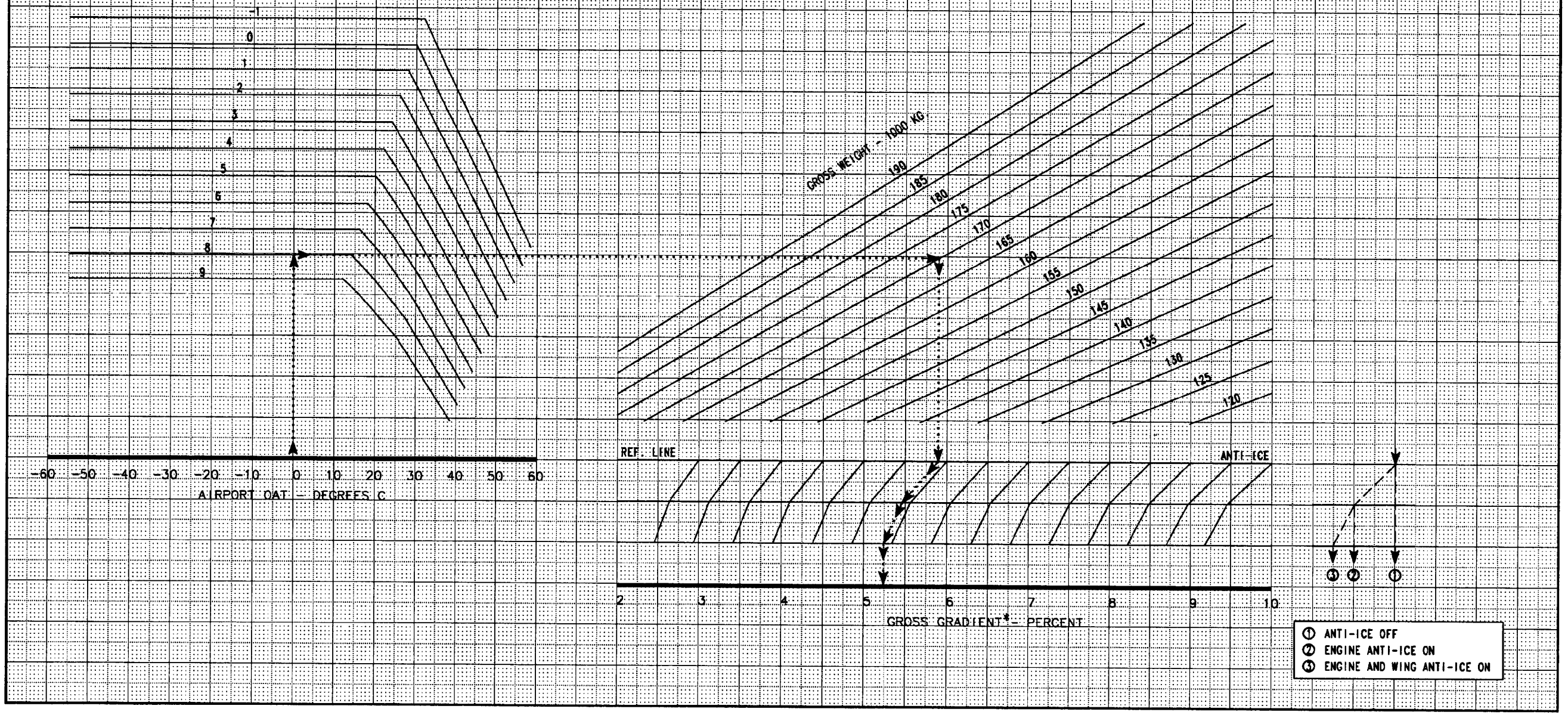
PERFORMANCE

LANDING CLIMB

FLAPS 25



- LANDING CLIMB GROSS GRADIENT LIMIT = 3.2 PERCENT.
- * A/C PACKS ON, FOR A/C PACKS OFF INCREASE GRADIENT BY 0.20 PERCENT.
- * REDUCE GRADIENT BY 1.25 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WITH THE FORECAST LANDING TEMPERATURES BELOW 10 DEGREES C.



P.C. K600C05007
D041T507-1 PG. 4.12-5

APPROVED	DATE
Shields	9/24/02
D. D. Davis	09/10/03

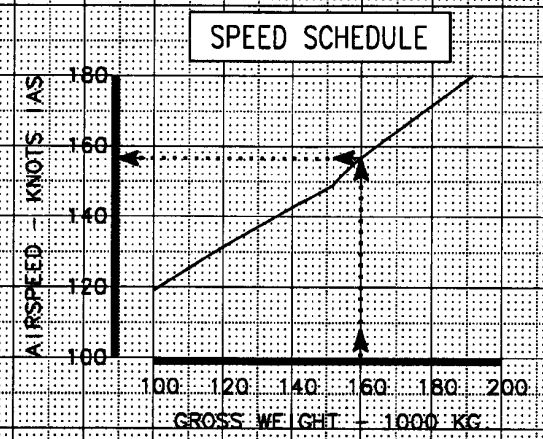
P. DUTTON
767-300ER
CF6-80C2B6/B6F

S42415

PERFORMANCE

LANDING CLIMB

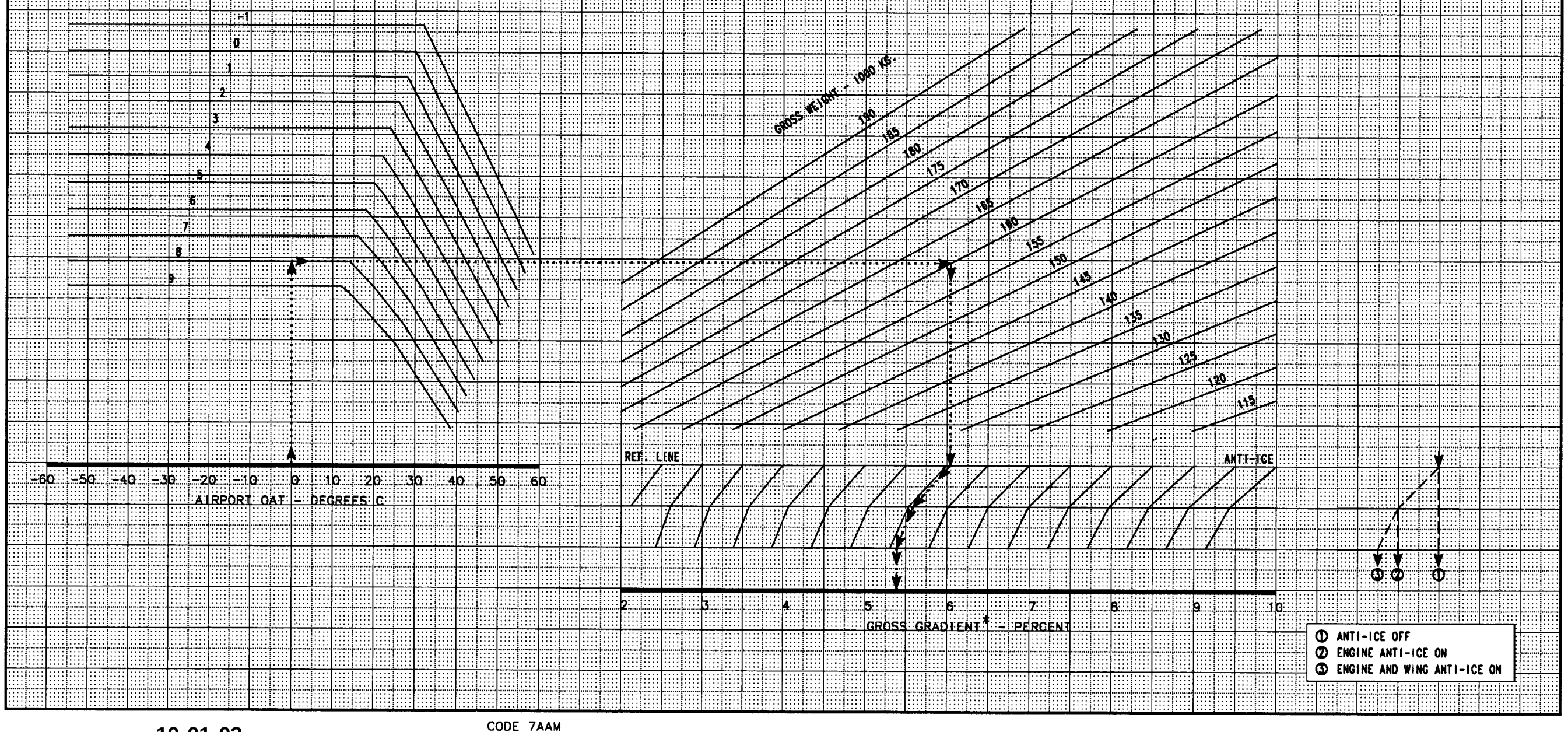
FLAPS 30



■ LANDING CLIMB GROSS GRADIENT LIMIT = 3.2 PERCENT.

* A/C PACKS ON, FOR A/C PACKS OFF INCREASE GRADIENT BY 0.20 PERCENT.

* REDUCE GRADIENT BY 1.55 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WITH THE FORECAST LANDING TEMPERATURES BELOW 10 DEGREES C.



P.C.K600C06007
D041T507-1 PG. 4.12-6

APPROVED	DATE
SHIELDS	9/22/92
D. D. Davis	09/10/03

J. NEWELL
767-300ER
CF6-80C2B6/B6F

S42431

MAXIMUM LANDING WEIGHT

CLIMB LIMITS

P.C. K600C09A07
D041T507-1 PG. 4.12-9A

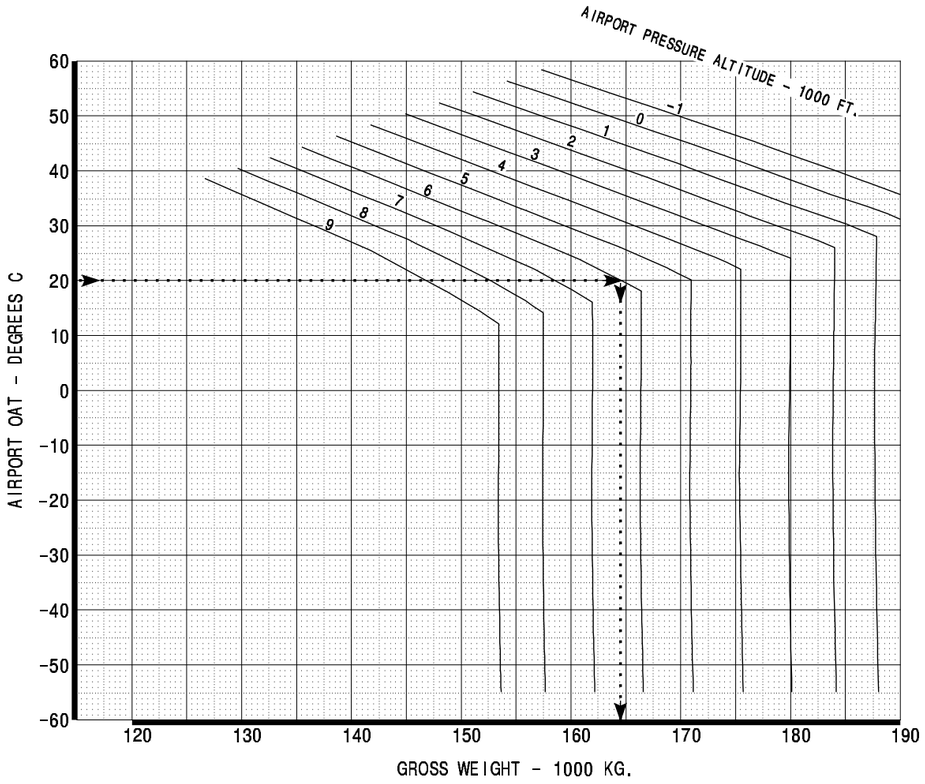
L. ENEBRAD
767-300ER
CF6-80C2B6/B6F

APPROVED DUTTON DATE 02-27-03

APPROACH FLAPS 20
LANDING FLAPS 25 AND 30

- REDUCE GROSS WEIGHT BY 15,350 KG. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.
- APPLY THE FOLLOWING GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	WEIGHT ADJUSTMENT - KG.	
	A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+1700	0
ENGINE ANTI-ICE ON	-900	-2500
ENGINE AND WING ANTI-ICE ON	-3200	-4600



SECTION 4.13 - LANDING FIELD LENGTH AND SPEED

C O N T E N T S

	PAGE
Contents	1
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Automatic Landing	2
Automatic Wheel Brakes	2
Maximum Quick Turnaround Weight	3A
LANDING SPEEDS	4
LANDING FIELD LENGTH, ANTISKID OPERATIVE (FLAPS 25)	5
LANDING FIELD LENGTH CORRECTIONS, ANTISKID INOPERATIVE (FLAPS 25)	6
LANDING FIELD LENGTH, ANTISKID OPERATIVE (FLAPS 30)	7
LANDING FIELD LENGTH CORRECTIONS, ANTISKID INOPERATIVE (FLAPS 30)	8
MAXIMUM QUICK TURNAROUND WEIGHT (FLAPS 25)	9
(FLAPS 30)	10
STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES	11

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S28290

G E N E R A L

The charts on the following pages present landing speeds, landing field length requirements, landing field length corrections with the antiskid system inoperative, maximum landing weights for the brake energy at which the wheel thermal plugs will remain intact, and stopping distance with automatic wheel brakes. Brake part numbers (P.N.) in the same category produce equal braking performance, and Maximum Quick Turnaround Weight charts that are labeled for one category can be used for all brakes in that category. This does not allow interchangeability of the brakes themselves.

Category C: Boeing P.N. S160T300-12, -14, -15, -18, -19

A U T O M A T I C L A N D I N G

The following is provided as guidance material which may be used for compliance with AC 120-28C or 120-28D when the antiskid system and thrust reversers are operative:

When using autoland during Category III operations, the landing field length is 115 percent of the dry non-autoland landing field length determined from the LANDING FIELD LENGTH charts.

A U T O M A T I C W H E E L B R A K E S

The STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES chart is provided for guidance information only in the selection of the most desirable autobrake setting for the field length available. It is not to be used to determine required landing field length.

The automatic wheel brake system is designed to improve the consistency and smoothness of the landing roll-out by modulating brake pressure to achieve a selected deceleration rate. Use of the system is optional and does not relieve the pilot of the responsibility to assure a safe stop within the available runway length.

The automatic wheel brake system is triggered at touchdown by landing gear truck tilt and main gear wheel spin-up. Therefore, a delay in lowering the nose gear will not delay application of the brakes. The MAX AUTO setting applies a brake pressure necessary to achieve the highest level of fixed deceleration; full antiskid braking pressure is provided by the MAX AUTO setting only if the runway conditions are such that this deceleration level cannot be achieved. Therefore, the MAX AUTO setting may not achieve the minimum stopping distance that is available with maximum manual braking. The use of reverse thrust is demonstrated to have no adverse effects on autobrake stopping distances.

LANDING FIELD LENGTH AND SPEED

AUTOMATIC WHEEL BRAKES (Continued)

The Stopping Distance With Automatic Wheel Brakes chart shows actual (unfactored) distances for settings 1 through MAX AUTO from touchdown to full stop that can be expected when using this system. The stopping distances shown are based on demonstrated deceleration values using automatic speed brakes and are valid for all landing flap settings, with or without reverse thrust. Distance corrections for tail wind and non-standard temperatures are provided.

Recommended use of the stopping distance chart is as follows:

1) Determine the available or desired distance from touchdown to stop (see NOTE for autoland).
2) Estimate approach speed considering approach conditions, flap setting, and operating procedures.
3) Enter the Stopping Distance with Automatic Wheel Brakes chart with approach speed from step 2, correcting for airport altitude to determine stopping distance and setting.

Stopping distances that can be achieved on wet runways depend on the friction characteristics, or slipperiness, of the particular runway. A range of stopping distance for varying slipperiness is shown; the range shown is based on the variation of wet runway friction characteristics expected in service. The wet runway stopping distance that is achieved for a given setting will be the longer of (1) the distance produced by the fixed deceleration of the setting or (2) the distance produced by the runway friction available, as indicated by the shaded region on the chart. A higher setting (MAX AUTO rather than 4, or 4 rather than 3) will produce shorter stopping distances on wet runways if friction characteristics are such to permit the higher deceleration. The use of reverse thrust will decrease wet runway stopping distance when the deceleration is limited by runway friction characteristics. Extremely wet and slippery conditions can result in longer distances than indicated.

NOTE: When using automatic wheel brakes with autoland operations, touchdown should be assumed to occur at 2,500 feet from the runway threshold. Enter chart with the remaining stopping distance available and approach speed, to find the Minimum autobrake setting.

S28314

LANDING FIELD LENGTH AND SPEED

MAXIMUM QUICK TURNAROUND WEIGHT

Use one of the two following methods:

1. After landing at weights exceeding those shown on the Maximum Quick Turnaround Weight charts, this section, wait at least 58 minutes (Category A & B steel brakes) or 75 minutes (Category C carbon brakes). Before making a subsequent takeoff, check that the wheel thermal plugs have not melted.

2. If a Brake Temperature Monitoring System (BTMS) is installed: No sooner than 10 and no later than 15 minutes after parking, check the brake temperature display digits on the EICAS status page and the BRAKE TEMP light. If all the brake temperature values are within a range of 1 through 4 and the BRAKE TEMP light is not on, no further ground waiting period is required. If any brake temperature value is 5 or higher, or the BRAKE TEMP light is on, a minimum ground waiting period of 58 minutes (Category A & B steel brakes) or 75 minutes (Category C carbon brakes) is required. Before making a subsequent takeoff, check that the wheel thermal plugs have not melted.

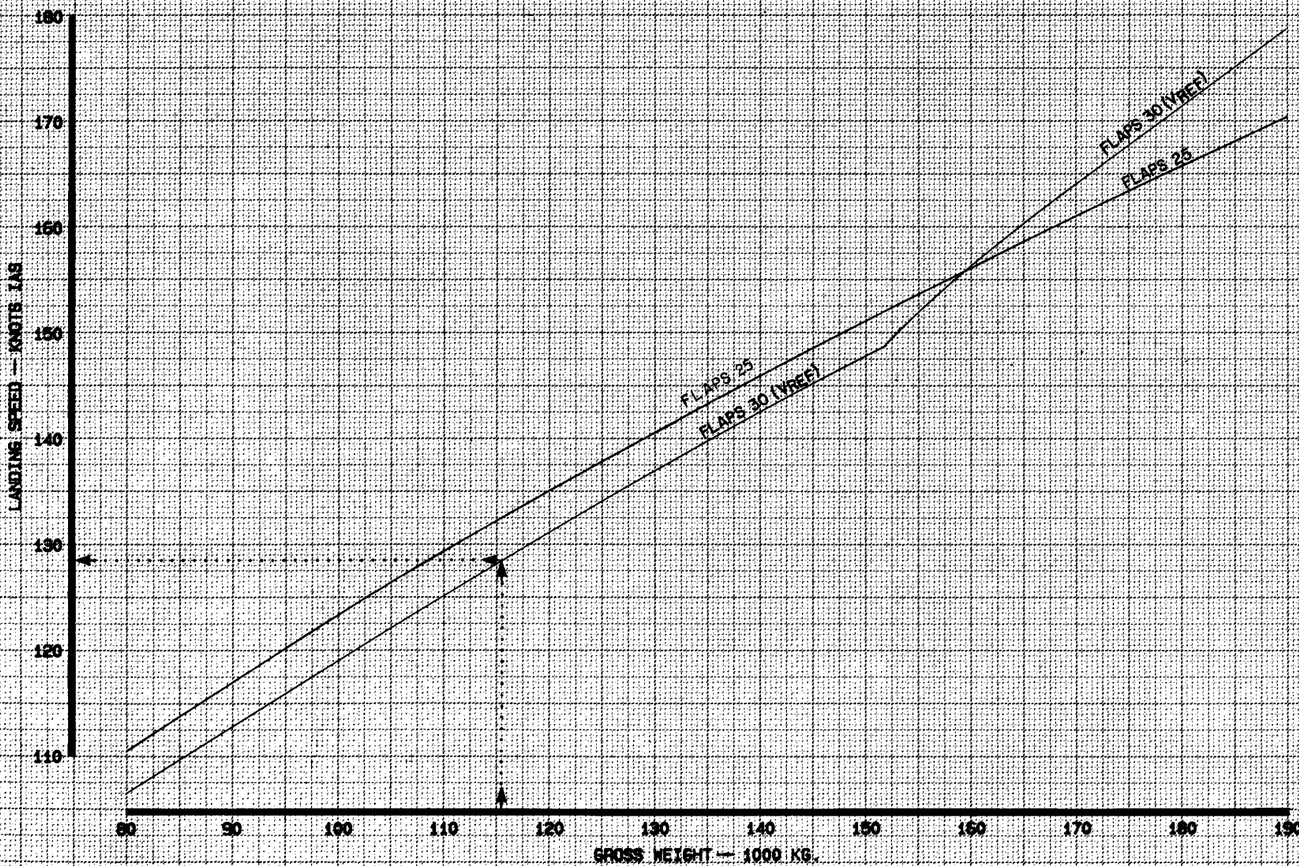
   Note: If any brake temperature display digit is blank or indicates 0, the Maximum Quick Turnaround Weight charts, Method 1, must be used.

S28317

PERFORMANCE

LANDING SPEEDS

● FOR AUTOMATIC LANDING INCREASE SPEED SHOWN BELOW BY 5 KNOTS.



P.C. 6L001744
D041T507-1 P6.4.13-4

KREINER
767-300ER
CF6-80C2 SERIES

	APPROVED	DATE
	RAKER NM	7.4.88

S38466

P.C.BL001802
D041T607-1 PG. 4.13-5

GARDNER
767-300ER
CF6-80C2 SERIES

	APPROVED	DATE
	[illegible]	2/10/88
	[illegible]	5/5/88

PERFORMANCE

LANDING FIELD LENGTH

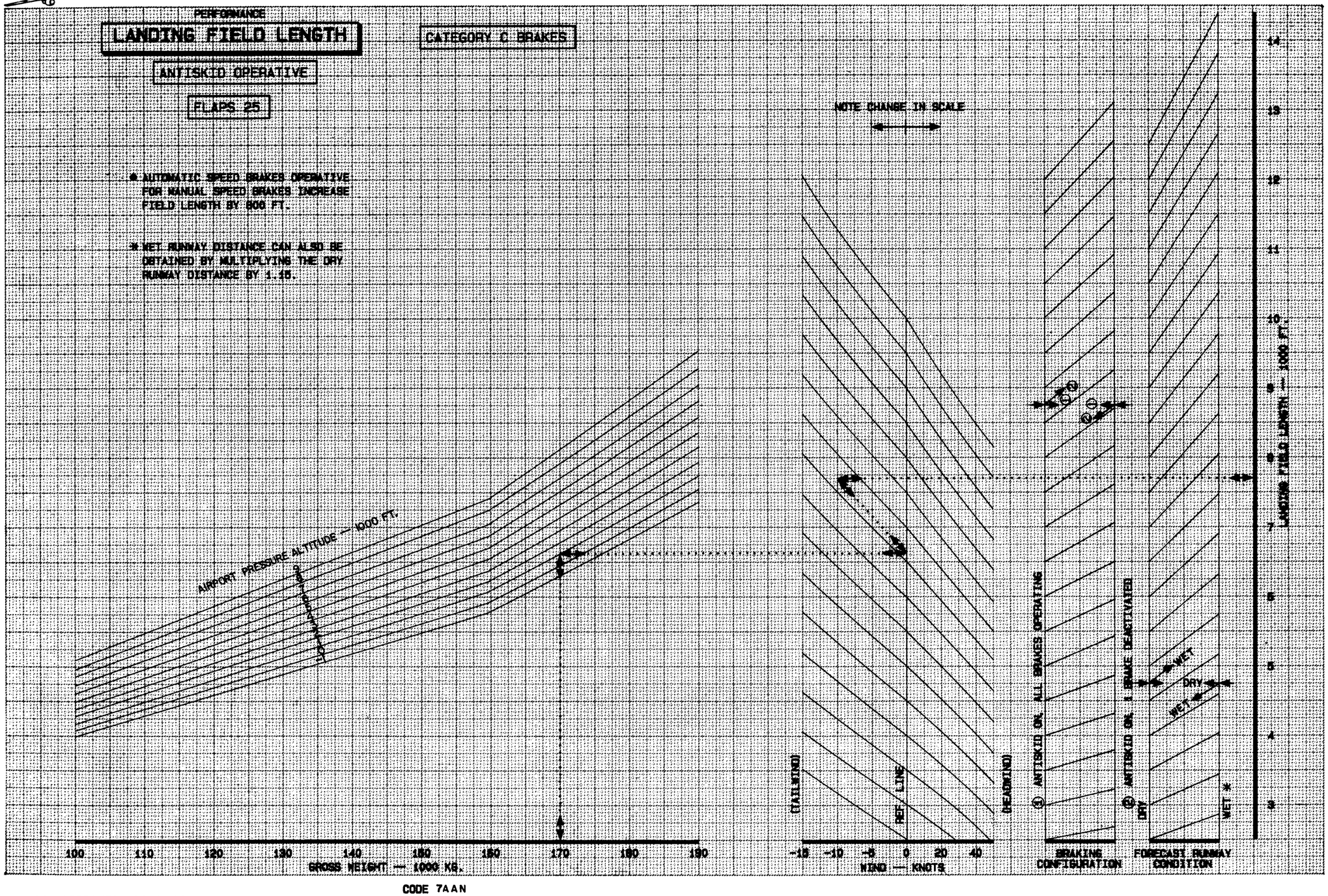
CATEGORY C BRAKES

ANTISKID OPERATIVE

FLAPS 25

* AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES INCREASE FIELD LENGTH BY 800 FT.

* WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



S38476

6E4208

P.C. 89000764
D041T607-1 P6.4.13-6

LIEURANCE
787-300ER
CF6-80C2 SERIES

	APPROVED	DATE
	[illegible]	9/10/87

LANDING FIELD LENGTH CORRECTIONS

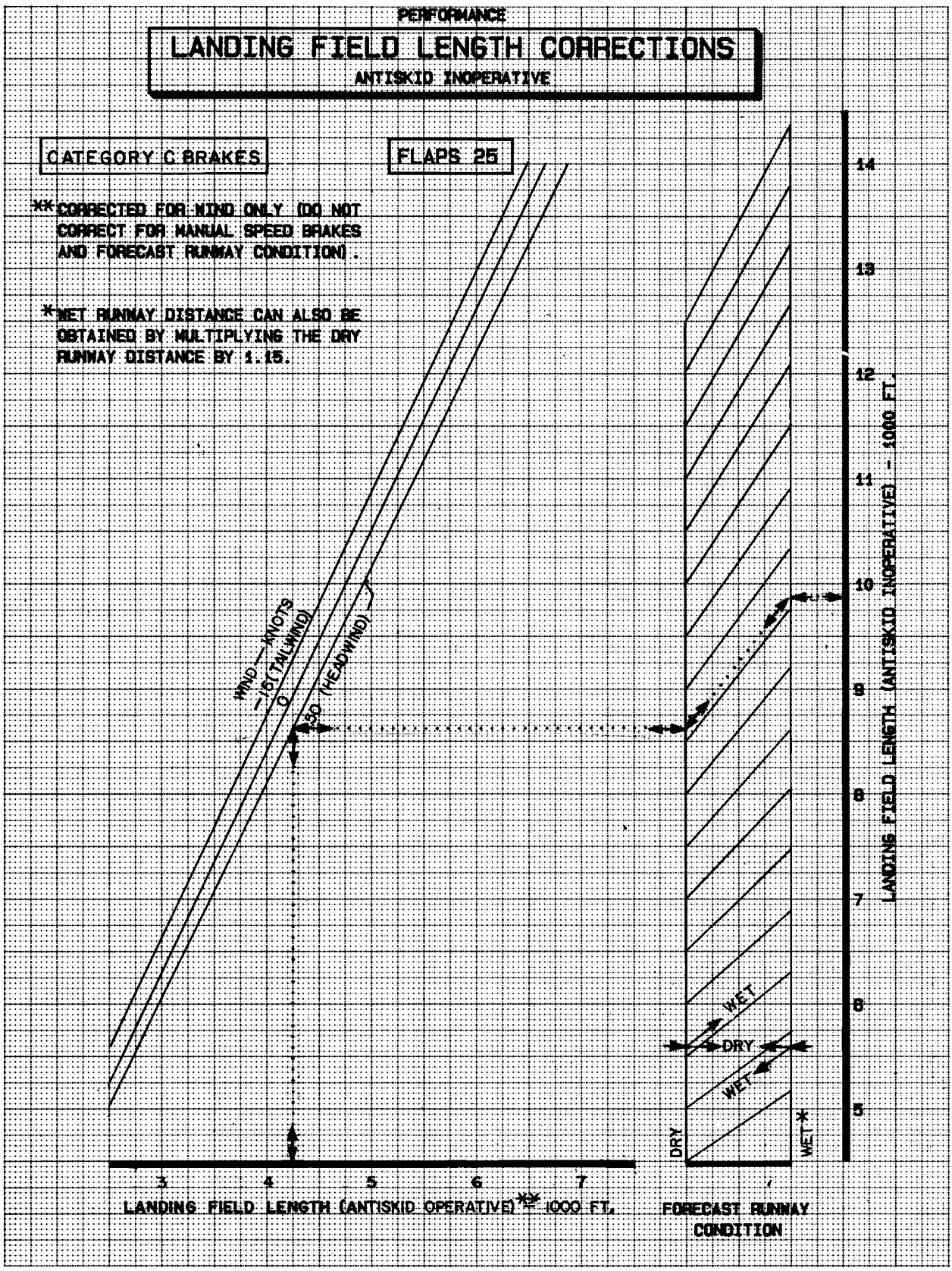
ANTISKID INOPERATIVE

CATEGORY C BRAKES

FLAPS 25

**CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES AND FORECAST RUNWAY CONDITION).

*WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



96420

S29965

PERFORMANCE

LANDING FIELD LENGTH

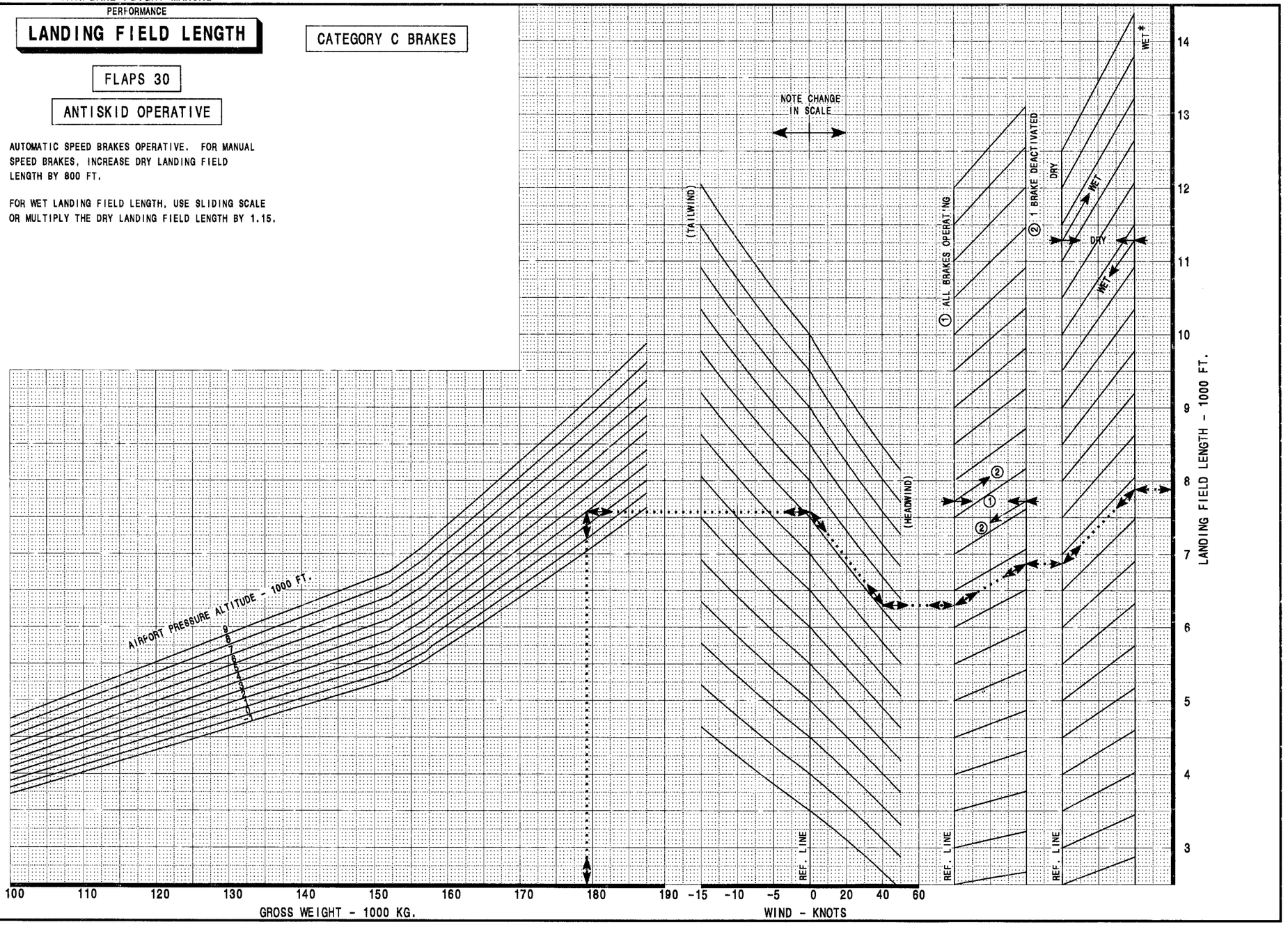
CATEGORY C BRAKES

FLAPS 30

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 800 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. K600D07007
D041T507-1 PG.4.13-7

	APPROVED	DATE
D.BACH		

767-300ER
CF6-80C2 SERIES

S42559

PERFORMANCE

LANDING FIELD LENGTH CORRECTIONS

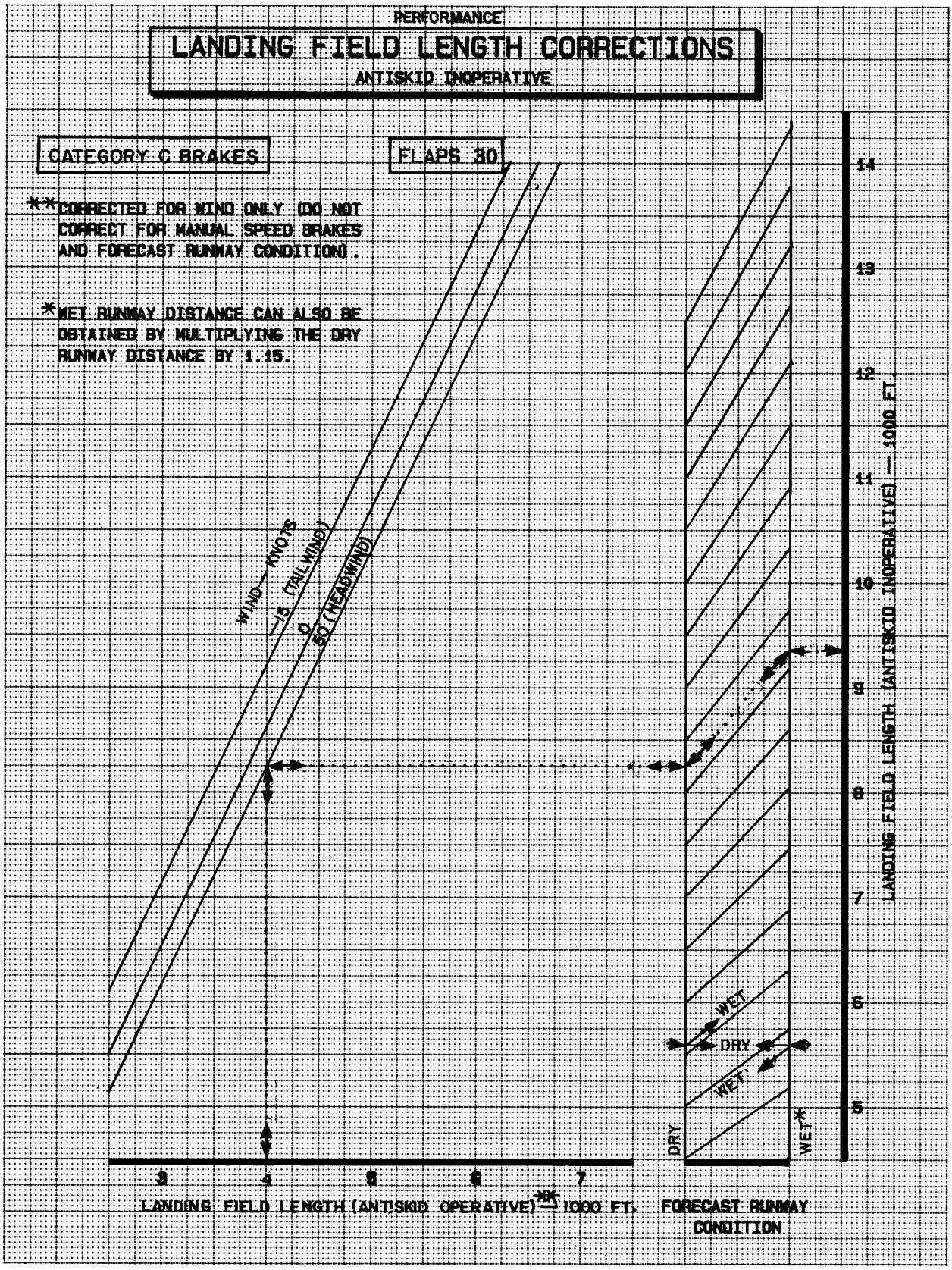
ANTISKID INOPERATIVE

CATEGORY C BRAKES

FLAPS 30

**CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES AND FORECAST RUNWAY CONDITION).

*WET RUNWAY DISTANCE CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



LIEURANCE		APPROVED	DATE
767-300	IF	C.S. Zill: LM386	9.16.87
CF6-80C2 SERIES			

P.C. BS000788
D041T507-1 P6.4.13-8

6E420

S29972

PERFORMANCE

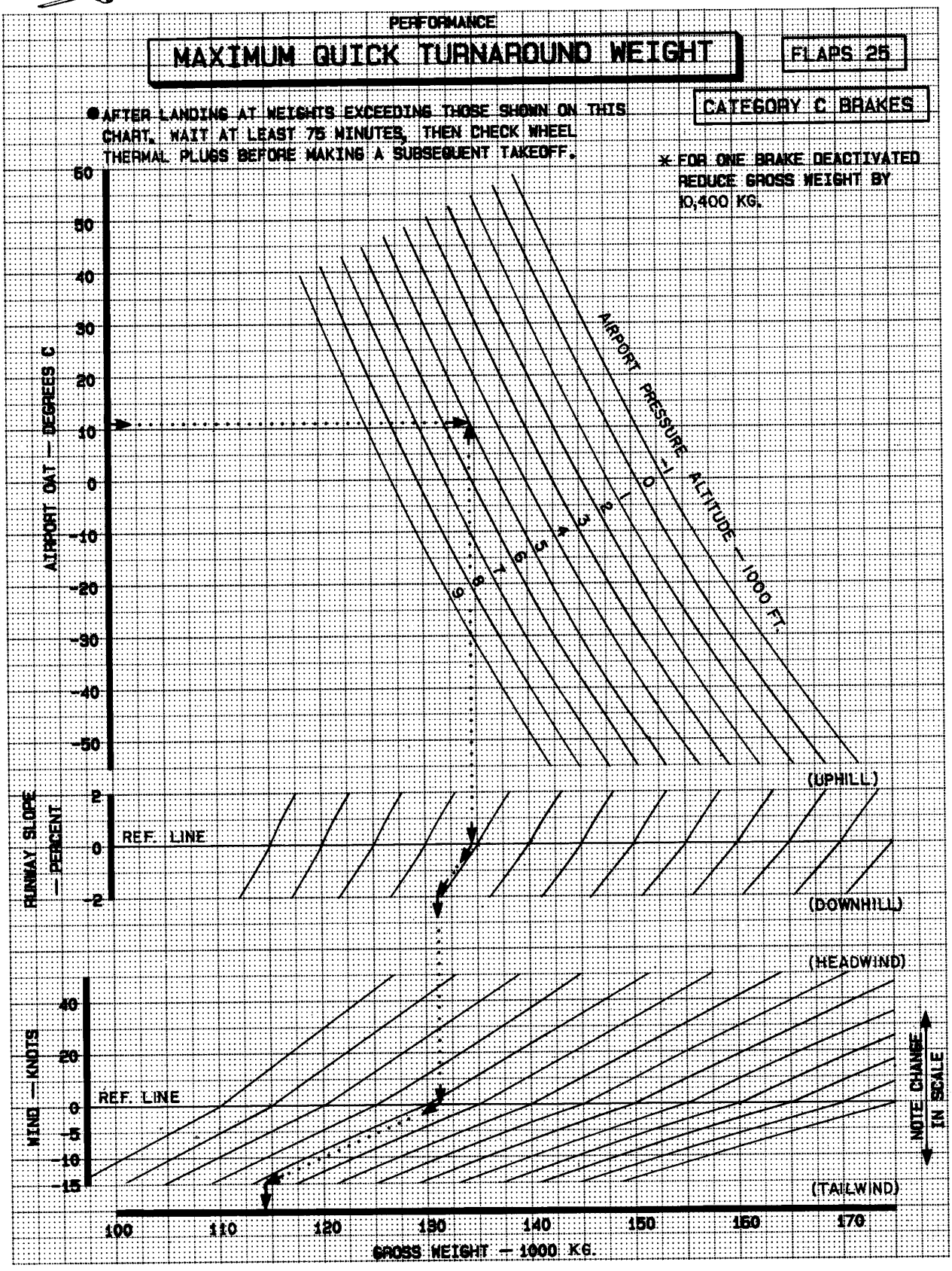
MAXIMUM QUICK TURNAROUND WEIGHT

FLAPS 25

CATEGORY C BRAKES

● AFTER LANDING AT WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.

* FOR ONE BRAKE DEACTIVATED REDUCE GROSS WEIGHT BY 10,400 KG.



P.C. 6S000629
D041T507-1 PG. 4.13-9

APPROVED	DATE
BR	2/4/88

KREINER / RUFF
767-300ER
CF6-80C2 SERIES

6E2407

S29988

PERFORMANCE

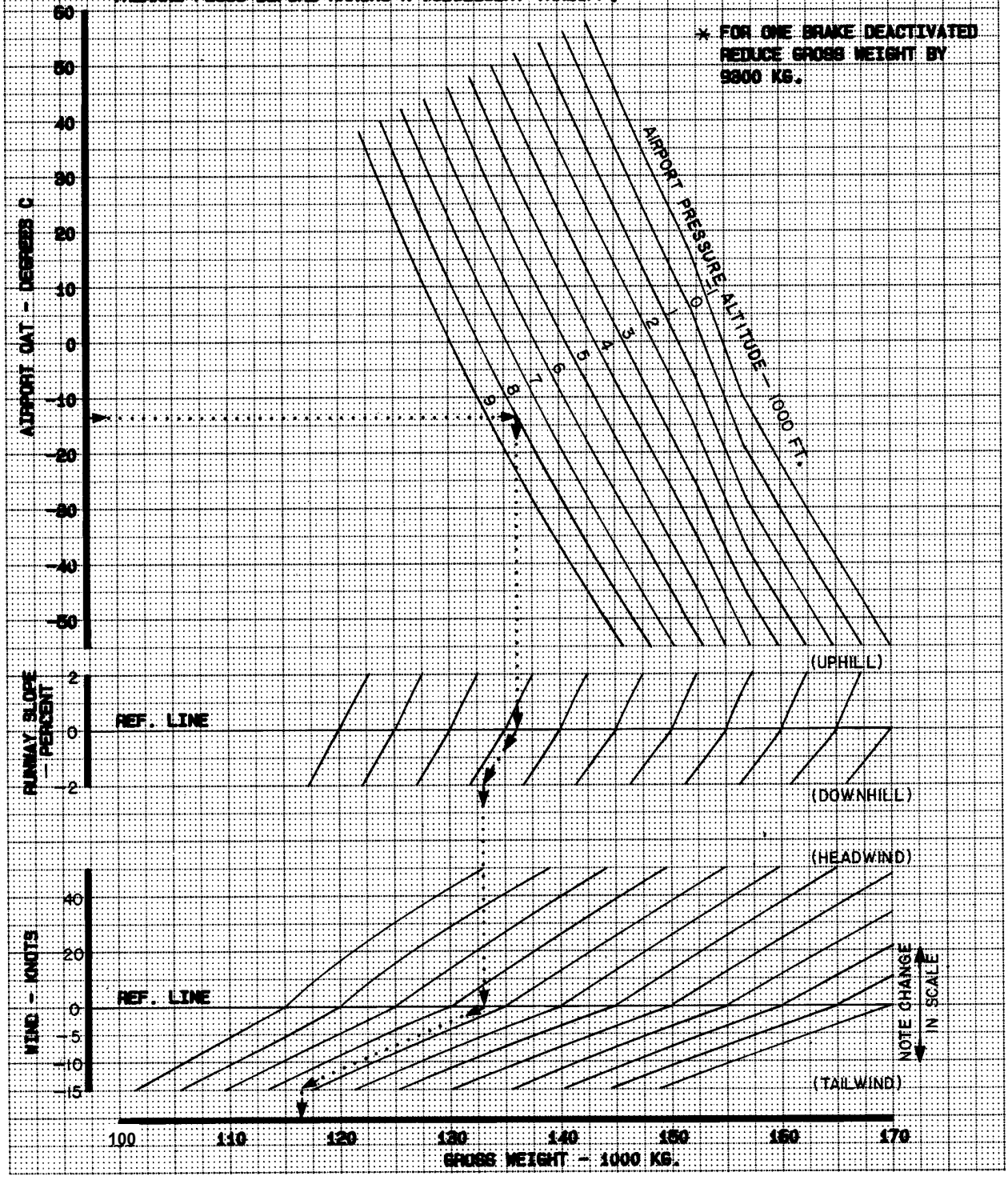
MAXIMUM QUICK TURNAROUND WEIGHT

FLAPS 30

CATEGORY C BRAKES

● AFTER LANDING AT WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 76 MINUTES. THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.

* FOR ONE BRAKE DEACTIVATED REDUCE GROSS WEIGHT BY 9300 KG.



KAEINER	APPROVED	DATE
767-300ER	NM-19 2-4-98	
CF6-80C2 SERIES	R. Sugawara 11/16/04	

P.C. 63000831
D041T607-1 P6.4.13-10

6E4207

S29999

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

CATEGORY A AND B BRAKES

CATEGORY C BRAKES WITH ANTISKID/AUTOBRAKE CONTROL UNIT S283T001-23 OR S283T001-25 INSTALLED

GUIDANCE INFORMATION ONLY - SEE TEXT

NOTE: VALID FOR ALL FLAPS

CHART ASSUMES ZERO WIND
FOR TAILWIND CORRECT CHART BY ADDING:

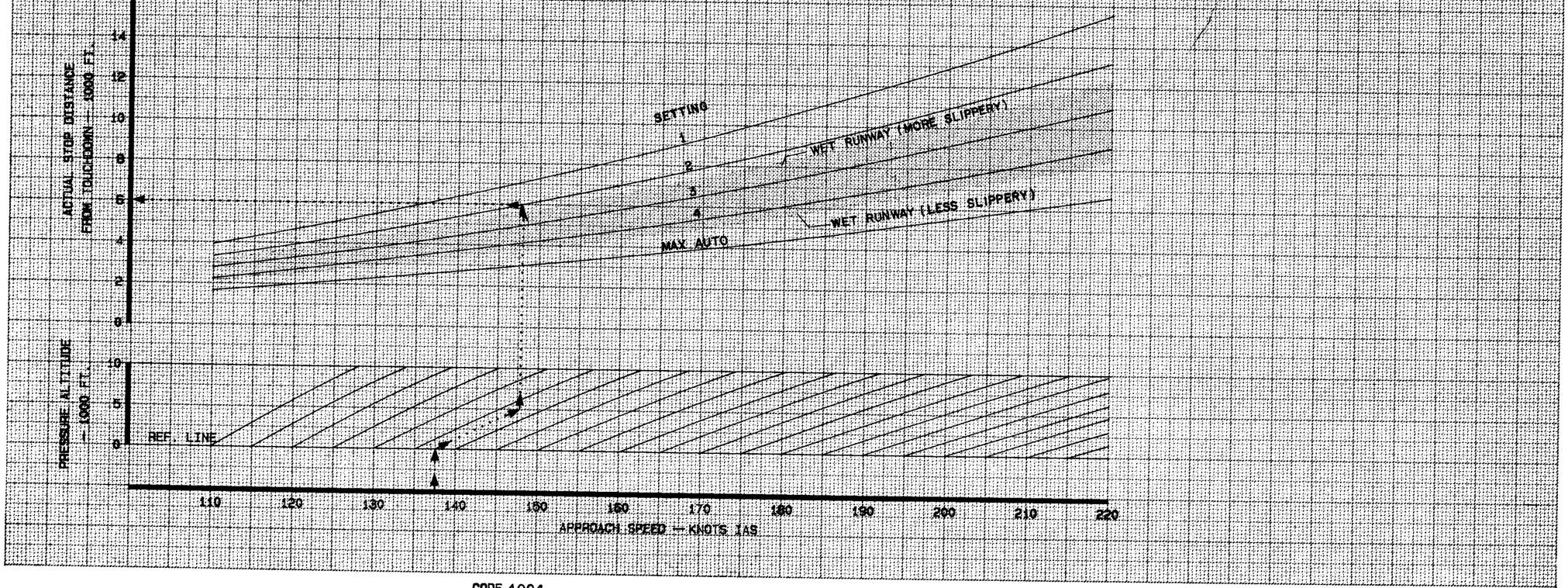
SETTING	FEET PER KNOT OF REPORTED TAILWIND
MAX AUTO	40
4	55
3	70
2	85
1	100

CHART ASSUMES STANDARD DAY TEMPERATURE
FOR HOTTER DAYS CORRECT CHART BY ADDING
FEET PER 2°F (1°C)

SETTING	ABOVE STANDARD DAY
MAX AUTO	10
4	15
3	20
2	25
1	30

WET RUNWAY GUIDANCE

- STOPPING DISTANCE WILL DEPEND ON SELECTED SETTING AND WET RUNWAY FRICTION CHARACTERISTICS. (SEE TEXT)
- EXTREMELY WET AND SLIPPERY CONDITIONS CAN RESULT IN LONGER DISTANCES THAN INDICATED.
- A HIGHER SETTING (MAX AUTO RATHER THAN SETTING 4, OR SETTING 4 RATHER THAN SETTING 3) WILL PRODUCE BETTER STOPPING PERFORMANCE ON WET RUNWAYS IF RUNWAY FRICTION CHARACTERISTICS PERMIT BETTER DECELERATION.
- THE USE OF REVERSE THRUST WILL IMPROVE WET RUNWAY STOPPING PERFORMANCE WHEN THE PERFORMANCE IS LIMITED BY RUNWAY FRICTION CHARACTERISTICS.



P.C.BL#01993 | D041T502 | PG. 4.13-13

	APPROVED	DATE
J. PETERS	J. Peters	7/1/88
767		

S38874

6E4208

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

ADVISORY INFORMATION ONLY

CATEGORY C BRAKES WITH ANTISKID/AUTOBRAKE CONTROL UNIT S283T001-13 INSTALLED

FLAPS 25 AND 30

- WET RUNWAY GUIDANCE.

  STOP DISTANCE DEPENDS ON AUTOBRAKE SETTING AND WET RUNWAY FRICTION CHARACTERISTICS. SEE TEXT.

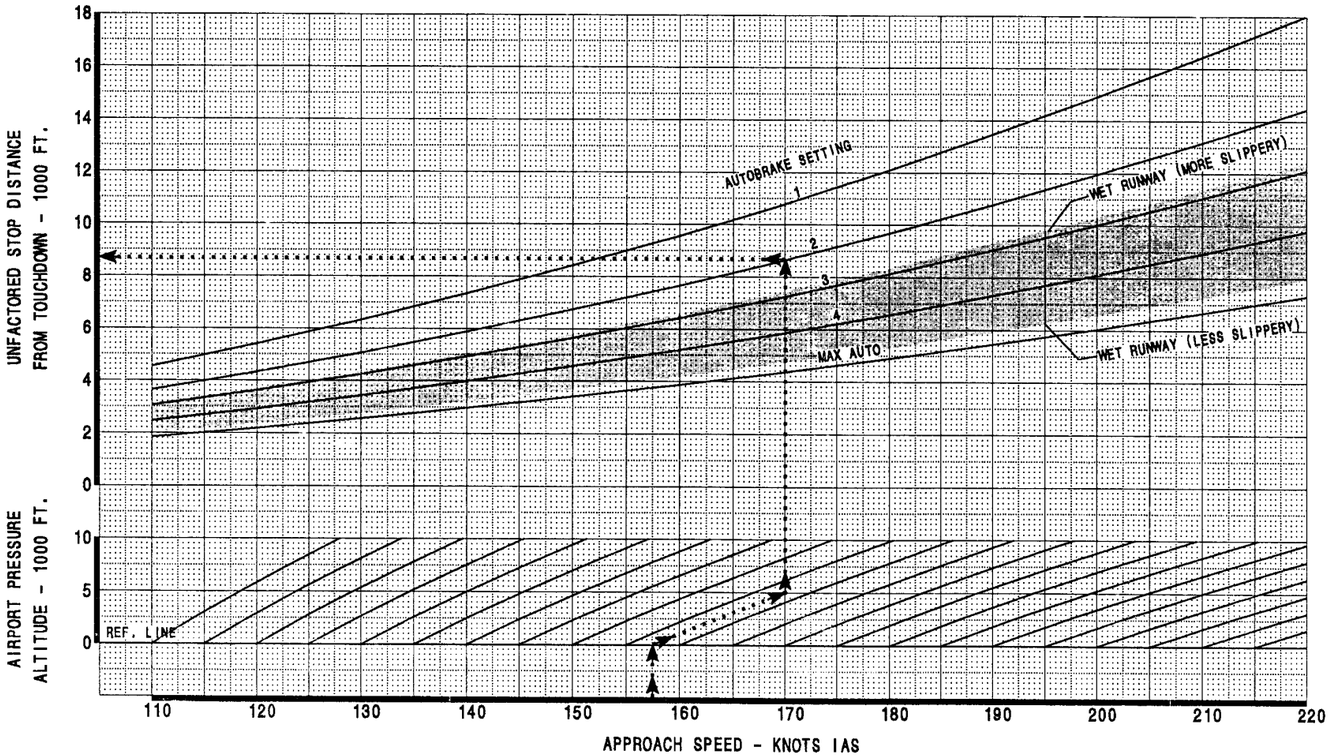
  EXTREMELY WET OR SLIPPERY RUNWAY CONDITIONS MAY RESULT IN LONGER STOP DISTANCES THAN INDICATED.

  HIGHER AUTOBRAKE SETTINGS (MAX AUTO RATHER THAN SETTING 4) RESULT IN SHORTER STOP DISTANCES IF RUNWAY FRICTION CHARACTERISTICS PERMIT BETTER DECELERATION.

  SHORTER STOP DISTANCES WILL RESULT FROM THE USE OF REVERSE THRUST ONLY WHEN PERFORMANCE IS LIMITED BY RUNWAY FRICTION CHARACTERISTICS.

- ZERO WIND. FOR EACH KNOT OF REPORTED TAILWIND, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.
- STANDARD DAY. FOR EACH DEGREE C (2 DEGREES F) ABOVE STANDARD DAY, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.
- MANUAL LANDING. FOR AUTOLAND, APPLY THE FOLLOWING DISTANCE ADJUSTMENT.

AUTOBRAKE SETTING	DISTANCE ADJUSTMENT - FT.		
	FOR TAILWIND	FOR TEMPERATURE	FOR AUTOLAND
1	+ 115	+ 30	+ 0
2	+ 95	+ 25	+ 0
3	+ 80	+ 20	+ 50
4	+ 65	+ 15	+ 100
MAX AUTO	+ 45	+ 10	+ 200



P.C. h600D11A04
D041T509-3 PG.4.13-11

APPROVED	DATE
V.HILL	08-28-96

M. MCGONIGAL
767-200/300

REVISION HIGHLIGHTS

Revision 5 to Appendix 43K to D6T11321 dated 02-10-04.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to remove the note refering to the Third Segment Distance (Full Rated-Derated) chart. This chart does not exist in this appendix.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	044702	This page uniquely identifies the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Section 4.9		
5	A43	Removed the note that refers to the Third Segment Distance (Full Rated-Derated) chart.

APPENDIX 43K

OPERATION AT
10% AND 20%
DERATED TAKEOFF THRUST

CF6-80C2B6F ENGINES

767-300

S16660

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 044702** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 02-10-04

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Log of Pages
Appendix 43K

The following pages comprise this appendix applicable to the above series airplanes.

Revision 5 Date 02-10-04

Page	Code	Date
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1		08-14-91
Revision Approval		
* 1	044702	02-10-04
Log of Pages		
* 1		02-10-04
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S16572

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S16573

INTRODUCTION

This appendix provides the additional Certificate Limitations to operate the Model 767-300 series airplanes at the derated engine ratings Derate 1 and Derate 2. This appendix is used in conjunction with Sections 1, 2, 3 and 4 from the basic Airplane Flight Manual and appropriate appendices.

Use of this appendix is optional. Its use may result in the airplane operating at or near weight limits due to field length, takeoff climb or net flight path minimums where, under the same conditions and airplane configuration at full takeoff thrust rating, the airplane would not be limited.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

The limitations in Section 1 of the basic Airplane Flight Manual or appropriate appendices are applicable except as supplemented or amended herein.

G E N E R A L L I M I T A T I O N S

This appendix contains the additional limitations, procedures, and performance to schedule takeoff and landing operation at the derated engine ratings, Derate 1 and Derate 2.

When takeoff is made using Derate 1 or Derate 2, the approach and landing climb performance must be based on the corresponding derate unless it has been determined that the engines are capable of achieving full rated takeoff thrust.

DERATED THRUST PROCEDURES

As a condition to the use of derated thrust, operators must assure that engines are capable of achieving full rated takeoff thrust, including full power lever angle capability with EEC operating, without exceeding the corresponding certificated engine limits.

As a condition for basing the approach and landing climb performance on the full takeoff rating of the engines, periodic takeoffs must be conducted at the full takeoff rating.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

P E R F O R M A N C E A D J U S T M E N T S

The performance adjustments in this appendix are applicable to the CF6-80C2B6F Derate 1 and Derate 2 performance levels.

USE OF THE CHARTS

The charts in this appendix provide the performance information necessary for operation at Derate 1 and Derate 2. Only the performance information which is different from the basic manual or appropriate appendix is included in this appendix.

The majority of the charts in this appendix relate the derated performance to the full rated performance in the basic manual or appropriate appendix. These performance relationships are for a common airplane configuration, i.e., the same flap detent, A/C pack configuration, etc. The exceptions to this are the Takeoff Derate Power Setting, the Obstacle Distance Trade Lines, and the Minimum V_1 for Control on the Ground, $V_{1(MCG)}$, charts whose usage is independent of the full rated values.

TAKEOFF WEIGHT DETERMINATION PROCEDURE

The Takeoff Weight Determination Procedure defined in the basic manual or appropriate appendix is modified when determining performance at the derated engine ratings. The following flow diagram shows in simplified steps this modified procedure for determining the scheduled takeoff gross weight and associated speeds for a given set of airplane, airport, and atmospheric conditions. The more detailed procedures are defined in the appropriate sections of the basic manual or appropriate appendix and this appendix.

RECOMMENDED TAKEOFF STABILIZER SETTING

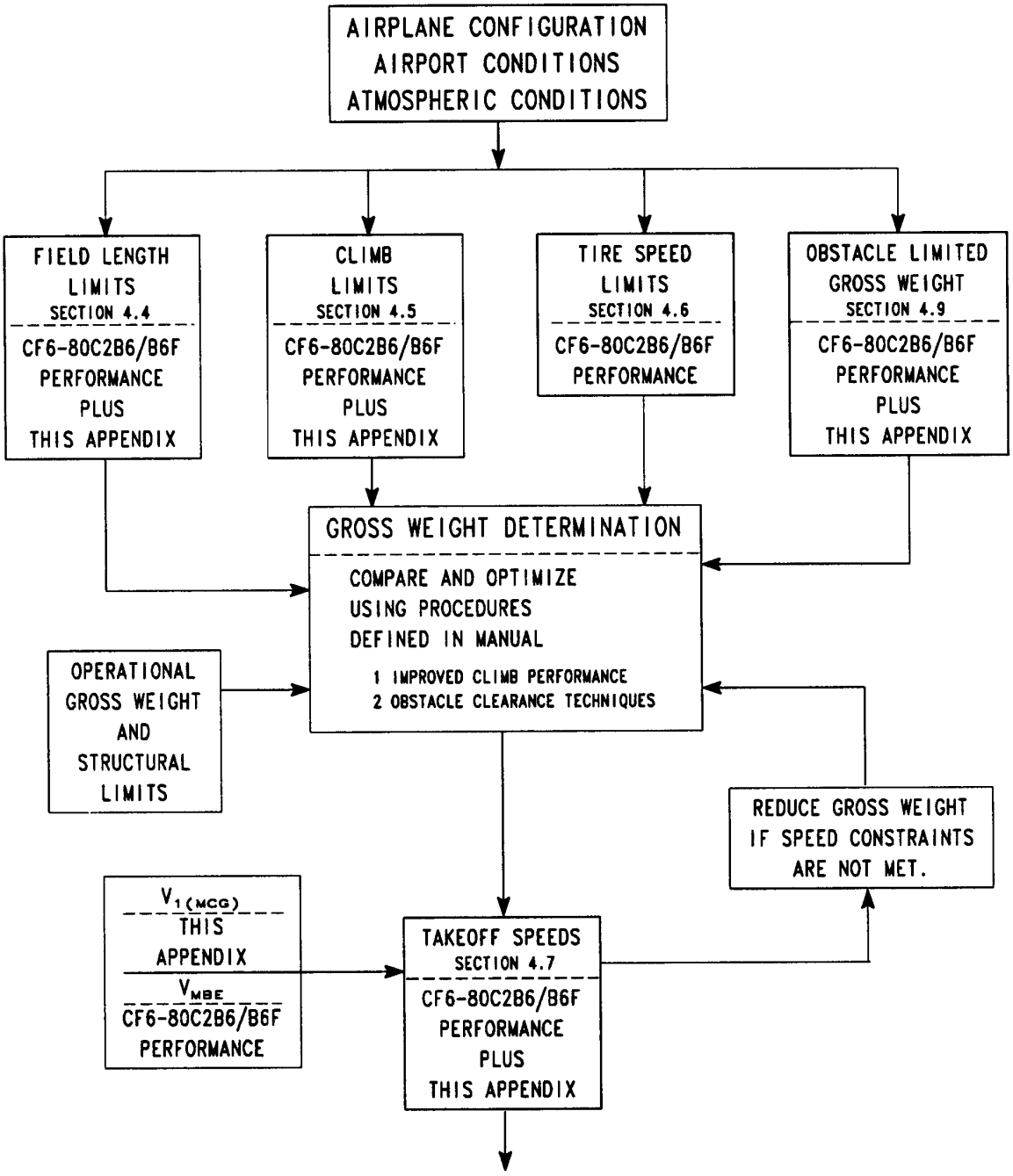
For derate operation, the following stabilizer trim increments should be applied to the applicable Recommended Takeoff Stabilizer Setting chart in the basic manual. If the following Boeing Service Bulletins are installed (or the production equivalents), these increments are included in the trim value calculated by the FMC Recommended Takeoff Stabilizer Trim Function when Derate 1 or Derate 2 is selected:

1) Flight Management Computer System Product Improvement Package (PIP), "NAVIGATION - POSITION COMPUTING - FLIGHT MANAGEMENT COMPUTER SYSTEM - PRODUCT IMPROVEMENT PACKAGE (PIP)", or
2) Pegasus FMC installation, “NAVIGATION – FLIGHT MANAGEMENT COMPUTING – FLIGHT MANAGEMENT COMPUTER SYSTEM – PEGASUS FMC INSTALLATION WITH CONTROL DISPLAY UNIT” (or “ HYBRID MULTIPURPOSE DISPLAY UNIT CONFIGURATION”).

Stabilizer Trim Increment*	
Thrust Derate	Increment, Units of Trim
Derate 1 – 10%	+1/2
Derate 2 – 20%	+1

* Not to exceed the Greenband limit of 7 units.

TAKEOFF WEIGHT DETERMINATION PROCEDURE



K643102000

J. PETERS

S27253

SECTION 4.2 - ENGINE DATA

G E N E R A L

This section provides the Takeoff Power Setting Charts for the CF6-80C2B6F engine as installed on the 767-300 airplane when operated at Derate 1 or Derate 2.

For the CF6-80C2B6F engine, power is set with percent fan rotor speed (%N1 gage). This power setting %N1 is a function of engine rating, pressure altitude, airplane velocity, ambient temperature and engine air bleeds. This section includes power setting charts for Derate 1 or Derate 2 takeoff ratings. These charts provide certified installed thrust levels for a minimum engine. All other engine power settings are unchanged from the basic manual or appropriate appendix.

TAKEOFF POWER SETTING

Takeoff power must be set at an airplane velocity between 40 and 80 knots. Takeoff %N1 is determined by entering the Takeoff Power Setting chart with pressure altitude and ambient temperature. %N1 adjustments for air conditioning packs and engine thermal anti-ice are included on the chart.

TAKEOFF DERATE POWER SETTING

PROCEDURES

1. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART A.
2. DETERMINE PERCENT CORRECTED N1 FROM CHART B.
3. DETERMINE Δ% CORR. N1 FROM CHART C USING THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
4. REDUCE THE PERCENT CORRECTED N1 FROM STEP 2 BY THE Δ% CORR. N1 FROM STEP 3.
5. DETERMINE MAXIMUM PERCENT CORRECTED N1 FROM CHART B.
6. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 4 OR STEP 5.
7. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 6 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART D.
8. DETERMINE PERCENT N1 GAGE FROM CHART E.

CHART A

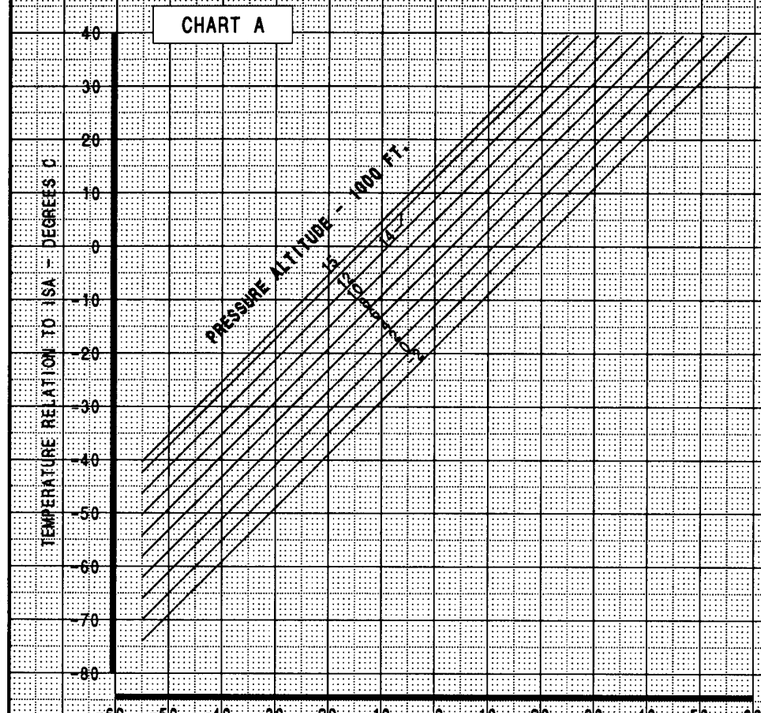


CHART B

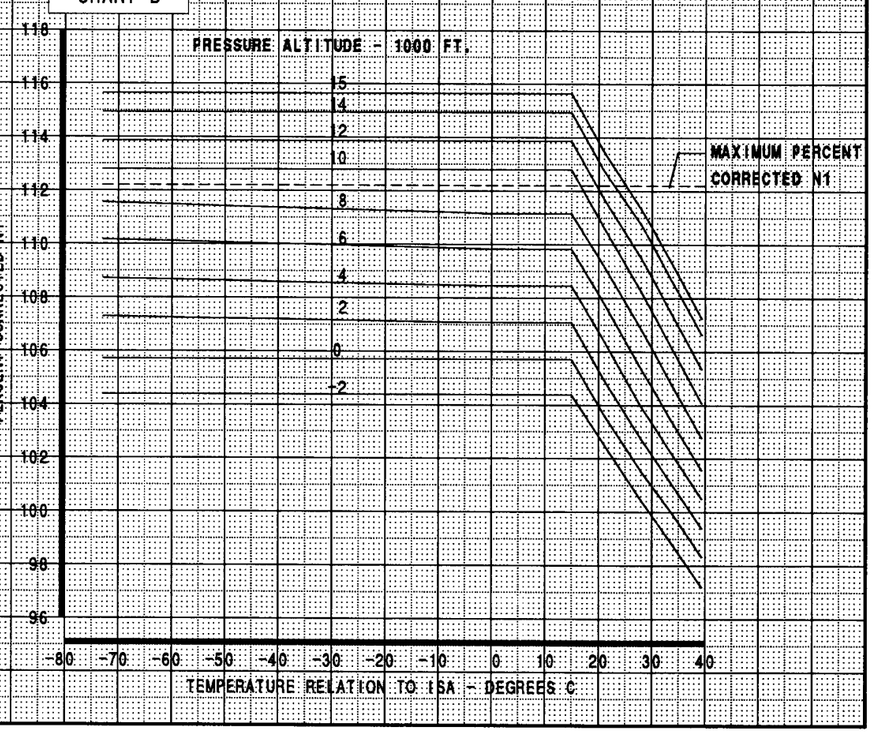
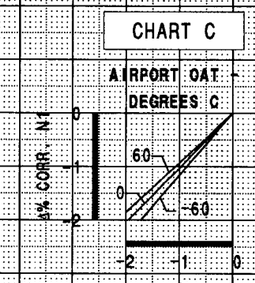
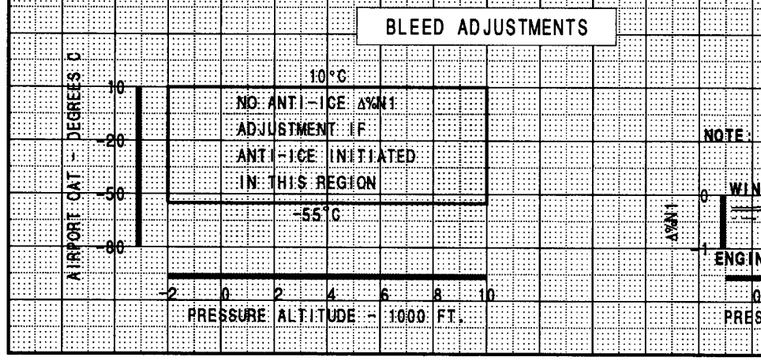


CHART C



BLEED ADJUSTMENTS



P.C. K643202003 APP. 43
D041T507-1 PG. 4.2-2

L.K. WIMER
767
CF6-80C2B6F
DERATES 1 & 2

APPROVED DATE
6/13/91

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TAKEOFF DERATE POWER SETTING
(CONTINUED)

P.C. K6432020A3 APP. 43
D041T507-1 PG. 4.2-2A

L.K. WIMER
767
CF6-80C2B6F
DERATES 1 & 2

APPROVED
DATE 6/3/91

CHART D

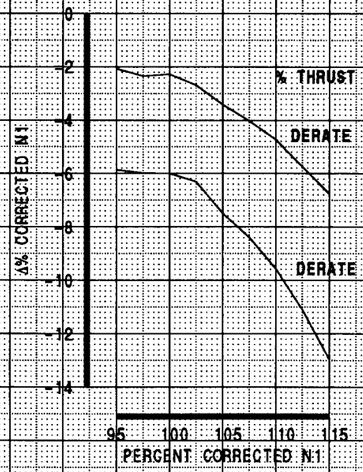
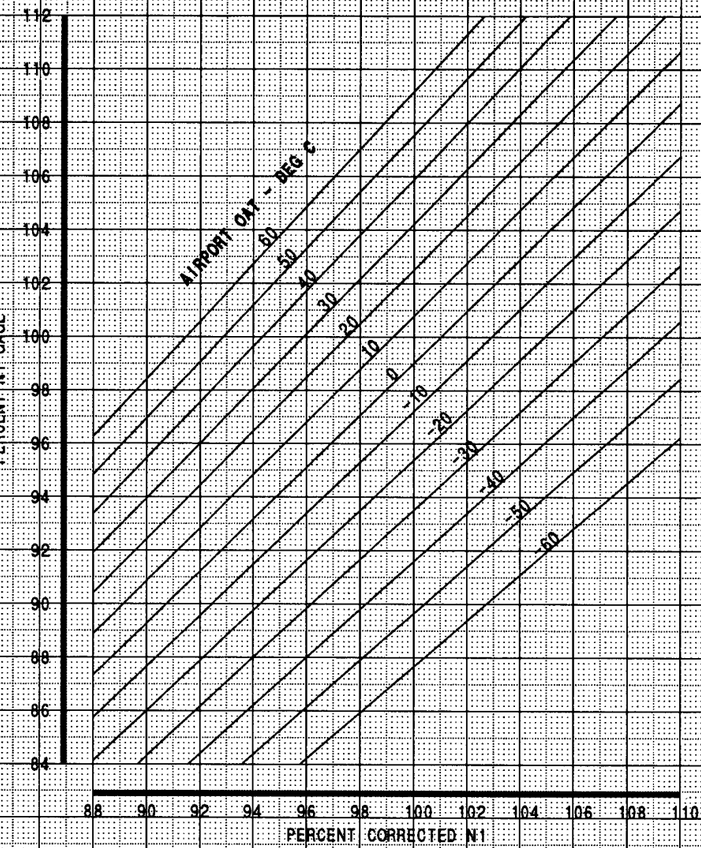


CHART E



SECTION 4.4 - FIELD LENGTH LIMITS

GENERAL

The Field Length Limits (Full Rated - Derated) chart in this section relates derated field length limited takeoff gross weight to full rated field length limited takeoff gross weight at a constant value of corrected runway length.

The chart on page 2, this section, may be used for any conditions within the Operating Envelope. Improved performance is available by using the chart on page 2A, this section, when conditions are within those stated on that chart.

FIELD LENGTH LIMITED TAKEOFF GROSS WEIGHT

The following steps are required to obtain the field length limited takeoff gross weight for a derated takeoff:

1. Determine the corrected runway length available in Section 4.3 of the basic manual or appropriate appendix.

2. Enter the appropriate Field Length Limits chart in Section 4.4 of the basic manual or appropriate appendix with the corrected runway length available, Step 1, and airport temperature/altitude. Read full rated field length limited takeoff gross weight.

3. Enter the Field Length Limits (Full Rated - Derated) chart in this section with the full rated field length limited takeoff gross weight, Step 2, and Derate 1 or 2 as appropriate. Read derated field length limited takeoff gross weight.

CORRECTED RUNWAY LENGTH REQUIRED

The following steps are required to obtain the corrected runway length required for a derated takeoff:

1. Enter the Field Length Limits (Full Rated - Derated) chart in this section with the derated takeoff gross weight and Derate 1 or 2 as appropriate. Read the full rated field length limited takeoff gross weight.

2. Enter the appropriate Field Length Limits chart in Section 4.4 from the basic manual or appropriate appendix with the full rated field length limited takeoff gross weight, Step 1, and airport temperature/altitude. Read corrected runway length required.

S16580

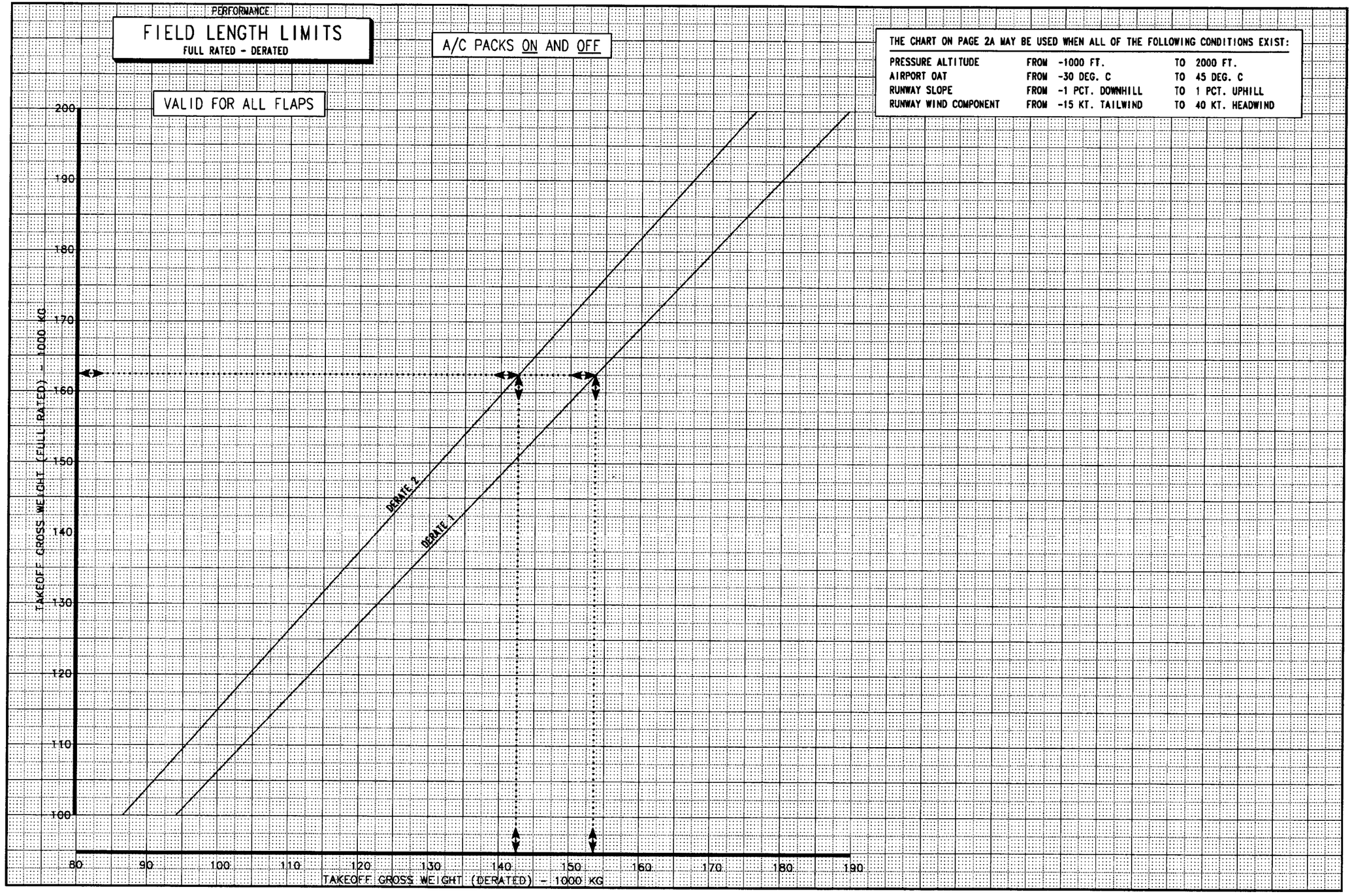
FIELD LENGTH LIMITS
FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR ALL FLAPS

THE CHART ON PAGE 2A MAY BE USED WHEN ALL OF THE FOLLOWING CONDITIONS EXIST:

PRESSURE ALTITUDE	FROM -1000 FT.	TO 2000 FT.
AIRPORT OAT	FROM -30 DEG. C	TO 45 DEG. C
RUNWAY SLOPE	FROM -1 PCT. DOWNHILL	TO 1 PCT. UPHILL
RUNWAY WIND COMPONENT	FROM -15 KT. TAILWIND	TO 40 KT. HEADWIND



P.C.K623402007 APP.43
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D.BACH
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

APPROVED DATE 7/9/91

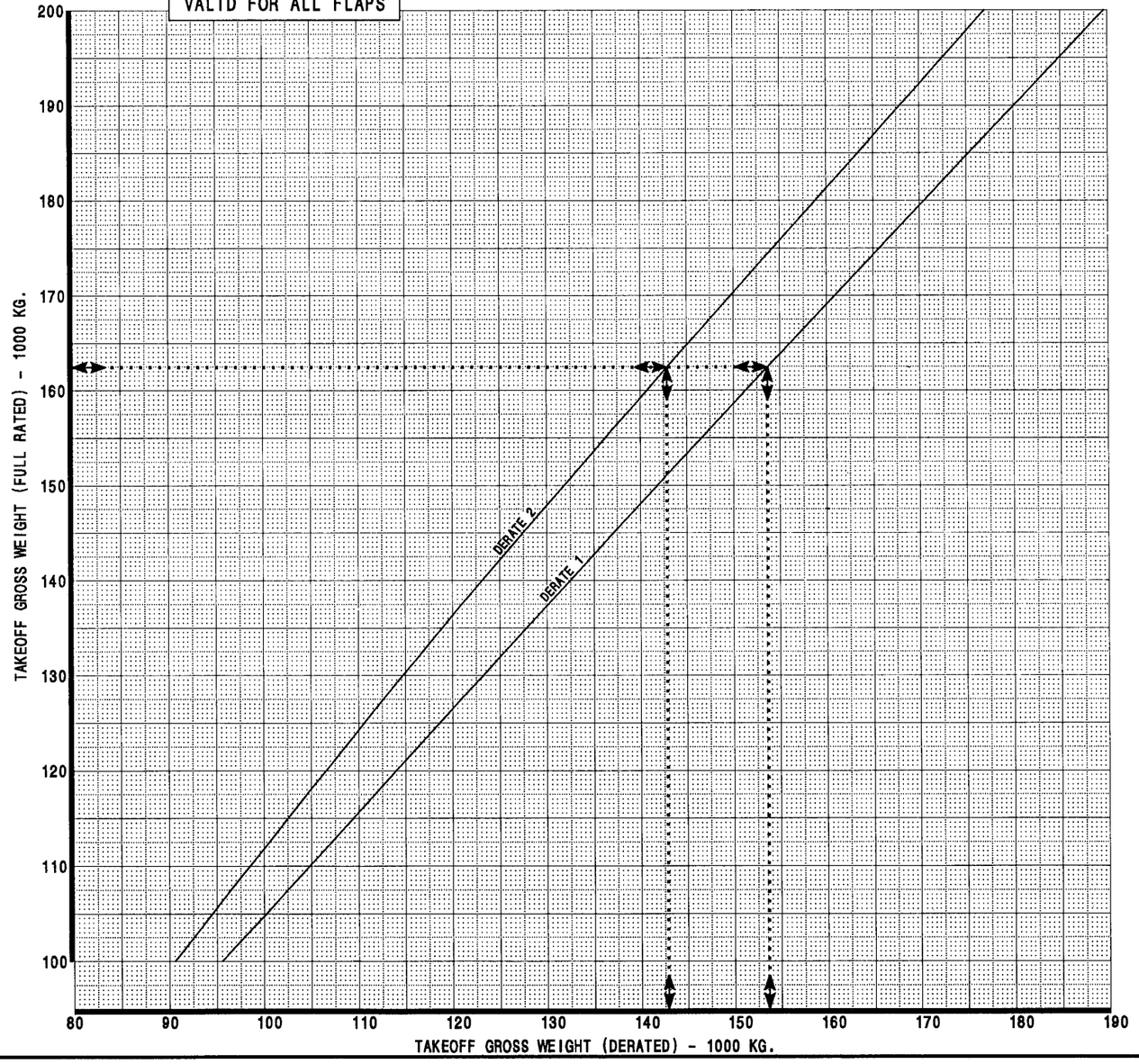
S20149

FIELD LENGTH LIMITS

FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR ALL FLAPS



- THIS CHART IS VALID ONLY WHEN ALL OF THE FOLLOWING CONDITIONS EXIST:

PRESSURE ALTITUDE	FROM -1000 FT.	TO 2000 FT.
AIRPORT OAT	FROM -30 DEG. C	TO 45 DEG. C
RUNWAY SLOPE	FROM -1 PCT. DOWNHILL	TO 1 PCT. UPHILL
RUNWAY WIND COMPONENT	FROM -15 KT. TAILWIND	TO 40 KT. HEADWIND

P.C. K62342A007 APP.43
D041T507-1 PG. 4.4-2A

APPROVED	DATE
G.LARSON	04-24-97

B. BARTEL
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

S20150

SECTION 4.5 - TAKEOFF CLIMB LIMITS

G E N E R A L

The Takeoff Climb Limits (Full Rated - Derated) chart in this section relates derated takeoff climb limited gross weight to full rated takeoff climb limited gross weight at a constant climb gradient. To obtain the takeoff climb limited gross weight for a derated takeoff:

1. Enter the appropriate Takeoff Climb Limits chart in Section 4.5 from the basic manual or appropriate appendix with airport temperature/altitude. Read full rated takeoff climb limited gross weight.

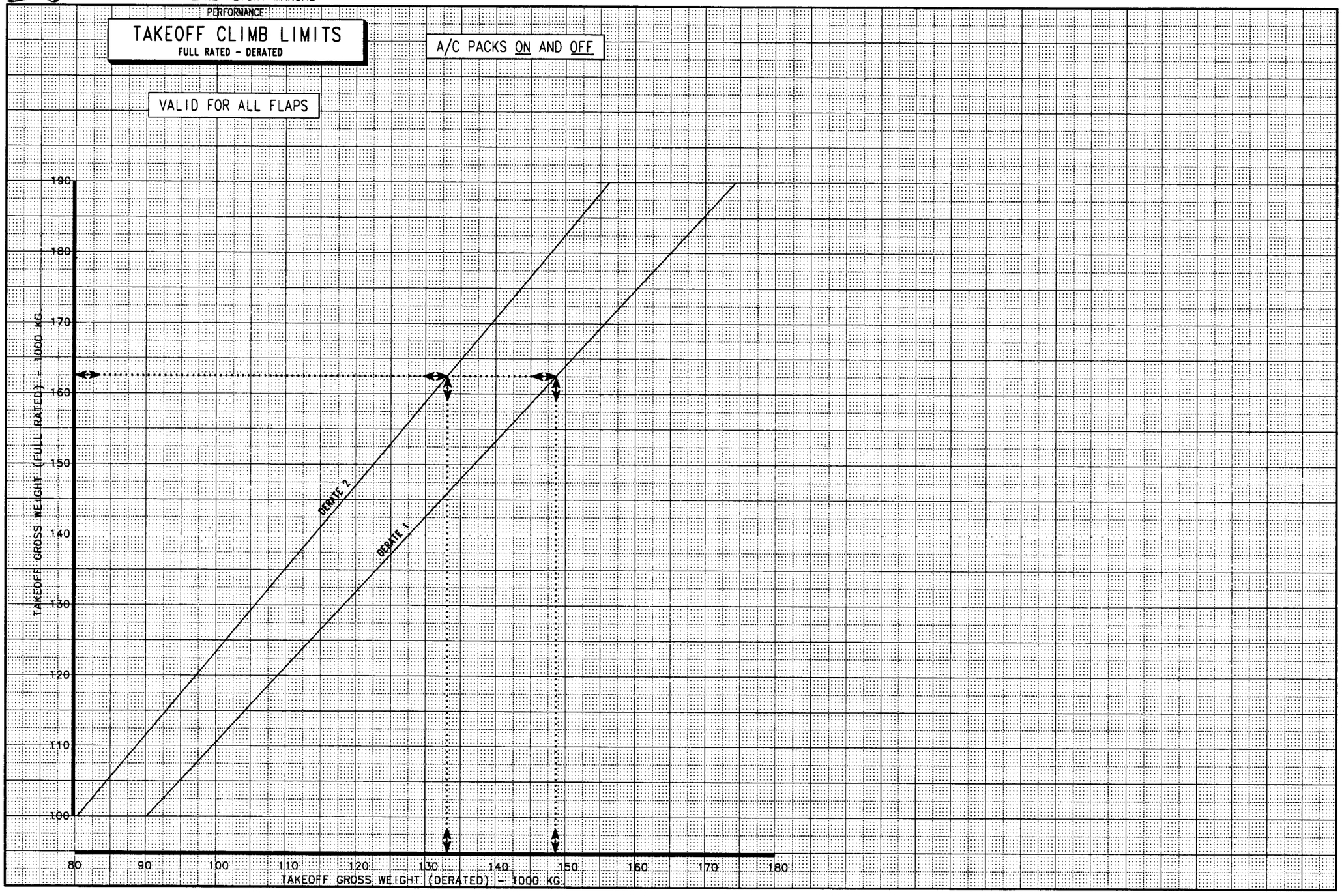
2. Enter the Takeoff Climb Limits (Full Rated - Derated) chart in this section with the full rated takeoff climb limited gross weight, Step 1, and Derate 1 or 2 as appropriate. Read derated takeoff climb limited gross weight.

S16581

TAKEOFF CLIMB LIMITS
FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR ALL FLAPS



P.C. K643502007 APP. 43
D041T507-1 PG. 4.5-2

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

APPROVED	DATE
SHIELDS	4/29/91

S20151

SECTION 4.6 - TIRE SPEED LIMITS

G E N E R A L

Enter the Tire Speed Limits chart in Section 4.6 from the basic manual or appropriate appendix with airport temperature/altitude, flap position and wind component and read full rated tire speed limited gross weight.

Subtract 900 kilograms for Derate 1 and 1900 kilograms for Derate 2 from the full rated tire speed limited gross weight, Step 1, to determine derated tire speed limited gross weight.

S16582

SECTION 4.7 - TAKEOFF SPEEDS

G E N E R A L

The charts and adjustments in this section relate the takeoff speeds, V_1, V_R and V_2, for Derate 1 and 2 to the full rated speeds. See the Takeoff Speed Determination flow diagram in this section as an aid in determining the takeoff speeds and restrictions.

T A K E O F F S P E E D R E S T R I C T I O N S

The scheduled takeoff speeds with Derate 1 or 2 must comply with the FAR requirements discussed in Section 4.7 of the basic manual or appropriate appendix.

BRAKE ENERGY LIMITS

Enter the appropriate Brake Energy Limits chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude, derated takeoff gross weight, runway slope, wind component and braking configuration and read derated brake energy limit, V_{MBE}.

MINIMUM V_1 FOR CONTROL ON THE GROUND, $V_{1\,(MCG)}$

Enter the appropriate Minimum V_1 For Control On the Ground chart in this section with airport temperature/altitude and derated takeoff gross weight and read derated minimum V_1 for control on the ground, $V_{1\,(MCG)}$.

AIR MINIMUM CONTROL SPEED, V_{MCA}

The Air Minimum Control Speed, V_{MCA}, is not a limitation on takeoff speeds. To determine V_{MCA}:

1. Enter the Air Minimum Control Speed chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and read full rated air minimum control speed, V_{MCA}.

2. Subtract 3.0 knots for Derate 1 or 7.5 knots for Derate 2 to determine derated air minimum control speed, V_{MCA}.

ROTATION SPEED, V_R

1. Enter the appropriate Takeoff Speed chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. Read full rated rotation speed, V_R.

2. Add 1.5 knots for Derate 1 or 2.5 knots for Derate 2 to the full rated rotation speed, Step 1, to determine the derated rotation speed, V_R.

S16583

TAKEOFF SPEED RESTRICTIONS (Continued)

TAKEOFF SAFETY SPEED, V_2

1. Enter the appropriate Takeoff Speeds chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. Read full rated takeoff safety speed, V_2.

2. Subtract 0.5 knot for Derate 1 and 2 from the full rated takeoff safety speed, Step 1 to determine the derated takeoff safety speed, V_2.

TAKEOFF DECISION SPEED, V_1 DETERMINATION

The Takeoff Decision Speed Determination Procedure defined in the basic manual or appropriate appendix is modified when determining V_1 for Derates 1 and 2. See the V_1 Determination flow diagram which shows how the charts in this appendix are integrated with the charts of the basic manual or appropriate appendix to obtain the desired takeoff decision speed.

The following steps correspond to the identified points on the V_1 Determination flow diagram.

1. Determine the engine inoperative corrected takeoff distance available per Section 4.3 in the basic manual or appropriate appendix.

2. Determine the corrected runway length required for the derated gross weight.

   a) Enter the Field Length Limits (Full Rated - Derated) chart in Section 4.4 of this appendix with the derated takeoff gross weight and appropriate derate rating. Read full rated takeoff gross weight.

   b) Enter the appropriate Field Length Limits chart in Section 4.4 of the basic manual or appropriate appendix with airport temperature/altitude and full rated takeoff gross weight, Step 2(a). Read corrected runway length required.

3. Determine derated rotation speed.

   a) Enter the appropriate Takeoff Speeds chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. Read full rated rotation speed.

   b) Add 1.5 knot for Derate 1 or 2.5 knots for Derate 2 to the full rated rotation speed, Step 3(a), to determine the derated rotation speed, V_R.

S16585

TAKEOFF DECISION SPEED, V_1 DETERMINATION (Continued)

4. Determine the corrected accelerate-stop distance available per Section 4.3 in the basic manual or appropriate appendix.

5. Determine full rated $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$.

   a) Enter the Runway Length and V_1 Adjustment chart in Section 4.3 of the basic manual or appropriate appendix with engine inoperative corrected takeoff distance available, Step 1, and corrected runway length required, Step 2(b). Read full rated $(V_1/V_R)_{MIN}$.

   b) Enter the Runway Length and V_1 Adjustment chart in Section 4.3 of the basic manual or appropriate appendix with corrected accelerate-stop distance available, Step 4, and corrected runway length required, Step 2(b). Read full rated $(V_1/V_R)_{MAX}$.

6. Determine derated $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$.

   a) Enter the V_1 Adjustment (Full Rated - Derated) chart in this section with full rated (V_1/V_R)MIN, Step 5(a), and the appropriate derate rating. Read derated $(V_1/V_R)_{MIN}$.

   b) Enter the V_1 Adjustment (Full Rated - Derated) chart in this section with full rated (V_1/V_R)MAX, Step 5(b), and the appropriate derate rating. Read derated $(V_1/V_R)_{MAX}$.

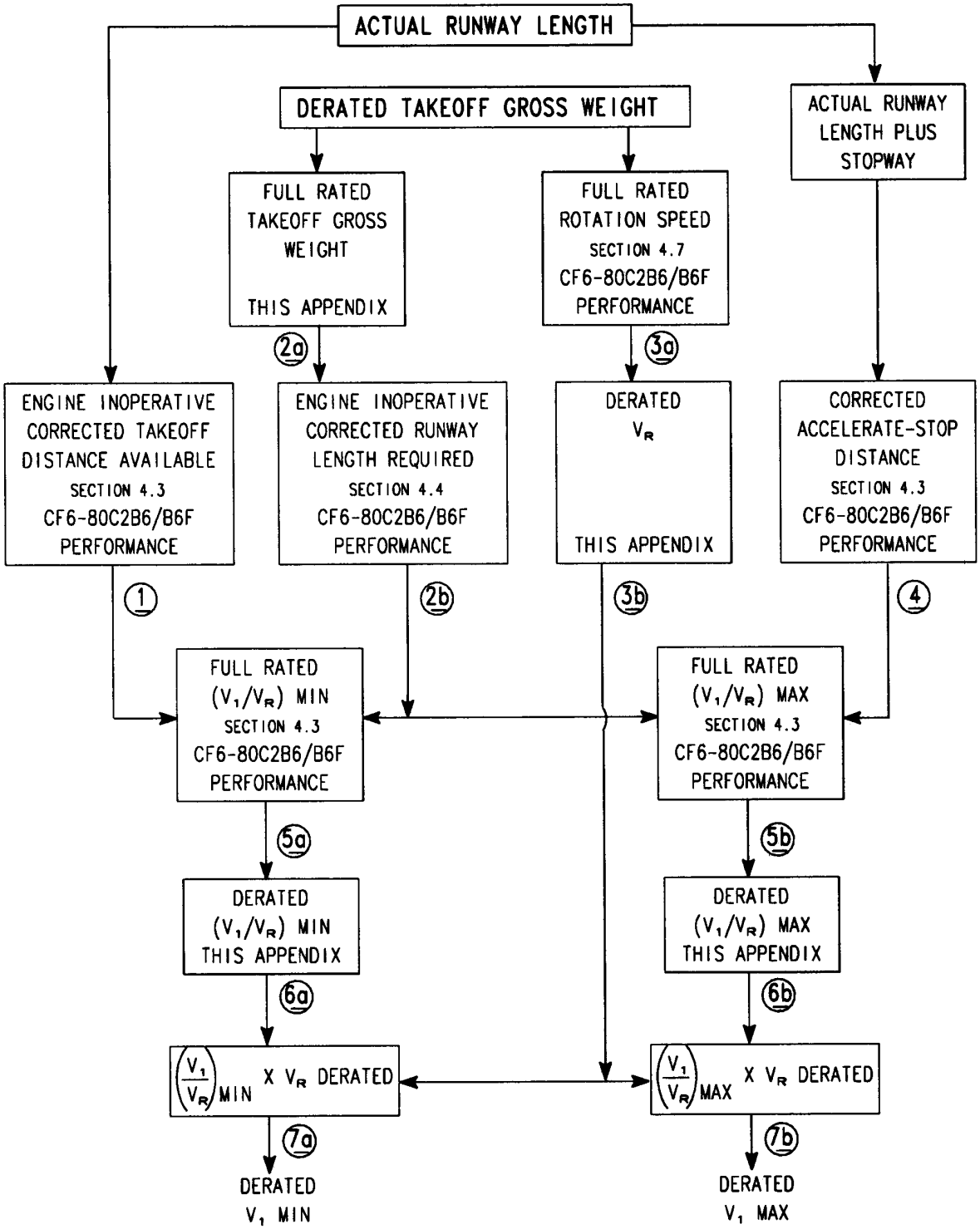
7. Determine derated $V_{1\ MIN}$ and $V_{1\ MAX}$, the lowest and highest values of V_1 that will allow a derated takeoff from the actual runway, at the takeoff gross weight. See Takeoff Speed Restrictions for other possible limitations.

   a) Multiply derated V_R, Step 3(b), by derated $(V_1/V_R)_{MIN}$, Step 6(a), to obtain derated $V_{1\ MIN}$.

   b) Multiply derated V_R, Step 3(b), by derated $(V_1/V_R)_{MAX}$, Step 6(b), to obtain derated $V_{1\ MAX}$.

S16632

V_1 DETERMINATION PROCEDURE



K643704000

J.PETERS

S27336

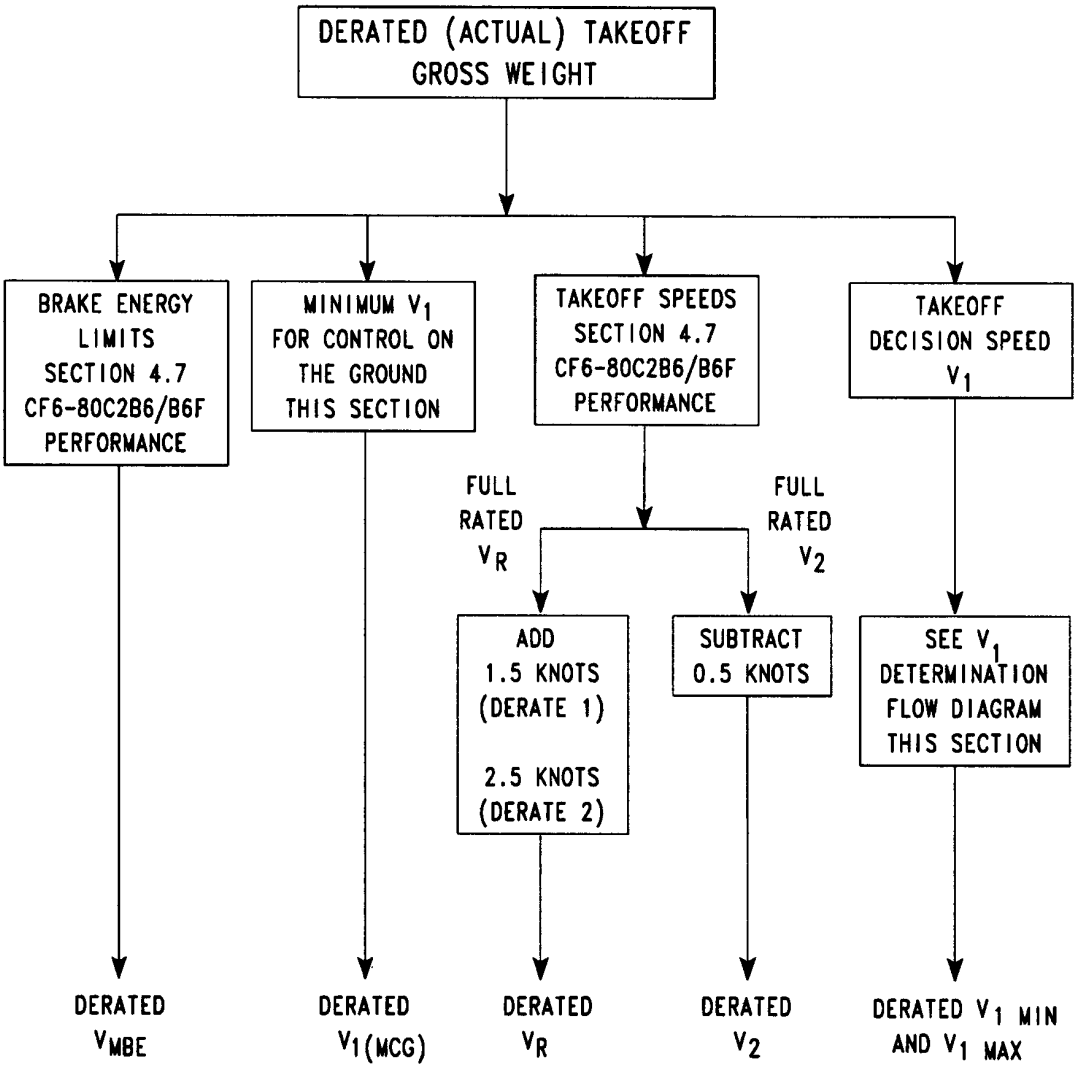
TAKEOFF SPEEDS

SELECTION OF V1

The selection of the takeoff decision speed, V1, from an allowable range must be made for each scheduled takeoff. See Section 4.7 of the basic manual or appropriate appendix for a discussion of the factors to be considered in making this selection.

S16633

TAKEOFF SPEED DETERMINATION PROCEDURE



K643706000

J.PETERS

S27308

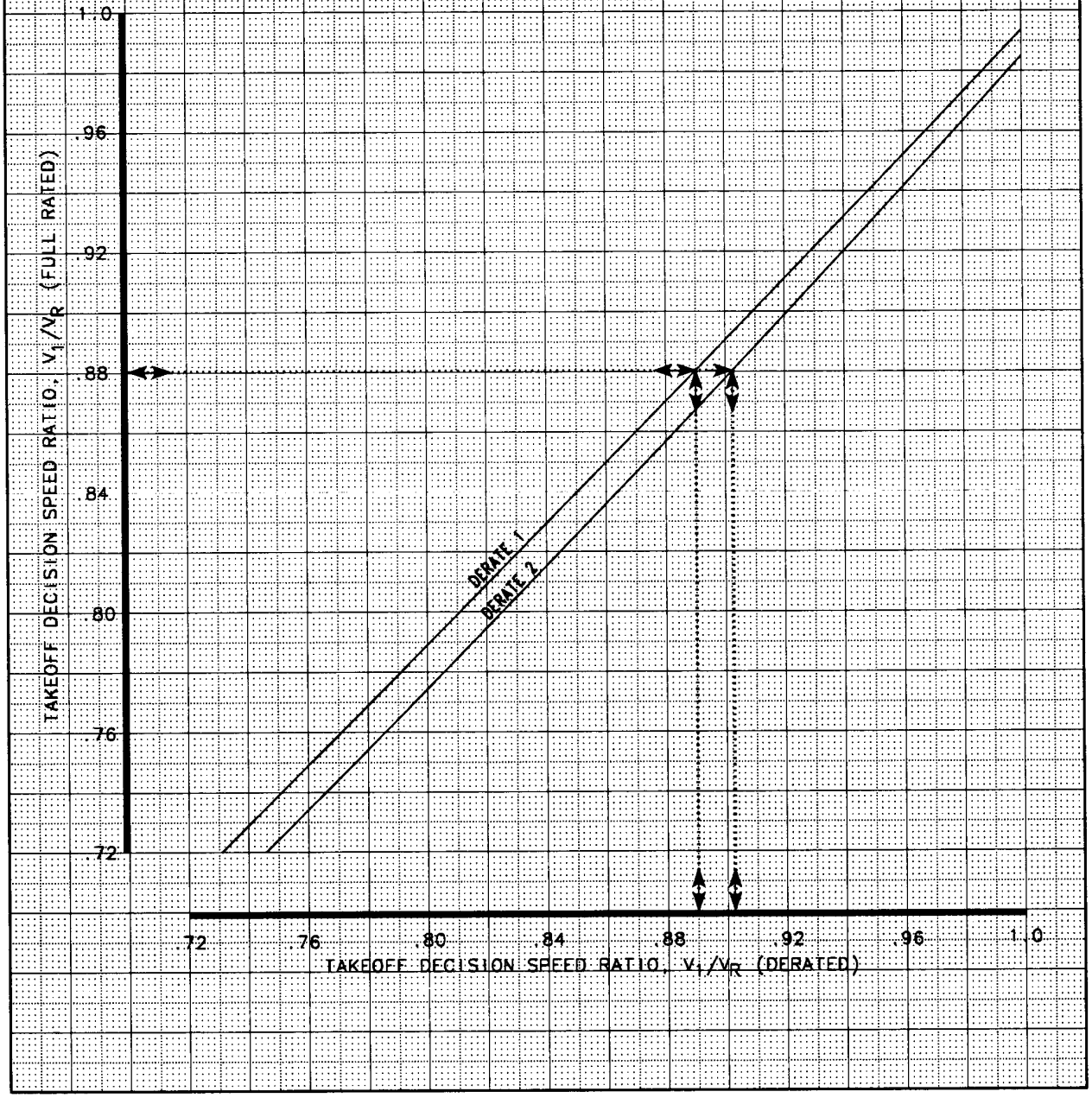
PERFORMANCE

V_1 ADJUSTMENT

FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR ALL FLAPS



P.C. K643707004 APP 43
D041T507-1 PG. 4.7-7

APPROVED	DATE
SHIELDS	4/29/91

L. SAMUELS

767-300ER

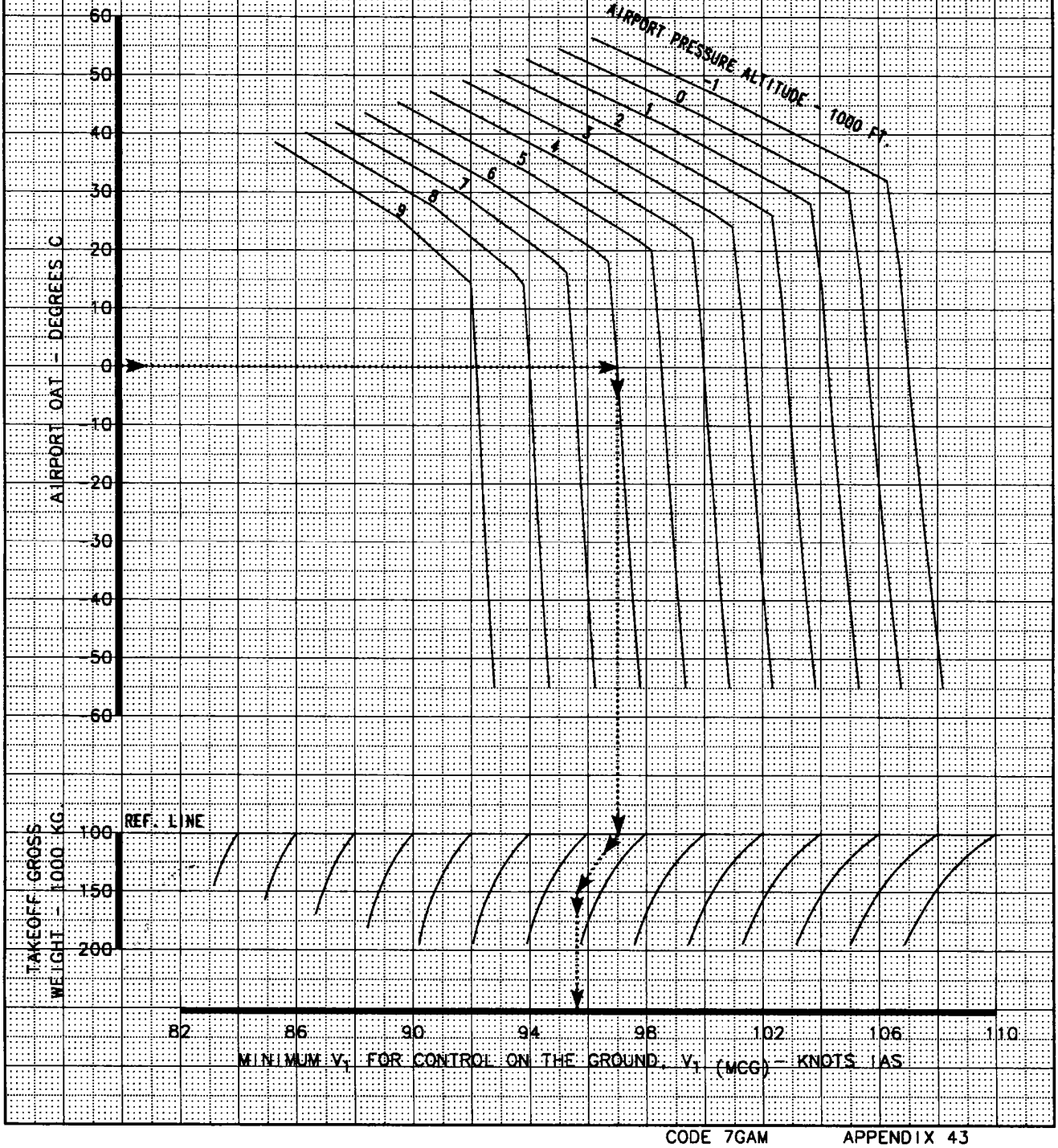
CF6-80C2B6/B6F
DERATES 1 & 2

S27309

MINIMUM V_1 FOR CONTROL ON THE GROUND

V_1 (MCG)

DERATE 1



P.C.K643708007 APP.43
D041T507-1 PG. 4.7-8

APPROVED	DATE
	5/13/91

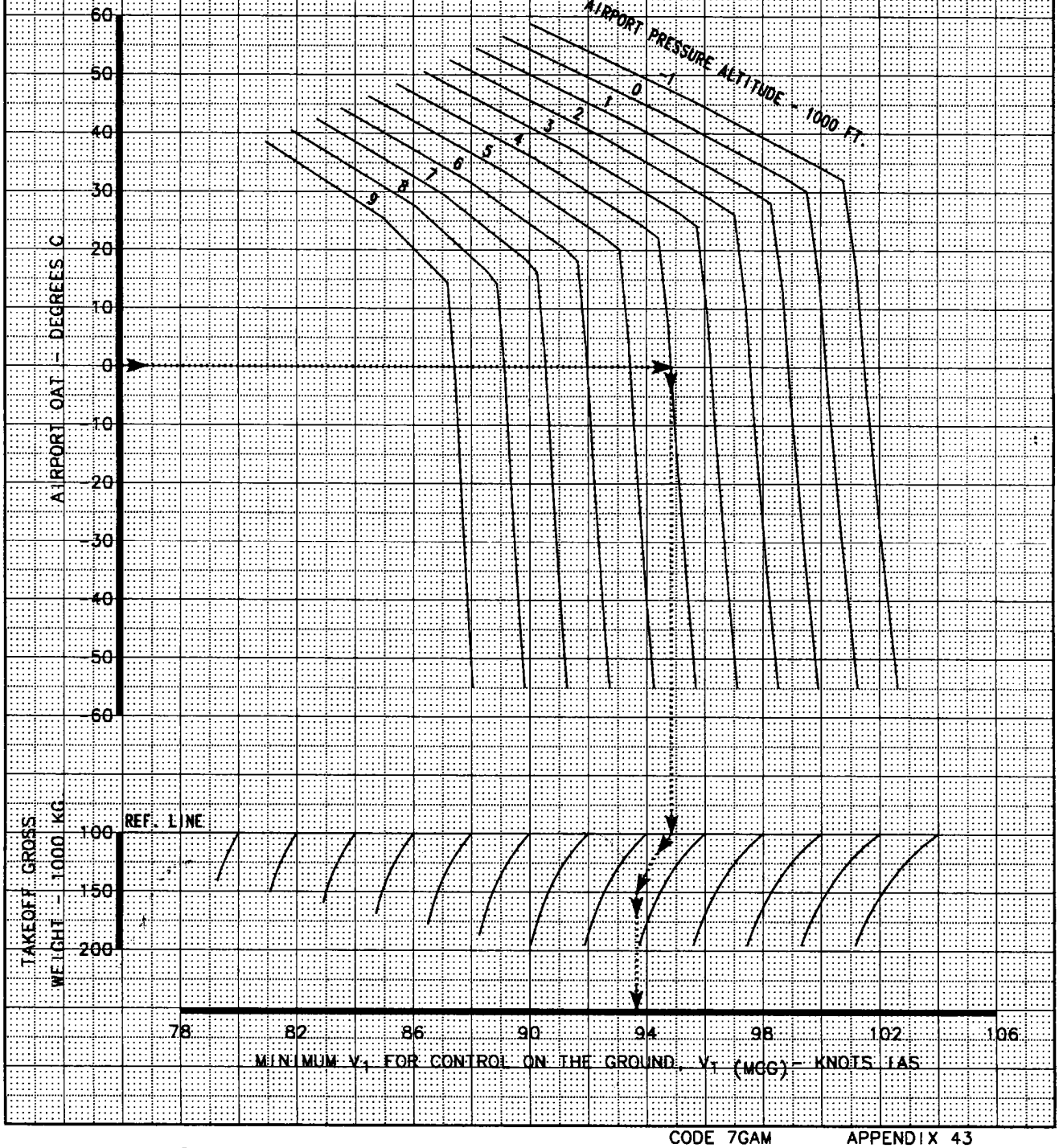
D. BACH
767-300ER
CF6-80C2B6/B6F
DERATE 1

S16664

MINIMUM V_1 FOR CONTROL ON THE GROUND

V_1 (MCG)

DERATE 2



P.C.K64370907 APP.43
D041T507-1 PG. 4.7-9

APPROVED	DATE
K. Swan	5/3/91

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATE 2

S16666

SECTION 4.9 - OBSTACLE CLEARANCE

G E N E R A L

Two Procedures are presented to determine the allowable derated takeoff gross weight when there are obstacles in the flight path. Procedure 1 consists of a simple correction to the full rated allowable takeoff gross weight and results in a conservative derated takeoff gross weight for obstacle clearance. Procedure 2 is a more detailed analysis which allows the construction of the derated flight path and thereby results in a less conservative derated obstacle limited takeoff gross weight.

O B S T A C L E C L E A R A N C E A N A L Y S I S P R O C E D U R E

Procedure 1

Procedure 1 assumes that the allowable full rated takeoff gross weight based on field length, tire speed, takeoff climb, obstacle clearance or structural limits has been determined using the basic manual or appropriate appendix. Enter the Obstacle Clearance Limits (Full Rated - Derated) chart in this Section, with the full rated obstacle clearance limited gross weight if available, or the allowable takeoff gross weight, and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

Procedure 2

Procedure 2 is a modification of the obstacle clearance analysis in Section 4.9 from the basic manual or appropriate appendix. Charts and adjustments from this section, together with charts from Section 4.4 and 4.5 of this appendix, are used in conjunction with the obstacle clearance charts from Section 4.9 from the basic manual or appropriate appendix. This section provides new derated Obstacle Distance Trade Line charts and adjustments to Maximum Level-Off Height and the End of Second Segment Climb Distance.

1. Determine Reference Zero.

   a) Enter the Field Length Limits (Full Rated - Derated) chart, in Section 4.4 of this appendix, with the lightest derated gross weight determined by climb limits, tire speed limits, structural limits, or operational requirements and Derate 1 or Derate 2 as appropriate. Read the full rated field length limited takeoff gross weight.

   b) With the full rated gross weight from 1(a) determine the location of Reference Zero relative to the brake release end of the runway using Section 4.9 from the basic manual or appropriate appendix.

S16635

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

2. Adjust Obstacle Distance and Height to Reference Zero.

Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

NOTE: When using the Gradient Corrections (Takeoff Climb) chart in Section 4.9 of the basic manual or appropriate appendix, the following corrections must be applied:

1) For each 5 knots of tailwind, subtract 0.05 percent from the full rated corrected gross gradient to obtain the derated corrected gross gradient.

2) For each 5 knots of tailwind, add 0.05 percent to the derated gross gradient to obtain the full rated gross gradient.

3. Corrected Gross Gradient Available.

a) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix with the derated gross weight used to determine Reference Zero, Step 1, and Derate 1 or Derate 2 as appropriate. Read the full rated takeoff gross weight.

b) With the full rated gross weight, Step 3(a), determine the corrected gross gradient available using Section 4.9 from the basic manual or appropriate appendix.

4. Close-In Obstacles.

a) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the full rated obstacle limited takeoff gross weight.

NOTE: To construct an obstacle distance trade line on the Close-In Obstacle Clearance chart, if required, use the appropriate Obstacle Distance Trade Line Chart in this Section.

b) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix with the full rated obstacle limited takeoff gross weight, Step 4(a), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

S16636

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

5. Distant Obstacles.

a) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix.

NOTE: Adjust distance to the end of extended second segment, as read in the basic manual or appropriate appendix, by subtracting 1900 feet for Derate 1 or 3900 feet for Derate 2.

Second Segment.

b) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the full rated obstacle limited takeoff gross weight.

NOTE 1: Find the limiting maximum level-off height by entering the Maximum Level-Off Height (Full Rated - Derated) chart, this section, with the full rated maximum level-off height determined from the basic manual or appropriate appendix and Derate 1 or Derate 2 as appropriate. Read derated maximum level-off height.

NOTE 2: To construct an obstacle distance trade line on the Distant Obstacle Clearance chart, if required, use the appropriate Obstacle Distance Trade Line Chart in this section.

c) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight, Step 5(b), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

S16637

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

6. Extended Second Segment.

Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

a) The derated final segment gradient capability required for extended second segment is 3.00 percent for flaps 5, 3.50 percent for flaps 15 and 4.10 percent for flaps 20.

b) Find the derated final takeoff climb gradient by entering the Final Takeoff Climb (Full Rated-Derated) chart, this section, with the full rated final takeoff climb gradient obtained directly from the Final Takeoff Climb Chart in the basic manual or appropriate appendix. Read derated final takeoff climb gradient. Apply the appropriate correction (bank angle, wind and gross height) if required, using the Gradient Corrections (Final Takeoff Climb) chart in the basic manual or appropriate appendix.

c) Continue with step 6(c) procedure of Section 4.9 from the basic manual or appropriate appendix.

7. Maximum Gross Weight for Extended Second Segment.

a) To determine the maximum gross weight for extended second segment:

1) Enter the Final Takeoff Climb (Full Rated-Derated) chart, this section, with derated final segment gradient capability required for extended second segment, given in step 6(a). Read equivalent full rated final segment gradient capability required for extended second segment.

2) Enter the appropriate Final Takeoff Climb chart in the basic manual or appropriate appendix with the equivalent full rated final segment gradient capability required for extended second segment, step 7(a)(1) and airport temperature/altitude. Read maximum derated gross weight for extended second segment.

b) Follow the procedure of Section 4.9 step 7(a) and 7(b) of the basic manual or appropriate appendix to determine the full rated obstacle clearance limited gross weight.

c) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight from step 7(b), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

S16638

O B S T A C L E C L E A R A N C E A N A L Y S I S
P R O C E D U R E (Continued)

8. Obstacle in Third Segment.

a) Follow the procedure of Section 4.9 from the basic manual or appropriate appendix to determine the full rated obstacle clearance limited gross weight.

NOTE: When constructing the Maximum Level-Off Height line on the Distant Obstacle Clearance chart use the Maximum Level-Off Height (Full Rated - Derated) chart, in this section.

b) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight, Step 8(a), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

9. Obstacle in Final Segment.

Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

NOTE:

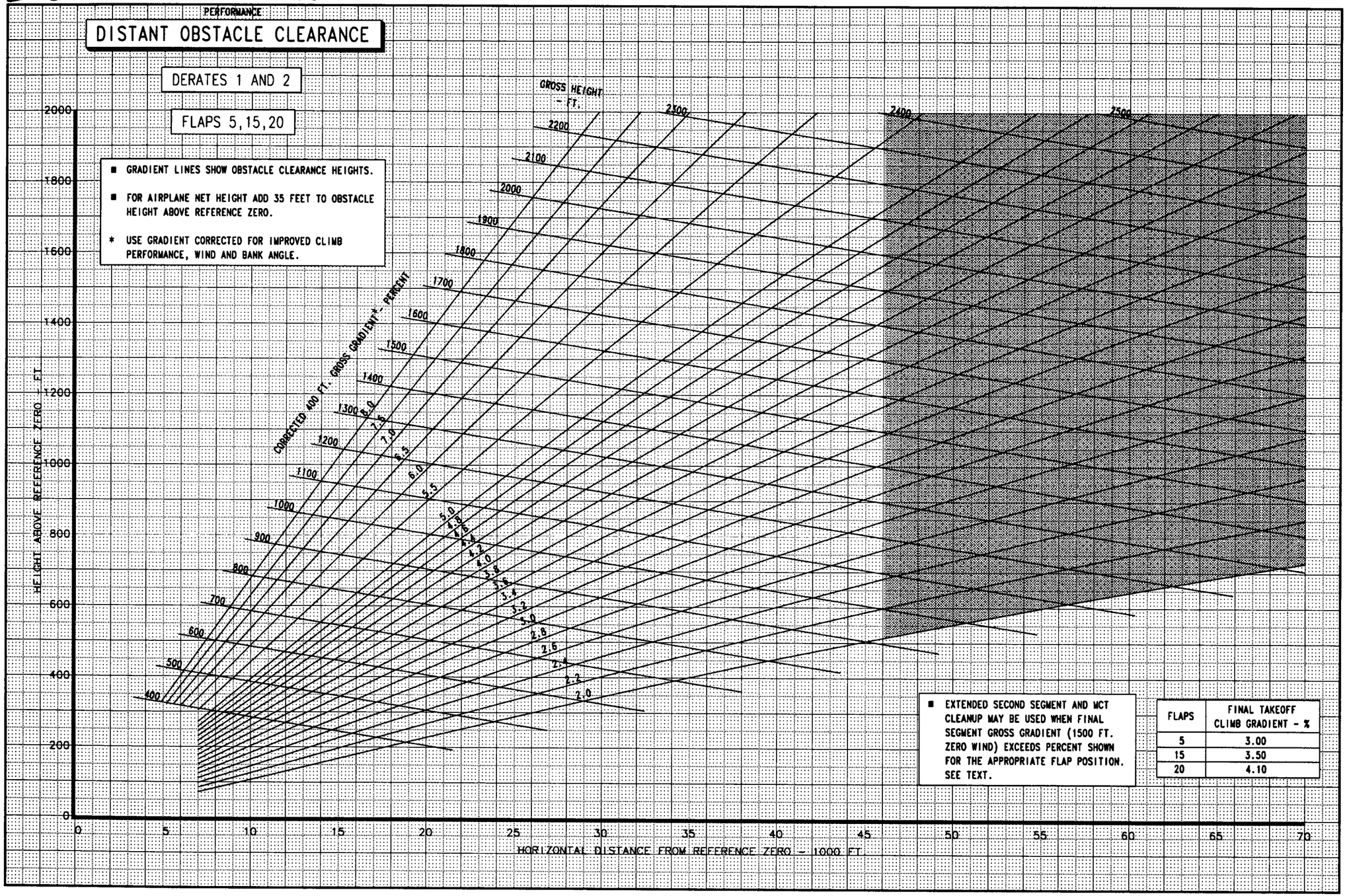
Find the derated final takeoff climb gradient by entering the Final Takeoff Climb (Full Rated-Derated) chart, this section, with the full rated final takeoff climb gradient obtained directly from the Final Takeoff Climb Chart in the basic manual or appropriate appendix. Read derated final takeoff climb gradient. Apply the appropriate correction (bank angle, wind and gross height) if required, using the Gradient Corrections (Final Takeoff Climb) chart in the basic manual or appropriate appendix.

DISTANT OBSTACLE CLEARANCE

DERATES 1 AND 2

FLAPS 5,15,20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.
- * USE GRADIENT CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND AND BANK ANGLE.



- EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL SEGMENT GROSS GRADIENT (1500 FT. ZERO WIND) EXCEEDS PERCENT SHOWN FOR THE APPROPRIATE FLAP POSITION. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GRADIENT - %
5	3.00
15	3.50
20	4.10

P.C.K64390604 APP.43
D041T507-1 PG. 4.9-6

APPROVED	DATE
SHIELDS	9/29/91

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

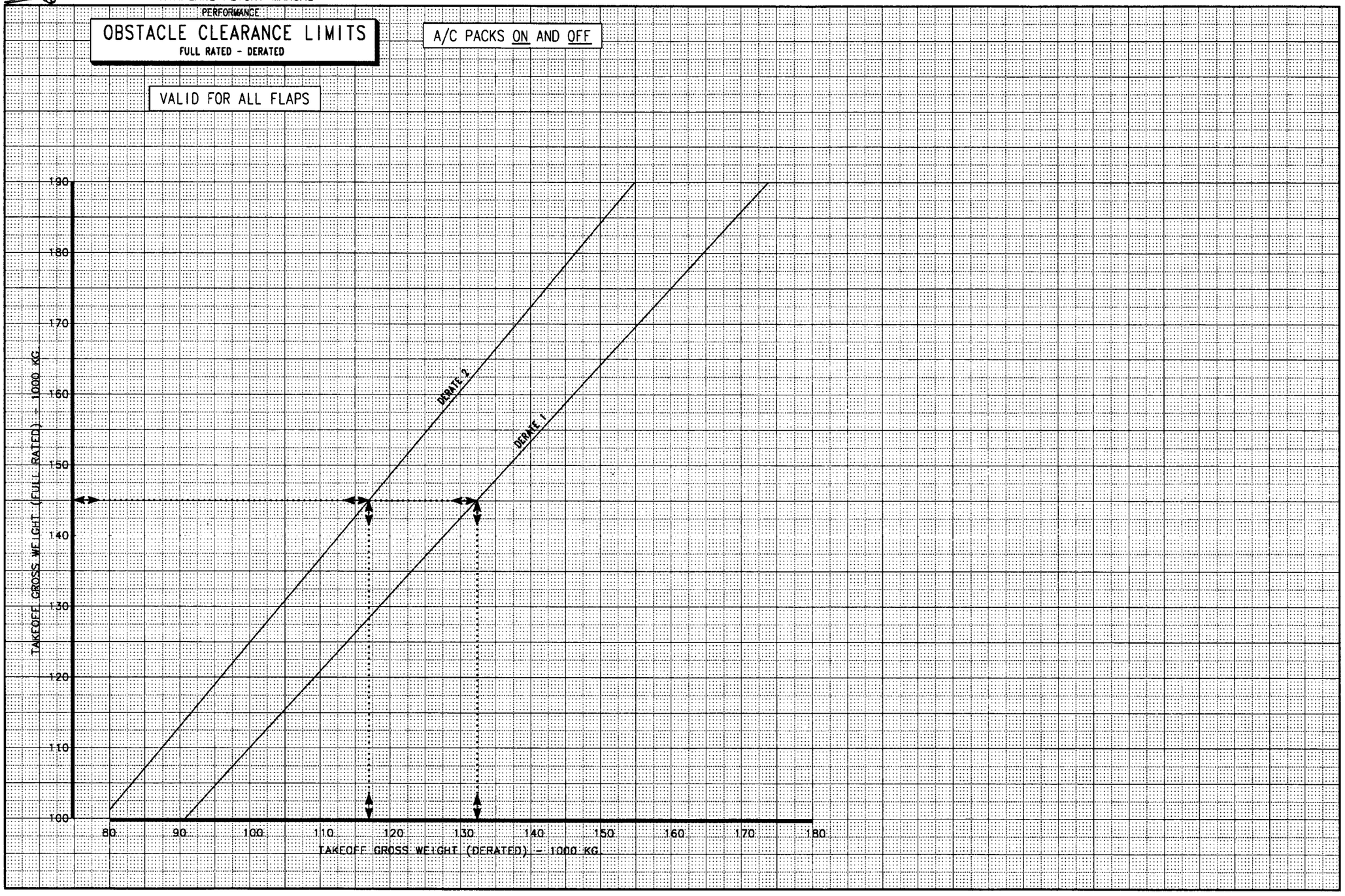
S25715

OBSTACLE CLEARANCE LIMITS

FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR ALL FLAPS



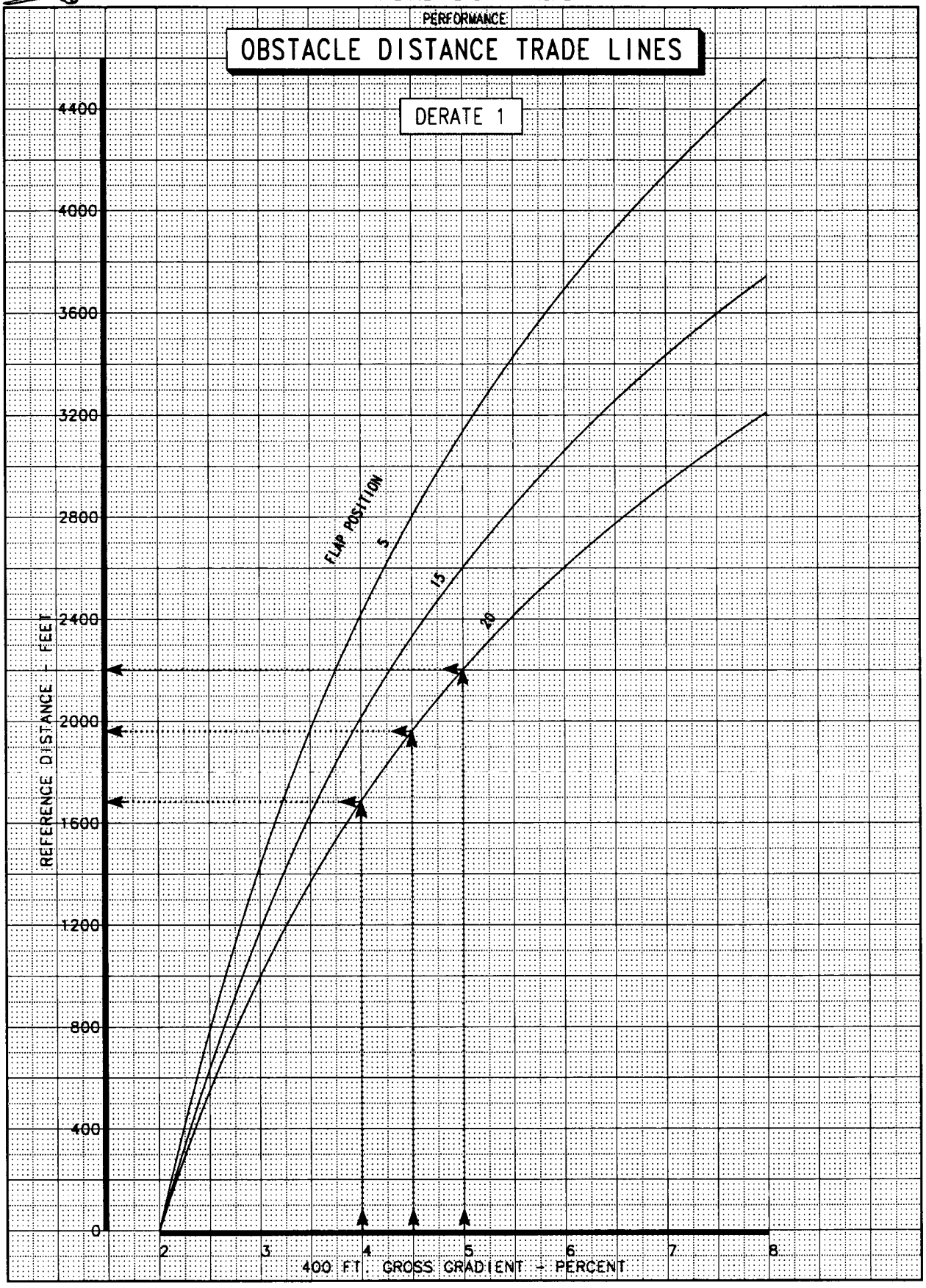
P.C. K643907007 APP. 43
D041T507-1 PG. 4.9-7

APPROVED	DATE
SHIELDS	4/11/91

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

S20152

OBSTACLE DISTANCE TRADE LINES



P.C. K643908004 APP. 43
D041T507-1 PG. 4.9-8

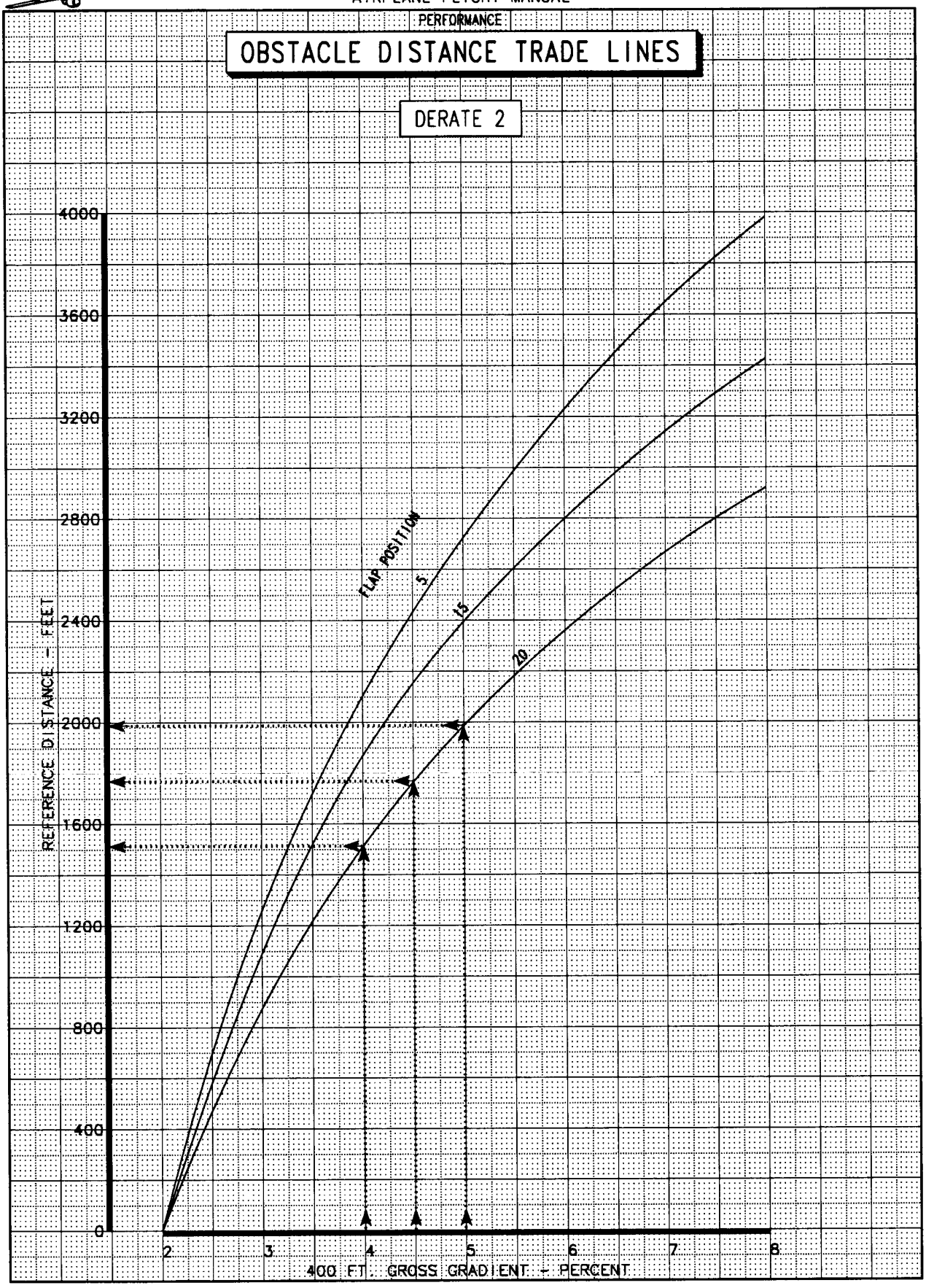
APPROVED	DATE
SHIELDS	4/29/91

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATE 1

S27317

OBSTACLE DISTANCE TRADE LINES

DERATE 2



P.C. K643909004 APP.43
D041T507-1 PG. 4.9-9

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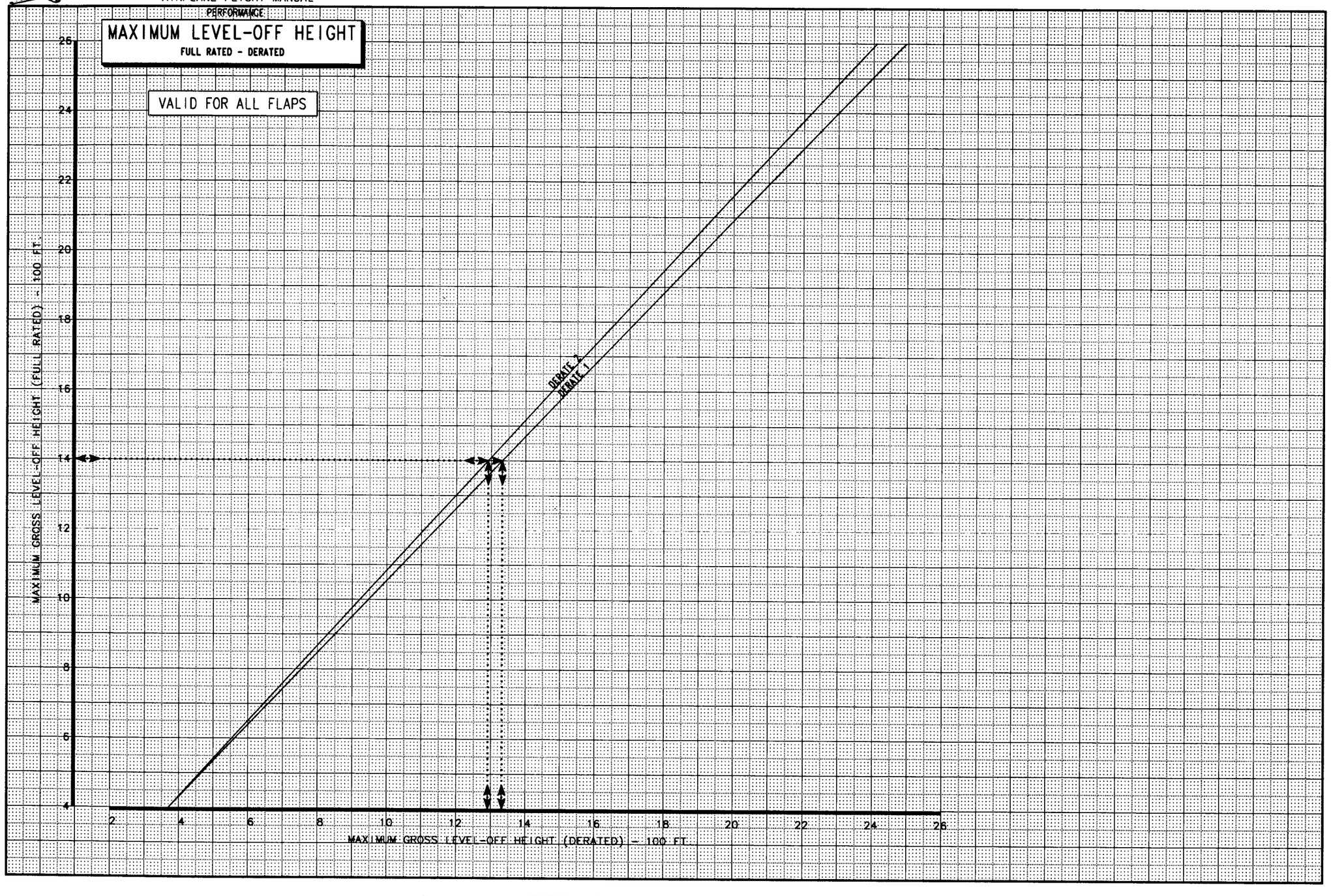
D. BACH
767-300ER
CF6-80C2B6/B6F
DERATE 2

S27320

MAXIMUM LEVEL-OFF HEIGHT

FULL RATED - DERATED

VALID FOR ALL FLAPS



P.C. K643910004 APP. 43
D041T507-1 PG. 4.9-10

D. BACH

767-300ER
CF6-80C2B6/B6F DERATES 1 & 2

APPROVED	DATE
SHIELDS	4/29/91

S25719

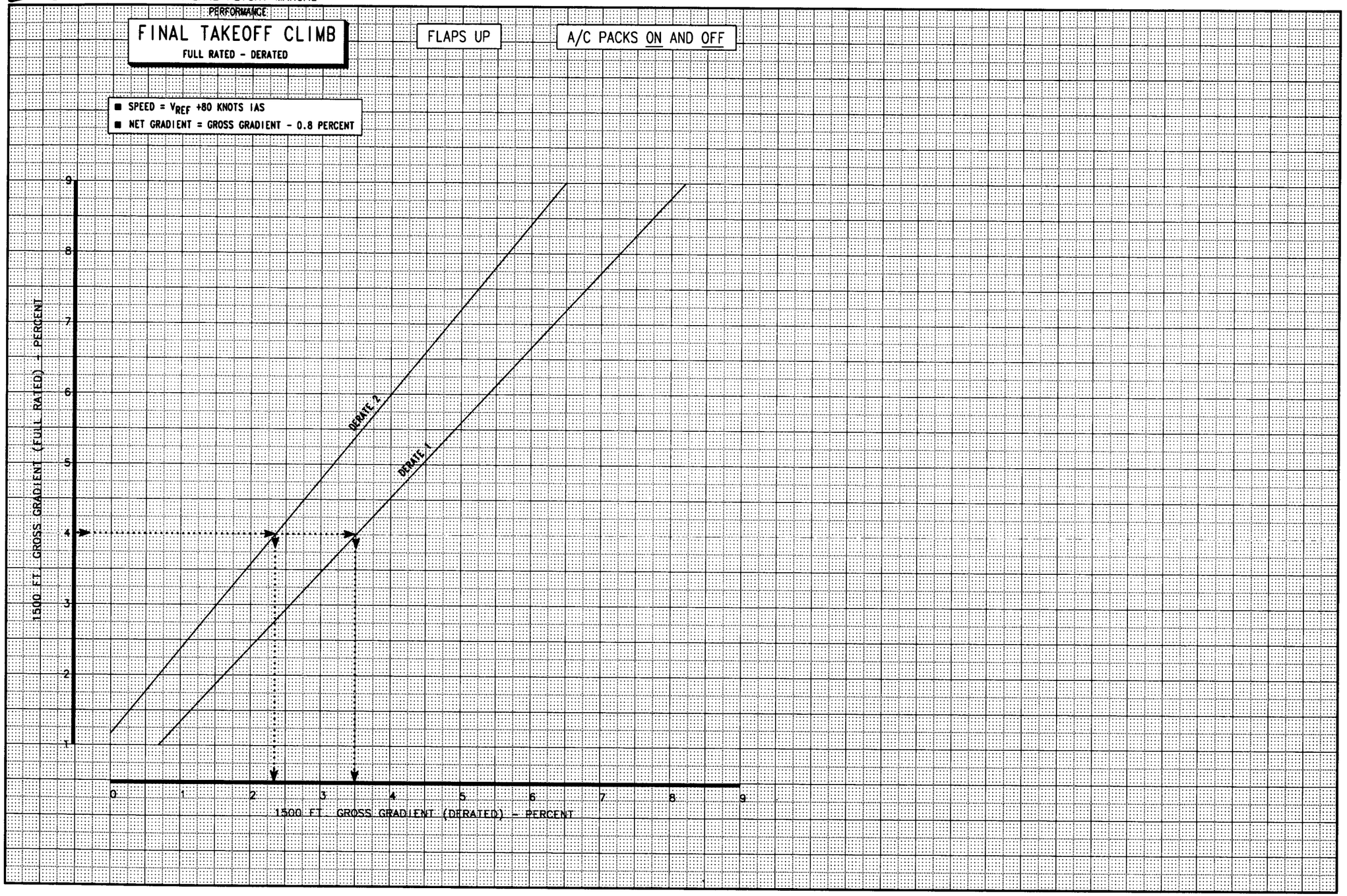
FINAL TAKEOFF CLIMB

FULL RATED - DERATED

FLAPS UP

A/C PACKS ON AND OFF

- SPEED = V_{REF} +80 KNOTS IAS
- NET GRADIENT = GROSS GRADIENT - 0.8 PERCENT



P.C.K643911004 APP.43
D041T507-1 PG. 4.9-11

APPROVED	DATE
SHIELDS	4/19/91

D. BACH
767-300ER
CF6-80C2B6/B6F
DERATES 1 & 2

S25721

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

The procedure for determining the maximum allowable derated takeoff weight when using Improved Climb Performance is unchanged from the full-rated procedure described in Section 4.10 from the basic manual or appropriate appendix. The appropriate Improved Climb Performance chart may be used directly with derated takeoff weight limits (field length, climb, and tire) and derated takeoff speeds. (V_1, V_R, and V_2).

SECTION 4.12 - APPROACH AND LANDING CLIMB

GENERAL

The charts in this section relate approach and landing performance for derate operation to the full rated thrust performance in Section 4.12 from the basic manual or appropriate appendix.

APPROACH AND LANDING CLIMB

To obtain approach and landing climb gradients for derate operation:

1. Enter the appropriate Approach Climb chart and appropriate Landing Climb chart in Section 4.12 from the basic manual or appropriate appendix with airport temperature/altitude and derated gross weight. Apply the required adjustments and determine full rated gross gradient.

2. Enter the Approach Climb (Full Rated - Derated) chart and Landing Climb (Full Rated - Derated) chart in this section with the full rated gradients, Step 1, and Derate 1 or 2 as appropriate. Read derated approach climb gradient and derated landing climb gradient.

3. To obtain the approach climb and landing climb speed schedule for derate operation enter the Speed Schedule sub-chart on the appropriate Approach Climb chart and Landing Climb chart in Section 4.12 from the basic manual or appropriate appendix with the derated gross weight.

MAXIMUM LANDING WEIGHT, CLIMB LIMITS

To obtain maximum landing weight, based on climb limits, for derate operation:

1. Enter the appropriate Maximum Landing Weight, Climb Limits chart in Section 4.12 from the basic manual or appropriate appendix with airport temperature/altitude. Determine full rated maximum landing climb limited gross weight.

2. Enter the Maximum Landing Weight, Climb Limits (Full Rated - Derated) chart in this section with the full rated maximum landing climb limited gross weight, Step 1, and Derate 1 or 2 as appropriate. Read derated maximum landing climb limited gross weight.

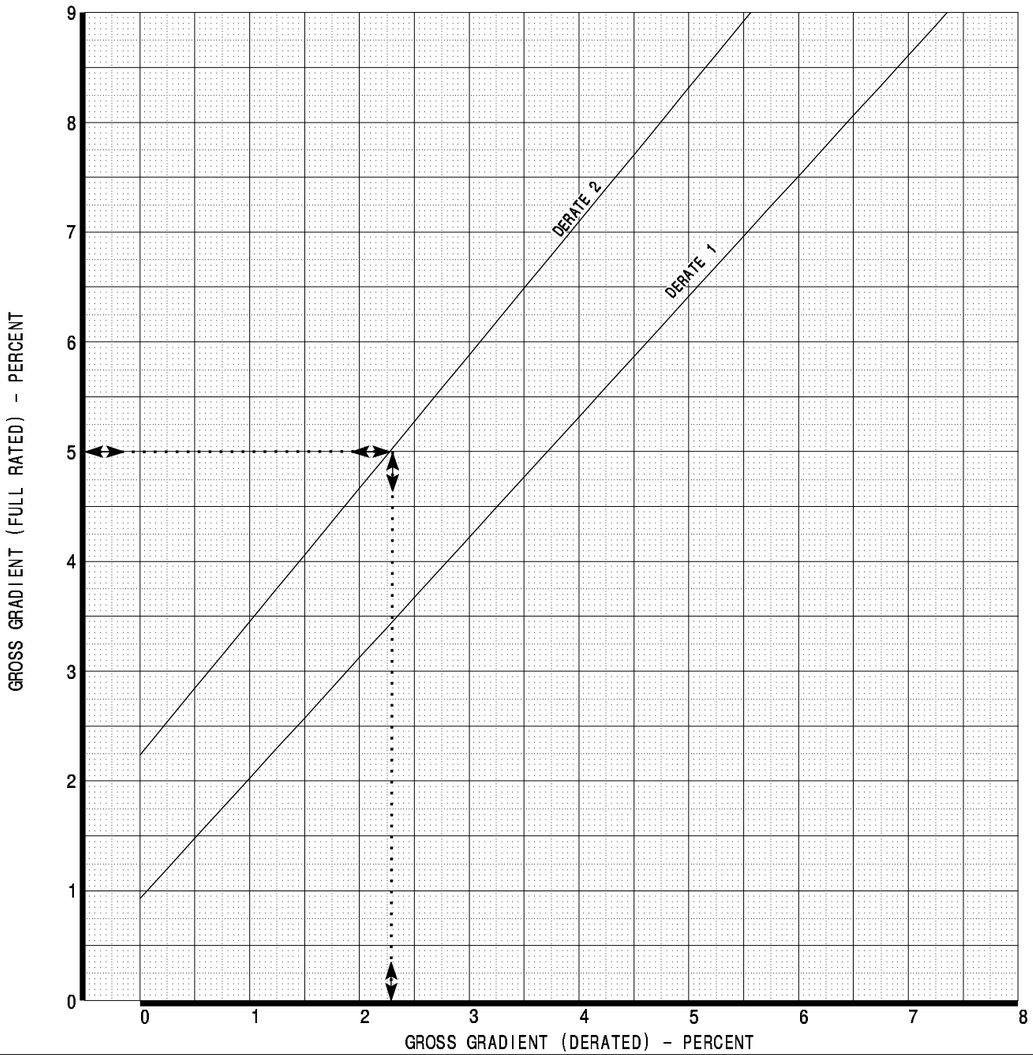
S16641

PERFORMANCE

APPROACH CLIMB

FULL RATED - DERATED

FLAPS 20



P.C. K643C02A14 APP. 43
D041T507-1 PG. 4.12-2A

APPROVED	DATE
DUTTON	03-06-02

W. VASSER

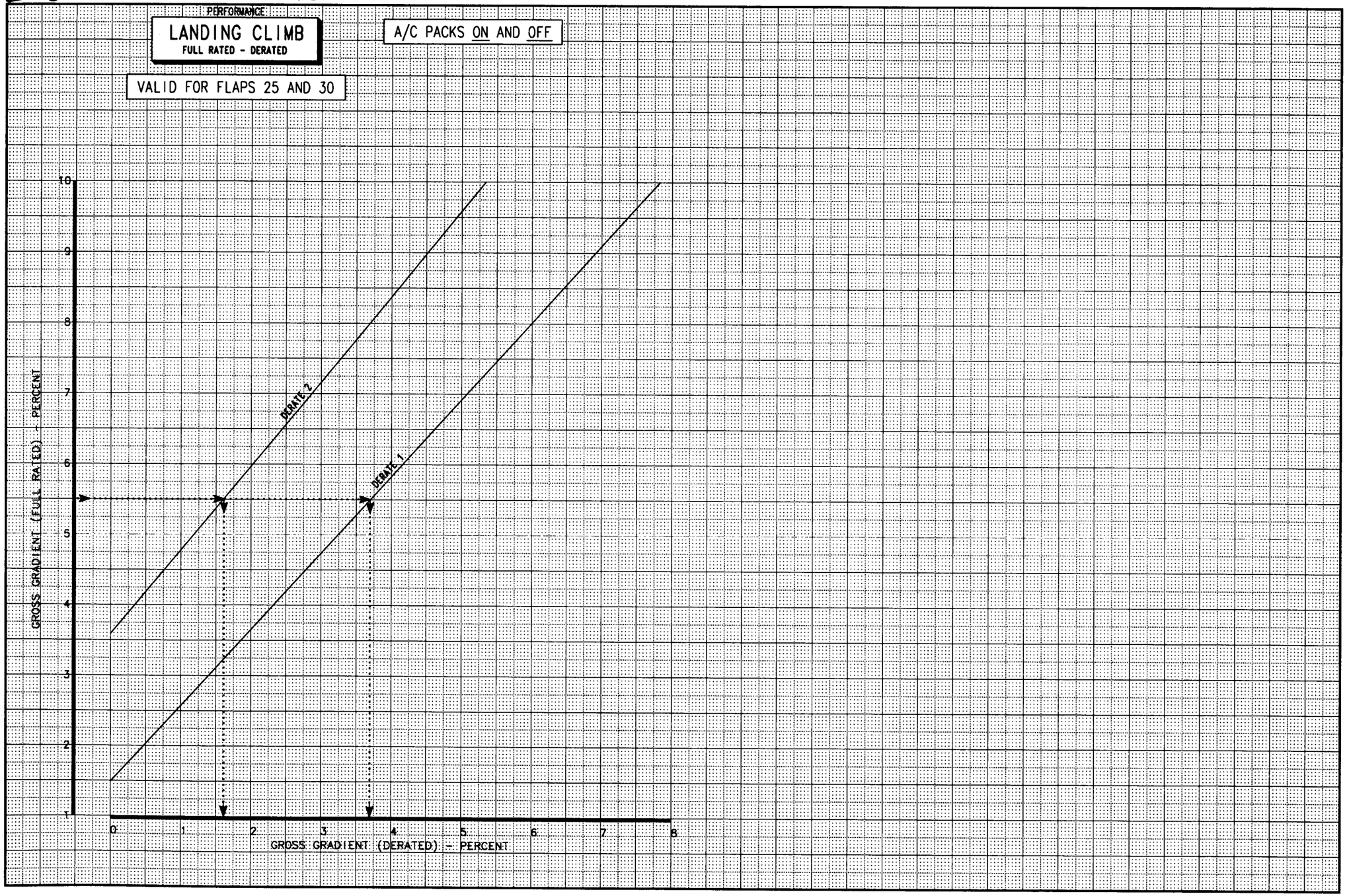
767-300ER

CF6-80C2B6/B6F
DERATES 1 AND 2

LANDING CLIMB
FULL RATED - DERATED

A/C PACKS ON AND OFF

VALID FOR FLAPS 25 AND 30



P.C. K643C03004 APP. 43
D0411T507-1 PG. 4.12-3

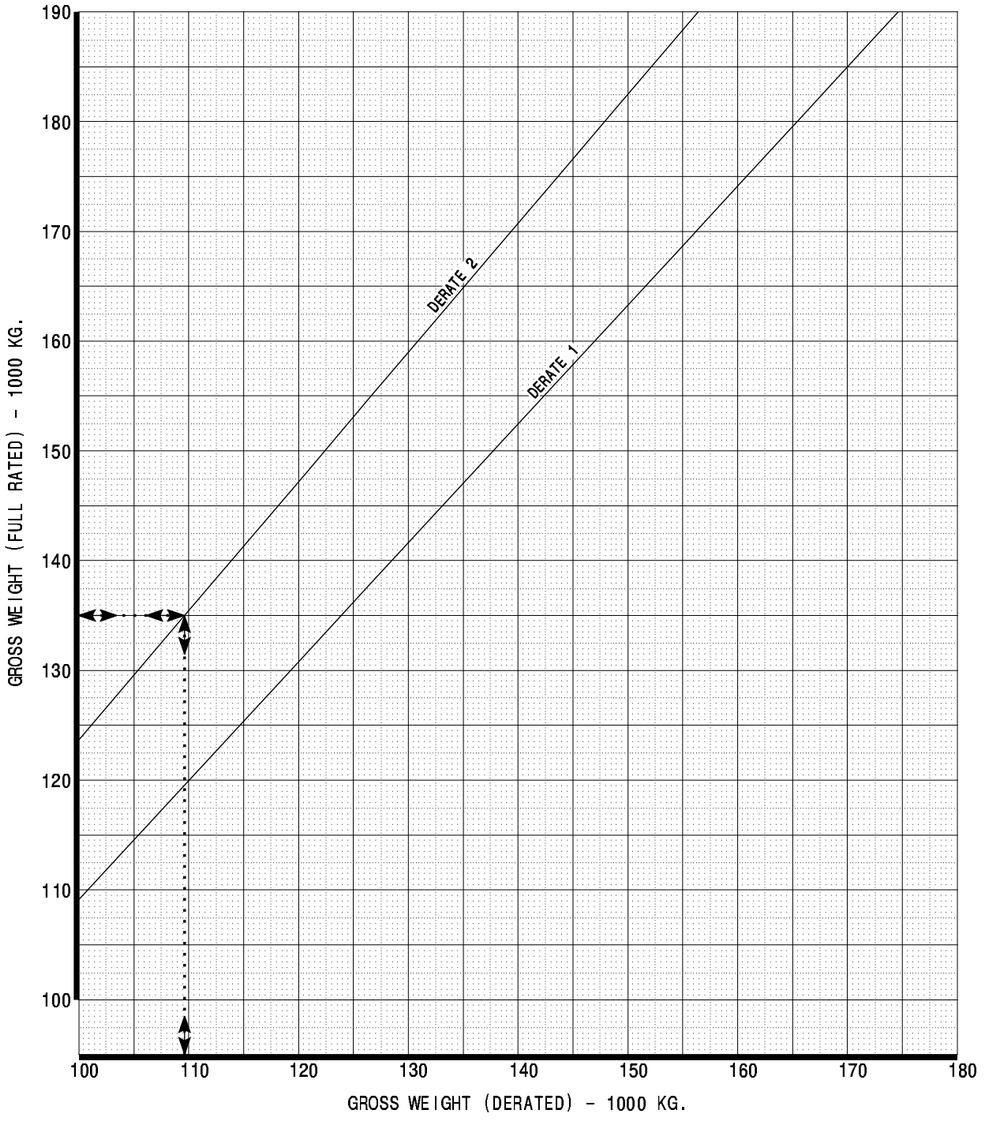
L. SAMUELS	APPROVED	DATE
767-300ER	SHIELDS	4/24/91
CF6-80C2B6/B6F DERATES 1 & 2		

S25723

MAXIMUM LANDING WEIGHT - CLIMB LIMITS

FULL RATED - DERATED

APPROACH FLAPS 20
LANDING FLAPS 25 AND 30



P.C. K643C04007	APP. 43
D041T507-1	PG. 4.12-4A

APPROVED	DATE
D. Davis	08-27-03

A.G. PARKS
767-300ER
CF6-80C2B6/B6F
DERATES 1 AND 2

REVISION HIGHLIGHTS

Revision 2 to Appendix 49K to D6T11321 dated 07-20-01.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to add a procedure for the use of the Flight Management Computer System (FMCS) while operating with landing gear extended.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	011551	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Contents		
1	A49	Revised to add "Flight Management Computer System" to the contents of Section 3.
Section 2&3		
1	A49	Added the FMCS procedure for operation with landing gear extended.

APPENDIX 49K

LANDING GEAR
EXTENDED

CF6-80C2B7F
767-300

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 011551** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 07-20-01

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Units KG/C

Log of Pages
Appendix 49K

The following pages comprise this appendix applicable to the above series airplanes.

Revision 2

Date 07-20-01

Page	Code	Date
Title		
1	A49K	12-12-96
Revision Approval		
* 1	011551	07-20-01
Log of Pages		
* 1		07-20-01
Contents		
* 1	A49	07-20-01
2	A49	07-22-96
Introduction		
1	A49	12-12-96
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1	A49	07-22-96
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1	A49	07-22-96
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Section 4.9		
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34	0ZBB	04-13-94
38	3ZBB	12-12-96
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   Takeoff Weight Determination Procedure. 1

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S16854

INTRODUCTION

This appendix contains Certificate Limitations, Procedures and Performance for operation with landing gear extended. Airplane performance with CF6-80C2B7F engine rating is the base to which the performance adjustments in this appendix are applied.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in
Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

G E N E R A L L I M I T A T I O N S

This appendix contains the additional limitations, procedures, and performance when operating with the landing gear down. Flight data is based on drag associated with all-gear-down performance.

Airplane performance with CF6-80C2B7F engine rating is the base to which the performance adjustments in this appendix are applied.

The use of speed increase for improved climb performance in order to increase maximum takeoff weight is prohibited.

Takeoff is limited to flap position 5.

T Y P E O F A I R P L A N E O P E R A T I O N

Limitations are unchanged except the airplane is not eligible for extended over-water operations.

O P E R A T I O N A L L I M I T S

Operational limits are unchanged.

M A X I M U M O P E R A T I N G L I M I T S P E E D

Limitations are unchanged except:

V_{MO} and M_{MO} are reduced to 270 KIAS and .73 Mach.

The airspeed indicator and Mach-airspeed warning switch must be reprogrammed for V_{MO} and M_{MO}.

S16874

SECTION 2 - EMERGENCY PROCEDURES

Emergency Procedures are unchanged except as amended herein.

E M E R G E N C Y D E S C E N T

Procedures are unchanged except:

Target Speed - 270 KIAS.

SECTION 3 - OPERATING PROCEDURES

Operating Procedures are unchanged except as amended herein.

F L I G H T M A N A G E M E N T C O M P U T E R S Y S T E M (FMCS)

The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), and maximum altitude, and compute overly shallow descent path.

To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CRZ page of the Control and Display Unit (CDU). Appropriate gear down speeds should also be entered on the CLB and DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of the VNAV during descent, under these circumstances is not recommended.

S E V E R E T U R B U L E N T A I R P E N E T R A T I O N

The conditions for severe turbulent air penetration are unchanged except the recommended airspeed for flight in severe turbulence is V_{REF} +70 knots IAS.

PERFORMANCE ADJUSTMENTS

The performance adjustments in this appendix are applicable to the CF6-80C2B7F performance level.

SECTION 4.1 - GENERAL

G E N E R A L

When operating with the landing gear extended, the performance adjustments and the amended performance configuration in this appendix are used.

P E R F O R M A N C E C O N F I G U R A T I O N

Performance configuration is unchanged except the landing gear configuration for each phase of operation will be "Down".

P E R F O R M A N C E C O N D I T I O N S A N D P R O C E D U R E S

TAKEOFF

The conditions for flight performance are unchanged except the landing gear will not be retracted after liftoff.

FLAP RETRACTION SPEED SCHEDULE (Takeoff Flap Position 5)

During acceleration, select flap positions at the following speeds:

Initiation Speed, Knots	Select Flap Position
V_{REF} + 40	1
V_{REF} + 60	0

Final Segment Climb Speed: V_{REF} + 70 knots

TAKEOFF WEIGHT DETERMINATION PROCEDURE

The maximum allowable takeoff weights for landing gear extended operation are determined by the procedures in the basic manual. Only flap position 5 with no improved climb performance is allowed. The charts in this appendix are used in place of similar charts in the basic manual. In some cases, decrements are applied to the values obtained from the basic manual. Only information in the subsections tabulated below are revised in this appendix and the remaining subsections are unchanged from the basic manual.

Subsection	Title
4.5	Takeoff Climb Limits
4.9	Obstacle Clearance
4.11	Enroute Climb
4.12	Approach and Landing Climb

S16883

SECTION 4.5 - TAKEOFF CLIMB LIMITS

G E N E R A L

None of the charts in the basic manual in the Takeoff Climb Limits subsection are applicable for gear extended operation. The scheduled takeoff gross weight cannot exceed the takeoff gross weight obtained from the Final Takeoff Climb Limits chart in this subsection. The Final Takeoff Climb Limits chart did not appear in the basic manual since climb limits in the final segment were never limiting in the gear retracted operation. A/C packs ON and OFF information can be obtained from the chart in this subsection.

PERFORMANCE

FINAL TAKEOFF CLIMB LIMITS

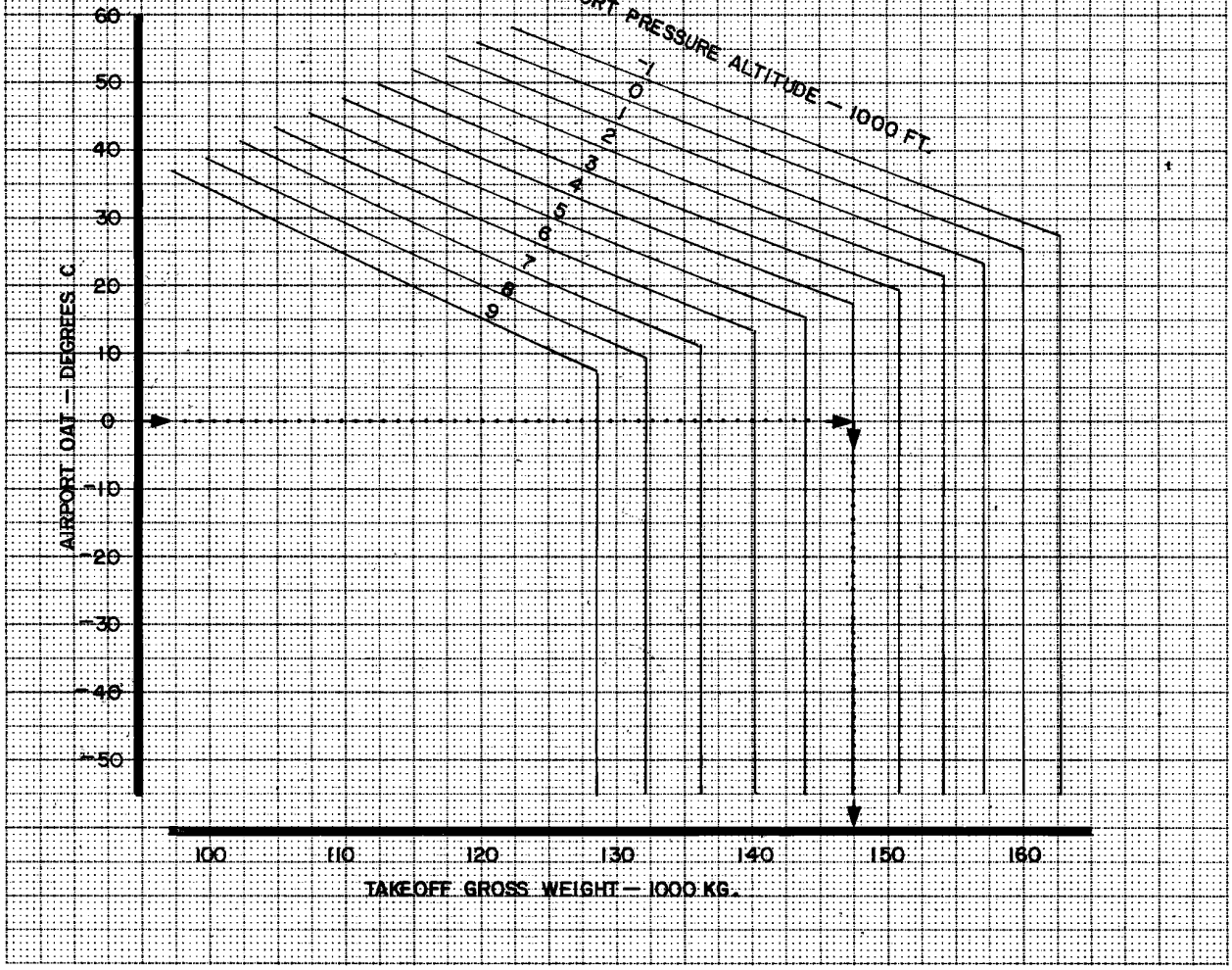
FLAPS UP

APPENDIX 49
LANDING GEAR EXTENDED

A/C PACKS ON AND OFF

● SPEED V_{REF} +70 KNOTS IAS

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT – KG.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON	3700
ENGINE AND WING ANTI-ICE ON	7600



P.C. 6S000834
D041T507-1 APPENDIX 49 PG.4.5-11

APPROVED	DATE
	4/5/88

A.SACHS
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

6E420

S16933

SECTION 4.9 - OBSTACLE CLEARANCE

ASSUMED CLIMB TECHNIQUE

The definitions of the first and second segments are modified. The first segment extends to the point where the landing gear would normally be retracted and is based on demonstrated performance in ground effect. The second segment is based on gear extended performance out of ground effect.

FLIGHT PATH CHART PRESENTATION AND OBSTACLE CLEARANCE ANALYSIS PROCEDURE

GENERAL

The charts in the Obstacle Clearance subsection of the basic manual are not applicable for gear extended operation except the Takeoff Climb charts, flaps 5, A/C packs ON and OFF, to which a decrement is applied when used in this appendix. The obstacle clearance analysis procedures in the basic manual still apply using the charts in this appendix with the exception that improved climb performance techniques are not permitted for gear extended operations.

TAKEOFF CLIMB

For obstacle clearance, the available 400 ft. gross gradients are obtained by reducing the gradients read from the basic flap position 5 Takeoff Climb chart by 1.90 percent. This decrement applies to both the (A/C) packs ON and OFF condition.

The corrected gear down gradients are then used in the obstacle clearance charts in this appendix. If obstacle clearance is limiting, the required gradients from the obstacle clearance charts must be increased by 1.90 percent to find the limiting takeoff weights.

NOTE: For landing gear extended operations, extended second segment and maximum continuous thrust flap retraction may be used for all conditions.

S16885

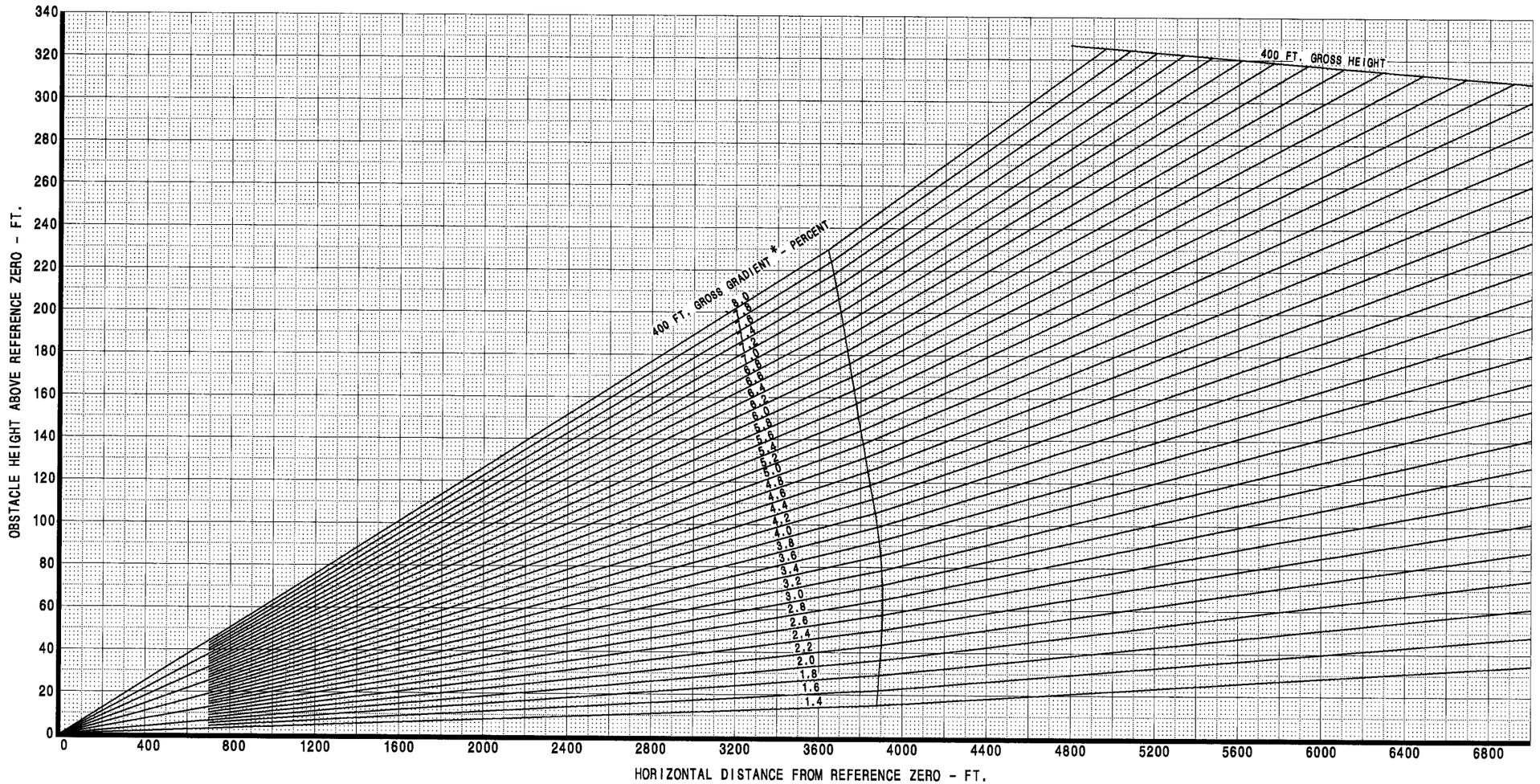
CLOSE-IN OBSTACLE CLEARANCE

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.

* MUST BE CORRECTED FOR WIND AND BANK ANGLE.

LANDING GEAR EXTENDED

FLAPS 5



P.C. d649933000 APP. 49
D041T513-1 PG. 4.9-33

J. CRAVENER | APPROVED | DATE
767-300ER | M L Fobes | 11/29/93
CF6-80C2B7/B7F

DISTANT OBSTACLE CLEARANCE

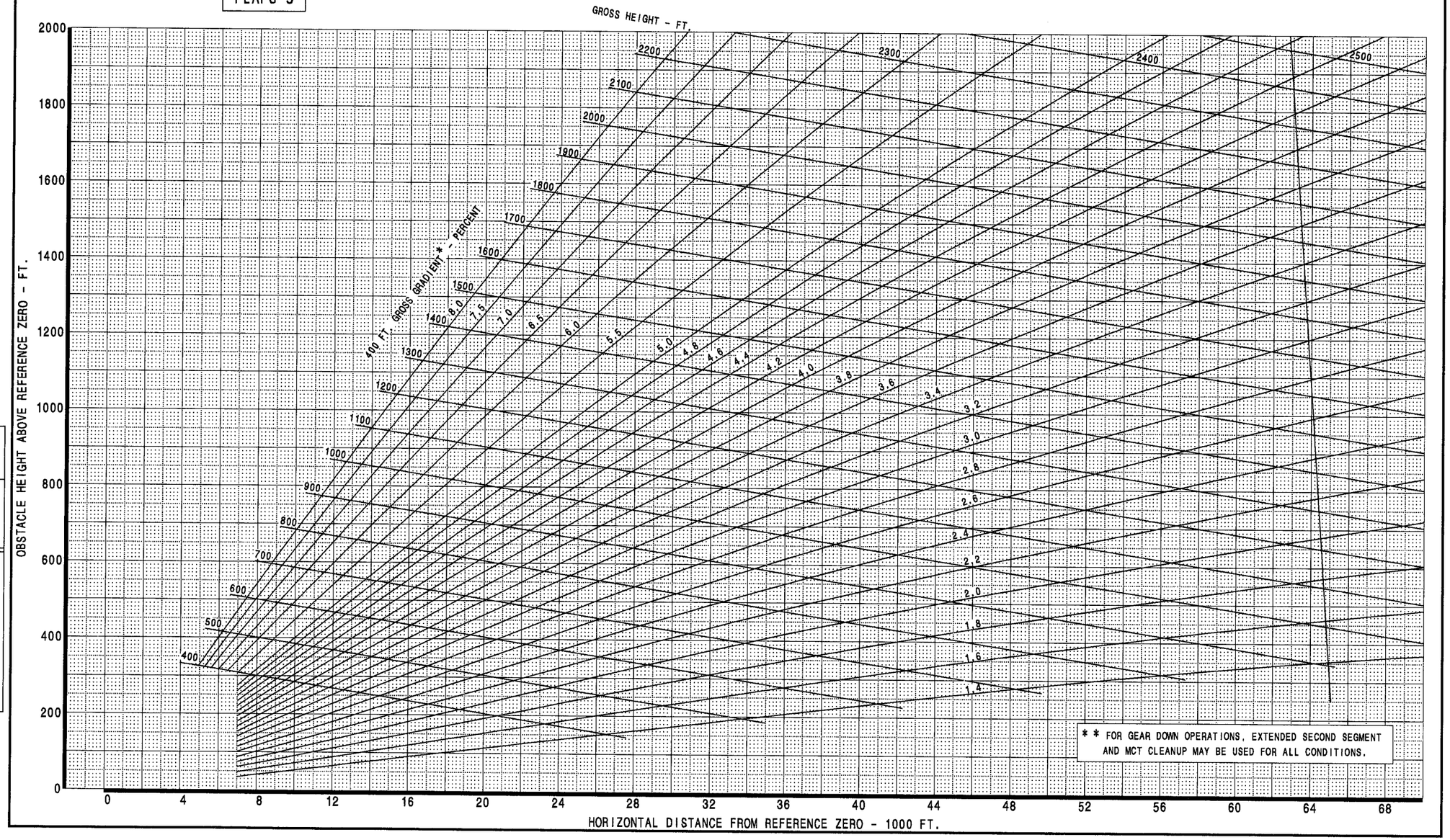
LANDING GEAR EXTENDED

FLAPS 5

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.

* MUST BE CORRECTED FOR WIND AND BANK ANGLE.

END OF EXTENDED SECOND SEGMENT CLIMB (5 MINUTE LIMIT)**



** FOR GEAR DOWN OPERATIONS, EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED FOR ALL CONDITIONS.

P.C. d649934000 APP. 49
D041T513-1 PG. 4.9-34

APPROVED	DATE
ML Fobes	11/29/93

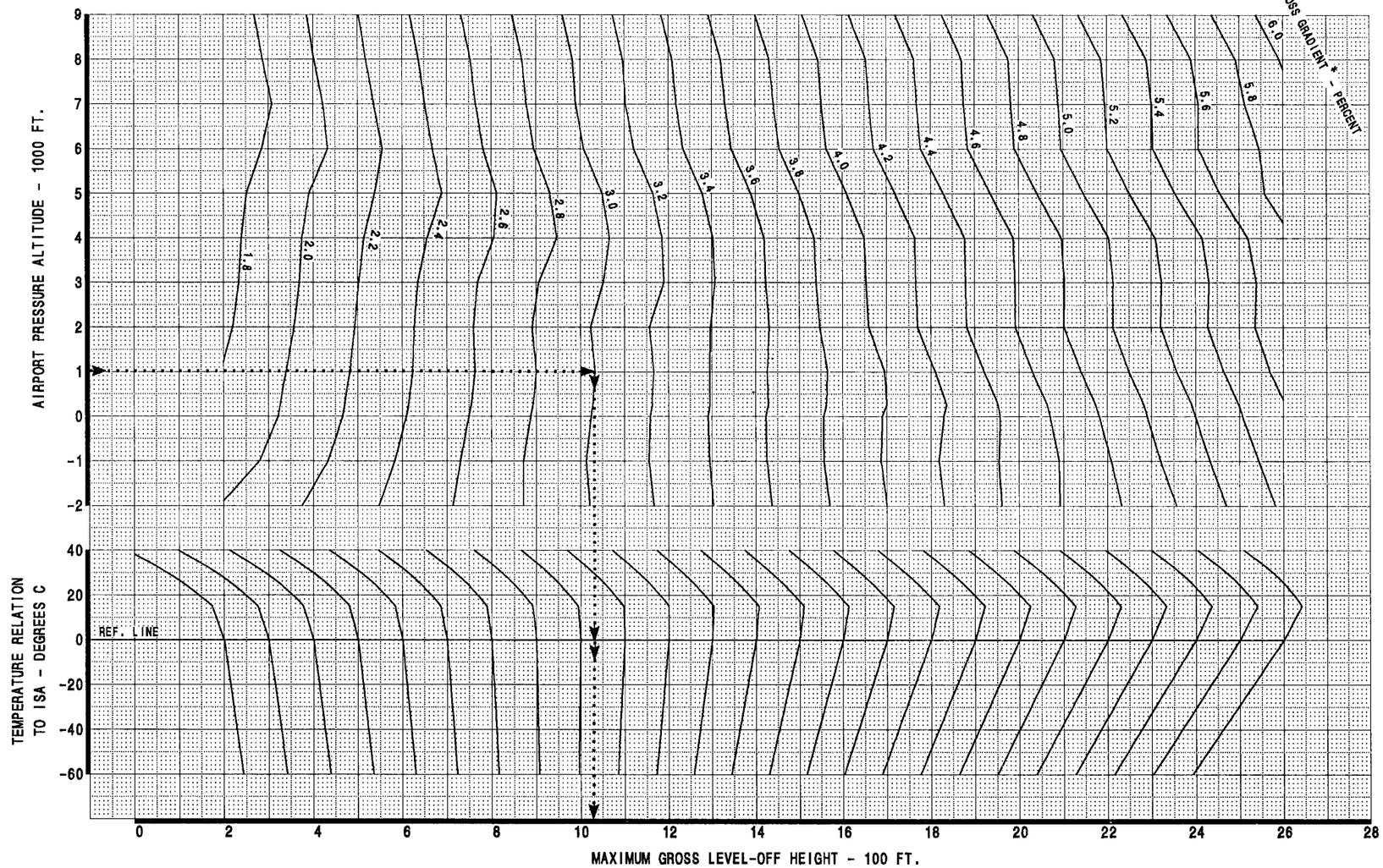
J. CRAVENER
767-300ER
CF6-80C2B7/B7F

MAXIMUM LEVEL-OFF HEIGHT

*MUST BE CORRECTED FOR BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

FLAPS 5

LANDING GEAR EXTENDED



P.C. d649938003 APP.49
D041T513-1 PG. 4.9-38

APPROVED	DATE
G.LARSON	04-23-97

R. HUGHES
767-300ER
CF6-80C2B7/B7F

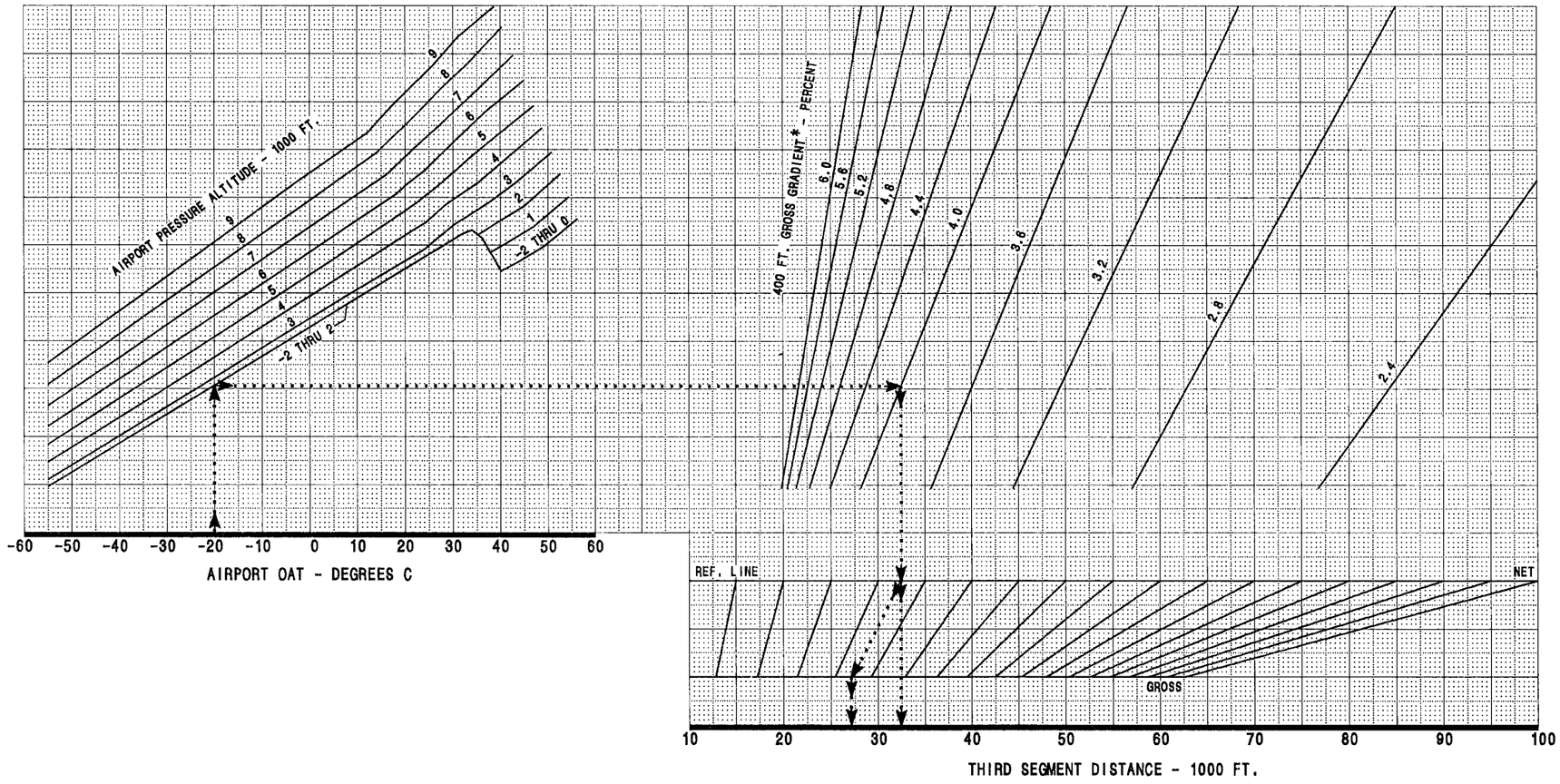
S20404

THIRD SEGMENT DISTANCE

LANDING GEAR EXTENDED

FLAPS 5

* MUST BE CORRECTED FOR WIND, LEVEL-OFF HEIGHT, AND BANK ANGLE.



P.C. d64994l003 APP. 49
D041T513-1 PG. 4.9-41

J. NEWELL
767-300ER
CF6-80C2B7/B7F

APPROVED G.LARSON DATE 04-23-97

PERFORMANCE

FINAL TAKEOFF CLIMB

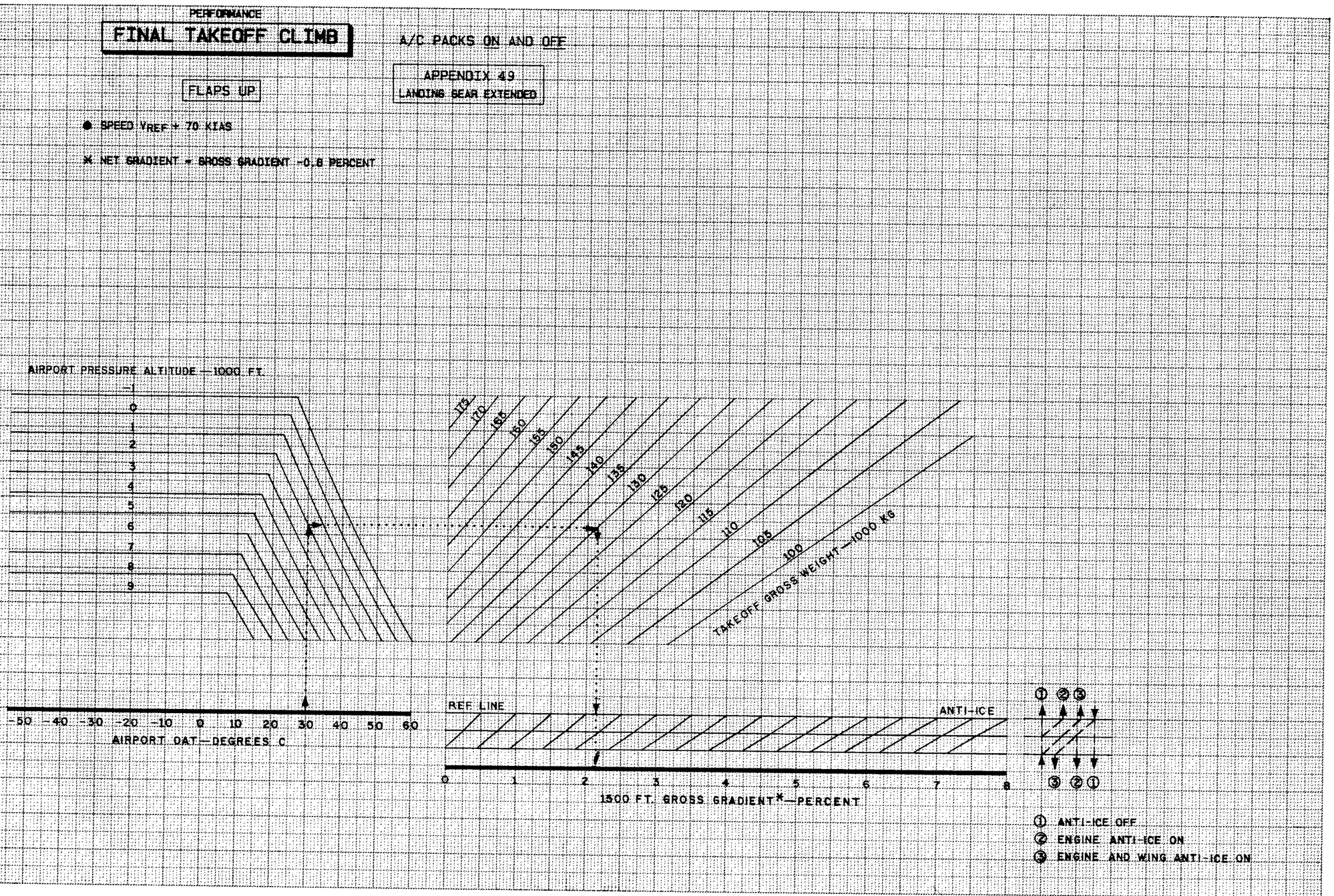
A/C PACKS ON AND OFF

APPENDIX 49
LANDING GEAR EXTENDED

FLAPS UP

● SPEED V_{REF} + 70 KIAS

✕ NET GRADIENT = GROSS GRADIENT -0.8 PERCENT



P.C.6L001748
D041T507-1 APP. 49 PG. 4.9-44

SCHMIDT
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

APPROVED M. LECHNER 30 JAN 98
DATE 30 JAN 98

GRADIENT CORRECTIONS

TAKEOFF CLIMB

LANDING GEAR EXTENDED

■ APPLY THE FOLLOWING ADJUSTMENTS TO THE CORRECTED 400 FT. GROSS GRADIENT.

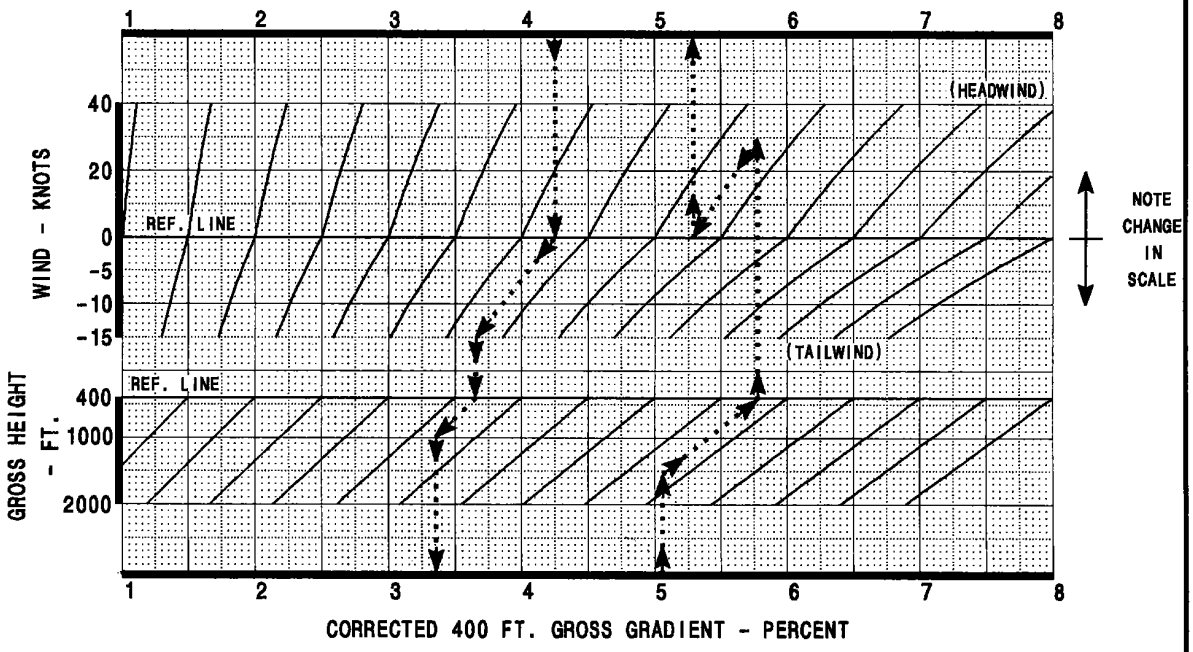
GRADIENT ADJUSTMENT - PERCENT	
BANK ANGLE - DEGREES	FLAPS 5
5	-0.05
10	-0.20
15	-0.47

P.C. d649945000 APP. 49
D041T513-I PG. 4.9-45

APPROVED DATE
D. Bach 12/17/93

D. BACH
767-300ER
CF6-80C2B7/B7F

400 FT. GROSS GRADIENT - PERCENT



S16886

PERFORMANCE

GRADIENT CORRECTIONS

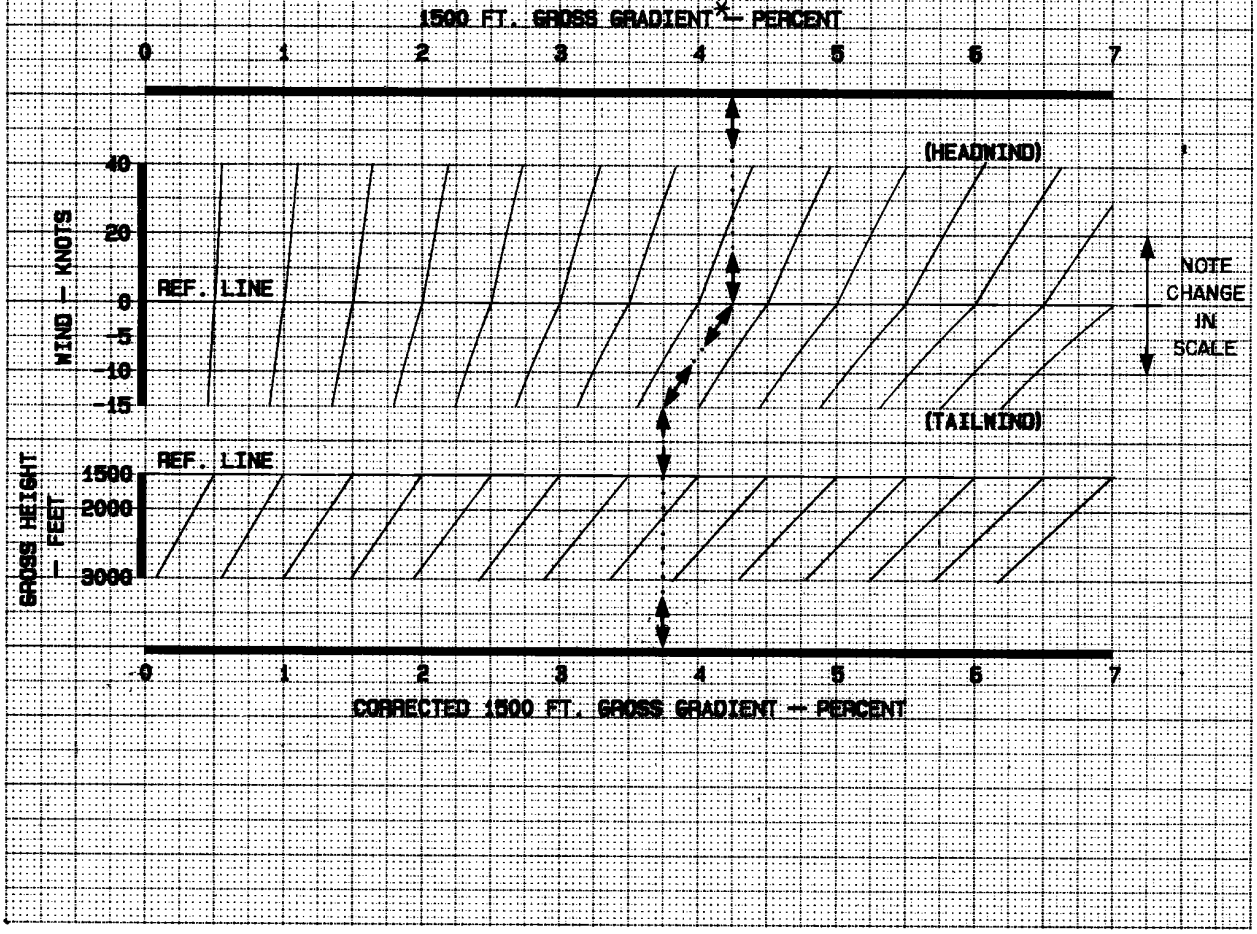
FINAL TAKEOFF CLIMB

APPENDIX 49
LANDING GEAR EXTENDED

● APPLY THE FOLLOWING ADJUSTMENTS AFTER WIND AND GROSS HEIGHT CORRECTIONS ARE MADE.

GRADIENT DECREMENT (%) IN BANKED TURNS	
BANK ANGLE DEGREES	FLAPS UP
5	0.02
10	0.09
15	0.21

* THIS IS THE 1500 FT. GROSS GRADIENT OBTAINED FROM THE FINAL TAKEOFF CLIMB CHART.



P.C. 65000773	
D041T507-1 APP. 49	PG. 4.9-47

TERRY	APPROVED	DATE
767-300ER	KRS NM-135	10/20/87
CF6-80C2B6/B6F		
CF6-80C2B7/B7F		

6E420

S16887

SECTION 4.11 - ENROUTE

G E N E R A L

Enroute climb weight limits with landing gear extended are determined from the Enroute Climb Weights chart in this appendix. To obtain enroute climb gradients with landing gear extended, adjust the gradients read from the charts in the basic manual by -3.75 percent. This applies to A/C packs ON and OFF conditions and Anti-Ice ON and OFF conditions.

PERFORMANCE

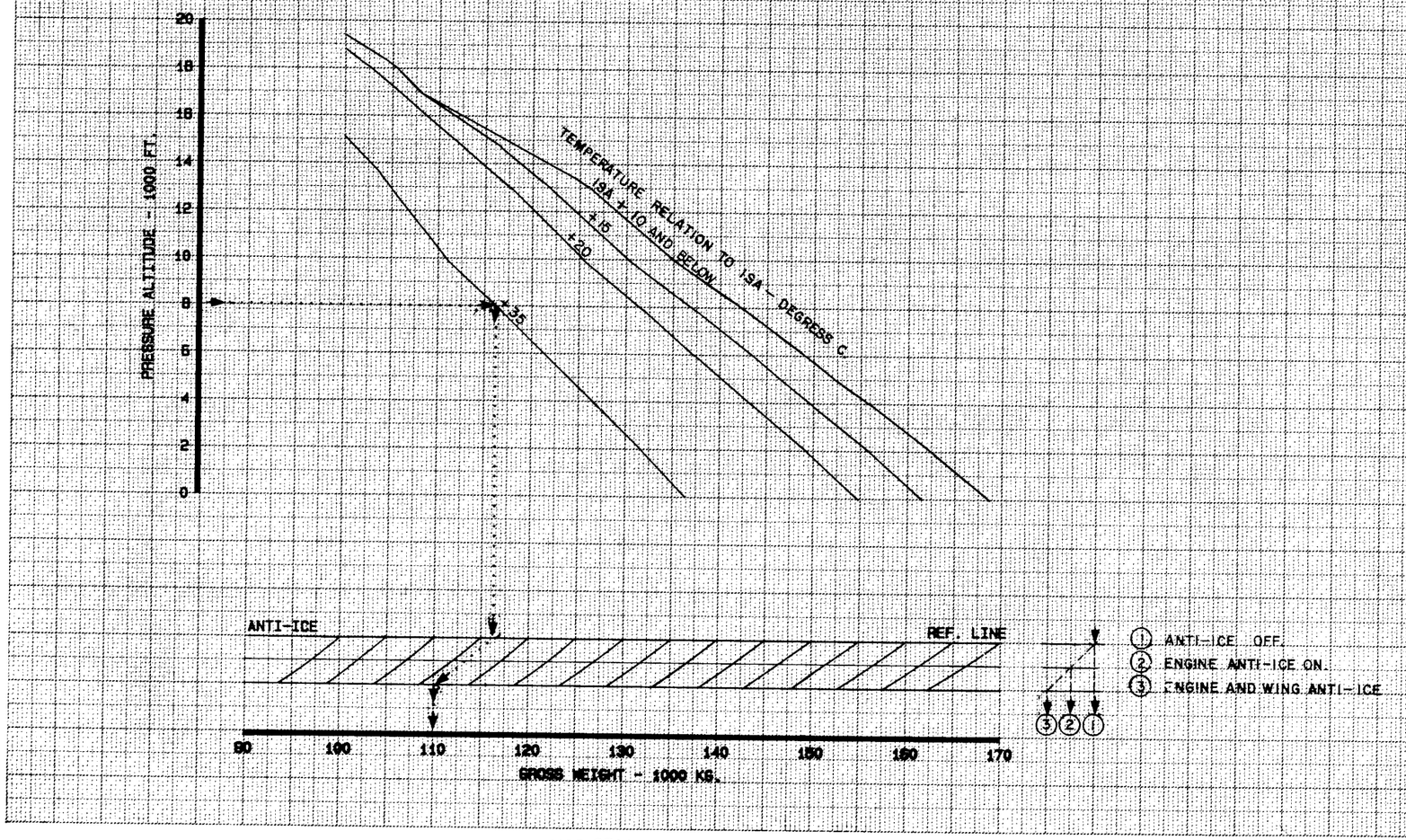
ENROUTE CLIMB WEIGHTS

FOR POSITIVE NET GRADIENTS

A/C ON AND OFF

1 ENGINE INOPERATIVE

APPENDIX 49
LANDING GEAR EXTENDED



P.C. 6L001901
D041T507-1 APP. 49 4.11-3

APPROVED	DATE
KB1 N/MGS	9 FEB 88

G. SAUNDERS
767-300ER
CF6-80C2B6/B6F
CF6-80C2B7/B7F

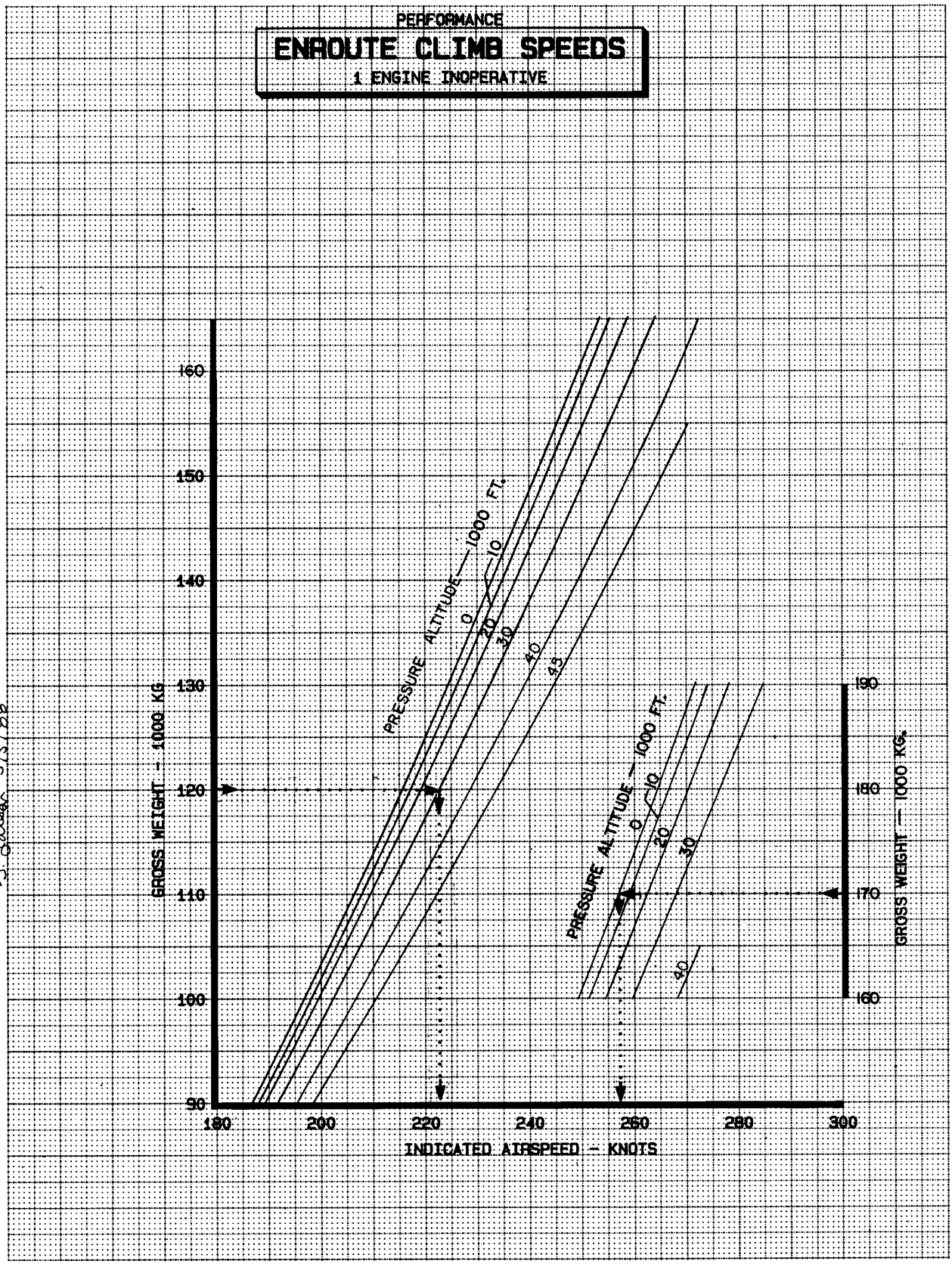
P.C..6S000158	
D041T503	PG. 4.11-8

C. FRANK	APPROVED	DATE
767-200/300	C.S. Ellis	8.7.84
	R. Sorensen	7.1.85
	[illegible]	2.2.88

PERFORMANCE

ENROUTE CLIMB SPEEDS

1 ENGINE INOPERATIVE



S29908

SECTION 4.12 - APPROACH AND LANDING CLIMB

G E N E R A L

Maximum landing weight climb limits are determined from the most limiting (least) of the gross weight from the Final Takeoff Climb Limits chart (Section 4.5, this appendix) and the appropriate Maximum Landing Weights Climb Limits chart (this section). To obtain approach and landing climb gradients with landing gear extended, adjust the gradients read from the charts in the basic manual by the values listed below.

Condition	Flaps	Gradient Correction (%)
Approach	20	-1.95
Approach (Icing Conditions)	20	-2.35*
Landing	25	- .60*
(Icing Conditions)	30	- .55*

* These corrections account for maximum ice accumulation on the extended landing gear and are in addition to the ice accumulation decrements shown on the Approach and Landing Climb charts.

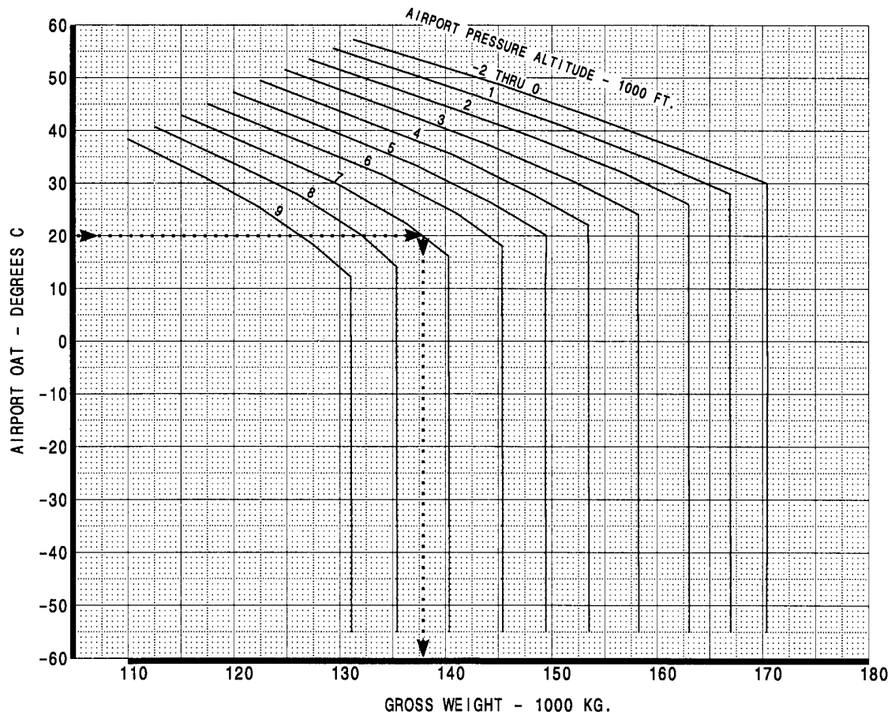
MAXIMUM LANDING WEIGHT

LANDING GEAR EXTENDED

APPROACH FLAPS 20
LANDING FLAPS 25 AND 30

- FOR SPEEDS, SEE TEXT.
- REDUCE GROSS WEIGHT BY 15,450 KG. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 10 DEGREES C.
- APPLY THE FOLLOWING GROSS WEIGHT ADJUSTMENT FOR ALTERNATE BLEED CONFIGURATIONS.

BLEED CONFIGURATION	GROSS WEIGHT ADJUSTMENT - KG.	
	A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+1450	0
ENGINE ANTI-ICE ON	-1200	-2750
ENGINE AND WING ANTI-ICE ON	-3600	-4900



P.C. e649C09A07 APP. 49
D041T507-4 PG. 4.12-9A

R. HUGHES
767-300ER
CF6-80C2B7/B7F

APPROVED	DATE
DDD	07-27-99

V07003

APPENDIX 51K

OPERATION WITH ALTERNATE FORWARD CENTER OF GRAVITY LIMIT FOR TAKEOFF

CF6-80C2 SERIES ENGINES

767-300

Model 767-300
Units KG/C

Log of Pages
Appendix 51K

The following pages comprise this appendix applicable to the above series airplanes.

Revision 0
Approved By Donald B. Wilson for Manager, Seattle Aircraft Certification Office, FAA Transport Airplane Directorate

Date 12-12-96

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1		12-12-96
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2	A51	12-12-96
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1	A51	12-12-96
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* = Revised Pages
FAA Approved 12-12-96

D6T11321

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SECTION 3 - OPERATING PROCEDURES 1

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

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EXTENDED SECOND SEGMENT MINIMUM GRADIENT ADJUSTMENT. 7

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

General. 1

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S16955

INTRODUCTION

This appendix provides the additional Certificate Limitations and Performance to operate the Model 767-300 series airplane with CF6-80C2 series engines with takeoff performance based on an alternate forward center of gravity (CG) limit. This appendix is used in conjunction with Sections 1, 2, 3, and 4 of the basic Airplane Flight Manual. Use of this appendix is optional and applicable appendices.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

CENTER OF GRAVITY LIMITS

This appendix is only for use with Alternate Forward Center of Gravity (CG) limits I or II as shown on the Center of Gravity Limits chart(s) on Section 1, page(s) 4, 4A or 4B of the basic airplane flight manual or applicable appendices.

FLIGHT MANAGEMENT COMPUTER SYSTEM (FMCS) WITH FMCS CALCULATED TAKEOFF SPEEDS

When operating at an alternate forward CG limit for takeoff, disregard FMCS calculated takeoff speeds, if displayed. Determine takeoff speeds as shown in Section 4.7, this appendix.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

PERFORMANCE ADJUSTMENTS

The performance adjustments in this appendix must be referenced to the performance levels from the basic Airplane Flight Manual and its applicable appendices.

SECTION 4.1 - GENERAL

USE OF THE CHARTS

The charts in this appendix provide the performance information necessary for determining takeoff performance based on an alternate forward center of gravity (CG) limit.

The charts in this appendix provide weight adjustments to the limiting takeoff weights determined from the basic Airplane Flight Manual for field length, takeoff climb, and tire speed limits. Adjustments to obstacle clearance limited weights are provided once adjustments to maximum level off height and end of extended second segment climb distance are accounted for.

Charts showing adjustments to decision speed (V_1), rotation speed (V_R), and takeoff safety speed (V_2) obtained from the basic Airplane Flight Manual are also included in this appendix.

These performance relationships are for common airplane configuration, i.e., the same flap detent, A/C pack configuration, etc.

TAKEOFF WEIGHT DETERMINATION PROCEDURE

The Takeoff Weight Determination Procedure defined in the basic manual is modified when determining performance based on an alternate forward CG limit. These modifications are defined in the appropriate sections of this appendix.

STALL SPEED PROCEDURE

The Stall Speed Adjustment chart in this section adjusts the stall speed from the basic manual based on the basic certified forward CG limit to the stall speed at the alternate forward CG limit.

PERFORMANCE

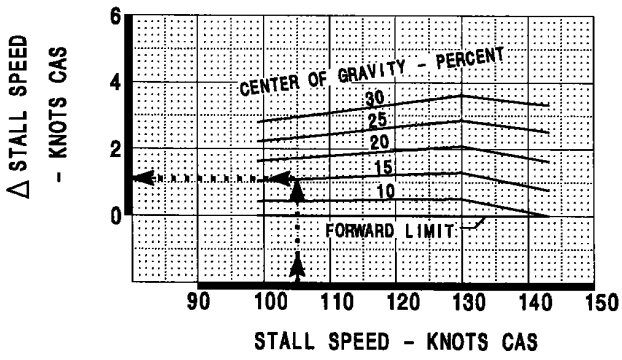
STALL SPEED ADJUSTMENT

FLAPS 5, 15, AND 20

1) DETERMINE STALL SPEED FROM THE BASIC A.F.M.

2) DETERMINE "Δ STALL SPEED" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

STALL SPEED AT ALTERNATE C.G. = BASIC A.F.M. V_S - Δ STALL SPEED



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S16991

SECTION 4.4 - FIELD LENGTH LIMITS

GENERAL

The Field Length Limits Weight Adjustment charts in this section adjust field length limited gross weight based on the basic certified forward CG limit from the basic manual to the field length limited gross weight at the airplane's alternate forward CG limit at a constant value of corrected runway length.

FIELD LENGTH LIMITED TAKEOFF GROSS WEIGHT

The following steps are required to obtain the field length limited takeoff gross weight at an alternate forward CG limit:

1. Determine the corrected runway length in Section 4.3 of the basic manual.

2. Enter the appropriate Field Length Limits chart in section 4.4 of the basic manual with the corrected runway length, Step 1, and airport temperature/altitude. Read takeoff gross weight.

3. For the appropriate flap, enter the Field Length Limits Weight Adjustment chart in this section with the field length limited gross weight, Step 2, and the alternate forward CG limit. Read delta gross weight.

4. Enter the Field Length Limits Weight Adjustment chart for runway slope correction in this section with the alternate forward CG limit used in Step 3 and the appropriate value of runway slope. Read delta gross weight.

5. Add delta gross weight determined from Steps 3 and 4 to field length limited gross weight determined in Step 2 to obtain the field length limited gross weight at the alternate forward CG limit.

FIELD LENGTH LIMITS

CORRECTED RUNWAY LENGTH REQUIRED

The following steps are required to obtain the corrected runway length required for a takeoff at an alternate forward CG limit:

1. Enter the Field Length Limits Weight Adjustment charts in this section with the takeoff gross weight, runway slope, and the alternate forward CG limit. Determine total delta gross weight by adding the gross weight adjustment for the appropriate flap and the slope gross weight adjustment together.

2. Subtract this total adjustment from the takeoff gross weight at the alternate forward CG limit. Enter the appropriate Field Length limits chart in Section 4.4 of the basic manual with this value of field length limited takeoff gross weight and airport temperature/altitude. Read corrected runway length required.

S17033

FIELD LENGTH LIMITS
WEIGHT ADJUSTMENT

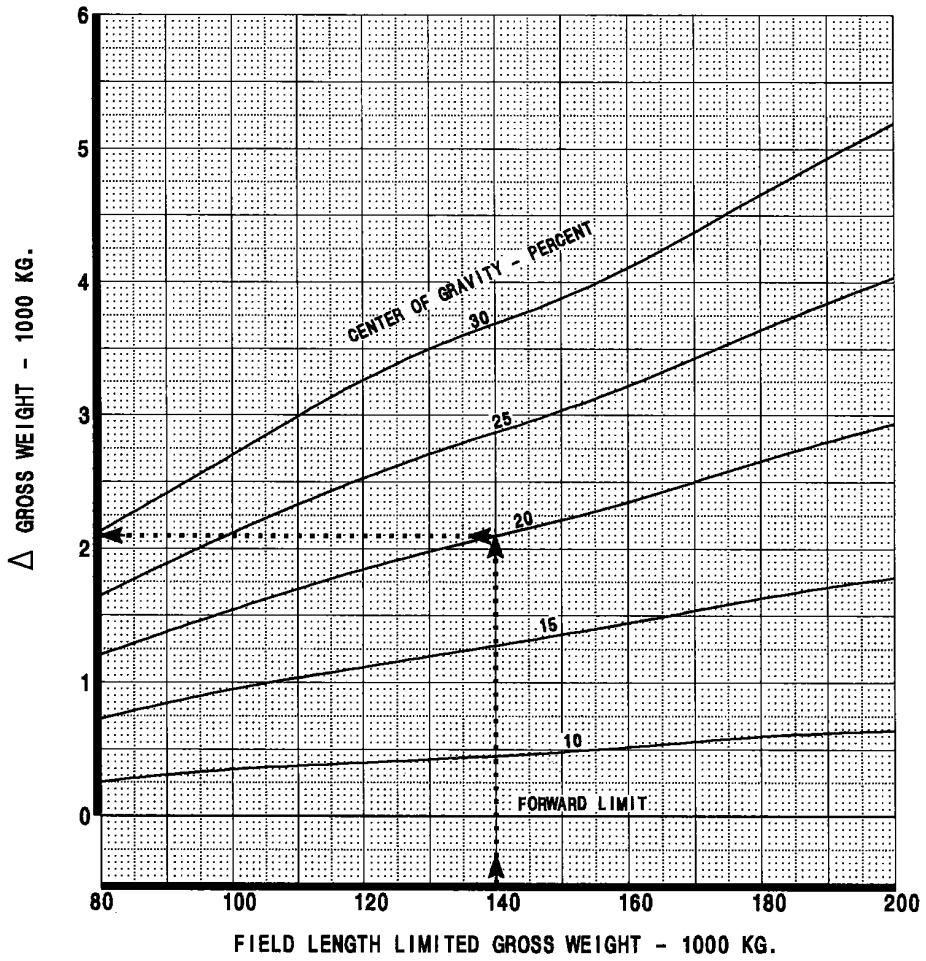
FLAPS 5

1) DETERMINE FIELD LENGTH LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM PAGE 6 AND THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

FIELD LENGTH LIMITED GROSS WEIGHT AT ALTERNATE C.G. = FIELD LENGTH LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW*

* Δ GW FROM THIS PAGE + Δ GW FROM PAGE 6 OF THIS SECTION.



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CF6-80C2 SERIES		

S17035

FIELD LENGTH LIMITS
WEIGHT ADJUSTMENT

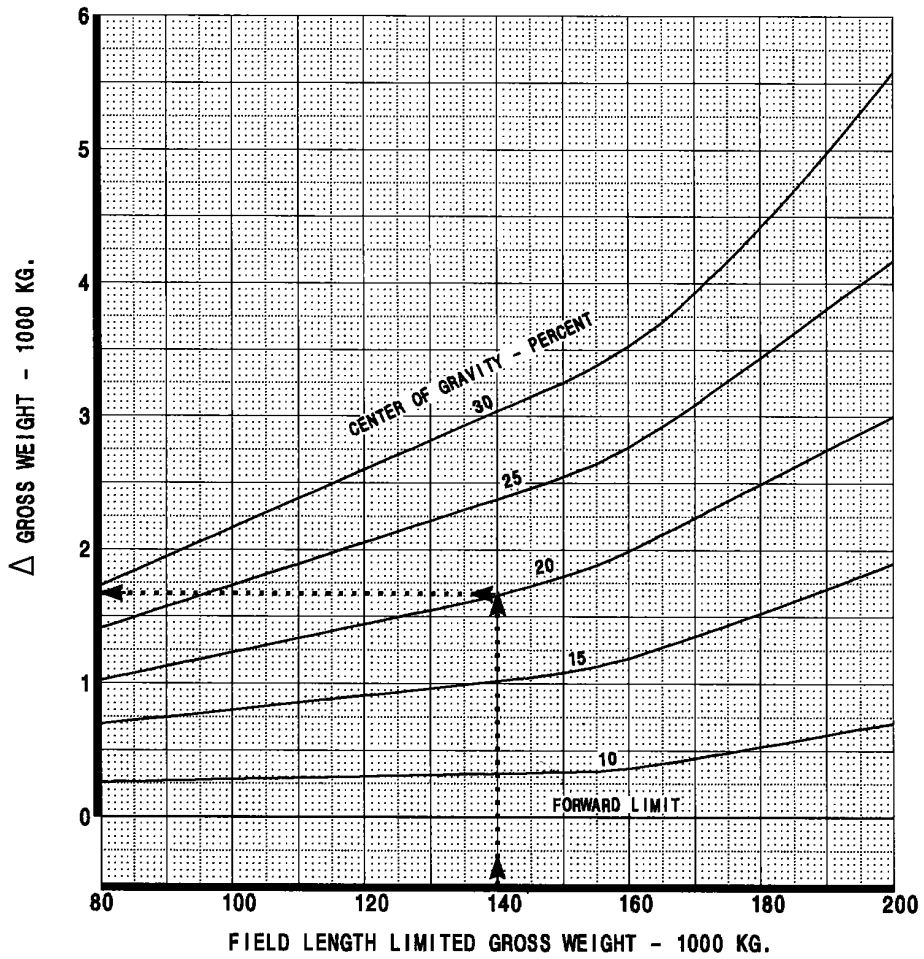
FLAPS 15

1) DETERMINE FIELD LENGTH LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM PAGE 6 AND THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

FIELD LENGTH LIMITED GROSS WEIGHT AT ALTERNATE C.G. = FIELD LENGTH LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW*

* Δ GW FROM THIS PAGE + Δ GW FROM PAGE 6 OF THIS SECTION.



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CF6-80C2 SERIES		

S17036

FIELD LENGTH LIMITS WEIGHT ADJUSTMENT

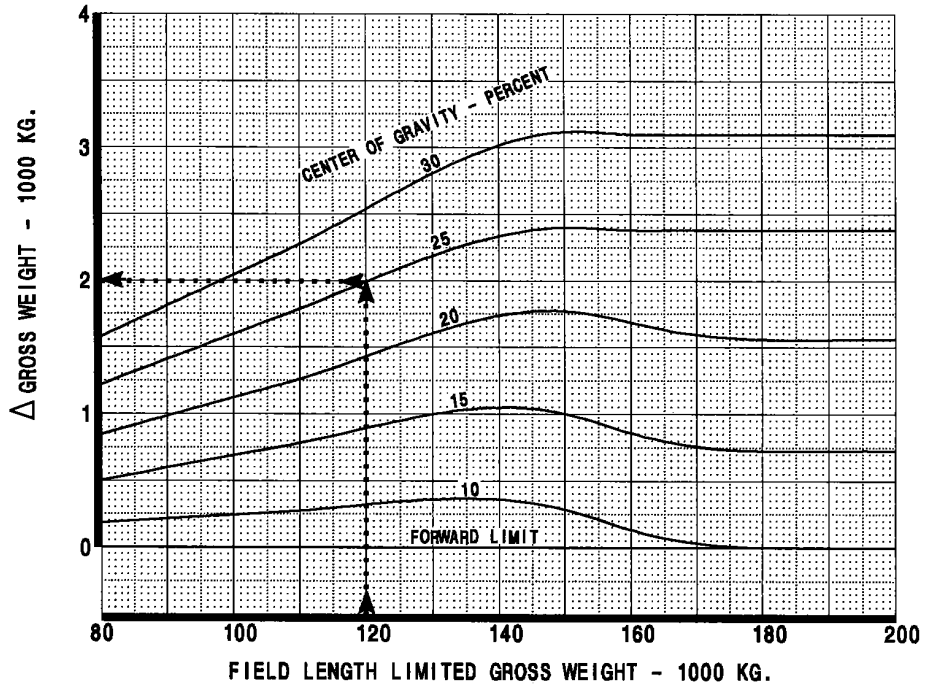
FLAPS 20

1) DETERMINE FIELD LENGTH LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM PAGE 6 AND THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

FIELD LENGTH LIMITED GROSS WEIGHT AT ALTERNATE C.G. = FIELD LENGTH LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW *

* Δ GW FROM THIS PAGE + Δ GW FROM PAGE 6 OF THIS SECTION.



P.C. K651405003 APP.51
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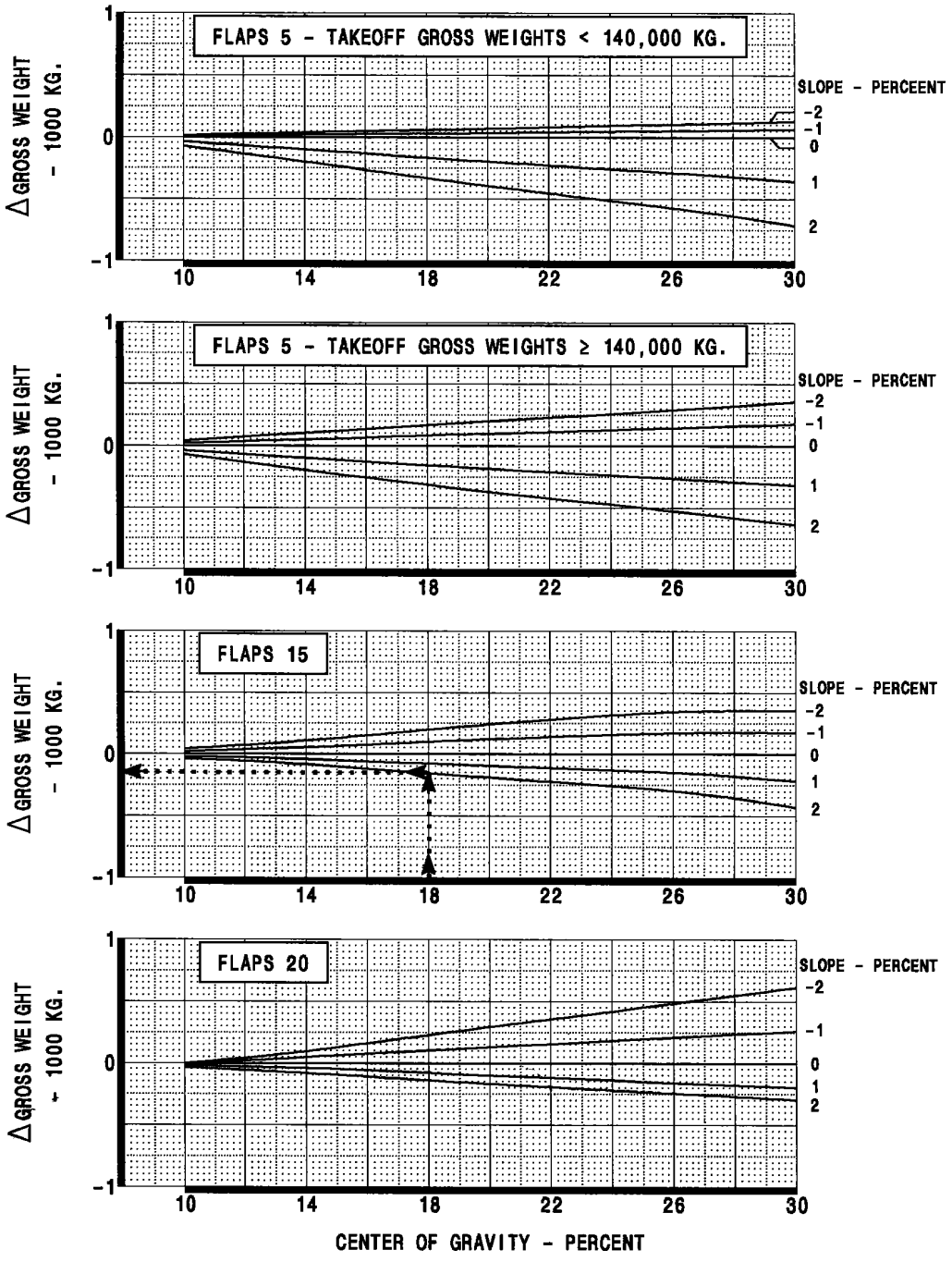
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S17038

FIELD LENGTH LIMITS
WEIGHT ADJUSTMENT

SLOPE CORRECTION



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SECTION 4.5 - TAKEOFF CLIMB LIMITS

G E N E R A L

The Takeoff Climb Limits Weight Adjustments charts in this section adjust the takeoff climb limited gross weight based on the basic certified forward CG limit to the takeoff climb limited gross weight at the airplane's alternate forward CG limit at a constant value of climb gradient.

To obtain the takeoff climb limited gross weight at an alternate forward CG limit:

1. Enter the appropriate Takeoff Climb Limits chart in Section 4.5 of the basic manual with airport temperature/ altitude. Read takeoff gross weight.

2. Enter the Takeoff Climb Limits Weight Adjustment chart in this section with the takeoff climb limited gross weight, Step 1, and the alternate forward CG limit. Read delta gross weight.

3. Add the delta gross weight determined from Step 2 to takeoff climb limited gross weight determined in Step 1 to obtain the takeoff climb limited gross weight at the alternate forward CG limit.

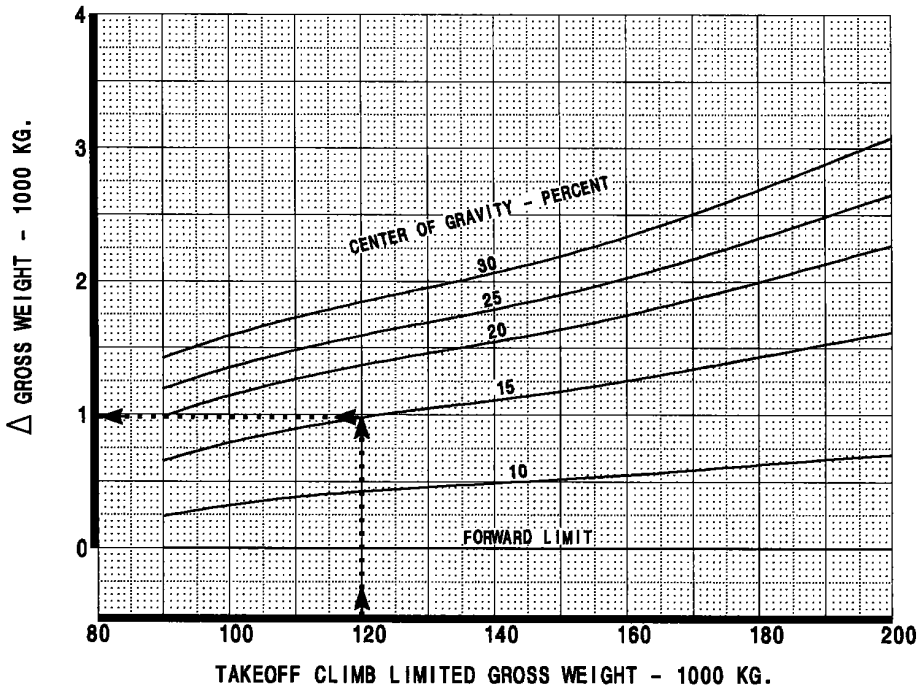
TAKEOFF CLIMB LIMITS
WEIGHT ADJUSTMENT

FLAPS 5

1) DETERMINE TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TAKEOFF CLIMB LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



P.C. K651502003 APP.51
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M. NGUYEN

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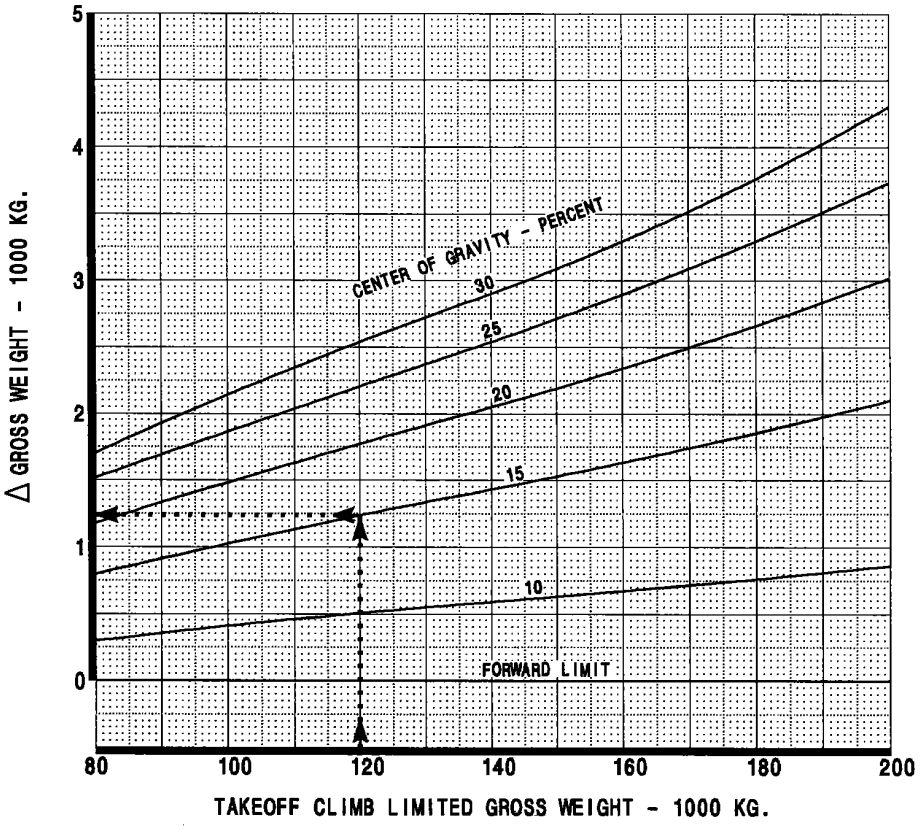
TAKEOFF CLIMB LIMITS
WEIGHT ADJUSTMENT

FLAPS 15

1) DETERMINE TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TAKEOFF CLIMB LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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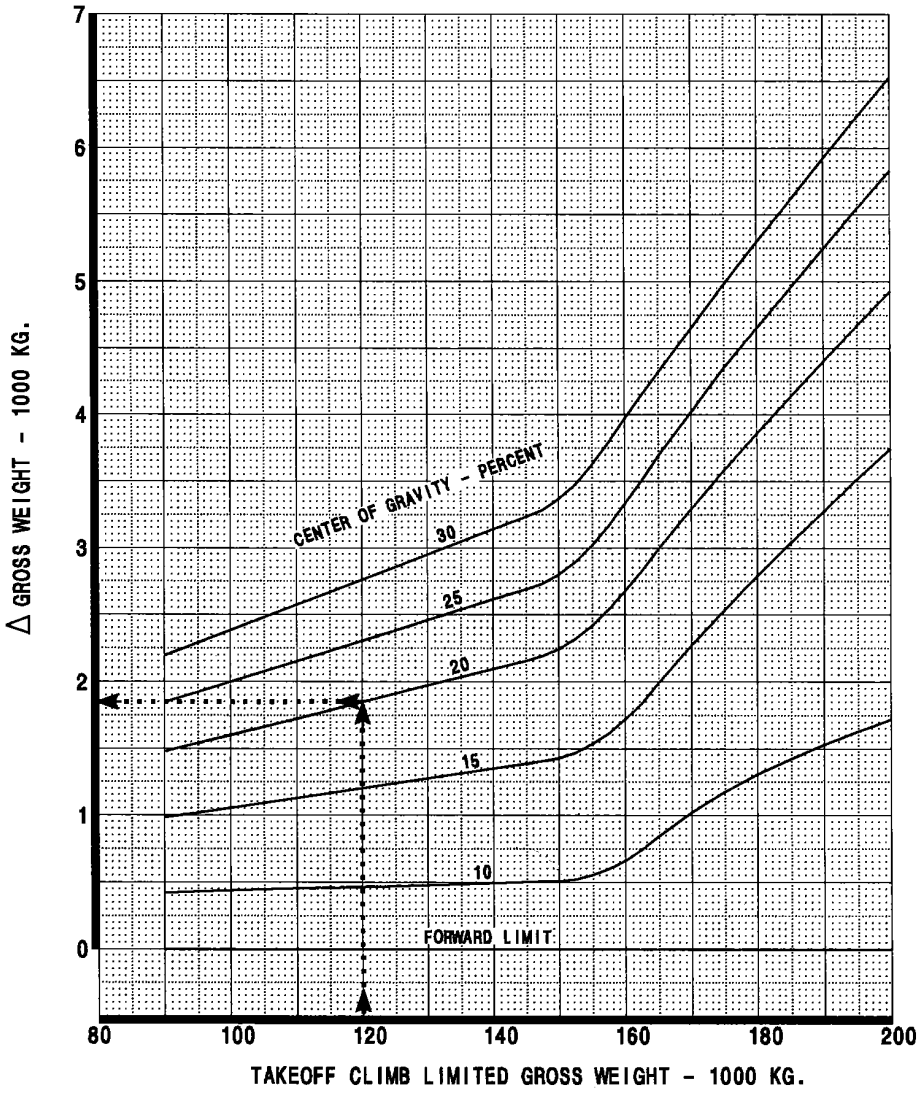
TAKEOFF CLIMB LIMITS
WEIGHT ADJUSTMENT

FLAPS 20

1) DETERMINE TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TAKEOFF CLIMB LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TAKEOFF CLIMB LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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S17047

SECTION 4.6 - TIRE SPEED LIMITS

G E N E R A L

The Tire Speed Limits Weight Adjustments charts in this section adjust the tire speed limited gross weight based on the basic certified forward CG limit to the tire speed limited takeoff gross weight at the airplane's alternate forward CG limit at a constant value of tire speed.

To obtain the tire speed limited gross weight at an alternate forward CG limit:

1. Enter the appropriate Tire Speed Limits chart in Section 4.6 of the basic manual with airport temperature/ altitude, flap position, and wind component. Read takeoff gross weight.

2. Enter the Tire Speed Limits Weight Adjustment chart in this section with the tire speed limited gross weight, Step 1, and the alternate forward CG limit. Read delta gross weight.

3. Add the delta gross weight increment determined from Step 2 to tire speed limited gross weight determined in Step 1 to obtain the tire speed limited gross weight at the alternate forward CG limit.

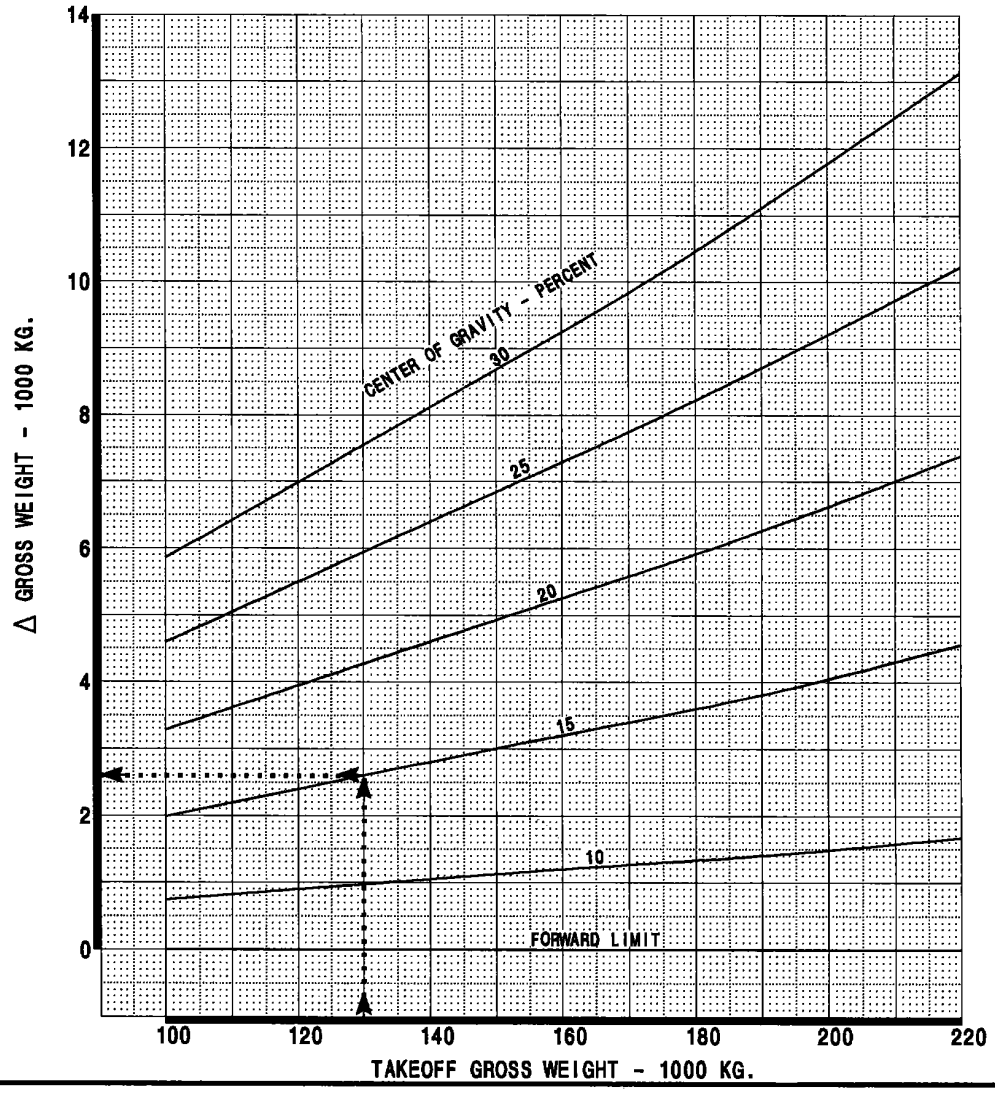
TIRE SPEED LIMITS
WEIGHT ADJUSTMENTS

FLAPS 5

1) DETERMINE THE TIRE SPEED LIMITED TAKEOFF GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TIRE SPEED LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TIRE SPEED LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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CHANDLER
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S17050

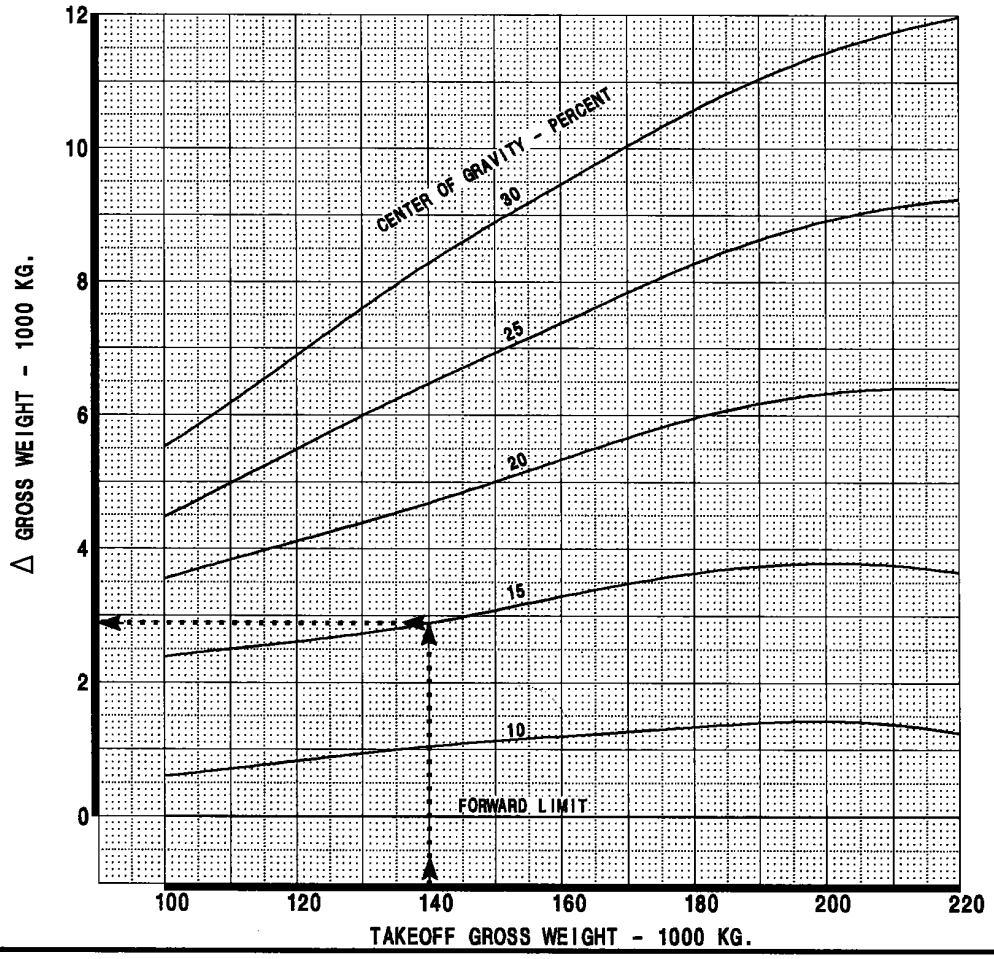
TIRE SPEED LIMITS
WEIGHT ADJUSTMENTS

FLAPS 15

1) DETERMINE THE TIRE SPEED LIMITED TAKEOFF GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TIRE SPEED LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TIRE SPEED LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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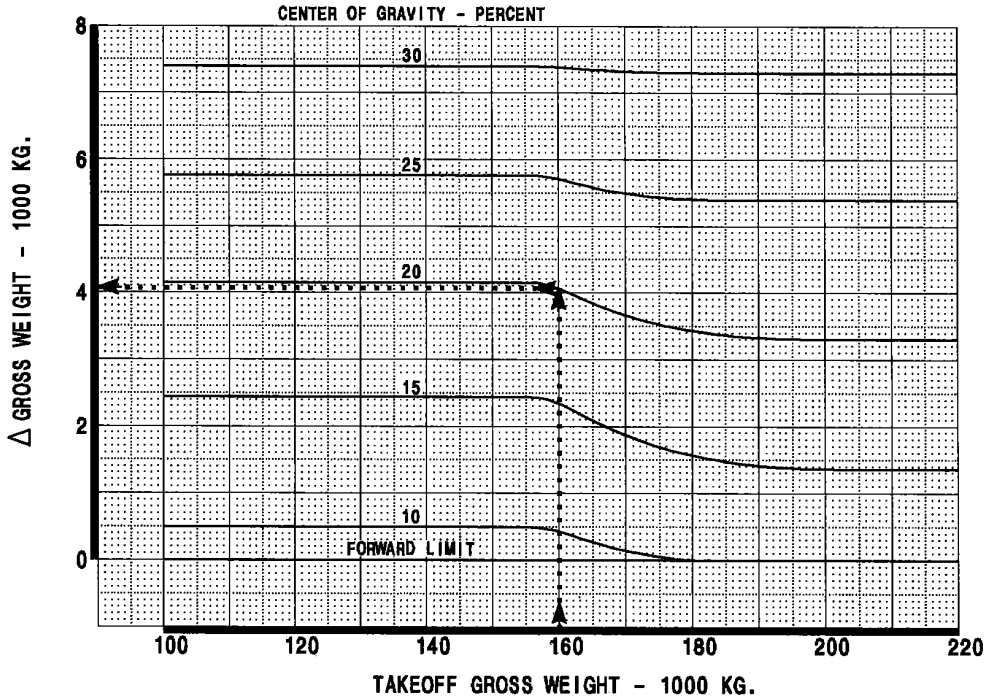
TIRE SPEED LIMITS
WEIGHT ADJUSTMENTS

FLAPS 20

1) DETERMINE THE TIRE SPEED LIMITED TAKEOFF GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TIRE SPEED LIMITED GROSS WEIGHT AT ALTERNATE C.G. = TIRE SPEED LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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	APPROVED	DATE
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S17052

SECTION 4.7 - TAKEOFF SPEEDS

GENERAL

The Takeoff Speeds Adjustment chart in this section adjust the takeoff speeds V_1, V_R, V_2, based on the basic certified forward CG limit to the takeoff speeds at the airplane's alternate forward CG limit. The scheduled takeoff speeds must comply with the FAR requirements discussed in Section 4.7 of the basic manual.

TAKEOFF SPEED DETERMINATION

1. Enter the appropriate Takeoff Speeds chart in Section 4.7 of the basic manual with the airport altitude/temperature and the takeoff gross weight. Read rotation speed, takeoff safety speed, and takeoff decision speed.

2. Enter the Takeoff Speeds Adjustment chart in this section with the three takeoff speeds, Step 1, and the alternate forward CG limit. Read delta takeoff speed for each speed.

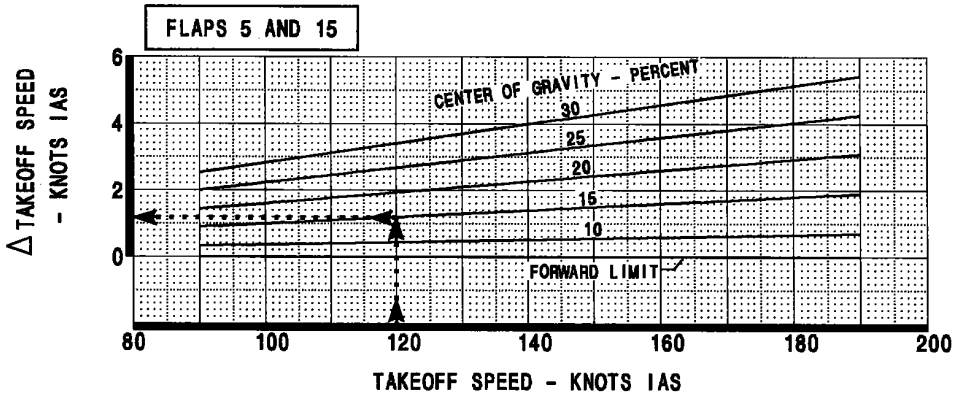
3. Adjust the delta takeoff speed determined from Step 2 to the appropriate takeoff speed determined in Step 1 to obtain the takeoff speeds at the alternate forward CG limit.

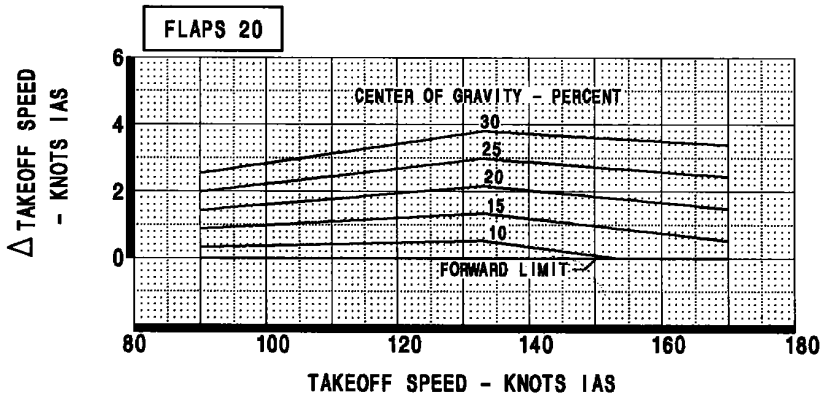
TAKEOFF SPEEDS
SPEED ADJUSTMENT

1) DETERMINE TAKEOFF SPEEDS FROM THE BASIC A.F.M.

2) DETERMINE "Δ TAKEOFF SPEED" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

TAKEOFF SPEED AT ALTERNATE C.G. = BASIC A.F.M. V_R - Δ TAKEOFF SPEED
TAKEOFF SPEED AT ALTERNATE C.G. = BASIC A.F.M. V_2 - Δ TAKEOFF SPEED
TAKEOFF SPEED AT ALTERNATE C.G. = BASIC A.F.M. V_1 - Δ TAKEOFF SPEED





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S17054

SECTION 4.9 - OBSTACLE CLEARANCE

GENERAL

The Obstacle Clearance Limits Weight Adjustment charts in this section adjust the obstacle limited gross weight based on the basic certified forward CG limit to the obstacle clearance limited takeoff gross weight at the airplane's alternate forward CG limit.

Two procedures are presented to determine the allowable takeoff gross weight when there are obstacles in the flight path. Procedure 1 consists of a simple correction to the basic manual allowable takeoff gross weight for obstacle clearance. Procedure 2 is a more detailed analysis which allows the construction of the flight path and thereby results in a less conservative obstacle limited takeoff gross weight. These adjustments and procedures may not be used for obstacles which require clearance in the final climb segment.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE

PROCEDURE 1

1. Determine the allowable takeoff gross weight based on field length, tire speed, takeoff climb, obstacle clearance, or structural limits using the basic manual.

2. For the appropriate flap, enter the Obstacle Clearance Weight Adjustment chart in this section with the obstacle clearance limited takeoff gross weight, if available, or the allowable takeoff gross weight, Step 1, and the alternate forward CG limit. Read delta gross weight.

3. Add delta gross weight determined in Step 2 to the allowable takeoff gross weight determined in Step 1 to obtain the obstacle limited takeoff gross weight at the alternate forward CG limit.

PROCEDURE 2

Procedure 2 is a modification of the obstacle clearance analysis in Section 4.9 from the basic manual. Charts and adjustments from this section, together with charts from Section 4.4 and 4.5 of this appendix, are used in conjunction with the obstacle clearance charts from Section 4.9 from the basic manual. This section provides adjustments to the Maximum Level-off Height and the End of Second Segment Climb Distance.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

PROCEDURE 2 (Continued)

1. Determine Reference Zero

   a) Enter the Field Length Limits, Weight Adjustment chart, in Section 4.4 of this appendix, with the lightest gross weight at the alternate forward CG limit determined by climb limits, tire speed limits, structural limits, or the operational requirements along with runway slope and the alternate forward CG limit. Read the delta gross weight adjustment and subtract to obtain the field length limited gross weight.

   b) With the gross weight from Step 1 (a) determine the location of Reference Zero relative to the brake release end of the runway using Section 4.9 from the basic manual.

2. Adjust Obstacle Distance and Height to Reference Zero

   Follow the procedure of Section 4.9 from the basic manual.

3. Corrected Gross Gradient Available

   a) Enter the Takeoff Climb Limits Weight Adjustment chart, in Section 4.5 of this appendix, with the gross weight at the alternate forward CG limit used to determine Reference Zero, Step 1, and the alternate forward CG limit. Read the delta gross weight and subtract to obtain the climb limited gross weight.

   b) With the gross weight, Step 3 (a), determine the corrected gross gradient available using Section 4.9 from the basic manual.

4. Close-In Obstacles

   a) Follow the procedures in Section 4.9 from the basic manual using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the obstacle limited takeoff gross weight.

      NOTE: To construct an obstacle distance trade line in the Close-In Obstacle Clearance chart, if required, use the appropriate procedure from the basic manual.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

PROCEDURE 2 (Continued)

4. Close-In Obstacles (Continued)

b) Enter the Takeoff Climb Limits (Weight Adjustment) chart, in Section 4.5 of this appendix, with the obstacle limited takeoff gross weight, Step 4 (a), and the alternate forward CG limit. Read delta gross weight and add to obtain the gross weight at the alternate forward CG limit.

5. Distant Obstacles

a) Follow the procedure in Section 4.9 from the basic manual.

NOTE: Adjust Distance to the end of extended second segment, as read from the basic manual, by applying the delta distance from the end of Extended Second Segment Adjustment chart in this section.

Second Segment

b) Follow the procedure in Section 4.9 from the basic manual using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the obstacle limited takeoff gross weight.

NOTE 1: Find the limiting maximum level-off height by entering the Maximum Level-Off Height Adjustment chart, this section, with the alternate forward CG limit and determine the adjustment to apply to the maximum level-off height from the basic manual.

NOTE 2: To construct an obstacle distance trade line on the Distant Obstacle Clearance chart, if required, use the appropriate procedure from the basic manual.

c) Enter the Takeoff Climb Limits Weight Adjustment chart, in Section 4.5 of this appendix, with the obstacle limited takeoff gross weight, Step 5 (b), and the alternate forward CG limit. Read the delta gross weight and add to obtain the gross weight at the alternate forward CG limit.

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OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

PROCEDURE 2 (Continued)

6. Extended Second Segment

Follow the procedure in Section 4.9 from the basic manual.

a) The final segment gradient capability required at the alternate forward CG limit for extended second segment is determined by applying the gradient adjustment from the Extended Second Segment Minimum Gradient Adjustment chart in this appendix to the value defined on the Obstacle Clearance, Distant Obstacles chart values in the basic manual.

b) Continue with Step 6 (b) and 6 (c) procedure in Section 4.9 from the basic manual.

7. Maximum Gross Weight for Extended Second Segment

To determine the maximum gross weight for extended second segment enter the Final Takeoff Climb chart in the basic manual with the final segment gradient capability required for extended second segment, given in Step 6 (a). Read takeoff gross weight for extended second segment.

8. Obstacle in Third Segment

a) Follow the procedure of Section 4.9 from the basic manual to determine the obstacle clearance limited gross weight.

NOTE: When constructing the Maximum Level-Off Height line on the Distant Obstacle Clearance chart use the Maximum Level-Off Height Adjustment chart, in this section.

b) Enter the Takeoff Climb Limits Weight Adjustment chart, in Section 4.5 of this appendix with the obstacle limited takeoff gross weight, Step 8 (a), and the alternate forward CG limit. Read delta gross weight and add to obtain the obstacle limited takeoff gross weight for the alternate forward CG limit.

9. Obstacle in Final Segment

The procedures and adjustments in this appendix may not be used for obstacle which require clearance in the final climb segment.

PERFORMANCE

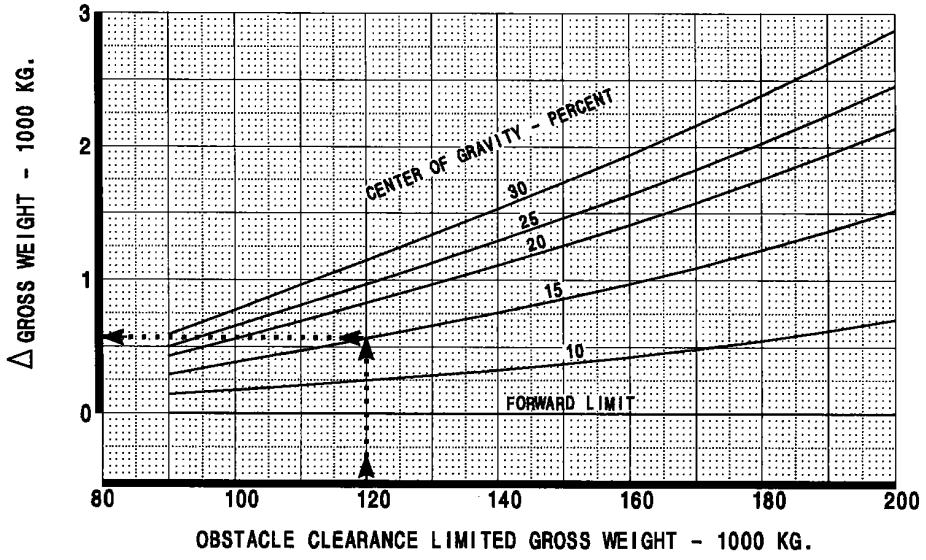
OBSTACLE CLEARANCE LIMITS WEIGHT ADJUSTMENT

FLAPS 5

1) DETERMINE OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

OBSTACLE CLEARANCE LIMITED GROSS WEIGHT AT ALTERNATE C.G. = OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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S17063

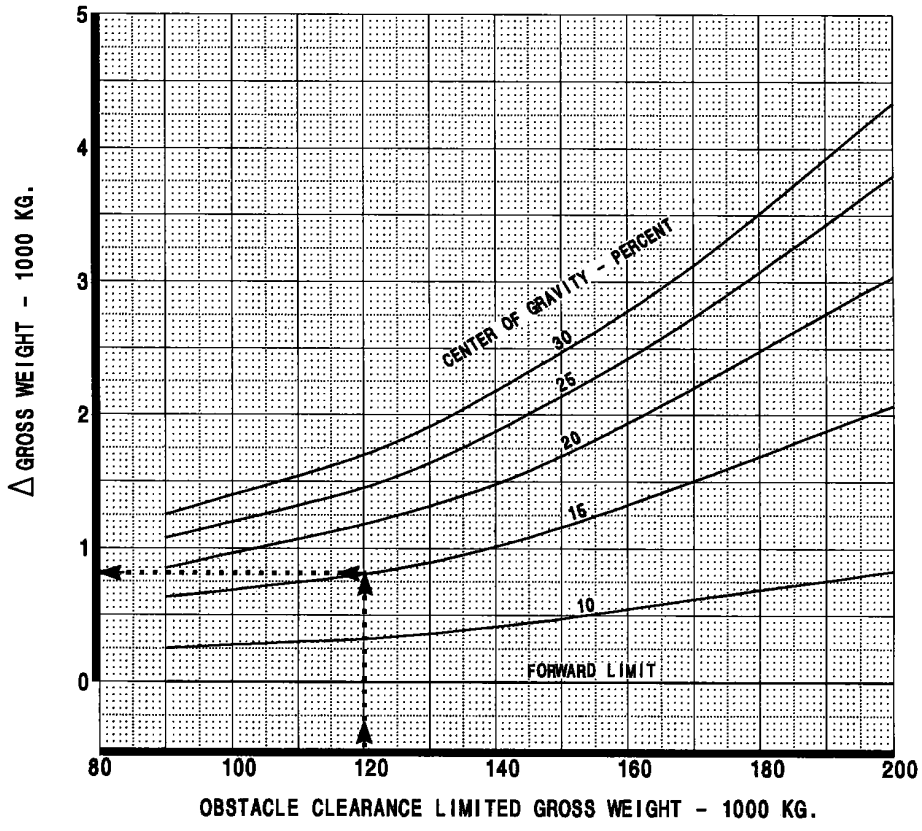
OBSTACLE CLEARANCE LIMITS
WEIGHT ADJUSTMENT

FLAPS 15

1) DETERMINE OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

OBSTACLE CLEARANCE LIMITED GROSS WEIGHT AT ALTERNATE C.G. = OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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S17064

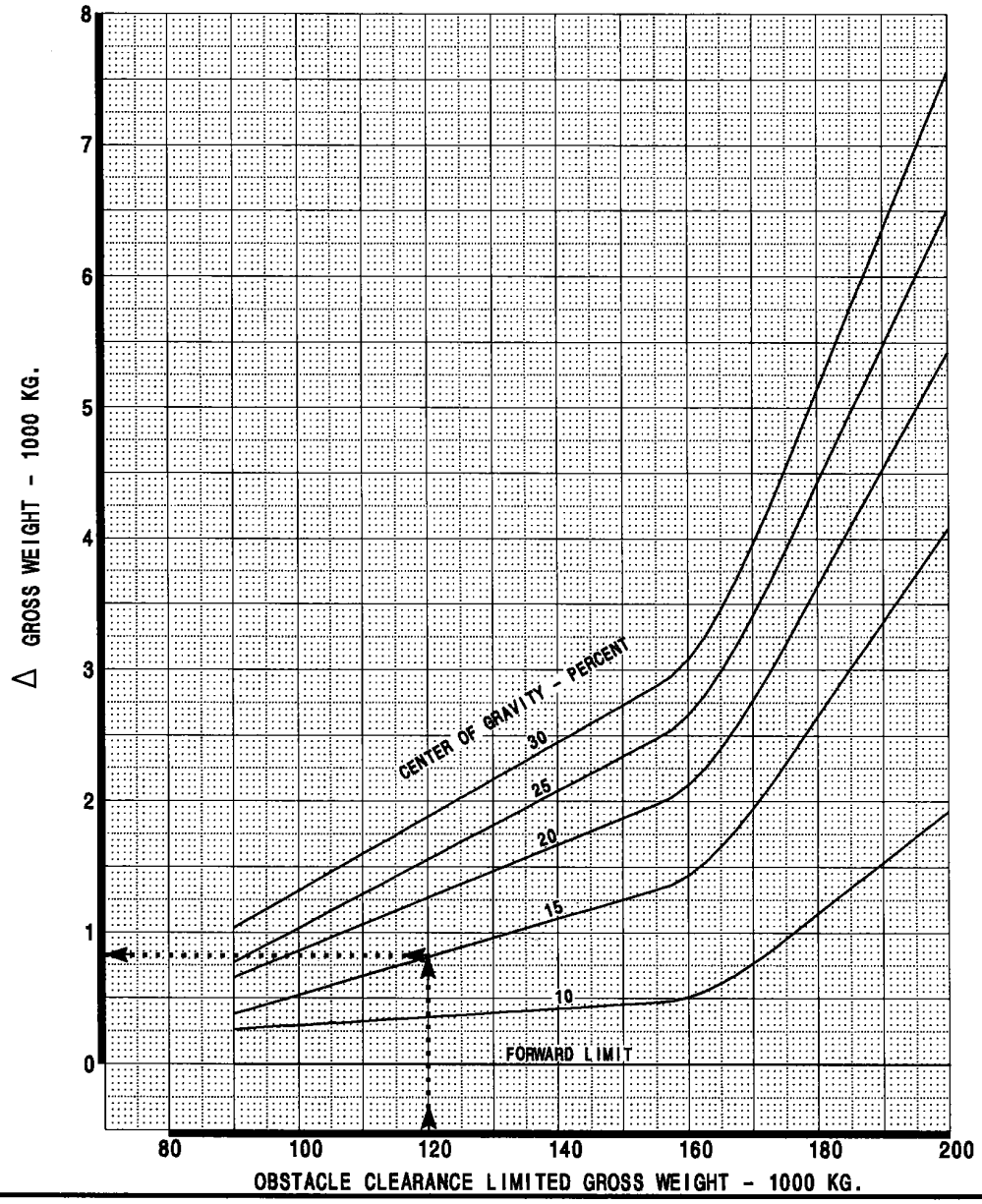
OBSTACLE CLEARANCE LIMITS
WEIGHT ADJUSTMENT

FLAPS 20

1) DETERMINE OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "Δ GROSS WEIGHT" FROM THE PLOT BELOW AT THE ALTERNATE FORWARD C.G. LIMIT.

OBSTACLE CLEARANCE LIMITED GROSS WEIGHT AT ALTERNATE C.G. = OBSTACLE CLEARANCE LIMITED GROSS WEIGHT FROM A.F.M. + Δ GW



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MAXIMUM LEVEL-OFF HEIGHT ADJUSTMENT

FLAPS 5, 15, AND 20

1) DETERMINE MAXIMUM GROSS LEVEL-OFF HEIGHT FROM THE BASIC A.F.M.

2) DETERMINE "MAXIMUM LEVEL-OFF HEIGHT ADJUSTMENT" FROM THE TABLE BELOW AT THE ALTERNATE FORWARD C.G. LIMIT. USE LINEAR INTERPOLATION.

MAXIMUM LEVEL-OFF HEIGHT AT ALTERNATE C.G. = MAXIMUM LEVEL-OFF HEIGHT FROM A.F.M. + Δ HEIGHT

5 MINUTE TAKEOFF THRUST

FLAPS	CENTER OF GRAVITY - PERCENT				
	10	15	20	25	30
5	-15 FT	-41 FT	-65 FT	-92 FT	-117 FT
15	-15 FT	-40 FT	-59 FT	-77 FT	-100 FT
20	-13 FT	-31 FT	-50 FT	-71 FT	-91 FT

10 MINUTE TAKEOFF THRUST

FLAPS	CENTER OF GRAVITY - PERCENT				
	10	15	20	25	30
5	-15 FT	-45 FT	-76 FT	-111 FT	-146 FT
15	-13 FT	-33 FT	-58 FT	-86 FT	-111 FT
20	-11 FT	-27 FT	-46 FT	-66 FT	-87 FT

P.C. K651905000 APP.51
D041T507-1 PG. 4.9 - 5

APPROVED LARSON DATE 12-05-96

B. BARTEL
767-300IF/300ER
CF6-80C2 SERIES

S17066

END OF EXTENDED SECOND SEGMENT ADJUSTMENT

FLAPS 5, 15, AND 20

1) DETERMINE "HORIZONTAL DISTANCE FROM REFERENCE ZERO" FROM END OF EXTENDED SECOND SEGMENT CHART IN THE BASIC A.F.M.

2) DETERMINE "END OF EXTENDED SECOND SEGMENT ADJUSTMENT" FROM THE TABLE BELOW AT THE ALTERNATE FORWARD C.G. LIMIT. USE LINEAR INTERPOLATION.

HORIZONTAL DISTANCE FROM REFERENCE ZERO AT ALTERNATE C.G. = HORIZONTAL DISTANCE FROM REFERENCE ZERO FROM A.F.M. + Δ DISTANCE

5 MINUTE TAKEOFF THRUST

CENTER OF GRAVITY - PERCENT				
10	15	20	25	30
-325 FT	-600 FT	-900 FT	-1230 FT	-1600 FT

10 MINUTE TAKEOFF THRUST

CENTER OF GRAVITY - PERCENT				
10	15	20	25	30
-625 FT	-1430 FT	-2345 FT	-3230 FT	-4120 FT

P.C. K651906000 APP.51
D041T507-1 PG. 4.9 - 6

APPROVED LARSON DATE 12-05-96

B. BARTEL
767-300IF/300ER
CF6-80C2 SERIES

S17067

FINAL TAKEOFF CLIMB GRADIENT ADJUSTMENT FOR EXTENDED SECOND SEGMENT

FLAPS 5, 15, AND 20

1) DETERMINE THE MINIMUM FINAL TAKEOFF CLIMB GRADIENT FOR EXTENDED SECOND SEGMENT AND MCT CLEANUP FROM THE DISTANT OBSTACLE CLEARANCE CHART OF THE BASIC A.F.M. OR A.F.M. DERATE APPENDIX.

2) DETERMINE DELTA MINIMUM GRADIENT FROM THE TABLE BELOW AT THE ALTERNATE FORWARD C.G. LIMIT. USE LINEAR INTERPOLATION.

FINAL TAKEOFF CLIMB MINIMUM GRADIENT AT ALTERNATE C.G. = FINAL TAKEOFF CLIMB MINIMUM GRADIENT FROM BASIC A.F.M. OR A.F.M. DERATE APPENDIX + DELTA MINIMUM GRADIENT

DELTA MINIMUM GRADIENT - PERCENT

FLAPS	CENTER OF GRAVITY - PERCENT			
	FORWARD LIMIT	10	20	30
5	0	-.05	-.18	-.18
15	0	-.08	-.20	-.25
20	0	-.09	-.22	-.33

P.C. K651907000 APP. 51
D041T507-1 PG. 4.9 - 7

M. MCGONIGAL
767-300IF/300ER
CF6-80C2 SERIES
APPROVED V.HILL
DATE 11-11-96

S17068

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

G E N E R A L

Takeoff performance based on an alternate forward CG limit and using improved climb performance is allowable. Refer to Section 4.10 of the basic manual for complete instructions on the use of improved climb performance.

When using improved climb performance at an alternate forward CG limit:

1. Determine field length limited takeoff gross weight from Section 4.4 of this appendix.

2. Determine takeoff climb limited gross weight from Section 4.5 of this appendix.

3. Determine the tire speed limited takeoff gross weight from Section 4.6 of this appendix.

4. Using the values from Steps 1, 2, and 3, enter the appropriate charts in Section 4.10 of the basic manual and determine the takeoff gross weight, takeoff decision speed, rotation speed, and takeoff safety speed.

5. Adjust the takeoff decision speed, rotation speed, and takeoff safety speed from Step 4 for the alternate forward CG limit using Section 4.7 of this appendix.

APPENDIX 53

10-MINUTE TAKEOFF THRUST

767-300

CF6-80C2B6/B6F ENGINES

Model 767-300

Log of Pages
Appendix 53

The following pages comprise this appendix applicable to the above series airplanes.

Revision 2
Approved By Donald B. Wilson for Manager, Seattle Aircraft Certification Office, FAA Transport Airplane Directorate

Date 11-26-97

Page	Code	Date
Title		
* 1	A53	11-26-97
Log of Pages		
* 1		11-26-97
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* 1	A53	11-26-97
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* 1	A53	11-26-97
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* A	A53	11-26-97
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40	3F07	03-30-94
45	0F07	03-30-94
46	0F07	03-30-94

* = Revised Pages
FAA Approved 11-26-97

D6T11321

S43010

BOEING 767

AIRPLANE FLIGHT MANUAL

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S17072

I N T R O D U C T I O N

This appendix contains the additional Certificate Limitations, Procedures and Performance information for using the takeoff thrust rating of CF6-80C2B6/B6F engines for a maximum of 10 minutes in the circumstance of an engine failure during takeoff where there is an obstacle in the takeoff flight path.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

G E N E R A L L I M I T A T I O N S

The time limit on the use of takeoff thrust when operating with CF6-80C2B6/B6F engines, is increased to 10 minutes provided this use is limited to situations where an engine failure actually occurs and there is an obstacle in the takeoff flight path.

E N G I N E L I M I T A T I O N S

ENGINE EGT

The time limit on Takeoff is amended to read:

10 Minutes

Temperature limits are unchanged.

If the 10 minute time limit is utilized, the total operating time at takeoff thrust must be recorded in the airplane flight log.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

SECTION 4 - PERFORMANCE

G E N E R A L

The performance data in this appendix extends the takeoff flight path information to heights and distances attainable when the time limit on the use of takeoff thrust is increased to 10 minutes. This information simplifies the flight path determination for high distant obstacles.

Charts presented in this section are replacement pages for charts with the same titles in the FAA Approved Airplane Flight Manual for the Model 767-300 airplane when operating with CF6-80C2B6/B6F engines. The presentation and usage of the charts are unchanged from the basic flight manual and will be discussed when differences exist.

Pages in the basic manual, not replaced by pages in this appendix, still apply.

SECTION 4.9 - OBSTACLE CLEARANCE

G E N E R A L

The Distant Obstacle Clearance chart, the Maximum Level-Off Height charts and the Gradient Corrections chart in this section replace the corresponding charts in the basic manual. The use of the charts is unchanged.

FLIGHT PATH CHART PRESENTATION

The various charts used in determining a height versus distance profile of the takeoff flight path for checking obstacle clearance are described below. The flight path segments in which takeoff thrust is used are shown as functions of corrected takeoff climb gradient at 400 feet above airport elevation. Obstacle-limited weights for obstacles which can be cleared in the first or second segments of the takeoff flight path can be determined by direct reference to the charts. For more distant obstacles, it is necessary to construct a flight path diagram from information on the various charts in order to determine the maximum allowable takeoff weight for obstacle clearance.

TAKEOFF CLIMB - These charts show gross climb gradient capability in the second segment configuration as a function of gross weight, airport temperature, and airport pressure altitude. They are based on thrust and temperature conditions 400 feet above airport elevation. This height is higher than the gear retracted height which is why the available gradient at takeoff-climb-limited weights is slightly less than the 2.4 percent minimum specified in FAR 25.121(b).

CLOSE-IN OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for the first and second segments out to a distance of 7,000 feet as a function of the corrected takeoff climb gross gradient at a 400 foot height. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

DISTANT OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for a one-engine-inoperative climb at V_2 speed in the takeoff climb (second segment) configuration, as a function of corrected takeoff climb gross gradient at 400 feet. Gross height lines are superimposed on the flight path lines. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

FLIGHT PATH CHART PRESENTATION
(Continued)

OBSTACLE DISTANCE TRADE LINES - When weight is reduced to achieve a higher takeoff climb gradient for obstacle clearance, the required takeoff distance is also reduced. This increases the obstacle distance from Reference Zero. This chart shows the relationship between takeoff distance saved (increased obstacle distance) and takeoff climb gradient as both are affected by gross weight. See Construction of Obstacle Distance Trade Line on Obstacle Clearance Chart.

MAXIMUM LEVEL-OFF HEIGHT - These charts show the maximum gross height at which the acceleration segment can be scheduled at takeoff thrust; the corresponding net height is used to check obstacle clearance.

THIRD SEGMENT DISTANCE - These charts present the gross and net horizontal distances required to accelerate to the final takeoff climb speed, while retracting flaps according to the recommended schedule, as a function of the available corrected takeoff climb gradient. The gradient read from the Takeoff Climb chart must be corrected for level-off height and wind on the Gradient Corrections chart before entering the Third Segment Distance chart.

FINAL TAKEOFF CLIMB CHART - This chart shows the gross and net gradient available upon completion of the flap retraction segment and reduction of thrust to maximum continuous limits. It is used to construct the final segment of the flight path to determine clearance of very high and distant obstacles. It is based on conditions 1,500 feet above airport altitude and 3 degrees C below airport temperature. The gradients from this chart should be corrected for height and wind on the Gradient Corrections chart as required.

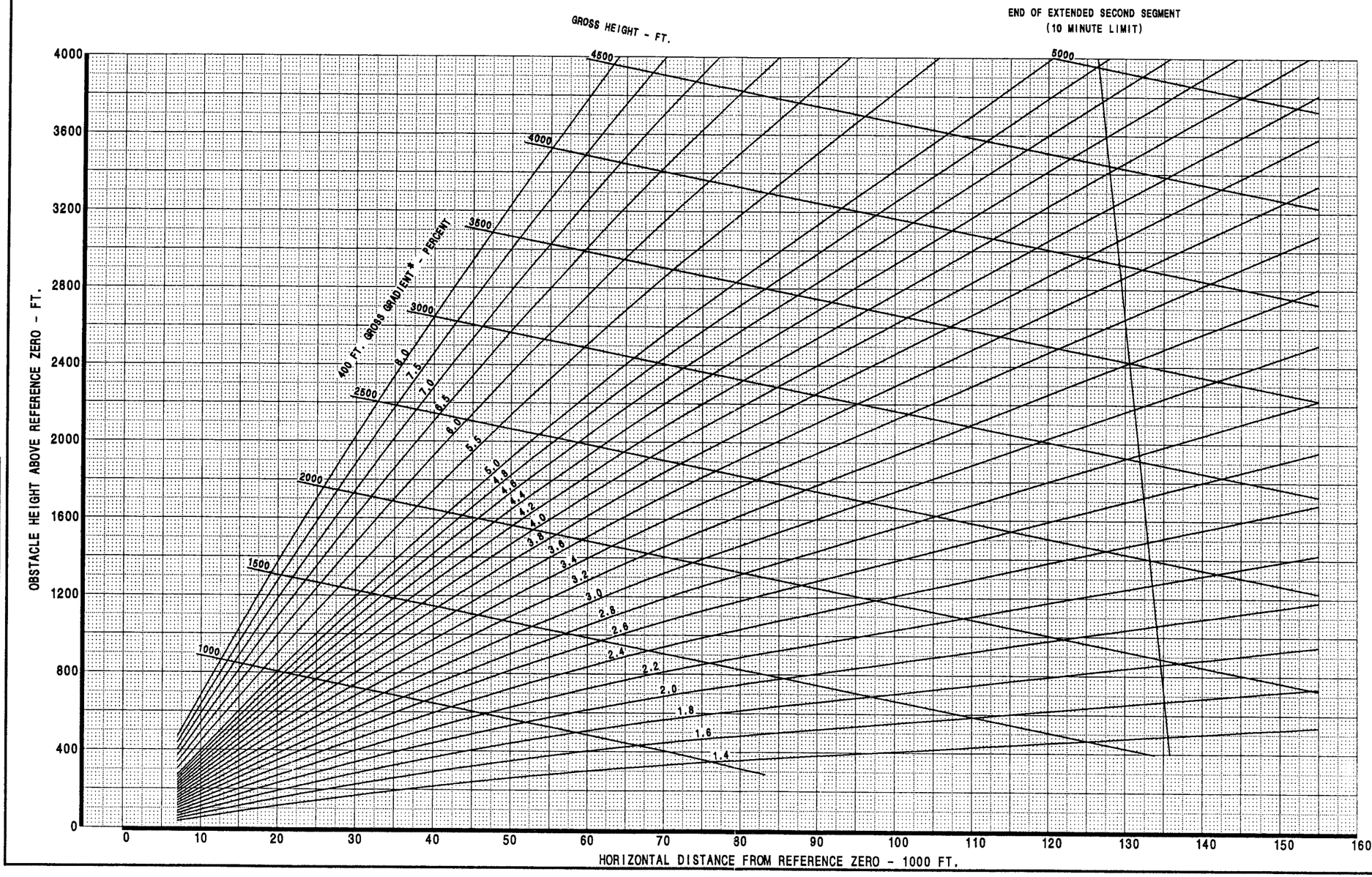
GRADIENT CORRECTIONS - Corrections to takeoff and final takeoff climb gradients are shown on this chart for wind, gross height and for steady turns in the flight path. Wind corrections should be applied to the takeoff climb gradients used in the Obstacle Clearance charts. Both wind and gross height corrections may be required when a flight path analysis extends into the third and final segments. It should be noted that the procedure used to read this chart is different depending on the direction that the correction is to be made. For example, from a zero wind 400 ft. gross gradient (from a Takeoff Climb chart), start with the zero wind gradient on the REF LINE and slide to the required wind to get the wind corrected gradient. However, from a wind corrected gradient (from an Obstacle Clearance chart), start with the wind corrected gradient at the wind value and slide to the REF LINE to get the zero wind gradient.

DISTANT OBSTACLE CLEARANCE

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5, 15, AND 20

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.
- * MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, AND BANK ANGLE.



P.C. K653934000 APP. 53
D041T507-1 PG. 4.9-34

APPROVED	DATE
JC Zhu	1/20/94

D. BACH
767-300ER
CF6-80C2B6/B6F

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

P.C. K653938002 APP. 53
D041T507-1 PG. 4.9-38

APPROVED	DATE
LARSON	02-22-97

B. BARTEL
767-300ER
CF6-80C2B6/B6F

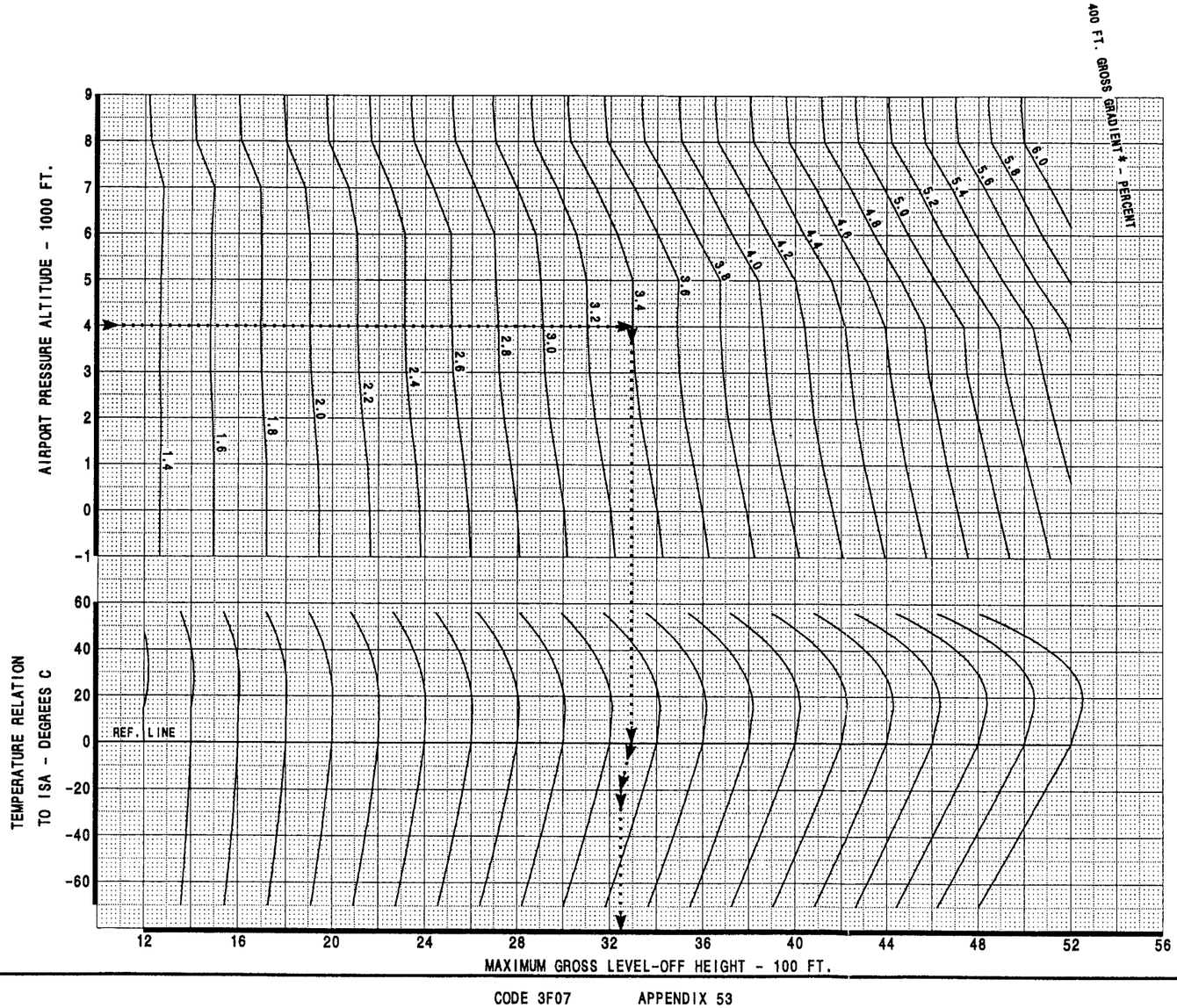
S20483

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. K653938003 APP. 53
D041T507-1 PG. 4.9-38

D. BACH
767-300ER
CF6-80C2B6/B6F

APPROVED C.J. Bach
DATE 1/18/94

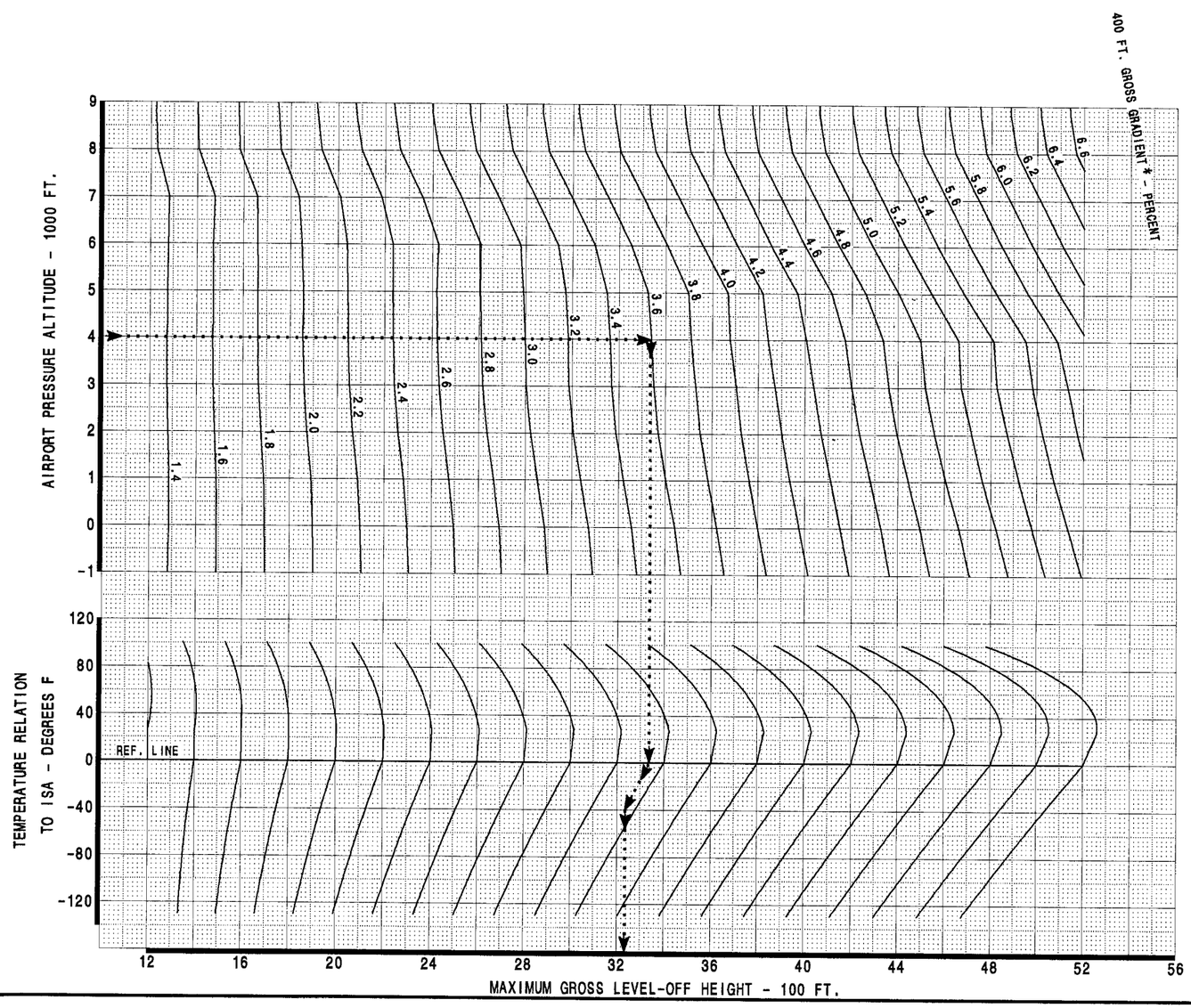
S20416

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 15

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. K653939002 APP. 53
D041T507-1 PG. 4.9-39

APPROVED	DATE
LARSON	02-22-97

B. BARTEL
767-300ER
CF6-80C2B6/B6F

S20485

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 15

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

P.C. K653939003 APP. 53
D041T507-1 PG. 4.9-39

APPROVED	DATE
D. BACH	1/18/94

767-300ER
CF6-80C2B6/B6F

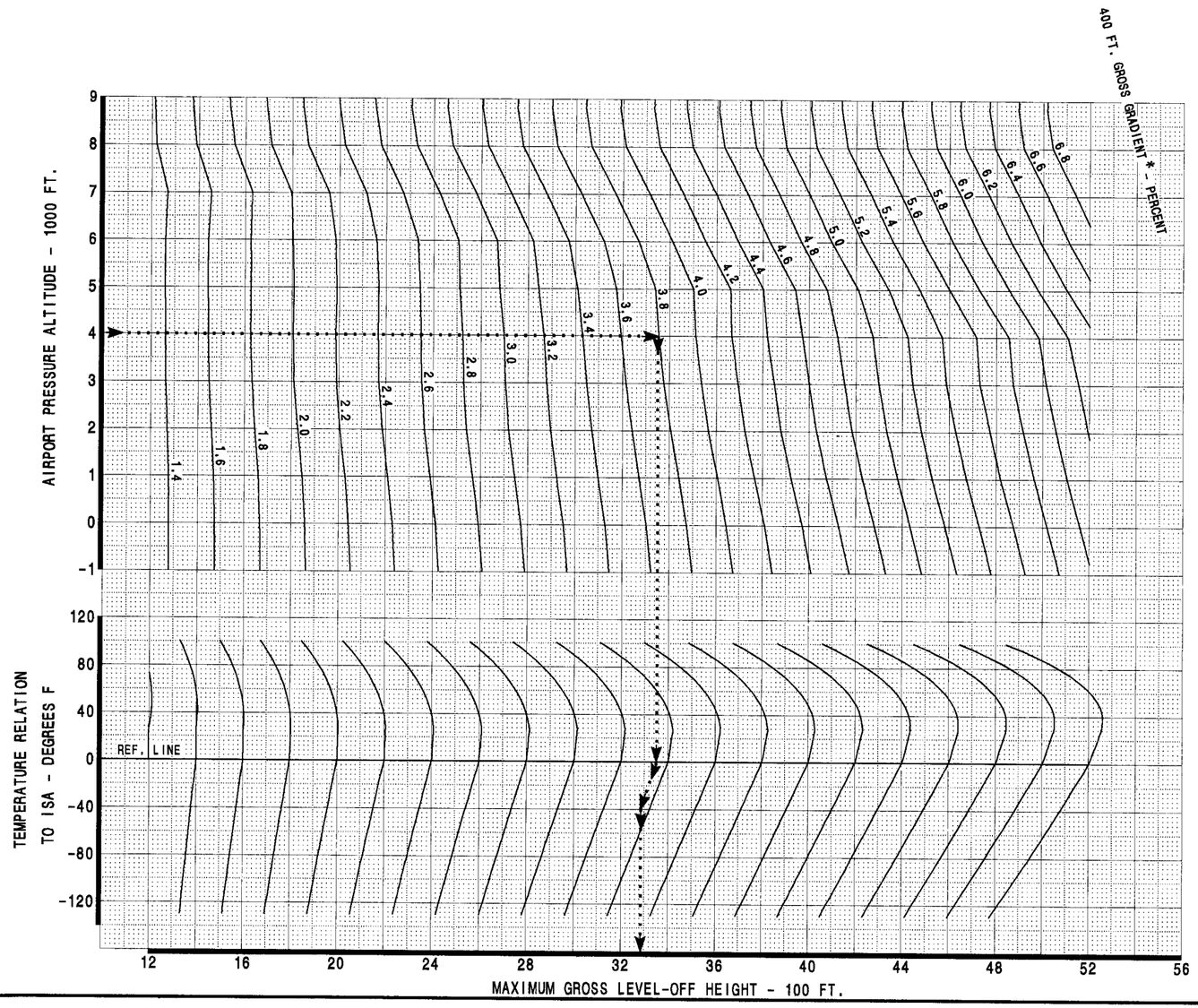
S20484

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 20

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. K653940002 APP. 53
D041T507-1 PG. 4.9-40

APPROVED	DATE
LARSON	02-22-97

B. BARTEL
767-300ER
CF6-80C2B6/B6F

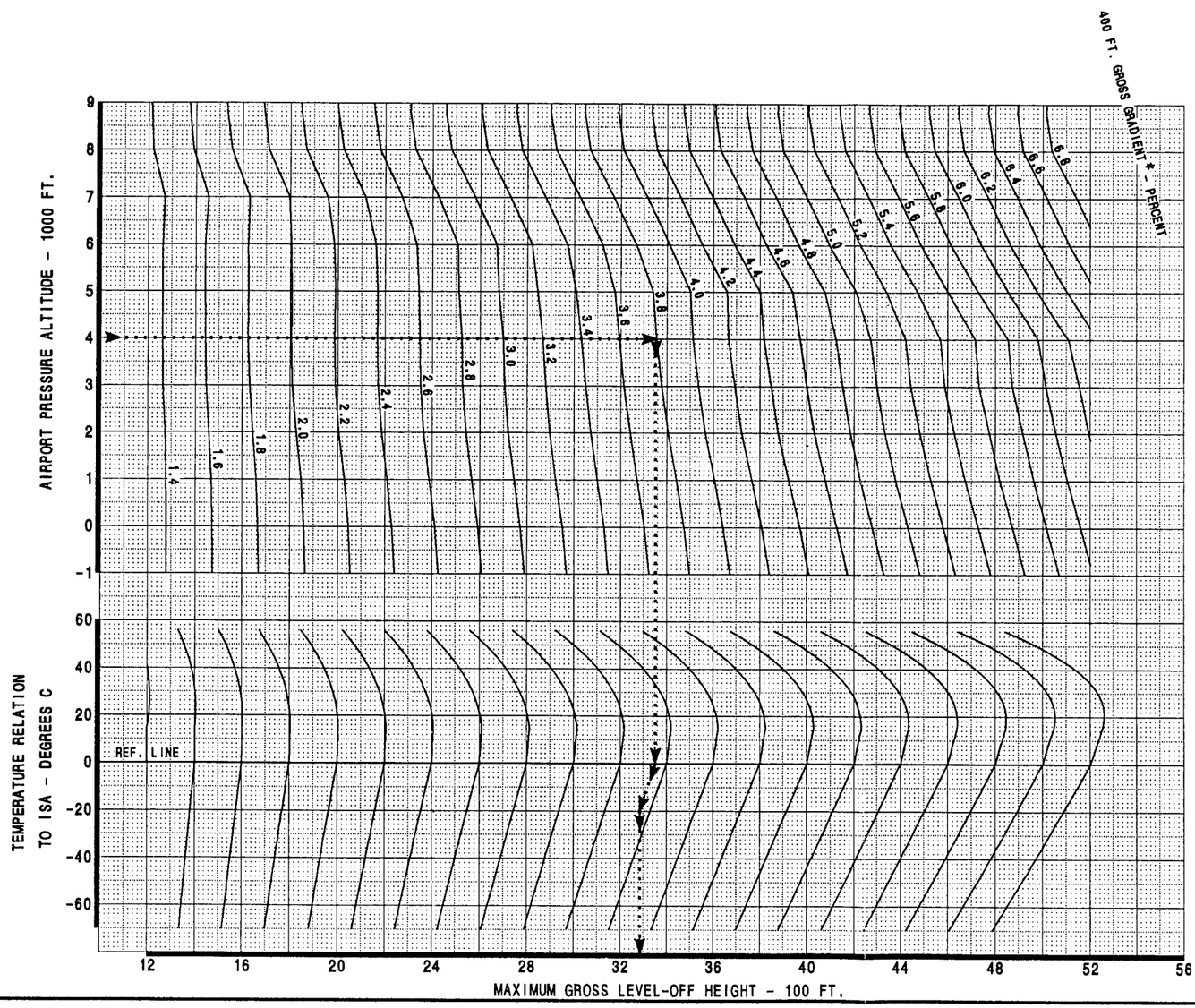
S20487

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 20

*MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. K653940003 APP. 53
D041T507-1 PG. 4.9-40

D. BACH
767-300ER
CF6-80C2B6/B6F

APPROVED	DATE
C. J. Mark	1/19/94

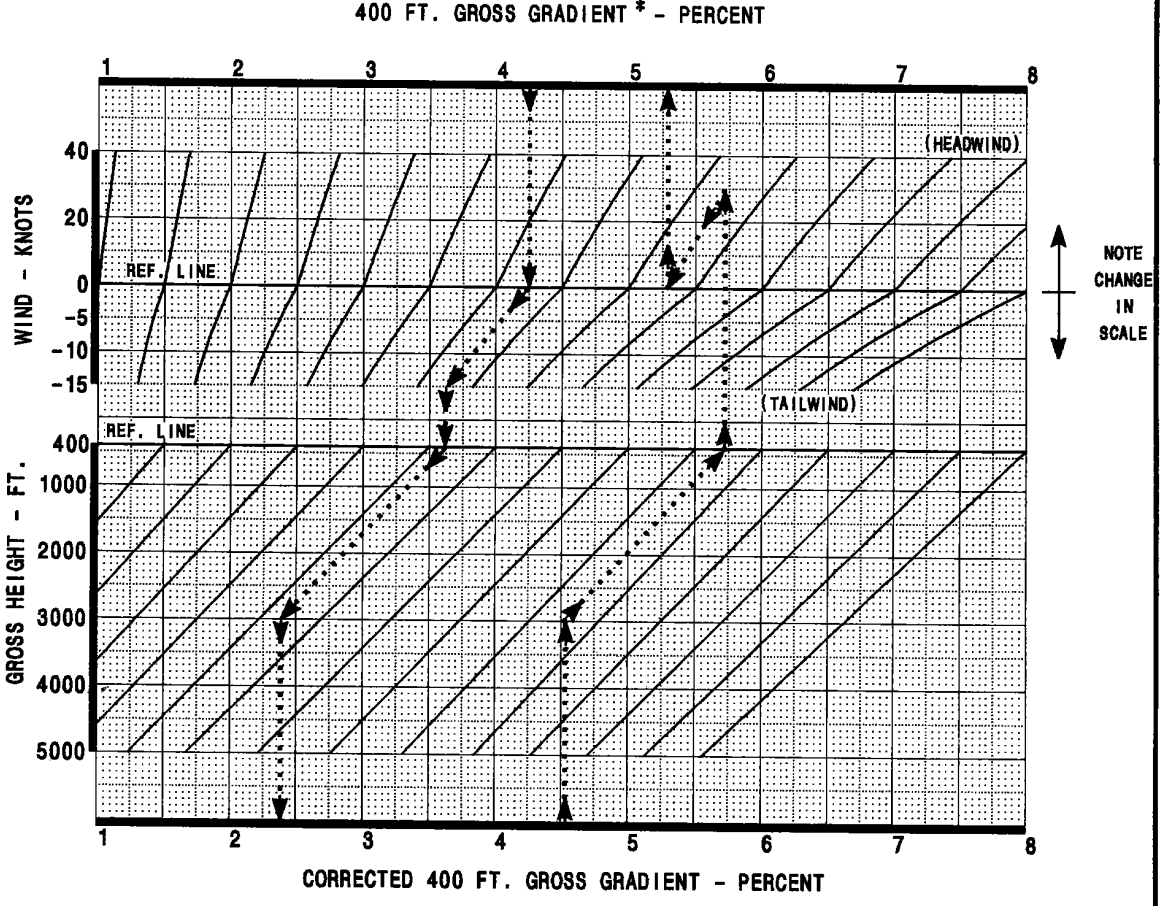
GRADIENT CORRECTIONS

TAKEOFF CLIMB

■ APPLY THE FOLLOWING ADJUSTMENTS TO THE CORRECTED 400 FT. GROSS GRADIENT.

GRADIENT ADJUSTMENT - PERCENT			
BANK ANGLE - DEGREES	FLAPS 5	FLAPS 15	FLAPS 20
5	-0.05	-0.06	-0.06
10	-0.21	-0.23	-0.24
15	-0.48	-0.52	-0.54

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, IF APPLICABLE.



P.C. K653945000
D041T507-1 PG. 4.9-45

D. BACH
767-300ER
CF6-80C2B6/B6F
APPROVED
DATE 2/16/94

S17079

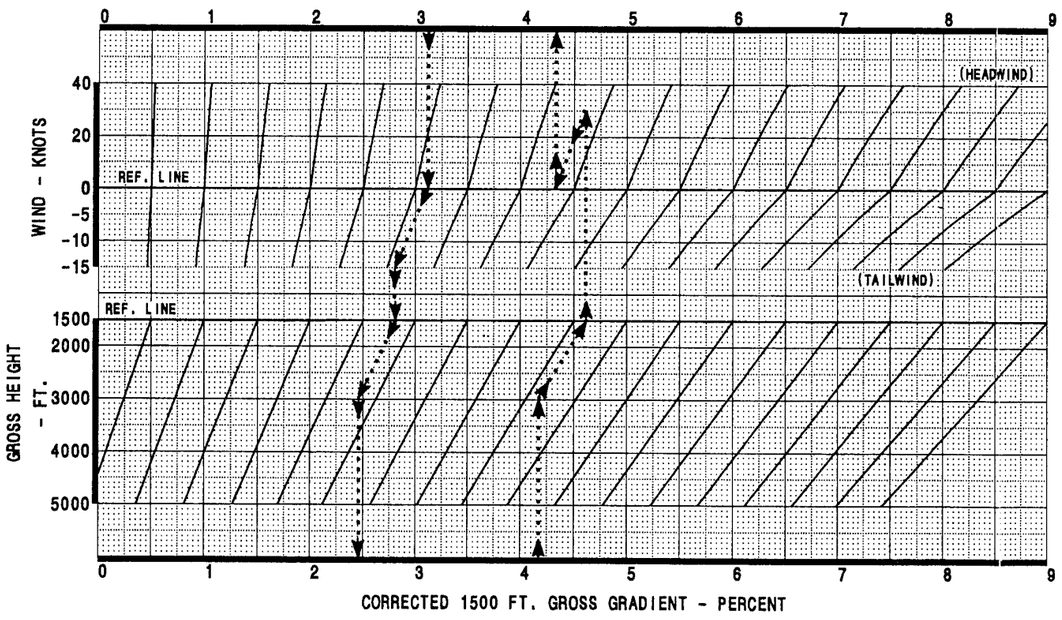
GRADIENT CORRECTIONS

FINAL TAKEOFF CLIMB

■ APPLY THE FOLLOWING ADJUSTMENTS TO THE CORRECTED 1500 FT. GROSS GRADIENT.

GRADIENT ADJUSTMENT - PERCENT	
BANK ANGLE - DEGREES	FLAPS UP
5	-0.02
10	-0.10
15	-0.22

1500 FT. GROSS GRADIENT - PERCENT



NOTE CHANGE IN SCALE

P.C. K653W46000 APP. 53
D041T507-1 PG. 4.9-46
D. BACH
767-300ER
CF6-80C2B6/B6F
APPROVED C. J. Beal DATE 1/18/94

REVISION HIGHLIGHTS

Revision 1 to Appendix 54 to D6T11321 dated 01-05-05.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to format the footers on the text pages to reflect a page code in lieu of the Appendix number for clarity.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Title		
1	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.
Revision Approval		
1	045660	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Contents		
1	A54	Revised to replace "Appendix 54" with "Code A54" in the footer. The page number for Sections 2 and 3 were changed to page 1 in lieu of page 3.
Introduction		
1	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.

REVISION HIGHLIGHTS

Revision 1 to Appendix 54 to D6T11321 dated 01-05-05.

PAGE	CODE	EXPLANATION
Section 1		
1	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.
2	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.
Section 2&3		
1	A54	Revised to replace "Appendix 54" with "Code A54" in the footer. Also changed the page number from page 3 to page 1.
Section 4		
4	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.
5	A54	Revised to replace "Appendix 54" with "Code A54" in the footer.

APPENDIX 54

OPERATION AT REDUCED TAKEOFF THRUST

CF6-80C2B7F ENGINES

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 045660** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 01-05-05

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Log of Pages
Appendix 54

The following pages comprise this appendix applicable to the above series airplanes.

Revision 1 Date 01-05-05

Page	Code	Date
Title		
* 1	A54	01-05-05
Revision Approval		
* 1	045660	01-05-05
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Section 2&3		
* 1	A54	01-05-05
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* 5	A54	01-05-05
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Engine Thrust 2

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SECTION 3 - OPERATING PROCEDURES 1

SECTION 4 - PERFORMANCE

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Determination of the Assumed Temperature
Takeoff Power Setting $\%N_1$ 5
TAKEOFF POWER SETTING ASSUMED TEMPERATURE REDUCED THRUST 6

Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

I N T R O D U C T I O N

This appendix presents a method for determining takeoff performance with the engines operating at less than a Full Rated Takeoff thrust rating. The method consists of using the performance data at an assumed temperature higher than the actual ambient temperature to determine weight limits, speeds, and takeoff flight path information, and setting a reduced value of takeoff %N1 compatible with the selected assumed temperature.

Use of this appendix is optional; its purpose is to reduce engine wear associated with maximum thrust operation. Its use may result in the airplane operating at or near weight limits due to field length, takeoff climb or net flight path minimums where, under the same conditions and airplane configuration at full takeoff thrust, the airplane would not be limited.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in
Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

G E N E R A L L I M I T A T I O N S

This appendix contains the additional limitations, procedures, and performance to schedule takeoff operation at reduced engine thrust.

The allowable thrust reduction is such that:

1. Airplane performance at the reduced thrust meets all applicable performance requirements; and,

2. The takeoff thrust reduction does not exceed 25 percent of the Full Rated Takeoff thrust as shown on Sub-chart D in this appendix.

REDUCED TAKEOFF THRUST PROCEDURES

As a condition to the use of reduced thrust procedures, operators must establish a periodic check system to ensure that the engines are capable of producing full takeoff thrust.

Use of reduced thrust procedures is not allowed when the takeoff runway is contaminated with water, ice, slush, or snow.

Use of reduced thrust procedures is not allowed with antiskid inoperative.

SECTION 1 - CERTIFICATE LIMITATIONS

O P E R A T I O N A L L I M I T S

Takeoff and landing operational temperature limits are amended by the following addition:

The takeoff performance data associated with a particular ambient temperature is valid or conservative for any lower temperature, within thrust reduction limits established in General Limitations, this appendix.

E N G I N E L I M I T A T I O N S

Limitations are unchanged except for the following:

ENGINE THRUST

Limitations are unchanged except for the following addition:

The %N1 values used to set takeoff thrust are determined at the selected assumed temperature.

SECTION 2 - EMERGENCY PROCEDURE

Emergency procedures are unchanged.

SECTION 3 - PROCEDURES

Operating procedures are unchanged.

REDUCED THRUST PERFORMANCE LIMITS

In accordance with the limitations on page 1 of this appendix, operation at reduced thrust is only permissible if the airplane meets all applicable performance requirements at the planned takeoff weight and reduced thrust setting, and the amount of thrust reduction does not exceed 25 percent of the Rated Takeoff rating. Rated Takeoff rating is the full takeoff rating of the engines actually installed on the airplane, or any alternate engine rating for which performance data are included in the flight manual. Performance limits are determined by reading the performance charts at an assumed airport temperature higher than the actual ambient temperature. The higher the assumed temperature, the greater the thrust reduction that will be achieved. Therefore, the analysis usually involves determination of the maximum assumed temperature for the actual conditions. The following procedure may be used to determine reduced thrust performance limits.

DETERMINATION OF THE ASSUMED TEMPERATURE

1. Enter the field Length Limits chart using the corrected runway length, airport pressure altitude and the desired takeoff weight and read the airport OAT.

2. Enter the Takeoff Climb Limits chart using the airport pressure altitude and the desired takeoff weight and read the airport OAT.

3. The lower of the temperatures determined from Steps 1 and 2 is the maximum assumed temperature upon which reduced takeoff thrust may be based.

4. Select a desired assumed temperature greater than the actual ambient temperature but not exceed the maximum assumed temperature from Step 3.

5. Complete the takeoff weight analysis using the selected assumed temperature. If other performance considerations such as obstacle clearance, tire speed, etc., become limiting, then a lower assumed temperature must be selected.

6. V_1 and V_R determined using the selected assumed temperature must not be less than the $V_{1(MCG)}$ for the actual airport ambient temperature.

D E T E R M I N A T I O N O F T H E A S S U M E D T E M P E R A T U R E T A K E O F F P O W E R S E T T I N G % N_1

The Assumed Temperature Takeoff %N1 is determined from the Takeoff Power Setting Assumed Temperature Reduced Thrust chart using the procedures specified thereon.

NOTE: Use of these procedures will ensure that thrust reduction does not exceed 25 percent.

P.C. d654006002 APP. 54
D041T513-1 PG. 4.0-6

TAKEOFF POWER SETTING

ASSUMED TEMPERATURE REDUCED THRUST WITH OR WITHOUT ADDITIONAL DERATE

PROCEDURES

1. DO NOT USE AN ASSUMED TEMPERATURE IN SHADED REGION OF CHART A.
2. DETERMINE Δ% CORR. N1 FROM CHART B USING THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
3. ENTER CHART C WITH ASSUMED OAT TO DETERMINE TERMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
4. REDUCE THE PERCENT CORRECTED N1 FROM STEP 3 BY THE Δ% CORR. N1 FROM STEP 2.
5. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 4 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 3.
6. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 5 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
7. ENTER CHART C WITH ACTUAL AIRPORT OAT TO DETERMINE TEMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
8. REDUCE THE PERCENT CORRECTED N1 FROM STEP 7 BY THE Δ% CORR. N1 FROM STEP 2.
9. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 8 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 7.
10. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 9 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
11. ENTER CHART E WITH THE PERCENT CORRECTED N1 FROM STEP 10 AND DETERMINE MAXIMUM THRUST REDUCTION Δ% CORRECTED N1. REDUCE PERCENT CORRECTED N1 FROM STEP 10 BY THIS Δ% CORRECTED N1.
12. DETERMINE PERCENT N1 GAGE FROM CHART F USING THE HIGHER PERCENT CORRECTED N1 FROM STEP 6 OR STEP 11.

CHART C

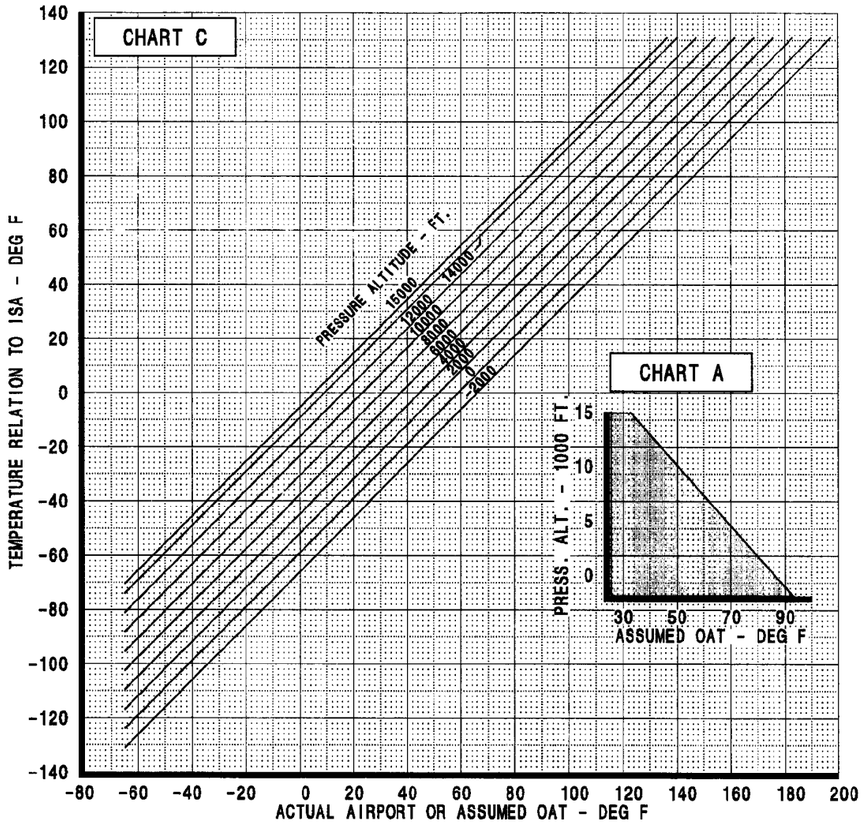


CHART A

CHART B

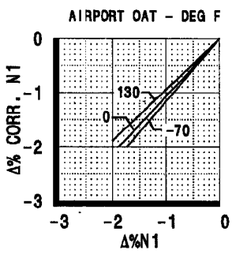
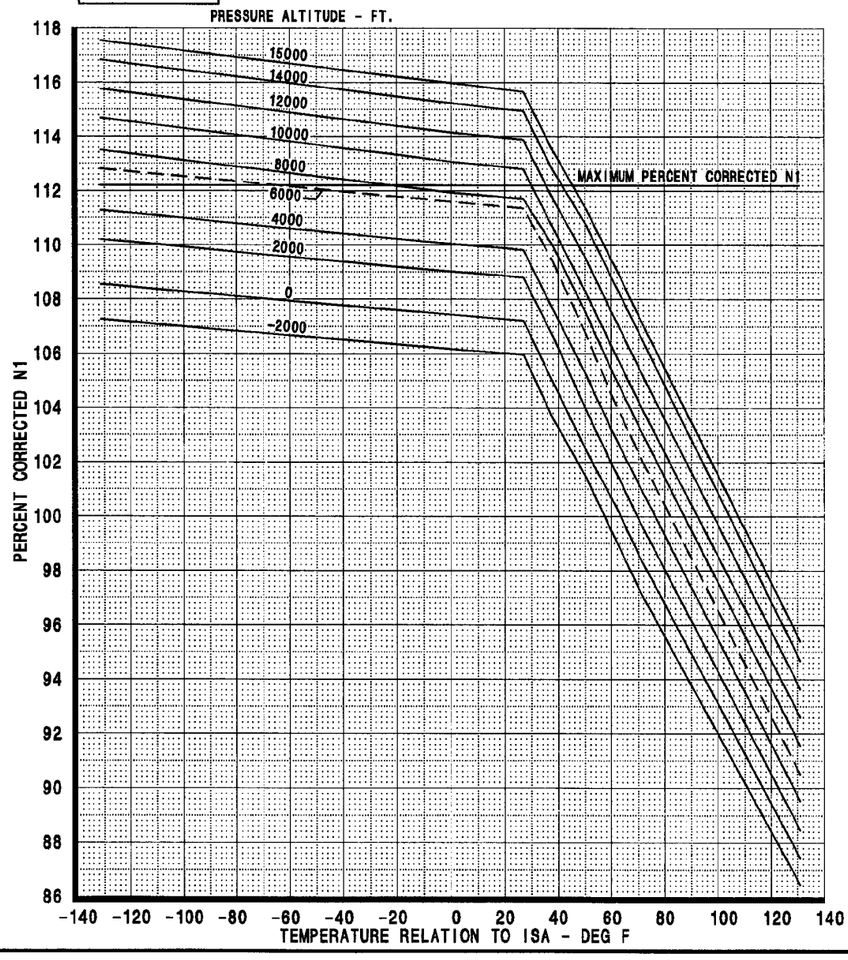
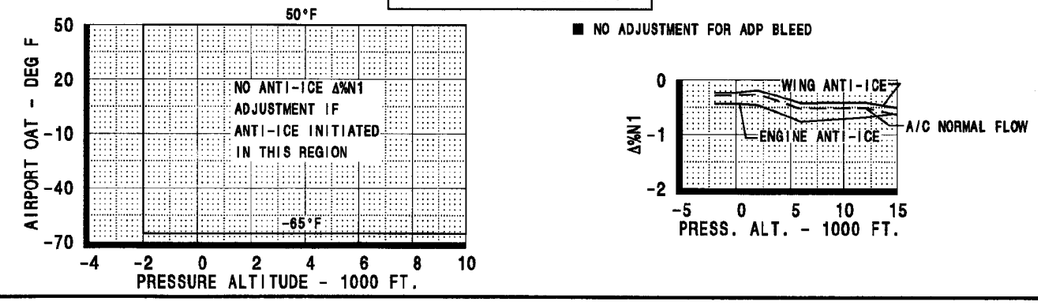


CHART D



BLEED ADJUSTMENTS



■ NO ADJUSTMENT FOR ADP BLEED

APPROVED	DATE
L. BOVAIRD	1/12/94
767	
CF6-80C2B7F	

TAKEOFF POWER SETTING

ASSUMED TEMPERATURE REDUCED THRUST WITH OR WITHOUT ADDITIONAL DERATE

P.C. d654006003 APP. 54
D041T513-1 PG. 4.0-6

APPROVED DATE
L. BOVAIRD 767 CF6-80C2B7F

CHART C

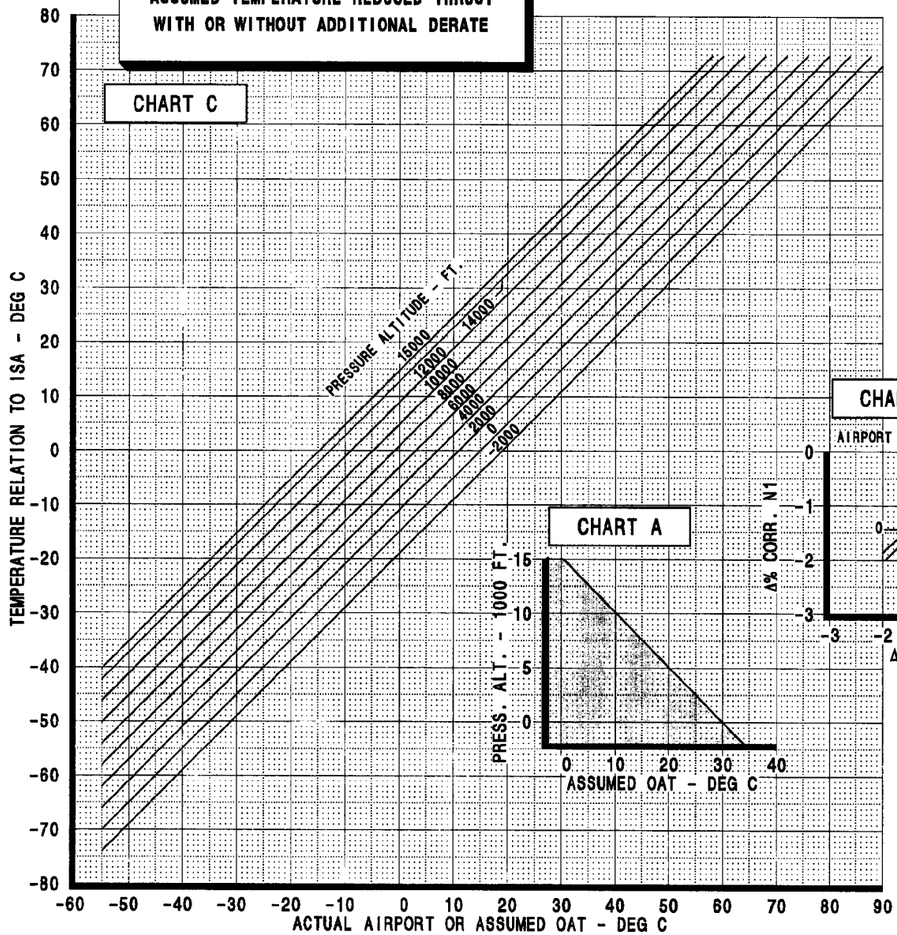
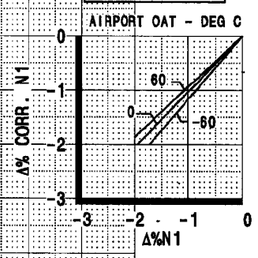
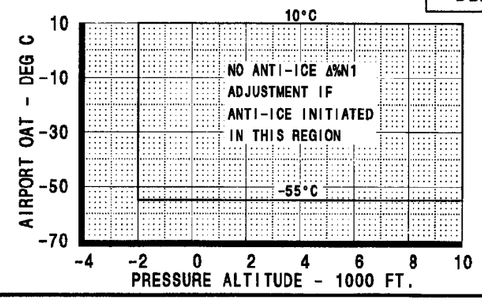


CHART A

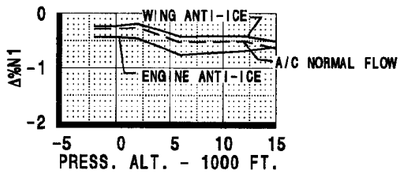
CHART B



BLEED ADJUSTMENTS



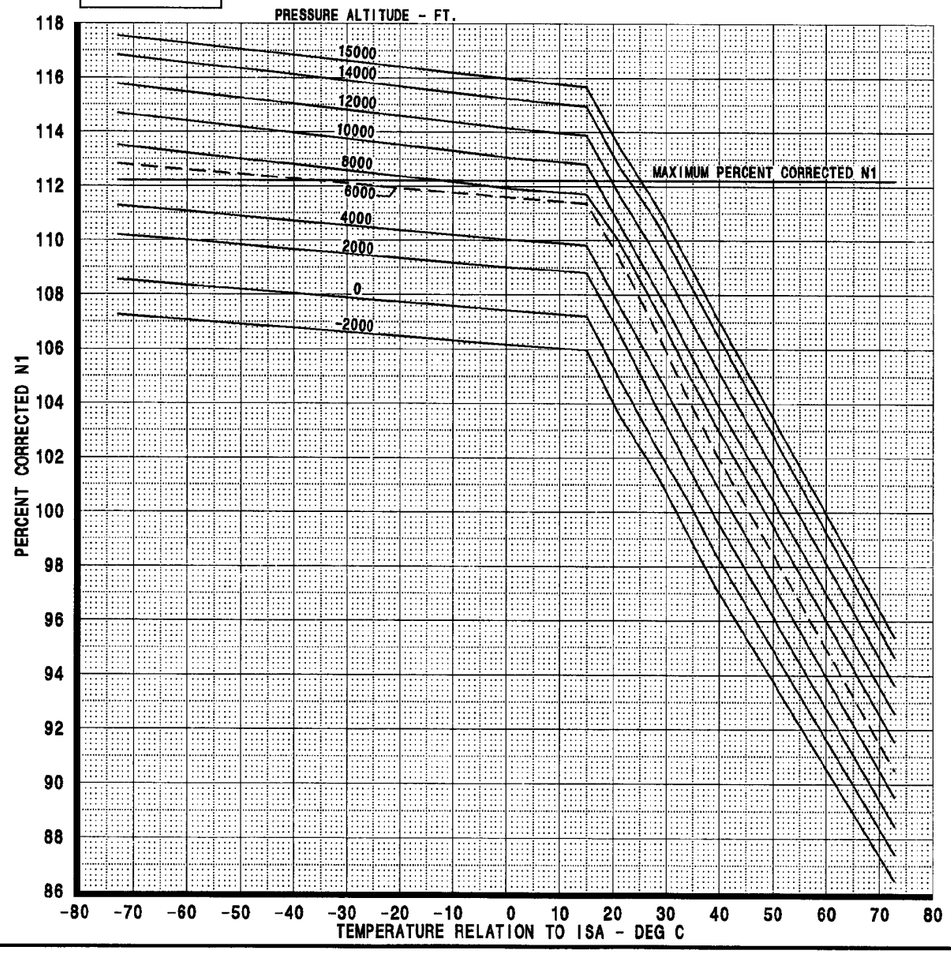
■ NO ADJUSTMENT FOR ADP BLEED



PROCEDURES

1. DO NOT USE AN ASSUMED TEMPERATURE IN SHADED REGION OF CHART A.
2. DETERMINE Δ% CORR. N1 FROM CHART B USING THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
3. ENTER CHART C WITH ASSUMED OAT TO DETERMINE TEMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
4. REDUCE THE PERCENT CORRECTED N1 FROM STEP 3 BY THE Δ% CORR. N1 FROM STEP 2.
5. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 4 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 3.
6. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 5 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
7. ENTER CHART C WITH ACTUAL AIRPORT OAT TO DETERMINE TEMPERATURE RELATION TO ISA. DETERMINE BOTH THE PERCENT CORRECTED N1 AND THE MAXIMUM PERCENT CORRECTED N1 FROM CHART D.
8. REDUCE THE PERCENT CORRECTED N1 FROM STEP 7 BY THE Δ% CORR. N1 FROM STEP 2.
9. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 8 OR THE MAXIMUM PERCENT CORRECTED N1 FROM STEP 7.
10. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 9 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART E.
11. ENTER CHART E WITH THE PERCENT CORRECTED N1 FROM STEP 10 AND DETERMINE MAXIMUM THRUST REDUCTION Δ% CORRECTED N1. REDUCE PERCENT CORRECTED N1 FROM STEP 10 BY THIS Δ% CORRECTED N1.
12. DETERMINE PERCENT N1 GAGE FROM CHART F USING THE HIGHER PERCENT CORRECTED N1 FROM STEP 6 OR STEP 11.

CHART D



PERFORMANCE

TAKEOFF POWER SETTING

ASSUMED TEMPERATURE REDUCED THRUST
WITH OR WITHOUT ADDITIONAL DERATE
(CONTINUED)

CHART E

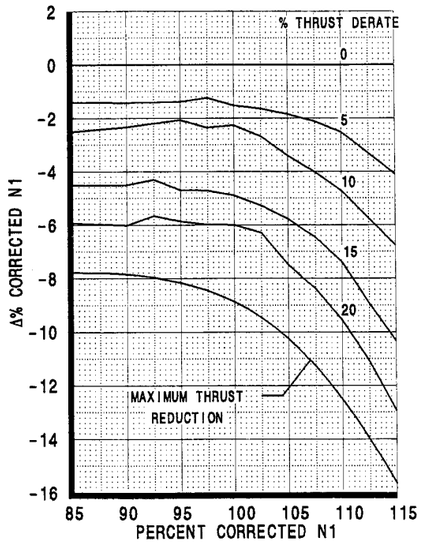
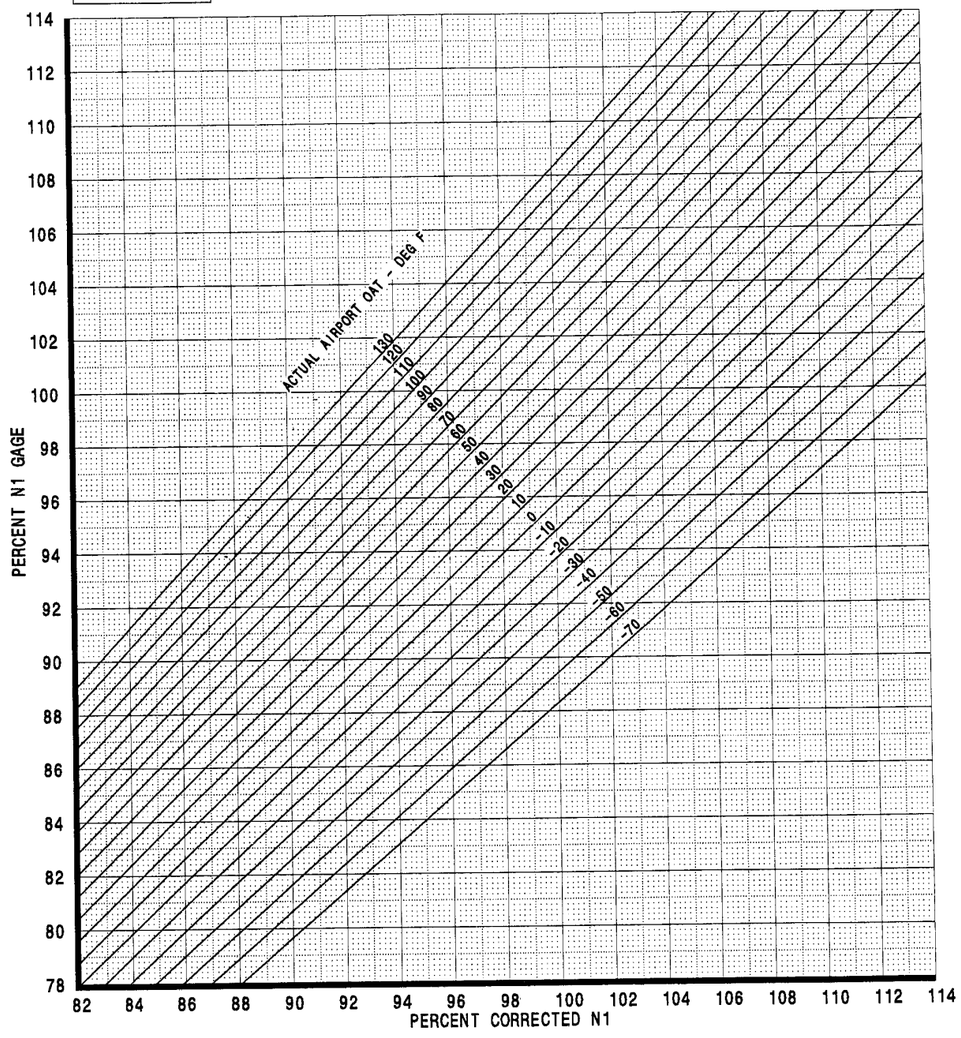


CHART F



P.C. d654006002	APP. 54
D041T513-1	PG. 4.0-6A

L. BOVAIRD	APPROVED	DATE
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CF6-80C2B7F		

TAKEOFF POWER SETTING

ASSUMED TEMPERATURE REDUCED THRUST
WITH OR WITHOUT ADDITIONAL DERATE
(CONTINUED)

P.C. d6540060A3 APP. 54
D041T513-1 PG. 4.0-6A

CHART E

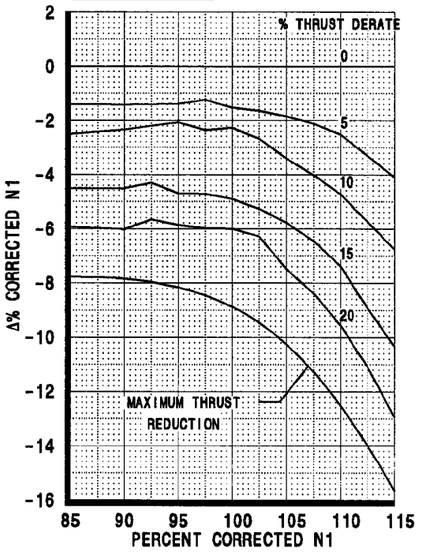
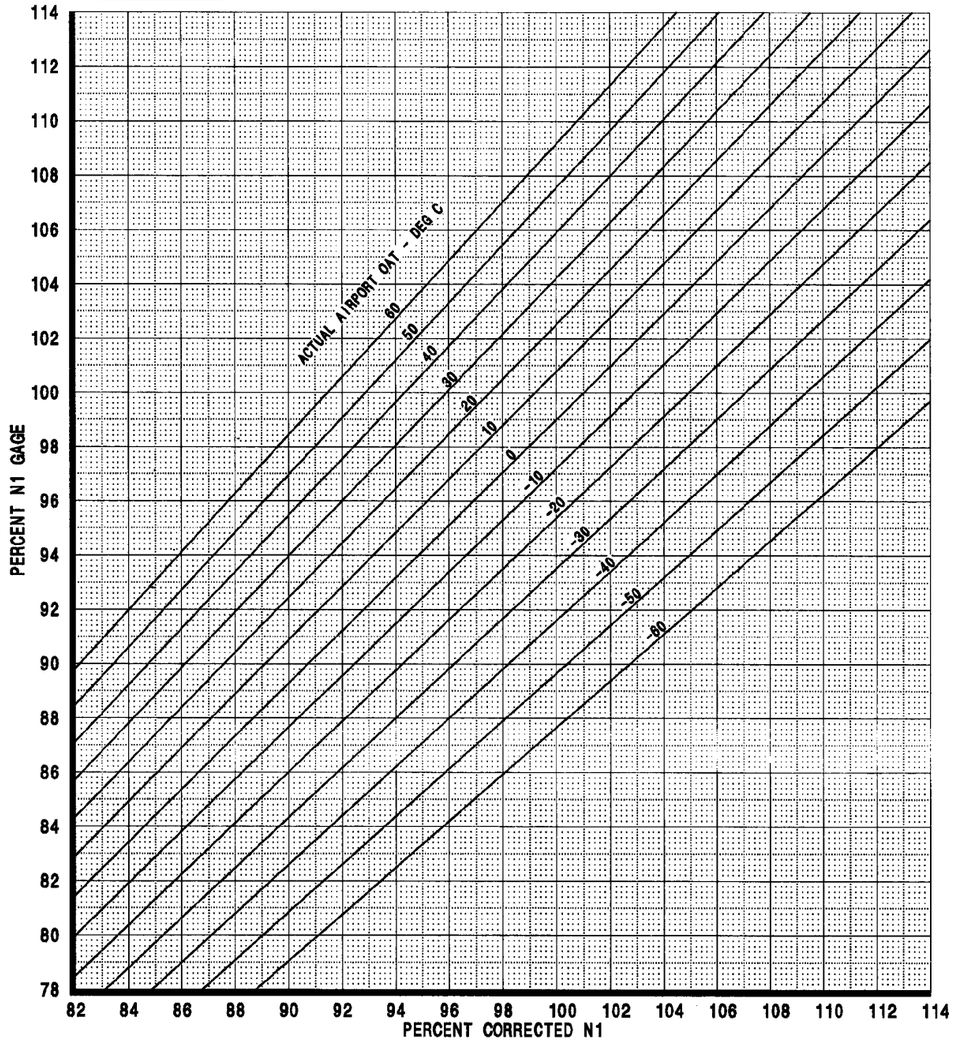


CHART F



L. BOVAIRD	APPROVED	DATE
767		
CF6-80C2B7F		

REVISION HIGHLIGHTS

Revision 4 to Appendix 59K to D6T11321 dated 09-13-04.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to remove the limitation to set thrust manually when using Derate in conjunction with assumed temperature reduced thrust methods. This limitation does not apply to CF6-80C2 series engines.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	045395	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Section 1&2&3		
1	A59	Removed the limitation to set thrust manually when using Derate in conjunction with assumed temperature reduced thrust methods.

APPENDIX 59K

OPERATION AT 10% AND 20% DERATED TAKEOFF THRUST

CF6-80C2B7F ENGINES

767-300

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 045395** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 09-13-04

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Units KG/C

Log of Pages
Appendix 59K

The following pages comprise this appendix applicable to the above series airplanes.

Revision 4

Date 09-13-04

Page	Code	Date
Title		
1	A59K	05-07-96
Revision Approval		
* 1	045395	09-13-04
Log of Pages		
* 1		09-13-04
Contents		
1	A59	05-07-96
2	A59	05-07-96
Introduction		
1	A59	05-07-96
Section 1&2&3		
* 1	A59	09-13-04
Section 4		
1	A59	05-07-96
Section 4.1		
1	A59	04-04-01
2	01C00	10-11-95
Section 4.2		
1	A59	05-07-96
2	31C00	05-07-96
2A	31C00	05-07-96
Section 4.4		
1	A59	05-07-96
2	31C01	05-07-96
Section 4.5		
1	A59	05-07-96
2	31C00	05-07-96
Section 4.6		
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7	01C01	10-11-95
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9	71C00	05-07-96
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Section 4.10		
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3	41C00	10-11-95
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S17112

INTRODUCTION

This appendix provides the additional Certificate Limitations to operate the Model 767-300 series airplanes at the derated engine ratings Derate 1 (10% derate) and Derate 2 (20% derate). This appendix is used in conjunction with Sections 1, 2, 3 and 4 from the basic Airplane Flight Manual and appropriate performance appendices.

Use of this appendix is optional. Its use may result in the airplane operating at or near weight limits due to field length, takeoff climb or net flight path minimums where, under the same conditions and airplane configuration at full takeoff thrust rating, the airplane would not be limited.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this appendix is required by law

The limitations in Section 1 from the basic Airplane Flight Manual are applicable except as supplemented or amended herein.

G E N E R A L L I M I T A T I O N S

This appendix contains the additional limitations, procedures, and performance to schedule takeoff and landing operation at the derated engine ratings, Derate 1 and Derate 2.

When takeoff is made using Derate 1 or Derate 2, the approach and landing climb performance must be based on the corresponding derate unless it has been determined that the engines are capable of achieving full rated takeoff thrust.

DERATED THRUST PROCEDURES

As a condition to the use of derated thrust, operators must assure that engines are capable of achieving full rated takeoff thrust, including full power lever angle capability with EEC operating, without exceeding the corresponding certificated engine limits.

As a condition for basing the approach and landing climb performance on the full takeoff rating of the engines, periodic takeoffs must be conducted at the full takeoff rating.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

PERFORMANCE ADJUSTMENTS

The performance adjustments in this appendix are applicable to the CF6-80C2B7F Derate 1 and Derate 2 performance levels.

U S E O F T H E C H A R T S

The charts in this appendix provide the performance information necessary for operation at Derate 1 and Derate 2. Only the performance information which is different from the basic manual or appropriate appendix is included in this appendix.

The majority of the charts in this appendix relate the derated performance to the full rated performance in the basic manual or appropriate appendix. These performance relationships are for a common airplane configuration, i.e., the same flap detent, A/C pack configuration, etc. The exceptions to this are the Takeoff Derate Power Setting, the Obstacle Distance Trade Lines, and the Minimum V_1 for Control on the Ground, $V_{1(MCG)}$, charts whose usage is independent of the full rated values.

T A K E O F F W E I G H T D E T E R M I N A T I O N P R O C E D U R E

The Takeoff Weight Determination Procedure defined in the basic manual or appropriate appendix is modified when determining performance at the derated engine ratings. The following flow diagram shows in simplified steps this modified procedure for determining the scheduled takeoff gross weight and associated speeds for a given set of airplane, airport, and atmospheric conditions. The more detailed procedures are defined in the appropriate sections of the basic manual or appropriate appendix and this appendix.

R E C O M M E N D E D T A K E O F F S T A B I L I Z E R S E T T I N G

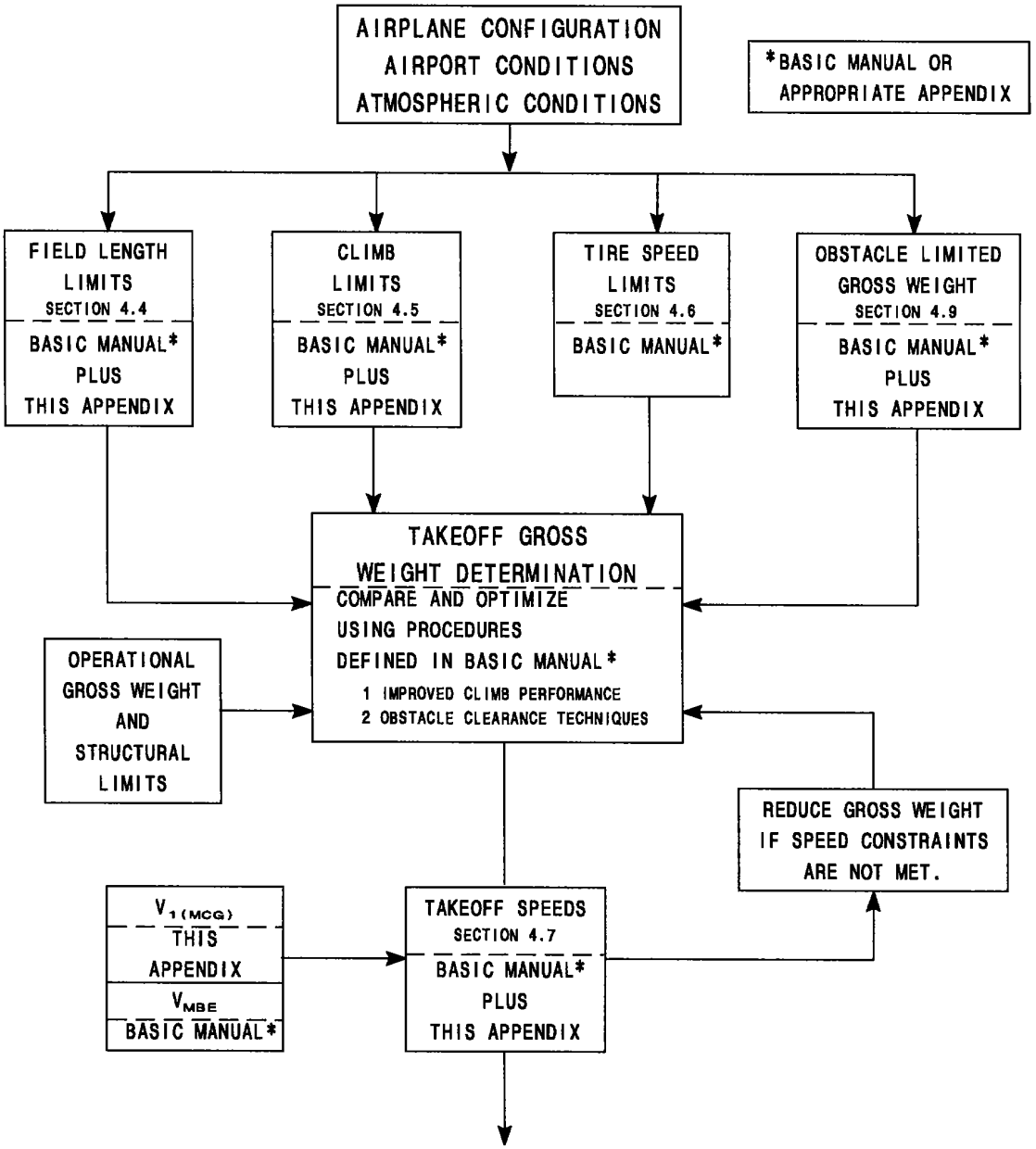
For derate operation, the following stabilizer trim increments should be applied to the applicable Recommended Takeoff Stabilizer Setting chart in the basic manual. If the following Boeing Service Bulletins are installed (or the production equivalents), these increments are included in the trim value calculated by the FMC Recommended Takeoff Stabilizer Trim Function when Derate 1 or Derate 2 is selected:

1) Flight Management Computer System Product Improvement Package (PIP), "NAVIGATION - POSITION COMPUTING - FLIGHT MANAGEMENT COMPUTER SYSTEM - PRODUCT IMPROVEMENT PACKAGE (PIP)", or
2) Pegasus FMC installation, “NAVIGATION – FLIGHT MANAGEMENT COMPUTING – FLIGHT MANAGEMENT COMPUTER SYSTEM – PEGASUS FMC INSTALLATION WITH CONTROL DISPLAY UNIT” (or “ HYBRID MULTIPURPOSE DISPLAY UNIT CONFIGURATION”).

Stabilizer Trim Increment*	
Thrust Derate	Increment, Units of Trim
Derate 1 – 10%	+1/2
Derate 2 – 20%	+1

* Not to exceed the Greenband limit of 7 units.

TAKEOFF GROSS WEIGHT DETERMINATION PROCEDURE



d659102000

G.LARSON 09-19-95

C.SHURE

S17307

SECTION 4.2 - ENGINE DATA

G E N E R A L

This section provides the Takeoff Power Setting Charts for the CF6-80C2B7F engine as installed on the 767-300 airplane when operated at Derate 1 or Derate 2.

For the CF6-80C2B7F engine, power is set with percent fan rotor speed (%N1 gage). This power setting %N1 is a function of engine rating, pressure altitude, airplane velocity, ambient temperature and engine air bleeds. This section includes power setting charts for Derate 1 or Derate 2 takeoff ratings. These charts provide certified installed thrust levels for a minimum engine. All other engine power settings are unchanged from the basic manual or appropriate appendix.

TAKEOFF POWER SETTING

Takeoff power must be set at an airplane velocity between 40 and 80 knots. Takeoff %N1 is determined by entering the Takeoff Power Setting chart with pressure altitude and ambient temperature. %N1 adjustments for air conditioning packs and engine thermal anti-ice are included on the chart.

TAKEOFF DERATE POWER SETTING

P.C. BR1B7FTOD01

D.L. GRAY | 767 | CF6-80C2B7F

APPROVED | DATE 4/2/96

PROCEDURES

1. DETERMINE TEMPERATURE RELATION TO ISA FROM CHART A.
2. DETERMINE PERCENT CORRECTED N1 FROM CHART B.
3. DETERMINE Δ% CORR. N1 FROM CHART C USING THE SUM OF THE APPROPRIATE Δ%N1 BLEED ADJUSTMENTS.
4. REDUCE THE PERCENT CORRECTED N1 FROM STEP 2 BY THE Δ% CORR. N1 FROM STEP 3.
5. DETERMINE MAXIMUM PERCENT CORRECTED N1 FROM CHART B.
6. SELECT THE LOWER PERCENT CORRECTED N1 FROM STEP 4 OR STEP 5.
7. REDUCE THE SELECTED PERCENT CORRECTED N1 FROM STEP 6 BY THE APPROPRIATE Δ% CORRECTED N1 FROM CHART D.
8. DETERMINE PERCENT N1 GAGE FROM CHART E.

CHART A

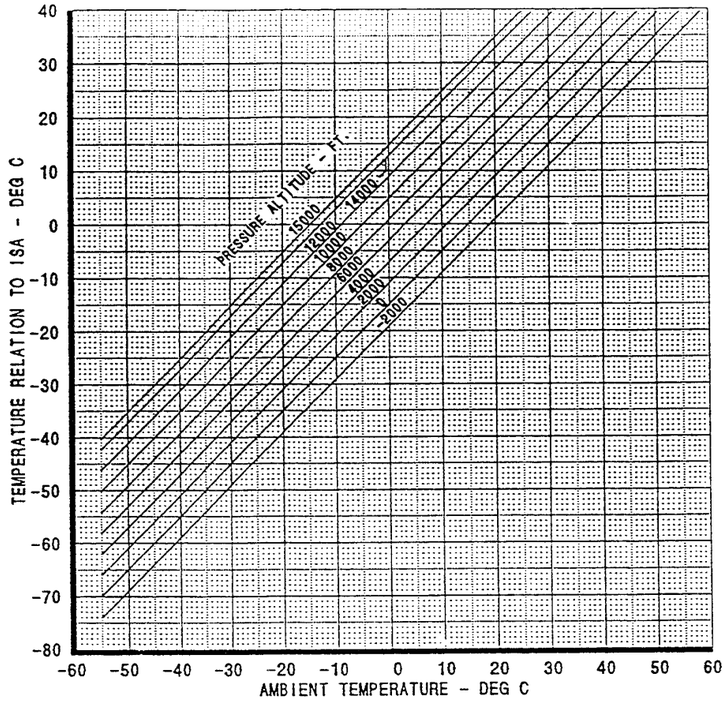


CHART C

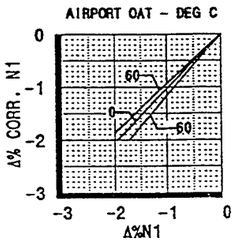
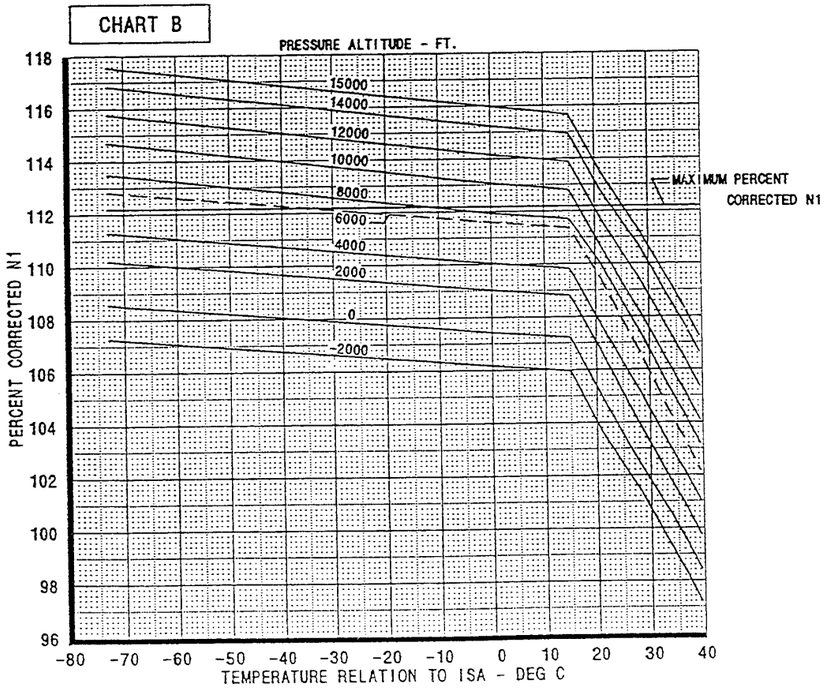
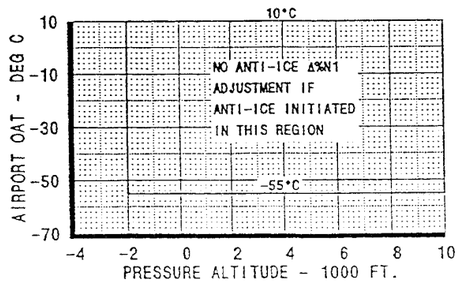


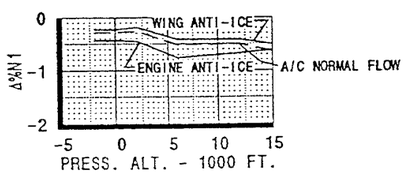
CHART B



BLEED ADJUSTMENTS

■ NO ADJUSTMENT FOR ADP BLEED





TAKEOFF DERATE POWER SETTING

(CONTINUED)

CHART D

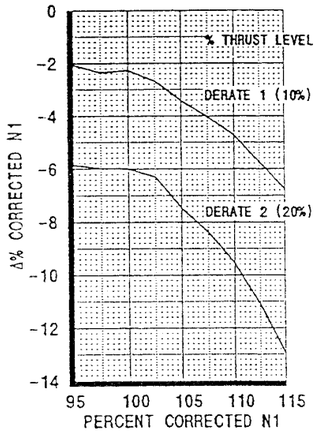
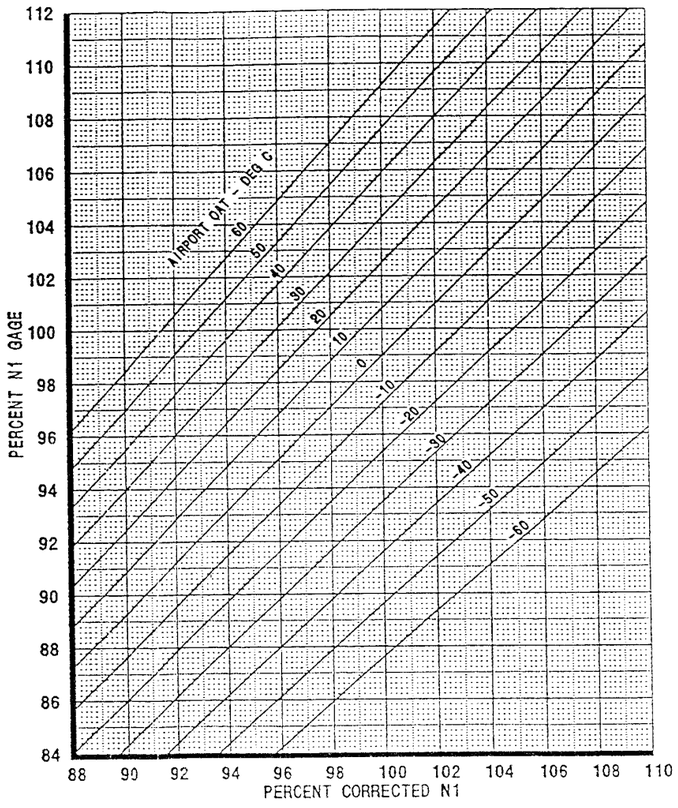


CHART E



P.C. BR1B7FTOD02

APPROVED	DATE
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D.L. GRAY

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CF6-80C2B7F

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SECTION 4.4 - FIELD LENGTH LIMITS

GENERAL

The Field Length Limits (Full Rated - Derated) chart in this section relates derated field length limited takeoff gross weight to full rated field length limited takeoff gross weight at a constant value of corrected runway length. The derated procedure is not recommended for precipitation covered runways or icy runways.

FIELD LENGTH LIMITED TAKEOFF GROSS WEIGHT

The following steps are required to obtain the field length limited takeoff gross weight for a derated takeoff:

1. Determine the corrected runway length available in Section 4.3 of the basic manual or appropriate appendix.

2. Enter the appropriate Field Length Limits chart in Section 4.4 of the basic manual or appropriate appendix with the corrected runway length available, Step 1, and airport temperature/altitude. Read full rated field length limited takeoff gross weight.

3. Enter the Field Length Limits (Full Rated - Derated) chart in this section with the full rated field length limited takeoff gross weight, Step 2, and Derate 1 or 2 as appropriate. Read derated field length limited takeoff gross weight.

CORRECTED RUNWAY LENGTH REQUIRED

The following steps are required to obtain the corrected runway length required for a derated takeoff:

1. Enter the Field Length Limits (Full Rated - Derated) chart in this section with the derated takeoff gross weight and Derate 1 or 2 as appropriate. Read the full rated field length limited takeoff gross weight.

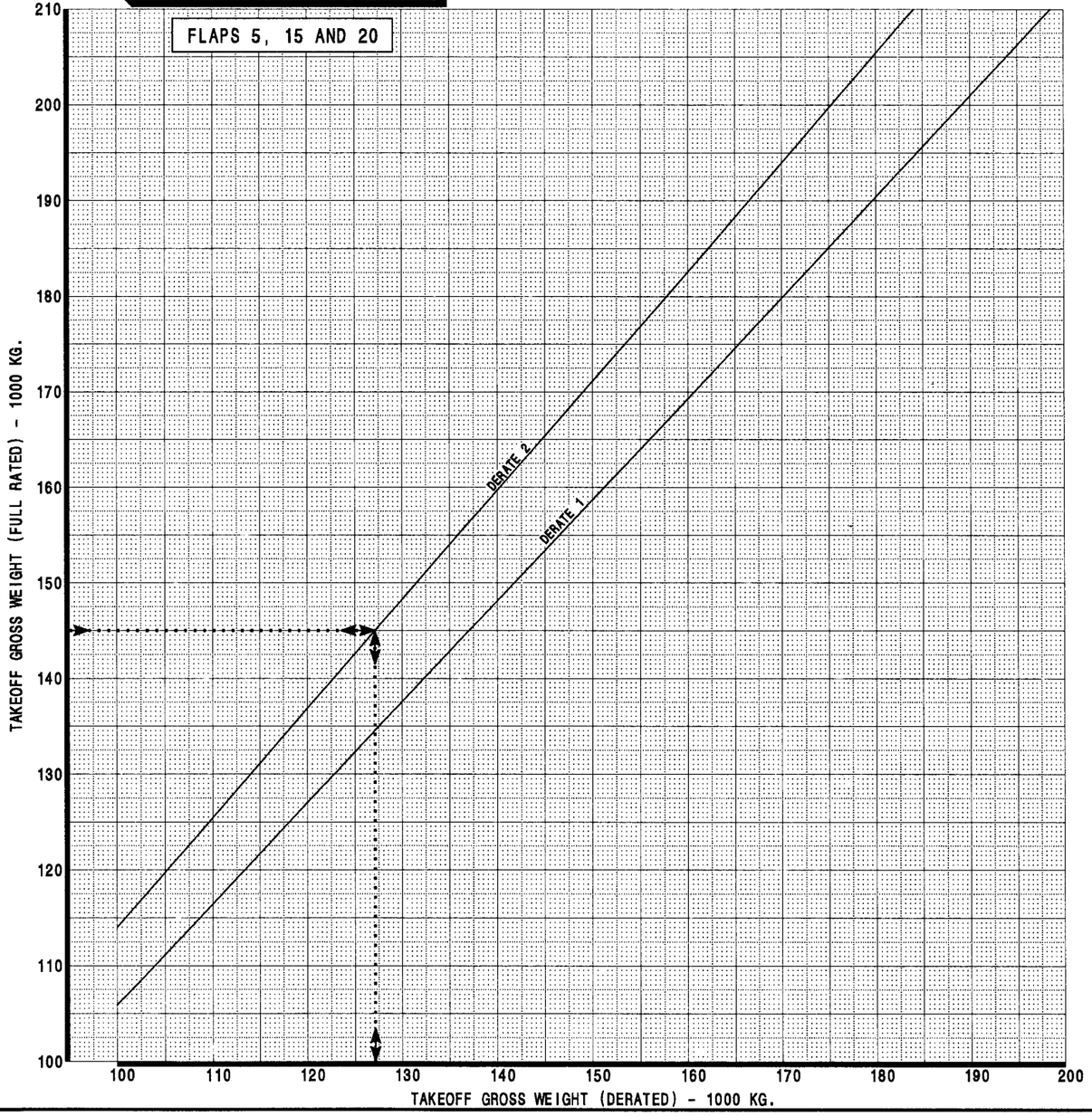
2. Enter the appropriate Field Length Limits chart in Section 4.4 from the basic manual or appropriate appendix with the full rated field length limited takeoff gross weight, Step 1, and airport temperature/altitude. Read corrected runway length required.

FIELD LENGTH LIMITS

FULL RATED - DERATED

CATEGORY C BRAKES

FLAPS 5, 15 AND 20



P.C. d659402003	APP. 59
D041T513-1	PG. 4.4-2

L. ENEBRAD	APPROVED	DATE
767-300ER	P.SCHMID	01-18-96
CF6-80C2B7/B7F DERATES 1 AND 2		

SECTION 4.5 - TAKEOFF CLIMB LIMITS

G E N E R A L

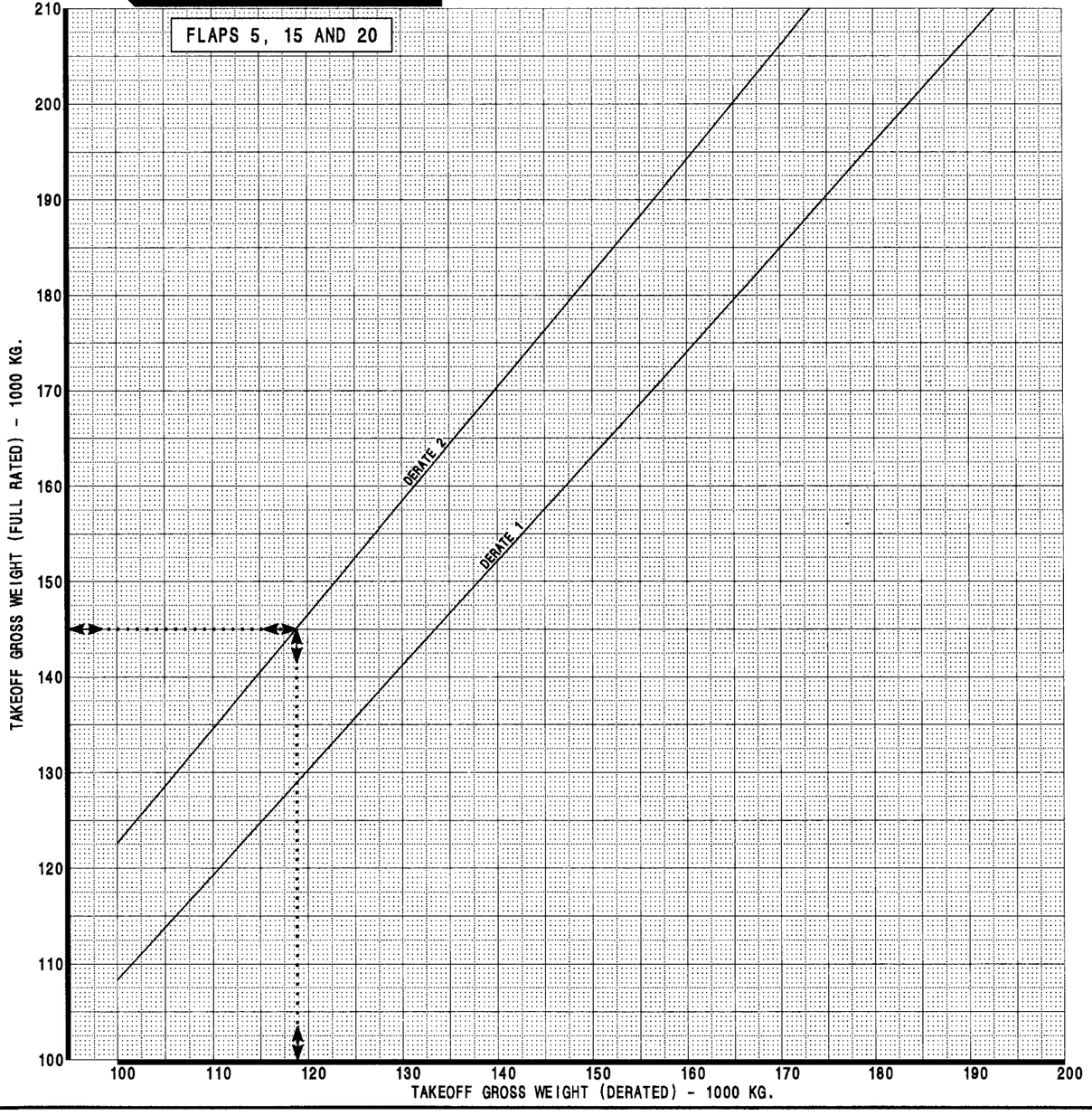
The Takeoff Climb Limits (Full Rated - Derated) chart in this section relates derated takeoff climb limited gross weight to full rated takeoff climb limited gross weight at a constant climb gradient. To obtain the takeoff climb limited gross weight for a derated takeoff:

1. Enter the appropriate Takeoff Climb Limits chart in Section 4.5 from the basic manual or appropriate appendix with airport temperature/altitude. Read full rated takeoff climb limited gross weight.

2. Enter the Takeoff Climb Limits (Full Rated - Derated) chart in this section with the full rated takeoff climb limited gross weight, Step 1, and Derate 1 or 2 as appropriate. Read derated takeoff climb limited gross weight.

TAKEOFF CLIMB LIMITS

FULL RATED - DERATED



P.C. d659S02003 APP. 59
D0417513-1 PG. 4.5-2

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V.HILL	03-12-96

L. ENEBRAD

767-300ER

CF6-80C2B7/B7F
DERATE 1 AND 2

S20510

SECTION 4.6 - TIRE SPEED LIMITS

G E N E R A L

There is no reduction in tire speed limited gross weight required when using derated thrust. Use the values from the basic manual or appropriate appendix.

SECTION 4.7 - TAKEOFF SPEEDS

G E N E R A L

The charts and adjustments in this section relate the takeoff speeds, V_1, V_R and V_2, for Derate 1 and 2 to the full rated speeds. See the Takeoff Speed Determination flow diagram in this section as an aid in determining the takeoff speeds and restrictions.

T A K E O F F S P E E D R E S T R I C T I O N S

The scheduled takeoff speeds with Derate 1 or 2 must comply with the FAR requirements discussed in Section 4.7 of the basic manual or appropriate appendix.

BRAKE ENERGY LIMITS

Enter the appropriate Brake Energy Limits chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude, derated takeoff gross weight, runway slope, wind component and braking configuration and read derated brake energy limit, V_{MBE}.

MINIMUM V_1 FOR CONTROL ON THE GROUND, $V_{1(MCG)}$

Enter the appropriate Minimum V_1 For Control On the Ground chart in this section with airport temperature/altitude and derated takeoff gross weight and read derated minimum V_1 for control on the ground, $V_{1(MCG)}$.

AIR MINIMUM CONTROL SPEED, V_{MCA}

The Air Minimum Control Speed, V_{MCA}, is not a limitation on takeoff speeds. To determine V_{MCA}:

1. Enter the Air Minimum Control Speed chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and read full rated air minimum control speed, V_{MCA}.

2. Subtract 2.5 knots for Derate 1 or 6.5 knots for Derate 2 to determine derated air minimum control speed, V_{MCA}.

ROTATION SPEED, V_R

1. Enter the appropriate Takeoff Speed chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. Read full rated rotation speed, V_R.

2. Add 1.5 knots for Derate 1 or 3.0 knots for Derate 2 to the full rated rotation speed, Step 1, to determine the derated rotation speed, V_R.

S17324

TAKEOFF SPEED RESTRICTIONS (Continued)

TAKEOFF SAFETY SPEED, V_2

Enter the appropriate Takeoff Speeds chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. No correction for derate is required. Read derated takeoff safety speed, V_2.

TAKEOFF DECISION SPEED, V_1 DETERMINATION

The Takeoff Decision Speed Determination Procedure defined in the basic manual or appropriate appendix is modified when determining V_1 for Derates 1 and 2. See the V_1 Determination flow diagram which shows how the charts in this appendix are integrated with the charts of the basic manual or appropriate appendix to obtain the desired takeoff decision speed.

The following steps correspond to the identified points on the V_1 Determination flow diagram.

1. Determine the engine inoperative corrected takeoff distance available per Section 4.3 in the basic manual or appropriate appendix.

2. Determine the corrected runway length required for the derated gross weight.

   a) Enter the Field Length Limits (Full Rated - Derated) chart in Section 4.4 of this appendix with the derated takeoff gross weight and appropriate derate rating. Read full rated takeoff gross weight.

   b) Enter the appropriate Field Length Limits chart in Section 4.4 of the basic manual or appropriate appendix with airport temperature/altitude and full rated takeoff gross weight, Step 2(a). Read corrected runway length required.

3. Determine derated rotation speed.

   a) Enter the appropriate Takeoff Speeds chart in Section 4.7 of the basic manual or appropriate appendix with airport temperature/altitude and derated takeoff gross weight. Read full rated rotation speed.

   b) Add 1.5 knot for Derate 1 or 3.0 knots for Derate 2 to the full rated rotation speed, Step 3(a), to determine the derated rotation speed, V_R.

S17325

TAKEOFF DECISION SPEED, V_1 DETERMINATION (Continued)

4. Determine the corrected accelerate-stop distance available per Section 4.3 in the basic manual or appropriate appendix.

5. Determine full rated $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$.

   a) Enter the Runway Length and V_1 Adjustment chart in Section 4.3 of the basic manual or appropriate appendix with engine inoperative corrected takeoff distance available, Step 1, and corrected runway length required, Step 2(b). Read full rated $(V_1/V_R)_{MIN}$.

   b) Enter the Runway Length and V_1 Adjustment chart in Section 4.3 of the basic manual or appropriate appendix with corrected accelerate-stop distance available, Step 4, and corrected runway length required, Step 2(b). Read full rated $(V_1/V_R)_{MAX}$.

6. Determine derated $(V_1/V_R)_{MIN}$ and $(V_1/V_R)_{MAX}$.

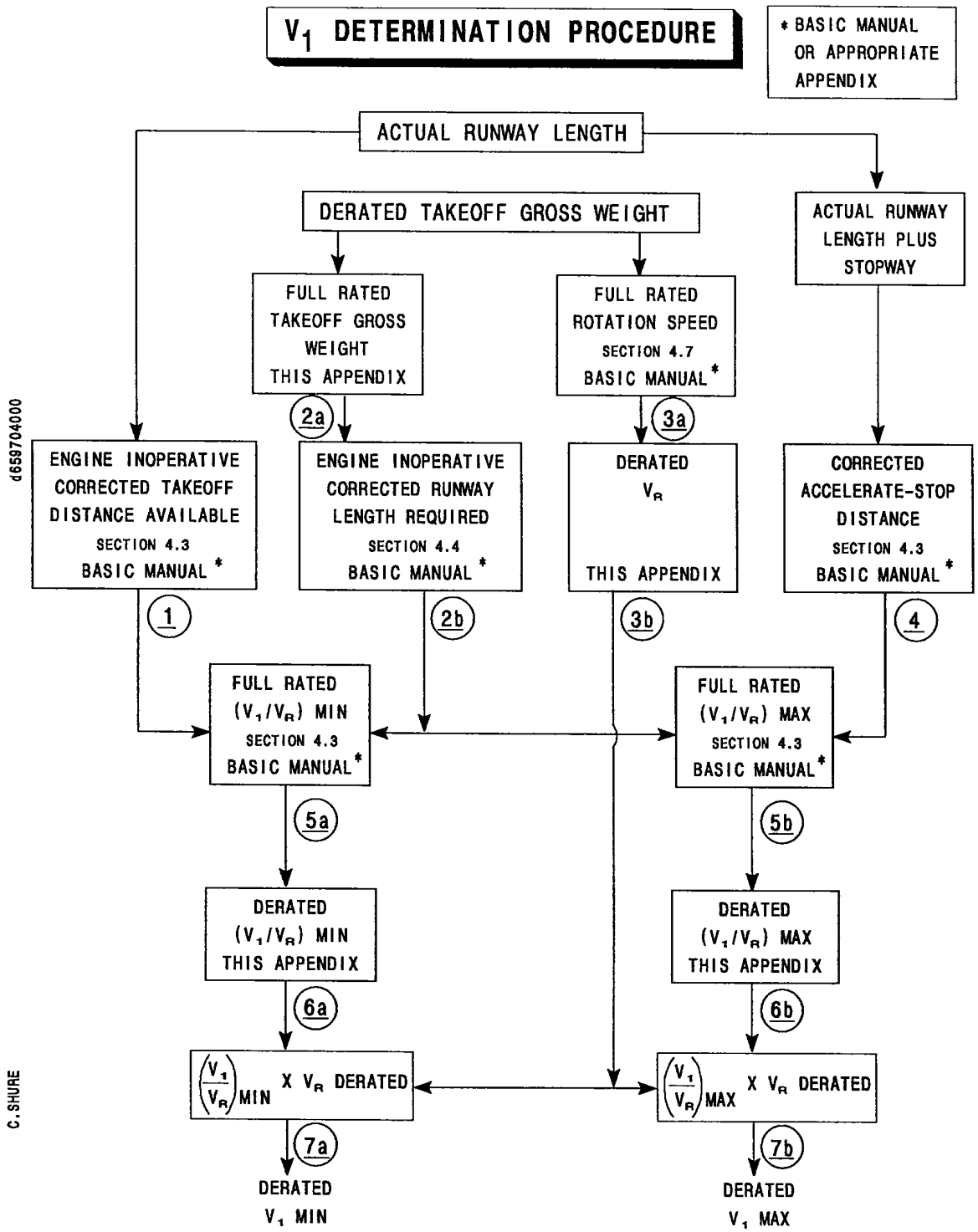
   a) Enter the V_1 Adjustment (Full Rated - Derated) chart in this section with full rated (V_1/V_R)MIN, Step 5(a), and the appropriate derate rating. Read derated $(V_1/V_R)_{MIN}$.

   b) Enter the V_1 Adjustment (Full Rated - Derated) chart in this section with full rated (V_1/V_R)MAX, Step 5(b), and the appropriate derate rating. Read derated $(V_1/V_R)_{MAX}$.

7. Determine derated $V_{1\ MIN}$ and $V_{1\ MAX}$, the lowest and highest values of V_1 that will allow a derated takeoff from the actual runway, at the takeoff gross weight. See Takeoff Speed Restrictions for other possible limitations.

   a) Multiply derated V_R, Step 3(b), by derated $(V_1/V_R)_{MIN}$, Step 6(a), to obtain derated $V_{1\ MIN}$.

   b) Multiply derated V_R, Step 3(b), by derated $(V_1/V_R)_{MAX}$, Step 6(b), to obtain derated $V_{1\ MAX}$.



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C.SHURE

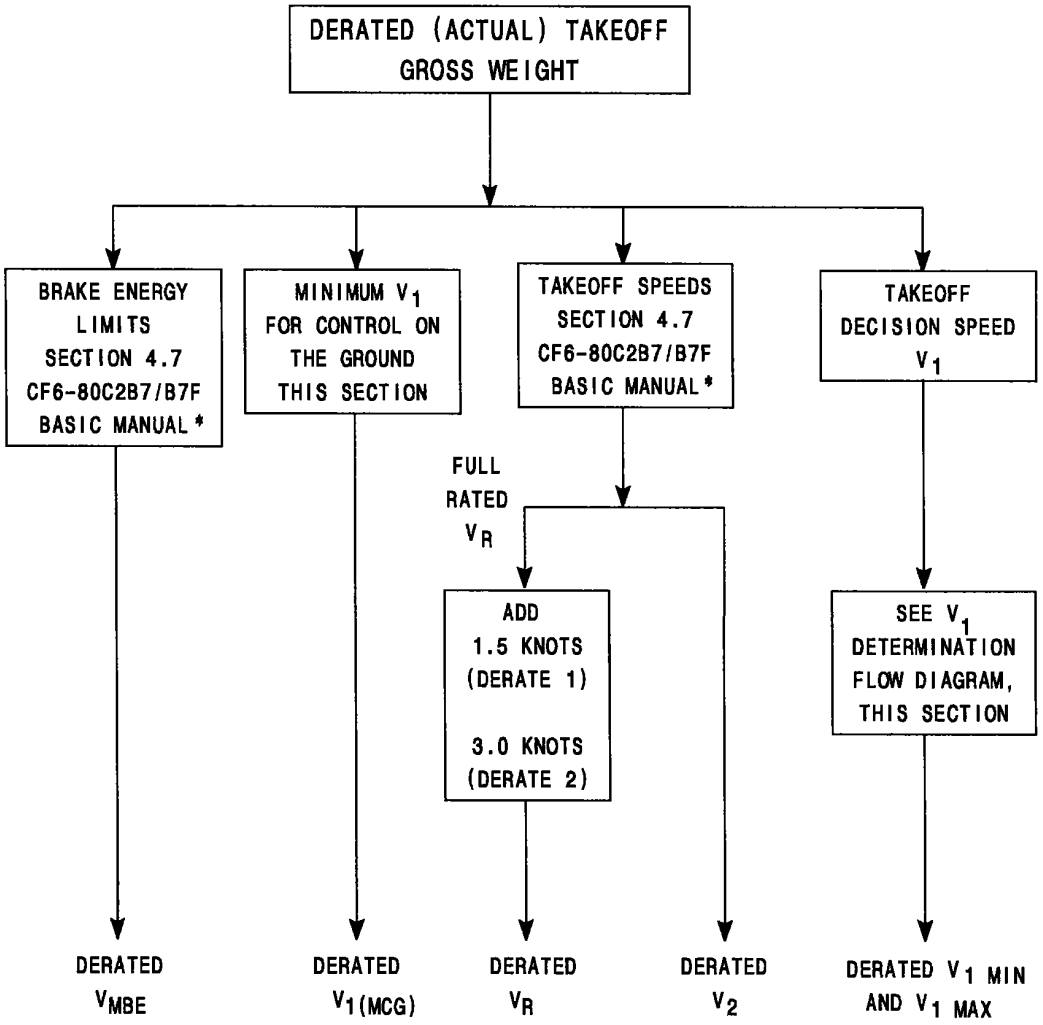
S17328

TAKEOFF SPEEDS

SELECTION OF V1

The selection of the takeoff decision speed, V1, from an allowable range must be made for each scheduled takeoff. See Section 4.7 of the basic manual or appropriate appendix for a discussion of the factors to be considered in making this selection.

TAKEOFF SPEED DETERMINATION PROCEDURE



*BASIC MANUAL OR APPROPRIATE APPENDIX

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C.SHURE

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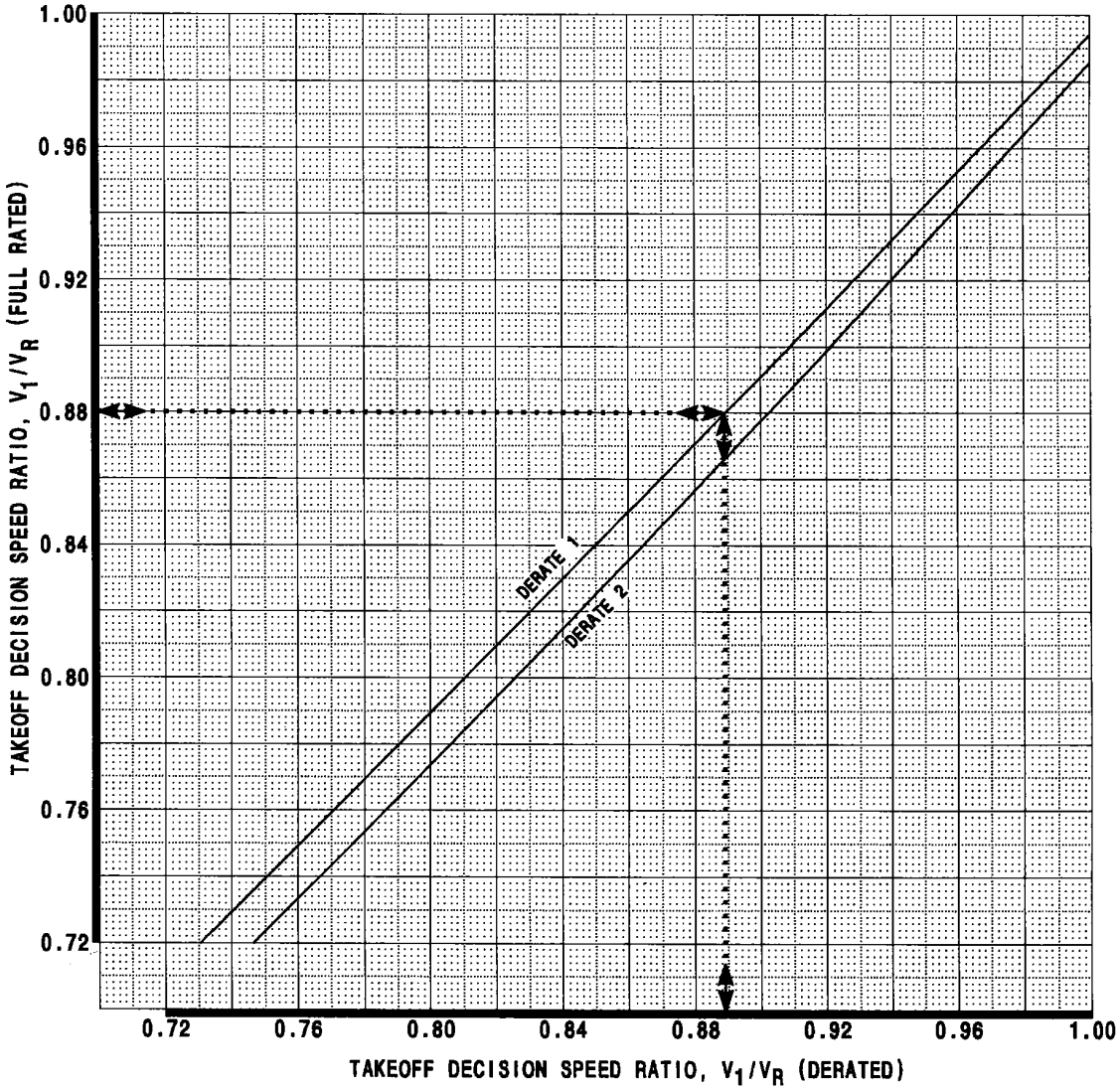
PERFORMANCE

V_1 ADJUSTMENT

FULL RATED - DERATED

CATEGORY C BRAKES

FLAPS 5, 15 AND 20



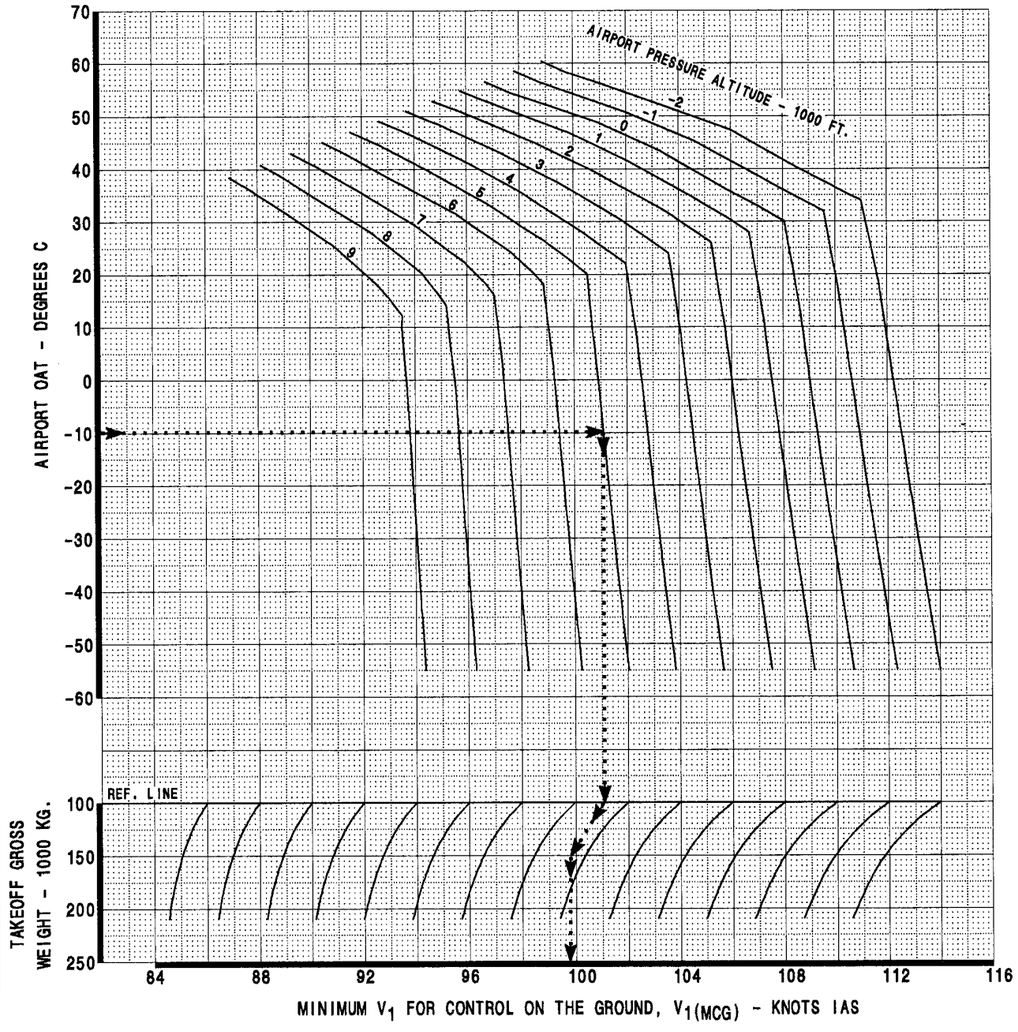
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R. HUGHES	APPROVED	DATE
767-300ER	SHIELDS	07-08-95
CF6-80C2B7/B7F DERATES 1 AND 2		

S17334

MINIMUM V_1 FOR CONTROL ON THE GROUND

DERATE 1



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D041T507-4	PG. 4.7-8

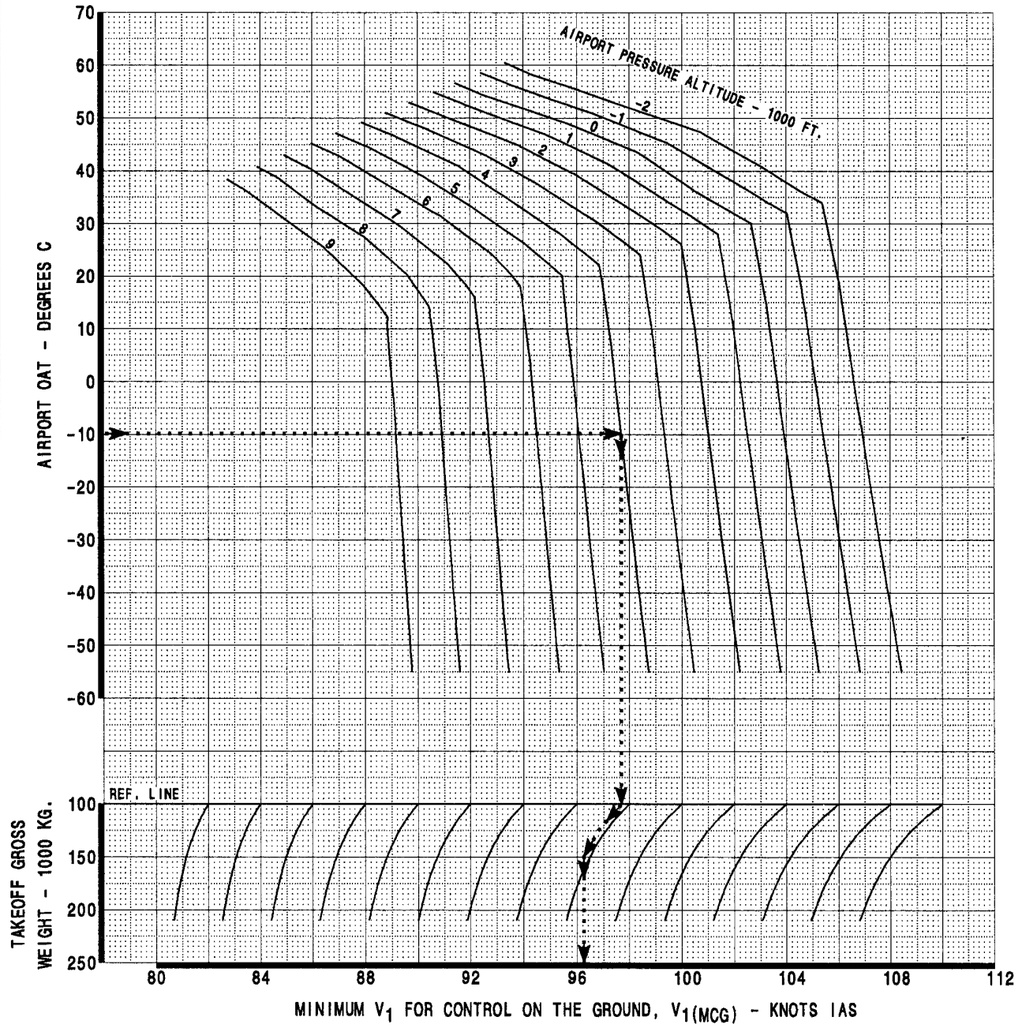
APPROVED	DATE
P.SCHMID	01-18-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F
DERATE 1

S20767

MINIMUM V_1 FOR CONTROL ON THE GROUND

DERATE 2



P.C. 6659709007 APP.59
D041T507-4 PG. 4.7-9

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M. MYERS	01-23-96

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767-300ER
CF6-80C2B7/B7F
DERATE 2

S20768

SECTION 4.9 - OBSTACLE CLEARANCE

G E N E R A L

Two Procedures are presented to determine the allowable derated takeoff gross weight when there are obstacles in the flight path. Procedure 1 consists of a simple correction to the full rated allowable takeoff gross weight and results in a conservative derated takeoff gross weight for obstacle clearance. Procedure 2 is a more detailed analysis which allows the construction of the derated flight path and thereby results in a less conservative derated obstacle limited takeoff gross weight.

O B S T A C L E C L E A R A N C E A N A L Y S I S P R O C E D U R E

Procedure 1

Procedure 1 assumes that the allowable full rated takeoff gross weight based on field length, tire speed, takeoff climb, obstacle clearance or structural limits has been determined using the basic manual or appropriate appendix. Enter the Obstacle Clearance Limits (Full Rated - Derated) chart in this Section, with the full rated obstacle clearance limited gross weight if available, or the allowable takeoff gross weight, and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

Procedure 2

Procedure 2 is a modification of the obstacle clearance analysis in Section 4.9 from the basic manual or appropriate appendix. Charts and adjustments from this section, together with charts from Section 4.4 and 4.5 of this appendix, are used in conjunction with the obstacle clearance charts from Section 4.9 from the basic manual or appropriate appendix. This section provides Maximum Level-Off Height and Final Takeoff Climb for Derates 1 and 2 and adjustments to the End of Second Segment Climb Distance.

1. Determine Reference Zero.

   a) Enter the Field Length Limits (Full Rated - Derated) chart, in Section 4.4 of this appendix, with the lightest derated gross weight determined by climb limits, tire speed limits, structural limits, or operational requirements and Derate 1 or Derate 2 as appropriate. Read the full rated field length limited takeoff gross weight.

   b) With the full rated gross weight from 1(a) determine the location of Reference Zero relative to the brake release end of the runway using Section 4.9 from the basic manual or appropriate appendix.

2. Adjust Obstacle Distance and Height to Reference Zero.

   Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

S17335

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

3. Corrected Gross Gradient Available.

   a) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the derated gross weight used to determine Reference Zero, Step 1, and Derate 1 or Derate 2 as appropriate. Read the full rated takeoff gross weight.

   b) With the full rated gross weight, Step 3(a), determine the corrected gross gradient available using Section 4.9 from the basic manual or appropriate appendix. For wind corrections to gross gradient, use the Gradient corrections chart in this section.

4. Close-In Obstacles.

   a) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the full rated obstacle limited takeoff gross weight.

CONSTRUCTION OF OBSTACLE DISTANCE TRADE LINE ON OBSTACLE CLEARANCE CHART

When takeoff gross weight is reduced to achieve a higher gradient capability to clear an obstacle, the required takeoff distance is also reduced. The relationship between gradient and distance (an obstacle distance trade line) can be constructed on an obstacle chart to solve obstacle problems when a gross weight reduction is required. The following procedure describes the steps required to construct such an obstacle distance trade line.

Starting with any point on an obstacle clearance chart, select additional adjoining corrected 400-foot gross gradients shown on the chart. Then find the corresponding uncorrected 400-foot gross gradients using the Gradient Corrections (Takeoff Climb) chart and the Takeoff Climb (Improved Climb Performance) chart, if applicable. Next determine the corresponding takeoff gross weights from the appropriate Takeoff Climb chart at the airport temperature/altitude and uncorrected 400-foot gross gradients. With these gross weights, determine the horizontal distances from Reference Zero using steps 1 and 2 of the Obstacle Clearance Analysis Procedure, this section. By plotting the corrected 400-foot gross gradient and the corresponding horizontal distance from Reference Zero, the required obstacle distance trade line is determined.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

b) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight, Step 4(a), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

5. Distant Obstacles.

a) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix.

NOTE: Adjust distance to the end of extended second segment, as read from the basic manual or appropriate appendix, by subtracting 2000 feet for Derate 1 or 4200 feet for Derate 2.

Second Segment.

b) Follow the procedure in Section 4.9 from the basic manual or appropriate appendix using the obstacle distance and height from reference zero, Step 2, and the corrected gross gradient available, Step 3. The result is either a non-limiting obstacle or the full rated obstacle limited takeoff gross weight.

NOTE 1: Find the limiting maximum level-off height by entering the Maximum Level-Off Height (Full Rated - Derated) chart, this section, with the full rated maximum level-off height determined from the basic manual or appropriate appendix and Derate 1 or Derate 2 as appropriate. Read derated maximum level-off height.

NOTE 2: To construct an obstacle distance trade line on the Distant Obstacle Clearance chart, if required, use the procedure outlined in Step 4(a).

c) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight, Step 5(b), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

6. Extended Second Segment.

Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

a) The derated final segment gradient capability required for extended second segment is as follows:

FLAP	DERATE 1	DERATE 2
5	2.90	2.70
15	3.40	3.20
20	3.95	3.80

b) Find the derated final takeoff climb gradient by entering the Final Takeoff Climb (Full Rated-Derated) chart, this section, with the full rated final takeoff climb gradient obtained directly from the Final Takeoff Climb Chart in the basic manual or appropriate appendix. Read derated final takeoff climb gradient. Apply the appropriate correction (bank angle, wind and gross height) if required, using the Gradient Corrections (Final Takeoff Climb) chart in the basic manual or appropriate appendix.

c) Continue with step 6(c) procedure of Section 4.9 from the basic manual or appropriate appendix.

7. Maximum Gross Weight for Extended Second Segment.

a) To determine the maximum gross weight for extended second segment:

1) Enter the Final Takeoff Climb (Full Rated-Derated) chart, this section, with derated final segment gradient capability required for extended second segment, given in step 6(a). Read equivalent full rated final segment gradient capability required for extended second segment.

2) Enter the appropriate Final Takeoff Climb chart in the basic manual or appropriate appendix with the equivalent full rated final segment gradient capability required for extended second segment, step 7(a)(1) and airport temperature/altitude. Read maximum derated gross weight for extended second segment.

b) Follow the procedure of Section 4.9 step 7(a) and 7(b) of the basic manual or appropriate appendix to determine the full rated obstacle clearance limited gross weight.

S17511

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

c) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight from step 7(b), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

8. Obstacle in Third Segment.

a) Follow the procedure of Section 4.9 from the basic manual or appropriate appendix to determine the full rated obstacle clearance limited gross weight.

NOTE: When constructing the Maximum Level-Off Height line on the Distant Obstacle Clearance chart use the Maximum Level-Off Height (Full Rated - Derated) chart, in this section.

b) Enter the Takeoff Climb Limits (Full Rated - Derated) chart, in Section 4.5 of this appendix, with the full rated obstacle limited takeoff gross weight, Step 8(a), and Derate 1 or Derate 2 as appropriate. Read derated obstacle limited takeoff gross weight.

9. Obstacle in Final Segment.

Follow the procedure of Section 4.9 from the basic manual or appropriate appendix.

NOTE: Find the derated final takeoff climb gradient by entering the Final Takeoff Climb (Full Rated-Derated) chart, this section, with the full rated final takeoff climb gradient obtained directly from the Final Takeoff Climb Chart in the basic manual or appropriate appendix. Read derated final takeoff climb gradient. Apply the appropriate correction (bank angle, wind and gross height) if required, using the Gradient Corrections (Final Takeoff Climb) chart in the basic manual or appropriate appendix.

GRADIENT CORRECTIONS

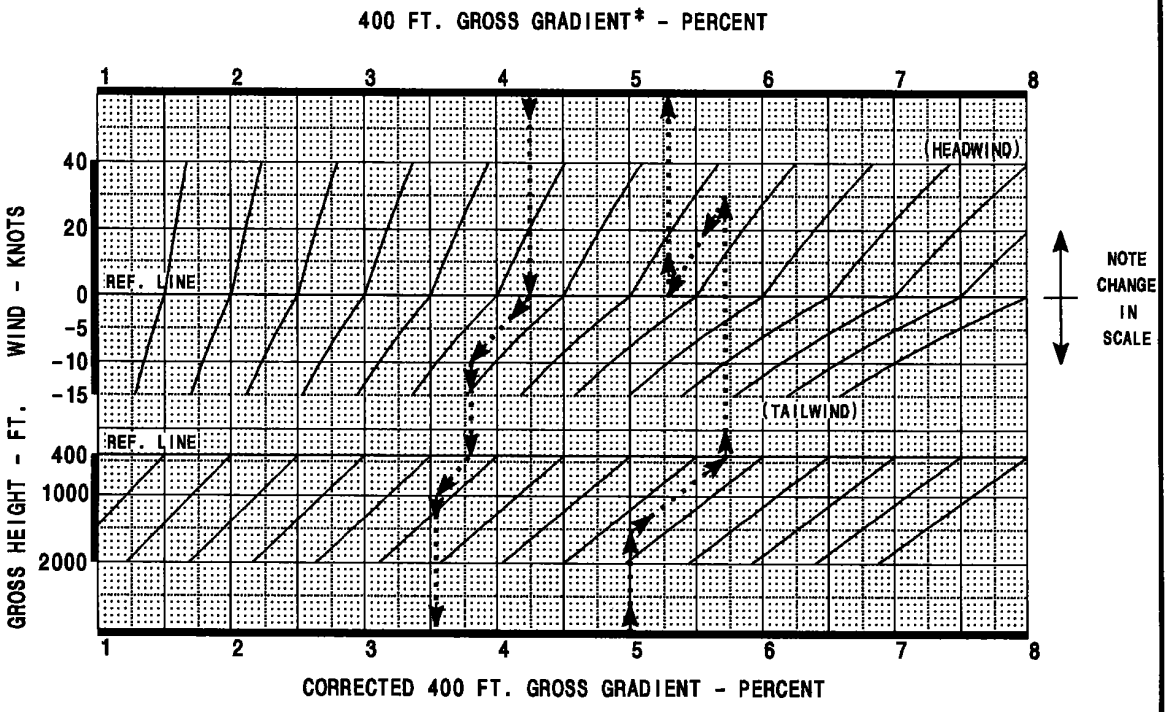
TAKEOFF CLIMB

DERATE 1 AND 2

■ APPLY THE FOLLOWING ADJUSTMENTS TO THE CORRECTED 400 FT. GROSS GRADIENT.

GRADIENT ADJUSTMENT - PERCENT			
BANK ANGLE - DEGREES	FLAPS 5	FLAPS 15	FLAPS 20
5	0.05	0.06	0.06
10	0.21	0.23	0.24
15	0.48	0.52	0.54

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, IF APPLICABLE.



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R. HUGHES
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DERATE 1 AND 2

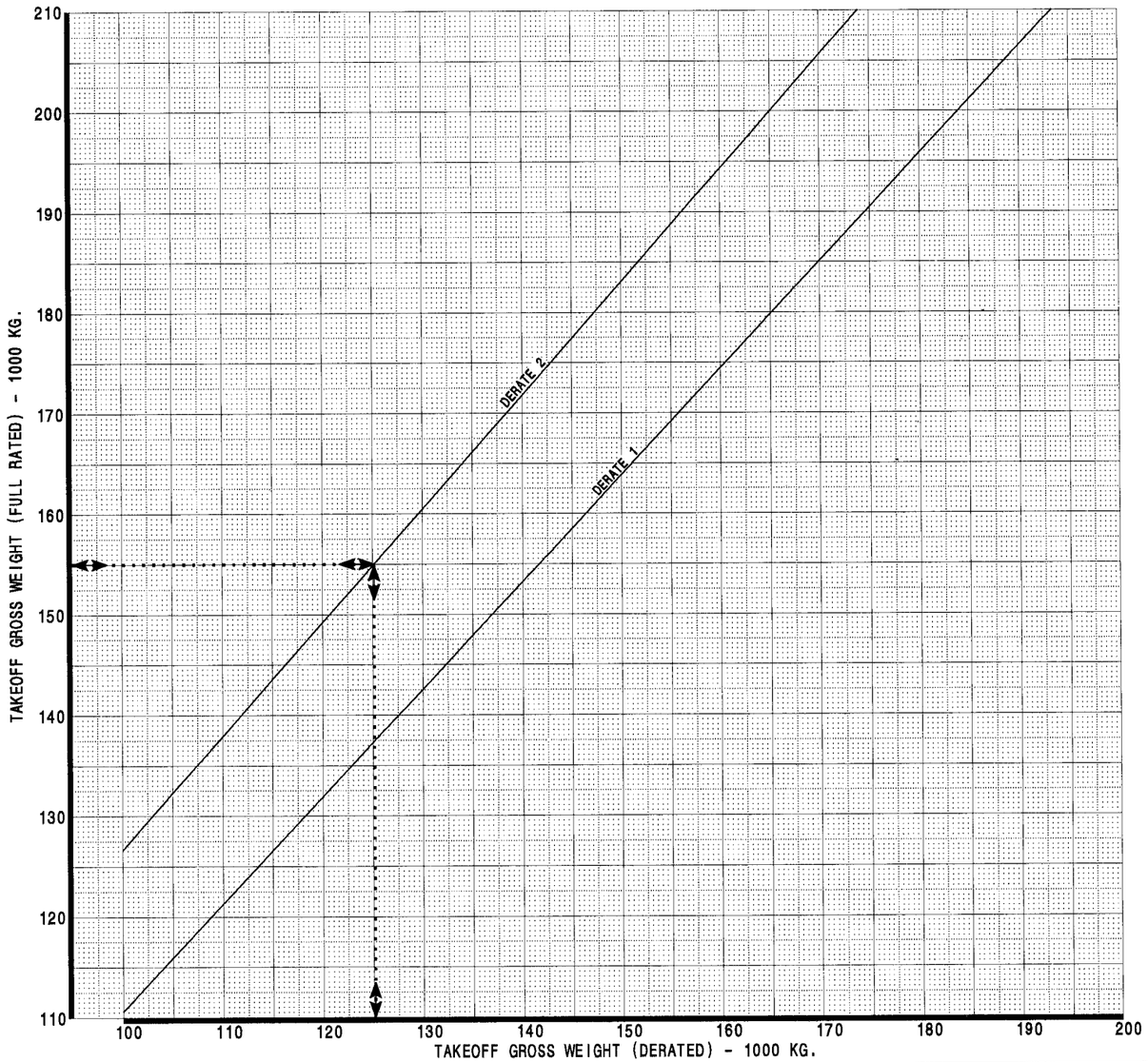
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S17541

OBSTACLE CLEARANCE LIMITS

FULL RATED - DERATED

FLAPS 5, 15 AND 20



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D041T513-1 PG. 4.9-5

L. ENEBRAD

APPROVED	DATE
G.LARSON	03-12-96

767-300ER
CF6-80C2B7/B7F
DERATES 1 AND 2

S20769

MAXIMUM LEVEL-OFF HEIGHT

FULL RATED - DERATED

P.C. d659906000 APP. 59
D0417513-1 PG. 4.9-6

R. HUGHES
767-300ER
CF6-80C2B7/B7F
DERATES 1 AND 2

APPROVED V.HILL
DATE 10-17-95

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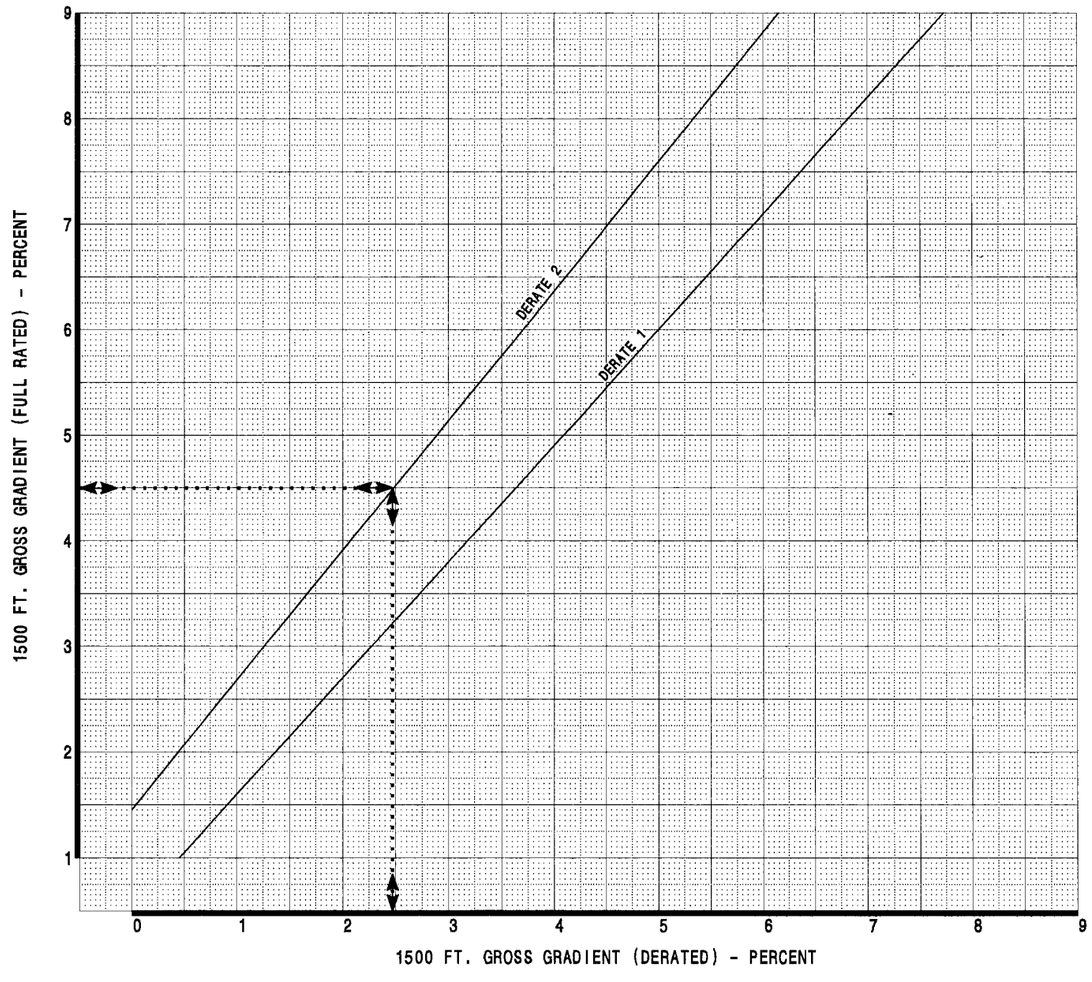
FAA APPROVED 12-12-96 D6T11321

FINAL TAKEOFF CLIMB

FULL RATED - DERATED

- SPEED = VREF + 80 KNOTS IAS
- NET GRADIENT = GROSS GRADIENT REDUCED BY 0.8 PERCENT

FLAPS UP



P.C. d659907000 APP. 59
D041T513-1 PG. 4.9-7

B. BARTEL

767-300ER
CF6-80C2B7/B7F DERATES 1 AND 2

APPROVED	DATE
SHIELDS	08-08-95

S20501

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

The procedure for determining the maximum allowable derated takeoff weight when using Improved Climb Performance is unchanged from the full-rated procedure described in Section 4.10 from the basic manual or appropriate appendix. The appropriate Improved Climb Performance chart may be used directly with derated takeoff weight limits (field length, climb, and tire) and derated takeoff speeds. (V_1, V_R, and V_2).

S17542

SECTION 4.12 - APPROACH AND LANDING CLIMB

GENERAL

The charts in this section relate approach and landing performance for derate operation to the full rated thrust performance in Section 4.12 from the basic manual or appropriate appendix.

APPROACH AND LANDING CLIMB

To obtain approach and landing climb gradients for derate operation:

1. Enter the appropriate Approach Climb chart and appropriate Landing Climb chart in Section 4.12 from the basic manual or appropriate appendix with airport temperature/altitude and derated gross weight. Apply the required adjustments and determine full rated gross gradient.

2. Enter the Approach Climb (Full Rated - Derated) chart and Landing Climb (Full Rated - Derated) chart in this section with the full rated gradients, Step 1, and Derate 1 or 2 as appropriate. Read derated approach climb gradient and derated landing climb gradient.

3. To obtain the approach climb and landing climb speed schedule for derate operation enter the Speed Schedule sub-chart on the appropriate Approach Climb chart and Landing Climb chart in Section 4.12 from the basic manual or appropriate appendix with the derated gross weight.

MAXIMUM LANDING WEIGHT, CLIMB LIMITS

To obtain maximum landing weight, based on climb limits, for derate operation:

1. Enter the appropriate Maximum Landing Weight, Climb Limits chart in Section 4.12 from the basic manual or appropriate appendix with airport temperature/altitude. Determine full rated maximum landing climb limited gross weight.

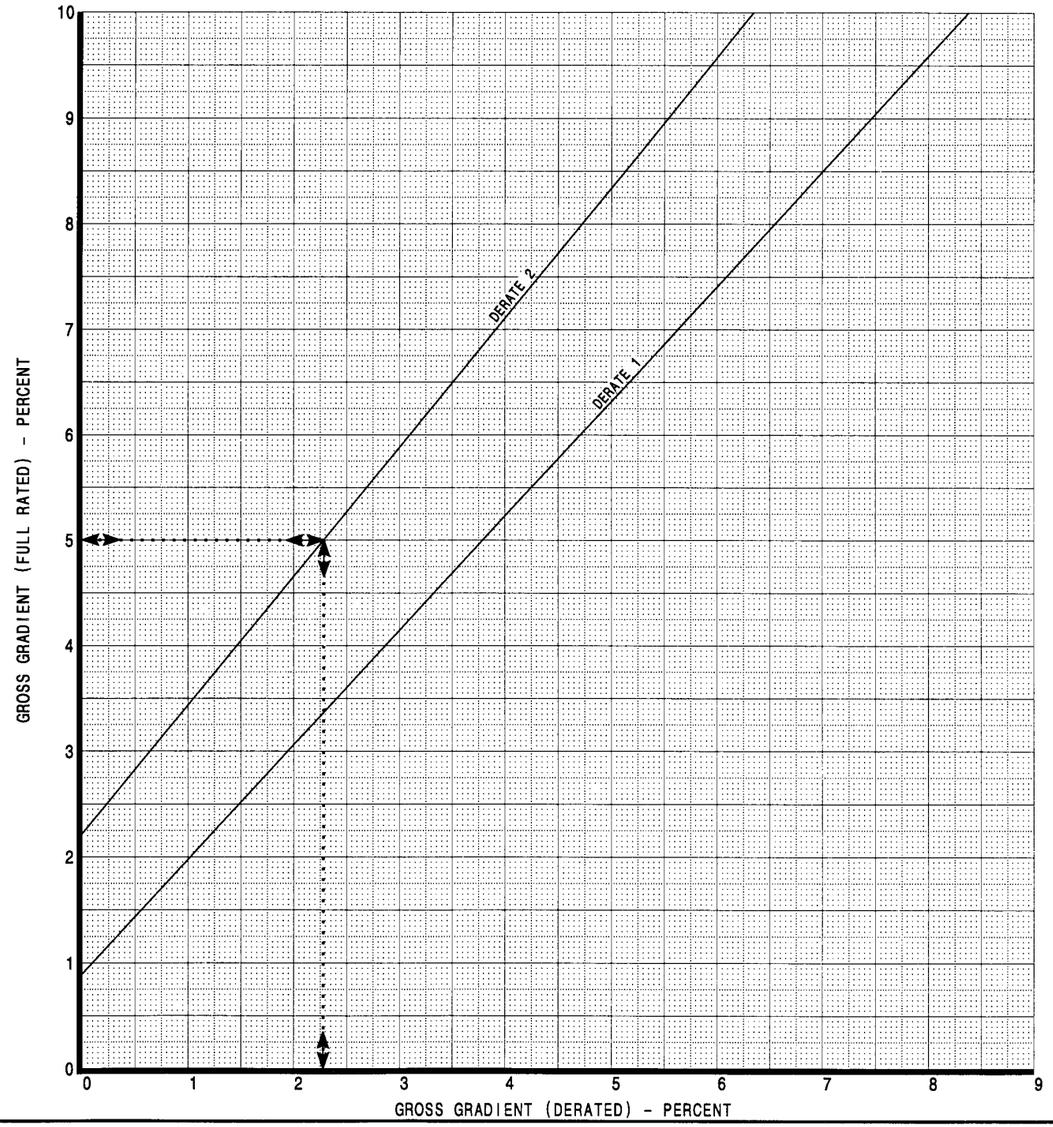
2. Enter the Maximum Landing Weight, Climb Limits (Full Rated - Derated) chart in this section with the full rated maximum landing climb limited gross weight, Step 1, and Derate 1 or 2 as appropriate. Read derated maximum landing climb limited gross weight.

S17543

APPROACH CLIMB

FULL RATED - DERATED

FLAPS 20



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D041T507-4	PG. 4.12-2A

APPROVED	DATE
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D. DAVIS

767-300ER
CF6-80C2B7/B7F
DERATES 1 AND 2

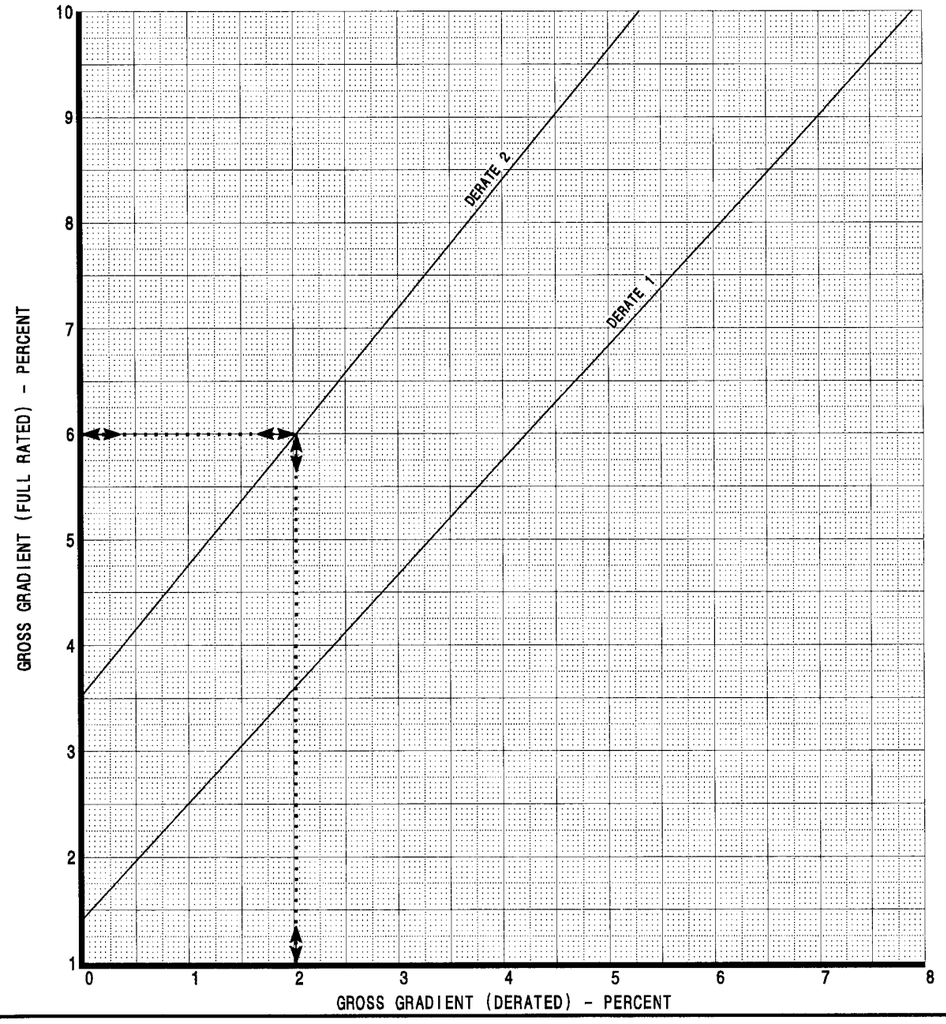
V06930

PERFORMANCE

LANDING CLIMB

FULL RATED - DERATED

FLAPS 25 AND 30



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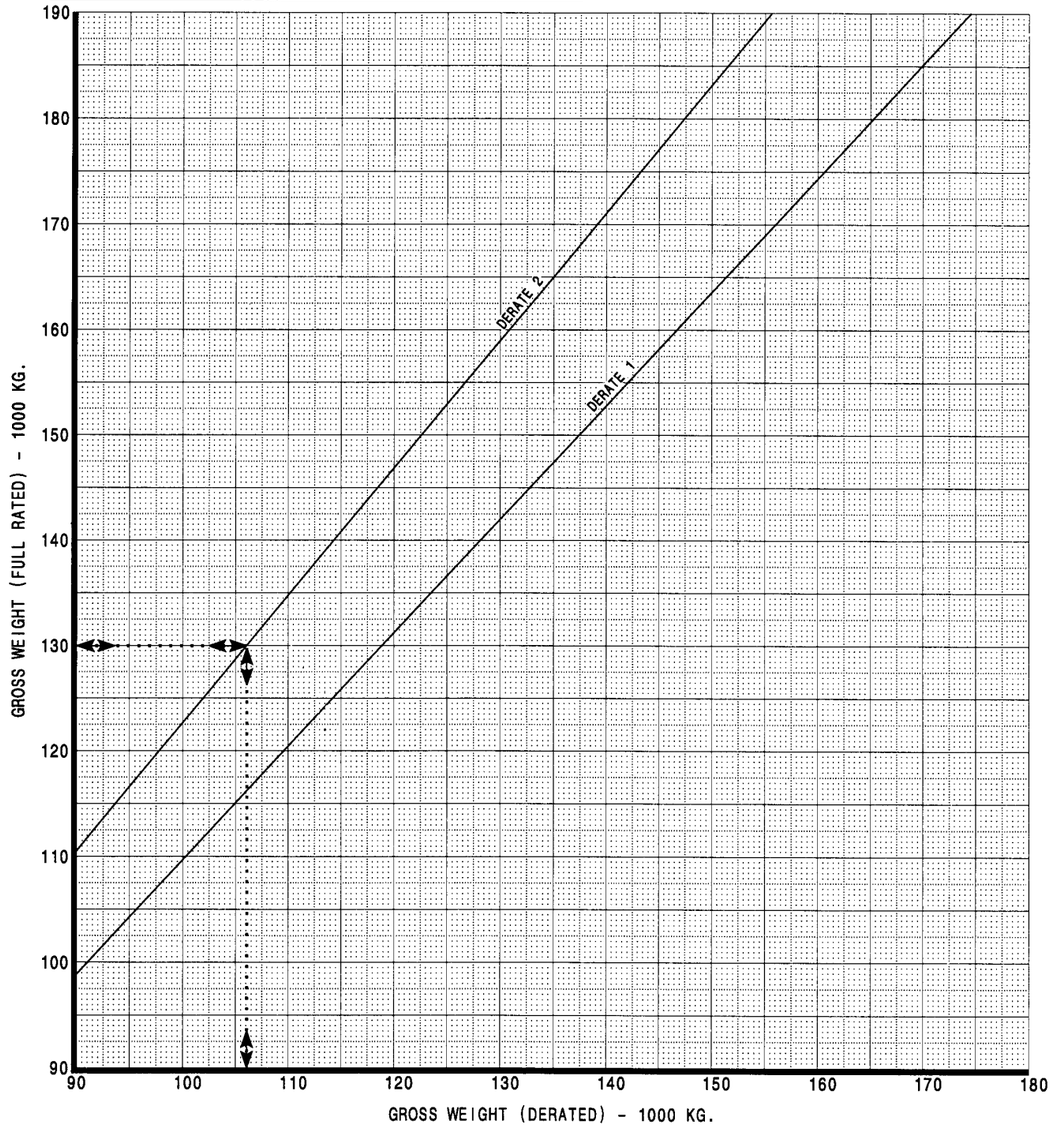
B. BARTEL
767-300ER
CF6-80C2B7/B7F
DERATES 1 AND 2

S20503

MAXIMUM LANDING WEIGHT - CLIMB LIMITS

FULL RATED - DERATED

APPROACH FLAPS 20, LANDING FLAPS 25 AND 30



P.C.	APP.
D041T507-4	PG. 4.12-4A

APPROVED	DATE
PRS	07-24-99

D. DAVIS

767-300ER
CF6-80C2B7/B7F
DERATES 1 AND 2

V06931

REVISION HIGHLIGHTS

Revision 3 to Appendix 64 to D6T11321 dated 09-01-05.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to provide a revision approval page which was erroneously omitted from the previous revision. This revision will also add the revision approval page to the Log of Pages.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	056320	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.

APPENDIX 64

10-MINUTE TAKEOFF THRUST

767-300

CF6-80C2B7F ENGINES

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 056320** in the code column for the Revision Approval page.

George T. Haglund DERY-635229-NM Date 09-01-05

FAA Designated Engineering Representative,
Seattle Aircraft Certification Office
FAA Transport Airplane Directorate

Log of Pages
Appendix 64

The following pages comprise this appendix applicable to the above series airplanes.

Revision 3 Date 09-01-05

Page	Code	Date
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1	A64	12-12-96
Revision Approval		
* 1	056320	09-01-05
Log of Pages		
* 1		09-01-05
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SECTION 4.9 - OBSTACLE CLEARANCE

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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

S17721

INTRODUCTION

This appendix contains the additional Certificate Limitations, Procedures and Performance information for using the takeoff thrust rating of CF6-80C2B7F engines for a maximum of 10 minutes in the circumstance of an engine failure during takeoff where there is an obstacle in the takeoff flight path.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in
Section 1 of this appendix is required by law

The limitations in Section 1, procedures in Sections 2 and 3 and performance in Section 4 of the basic Airplane Flight Manual or appropriate appendices are applicable except as amended herein.

G E N E R A L L I M I T A T I O N S

The time limit on the use of takeoff thrust when operating with CF6-80C2B7F engines, is increased to 10 minutes provided this use is limited to situations where an engine failure actually occurs and there is an obstacle in the takeoff flight path.

E N G I N E L I M I T A T I O N S

ENGINE EGT

The time limit on Takeoff is amended to read:

10 Minutes

Temperature limits are unchanged.

If the 10 minute time limit is utilized, the total operating time at takeoff thrust must be recorded in the airplane flight log.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating procedures are unchanged.

S17723

SECTION 4 - PERFORMANCE

G E N E R A L

The performance data in this appendix extends the takeoff flight path information to heights and distances attainable when the time limit on the use of takeoff thrust is increased to 10 minutes. This information simplifies the flight path determination for high distant obstacles.

Charts presented in this section are replacement pages for charts with the same titles in the FAA Approved Airplane Flight Manual for the Model 767-300 airplane when operating with CF6-80C2B7F engines. The presentation and usage of the charts are unchanged from the basic flight manual and will be discussed when differences exist.

Pages in the basic manual, not replaced by pages in this appendix, still apply.

SECTION 4.9 - OBSTACLE CLEARANCE

G E N E R A L

The Distant Obstacle Clearance chart, the Maximum Level-Off Height charts and the Gradient Corrections chart in this section replace the corresponding charts in the basic manual. The use of the charts is unchanged.

S17725

FLIGHT PATH CHART PRESENTATION

The various charts used in determining a height versus distance profile of the takeoff flight path for checking obstacle clearance are described below. The flight path segments in which takeoff thrust is used are shown as functions of corrected takeoff climb gradient at 400 feet above airport elevation. Obstacle-limited weights for obstacles which can be cleared in the first or second segments of the takeoff flight path can be determined by direct reference to the charts. For more distant obstacles, it is necessary to construct a flight path diagram from information on the various charts in order to determine the maximum allowable takeoff weight for obstacle clearance.

TAKEOFF CLIMB - These charts show gross climb gradient capability in the second segment configuration as a function of gross weight, airport temperature, and airport pressure altitude. They are based on thrust and temperature conditions 400 feet above airport elevation. This height is higher than the gear retracted height which is why the available gradient at takeoff-climb-limited weights is slightly less than the 2.4 percent minimum specified in FAR 25.121(b).

CLOSE-IN OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for the first and second segments out to a distance of 7,000 feet as a function of the corrected takeoff climb gross gradient at a 400 foot height. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

DISTANT OBSTACLE CLEARANCE - This chart shows net takeoff flight paths, reduced in height by 35 feet, for a one-engine-inoperative climb at V_2 speed in the takeoff climb (second segment) configuration, as a function of corrected takeoff climb gross gradient at 400 feet. Gross height lines are superimposed on the flight path lines. The gradient read from the Takeoff Climb chart must be corrected for wind and bank angle on the Gradient Corrections chart before entering this chart.

S17726

OBSTACLE CLEARANCE

F L I G H T P A T H C H A R T P R E S E N T A T I O N
(Continued)

MAXIMUM LEVEL-OFF HEIGHT - These charts show the maximum gross height at which the acceleration segment can be scheduled at takeoff thrust; the corresponding net height is used to check obstacle clearance.

THIRD SEGMENT DISTANCE - These charts present the gross and net horizontal distances required to accelerate to the final takeoff climb speed, while retracting flaps according to the recommended schedule, as a function of the available corrected takeoff climb gradient. The gradient read from the Takeoff Climb chart must be corrected for level-off height and wind on the Gradient Corrections chart before entering the Third Segment Distance chart.

FINAL TAKEOFF CLIMB CHART - This chart shows the gross and net gradient available upon completion of the flap retraction segment and reduction of thrust to maximum continuous limits. It is used to construct the final segment of the flight path to determine clearance of very high and distant obstacles. It is based on conditions 1,500 feet above airport altitude and 3 degrees C below airport temperature. The gradients from this chart should be corrected for height and wind on the Gradient Corrections chart as required.

GRADIENT CORRECTIONS - Corrections to takeoff and final takeoff climb gradients are shown on this chart for wind, gross height and for steady turns in the flight path. Wind corrections should be applied to the takeoff climb gradients used in the Obstacle Clearance charts. Both wind and gross height corrections may be required when a flight path analysis extends into the third and final segments. It should be noted that the procedure used to read this chart is different depending on the direction that the correction is to be made. For example, from a zero wind 400 ft. gross gradient (from a Takeoff Climb chart), start with the zero wind gradient on the REF LINE and slide to the required wind to get the wind corrected gradient. However, from a wind corrected gradient (from an Obstacle Clearance chart), start with the wind corrected gradient at the wind value and slide to the REF LINE to get the zero wind gradient.

DISTANT OBSTACLE CLEARANCE

FLAPS 5, 15, AND 20

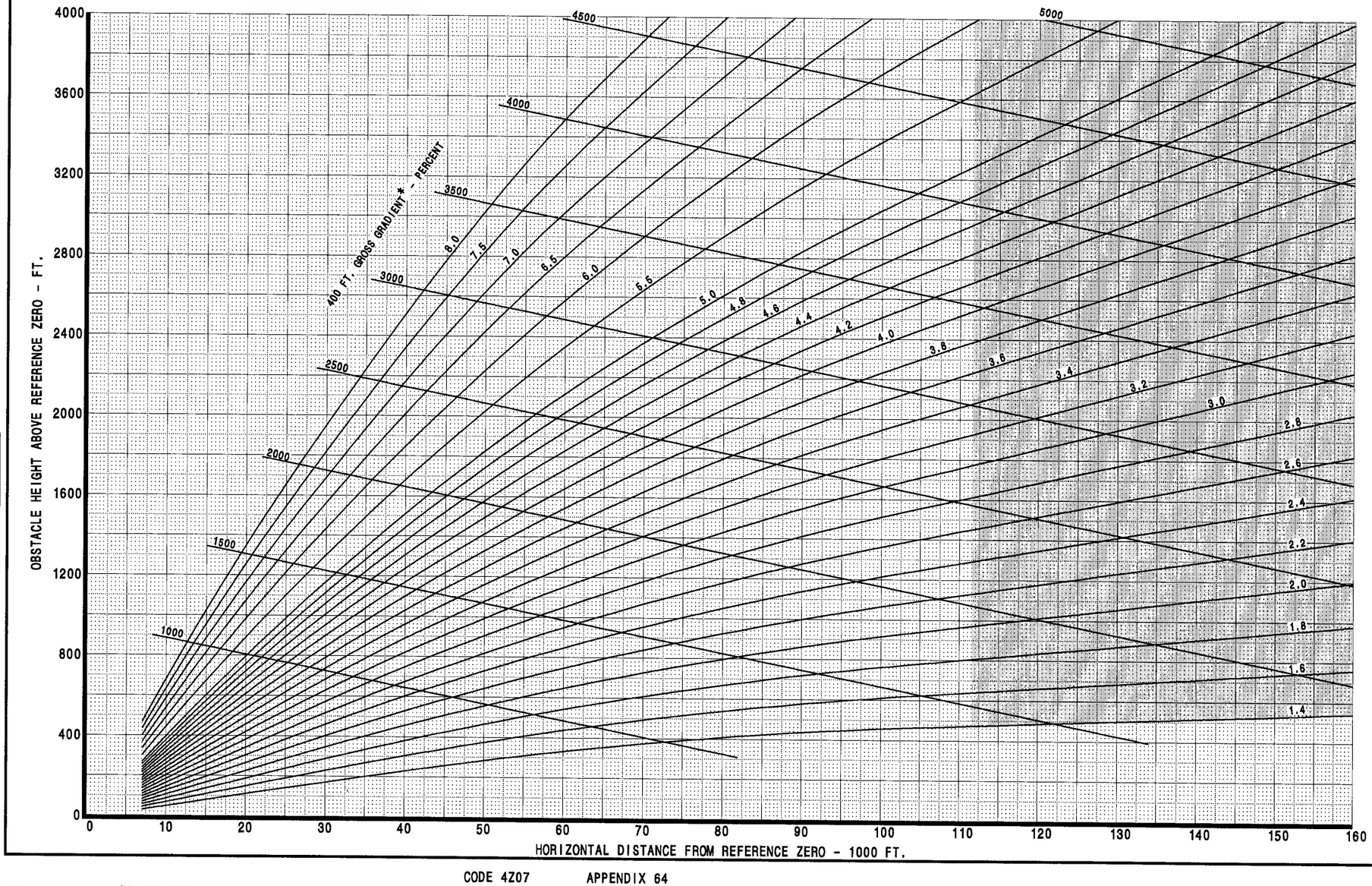
TEN MINUTE TAKEOFF THRUST LIMIT

- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT, ADD 35 FT. TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, WIND, AND BANK ANGLE.

- EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.
- IN SHADED REGION, CHECK END OF EXTENDED SECOND SEGMENT CHART.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10



P.C. d66493400 4 APP. 64
D041T513-1 PG. 4.9-34

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

APPROVED	DATE
G.LARSON	11-09-96

S20884

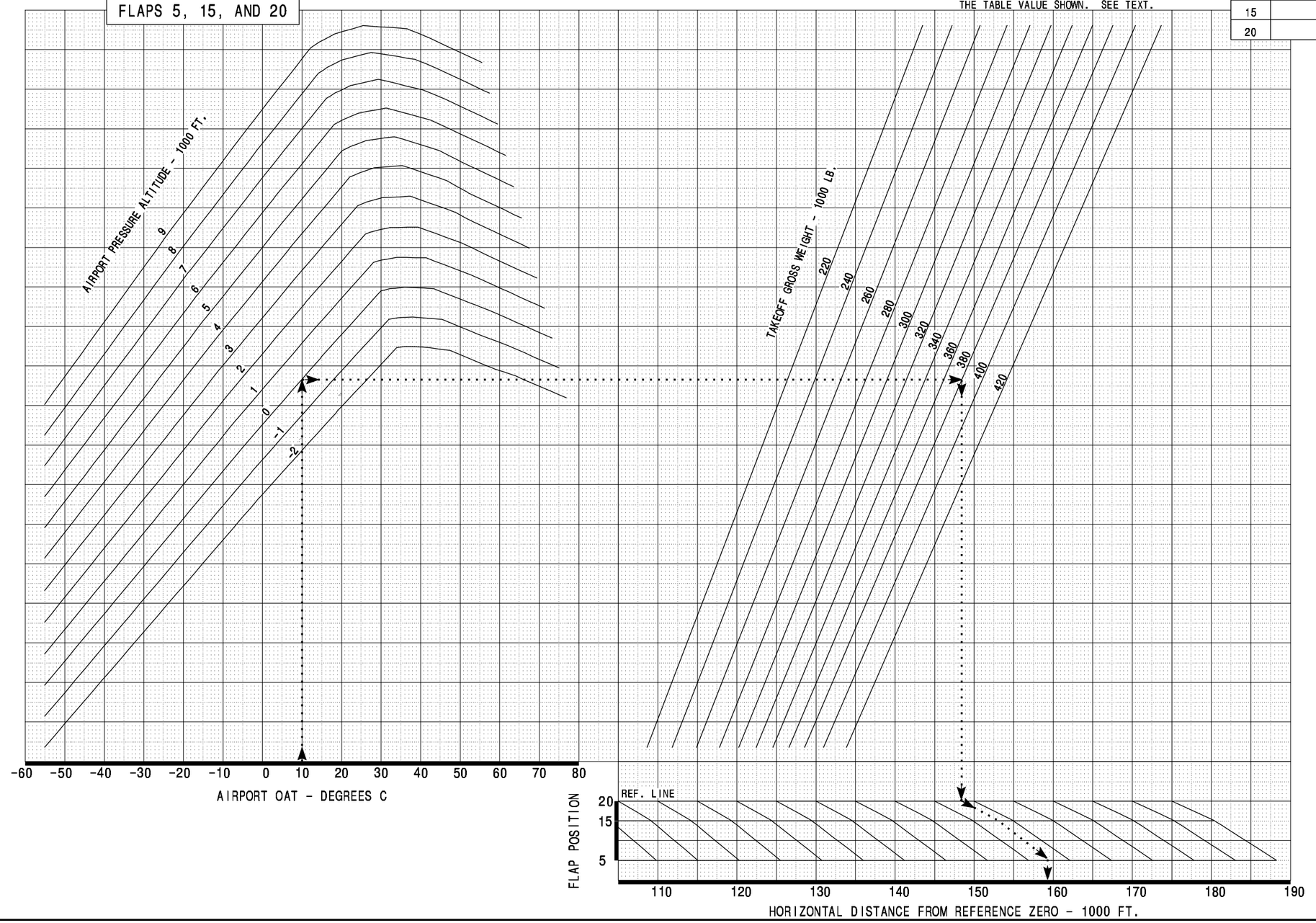
END OF EXTENDED SECOND SEGMENT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5, 15, AND 20

■ EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10



P.C. d66493600 5 APP. 64
D041T513-1 PG. 4.9-36

W. WELK
767-300ER
CF6-80C2B7/B7F

APPROVED V.HILL DATE 04-24-02

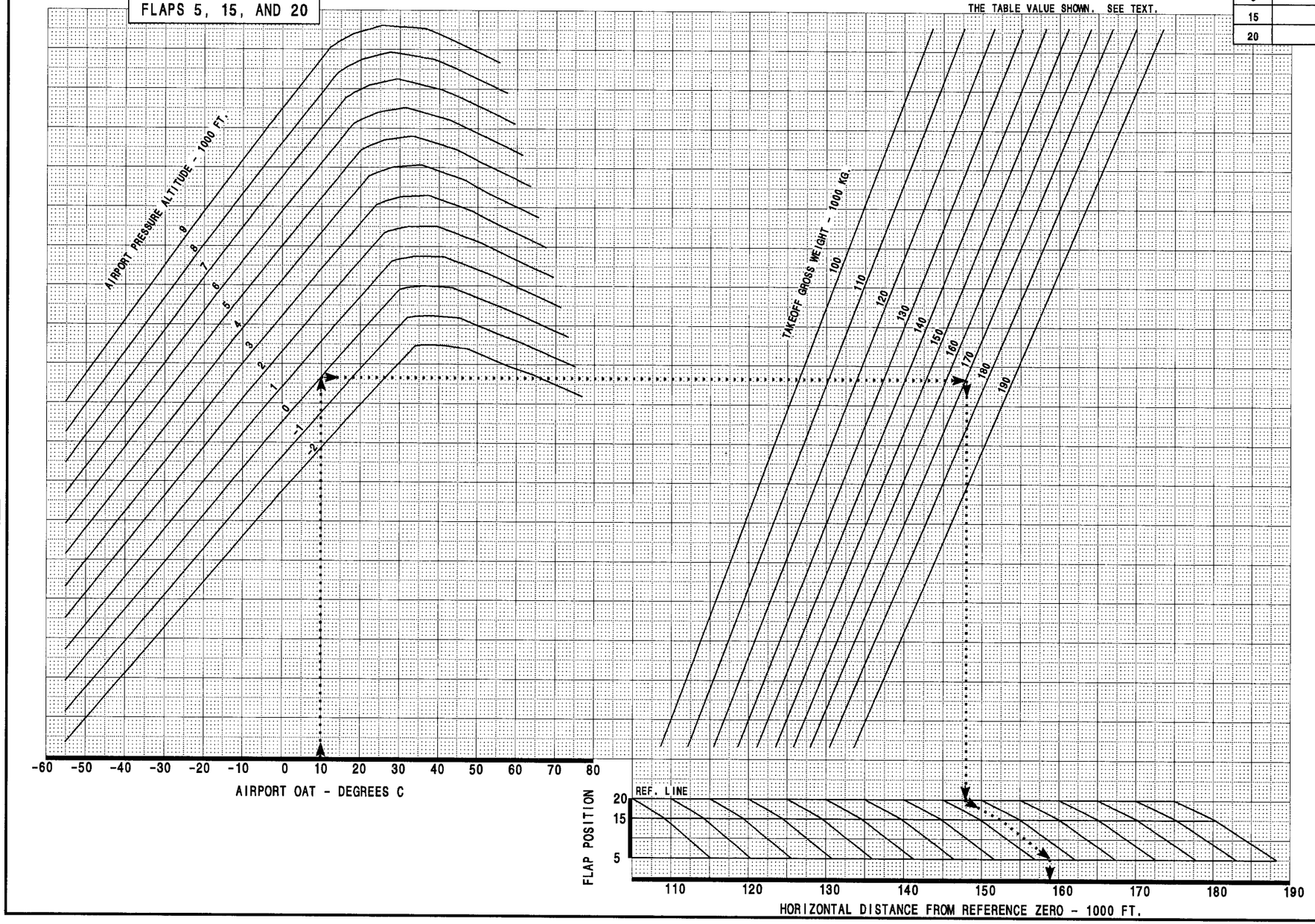
END OF EXTENDED SECOND SEGMENT

TEN MINUTE TAKEOFF THRUST LIMIT

■ EXTENDED SECOND SEGMENT AND MCT CLEANUP MAY BE USED WHEN FINAL TAKEOFF CLIMB GROSS GRADIENT (1500 FT., ZERO WIND) EXCEEDS THE TABLE VALUE SHOWN. SEE TEXT.

FLAPS	FINAL TAKEOFF CLIMB GROSS GRADIENT - PERCENT
5	3.00
15	3.50
20	4.10

FLAPS 5, 15, AND 20



P.C. d664936007 APP. 64
D041T513-1 PG. 4.9-36

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

APPROVED G.LARSON DATE 11-09-96

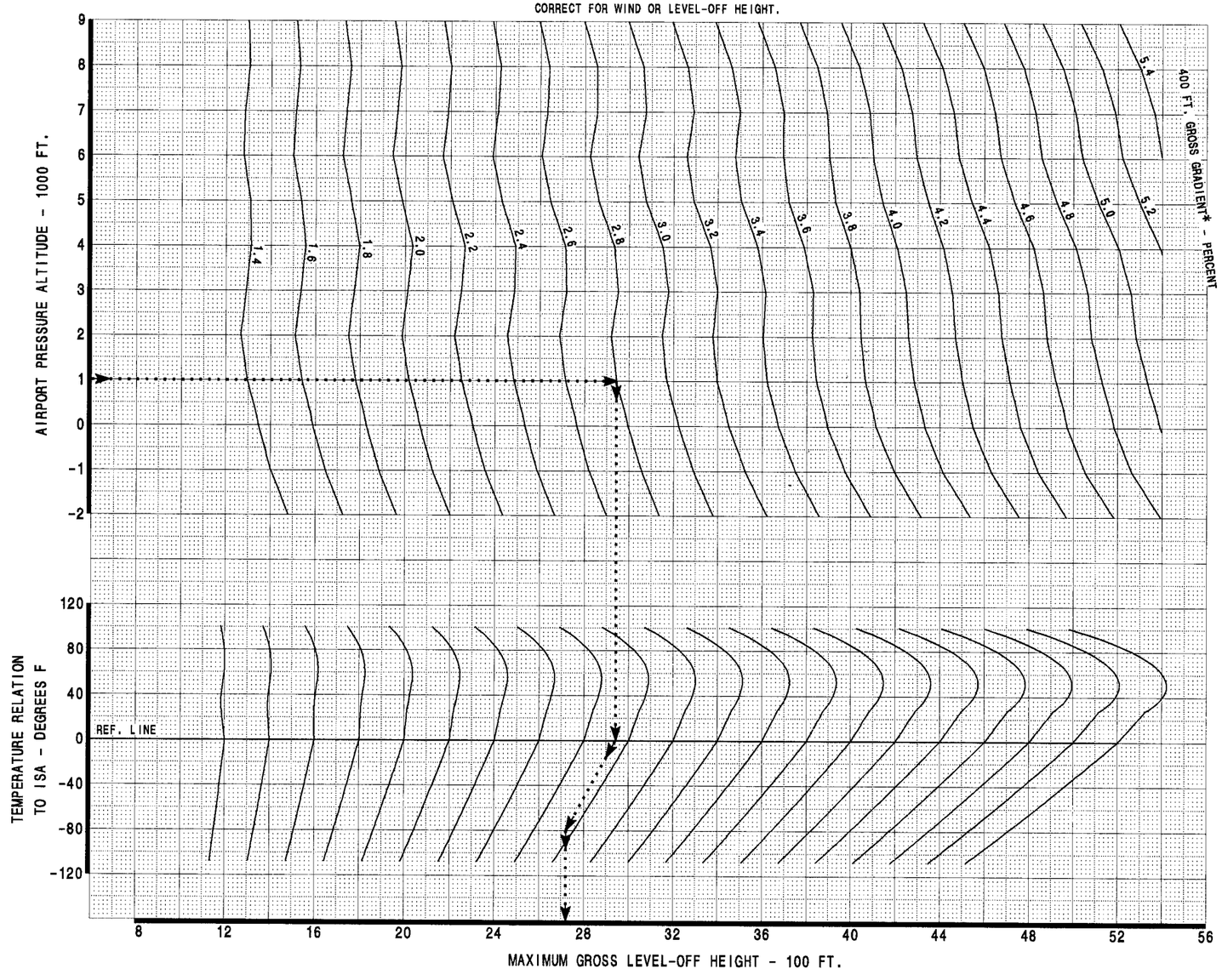
S20885

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. d664938006 APP. 64
D041T513-1 PG. 4.9-38

B. BARTEL
767-300ER
CF6-80C2B7/B7F

APPROVED	DATE
LARSON	02-22-97

S20887

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 5

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

P.C. d664938007 APP. 64
D041T513-1 PG. 4.9-38

APPROVED G.LARSON DATE 11-09-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

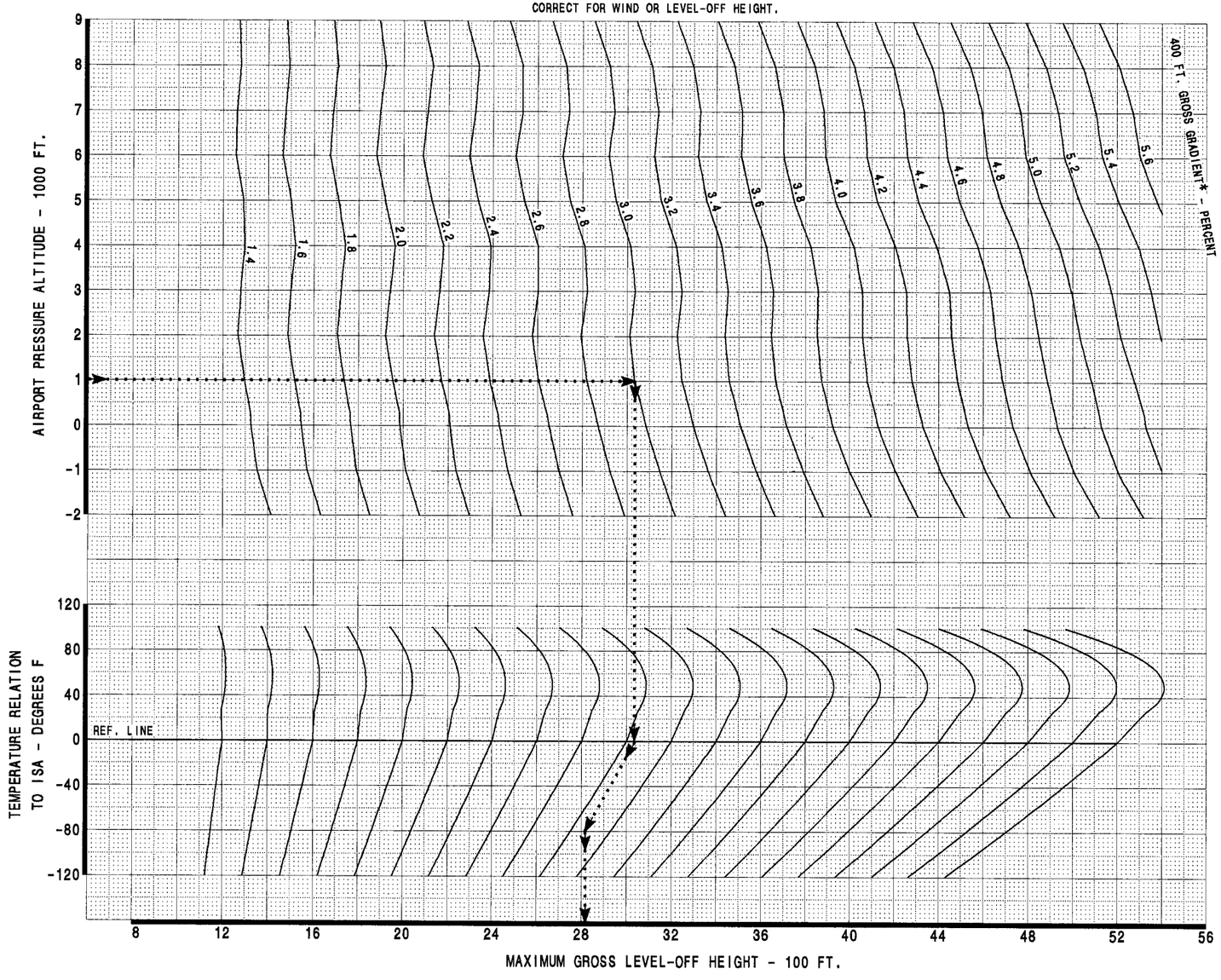
S20886

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 15

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. d664939006 APP. 64
D041T513-1 PG. 4.9-39

B. BARTEL
767-300ER
CF6-80C2B7/B7F

APPROVED LARSON DATE 02-22-97

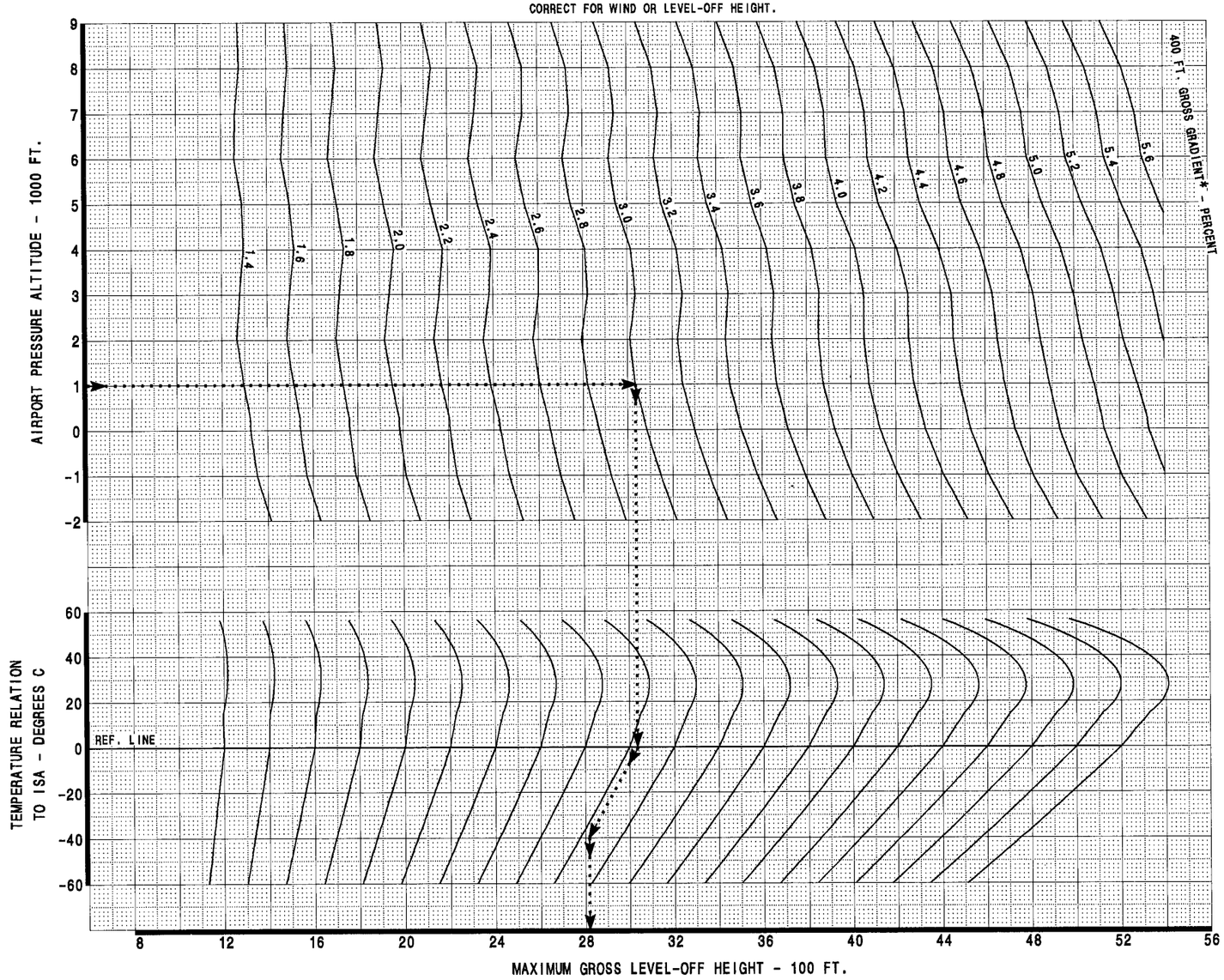
S20889

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 15

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. d664939007 APP. 64
D0417513-1 PG. 4.9-39

APPROVED	DATE
G.LARSON	11-09-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

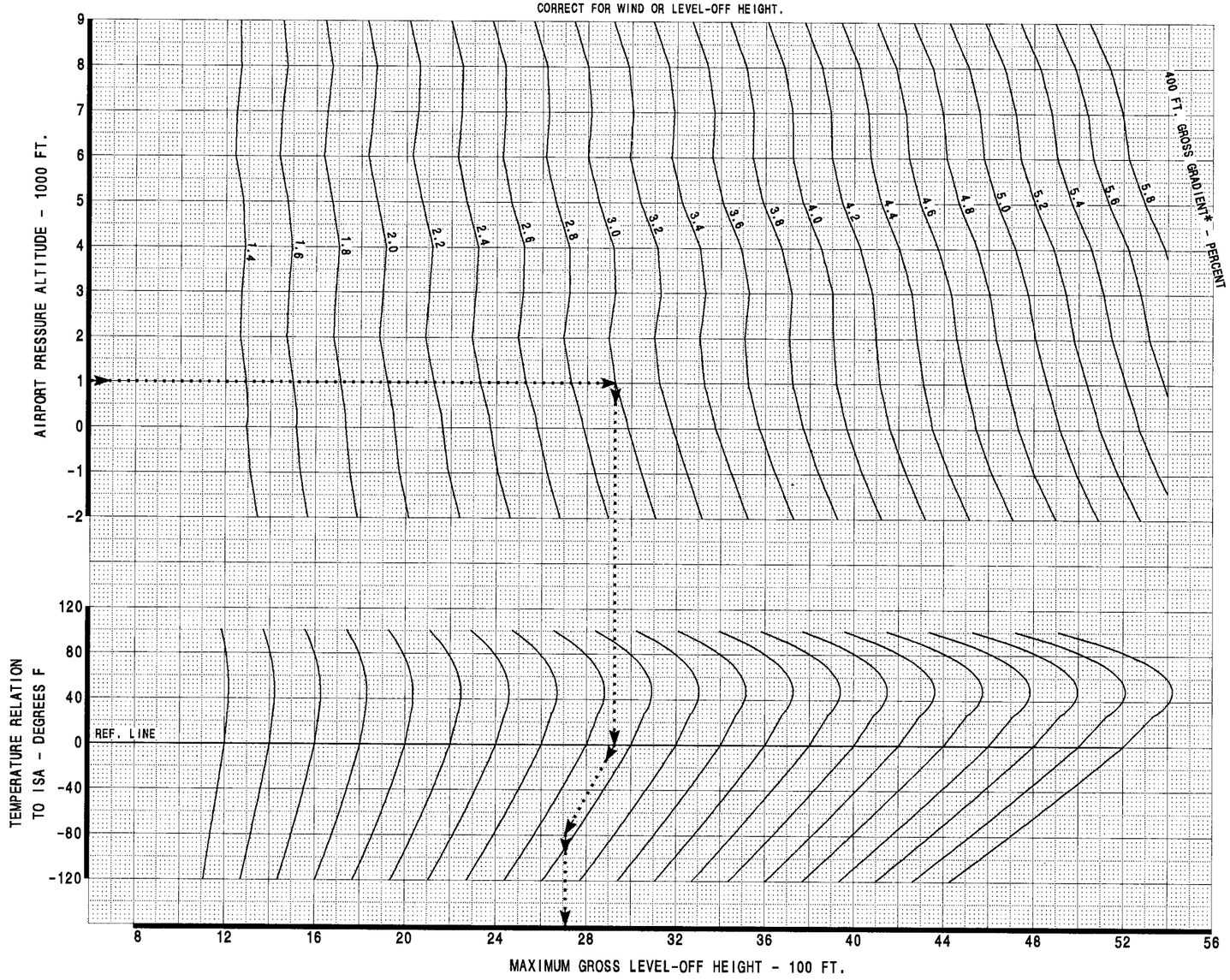
S20888

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 20

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.



P.C. d664940006 APP. 64
D041T513-1 PG. 4.9-40

APPROVED	DATE
LARSON	02-22-97

B. BARTEL
767-300ER
CF6-80C2B7/B7F

S20891

MAXIMUM LEVEL-OFF HEIGHT

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS 20

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE AND BANK ANGLE. DO NOT CORRECT FOR WIND OR LEVEL-OFF HEIGHT.

P.C. d664940007	APP. 64
D041T513-1	PG. 4.9-40

APPROVED	DATE
G.LARSON	11-09-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

S20890

PERFORMANCE

GRADIENT CORRECTIONS

TAKEOFF CLIMB

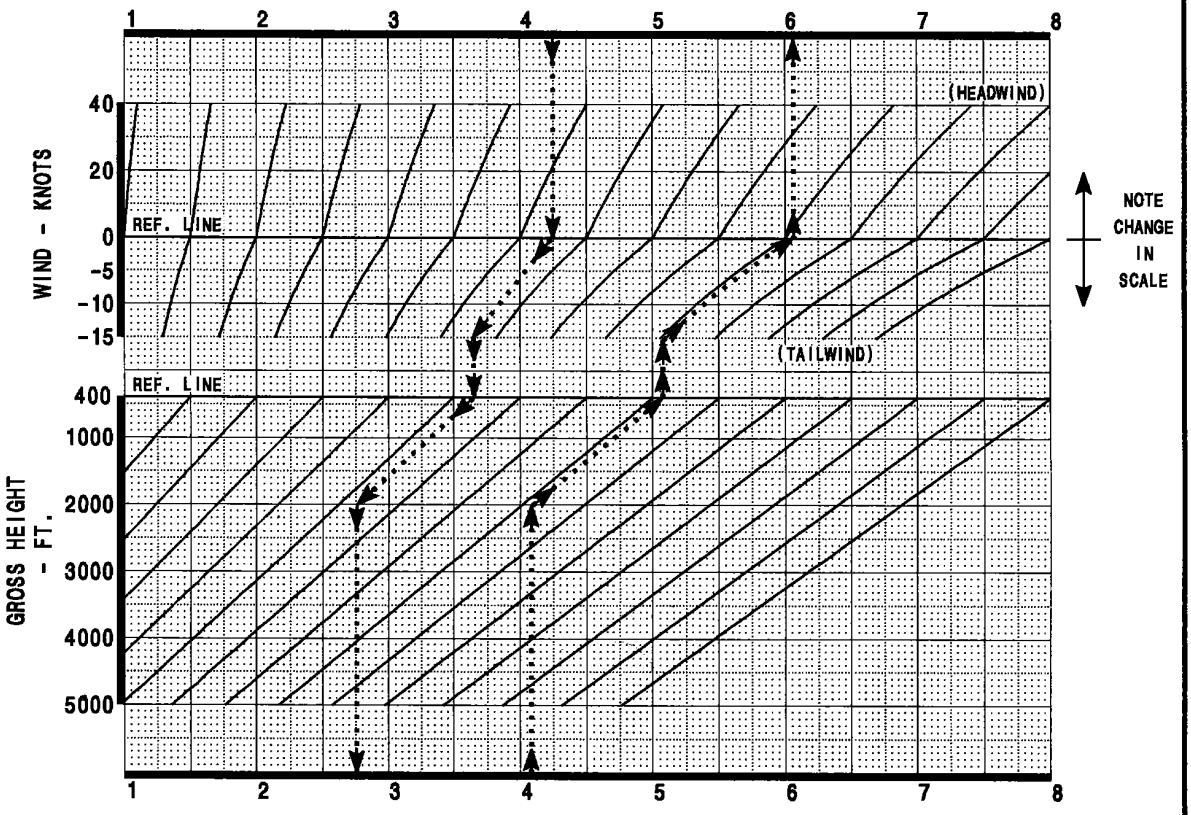
TEN MINUTE TAKEOFF THRUST LIMIT

- TO OBTAIN CORRECTED 400 FT. GROSS GRADIENT, SUBTRACT GRADIENT ADJUSTMENT FOR BANK ANGLE AFTER CORRECTING 400 FT. GROSS GRADIENT FOR WIND AND GROSS HEIGHT.
- TO OBTAIN 400 FT. GROSS GRADIENT, ADD GRADIENT ADJUSTMENT FOR BANK ANGLE TO CORRECTED 400 FT. GROSS GRADIENT BEFORE ENTERING CHART.

GRADIENT ADJUSTMENT - PERCENT			
BANK ANGLE - DEGREES	FLAPS 5	FLAPS 15	FLAPS 20
5	0.05	0.06	0.06
10	0.21	0.23	0.24
15	0.48	0.52	0.54

* MUST BE CORRECTED FOR IMPROVED CLIMB PERFORMANCE, IF APPLICABLE.

400 FT. GROSS GRADIENT * - PERCENT



P.C. d664945004 APP.64
D041T513-1 PG. 4.9-45

APPROVED	DATE
G.LARSON	11-09-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

S17728

GRADIENT CORRECTIONS

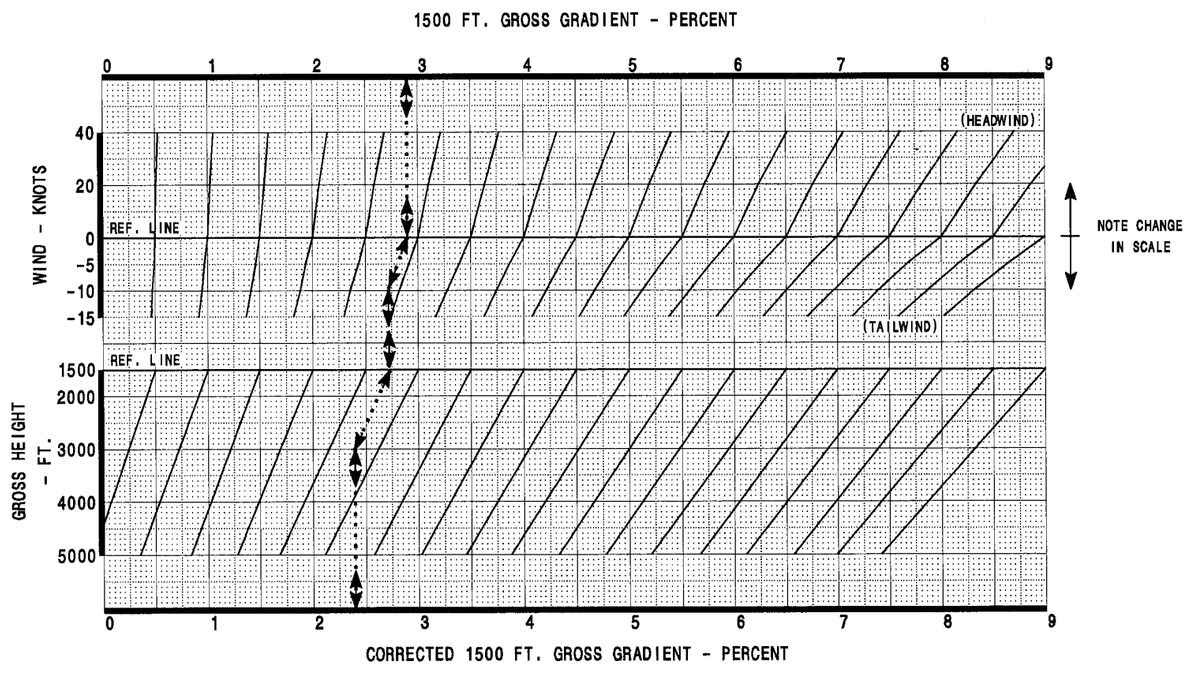
FINAL TAKEOFF CLIMB

TEN MINUTE TAKEOFF THRUST LIMIT

FLAPS UP

- TO OBTAIN CORRECTED 1500 FT. GROSS GRADIENT, SUBTRACT GRADIENT ADJUSTMENT FOR BANK ANGLE AFTER CORRECTING 1500 FT. GROSS GRADIENT FOR WIND AND GROSS HEIGHT.
- TO OBTAIN 1500 FT. GROSS GRADIENT, ADD GRADIENT ADJUSTMENT FOR BANK ANGLE TO CORRECTED 1500 FT. GROSS GRADIENT BEFORE ENTERING CHART.

BANK ANGLE - DEGREES	GRADIENT ADJUSTMENT - PERCENT
5	0.02
10	0.10
15	0.22



P.C. d664946004 APP. 64
D041T513-1 PG. 4.9-46

APPROVED G.LARSON DATE 11-09-96

L. ENEBRAD
767-300ER
CF6-80C2B7/B7F

S20892

REVISION HIGHLIGHTS

Revision 2 to Appendix 68 to D6T11321 dated 12-02-99.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to replace the maximum quick turnaround weight charts with charts having a penallty for the brake fans inoperative or deactivated.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	990178	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Section 4.13		
1	A68	Revised to add an explanation about the weight penalty for one brake deactivated with brake cooling fans inoperative on the Maximum Quick Turnaround Weight charts.

V16417

REVISION HIGHLIGHTS

Revision 2 to Appendix 68 to D6T11321 dated 12-02-99.

PAGE	CODE	EXPLANATION
Section 4.13		
11	100AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.
11	200AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.
11	300AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.
12	100AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.
12	200AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.
12	300AE	Revised to add a note to reduce gross weight with either one or all of the brake cooling fans inoperative or deactivated. The other data shown on the page has not changed.

V16419

APPENDIX 68

OPERATION WITH CATEGORY D BRAKES

767-300 WITH CF6-80C

SERIES ENGINES

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 990178** in the code column for the Revision Approval page.

for Donald B. Wilson Date 12-02-99

Manager, Seattle Aircraft Certification Office,
FAA Transport Airplane Directorate

V16420

Log of Pages
Appendix 68

The following pages comprise this appendix applicable to the above series airplanes.

Revision 2 Date 12-02-99

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1	A68	02-03-99
Revision Approval		
* 1	990178	12-02-99
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* 1		12-02-99
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5	700AE	02-03-99
6	400AE	02-03-99
7	500AE	02-03-99
7	700AE	02-03-99
8	400AE	02-03-99
* 11	100AE	12-02-99
* 11	200AE	12-02-99
* 11	300AE	12-02-99
* 12	100AE	12-02-99
* 12	200AE	12-02-99
* 12	300AE	12-02-99

* = Revised Pages
FAA Approved 12-02-99

D6T11321

V16421

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SECTION 3 - OPERATING PROCEDURES 1

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General. 1

SECTION 4.13 - LANDING FIELD LENGTH AND SPEED
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MAXIMUM QUICK TURNAROUND WEIGHT, FLAPS 30. 12

INTRODUCTION

GENERAL

This appendix is to be used when operating with Category D brakes. Category C performance in the basic manual is applicable unless the corresponding performance charts are contained in this appendix.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this manual is required by law.

G E N E R A L

This appendix must be used when operating with Category D brakes. Performance data included in Section 4 of this appendix must be used.

SECTION 2 - EMERGENCY PROCEDURES

Emergency procedures are unchanged.

SECTION 3 - OPERATING PROCEDURES

Operating Procedures are unchanged.

SECTION 4 - PERFORMANCE

GENERAL

When operating with Category D brakes, Category C performance charts in the basic AFM are used, unless a corresponding chart exists in this appendix.

Brake part numbers (P.N.) in the same category produce equal braking performance and Maximum Quick Turnaround Weight charts that are labeled for one category can be used for all brakes in that category. Intermix between brake categories is not allowed.

Category D: Boeing P.N. S160T400-210, -510

V05582

LANDING FIELD LENGTH AND SPEED

GENERAL

The Landing Field Length, Landing Field Length Corrections (except for Automatic Landing chart) and Maximum Quick Turnaround Weight charts from the basic manual are not used. Instead use the corresponding charts from this appendix.

The Maximum Quick Turnaround weight penalty for Brake Cooling Fans Inoperative with One Brake Deactivated includes the penalty for one brake deactivated.

V16422

LANDING FIELD LENGTH

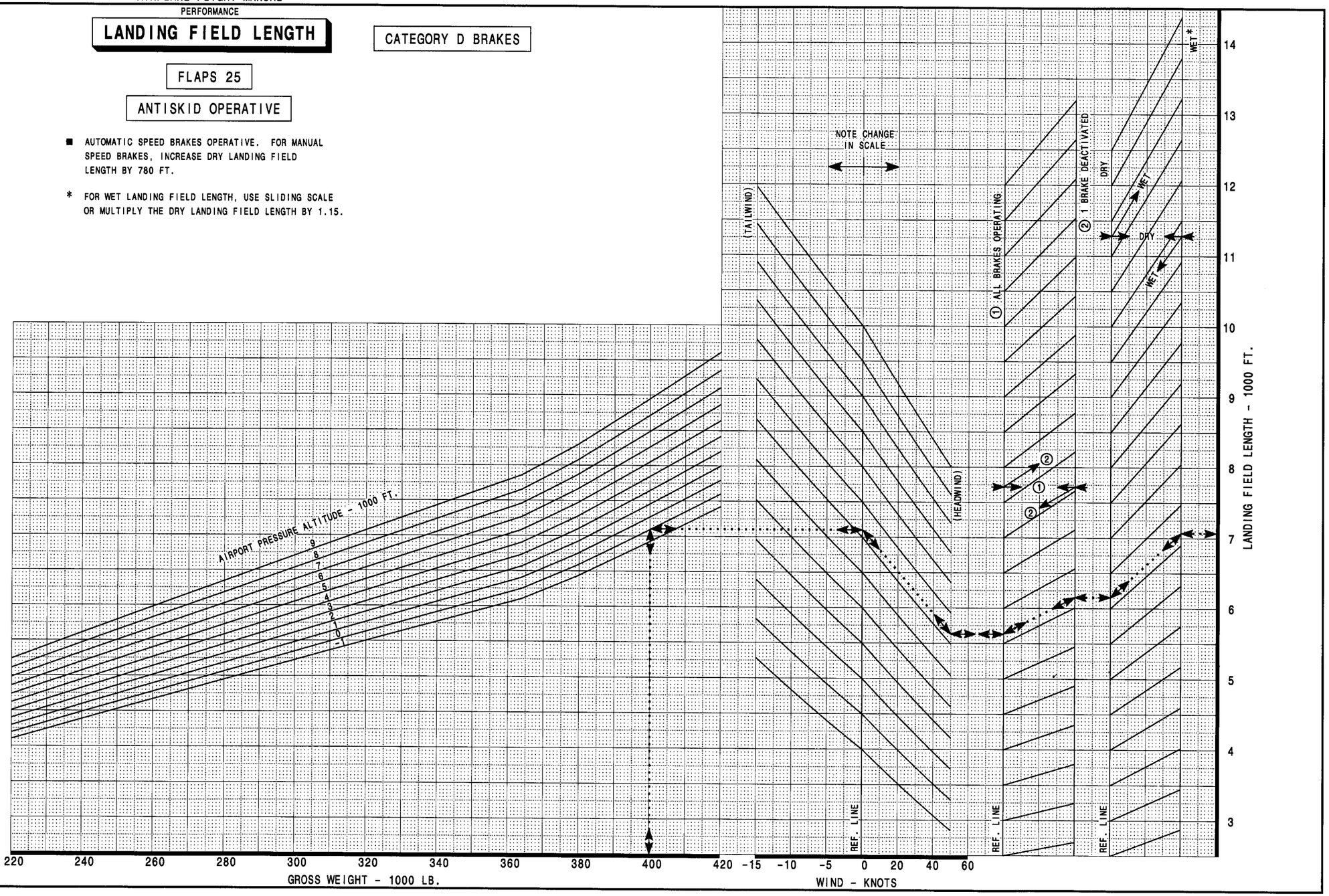
CATEGORY D BRAKES

FLAPS 25

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 780 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. e600D05005
D041T507-4 PG. 4.13-5

B. BARTEL
767-300ER
CF6-80C2 SERIES

APPROVED	DATE
D.DAVIS	01-12-99

S79106

LANDING FIELD LENGTH

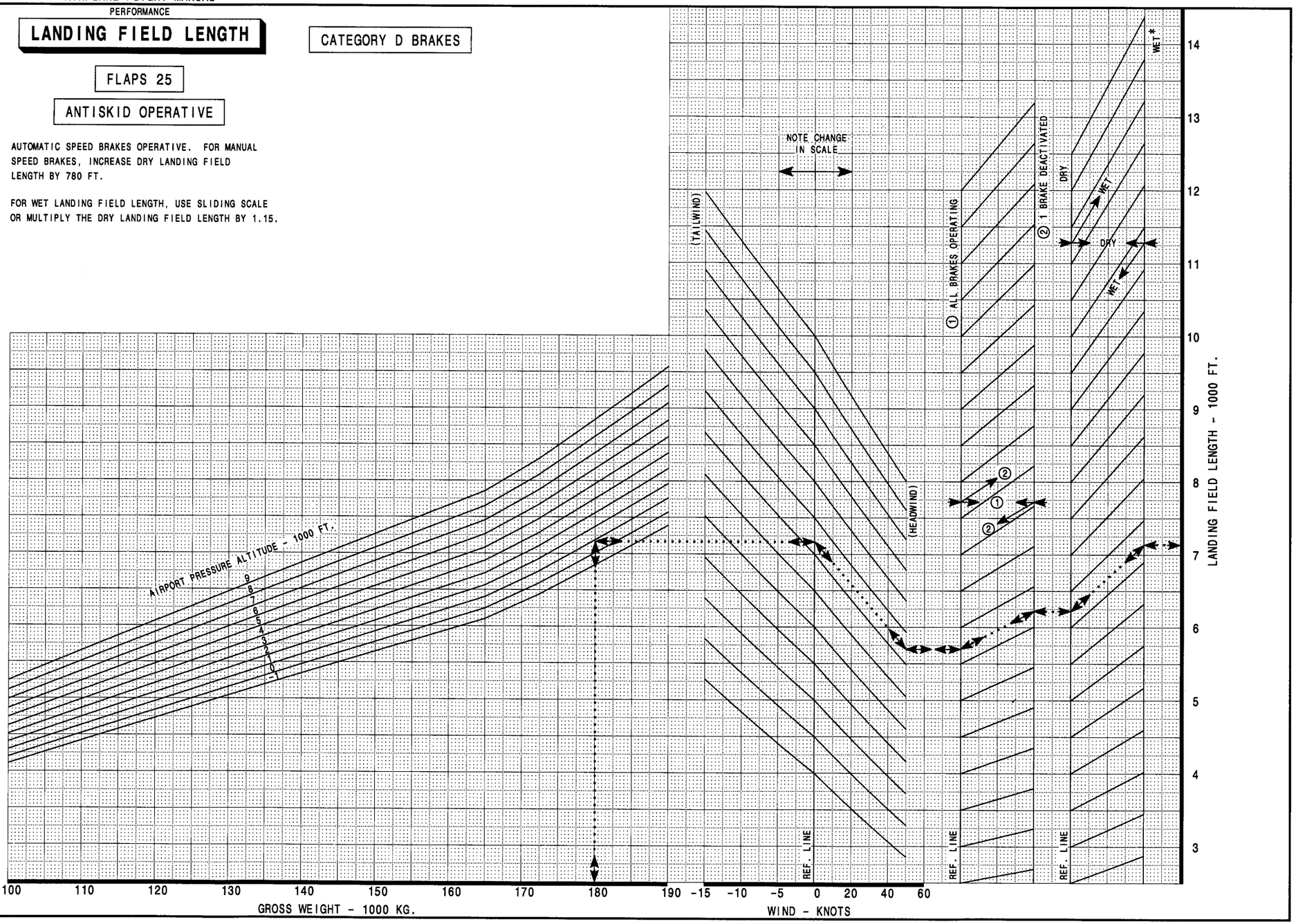
CATEGORY D BRAKES

FLAPS 25

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 780 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. e600D05007
D041T507-4 PG. 4.13-5

APPROVED	DATE
D.DAVIS	01-12-99

B. BARTEL
767-300ER
CF6-80C2 SERIES

S79122

LANDING FIELD LENGTH CORRECTIONS

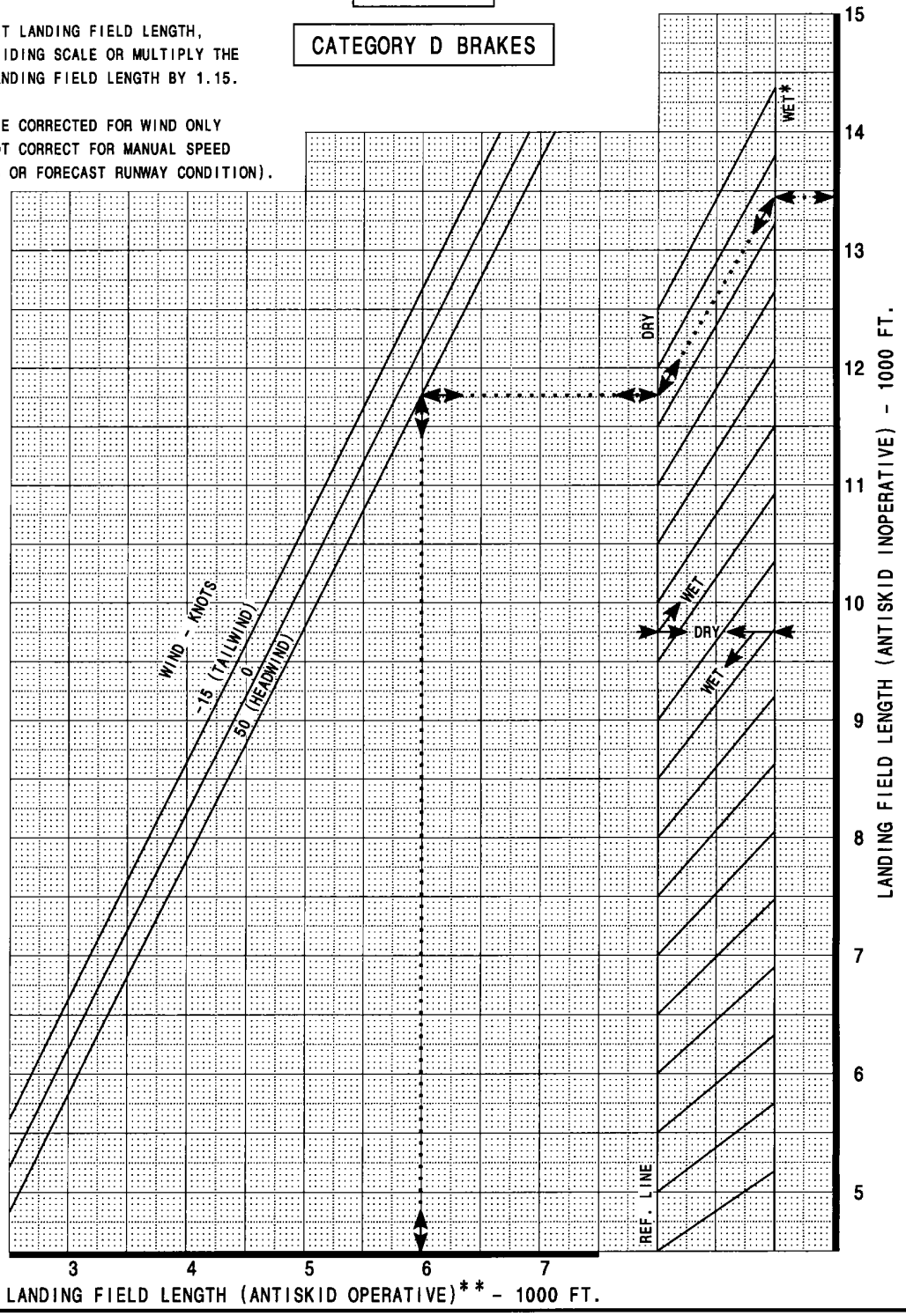
ANTISKID INOPERATIVE

FLAPS 25

CATEGORY D BRAKES

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.

** MUST BE CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES OR FORECAST RUNWAY CONDITION).



P.C. e600D06004
D041T507-4 PG. 4.13-6

APPROVED	DATE
D.DAVIS	01-12-99

B. BARTEL
767-300ER
CF6-80C2 SERIES

S79123

LANDING FIELD LENGTH

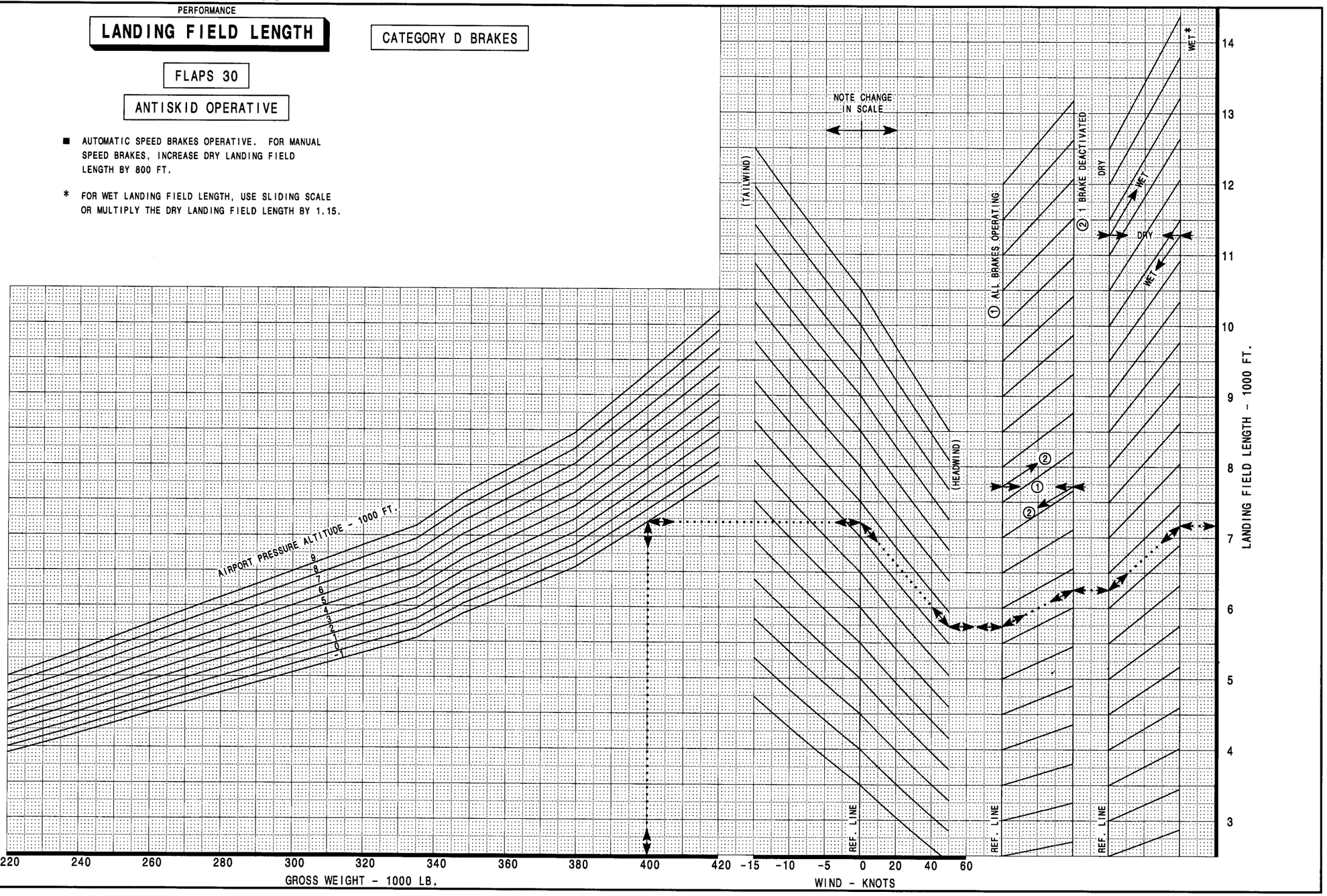
CATEGORY D BRAKES

FLAPS 30

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 800 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. e600D07005
D041T507-4 PG. 4.13-7

APPROVED	DATE
D.DAVIS	01-12-99

B. BARTEL
767-300ER
CF6-80C2 SERIES

S79125

PERFORMANCE

LANDING FIELD LENGTH

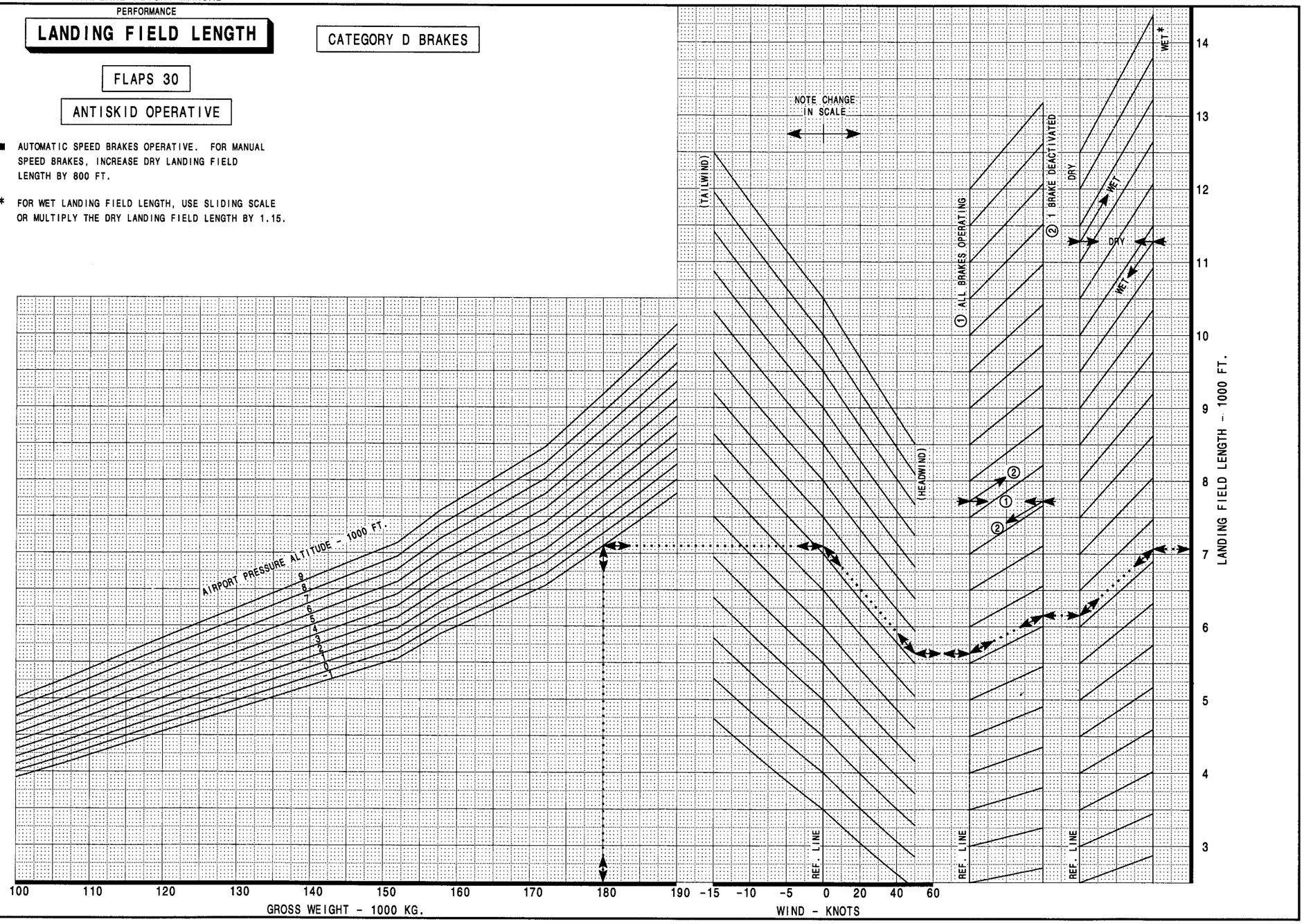
CATEGORY D BRAKES

FLAPS 30

ANTISKID OPERATIVE

■ AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES, INCREASE DRY LANDING FIELD LENGTH BY 800 FT.

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.



P.C. e600D07007
D041T507-4 PG. 4.13-7

APPROVED	DATE
D.DAVIS	01-12-99

B. BARTEL
767-300ER
CF6-80C2 SERIES

S79124

LANDING FIELD LENGTH CORRECTIONS

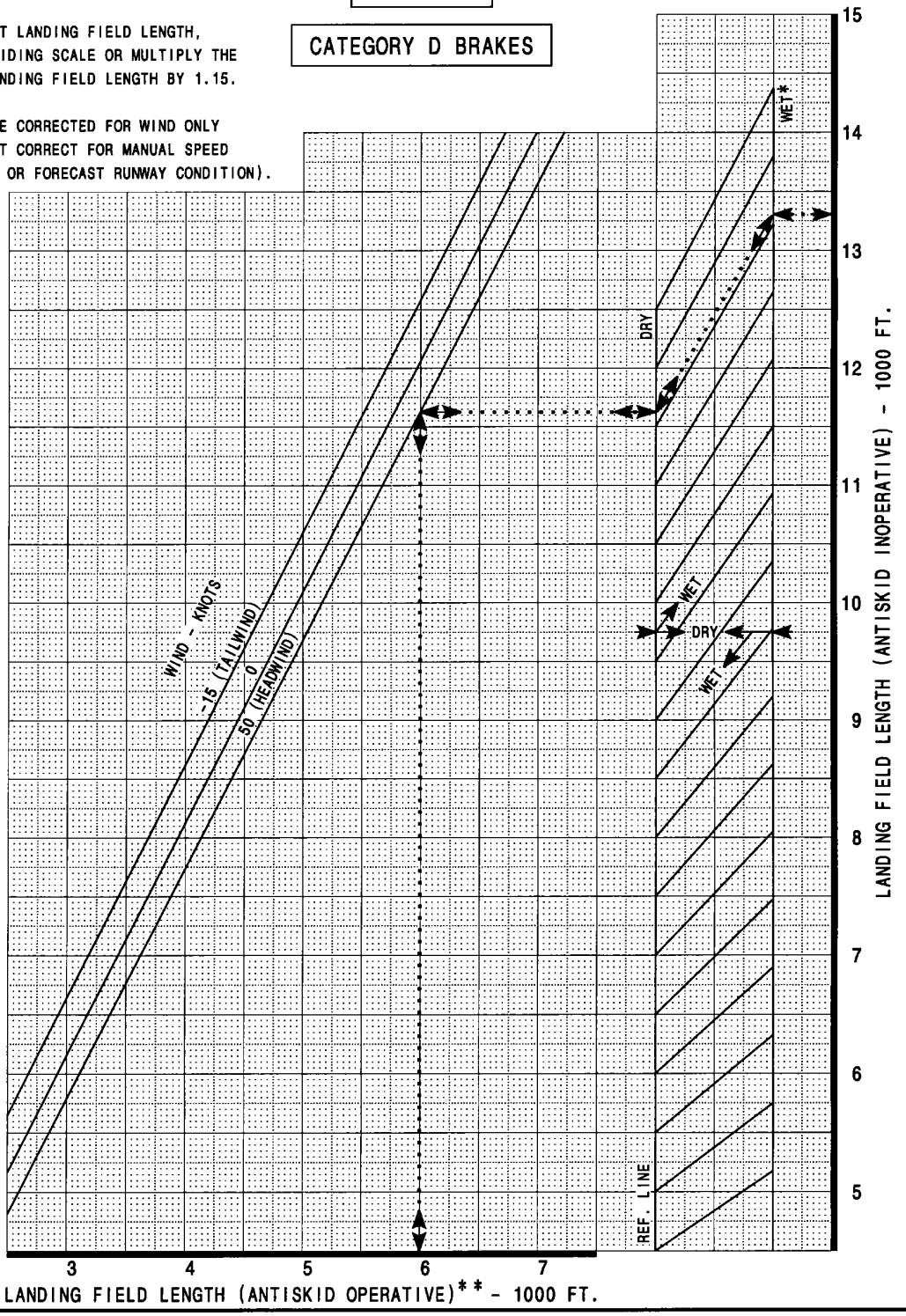
ANTISKID INOPERATIVE

FLAPS 30

CATEGORY D BRAKES

* FOR WET LANDING FIELD LENGTH, USE SLIDING SCALE OR MULTIPLY THE DRY LANDING FIELD LENGTH BY 1.15.

** MUST BE CORRECTED FOR WIND ONLY (DO NOT CORRECT FOR MANUAL SPEED BRAKES OR FORECAST RUNWAY CONDITION).



P.C. e600D08004
D041T507-4 PG. 4.13-8

APPROVED	DATE
D.DAVIS	01-12-99

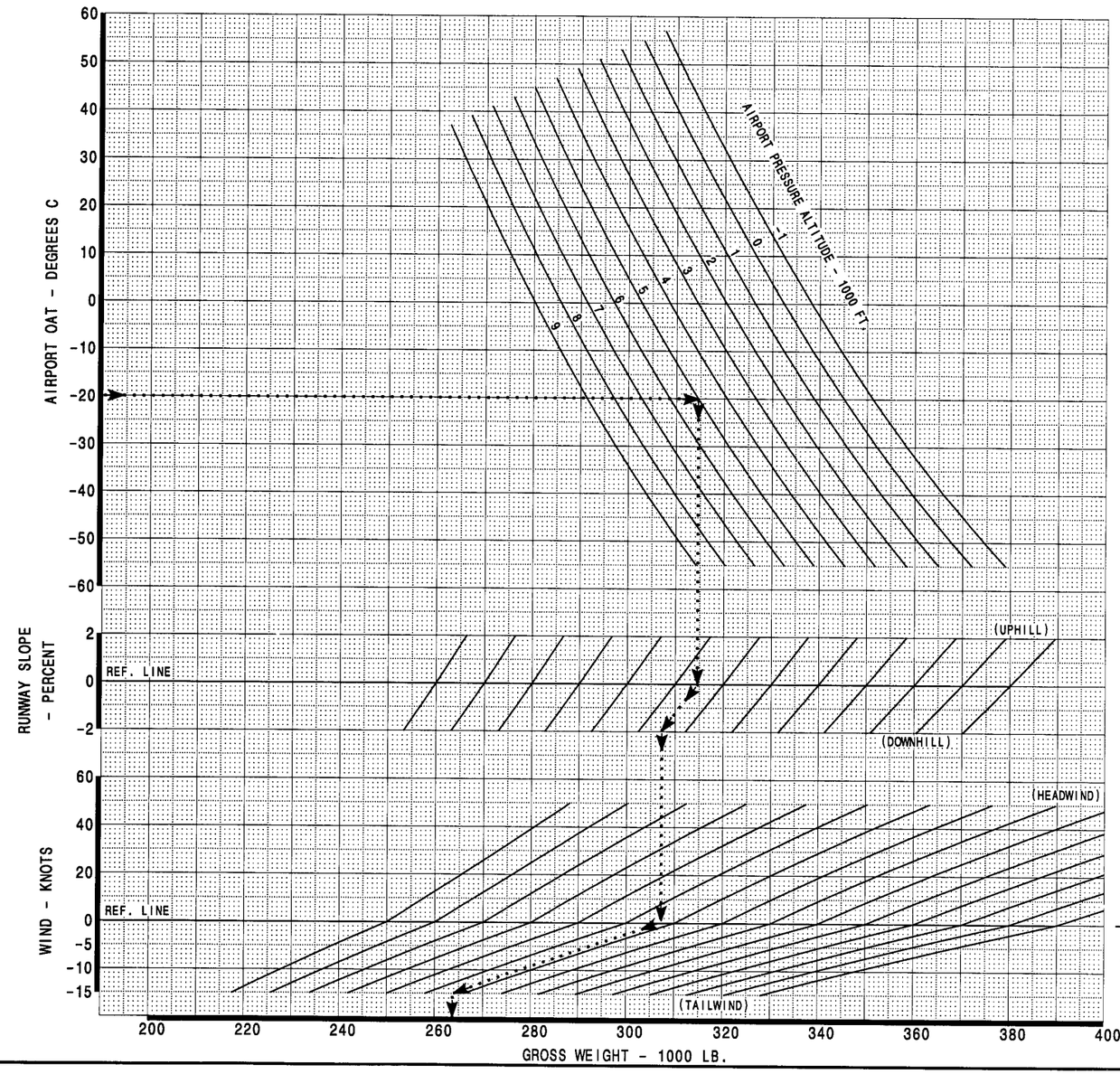
B. BARTEL
767-300ER
CF6-80C2 SERIES

S79127

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 25



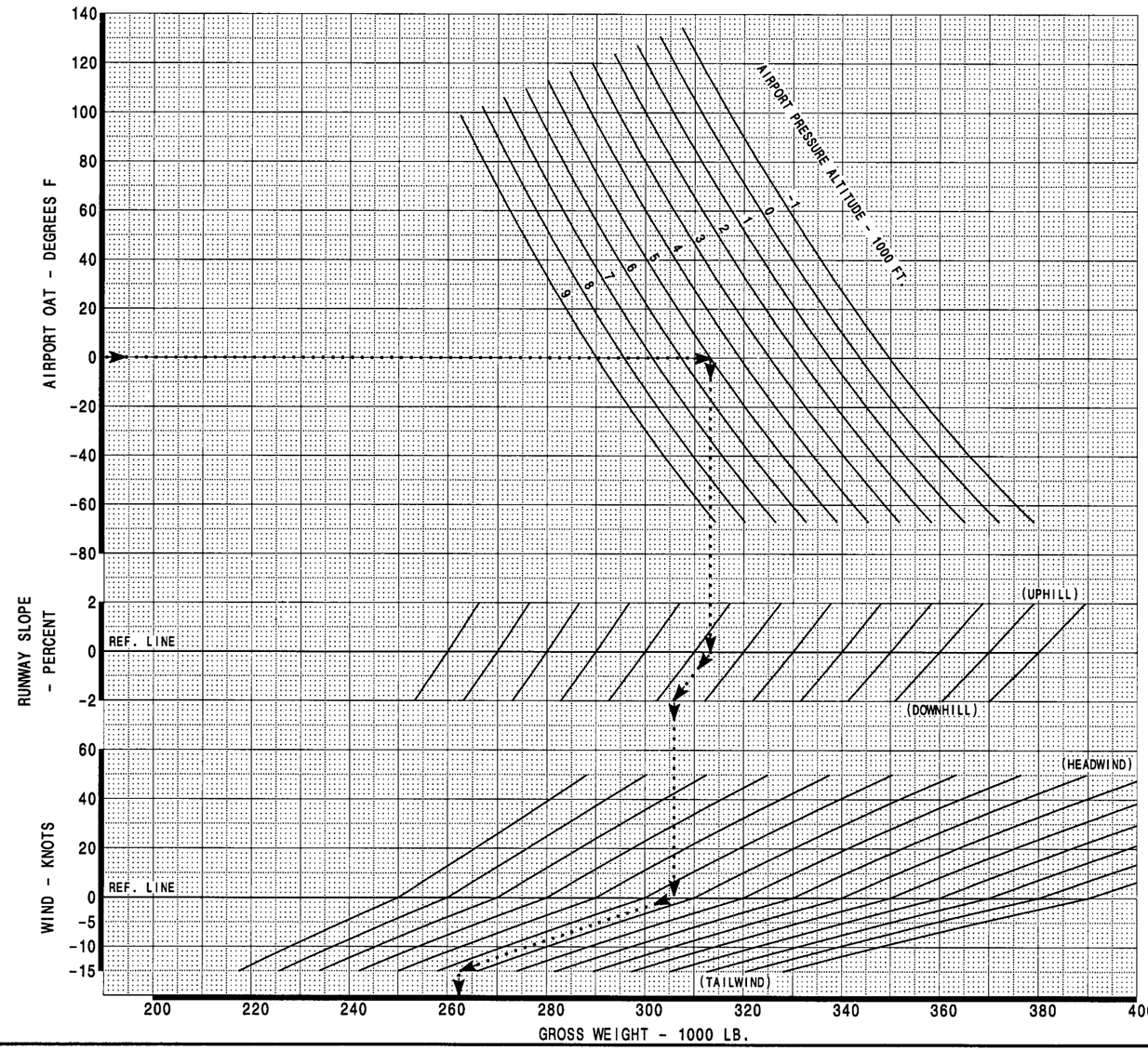
- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 23,100 LB.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 29,000 LB.
  FOR ONE BRAKE DEACTIVATED = 52,100 LB.

P.C. d600D110A1
D041T513-1 PG. 4.13-11
B. BARTEL
767-300ER
CF6-80C2 SERIES
APPROVED SUGAWARA DATE 10-20-99
V16425

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 25



- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 23,100 LB.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 29,000 LB.
  FOR ONE BRAKE DEACTIVATED = 52,100 LB.

P.C. d600D110A2
D041T513-1 PG. 4.13-11

B. BARTEL
767-300ER
CF6-80C2 SERIES

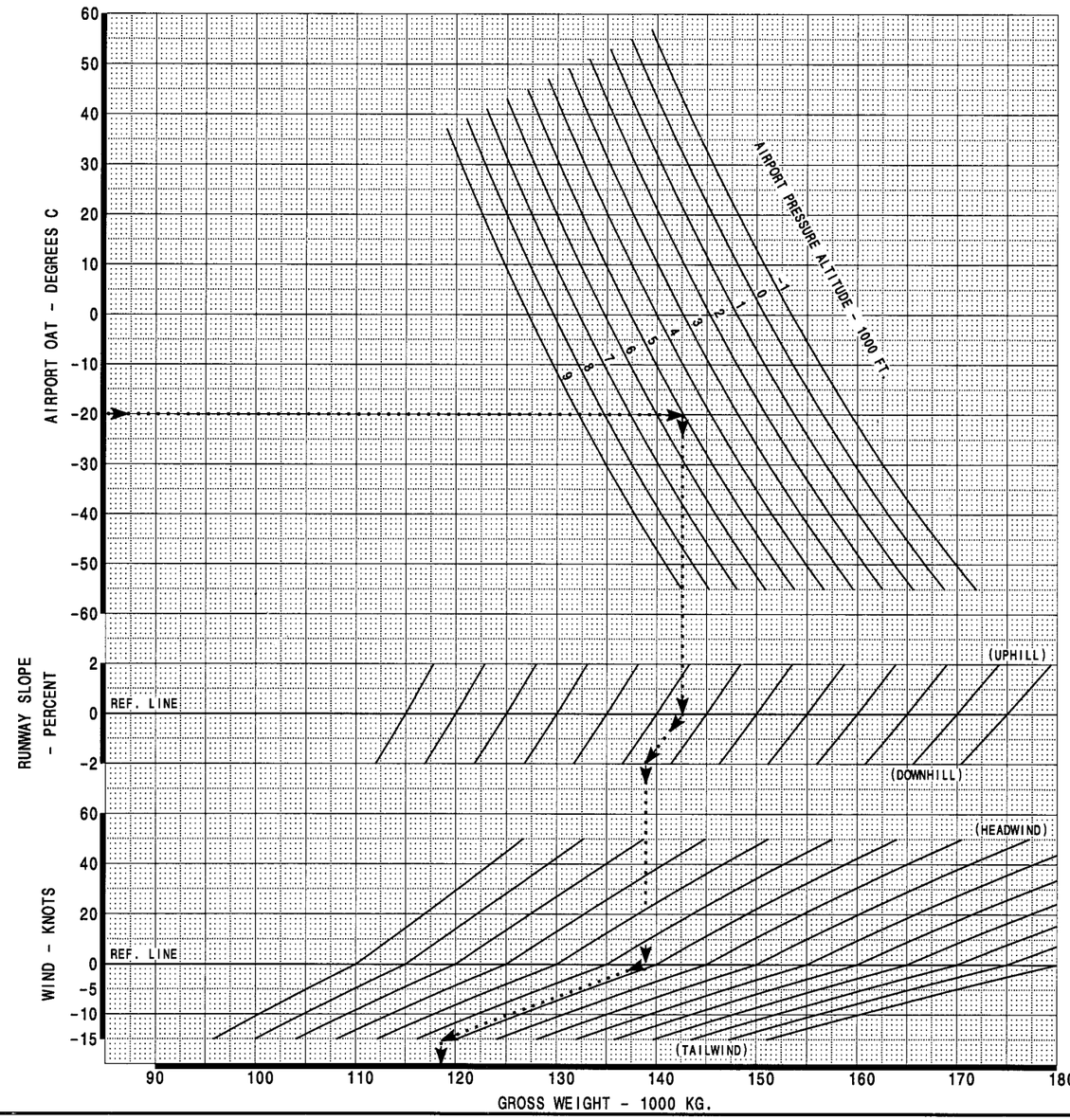
APPROVED SUGAWARA DATE 10-20-99

V16426

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 25



- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 10,500 KG.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 13,200 KG.
  FOR ONE BRAKE DEACTIVATED = 23,700 KG.

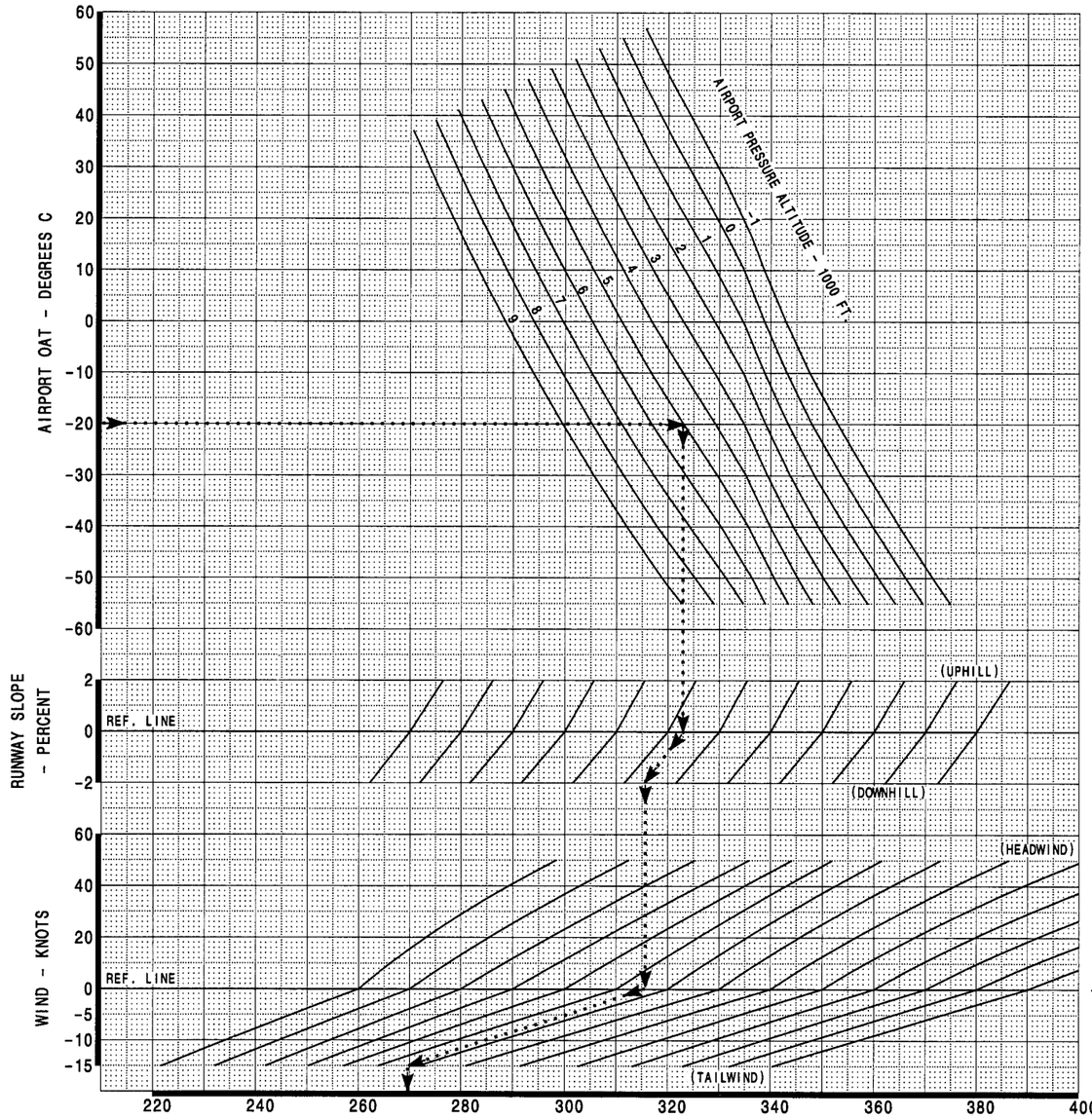
NOTE CHANGE IN SCALE

P.C. d600D110A3
D041T513-1 PG. 4.13-11
APPROVED SUGAWARA DATE 10-20-99
J. LARSON
767-300ER
CF6-80C2 SERIES
V16427

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 30



- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 22,400 LB.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 29,000 LB.
  FOR ONE BRAKE DEACTIVATED = 51,400 LB.

P.C. d600D120A1
D041T513-1 PG. 4.13-12

B. BARTEL
767-300ER
CF6-80C2 SERIES

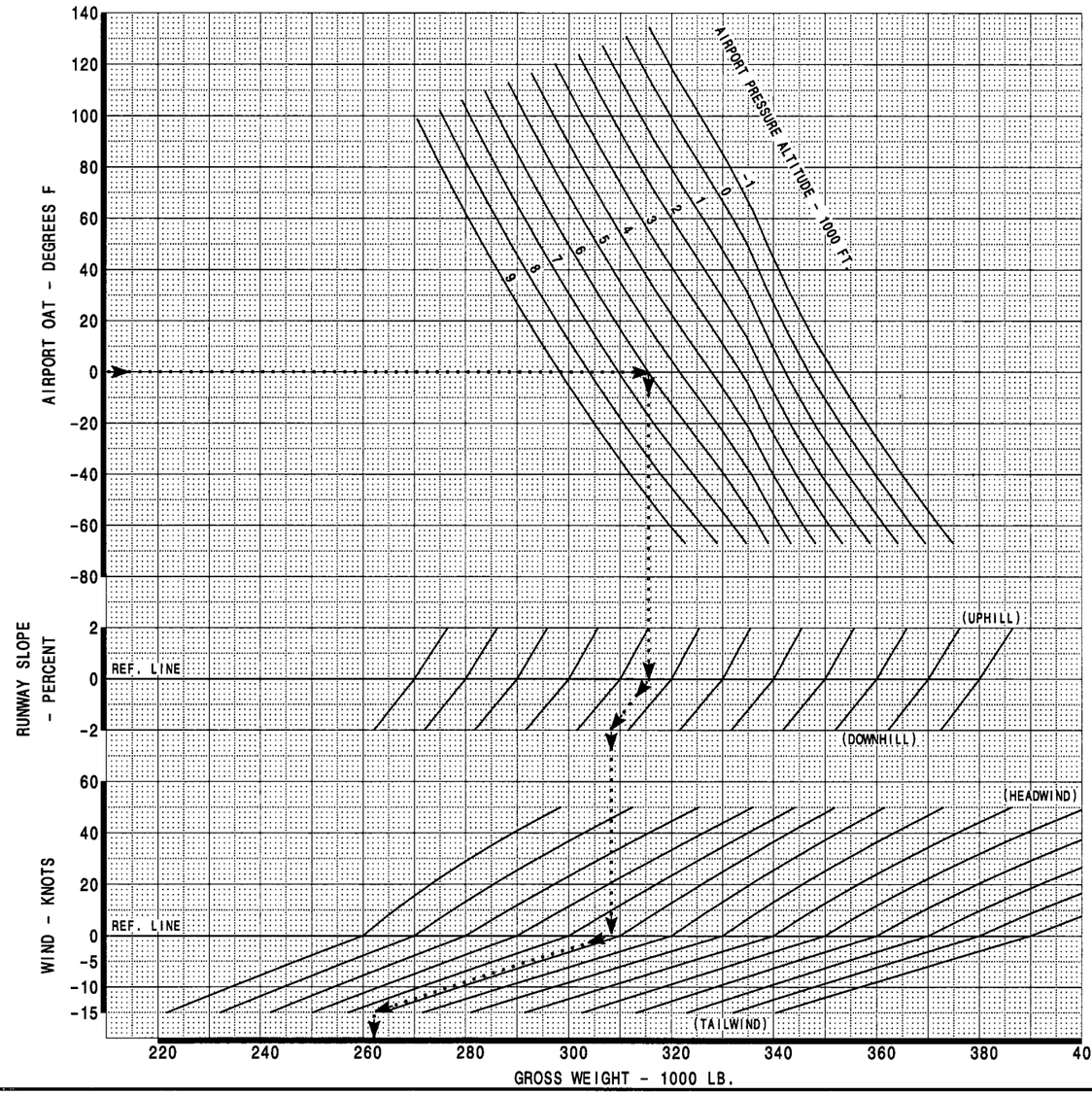
APPROVED SUGAWARA DATE 10-20-99

V16428

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 30



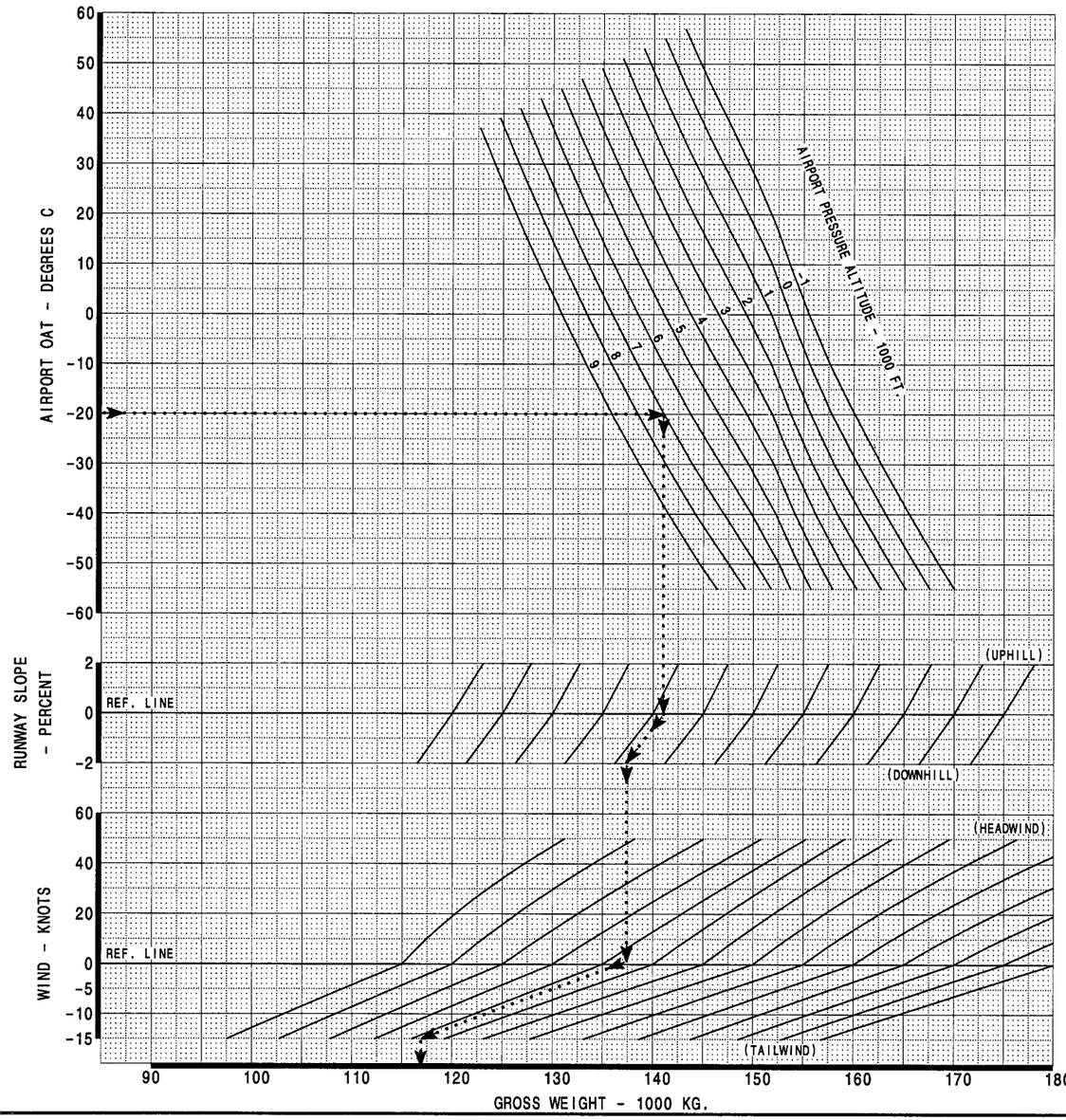
- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 22,400 LB.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 29,000 LB.
  FOR ONE BRAKE DEACTIVATED = 51,400 LB.

P.C. d600D120A2
D041T513-1 PG. 4.13-12
B. BARTEL
767-300ER
CF6-80C2 SERIES
APPROVED SUGAWARA DATE 10-20-99
V16430

MAXIMUM QUICK TURNAROUND WEIGHT

CATEGORY D BRAKES

FLAPS 30



NOTE CHANGE IN SCALE

- AFTER LANDING AT GROSS WEIGHTS EXCEEDING THOSE SHOWN ON THIS CHART, WAIT AT LEAST 75 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- ALL BRAKES OPERATING. FOR ONE BRAKE DEACTIVATED, REDUCE GROSS WEIGHT BY 10,200 KG.
- FOR ANY OR ALL BRAKE COOLING FANS INOPERATIVE OR DEACTIVATED, REDUCE GROSS WEIGHT BY THE FOLLOWING:
  FOR ALL BRAKES OPERATING = 13,200 KG.
  FOR ONE BRAKE DEACTIVATED = 23,400 KG.

P.C. d600D120A3
D041T513-1 PG. 4.13-12

APPROVED	DATE
SUGAWARA	10-20-99

B. BARTEL
767-300ER
CF6-80C2 SERIES

APPENDIX 709

OPERATION AT ALTERNATE
MAXIMUM TAXI/TAKEOFF WEIGHTS

767-300

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 133052** in the code column for the Revision Approval page.

E. K. Mijamot AR-635937 Date 08-28-13

Authorized Representative,
Regulatory Administration
Boeing Commercial Airplanes

Log of Pages
Appendix 709

The following pages comprise this appendix applicable to the above series airplanes.

Revision 0 Date 08-28-13

Page	Code	Date	Page	Code	Date	Page	Code	Date
Title								
1	A709	08-28-13						
Revision Approval								
1	133052	08-28-13						
Log of Pages								
1		08-28-13						
Contents								
1	A702	06-09-00						
Introduction								
1	A708	03-05-13						
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4A	A709	08-28-13						

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CENTER OF GRAVITY LIMITS 4

I N T R O D U C T I O N

This appendix contains the Certificate Limitations for operation of 767-300 airplanes at alternate maximum taxi and takeoff weights. The alternate weights and Center of Gravity Limits provided in this appendix are applicable only when the appropriate Boeing Service Bulletin is incorporated.

SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in Section 1 of this manual is required by law.

W E I G H T L I M I T A T I O N S

	Pounds	Kilograms
MAXIMUM TAXI WEIGHT.	353,738	160,452 [a]
	331,692	150,452 [b]
MAXIMUM TAKEOFF WEIGHT	352,738	159,999 [a]
	330,692	149,999 [b]

NOTE: The Maximum Weight Limits may be less as limited by center of gravity (page 4). Refer to the applicable Weight and Balance Manual for additional specific airplane loading limitations.

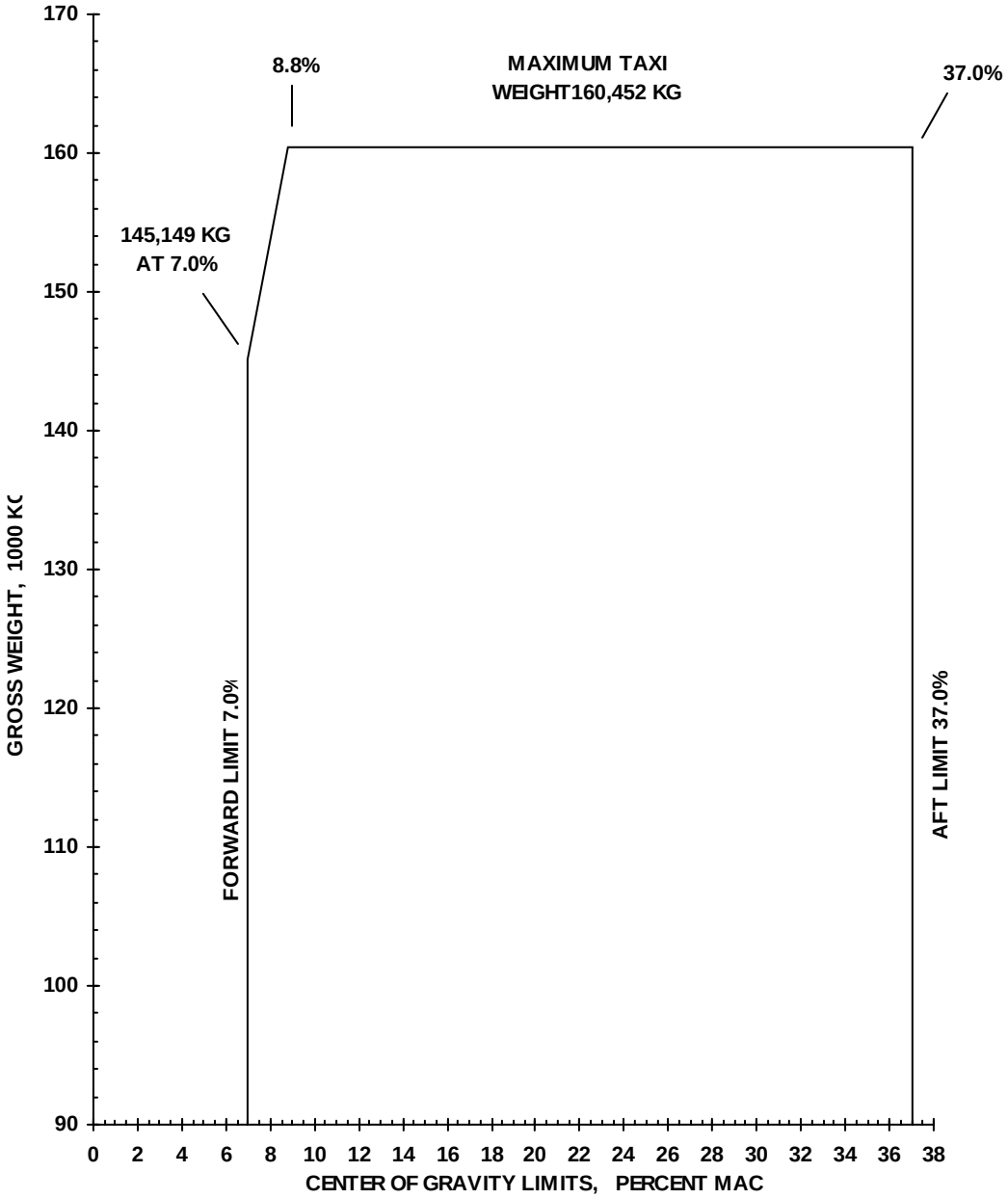
Alternate weights are applicable only when the appropriate Boeing Service Bulletin is incorporated.

[a] See page 4, this section for Center of Gravity Limits.

[b] See page 4A, this section for Center of Gravity Limits

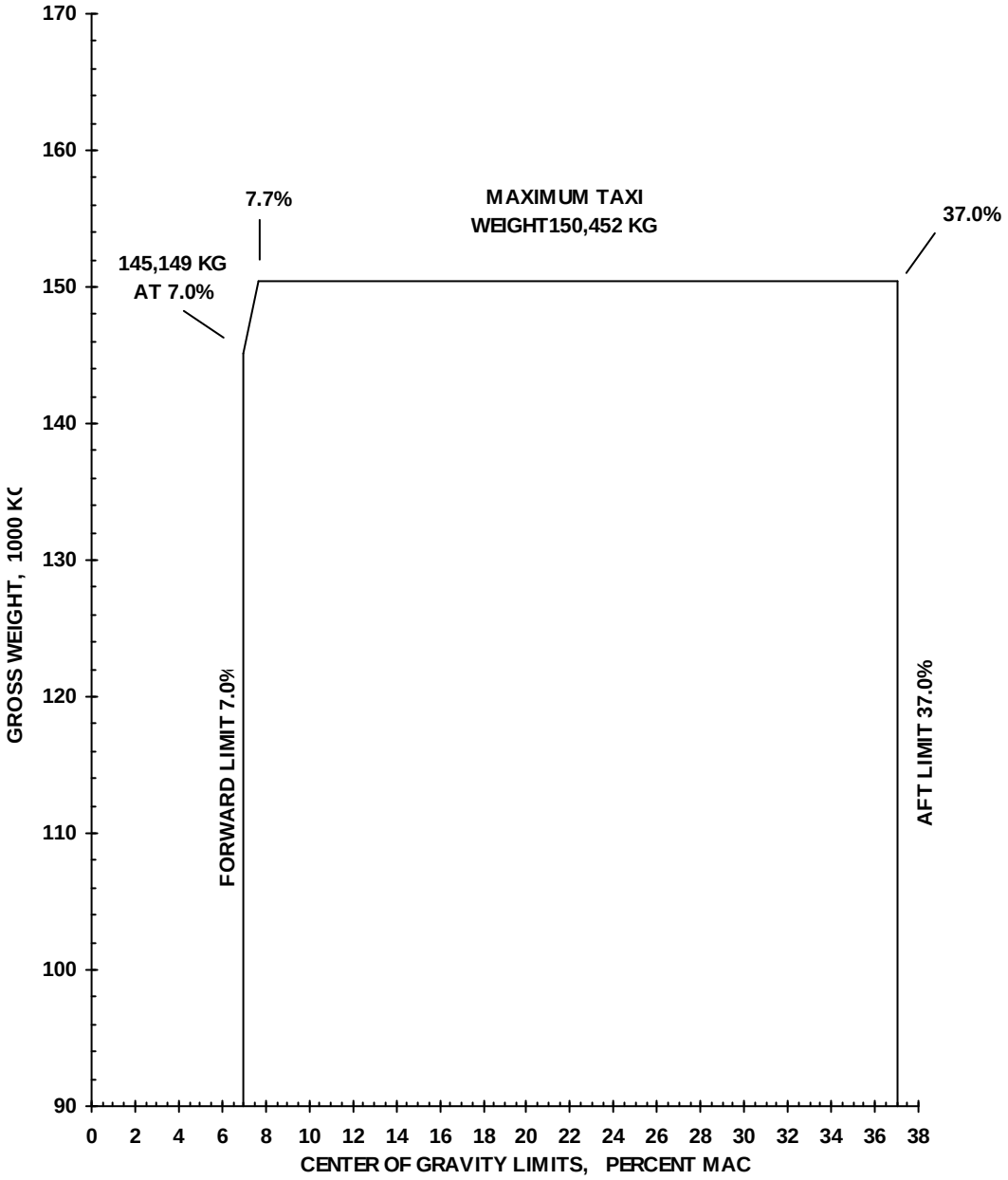
CENTER OF GRAVITY LIMITS

REFER TO THE APPLICABLE WEIGHT AND BALANCE MANUAL FOR IDENTIFICATION OF C.G. COORDINATES AND SPECIFIC LOADING/OPERATING RESTRICTIONS



CENTER OF GRAVITY LIMITS

REFER TO THE APPLICABLE WEIGHT AND BALANCE MANUAL FOR IDENTIFICATION OF C.G. COORDINATES AND SPECIFIC LOADING/OPERATING RESTRICTIONS



REVISION HIGHLIGHTS

Revision 12 to Appendix CDL to D6T11320, D6T11321 dated 11-21-13.

The engineering developed and the FAA certification provided by Airplane Flight Manual (AFM) revisions are applicable and valid only for the airplane in its original Boeing delivery configuration as modified by the incorporation of approved Boeing service bulletins. With respect to any other modifications, it shall be the responsibility of the operator to obtain appropriate regulatory agency approval for application of the data provided by this AFM revision.

The purpose of this revision is to update CDL item number 27-51-02 to list the Takeoff and Enroute performance penality as a negligible item.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	133234	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1		Revised to reflect pages changed in this revision.
Section 1		
8	ACDL	Revised to add Takoff and Enroute penality as negligible.

APPENDIX CDL

CONFIGURATION DEVIATION LIST (CDL)

MODEL 767-200 / 300 / 400ER SERIES

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 133234** in the code column for the Revision Approval page.

Clifford L Kuykendall AR-60020 Date 11-21-13

Authorized Representative,
Regulatory Administration
Boeing Commercial Airplanes

The following pages comprise this appendix applicable to the above series airplanes.

Revision 12 Date 11-21-13

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Title		
1	ACDL	07-20-00
Revision Approval		
* 1	133234	11-21-13
Log of Pages		
* 1		11-21-13
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2	ACDL	02-13-06
3	ACDL	03-02-10
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* 8	ACDL	11-21-13
9	ACDL	05-21-01
9A	ACDL	05-21-01
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27A	ACDL	05-21-01
27B	ACDL	05-21-01
28	ACDL	05-21-01
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30A	ACDL	05-21-01
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33A	ACDL	05-21-01
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34	ACDL	05-21-01
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Section 1 (Cont'd)		
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Trailing Edge Flap Hinge Fairings
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SECTION 1 - CERTIFICATE LIMITATIONS

Observance of the limitations contained in
Section 1 of this appendix is required by law.

G E N E R A L L I M I T A T I O N S

This Configuration Deviation List contains additional certificate limitations for operation of the BOEING Model 767 Airplane with certain secondary airframe and engine parts missing and with certain parts damaged by hail when on the ground as listed herein. The Certificate Limitations in the Airplane Flight Manual are applicable except as amended in this appendix.

The associated limitations must be listed on a placard affixed in the cockpit in clear view of the pilot-in-command and other appropriate crew member(s).

Operation with those missing parts requiring a reduction of VMO/MMO is permitted only when the airplane has the airspeed limit speed hand (or the airspeed tape on the PFD) and the Mach airspeed warning system programmed for the altitude/speed schedule specified for the applicable missing part.

The pilot in command will be notified of each operation with a missing or damaged part(s) by listing the missing or damaged part(s) in the flight or dispatch release.

The operator will list in the aircraft logbook an appropriate notation covering the missing or damaged part(s) on each flight.

If an additional part is lost in flight the airplane may not depart the airport at which it landed following this event until it again complies with the limitation of this appendix. This, of course, does not preclude the issuance of a ferry permit to allow the airplane to be flown to a point where the necessary repairs or replacements can be made.

No more than one part for any one sub-system in this appendix may be missing unless specifically designated combinations are indicated herein. Unless otherwise specified herein, parts from different sub-systems may be missing. The performance penalties are cumulative unless specifically designated penalties for combination of missing parts are indicated. Where performance penalties are listed as negligible, no more than three negligible items may be missing or damaged without taking further penalty. For each missing or damaged item more than three reduce the takeoff, landing, and enroute climb limits 100 pounds.

G E N E R A L L I M I T A T I O N S (Continued)

The takeoff performance decrements in this appendix are to be applied to performance limited takeoff weights which are limited by:

Field length, first segment climb, second segment climb, final segment climb, or obstacles in the takeoff flight path.

The landing performance decrements in this appendix are to be applied to performance limited landing weights, which are limited by:

Landing field length, landing climb, or approach climb.

The enroute performance decrements in this appendix are to be applied to the weight limit determined from enroute, one-engine-inoperative climb performance.

The quick turnaround decrements in this appendix are to be applied to the weight limit determined from maximum quick turnaround performance.

The numbering and designation of system in this appendix is based on ATA Spec. 100. The parts within each system are identified by functional description and, when necessary, by part numbers.

Items are applicable to all 767 engine/airframe combinations unless specifically designated.

SYSTEM 21 – AIR CONDITIONING

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
21-32-	1. CABIN PRESSURE SAFETY RELIEF VALVE FLAPPER DOORS 767-200/300/400ER	4	Any number may be missing. The performance decrement is negligible.
21-53-	1. RAM AIR INLET DOORS a. When missing in combination with Ram Air Exhaust Doors, use penalties in Item 3. 767-200/300 ONLY	2	One may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 500 lb / 227 kg Enroute Climb 900 lb / 409 kg GE CF6-80C2 SERIES Takeoff and Landing 700 lb / 318 kg Enroute Climb 700 lb / 318 kg PRATT & WHITNEY Takeoff and Landing 500 lb / 227 kg Enroute Climb 900 lb / 409 kg ROLLS ROYCE Takeoff and Landing 400 lb / 182 kg Enroute Climb 700 lb / 318 kg NOTE: If inlet door is missing, exhaust door on the same side must be locked open.
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 550 lb / 250 kg Enroute Climb 1100 lb / 499 kg

SYSTEM 21 – AIR CONDITIONING		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	PART DESCRIPTION		2. REMARKS AND/OR EXCEPTIONS
21-53- (Con't.)	2. RAM AIR EXHAUST DOORS a. When missing in combination with Ram Air Inlet Doors, use penalties in Item 3. 767-200/300 ONLY	2	One or both may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 600 lb / 272 kg Enroute Climb 1000 lb / 454 kg GE CF6-80C2 SERIES Takeoff and Landing 900 lb / 409 kg Enroute Climb 800 lb / 363 kg PRATT & WHITNEY Takeoff and Landing 600 lb / 272 kg Enroute Climb 1000 lb / 454 kg ROLLS ROYCE Takeoff and Landing 500 lb / 227 kg Enroute Climb 800 lb / 363 kg

SYSTEM 21 – AIR CONDITIONING

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
21-53- (Con't.)	3. RAM AIR INLET AND EXHAUST DOORS a. Use these penalties when Ram Air Inlet and Exhaust Doors are missing in any combination. 767-200/300 ONLY	4	One Ram Air Inlet Door and two Ram Air Exhaust Doors may be missing in any combination provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 900 lb / 409 kg Enroute Climb 1800 lb / 817 kg GE CF6-80C2 SERIES Takeoff and Landing 1300 lb / 590 kg Enroute Climb 1400 lb / 635 kg PRATT & WHITNEY Takeoff and Landing 900 lb / 409 kg Enroute Climb 1800 lb / 817 kg ROLLS ROYCE Takeoff and Landing 800 lb / 363 kg Enroute Climb 1500 lb / 681 kg NOTE: If inlet door is missing, exhaust door on the same side (if not missing) must be locked open.

SYSTEM 23 - COMMUNICATIONS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
23-61-	1. STATIC DISCHARGERS (TRAILING AND TIP TYPE)		A minimum of fifteen static dischargers is required when operations are dependent upon the use of ADF, HF, VOR, or Marker Beacon capability. Trailing edge or tip type dischargers must be installed in three of the five most outboard positions on each wing, horizontal stabilizer/elevator assembly, and vertical stabilizer/rudder assembly. Static dischargers are not required when operations are not dependent upon use of ADF, HF, VOR, or Marker Beacon capability.
	767-200/300	39	
	767-400ER	45	

SYSTEM 27 – FLIGHT CONTROLS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
27-51-	1. INBOARD TRAILING EDGE FLAP-TO-FUSELAGE SEALS 767-200/300 ONLY	2	One or both may be missing provided the performance limited weights are reduced by: <u>GE CF6-80A/A2</u> Takeoff and Landing 2300 lb / 1043 kg Enroute Climb 600 lb / 272 kg <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 3400 lb / 1543 kg Enroute Climb 500 lb / 227 kg <u>PRATT & WHITNEY</u> Takeoff and Landing 2300 lb / 1043 kg Enroute Climb 600 lb / 272 kg <u>ROLLS ROYCE</u> Takeoff and Landing 2000 lb / 908 kg Enroute Climb 500 lb / 227 kg
	767-400ER ONLY		<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 2200 lb / 998 kg Enroute Climb 550 lb / 250 kg

SYSTEM 27 – FLIGHT CONTROLS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
27-51- (Con't.)	2. INBOARD FLAP TORQUE TUBE SLOT DOORS (Three Segment Door)	6	Any number or combination may be missing provided the performance limited weights are reduced by:
	767-300 ONLY		GE PRATT & WHITNEY Takeoff and Enroute negligible Landing Climb 4700 lb 2132 kg Landing Field Length 7600 lb 3448 kg Quick Turnaround 4100 lb 1860 kg ROLLS ROYCE Takeoff and Enroute negligible Landing Climb 5000 lb 2268 kg Landing Field Length 7900 lb 3583 kg Quick Turnaround 4100 lb 1860 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Enroute negligible Landing Climb 6350 lb 2881 kg Landing Field Length 9200 lb 4174 kg Quick Turnaround 4120 lb 1869 kg
	767-300 / -400ER When missing in combination with Trailing Edge Flap Vortex Generators (Item 57-00-01), use penalties for Trailing Edge Flap Vortex Generators only.		Increase landing approach speed VREF by 2 knots.

SYSTEM 27 – FLIGHT CONTROLS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
27-81-	1. SLAT END PAN SEAL	2	One or both may be missing provided the performance limited weights are reduced by:
	767-200		Takeoff and Landing 250 lb / 114 kg Enroute Climb 400 lb / 182 kg
	767-300/400ER		Takeoff and Landing 200 lb / 91 kg Enroute Climb 350 lb / 159 kg
	2. KRUEGER SEAL BULLNOSE ASSEMBLY	2	One or both may be missing provided the performance limited weights are reduced by:
	767-200		GE CF6-80A/A2, PRATT & WHITNEY Takeoff and Landing 2500 lb / 1134 kg
	767-200		GE CF6-80C2 SERIES Takeoff and Landing 3800 lb / 1724 kg
	767-300		GE CF6-80A/A2, PRATT & WHITNEY Takeoff and Landing 2300 lb / 1044 kg
	767-300		GE CF6-80C2 SERIES, ROLLS ROYCE Takeoff and Landing 2200 lb / 998 kg
	767-400ER		GE CF6-80C2 SERIES Takeoff and Landing 2400 lb / 1089 kg

SYSTEM 27 – FLIGHT CONTROLS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
27-82-	1. KRUEGER SEAL END SEALS	8	Two flat seals or bulb seals may be missing provided the performance limited weights are reduced by:
	767-200		GE CF6-80A/A2, PRATT & WHITNEY Takeoff and Landing 150 lb 69 kg
	767-200		GE CF6-80C2 SERIES Takeoff and Landing 250 lb 114 kg
	767-300/400ER		ALL ENGINES Takeoff and Landing 150 lb 69 kg

SYSTEM 28 – FUEL

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
28-22-	1. OVERRIDE BOOST PUMP ACCESS PANELS 767-200/300/400ER	2	One may be missing. The performance decrement is negligible. NOTE: Wires in the cavity must be protected, inspect wires before reinstalling door. Pull and collar pump CB.
28-44-	1. FUEL QUANTITY MEASURING STICKS 767-200/300/400ER	16	Any number or combination may be missing. The performance decrement is negligible.

SYSTEM 32 – LANDING GEAR

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
32-10-	1. BOGIE BEAM SHIELD 767-200/300/400ER	2	1. One or both may be missing with no penalty. 2. The Bogie Beam Shield should be replaced as soon as possible and the electrical conduits beneath the main landing gear truck should be inspected prior to reinstallation.
32-12-	1. MAIN LANDING GEAR WING DOORS (2 SHOCK STRUT DOORS, 2 TRUNNION DOORS, 2 DRAG STRUT DOORS) 767-200/300 ONLY		1. Any one of six doors may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 600 lb / 272 kg Enroute Climb 1200 lb / 544 kg GE CF6-80C2 SERIES Takeoff and Landing 900 lb / 409 kg Enroute Climb 1000 lb / 454 kg PRATT & WHITNEY Takeoff and Landing 600 lb / 272 kg Enroute Climb 1200 lb / 544 kg ROLLS ROYCE Takeoff and Landing 500 lb / 227 kg Enroute Climb 1000 lb / 454 kg 2. Limit speed to 270 KIAS / 0.73 Mach. NOTE: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position.

SYSTEM 32 – LANDING GEAR

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
32-12-	2. MAIN LANDING GEAR WING DOORS – SHOCK STRUT DOORS 767-400ER ONLY	2	1. One may be missing provided the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 1400 lb / 636 kg Enroute Climb 2750 lb / 1248 kg 2. Limit speed to 270 KIAS / 0.73 Mach. <u>NOTE</u>: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position.
	3. MAIN LANDING GEAR WING DOORS – TRUNNION DOORS 767-400ER ONLY	2	1. One may be missing provided the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 600 lb / 273 kg Enroute Climb 1200 lb / 545 kg 2. Limit speed to 270 KIAS / 0.73 Mach. <u>NOTE</u>: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position.

SYSTEM 32 LANDING GEAR

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
32-71-	1. TAIL SKID FAIRING 767-300 ONLY	1	May be missing provided the performance limited weights are reduced by: GE Takeoff and Landing 200 lb / 91 kg Enroute Climb 300 lb / 136 kg PRATT & WHITNEY Takeoff and Landing 200 lb / 91 kg Enroute Climb 300 lb / 136 kg ROLLS ROYCE Takeoff and Landing 200 lb / 91 kg Enroute Climb 300 lb / 136 kg 767-400ER ONLY GE CF6-80C2 SERIES Takeoff and Landing 350 lb / 159 kg Enroute Climb 700 lb / 318 kg
	2. TAIL SKID LEVER DOOR 767-300/400ER ONLY	1	May be missing. The performance decrement is negligible. Items 1 and 2: Any combination of the authorized numbers of these items may be missing.

SYSTEM 33 – LIGHTS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
33-31-	1. MAIN AND BULK CARGO DOOR LIGHT COVERS 767-200/300/400ER	4	Any number or combination may be missing provided the performance limited weights are reduced by: GE PRATT & WHITNEY Enroute Climb 100 lb / 45 kg ROLLS ROYCE Any number may be missing. The performance decrement is negligible.
33-41-	1. WING ILLUMINATION LIGHT COVERS 767-200/300/400ER	2	One or both may be missing. The performance penalty is negligible.
33-42-	1. NOSE GEAR TAXI LIGHT - Double Configuration - Single Configuration 767-200/300/400ER	 2 1	Any number or combination may be missing with no penalty.
33-44-	1. WING TIP AFT NAVIGATION LIGHT LENS 767-200/300 ONLY	2	One or both may be missing with no penalty.
	2. WING TIP STROBE LIGHT LENS 767-200/300 ONLY	2	One or both may be missing with no penalty.
	3. UPPER AND LOWER BODY ANTI-COLLISION LIGHT LENS 767-200/300/400ER	2	One or both may be missing. The performance decrement is negligible. When the lens is missing, disconnect electrical power and remove the light bulb, reflector, lens cover, and lens cover support. With the rest of the light assembly intact, cover the opening with appropriate materials (speed tape, for example) to prevent moisture or debris from entering the light assembly. NOTE: The minimum number of strobe/anti-collision lights required by the operating rules must be operative. Items 1, 2, and 3: Any combination of the authorized numbers of these items may be missing.

SYSTEM 33 – LIGHTS		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	PART DESCRIPTION		2. REMARKS AND/OR EXCEPTIONS
33-45-	1. LOGO ILLUMINATION LIGHT COVERS	4	Any number or combination may be missing with no penalty.
	767-200/300/400ER		NOTE: Openings created by the missing light covers must be covered with “speed tape” (Permacel II or 3M 425). Pull and collar logo light CB. Inspect condition of “speed tape” every other flight.
33-51-	1. EXTERNAL EMERGENCY ESCAPE LIGHT COVERS (OVERWING AND GROUND ILLUMINATION)		
	767-200/300 ONLY	8 or 14	Any number or combination may be missing. The performance decrement is negligible.
	767-400ER ONLY	8	Any number or combination may be missing. The performance decrement is negligible.

SYSTEM 52 – DOORS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
52-36-	1. BULK CARGO DOOR HANDLE 767-200/300/400ER	1	May be missing. The performance decrement is negligible.
52-49-	1. ELECTRICAL/ELECTRONICS EXTERNAL POWER DOOR 767-200/300/400ER	1	May be missing. The performance decrement is negligible.
	2. POTABLE WATER SERVICE DOORS – STANDARD CONFIGURATION 767-200/300 ONLY	2	GE PRATT & WHITNEY One or both may be missing provided the performance limited weights are reduced by: Enroute Climb 100 lb / 45 kg ROLLS ROYCE One or both may be missing. The performance decrement is negligible. Note: For 767-200/300 line numbers 901 and on: the potable water system will be inoperative if the aft potable water service panel door is missing. Refer to MMEL Item 38-10-01B.
	767-400ER ONLY		GE CF6-80C2 SERIES One or both may be missing. The performance decrement is negligible. Note: The potable water system will be inoperative if the aft or forward potable water service panel door is missing. Refer to MMEL Item 38-10-01B.
	3. POTABLE WATER SERVICE DOORS – ALTERNATE CONFIGURATION 767-200/300 ONLY	3	GE PRATT & WHITNEY Any number may be missing provided the performance limited weights are reduced by: Enroute Climb 100 lb / 45 kg

SYSTEM 52 – DOORS		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	PART DESCRIPTION		2. REMARKS AND/OR EXCEPTIONS
52-49- (Cont.)	4. OUTBOARD WING LEADING EDGE PRESSURE FUELING DOOR 767-200/300 ONLY	1 installed	May be missing provided the performance limited weights are reduced by: <u>GE, PRATT & WHITNEY JT9D SERIES, ROLLS-ROYCE</u> Takeoff and Landing negligible Enroute Climb 100 lb 45 kg <u>PRATT & WHITNEY 4000 SERIES</u> Takeoff and Landing negligible Enroute Climb 200 lb 91 kg See <u>NOTE</u> below.
		2 installed	If only one is missing use the performance decrement shown above. Both may be missing provided the performance limited weights are reduced by: <u>GE, PRATT & WHITNEY</u> Takeoff and Landing 200 lb 91 kg Enroute Climb 300 lb 136 kg <u>ROLLS ROYCE</u> Takeoff and Landing negligible Enroute Climb 200 lb 91 kg
	767-400ER ONLY	1 installed	May be missing provided the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing negligible Enroute Climb 150 lb 68 kg <u>NOTE</u>: For both one or two doors installed, the Power Control Limit (or Battery Power) Switch must be locked in the “NORM” position, the Fueling Valve Switches in the “OFF” position, and the Defueling Valve Switches in the “CLOSE” position. Required placard information must be reproduced within the fueling bay.

SYSTEM 52 – DOORS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
52-49- (Cont.)	5. MAIN CARGO LOADING CONTROL DOORS 767-200/300/400ER	2	One or both may be missing. The performance decrement is negligible. <u>Items 1, 2, 3, 4 and 5</u>: Any combination of the authorized numbers of these items may be missing.
52-49-	6. AFT TOILET SERVICE DOOR 767-200/300/400ER	1	May be missing. The performance decrement is negligible.

SYSTEM 53 – FUSELAGE

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
53-16-	1. NOSE LANDING GEAR HINGE COVER DOORS 767-200/300/400ER	8	Any number or combination may be missing. The performance decrement is negligible.
53-30-	1. WING ROOT JACKING POINT ACCESS PANELS 767-200/300 ONLY	2	One or both may be missing provided the performance limited weights are reduced by: <u>All Engine Types</u> Takeoff and Landing negligible Enroute Climb 100 lb / 45 kg
	767-400ER ONLY		One or both may be missing provided the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing negligible Enroute Climb 150 lb / 68 kg
53-65-	1. MAIN CARGO DOORS CONTROL SWITCH PANELS 767-200/300/400ER	2	One or both may be missing. The performance decrement is negligible.
53-85-	1. APU LOUVERED PRESSURE RELIEF DOOR 767-200/300/400ER	1	May be missing. The performance decrement is negligible.

SYSTEM 54 – NACELLE/PYLON

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
54-52-	1. AFT FAIRING PRIMARY NOZZLE-TO-STRUT SEALS	4 (2 per strut)	Any number or combination may be missing provided the performance limited weights are reduced by:
	767-200/300 ONLY		GE Takeoff and Landing 600 lb / 272 kg Enroute Climb 1400 lb / 635 kg PRATT & WHITNEY JT9D SERIES Takeoff and Landing 700 lb / 318 kg Enroute Climb 1500 lb / 681 kg PRATT & WHITNEY 4000 SERIES Takeoff and Landing negligible Enroute Climb 300 lb / 136 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 400 lb / 182 kg Enroute Climb 650 lb / 295 kg

SYSTEM 54 – NACELLE/PYLON

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
54-53-	1. NACELLE STRUT PRESSURE RELIEF DOORS 767-200/300 ONLY	4 (2 per strut)	GE PRATT & WHITNEY A maximum of two may be missing (one per strut). The performance decrement is negligible. ROLLS ROYCE A maximum of two may be missing (one per strut) provided the performance limited weights are reduced by: Takeoff and Landing 2000 lb / 908 kg Enroute Climb 4000 lb / 1815 kg
	767-400ER ONLY		GE CF6-80C2 SERIES A maximum of two may be missing (one per strut). The performance decrement is negligible. NOTE: When Items 1 and 2 are missing in combination, use only one penalty.

SYSTEM 54 – NACELLE/PYLON

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
54-53- (Cont.)	2. NACELLE STRUT ACCESS DOORS	4 (2 per strut)	GE Any number or combination may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 400 lb / 181 kg Enroute Climb 1000 lb / 454 kg GE CF6-80C2 SERIES Takeoff and Landing 700 lb / 318 kg Enroute Climb 700 lb / 318 kg
	767-200/300 ONLY	8 (4 per strut)	PRATT & WHITNEY Any number or combination may be missing provided the performance limited weights are reduced by: Takeoff and Landing 600 lb / 272 kg Enroute Climb 1400 lb / 635 kg
		10 (5 per strut)	ROLLS ROYCE A maximum of four may be missing (two per strut) provided the performance limited weights are reduced by: Takeoff and Landing 2000 lb / 908 kg Enroute Climb 4000 lb / 1815 kg
	767-400ER ONLY	4 (2 per strut)	GE CF6-80C2 SERIES Any number or combination may be missing provided the performance limited weights are reduced by: Takeoff and Landing 400 lb / 181 kg Enroute Climb 800 lb / 363 kg
			NOTE: When Items 1 and 2 are missing in combination, use only one penalty. Items 1 and 2: For all engine types, any combination of the authorized numbers of these items may be missing.

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-10-	1. HORIZONTAL STABILIZER – AUXILIARY BOX	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 440 lb / 200 kg Enroute Climb 970 lb / 440 kg
			GE CF6-80C2 SERIES Takeoff and Landing 670 lb / 304 kg Enroute Climb 750 lb / 341 kg
			PRATT & WHITNEY Takeoff and Landing 430 lb / 196 kg Enroute Climb 900 lb / 409 kg
			ROLLS ROYCE Takeoff and Landing 390 lb / 177 kg Enroute Climb 800 lb / 363 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 430 lb / 196 kg Enroute Climb 840 lb / 381 kg

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-10- (Cont.)	2. HORIZONTAL STABILIZER – FIXED TRAILING EDGE	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged trailing edge the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 500 lb / 227 kg Enroute Climb 1090 lb / 495 kg
			GE CF6-80C2 SERIES Takeoff and Landing 750 lb / 341 kg Enroute Climb 850 lb / 386 kg
			PRATT & WHITNEY Takeoff and Landing 480 lb / 218 kg Enroute Climb 1010 lb / 459 kg
			ROLLS ROYCE Takeoff and Landing 440 lb / 200 kg Enroute Climb 900 lb / 409 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 480 lb / 218 kg Enroute Climb 950 lb / 431 kg

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-16-	1. HORIZONTAL STABILIZER-TO-ELEVATOR SEALS	34	A maximum of 320 inches (80 inches per surface) may be missing provided the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 600 lb / 272 kg Enroute Climb 1000 lb / 454 kg GE CF6-80C2 SERIES Takeoff and Landing 900 lb / 409 kg Enroute Climb 800 lb / 363 kg PRATT & WHITNEY Takeoff and Landing 600 lb / 272 kg Enroute Climb 1000 lb / 454 kg ROLLS ROYCE Takeoff and Landing 500 lb / 227 kg Enroute Climb 900 lb / 409 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 550 lb / 250 kg Enroute Climb 900 lb / 409 kg

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-20-	1. INBOARD ELEVATORS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged elevator the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 430 lb / 196 kg Enroute Climb 950 lb / 431 kg GE CF6-80C2 SERIES Takeoff and Landing 650 lb / 295 kg Enroute Climb 740 lb / 336 kg PRATT & WHITNEY Takeoff and Landing 420 lb / 191 kg Enroute Climb 880 lb / 400 kg ROLLS ROYCE Takeoff and Landing 380 lb / 173 kg Enroute Climb 780 lb / 354 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 420 lb / 191 kg Enroute Climb 820 lb / 372 kg
	767-200/300/400ER		NOTE: If either of the inboard elevators are damaged, the forward Center of Gravity (C.G.) Limit must be shifted aft by 3.0% MAC (except for dispatch with Alternate Forward C.G.).

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-20- (Cont.)	2. OUTBOARD ELEVATORS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged elevator the performance limited weights are reduced by:
	767-200/300 ONLY		<u>GE CF6-80A/A2</u> Takeoff and Landing 640 lb / 291 kg Enroute Climb 1410 lb / 640 kg <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 970 lb / 440 kg Enroute Climb 1090 lb / 495 kg <u>PRATT & WHITNEY</u> Takeoff and Landing 620 lb / 282 kg Enroute Climb 1310 lb / 595 kg <u>ROLLS ROYCE</u> Takeoff and Landing 570 lb / 259 kg Enroute Climb 1160 lb / 527 kg
	767-400ER ONLY		<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 620 lb / 282 kg Enroute Climb 1220 lb / 554 kg
	767-200/300/400ER		<u>NOTE</u>: If either of the outboard elevators are damaged, the forward Center of Gravity (C.G.) Limit must be shifted aft by 3.0% MAC (except for dispatch with Alternate Forward C.G.).

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-30-	1. VERTICAL STABILIZER – AUXILIARY BOX 767-200/300 ONLY 767-400ER ONLY	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 470 lb / 214 kg Enroute Climb 1040 lb / 472 kg GE CF6-80C2 SERIES Takeoff and Landing 710 lb / 323 kg Enroute Climb 800 lb / 363 kg PRATT & WHITNEY Takeoff and Landing 460 lb / 209 kg Enroute Climb 960 lb / 436 kg ROLLS ROYCE Takeoff and Landing 420 lb / 191 kg Enroute Climb 850 lb / 386 kg GE CF6-80C2 SERIES Takeoff and Landing 460 lb / 209 kg Enroute Climb 900 lb / 409 kg

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-30- (Cont.)	2. VERTICAL STABILIZER – FIXED TRAILING EDGE 767-200/300 ONLY 767-400ER ONLY	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged trailing edge the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 770 lb / 350 kg Enroute Climb 1690 lb / 767 kg GE CF6-80C2 SERIES Takeoff and Landing 1160 lb / 527 kg Enroute Climb 1310 lb / 595 kg PRATT & WHITNEY Takeoff and Landing 740 lb / 336 kg Enroute Climb 1570 lb / 713 kg ROLLS ROYCE Takeoff and Landing 680 lb / 309 kg Enroute Climb 1380 lb / 626 kg GE CF6-80C2 SERIES Takeoff and Landing 740 lb / 336 kg Enroute Climb 1460 lb / 663 kg

SYSTEM 55 – STABILIZER

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
55-31-	1. VERTICAL STABILIZER-TO-FUSELAGE SEALS 767-200/300/400ER	8	Any number or combination may be missing. The performance decrement is negligible.
55-40-	1. RUDDER 767-200/300 ONLY	1	May not be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing — negligible Enroute Climb — 150 lb / 69 kg GE CF6-80C2 SERIES Takeoff and Landing — 100 lb / 46 kg Enroute Climb — 120 lb / 55 kg PRATT & WHITNEY Takeoff and Landing — negligible Enroute Climb — 140 lb / 64 kg ROLLS ROYCE Takeoff and Landing — negligible Enroute Climb — 120 lb / 55 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing — negligible Enroute Climb — 130 lb / 59 kg

SYSTEM 56 – WINDOWS		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	PART DESCRIPTION		2. REMARKS AND/OR EXCEPTIONS
56-11-	1. WINDSHIELD AERODYNAMIC SEALANT (#1 and #3 WINDOWS) 767-200/300/400ER	1 per window	May be missing. The performance decrement is negligible.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-00-	1. VORTEX GENERATORS WINGS	14	A total of two may be missing, but not more than one per group. Operations must be limited to a maximum altitude of 18,000 feet. The performance penalty is negligible.
	767-200/300/400ER		
	TRAILING EDGE FLAP	50	A total of four (two from each flap) may be missing provided the performance limited weights are reduced by:
	767-300 ONLY		GE PRATT & WHITNEY Landing Climb 4700 lb 2132 kg Landing Field Length 7600 lb 3448 kg Quick Turnaround 4100 lb 1860 kg ROLLS ROYCE Landing Climb 5000 lb 2268 kg Landing Field Length 7900 lb 3583 kg Quick Turnaround 4100 lb 1860 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Landing Climb 6350 lb 2881 kg Landing Field Length 9200 lb 4173 kg Quick Turnaround 4120 lb 1869 kg Increase landing approach speed VREF by 2 knots.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-20-	1. INSPAR UPPER WING PANEL	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by:
	767-200/300 ONLY		<u>GE CF6-80A/A2</u> Takeoff and Landing 290 lb / 132 kg Enroute Climb 640 lb / 291 kg
			<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 440 lb / 200 kg Enroute Climb 500 lb / 227 kg
			<u>PRATT & WHITNEY</u> Takeoff and Landing 280 lb / 127 kg Enroute Climb 600 lb / 273 kg
			<u>ROLLS ROYCE</u> Takeoff and Landing 260 lb / 118 kg Enroute Climb 530 lb / 241 kg
	767-400ER ONLY		<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 330 lb / 150 kg Enroute Climb 650 lb / 295 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-31-	1. RAKED WING TIPS 767-400ER ONLY	2	Both must be removed. The performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 35,600 lb / 16,148 kg Enroute 38,600 lb / 17,509 kg Quick Turnaround 6,800 lb / 3,085 kg See Flight Manual D631T001, Appendix 2, Operation with Raked Wingtips Removed, for structural weight limitations, takeoff speed adjustments, reference speed adjustments, and initial buffet boundary. Use of autoland is not permitted.
		2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged wing tip the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 270 lb / 123 kg Enroute Climb 530 lb / 241 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-41-	1. WING LEADING EDGE SLAT LINKAGE FAIRING PANELS	24	A maximum of six (three per side) in any combination may be missing provided none of the Leading Edge Slat Mechanism Lubrication Access Doors (ATA Sub-System 57-41, Item 4) are missing and the performance limited weights are reduced by: 767-200/300 ONLY Enroute Climb 2800 lb 1270 kg 767-400ER ONLY Enroute Climb 2900 lb 1316 kg NOTE: Avoid icing conditions if any inboard slat linkage fairings are missing from either inboard slat.
	2. WING THERMAL ANTI-ICING DUCT SEAL – DOOR ASSEMBLY 767-200/300/400ER	2	One or both may be missing. The performance decrement is negligible.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-41 (Cont.)	3. FIXED LEADING EDGE SEALS 767-200/300 ONLY	50	All inboard Sliding Seals (four per side) and one Curtain Seal per outboard slat (five per side) may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Landing Climb 2200 lb 998 kg GE CF6-80C2 SERIES Landing Climb 2700 lb 1225 kg PRATT & WHITNEY JT9D SERIES Landing Climb 2200 lb 998 kg PRATT & WHITNEY 4000 SERIES Landing Climb 2600 lb 1180 kg ROLLS ROYCE Landing Climb 2700 lb 1225 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Landing Climb 3550 lb 1611 kg NOTE: Curtain seal configuration must be symmetrical. Sliding seal configuration may be asymmetrical. Items 1, 2, and 3: Any combination of the authorized numbers of these items may be missing.
	4. LEADING EDGE SLAT MECHANISM LUBRICATION ACCESS DOORS 767-200/300/400ER	40 (20 per side)	A maximum of four total per airplane in any combination may be missing provided none of the Wing Leading Edge Slat Linkage Fairing Panels (ATA Sub-System 57-41, item 1) are missing and the performance limited weights are reduced by: Enroute Climb 950 lb 431 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-41- (Cont.)	5. INBOARD WING FIXED LEADING EDGE	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by:
	767-200/300 ONLY		<u>GE CF6-80A/A2</u> Takeoff and Landing 740 lb / 336 kg Enroute Climb 1620 lb / 735 kg
			<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 1110 lb / 504 kg Enroute Climb 1250 lb / 567 kg
			<u>PRATT & WHITNEY</u> Takeoff and Landing 710 lb / 323 kg Enroute Climb 1500 lb / 681 kg
			<u>ROLLS ROYCE</u> Takeoff and Landing 650 lb / 295 kg Enroute Climb 1330 lb / 604 kg
	767-400ER ONLY		<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 710 lb / 323 kg Enroute Climb 1400 lb / 636 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-41- (Cont.)	6. OUTBOARD WING FIXED LEADING EDGE	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by: 767-200/300 ONLY GE CF6-80A/A2 Takeoff and Landing 380 lb / 173 kg Enroute Climb 840 lb / 382 kg GE CF6-80C2 SERIES Takeoff and Landing 580 lb / 264 kg Enroute Climb 650 lb / 295 kg PRATT & WHITNEY Takeoff and Landing 370 lb / 168 kg Enroute Climb 780 lb / 354 kg ROLLS ROYCE Takeoff and Landing 340 lb / 155 kg Enroute Climb 690 lb / 313 kg 767-400ER ONLY GE CF6-80C2 SERIES Takeoff and Landing 370 lb / 168 kg Enroute Climb 730 lb / 332 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-43-	1. WING LEADING EDGE SLAT WEDGE	12	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged slat wedge the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 190 lb / 87 kg Enroute Climb 420 lb / 191 kg GE CF6-80C2 SERIES Takeoff and Landing 290 lb / 132 kg Enroute Climb 330 lb / 150 kg PRATT & WHITNEY Takeoff and Landing 190 lb / 87 kg Enroute Climb 390 lb / 177 kg ROLLS ROYCE Takeoff and Landing 170 lb / 78 kg Enroute Climb 350 lb / 159 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 190 lb / 87 kg Enroute Climb 370 lb / 168 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-51-	1. MAIN LANDING GEAR TRUNNION SUPPORT FAIRINGS 767-200/300 ONLY NOTE: For 767-400ER, see Items 5 and 6.	2	1. One may be missing provided the performance limited weights are reduced by: GE CF6-80A/A2 Takeoff and Landing 300 lb / 136 kg Enroute Climb 600 lb / 272 kg GE CF6-80C2 SERIES Takeoff and Landing 500 lb / 227 kg Enroute Climb 500 lb / 227 kg PRATT & WHITNEY Takeoff and Landing 300 lb / 136 kg Enroute Climb 600 lb / 272 kg ROLLS ROYCE Takeoff and Landing 300 lb / 136 kg Enroute Climb 500 lb / 227 kg 2. Limit speed to 270 KIAS / 0.73 Mach. NOTE: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-51- (Cont.)	2. TRAILING EDGE FLAP HINGE FAIRINGS	6	Each fairing is comprised of three sections. All or part of one fairing may be missing with the following provisions: 1. If the forward section is removed, the mid and aft sections must be removed also. 2. If the mid section is removed, the aft section must be removed. The forward section may remain installed. 3. The aft section may be removed without removing the forward or mid sections. 4. The performance limited weights are reduced by: 767-200/300 ONLY GE CF6-80A/A2 Takeoff and Landing 1700 lb / 772 kg Enroute Climb 3800 lb / 1724 kg GE CF6-80C2 SERIES Takeoff and Landing 2600 lb / 1180 kg Enroute Climb 2900 lb / 1315 kg PRATT & WHITNEY Takeoff and Landing 1700 lb / 772 kg Enroute Climb 3800 lb / 1724 kg ROLLS ROYCE Takeoff and Landing 1500 lb / 681 kg Enroute Climb 3100 lb / 1406 kg 767-400ER ONLY GE CF6-80C2 SERIES Takeoff and Landing 1650 lb / 749 kg Enroute Climb 3250 lb / 1475 kg Items 1 and 2: Any combination of the authorized numbers of these items may be missing.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-51- (Cont.)	3. INBOARD TRAILING EDGE FIXED PANEL	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by: 767-200/300 ONLY GE CF6-80A/A2 Takeoff and Landing 2400 lb / 1089 kg Enroute Climb 5270 lb / 2391 kg GE CF6-80C2 SERIES Takeoff and Landing 3620 lb / 1642 kg Enroute Climb 4080 lb / 1851 kg PRATT & WHITNEY Takeoff and Landing 2300 lb / 1044 kg Enroute Climb 4890 lb / 2219 kg ROLLS ROYCE Takeoff and Landing 2110 lb / 958 kg Enroute Climb 4320 lb / 1960 kg 767-400ER ONLY GE CF6-80C2 SERIES Takeoff and Landing 2300 lb / 1044 kg Enroute Climb 4560 lb / 2069 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-51- (Cont.)	4. OUTBOARD TRAILING EDGE FIXED PANEL	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged panel the performance limited weights are reduced by: 767-200/300 ONLY GE CF6-80A/A2 Takeoff and Landing 2290 lb / 1039 kg Enroute Climb 5030 lb / 2282 kg GE CF6-80C2 SERIES Takeoff and Landing 3460 lb / 1570 kg Enroute Climb 3890 lb / 1765 kg PRATT & WHITNEY Takeoff and Landing 2200 lb / 998 kg Enroute Climb 4670 lb / 2119 kg ROLLS ROYCE Takeoff and Landing 2020 lb / 917 kg Enroute Climb 4120 lb / 1869 kg 767-400ER ONLY GE CF6-80C2 SERIES Takeoff and Landing 2200 lb / 998 kg Enroute Climb 4350 lb / 1974 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-51- (Cont.)	5. MAIN LANDING GEAR FORWARD TRUNNION FAIRINGS (ON WING FIXED TRAILING EDGE) 767-400ER ONLY	2	1. One may be missing provided the corresponding Aft Trunnion Fairing is also removed. The performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 2300 lb / 1044 kg Enroute Climb 4500 lb / 2042 kg 2. Limit speed to 270 KIAS / 0.73 Mach. <u>NOTE</u>: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position. NOTE: The above performance decrements are for one set of Forward and Aft Trunnion Fairings removed.
	6. MAIN LANDING GEAR AFT TRUNNION FAIRINGS (ON WING FIXED TRAILING EDGE) 767-400ER ONLY	2	1. One may be missing provided the performance limited weights are reduced by: <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 400 lb / 182 kg Enroute Climb 750 lb / 342 kg 2. Limit speed to 270 KIAS / 0.73 Mach. <u>NOTE</u>: Place the ALTERNATE V_{mo} / M_{mo} Switch (if installed) in the alternate position.
	7. MAIN LANDING GEAR SIDE BRACE TRUNNION AFT FAIRINGS 767-200/300 ONLY	2	Both may be missing. The performance penalty is negligible.

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-53-	1. INBOARD TRAILING EDGE FLAPS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged flap the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 590 lb / 268 kg Enroute Climb 1300 lb / 590 kg GE CF6-80C2 SERIES Takeoff and Landing 900 lb / 409 kg Enroute Climb 1010 lb / 459 kg PRATT & WHITNEY Takeoff and Landing 570 lb / 259 kg Enroute Climb 1210 lb / 549 kg ROLLS ROYCE Takeoff and Landing 520 lb / 236 kg Enroute Climb 1070 lb / 486 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 570 lb / 259 kg Enroute Climb 1130 lb / 513 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-53- (Cont.)	2. OUTBOARD TRAILING EDGE FLAPS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged flap the performance limited weights are reduced by:
	767-200/300 ONLY		<u>GE CF6-80A/A2</u> Takeoff and Landing 1190 lb / 540 kg Enroute Climb 2620 lb / 1189 kg <u>GE CF6-80C2 SERIES</u> Takeoff and Landing 1800 lb / 817 kg Enroute Climb 2030 lb / 921 kg <u>PRATT & WHITNEY</u> Takeoff and Landing 1150 lb / 522 kg Enroute Climb 2430 lb / 1103 kg <u>ROLLS ROYCE</u> Takeoff and Landing 1050 lb / 477 kg Enroute Climb 2150 lb / 976 kg
	767-400ER ONLY		<u>GE CF6-80C2 SERIES</u> Takeoff and Landing 1150 lb / 522 kg Enroute Climb 2270 lb / 1030 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-60-	1. INBOARD AILERONS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged aileron the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 400 lb / 182 kg Enroute Climb 880 lb / 400 kg GE CF6-80C2 SERIES Takeoff and Landing 610 lb / 277 kg Enroute Climb 680 lb / 309 kg PRATT & WHITNEY Takeoff and Landing 390 lb / 177 kg Enroute Climb 820 lb / 372 kg ROLLS ROYCE Takeoff and Landing 360 lb / 164 kg Enroute Climb 720 lb / 327 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 390 lb / 177 kg Enroute Climb 760 lb / 345 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-60- (Cont.)	2. OUTBOARD AILERONS	2	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged aileron the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 530 lb / 241 kg Enroute Climb 1170 lb / 531 kg GE CF6-80C2 SERIES Takeoff and Landing 810 lb / 368 kg Enroute Climb 910 lb / 413 kg PRATT & WHITNEY Takeoff and Landing 510 lb / 232 kg Enroute Climb 1090 lb / 495 kg ROLLS ROYCE Takeoff and Landing 470 lb / 214 kg Enroute Climb 960 lb / 436 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 510 lb / 232 kg Enroute Climb 1010 lb / 459 kg

SYSTEM 57 – WINGS

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
57-70-	1. SPOILER PANELS	12	None may be missing. May have damage due to on-ground hail. If a performance restriction is required due to on-ground hail damage, as assessed in the Structural Repair Manual 51-10-04, for each damaged spoiler panel the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 240 lb / 109 kg Enroute Climb 530 lb / 241 kg
			GE CF6-80C2 SERIES Takeoff and Landing 370 lb / 168 kg Enroute Climb 410 lb / 186 kg
			PRATT & WHITNEY Takeoff and Landing 240 lb / 109 kg Enroute Climb 490 lb / 223 kg
			ROLLS ROYCE Takeoff and Landing 220 lb / 100 kg Enroute Climb 440 lb / 200 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 240 lb / 109 kg Enroute Climb 460 lb / 209 kg

SYSTEM 71 – PROPULSION		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	PART DESCRIPTION		2. REMARKS AND/OR EXCEPTIONS
71-11-	1. FAN COWL PRESSURE RELIEF ACCESS DOORS 767-200/300/400ER	2 (1 per nacelle)	GE PRATT & WHITNEY One or both may be missing provided the Fan Cowl Oil Tank Access Door (ATA Sub-System 71-11, Item 2) on the same nacelle is not missing. The performance decrement is negligible.
	2. FAN COWL OIL TANK ACCESS DOORS 767-200/300/400ER	2 (1 per nacelle)	GE CF6-80C2 SERIES One or both may be missing provided the Fan Cowl Oil Pressure Relief Door (ATA Sub-System 71-11, Item 1) on the same nacelle is not missing and the performance limited weights are reduced by: Enroute Climb 200 lb 91 kg

SYSTEM 72 – ENGINE		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
ATA SUB-SYSTEM	PART DESCRIPTION		
72-33-	1. FAN CASE EXIT LINER SEGMENTS 767-200/300 ONLY	18 (9 per engine)	A maximum of two (one per engine) may be missing provided the top segment on each cowl half remains in place and the performance limited weights are reduced by: <u>PRATT & WHITNEY JT9D SERIES</u> Takeoff and Landing 4400 lb 1996 kg Enroute Climb 4400 lb 1996 kg

SYSTEM 78 – EXHAUST

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
78-31-	1. THRUST REVERSER SLEEVE ACTUATOR ACCESS PANELS	12 (6 per nacelle)	A maximum of eight (four per nacelle) in any combination may be missing provided the performance limited weights are reduced by:
	767-200/300 ONLY		PRATT & WHITNEY Takeoff and Landing negligible Enroute Climb 200 lb / 91 kg
	767-200/300/400ER		GE Takeoff and Landing negligible Enroute Climb negligible
	2. THRUST REVERSER TRACK FAIRINGS	8 (4 per engine)	Any number or combination may be missing provided the performance limited weights are reduced by:
	767-200/300 ONLY		GE CF6-80A/A2 Takeoff and Landing 300 lb / 136 kg Enroute Climb 600 lb / 272 kg
			GE CF6-80C2 SERIES Takeoff and Landing 400 lb / 181 kg Enroute Climb 600 lb / 272 kg
			PRATT & WHITNEY Takeoff and Landing 300 lb / 136 kg Enroute Climb 600 lb / 272 kg
	767-400ER ONLY		GE CF6-80C2 SERIES Takeoff and Landing 500 lb / 227 kg Enroute Climb 750 lb / 341 kg

SYSTEM 78 – EXHAUST

ATA SUB-SYSTEM	PART DESCRIPTION	1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	2. REMARKS AND/OR EXCEPTIONS
78-31- (Cont.)	3. FAN THRUST REVERSER BLOCKER DOORS 767-200/300 ONLY NOTE: Drag links must be removed for all engine types.	24 (6 per cowl half)	GE CF6-80A/A2 A maximum of four (one per cowl half) may be missing provided the performance limited weights are reduced by Takeoff and Landing 1400 lb / 635 kg Enroute Climb 1300 lb / 590 kg GE CF6-80C2 SERIES One may be missing from each reverser half of one engine, provided the thrust reverser is deactivated and the performance limited weights are reduced by: Takeoff and Landing 800 lb / 363 kg Enroute Climb 1600 lb / 726 kg PRATT & WHITNEY A maximum of four (one per cowl half) may be missing provided the performance limited weights are reduced by: PRATT & WHITNEY JT9D SERIES Takeoff and Landing 2100 lb / 953 kg Enroute Climb 2000 lb / 908 kg PRATT & WHITNEY 4000 SERIES Takeoff and Landing 2400 lb / 1089 kg Enroute Climb 2300 lb / 1043 kg ROLLS-ROYCE Only two blocker doors per engine may be missing. Only one engine may have any missing blocker doors provided the thrust reverser is deactivated and the performance limited weights are reduced by: Takeoff and Landing 1600 lb / 726 kg Enroute Climb 1900 lb / 862 kg

(Continued on next page)

SYSTEM 78 – EXHAUST		1. NUMBER OF PARTS REQUIRED FOR ALL FLIGHT CONDITIONS EXCEPT AS PROVIDED IN COLUMN 2.	
ATA SUB-SYSTEM	**PART DESCRIPTION**		**2. REMARKS AND/OR EXCEPTIONS**
78-31- (Cont.)	3. FAN THRUST REVERSER BLOCKER DOORS (Continued) 767-400ER ONLY	24 (6 per cowl half)	<u>GE CF6-80C2 SERIES</u> One may be missing from each reverser half of one engine, provided the thrust reverser is deactivated and the performance limited weights are reduced by: Takeoff and Landing 950 lb / 431 kg Enroute Climb 850 lb / 386 kg <u>NOTE</u>: Drag links must be removed.
78-31	4. THRUST REVERSER CASCADE VANE SEGMENTS 767-200/300 ONLY	36 (18 per engine)	<u>GE CF6-80A/A2</u> <u>PRATT & WHITNEY</u> A maximum of three per reverser side (six per engine) may be missing with no penalty, provided: a) Segments are missing only from one engine only and thrust reverser is deactivated. b) No two adjacent segments are missing. c) Top and bottom segments remain in place. <u>Items 1, 2, 3 and 4</u>: Any combination of the authorized numbers of these items may be missing.