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ACSS T2CAS TAWS with Internal GPS

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Electronic Cable Specialists
Franklin, WI 53132

Airplane Flight Manual Supplement
for Boeing B757 Series Aircraft
Equipped with T^2CAS

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

For

Boeing 757 Series Aircraft

With

ACSS T^2CAS TAWS with Internal GPS Position Source, Terrain Display on EFIS

Registration No. _____

Serial No. _____

This supplement must be attached to the FAA approved Aircraft Flight Manual when an ACSS Terrain and Traffic Collision Avoidance System is installed in accordance with FAA STC ST01885CH.

The information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: Charles L. Smalley

Charles L. Smalley,
Manager, Systems and Flight Test Branch
Chicago Aircraft Certification Office
Federal Aviation Administration

Electronic Cable Specialists
Franklin, WI 53132

Airplane Flight Manual Supplement
for Boeing B757 Series Aircraft
Equipped with T²CAS

LOG OF REVISIONS

Revision	Date	Page	Description	Approval
N/C		1 – 25	New Release	C Smalley

SECTION 1 - GENERAL

This Flight Manual Supplement is intended for use with Aviation Communication and Surveillance Systems (ACSS) Terrain and Traffic Collision Avoidance System (T²CAS) Computer P/N 9000000-20002 or later FAA approved minor software revision.

The T²CAS update adds TAWS capability to a previously approved TCAS installation, which was approved under STC SA4839NM. The T²CAS computer combines the functions of TCAS (with change 7) and Terrain Awareness Warning System (TAWS) into one LRU. Refer to the appropriate flight manual supplement under SA4839NM for TCAS limitations and operating procedures and flight manual supplement document number TCAS-APPS-0294, Rev A (or Later FAA approved revision level), for TCAS change 7.0 limitations and operating procedures.

Information in this Fight Manual Supplement applies to the TAWS functions of T²CAS.

A. FUNCTIONAL OVERVIEW

The T²CAS extends and replaces the functionality of the existing GPWS and TCAS systems.

The T²CAS system operates by accepting a variety of aircraft parameters as inputs, applying alerting algorithms, and providing the flight crew with aural alert messages and visual annunciations and displays in the event that the boundaries of any alerting envelope are exceeded.

The T²CAS Computer installation utilizes an internal Global Positioning System as a source for TAWS aircraft position.

The system comprises the following groups of components:

- Aircraft sensors and other systems providing input signals
- The Terrain and Traffic Collision Avoidance System Computer (T²CAS)
- Flight deck audio speakers
- Alert annunciators
- Mode and selector switches
- Terrain display (on EFIS EHSI)

B. CIRCUIT BREAKERS

The T²CAS is protected by the following circuit breakers.

Label	Function	Rating	Bus
T²CAS COMPUTER	T²CAS Computer main power	5 amp	115 VAC BUS – LEFT
TERR DISPL	GPWS and T²CAS display lights and WXR/TERR select relay power	2.5 amp	28 VDC BUS – LEFT
WIND SHR COMP	Main power for windshear warning system.	2.5 amp	115 VAC BUS – LEFT

SECTION 2 - LIMITATIONS

1. Navigation must not be predicated upon the use of the T²CAS TAWS Terrain Display.

   Note: The Terrain Display is intended to serve as a situational awareness tool only. It may not provide the accuracy and/or fidelity on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

2. Pilots are authorized to deviate from their current air traffic control (ATC) clearance to the extent necessary to comply with a T²CAS TAWS warning.

3. In order to avoid giving unwanted alerts, the Collision Prediction and Alerting (CPA) must be OVERRIDDEN by selecting TERR OVRD prior to takeoff or within 15 nm of approach, or landing, at an airport not contained in the T²CAS TAWS Airport Database.

4. Terrain and Traffic Collision Avoidance System Pilot's Guide, ACSS document number 8000264-001, dated Feb 06/2003, or later, or the equivalent airline information must be available to the pilots. In the event of any discrepancies between the Pilot's Guide and this supplement, this supplement takes precedence.

5. When operating below Minimum Descent Altitude (MDA) in Visual Meteorology Condition (VMC), in close proximity to terrain, select TERR OVRD to avoid nuisance alerts.

6. If the internal GPS navigation position source has failed or is unreliable, the CPA functions of the T²CAS TAWS must be deactivated by selecting TERR OVRD.

7. The current local altimeter setting must be entered in the pilots' altimeters for proper terrain alerting. For operations in extreme cold temperature conditions, consult COLD TEMPERATURE OPERATIONS in the Normal Procedures section.

SECTION 3 - EMERGENCY/ABNORMAL PROCEDURES

A. EMERGENCY PROCEDURES

1. For ditching, or other off-airport landings, the Collision Prediction and Alerting (CPA) functions should be inhibited by selecting TERR OVRD.

2. For ditching, or other off-airport landings, the GND PROX FLAP OVRD and GND PROX GEAR OVRD switches on the lower right center instrument panel can be used to inhibit the GPWS "Too Low Flap" alert and "Too Low Gear" alert.

B. ABNORMAL PROCEDURES

When a procedure in the basic Aircraft Flight Manual specifies landing with flap settings not normally used for landing, the GND PROX FLAP OVRD switch on the lower right center instrument panel can be used to inhibit the "Too Low Flap" alert.

SECTION 4 - NORMAL PROCEDURES

A. OPERATION

Normal operating procedures for TAWS are outlined in the T²CAS System Pilot's Guide, ACSS document number 8000264-001, or the equivalent airline information. In addition, appendix A of this supplement provides an operational description of the TAWS modes.

When there are discrepancies between the pilot's guide and this supplement, the information contained within this supplement takes precedence.

B. SYSTEM ACTIVATION

The T²CAS TAWS is fully active when electrical power is on, the GND PROX BITE message is not displayed on EICAS, the Terrain INOP annunciator is extinguished, and the following systems are operational:

- Terrain and Traffic Collision Avoidance System (T²CAS)
- Radio Altimeter Left, Right, or Center
- Air Data Computer Left or Right
- ILS Receiver Left, Right, or Center
- FMS Left or Right
- IRU Left, Right, or Center
- EFIS Symbol Generator Left or Right
- Gear and Flap Indicating Systems
- Flight Deck Audio Warning System
- EFIS EHSIs (for terrain display)

Two fault indications are provided for the T²CAS TAWS System. A white GND PROX BITE message on the EICAS indicates a failure of the basic GPWS functions or their required sensors. An amber Terrain INOP annunciator indicates the CPA functions have failed, the Terrain Display output has failed, the GPS position sensor has failed or is unreliable, or the Terrain Database has failed.

Note: The CPA mode cautions and warnings, including Avoid Terrain alerts, are automatically inhibited (TERR INOP annunciated) when the navigation accuracy or integrity of the GPS position is less than required or when a reliable GPS or barometric altitude is not available.

SECTION 4 - NORMAL PROCEDURES (continued)

C. SYSTEM SELF TEST

Perform a System Self-Test on the ground prior to the first flight of the day to verify proper operation of the T²CAS TAWS System.

1. Ensure that the TERR OVRD switch is not in the OVRD position.
2. Set the EFIS Weather Radar Display to a desired brightness level.
3. Select a display mode that is capable of displaying weather (i.e. MAP).
4. Select Terrain display mode on the Captain's and First Officer's EFIS Displays. Ensure terrain is being displayed (Green TERR annunciated on WXR/TERR select annunciator switches).
5. Initiate the T²CAS TAWS System Self-Test by momentarily pressing the amber GND PROX G/S Inhibit switch on the center instrument panel for less than 2 seconds.
6. Verify the following sequence:
   a) "*TERRAIN AWARENESS TEST START*" is annunciated.
   b) Amber GND PROX annunciator turns ON, turns OFF, then turns ON and remains ON until TAWS self-test is complete.
   c) Red PULL UP annunciator turns ON, turns OFF, then turns ON and remains ON until TAWS self-test is complete.
   d) TERR INOP legend on the Terrain Override Switch turns ON, turns OFF, then turns ON and remains ON until TAWS self-test is complete.
   e) Verify the GND PROX BITE message is displayed in EICAS and remains ON until the TAWS self-test is complete. (May flash once initially).
   f) Terrain display test pattern is displayed on the Terrain Displays.
   g) "*TERRAIN AWARENESS TEST PASSED*" is annunciated.
   h) "*TERRAIN AWARENESS TEST COMPLETE*" is annunciated after end of self-test.
   i) T²CAS test color pattern goes away on both displays upon completion of the self test, and WXR is illuminated on both the Captain's and First Officer's TERR/WXR display select switches.

SECTION 4 - NORMAL PROCEDURES (continued)

D. SYSTEM SELF TEST – WINDSHEAR

Perform a Windshear System Self Test on the ground prior to the first flight of the day to verify proper operation of the GPWS Windshear function.

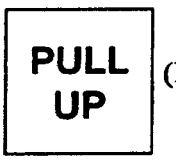
1. Initiate the Windshear Self-Test by momentarily pressing the W/S TEST switch on the maintenance test panel behind the First Officer's seat.

2. Verify the following sequence of aural messages and illuminated annunciators :

   a) WINDSHEAR INOP message on EICAS
   b) After approximately 5 seconds , Red WINDSHEAR warning message on ADIs appears
   c) Amber WNDSHEAR caution message appears on EADIs.
   d) Siren and *"Windshear, Windshear, Windshear"* audible message
   e) Red WNDSHEAR warning and amber WNDSHEAR messages are removed from EADIs
   f) WINDSHEAR INOP message is removed from EICAS.

E. T²CAS TAWS WARNINGS/CAUTIONS.

T²CAS TAWS WARNING:



(Red)

The following conditions are regarded as a T²CAS TAWS warning:

- Illumination of red PULL UP annunciator:
- *"TERRAIN, TERRAIN, PULL UP, PULL UP", "AVOID TERRAIN", "PULL UP, PULL UP"* aural warning.
- Pop up of terrain display with red warning area displayed.

T²CAS TAWS CAUTION.

(Amber)

The following conditions are regarded as a T²CAS TAWS cautionary alert:

- Illumination of amber GND PROX annunciator:
- *"CAUTION TERRAIN", "SINK RATE", "TERRAIN", "DON'T SINK", "TOO LOW TERRAIN", "TOO LOW FLAPS", "TOO LOW GEAR", "GLIDESLOPE", "BANK ANGLE, BANK ANGLE"* aural caution.
- Pop up of terrain display with amber caution area displayed.

SECTION 4 - NORMAL PROCEDURES (continued)

F. RESPONSE TO GROUND PROXIMITY WARNINGS AND CAUTION ALERTS (Mode 1 - 4)

"TERRAIN, TERRAIN, PULL UP, PULL UP" Warning Escape Maneuver

1. Disconnect the Autopilot.
2. Immediately apply maximum certified thrust. Do not overboost engines unless ground contact is imminent.
3. Simultaneously execute a positive pull up to approximately 20 degrees pitch and level the wings as necessary.
4. Retract speed brakes if deployed.
5. If terrain remains a threat, continue rotation up to the PLI or stick shaker and adjust the pitch attitude to achieve and maintain approximately 2 degrees pitch below the PLI to approximate the best angle-of-climb speed until safe terrain clearance is assured.
6. Do not change gear or flap configuration until terrain separation is assured.

Note: The aural warning alert will stop when the system determines that the current flight path angle, if maintained, will result in safe terrain clearance. If the aural alert ceases before the pitch limit is reached, the current pitch should be maintained until safe terrain clearance is assured.

Note: Safe terrain clearance will be indicated in the Terrain Display with the absence of red or yellow terrain along the airplane's flight path.

"AVOID TERRAIN" Escape Maneuver

1. Disconnect the Autopilot.
2. Immediately apply maximum certified thrust. Do not overboost engines unless ground contact is imminent.
3. Execute a positive pull up to approximately 20 degrees pitch.
4. Retract speed brakes if deployed.
5. Using all available information, immediately initiate a turn in the safest direction.

Note: If the "Avoid Terrain" warning occurred when or just after a turn was initiated, reverse the turn direction while executing the positive pull up.

6. When the "Avoid Terrain" alert ceases, if terrain remains a threat, continue rotation up to the PLI or stick shaker and adjust the pitch attitude to achieve and maintain approximately 2 degrees pitch below the PLI to approximate the best angle-of-climb speed until safe terrain clearance is assured.
7. Do not change gear or flap configuration until terrain separation is assured.

Note: If all aural alerts cease before the pitch limit is reached, the current pitch should be maintained until safe terrain clearance is assured.

Note: Safe terrain clearance will be indicated in the Terrain Display with the absence of red or yellow terrain along the airplane's flight path.

SECTION 4 - NORMAL PROCEDURES (continued)

"CAUTION TERRAIN" Escape Maneuver

1. If the Terrain Caution occurred while in a descent, an immediate level off is recommended.

   Note: A prompt level off will often result in positive terrain clearance (but less than the minimum terrain displayed clearance required by FAA regulations and thus a climb will often be necessary to achieve the required terrain clearance).

2. If the terrain in front of the airplane is amber or red, a climb will be necessary to achieve safe terrain clearance.
3. If the Terrain Caution occurred while the airplane is in level flight, a climb will always be necessary to achieve safe terrain clearance.

Other Caution Alert Response

If any other Mode 1 – 4 Caution Alerts occur along with illumination of the amber GND PROX annunciator, initiate corrective action to remove the cause of the alert.

G. RESPONSE TO GLIDESLOPE DEVIATION ALERT (Mode 5)

When an aural *"GLIDESLOPE"* alert occurs along with illumination of the amber GND PROX annunciators, initiate corrective action to fly the airplane back to the glideslope centerline.

To inhibit/cancel nuisance messages (e. g., on backcourse approaches), push the amber GND PROX / G/S INHIBIT annunciator switch when the aircraft is below 1000 feet AGL.

H. RESPONSE TO WINDSHEAR ALERT

Refer to existing GPWS flight manual supplement for windshear functions and response procedures.

SECTION 4 - NORMAL PROCEDURES (continued)

I. ALTITUDE CALLOUTS/ADVISORY (Mode-6)

The following advisory callouts are provided in this installation:

• *"DECISION HEIGHT"*	Occurs at Captain's selected Decision Height
• *"ONE THOUSAND"*	Occurs at 1000 feet AGL
• *"FIVE HUNDRED"*	Occurs at 500 feet AGL.
• *"FOUR HUNDRED"*	Occurs at 400 feet AGL.
• *"THREE HUNDRED"*	Occurs at 300 feet AGL.
• *"TWO HUNDRED"*	Occurs at 200 feet AGL.
• *"ONE HUNDRED"*	Occurs at 100 feet AGL.
• *"FIFTY"*	Occurs at 50 feet AGL.
• *"FORTY"*	Occurs at 40 feet AGL.
• *"THIRTY"*	Occurs at 30 feet AGL.
• *"TWENTY"*	Occurs at 20 feet AGL.
• *"TEN"*	Occurs at 10 feet AGL.
• *"BANK ANGLE BANK ANGLE"*	Occurs when roll attitude is excessive. Refer to appendix A.

SECTION 4 - NORMAL PROCEDURES (continued)

J. T²CAS TAWS INDICATORS & CONTROLS

The following indicators and switches are associated with the T²CAS TAWS:

Indicator/control	Color	Location	Function
PULL UP annunciator	RED	Adjacent to standby ADI	T²CAS TAWS Pull Up warnings
GND PROX / G/S Inhibit annunciator switch	AMBER	Adjacent to EICAS	T²CAS TAWS cautionary alerts. Press to inhibit or cancel glideslope alerts. Also used As T²CAS Test Switch.
WINDSHEAR annunciation and annunciator	RED	Message on each EADI. Annunciator next to standby ADI.	WINDSHEAR warning
GND PROX BITE message (text)	WHITE	EICAS	Indicates basic GPWS warning is inoperative
W/S TEST switch	None	WINDSHEAR TEST switch on the P61 Switch Panel	Tests the Windshear System
GND PROX GEAR OVRD switch/ OVRD annunciator	WHITE	Lower right center instrument panel	Inhibits GPWS Mode 4A "Too Low Gear" alert.
GND PROX FLAP OVRD switch/ OVRD annunciator	WHITE	Lower right center instrument panel	Inhibits GPWS Mode 4B "Too Low Flap" alert.
TERR/WXR annunciator Switches	GRN/WHITE	Adjacent to Captain's and First Officer's EHSIs.	Provides manual selection of T²CAS TAWS terrain display on associated EHSI.
TERR OVRD annunciator switch (guarded)	WHITE	Adjacent to First Officer's EHSI	Inhibits CPA functions and terrain display. OVRD illuminated when selected.
Terrain INOP annunciator	AMBER	Adjacent to First Officer's EHSI	Indicates CPA functions and terrain display are inoperative.
EFIS WXR mode ON annunciator / Switch	AMBER	On each EFIS control panel	Enables WXR mode on the EFIS. TERR or WXR are displayable on the EHSI when EFIS WXR mode is enabled.

K. ALERT PRIORITIES

- When any TAWS alerts are in progress, all TCAS aural alerts will be inhibited, and any RA traffic symbol will become a yellow TA traffic symbol on the TAD.
- When a Windshear alert is in progress, all TAWS and TCAS aural alerts will be inhibited, and any RA traffic symbol will become a yellow TA traffic symbol on the TAD.

SECTION 4 - NORMAL PROCEDURES (continued)

L. TERRAIN DISPLAY

The T²CAS TAWS terrain display provides a graphical plan-view image of the surrounding terrain as varying density patterns of green, yellow, and red. The various displayed patterns indicate RELATIVE altitude of surrounding terrain with respect to current aircraft altitude. The table below lists the various display symbology.

Solid Red	Terrain Warning.
Red w/Black X's	Avoid Terrain Warning area.
Solid Yellow	Terrain Caution area.
High Density Red Fill	Terrain 1500 ft or more above the aircraft.
Low Density Red Fill	Terrain between 500 ft above and 1000 ft above the aircraft.
High Density Yellow Fill	Terrain between Minimum Terrain Clearance Distance (MTCD) below the aircraft and 500 ft above the aircraft.
High Density Green Fill	Terrain between MTCD and 1000 ft below the aircraft.
Black (Not Displayed)	Terrain 1000 ft or more below the aircraft.
Solid Magenta	Invalid Terrain Cell

SECTION 4 - NORMAL PROCEDURES (continued)

L. TERRAIN DISPLAY - continued

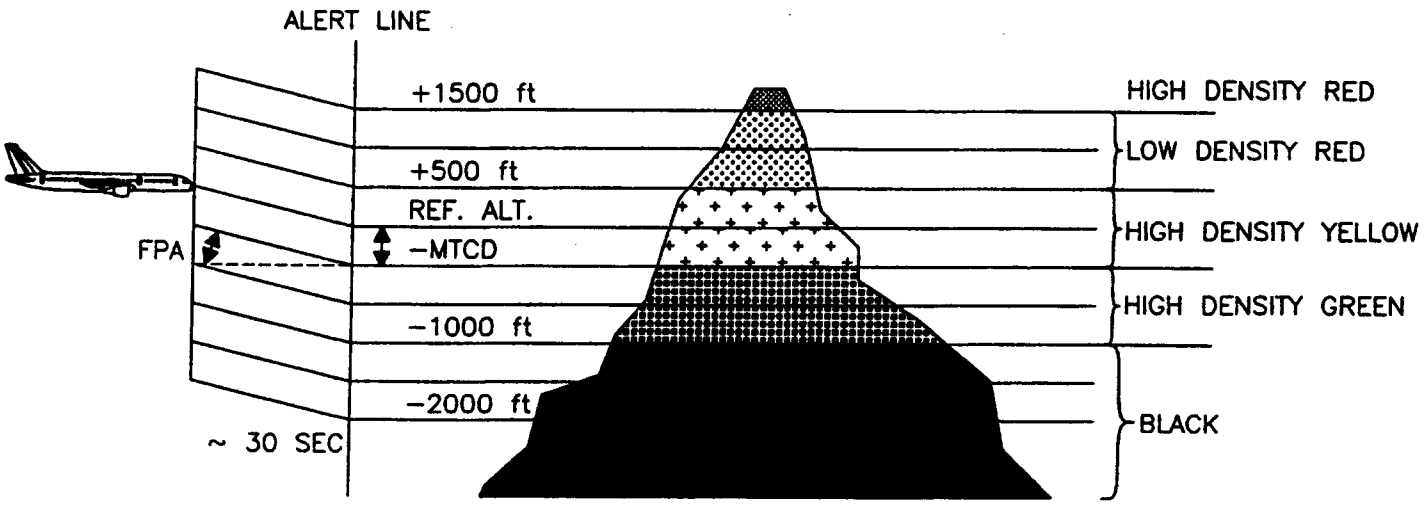


Figure 1
Terrain Display Patterns for Various Terrain Elevations

M. TERRAIN ADVISORY LINES

Any area on the Terrain Display that is within +/- 30 degrees from the current track for which a Caution Alert is predicted to occur will be depicted with an amber line (or series of individual segments).

The terrain advisory line depicts the location at which the Caution Alert will occur should the airplane continue its current flight path. Therefore, a Terrain Advisory Line depicted along the current airplane trajectory will result in a Caution Alert unless the airplane trajectory changes prior to reaching the Terrain Advisory Line.

N. COLD TEMPERATURE OPERATIONS

At temperatures more than 10 degrees C below standard and with GPS satellites showing insufficient coverage, the amber TERR INOP annunciator will be annunciated and the terrain display will indicate "Terrain Image Not Available". This is an indication that while GPS altitude is known, accuracy can not be assured to an adequate level. Therefore, predictive alerting is inoperative. It should be noted that GPWS modes 1, 2, 4 and 5 remain available even without GPS altitude. Reactive alerting is still present based on radio altitude.

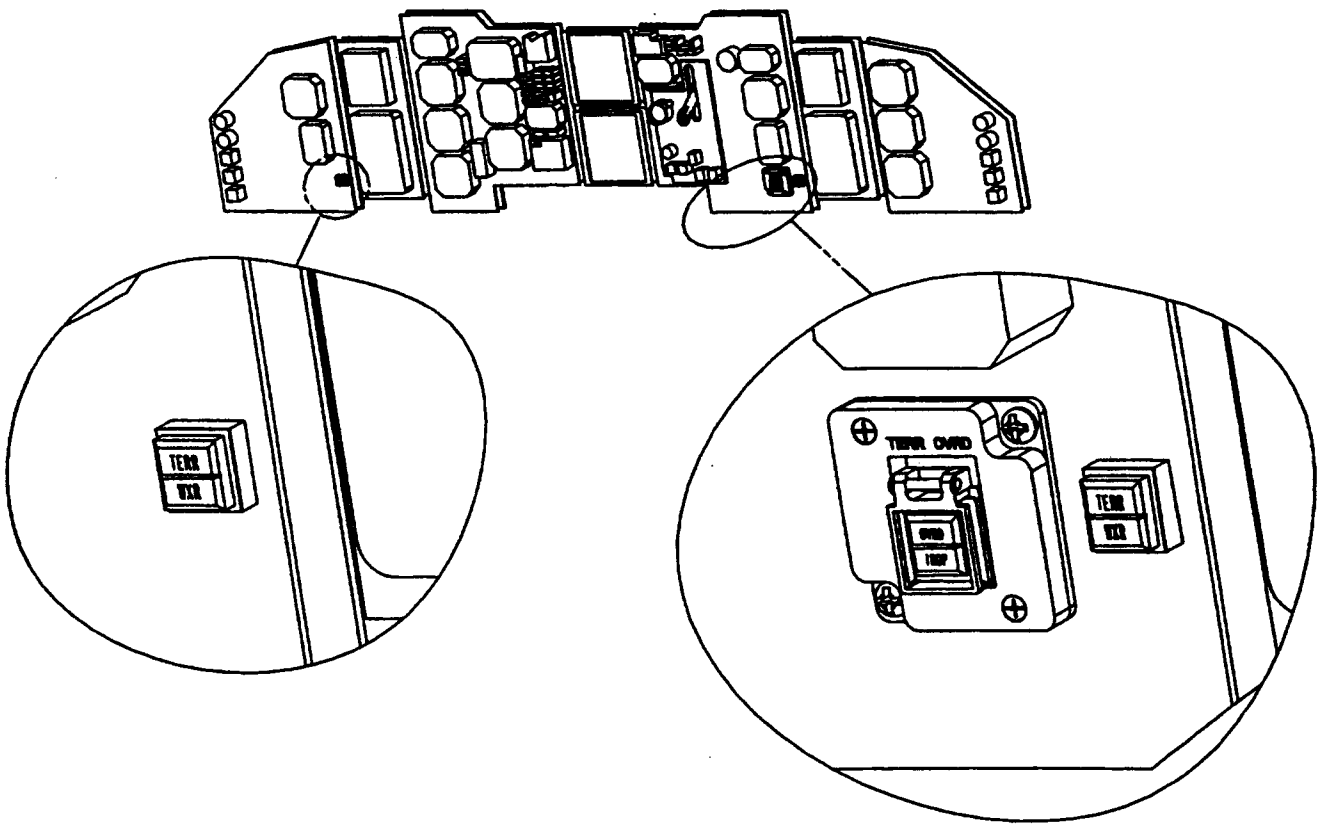
SECTION 4 - NORMAL PROCEDURES (continued)

O. TERRAIN DISPLAY SELECTION

The currently displayed information on the EHSIs, either weather or terrain, will be annunciated on the Captain's and First Officer's display control annunciator switches as either:

- TERR illuminated - display of terrain selected
- WXR illuminated - display of weather selected

The terrain awareness display may be selected on the desired EHSI by first enabling the WXR mode on the associated EFIS Control Panel and selecting either ARC or MAP EFIS display format. Pressing the TERR/WXR button on either the Captain's or First Officer's panel when weather information is being displayed will change the displayed information on the associated EHSI to T²CAS terrain (TERR will be illuminated). Pressing the TERR/WXR button when Terrain information is being displayed will change the associated display to weather information (WXR will be illuminated)



Captain's and First Officer's
Terrain Display Control

Figure 3

SECTION 4 - NORMAL PROCEDURES (continued)

O. TERRAIN DISPLAY SELECTION (continued)

If weather is selected for display (WXR is illuminated) on either EHSI when T²CAS issues a caution alert (amber GND PROX) or warning alert (red PULL UP), both EHSIs will automatically revert to terrain display (Auto Pop Up) with TERR illuminated on both display select annunciator switches. If terrain is being displayed on only one EHSI when T²CAS issues an alert, that EHSI will continue to display terrain, while the other EHSI switches to display terrain. If a T²CAS caution or warning alert is received and the WXR mode is not enabled on EFIS or the selected display format does not support a weather or terrain display, then select EFIS WXR mode ON and select EFIS ARC or MAP display mode to allow display of terrain. Adjust the EFIS range and WXR brightness as required for best situation awareness.

A Terrain Override select annunciator switch is located on the First Officer's instrument panel. Pressing this switch inhibits the Collision Prediction and Alerting features of the T²CAS. OVRD is annunciated on the annunciator switch when the CPA features are inhibited. INOP is annunciated on this annunciator switch when the T²CAS internal BITE has determined that the terrain features are inoperative. In both above cases, with either OVRD or INOP annunciated, the basic GPWS modes are still functional. Terrain is not displayed if either of these annunciators are illuminated.

SECTION 4 - NORMAL PROCEDURES (continued)

P. SYSTEM CONSTRAINTS

If there is no terrain data in the database for a particular area, then CPA is not available for that area Magenta displayed).

If the CPA features of the T²CAS System have been overridden (TERR OVRD), the T²CAS TAWS will revert to basic Ground Proximity Warning System (Modes 1-6) protection.

With the CPA functions overridden, the GPWS may give little or no advance warning time for flight into precipitous terrain where there are few or no preceding obstructions. If the aircraft is flown toward obstructing terrain, no warnings will be given if all the following conditions apply:

- The aircraft is in landing configuration.
- The aircraft is in a stabilized descent at a normal approach descent rate.
- There is no ILS Glideslope signal being received by T²CAS System (i.e., there is no ILS available or the Glideslope receiver connected to the T²CAS Computer is not tuned to the appropriate ILS frequency).

Terrain clearances or descent rates during radar vectoring that are not compatible with those required by the minimum regulatory standards for Ground Proximity Warning equipment may cause unwanted warnings or alerts.

SECTION 5 - PERFORMANCE

No Change

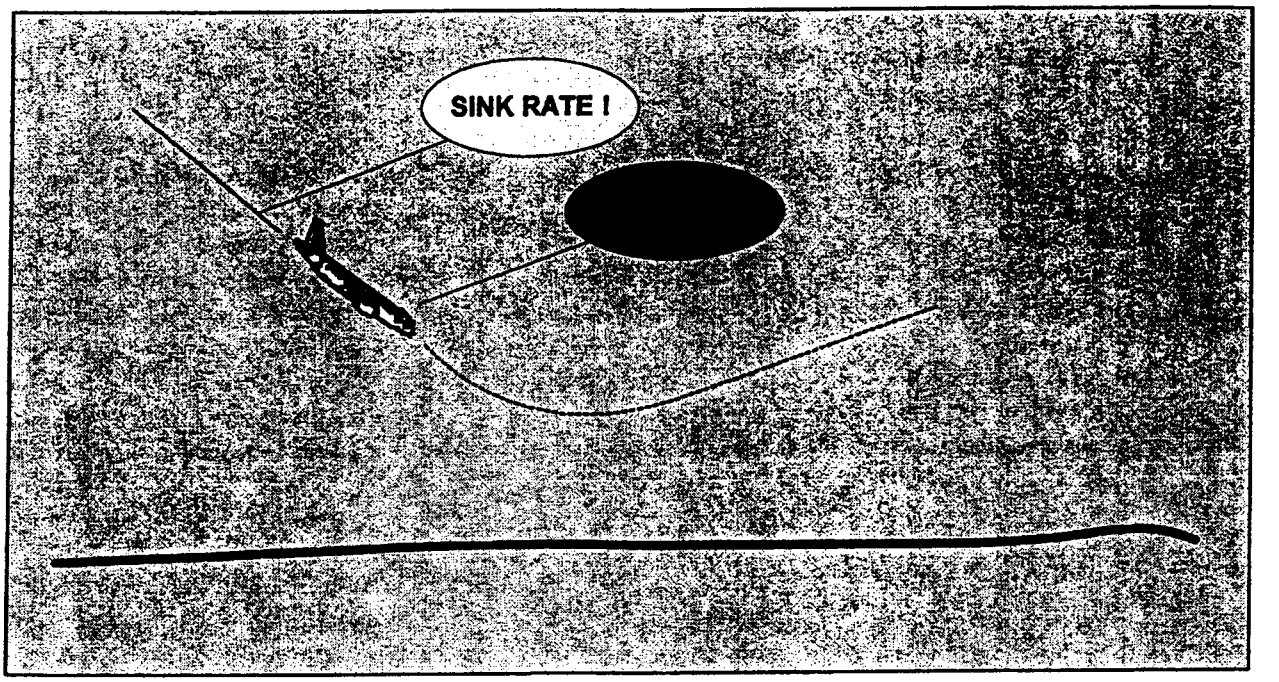
Appendix A: T²CAS TAWS Operational Description

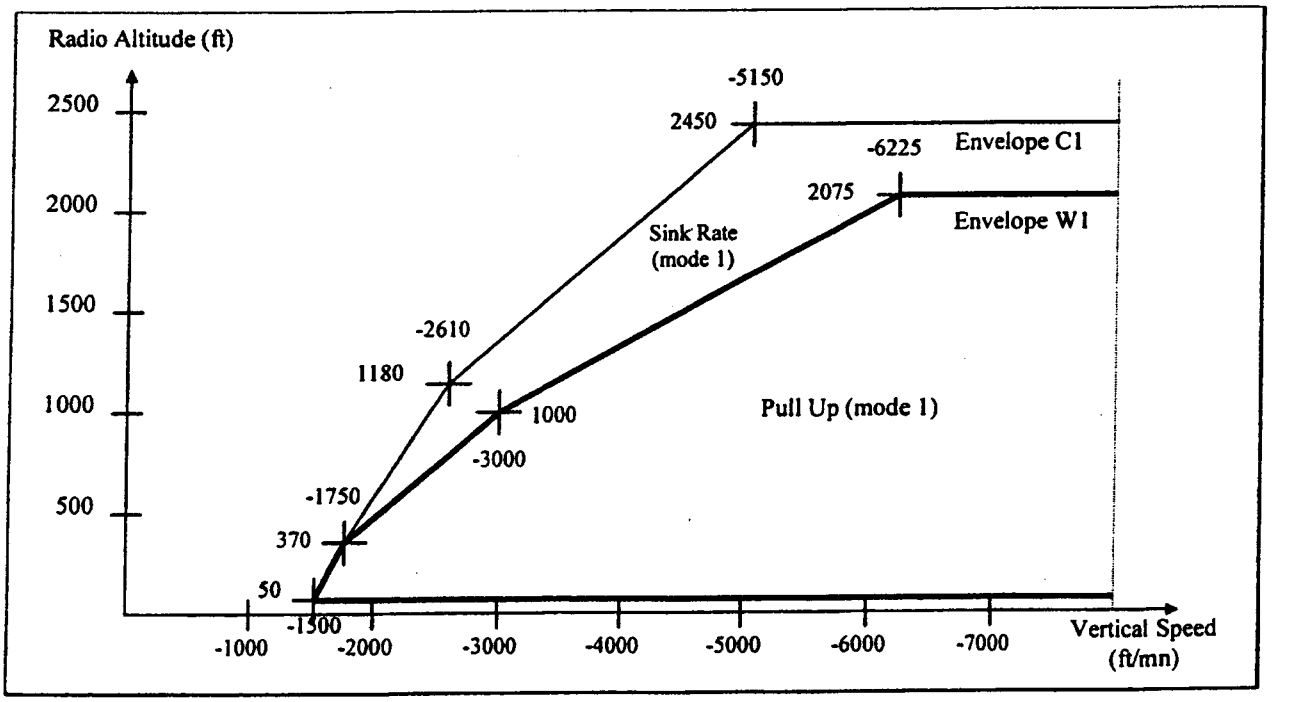
The ACSS Terrain and Traffic Collision Avoidance System (T²CAS) is designed to provide the flight crew with visual and aural warnings of possible inadvertent flight into terrain. It incorporates a forward looking function as well as basic Ground Proximity Warning System (GPWS) functions. The system includes a performance module that will optimize the alert schedule based upon each airplane's approved climb performance capabilities so that safe terrain clearance can be achieved provided the pilot accomplishes the recommended escape maneuver.

The following functions are included:

A) Basic GPWS Operation

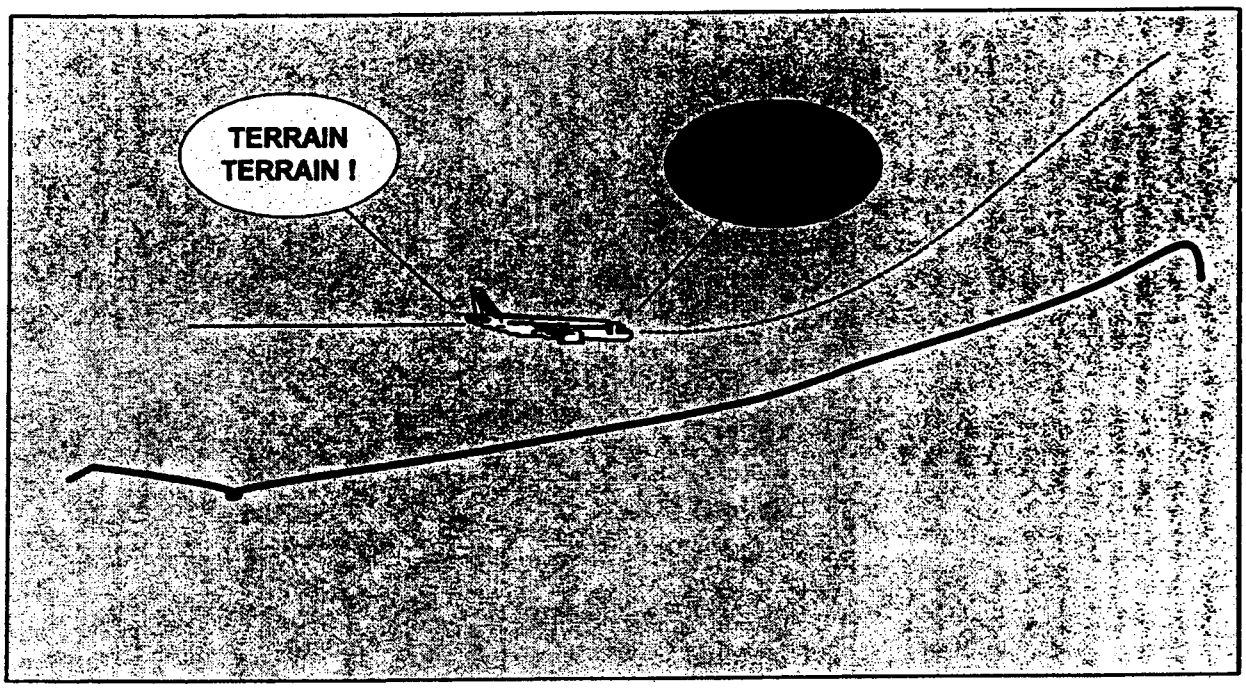
The basic GPWS system, as defined in TSO C-151a, contains six basic modes that are described in the following figures. The callouts indicate where the alerts are expected. Additional radio-altitude call outs and bank angle warnings are features that have been added.

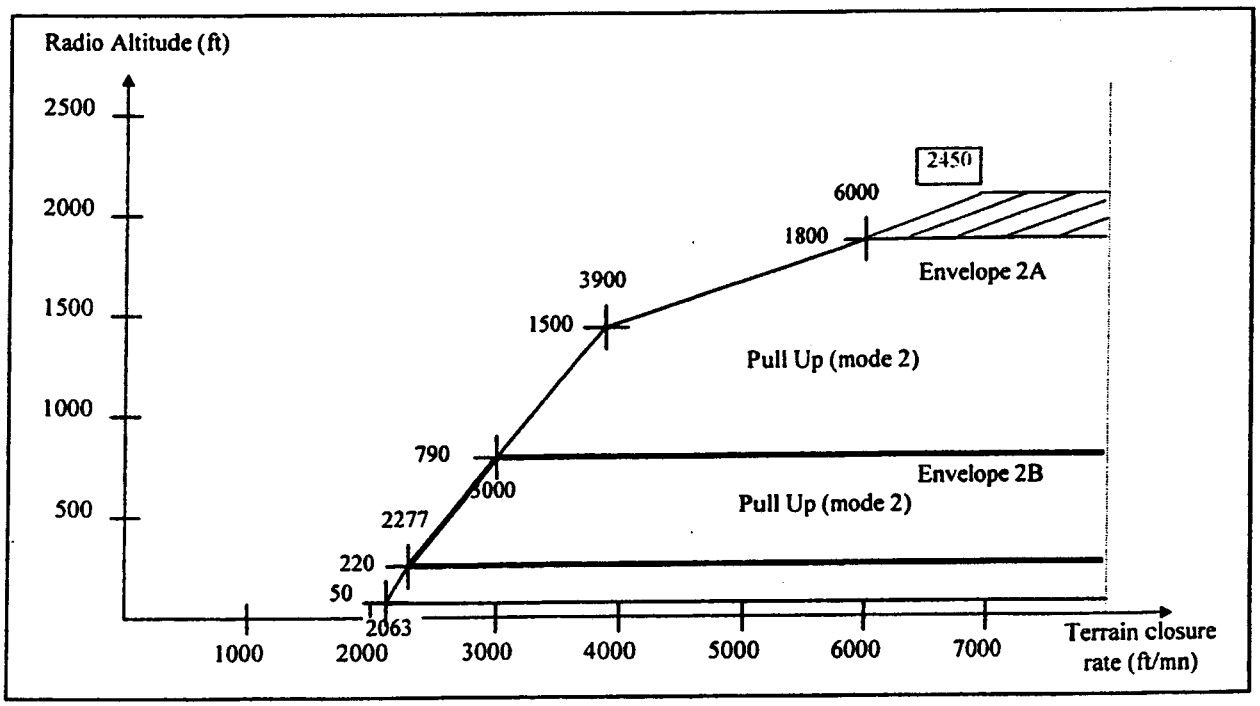




MODE 1 – EXCESSIVE DESCENT RATE

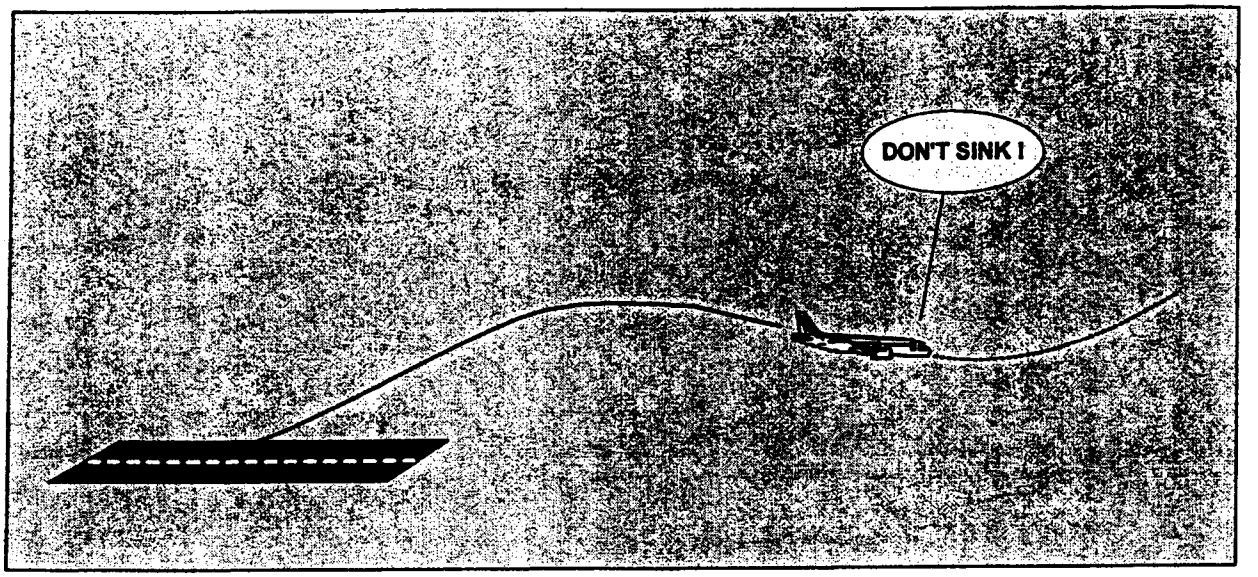
Note: Aircraft must be inside the caution envelope 1 second before the caution is issued. The aircraft must be inside the warning envelope 0.5 seconds before the warning is issued.

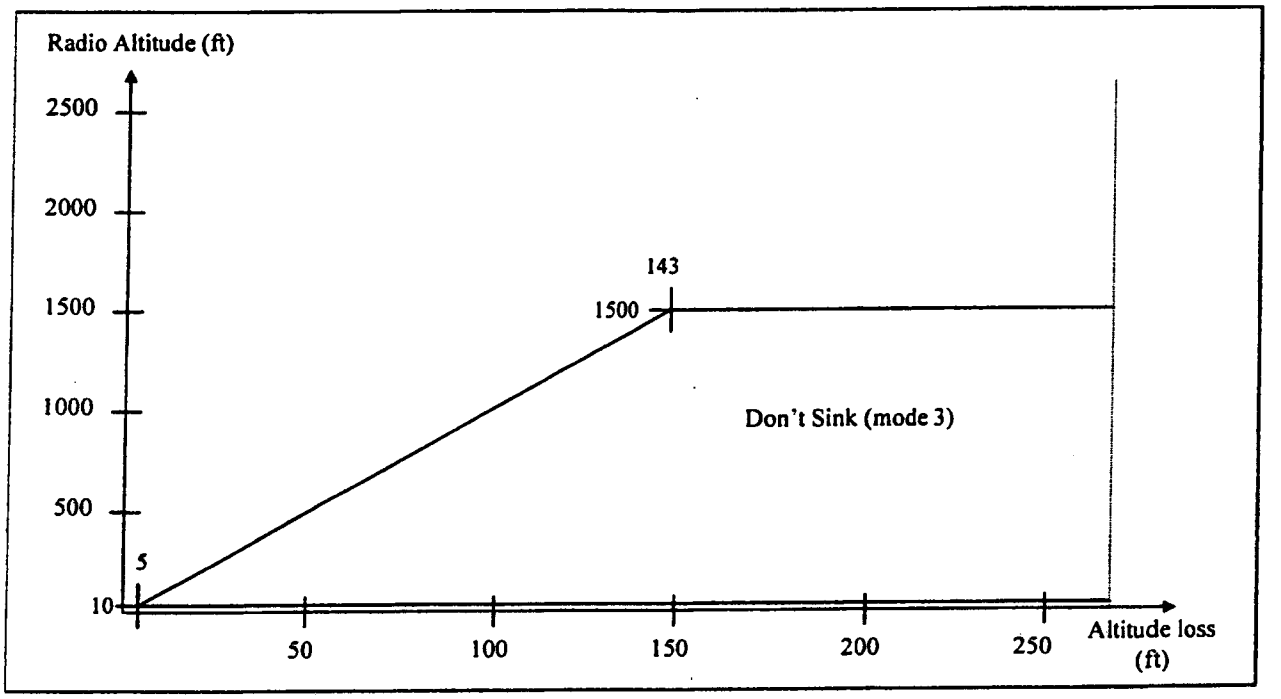




MODE 2 – EXCESSIVE TERRAIN CLOSURE RATE

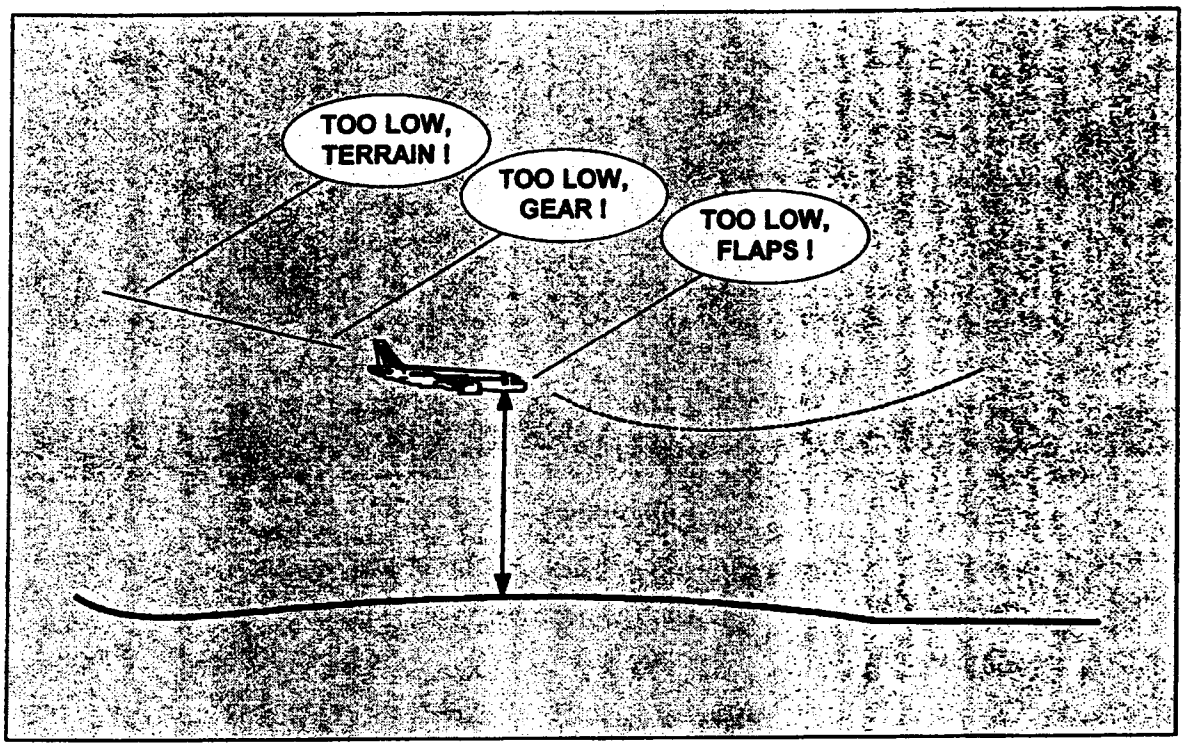
Note: Aircraft must be inside the envelope 1 second before the caution is issued. The caution must occur continuously for 2 seconds before the warning is issued. A warning will not be issued if the landing gear is down. The Mode 2A envelope is for flaps up. The Mode 2B envelope is for flaps extended 30 degrees or more.

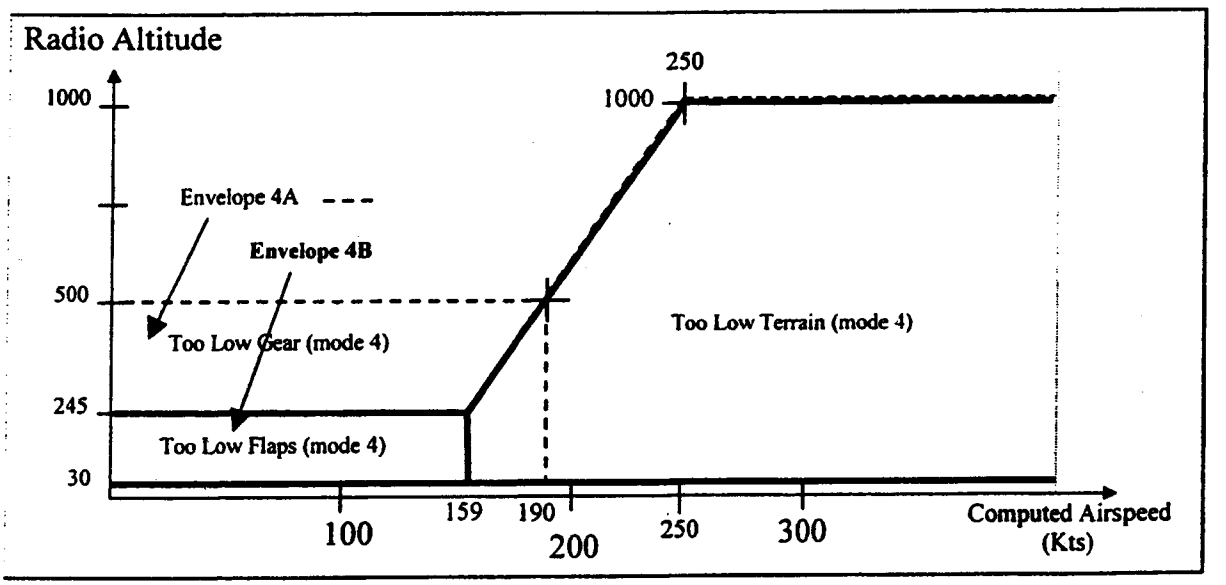




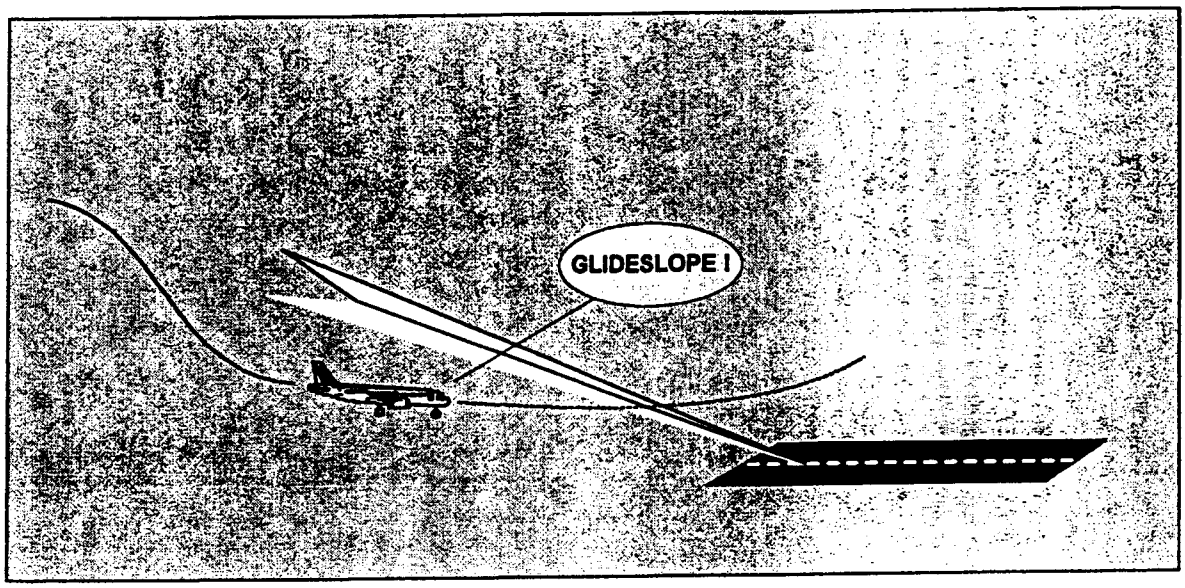
MODE 3 – ALTITUDE LOSS AFTER TAKEOFF

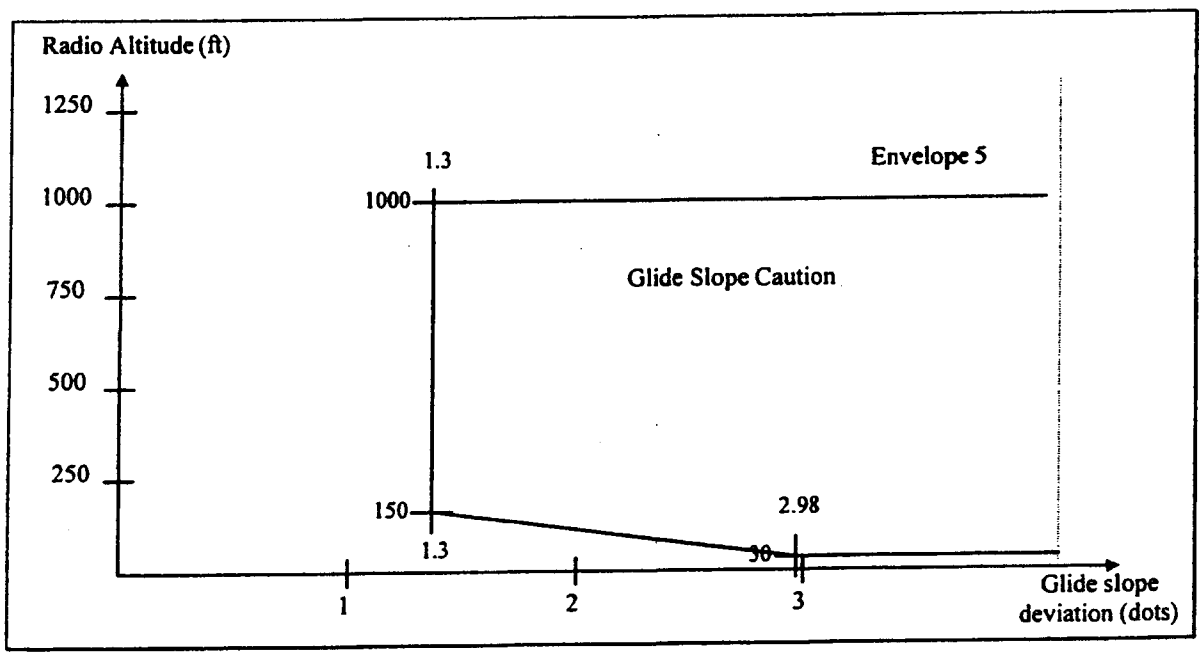
Note: Aircraft must be inside the caution envelope 1 second before the caution is issued. The caution will be canceled as soon as the aircraft is out of the envelope or the filtered vertical speed has been positive for 1 second.





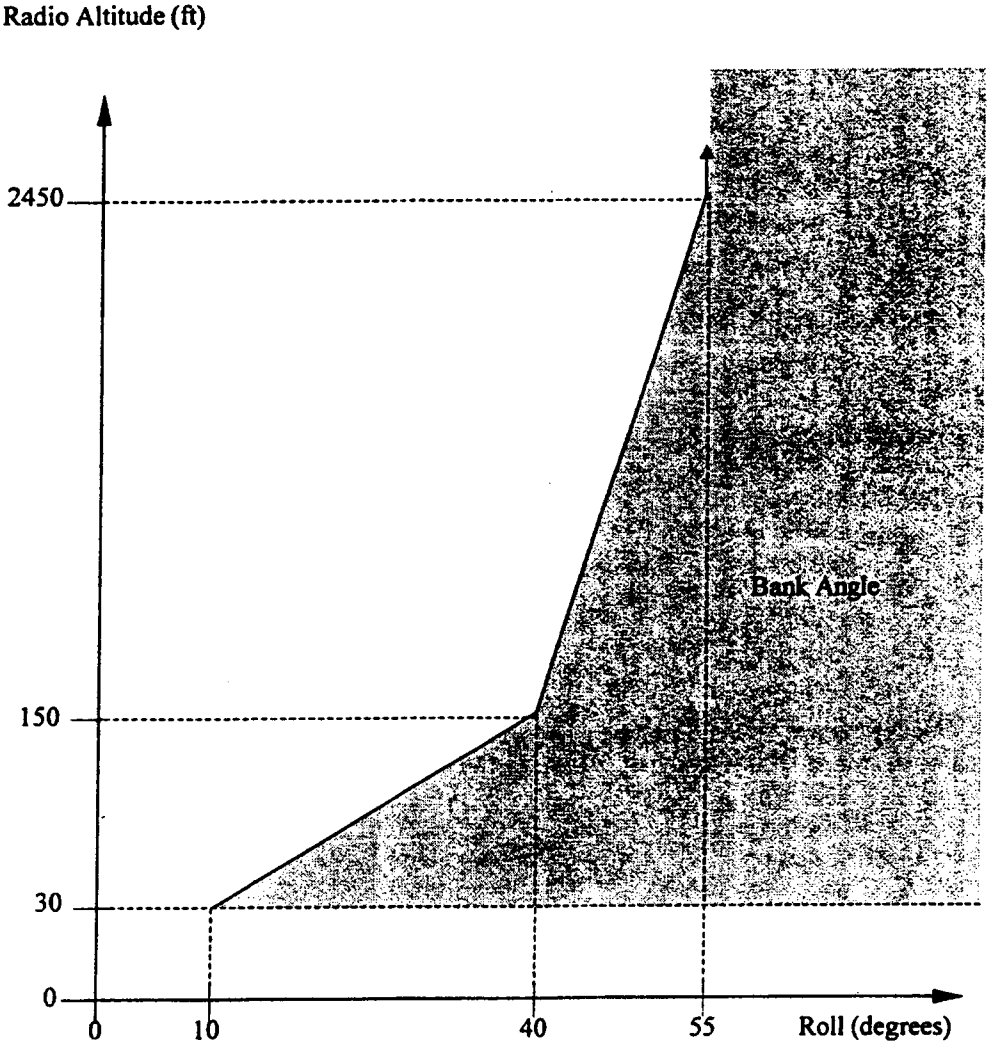
MODE 4 – TERRAIN CLEARANCE
(Descent in Wrong Configuration – Gear Up and/or Flaps Not in Landing Position)





MODE 5 – DESCENT BELOW GLIDESLOPE

Note: This mode warns of excessive low ILS glideslope deviation when the aircraft is below 1000 feet radio altitude and a valid ILS frequency is received. When the glideslope advisory region is penetrated, a soft warning is given by illumination of the amber TERR annunciator and aural annunciation "GLIDESLOPE". As the altitude is decreased and the DOTS "FLY UP" glideslope deviation is increased, the aural "GLIDESLOPE" alert repeat rate will increase.



EXCESSIVE BANK ANGLE

B) T²CAS Predictive Terrain Alert Function

T²CAS includes a means to look along and below the flight path of the airplane and is designed to provide an aural and visual alert for potentially hazardous terrain. This alert is based on the climb performance capability of the airplane. Compliance with the T²CAS warning procedures will provide safe terrain clearance. In the event that a wings level climb maneuver will not provide safe terrain clearance, an aural "Avoid Terrain" alert will be provided.

Refer to the T²CAS Pilot's Guide, Document 8000264-001 for additional details on the operation of the system.

Databases

The operation of the forward-looking CPA function requires the incorporation of the following databases:

- Terrain database
- Airport runway database

The terrain database describes the terrain elevation data for all major landmasses and significant islands together with sea level surfaces. The grid resolution of the database is as follows:

- Low resolution: grid formed by 3x3 arc-minutes cells
- High resolution: grid formed by 30x30 arc-seconds cells
- Very high resolution: grid formed by 15x15 arc-seconds cells

The different resolutions are used as follows:

- Enroute zones: low resolution
- Airport areas: high resolution
- Mountainous Approach Areas: very high resolution, if available, otherwise high resolution

Warning:

The T²CAS terrain database does not include man made obstacles.

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APPENDIX APPLICABILITY

SECTION 4.10 - IMPROVED CLIMB PERFORMANCE

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

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IMPROVED CLIMB PERFORMANCE

GENERAL

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. V1 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.

CHART PRESENTATION

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. Improved Climb Performance with flaps 1 is not allowed. 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."

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IMPROVED CLIMB PERFORMANCE

CHART PRESENTATION (Continued)

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).

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 tire/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).

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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.

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REVISION HIGHLIGHTS

Revision 26 to D631N002.29J dated 04-04-07.

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 label "Use this chart with ANTI-SKID/AUTO BRAKE CONTROL UNIT S283T001-12". Data are applicable for all control units.

The following changes comprise this revision:

PAGE	CODE	EXPLANATION
Revision Approval		
1	077559	This page uniquely identifies the approval authority and the reference number for this revision.
Log of Pages		
1,2,3,4	29J	Revised to reflect pages changed in this revision.
Section 4.13		
11	4021	Revised to remove label "Use this chart with ANTI-SKID/AUTO BRAKE CONTROL UNIT S283T001-12".

Revision Approval

This Revision Approval page may only be used in conjunction with a Log of Pages that refers to **Reference Number 077559** in the code column for the Revision Approval page.

E. K. Mijamot AR-635937 Date 04-04-07

Authorized Representative,
BDCO Delegated Compliance Organization
Boeing Commercial Airplanes

Units LB/F

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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Date 04-04-07

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AIRPLANE SERIAL NUMBER EFFECTIVITY

(Model 757-29J/27A)
The Airplane Flight Manual (AFM) containing this page is applicable to the following airplane serial numbers:

27203, 27204 and 29607 thru 29611

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:

1, 2, 3F, 4P, 5F, 21, 701, CDL

NOTES

APPENDIX 2 IS APPLICABLE TO AIRPLANE SERIAL NUMBERS 29607 THRU 29611.

APPENDIX 5F IS APPLICABLE ONLY TO AIRPLANE SERIAL NUMBERS 27203 AND 27204.

APPENDIX 701 IS APPLICABLE ONLY UPON INCORPORATION OF BOEING SERVICE BULLETIN 757-11-0032 OR PRODUCTION EQUIVALENT.

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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

	Pounds	Kilograms
MAXIMUM TAXI WEIGHT.	221,000	100,243
	231,000	104,779 [a]
MAXIMUM TAKEOFF WEIGHT	220,000	99,790
	230,000	104,326 [a]
MAXIMUM LANDING WEIGHT	198,000	89,811
MAXIMUM ZERO FUEL WEIGHT	184,000	83,460
MINIMUM INFLIGHT WEIGHT.	115,600	52,435

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.

The minimum inflight weight does not include usable fuel.

[a] Applicable to Airplane Serial Numbers 27203 and 27204 only. See page 4A, this section, for Center of Gravity Limitations.

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.

R17129

CERTIFICATE LIMITATIONS

PERFORMANCE CONFIGURATION

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

OPERATIONAL LIMITS

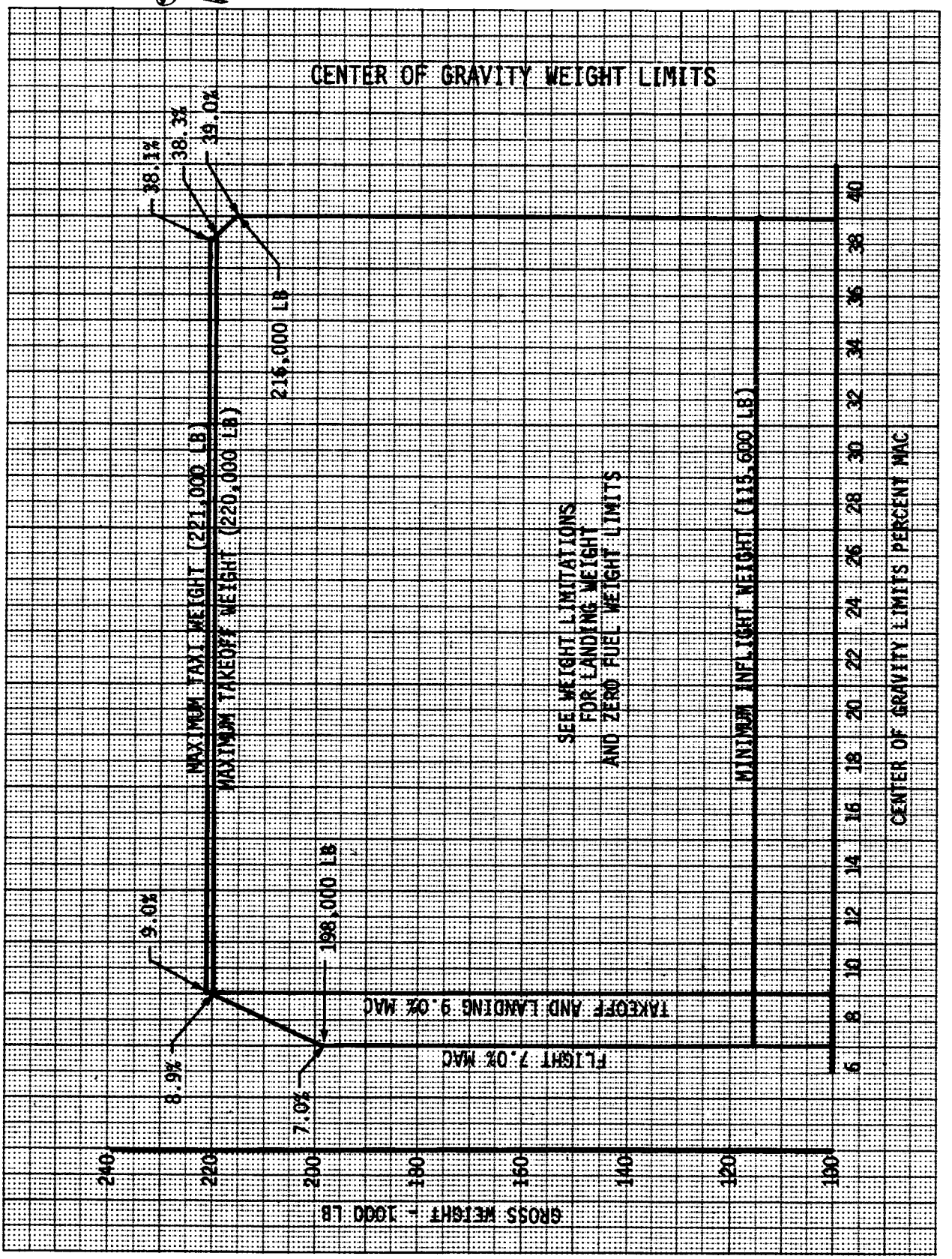
Runway slope -- ±2%

Maximum Takeoff and Landing Tailwind Component -- 10 knots.

Maximum Operating Altitude -- 42,000 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.



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APPROVED	DATE
	1-9-85

6E207

R17633

CENTER OF GRAVITY LIMITS

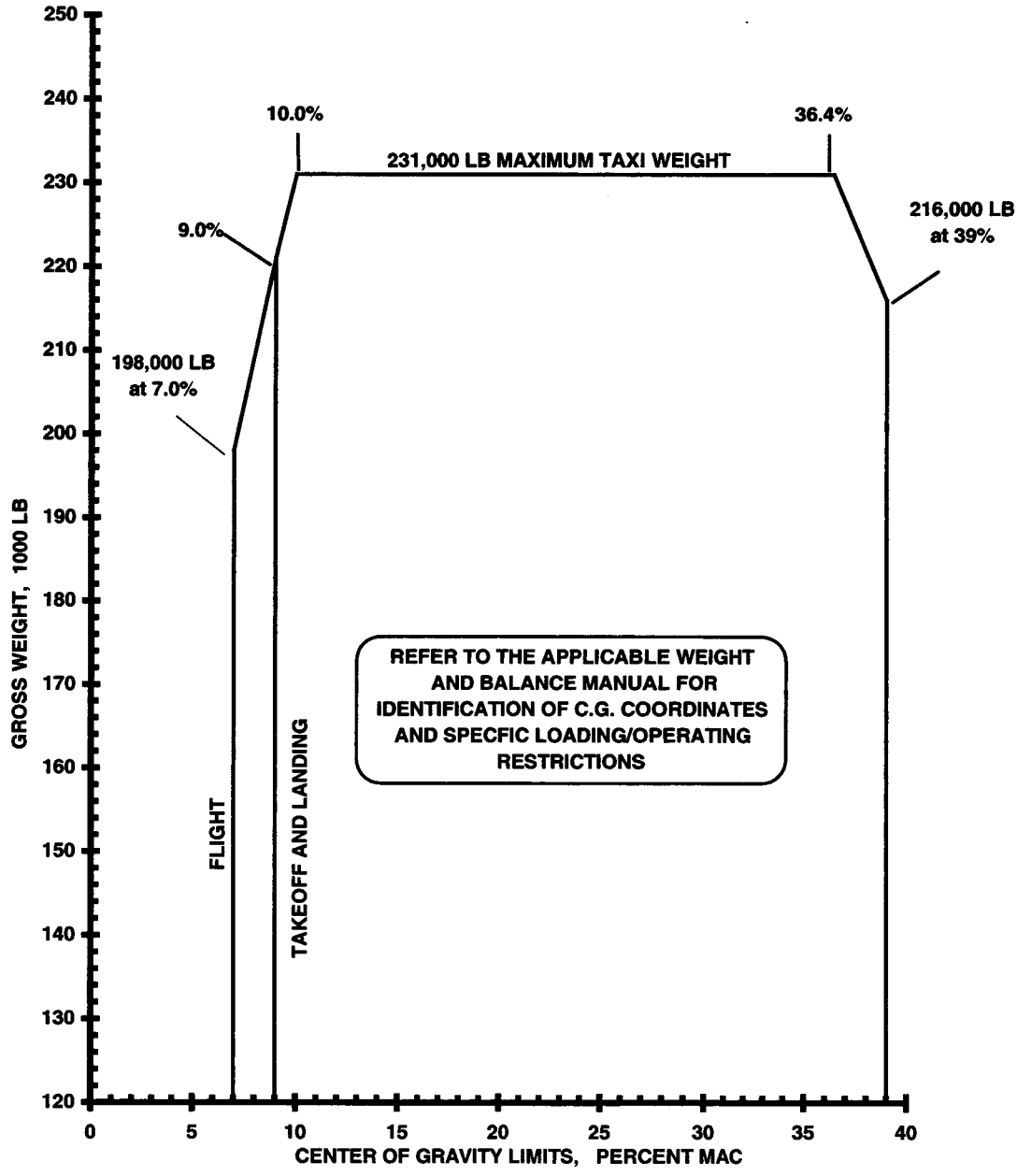


CHART APPLICABLE TO	APPROVED	DATE
757-200	C. J. Thomas	11-11-00

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 +2.0g at maximum landing weight to +1.5g at maximum takeoff weight.

FLIGHT CREW

Required flight crew: Pilot and Copilot.

R17147

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.

CERTIFICATE LIMITATIONS

MAXIMUM AIRSPEED LIMITS

FLAP PLACARD SPEEDS V_{FE}

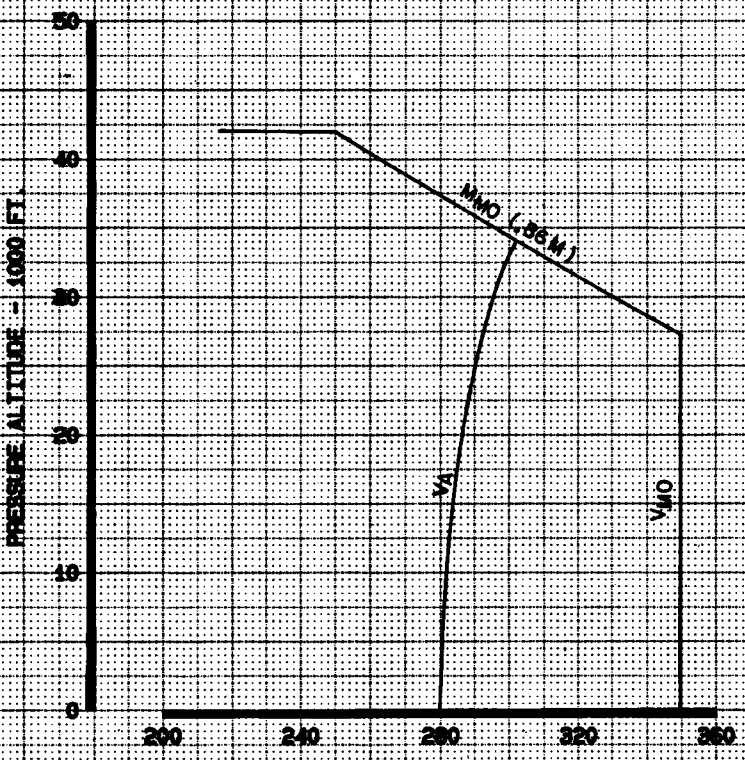
POSITION	
1	240
5	220
15	210
20	195
25	190
30	162

LANDING GEAR PLACARD SPEEDS

RETRACT	V_{LO}	270
EXTEND *	V_{LO}	270
	M_{LO}	.82
EXTENDED	V_{LE}	270
	M_{LE}	.82

*LANDING GEAR EXTENDED WITH ALTERNATE SYSTEM V_{LO} = 250, M_{LO} = .75

SPEEDS ARE INDICATED AIRSPEED IN KNOTS AND INDICATED MACH NO.



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YARNES
757-200

6E4207

R17636

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 is 15,450 pounds (7,008 kilograms) and in the center tank is 48,997 pounds (22,224 kilograms)#.

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.)

LATERAL FUEL IMBALANCE

Fuel imbalance must not exceed 1950 pounds (884 kilograms) for all operations.

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.

** 2,000 pounds (907 kilograms) of fuel may be loaded in the center tank with less than full 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.

\# Maximum allowable fuel weight in the center tank is 49,160 pounds (22,298 kilograms) for airplanes with Center Wing Tank fuel scavenge system.

FUEL PUMP

Do not reset a tripped fuel pump circuit breaker.

CERTIFICATE LIMITATIONS

E N G I N E S Pratt and Whitney PW2037

ENGINE THRUST

EPR 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 Compressor Rotor 100.5%
N2 - Intermediate Pressure Compressor Rotor 100.0%*

*Transient operation, 100.7%, 5 seconds.

ENGINE EGT

Operating Condition	Temperature Limits	Time Limit
Takeoff	645 deg C*	5 Minutes
Maximum Continuous	615 deg C	Continuous
Starting, Ground and Flight	485 deg C	Momentary

Upon installation of EICAS hardware part number S242N701-1001 or later, and installation of Operational Software Part number (OPS P/N) 3171-COL-DE0-02 or later, the following limits apply:

Starting, Flight	645 deg C	Momentary
Starting, Ground	545 to 485 deg C	Varies with time**

* Transient operation, 660 deg C, 5 seconds.

** For ground starting, 545 deg C at zero seconds and decreasing linearly to 485 deg C at 30 seconds and thereafter.

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.

E N G I N E S Pratt and Whitney PW2037

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*
Jet B as specified in ASTM D 6615*
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 specified in Pratt and Whitney Service Bulletin No. 2016 is acceptable provided that the limitations and requirements specified in Pratt and Whitney Service Bulletin No. 2016 and this AFM are met. Approved fuel additives are defined in ASTM D 1655, ASTM D 6615, MIL-DTL-5624, MIL-DTL-83133 and Pratt and Whitney Service Bulletin No. 2016.

Tank fuel temperature prior to takeoff must not be less than -45 degrees C (-49 deg F) or 3 degrees C above the fuel freezing point temperature, whichever is higher. Inflight tank fuel temperature must be maintained at least 3 degrees C above the 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 degrees C (120 degrees F), except for JP-4 or Jet B which is 43 degrees C (110 degrees F).

*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 when Boeing Service Bulletin 757-73-0013, "ENGINE FUEL AND CONTROL - FUEL CONTROL REPLACEMENT - PW2037 ENGINES", is incorporated.

E N G I N E S Pratt and Whitney PW2037 (Continued)

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS)

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

ENGINE IGNITION

On for takeoff and landing.

ENGINE OIL SYSTEM

The oil designation is per Pratt and Whitney Service Bulletin No. 238.

Minimum engine oil pressure:

AT IDLE RPM	70 PSID
AT ALL OTHER OPERATING CONDITIONS	80 PSID

Maximum oil temperature, unrestricted use	163 deg C
Maximum oil temperature, 20 min. transient	177 deg C

REVERSE THRUST

Use for ground operation only. Backing the airplane with use of reverse thrust is not permitted.

N_2 Control Mode

Takeoff in N_2 control mode is not permitted.

S81522

OPERATION IN ICING CONDITIONS

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 during climb and cruise when the temperature is below -40°C SAT. Engine anti-ice must be on prior to and during descent in icing conditions, including temperatures below -40°C SAT.

NOTES: Do not rely on airframe visual icing or electronic ice detector cues 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 or an ice detector message is displayed may result in severe engine damage and/or flameout.

Icing Conditions - Icing Conditions exist when the OAT on the ground and for takeoff, or TAT inflight 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.

CERTIFICATE LIMITATIONS

OPERATION IN ICING CONDITIONS (Continued)

Ground Operations During Icing Conditions

Periodic engine run-ups must be performed during prolonged ground operation in icing conditions (including time to taxi-in and taxi-out, and ground hold time), when engine anti-ice is required and the outside air temperature (OAT) is +3 degrees Centigrade (37 degrees Fahrenheit) or less.

These momentary run-ups must be performed to a minimum of 50 percent N_1 in order to shed ice from the first stage of the low pressure compressor (LPC) stator. The run-up interval is established according to either paragraph a. or paragraph b., below:

a. If a visual check of the leading edge of the first stage of the LPC stator has NOT been accomplished prior to engine start, run-ups must be performed at intervals not to exceed 15 minutes (including time to taxi-in and taxi-out, and ground hold time); or

b. If a visual check of the leading edge of the first stage of the LPC stator has been accomplished prior to engine start and it is determined to be free of ice, run-ups must be performed at intervals not to exceed 30 minutes (including time to taxi-in and taxi-out, and ground hold time). Any ice accumulation on the first stage of the LPC must be removed prior to dispatch.

In no case can the engines be operated for more than 30 minutes without either a visual check or an engine run-up.

If either of the time limits in paragraph a. or paragraph b., above, is exceeded without performing a run-up, the aircraft must be taxied to an area where the engines can be shut down, a visual check for ice accumulation must be accomplished, and any ice must be removed prior to the next run-up or takeoff. During taxi to the area for the visual inspection, engine speeds greater than 40 percent N_1 should be avoided to minimize the potential for ice shedding into the engine compressor. If these requirements cannot be met, takeoff is not authorized.

The procedures for accomplishing the visual check of and ice removal from the first stage of the LPC stator are contained in paragraphs (b) and (c) of AD 95-01-05.

S21065

CABIN PRESSURIZATION

Maximum cabin pressure differential is 9.10 psi.

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

AUTOPILOT - FLIGHT DIRECTOR

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
Crosswind - 25 knots

Use of aileron trim with the autopilot engaged is prohibited.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS)

(If Installed)

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

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 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.

DEVELOPMENTAL FLIGHT TESTING

When the autopilot is not engaged, do not apply large abrupt control column pitch inputs and then allow the controls to respond with the pilot's hands removed. Undesirable fuselage oscillation may result if the control column is not restrained.

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 (ACARS) (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.

CERTIFICATE LIMITATIONS

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.

E Q U I P M E N T C O O L I N G G R O U N D O P E R A T I O N

When the airplane is electrically powered for more than 20 minutes on the ground, equipment cooling must be provided as shown below.

TEMP (OAT)	COOLING REQUIRED
94°F to 105°F (34°C to 40°C)	One forward and one aft entry or service door on opposite sides open, or, at least one A/C pack or equivalent ground cooling operating.
106°F to 120°F (41°C to 49°C)	At least one A/C pack or equivalent ground cooling operating.
More than 120°F (49°C)	Two A/C packs or equivalent ground cooling operating.

R17169

CERTIFICATE LIMITATIONS

CONFIGURATION DEVIATION LIST (CDL)

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.

ISOLATION VALVE

The pneumatic isolation valve must be closed except when opened for ground operation of the air conditioning system, engine start or non-normal operation of the air conditioning or anti-ice systems.

HF RADIO COMMUNICATIONS

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

Frequency	See note #
11.133 Mhz	1.
19.383 Mhz	2.
19.384 Mhz	2.
22.434 Mhz	1.
22.608 Mhz	2.
22.609 Mhz	2.
22.683 Mhz	1.
22.766 Mhz	1.

Note:

1. Only applicable to airplanes equipped with Rockwell/Collins Model HFS-700 and/or HFS-900 HF communication transceivers.
2. Only applicable to airplane serial numbers 29607 and 29608.

The following limitation is applicable only to airplanes equipped with a dual Rockwell/Collins HF system with Rockwell/Collins digital coupler part number 822-0987-002:

If one HF radio is selected for transmission, deselect the other HF radio on all audio select panels to prevent audio interference.

S97696

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 DECK SECURITY DOOR (If installed)

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

For airplanes with the Flight Deck Security Door installed per STC No. ST01334LA, additional limitations and procedures are contained in the AFM Supplement for this STC.

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 when 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

F I R E (Continued)

CARGO FIRE - FWD/AFT

Cargo Compartment Arming Switch (FWD/AFT) . . . . . ARMED
No. 1 Bottle Discharge Switch . . . . . DISCH
One Pack Control Selector . . . . . OFF

After 80 minutes, or during approach (if less than 80 minutes):

No. 2 Bottle Discharge Switch . . . . . .DISCH

ELECTRICAL SMOKE OR FIRE

Use oxygen masks and smoke goggles, if required, establish crew communications, and select both recirculation fans 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 the Alternate Equipment Cooling Switch to ALTN.

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)

Cockpit Door . . . . . CLOSED
Recirc Fans. . . . . .OFF
Landing Altitude Selector. . . . . 09500 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 35,000 FT . . . . . 240 Kts
35,000 Ft or below . . . . . 250 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 is 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 AC power cannot be restored:

APU selector OFF
Deploy the Ram Air Turbine.
Master Caution is inoperative.
Use manual speedbrakes after landing.
Antiskid is inoperative on outboard wheels.

If hydraulic-driven generator is not available:
Avoid icing conditions.
Control Pressurization manually.
Flap indicator is inoperative.
Flight beyond 30 minutes will result in complete loss of electrical power.
30 minutes standby power cannot be assured with both ignitors selected.

S40389

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, depressurize, turn pack control selectors off and close outflow valves.

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) Negligible deviation from airplane glide path when recovery was initiated one second after pilot recognition.

(b) Negligible deviation from airplane glide path when recovery was initiated without delay after pilot recognition.

R17279

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.

CERTIFICATE LIMITATIONS

SECTION 3.1 - NORMAL PROCEDURES

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NORMAL PROCEDURES

GENERAL

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

FUEL TANK CAPACITY

TANK	USABLE FUEL U.S. GALLONS	MAXIMUM WEIGHT POUNDS	MAXIMUM WEIGHT KILOGRAMS
L or R Main	2,176	15,450	7,008
Center Wing	6,901	48,997	22,224
	6,924*	49,160*	22,298*
Total, Main Tanks	4,352	30,899	14,016
Total All Tanks	11,253	79,896	36,240
	11,276*	80,059*	36,314*

*Applicable to airplanes with Center Wing Tank fuel scavenge system.

R17286

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 757-28A0081.

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.

De-fueling main wing tanks with passengers onboard is prohibited if main tank fuel pumps are powered. De-fueling center wing tank with passengers onboard is prohibited if the center wing tank fuel pumps are powered with the automatic center tank fuel pump power removal system inhibited. Fuel may be transferred from tank to tank, or the aircraft may be de-fueled with passengers onboard, provided fuel quantity in the tank from which fuel is being transferred from is maintained above 2,000 pounds (900 kilograms).

NORMAL PROCEDURES

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.

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.

AIR TRAFFIC CONTROL RADAR BEACON SYSTEM

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.

TURBULENCE AVOIDANCE

Flight through severe turbulence should be avoided, if possible.

Weather radars, equipped with the turbulence detection mode, may assist the crew in selection of a flight path to circumvent areas of severe turbulence. However, the turbulence feature and associated use in avoiding turbulence have not been fully evaluated by the FAA.

SEVERE TURBULENT AIR PENETRATION

Flight through severe turbulence should be avoided, if possible.

The recommended procedures for inadvertent flight in 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

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.

SEVERE TURBULENT AIR PENETRATION
(Continued)

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 with windshear capability will provide 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, except 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)
40 to 100	40
30	28
20	18
10	9
5	5

R17291

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 - 34 knots
Tailwind - 25 knots
Crosswind - 25 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 both wet and dry runways. Each autobrake setting has been demonstrated on dry runways.

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.

R17292

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.

S89800

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 AC 120-28C 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, if available, may be used as an independent power source.)

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.*

* Not applicable with incorporation of Boeing Service Bulletin 757-22-0033, AUTOFLIGHT - AUTOPILOT/FLIGHT DIRECTOR - CHANGES TO THE WIRING AND REPLACEMENT OF THE FLIGHT CONTROL COMPUTERS, or production equivalent.

S89802

AUTOPILOT - FLIGHT DIRECTOR SYSTEM (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, if available may be used as an independent power source.)

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, if available, may be used as an independent power source.)

R17296

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, if available, may be used as an independent power source.)

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.

INERTIAL REFERENCE SYSTEM

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 757-34-0124 or 757-34-0134 NAVIGATION - ATTITUDE AND DIRECTION - INERTIAL REFERENCE SYSTEM - UPDATED AND EXTENDED 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 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.

NORMAL PROCEDURES

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 nav aid 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 demonstrations 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.

FLIGHT MANAGEMENT COMPUTER SYSTEM (FMCS) (cont.)

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 and DME data relative to the 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 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.

FLIGHT MANAGEMENT COMPUTER SYSTEM (FMCS) (cont.)

REQUIRED NAVIGATIONAL PERFORMANCE (RNP) OPERATIONS

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

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 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 lateral 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 primary means RNP navigation with the following equipment operational at dispatch: two FMCs; two CDUs, MCDUs or HMCDUs; 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 Notice 8110.50, dated 4/20/94. This approval was based on the safety and interoperability requirements contained in FAA approved Boeing documents below:

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".

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

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 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.

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.

Increases in engine vibration level may develop in icing. The fan will normally shed the ice and vibration will return to normal. To assist in shedding ice, if sustained vibration is indicated, quickly retard one thrust lever at a time to idle for five seconds, then restore the required thrust.

Should vibration exceedence still exist after completion of this procedure, advance the thrust lever momentarily to 90% N1.

EXTENDED RANGE OPERATIONS

The type design reliability and performance of this airplane/engine combination has been evaluated in accordance with FAA Advisory Circular 120-42A and found suitable for extended range operations when configured in accordance with Boeing Document D011N002 "CONFIGURATION, MAINTENANCE AND PROCEDURES FOR EXTENDED RANGE (ER) OPERATION". This finding does not constitute approval to conduct extended range 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 Bulletins 757-34-0132, NAVIGATIONS - AIR DATA SYSTEM - AIR DATA COMPUTER REPLACEMENT AND WIRE CHANGES TO SUPPORT REDUCED VERTICAL SEPARATION MINIMUMS and 757-53-0074, FUSELAGE - SECTION 43 SKIN - QUALIFICATION FOR REDUCED VERTICAL SEPARATION MINIMUM (RVSM) OPERATION, or their production equivalent.

SECTION 3.2 - NON-NORMAL PROCEDURES

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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 V_{REF} flaps 20 for use with procedures in this section. These V_{REF} 20 speeds are based on approximately 130% of stall speed in the flaps 20 configuration. They are not the V_{REF} speeds used to establish the performance information presented in Section 4.

GROSS WEIGHT (1000 LB)	V_{REF} 20 (KIAS)
260	165
250	162
240	158
220	151
200	144
180	136
160	128
140	119
120	110

GROSS WEIGHT (1000 KG)	V_{REF} 20 (KIAS)
120	166
110	159
100	152
90	143
80	134
70	126
60	117
50	108

R17308

NON-NORMAL PROCEDURES

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 low pressure is indicated on any pump, turn the affected pump OFF.

SYSTEM(S) LOW PRESSURE

If any system low pressure is indicated, turn off the affected system(s) pumps with low pressure lights illuminated. 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 use. GPWS flap override and RAT deployment may be required. With multiple hydraulic failures, land flaps 20, speed Vref 30 + 20 knots.

RAM AIR TURBINE (RAT)

The ram air turbine automatically deploys if both engines drop below 50% N2 RPM. It may also be deployed by operation of a guarded switch. Once extended the RAT remains extended until stowed on the ground.

BRAKES

In the event pressure for normal brakes from the right hydraulic system and pressure for alternate brakes from the left hydraulic system are not available, pushing the Reserve Brakes switch will regain system pressure for brakes.

If reserve brake pressure is not available after pushing Reserve Brakes switch, use steady brake pressure with antiskid ON to provide the best braking and accumulator life.

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.

ENGINE OIL SYSTEM

LOW OIL PRESSURE

If oil pressure is at or below the red line limit shut down the engine. If oil pressure is in the amber band, reduce thrust to minimum required. If oil pressure remains in the amber band and the Low Oil Pressure Light and the amber ENG OIL PRESS EICAS message appears, shut down the engine.

HIGH OIL TEMPERATURE

If oil temperature is at the red radial, attempt to reduce the temperature by moving the thrust levers to a mid-power position. If oil temperature does not fall below the red line, shut down the engine.

OIL FILTER

If the oil filter message occurs, reduce thrust sufficiently to cause the message to disapear. If the message continues to be displayed, shut down the engine, conditions permitting.

LOW FUEL QUANTITY

If any low fuel quantity is indicated [2200 lb (1000 kg), either main tank], open the crossfeed valve, turn on all boost pumps, and avoid high nose up attitudes and rapid acceleration.

ENGINE FUEL FILTER *

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 contamination.

* Applicable upon installation of EICAS computer hardware part number S242N701-1001 or later.

ENGINE IN-FLIGHT START

Check altitude and airspeed.

If X-BLD is not displayed, set Engine Start Selector to FLT. Set Fuel Control Switch to RUN. Abort start if EGT fails to rise in 30 seconds.

If X-BLD is displayed, set either Pack Control Selector to OFF, Isolation Switch to ON, Ignition Selector to BOTH, Engine Start Selector to GND. Hold in GND until 10% of N2. Set Fuel Control Switch to RUN position when N2 exceeds fuel on command bug. Abort start if EGT fails to rise in 30 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, close the crossfeed valve(s) and turn off the center fuel pumps. 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 cockpit indications), shut down the affected engine to stop the leak and retain fuel. After shutdown, remaining fuel from the center, left and right main tanks may be used for the operating engine. Use FQIS to determine fuel remaining.

ENGINE OVERHEAT

If an engine overheat is indicated, turn that engine bleed air switch off 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 and use flaps 20 and speed Vref 30 + 30 for approach and landing.

ENGINE LIMIT PROTECTION

If engine limit protection is not available, observe thrust limits. The following anomalies may also be observed:

- Engine response may not be synchronized with rapid thrust lever movement.
- Increased thrust lever stagger may be anticipated at high power at low altitude.
- Autothrottle will be inoperative.

STABILIZER TRIM FAULT

If a stabilizer trim light illuminates, trim rate is reduced to one half. Actuating trim levers may restore use of trim or increase trim 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 symmetric pair of panels. The automatic speed brake function is not affected.

RUDDER RATIO

If the rudder ratio changer fails, avoid large or abrupt rudder control 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 for landing and speed V_{REF} 20. Override the GPWS flap warning.

If leading edge slat asymmetry occurs at flap positions 20 or less, set the alternate flap selector to agree with flap lever, and use alternate flap system to extend/retract 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 at less than flaps 1, set alternate flaps selector to position 1 and set alternate leading edge flap switch to ALTN. Override the GPWS warning.

Use the following speeds for landing:

Indicated flap position	Speed
5 or less	V_{REF} 30 + 40 knots
between 5 and 20	V_{REF} 30 + 30 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 Vref 20. Override the GPWS warning.

If flap or slat position disagreement occurs at flap positions 20 or less, set alternate flaps selector to agree with flap lever and set the alternate flap switches to ALTN.

If leading edge or trailing edge light fails to extinguish or reilluminates, set the alternate flap switch(es) to off and accomplish the appropriate flap/slat asymmetry procedure.

If disagreement lights are extinguished, use alternate flap selector to set flaps and use flaps 20 and speed Vref 20 for landing. 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 push alternate gear extension switch. When gear is down, position landing gear lever to DN to agree with gear position.

WINDOW HEAT

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.

EQUIPMENT COOLING SYSTEM

If equipment overheat is indicated, turn on the alternate equipment cooling switch. If smoke enters the cockpit, return the switch to OFF.

If the overheat cannot be corrected, avionics and electrical equipment and displays, not powered by standby buses, are subject to imminent failure. Avionics and electrical equipment on standby buses are reliable for 90 minutes. Continued flight beyond 90 minutes can result in loss of all avionics and electrical equipment.*

* This paragraph is not applicable when auxiliary equipment cooling system is installed.

GROUND PROXIMITY WARNING SYSTEM (GPWS)

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. Activation of the G/S INHIBIT switch with less than 1000 feet terrain clearance inhibits or cancels the below glideslope alert to that approach.

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_{MC} 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

SECTION 4.1 -GENERAL

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

R17321

GENERAL

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	1, 5, 15, 20
Enroute	0
Approach	15, 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.

7. Cowl TAI bleed off at temperatures above 50°F (10°C).

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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	Go-around 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.

Engine isolation valve is closed for takeoff.

APU is OFF or not available. Corrections are shown on appropriate charts for APU operating.

R17323

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 V1, 1 second later.

Takeoff Decision Speed, V1 - 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. V1 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. V_R must not be less than 1.05 V_{MCA} or $V_{1(MCG)}$.

R17324

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.

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 is equal to 1.3 times the stall speed in the landing configuration.

Reference Speed, VREF - This speed is equal to 1.3 times the stall 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.

R17325

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.

ICING

Icing Conditions

Icing conditions exist when the OAT on the ground and for takeoff, or TAT inflight is 10°C (50°F) 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 (50°F) 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.

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.

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.

R17326

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.

R17327

GENERAL

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 30 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.

R17328

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 EPR 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 1.1 EPR prior to brake release or as the airplane is aligned with the runway. As the airplane accelerates, advance the thrust levers to the takeoff EPR setting. Readjust thrust levers, if necessary, prior to 80 knots to obtain target EPR. 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 12 to 25 degrees depending upon gross weight, flaps, and thrust available). Make minor attitude variations after liftoff to achieve the initial climb speed. Climb after engine failure requires approximately 2 to 9 degrees lower attitude than all engine climb.

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.

R17329

GENERAL

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 establishing 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 ground speed decreases.

R17330

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.

R17331

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 ground speed decreases.

GENERAL

FLAP RETRACTION SPEED SCHEDULE

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:

TAKEOFF 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.

R17334

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 V1, 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 757. 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.

R17335

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.

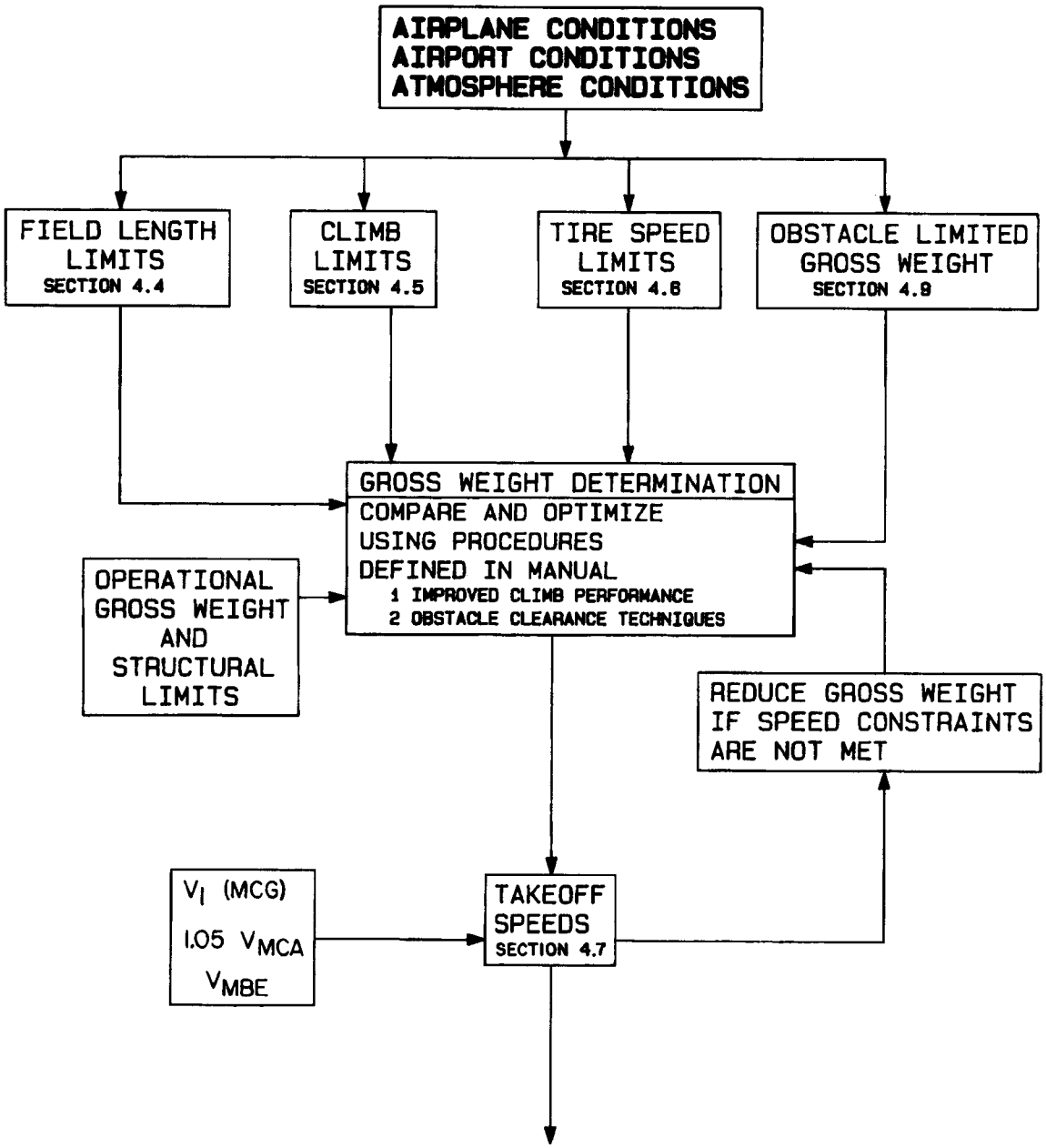
GENERAL

TAKEOFF WEIGHT DETERMINATION PROCEDURE FLOW DIAGRAM

The following flow diagram 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.

R17337

TAKEOFF WEIGHT DETERMINATION PROCEDURE



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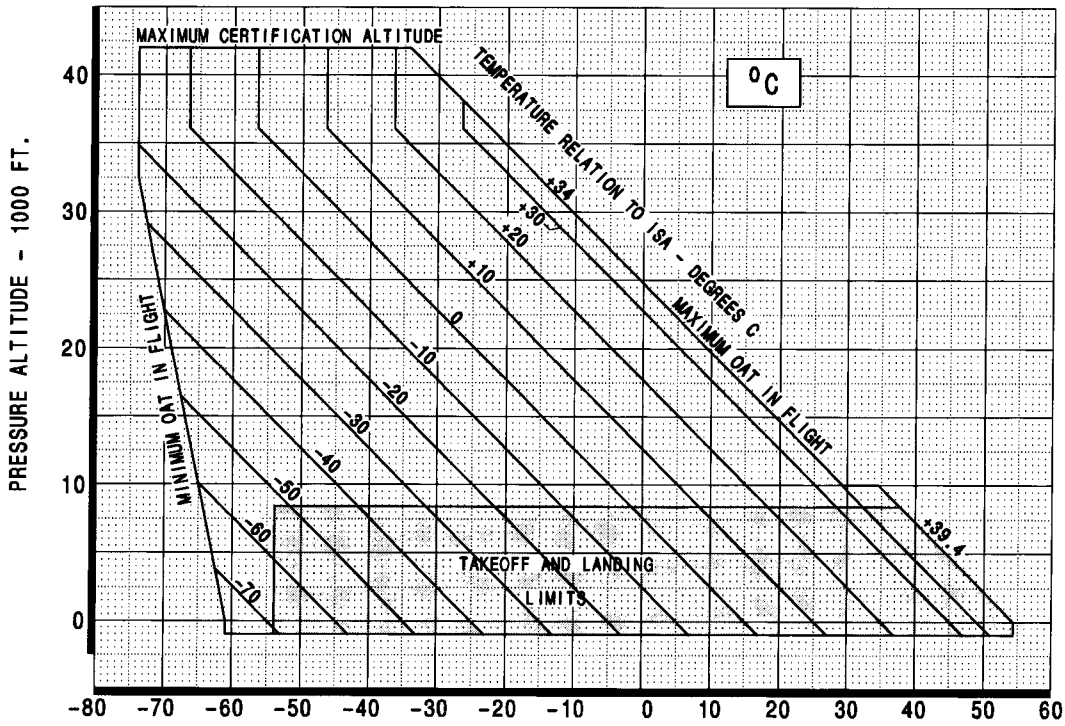
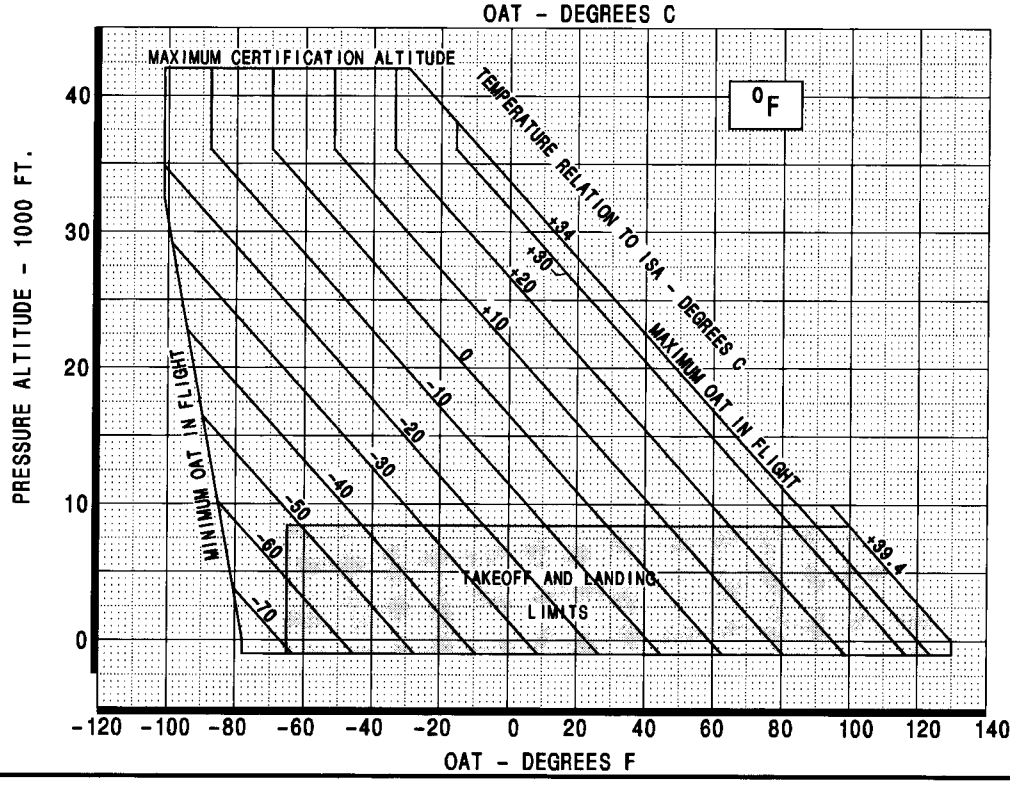
R17637

ENVIRONMENTAL ENVELOPE

■ ISA + 34°C UP TO 36,089 FT. ONLY.





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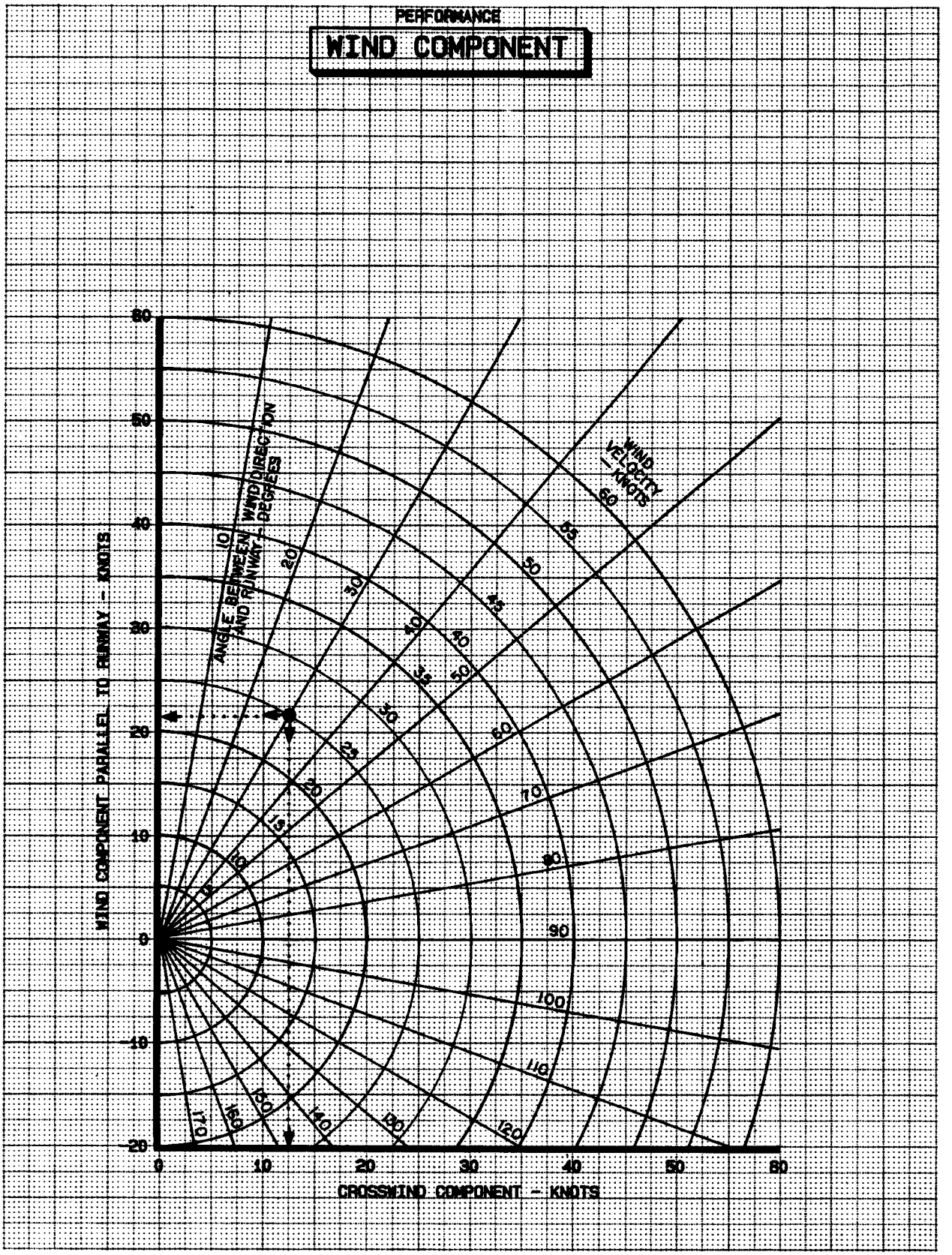
APPROVED	DATE
V. HILL	02-13-06

V. HILL
757-200

PERFORMANCE

WIND COMPONENT



P.C. 5S000118
D631N003 PG 4.1 - 20

YARNES	APPROVED	DATE
757-200	W. PAUL MH	8/9/84

6E4207

R17776

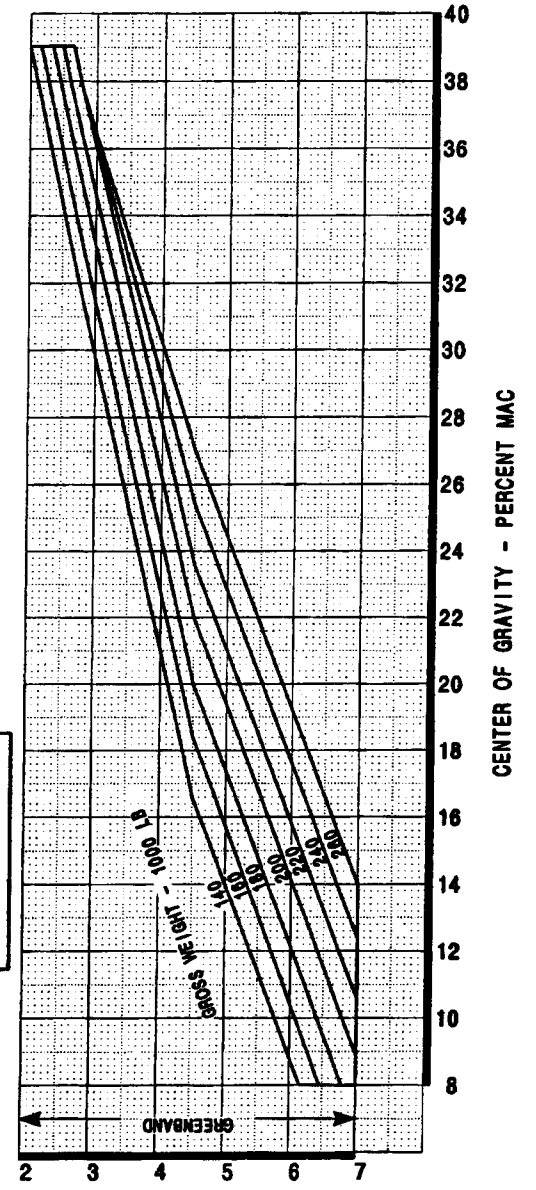
RECOMMENDED TAKEOFF STABILIZER SETTING

P.C. C500121001
D631N013 PG 4.1-21

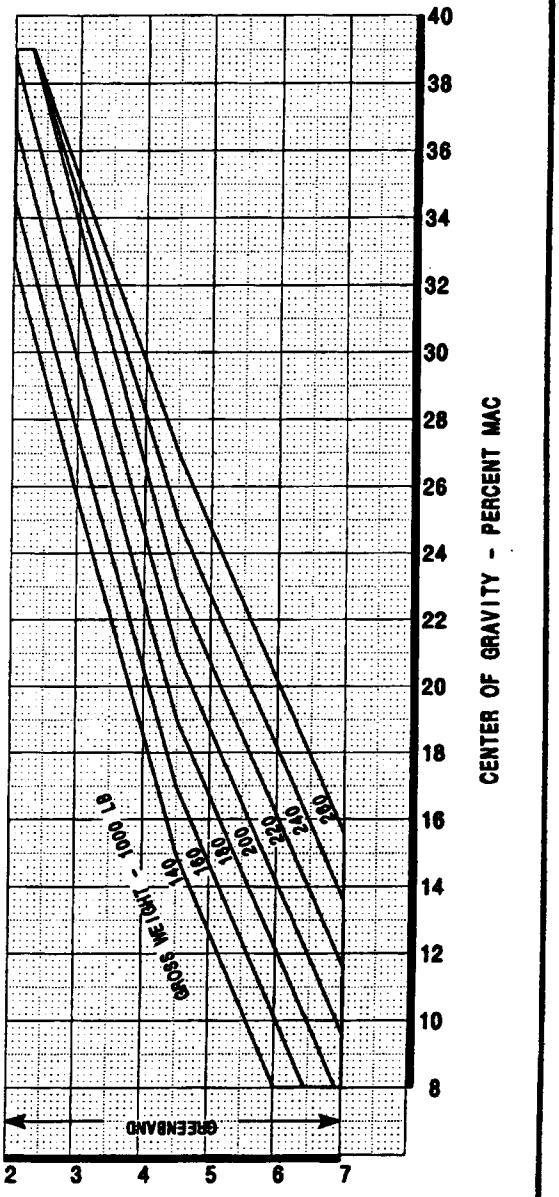
J. LARSON
757-200
PW2037

	APPROVED	DATE
	G.LARSON	12-01-97

FLAPS 1 AND 5



FLAPS 15 AND 20



S81524

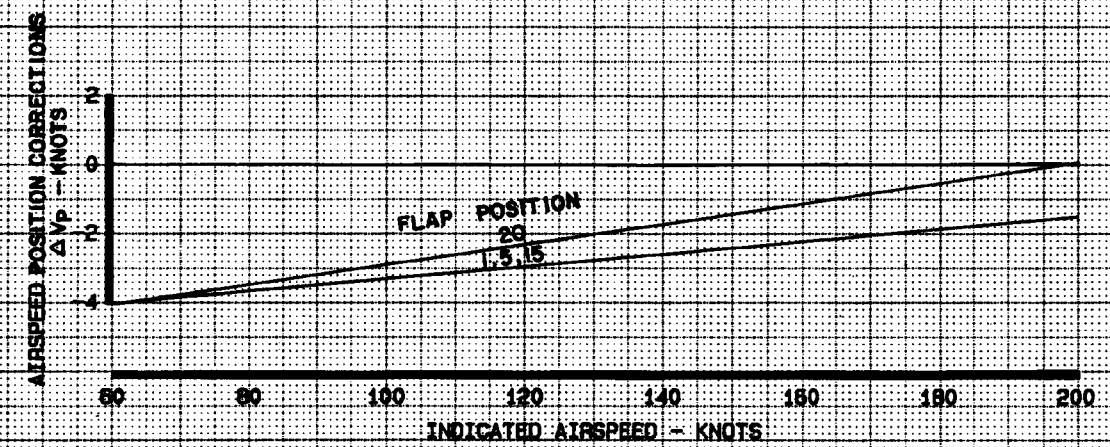
POSITION CORRECTIONS

PRIMARY STATIC SOURCE

NO CORRECTIONS ARE REQUIRED FOR NORMAL CRUISE OR FLAPS DOWN CONFIGURATIONS EXCEPT WHEN THE AIRPLANE IS ON THE GROUND.

GROUND ROLL ONLY

- APPLICABLE TO ALL WEIGHTS.
- TAXI ATTITUDE ON THE GROUND.
- CALIBRATED AIRSPEED $V_C = V_I + \Delta V_P$



P.C. 5S000121
D631N003 PG.4.1-22

APPROVED	DATE
W DALL NYE	01 0ct 84

C FRANK
757-200

E34207

R17781

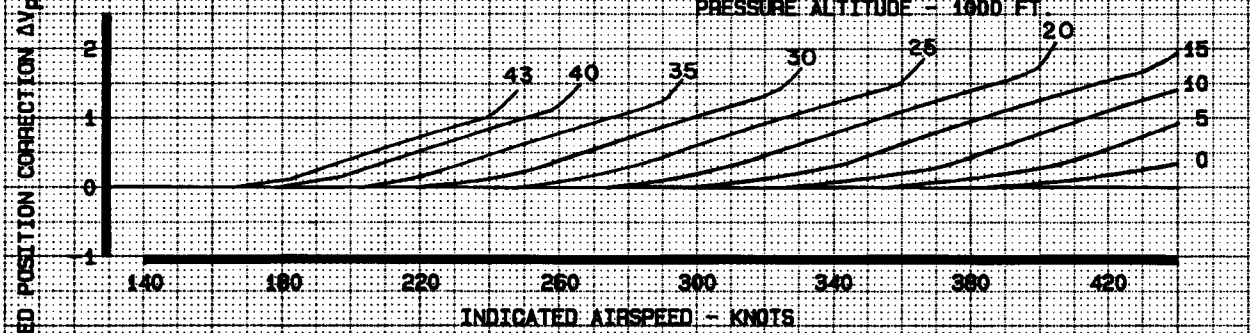
PERFORMANCE

POSITION CORRECTIONS

ALTERNATE STATIC SOURCE

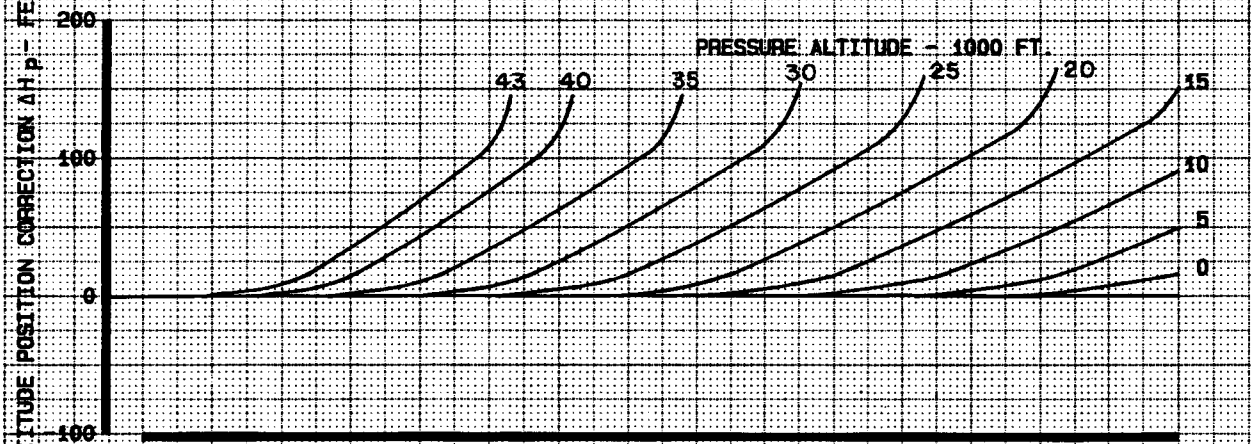
AIRSPEED

FLAPS UP



ALTITUDE

FLAPS UP



- APPLICABLE TO ALL WEIGHTS
- GEAR UP
- CALIBRATED AIRSPEED, $V_C = V_I + \Delta V_p$
- TRUE PRESSURE ALTITUDE $H_p = H_I + \Delta H_p$
- APPLICABLE ABOVE M_I = .5 ONLY. BELOW M_I = .5 USE PAGE 24.

P.C. 5S000122
D831N003 PAGE 4.1-23

MARTIN 757-200

APPROVED Paul Mt. DATE 8/11/84

66207

R17783

P.C. 5L000409
D631N003 PG. 4.I-24

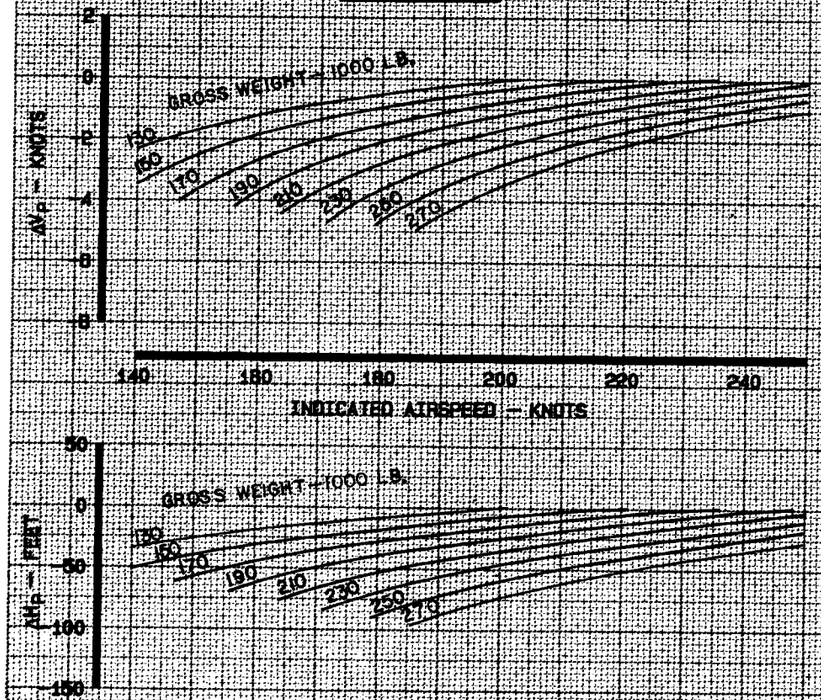
PERFORMANCE

POSITION CORRECTIONS

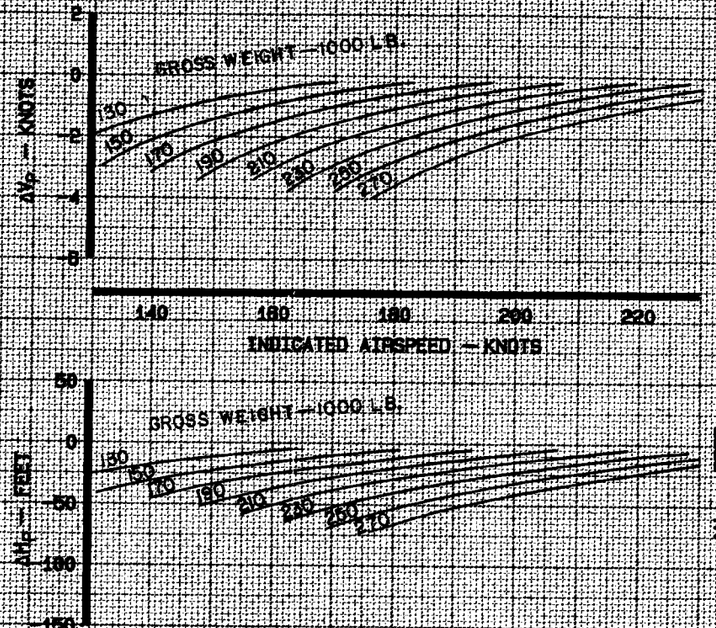
ALTERNATE STATIC SOURCE

NOTES:
1. CALIBRATED AIRSPEED $V_C = V_I + \Delta V_P$
2. TRUE PRESSURE ALTITUDE $H_P = H_I + \Delta H_P$
3. APPLICABLE TO TAKEOFF AND LANDING ALTITUDES ONLY.
4. USE FOR GEAR UP OR GEAR DOWN.

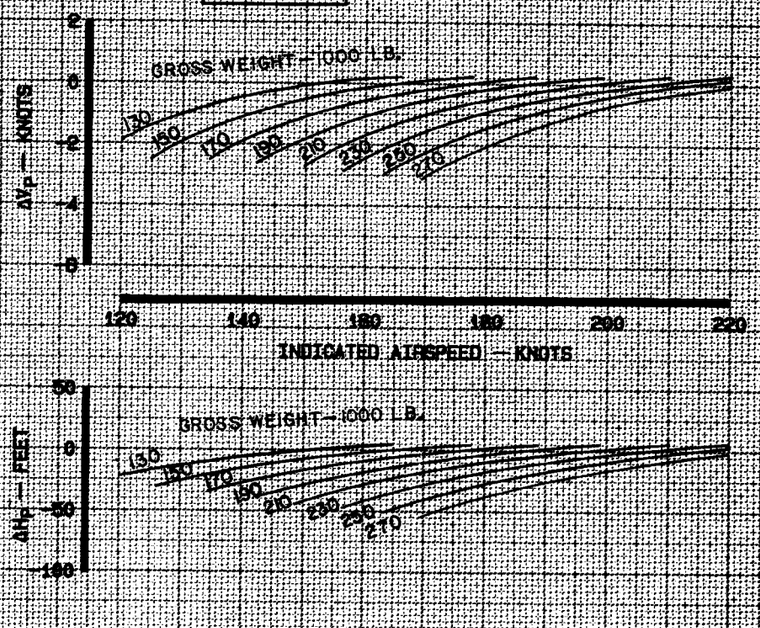
FLAPS 0, 1



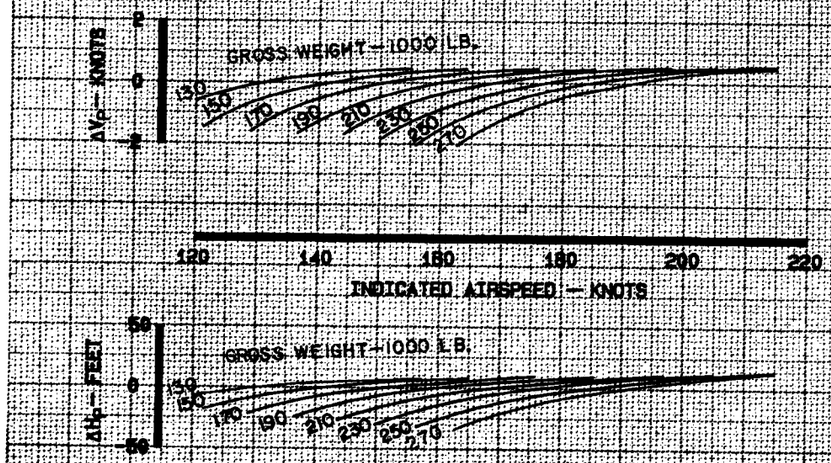
FLAPS 5



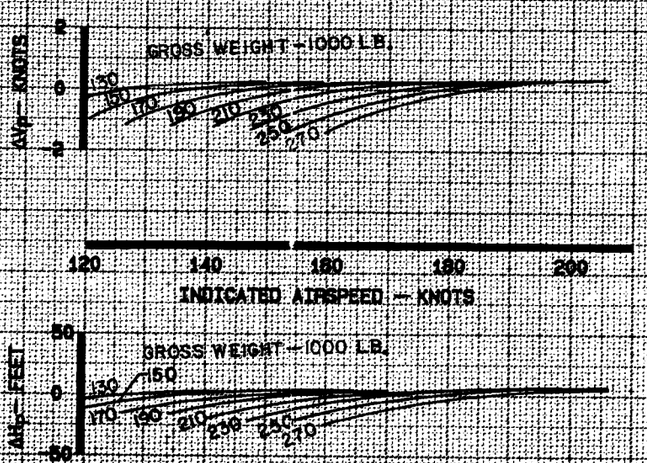
FLAPS 15



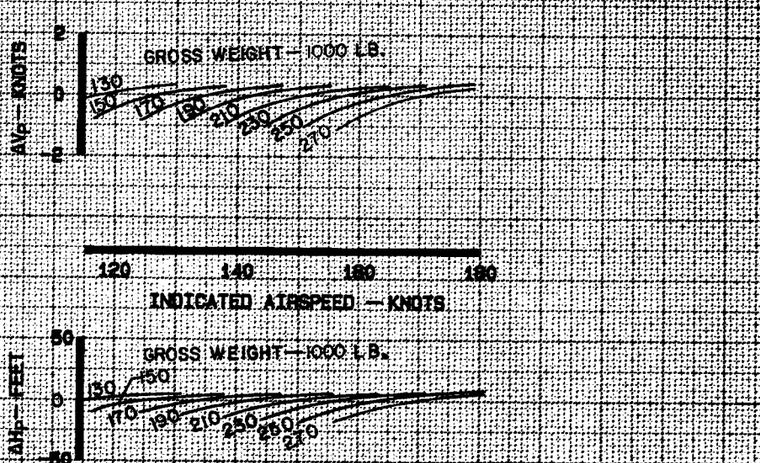
FLAPS 20



FLAPS 25



FLAPS 30



KREINER 757-200

APPROVED	DATE
W PAUL NR	8/9/84
R.S. [illegible]	7-11-87

R19558

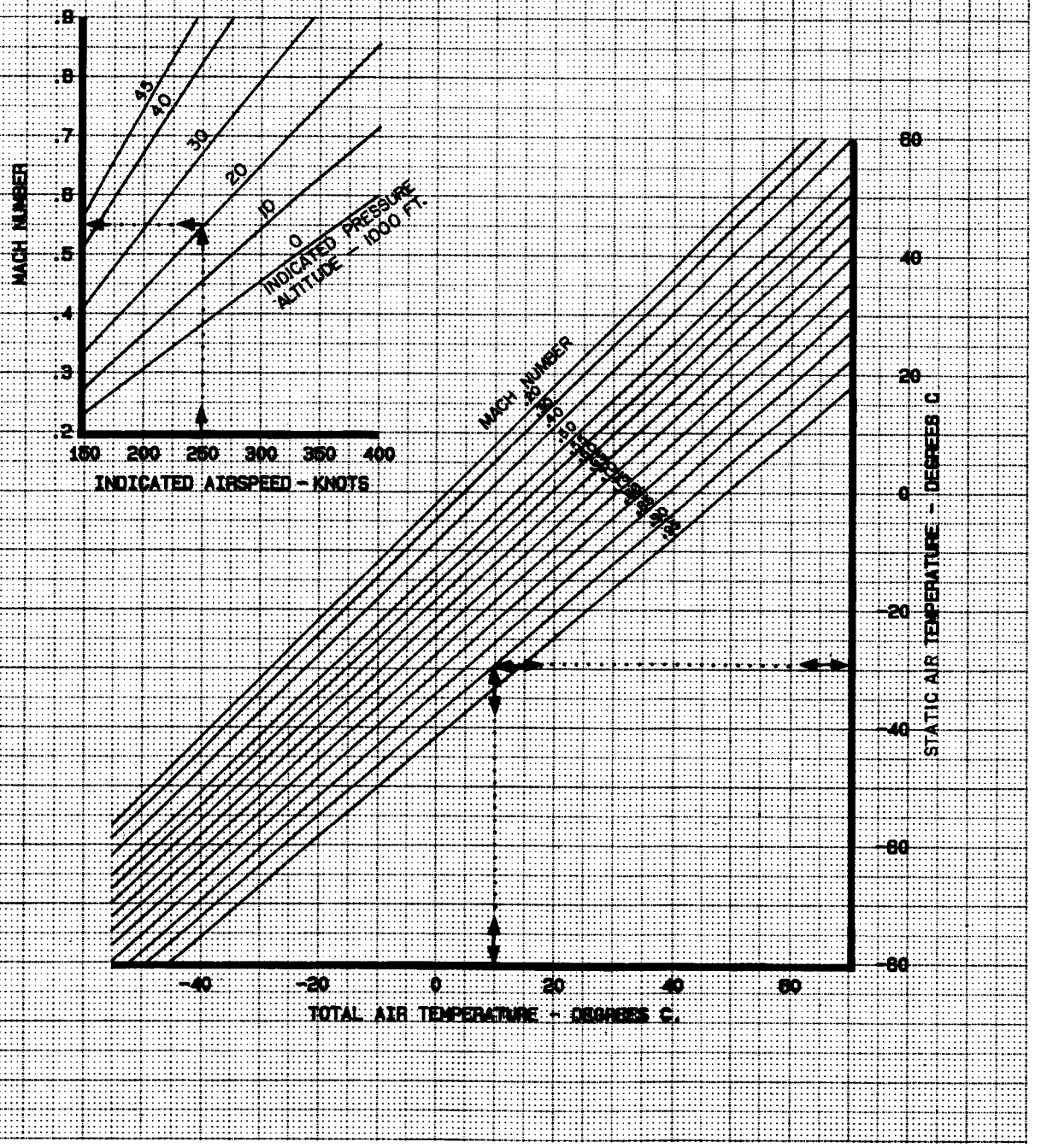
6E4208

PERFORMANCE

TEMPERATURE CONVERSION

TOTAL AIR-STATIC AIR

CONVERSION CHART FOR IAS TO MACH NUMBER



P.C. 5S000123
D041T502 PG. 4.1-25

YARNES	APPROVED	DATE
757-200	a/ Paul Mt.	8/9/84

664207

R17784

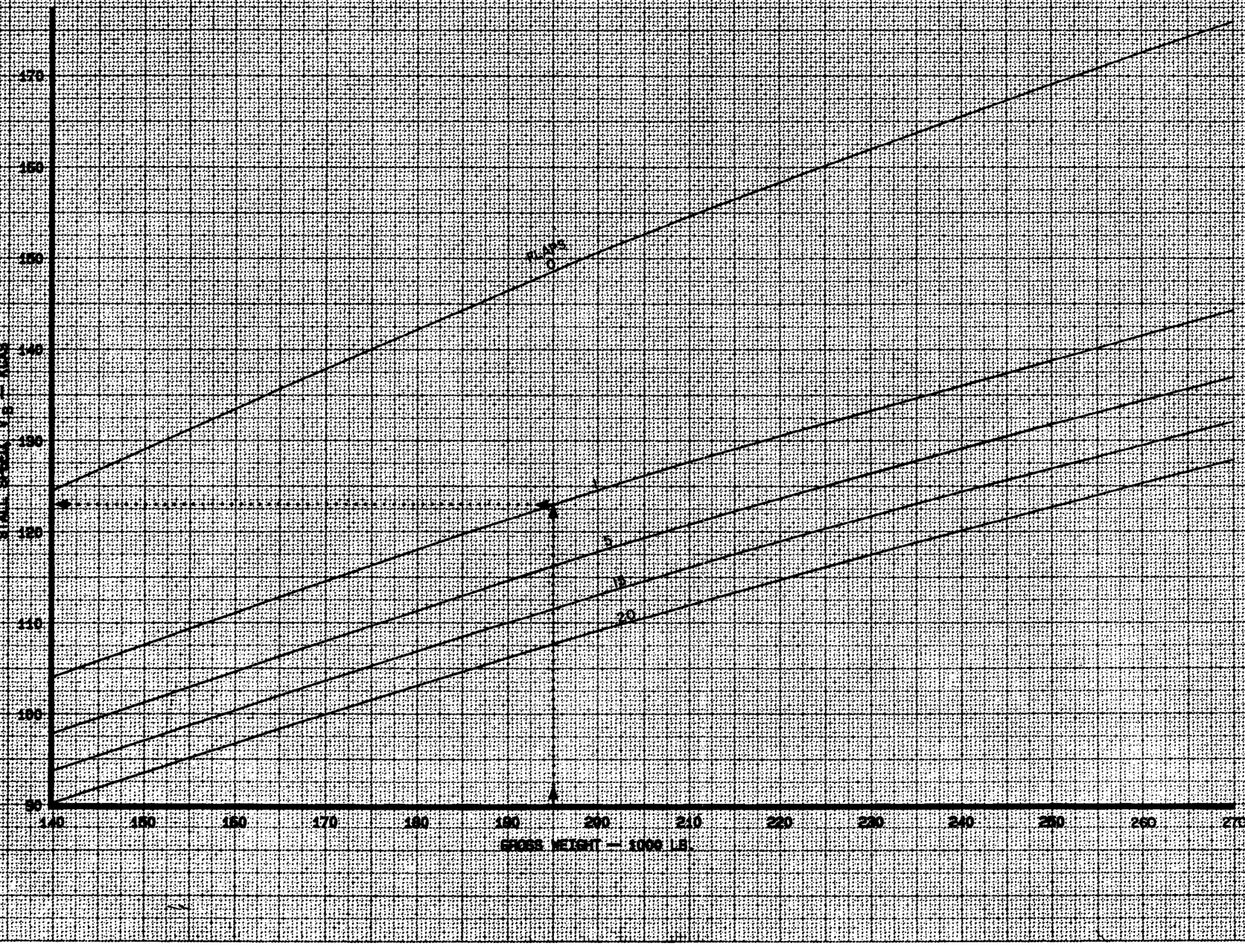
PERFORMANCE

STALL SPEEDS

GEAR UP

FLAPS 0, 1, 5, 15 & 20

● APPLICABLE TO TAKEOFF AND LANDING ALTITUDES ONLY.



P.C. 5L000411
D631N004 PG 4.1-27

C. SANDERS
757-200

APPROVED	DATE
W. PAUL KAY	2/11/94
G.T. Hayford JR	6-13-87

R19560

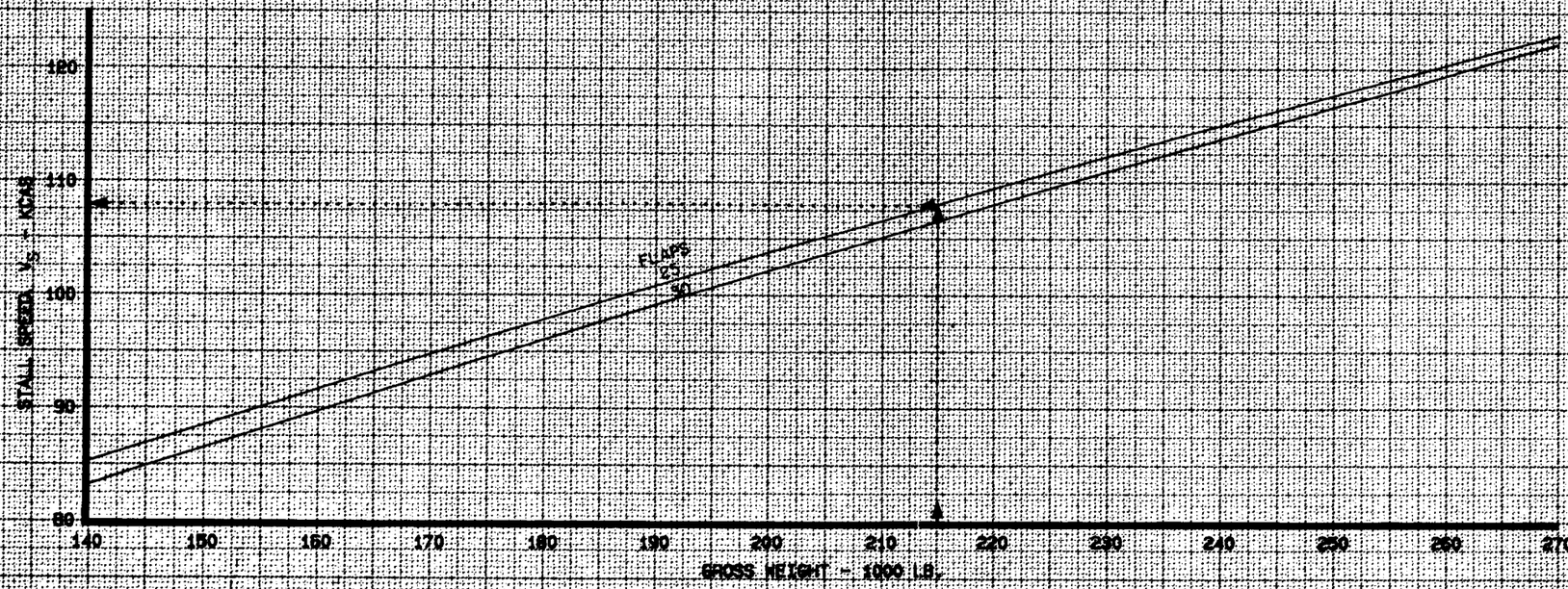
PERFORMANCE

STALL SPEEDS

GEAR DOWN

FLAPS 25 & 30

● APPLICABLE TO LANDING ALTITUDES ONLY.



P.C. BL000413
D631N004 PG. 4.1-27

APPROVED	DATE
G.T. Hoglund MM-83	7-20-87

C. SANDERS
757-200

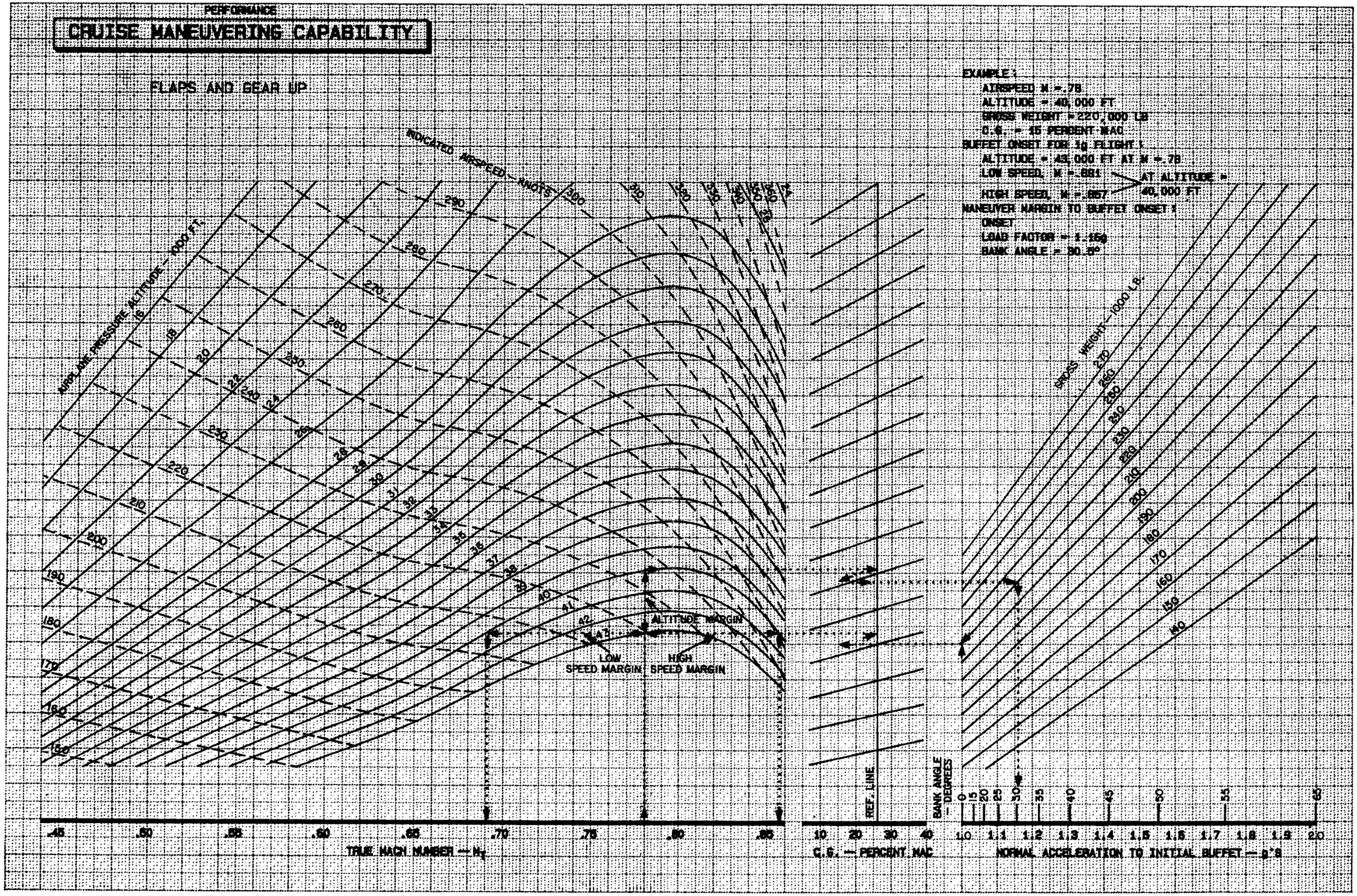
R19562

P.C. 5L000415
D631N003 PG. 4.1-28

PERFORMANCE

CRUISE MANEUVERING CAPABILITY

FLAPS AND GEAR UP



EXAMPLE:
AIRSPEED M = .78
ALTITUDE = 40,000 FT
GROSS WEIGHT = 220,000 LB
C.G. = 15 PERCENT MAC
BUFFET ONSET FOR 1g FLIGHT:
ALTITUDE = 43,000 FT AT M = .78
LOW SPEED, M = .681 — AT ALTITUDE = 40,000 FT
HIGH SPEED, M = .857
MANEUVER MARGIN TO BUFFET ONSET:
ONSET
LOAD FACTOR = 1.15g
BANK ANGLE = 30.2°

YARNES	APPROVED	DATE
757-200	w/ PAUL Nye MM-83 S.T. Hayland	8/19/87 6-13-90

R19564

SECTION 4.2 - ENGINE DATA

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GO-AROUND EPR (INFLIGHT TAKEOFF)	5
INFLIGHT EPR (MCT) (PRESSURE LIMIT)	6
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Noise Characteristics	10
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Certificated FAR Part 36, Stage 3 Noise Levels	10
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Noise Characteristics Applicability	10

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

S08056

ENGINE DATA

GENERAL

This section provides the Engine Power Setting Charts for the PW2037 engine as installed on the 757-200 airplane. The Inflight Restart Envelope is also provided for the pneumatic starter assist and the windmill start procedures.

For the PW2037 engine, power is set with engine pressure ratio (EPR). This power setting EPR 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.

Full power operation should be obtained by setting target values. Full throttle operation can cause engine overboost.

TAKEOFF POWER SETTING

Takeoff power must be set at an airplane velocity between 40 and 80 knots. Do not make further adjustments after 80 knots. Takeoff EPR is determined by entering the Takeoff EPR chart with pressure altitude and ambient temperature. EPR adjustments for air conditioning packs and engine thermal anti-ice are included on the chart. Reduce EPR by the sum of the appropriate EPR adjustments.

GO-AROUND POWER SETTING

The Go-Around EPR chart provides EPR power setting for go-around rating. Target EPR is determined by entering the chart with pressure altitude and total inlet air temperature (TAT). EPR adjustments for air conditioning packs, engine and wing thermal anti-ice are included on the chart. Reduce EPR by the sum of the appropriate EPR adjustments.

INFLIGHT POWER SETTING

The Inflight EPR charts for maximum continuous power rating provide the procedure for determining Inflight EPR power settings. Separate charts are included to determine the Pressure Limit EPR and the Temperature Limit EPR.

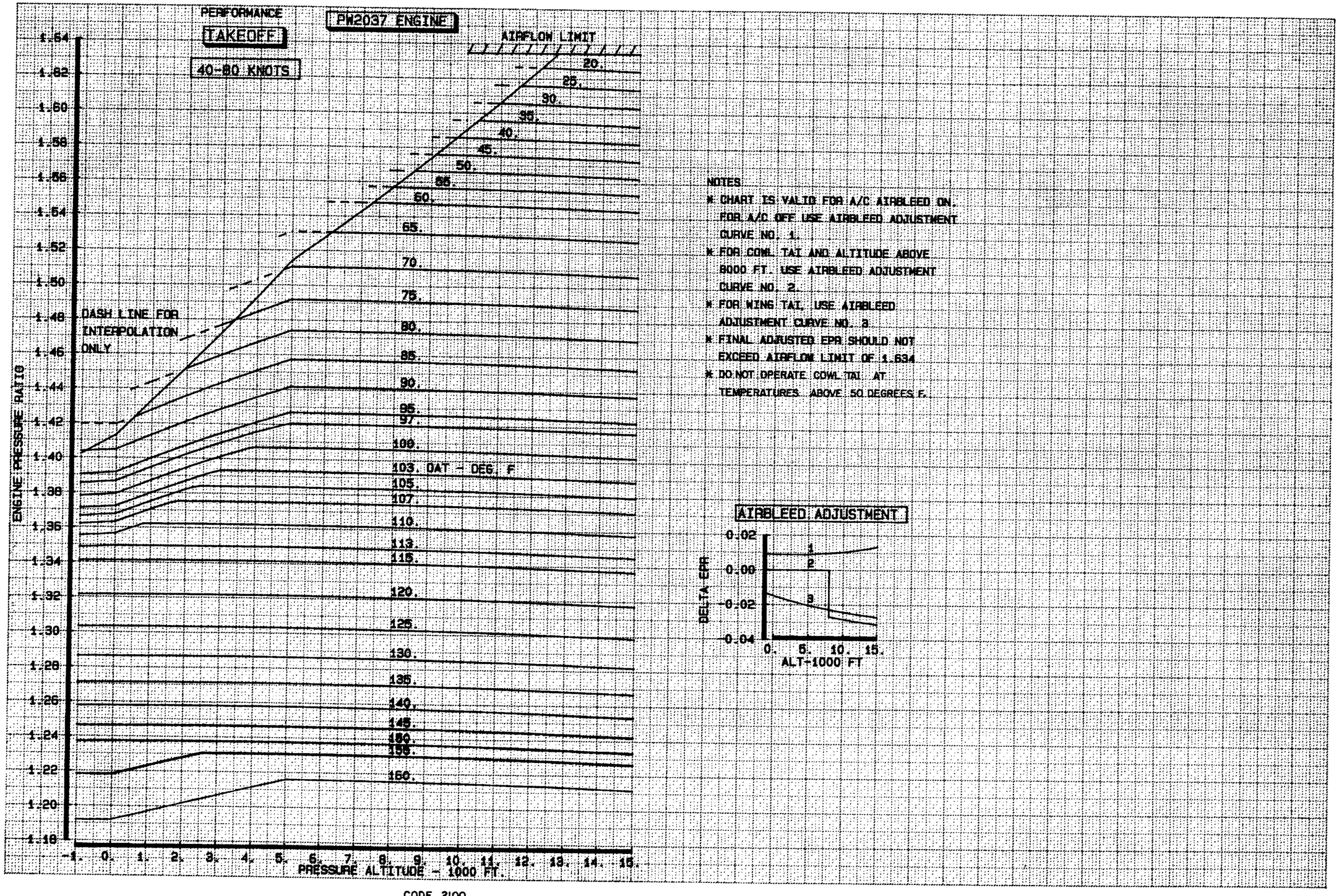
ENGINE DATA

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

To determine power setting EPR, enter the 'Pressure Limit 1' subchart with the pressure altitude and airplane Mach number to obtain an EPR. Then determine EPR1 from 'Temperature Limit 1' subchart and apply altitude correction. Next determine EPR2 from 'Temperature Limit 2' subchart and apply altitude correction. Select the greater of EPR1 and EPR2. Finally, use the lower EPR as determined between Pressure Limit subchart and altitude corrected Temperature Limit EPR. Make airbleed adjustments as appropriate.

R17342

P.C. 8L000417



NOTES

* CHART IS VALID FOR A/C AIRBLEED ON. FOR A/C OFF USE AIRBLEED ADJUSTMENT CURVE NO. 1.
* FOR COWL TAI AND ALTITUDE ABOVE 8000 FT. USE AIRBLEED ADJUSTMENT CURVE NO. 2.
* FOR WING TAI, USE AIRBLEED ADJUSTMENT CURVE NO. 3
* FINAL ADJUSTED EPR SHOULD NOT EXCEED AIRFLOW LIMIT OF 1.634
* DO NOT OPERATE COWL TAI AT TEMPERATURES ABOVE 50 DEGREES F.

APPROVED	DATE
JJA NH-12	9/17/84

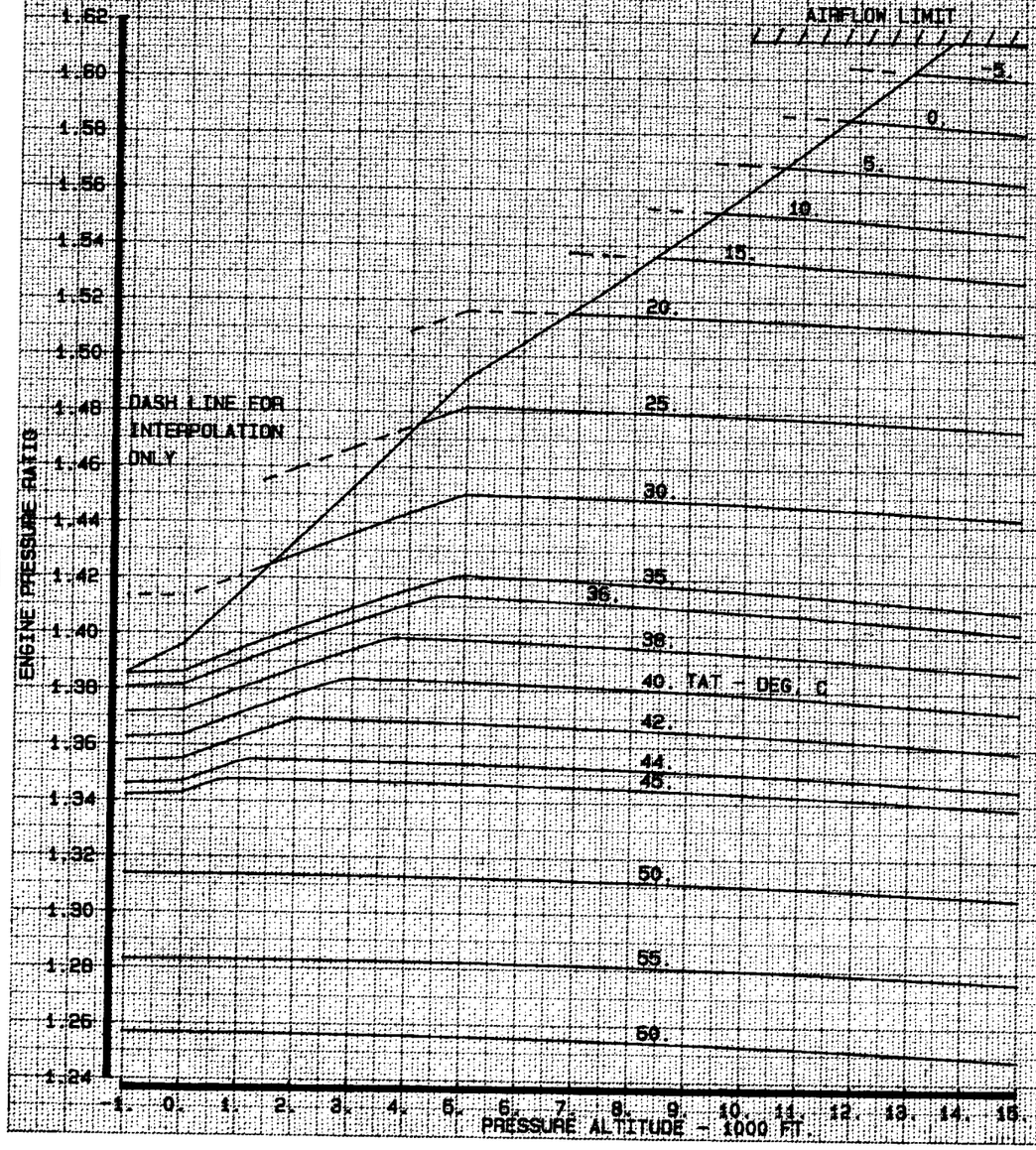
757-200
PW2037
EPR POWER SETTING

PERFORMANCE

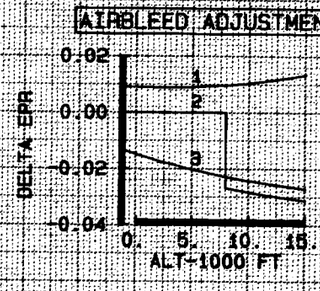
GO AROUND

PW2037 ENGINE

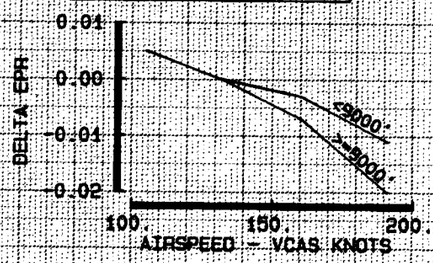
NOTES
1) CHART IS VALID FOR A/C AIRBLEED ON. FOR A/C OFF USE AIRBLEED ADJUSTMENT CURVE NO. 1.
2) FOR COWL TAI AND ALTITUDE ABOVE 8000 FT. USE AIRBLEED ADJUSTMENT CURVE NO. 2.
3) FOR WING TAI, USE AIRBLEED ADJUSTMENT CURVE NO. 3.
4) EPR FROM STEPS 1-3 SHOULD NOT EXCEED AIRFLOW LIMIT OF 1.813.
5) APPLY AIRSPEED ADJUSTMENT TO EPR FROM STEP 4.
6) DO NOT OPERATE COWL TAI AT TEMPERATURES ABOVE 10 DEGREES C.



AIRBLEED ADJUSTMENT



AIRSPEED ADJUSTMENT



P.C. BL000418

APPROVED	DATE
[illegible]	9/20/84

757-200
PW2037
EPR POWER SETTING

R19706

6E4208

PERFORMANCE

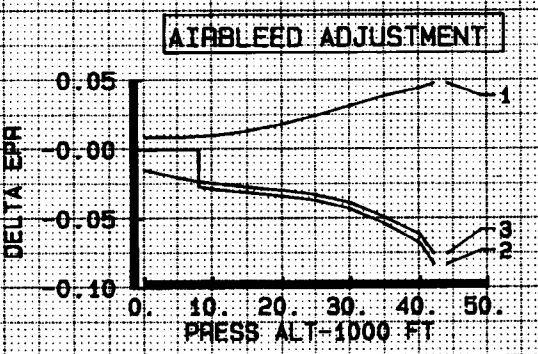
INFLIGHT POWER SETTING

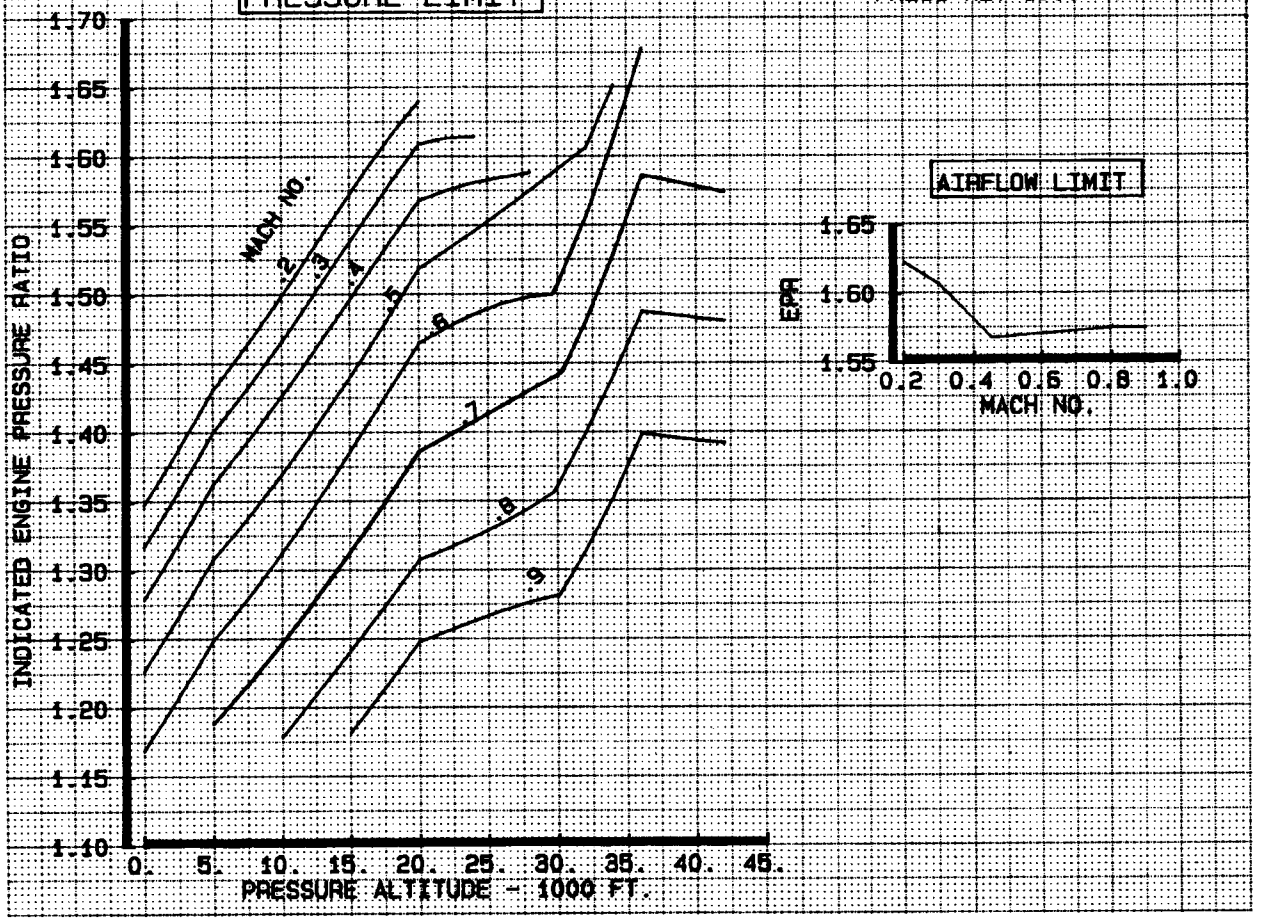
PW2037 ENGINE

MAXIMUM CONTINUOUS

NOTE

1) USE LOWER OF PRESSURE OR ALTITUDE CORRECTED TEMPERATURE (PAGE 7) LIMIT EPR
2) CHART IS VALID FOR A/C AIRBLEED ON. FOR A/C AIRBLEED OFF, USE AIRBLEED ADJUSTMENT CURVE NO. 1
3) FOR COWL TAI AND ALTITUDE ABOVE 8000 FT., USE AIRBLEED ADJUSTMENT CURVE NO. 2
4) FOR WING TAI, USE AIRBLEED ADJUSTMENT CURVE NO. 3.
5) EPR FROM STEPS 1-4 SHOULD NOT EXCEED EPR FROM AIRFLOW LIMIT SUBCHART





P.C. 5S000124

APPROVED	DATE
J.J. Aiken NM-12	9/25/84

757-200
PW2037
EPR POWER SETTING

64207

R17785

PERFORMANCE

INFLIGHT POWER SETTING

PW2037 ENGINE

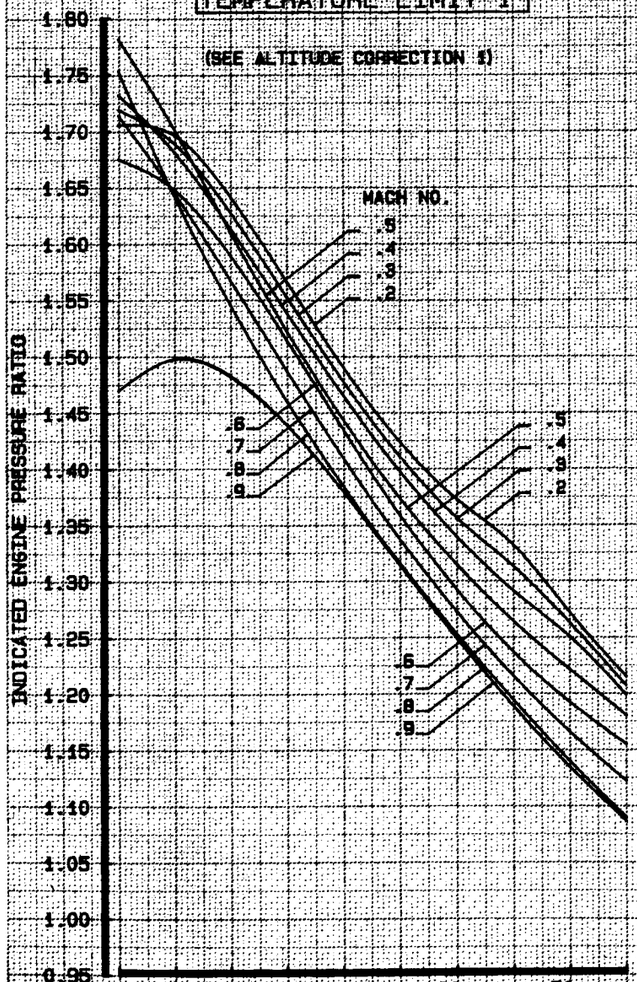
MAXIMUM CONTINUOUS

NOTE
1. USE LOWER OF PRESSURE (PAGE 6) OR ALTITUDE CORRECTED TEMPERATURE LIMIT EPR
2. CHART IS VALID FOR A/C AIRBLEED ON

TEMPERATURE LIMIT EPR CALCULATION
1) DETERMINE EPR1 FROM TEMPERATURE LIMIT 1 CHART. APPLY ALTITUDE CORRECTION 1.
2) DETERMINE EPR2 FROM TEMPERATURE LIMIT 2 CHART. APPLY ALTITUDE CORRECTION 2.
3) SELECT GREATER OF EPR1 AND EPR2
4) FOR A/C AIRBLEED OFF, USE AIRBLEED ADJUSTMENT CURVE NO. 1
5) FOR CONL TAI AND ALTITUDE ABOVE 8000 FT., USE AIRBLEED ADJUSTMENT CURVE NO. 2
6) FOR WING TAI, USE AIRBLEED ADJUSTMENT CURVE NO. 3
7) EPR FROM STEPS 1-6 SHOULD NOT EXCEED EPR FROM AIRFLOW LIMIT SUBCHART

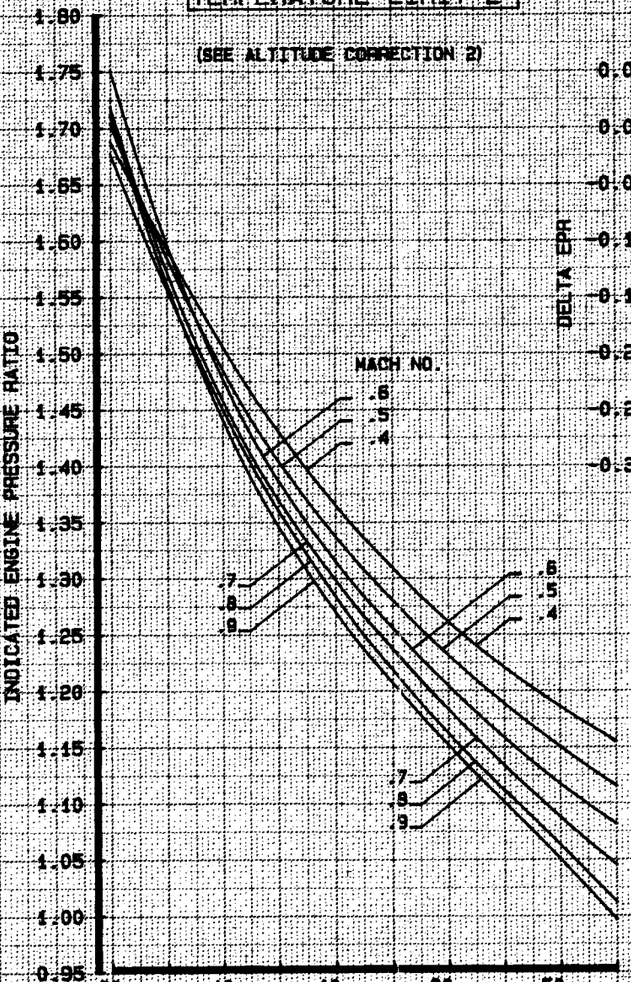
TEMPERATURE LIMIT 1

(SEE ALTITUDE CORRECTION 1)

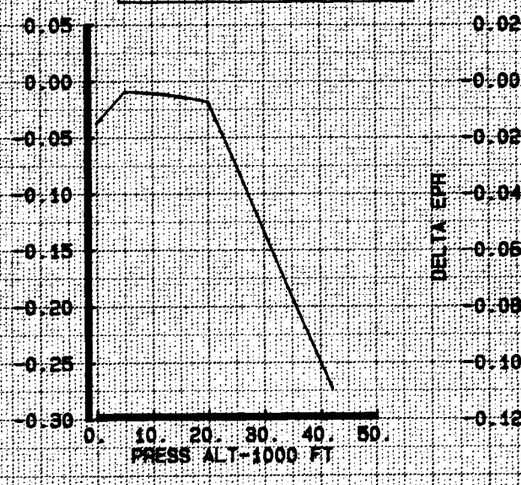


TEMPERATURE LIMIT 2

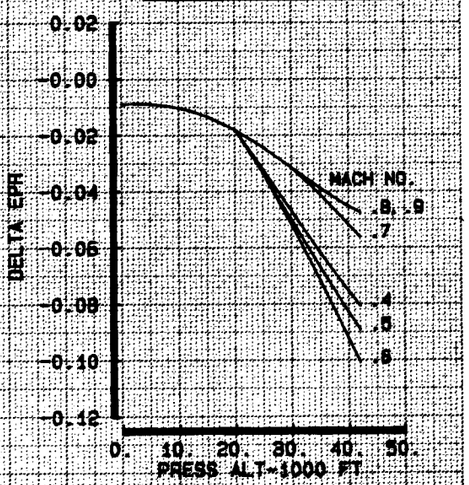
(SEE ALTITUDE CORRECTION 2)



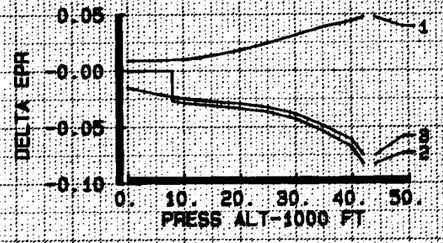
ALTITUDE CORRECTION FOR TEMPERATURE LIMIT 1



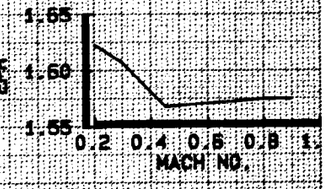
ALTITUDE CORRECTION FOR TEMPERATURE LIMIT 2



AIRBLEED ADJUSTMENT



AIRFLOW LIMIT

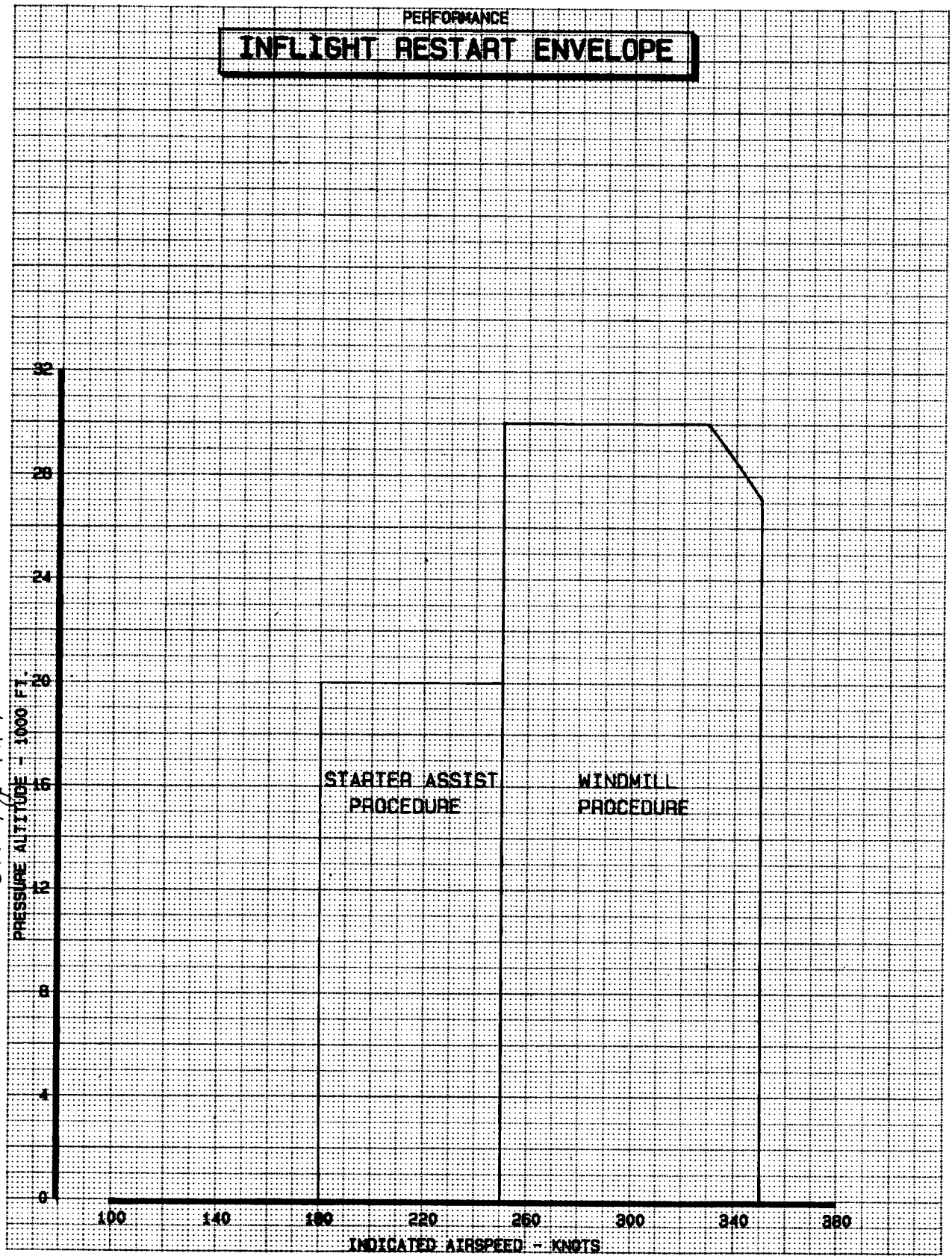


APPROVED	DATE
[illegible]	9/25/84

757-200
PW2037
EPR POWER SETTING

P.C. 6L000420

INFLIGHT RESTART ENVELOPE



P.C. 6S000125
D631N013 PG 4.2-8

MARTIN 757-200 PW SERIES	APPROVED	DATE
	[illegible]	10/15/86
	[illegible]	6/19/87
	[illegible]	8/17/87

664207

R17787

NOISE CHARACTERISTICS

CONFIGURATION

Engines:	PW2037 with Quiet Fan Case (QFC) [1]
Model:	757-200
Nacelle Treatment:	Basic Configuration Including Inlet, Fan Duct and Tail Pipe 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.

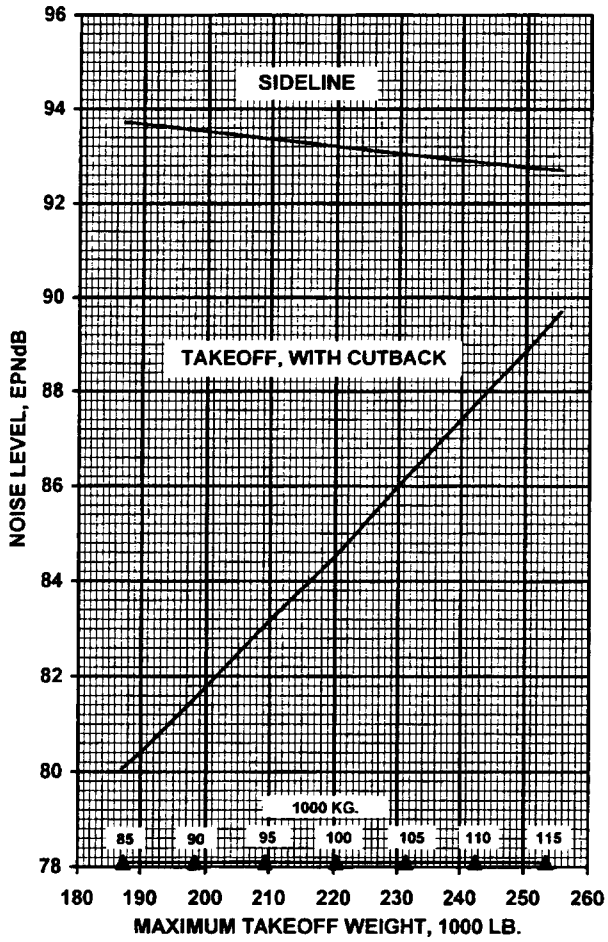
SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

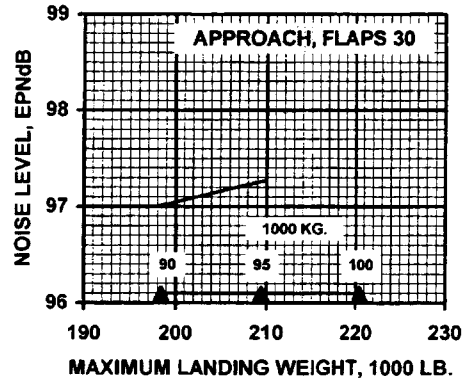
The test and analysis procedures used to obtain the FAR Part 36, Stage 3 noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Chapter 3. The ICAO Annex 16, Chapter 3 data is applicable only after approval by the proper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





Note:

1. Quiet Fan Case installed per Pratt & Whitney engine modification REA 97FA021C; or REAs 97FA021 and 97FA021A; or Pratt & Whitney Service Bulletin 72-633.

V16626

NOISE CHARACTERISTICS

CONFIGURATION

Engines:	PW2037
Model:	757-200
Nacelle Treatment:	Basic Configuration Including Inlet, Fan Duct and Tail Pipe 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.

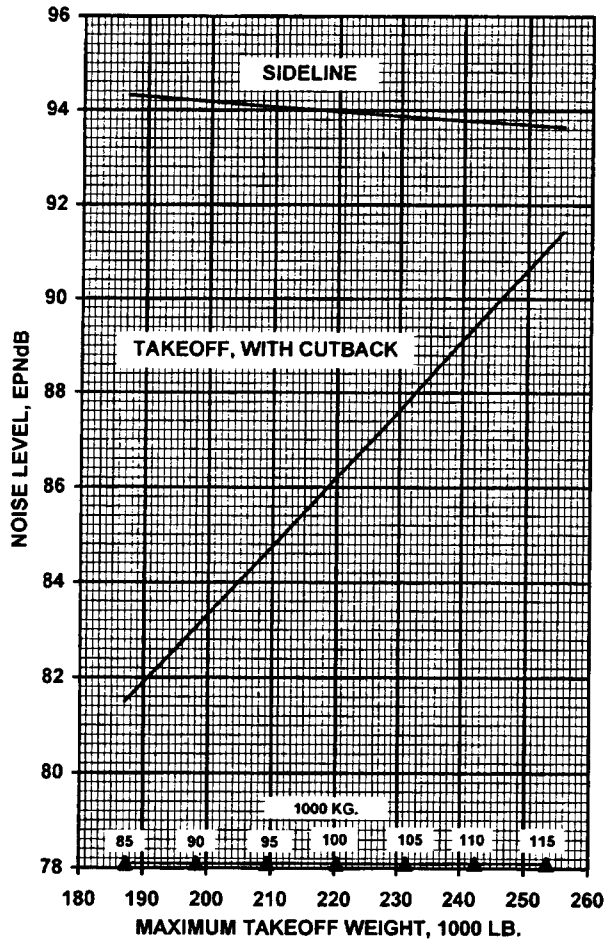
SUPPLEMENTAL ICAO ANNEX 16, CHAPTER 3 NOISE LEVEL INFORMATION

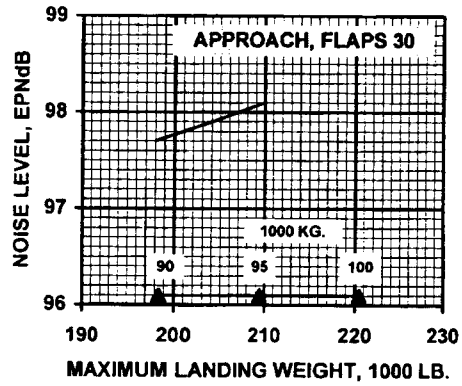
The test and analysis procedures used to obtain the FAR Part 36, Stage 3 noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume 1, Chapter 3. The ICAO Annex 16, Chapter 3 data is applicable only after approval by the proper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





V16625

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.

R17344

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.

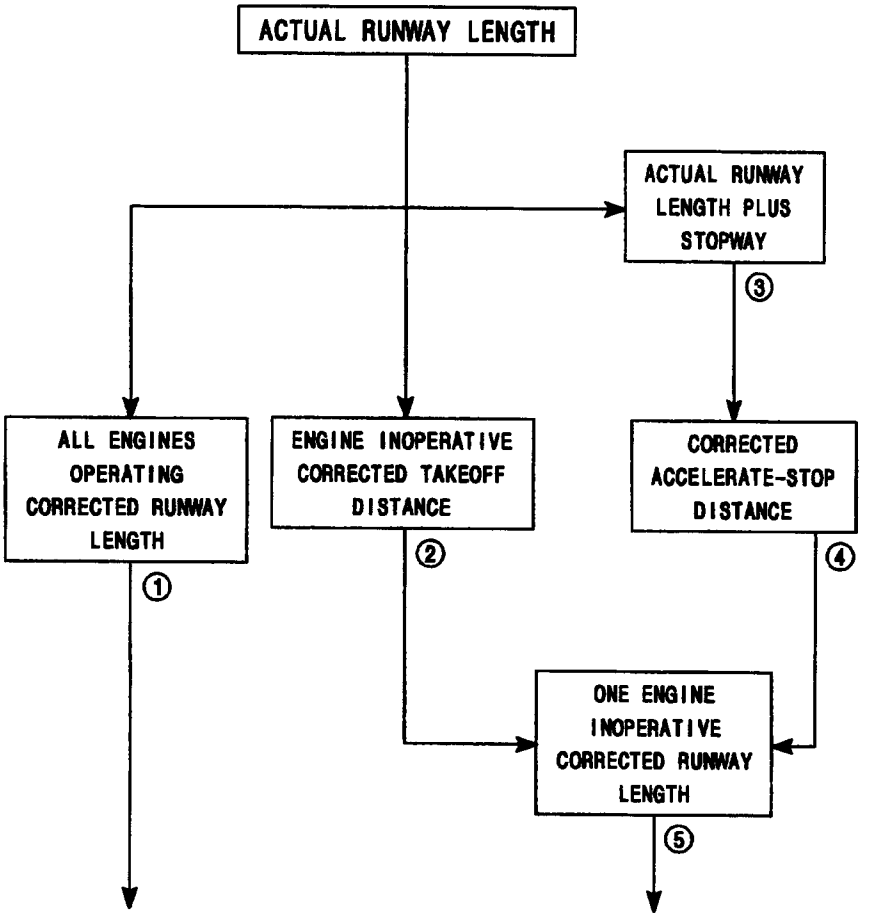
   The runway length with zero stopway, slope, and wind that provides, with anti-ice off and all brakes and antiskid operative, the same performance as the actual runway conditions available with the anti-ice, brake, and antiskid configuration selected when one engine becomes inoperative at VEF and the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

CORRECTED RUNWAY LENGTH DETERMINATION (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



C500304000

V.HILL 10-05-95

NAME L. ENEBRAD

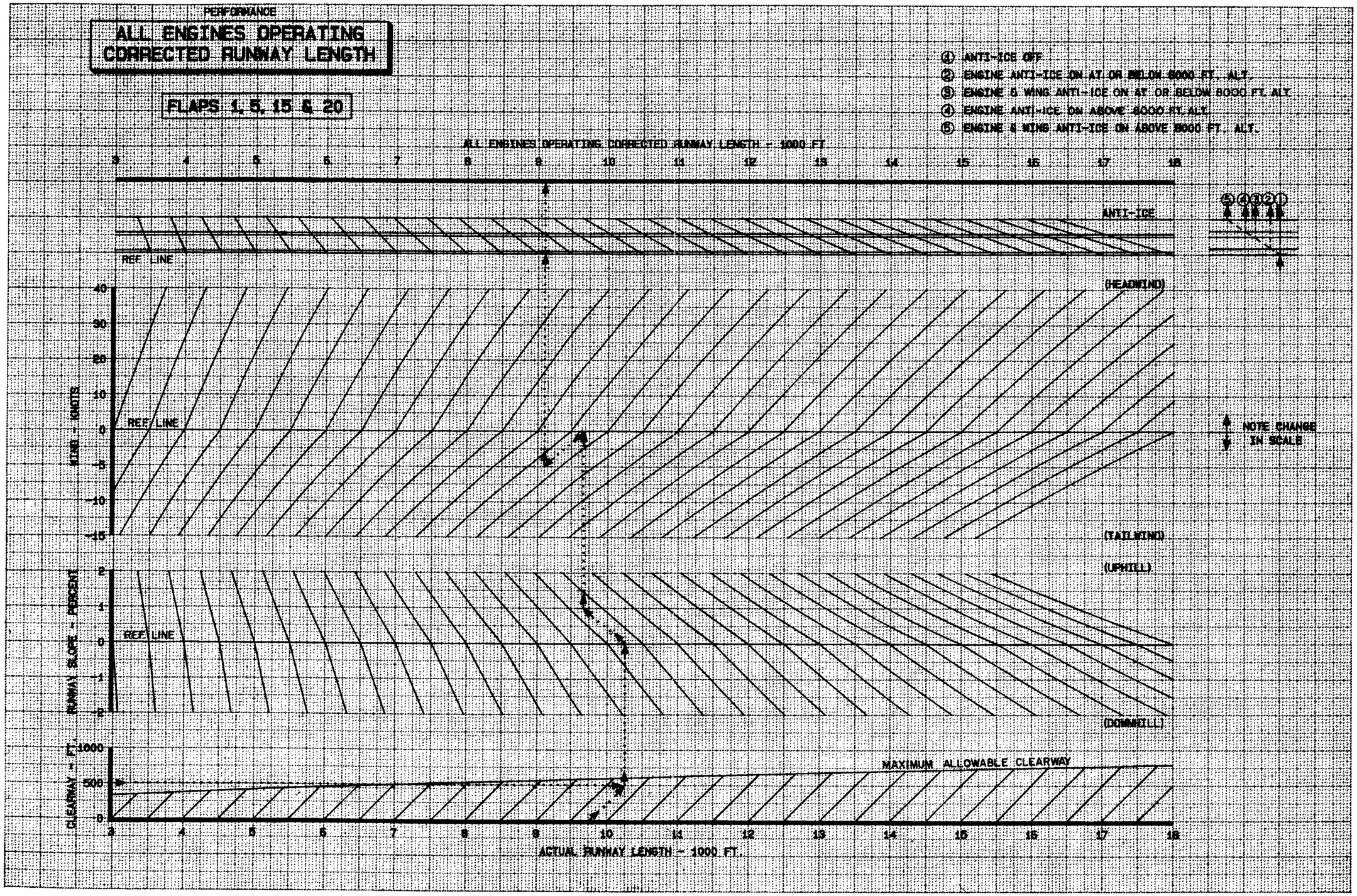
S08064

P.C. 85000422
D631N013
PG. 4.3-5

PERFORMANCE

ALL ENGINES OPERATING CORRECTED RUNWAY LENGTH

FLAPS 1, 5, 15 & 20



APPROVED	DATE
M. LEONARD MTC-309	23 Aug 84

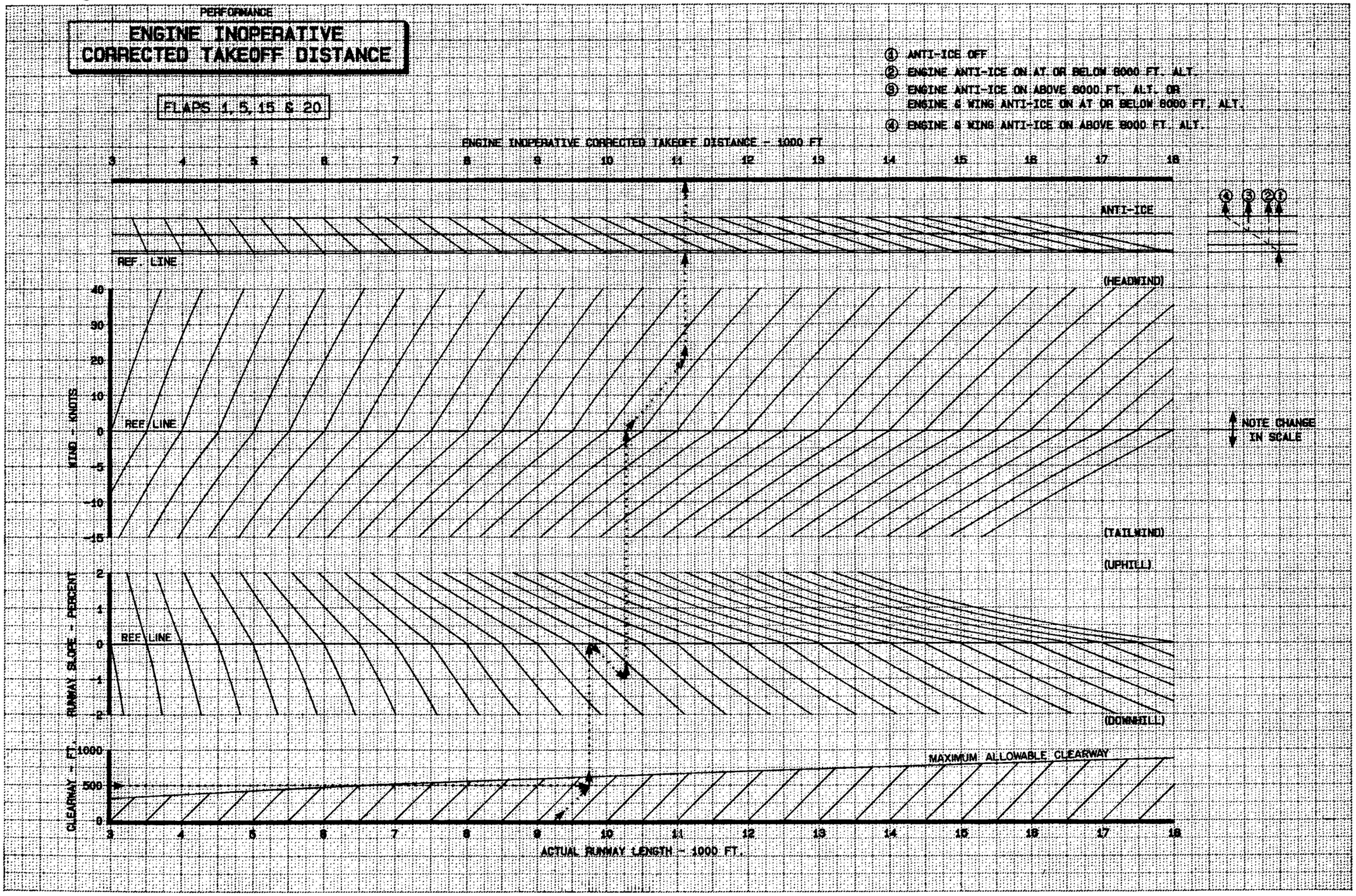
KOSTOFF
757-200
PW 2037

PERFORMANCE

ENGINE INOPERATIVE CORRECTED TAKEOFF DISTANCE

FLAPS 1, 5, 15 & 20

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT. OR ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.



P.C. BL000423
D631N013 PG. 4.3-6

APPROVED	DATE
C.S.II; MODEL	9.4.84

KOSTOFF
757-200
PW 2037

R19712

P.C. 5L000421
D631N013 PG. 4.3-7

KOSTOFF
757-200
PW 2037

APPROVED	DATE
W.K. PAUWELS	9/18/87
BRANIFF INTERNATIONAL	4/10/86

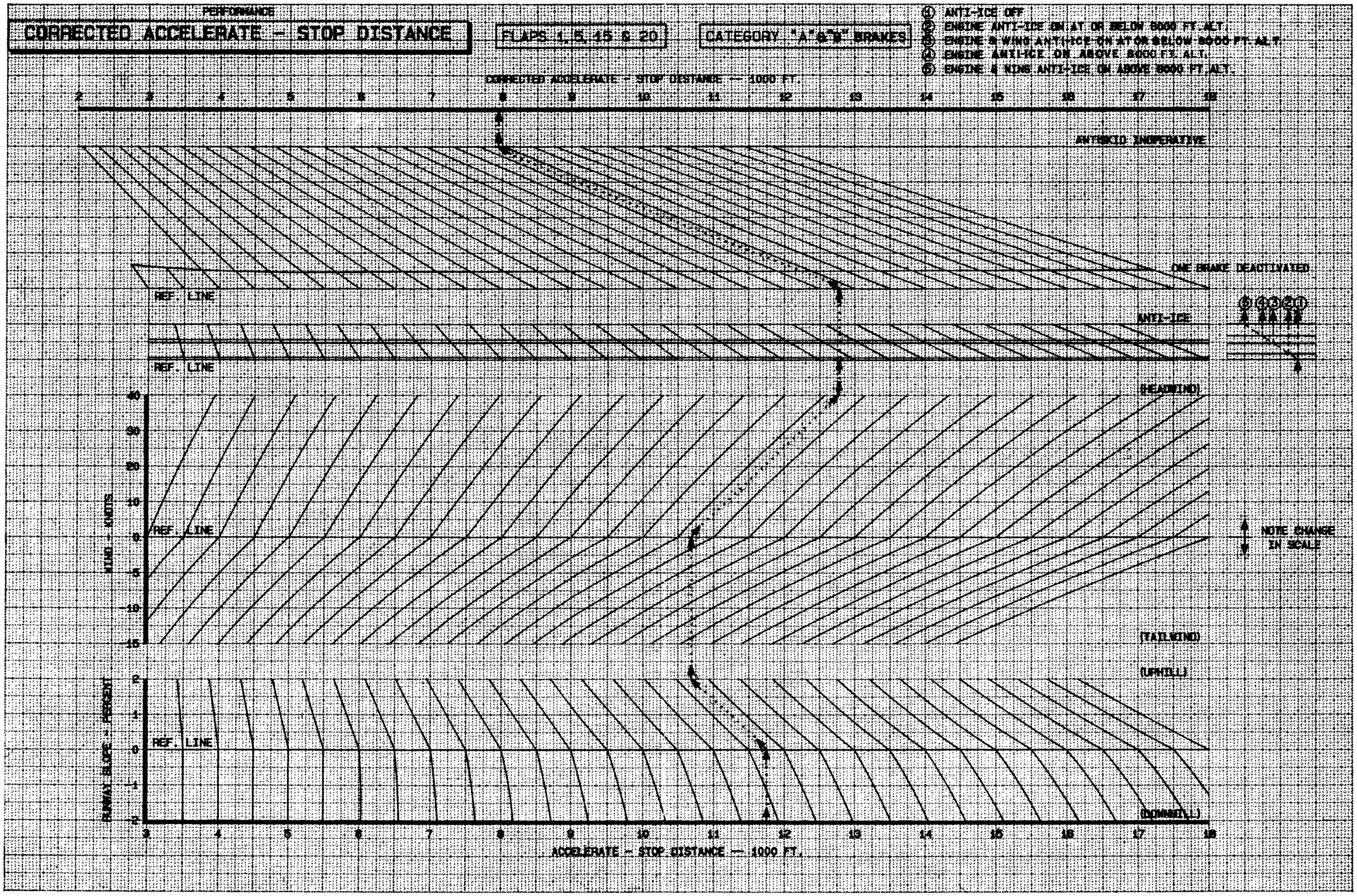
PERFORMANCE

CORRECTED ACCELERATE - STOP DISTANCE

FLAPS 1, 5, 15 & 20

CATEGORY "A" & "B" BRAKES

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.
⑤ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.

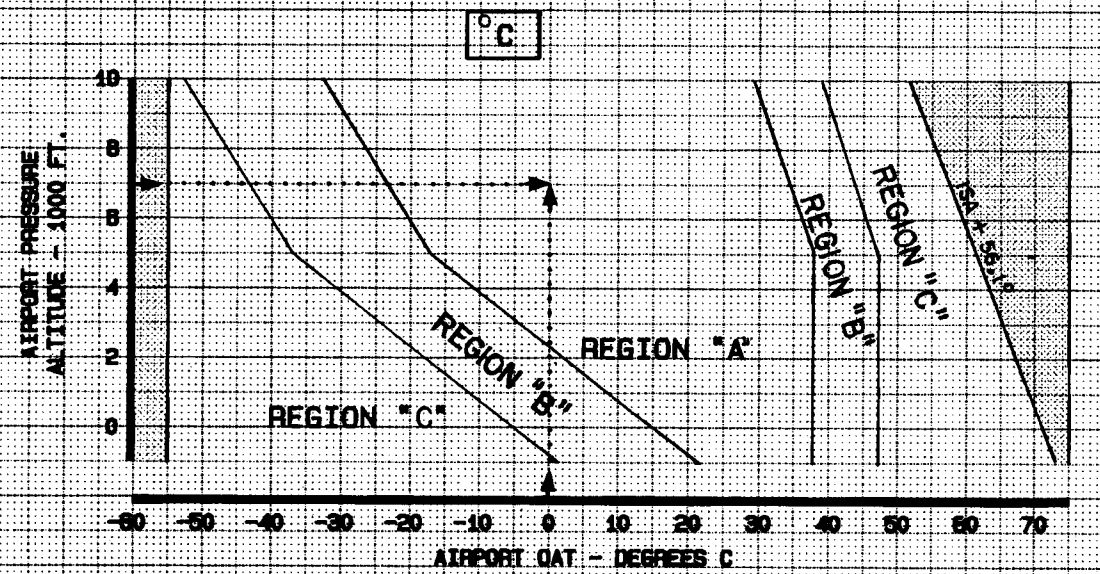


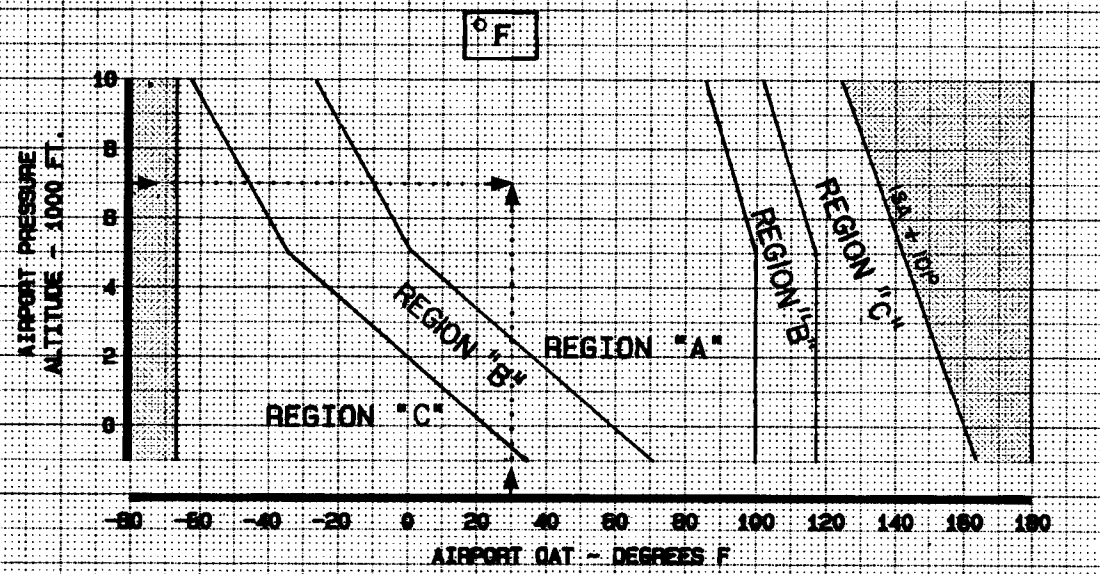
R19715

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. 55000127
D631N013 PG. 4.3-8

YARNES	APPROVED	DATE
757-200	R&NM-135	9/13/84
PW 2037		

6F4207

R17795

PERFORMANCE

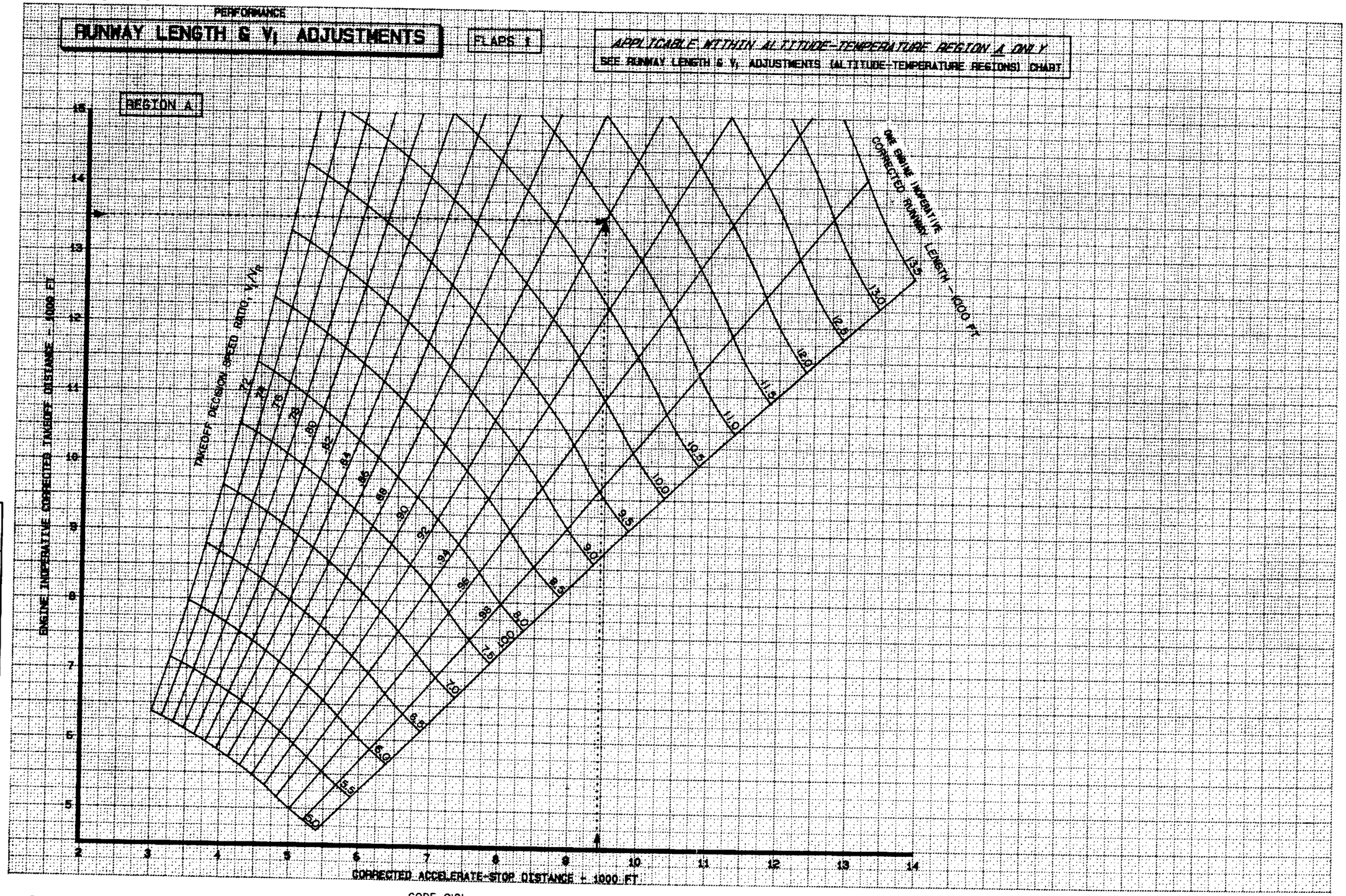
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



P.C. 5L000425
D631N013 PG. 4.3-9

KOSTOFF
757-200
PW 2037

APPROVED	DATE
H Anderson for JB	8/21/96
L Brown	7/22/96

S08581

GF 4208

P.C. 5L000428
D631N013 PG. 4.3-10

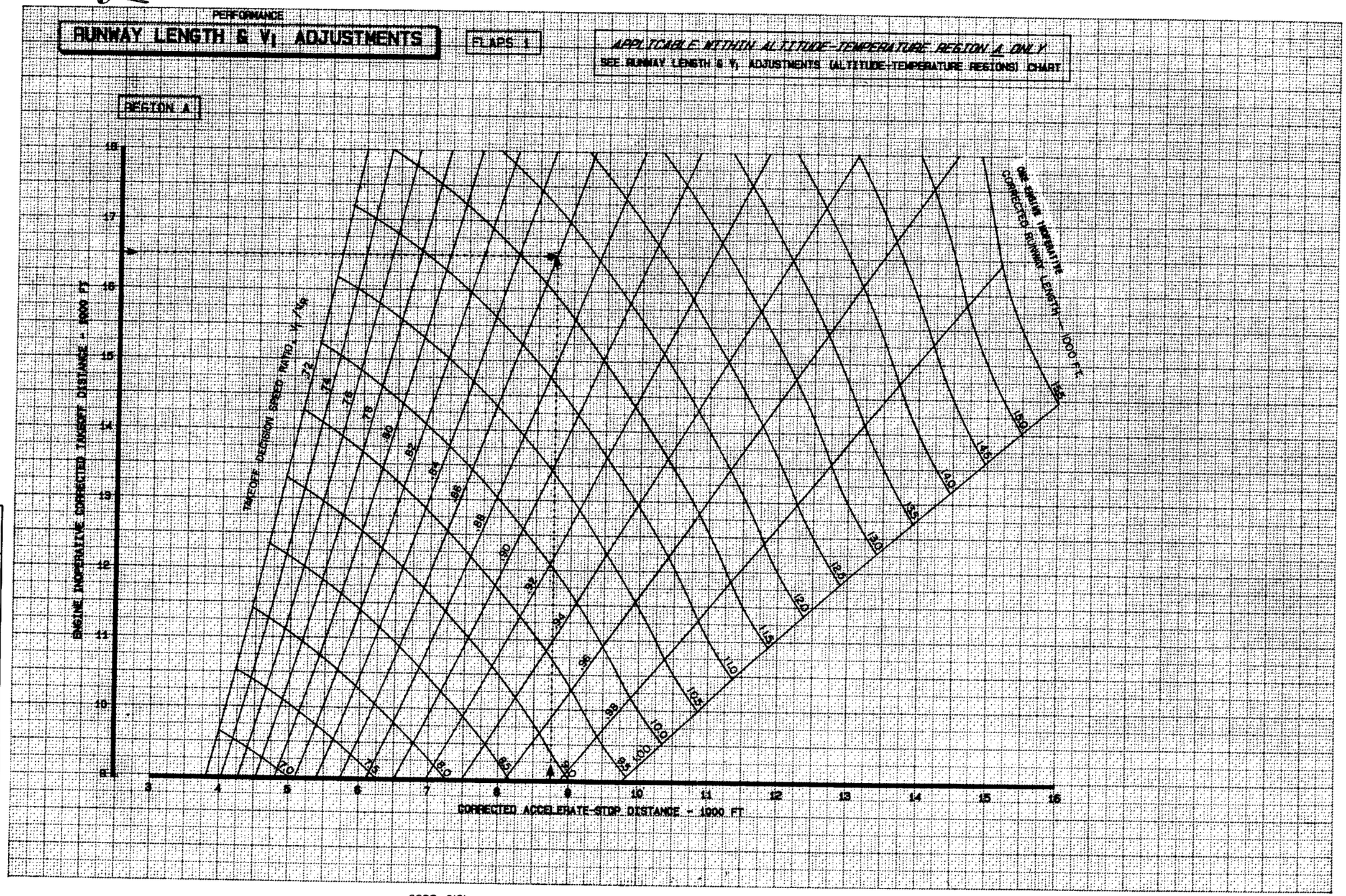
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION A ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION A



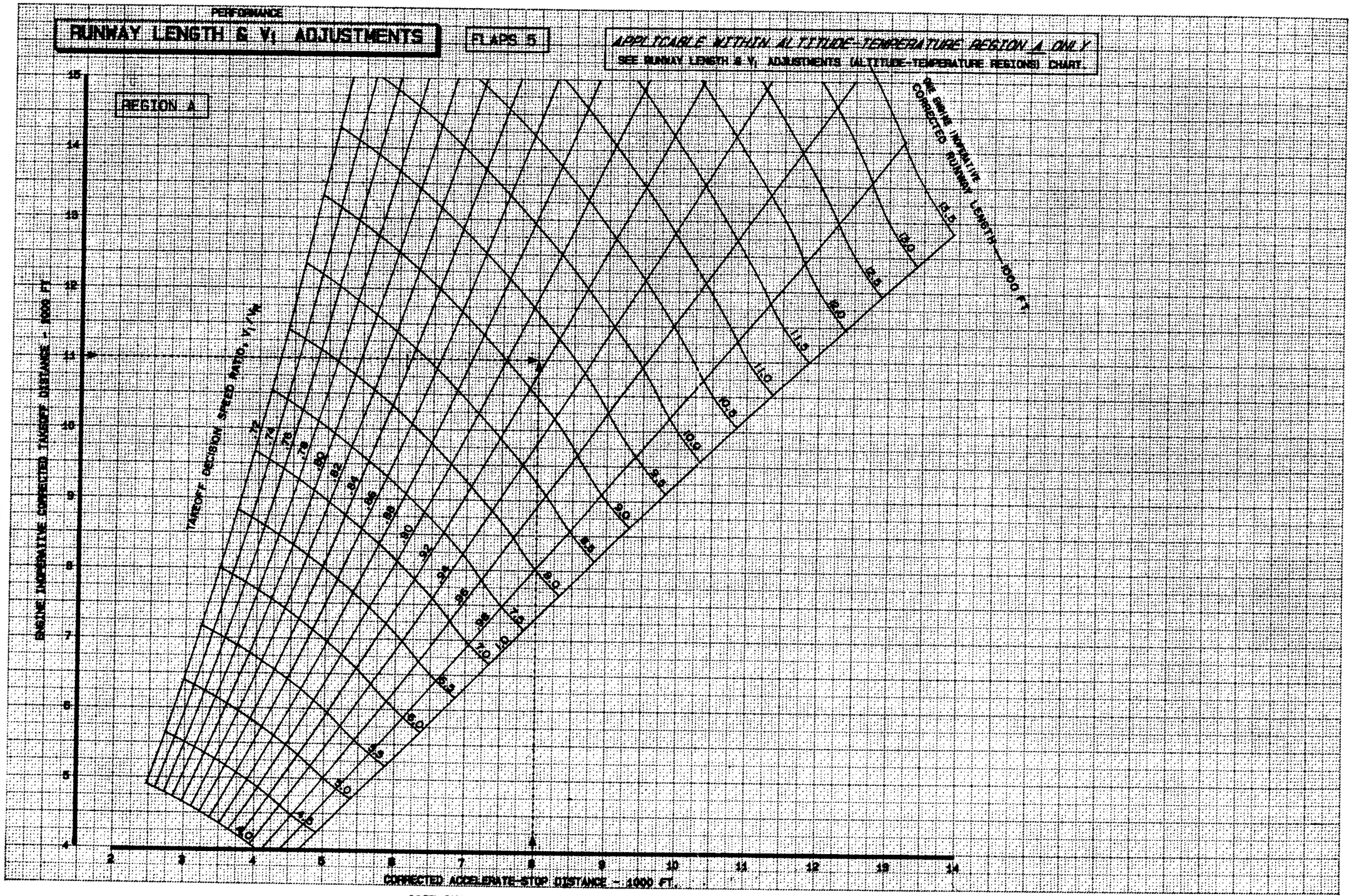
PERFORMANCE

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. 5L000427
D631N013 PAGE 4.3-11

J.BASSETT	APPROVED	DATE
757-200	M. LECHNAR Mgr. S08	2/25/94
PW 2037		7/22/95

P.C. 6L000428
D631N013 PAGE 4.3-12

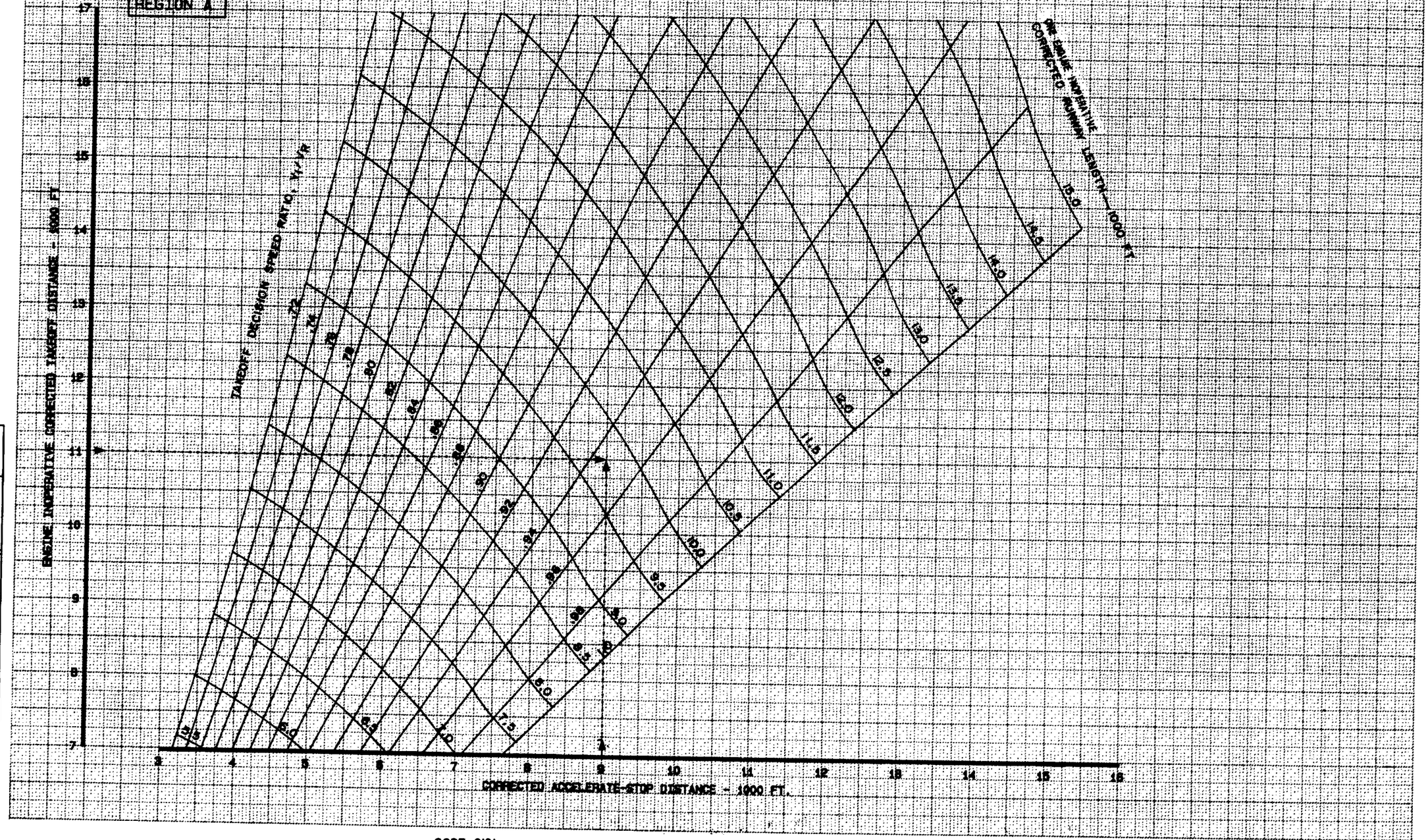
PERFORMANCE

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



J.BASSETT	APPROVED	DATE
757-200	M. LECHNER Num. 308	23 Aug 94
PW 2037	J. Bauman	11/22/95

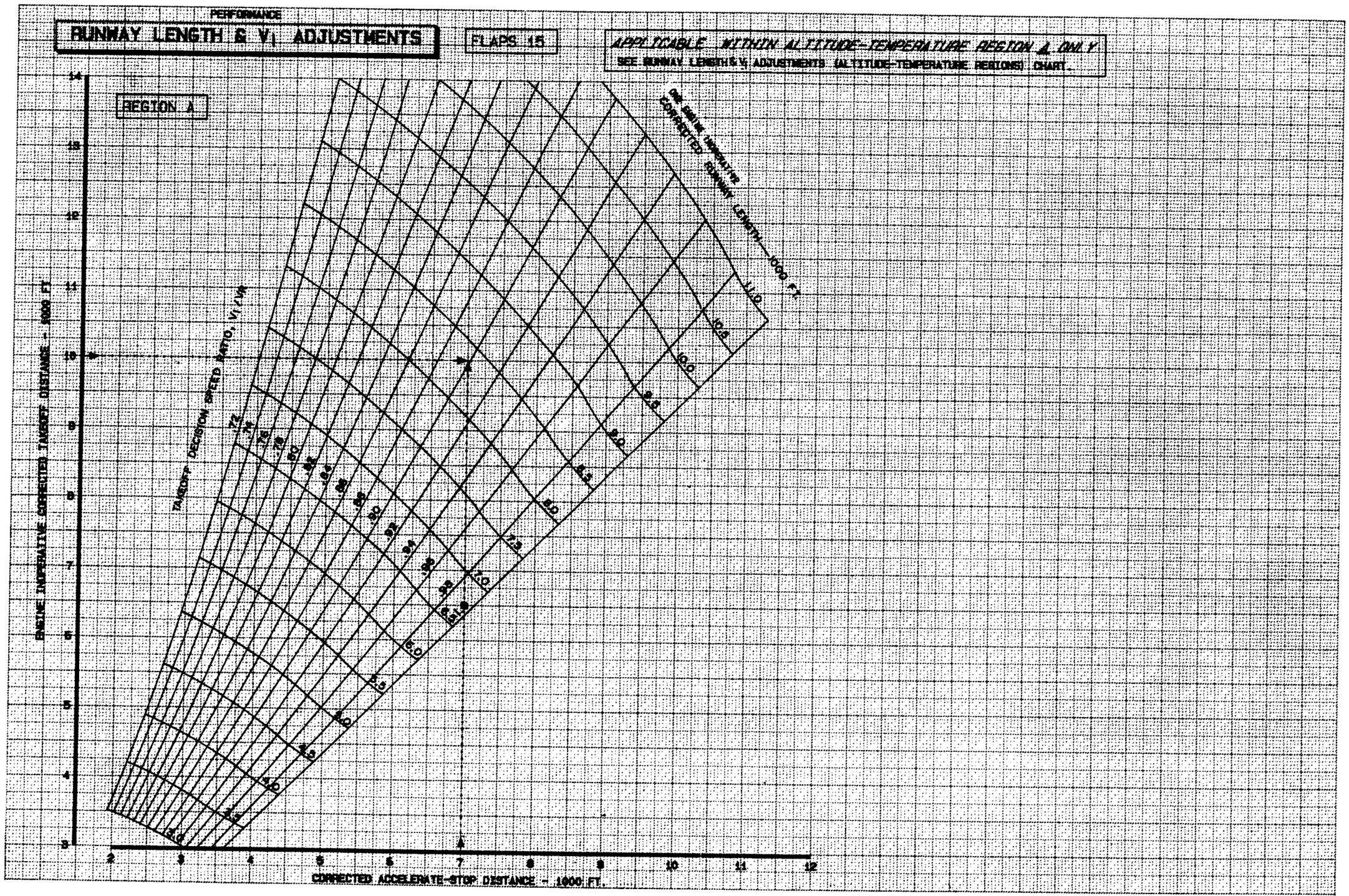
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION 4 ONLY.
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART.

REGION 4



P.C. BL000428
D631N013 PAGE 4.3-13

J.BASSETT	APPROVED	DATE
757-200	M. LECHNAR DM-308	24 Aug 94
PW 2037	J Bassett	7/22/96

PERFORMANCE

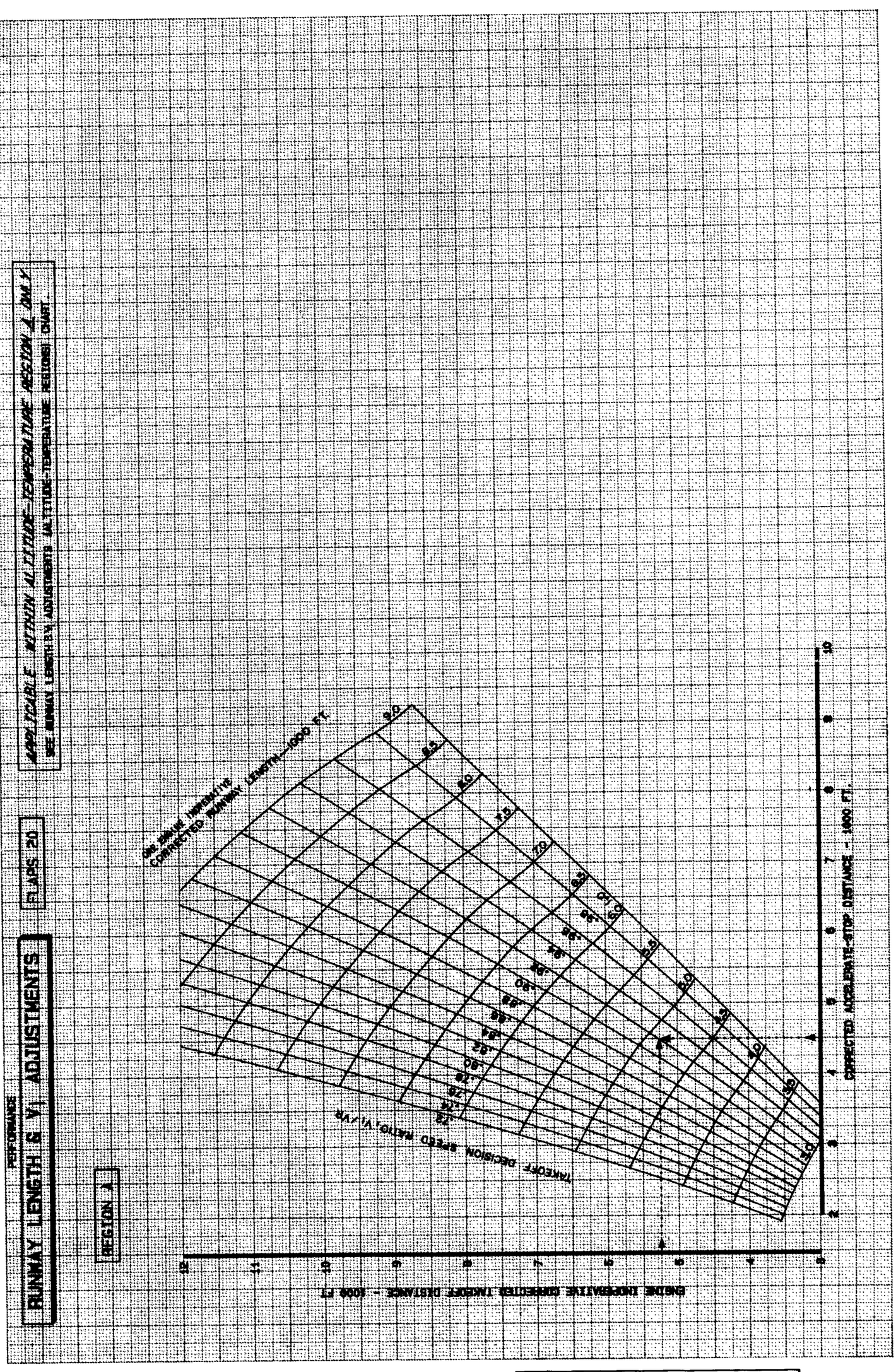
RUNWAY LENGTH & V1 ADJUSTMENTS

FLAPS 20

APPROVED PW 2037 ENGINES WITH ALTITUDE-TEMPERATURE RESTRICTION (VMAT)

SEE RUNWAY LENGTH ADJUSTMENTS FOR PW 2037 ENGINES WITH ALTITUDE-TEMPERATURE RESTRICTION (VMAT)

REGION 1



JEPPESSETT		
757-200	M. LEONARD	
PW 2037	APPROVED	DATE
	[illegible]	7/22/96

P.C. BL0004300
D631N013 PAGE 4.3-14

FAA APPROVED 03-08-96

D631N002 CODE 012I SECTION 4.3 PAGE 14

SD8586

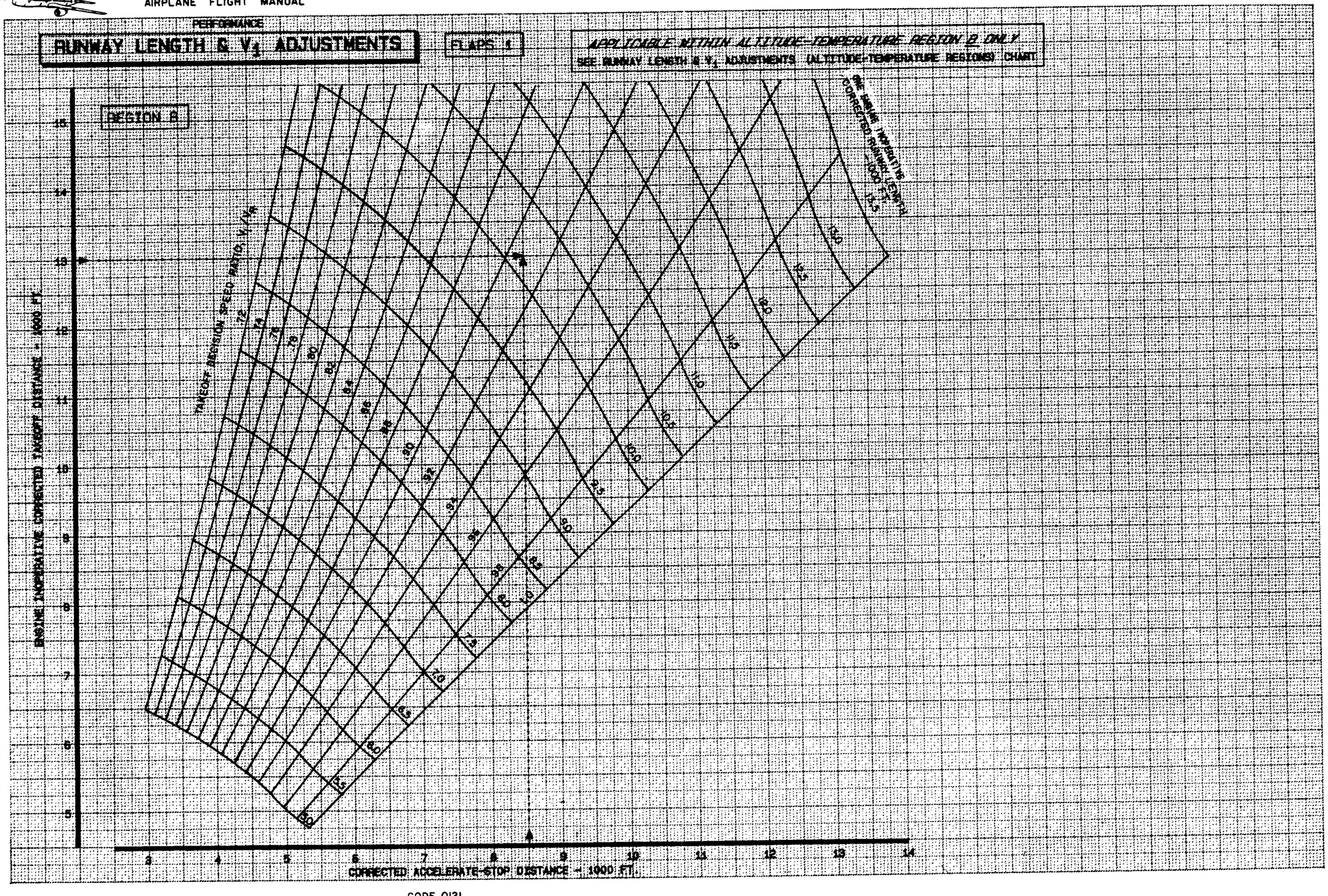
6E4208

PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART



P.C. 5L000431
D631N013 PG. 4.3-15

GRIECO	APPROVED	DATE
757-200	C.S. III 10166	9.10.81
PW 2037	G Edwards	7/22/82

S08587

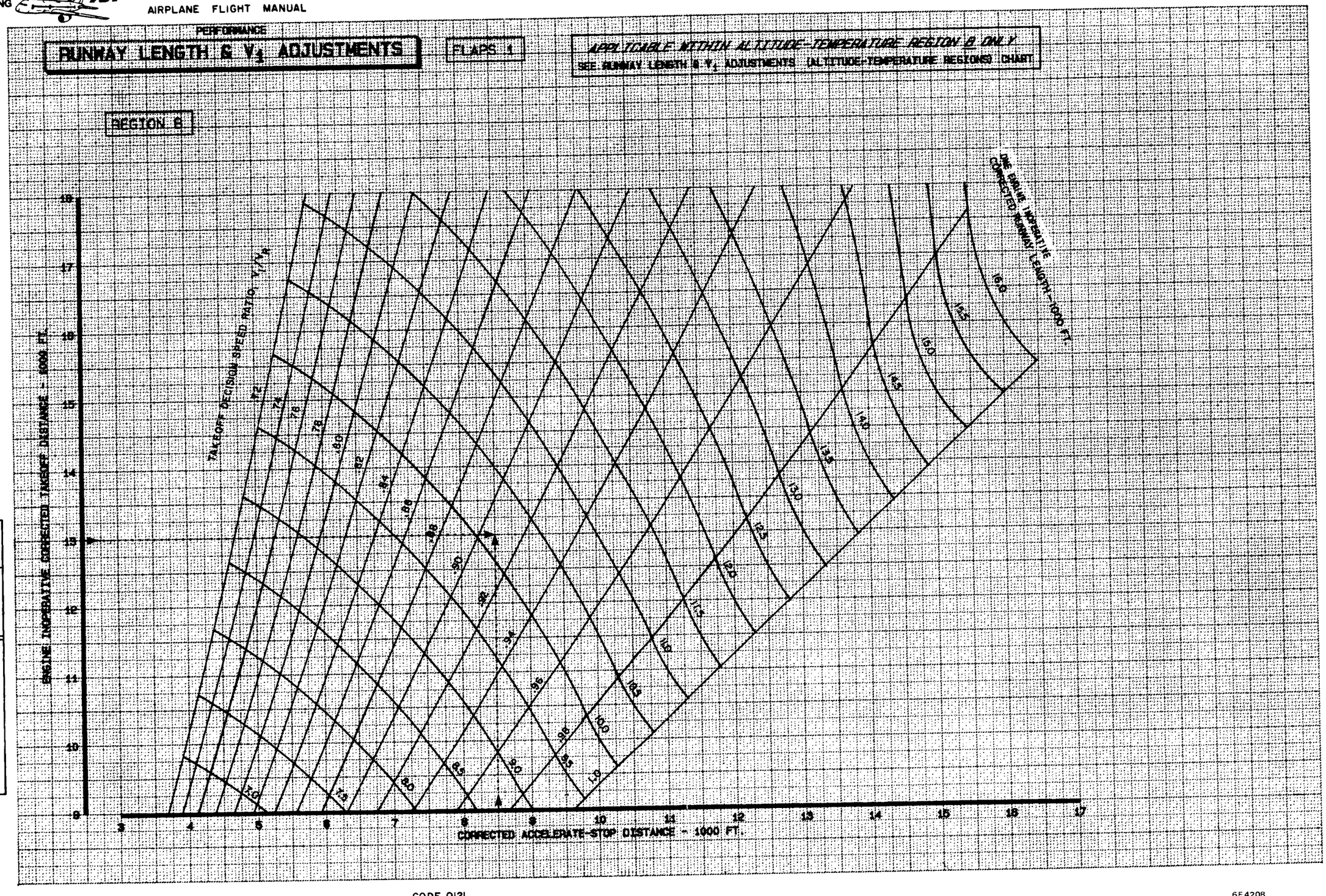
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION B ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION B



P.C. 5L000432
D631N013 PG. 4.3-16

APPROVED	DATE
C.F. Zill: MDAA	9.10.87
[illegible]	7/22/10

GRIECO
757-200
PW 2037

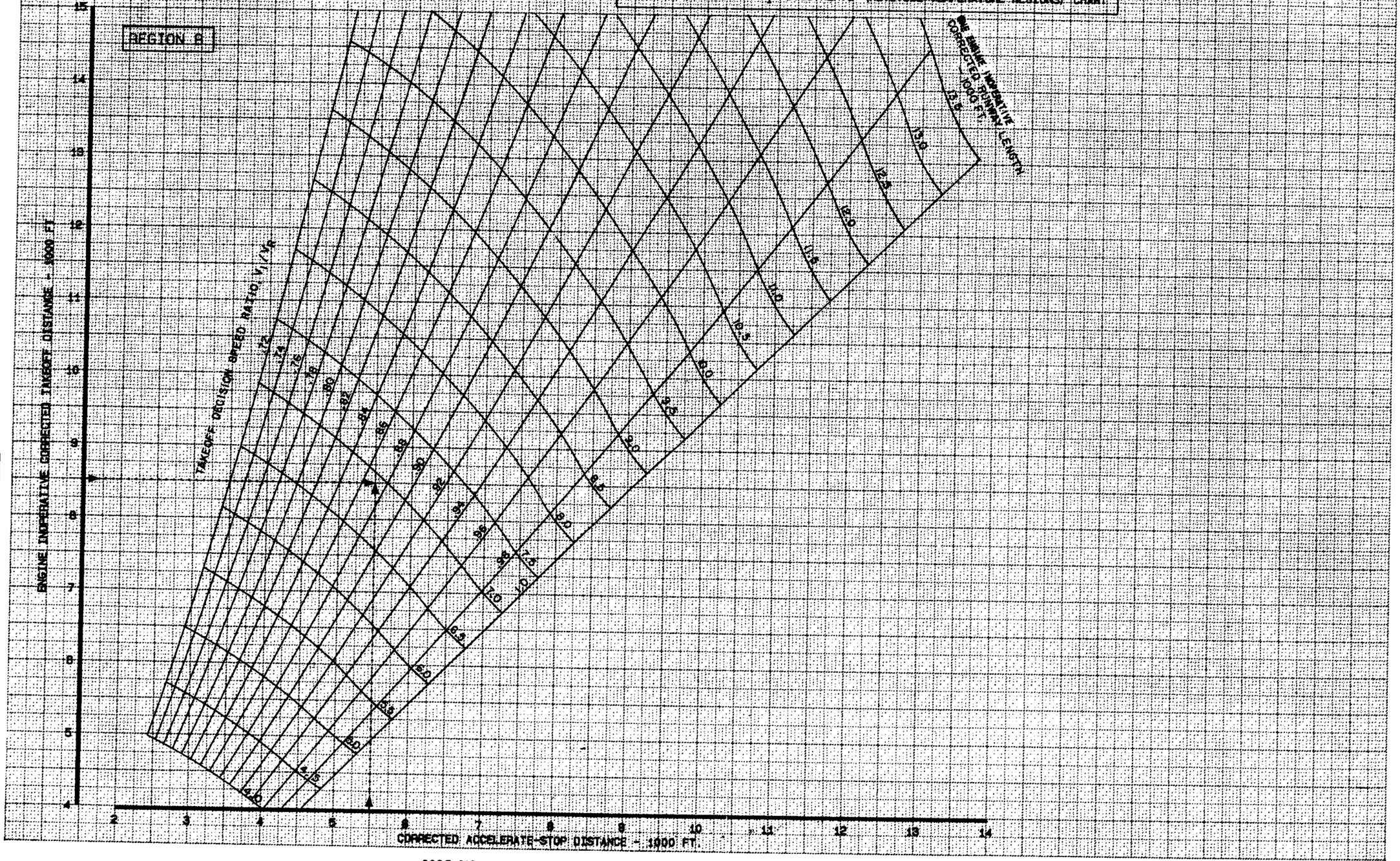
PERFORMANCE

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. BL000433
D631N013 PG. 4.3-17

APPROVED	DATE
C.S.Th. MUS	1-6-81
B Swan	7/22/80

BARTNICK
757-200
PW 2037

S08589

6E4208

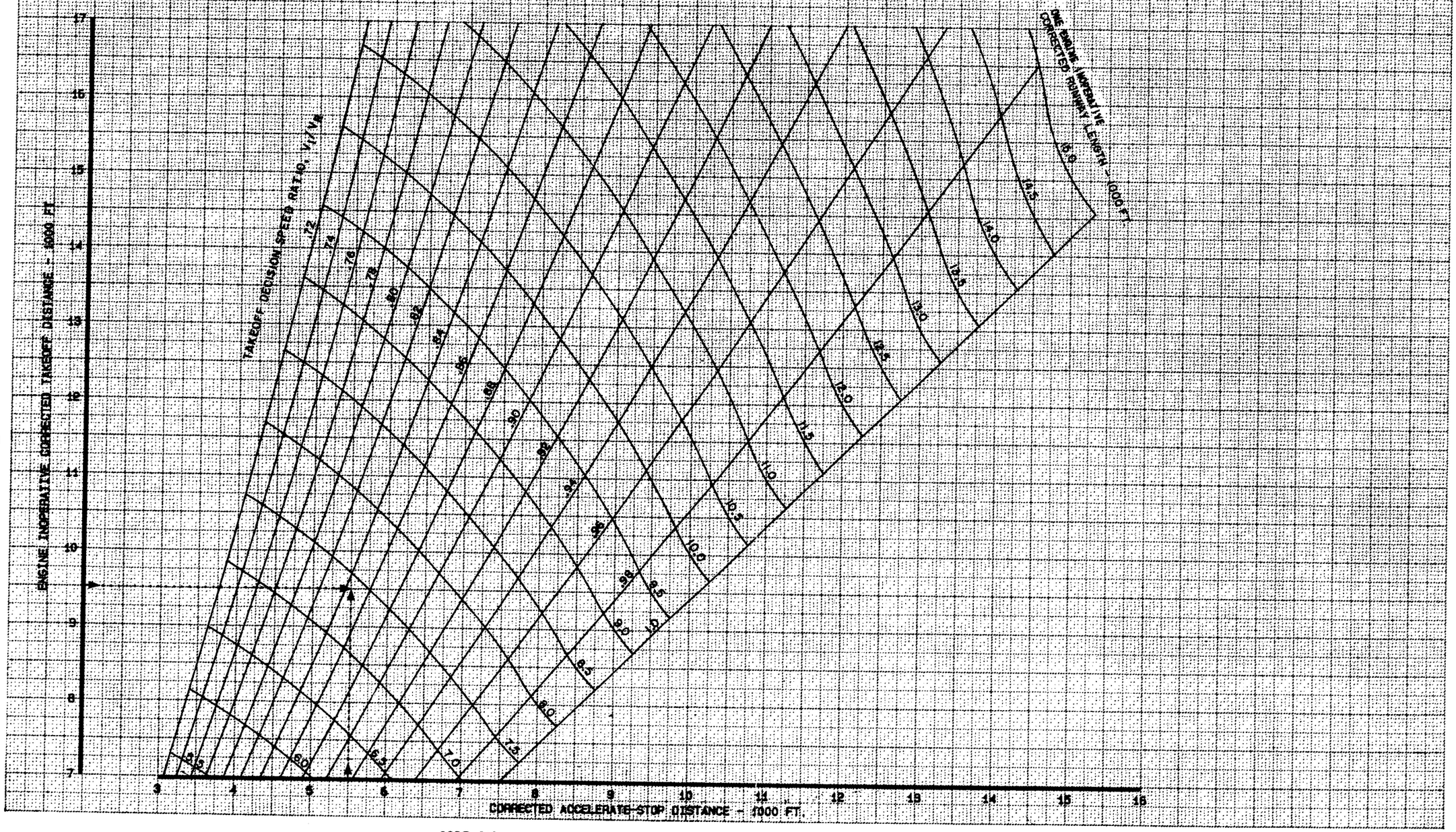
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 5

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION 8 ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION 8



P.C. 5L000434
D631N013 PG. 4.3-17

APPROVED	DATE
C.S. Zill write	9-6-01
B. Swanson	7/24/95

BARTNICK
757-200
PW 2037

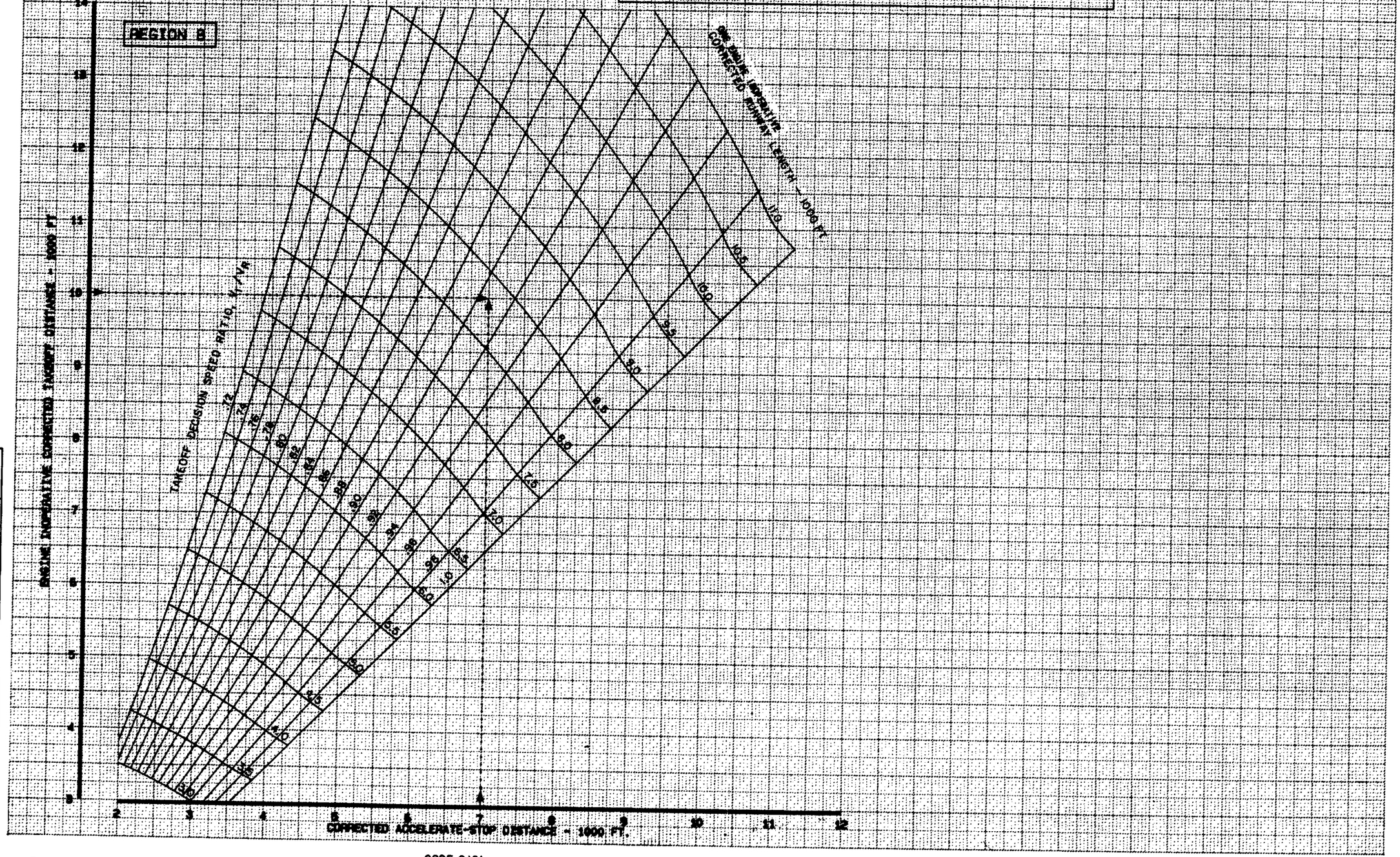
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION 8 ONLY.
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION 8



P.C. 5L000435
D631N013 PG. 4.3-19

BARTNICK	APPROVED	DATE
757-200	C.S. Tin MDA6	96-84
PW 2037	B Jansen	7/22/93

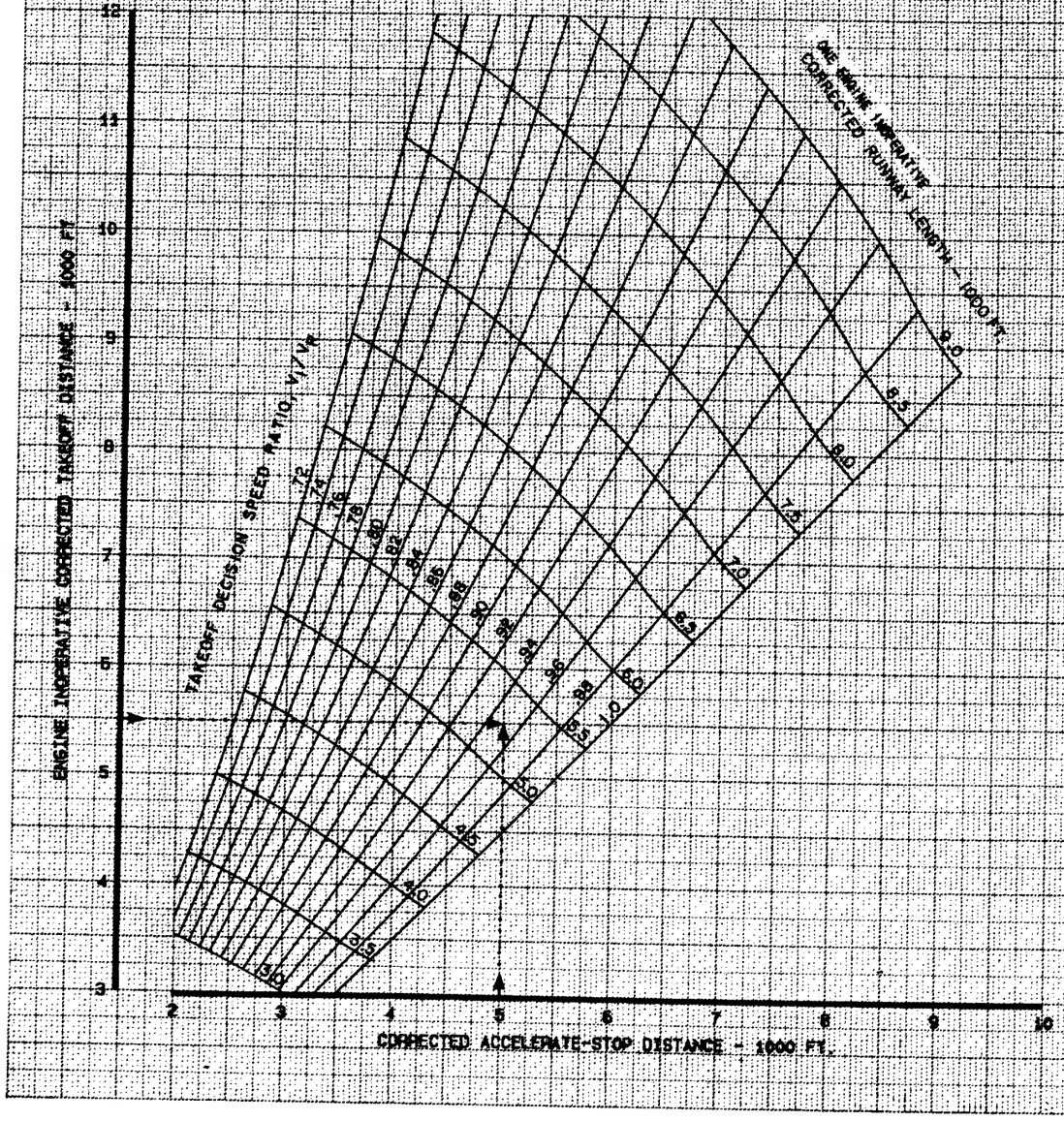
PERFORMANCE

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.	EL000438
D631N013	PG. 4.3-20

BARTNICK	APPROVED	DATE
757-200	C.S. Tillman	9.5.97
PW 2037	B. Johnson	7/22/95

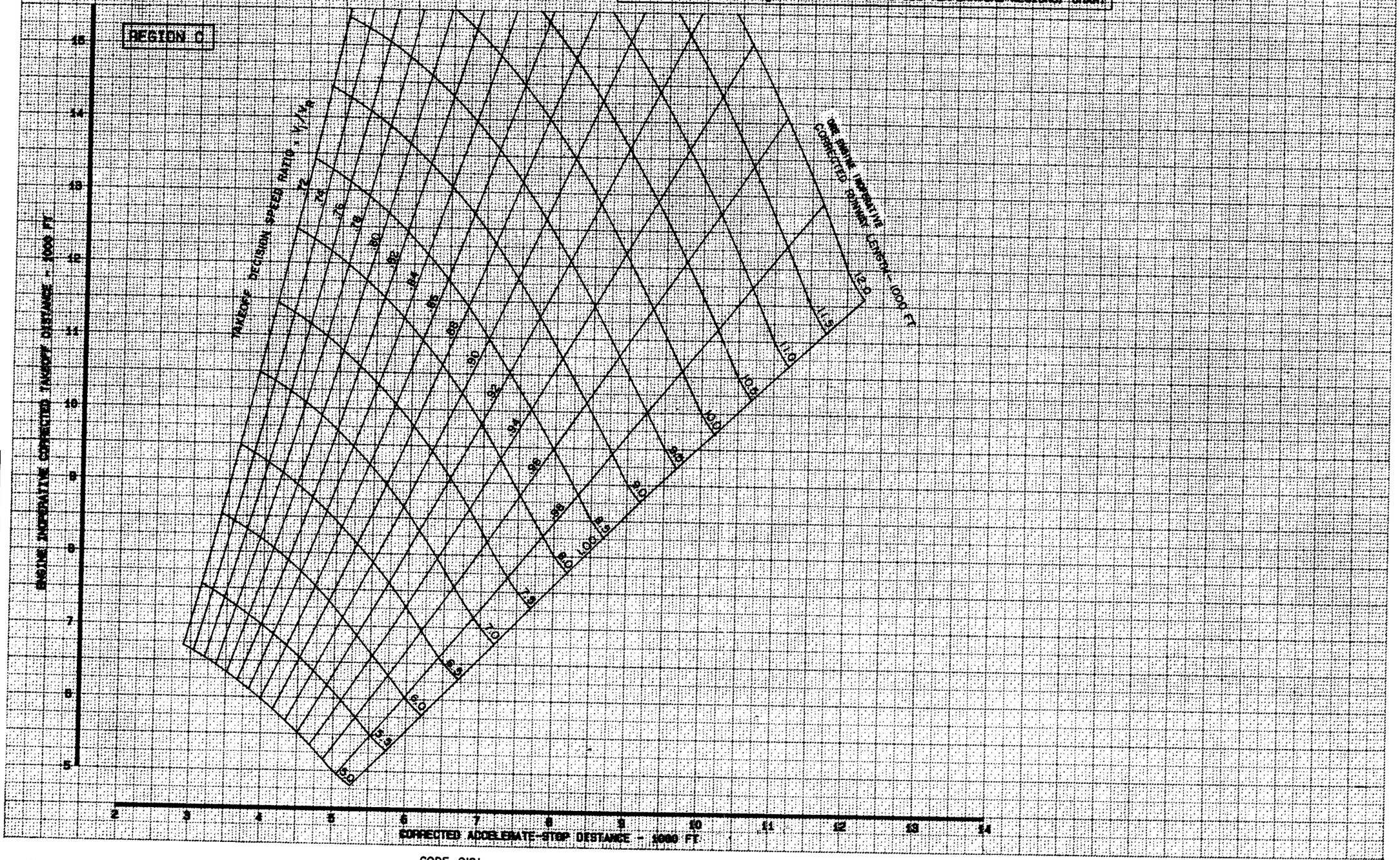
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. 5L000437
D631N013 PG. 4.3-21

APPROVED	DATE
KOSTOFF	9-15-94
DW Stuve	7/22/95
BJ Sauer	

KOSTOFF
757-200
PW 2037

S08593

6E4208

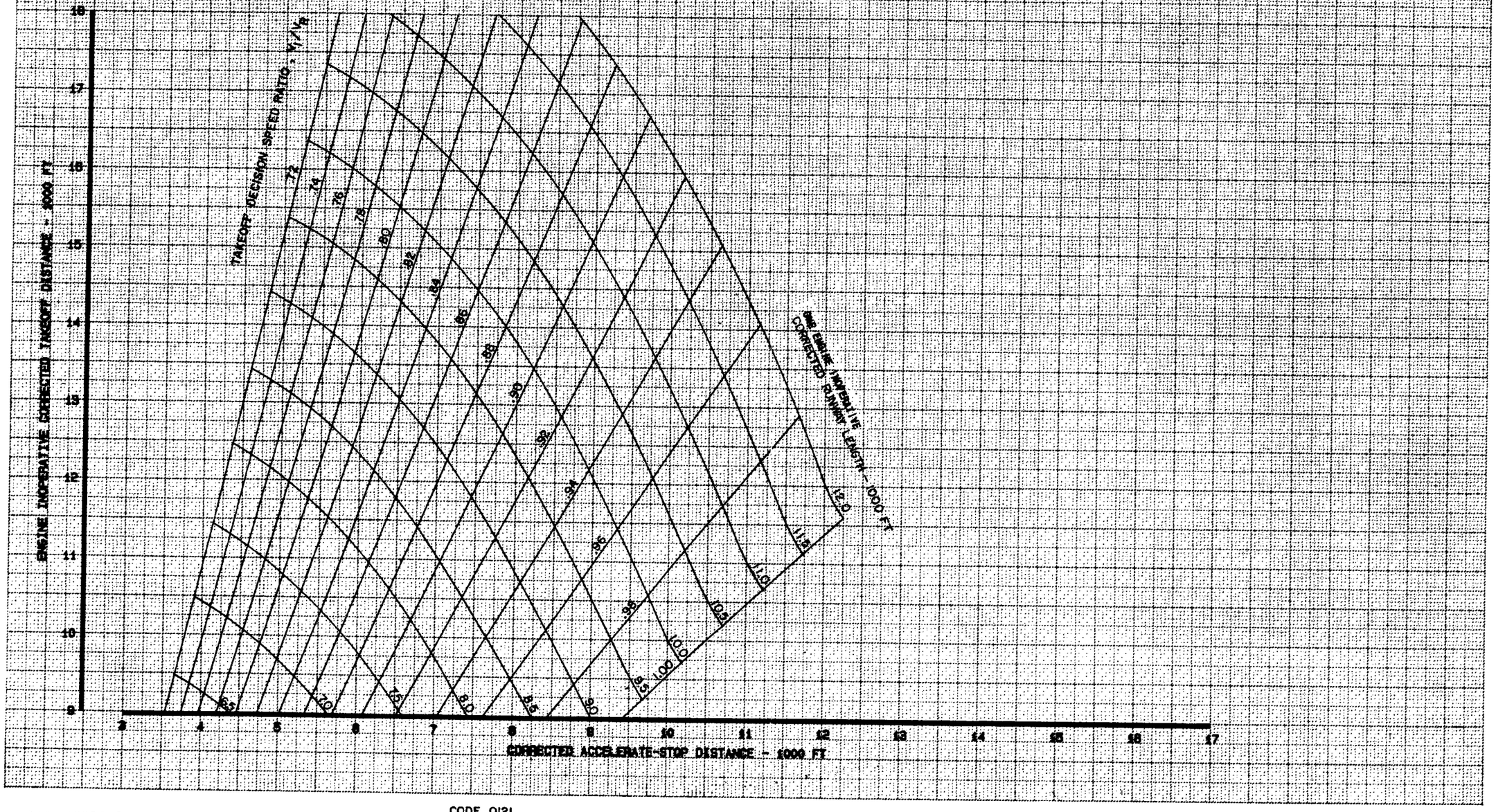
PERFORMANCE

RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 1

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY
SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. 5L000438
D631N013 PG. 4.3-22

KOSTOFF

757-200	
PW 2037	

	APPROVED	DATE
LOADING	D. Kostoff	9-15-93
PERFORMANCE	[signature]	7/27/93

S08594

6E4208

P.C. BL000439
D631N013 PG. 4.3-23

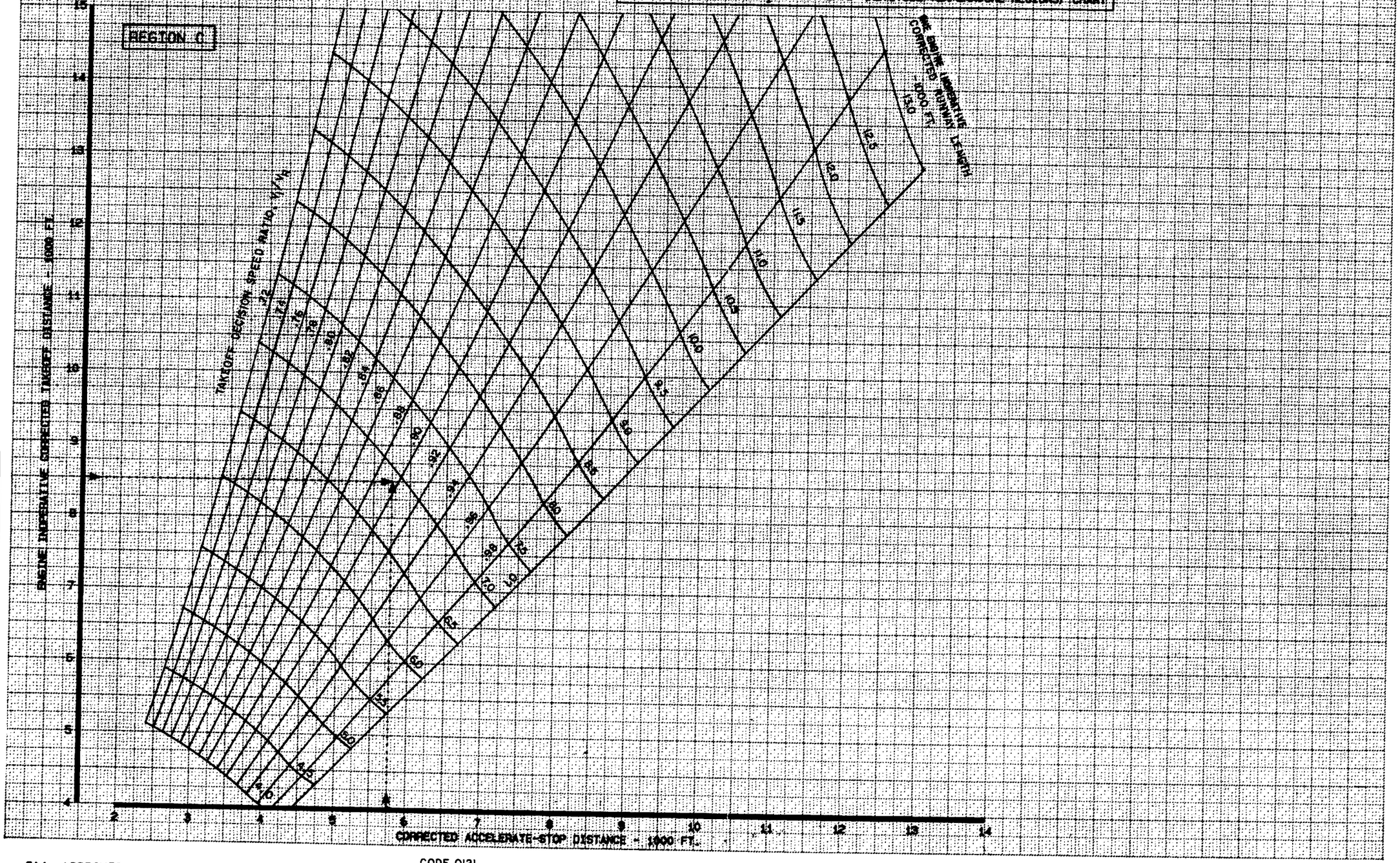
PERFORMANCE

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



GRIECO
757-200
PW 2037

	APPROVED	DATE
	C.S.Tilt MS146	9.6.94
	[signature]	7/22/93

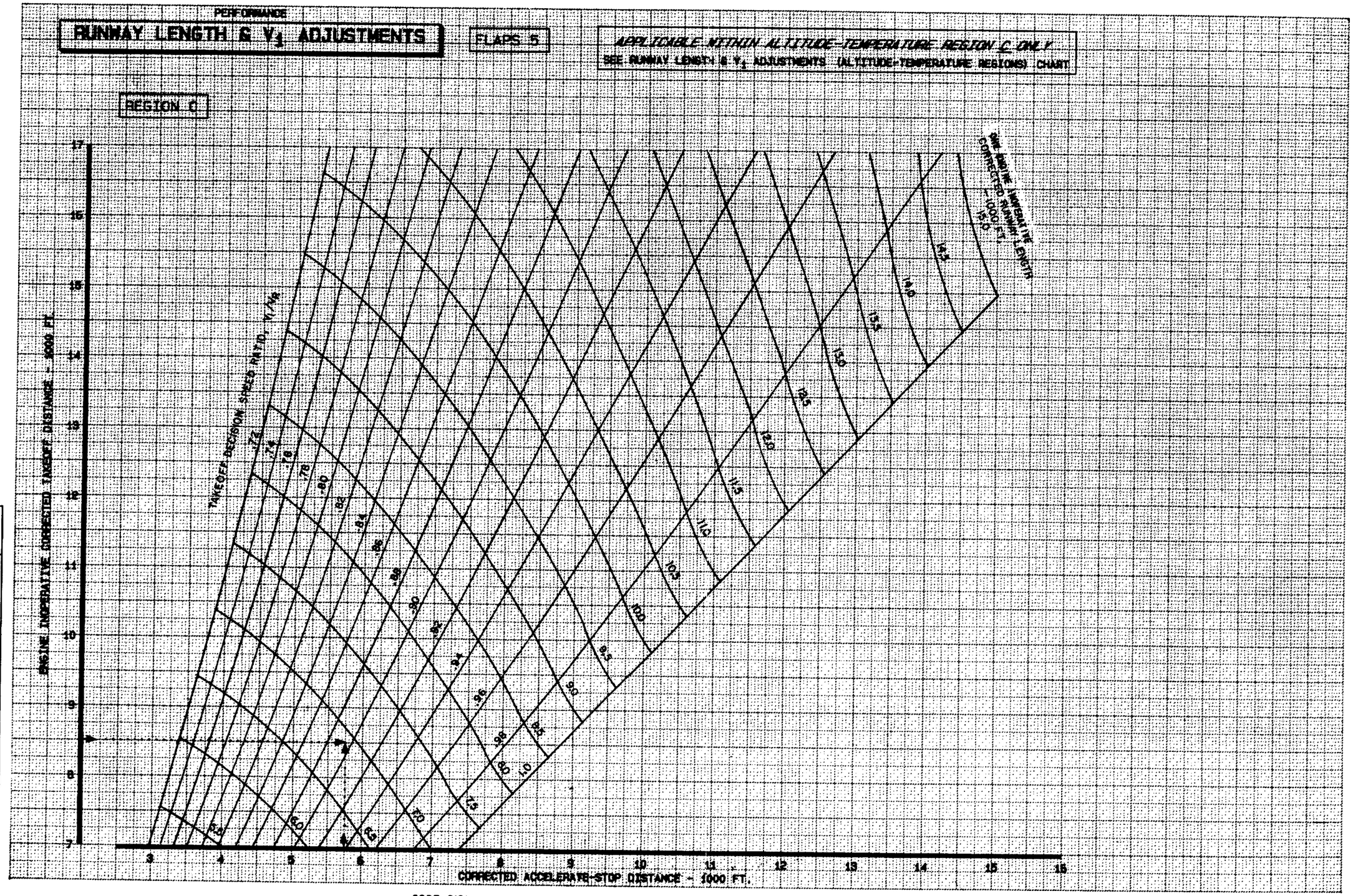
PERFORMANCE

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. 5L000440
D631N013 PG 4.3-24

APPROVED	DATE
C.S. Tilt MMAE	9.6.84
A Carlson	11/21/85

GRIECO
757-200
PW 2037

S08596

PERFORMANCE

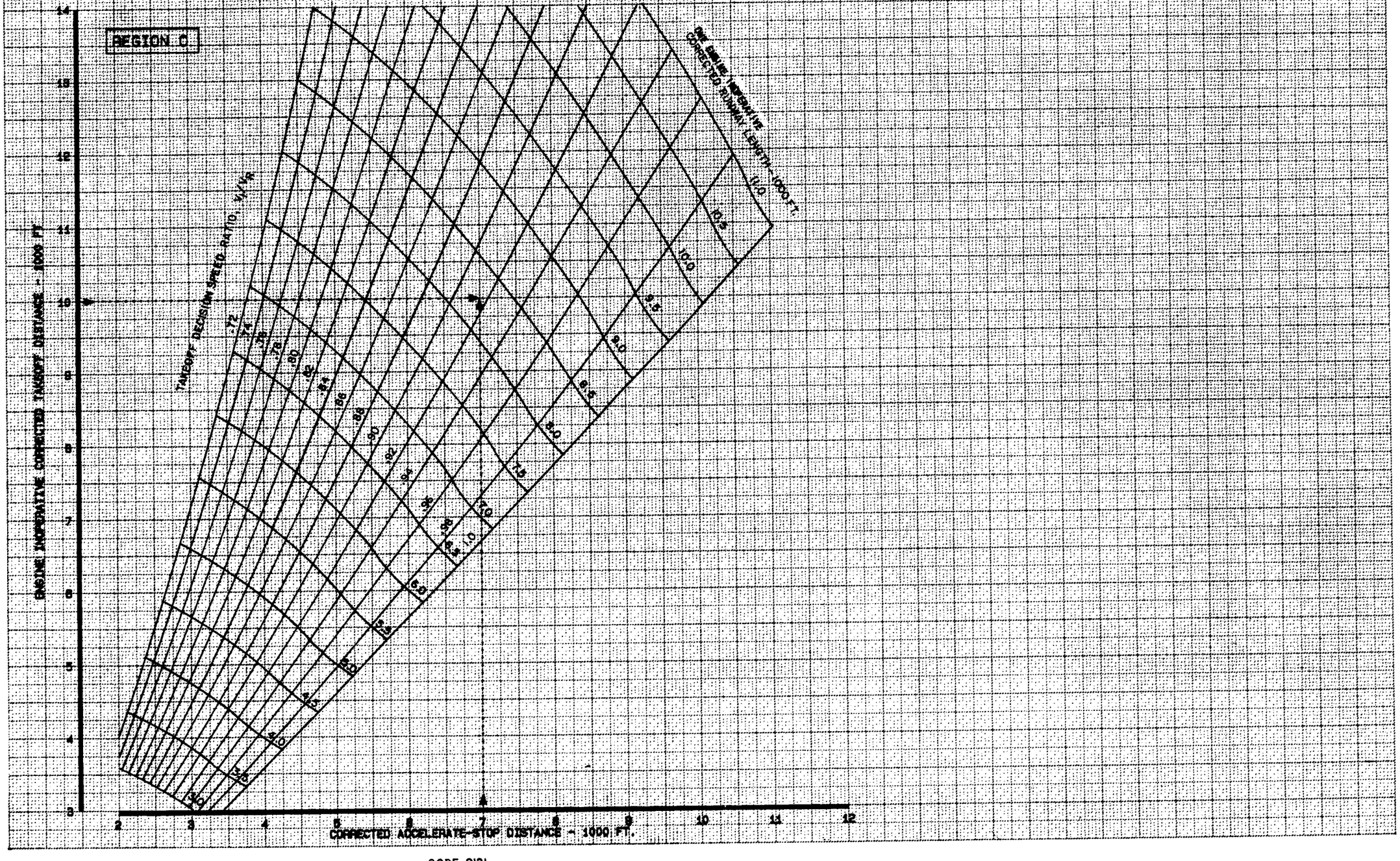
RUNWAY LENGTH & V_1 ADJUSTMENTS

FLAPS 15

APPLICABLE WITHIN ALTITUDE-TEMPERATURE REGION C ONLY

SEE RUNWAY LENGTH & V_1 ADJUSTMENTS (ALTITUDE-TEMPERATURE REGIONS) CHART

REGION C



P.C. 5L000441
D631N013 PG. 4.3-25

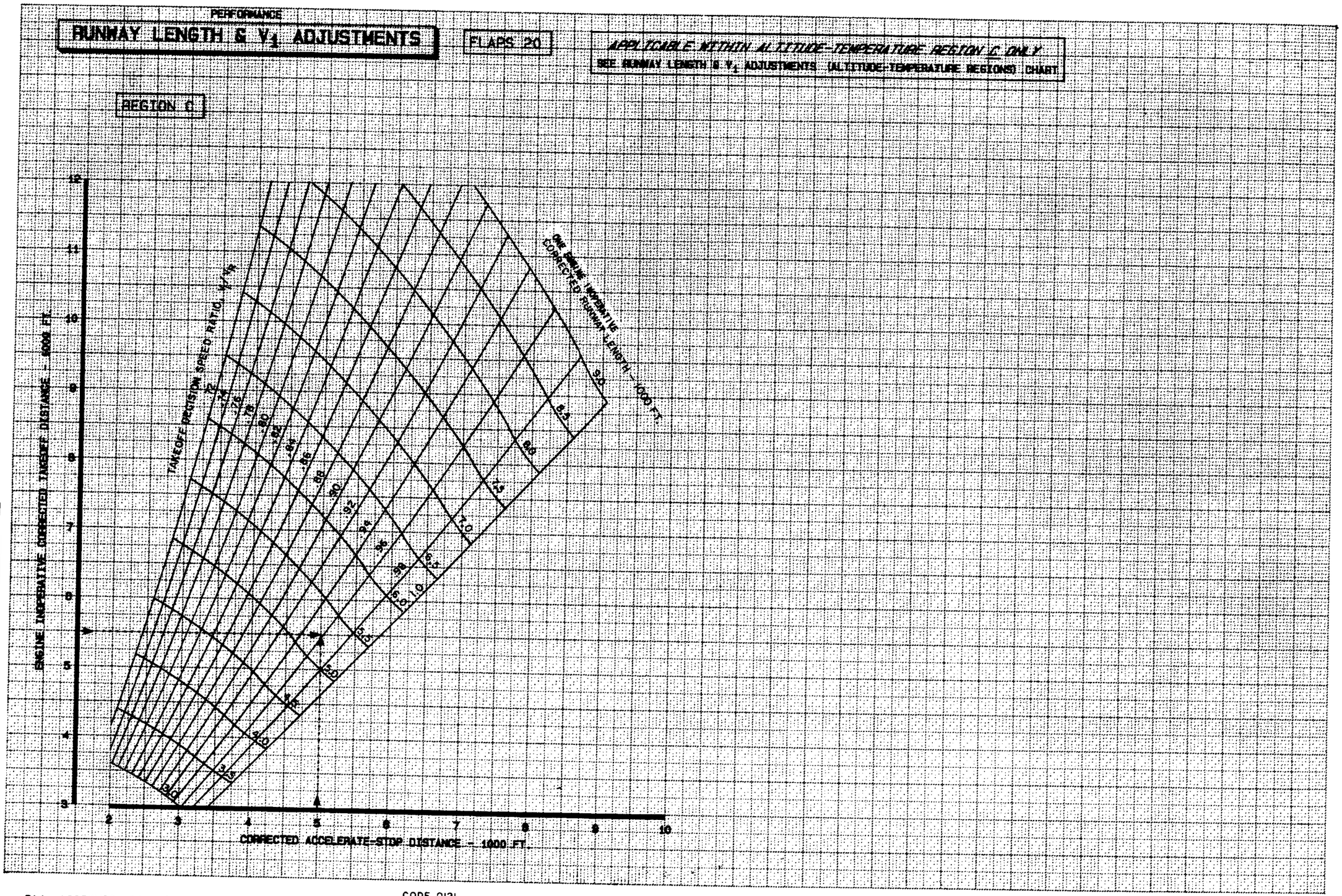
GRIECO	APPROVED	DATE
757-200	C.S. Zin [illegible]	1-6-97
PW 2037	[illegible]	7/22/93

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. 5L000442
D631N013 PG. 4.3-26

APPROVED	DATE
C.S.H. [illegible]	9.5.97
[illegible]	7/22/97

GRIECO
757-200
PW 2037

SECTION 4.4 - FIELD LENGTH LIMITS

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

S08065

FIELD LENGTH LIMITS

GENERAL

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 takeoff 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 weights is the field length limited takeoff gross weight. The scheduled takeoff gross weight cannot exceed the field length limited takeoff gross weight. See the example problem appendix for a numerical example of the use of these charts.

TAKEOFF FIELD LENGTH

Takeoff field length performance shown in this section accounts for: (1) 115 percent of the all-engines-operating distance, and (2) the one-engine-inoperative distance, considering a failure of the critical engine at V_{EF}. 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 is used.

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

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

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

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

S08066

P.C. SL000443
D631N013 PG. 4.4-4

PERFORMANCE

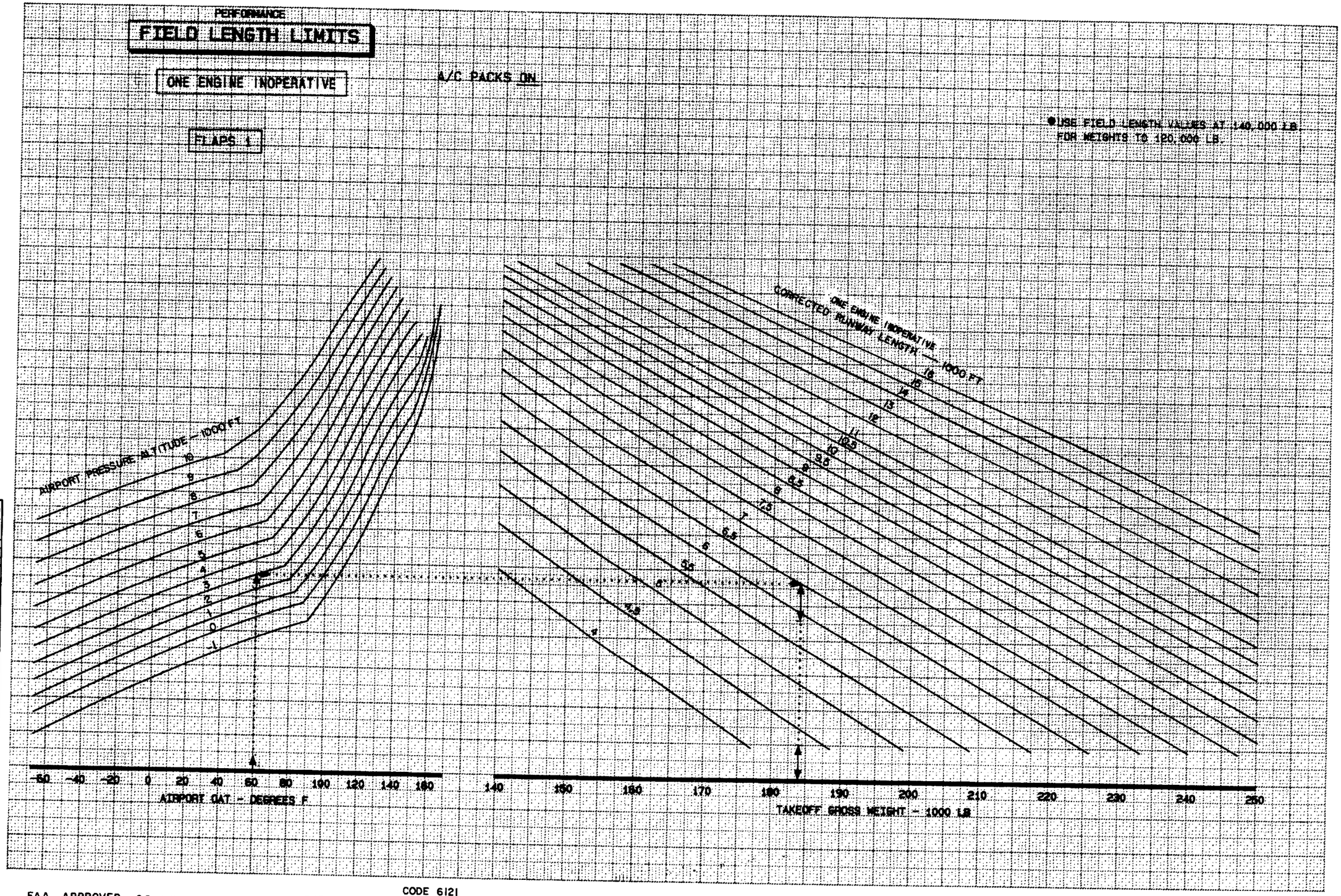
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 1

● USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



MILLER
757-200
PW 2037

APPROVED	DATE
W PAUL MTL	8/18/94
A.R. Brown	3/25/88
J. Johnson	7/22/85

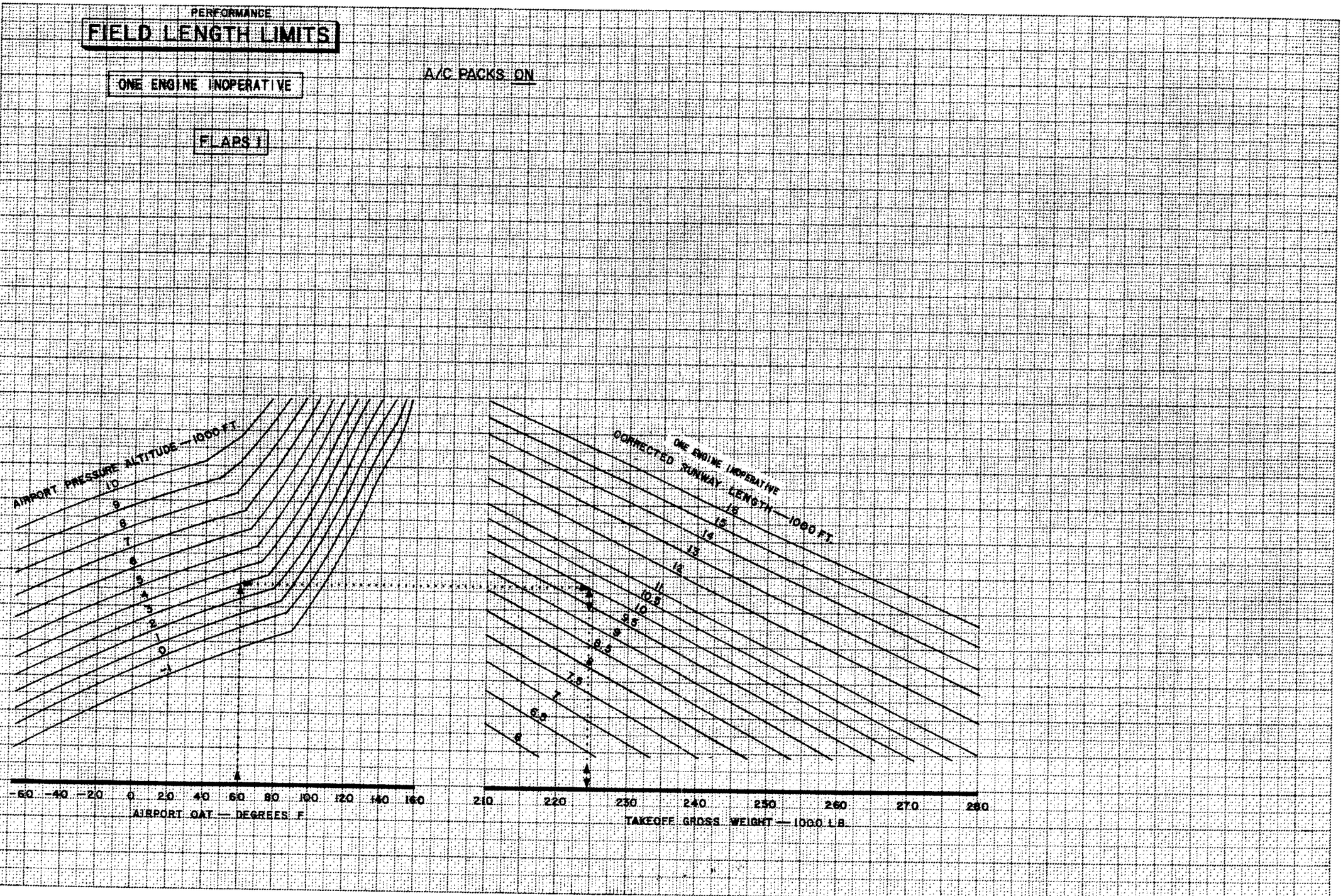
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 1



P.C. 5L000444
D631N013 PG. 4.4-4

NEWELL	APPROVED	DATE
757-200	D.E. Hill	4/6/94
PW 2037		

P.C. 5L000448
D631N013 PG. 4.4-6

MILLER
757-200
PW 2037

APPROVED	DATE
Al Paul Mr	8/25/98
B R Bauer	5/25/98
J Bauer	7/22/98

PERFORMANCE

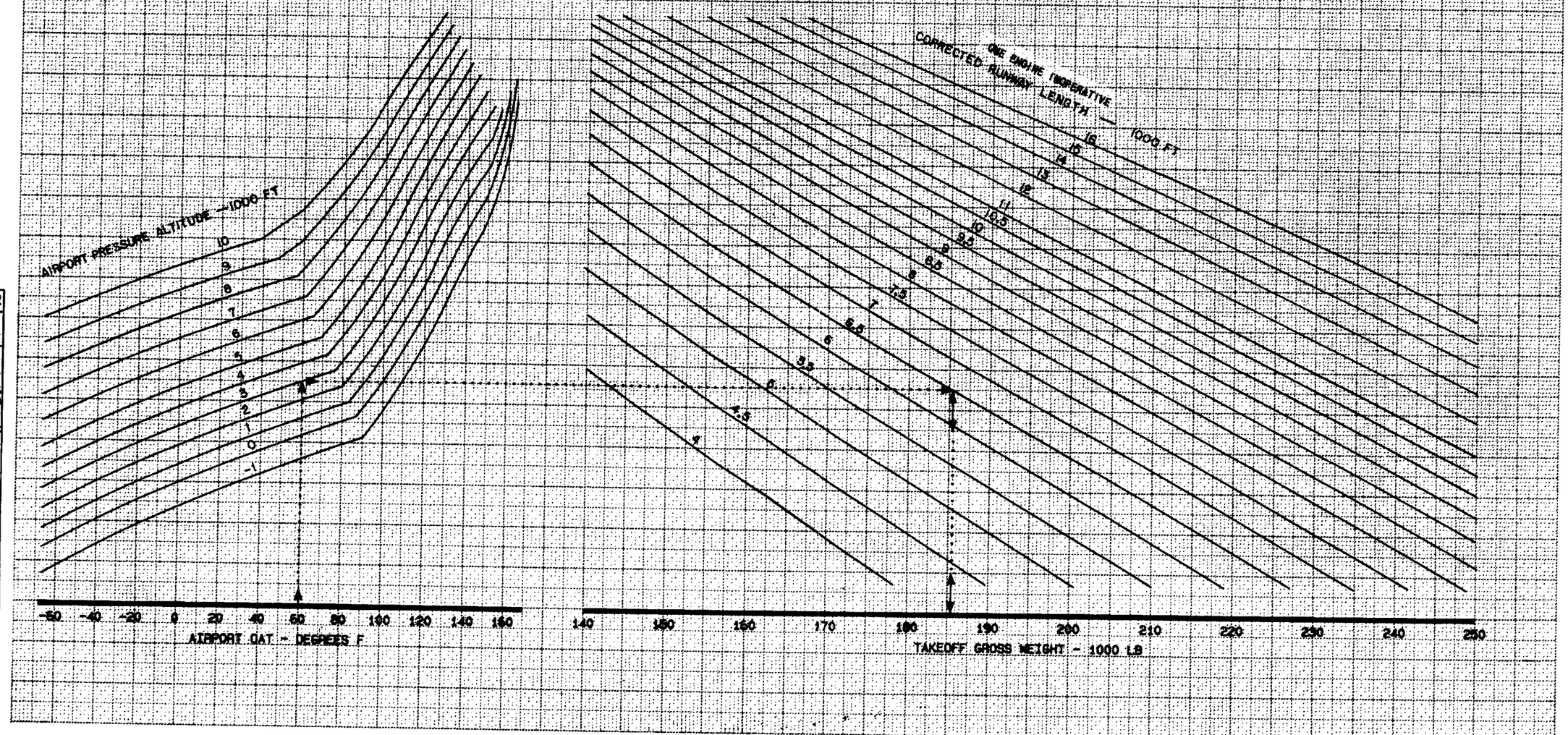
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 1

*USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



P.C. 5L000447
D631N013 PG. 4.4-6

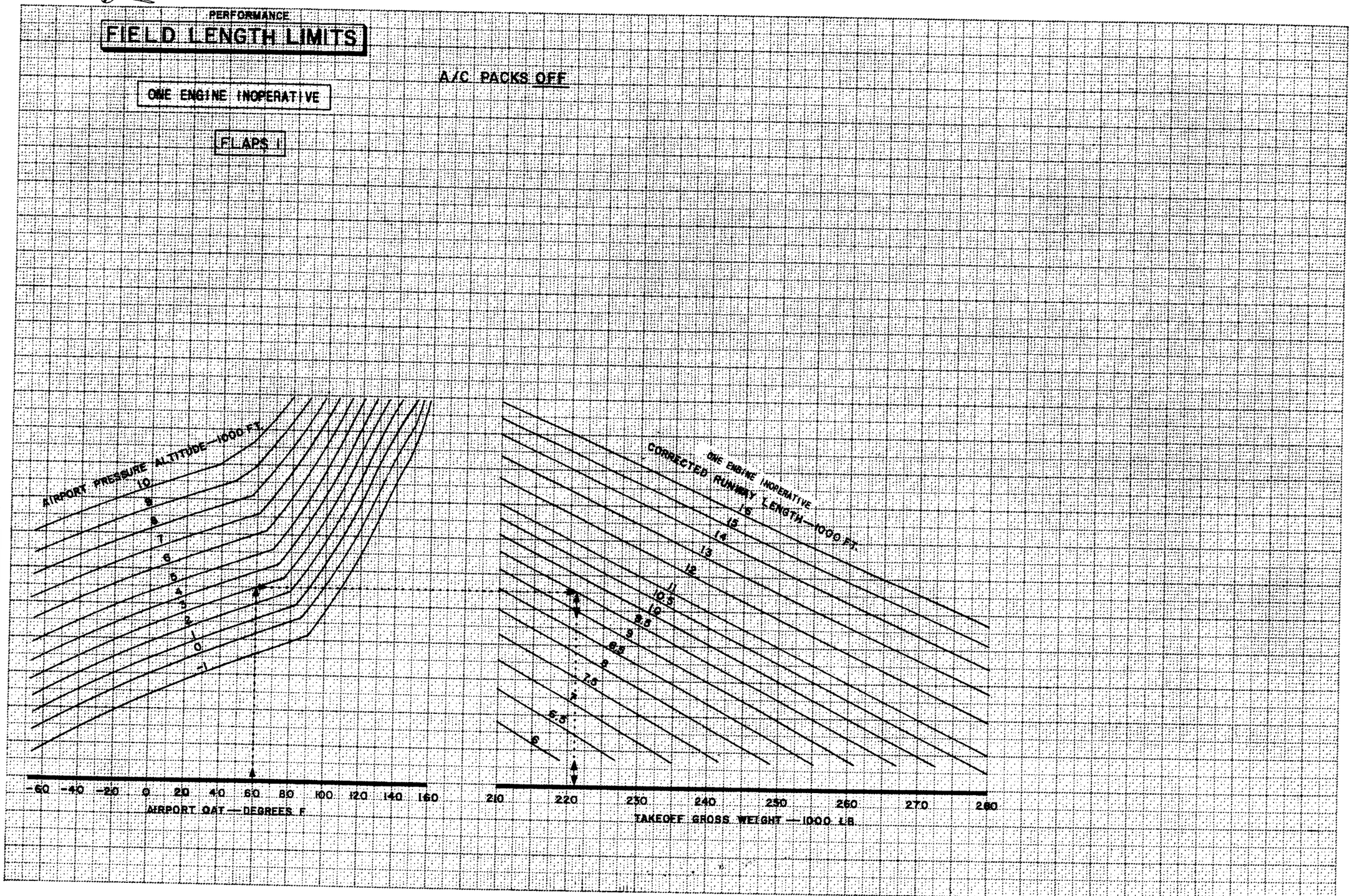
PERFORMANCE

FIELD LENGTH LIMITS

A/C PACKS OFF

ONE ENGINE INOPERATIVE

FLAPS 1



NEWELL	APPROVED	DATE
757-200	DPAS R. E. Simmons	4/25/94
PW 2037		

P.C. 5L00044B
D633N013 PG. 4.4-8

PERFORMANCE

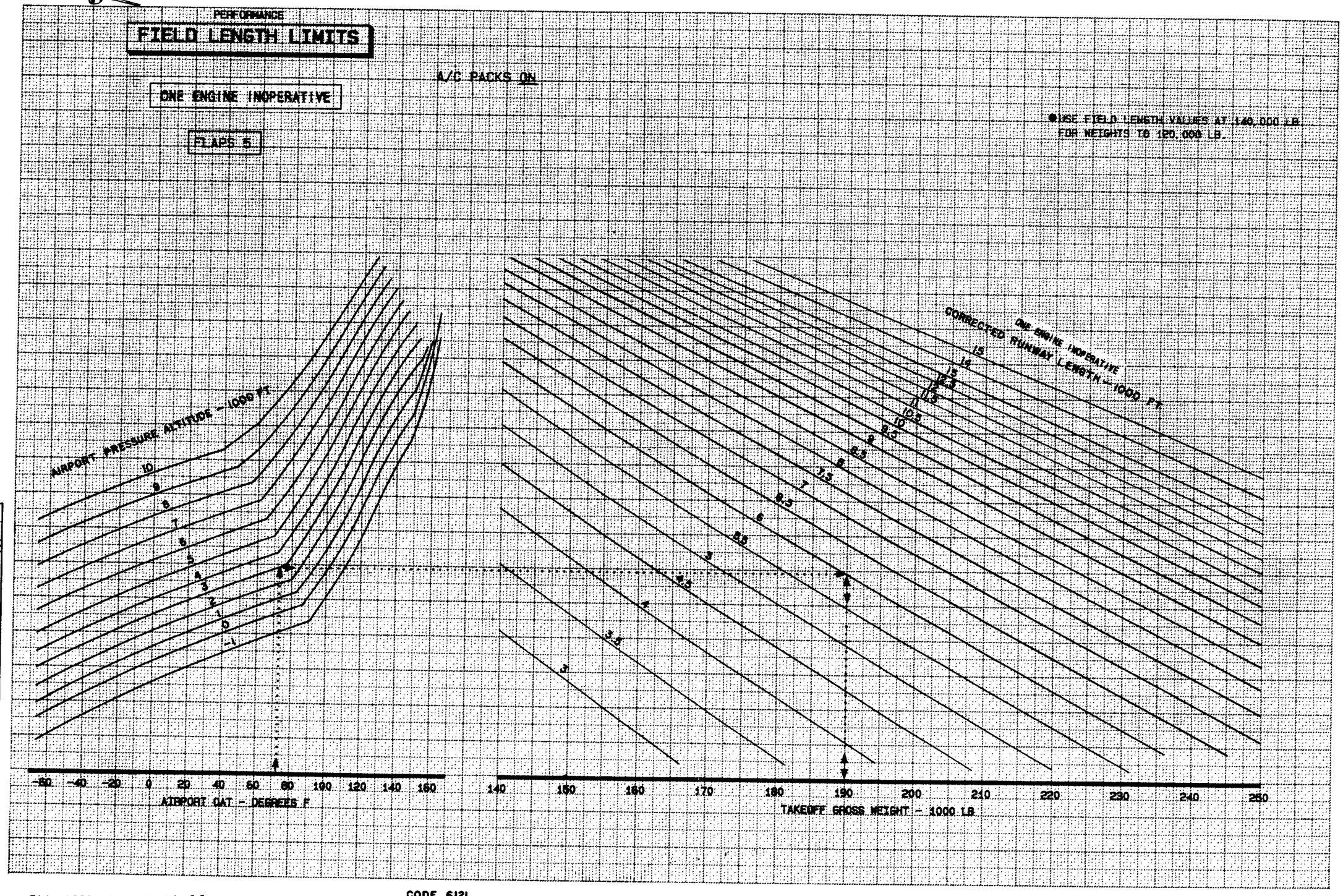
FIELD LENGTH LIMITS

A/C PACKS ON

ONE ENGINE INOPERATIVE

FLAPS 5

●USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



APPROVED	DATE
M. Lechner Asm. 308	29 Aug 94
J.R. Bauer	3/25/98
P.J. Jacobsen	7/22/98

OSWALD
757-200
PW 2037

P.C. 5L000451
D631N013 PG. 4.4-9

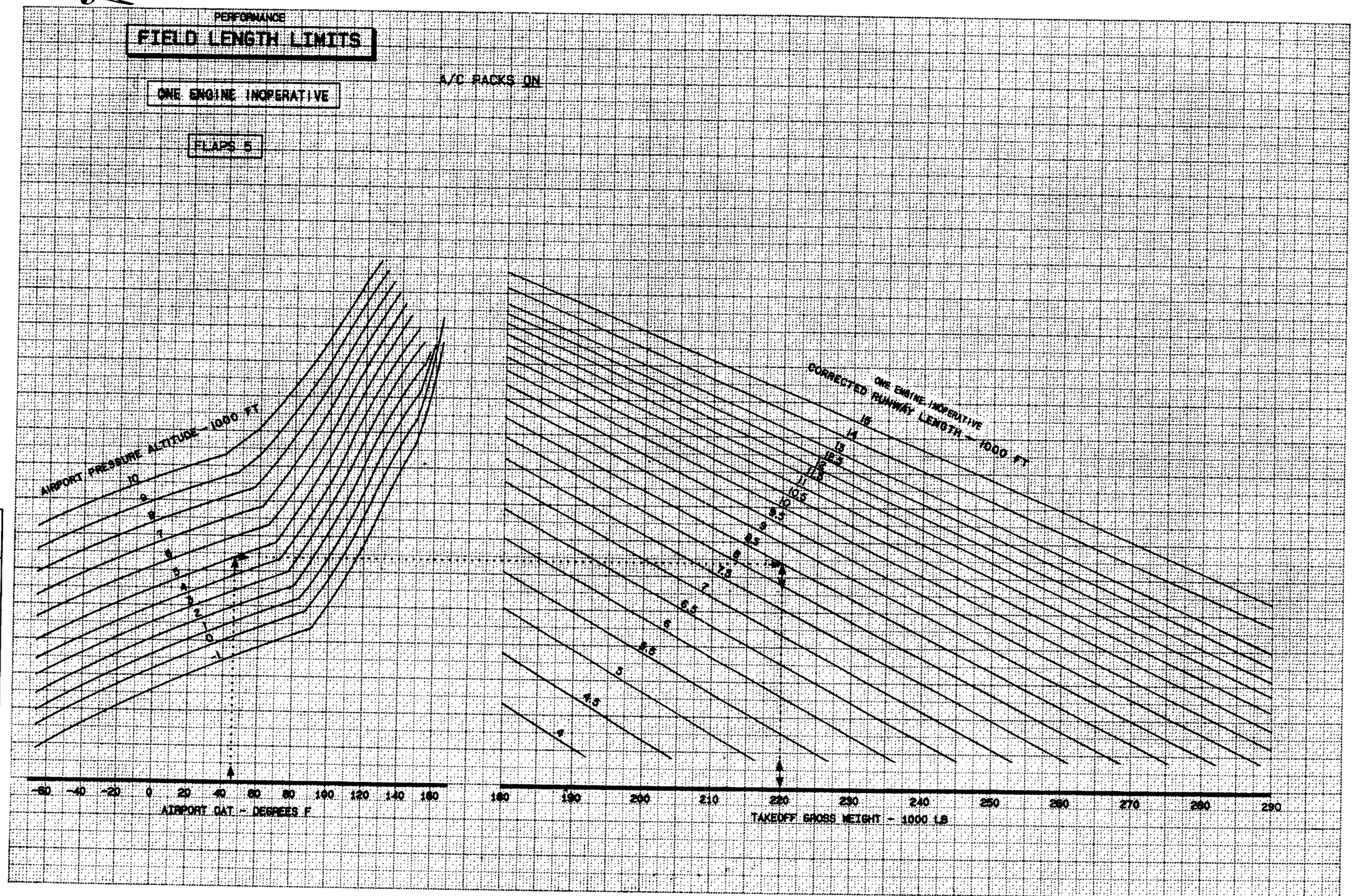
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 5



APPROVED	DATE
M. LECHNER Nov. 308	29 Aug 84
	5/3/95

OSWALD
757-200
PW 2037

P.C. 5L000453
D631N013 PG. 4.4-10

PERFORMANCE

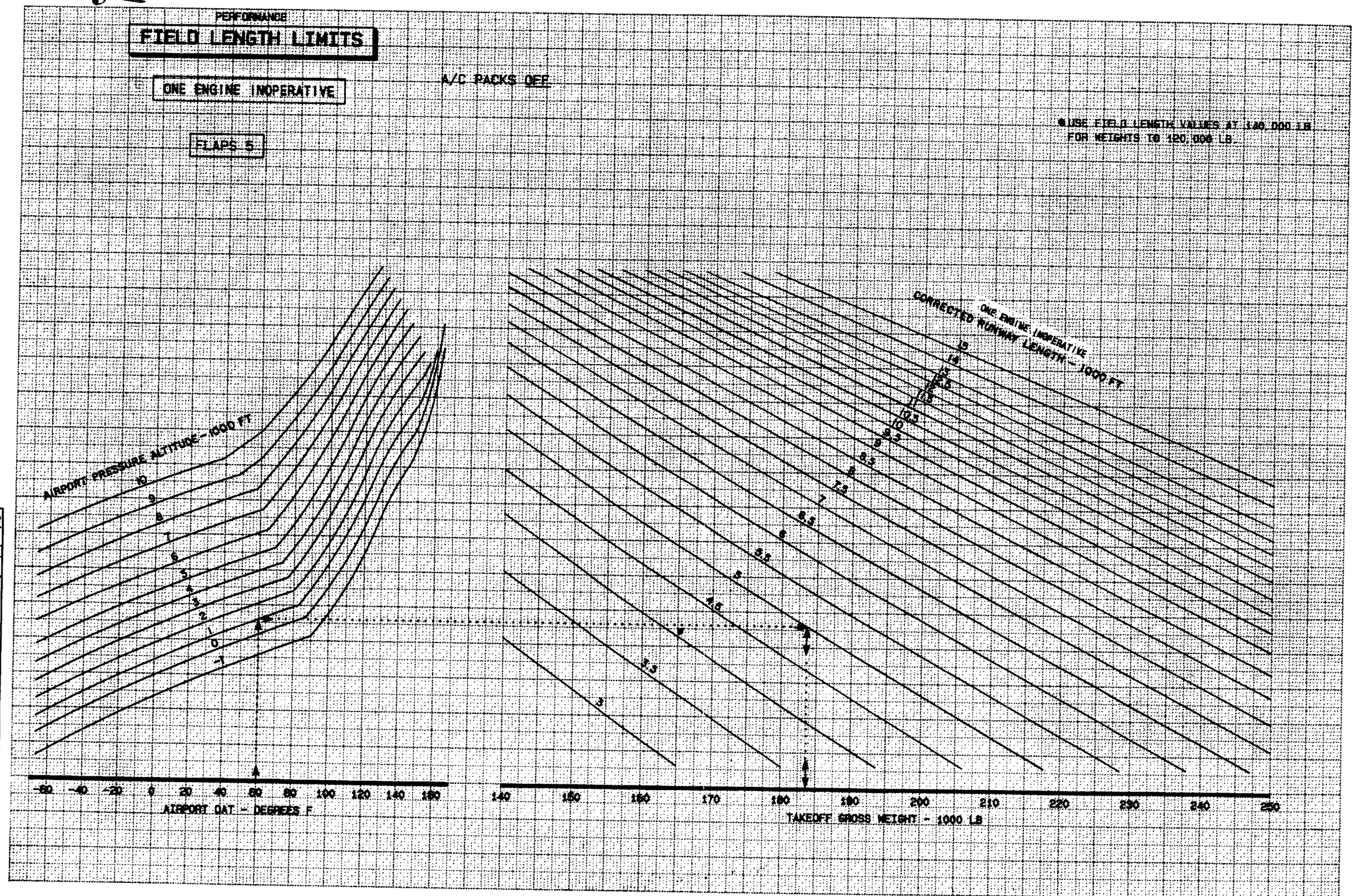
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 5

*USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB



OSWALD	APPROVED	DATE
757-200	M. LECHNER NM-308	29 Aug 84
PW 2037	A.R. Johnson	3/25/88
	J. Gaynor	7/22/93

P.C. BL000455
D631N013 PG. 4.4-11

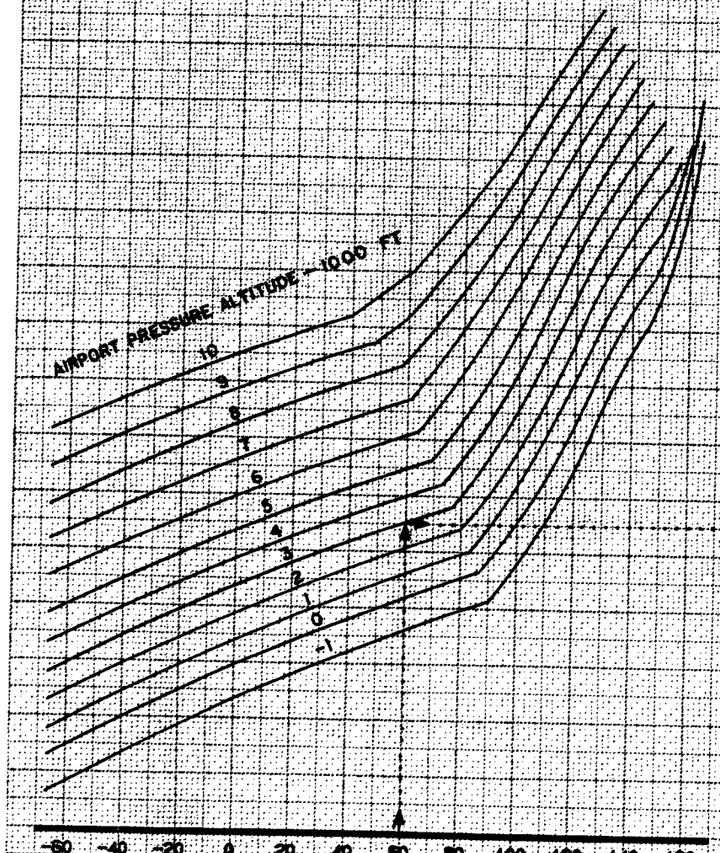
PERFORMANCE

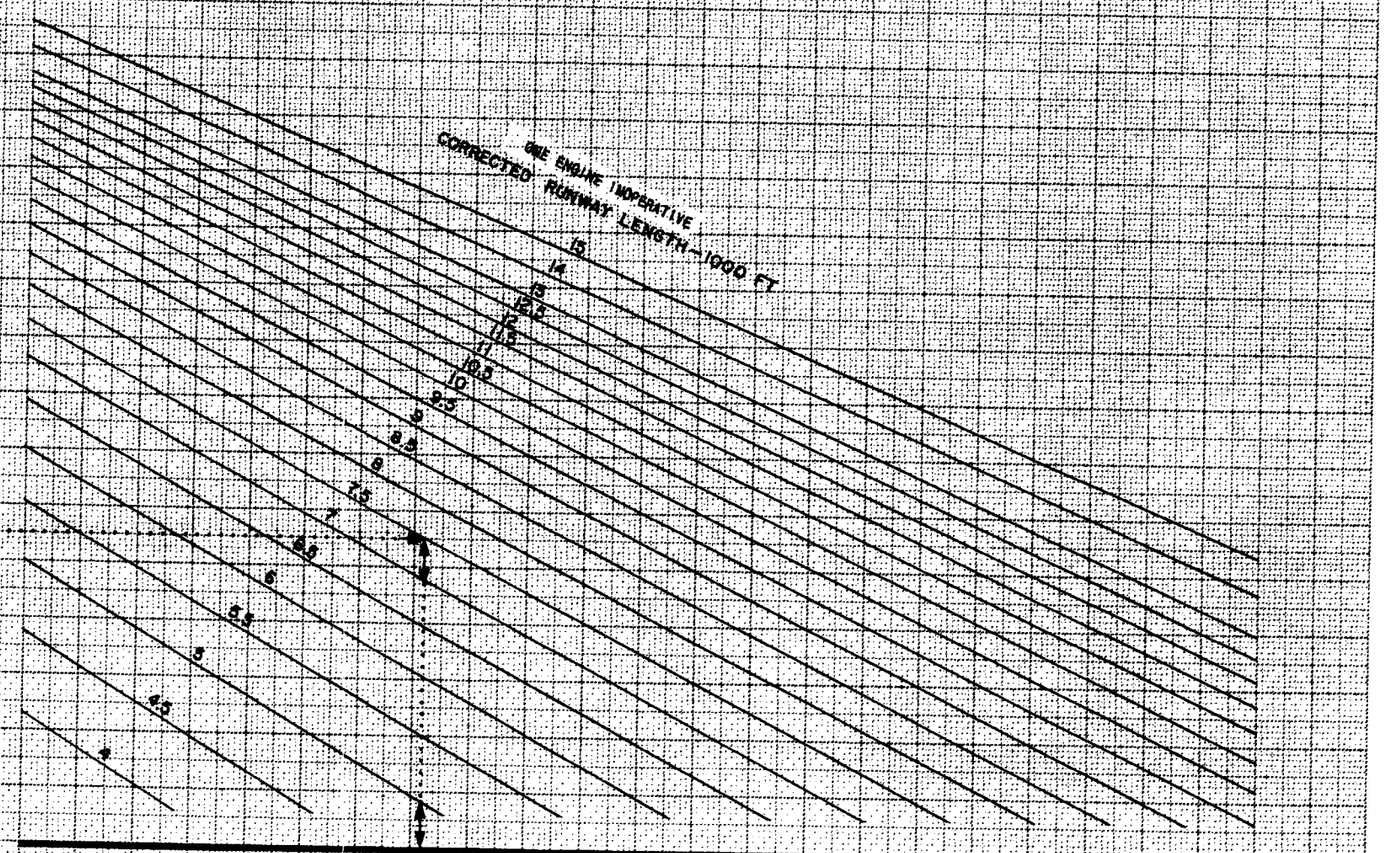
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 5





APPROVED	DATE
M. LESHNOWER MM-308	21Aug94
[signature]	5/3/95

OSWALD
757-200
PW 2037

P.C. 5L000457
D631N013 PG. 4.4-12

PERFORMANCE

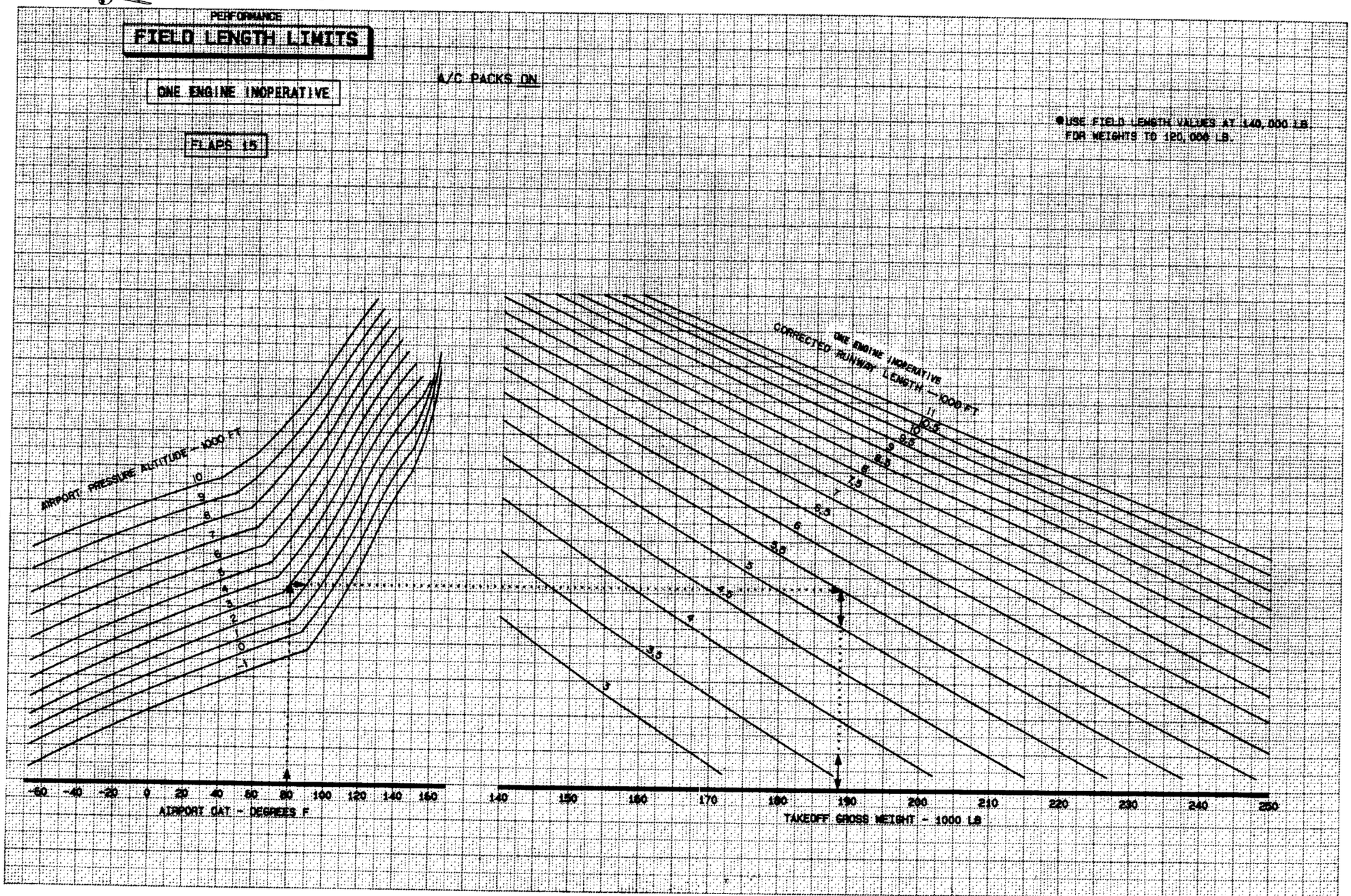
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 15

*USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



MILLER	APPROVED	DATE
757-200	[illegible]	8/20/96
PW 2037	[illegible]	3/25/188
	[illegible]	7/22/93

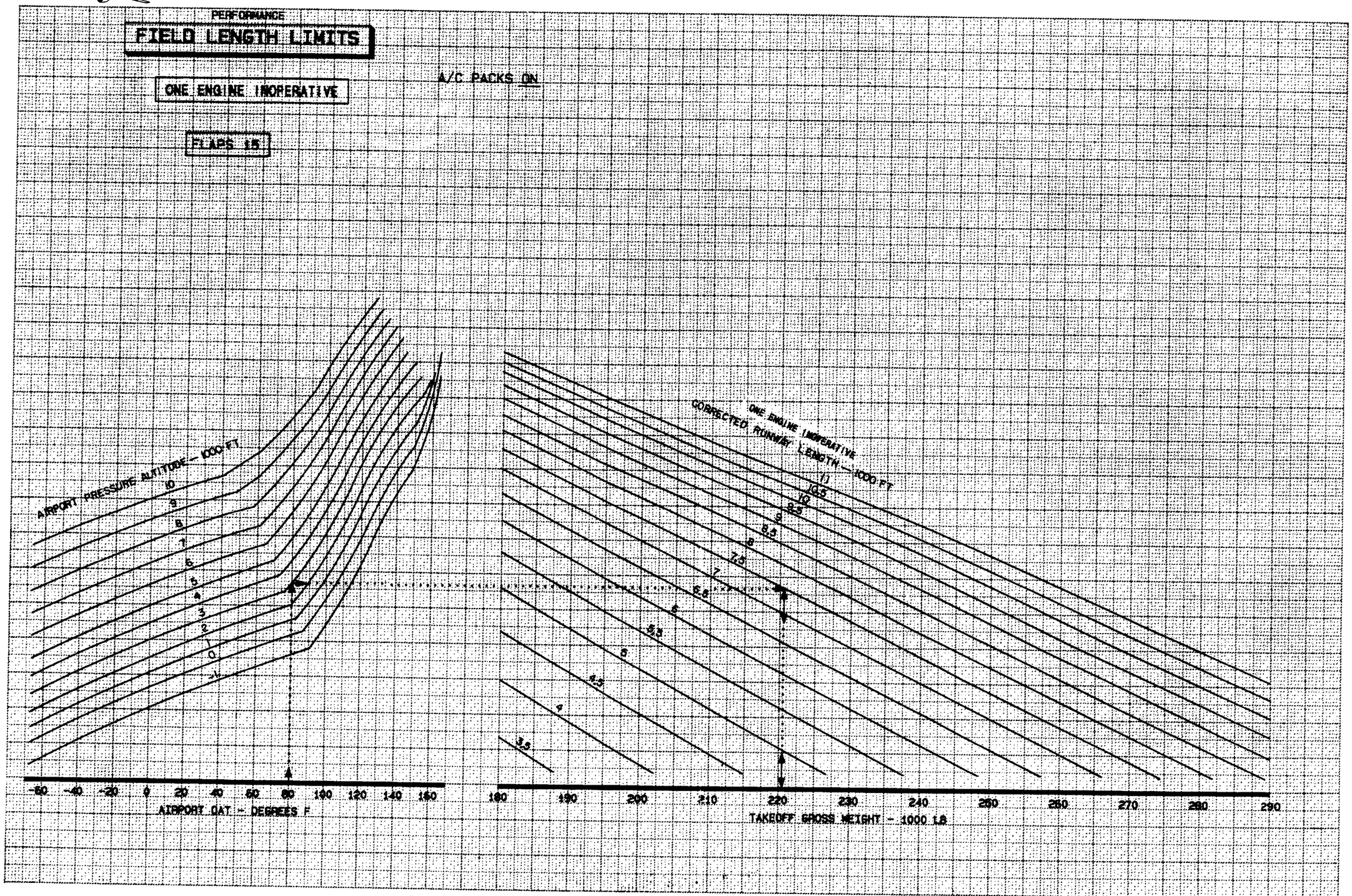
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 15



P.C. BL000458
D631N013 PG. 4.4-13

MILLER	APPROVED	DATE
757-200	H Gaydon	8/20/84
PW 2037	B Duncan	5/3/95

P.C. 5L000481
D631N013 PG. 4.4-14

PERFORMANCE

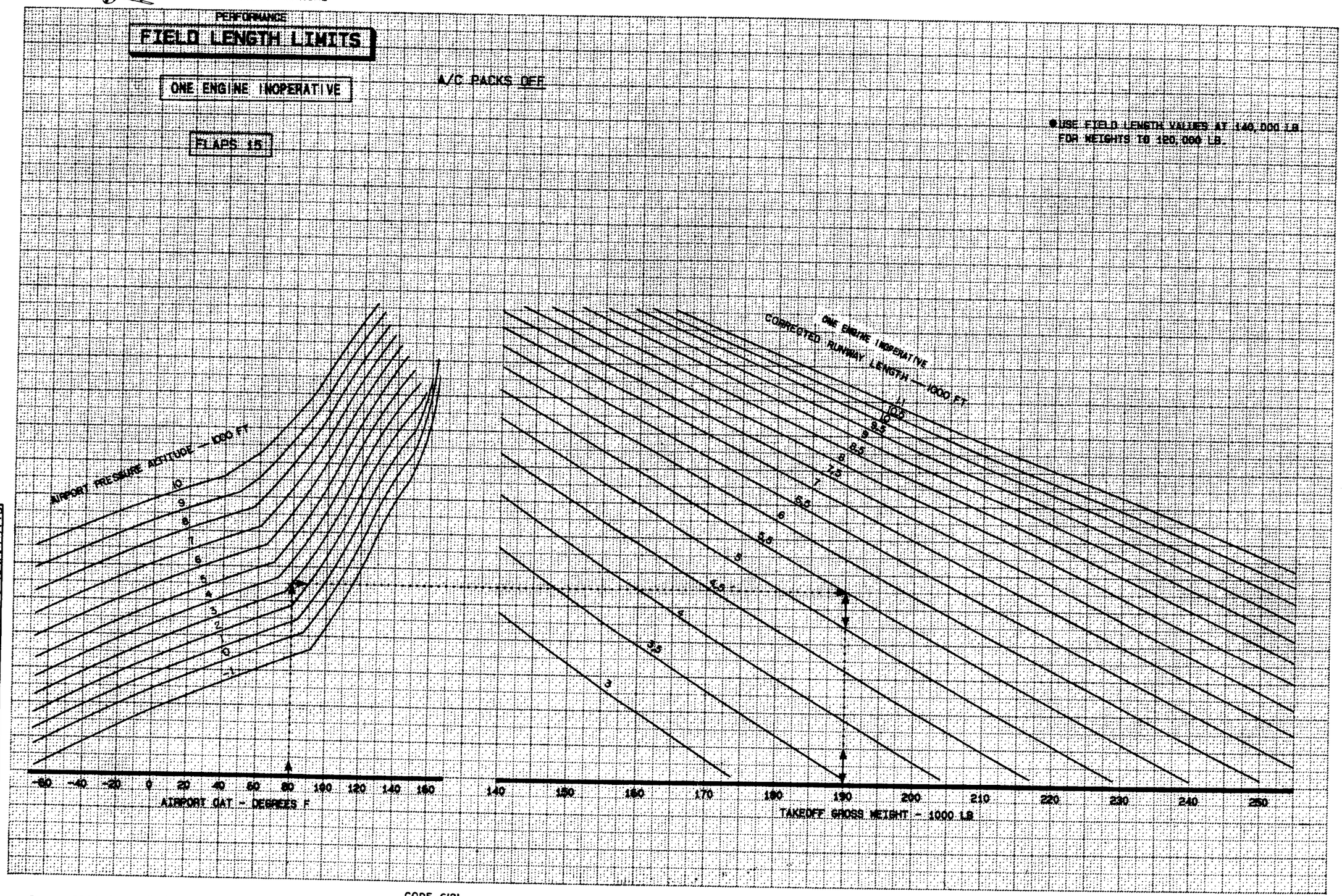
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 15

*USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



MILLER
757-200
PW 2037

APPROVED	DATE
Honderman NGS 18	8/20/84
A.R. Bauer	3/25/85
D.J. Swan	7/17/95

SD9655

6E4208

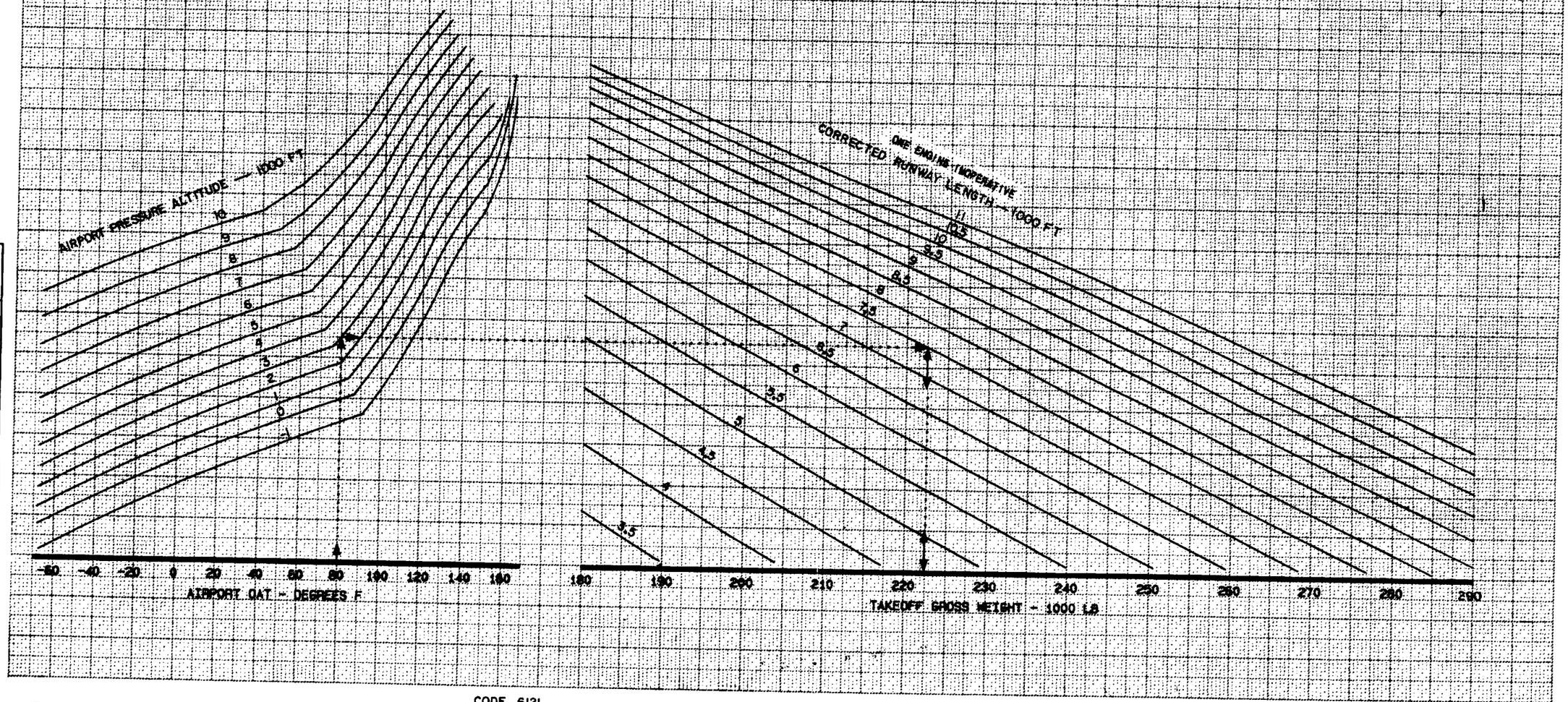
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 15



P.C. 5L000483
D631N013 PG. 4.4-15

APPROVED	DATE
Hamilton Miller	8/20/96
A Garner	7/17/96

MILLER
757-200
PW 2037

S09657

6E4208

PERFORMANCE

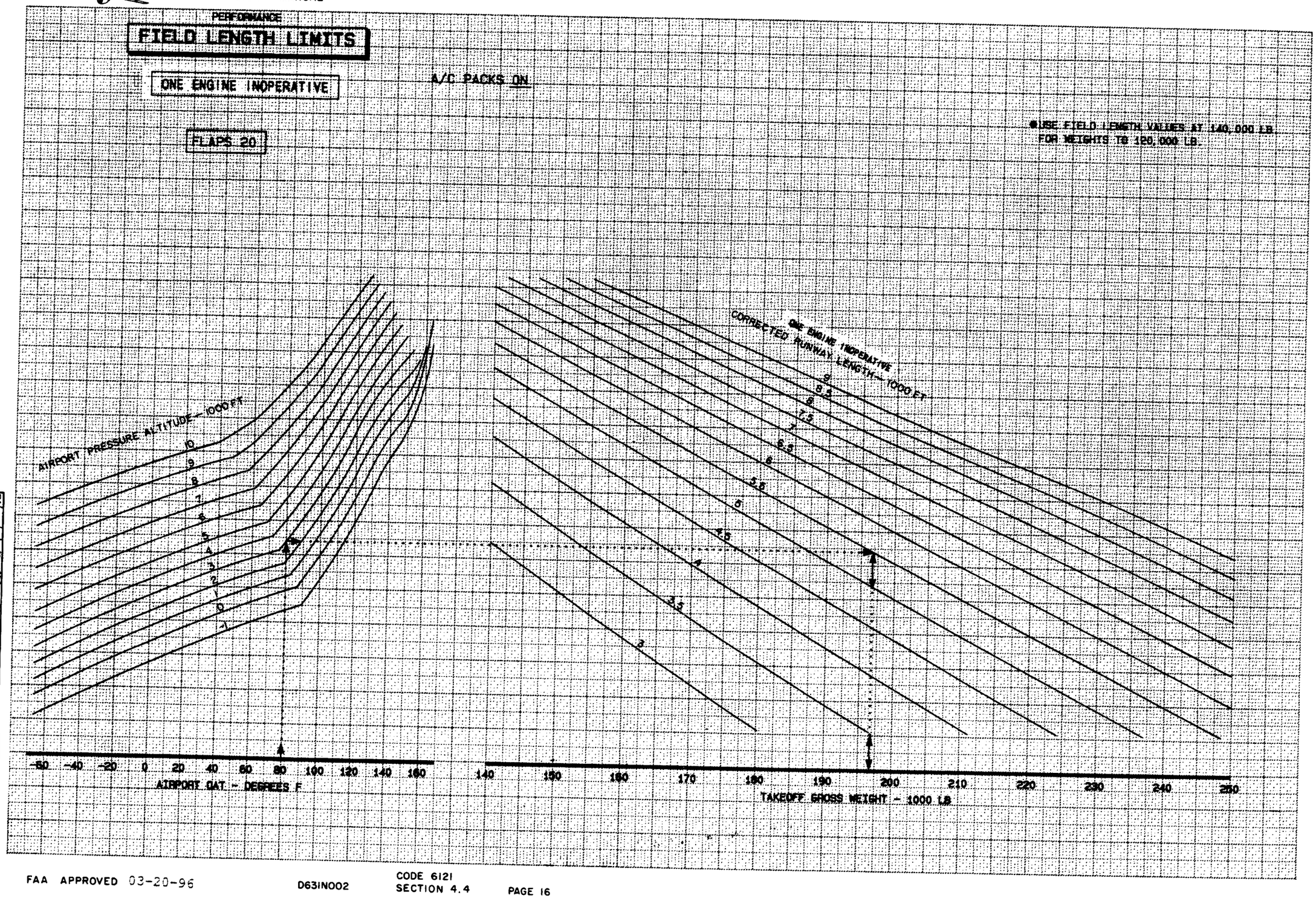
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 20

● USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 139,000 LB



P.C. 5L000485
D631N013 PG. 4.4-16

BARTNICK	APPROVED	DATE
757-200	MLECHNAK NMC-308	30 Aug 96
PW 2037	J.R. Barnes	3/27/96
	J. Cundy	7/22/96

S09659

GE4208

P.C. 5L000487
D631N013 PG. 4.4-17

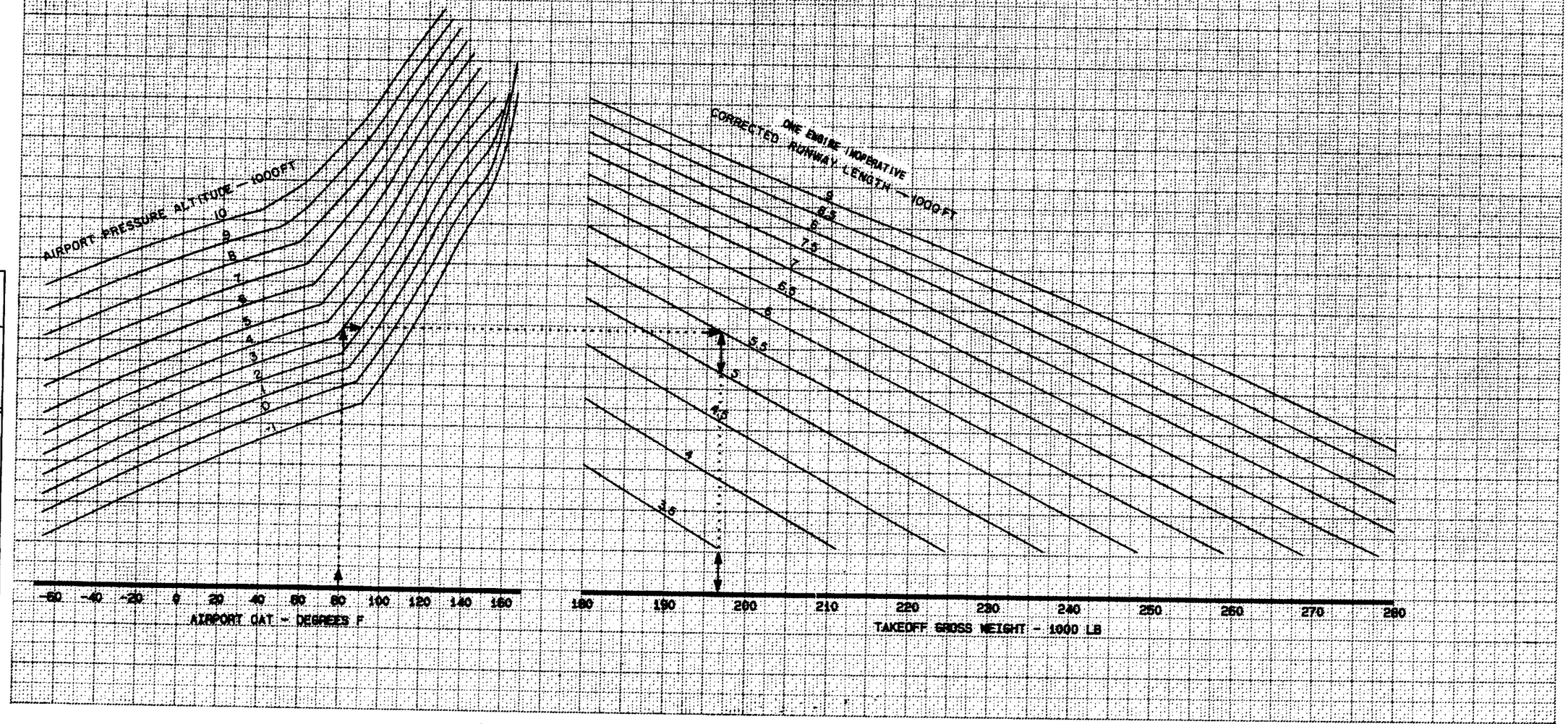
PERFORMANCE

FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS ON

FLAPS 20



BARTNICK
757-200
PW 2037

APPROVED	DATE
M. LACHMAR for 308	3 Aug 94
[signature]	7/22/96

PERFORMANCE

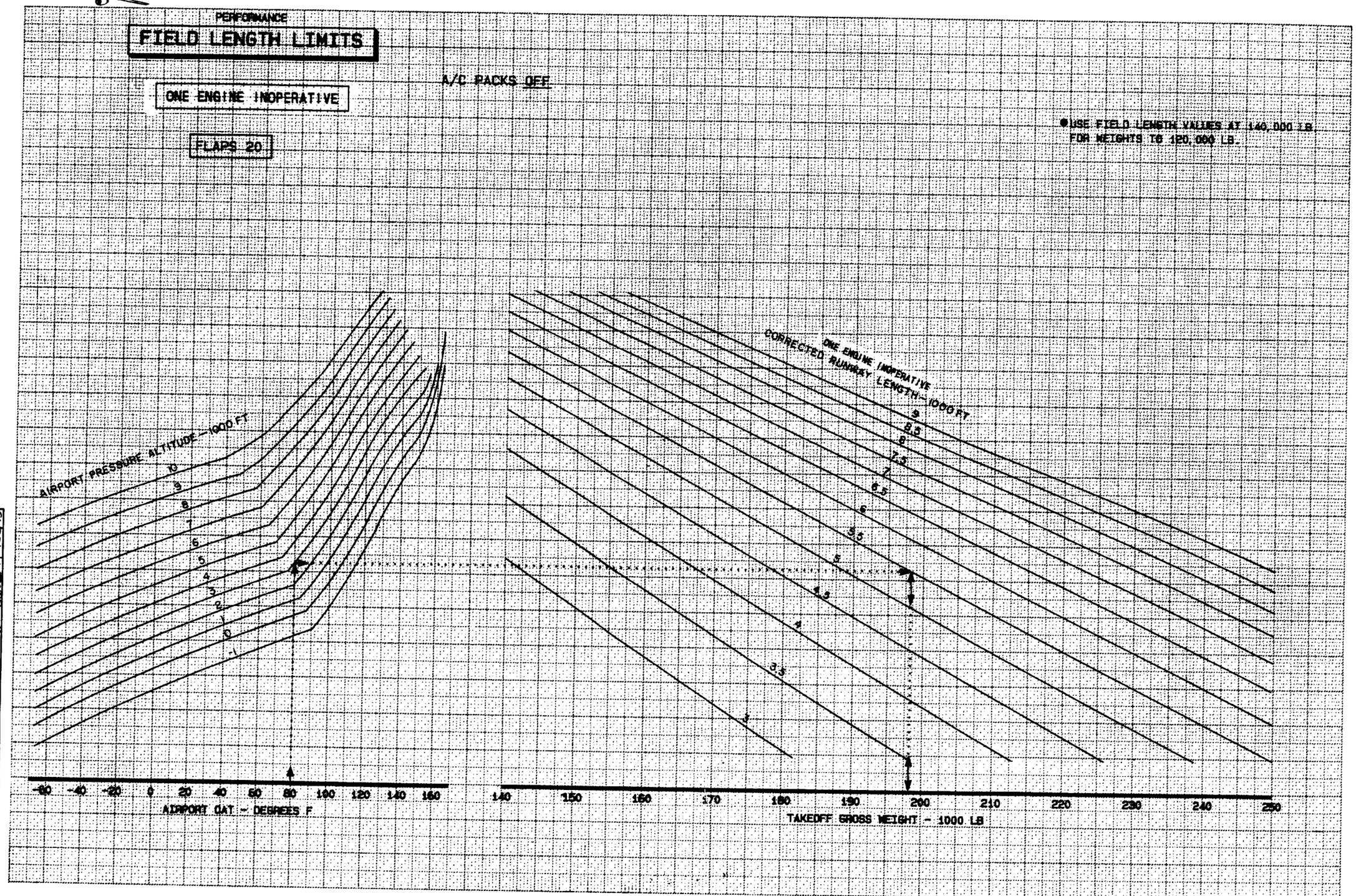
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 20

● USE FIELD LENGTH VALUES AT 140,000 LB FOR WEIGHTS TO 120,000 LB.



P.C. 5L000488
D631N013 PG. 4.4-18

BARTNICK
757-200
PW 2037

APPROVED	DATE
M. LACHANCE DIR. 308	2/26/96
A.R. Bartnick	3/25/96
J.S. Bartnick	7/22/96

S09663

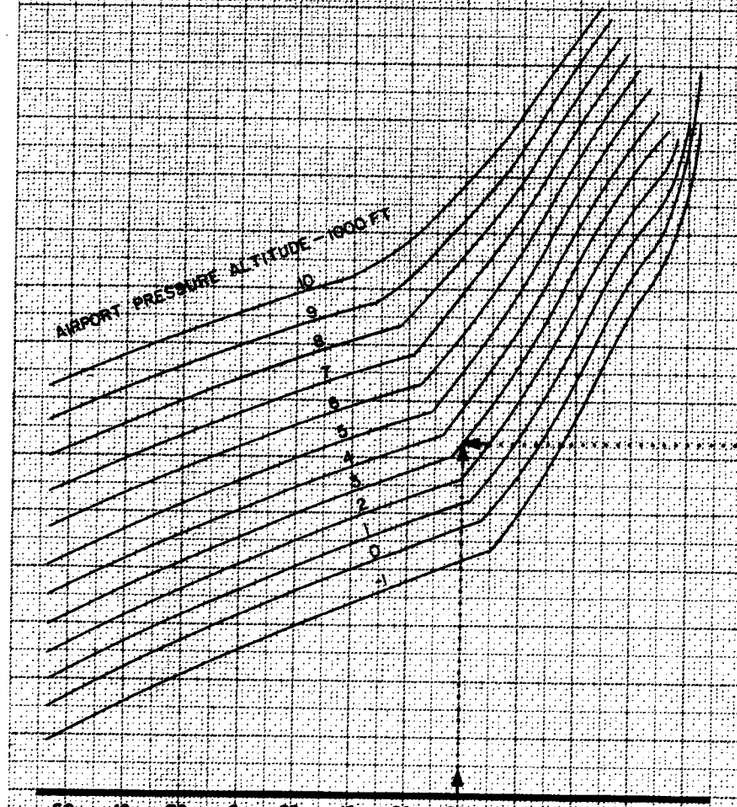
PERFORMANCE

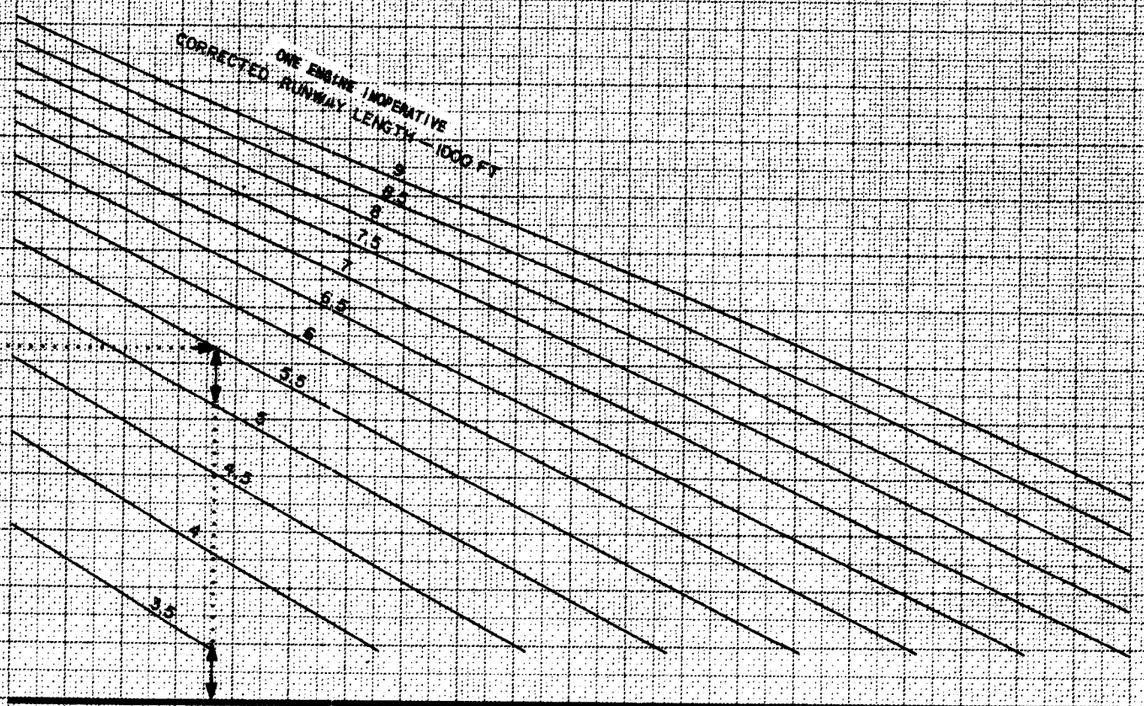
FIELD LENGTH LIMITS

ONE ENGINE INOPERATIVE

A/C PACKS OFF

FLAPS 20





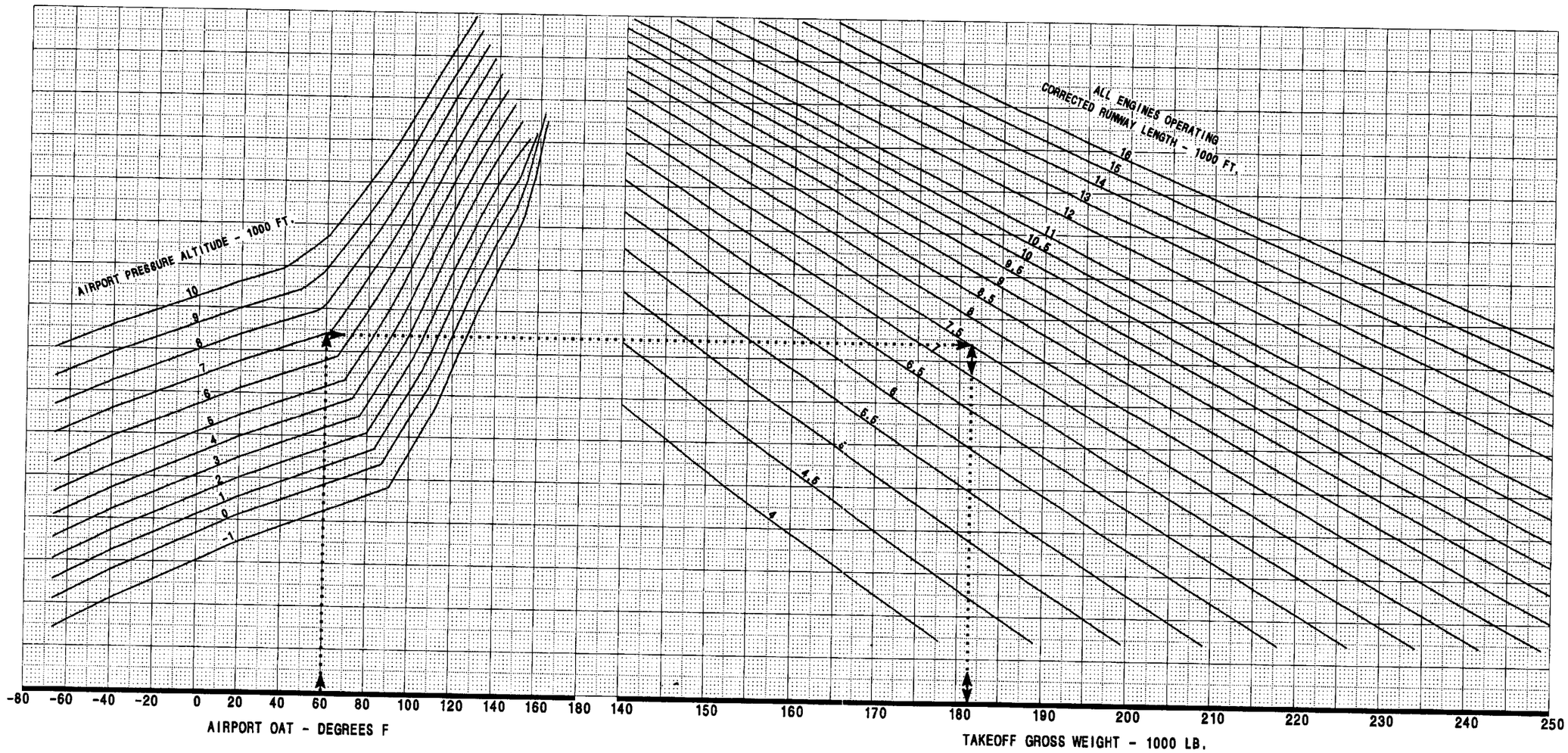
BARTNICK	APPROVED	DATE
757-200	W. LECHNER (Nov 3rd)	30 Aug 01
PW 2037	[signature]	7/22/05

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 1

A/C PACKS ON



P.C. C500420006
D631N013 PG. 4.4-20

APPROVED	DATE
V. HILL	06-01-95

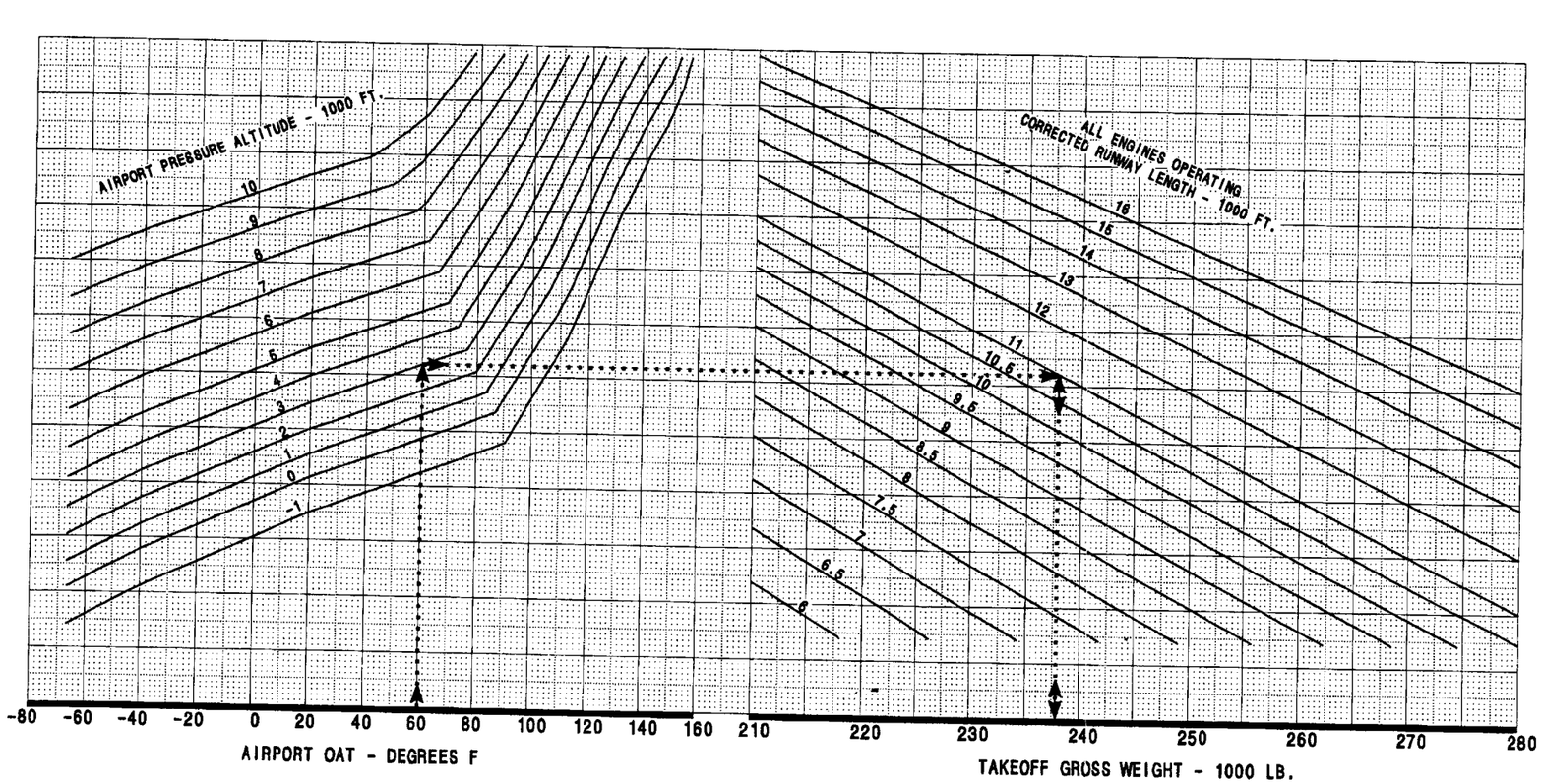
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 1

A/C PACKS ON



P.C. C500421006
D631N013 PG. 4.4-21

APPROVED	DATE
V.HILL	10-18-95

L. ENEBRAD
757-200
PW2037

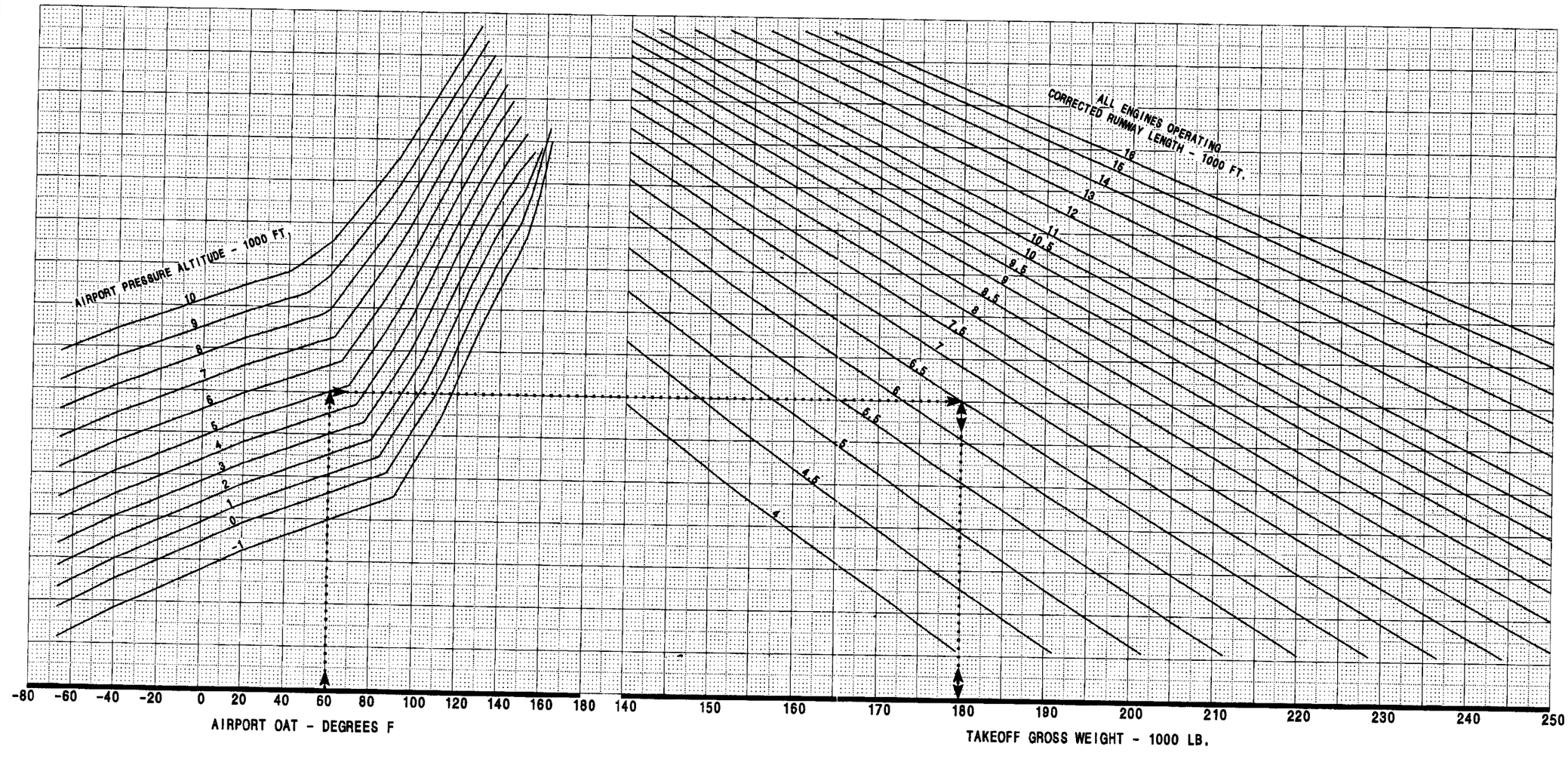
SD9669

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 1

A/C PACKS OFF



P.C. C500422006
D631N013 PG. 4.4-22

APPROVED	DATE
V. HILL	06-01-95

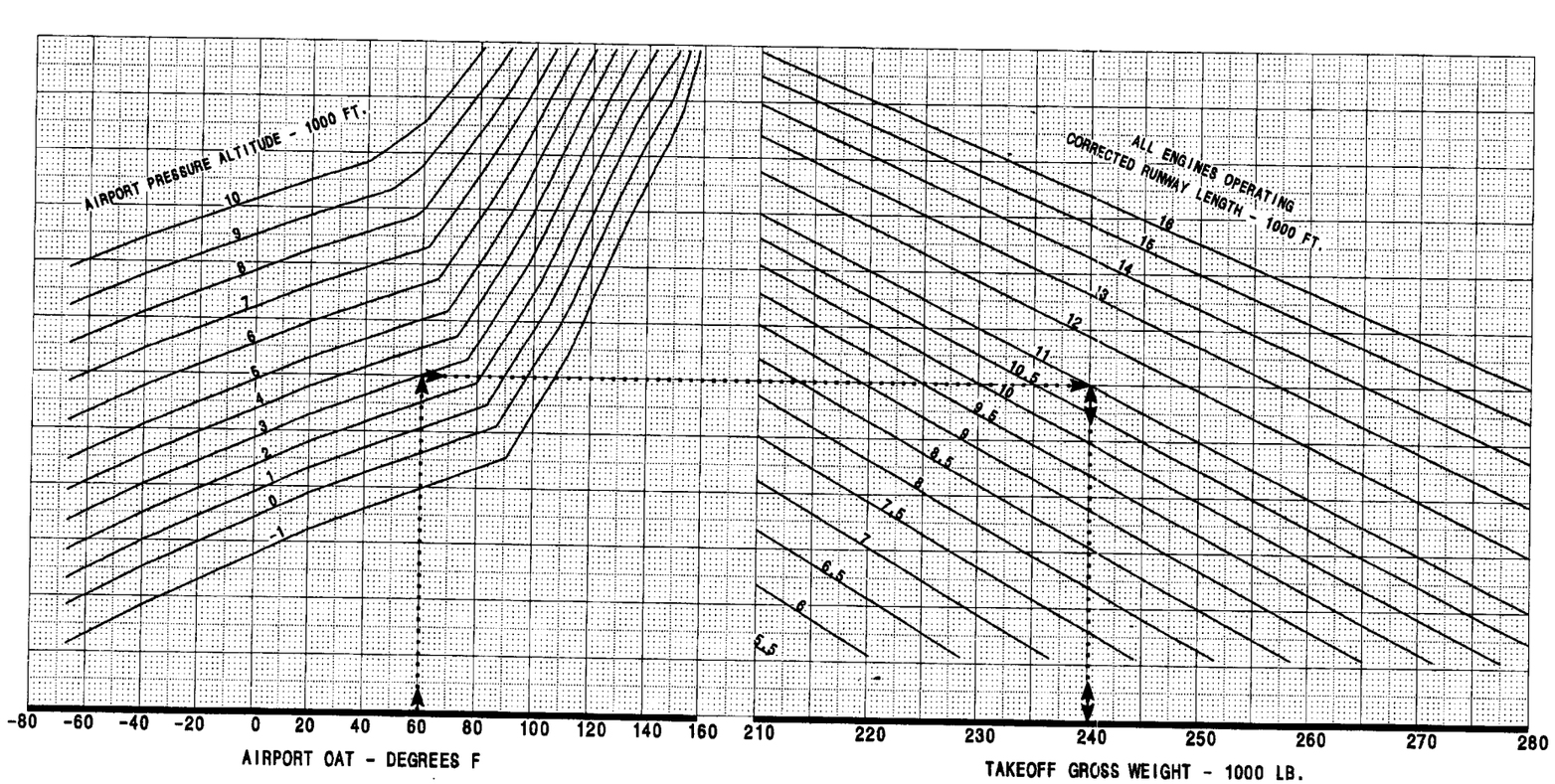
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 1

A/C PACKS OFF



P.C. C500423006
D631N013 PG. 4.4-23

APPROVED	DATE
V.HILL	10-18-95

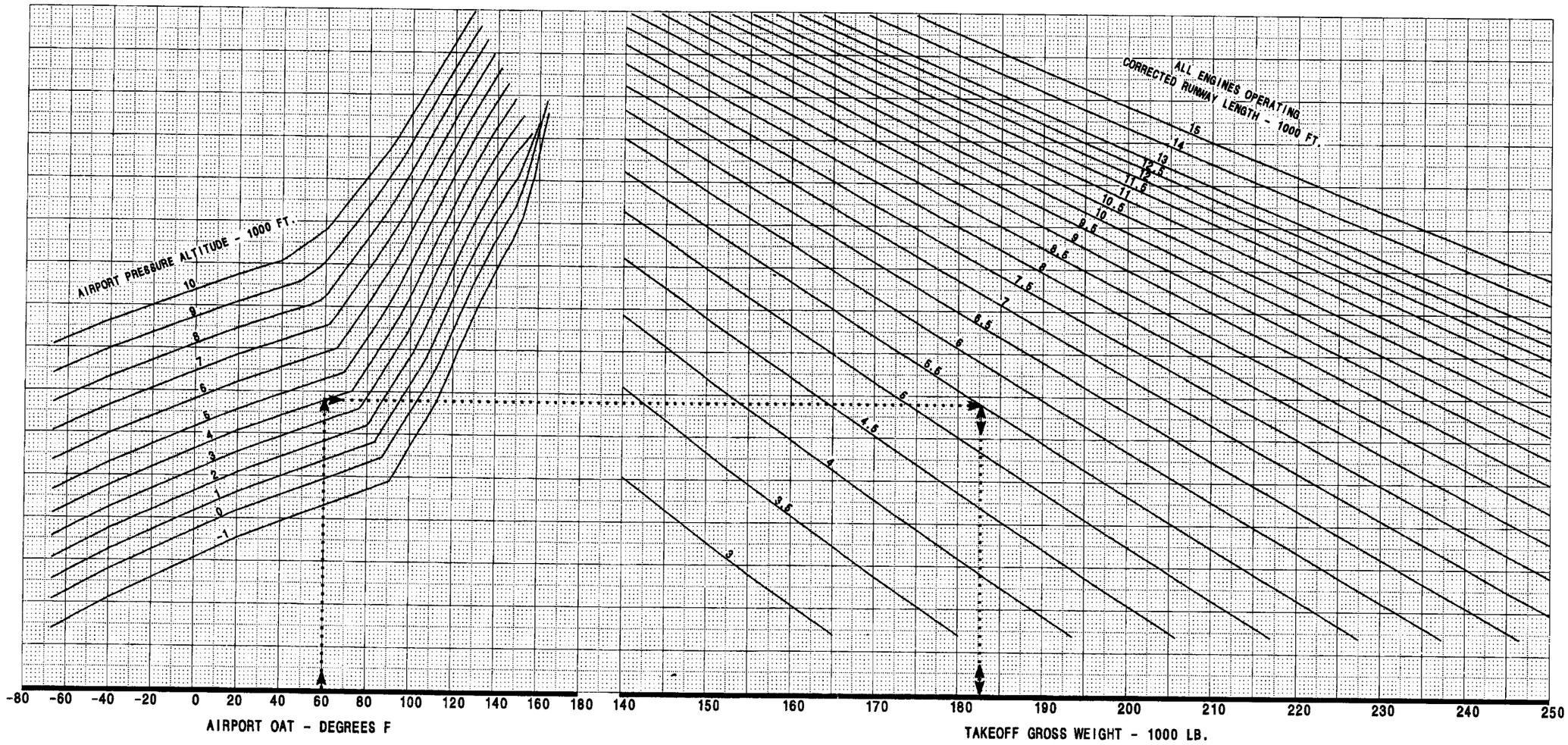
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS ON



P.C. C50042400G
D631N013 PG. 4.4-24

APPROVED	DATE
V. HILL	06-01-95

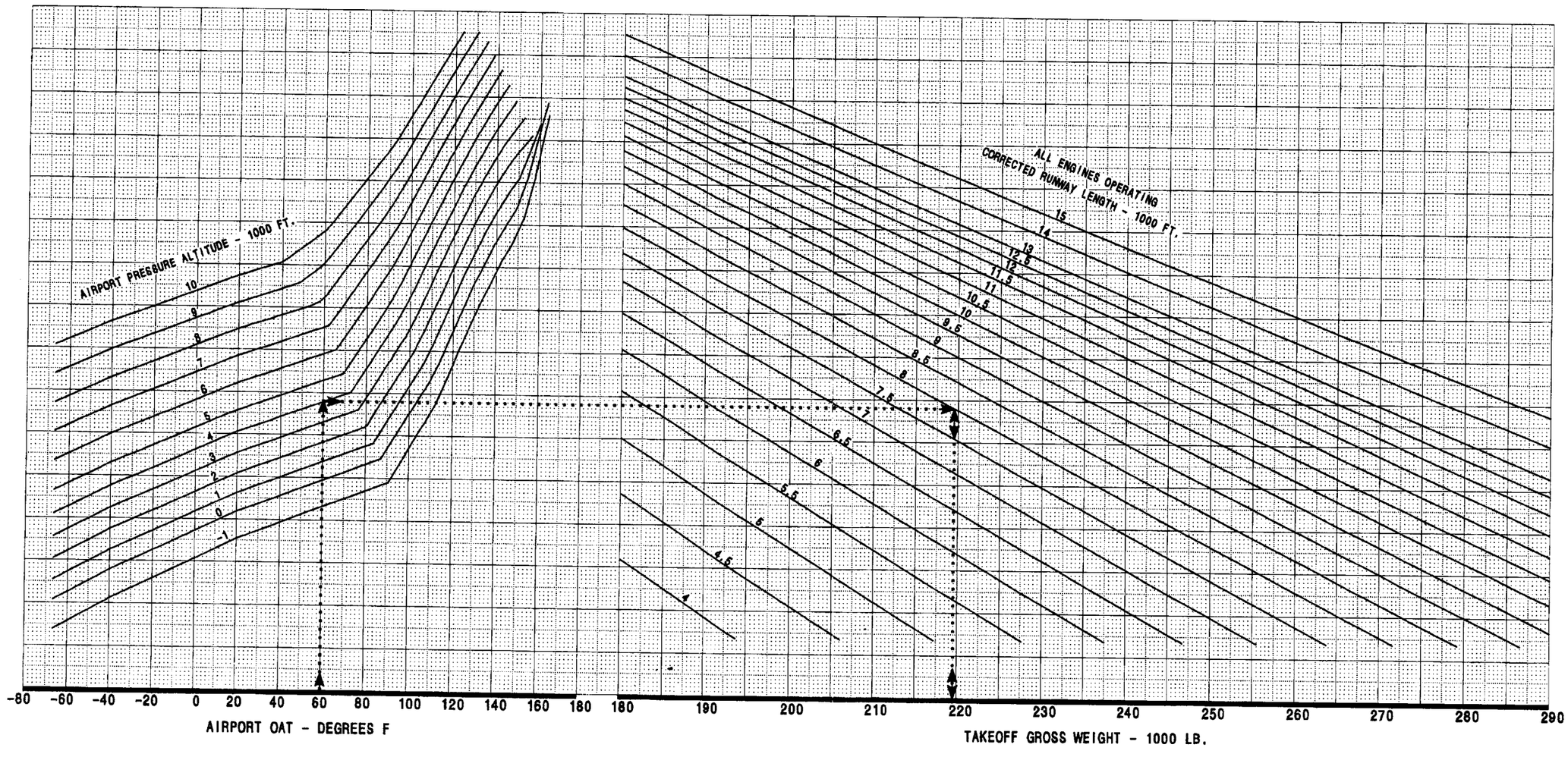
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS ON



P.C. C500425006
D631N013 PG. 4.4-25

APPROVED	DATE
V.HILL	10-18-95

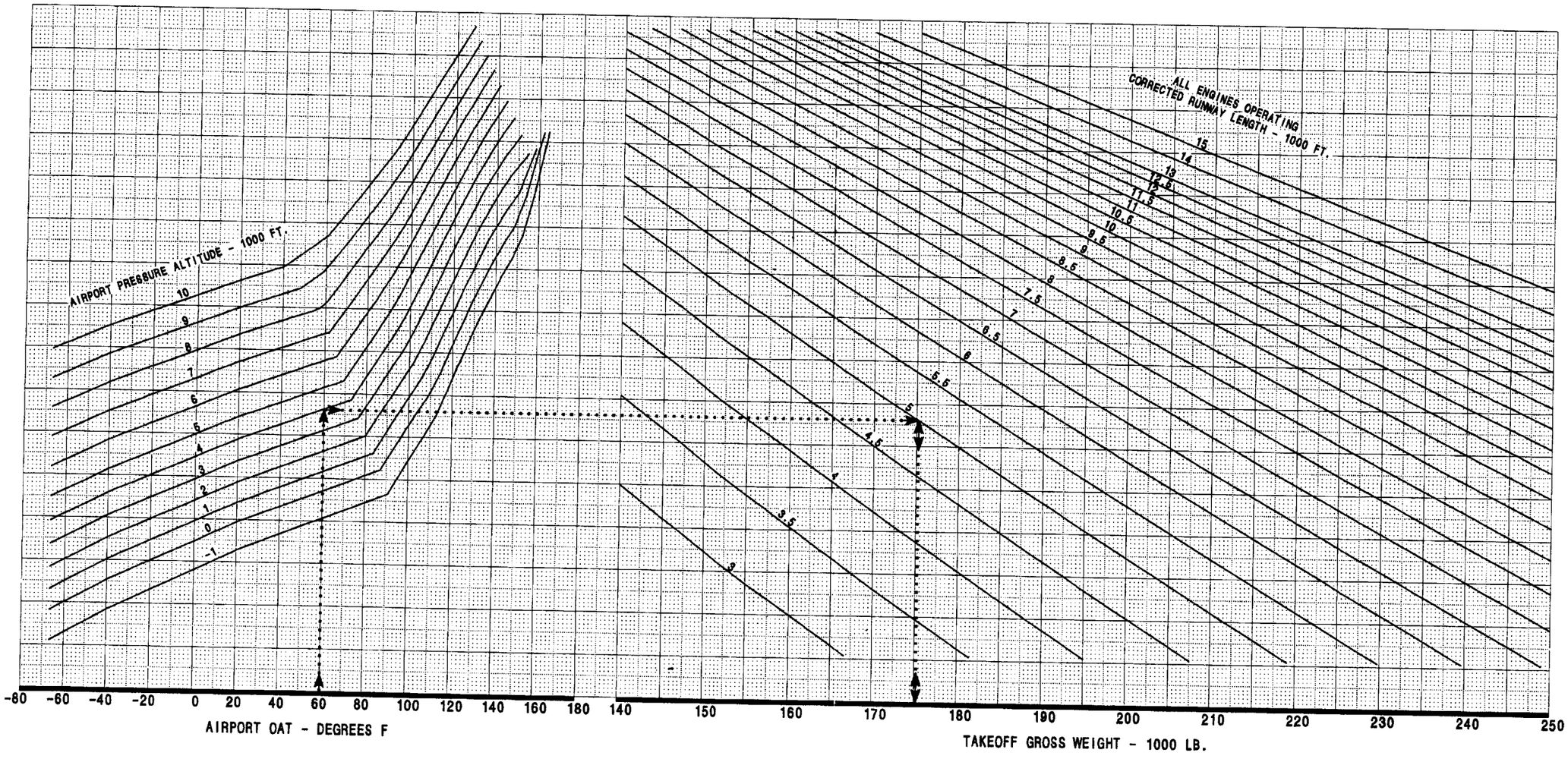
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS OFF



P.C. C500426006
D631N013 PG. 4.4-26

APPROVED	DATE
V. HILL	06-01-95

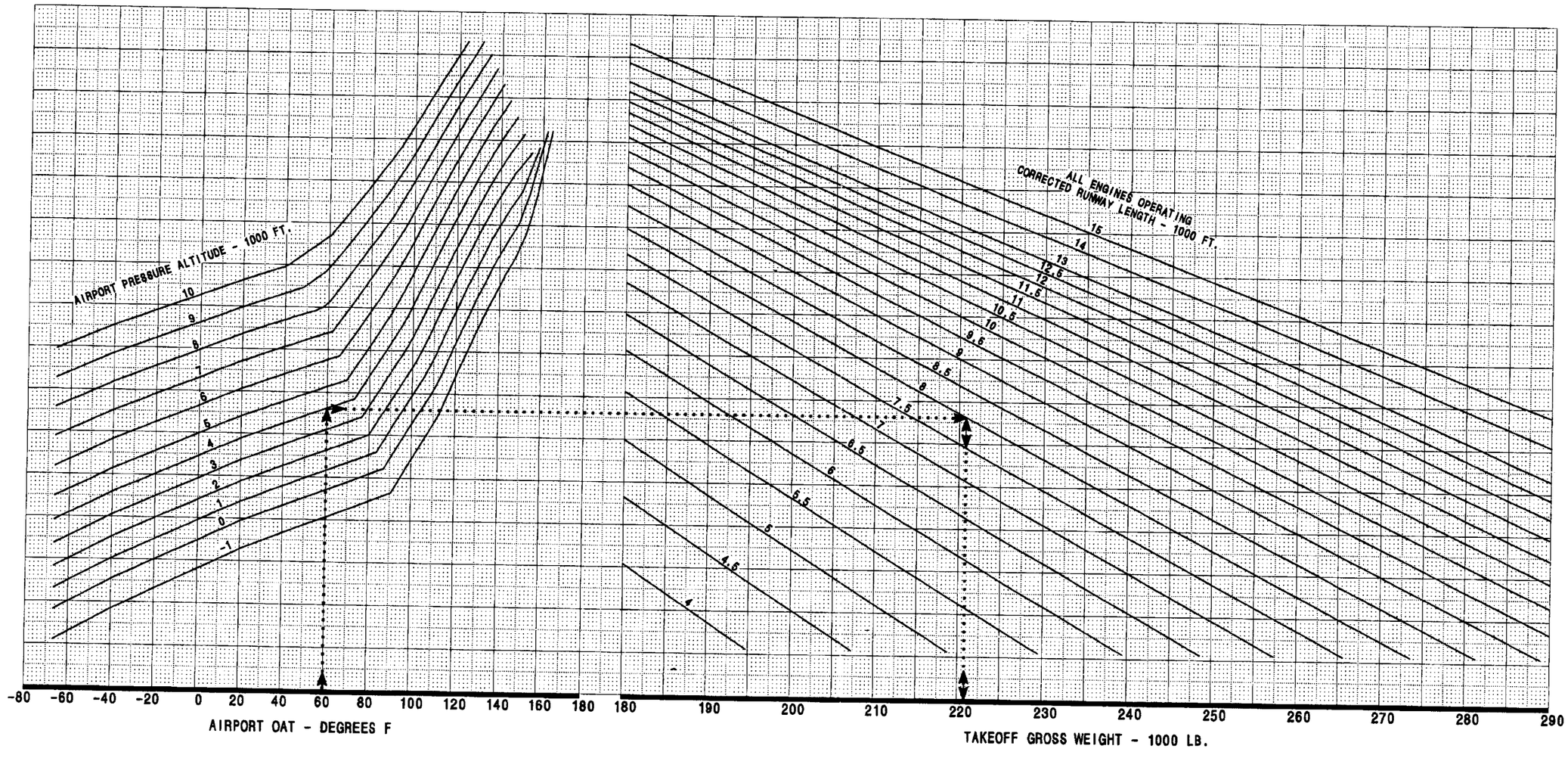
L. ENEBRAD
757-200
PW2037

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 5

A/C PACKS OFF



P.C. C500427006
D631N013 PG. 4.4-27

APPROVED	DATE
V.HILL	10-18-95

L. ENEBRAD
757-200
PW2037

S09681

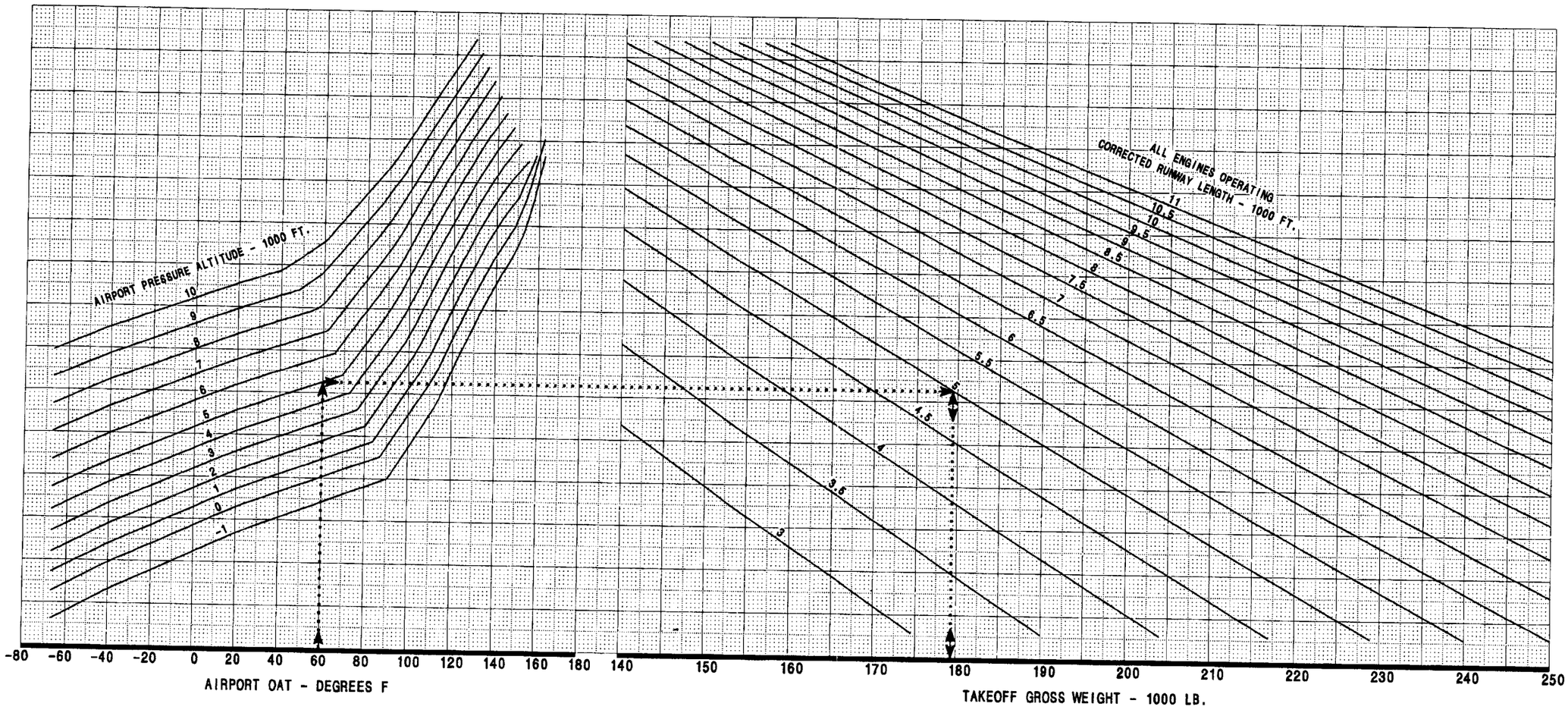
PERFORMANCE

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS ON



P.C. C500428006
D631N013 PG. 4.4-28

APPROVED	DATE
V. HILL	06-01-95

L. ENEBRAD
757-200
PW2037

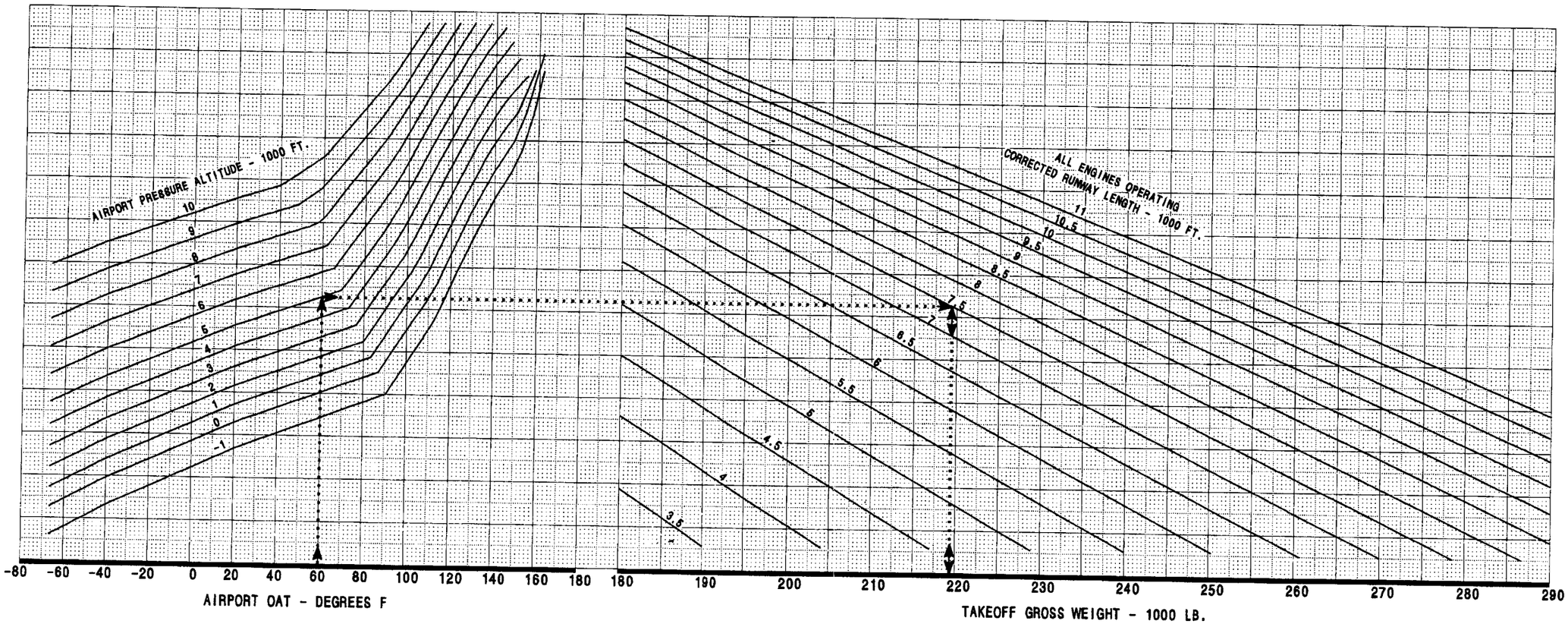
S09690

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS ON



P.C. C500429006
D631N013 PG. 4.4-29

APPROVED	V.HILL
DATE	10-18-95

L. ENEBRAD
757-200
PW2037

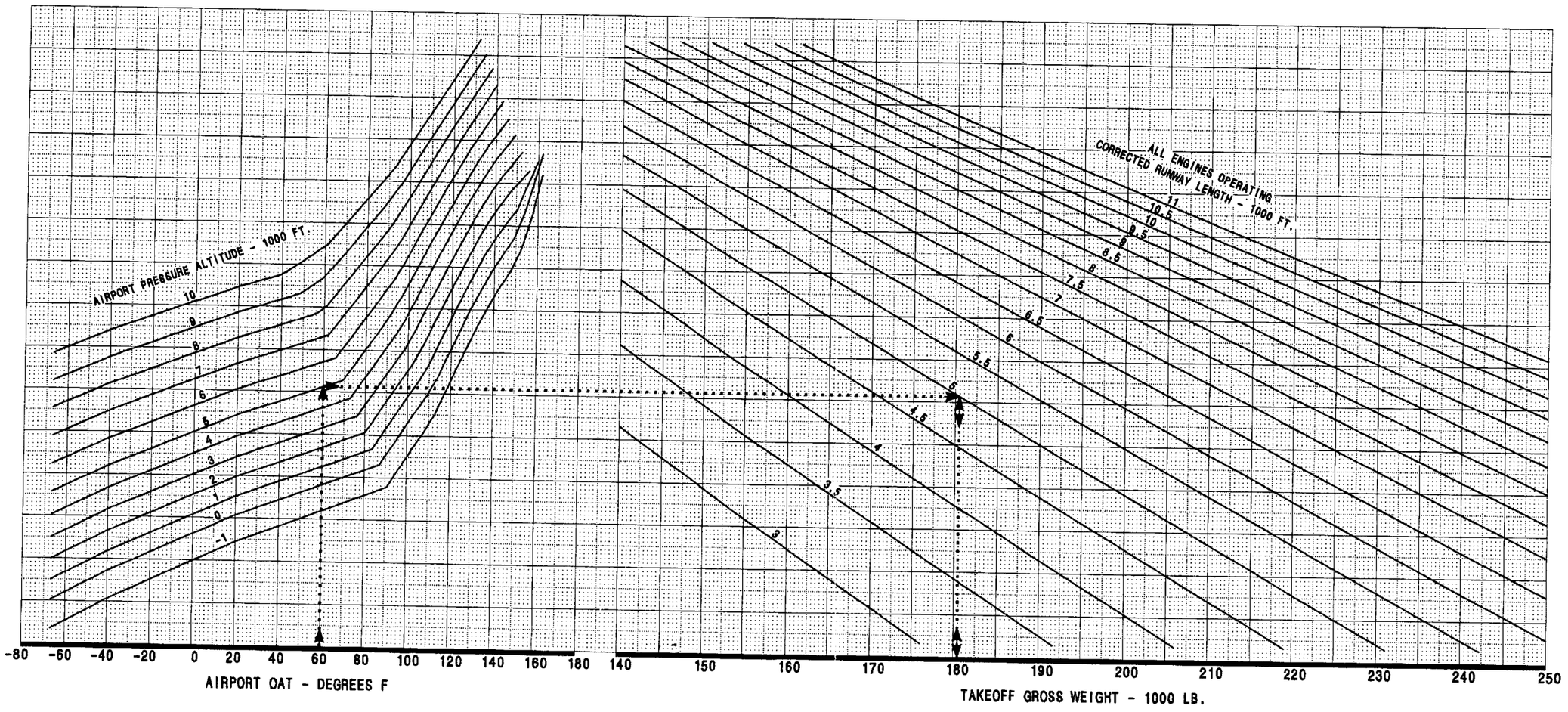
S09684

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS OFF



P.C. C500430006
D631N013 PG. 4.4-30

APPROVED	DATE
V. HILL	06-01-95

L. ENEBRAD
757-200
PW2037

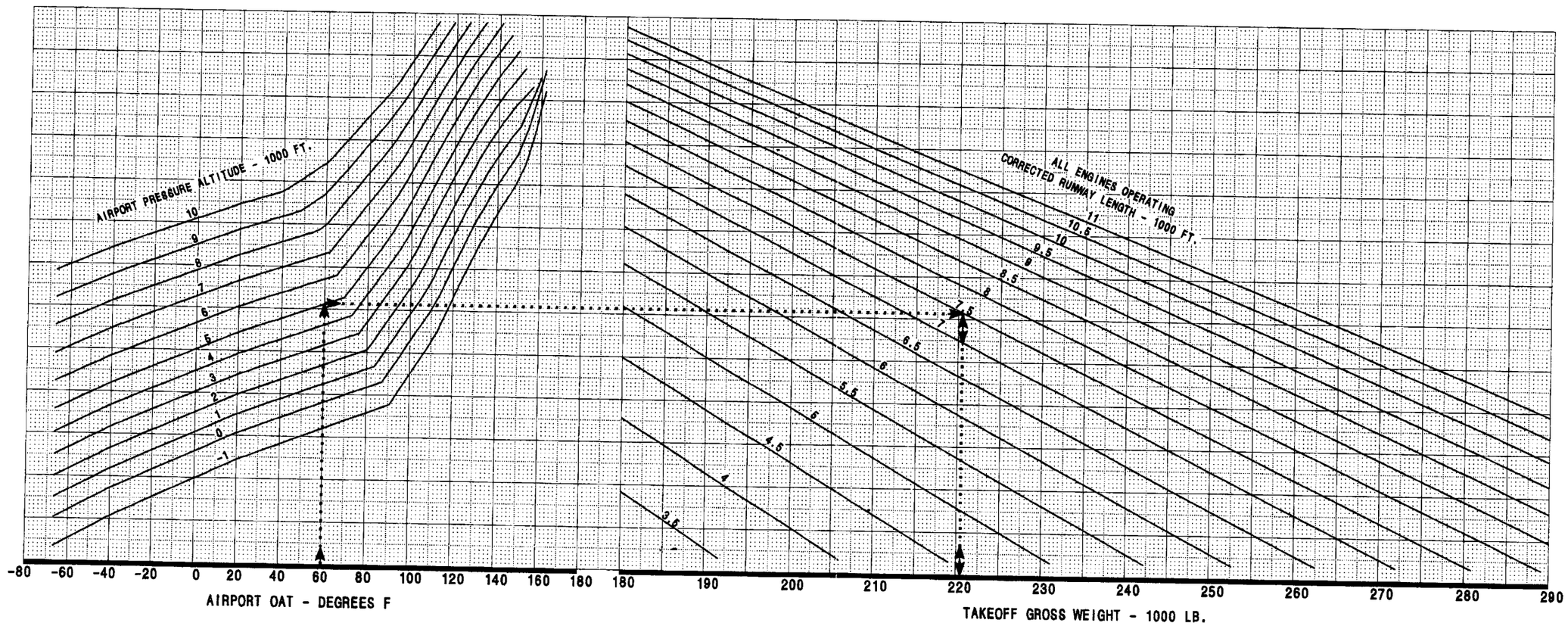
S09686

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 15

A/C PACKS OFF



P.C. C500431006
D631N013 PG. 4.4-31

APPROVED	DATE
V.HILL	10-18-95

L. ENEBRAD
757-200
PW2037

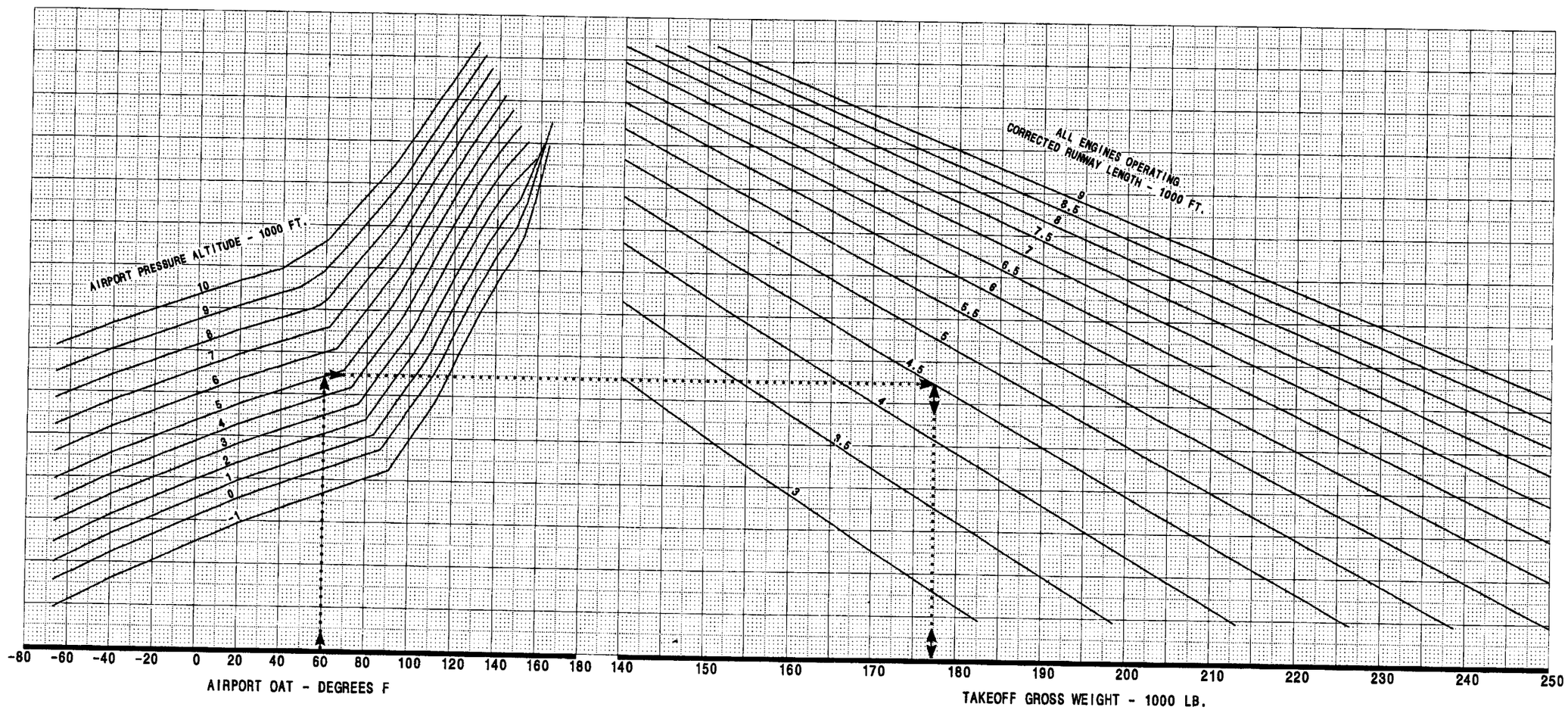
S09688

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS ON



P.C. C500432006
D631N013 PG. 4.4-32

APPROVED	DATE
V. HILL	06-01-95

L. ENEBRAD
757-200
PW2037

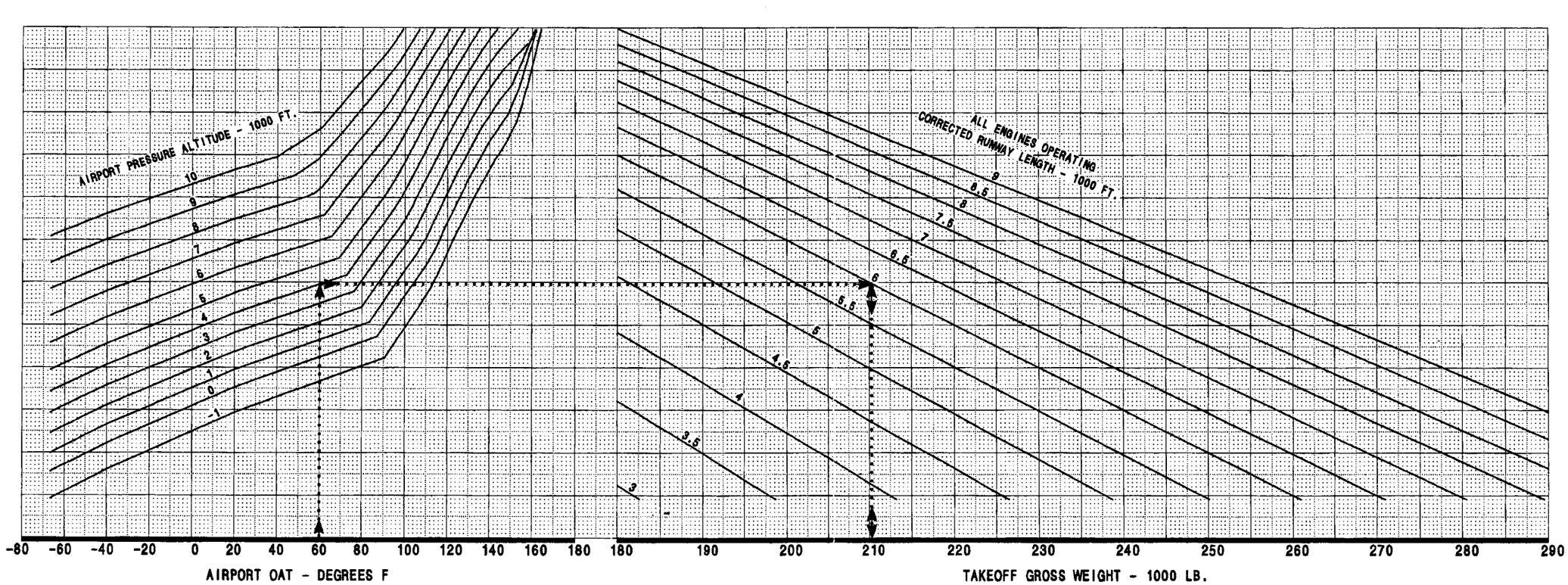
SD9691

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS ON



P.C. C500433006
D631N013 PG. 4.4-33

APPROVED	DATE
V.HILL	10-18-95

L. ENEBRAD
757-200
PW2037

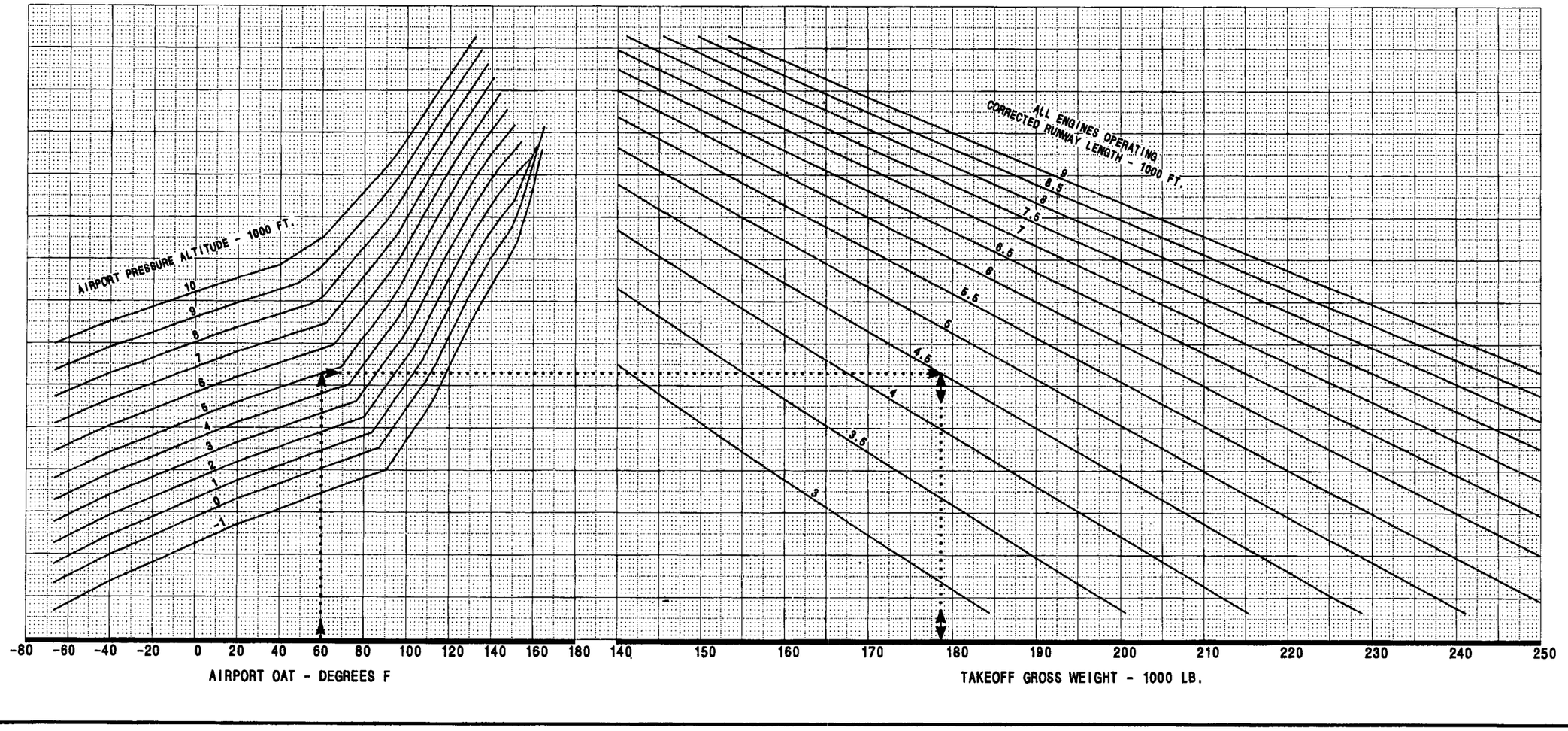
S09693

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS OFF



P.C. C50043006
D631N013 PG. 4.4-34

APPROVED	DATE
V. HILL	06-01-95

L. ENEBRAD
757-200
PW2037

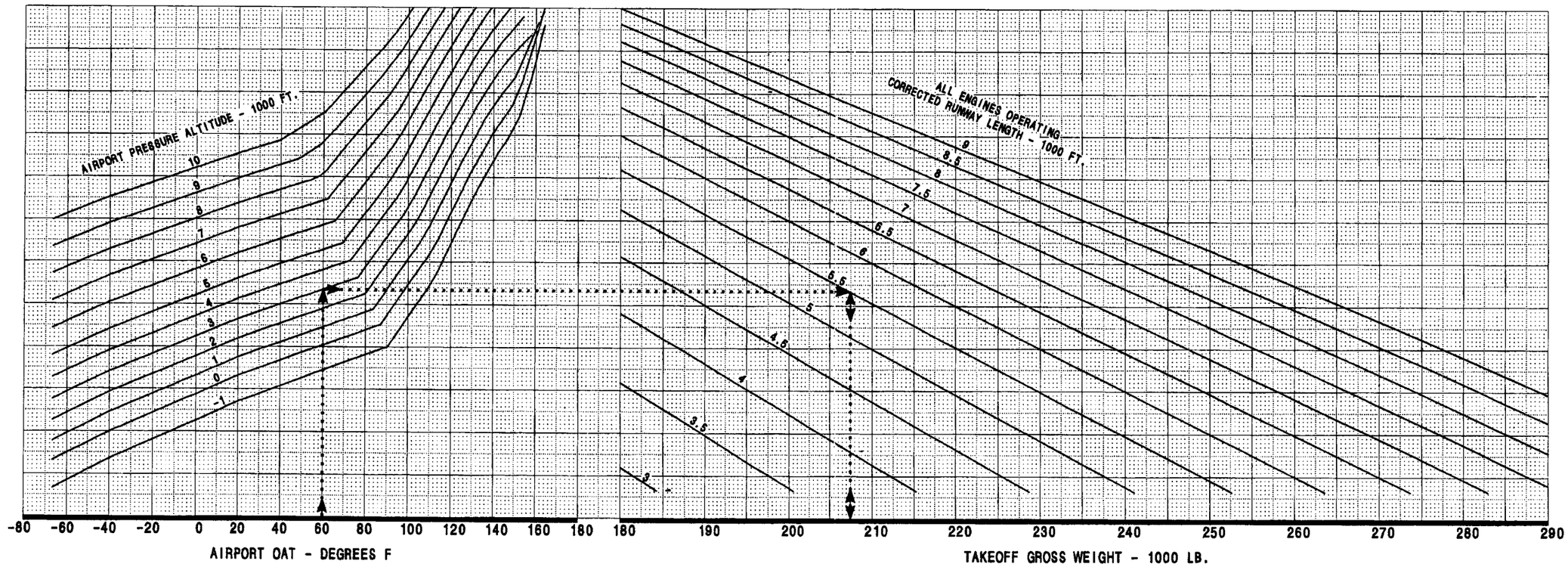
S09695

FIELD LENGTH LIMITS

ALL ENGINES OPERATING

FLAPS 20

A/C PACKS OFF



P.C. C500435006
D631N013 PG. 4.4-35

APPROVED	DATE
V.HILL	10-18-95

L. ENEBRAD
757-200
PW2037

SECTION 4.5 - TAKEOFF CLIMB LIMITS

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- A/C PACKS OFF	6
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- 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.

R17352

TAKEOFF CLIMB LIMITS

GENERAL

The 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, except using flaps 1, 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.

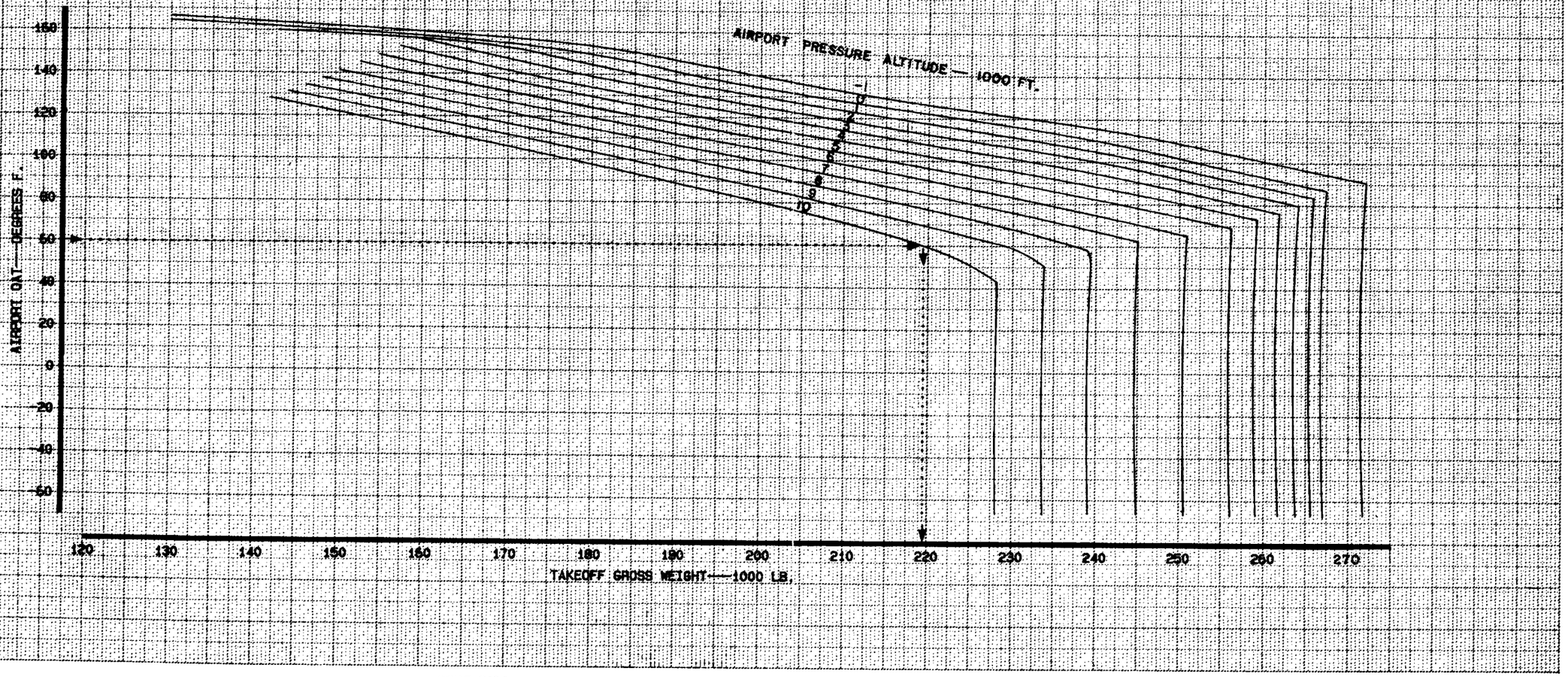
PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 1 — A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	1100
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	8300
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7800
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	14700

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



P.C. 5L000473
D631N013 PG. 4.5-3

APPROVED	DATE
M. LECHNAR NM-308	16 Aug 84

C FRANK
757-200
PW2037

P.C. 5L000475
D631N013 PG. 4.5-4

PERFORMANCE

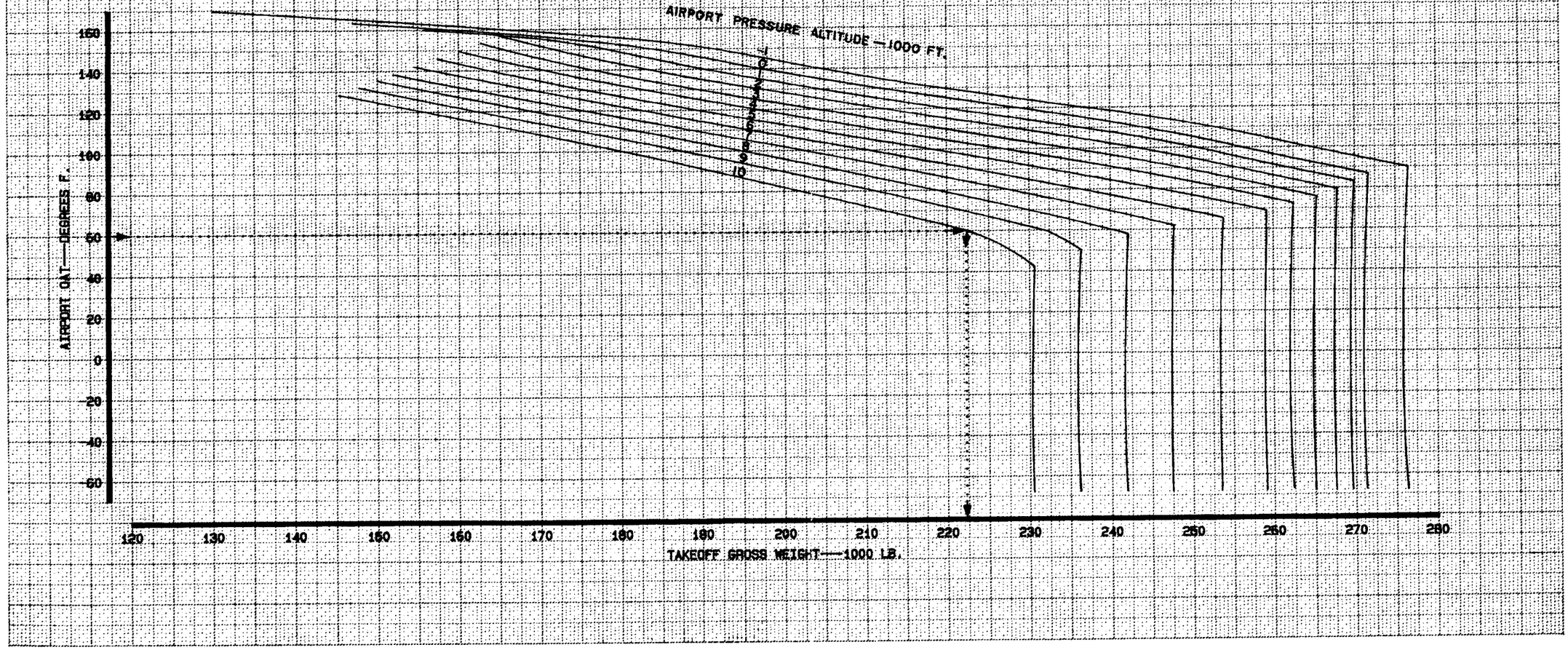
TAKEOFF CLIMB LIMITS

FLAPS 1

A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT--LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	1100
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	8300
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7800
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	14700

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



C. FRANK
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PW 2037

APPROVED	DATE
M. LESHNAR DER 3-28	17 Aug 84

R20729

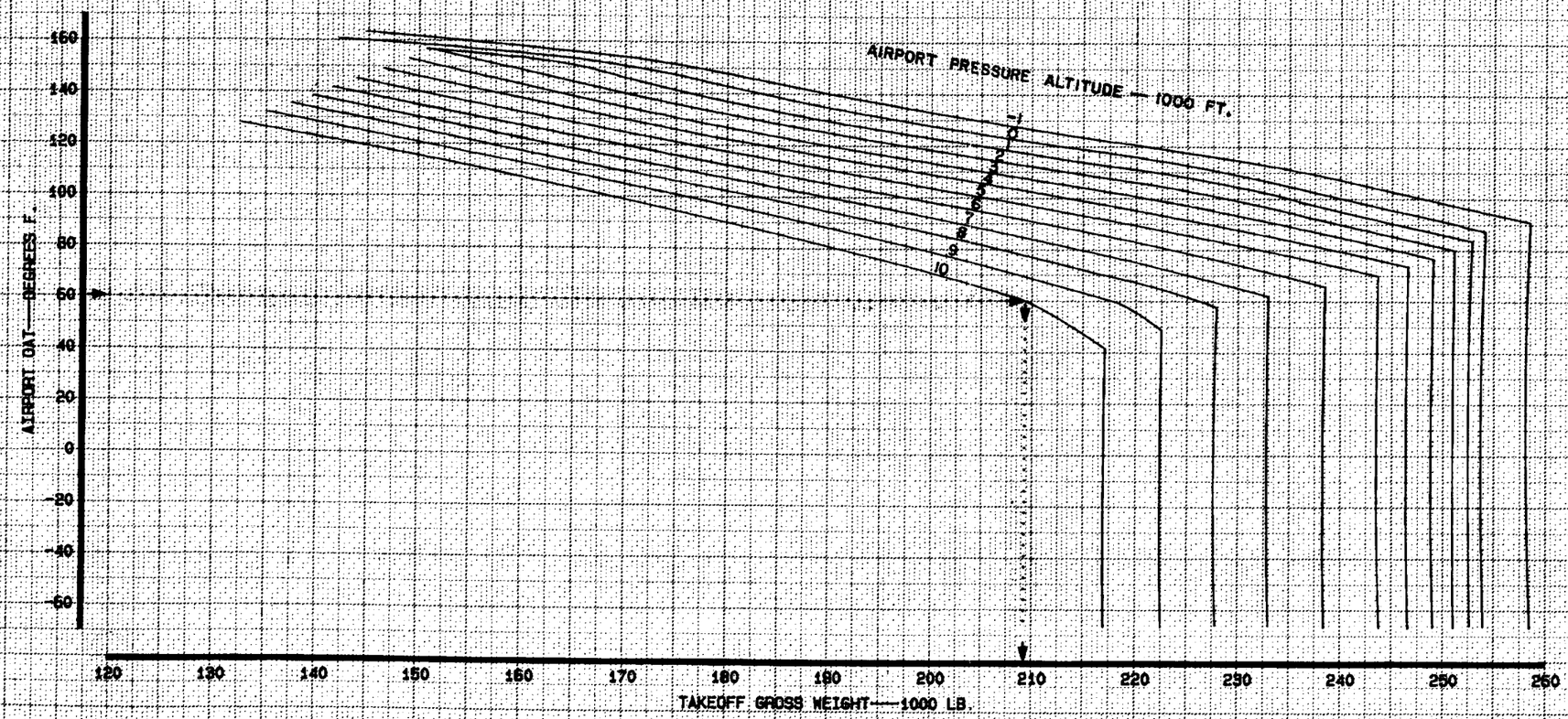
TAKEOFF CLIMB LIMITS

FLAPS 5

A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT---LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	1000
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	7500
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7400
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	13600

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



P.C. 5L000477
D631N013 PG. 4.5-5

C FRANK
757-200
PW2037

APPROVED M. LECHNER No. 308 | DATE 14 AUG 84

P.C. 5L000479
D631N015 PG 4.5-6

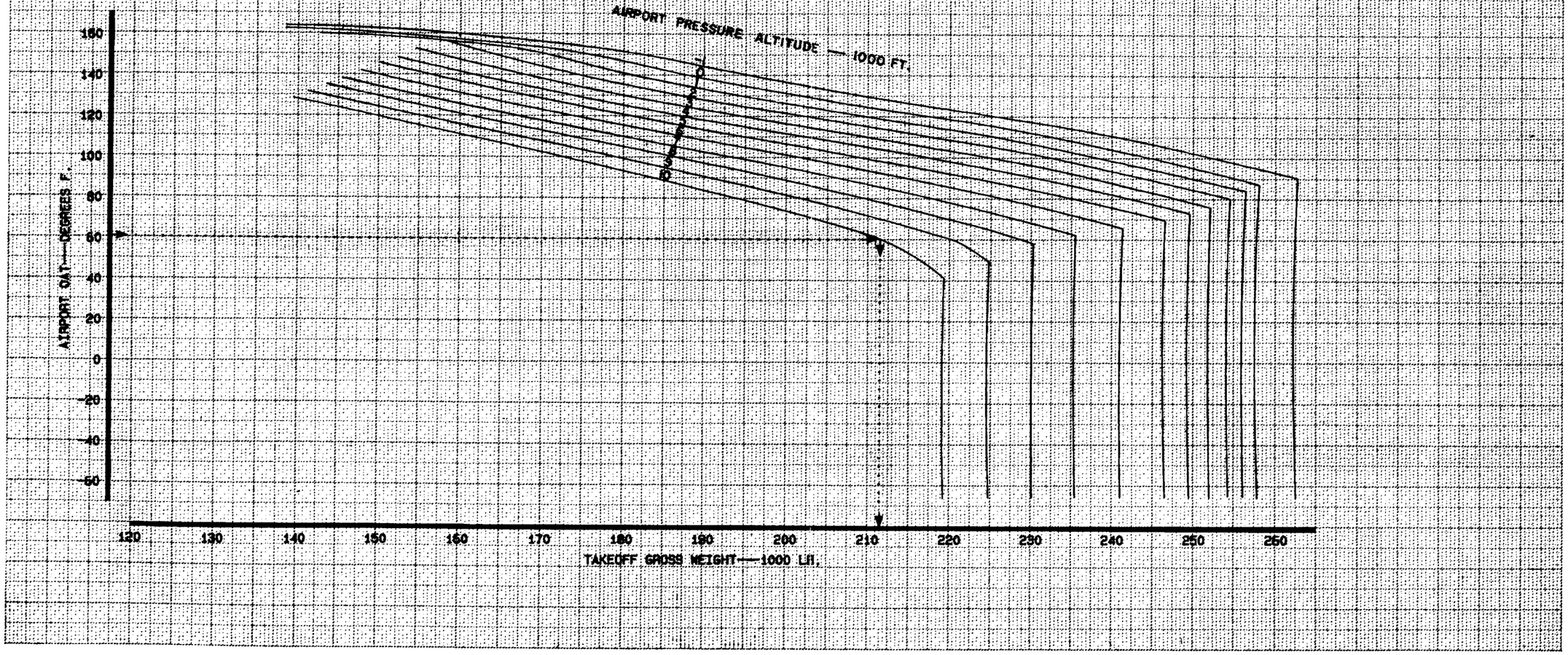
PERFORMANCE

TAKEOFF CLIMB LIMITS

FLAPS 5 A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	1000
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	7500
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7400
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	13600

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



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757-200
PW2037

APPROVED	DATE
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P.C. 5L000481
D631N013
PG. 4.5-7

PERFORMANCE

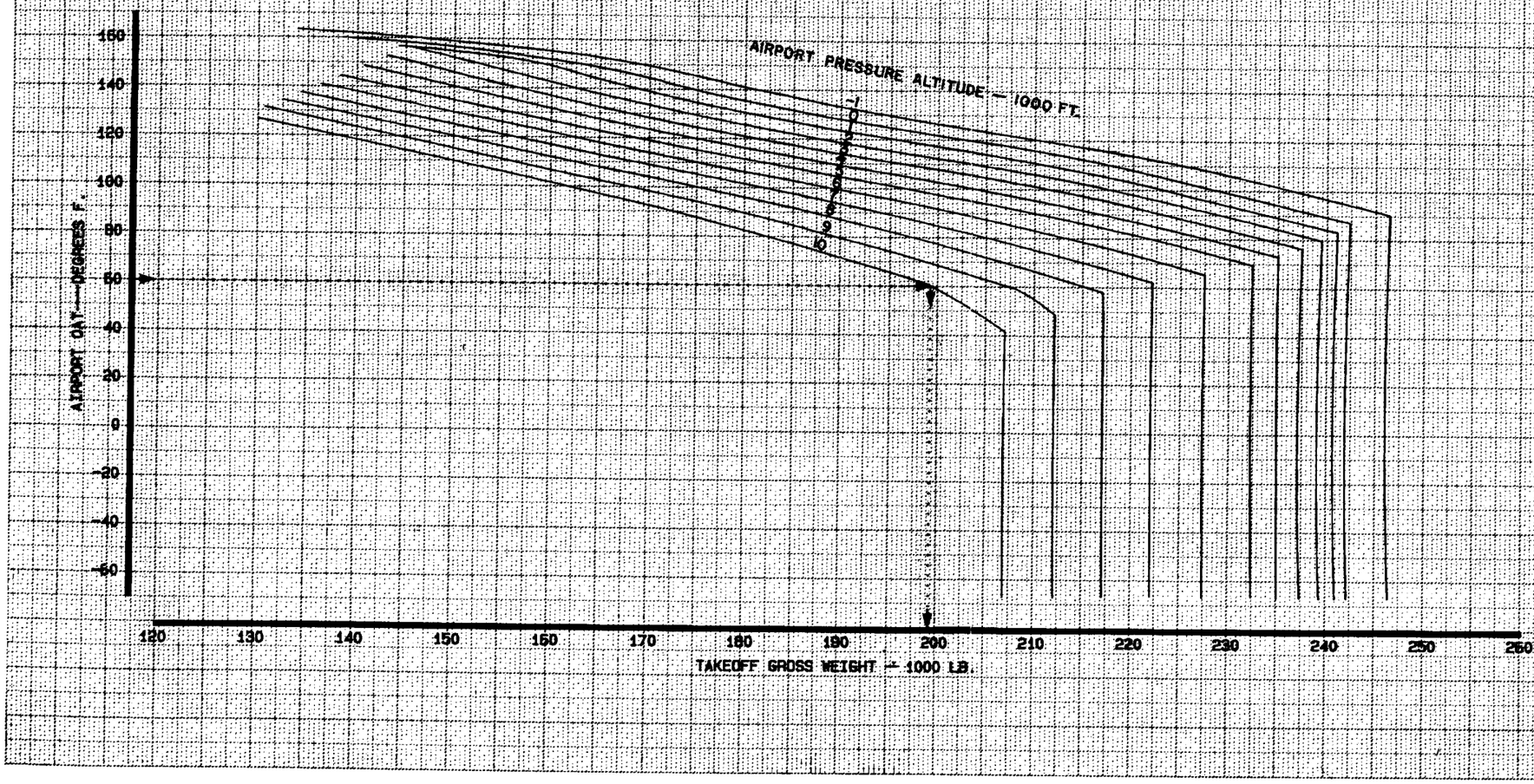
TAKEOFF CLIMB LIMITS

FLAPS 15

A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	800
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	7100
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7900
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	12900

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



C FRANK
757-200
PW 2037

APPROVED	DATE
M. LECHNER FAA-308	14 Aug 84

P.C. 5L000489
D631N013 PG. 4.5-8

PERFORMANCE

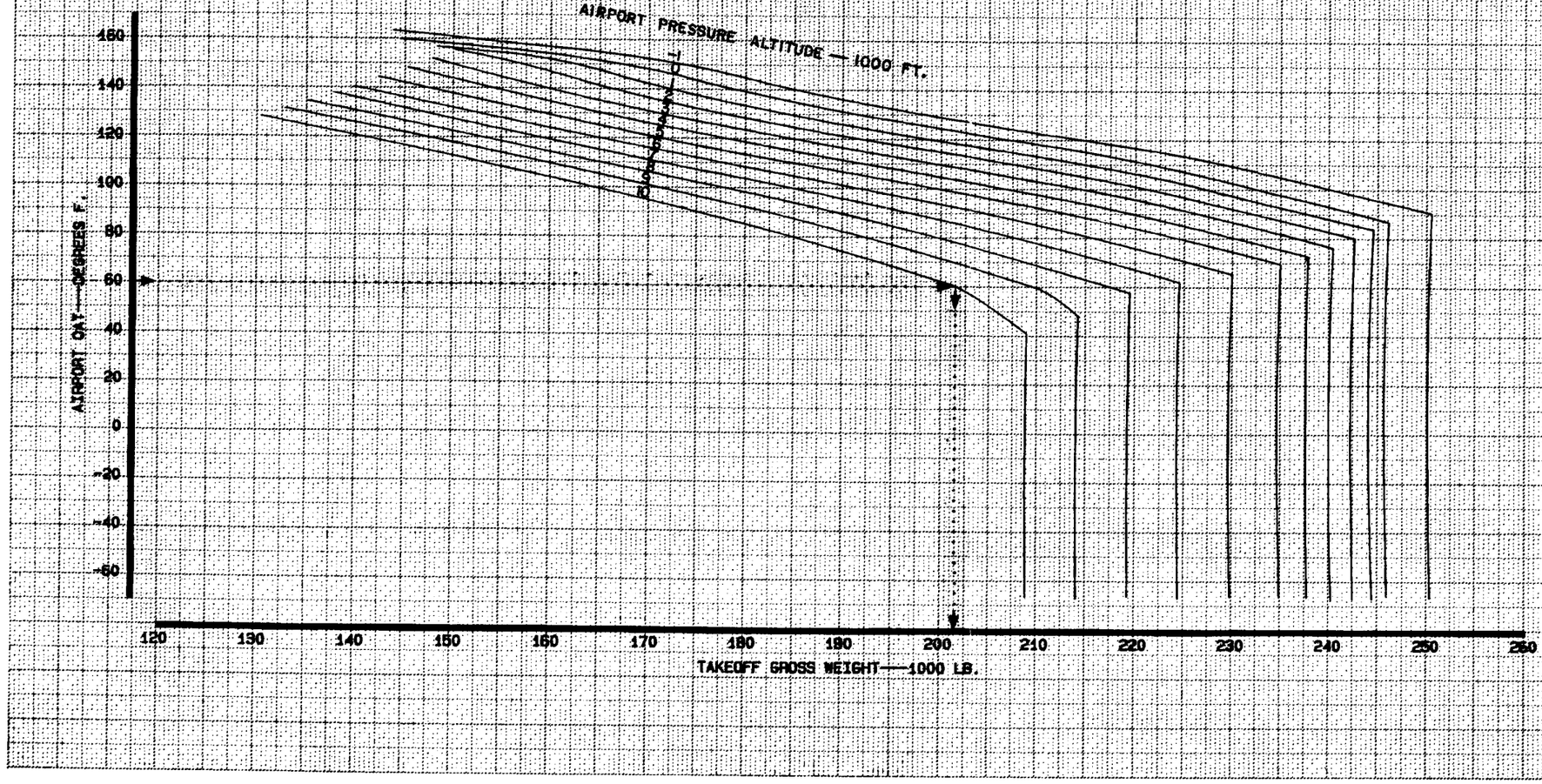
TAKEOFF CLIMB LIMITS

FLAPS 15

A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	800
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	7100
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	7000
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	12900

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



APPROVED	DATE
M. DECHAAK NM-329	18 SEP 84

C FRANK
757-200
PW 2037

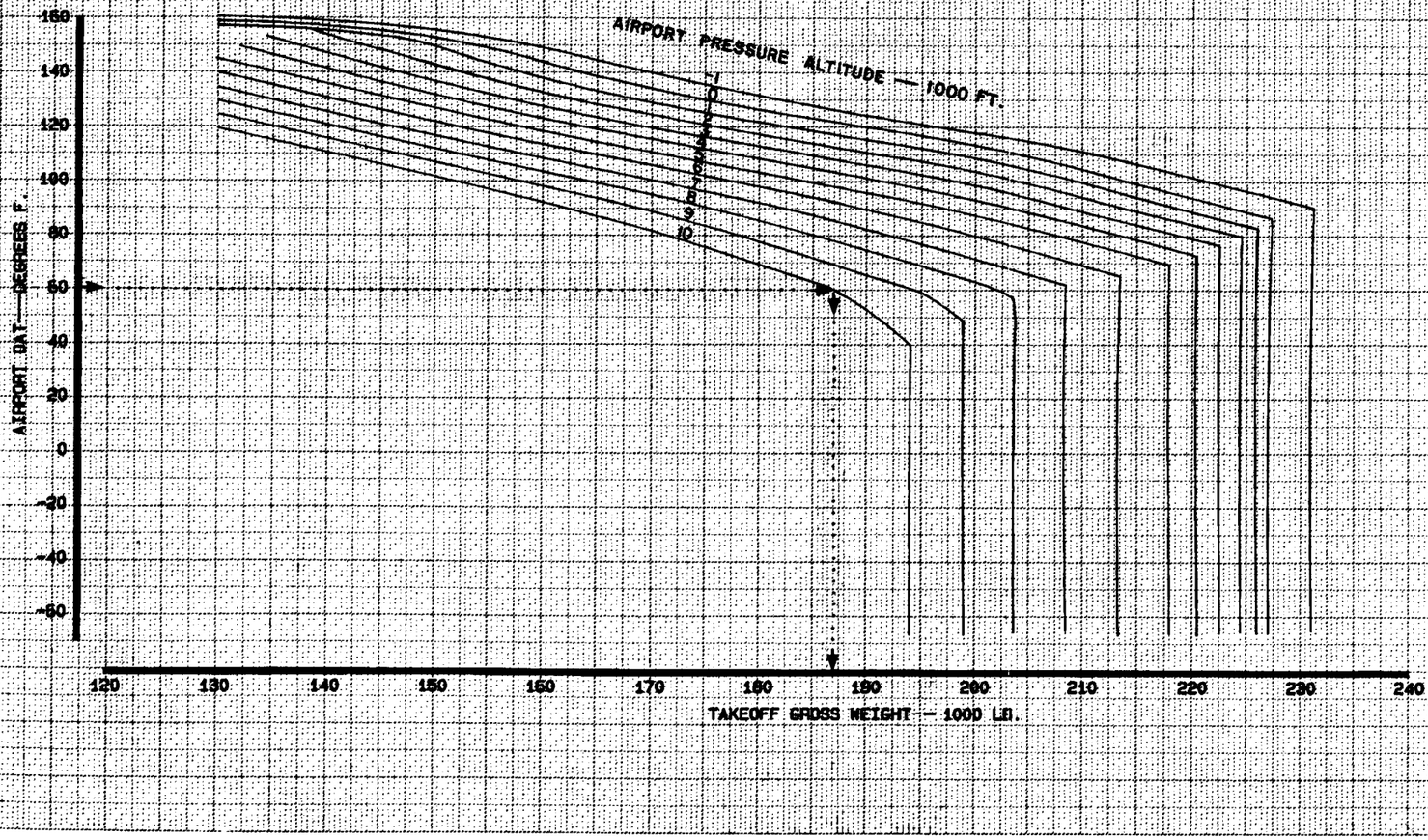
TAKEOFF CLIMB LIMITS

FLAPS 20

A/C PACKS ON

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	700
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	6500
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	6400
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	12000

● APU OFF, FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



P.C. 5L000485
D631N013 PG. 4.5-9

C.FRANK
757-200
PW 2037

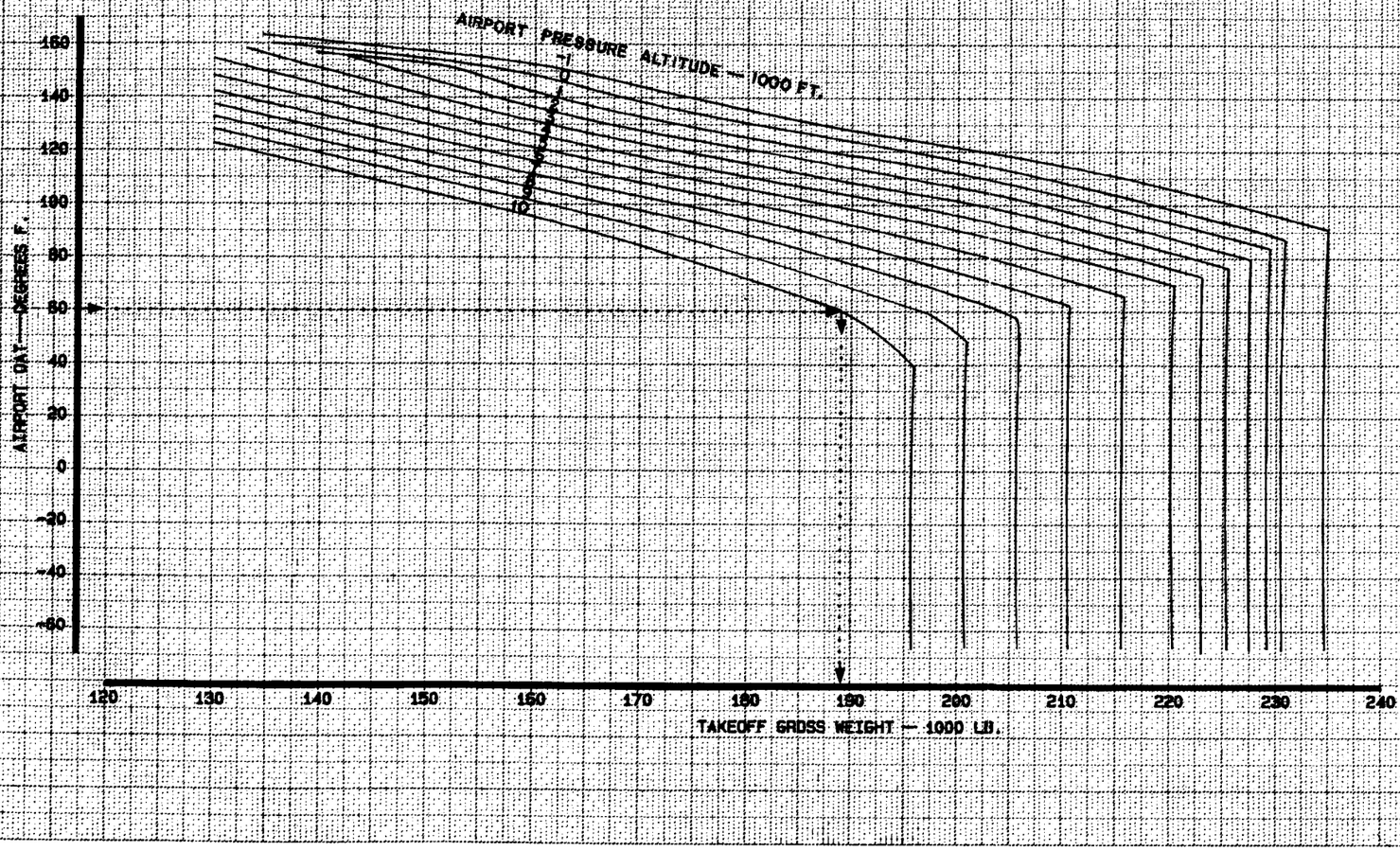
APPROVED FR. LEGWAR DM-3108 DATE 18 May 84

TAKEOFF CLIMB LIMITS

FLAPS 20 A/C PACKS OFF

ANTI-ICE BLEED CONFIGURATION	GROSS WEIGHT DECREMENT—LB.
ANTI-ICE OFF	0
ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	700
ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.	8500
ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.	6400
ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.	12000

● APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 500 LB.



P.C. 5L000487
D631N013 PG. 4.5-10

C FRANK
757-200
PW 2037

APPROVED M. LECHNER ANA-328 DATE 18 Aug 84

SECTION 4.6 - TIRE SPEED LIMITS

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  225 MPH TIRES
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    (FLAPS 15). 9

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

R17354

TIRE SPEED LIMITS

G E N E R A L

These charts show 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. Separate charts are included for 210 MPH and 225 MPH tires for each of the different takeoff flaps, with the exception of flaps 20 and 225 MPH tires, where the takeoff gross weight is never limited by tire speed. See the example problem appendix for a numerical example of the use of these charts.

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.

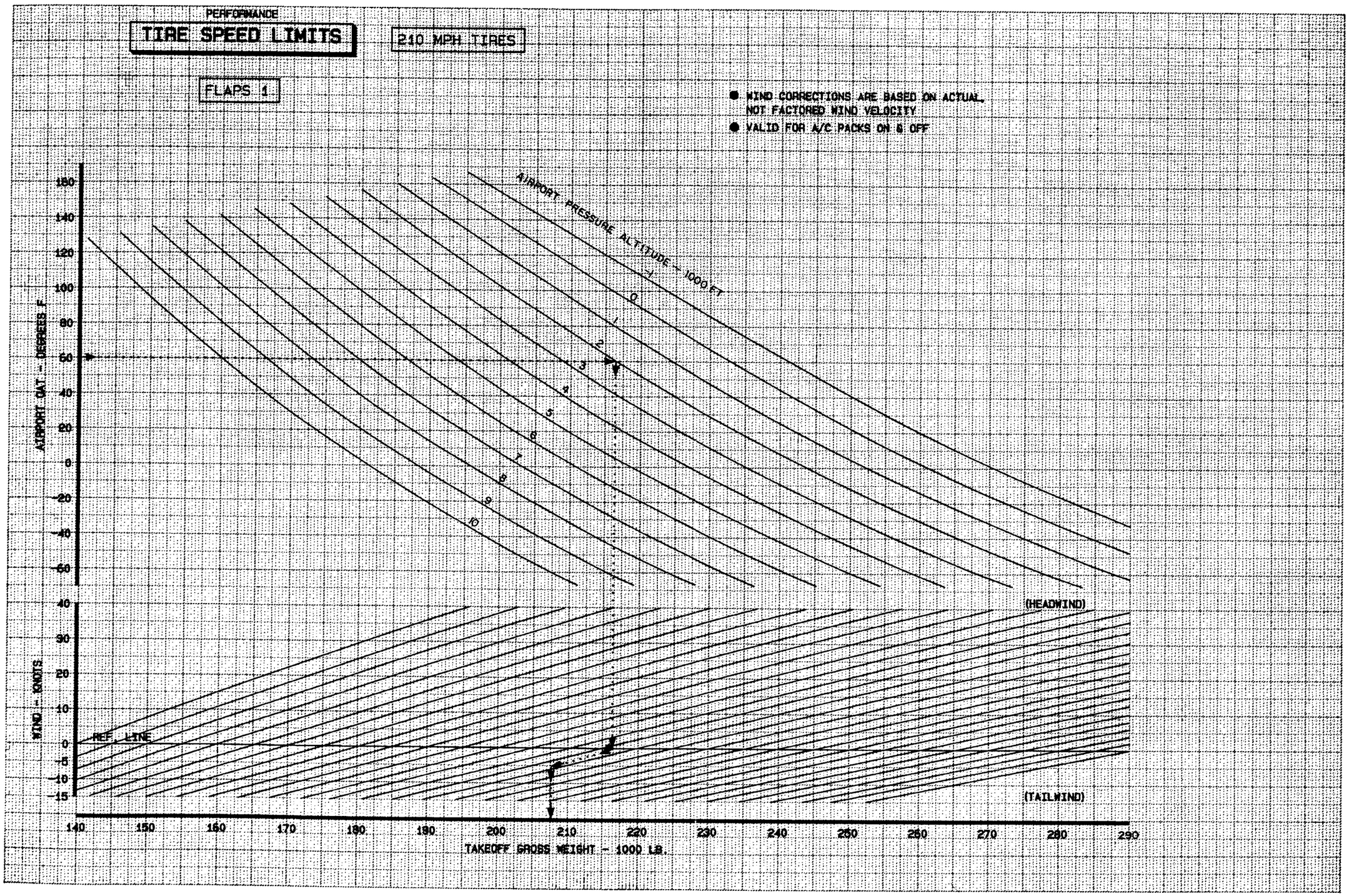
PERFORMANCE

TIRE SPEED LIMITS

210 MPH TIRES

FLAPS 1

- WIND CORRECTIONS ARE BASED ON ACTUAL, NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF



P.C. 5L000488
D631N013 PG. 4.6-3

APPROVED	DATE
M. LESHNAR NMA 308	1 Sep 84

BARTNICK

757-200
PW 2037

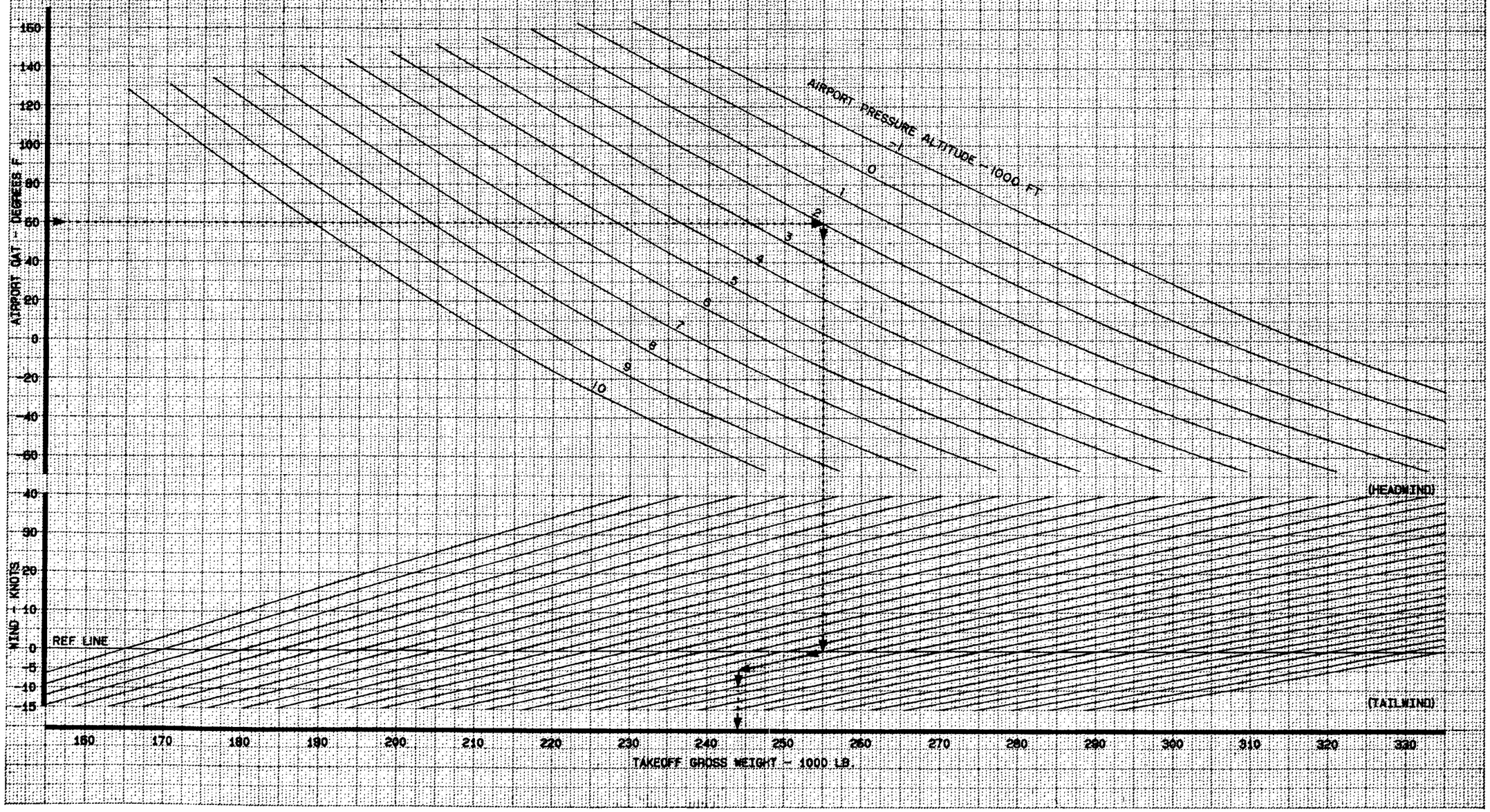
PERFORMANCE

TIRE SPEED LIMITS

210 MPH TIRES

FLAPS 5

* WIND CORRECTIONS ARE BASED ON ACTUAL, NOT FACTORED WIND VELOCITY
* VALID FOR A/C PACKS ON & OFF



P.C. 5L000481
D631N013 PG. 4.6-4

APPROVED	DATE
M. LECHNER DOM 328	1 Sep 84

KOSTOFF
757-200
PW 2037

R20807

6E4208

P.C. 5L000493
D631N013 PG. 4.6-5

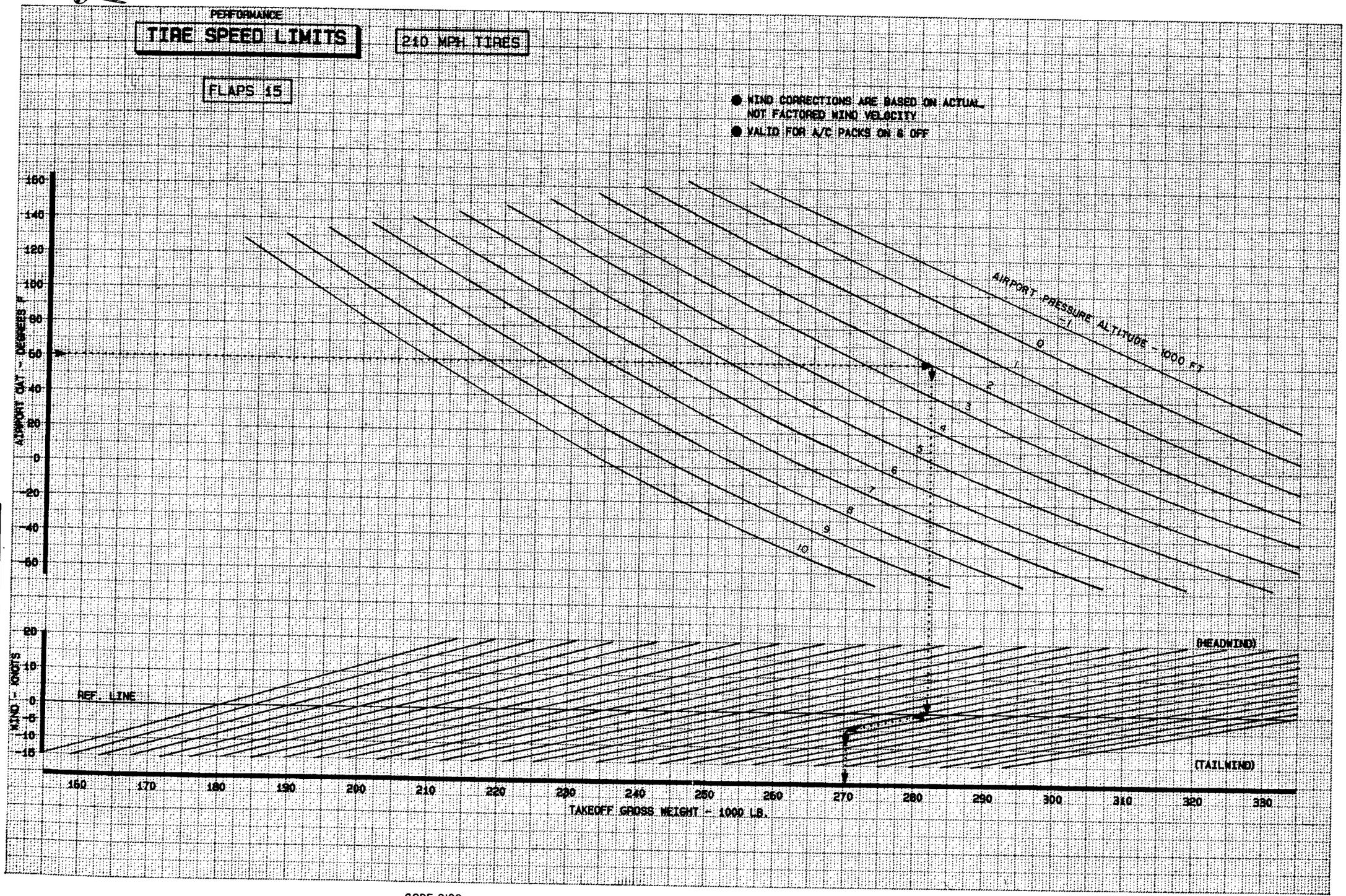
PERFORMANCE

TIRE SPEED LIMITS

210 MPH TIRES

FLAPS 15

- WIND CORRECTIONS ARE BASED ON ACTUAL, NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF



APPROVED	DATE
M. LECHNER No. 308	1 Sep 84

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757-200
PW 2037

P.C. 5L000495
D631N013 PG. 4.6 - 6

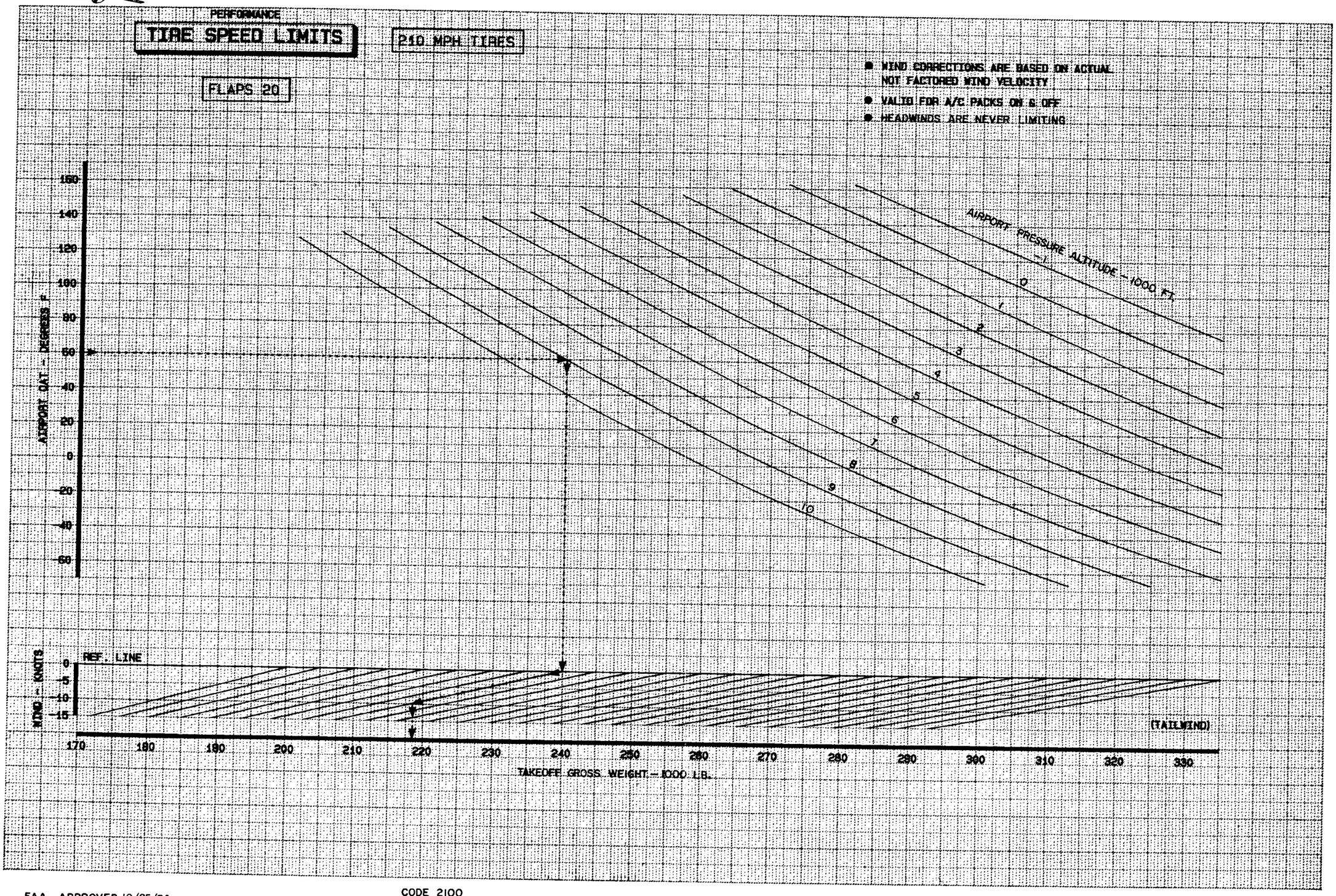
PERFORMANCE

TIRE SPEED LIMITS

210 MPH TIRES

FLAPS 20

- WIND CORRECTIONS ARE BASED ON ACTUAL NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF
- HEADWINDS ARE NEVER LIMITING



APPROVED	DATE
C.S. Tilt MGR	9-6-84

KOSTOFF
757-200
PW 2037

P.C. 5L000498
D631N013 PG 4.6-8

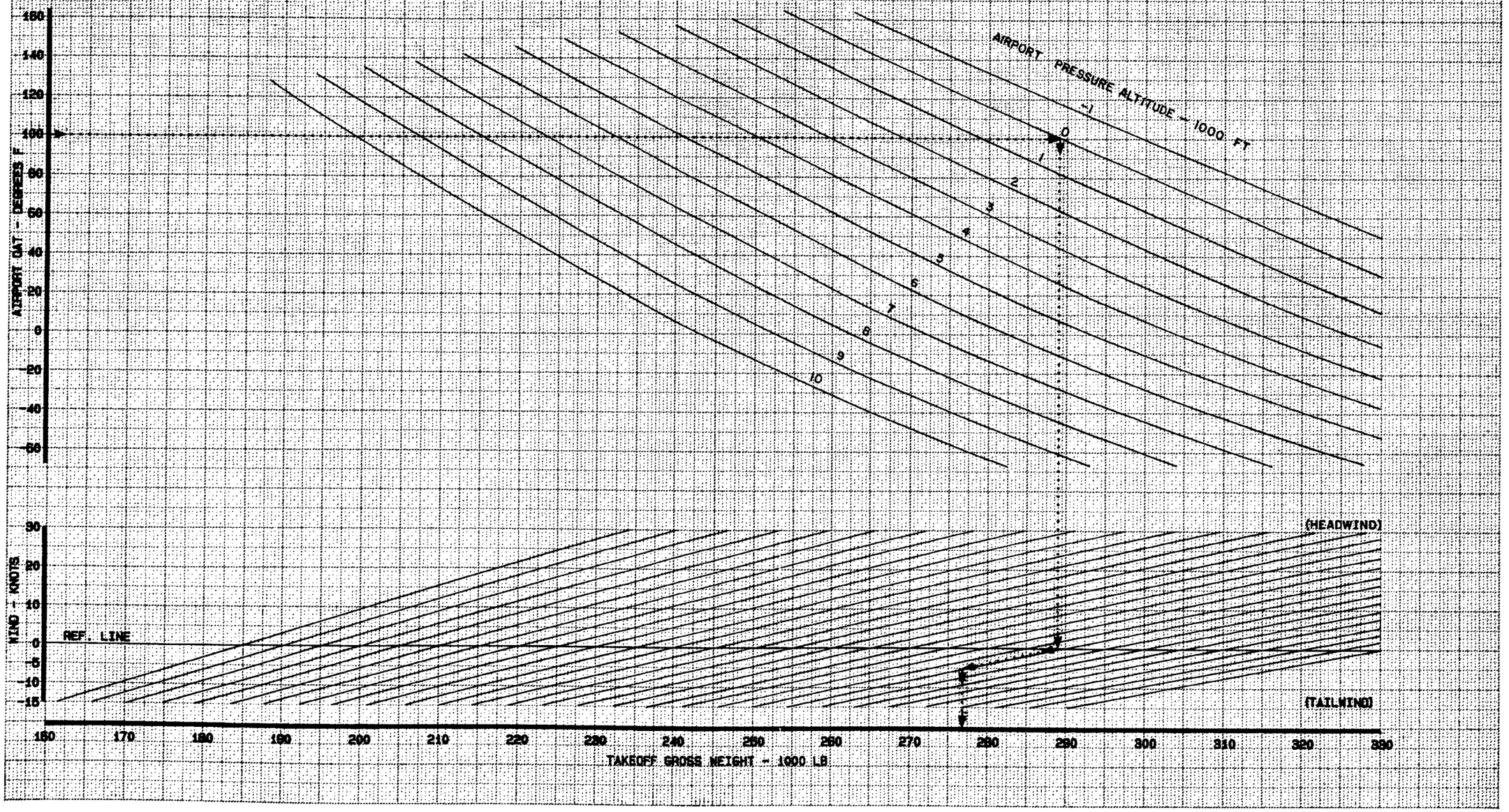
PERFORMANCE

TIRE SPEED LIMITS

225 MPH TIRES

FLAPS 5

- WIND CORRECTIONS ARE BASED ON ACTUAL NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF



APPROVED	DATE
C.S.I.# 14564	9.6.84

OSWALD
757-200
PW 2037

P.C. 5L000501
D631N013 PG 4.6-9

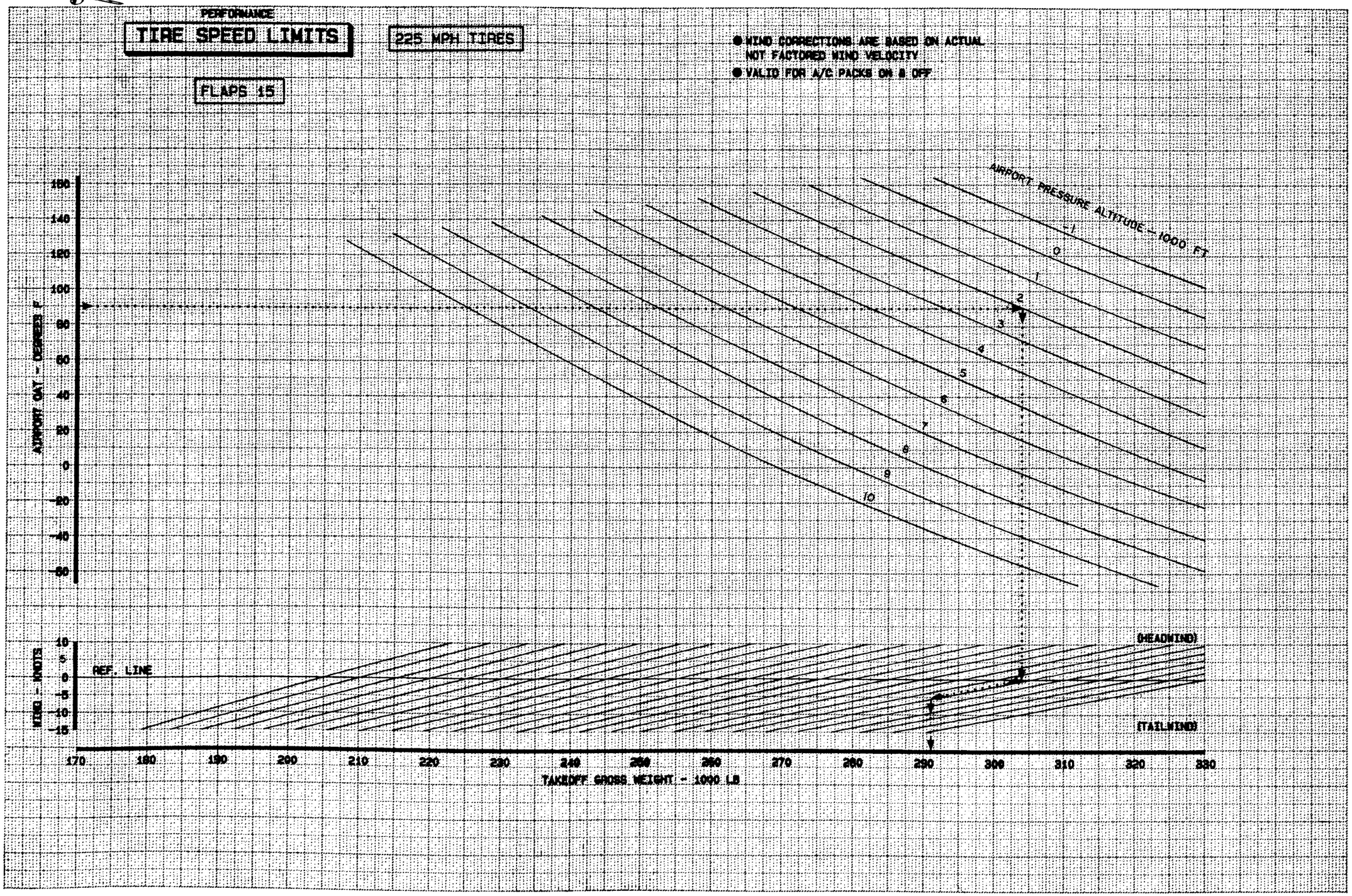
PERFORMANCE

TIRE SPEED LIMITS

225 MPH TIRES

FLAPS 15

- WIND CORRECTIONS ARE BASED ON ACTUAL NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF



APPROVED	DATE
C.S.T.// #484	9-6-84

OSWALD
757-200
PW 2037

SECTION 4.7 - TAKEOFF SPEEDS

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

R17358

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 1.05 V_{MCA} or V_1. The shaded area (for V_R) on the Takeoff Speeds Chart identifies the area where the 1.05 V_{MCA} restriction is most likely to occur. When operating in this region 1.05 V_{MCA} must be determined from the V_{MCA} chart as a function of altitude and temperature. If V_R falls below 1.05 V_{MCA}, see V_{MC} Limited Takeoff, Section 4.8.

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 unless specifically authorized by Boeing Service Bulletins.

Category A: Boeing P.N. S160N010-42,-43,-44,-45,-46 and S160N020-11.
Category B: Boeing P.N. S160N020-1,-5,-7,-8 and -14.

R17361

TAKEOFF SPEEDS

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_{MC} Limited takeoff, Section 4.8.

AIR MINIMUM CONTROL SPEED

The Air Minimum Control speeds (V_{MCA}) for this airplane are shown on this chart. 1.05 V_{MCA} may limit Rotation Speed, V_R, for some altitudes and temperatures at light gross weights. See Rotation Speed.

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.

R17362

TAKEOFF SPEEDS

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 corrected runway length required to satisfy all the Federal Aviation Regulations related to field length for the takeoff gross weight.

   Enter the appropriate Field Length Limits chart with airport temperature/altitude and takeoff gross weight. Read 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 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 corrected runway length required, Step 2. Read $(V_1/V_R)_{MAX}$.

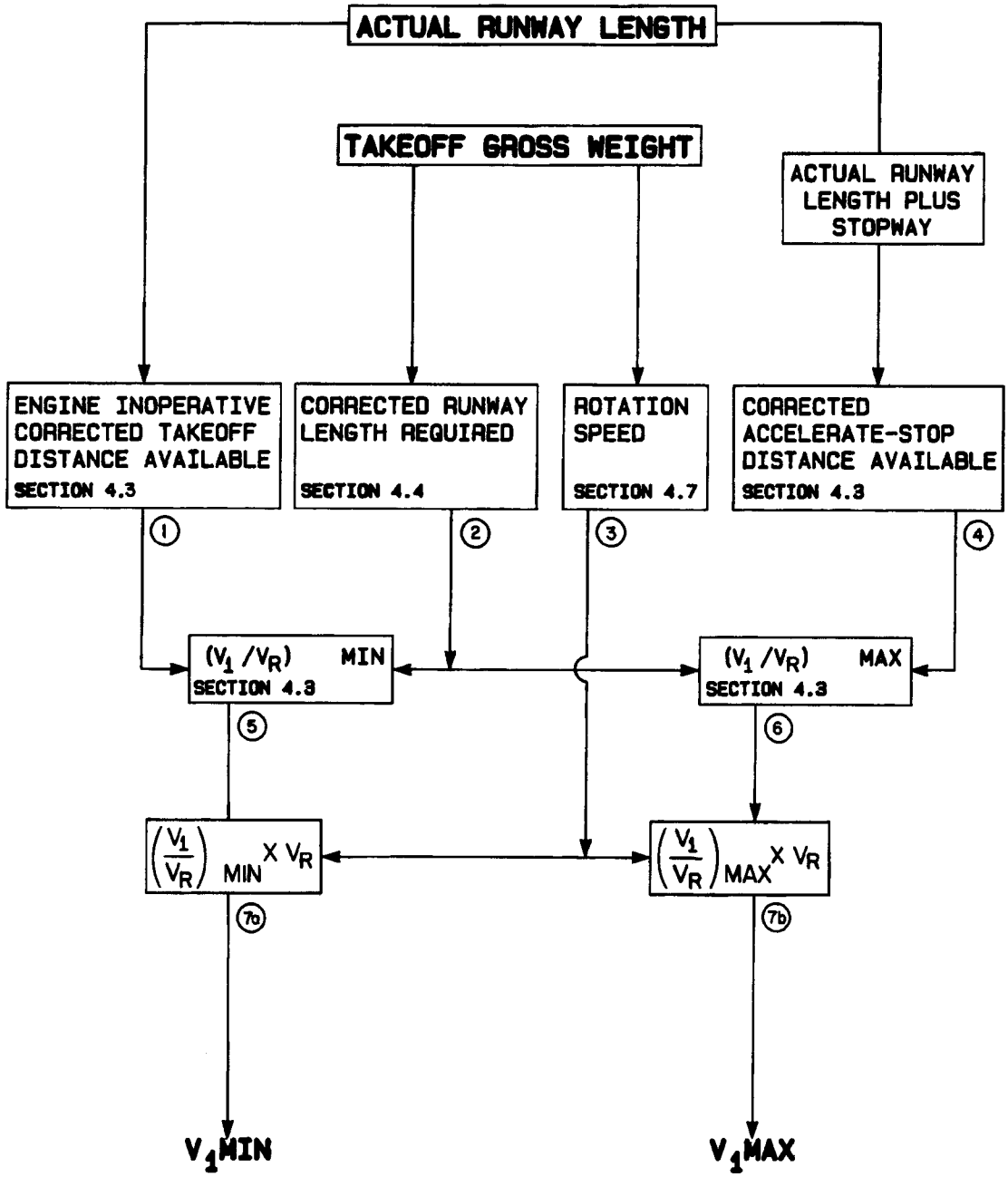
7. Determine $V_{1\ MIN}$ and $V_{1\ MAX}$, the lowest and highest values of V_1 that will allow a takeoff from the actual runway, at the takeoff gross weight, that satisfies all the Federal Aviation Regulations related to maximum takeoff gross weight, field length limits. See Takeoff Speed Restrictions 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).

R17363

V_1 DETERMINATION PROCEDURE



5S000128

R17797

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.

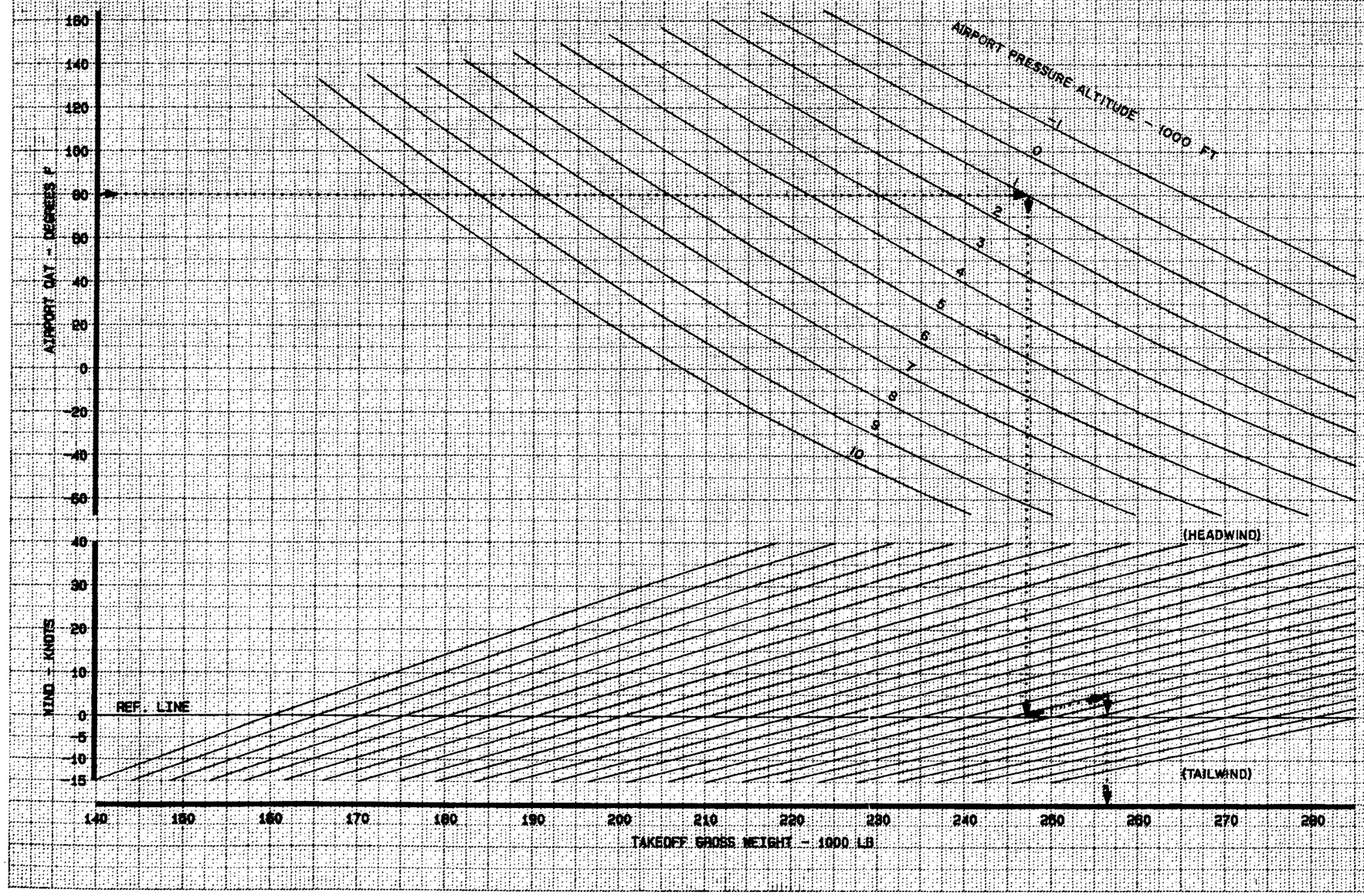
PERFORMANCE

TIRE SPEED LIMITS

225 MPH TIRES

FLAPS 1

- WIND COMPONENTS ARE BASED ON ACTUAL, NOT FACTORED WIND VELOCITY
- VALID FOR A/C PACKS ON & OFF



P.C. 5L000497
D631N013 PG. 4.6-7

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M. LECHNER DM-308	3 Aug 84

OSWALD
757-200
PW 2037

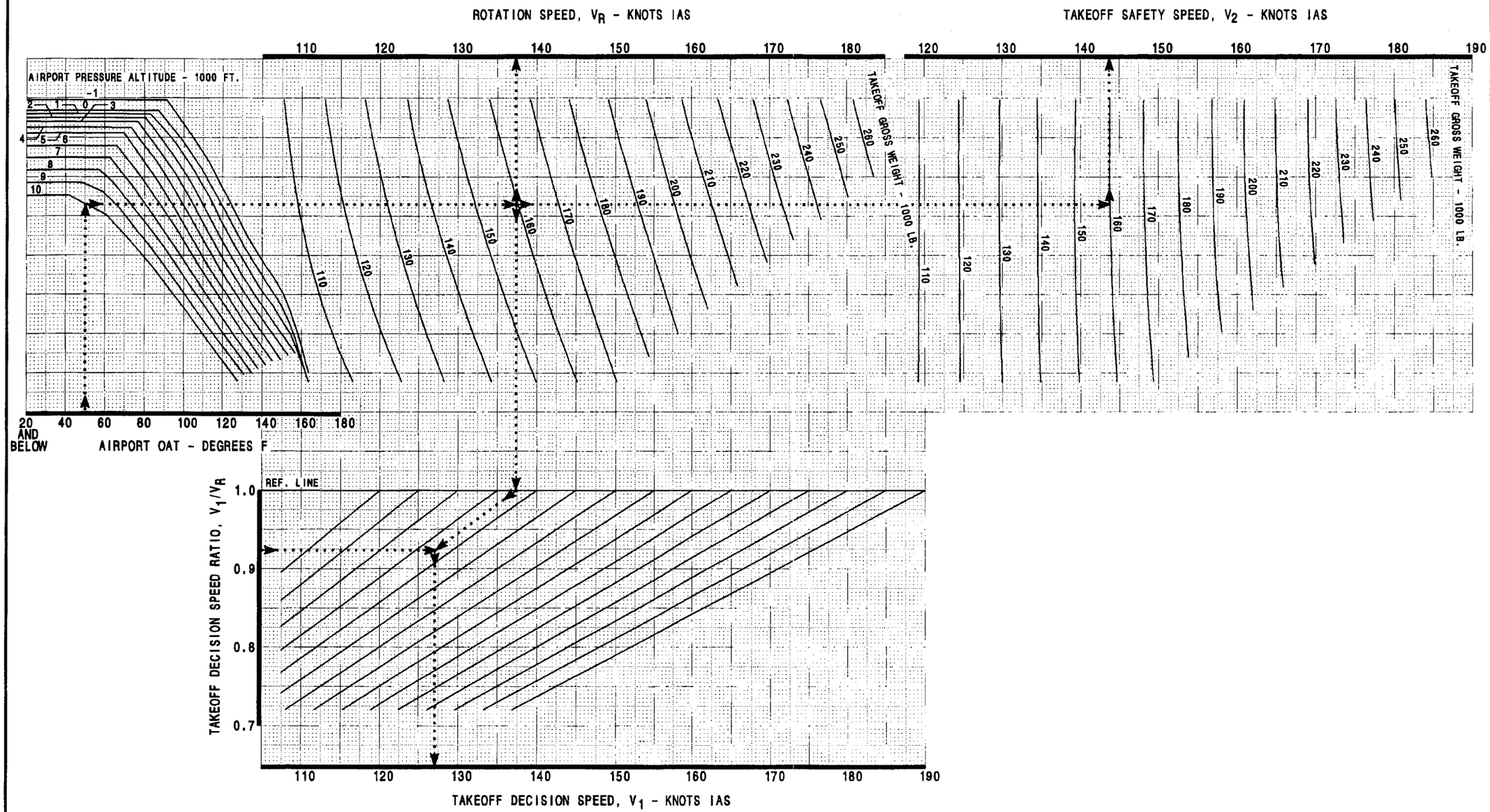
R20819

6E4208

TAKEOFF SPEEDS

FLAPS 1

- THE EFFECT OF ENGINE AIRBLEED ON THESE SPEEDS IS NEGLIGIBLE.
- V_1 CAN BE OBTAINED BY MULTIPLYING V_1/V_R BY V_R.
- CHECK $V_{1(MCG)}$ BELOW 104 KNOTS IAS.



P.C. C500708006 D631N013 PG. 4.7-8

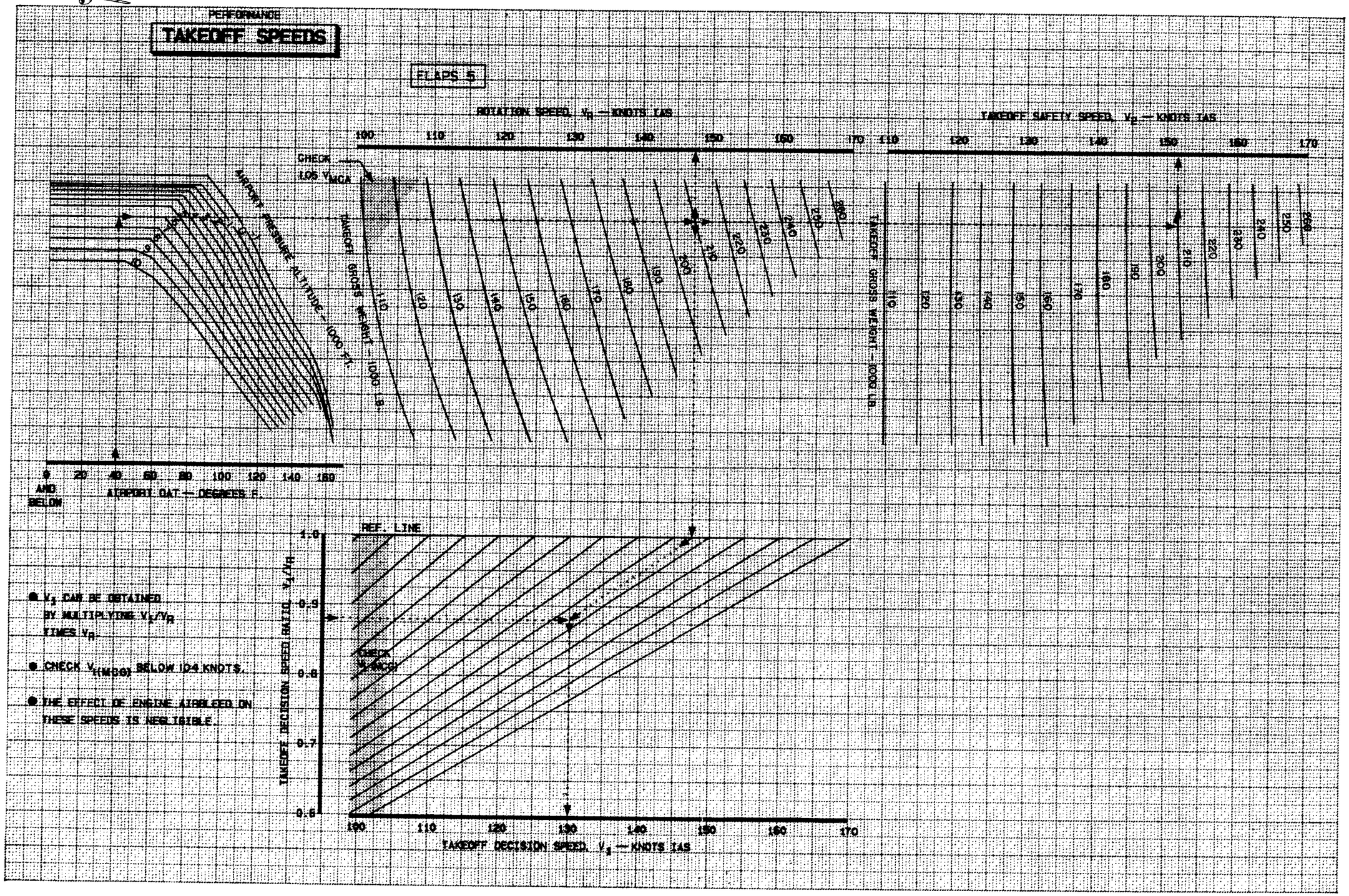
APPROVED	DATE
V.HILL	10-04-95

L. ENEBRAD
757-200
PW2037

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 5



- V_1 CAN BE OBTAINED BY MULTIPLYING V_1/V_R TIMES V_R.
- CHECK $V_{1(MBG)}$ BELOW 104 KNOTS.
- THE EFFECT OF ENGINE AIRBLEED ON THESE SPEEDS IS NEGLIGIBLE.

P.C. 5L001122
D631N013 P6 4.7-8

TANAKA
757-200
PW 2037

APPROVED / DATE
4/4/96
5/5/95

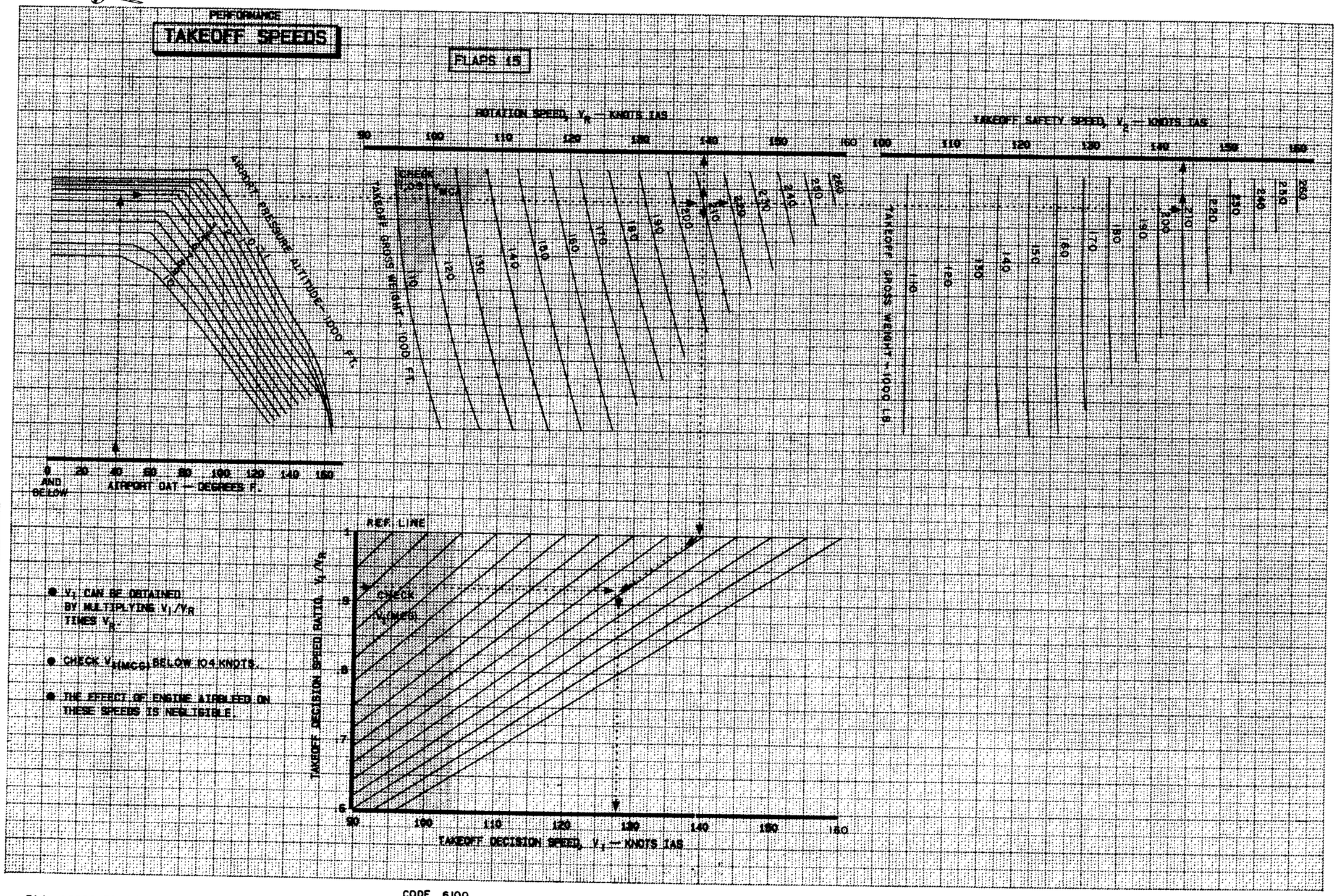
S10318

P.C. 5L001123
D631N013 PG 4.7-10

PERFORMANCE

TAKEOFF SPEEDS

FLAPS 15



- V_1 CAN BE OBTAINED BY MULTIPLYING V_1/V_R TIMES V_R.
- CHECK $V_{1(MCG)}$ BELOW 104 KNOTS.
- THE EFFECT OF ENGINE AIRBLEED ON THESE SPEEDS IS NEGLIGIBLE.

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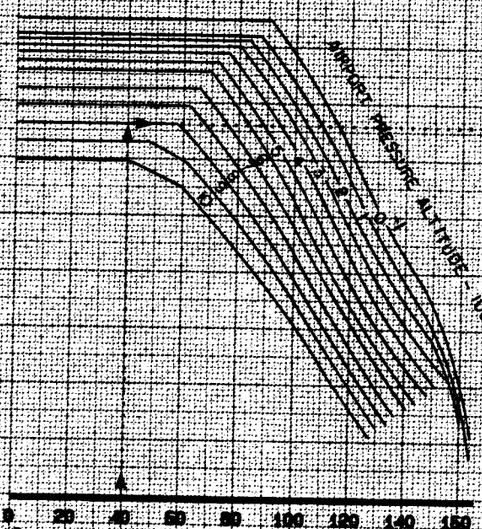
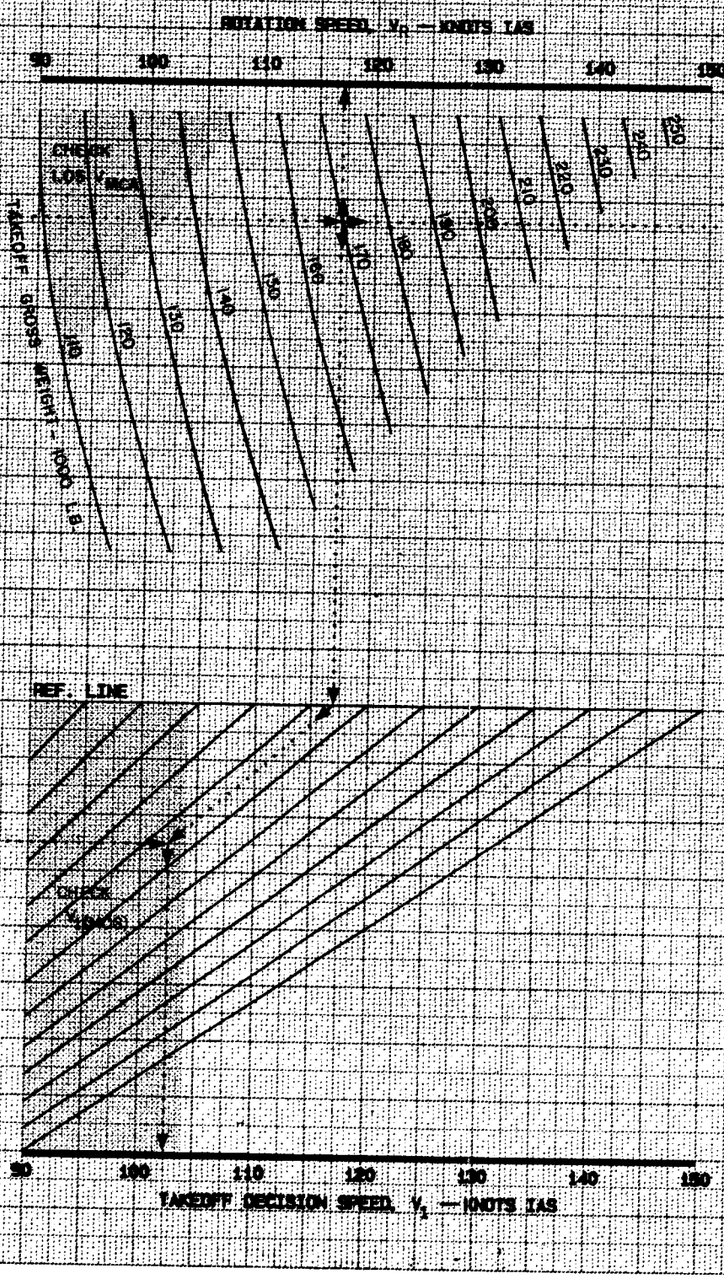
757-200
PW 2037

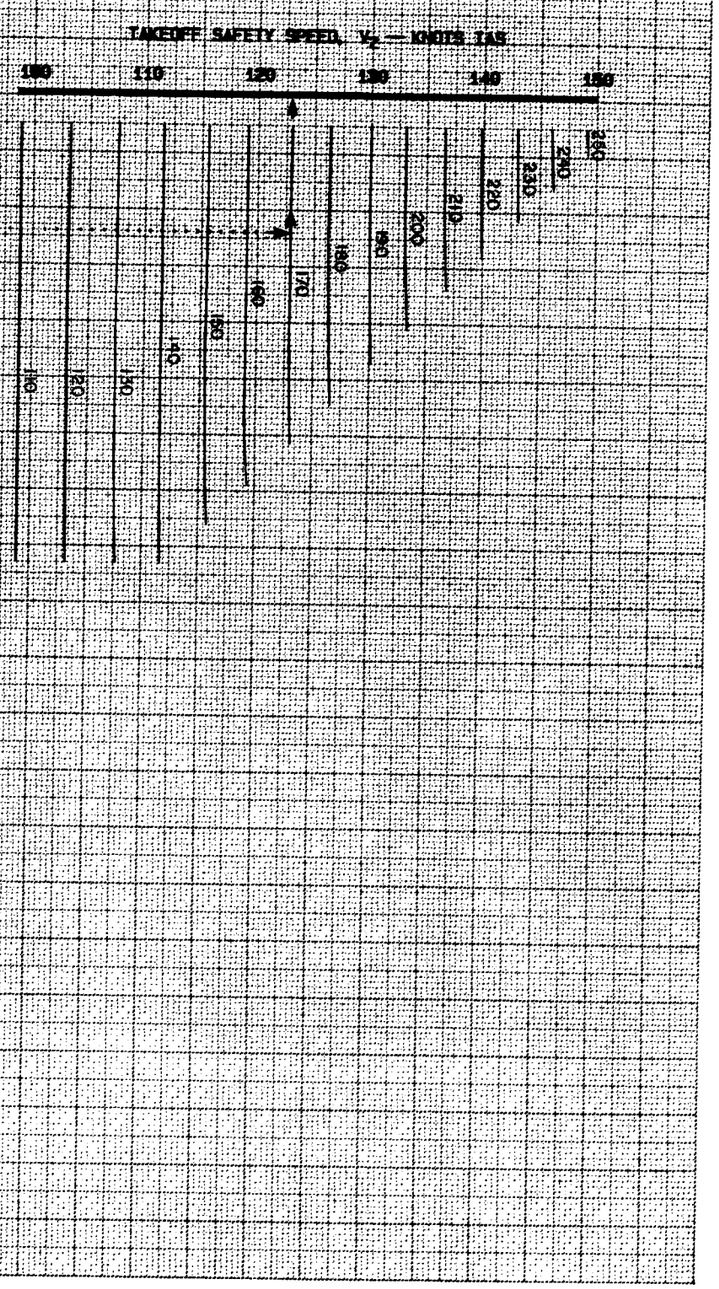
PERFORMANCE

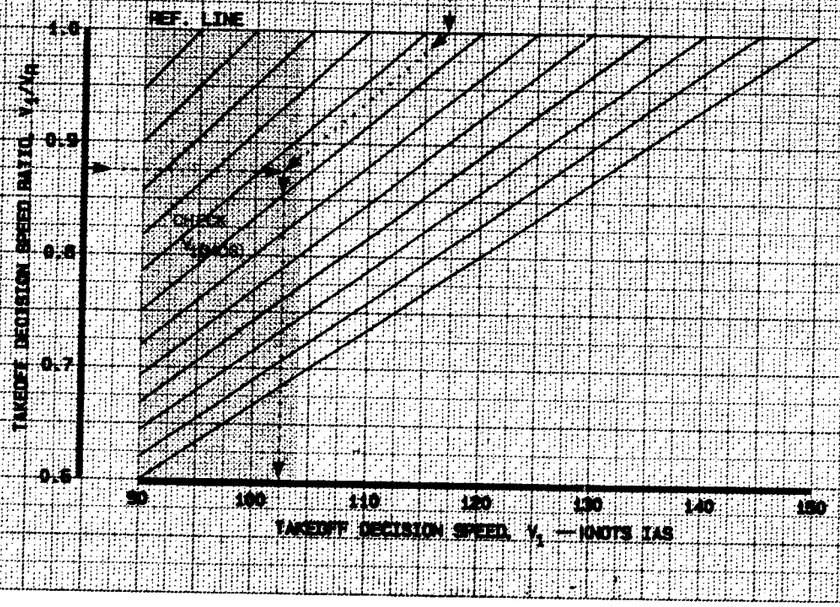
TAKEOFF SPEEDS

FLAPS 20









- V_2 CAN BE OBTAINED BY MULTIPLYING V_2/V_R TIMES V_R.
- CHECK $V_{2(MCG)}$ BELOW 104 KNOTS.
- THE EFFECT OF ENGINE AIRBLEED ON THESE SPEEDS IS NEGLIGIBLE.

APPROVED	DATE
	4-14-98

TANAKA
757-200
PW 2037

P.C. 5L000511
D631N013 PG. 4.7-12

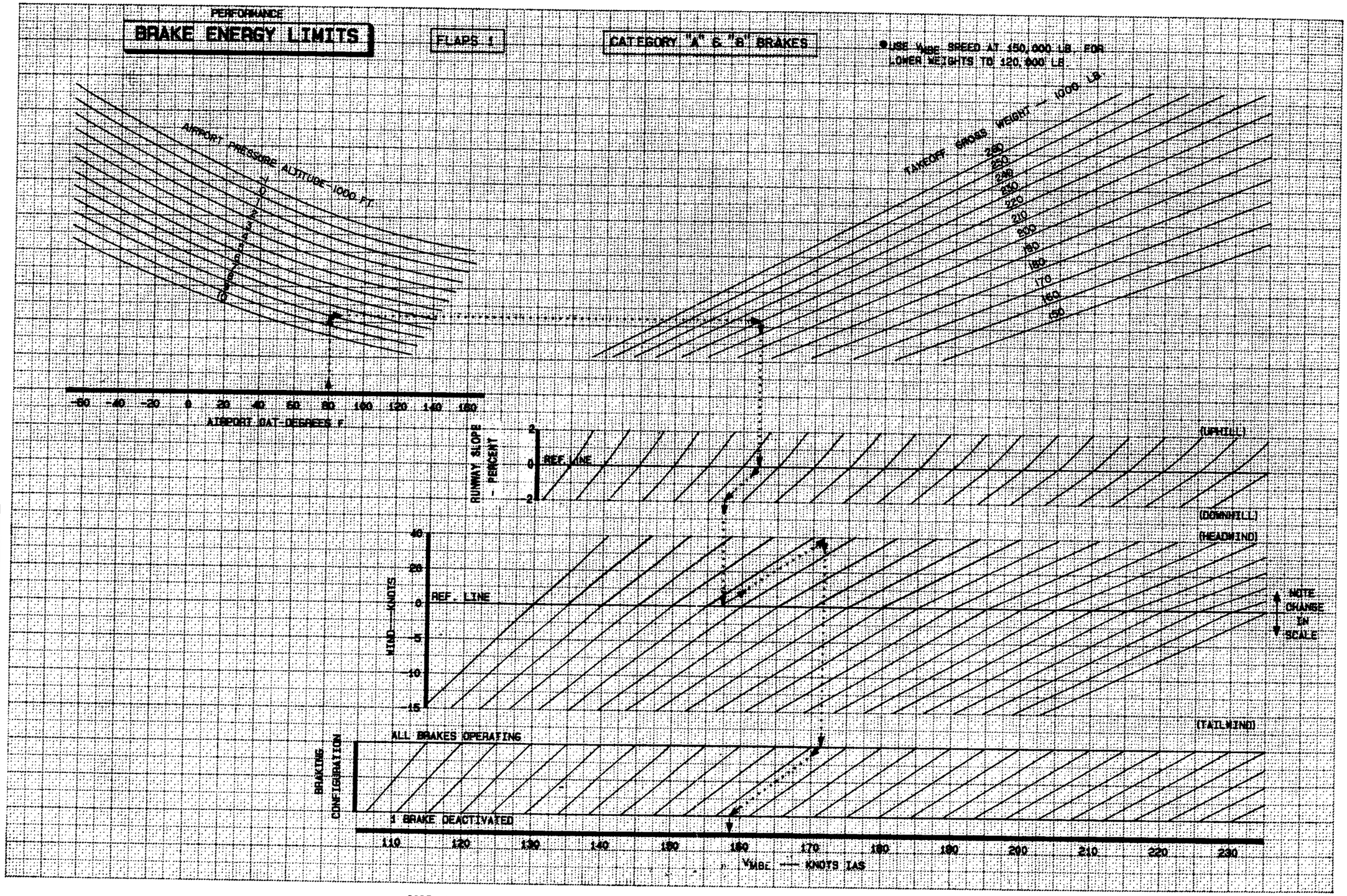
PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 1

CATEGORY "A" & "B" BRAKES

● USE V_{MBE} SPEED AT 150,000 LB. FOR LOWER WEIGHTS TO 120,000 LB.



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C.S. Ellis MMBM	8-31-94
J.R. Barnes	6/23/95

HOLTZCLAW
757-200
PW 2037

P.C. 5L000513
D631N013 PG 4.7-13

MARTIN
757-200
PW 2037

	APPROVED	DATE
	Martin	9-8-94
	J.R. Duncan	3/25/96
	J. Parsons	6/29/95

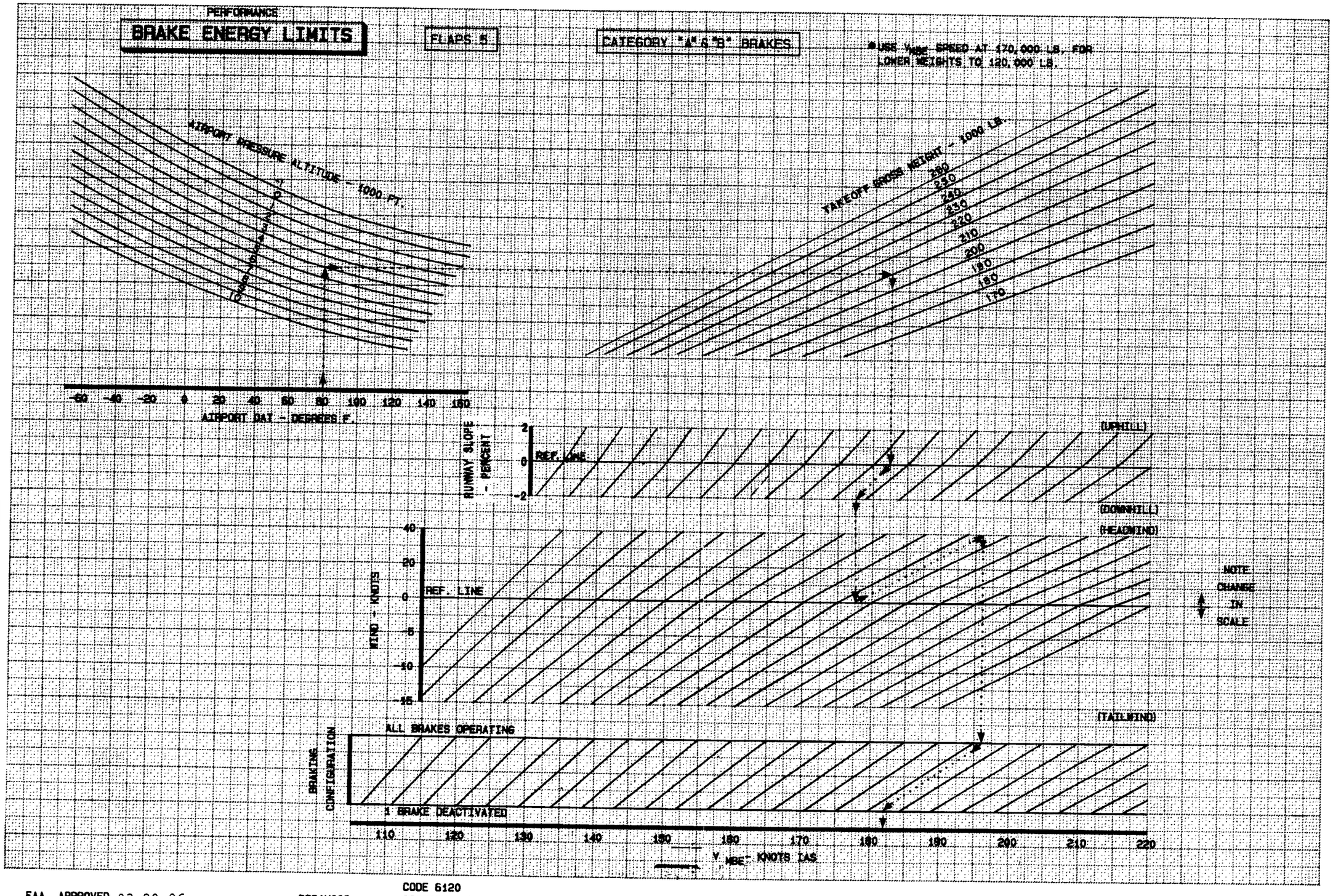
PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 5

CATEGORY "A" & "B" BRAKES

● USE V_{MBE} SPEED AT 170,000 LB. FOR LOWER WEIGHTS TO 120,000 LB.



P.C. 5L000515
D631N013 PG. 4.7-14

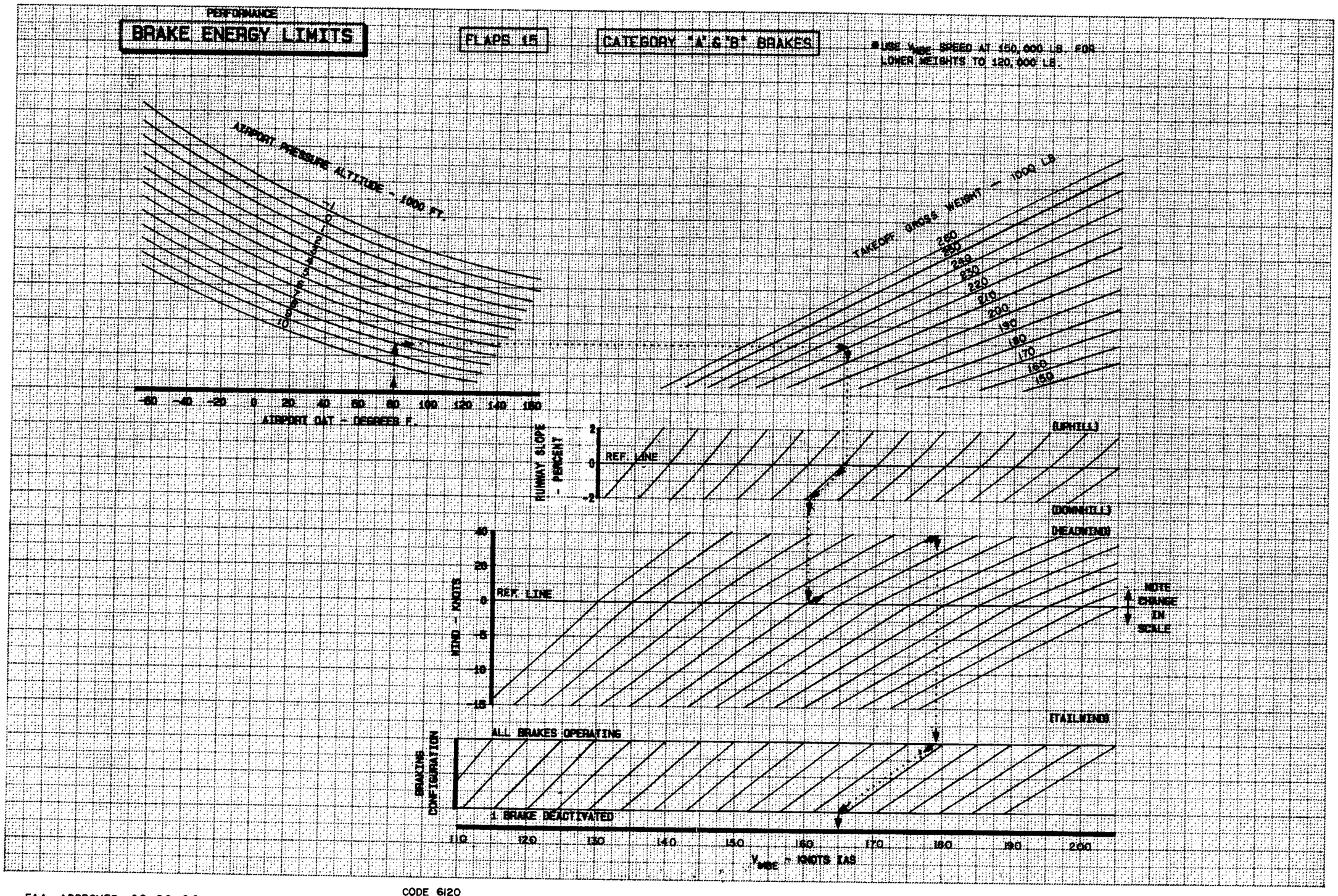
PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 15

CATEGORY "A" & "B" BRAKES

■USE V_{MBE} SPEED AT 150,000 LB. FOR LOWER WEIGHTS TO 120,000 LB.



SAUNDERS
757 – 200
PW 2037

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WA-273 DUPLICATE	9-8-94	
	[signature]	3/25/98
	[signature]	7/3/95

P.C. 5L0005I7
D631N013 P6 4.7-15

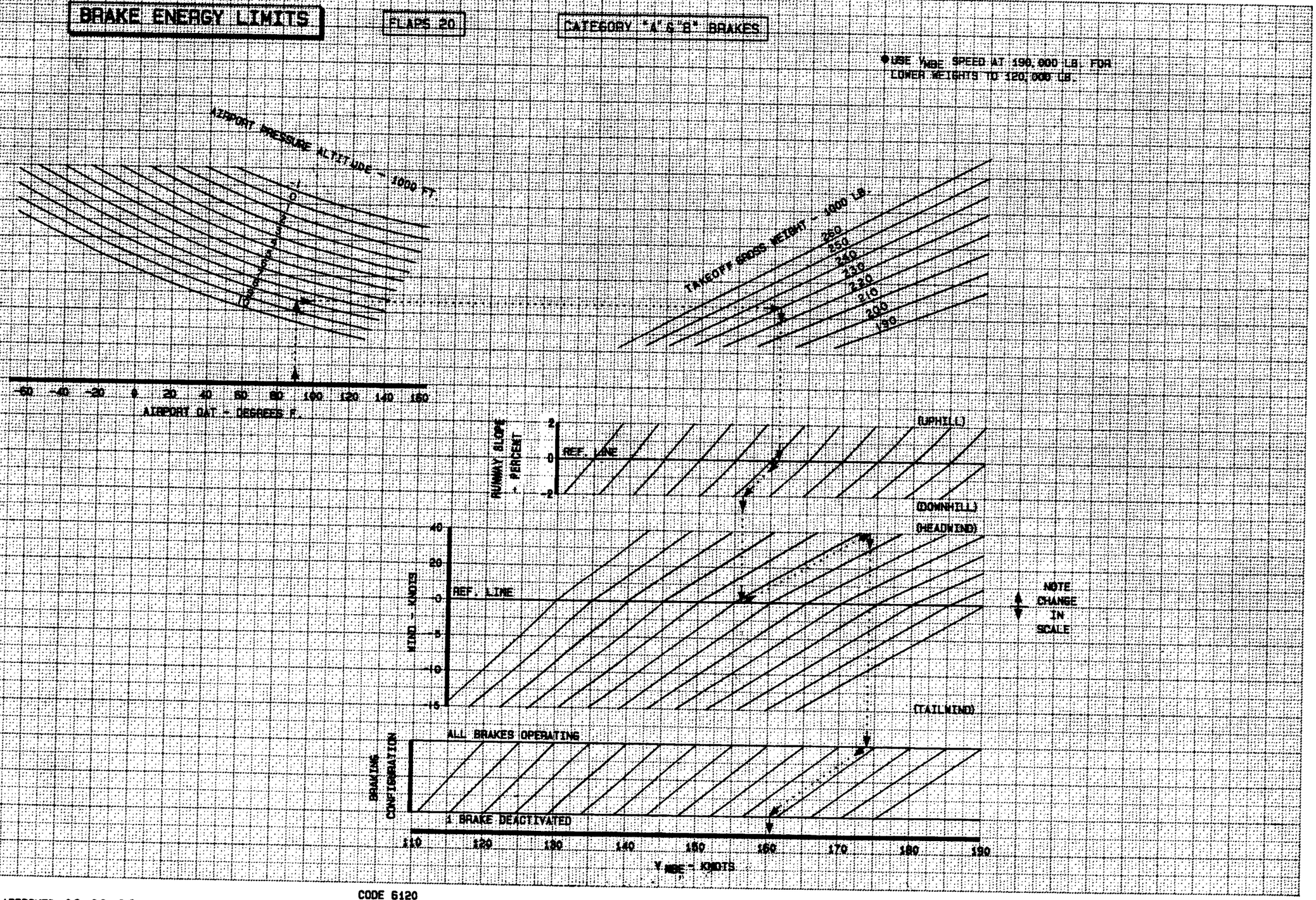
PERFORMANCE

BRAKE ENERGY LIMITS

FLAPS 20

CATEGORY "A" & "B" BRAKES

*USE V_{MBE} SPEED AT 190,000 LB. FOR LOWER WEIGHTS TO 120,000 LB.

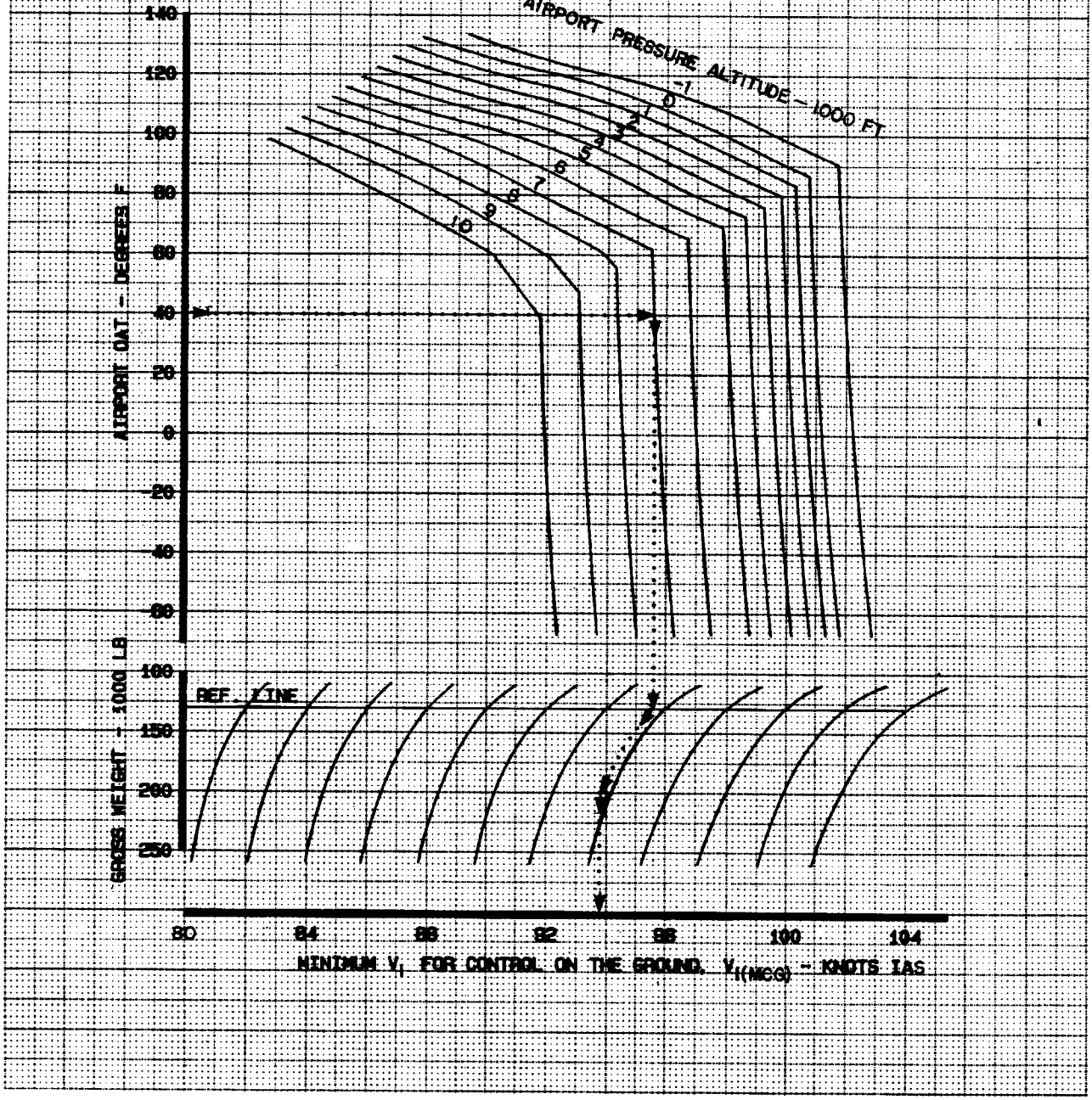


MARTIN	APPROVED	DATE
757-200	Boeing	9-8-84
PW 2037	A.R. Johnson	3/25/88
	R. Jansen	7/3/95

PERFORMANCE

MINIMUM V1 FOR CONTROL ON THE GROUND

V_1 (MCG)



P.C. 5S000128	
D631N013	PG. 4.7 – 16

KOSTOFF	APPROVED	DATE
757-200	W. PAUL NEAL	8/11/94
PW 2037	[signature]	3/29/96
	[signature]	7/3/95

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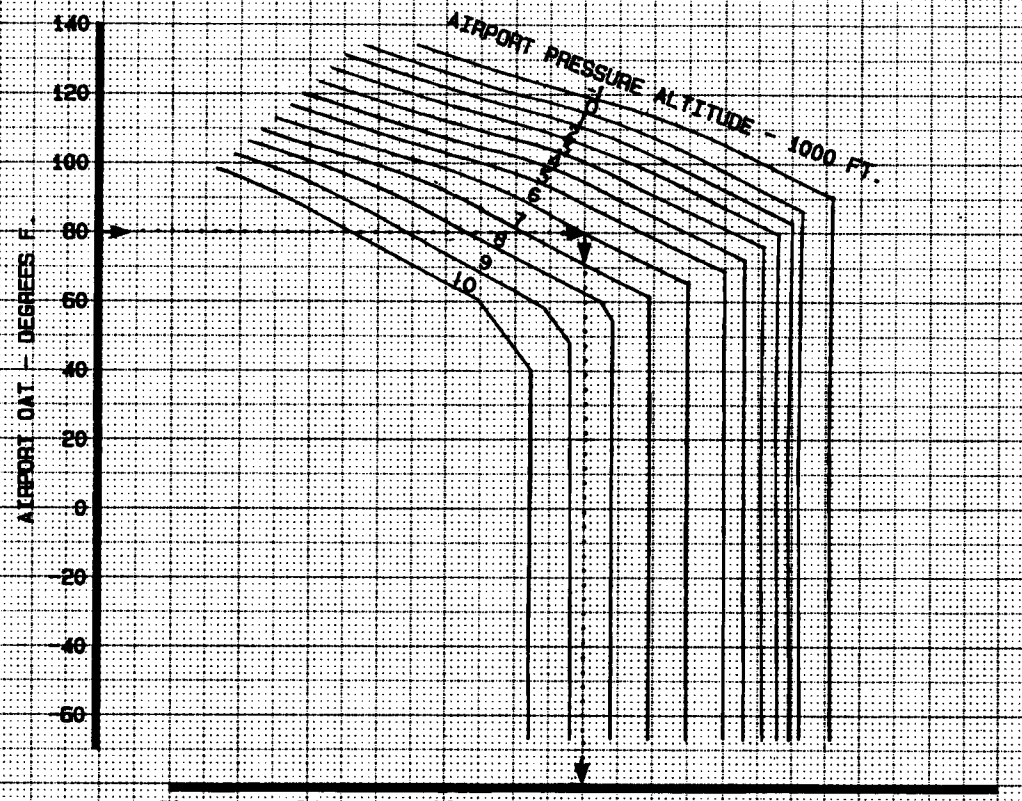
PERFORMANCE

AIR MINIMUM CONTROL SPEED

V_{MCA}

● APPLICABLE TO TAKEOFF AND LANDING FLAPS IN THE AIR.



P.C. 5S000131
D631N013 SECTION 4.7-17

APPROVED	DATE
NM-206 W.ROBERTS	9-15-84

MARTIN
757-200
PW 2037

664207

R17802

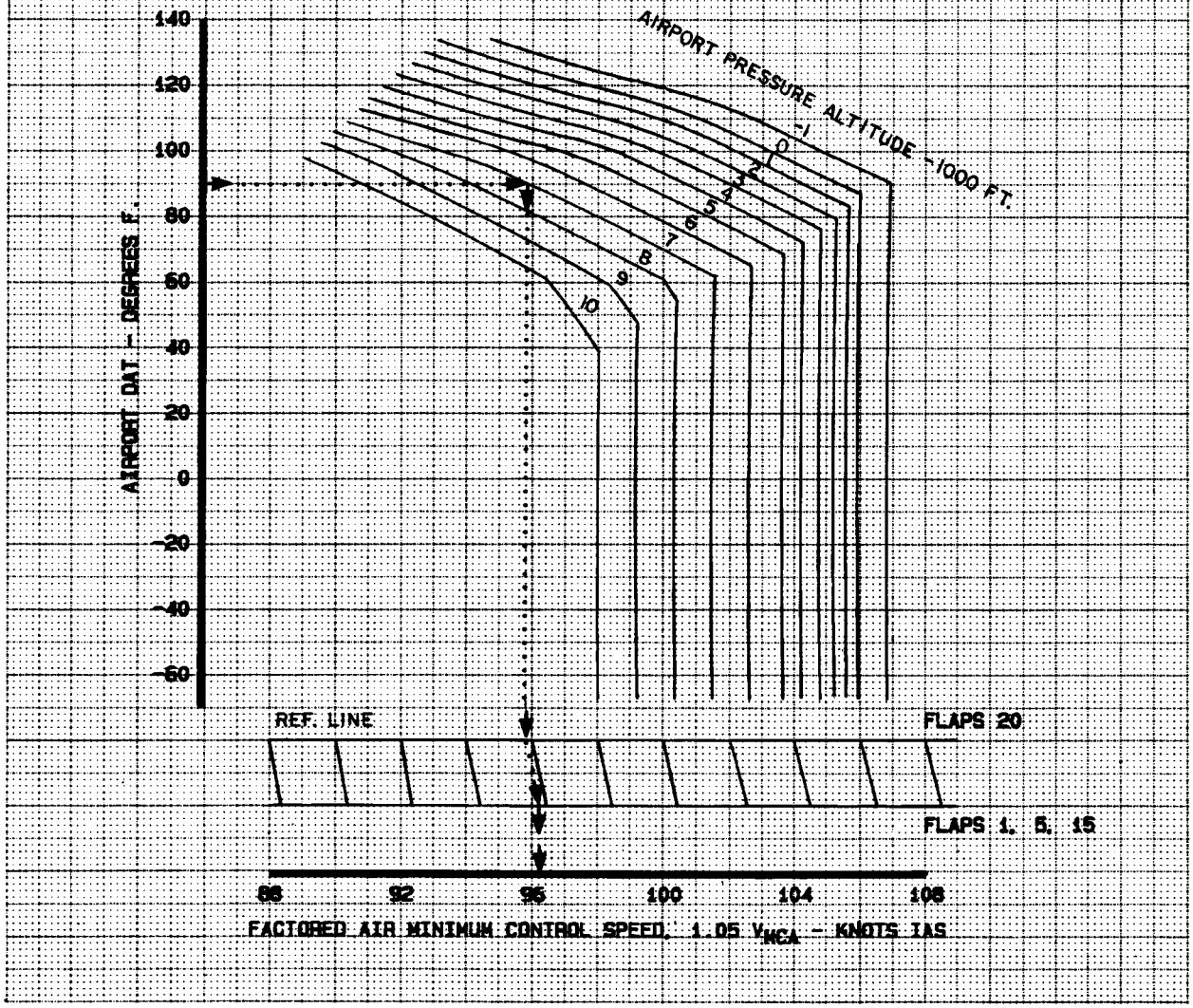
PERFORMANCE

AIR MINIMUM CONTROL SPEED

FACTORED

1.05 V_{MCA}

● APPLICABLE TO TAKEOFF
FLAPS ON THE GROUND



P.C. 5S000139
D631N013 P6. 4.7-18

APPROVED	DATE
NM-Z06 W. Roberts	9-18-84

GRIECO
757-200
PW 2037

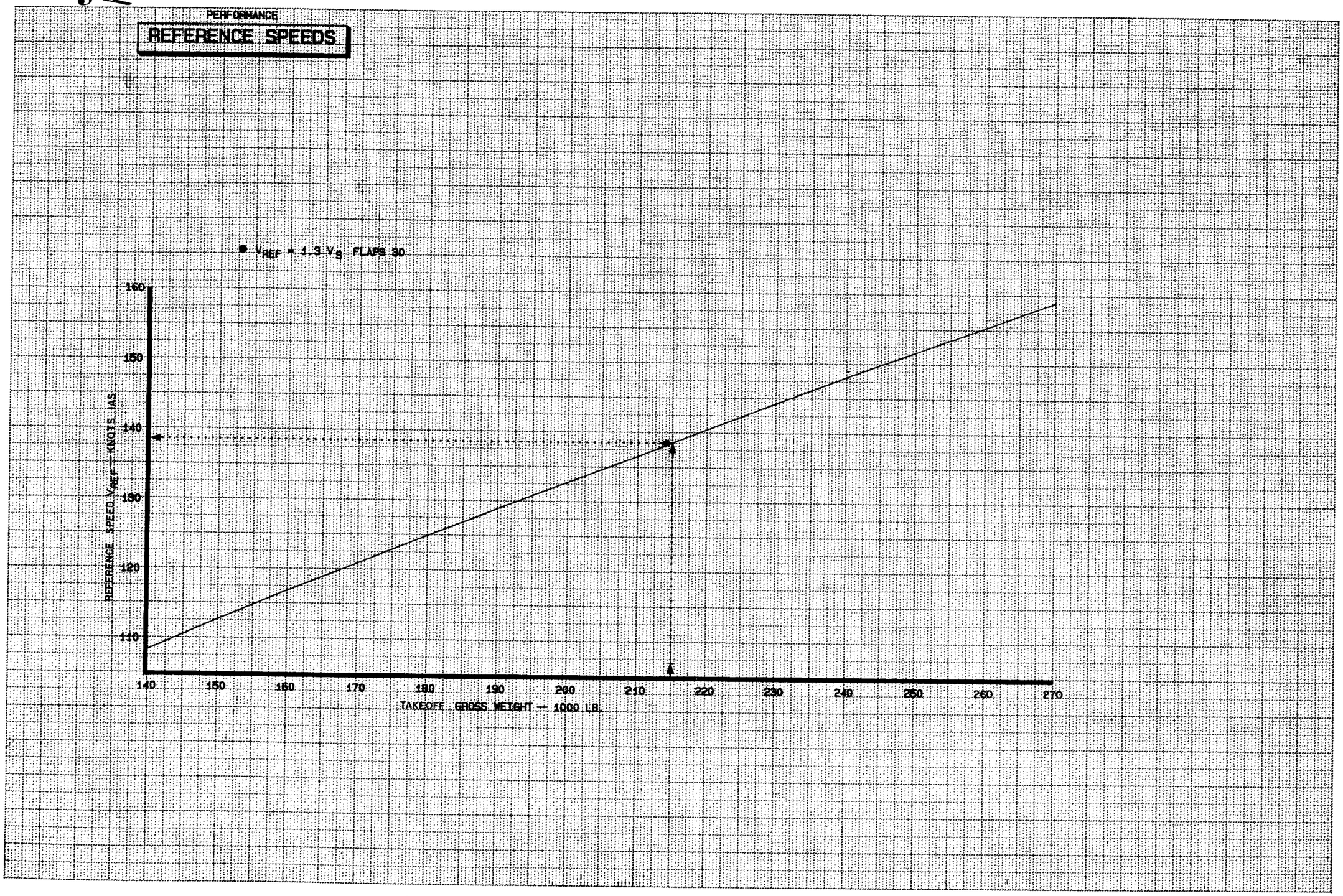
664207

R17806

P.C. 5L000518
D631N004 PG 4.13-4.1

PERFORMANCE

REFERENCE SPEEDS



APPROVED	DATE
W PAUL NM	8/15/84
KATZ	
F.T. Hoglund	6.20.82

C.SANDERS
757-200

SECTION 4.8 - V_{MC} LIMITED TAKEOFF

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Basic Takeoff Speeds	3
Speed Increase Required	3

R17365

V_{MC} LIMITED TAKEOFF

G E N E R A L

A V_{MC} limited takeoff results when either 1) the entire range of V_1 falls below $V_{1(MCG)}$ or 2) V_R falls below 1.05 V_{MCA}. If for Case 1 the corrected accelerate-stop distance available equals or exceeds the appropriate reference $V_{1(MCG)}$ limited accelerate-stop distance, V_1 may be increased to $V_{1(MCG)}$ without resulting in a field length limited takeoff. If the corrected accelerate-stop distance available is less than the reference $V_{1(MCG)}$ limited accelerate-stop distance, the takeoff is not allowed. If for Case 2 the lesser of the all engines operating corrected runway length available and the engine inoperative corrected runway length available, from the Runway Length and V_1 Adjustments Chart, equals or exceeds the reference 1.05 V_{MCA} limited corrected runway length, V_R is increased to 1.05 V_{MCA} without resulting in a field length limited takeoff. If the lesser distance is less than the reference 1.05 V_{MCA} limited corrected runway length, the takeoff is not allowed.

R E F E R E N C E D I S T A N C E S

Reference $V_{1(MCG)}$ limited accelerate-stop distance = 3500 ft. Applicable to all braking configurations.

Reference 1.05 V_{MCA} limited corrected runway length = 3500 ft.

NOTE: 1) 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 $V_{1(MCG)}$.

2) Takeoff with an all engines operating corrected runway length or engine inoperative corrected runway length less than the reference 1.05 V_{MCA} limited corrected runway length is permissible if V_R equals or exceeds 1.05 V_{MCA}.

R17366

V_{MC} LIMITED TAKEOFF

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

The following steps describe the procedures for determining takeoff speeds when V_{MC} limited and the appropriate reference distance requirements are met.

Basic Takeoff Speeds

If V_1 is less than $V_{1(MCG)}$ and V_R is equal to or greater than 1.05 V_{MCA}, then no speed increase is required for V_R and V_2 over the basic speeds obtained in Section 4.7. Set V_1 = $V_{1(MCG)}$.

Speed Increase Required

If V_R < 1.05 V_{MCA}, a speed increase is required for V_R and V_2 over the basic speeds obtained in Section 4.7 such that V_R = 1.05 V_{MCA}.

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 = 1.05 V_{MCA} and read speed increase required.

   If V_R < 1.05 V_{MCA} 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.

R17368

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

3. Determine Takeoff Decision Speeds, $V_{1(MIN)}$ & $V_{1(MAX)}$

Enter the appropriate Improved Climb Performance (Takeoff Speeds) chart, Section 4.10, with the V_1 speeds determined in Section 4.7. Follow the guidelines to the speed increase required (Step 1) and read takeoff decision speed, $V_{1(MIN)}$ and $V_{1(MAX)}$.

V_1 Selection

If $V_{1(MIN)} > V_{1(MCG)}$, select V_1 such that $V_{1(MIN)} \leqslant V_1 \leqslant V_{1(MAX)}$.

If $V_{1(MIN)} \leqslant V_{1(MCG)} \leqslant V_{1(MAX)}$, select V_1 such that $V_{1(MCG)} \leqslant V_1 \leqslant V_{1(MAX)}$.

If $V_{1(MAX)} < V_{1(MCG)}$, select $V_1 = V_{1(MCG)}$.

R17369

SECTION 4.9 - OBSTACLE CLEARANCE

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

R17370

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- A/C PACKS OFF 28
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Titles shown in capital letters are charts.
Titles shown in lower case letters are text.

R17371

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.

R17373

TAKEOFF FLIGHT PATH

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.

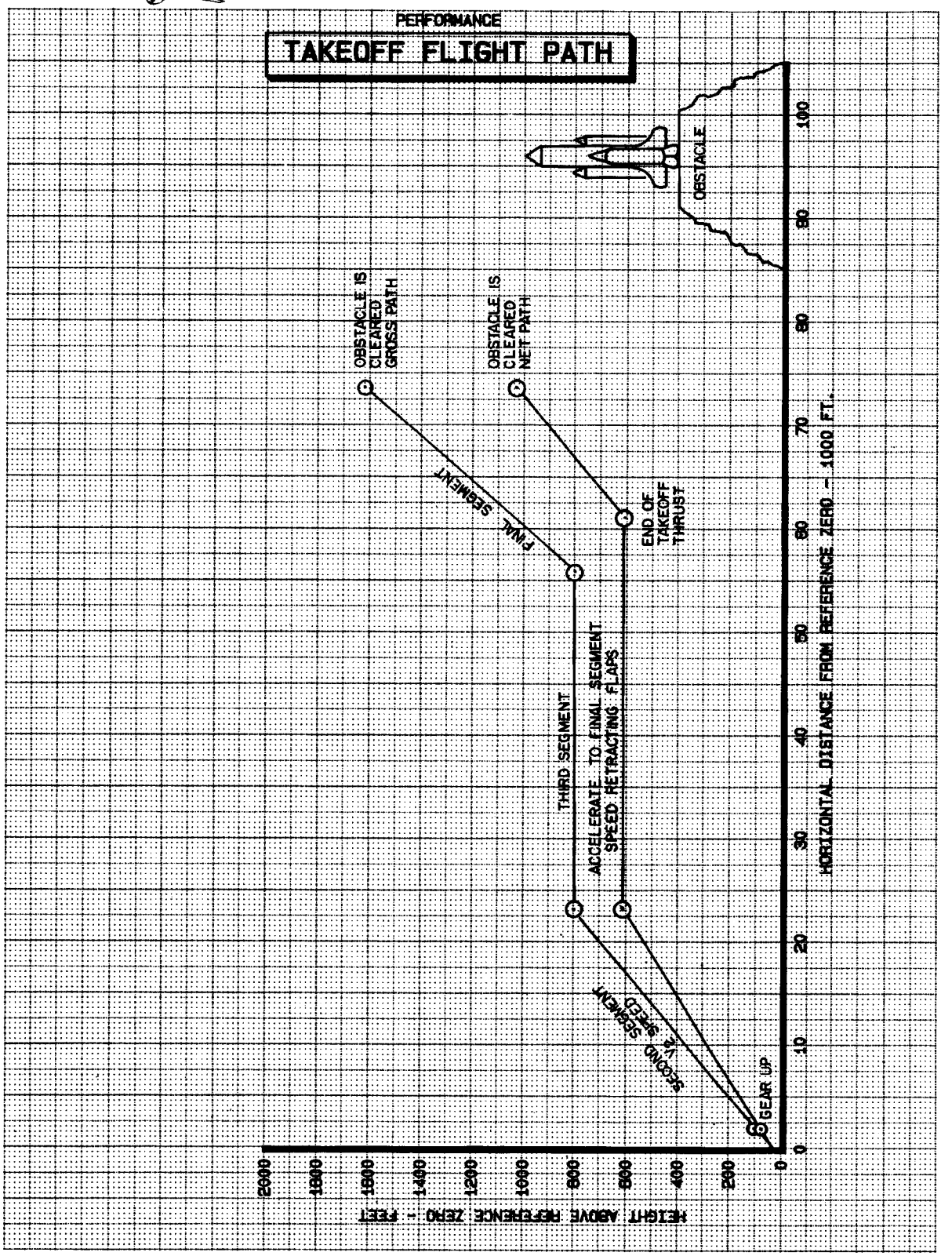
Occasionally the flight path analysis must be extended beyond the flap retraction point to show clearance of high and very distant obstacles which cannot be avoided by turning. For this purpose the Third Segment Distance and Final Takeoff Climb charts are included.

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.

APPROVED	DATE
[signature]	8/10/84

PERFORMANCE

TAKEOFF FLIGHT PATH



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R17810

OBSTACLE CLEARANCE

ASSUMED CLIMB TECHNIQUE

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,

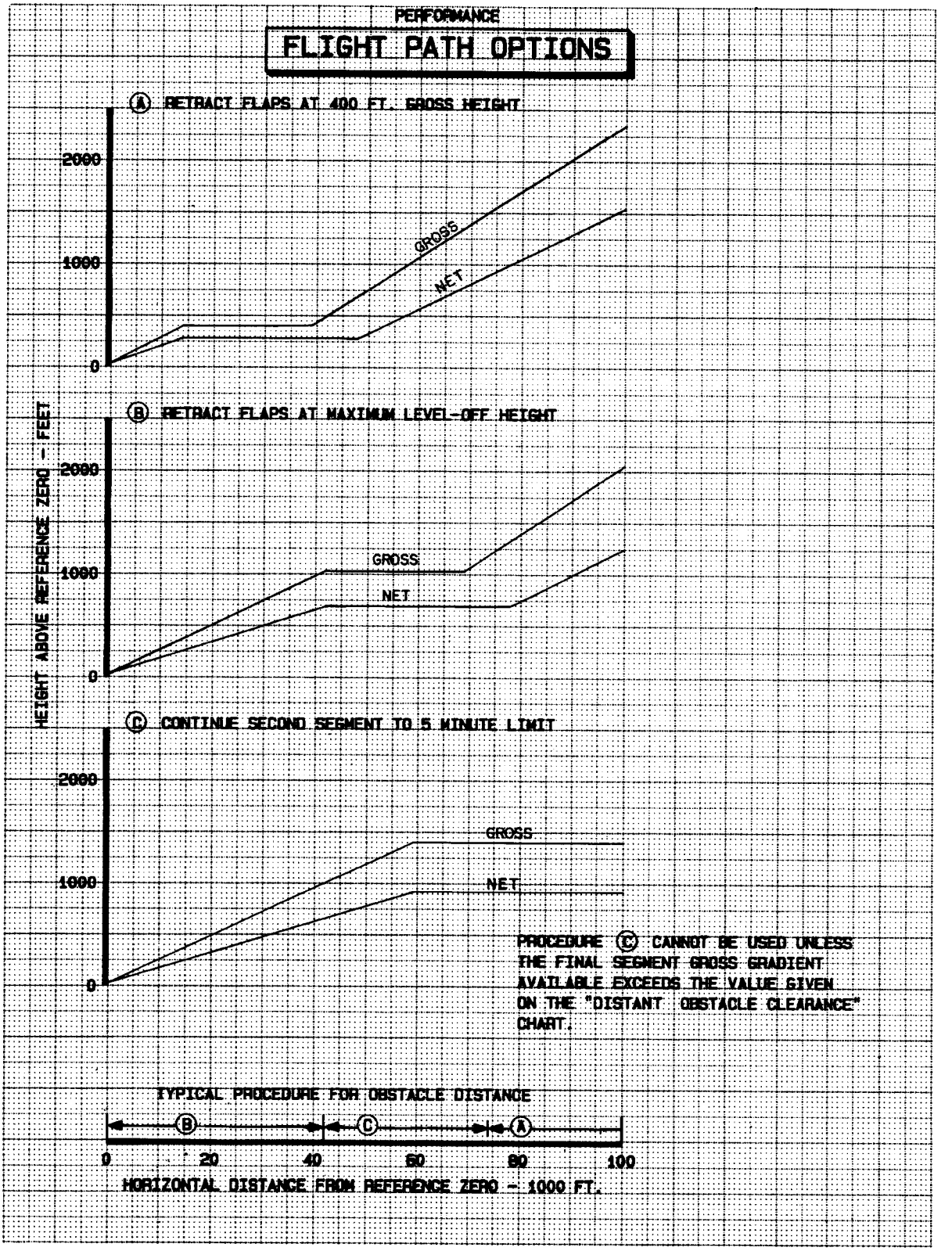
(c) The maximum height is attained which can be reached 5 minutes after setting takeoff thrust.

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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R17811

OBSTACLE CLEARANCE

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 - These charts show 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. Separate charts are included for use with and without improved climb performance for flaps 15 and 20. The gradient read from the Takeoff Climb chart must be corrected for speed increase on the Takeoff Climb (Improved Climb Performance) chart (Section 4.10) and then for wind and bank angle on the Gradient Corrections chart (this section) before entering these charts.

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 speed increase on the Takeoff Climb (Improved Climb Performance) chart (Section 4.10) and then for wind and bank angle on the Gradient Corrections chart (this section) before entering these charts.

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.

R17376

OBSTACLE CLEARANCE

FLIGHT PATH CHART PRESENTATION (Continued)

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 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.

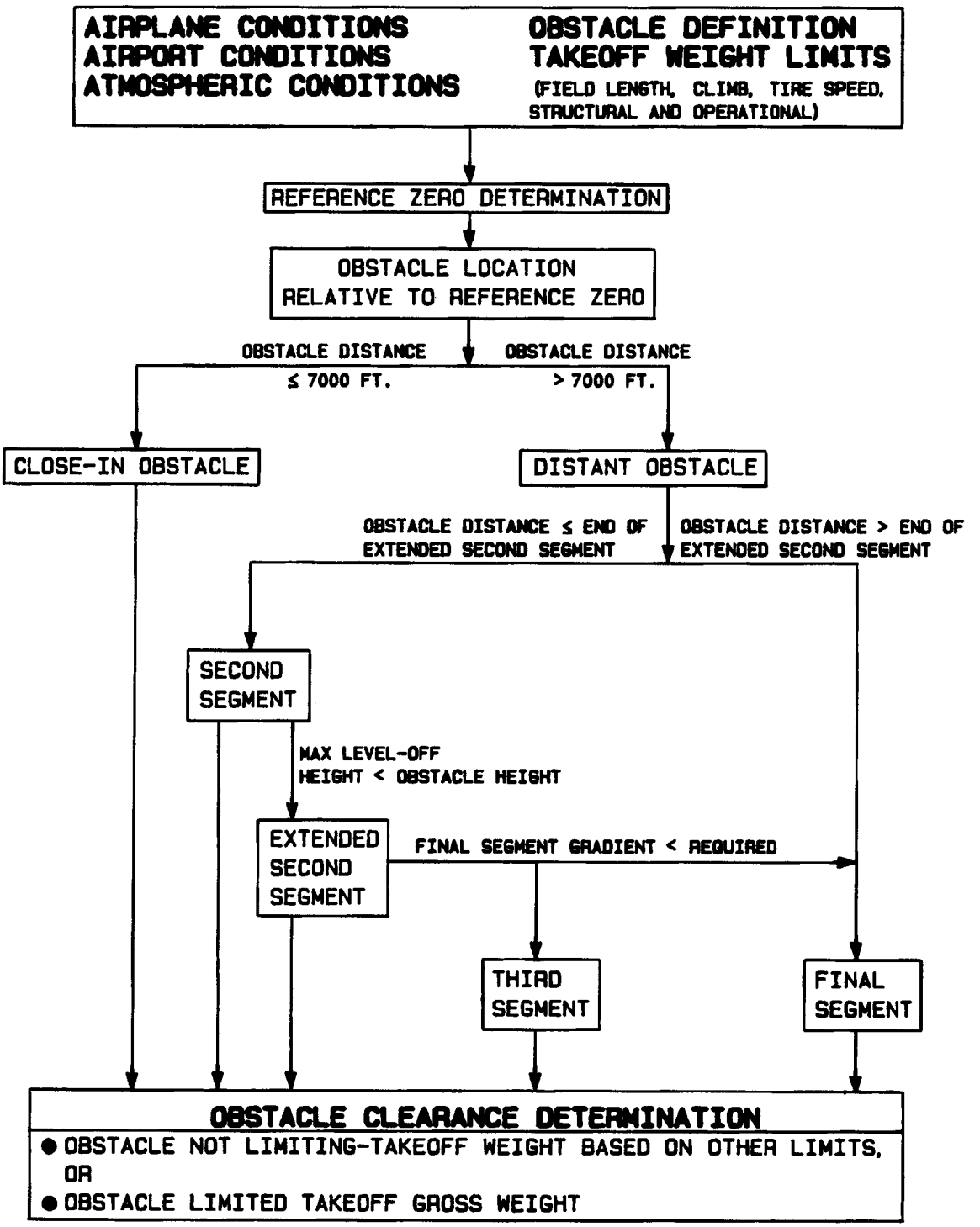
GROSS HEIGHT-PRESSURE ALTITUDE CONVERSION - When ambient temperatures are above or below ISA, the altitude change displayed on a pressure altimeter can differ significantly from the geometric heights calculated for the flight path. This chart relates the geometric height increment to a pressure altitude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

R17378

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



R17812

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) Determine corrected runway length required. If field length limited, corrected runway length required equals corrected runway length available from runway length determination.

(1) Minimum Takeoff Speeds

Enter appropriate Field Length Limits chart with the airport temperature/altitude and the least gross weight determined by climb limits, tire speed limits, structural limits or operational requirements. Read corrected runway length required.

(2) Improved Climb Performance

If the Improved Climb Performance technique is used, use the procedure described in Section 4.10 to determine corrected runway length required.

(b) Enter the appropriate Runway Length and V_1 Adjustments chart with the 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.

R17381

OBSTACLE CLEARANCE ANALYSIS PROCEDURE (Continued)

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

(e) The actual takeoff distance required is the greater of the engine inoperative, Step 1(c), or all engines operating, 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, Step 1(e), 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 gross weight used to determine Reference Zero, Step 1. 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.

R17382

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 appropriate 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 obstacle height above Reference Zero available.

(b) If obstacle 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 appropriate 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.

R17383

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 appropriate Distant Obstacle Clearance chart with obstacle height and corrected gross gradient available, Step 3(b) (or other obstacle clearance requirement). Read horizontal distance from Reference Zero. If it is beyond the appropriate end of extended second segment climb, 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 appropriate 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.

R17384

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

(f) If obstacle 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.

R17385

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 gross weight used to determine Reference Zero, Step 1 (or other obstacle clearance requirement). Read final segment gross gradient available.

R17386

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.

R17387

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 appropriate 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.

R17388

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 appropriate 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 obstacle 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.

R17389

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 =

$$\frac{\text{Obstacle Height - Third Segment Height}}{\text{Corrected Final Segment Net Gradient Available}}$$

R17390

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.

R17391

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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PG 4.9 – 25

PERFORMANCE

TAKEOFF CLIMB

FLAPS 1

A/C PACKS ON

● APU OFF. FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.

●USE 190,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.

AIRPORT PRESSURE ALTITUDE — 1000 FT.

-1
0
1
2
3
4
5
6
7
8
9
10

TAKEOFF GROSS WEIGHT - 1000 LB.

250
240
230
220
210
200
190
180
170
160
150
140
130

-60 -40 -20 0 20 40 60 80 100 120 140 160

AIRPORT OAT - DEGREES F

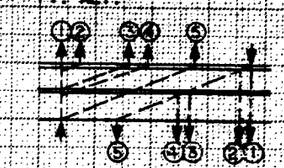
REF. LINE

ANTI-ICE

1 2 3 4 5 6 7 8

400 FT. GROSS GRADIENT - PERCENT

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE AND WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.
⑤ ENGINE AND WING ANTI-ICE ON ABOVE 8000 FT. ALT.



APPROVED	DATE
M. LEGWARK for SGB	2-Aug-94
J. R. Dever	3/25/96
W. ROBERTS	4-20-94

HOLTZCLAW
757-200
PW 2037

P.C. 5L000523
D633N013
PG 4.9-26

PERFORMANCE

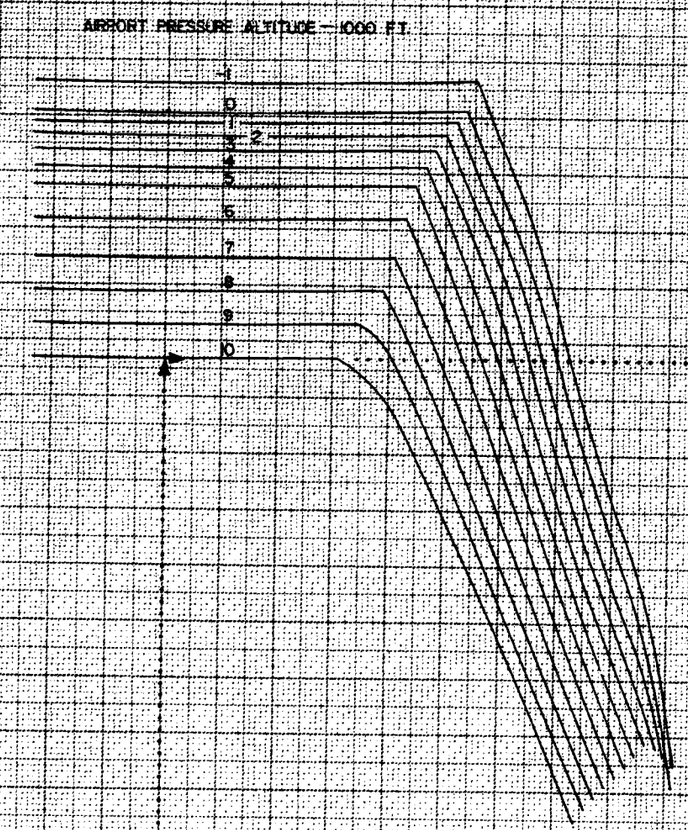
TAKEOFF CLIMB

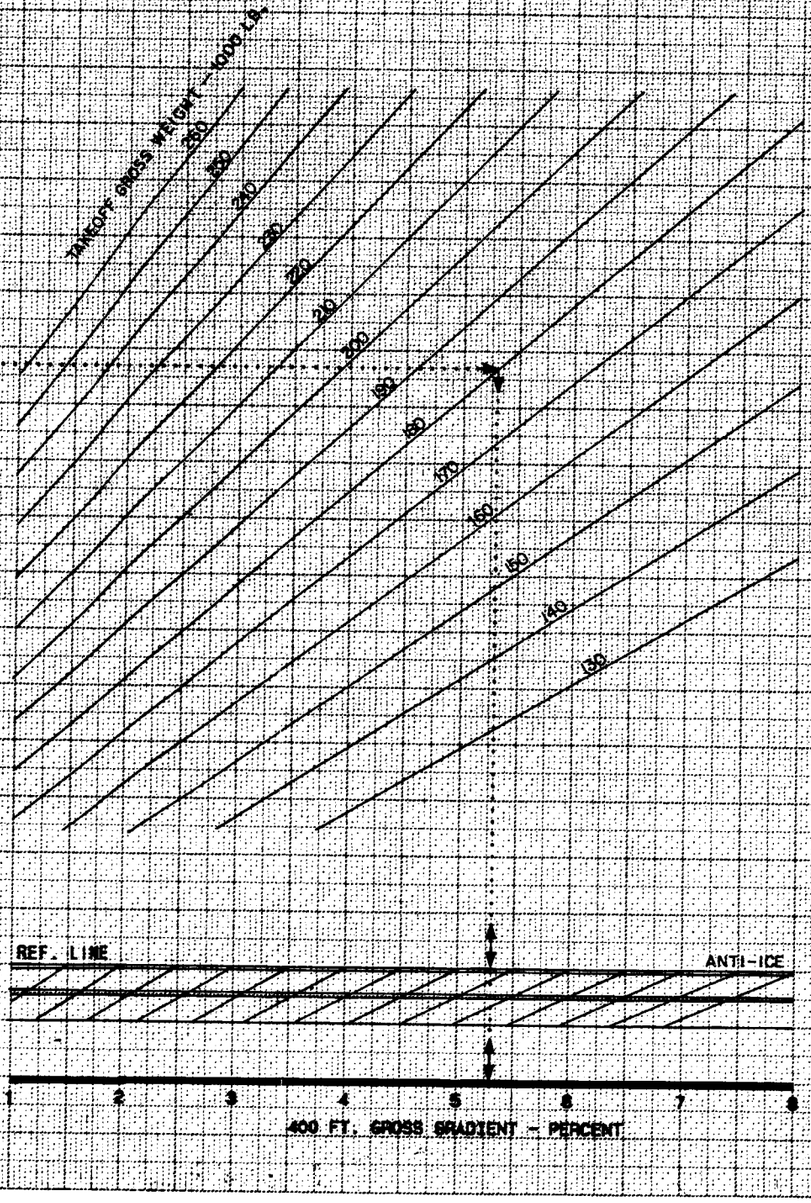
FLAPS 1

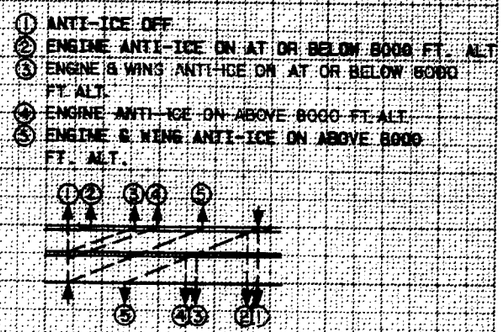
A/C PACKS OFF

● USE 130,000 LB LINE FOR LOWER WEIGHTS TO 120,000 LB.

● APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.







HOLTZCLAW
757-200
PW 2037

APPROVED	DATE
M. Lockear Nm-308	28 Aug 96
A.R. Sasse	3/26/96
W. Roberts	4-20-94

PERFORMANCE

TAKEOFF CLIMB

FLAPS 5

A/C PACKS ON

AIRPORT PRESSURE ALTITUDE—1000 FT.

-1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TAKEOFF GROSS WEIGHT—1000 LB

250, 240, 230, 220, 210, 200, 190, 180, 170, 160, 150

AIRPORT OAT—DEGREES F.

-60 -40 -20 0 20 40 60 80 100 120 140 160

① USE 190,000 LB LINE FOR LOWER WEIGHTS TO 180,000 LB.

② APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.

④ ANTI-ICE OFF

② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.

③ ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.

④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.

⑤ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.

REF. LINE

ANTI-ICE

1 2 3 4 5 6 7 8

400 FT. GROSS GRADIENT—PERCENT

P.C. 5L000525
D631N013 PAGE 4.9-27

SMARD	APPROVED	DATE
757-200	M. LECHNER for 3GB	24 Aug 94
PW 2037	J.R. Bauer	3/25/96
	W. Roberts	4-20-94

P.C. 5L000527
D631N013 PAGE 4.8-28

PERFORMANCE

TAKEOFF CLIMB

FLAPS 5

A/C PACKS OFF

* USE 130,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.

■ APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.

AIRPORT PRESSURE ALTITUDE—1000 FT.

-1 0 1 2 3 4 5 6 7 8 9 10

TAKEOFF GROSS WEIGHT—1000 LB.

250 240 230 220 210 200 190 180 170 160 150 140 130*

-50 -40 -20 0 20 40 60 80 100 120 140 160

AIRPORT OAT—DEGREES F.

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.
⑤ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.

REF. LINE

ANTI-ICE

1 2 3 4 5 6 7 8

400 FT. GROSS GRADIENT—PERCENT

SMARD
757-200
PW 2037

APPROVED	DATE
M. LECHNAR NM-308	24 Aug 94
K.R. Swan	3/25/96
W. ROBERTS	4-20-94

P.C. 5L000529
D631N0013 PAGE 4.9-29

PERFORMANCE

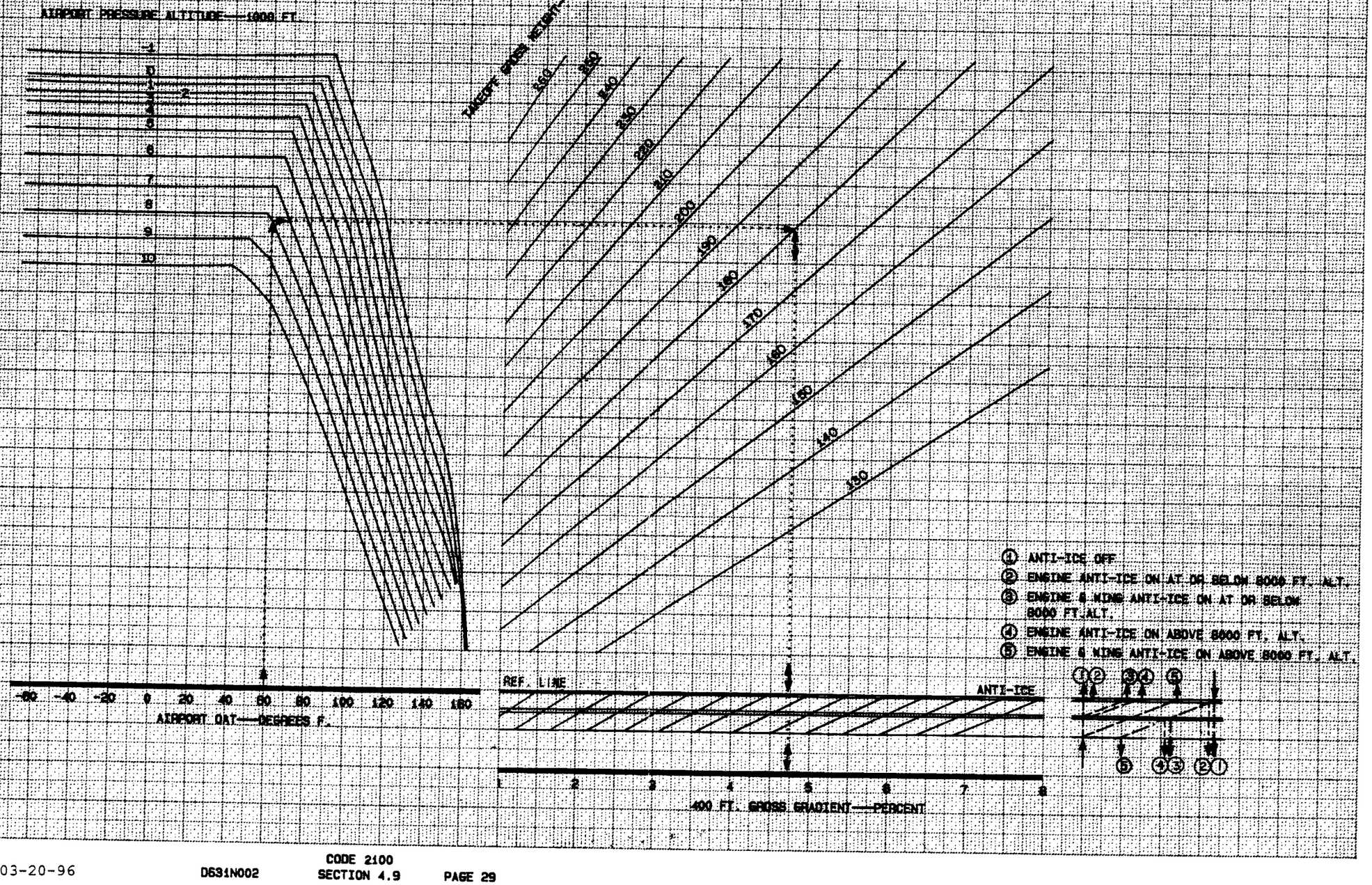
TAKEOFF CLIMB

FLAPS 15

A/C PACKS ON

●USE 130,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.

●APU OFF FOR APU OPERATING, REDUCE GROSS GRADIENT BY .025 PERCENT.



SNAPD
757-200
PW 2037

	APPROVED	DATE
	[signature]	8/2/95
	[signature]	8/2/95
	[signature]	8/22/94

P.C. 5L000531
D631N013 PAGE 4.8-30

PERFORMANCE

TAKEOFF CLIMB

FLAPS 15

A/C PACKS OFF

● USE 130,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.

● APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.

AIRPORT PRESSURE ALTITUDE—1000 FT.

-1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TAKEOFF GROSS WEIGHT—1000 LB.

260, 250, 240, 230, 220, 210, 200, 190, 180, 170, 160, 150, 140, 130

AIRPORT OAT—DEGREES F.

-60 -40 -20 0 20 40 60 80 100 120 140 160

REF. LINE

ANTI-ICE

1 2 3 4 5 6 7 8

400 FT. GROSS GRADIENT—PERCENT

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.
⑤ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.

SMARD	APPROVED	DATE
757-200	M. LOCKWAR ram-308	27 Aug 84
PW 2037	A. Jansen	3/2/88
	W. Roberts	4-20-94

P.C. 5L000533
D631N013 PAGE 4.9-31

PERFORMANCE

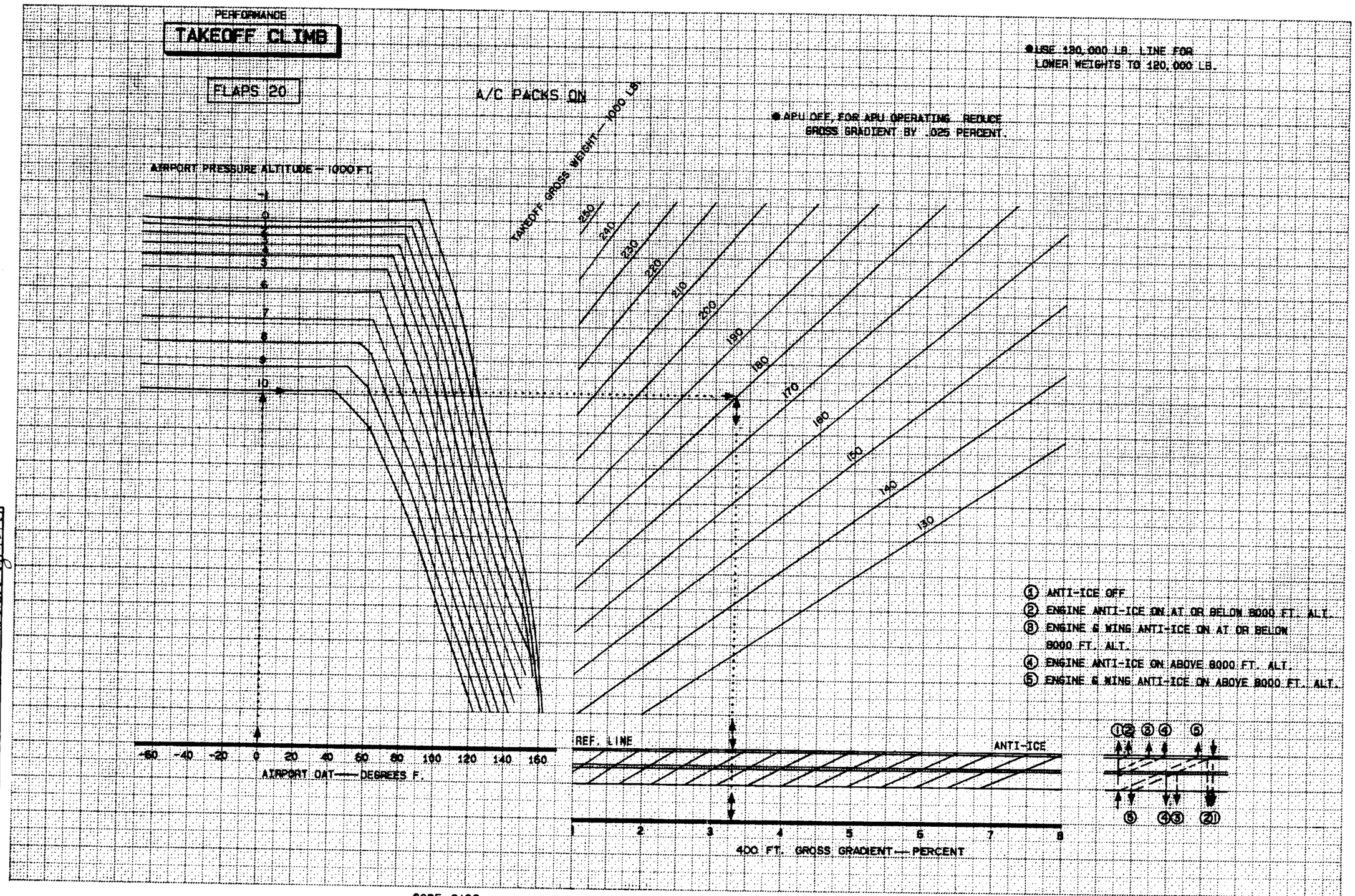
TAKEOFF CLIMB

FLAPS 20

A/C PACKS ON

*USE 120,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.

*APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT BY .025 PERCENT.



J.BASSETT	APPROVED	DATE
757-200	M.TECHNAK Nm-308	27Aug84
PW 2037	A. Sullivan	3/2/88
	W.E. Stuelpg	4/22/94

P.C. BL0006585
D631N013 PAGE 4.9-32

PERFORMANCE

TAKEOFF CLIMB

FLAPS 20

A/C PACKS OFF

AIRPORT PRESSURE ALTITUDE — 1000 FT.

-1 0 1 2 3 4 5 6 7 8 9 10

TAKEOFF GROSS WEIGHT — 1000 LB

240 230 220 210 200 190 180 170 160 150 140 130

-60 -40 -20 0 20 40 60 80 100 120 140 160

AIRPORT OAT — DEGREES F

REF. LINE

ANTI-ICE

1 2 3 4 5 6 7 8

400 FT. GROSS GRADIENT — PERCENT

● USE 190,000 LB LINE FOR LOWER WEIGHTS TO 120,000 LB.

● APU OFF, FOR APU OPERATING, REDUCE GROSS GRADIENT BY .025 PERCENT.

① ANTI-ICE OFF
② ENGINE ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
③ ENGINE & WING ANTI-ICE ON AT OR BELOW 8000 FT. ALT.
④ ENGINE ANTI-ICE ON ABOVE 8000 FT. ALT.
⑤ ENGINE & WING ANTI-ICE ON ABOVE 8000 FT. ALT.

	APPROVED	DATE
MILSCHWARZ SVC ENG		27 Aug 84
		3/2/88
		4/12/94

J. BASSETT
757-200
PW 2037

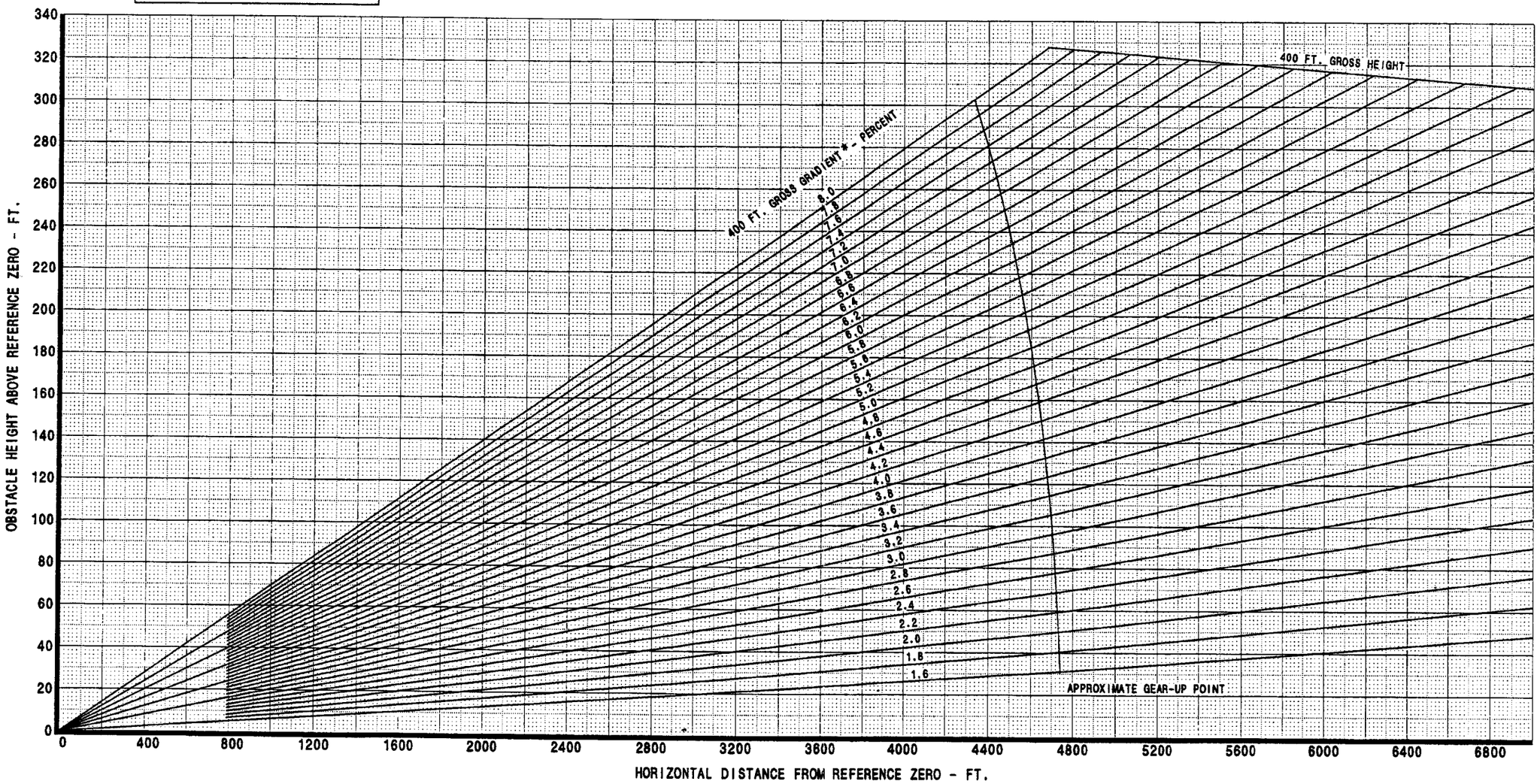
CLOSE-IN OBSTACLE CLEARANCE

FLAPS 1 AND 5
WITHOUT IMPROVED CLIMB PERFORMANCE

FLAPS 5, 15, AND 20
WITH IMPROVED CLIMB PERFORMANCE

- 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. C500933000
D631N013 PG. 4.9-33

L. ENEBRAD
757-200
PW 2037

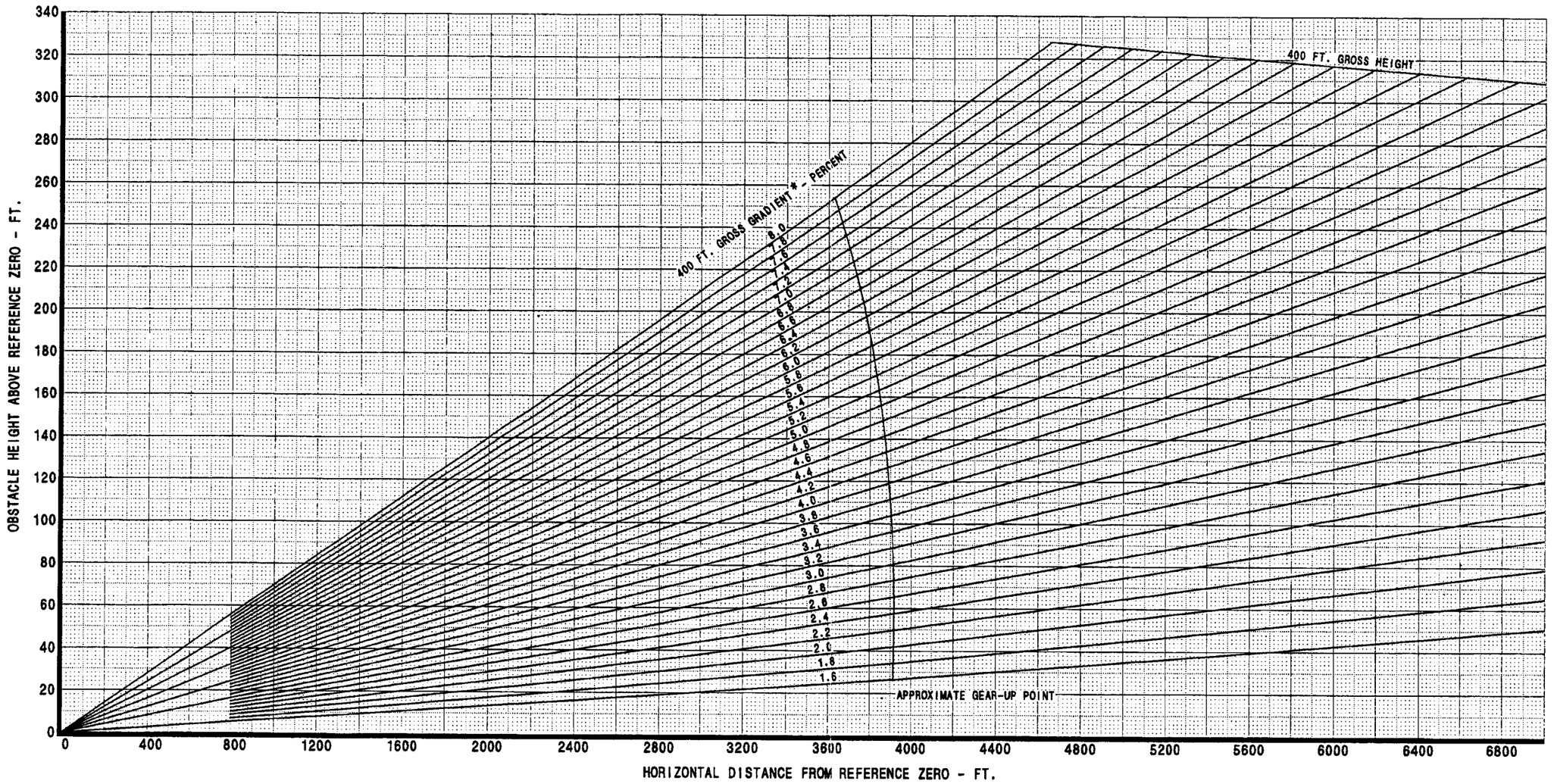
APPROVED DATE
5Oct95

CLOSE-IN OBSTACLE CLEARANCE

FLAPS 15 AND 20
WITHOUT IMPROVED CLIMB PERFORMANCE

- 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.



P.C. C500934000
D631N013 PG. 4.9-34

H.LEE
757-200
PW 2037

APPROVED DATE
5/24/95

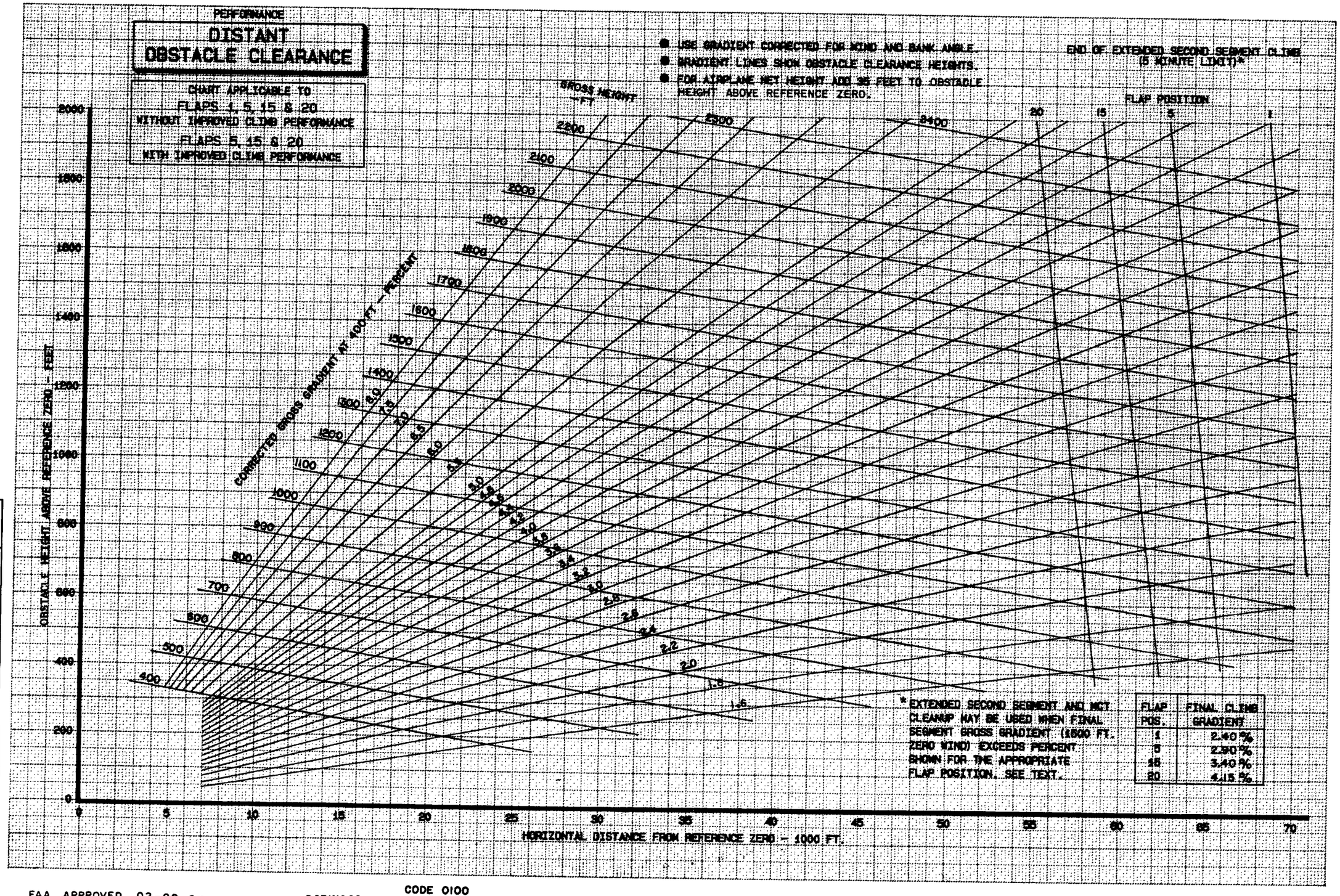
P.C. 5L000538
D631N013 PG. 4.9-35

PERFORMANCE

DISTANT OBSTACLE CLEARANCE

CHART APPLICABLE TO
FLAPS 1, 5, 15 & 20
WITHOUT IMPROVED CLIMB PERFORMANCE
FLAPS 5, 15 & 20
WITH IMPROVED CLIMB PERFORMANCE

- USE GRADIENT CORRECTED FOR WIND AND BANK ANGLE.
- GRADIENT LINES SHOW OBSTACLE CLEARANCE HEIGHTS.
- FOR AIRPLANE NET HEIGHT ADD 35 FEET TO OBSTACLE HEIGHT ABOVE REFERENCE ZERO.



* 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	2.40 %
5	2.90 %
15	3.40 %
20	4.15 %

C.FRANK	APPROVED	DATE
757-200	M. LECHNER Mec 328	23 Aug 94
PW 2037	JCMSI	12-12-95
	W. ROBERTS	4-20-94

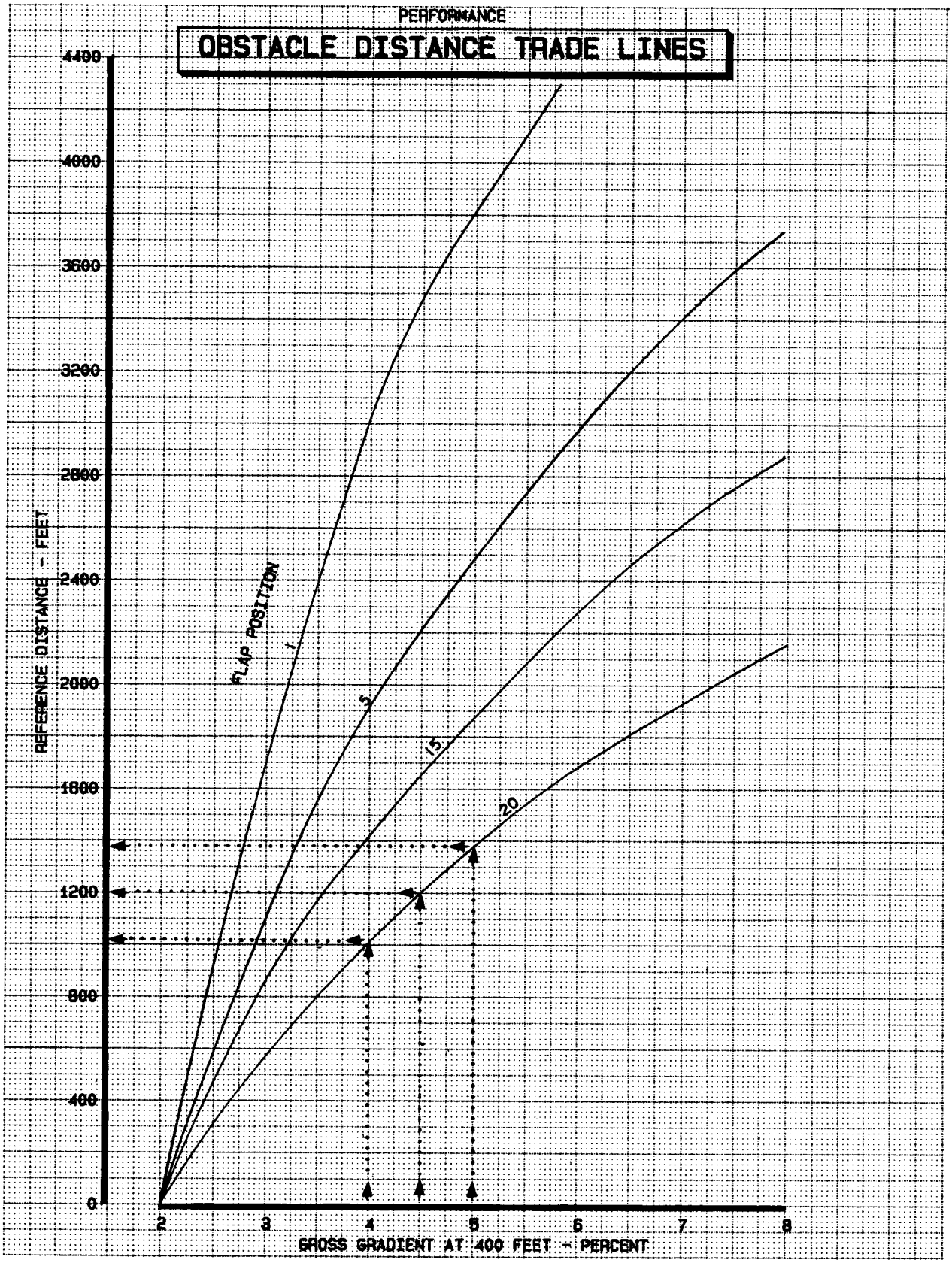
P.C. 5S000138
D631N013 PAGE 4.9-36

APPROVED	DATE
[illegible]	9.15.84

SAUNDERS
757-200
PW 2037

PERFORMANCE

OBSTACLE DISTANCE TRADE LINES



66420

R17813

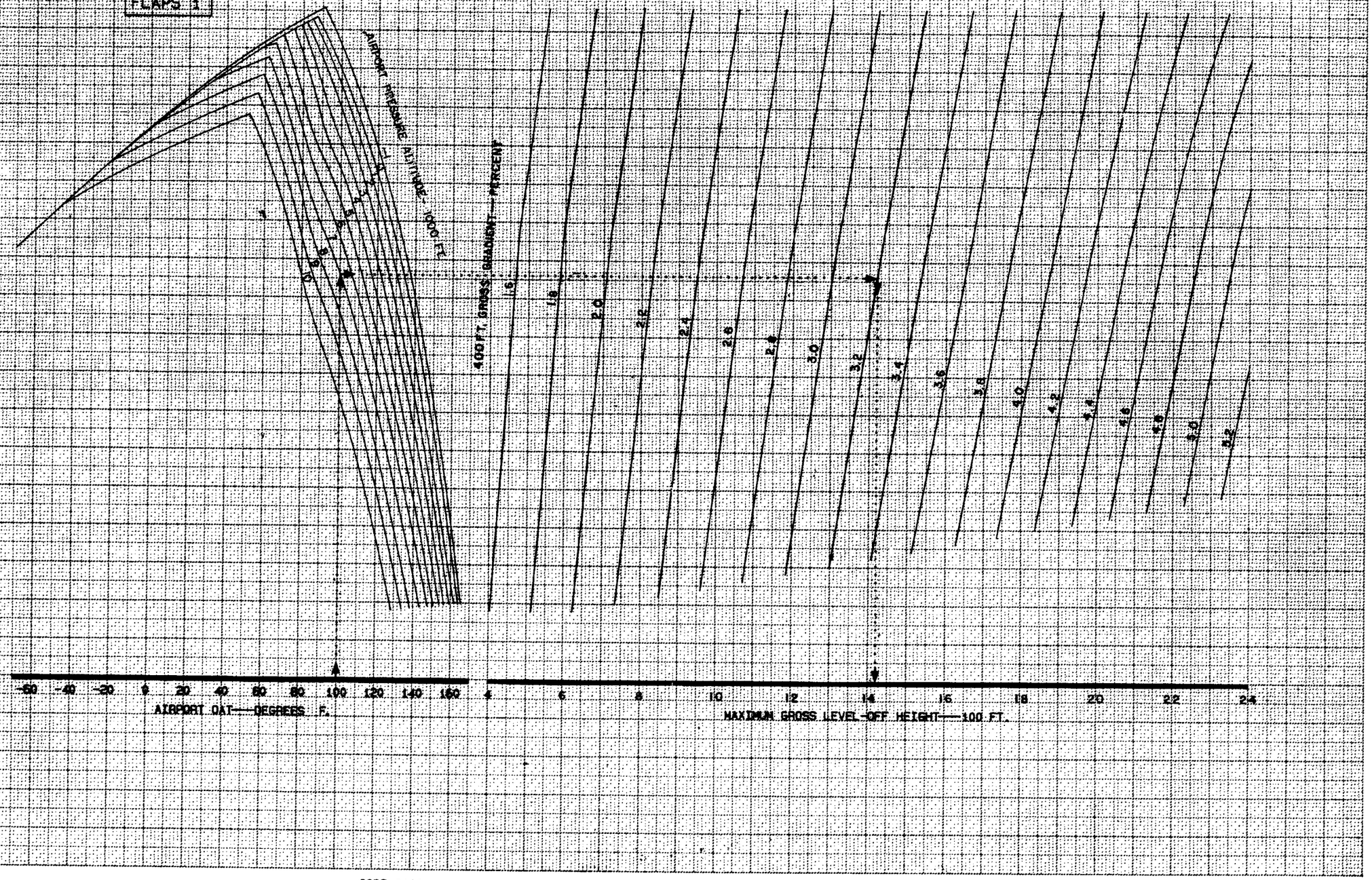
P.C. 5L000540
D631N013 PAGE 4.8-37

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 1

● USE 400 GROSS GRADIENT UNCORRECTED FOR WIND OR LEVEL-OFF HEIGHT.



SMARD
757-200
PW 2037

APPROVED	DATE
AE WALKER	16 SEP 94
R.L. Bowles	4 Oct 94

S11547

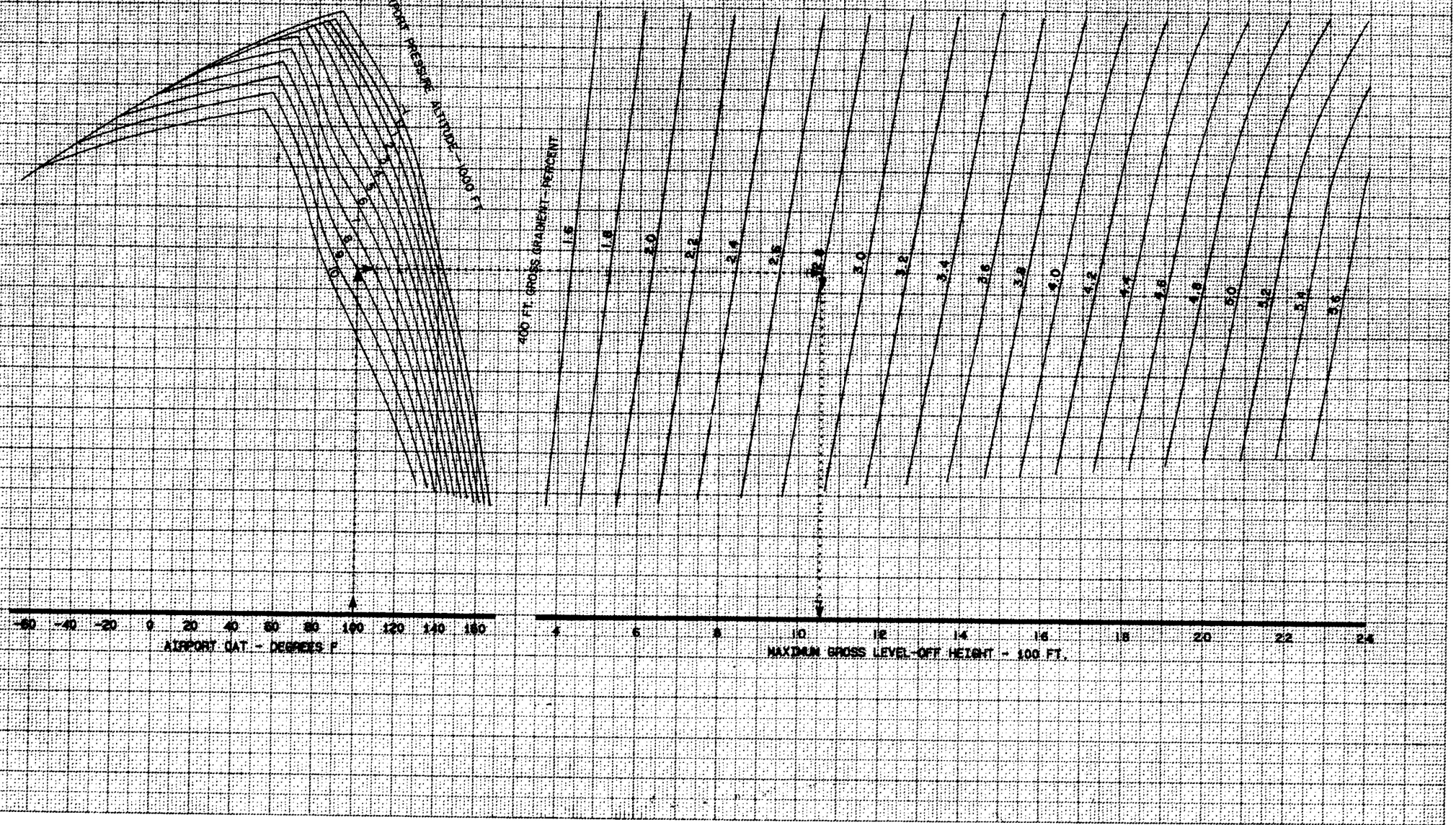
P.C. 5L000542
D631N013 PAGE 4.9-38

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 5

* USE 400 FT. GROSS GRADIENT UNCORRECTED FOR WIND OR LEVEL-OFF HEIGHT.



APPROVED	DATE
AEC SIGNATURE	17 Sep 96
D&B SIGNATURE	9/17/96

J.BASSETT
757-200
PW 2037

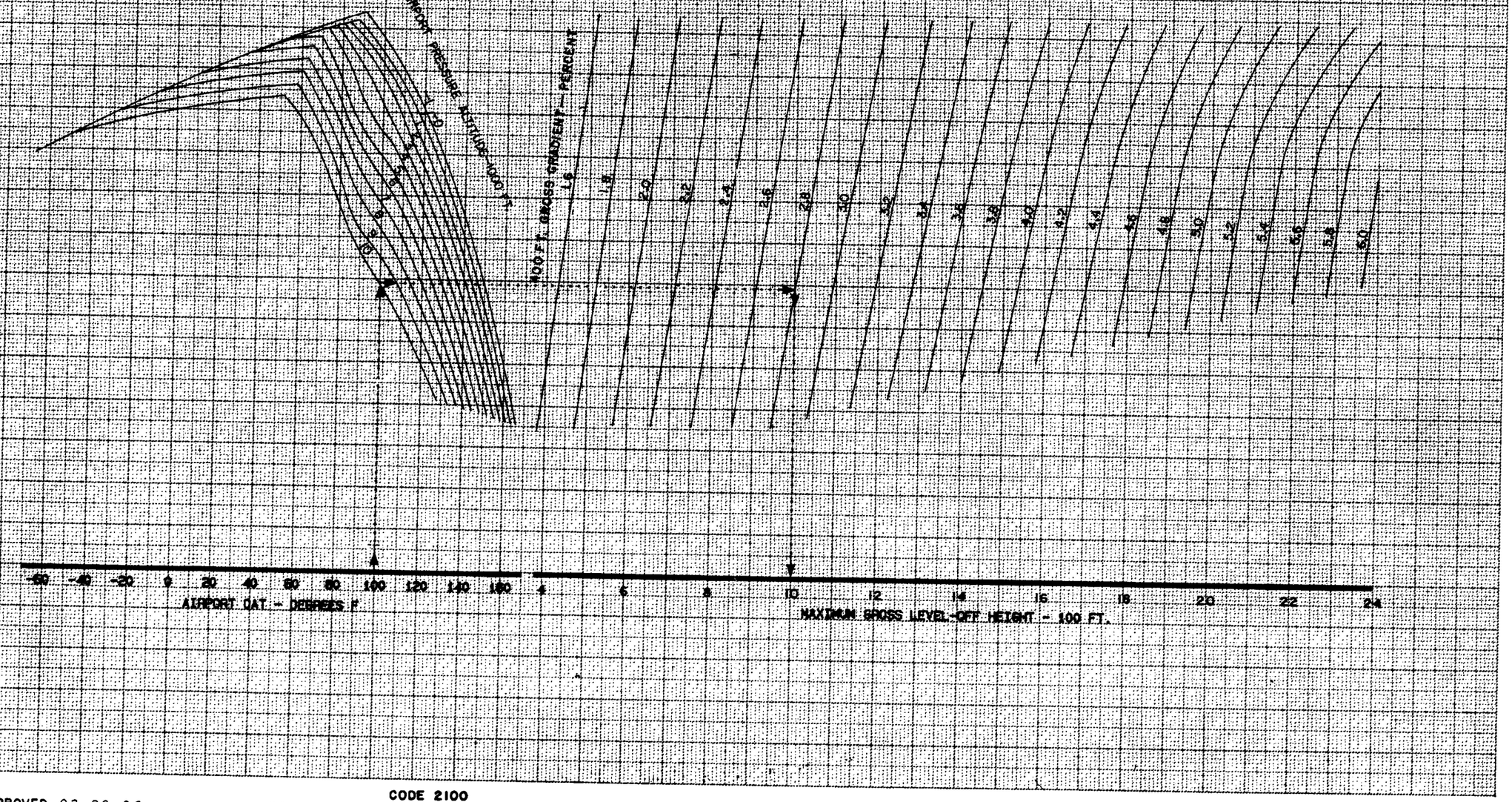
P.C. 5L000544
D631N013 PG. 4.9-39

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 15

1. USE 400 FT. ERORS GRADIENT UNCORRECTED FOR WIND OR LEVEL-OFF HEIGHT



APPROVED	DATE
MESCHARA	4/24/96
R.E. Bunting	4/24/96

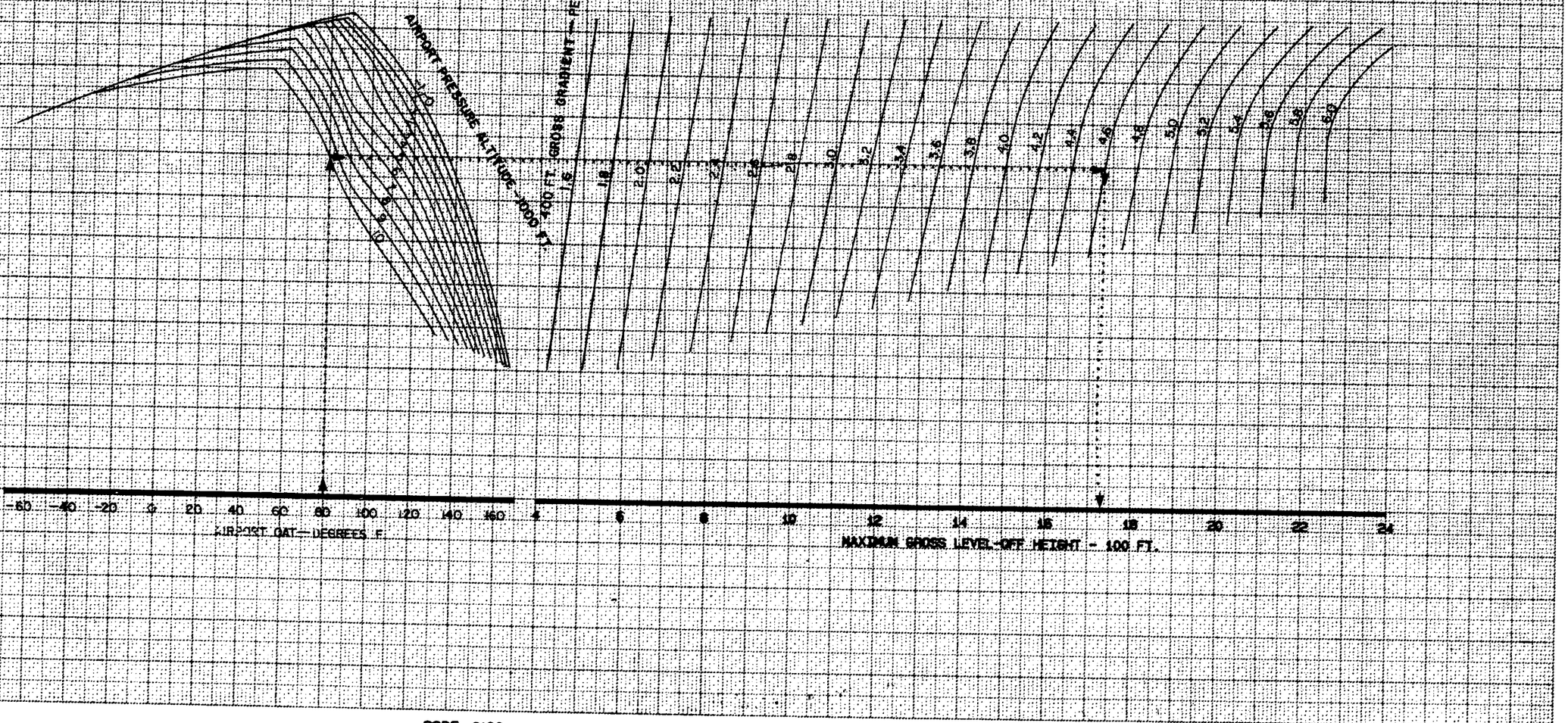
C.FRANK
757-200
PW 2037

PERFORMANCE

MAXIMUM LEVEL-OFF HEIGHT

FLAPS 20

■ USE 400 FT. GROSS GRADIENT UNCORRECTED FOR WIND OR LEVEL-OFF HEIGHT



P.C. BL000548
D631N013 PAGE 4.9-40

APPROVED	DATE
A.E. SCHAFF	17 Sep 84
	4/24/96

J.BASSETT
757 - 500
PW 2037

S11554

6E4208

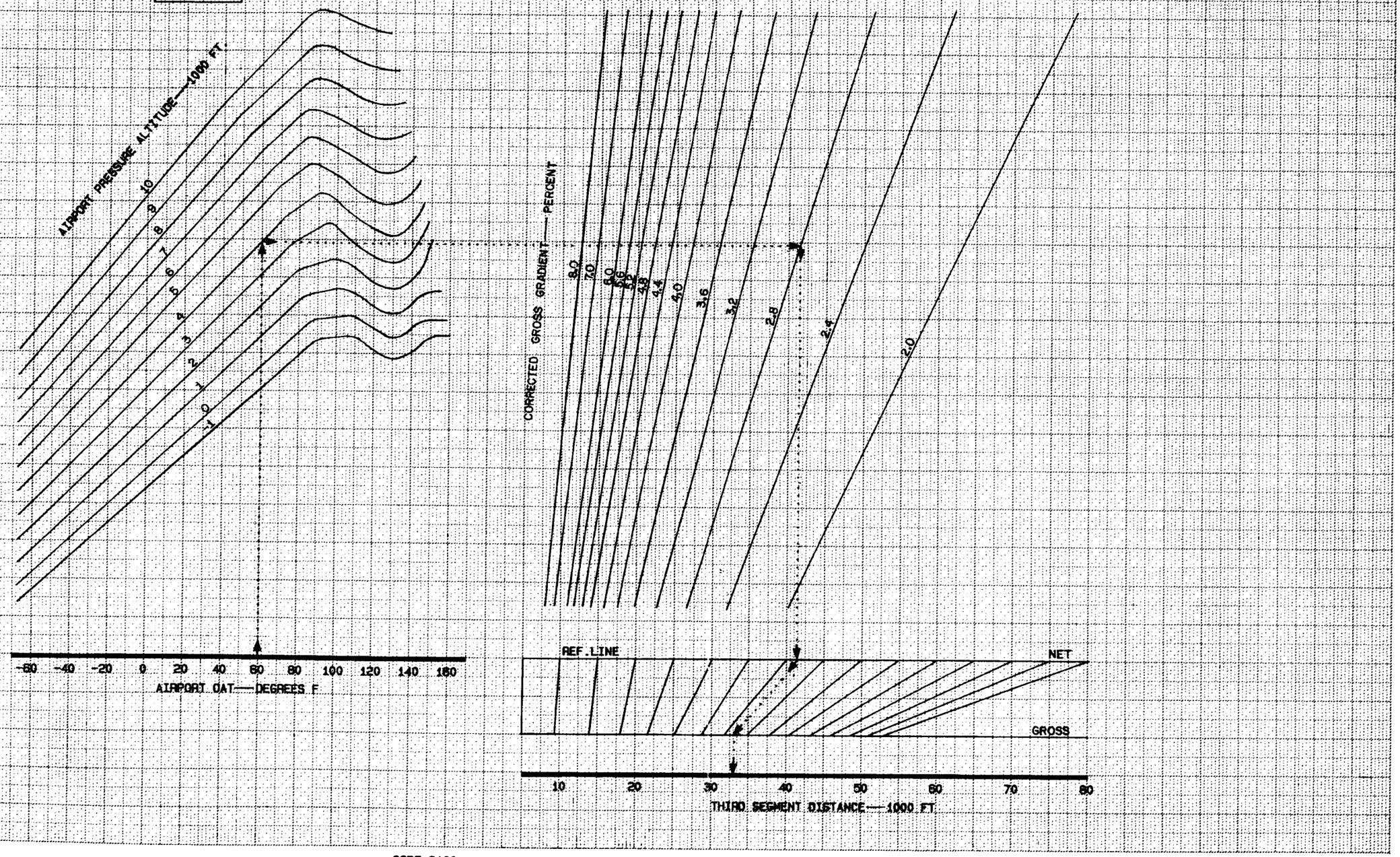
P.C. 5L000548
D831N013 PAGE 4.9-41

PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 1

● USE 400 FT GROSS GRADIENT CORRECTED FOR WIND AND LEVEL-OFF HEIGHT ABOVE 400 FT.



APPROVED	DATE
AE Staff	6 Sep 84

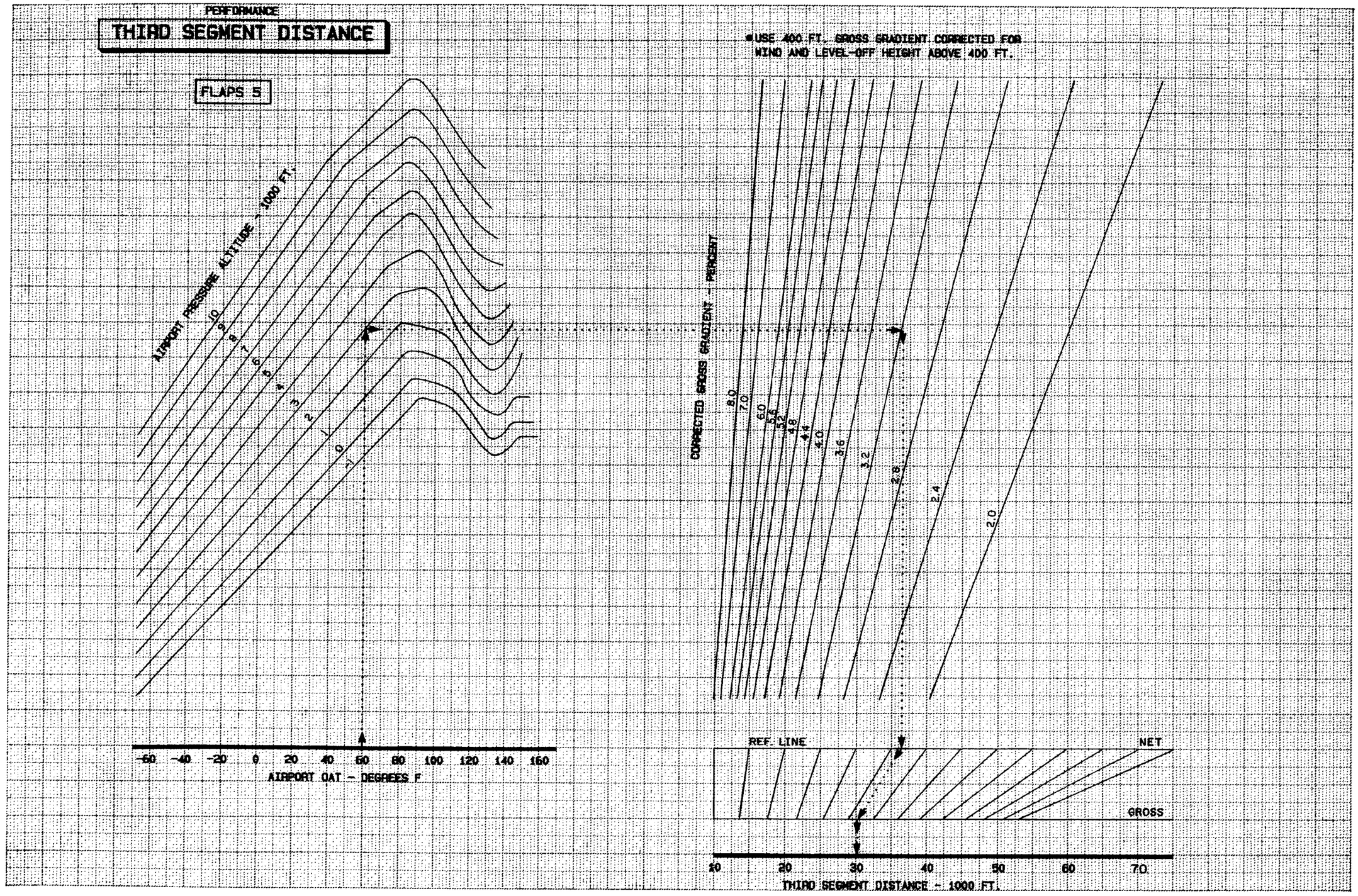
SWARD
757-200
PW 2037

P.C. 5L000550
D631N013 PG. 4.9-42

PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 5



APPROVED	DATE
AE SCHAEFER	7 SEP 84

O'LEARY
757 200
PW 2037

P.C. 6L000552
D631N013 PG. 4.9 - 43

APPROVED AE SCHAFF
DATE 6 Sep 84

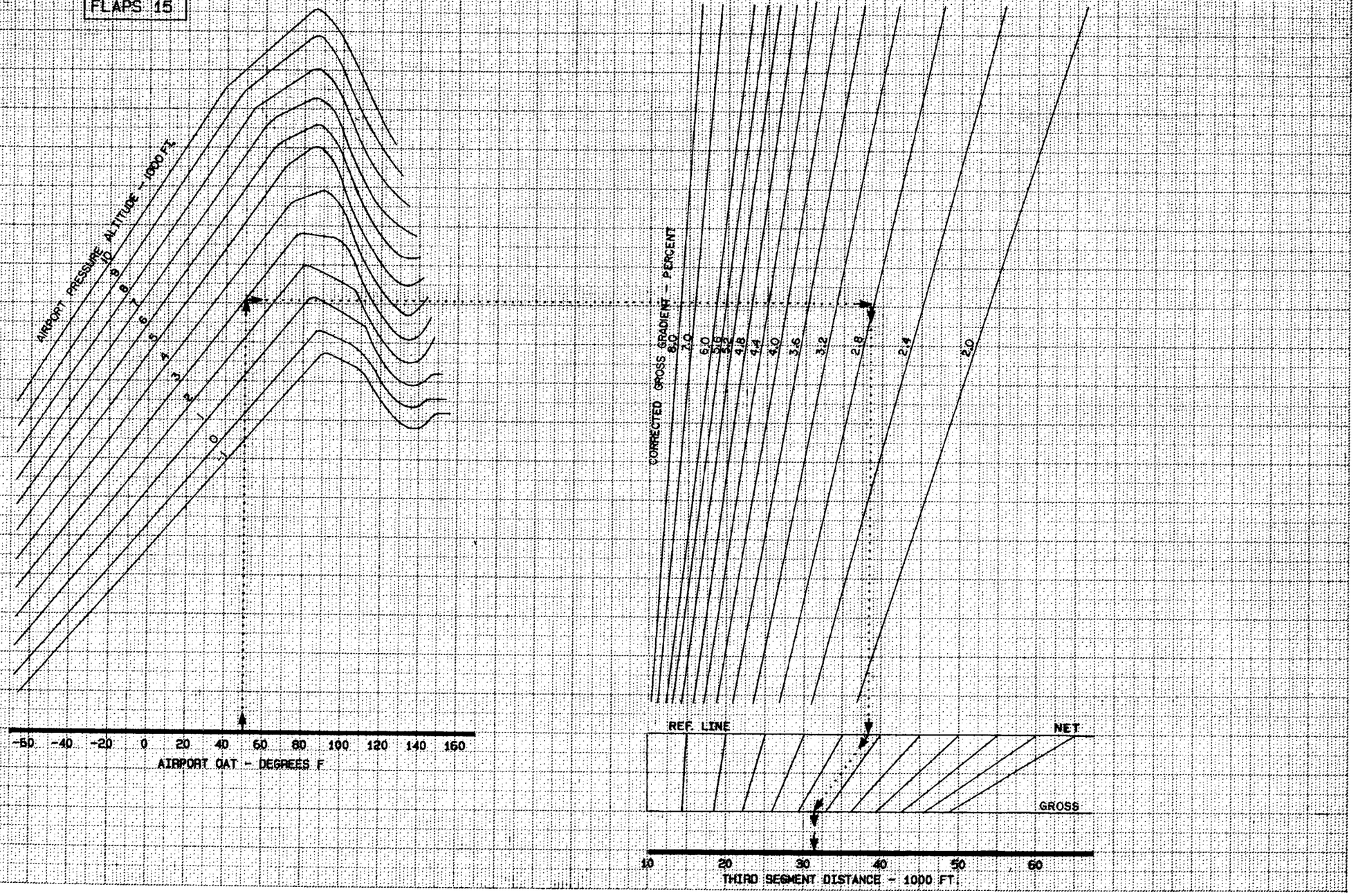
YARNES
757-200
PW 2037

PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 15

*USE 400 FT. GROSS GRADIENT CORRECTED FOR WIND AND LEVEL-OFF HEIGHT ABOVE 400 FT.

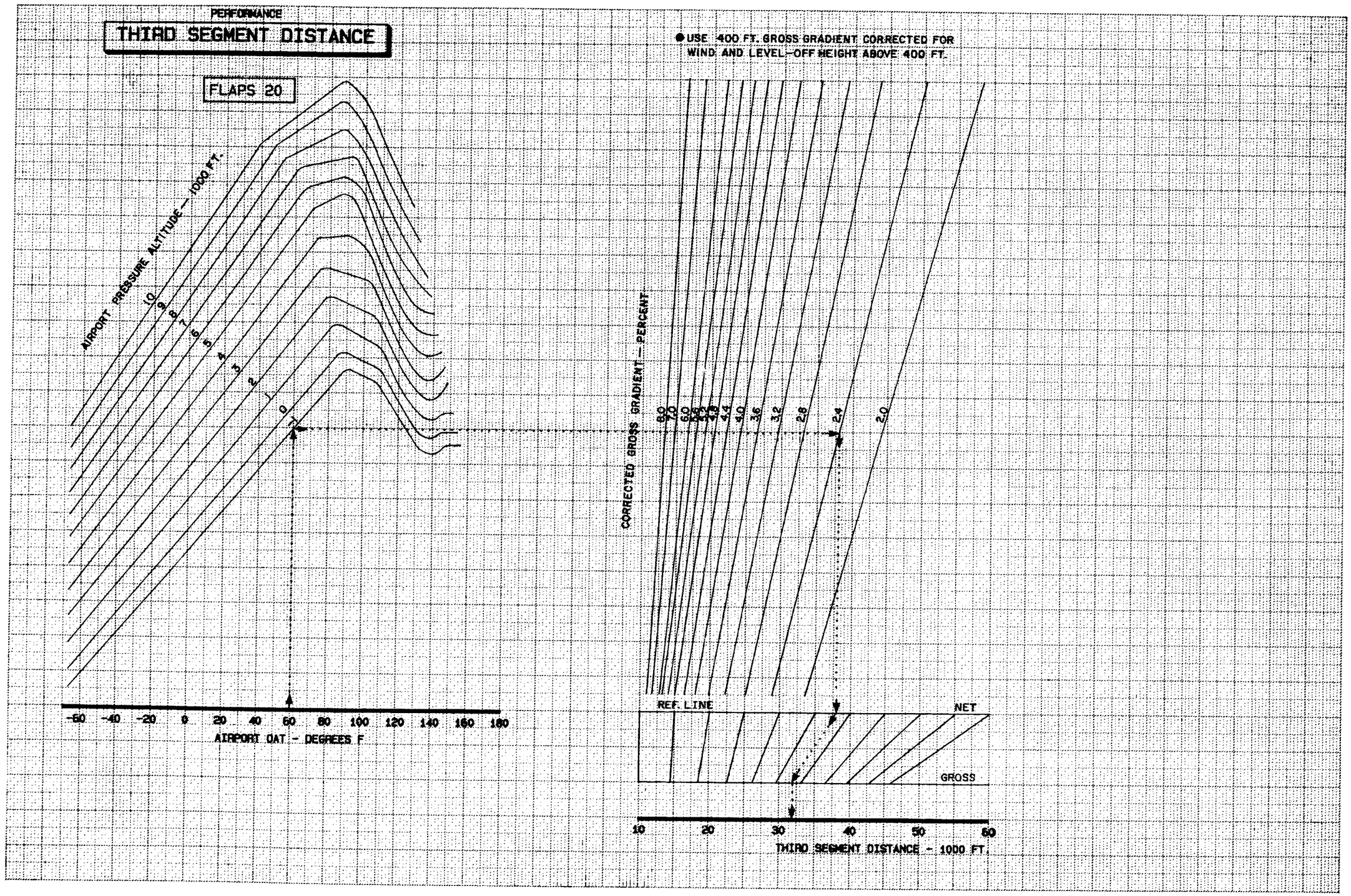


P.C. 5L000554
D631N013 PG.4.9-44

PERFORMANCE

THIRD SEGMENT DISTANCE

FLAPS 20



APPROVED	DATE
AE SCHAFF	6 Sep 84

C.FRANK
757-200
PW 2037

PERFORMANCE

FINAL TAKEOFF CLIMB

FLAPS UP

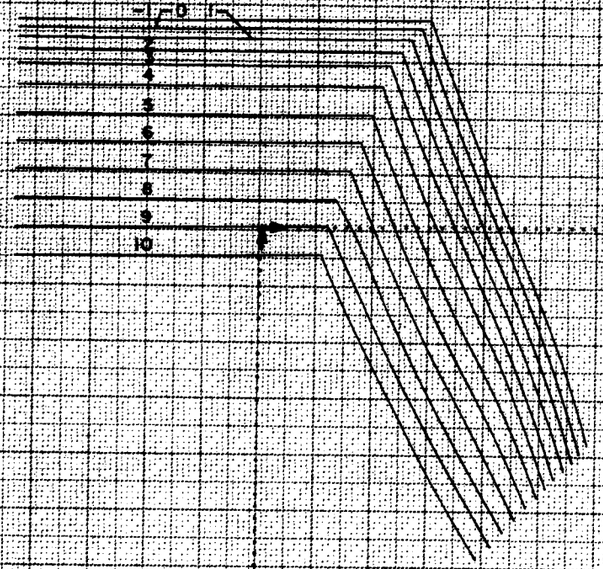
SPEED V_{REF}+80 KNOTS 145

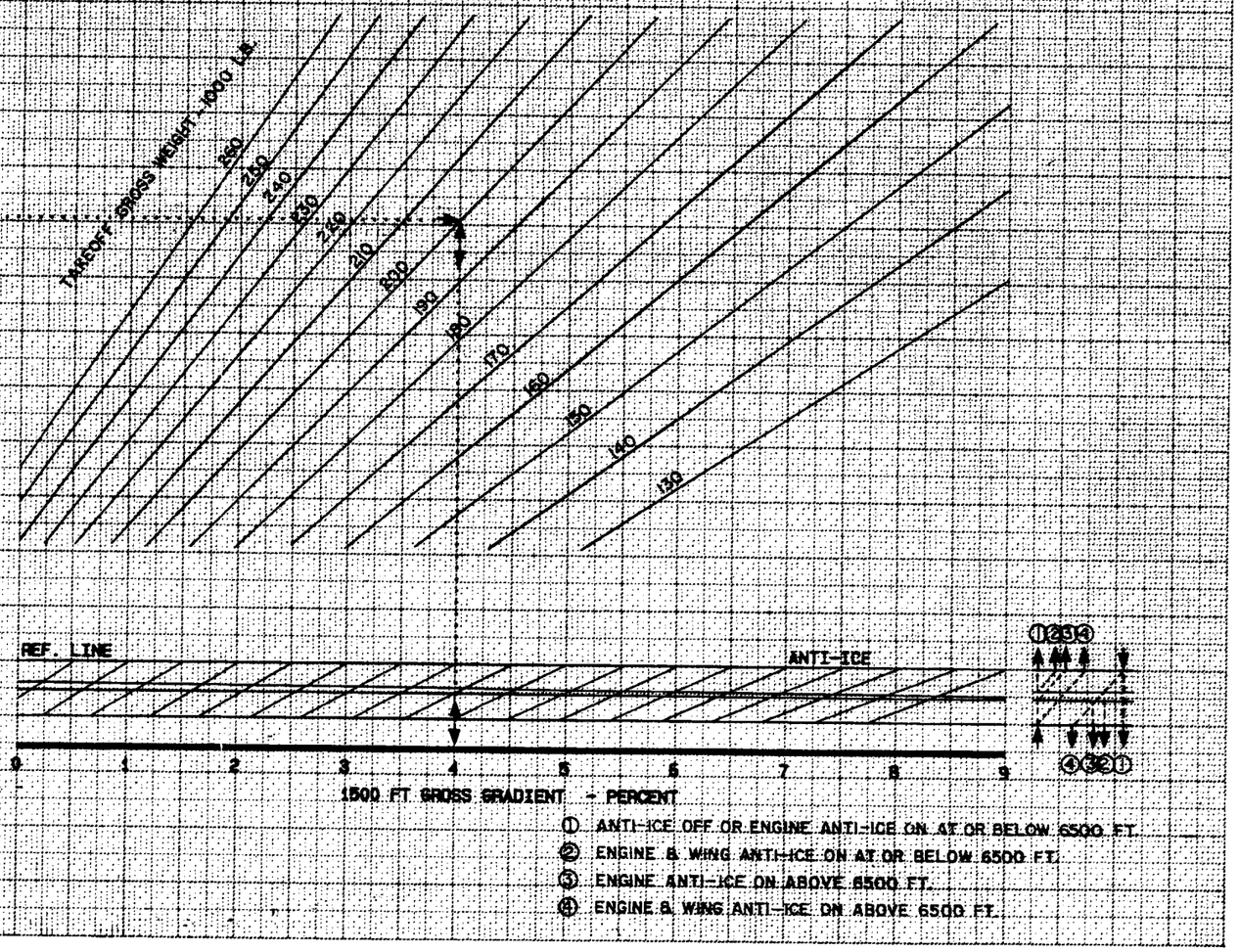
A/C PACKS ON

*APU OFF, FOR APU OPERATING, REDUCE GROSS GRADIENT .04 PERCENT.

*NET GRADIENT = GROSS GRADIENT – 0.8%

*USE 130,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.





P.C. 5L000556
D631N013 PG. 4.9 – 45

APPROVED	DATE
AE's Manager	10 Sept 96
S.R. Bowman	3/25/98
M.S. Bonner	7/3/95

O'LEARY
757-200
PW 2037

PERFORMANCE

FINAL TAKEOFF CLIMB

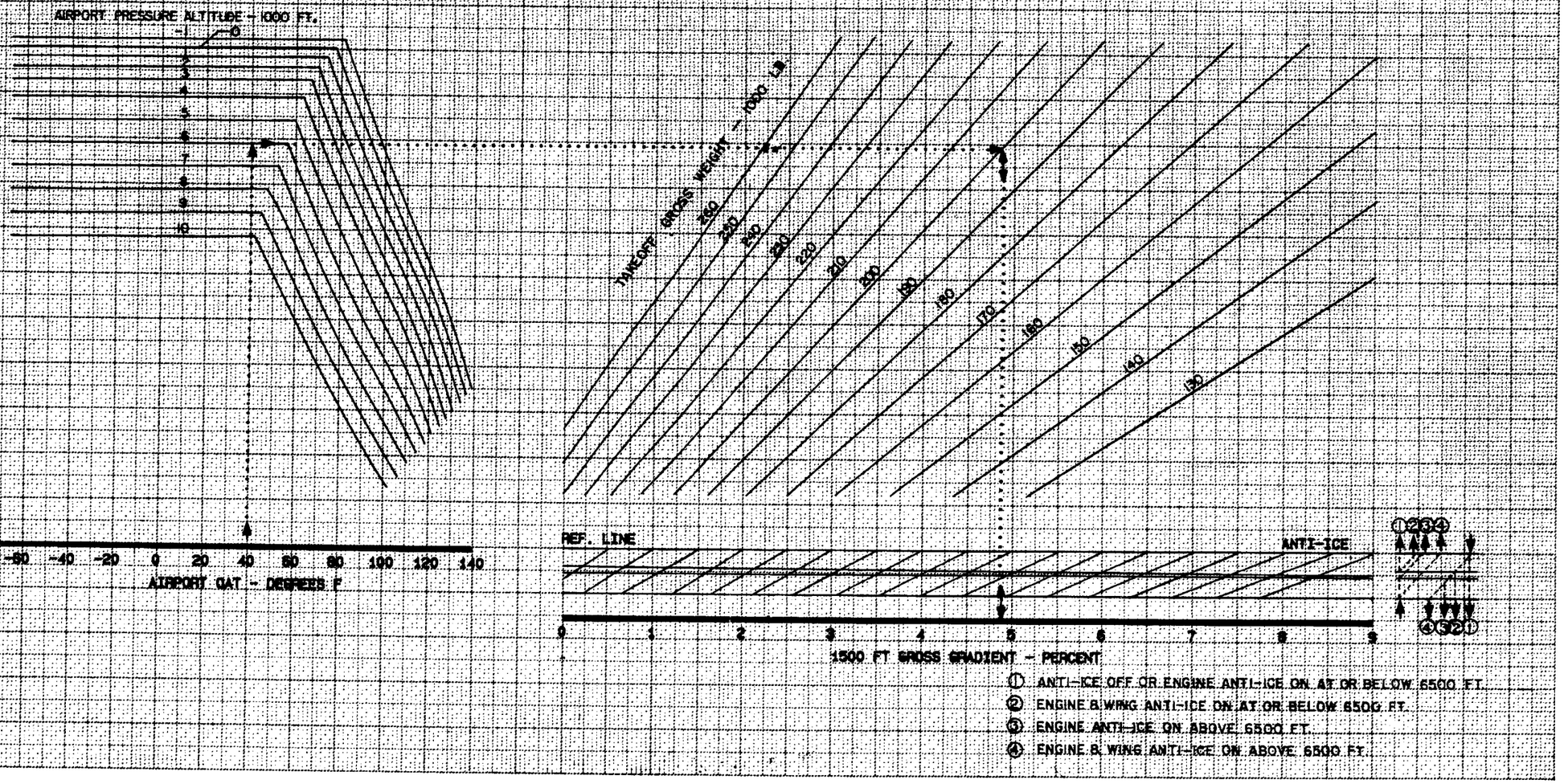
A/C PACKS OFF

FLAPS UP

SPEED V_{REF}+80 KNOTS TAS

- APU OFF, FOR APU OPERATING, REDUCE GROSS GRADIENT ON PERCENT.
- NET GRADIENT=GROSS GRADIENT−.8%

● USE 180,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.



① ANTI-ICE OFF OR ENGINE ANTI-ICE ON AT OR BELOW 6500 FT.
② ENGINE & WING ANTI-ICE ON AT OR BELOW 6500 FT.
③ ENGINE ANTI-ICE ON ABOVE 6500 FT.
④ ENGINE & WING ANTI-ICE ON ABOVE 6500 FT.

P.C.	5L000558
D631N013	PG 4.9-46

YARNES	APPROVED	DATE
757-200	[illegible] RMTG CHIEF ENGR	11 SEP 84
PW 2037	K.R. Swan	3/25/88
	D. Swan	7/5/95

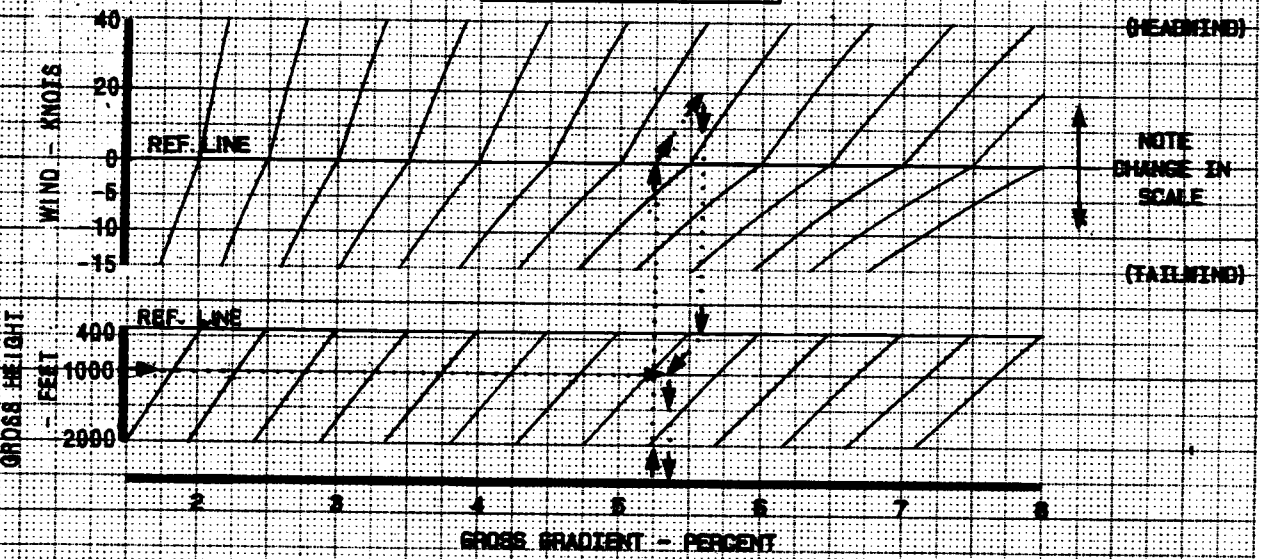
PERFORMANCE

GRADIENT CORRECTIONS

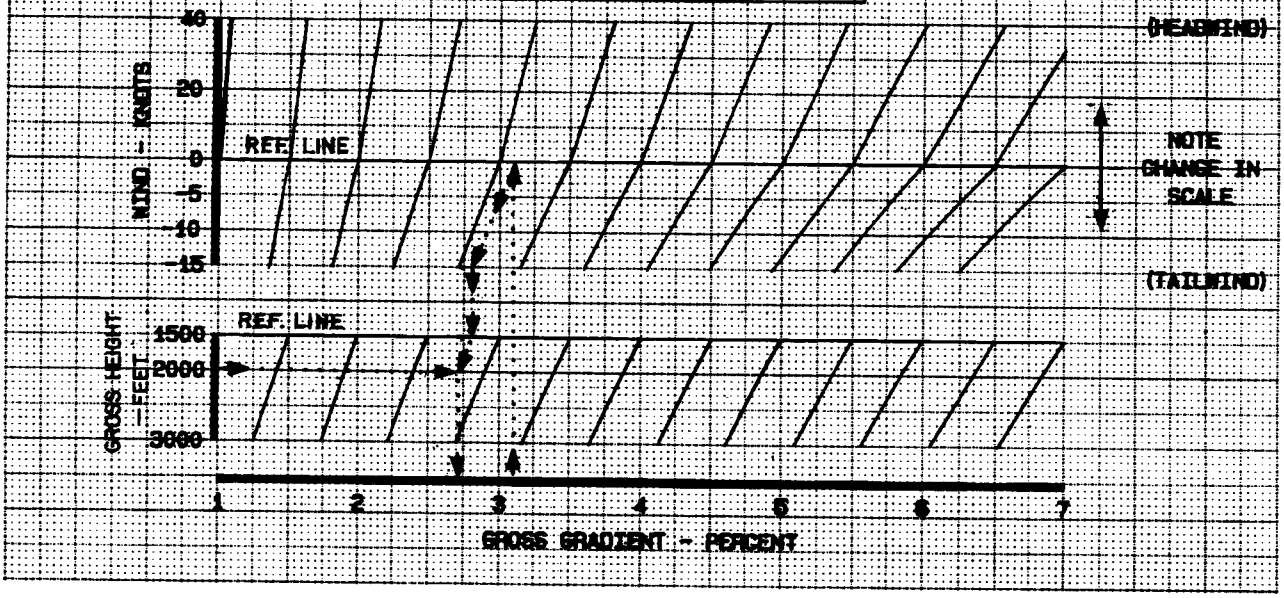
FLAPS UP, 1 & 5

GRADIENT DECREMENT (%) IN BANKED TURNS			
BANK ANGLE	FLAP POSITION		
DEGREES	UP	1	5
5	.03	.05	.06
10	.11	.20	.23
15	.27	.47	.53

TAKEOFF CLIMB



FINAL TAKEOFF CLIMB



P.C. 5S000138
D631N013 PG. 4.9 – 47

APPROVED	DATE
	9-15-94
	7/15/95

SAUNDERS
757-200
PW 2037

6E4207

S08101

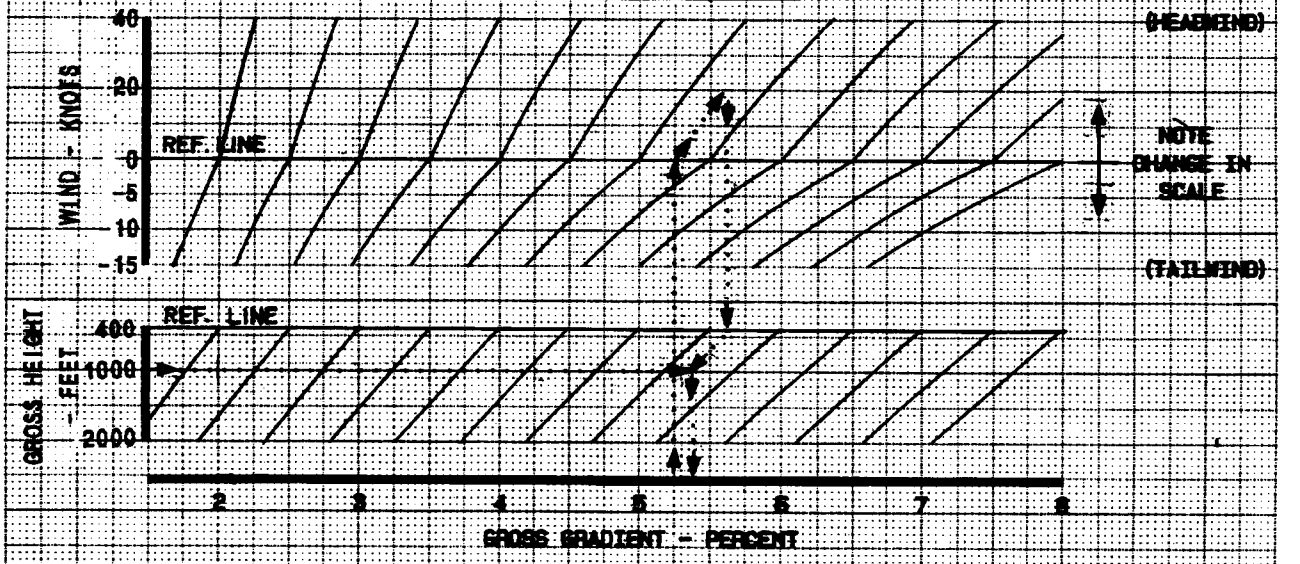
PERFORMANCE

GRADIENT CORRECTIONS

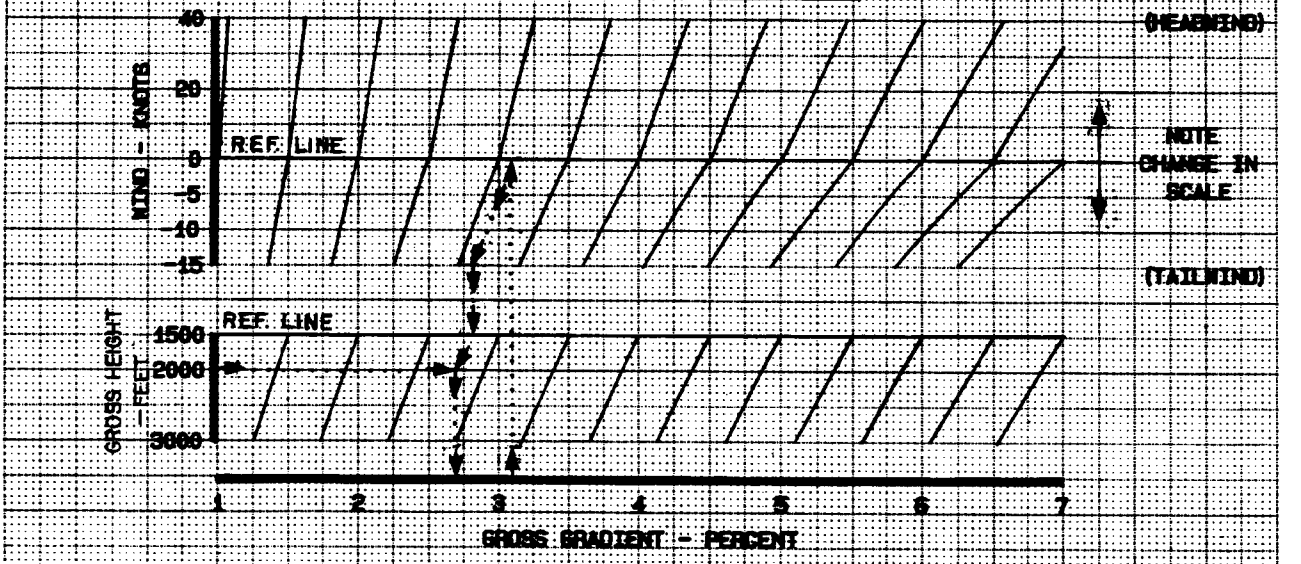
FLAPS UP, 15 & 20

GRADIENT DECREMENT (%) IN BANKED TURNS			
BANK ANGLE	FLAP POSITION		
DEGREES	UP	15	20
5	.03	.06	.06
10	.11	.25	.26
15	.27	.58	.61

TAKEOFF CLIMB



FINAL TAKEOFF CLIMB



P.C. 5S000140
D631N013 PG. 4.9 - 48

	APPROVED	DATE
		2.15.84
		7/5/85

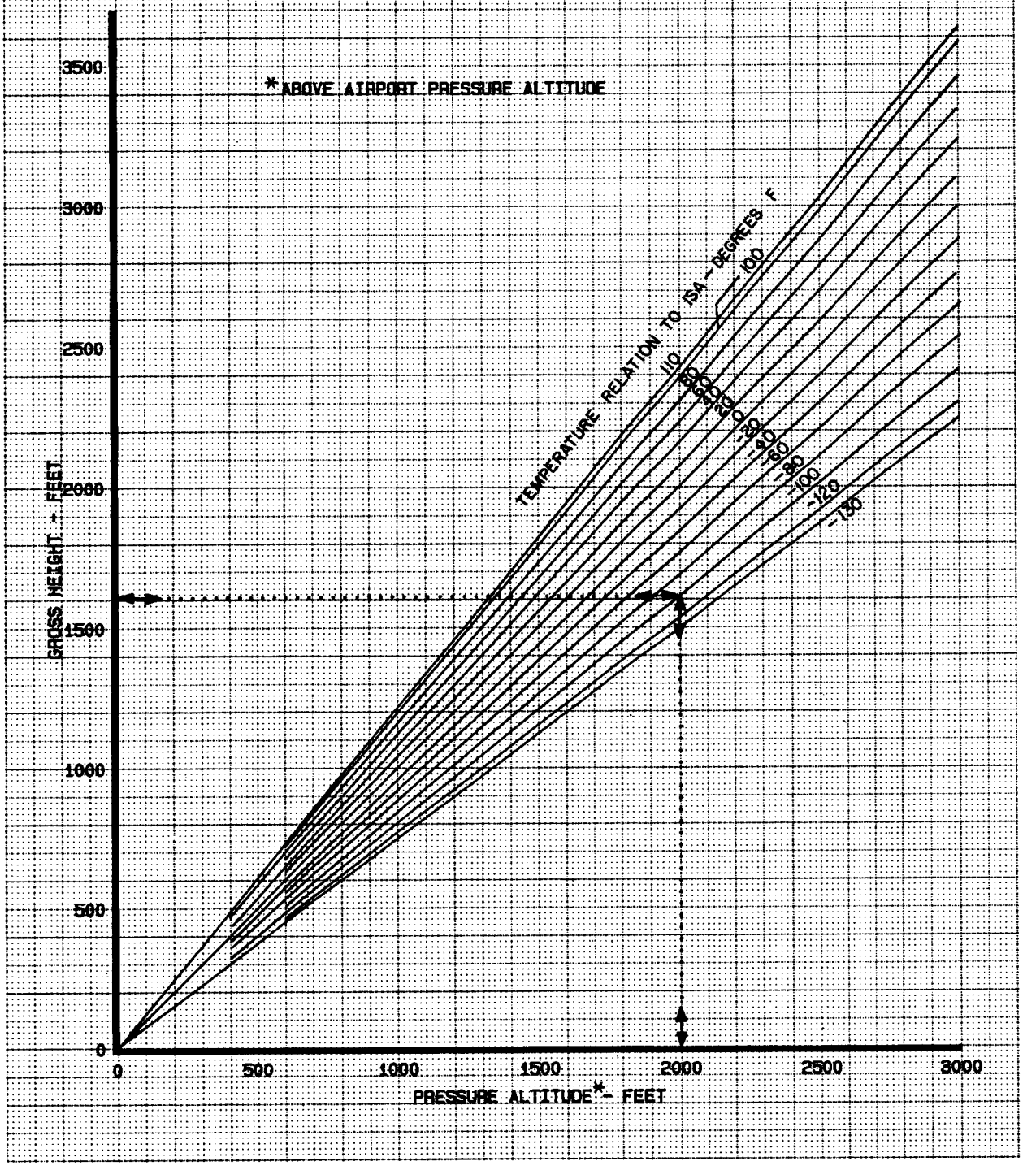
SAUNDERS
757-200
PW 2037

66207

S08102

PERFORMANCE

GROSS HEIGHT - PRESSURE ALTITUDE CONVERSION



P.C. 5S000141
D631N003 PG. 4.9 - 46

APPROVED	DATE
W PAUL NM 12	8/10/84

YARNES
757-200

E64207

R17819

IMPROVED CLIMB PERFORMANCE

CORRECTED RUNWAY LENGTH REQUIRED WITH IMPROVED CLIMB PERFORMANCE PROCEDURE (Continued)

2. Enter the appropriate Field Length Limits chart in Section 4.4 with the equivalent zero speed increase takeoff weight, Step 1, and airport temperature/altitude. Read corrected runway length required.

R17398

P.C. 5L000560
D631N013 PG 4.10-6

APPROVED | DATE
M. LECHNAR ASE 358 | 23 Aug 84
C.SANDERS | 757-200 | PW 2037

PERFORMANCE

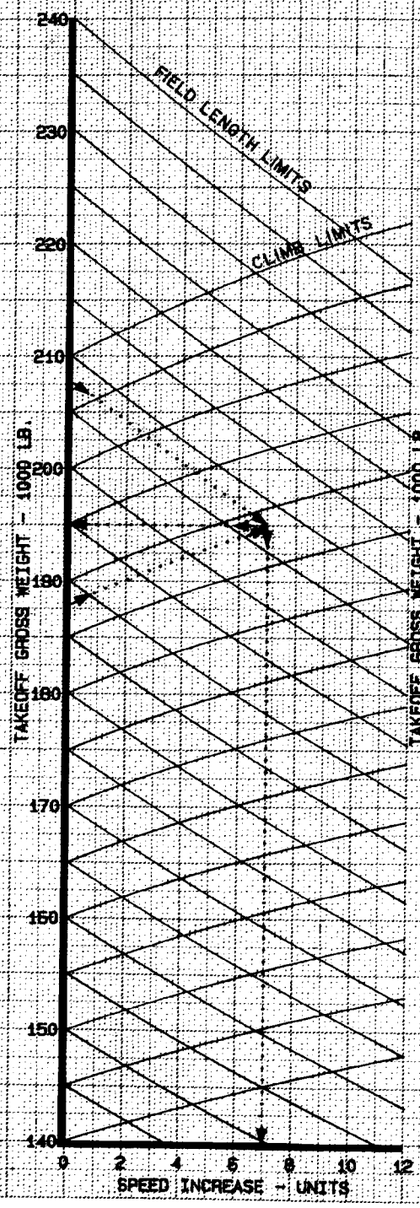
IMPROVED CLIMB PERFORMANCE

FLAPS 5, 15 & 20

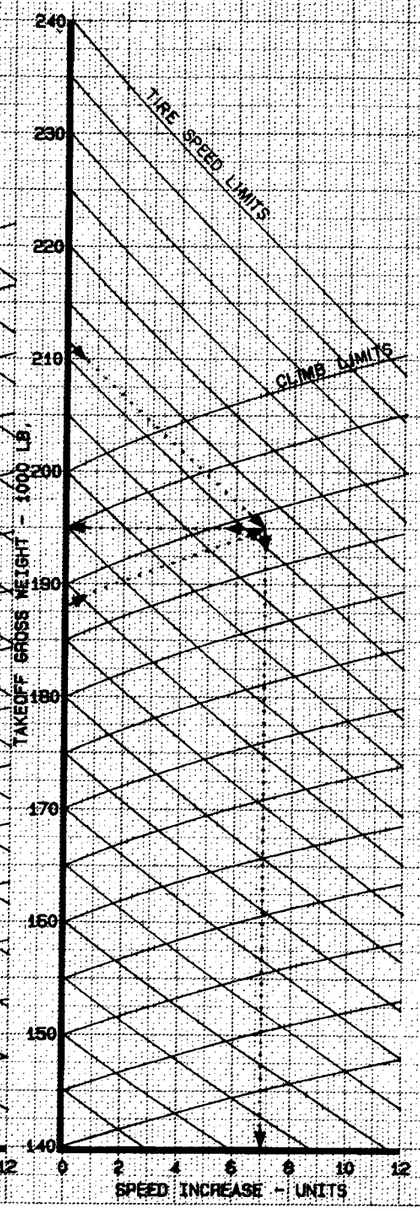
● SPEED INCREASE FOR FLAPS 1 IS NOT ALLOWED.

TAKEOFF WEIGHT LIMITS

FIELD LENGTH/CLIMB LIMITS

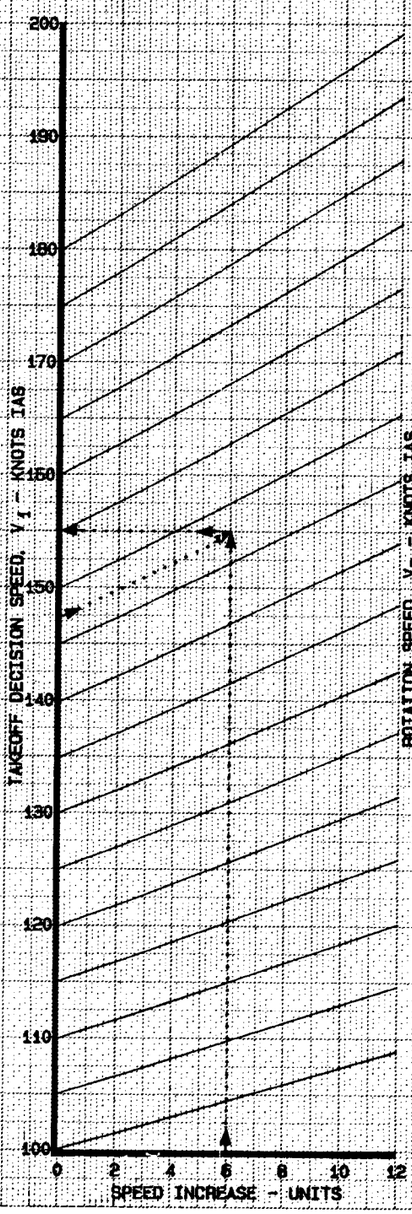


TIRE/CLIMB LIMITS

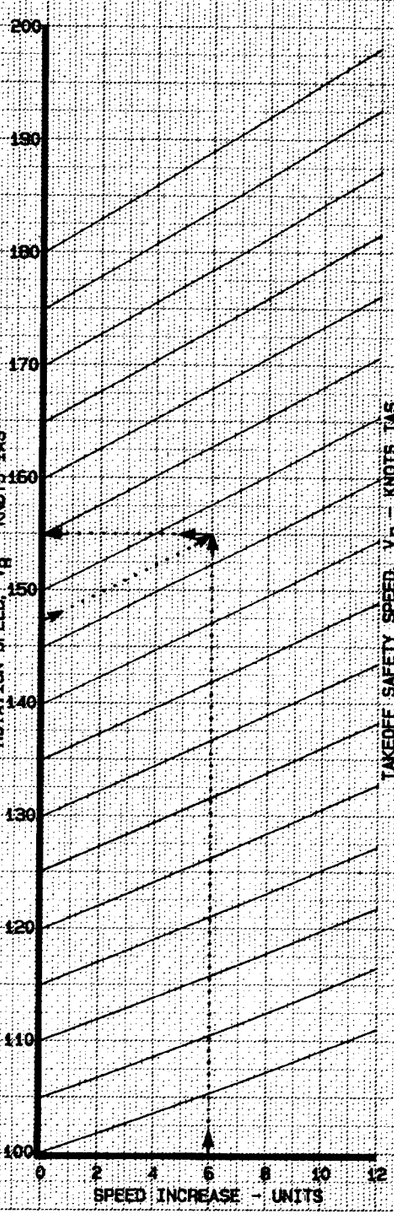


TAKEOFF SPEEDS

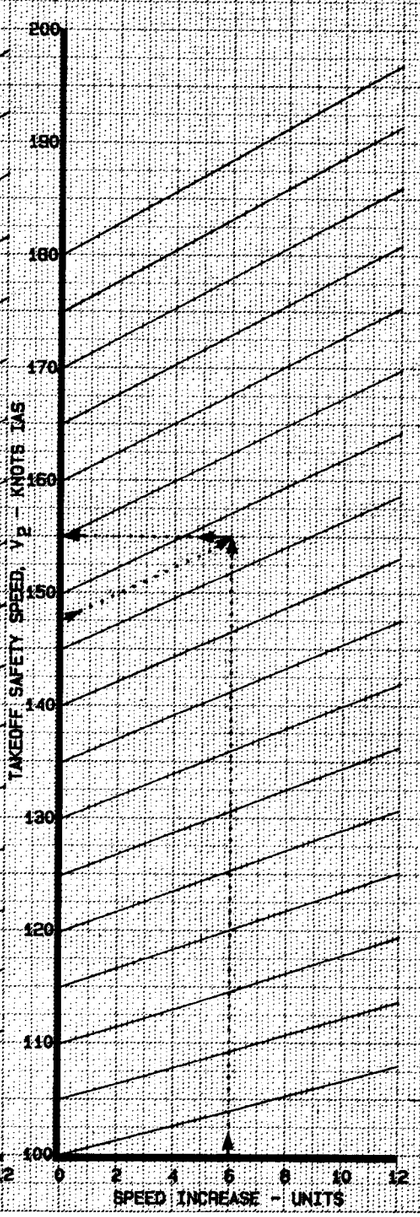
V_1



V_R



V_2



PERFORMANCE

IMPROVED CLIMB PERFORMANCE

FLAPS 5, 15 & 20

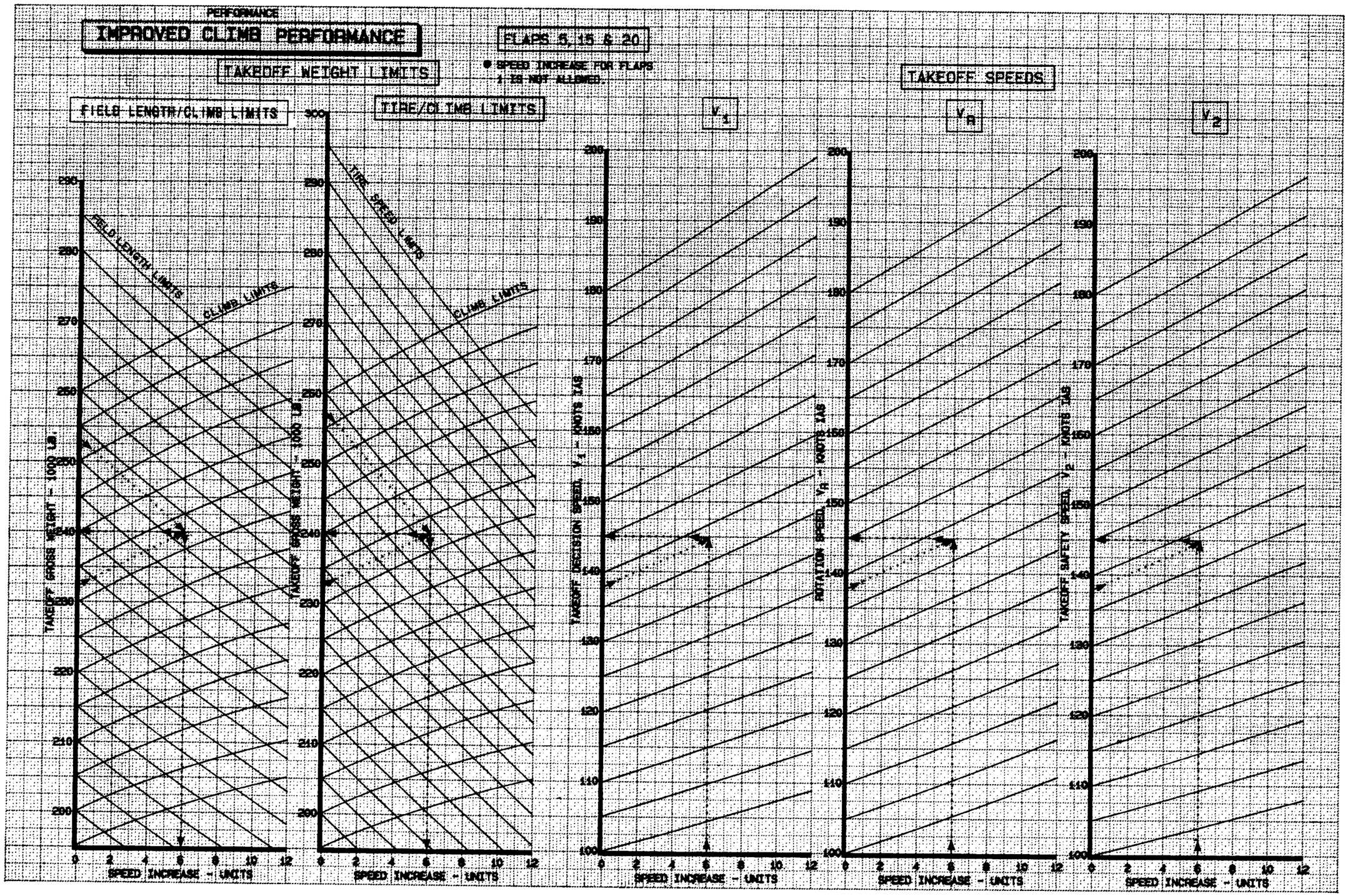
● SPEED INCREASE FOR FLAPS 1 IS NOT ALLOWED.

TAKEOFF WEIGHT LIMITS

FIELD LENGTH/CLIMB LIMITS

TIRE/CLIMB LIMITS

TAKEOFF SPEEDS



P.C. 5L000562
D631N013 PG 4.10-6

APPROVED	DATE
M. LECHNAR for J. Swan	23 Aug 04
J. Swan	7/5/95

C.SANDERS
757-200
PW 2037

PERFORMANCE

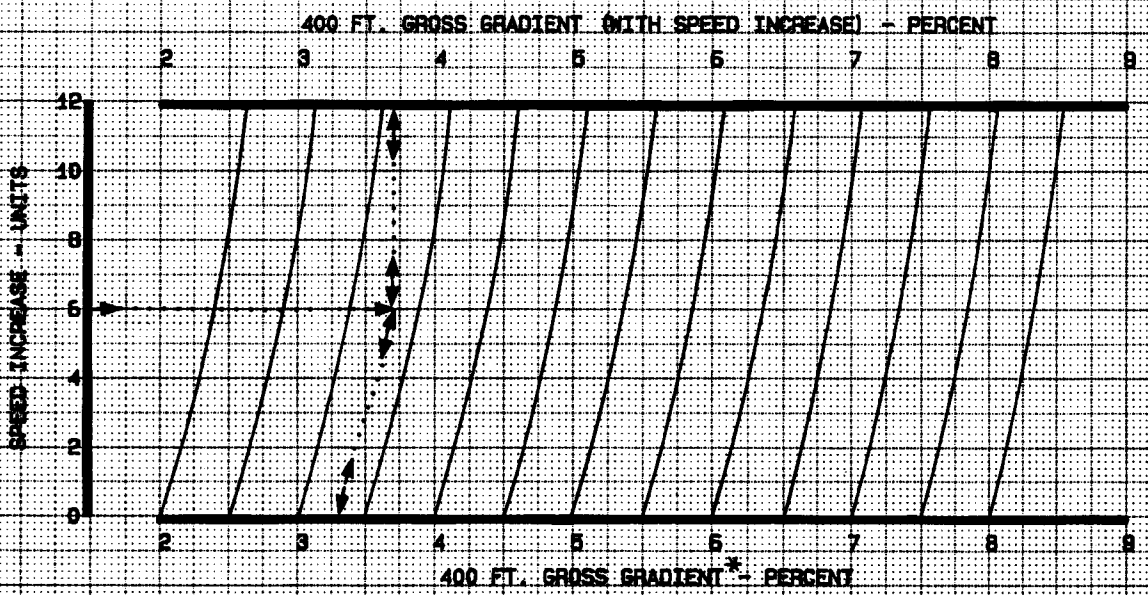
TAKEOFF CLIMB

IMPROVED CLIMB PERFORMANCE

* 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.

● SPEED INCREASE FOR FLAPS 1 IS NOT ALLOWED.

FLAPS 5, 15 & 20



P.C. 5S000143
D631N013 PAGE 4.10-8

APPROVED	DATE
H Anderson NTB	8/20/84	

C.FRANK
757-200
PW 2037

664207

R17823

SECTION 4.11 - ENROUTE CLIMB

C O N T E N T S

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ENROUTE CLIMB WEIGHTS FOR POSITIVE NET GRADIENTS 1 ENGINE INOPERATIVE	3
ENROUTE CLIMB, 1 ENGINE INOPERATIVE ISA + 10 DEG C AND BELOW	4
ISA + 15 DEG C	5
ISA + 20 DEG C	6
ENROUTE CLIMB SPEEDS, 1 ENGINE INOPERATIVE	7

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

R17399

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 anti-ice corrections shown on the enroute charts are based on temperatures of +10°C TAT and below.

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.

P.C. 5L000564
D631N013 P6. 4.11-3

PERFORMANCE

ENROUTE CLIMB WEIGHTS

FOR POSITIVE NET GRADIENTS

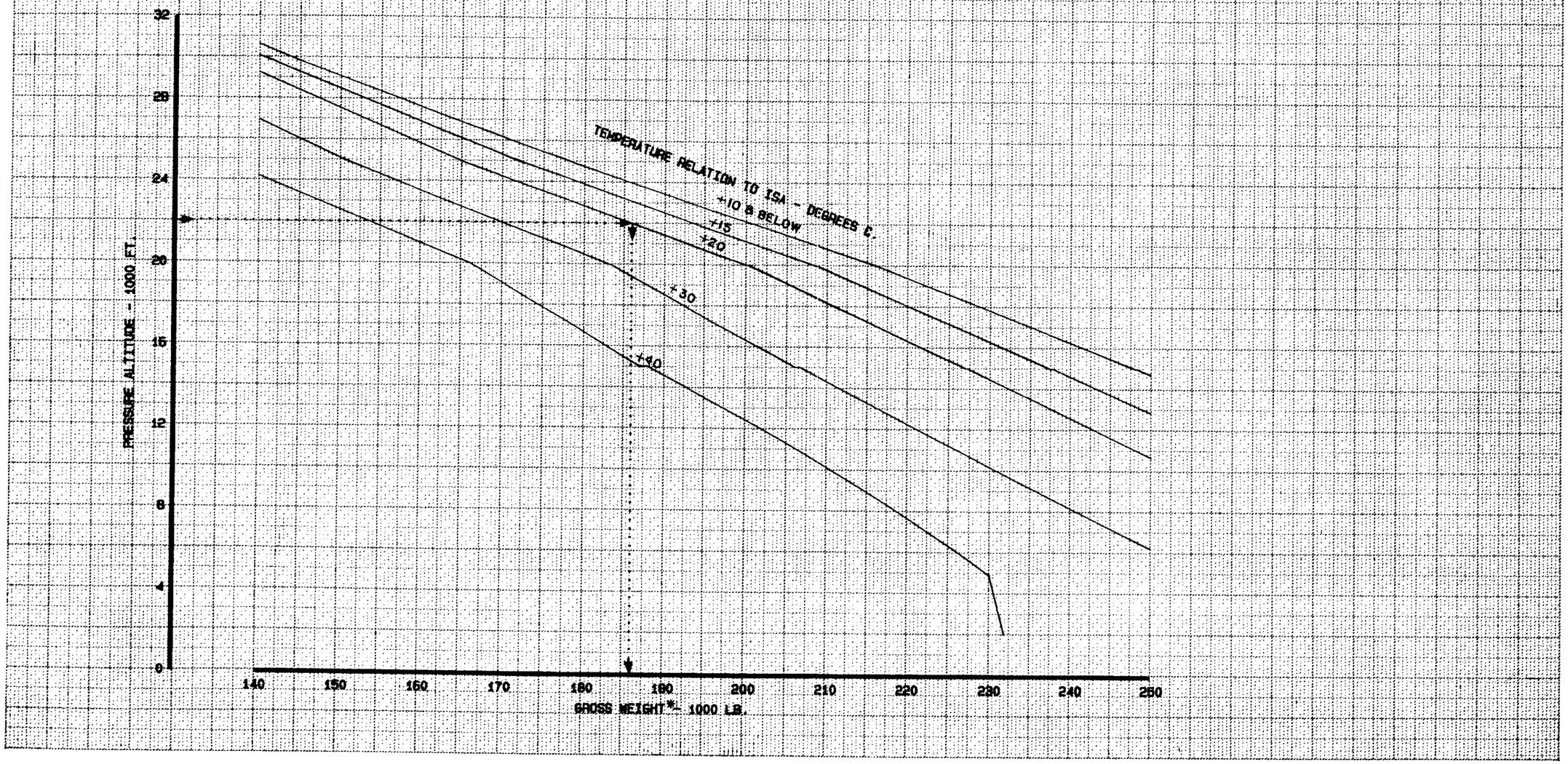
1 ENGINE INOPERATIVE

*APPLY THE FOLLOWING ADJUSTMENTS TO THIS GROSS WEIGHT FOR ALTERNATE BLEED CONFIGURATIONS.

ANTI-ICE BLEED CONFIGURATION	A/C PACKS	WEIGHT ADJUSTMENT-LB.
ANTI-ICE OFF	OFF AT 18,000 FEET AND BELOW	+3,800
	OFF ABOVE 18,000 FEET	0
	ON	0
ENGINE ANTI-ICE ON	OFF	-6,000
	ON	-12,000
ENGINE AND WING ANTI-ICE ON	OFF	-26,500
	ON	-31,500

*APU OFF. FOR APU OPERATING REDUCE GROSS WEIGHT BY 1500 LB.

*FOR ENROUTE CLIMB SPEED SCHEDULE SEE ENROUTE CLIMB SPEEDS CHART.



APPROVED	DATE
NP.206 W.ROBERTS	9-20-84

O'LEARY
757-200
PW 2037

P.C. 55000144
D631N013 PG 4.11-4

APPROVED Jun-Sig. DATE 1/8/84

C. FRANK
757-200
PW 2037

PERFORMANCE

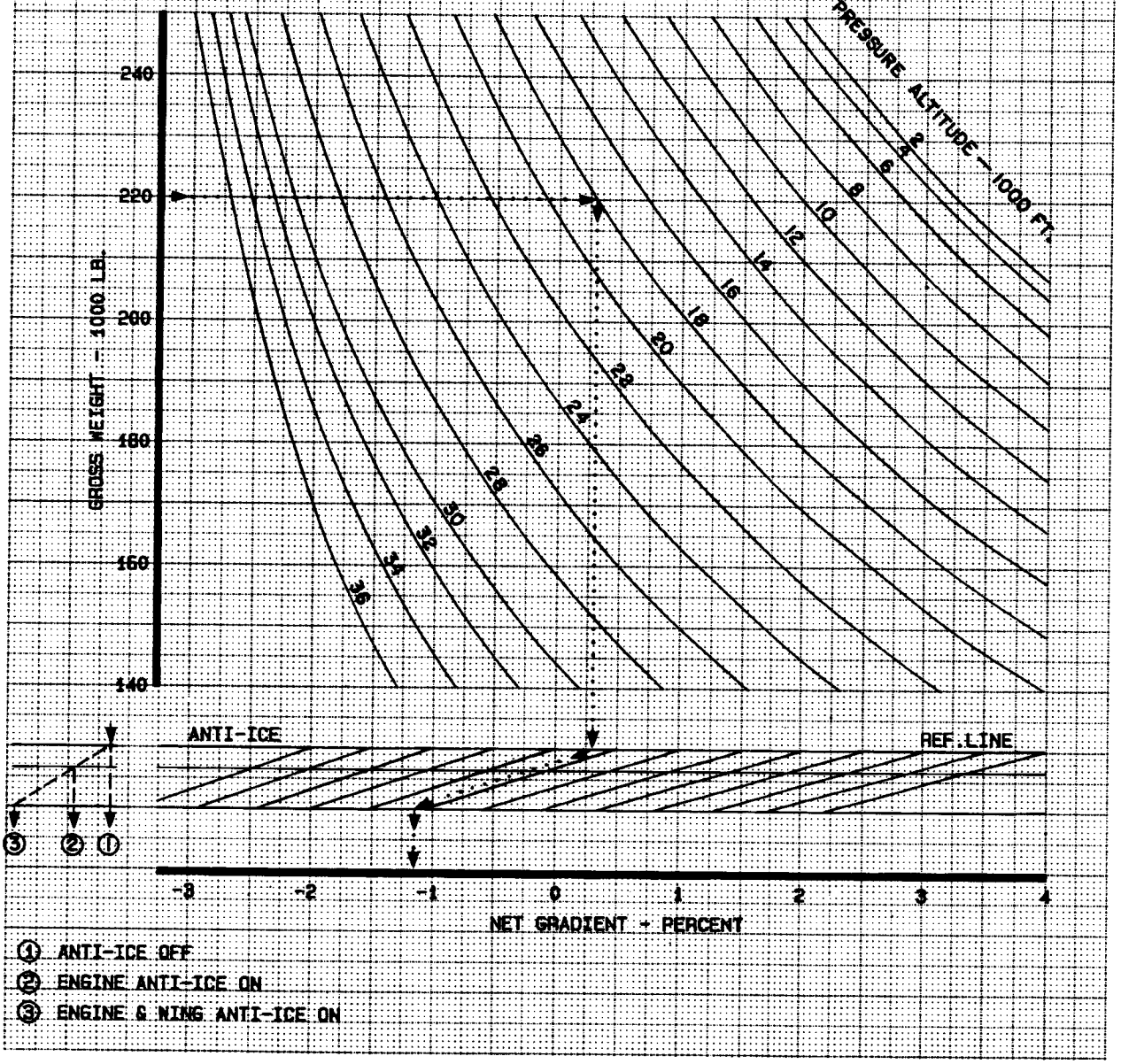
ENROUTE CLIMB

1 ENGINE INOPERATIVE

ISA+10°C & BELOW

A/C PACKS ON

- FOR A/C PACKS OFF, AT 18000 FT ALTITUDE AND BELOW, INCREASE GRADIENT BY .09 PERCENT.
- APU OFF, FOR APU OPERATING REDUCE GRADIENT BY .04 PERCENT.
- FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEEDS CHART.



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

66420?

R17825

P.C. 59000148 | D631N013 | PG. 4.11-5

FRANK | 757-200 | PW 2037

APPROVED	DATE
AEScHAFF NMZIG	10Sep84

PERFORMANCE

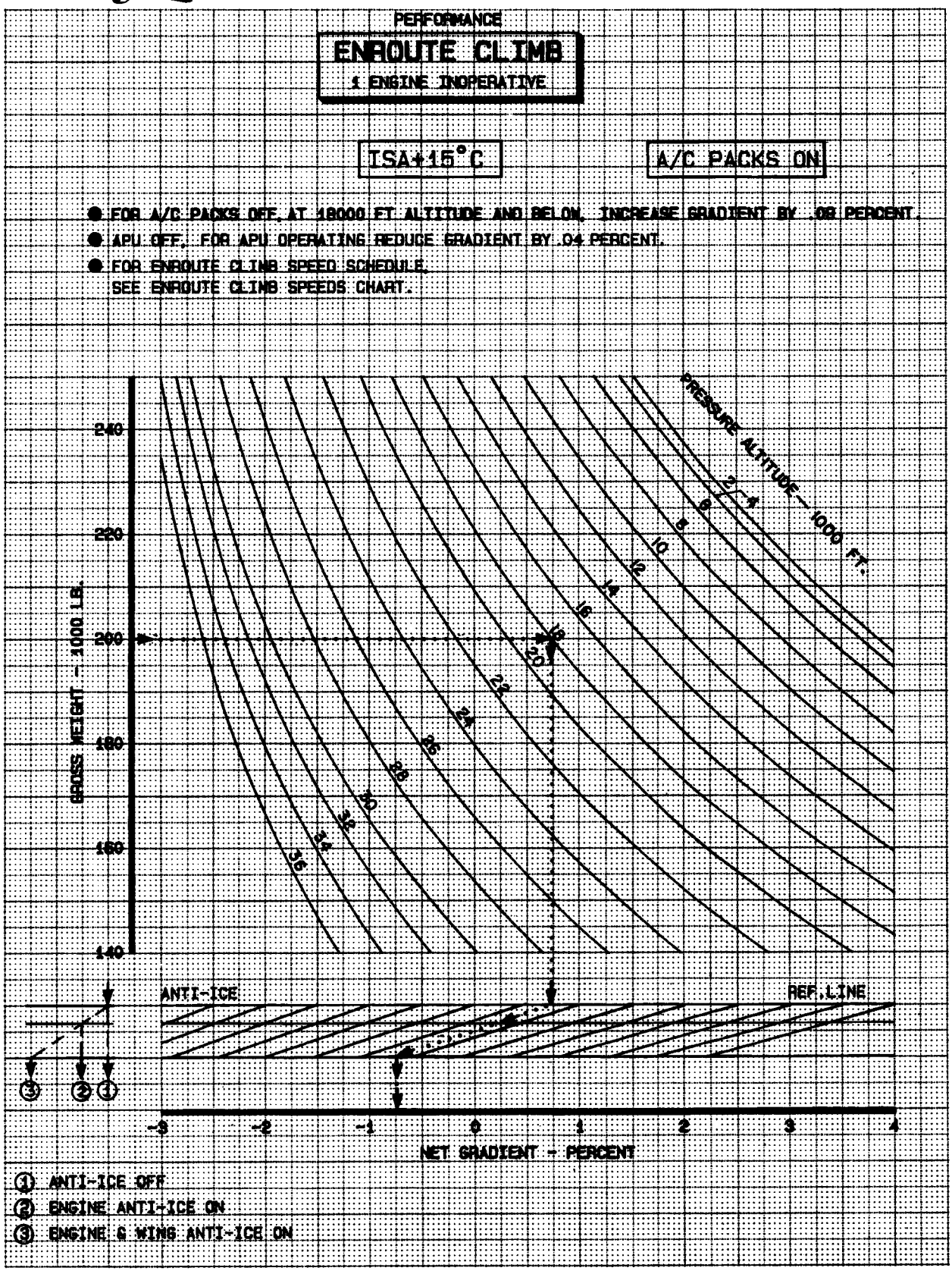
ENROUTE CLIMB

1 ENGINE INOPERATIVE

ISA+15°C

A/C PACKS ON

- FOR A/C PACKS OFF, AT 18000 FT ALTITUDE AND BELOW, INCREASE GRADIENT BY .08 PERCENT.
- APU OFF. FOR APU OPERATING REDUCE GRADIENT BY .04 PERCENT.
- FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEEDS CHART.



6E4207

R19012

P.C. 5S000148
D631N013 PAGE 4.11-6

APPROVED AES NMM 21C FAA
DATE 10 Sep 84

SAUNDERS
757-200
PW 2037

PERFORMANCE

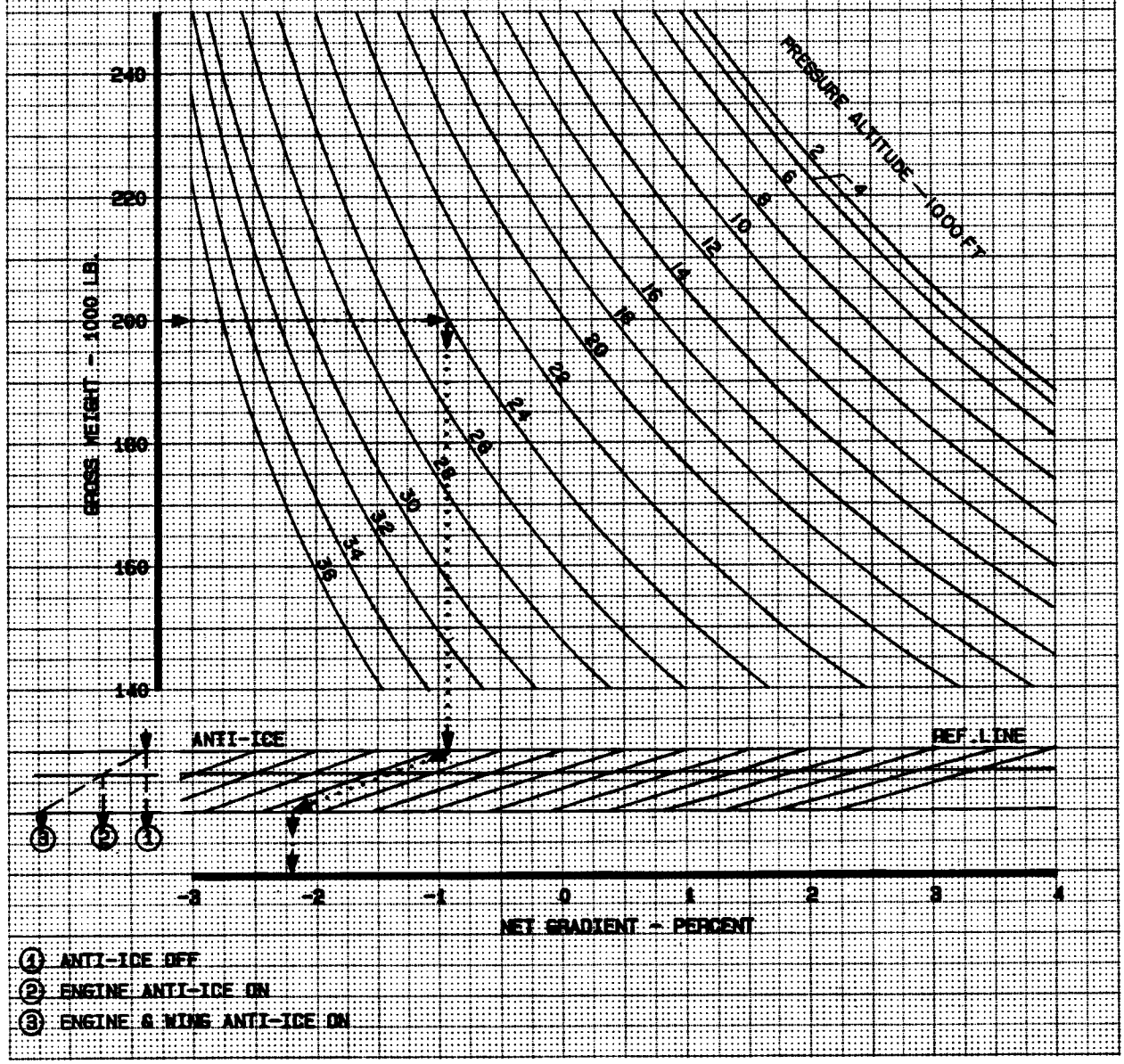
ENROUTE CLIMB

1 ENGINE INOPERATIVE

ISA + 20°C.

A/C PACKS ON

- FOR A/C PACKS OFF AT 18000 FT ALTITUDE AND BELOW, INCREASE GRADIENT BY .08 PERCENT.
- APU OFF, FOR APU OPERATING REDUCE GRADIENT BY .04 PERCENT.
- FOR ENROUTE CLIMB SPEED SCHEDULE, SEE ENROUTE CLIMB SPEEDS CHART.



(1) ANTI-ICE OFF
(2) ENGINE ANTI-ICE ON
(3) ENGINE & WING ANTI-ICE ON

664207

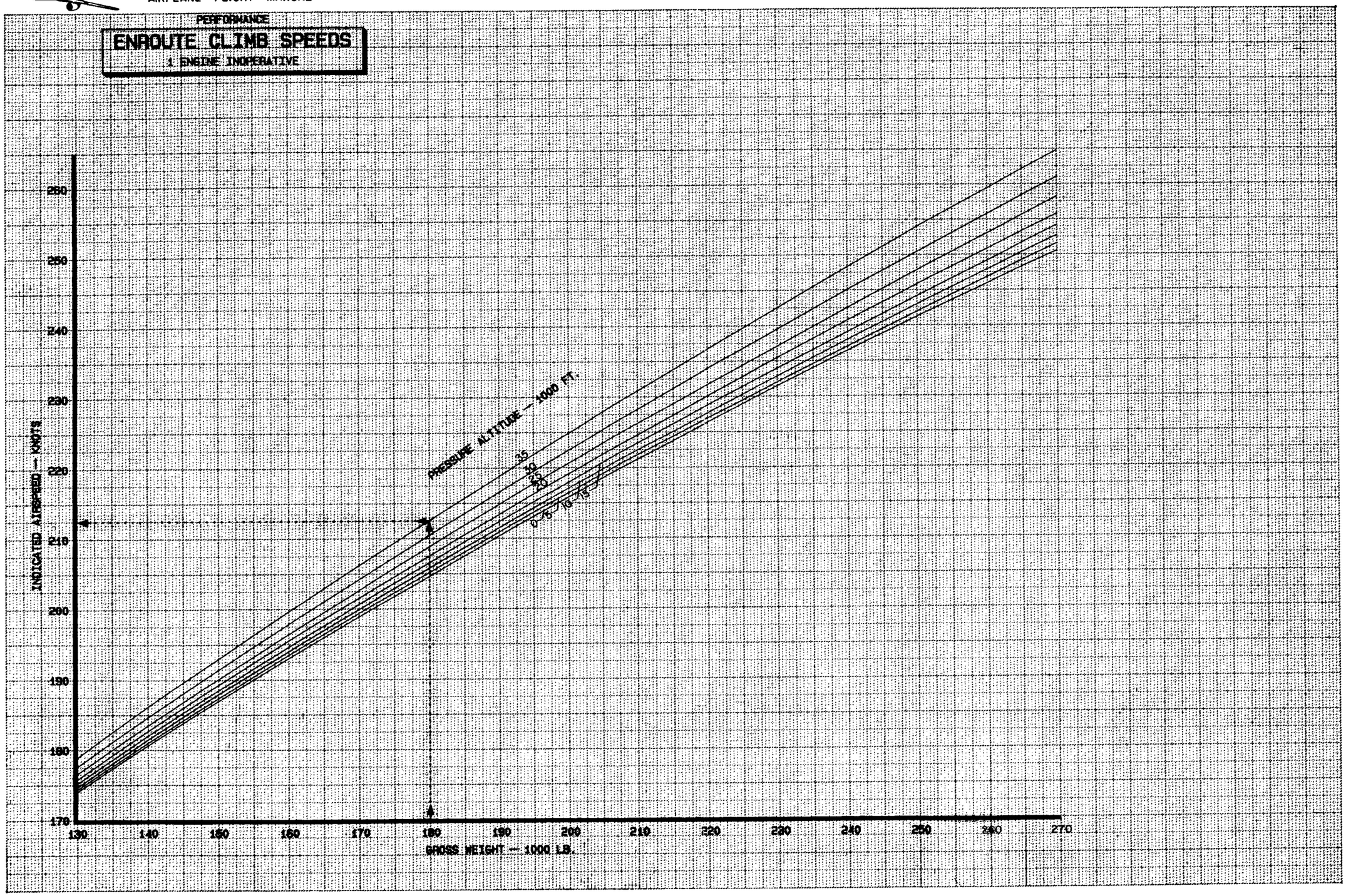
R19016

P.C. 5L000566
D631N013 PG. 4.11-7

PERFORMANCE

ENROUTE CLIMB SPEEDS

1 ENGINE INOPERATIVE



APPROVED DATE
P. 15-84
6-27-17
LaROCHE
757-200

R21863

SECTION 4.12 - APPROACH AND LANDING CLIMB

C O N T E N T S

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(FLAPS 20)	4
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(FLAPS 25)	5
(FLAPS 30)	6
MAXIMUM LANDING WEIGHT, CLIMB LIMITS	
APPROACH FLAPS 15, LANDING FLAPS 25	7
APPROACH FLAPS 20, LANDING FLAPS 30	8

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

R17401

APPROACH AND LANDING CLIMB

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 which do not have 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 8 deg C or 46 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.

The charts in this section are labeled AIRPORT PRESSURE ALTITUDE and AIRPORT OAT and are calculated at the runway surface. The gradient information on the APPROACH CLIMB and LANDING CLIMB charts may be used above the runway surface by treating the chart values as airplane pressure altitude and temperature.

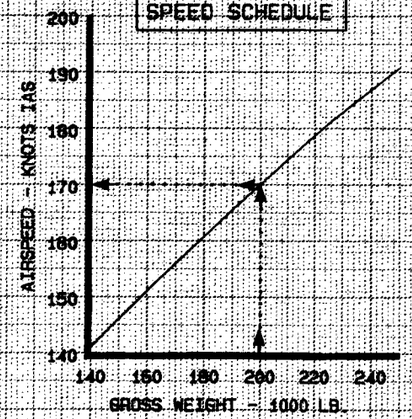
P.C. 5L000568
D631N013 PG 4.12-3

PERFORMANCE

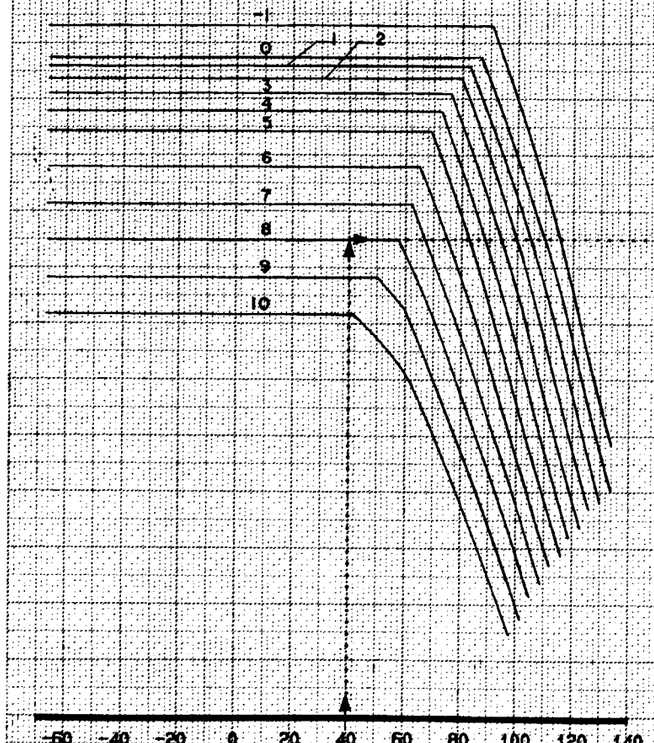
APPROACH CLIMB

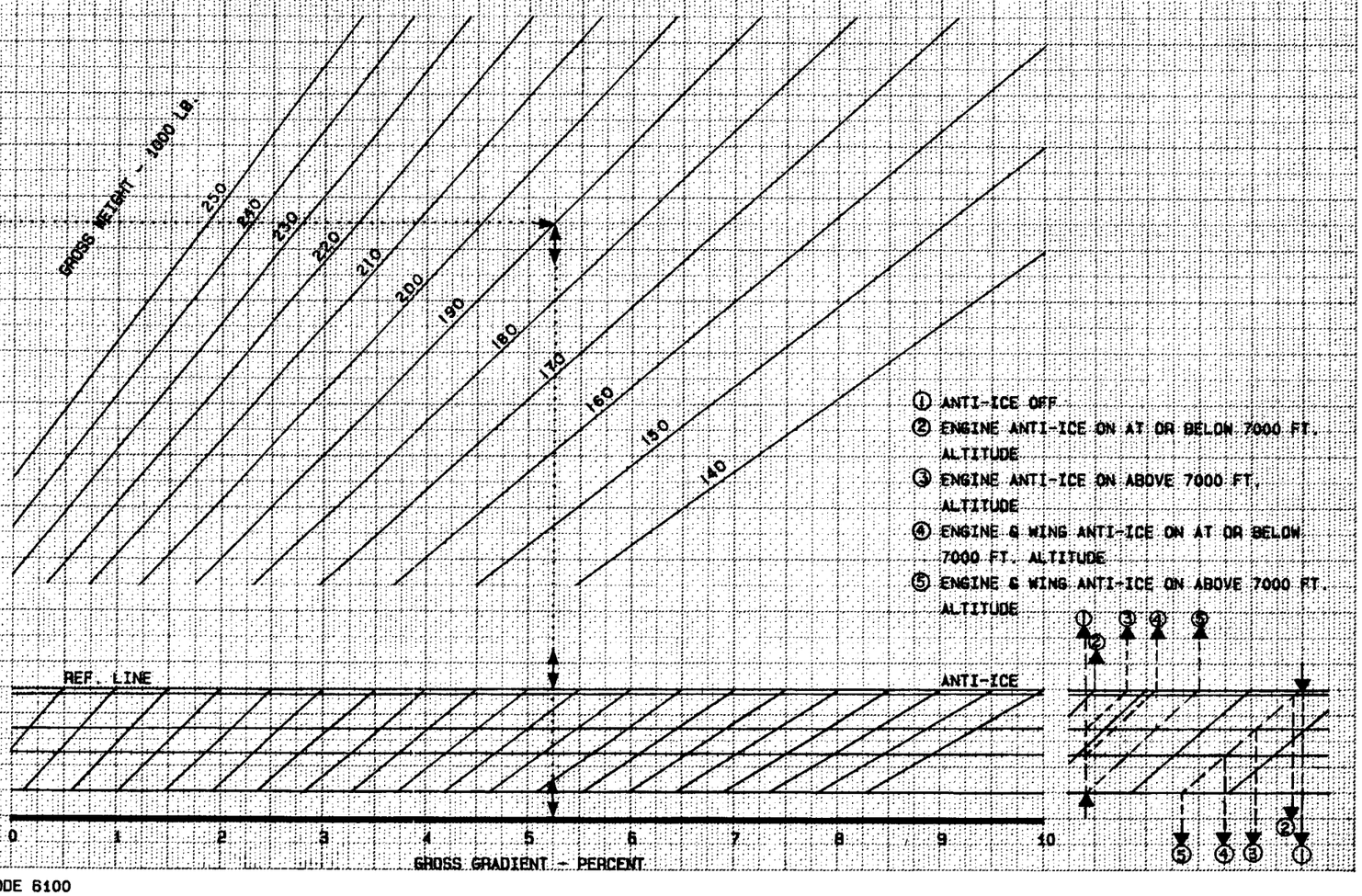
FLAPS 15

A/C PACKS ON



- REDUCE GROSS GRADIENT .55% FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WITH FORECAST LANDING TEMPERATURES BELOW 48°F.
- FOR A/C PACKS OFF, INCREASE GROSS GRADIENT .10%.
- APU OFF, FOR APU OPERATING REDUCE GROSS GRADIENT .025%.
- APPROACH CLIMB GROSS GRADIENT LIMIT = 2.1%.





MARTIN 757-200 PW 2037

APPROVED	DATE
MARTIN	9/28/84

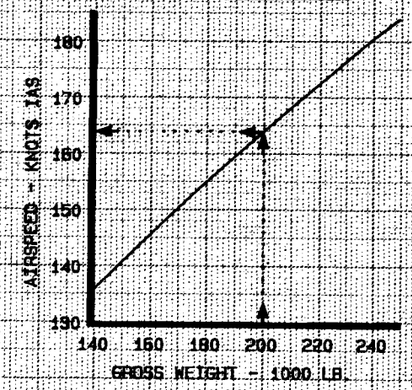
PERFORMANCE

APPROACH CLIMB

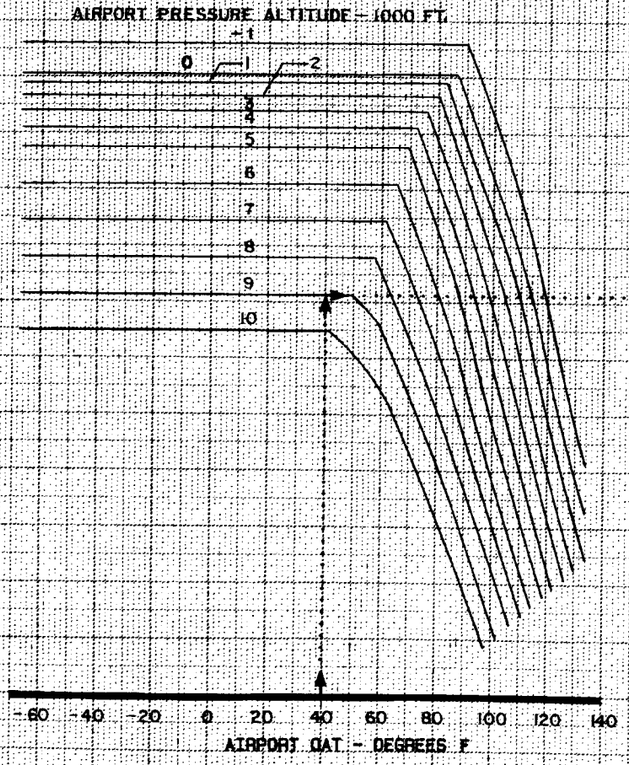
FLAPS 20

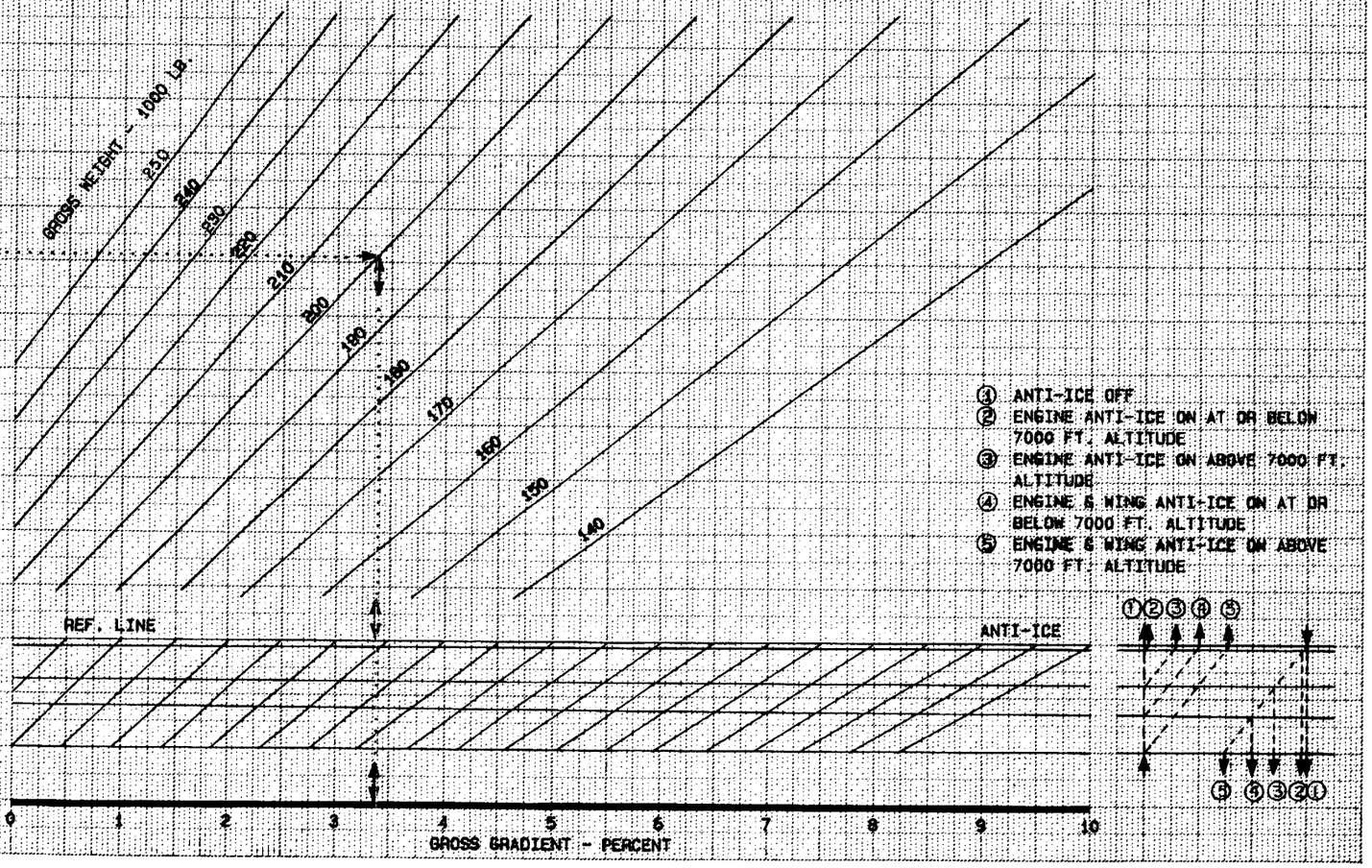
A/C PACKS ON

SPEED SCHEDULE



- REDUCE GROSS GRADIENT .52% FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WITH FORECAST LANDING TEMPERATURES BELOW 46°F.
- FOR A/C PACKS OFF INCREASE GROSS GRADIENT .10%.
- APU OFF. FOR APU OPERATING REDUCE GROSS GRADIENT .025%.
- APPROACH CLIMB GROSS GRADIENT LIMIT = 2.1%.





P.C. 5L000570
D631N013 PG. 4.12-4

APPROVED	DATE
[illegible]	10/25/84

GRIECO
757-200
PW 2037

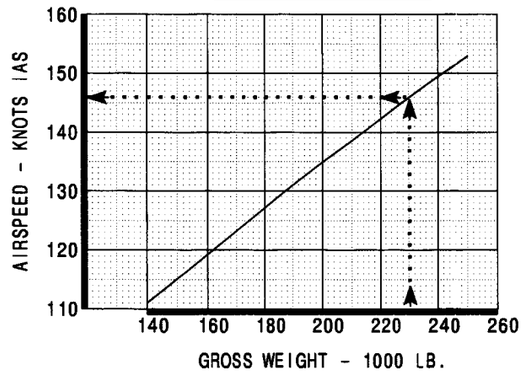
R21869

6E4208

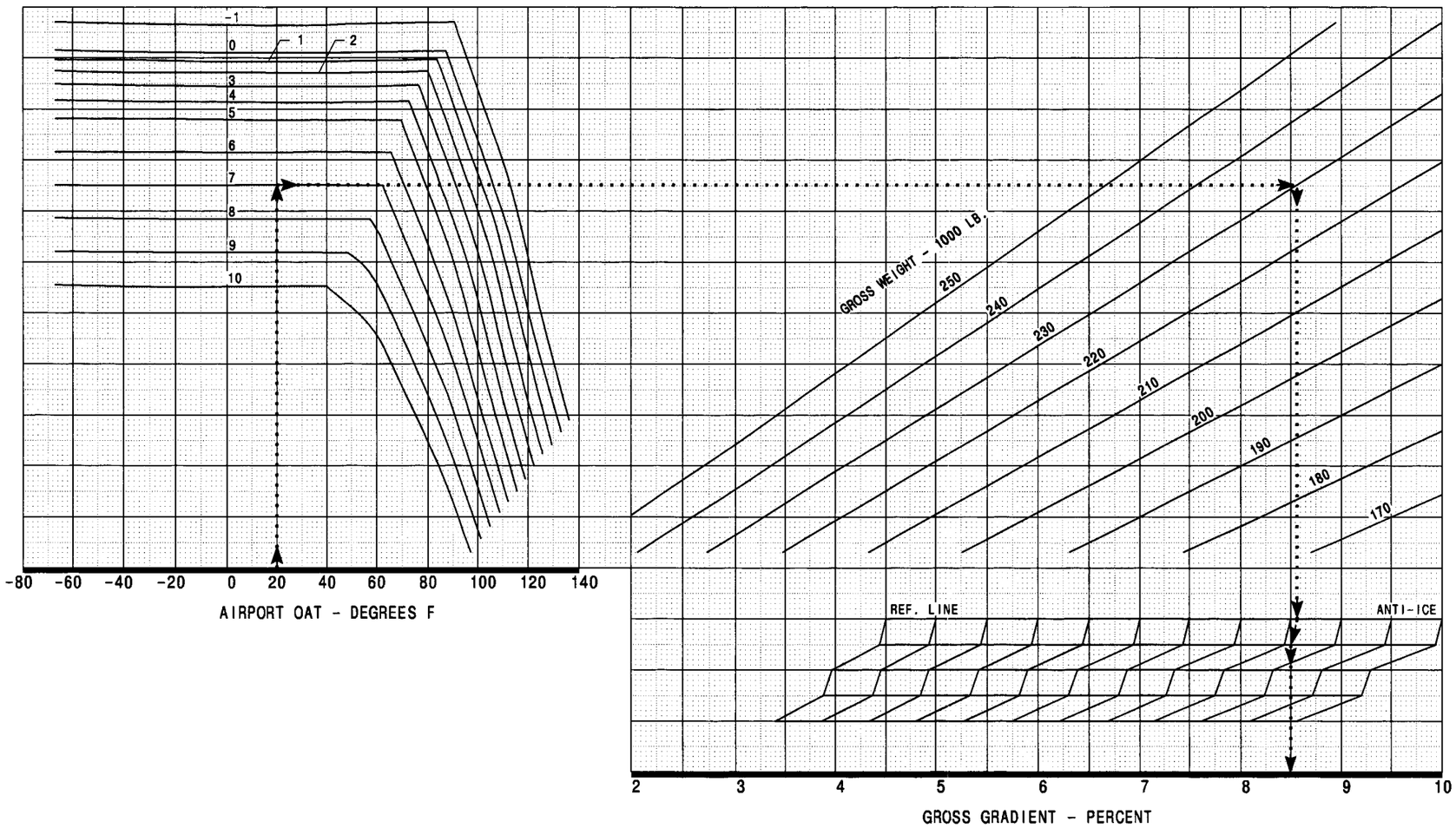
LANDING CLIMB

FLAPS 25

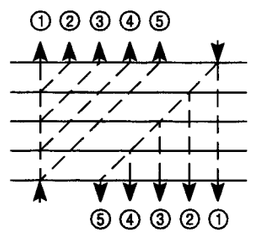
SPEED SCHEDULE



- 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 0.70 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 46 DEGREES F.
- APU OFF. FOR APU ON, REDUCE GROSS GRADIENT BY 0.02 PERCENT.
- IF LEADING EDGE AND TAI SEALS ARE REMOVED BY SERVICE BULLETIN 757-57-0025, OR PRODUCTION EQUIVALENT, REDUCE GROSS GRADIENT BY 0.04 PERCENT.
- WITH INCORPORATION OF SERVICE BULLETIN 757-57-0058 (VORTEX GENERATOR ADDITION), OR PRODUCTION EQUIVALENT, REDUCE GROSS GRADIENT BY 0.04 PERCENT.
- USE 170,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.



① ANTI-ICE OFF.
② ENGINE ANTI-ICE ON AT OR BELOW 7000 FT. AIRPORT PRESSURE ALTITUDE.
③ ENGINE ANTI-ICE ON ABOVE 7000 FT. AIRPORT PRESSURE ALTITUDE.
④ ENGINE AND WING ANTI-ICE ON AT OR BELOW 7000 FT. AIRPORT PRESSURE ALTITUDE.
⑤ ENGINE AND WING ANTI-ICE ON ABOVE 7000 FT. AIRPORT PRESSURE ALTITUDE.



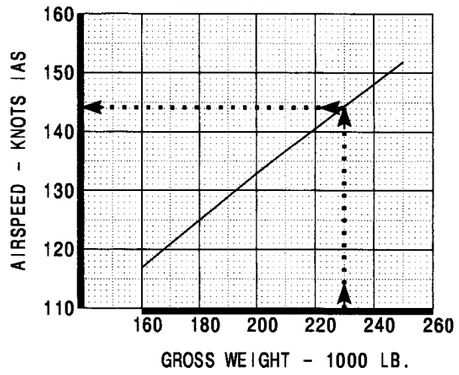
P.C. C500C05006 D631N013 PG. 4.12-5
APPROVED V.HILL DATE 05-23-01
S. STANSBURY 757-200 PW2037

PERFORMANCE

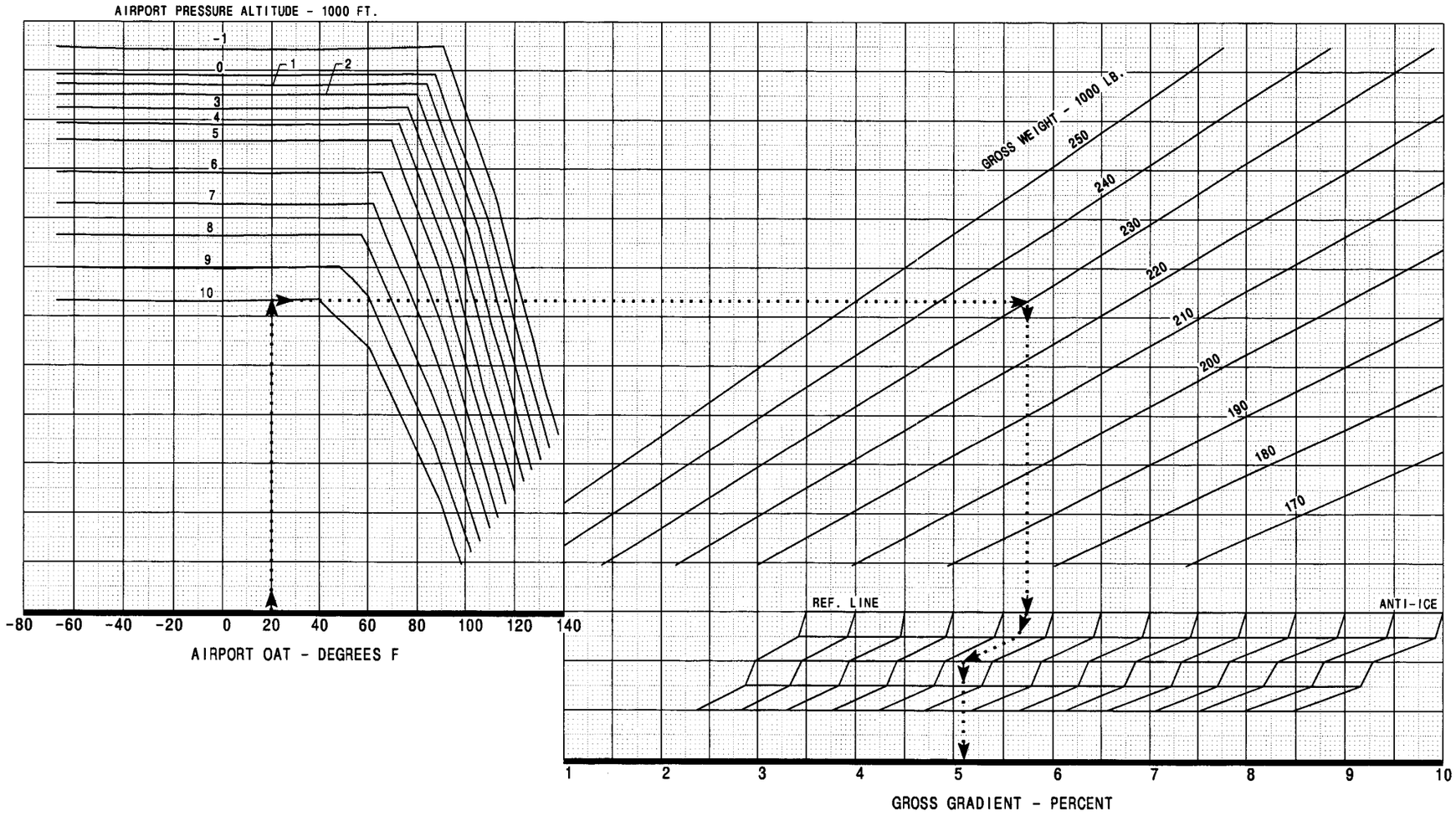
LANDING CLIMB

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 0.16 PERCENT.
- REDUCE GROSS GRADIENT BY 1.00 PERCENT FOR ICE ACCUMULATION WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 46 DEGREES F.
- APU OFF. FOR APU ON, REDUCE GROSS GRADIENT BY 0.02 PERCENT.
- IF LEADING EDGE AND TAI SEALS ARE REMOVED BY SERVICE BULLETIN 757-57-0025, OR PRODUCTION EQUIVALENT, REDUCE GROSS GRADIENT BY 0.04 PERCENT.
- WITH INCORPORATION OF SERVICE BULLETIN 757-57-0058 (VORTEX GENERATOR ADDITION), OR PRODUCTION EQUIVALENT, REDUCE GROSS GRADIENT BY 0.20 PERCENT.
- USE 170,000 LB. LINE FOR LOWER WEIGHTS TO 120,000 LB.



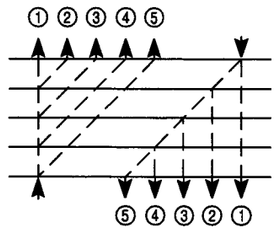
① ANTI-ICE OFF.

② ENGINE ANTI-ICE ON AT OR BELOW 7000 FT. AIRPORT PRESSURE ALTITUDE.

③ ENGINE ANTI-ICE ON ABOVE 7000 FT. AIRPORT PRESSURE ALTITUDE.

④ ENGINE AND WING ANTI-ICE ON AT OR BELOW 7000 FT. AIRPORT PRESSURE ALTITUDE.

⑤ ENGINE AND WING ANTI-ICE ON ABOVE 7000 FT. AIRPORT PRESSURE ALTITUDE.



P.C. C500C06006
D631N013 PG. 4-12.6

APPROVED	DATE
V.HILL	05-19-01

S. STANSBURY
757-200 PW2037

PERFORMANCE

MAXIMUM LANDING WEIGHT

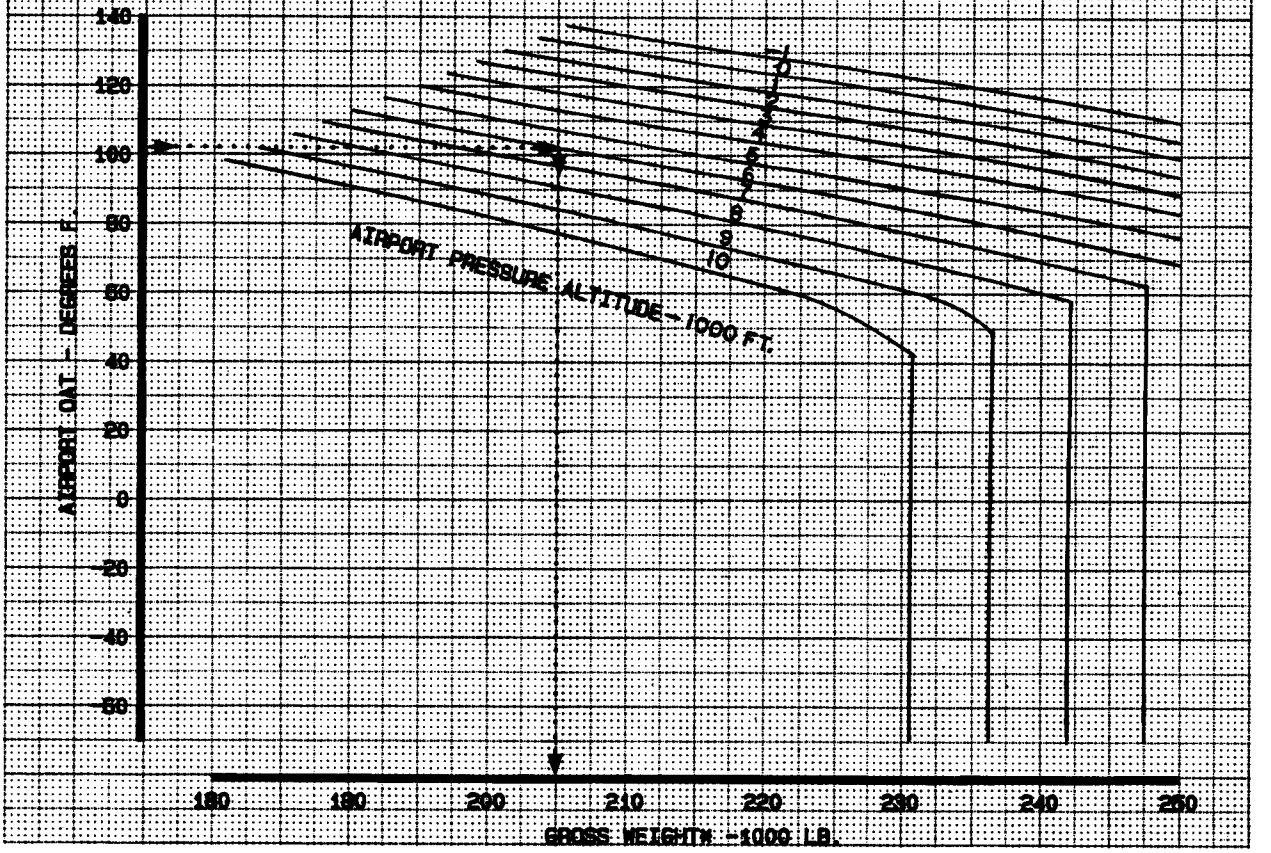
CLIMB LIMITS

APPROACH FLAPS 15
LANDING FLAPS 25

- REDUCE GROSS WEIGHT BY 9150 LBS. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 45°F.
- FOR SPEED SCHEDULES SEE THE APPROPRIATE APPROACH OR LANDING CLIMB CHART.
- APU OFF. FOR APU OPERATING REDUCE GROSS WEIGHT 700 LB.

*APPLY THE FOLLOWING ADJUSTMENTS TO THIS GROSS WEIGHT FOR ALTERNATE BLEED CONFIGURATIONS.

ANTI-ICE BLEED CONFIGURATION	WEIGHT ADJUSTMENT - LB. A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+2300	0
ENGINE ANTI-ICE ON AT OR BELOW 7000 FT. ALT.	+2300	-1150
ENGINE ANTI-ICE ON ABOVE 7000 FT. ALT.	-4750	-8250
ENGINE & WING ANTI-ICE ON AT OR BELOW 7000 FT. ALT.	-8250	-11750
ENGINE & WING ANTI-ICE ON ABOVE 7000 FT. ALT.	-15850	-18950



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P.C. 65000150
D631N013 P6.4.12-7

SAUNDERS
757-200
PW 2037

APPROVED W.R. Roberts NM-266 DATE 9-24-84

R19020

PERFORMANCE

MAXIMUM LANDING WEIGHT

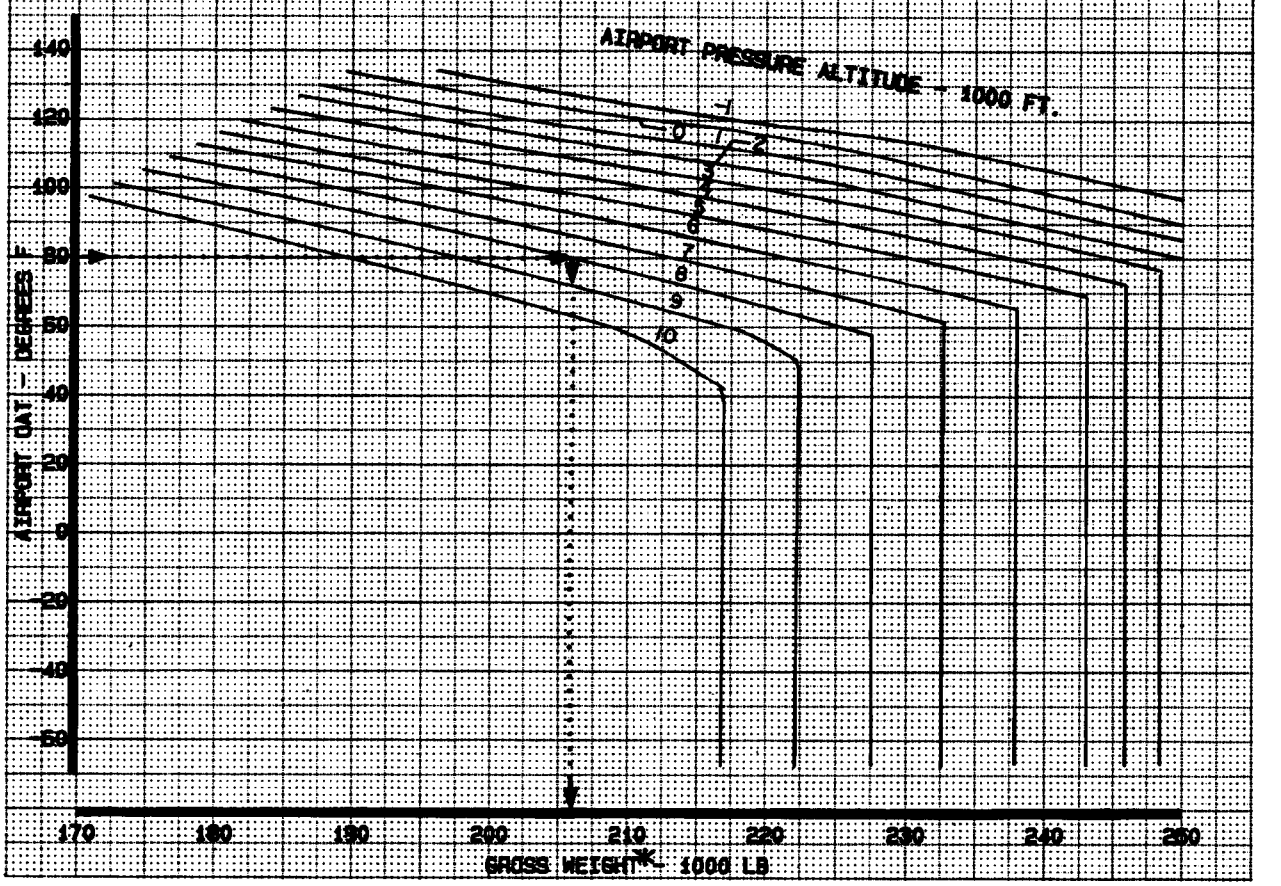
CLIMB LIMITS

APPROACH FLAPS 20
LANDING FLAPS 30

- REDUCE GROSS WEIGHT BY 10900 LB. WHEN OPERATING IN ICING CONDITIONS DURING ANY PART OF THE FLIGHT WHEN THE FORECAST LANDING TEMPERATURE IS BELOW 46°F.
- FOR SPEED SCHEDULES SEE THE APPROPRIATE APPROACH OR LANDING CLIMB CHART.
- APU OFF. FOR APU OPERATING, REDUCE GROSS WEIGHT BY 700 LB.

*APPLY THE FOLLOWING ADJUSTMENTS TO THIS GROSS WEIGHT FOR ALTERNATE BLEED CONFIGURATIONS.

ANTI-ICE BLEED CONFIGURATION	WEIGHT ADJUSTMENT - LB. A/C PACKS OFF	A/C PACKS ON
ANTI-ICE OFF	+2200	0
ENGINE ANTI-ICE ON AT OR BELOW 7000 FT. ALT.	+1800	-1100
ENGINE ANTI-ICE ON ABOVE 7000 FT. ALT.	-4500	-6000
ENGINE & WING ANTI-ICE ON AT OR BELOW 7000 FT. ALT.	-10800	-14000
ENGINE & WING ANTI-ICE ON ABOVE 7000 FT. ALT.	-18100	-21000



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P.C. 5S000151
D631N013 PG. 4.12-8

GRIECO	APPROVED	DATE
757-200	[signature]	9-18-97
PW 2037		

R19021

SECTION 4.13 - LANDING FIELD LENGTH AND SPEED

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STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES	11
LANDING FIELD LENGTH CORRECTION FOR AUTOLAND	12

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

S08106

LANDING FIELD LENGTH AND SPEED

GENERAL

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 unless specifically authorized by Boeing Service Bulletins.

Category A: Boeing P.N. S160N010-42,-43,-44,-45,-46 and S160N020-11.
Category B: Boeing P.N. S160N020-1,-5,-7,-8 and -14.

AUTOMATIC LANDING

The LANDING FIELD LENGTH CORRECTION FOR AUTOLAND chart is guidance material which may be used to comply with AC 120-28C (May 1982 draft) with operating antiskid and thrust reversers. This chart shows landing field lengths for Category III operations and is used in conjunction with the non-autoland LANDING FIELD LENGTH charts on pages 5 or 7 where adjustments for wind, braking configuration, and runway condition are shown.

AUTOMATIC WHEEL BRAKES

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.

R17405

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.

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 45 minutes (Category A & B 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 45 minutes (Category A & B 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.

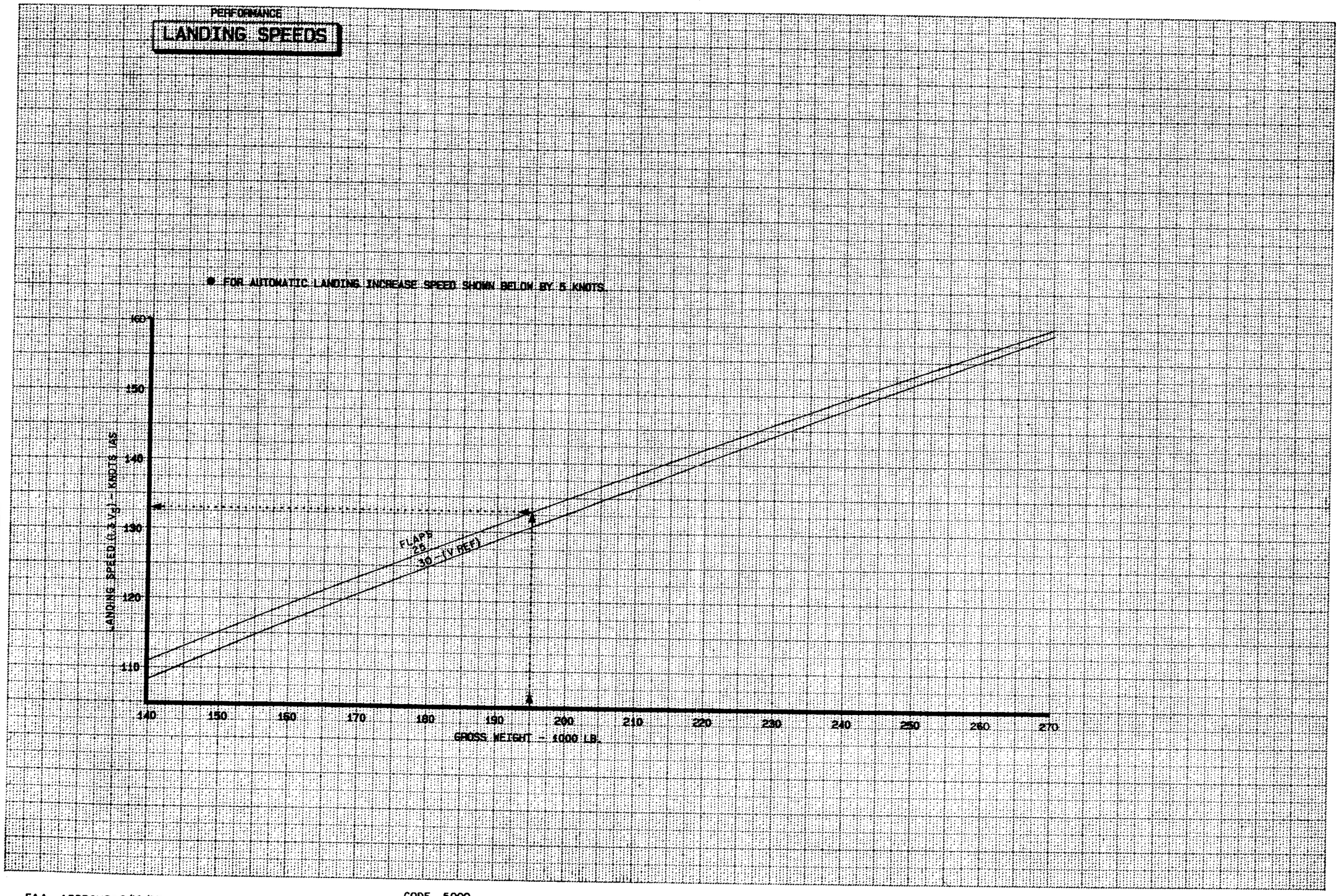
S08109

P.C. 5L000578
D631N004 PG 4.13 - 4.1

PERFORMANCE

LANDING SPEEDS

* FOR AUTOMATIC LANDING INCREASE SPEED SHOWN BELOW BY 5 KNOTS.



APPROVED	DATE
W. PAUL NR-13	8/15/84
G.T. Hoglund	6.20.87

C. SANDERS
757-200

PERFORMANCE

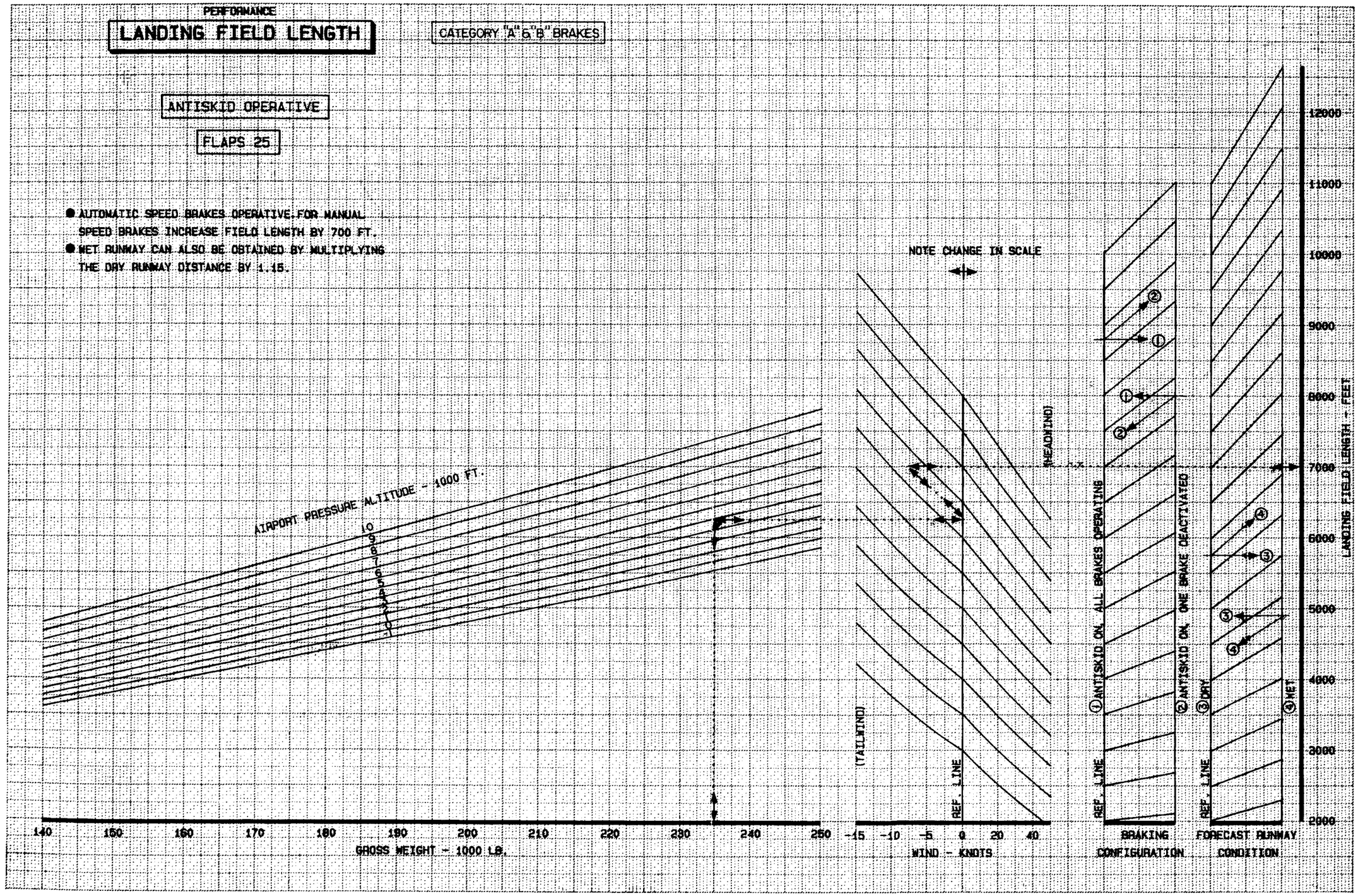
LANDING FIELD LENGTH

CATEGORY "A" & "B" BRAKES

ANTISKID OPERATIVE

FLAPS 25

- AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES INCREASE FIELD LENGTH BY 700 FT.
- WET RUNWAY CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



P.C. 5L000580
D631N013 PG 4.13-5

APPROVED	DATE
P.L. LEONHARD MM-308	31 Aug 84

MARTIN
757-200
PW 2037

R21986

6E4208

P.C. 5L000777
D631N013 PG. 4.13-6

HOLTZCLAW
757-200
PW-2037

APPROVED	DATE
SR&NM-135	1/23/85
SR&NM-135	4/10/86

PERFORMANCE

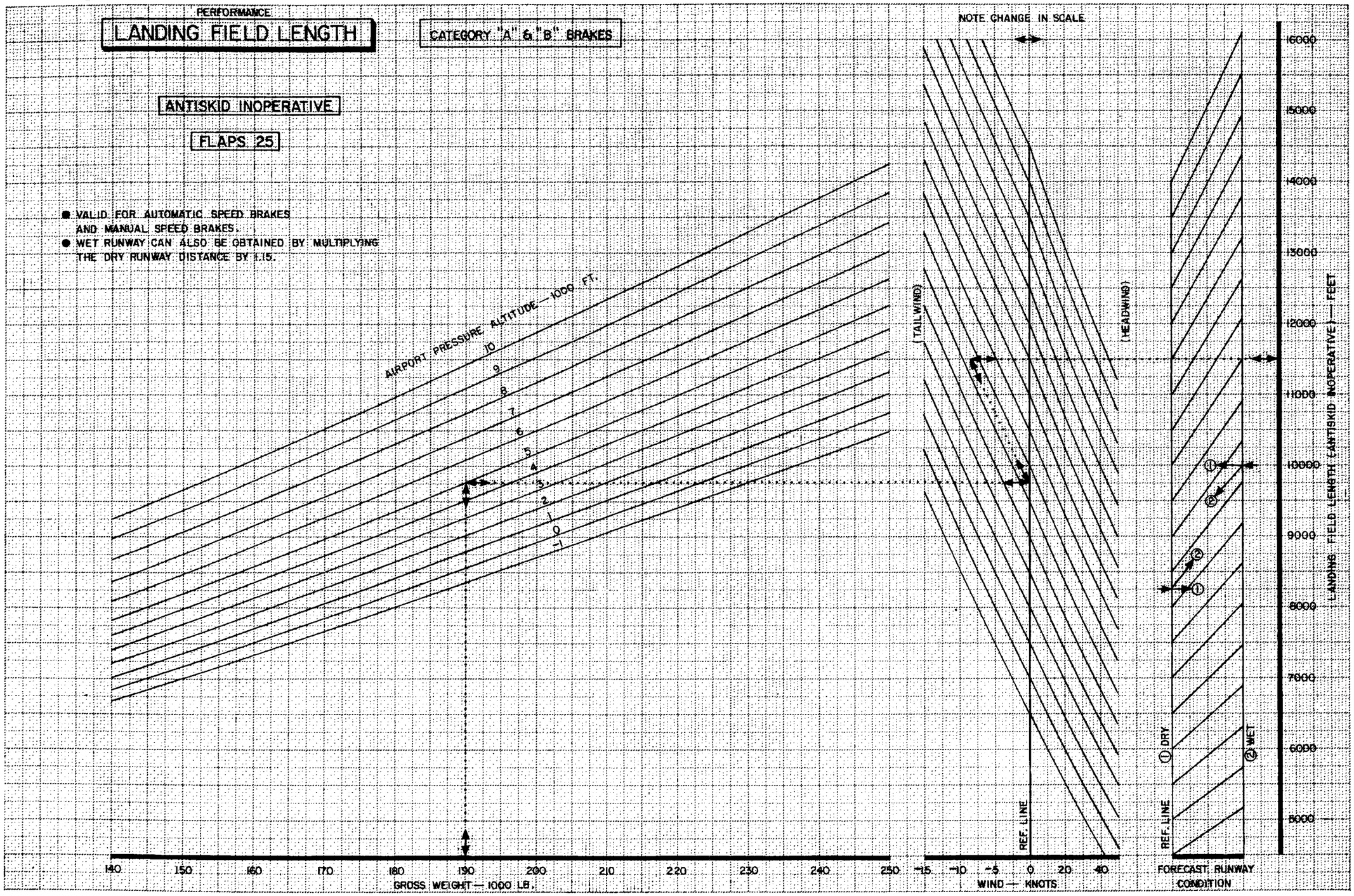
LANDING FIELD LENGTH

CATEGORY "A" & "B" BRAKES

ANTISKID INOPERATIVE

FLAPS 25

- VALID FOR AUTOMATIC SPEED BRAKES AND MANUAL SPEED BRAKES.
- WET RUNWAY CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



R21989

6F4208

P.C. 5L000584
D631N013 PG 4.13-7

PERFORMANCE

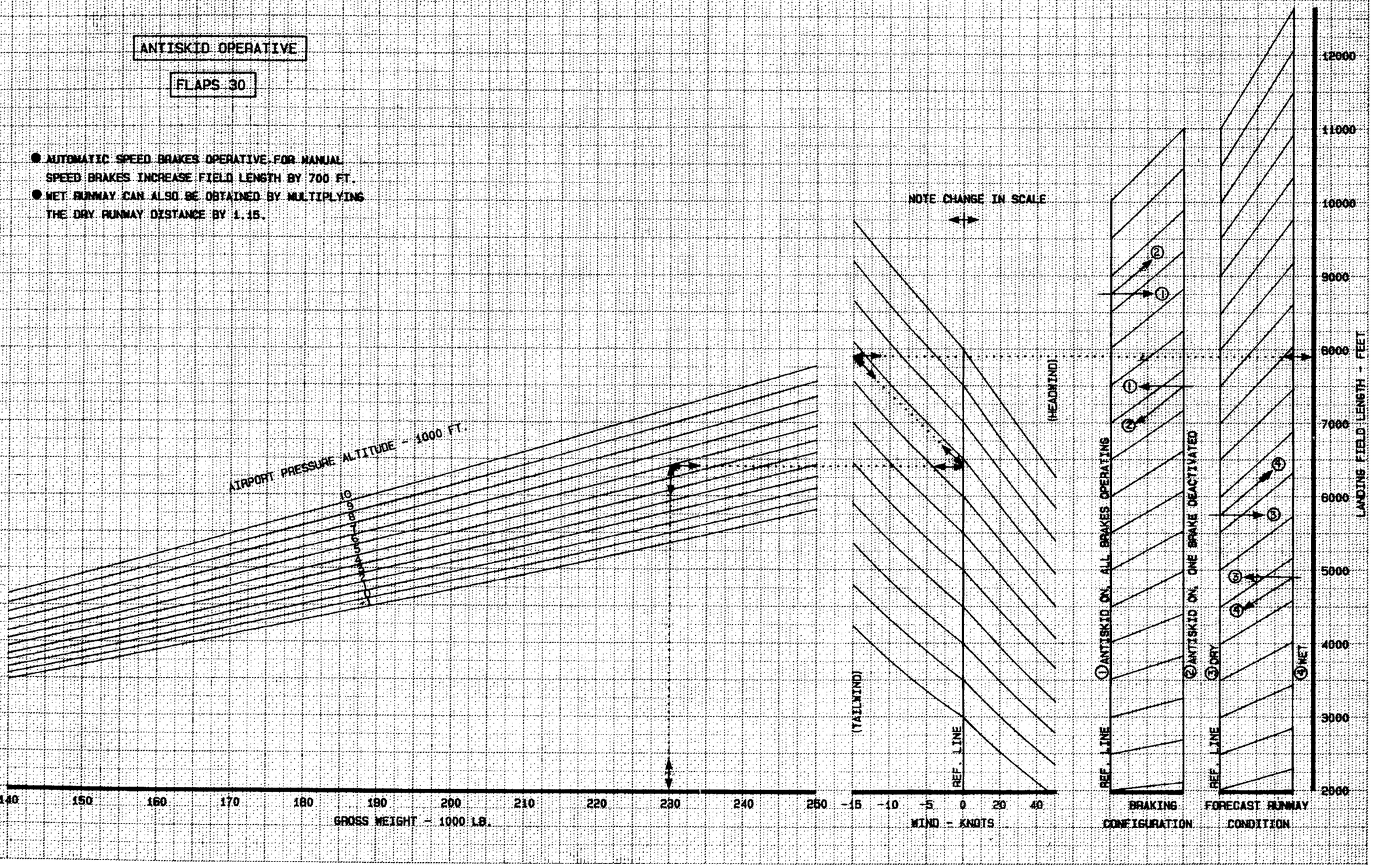
LANDING FIELD LENGTH

CATEGORY "A" & "B" BRAKES

ANTISKID OPERATIVE

FLAPS 30

- AUTOMATIC SPEED BRAKES OPERATIVE. FOR MANUAL SPEED BRAKES INCREASE FIELD LENGTH BY 700 FT.
- WET RUNWAY CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



MARTIN
757-200
PW 2037

APPROVED	DATE
M. LECHNAR DAR-328	31 Aug 84

PERFORMANCE

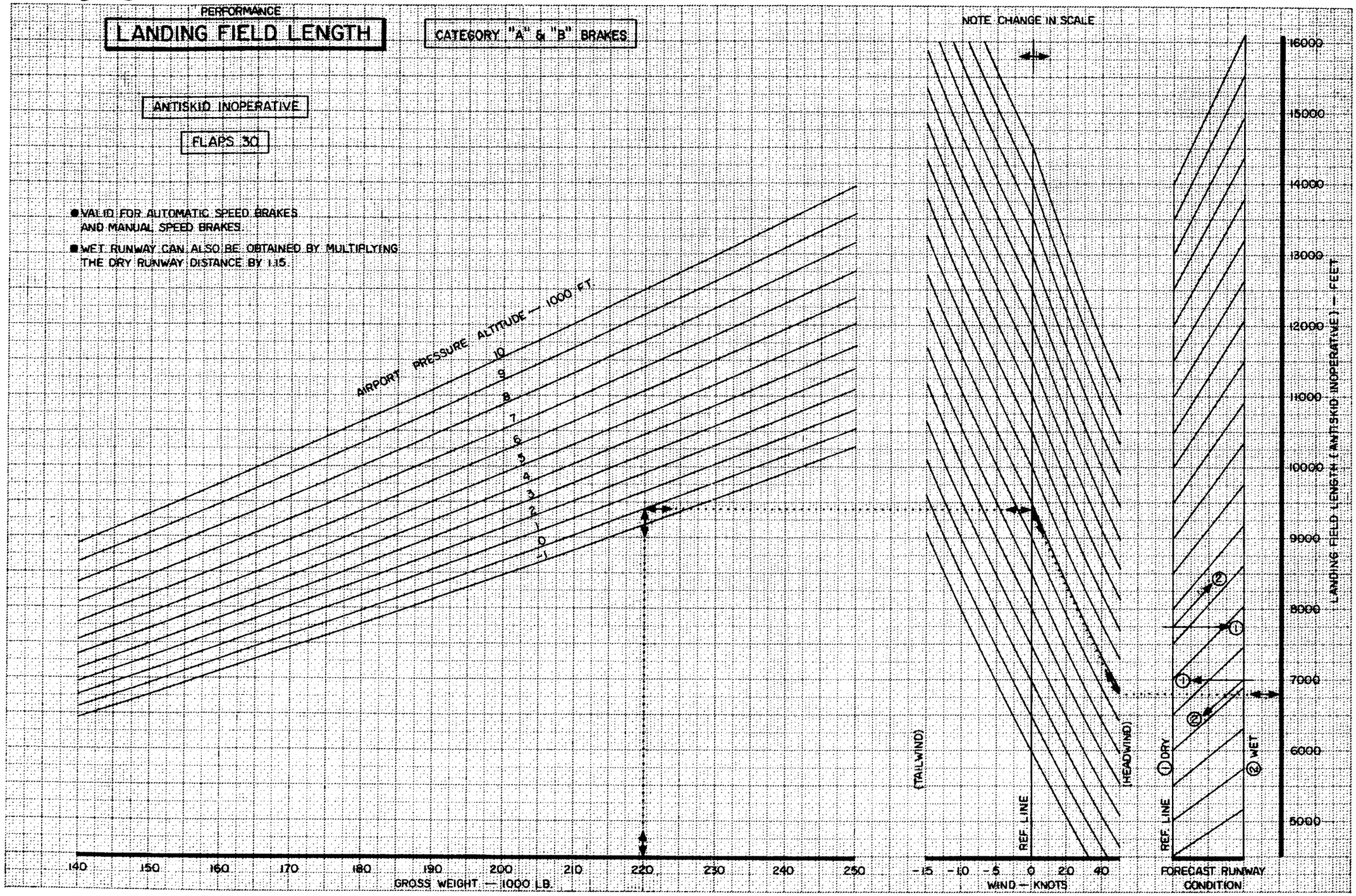
LANDING FIELD LENGTH

CATEGORY "A" & "B" BRAKES

ANTISKID INOPERATIVE

FLAPS 30

- VALID FOR AUTOMATIC SPEED BRAKES AND MANUAL SPEED BRAKES.
- WET RUNWAY CAN ALSO BE OBTAINED BY MULTIPLYING THE DRY RUNWAY DISTANCE BY 1.15.



P.C. 5L000776	PG. 4.13 - 8
D631N013	

DAVIS	APPROVED	DATE
757-200	ARS NM-13S	1/23/85
PW-2037	ARS NM-15S	4/10/86

P.C. 5L000588
D631N003 PG. 4.13-9

KOSTOFF
757-200
PW 2037
APPROVED PAUL NE DATE 8/20/86

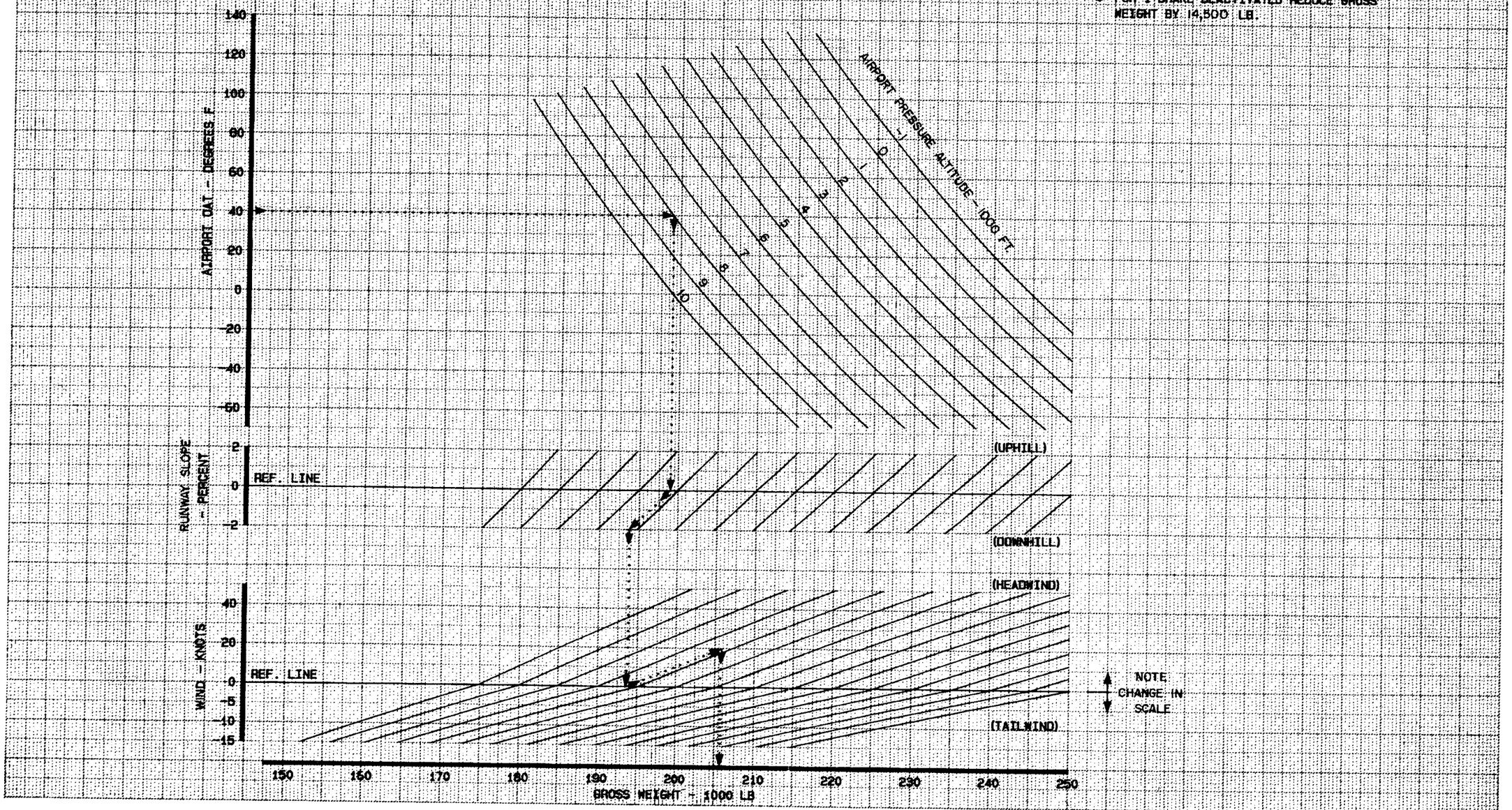
PERFORMANCE

MAXIMUM QUICK TURNAROUND WEIGHT

FLAPS 25

CATEGORY "A" & "B" BRAKES

- AFTER LANDING AT WEIGHTS EXCEEDING CHART VALUES, WAIT AT LEAST 45 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- FOR 1 BRAKE DEACTIVATED REDUCE GROSS WEIGHT BY 14,500 LB.

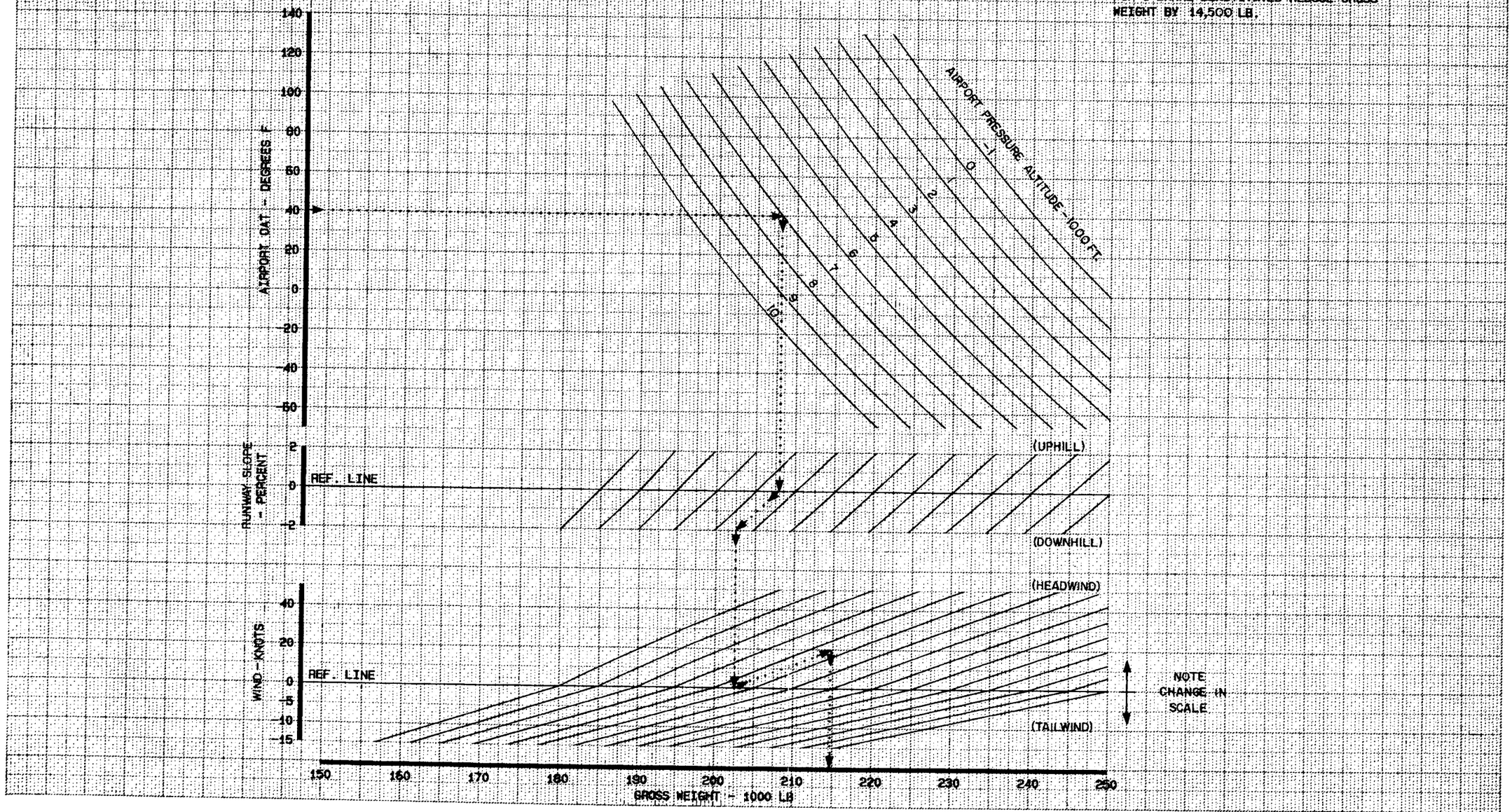


MAXIMUM QUICK TURNAROUND WEIGHT

FLAPS 30

CATEGORY "A" & "B" BRAKES

- AFTER LANDING AT WEIGHTS EXCEEDING CHART VALUES, WAIT AT LEAST 45 MINUTES, THEN CHECK WHEEL THERMAL PLUGS BEFORE MAKING A SUBSEQUENT TAKEOFF.
- FOR 1 BRAKE DEACTIVATED REDUCE GROSS WEIGHT BY 14,500 LB.



P.C. 5L000590
D631M003 PG. 4.13-10

APPROVED	DATE
W. Paul Mc	8/21/86

KOSTOFF
757-200
PW 2037

STOPPING DISTANCE WITH AUTOMATIC WHEEL BRAKES

GUIDANCE INFORMATION - SEE TEXT

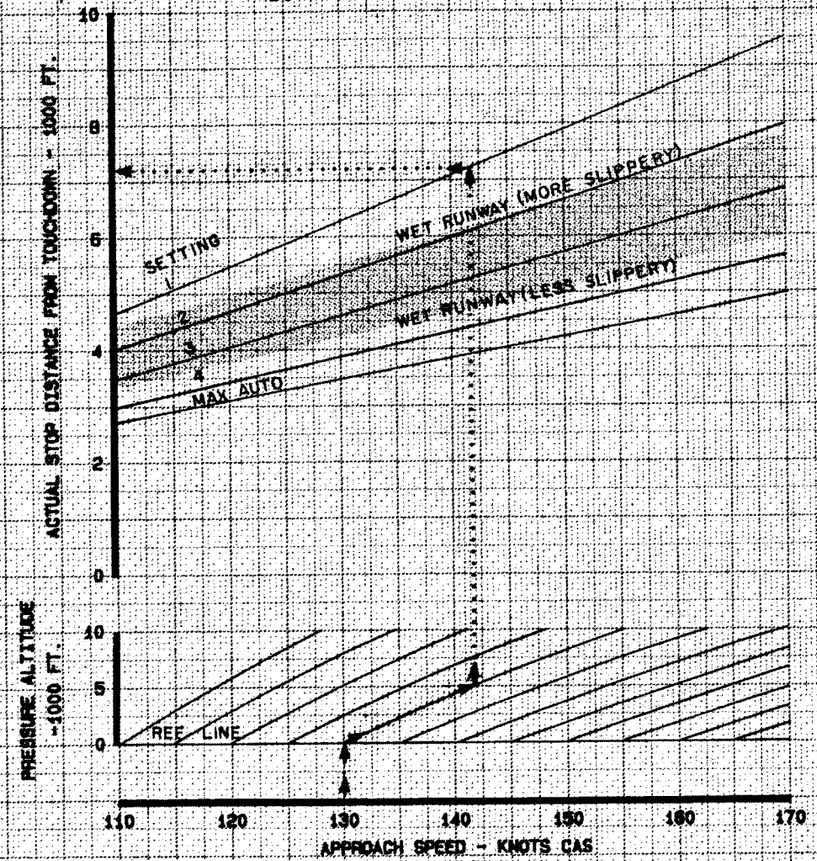
NOTE: VALID FOR FLAPS 25 OR 30

CHART ASSUMES ZERO WIND.
FOR TAILWIND CORRECT BY ADDING:

SETTING	FEET PER KNOT OF REPORTED TAILWIND
MAX AUTO	50
4	60
3	80
2	100
1	120

CHART ASSUMES STANDARD DAY TEMPERATURE.
FOR HOTTER DAYS CORRECT CHART BY ADDING:

SETTING	FEET PER 2°F (1°C) ABOVE STANDARD DAY
MAX AUTO	15
4	15
3	20
2	25
1	30



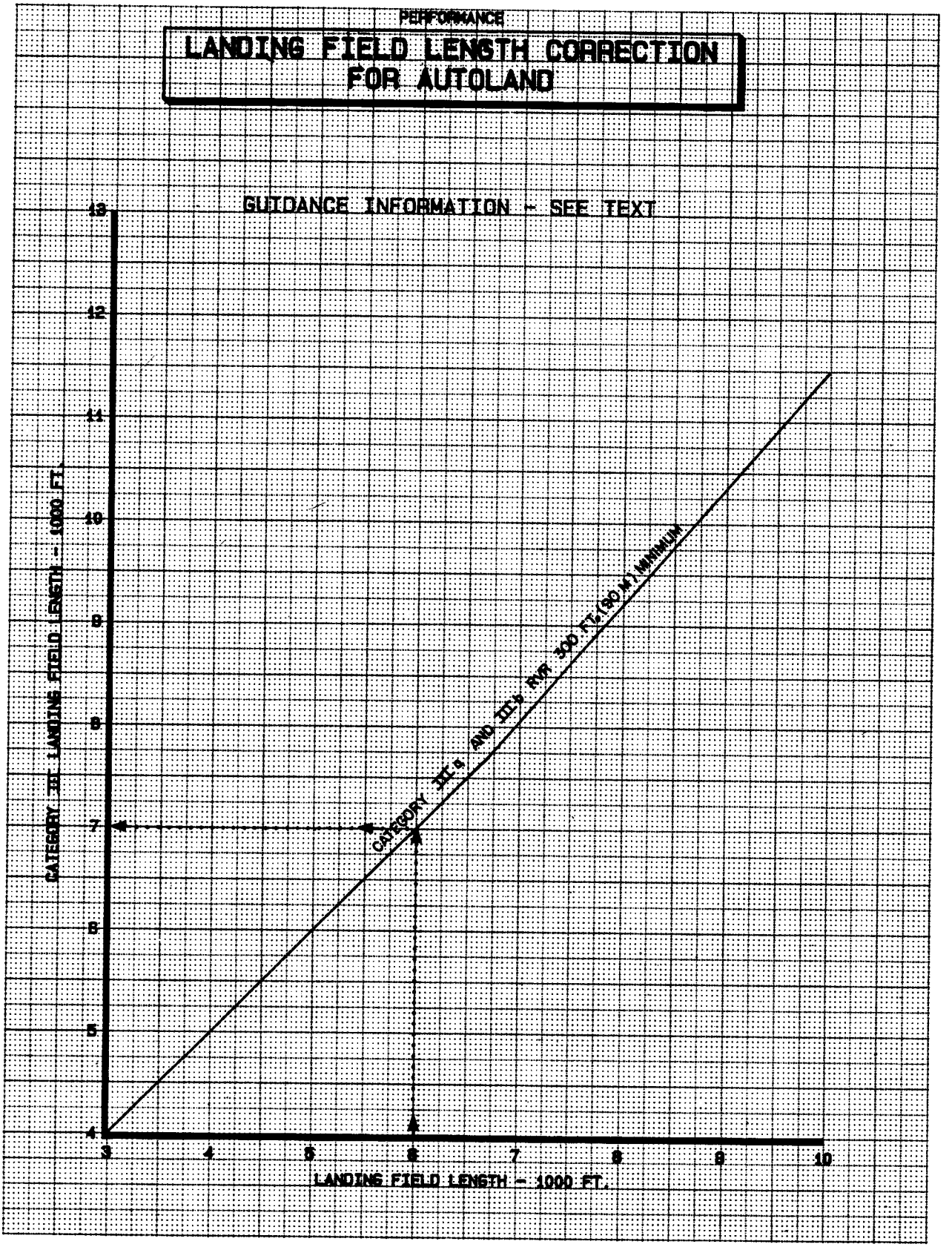
WET RUNWAY GUIDANCE

- 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. 5L000408
D631N0003 4.13-14

APPROVED S.HART 757-200
DATE 10-6-84

LANDING FIELD LENGTH CORRECTION FOR AUTOLAND



P.C. 59000152
D631N001 PG. 4.13 - 12

APPROVED	DATE
W. DAULT	8/13/84

YARNES
757-200

6E4207

R19022