

AIRPLANE FLIGHT MANUAL

MCDONNELL AIRCRAFT MODEL 220

REGISTRATION NO. N220N

SERIAL NO.1

ENGINES J34WE34

This airplane must be operated in compliance with the prescribed certificate limitations in Section I herein.

MCDONNELL AIRCRAFT ST. LOUIS, MISSOURI

10 JUNE 1960

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AIRPLANE FLIGHT MANUAL

LOG OF REVISIONS

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AIRPLANE FLIGHT MANUAL

SECTION I
OPERATING LIMITATIONS

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

WEIGHT LIMITATIONS

MAXIMUM TAXI WEIGHT.

Maximum taxi weight is 45,500 pounds. This weight must be adjusted so that maximum in-flight weights are not exceeded by accounting for fuel burn-off during taxi and initial take-off ground roll.

MAXIMUM IN-FLIGHT WEIGHT.

Maximum in-flight weight is 45,000 pounds or less as limited by the performance or center of gravity limitations; see Figures 1-1 through 1-7.

MAXIMUM LANDING WEIGHT.

Maximum landing weight is 35,500 pounds or less as limited by the performance limitations; see Section III.

NOTE

All weight in excess of the maximum landing weight must consist of disposable fuel.

MAXIMUM ZERO FUEL WEIGHT.

Maximum zero fuel weight is 29,500 pounds.

MINIMUM FLYING WEIGHT.

Minimum flying weight is 27,500 pounds.

CENTER OF GRAVITY LIMITS.

Maximum forward center of gravity is 20% M.A.C.. Maximum aft center of gravity is 32% M.A.C.. Center of gravity envelope figure 1-1.

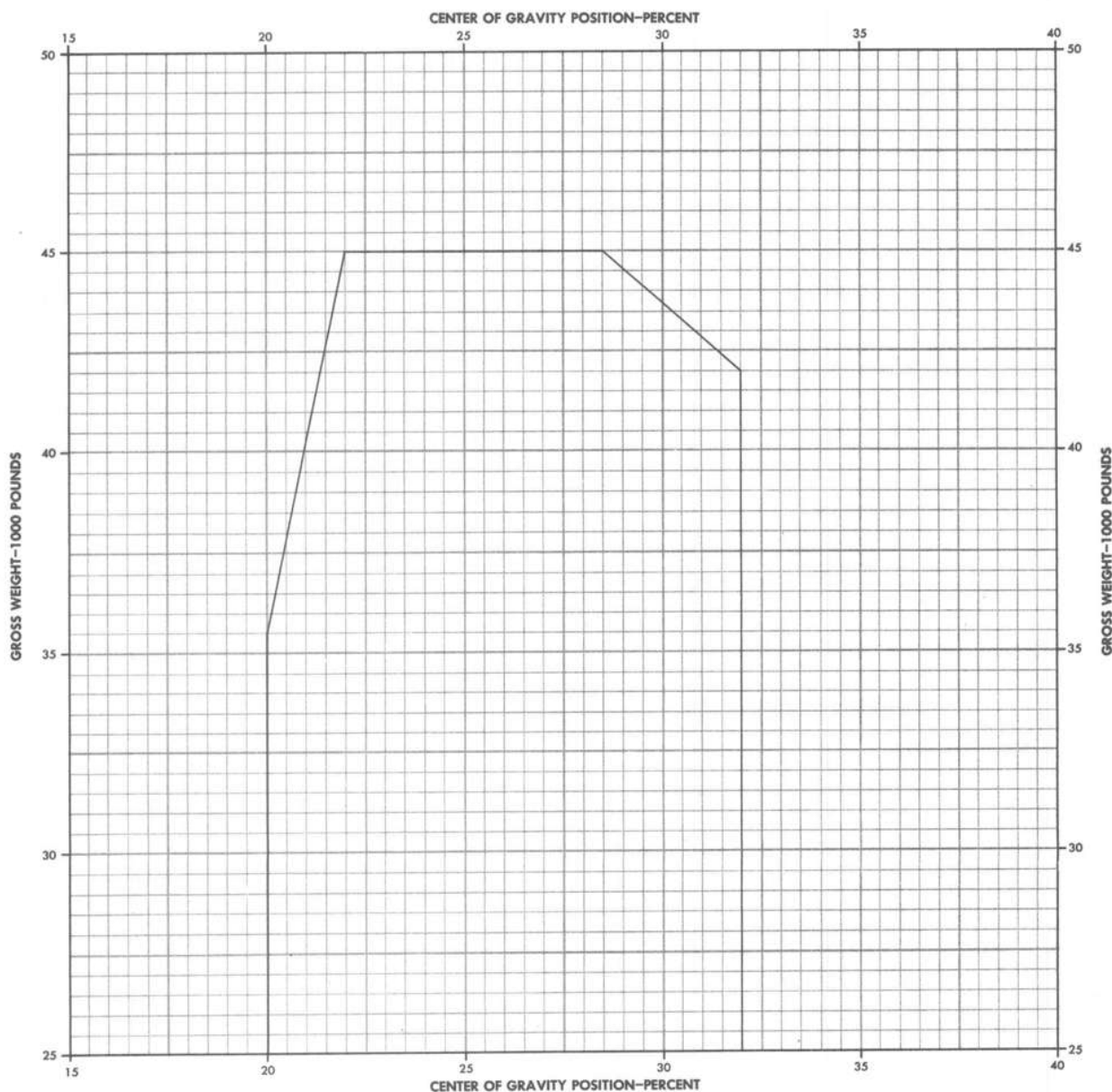
NOTE

This airplane is to be operated in accordance with the approved loading schedule.

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CENTER OF GRAVITY ENVELOPE

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
FLAPS UP, GEAR UP



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Figure 1-1

AIRPLANE FLIGHT MANUAL

TAKE-OFF OPERATIONAL LIMITS

TEMPERATURE LIMITS.

-40°F to standard day atmosphere temperature plus 60°F.

<u>ALTITUDE</u>	<u>COLD LIMIT</u>	<u>HOT LIMIT</u>
Sea Level	-40°F	+119.0°F
2000 Ft.	-40°F	+111.9°F
4000 Ft.	-40°F	+104.7°F
6000 Ft.	-40°F	+ 97.6°F
8000 Ft.	-40°F	+ 90.5°F

ALTITUDE LIMITS.

Take-off altitude limits are from Sea Level to 8000 Ft. (Pressure Altitude).

RUNWAY SLOPE LIMIT.

The maximum allowable runway slope for take-off is $\pm 2\%$.

LIMITING TAIL WIND COMPONENT.

Limiting take-off tail wind component is 10 knots.

LANDING OPERATIONAL LIMITS

TEMPERATURE LIMITS.

-40°F to standard day atmosphere temperature plus 60°F.

<u>ALTITUDE</u>	<u>COLD LIMIT</u>	<u>HOT LIMIT</u>
Sea Level	-40°F	+119.0°F
2000 Ft.	-40°F	+111.9°F
4000 Ft.	-40°F	+104.7°F
6000 Ft.	-40°F	+ 97.6°F
7250 Ft.	-40°F	+ 93.1°F

ALTITUDE LIMITS.

Landing altitude limits are from Sea Level to 7250 Ft. (pressure altitude).

RUNWAY SLOPE LIMIT.

Maximum allowable runway slope for landing is $\pm 2\%$.

LIMITING TAIL WIND COMPONENT.

Limiting landing tail wind component is 10 knots.

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IN-FLIGHT OPERATIONAL LIMITS

TEMPERATURE LIMITS.

-40°F or standard day minus 60°F, whichever is colder, to standard day plus 60°F.

<u>ALTITUDE</u>	<u>COLD TEMPERATURE</u>	<u>HOT TEMPERATURE</u>
Sea Level	-40.0°F	119.0°F
10,000 Ft.	-40.0°F	83.3°F
20,000 Ft.	-72.3°F	47.7°F
30,000 Ft.	-108.0°F	12.0°F
40,000 Ft.	-129.7°F	-9.7°F

ALTITUDE LIMITS.

In-flight operational altitude limits are from Sea Level to 43,000 ft.

PERFORMANCE LIMITATIONS

Airplane take-off weight limits complying with the climb gradients specified in SR422B are contained in figures 1-2, 1-3, and 1-4. Section III presents the climb gradient data from which the weight limits were derived. Landing is not performance limited with respect to landing climb or approach climb gradients.

TAKE-OFF WEIGHTS.

Take-off weight limits are given in figures 1-2, 1-3, and 1-4 for the first and second segment climbs. Two take-off configurations are considered. The up flap configuration is not limiting on the first segment climb gradient.

TAKE-OFF DISTANCE.

The CAR take-off field lengths, shown on figures 1-5 and 1-6, are the distance from brake release to a point where the airplane reaches a height of 35 feet above the runway surface. The take-off field lengths are balanced; i.e., an engine is assumed to fail at the critical engine failure speed (V_1) and continue to take-off, reaching a 35 foot height, or stopping within the same distance.

The pertinent take-off speeds; i.e., critical failure speed, rotation speed and climb speed, are given in Section III, figures 3-2 through 3-5

All field lengths are based on smooth, dry, hard surfaced runways.

For maximum allowable take-off weight for CAR take-off field lengths, refer to Section III Determination of Maximum Allowable Take-Off Weights and Associated Take-Off Speeds.

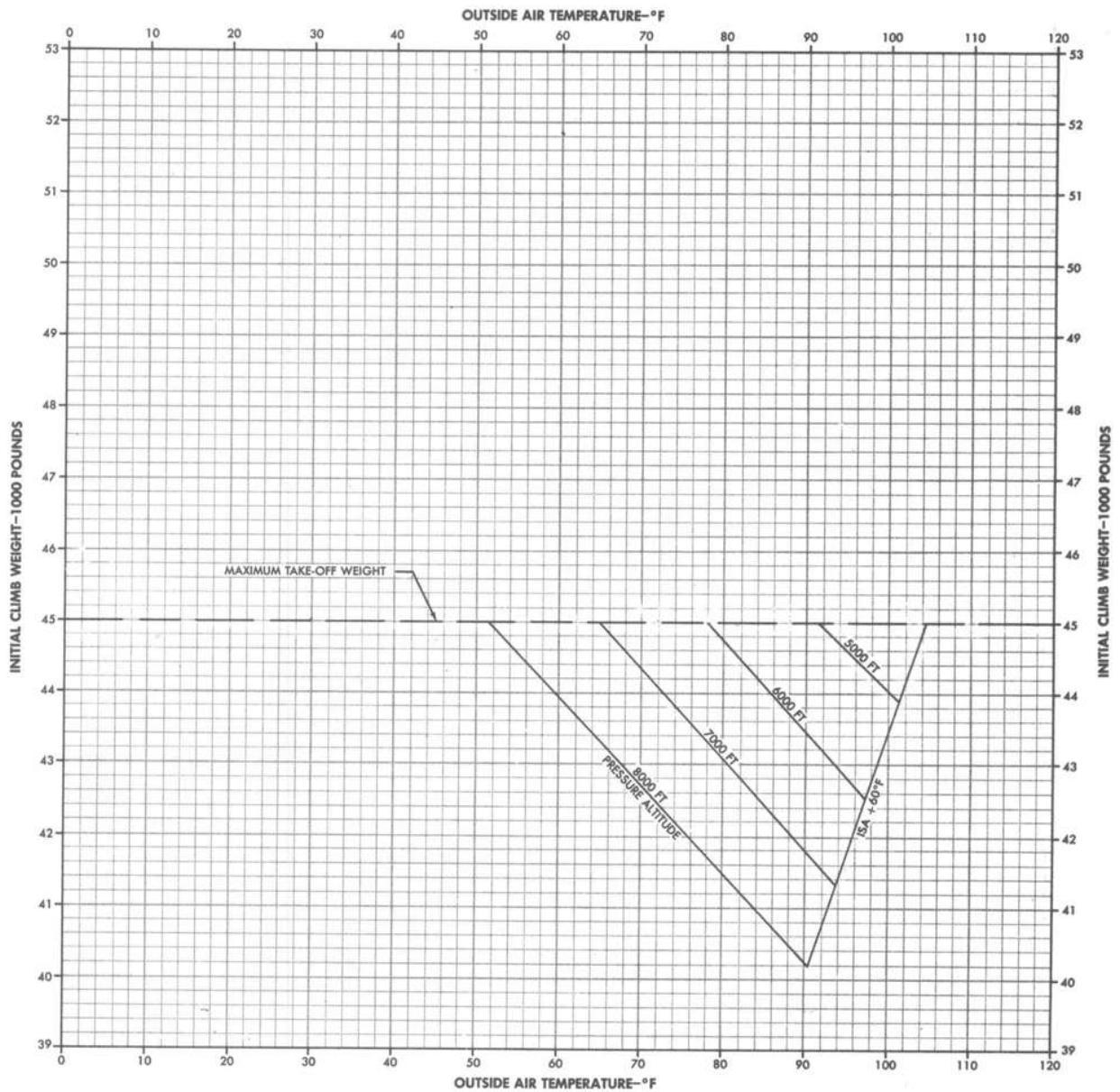
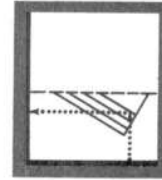
AIRPLANE FLIGHT MANUAL

FIRST SEGMENT CLIMB WEIGHT LIMITS TAKE-OFF THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR DOWN



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Figure 1-2

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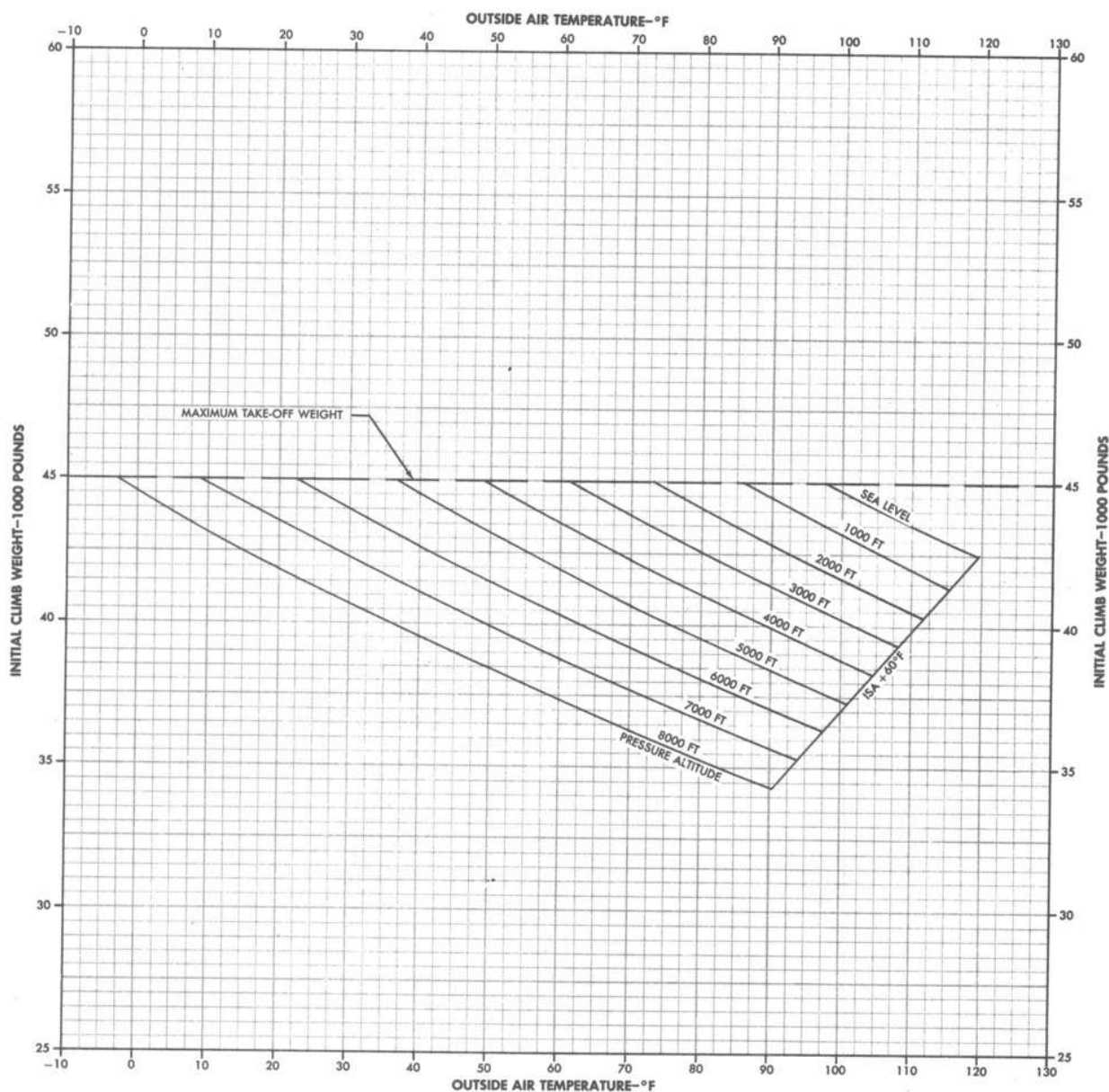
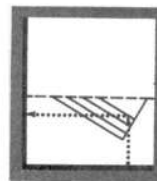
SECOND SEGMENT CLIMB WEIGHT LIMITS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR UP



TAKE-OFF THRUST
TAKE-OFF FLAPS

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Figure 1-3

AIRPLANE FLIGHT MANUAL

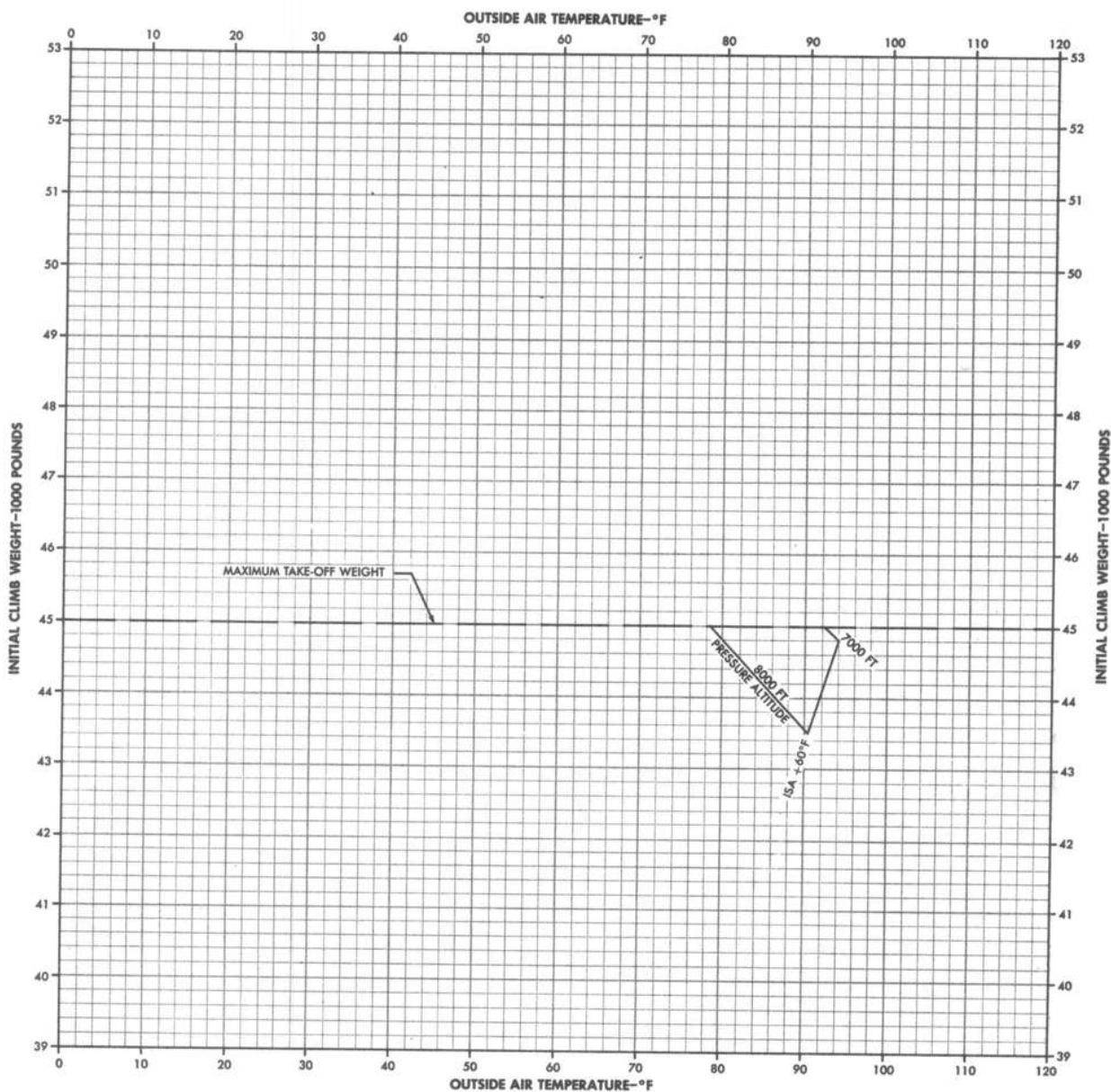
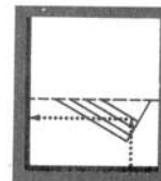
SECOND SEGMENT CLIMB WEIGHT LIMITS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



TAKE-OFF THRUST
FLAPS UP

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Figure 1-4

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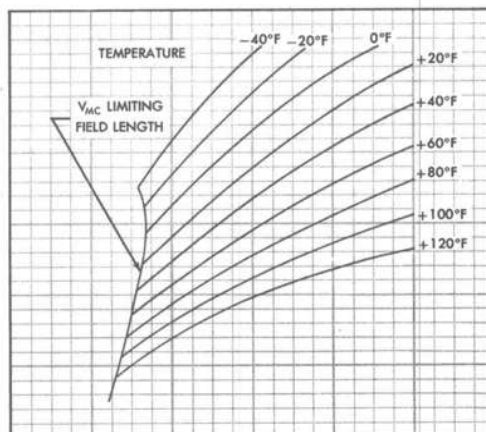
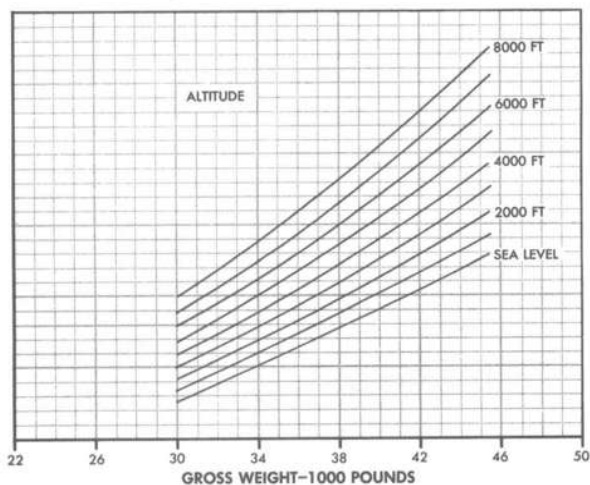
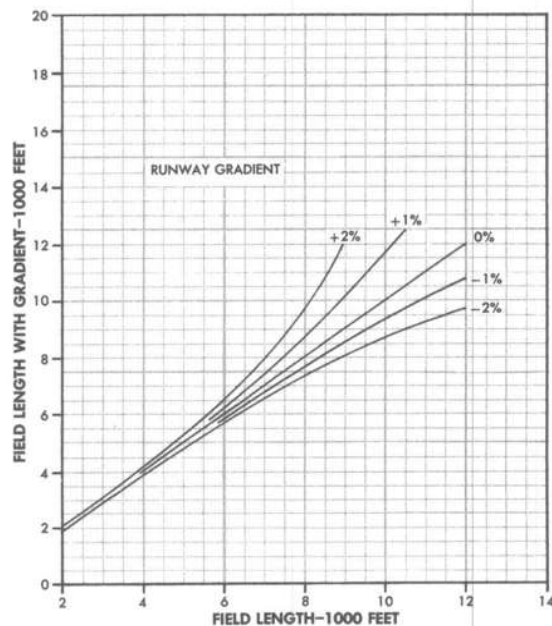
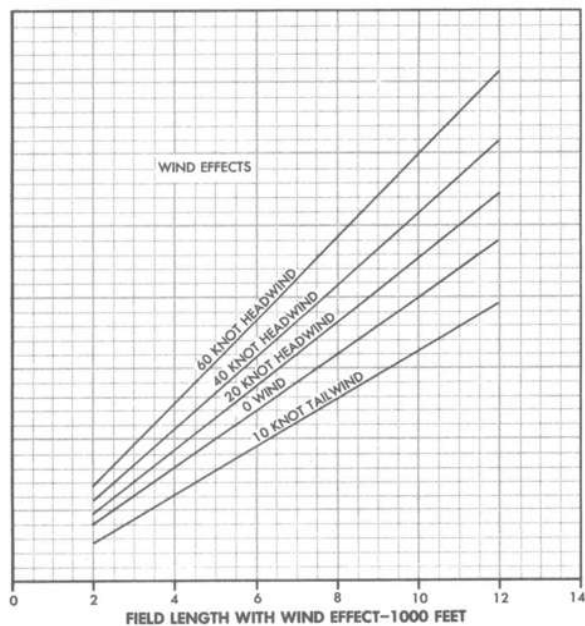
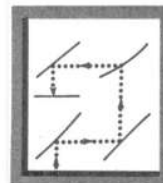
AIRPLANE FLIGHT MANUAL

C.A.R. TAKE-OFF FIELD LENGTH TAKE-OFF THRUST TAKE-OFF FLAPS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR DOWN



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Figure 1-5

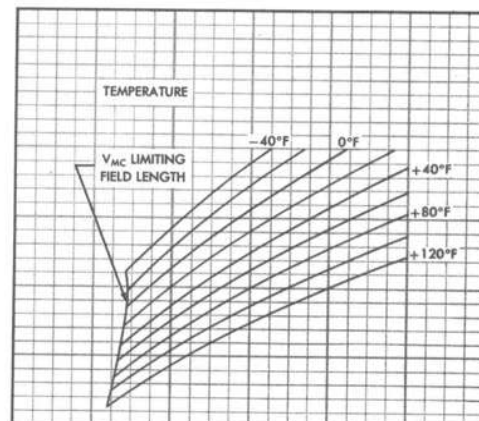
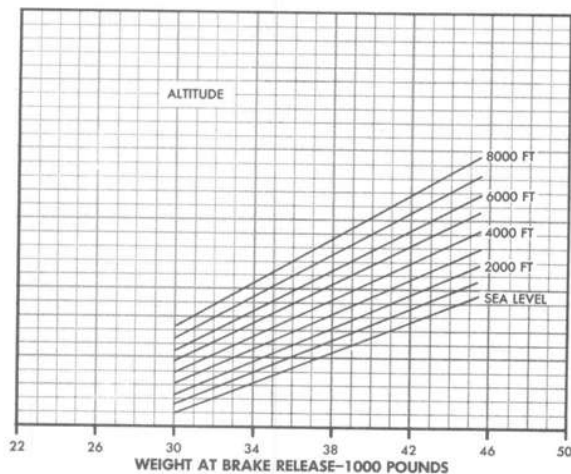
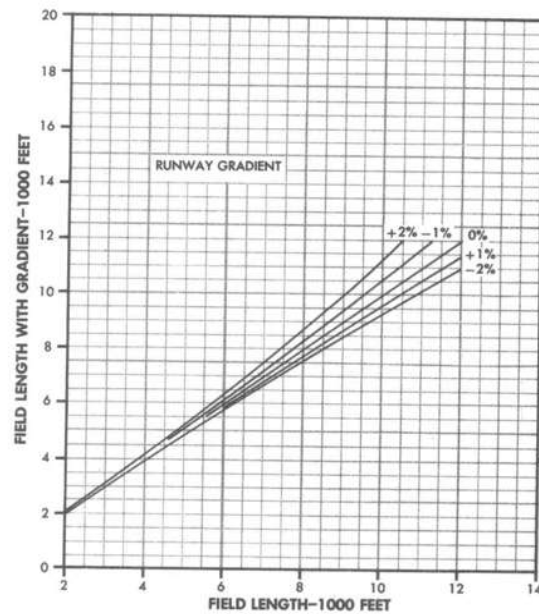
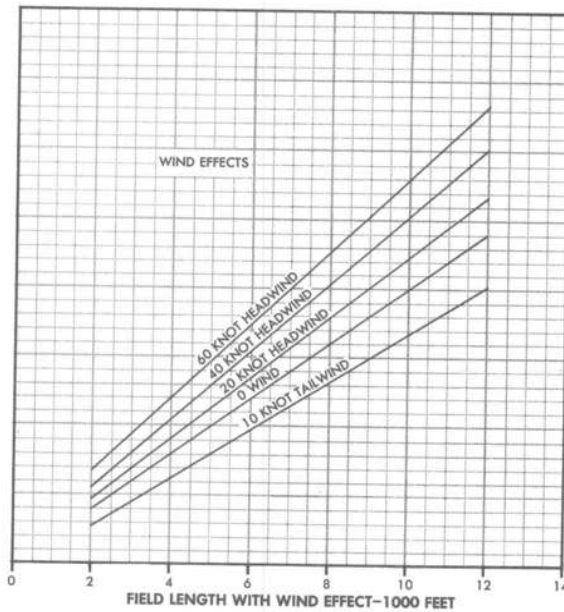
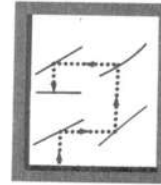
AIRPLANE FLIGHT MANUAL

C.A.R. TAKE-OFF FIELD LENGTH TAKE-OFF THRUST FLAPS UP

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR DOWN



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Figure 1-6

AIRPLANE FLIGHT MANUAL

TAKE-OFF CONFIGURATION

NORMAL OPERATION.

1. Flap setting: TAKE-OFF or UP depending upon Weight, Temperature, and Altitude, see figure 3-1.
2. Speed brakes - ZERO
3. Take-Off Thrust

ICING CONDITIONS.

1. The airplane has not been operated in icing conditions and take-off should not be made in known icing conditions. The airplane is equipped with de-icing boots for the wing and empennage in the event icing conditions are encountered.
2. For cold temperature operations pitot heat should be on and windshield temperature should be in HI for take-off.

TAKE-OFF - NORMAL OPERATION

Prior to a take-off the pilot should check the stabilizer setting, the engine RPM and E.G.T., V_1 speed, V_R rotation speed, V_2 climb speed, and CAR field length for the ambient conditions of the particular take-off.

The take-off run should be started by aligning with the runway and applying take-off thrust prior to brake release.

During the take-off run, the pilot and co-pilot should monitor the engine performance and the airspeed indication. Nose wheel steering should be used for directional control on the runway until the airspeed has increased to 80-90 knots. Above this speed directional control should be maintained by use of the rudder.

At the indicated airspeed for rotation V_R the airplane should be smoothly rotated from the taxi attitude to the climb attitude, stabilizing on the climb speed V_2 .

If an engine should fail prior to attaining V_1 speed, wheel brakes should be applied, engine thrust retarded to idle and full speed brake deflection applied. If the engine fails after V_1 speed is attained, the take-off must be continued and the same take-off technique used as for an all engines take-off. Directional control is maintained by the use of the rudder and ailerons when taking off with a failed engine.

AIRPLANE FLIGHT MANUAL

ENGINE LIMITATIONS - WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES

ENGINE THRUST.

Maximum take-off and maximum continuous thrust are established by RPM. The exhaust nozzle is trimmed to limits as defined in U.S. Navy Publication "Handbook Service Instructions" AN 02B-110BA-2.

ENGINE SPEED.

Maximum operational RPM is 100% (12,500) RPM. This RPM is time limited to 30 minutes. Normal operational RPM (maximum continuous) is 94.5% (11,800) RPM.

WARNING

Maximum RPM is 101% (12,625) RPM. Steady state operation between 101% (12,625) RPM and 102% (12,750) RPM is not cause for rejection, but must be corrected prior to next flight. Steady state operation above 102% (12,750) RPM is cause for rejection to overhaul. Overshoot to 104% (13,000) RPM is permissible. If an engine exceeds 104% (13,000) RPM, reject to overhaul.

ENGINE EXHAUST GAS TEMPERATURE.

<u>Operational Condition</u>	<u>Temperature Limit</u>	<u>Time Limit</u>
Take-Off	600-650 Gage Redline	30 Minutes
Normal	816°C	Continuous
Starting	816°C	5 Seconds
Acceleration	760°C	1 Minute

WARNING

If during starting the engine exceeds 926°C, the engine must be replaced. If temperature in excess of 816°C and over 5 seconds duration occurs during starting, an overtemperature inspection must be made.

INSTRUMENT MARKING.

Maximum limits are marked by a red radial line.
Cautionary limits are marked by a yellow arc.
Normal operating range is marked by a green arc.
Minimum limits are marked by a red radial line.

AIRPLANE FLIGHT MANUAL

ENGINE LIMITATIONS - WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES (Continued)

ENGINE FUEL SYSTEM LIMITATIONS.

The authorized fuel designations are:

MIL-F-5572 Aviation Gasoline (Lowest grade preferred)
MIL-J-5624D JP-3 or MIL-J-5624D with 5% (by volume) MIL-F-5566
Isopropyl Alcohol added.

ENGINE OIL SYSTEM LIMITATIONS.

Maximum operating oil pressure is ¹³⁵~~85~~ \pm 10 psig.
Idle RPM oil pressure is 15 ± 5 psig.

AIRSPEED MARKINGS AND PLACARDS

All instrument markings and placards in the airplane are shown as indicated values (IAS, MI). The pilot's and copilot's airspeed indicator have slightly different limits due to correction for source error, however neither is corrected for applicable instrument error.

AIRSPEED INDICATOR.

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

V_{NO} - Yellow radial line.

MACHMETER.

M_{NE} - Red radial line with black crosshatch.

NOTE

The normal operating limit airspeeds and Mach numbers, V_{NO} and M_{NO} should not be deliberately exceeded during flight.

AIRSPEED LIMITATIONS

NEVER EXCEED SPEED.

318 Knots CAS (V_{NE}) or .83 Mach (M_{NE}) whichever is lower.

NORMAL OPERATING SPEED.

302 Knots CAS (V_{NO}) or .83 Mach (M_{NO}) whichever is lower.

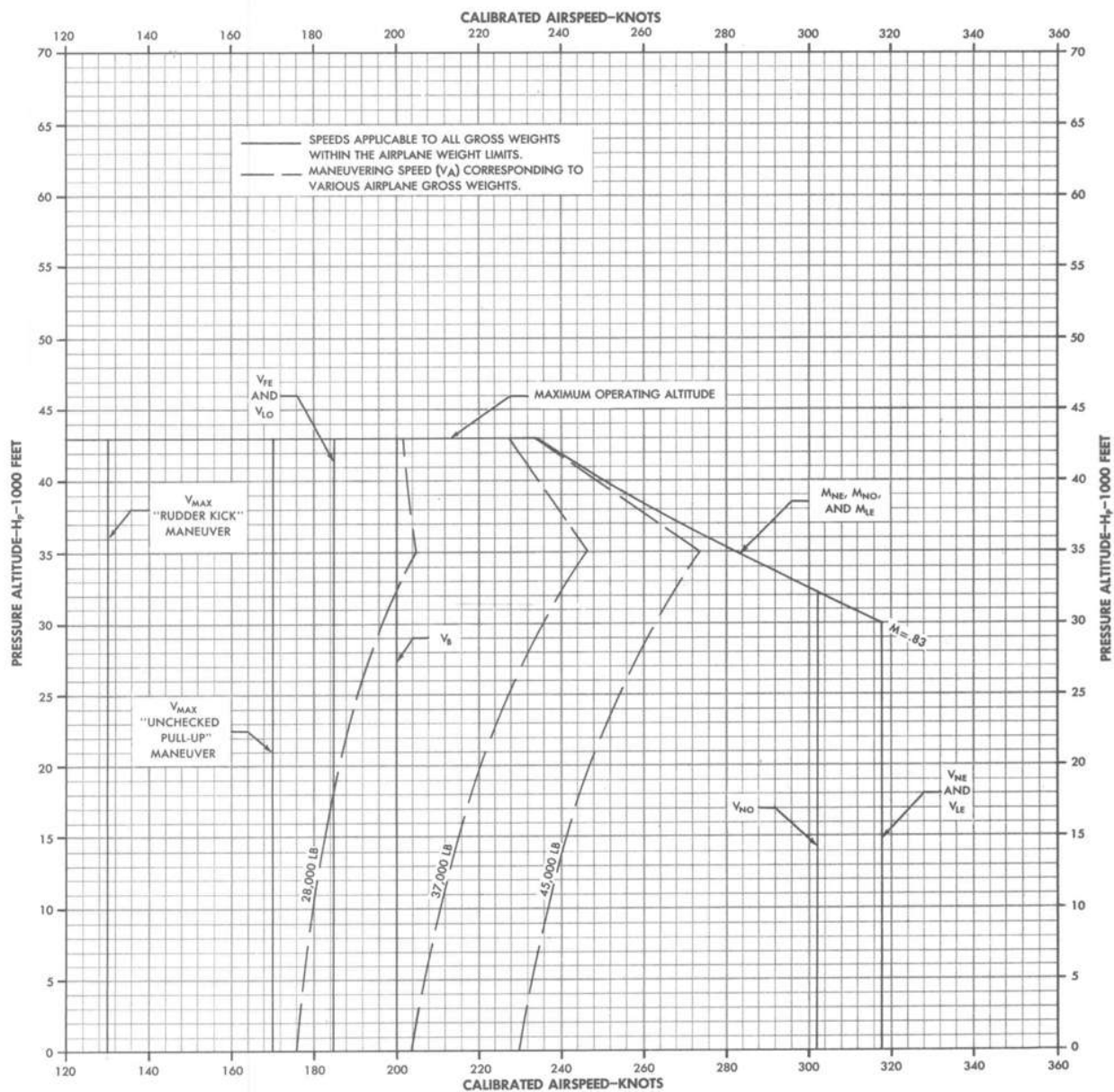
MANEUVERING SPEED.

V_A - See Figure 1-7.

AIRPLANE FLIGHT MANUAL

AIR SPEED LIMITATIONS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
FLAPS UP, GEAR UP



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Figure 1-7

AIRPLANE FLIGHT MANUAL

AIRSPEED LIMITATIONS (Continued)

NOTE

"Maximum Use" of the primary flight controls must be confined to speeds below V_A . For this purpose "Maximum Use" is defined as the lesser of the following:

Elevator and Rudder - Full throw, or 300 pounds total force
Aileron - Full throw, or 80 pounds total force with each hand.

In addition the following restrictions must be observed:

No "unchecked pull-up" maneuver is permitted above 170 knots CAS. This limitation is based on the following definition of "unchecked pull-up": From an initially steady level flight the elevator is displaced suddenly to the maximum attainable deflection ("maximum use") to obtain airplane nose-up pitching.

No "rudder kick" is permitted above 130 knots CAS. This limitation is based on the following definition of "rudder kick": From an initially steady straight flight the rudder is suddenly displaced to the maximum attainable deflection ("Maximum use") and held.

DESIGN SPEED FOR MAXIMUM GUST INTENSITY.

200 Knots CAS (V_B)

NOTE

V_B is considered the maximum speed for flying in known turbulent weather.

FLAPS EXTENDED SPEED.

185 Knots CAS (V_{FE})

LANDING GEAR OPERATING SPEED.

185 Knots CAS (V_{LO})

This is the maximum speed at which the landing gear may be retracted.

LANDING GEAR EXTEND SPEED.

The maximum speed at which the landing gear may be extended and locked, V_{LE} ; values quoted for Never Exceed Speed (V_{NE}) or (M_{NE}) apply.

LANDING LIGHT EXTEND SPEED.

218 Knots CAS (V_{LLO})

AIRPLANE FLIGHT MANUAL

AIRSPPEED LIMITATIONS (Continued)

MINIMUM CONTROL SPEED.

One Engine Inoperative:

 V_{MC} - 110 Knots CAS (Sea Level and 59°F)

For other ambient conditions, see Figure 3-4 or 3-5

Two Engines Inoperative:

See Section II for this information.

FLIGHT LOAD ACCELERATION LIMITS

Flaps - Up	+2.5g
	-.75g

Flaps - Landing	+2.0g
	-0.0g

TYPE OF AIRPLANE OPERATION

This airplane is provisionally certificated in the Transport Category (CAR 4b and SR 422B --- Class I Provisional Type, SR 425B).

The airplane is eligible for the following types of operation when the required equipment is installed:

Night Flight
Instrument (IFR)

NOTE

The airplane is not approved for flight in known icing conditions.

MINIMUM FLIGHT CREW

Two Crew Members - Pilot and Co-Pilot.

MAXIMUM OPERATING ALTITUDE

The maximum operating altitude for this airplane is 43,000 Ft.

AIRPLANE FLIGHT MANUAL

FUEL SYSTEM OPERATING LIMITATIONS

FUEL GRADE.

The approved fuel designations are:

MIL-F-5572, Aviation Gasoline (Lowest grade preferred)
MIL-J-5624D JP-3 or MIL-J-5624D JP-3 with 5% (by volume) MIL-F-5566
Isopropyl Alcohol added

FUEL LOADING

If less than full fuel is loaded, the decrement must be in the center wing tank; i.e. load outboard wing tanks first.

Approved loading schedule must be maintained. Therefore in the event that normal transfer does not empty the center wing tank, fuel from this tank must be dumped.

CROSSWIND LIMITATION

Satisfactory controllability has been demonstrated in landings and take-offs in crosswinds up to 17 knots. This crosswind value is not to be considered as limiting.

CABIN PRESSURIZATION LIMITATIONS

Normal maximum operating differential 8.9 +.1, -.3 psi.

During landing, the maximum cabin differential pressure may not exceed 2 psi.

WINDOW HEAT LIMITATION

To provide resistance to bird penetration, windshield temperature must be maintained.

STABILIZER TRIM SETTING LIMITATIONS

The stabilizer trim control should be set in accordance with the take-off stabilizer trim setting shown in figure 3-33.

The stabilizer trim control should be set to at least 10 degrees ANU for all landings.

OPERATIONS APPROVED WITH INOPERATIVE EQUIPMENT

The airplane may be operated with the following equipment inoperative:

1. Autopilot
2. Yaw Damper
3. Any ONE Generator
4. High Frequency Communications System (Telephone)

AIRPLANE FLIGHT MANUAL

OPERATIONS APPROVED WITH INOPERATIVE EQUIPMENT (Continued)

- *5. Either one of Dual ADF
- *6. Either one of Dual VHF Communications Systems
- *7. Either one of Dual VHF NAV Systems.
- *8. Either of Dual Flight Director System Computers

NOTE

* Only two of any items from 5 through 8 may be inoperative at any one time.

- 9. Wing De-Ice System
- 10. Electrical Power to KIFIS
- 11. Either Retractable Landing Light
- 12. Elevator Power Cylinder.

AIRPLANE FLIGHT MANUAL

SECTION II
OPERATING PROCEDURES
A. NORMAL PROCEDURES

Normal operating procedures which are peculiar to the McDonnell 220 jet transport are presented in abbreviated form. This section will not replace the check list but supplements it. It generally includes information involving unusual or unique techniques for this type of airplane.

ENTRANCE

The pneumatic-electric door may be opened externally by turning the flush mounted handle clockwise which pneumatically moves the door inboard to engage the slide rails. This movement exposes the control switch which when actuated, electrically slides the door back.

BEFORE ENTERING COCKPIT.

1. Check that cabin door air pressure is within 800-3000 psi.
2. Check that cabin's escape hatches are secure and locked.

PRE-START CHECK

NOTE

Overhead panel switches are moved down and forward to the ON position.

1. Emergency rudder hydraulic control circuit breaker - PULLED
This prevents emergency hydraulic pump motor from operating when electric power is turned on without hydraulic pressure on the system.
2. Power Select switch - NORMAL
This switch has a PARKED position to be used on the ground to provide electrical power for cabin and entrance light, Galley Equipment, thunderstorm lights and crossfeed valve.
3. Firewall shutoff "T" handle - CHECKED IN
When pulled the appropriate telelite marked "Fuel Valve Malfunction" will momentarily illuminate as this light is only on while the valve is in other than the position called for by the handle.

STARTING ENGINES

The recommended engine starting sequence is No. 4, 3, 2, and 1, because it is necessary to insert external power into each individual engine pod.

If engine does not start, do not operate starter longer than 30 seconds. Do not re-engage starter until engine has come to a complete stop. Allow a 30 minute cooling period for starter after two successive 30-second starting attempts.

AIRPLANE FLIGHT MANUAL

PRE-TAKE-OFF

1. To check generator voltage, place the switch of the generator it is desired to check in the OFF position and voltmeter selector switch to this generator.
2. Rudder emergency hydraulic control circuit breaker - IN
Since normal hydraulic pressure is available, the rudder emergency hydraulic pump will not operate.
3. Set flaps for take-off but do not overshoot the take-off setting as automatic speed brake deflection occurs at 3/4 full flap. Check speed brake visually for closed position.
4. Check center tank fuel quantity and transfer light to ascertain that automatic transfer is in progress. This will assure that airplane c.g. is within limits. Transfer normally will start while taxiing out.

TAKE-OFF

During take-off, one pilot should monitor engine instruments for indication of abnormal performance.

AFTER TAKE-OFF.

The flaps should be retracted after reaching 150 knots, and speed maintained below 185 knots until flaps are fully retracted.

LANDING

Approved loading schedule must be maintained. Therefore in the event that normal transfer does not empty the center wing tank, fuel from this tank may have to be dumped in order to maintain center-of-gravity within prescribed limits.

Automatic 8-10° speed brake deflection occurs whenever the flaps are extended to beyond TAKE-OFF. This provides increased aileron effectiveness.

Thrust is not linear with throttle movement. Consequently an undershoot must be recognized early and throttles advanced to OPEN until the condition is definitely corrected.

CROSSWIND LANDING.

Normal crosswind techniques are recommended for crosswind take-offs and landings. Due to less than 2 feet outer pod ground clearance in the level attitude, care should be exercised to prevent excessive lateral displacement. Avoid unnecessary nose-high attitudes at touchdown and lower the nose wheel to the runway as soon as practicable.

TURBULENT AIR PENETRATION SPEED

Refer to Limit Speeds Chart in Section I.

AIRPLANE FLIGHT MANUAL

HIGH ALTITUDE MANEUVERING

The airplane may be maneuvered in a normal manner at various conditions of weight, speed and altitude. Accelerations of more than 1.5 "g" at high altitude may cause light buffet. Refer to Maneuvering Envelope Chart in Section III.

HIGH SPEED TRIM CHANGE

Trim changes at high speed require very little movement of the autopilot pitch controller or the stabilizer trim. Abrupt movement of either will cause considerable changes in airplane attitude and normal acceleration.

COMPRESSIBILITY EFFECTS

Compressibility effects become noticeable at approximately 0.9 TMN as mild buffet onset occurs. The buffet will occur somewhat earlier if above 1 "g" acceleration is applied to the airplane. No stability changes are evident up to these speeds.

ENGINE OPERATION

Reasonably rapid throttle changes may be made during ground or low altitude operation without adverse engine reaction. However, compressor stalls may occur during rapid throttle accelerations at high altitudes. If compressor stall occurs, the throttle should be retarded until the stall is eliminated and then advanced slowly.

FUEL SYSTEM

Fuel capacity is 2550 gallons with approximately 65 gallons unuseable, yielding 2485 gallons of useable fuel.

Useable fuel tank quantity:

Tank	Nominal Capacity U.S. Gallons	Nominal Capacity JP-3 at 6.5 lbs./gal. pounds	Nominal Capacity AvGas at 6.0 lbs./gal. pounds
left wing	925	6013	5550
right wing	925	6013	5550
center tank	635	4128	3810
Totals	2485	16,154	14,910

FUEL QUANTITY INDICATION.

The fuel quantity system automatically compensates for fuel density; however, airplane attitude has considerable effect on fuel readings and airplane should be in stabilized level flight at reasonable cruise speeds in the clean configuration at 1 "g" acceleration for accurate readings.

AIRPLANE FLIGHT MANUAL

FUEL SYSTEM (Continued)

FUEL SYSTEM MANAGEMENT AND USEAGE SEQUENCE.

Fuel management is the same whether center tank fuel is available or not. Either the center tank should be empty or start transferring immediately whenever the outer wing tank level sensing switch actuates. With all tanks full, center tank transfer usually begins while taxiing out and operates intermittently until empty.

If unsymmetrical wing fuel distribution occurs, crossfeed from the heavier to the lighter tank is recommended.

When fuel level in either wing tank reaches approximately 1150 to 1250 pounds, the low level fuel warning light on the telelite panel will illuminate.

FUEL FILTER PRESSURE INDICATIONS.

Fuel filter on each engine has a pressure transducer actuating a light on the pedestal to announce when the filter bypass is operating. This provides a warning that ice or other foreign matter has clogged the filter and it should be inspected before the next flight.

USEABLE FUEL AFTER JETTISONING.

All except approximately 3250 lbs. of fuel in each wing can be jettisoned. The center tank will empty completely.

DE-ICE SYSTEM

GROUND OPERATION.

Remove all ice and snow from engine inlet, nose duct and wing and tail surfaces. Rotate the engine compressor by hand to be certain that it is free before starting engines. After engines are started and all generators are on the line, the windshield heat is normally placed on LOW required for bird proofing and anti-icing. After five minutes on LOW, it can be placed on HI and will automatically maintain windshield temperature at 110°F.

If icing encounters are possible, the de-ice boots should be checked prior to taxiing out. Either fast or slow cycle should be used and visual inspection made for proper operation. The airplane is not approved for flight into known icing conditions; such flight should be avoided when possible.

FLIGHT OPERATION.

If ice is encountered in flight, windshield heat should be turned to LOW if not already on and subsequently to HIGH. The wing ice should be allowed to accumulate to approximately 1 inch before activation of the boots. They should remove almost all accumulation within several cycles and should be turned off until sufficient new accumulation is formed.

AIRPLANE FLIGHT MANUAL

DE-ICE SYSTEM (Continued)

CAUTION

The engines have no anti-icing provisions. Continual operation in ice could result in sufficient ice accumulation to cause either excessive engine temperature or ice ingestion from the duct lips and consequent compressor damage.

SPEED BRAKE SYSTEM

Speed brake effect is obtained from displacing the spoilers symmetrically which decreases lift and increases drag. They may be used to reduce speed, change the approach pattern, or reduce the wing lift after landing, increasing brake effectiveness. The speed brakes may be operated at any speed within the approved flight envelope. The landing gear may also be used as a speed brake, and can be extended at any speed, but cannot be retracted above 185 knots CAS.

YAW DAMPER OPERATION

The airplane is satisfactorily stable under all conditions with yaw damper inoperative, however, the damper reduces pilot effort in flying the airplane. In some conditions with the yaw damper inoperative, a yaw-roll motion can be initiated which may be stopped by applying rudder and aileron to level the wings and stop the yaw.

AUTOMATIC FLIGHT CONTROL SYSTEM

The Automatic Flight Control System (AFCS) is the Lear L102B Autopilot with couplers for proper flight path control. The engagement of the various modes is controlled by integrally lighted pressure type push buttons on a pedestal mounted flight controller. The steady state condition of the autopilot servos is indicated by three miniature panel meters, which may be used to check the possibility of engaging transients prior to switching on the system or switching from one mode to another. The operation of the autopilot following selection of each mode (listed by controller engraved nomenclature) is described below.

SWITCHING SEQUENCES.

The application of power to the airplane by starting the engines or by applying external ground power supplies the necessary AC voltages to put the AFCS amplifiers and couplers in a standby position. Operation of the Autopilot Master switch applies power to the rate gyros (which takes 30 seconds to reach operating speed) and connects the d-c switching voltages to the AFCS Controller. Switch power for each channel of the AFCS passes through separate circuit breakers so that malfunction of one channel will not prevent use of the other two. A switch on the stabilizer cut-off lever prevents the AFCS from being engaged unless the stabilizer drive motor is geared to the screw jack. The DAMPER button engages only the rudder channel, whereas the ENGAGE button engages all three channels. Depression of the DAMPER button after the

AIRPLANE FLIGHT MANUAL

AUTOMATIC FLIGHT CONTROL SYSTEM (Continued)

ENGAGE button has been selected will cause the aileron and elevator channels to disengage. Operation of the Autopilot Disengage switch on the outboard arm of either control wheel will cause all three channels of the AFCS to disengage. A scissors switch on the main landing gear will disengage the AFCS if it has not been disengaged prior to touchdown.

DAMPER.

The rudder channel of the AFCS uses rate signals generated by a yaw rate gyro to improve the Dutch Roll stability of the airplane, and lateral acceleration signals from linear accelerometer to coordinate turns. The stability of the airplane is satisfactory without the damper for all flight conditions, but the use of the damper reduces the pilot's effort in flying the airplane.

ENGAGE.

The ENGAGE button adds the aileron and elevator channels of the AFCS to the rudder channel. The AFCS may be engaged directly without depressing the DAMPER button if desired. Operation is the same regardless of whether or not the damper has been previously engaged separately. Upon engagement, the AFCS will roll the airplane to wings level and hold the heading and the pitch angle present at the time of engagement. Airplane maneuvers may be made without disengaging the AFCS by using the ROLL knob and the PITCH switch. Rotation of the ROLL knob commands a proportional bank angle, up to a limit of $\pm 30^\circ$, while operation of the pitch switch commands an aircraft pitch rate. Two levels of pitch rate are available, being chosen by the force applied to the switch. Upon release of the PITCH switch or return to detent of the ROLL knob, the AFCS will operate in the ENGAGE mode.

NOTE

If the ROLL knob is out of detent, or if the stabilizer cut-off lever is in the emergency position, the ENGAGE button will not function.

HDG SEL

The pilot may use the AFCS to turn the aircraft to any desired heading by selecting that heading with the course set control on the Course Deviation Indicator of the flight director and then depressing the HDG SEL button. Once this mode has been selected, further motion of the course set control will cause identical maneuvering of the aircraft. If the pilot wishes to select another heading for future use, he may return the AFCS to the ENGAGE mode by momentarily depressing the ROLL knob.

ALTITUDE

The ALTITUDE mode will cause the airplane to hold the barometric altitude at which it is engaged. It is not recommended that the ALTITUDE control be

AIRPLANE FLIGHT MANUAL

AUTOMATIC FLIGHT CONTROL SYSTEM (Continued)

engaged if the rate of climb or dive of the airplane is greater than 2000 feet per minute. There are two levels of control available - HOLD and SOFT. The selection of SOFT control reduces the gain of the system for flying in turbulent air.

LOC/VOR

Operation of the LOC/VOR buttons will couple the AFCS to the output of the navigation receivers and cause the airplane to approach the desired station on the selected radial. The CAPTURE button will cause the airplane to properly bracket the radio beam, after which depression of the HOLD button will introduce circuits which will compensate for crosswind effects. It is recommended that the aircraft be within 5° of the desired radial before engagement of the HOLD button. Operation of these buttons is the same for both Localizer and VOR operation.

GLIDE PATH.

Depression of the GLIDE PATH button will cause the AFCS to capture and follow the glide path beam. Engagement of the glide path should not be attempted until the glide slope needle of the flight director shows that the airplane has reached beam center. Selection of GLIDE PATH control automatically disengages ALTITUDE control, if such has been previously engaged.

AUTOMATIC TRIM.

The automatic trim circuits are used to unload the AFCS servos so as to extend their useful life. A failure of the trim system is indicated by the YAW and Pitch Trim lights mounted beneath the three AFCS servo meters on the pedestal. A "nuisance" trip may be checked by disengaging and then re-engaging the AFCS. If either light remains lit, that trim circuit may be disconnected by use of the YAW and PITCH TRIM CUT-OFF switches on the front of the AFCS Accessory Box in the equipment bay. Failure of the trim system does not disengage the AFCS, but care must be taken to prevent airplane transients during mode switching or upon AFCS disengagement once either trim system is inoperative.

ELECTRICAL SYSTEM OPERATION

NORMAL OPERATION.

In normal operation, the electrical system will have four engine-driven d-c generators supplying power to the d-c bus. Three a-c - d-c inverters are connected to the d-c bus and supply all aircraft a-c power. The No. 1 inverter

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ELECTRICAL SYSTEM OPERATION (Continued)

supplies all a-c systems except pilot and co-pilot windshield heat, which is available from No. 2 and No. 3 inverter respectively. In case of No. 1 inverter failure, the No. 3 inverter can be transferred to the a-c bus with the overhead inverter transfer switch.

STARTING AND SHUTDOWN.

During starting and shutdown, the first generator connected and the last disconnected must carry all the load. Consequently, all non-essential electrical loads should be off until all generators are operating. After engines are running, the four generator switches are first turned to RESET and then ON.

CIRCUIT PROTECTION.

The d-c circuits are protected by circuit breakers and a-c circuits by fuses. If a circuit breaker opens again after being reset or a fuse blows after being replaced, it indicates an overload or a short in that circuit and continued use is not possible.

GENERATOR OVERHEAT.

The "Gen Overheat" warning light on the telelight panel will illuminate whenever the generator is above its normal running temperature. For corrective action see Emergency Procedures portion of this section.

GENERATOR FAILURE.

The failure of a generator will be indicated by illumination of the "Gen Out" light on the telelight panel. Refer to the Emergency Procedures portion of this section for the corrective action in the event of generator failure.

INVERTER FAILURE.

Illumination of either "Windshield Inverter Out" warning lights on the overhead telelight panel may indicate a failed inverter. Corrective action is discussed in the Emergency Procedures portion of this section.

CABIN PRESSURIZATION CONTROL SYSTEM

In the event that the pressure differential exceeds the maximum operating limit of 8.9 +.1, -.3 psi, the manual pressure control knob can be used to maintain the system within proper limits. This method simply bypasses the automatic feature of the cabin pressure controller and performs the function manually.

It is important, especially when operating at maximum differential pressure, to keep the current barometric pressure set in the proper window so that the **cabin pressure controller will be correctly calibrated and indicate a true differential pressure.**

AIRPLANE FLIGHT MANUAL

BENDIX "300" SERIES FLIGHT DIRECTOR SYSTEM

The dual flight director system provides precise flight control during navigation and landing approach. In addition to supplying visual guidance and attitude information it may also be interlocked with the autopilot to provide fully automatic flight control, at a constant altitude, or on the glide slope of a landing approach. Attitude and guidance information is displayed via a horizon director indicator and a course deviation indicator for both pilot and co-pilot. Controls used (excluding the autopilot controls) are the vertical gyro switch, located on the right aft corner of the pedestal, and the pitch sensitivity switch, altitude hold switch, pitch trim command and mode selector switch, located on the pilot's lower instrument panel.

VERTICAL GYRO SWITCH.

This is a two-position switch on the aft right hand corner of the pedestal panel and is marked GYRO.

1. Position No. 1 is the normal position for this gyro switch. In this position attitude information from vertical gyro No. 1 is fed to the pilot's flight director system while attitude information displayed on the co-pilot's flight director system comes from vertical gyro No. 2.
2. Position No. 2 allows the pilot's flight director system to receive attitude information from vertical gyro No. 2 while the co-pilot's flight director system will continue to receive attitude information from vertical gyro No. 2.

PITCH SENSITIVITY SWITCH.

This switch has two positions, NORM and HI. In the HI position it expands the pitch command display on the HDI. This sensitivity is generally set at a ratio of 2 to 1 over NORM sensitivity.

ALTITUDE HOLD SWITCH.

This two-position toggle switch provides an altitude reference on the command bar. Any deviation from the reference altitude will cause a pitch command to be displayed by the command bar on the HDI. Once engaged it is automatically held in the ENGAGE position except when the mode selector is in the OFF position or in the GS (Glide Slope) position, or when it is manually moved to the OFF position.

PITCH TRIM COMMAND.

This knob is used to trim the command bar and should not be confused with the pitch attitude trim knob on the horizon director indicator which is used to adjust the horizon sphere at a given aircraft attitude. This trim knob provides a means of trimming the command bar in the pitch axis, and can be used to introduce a desired pitch command. This pitch command may be used to introduce a climb reference up to 11° or a descent reference to -6° , as indicated.

AIRPLANE FLIGHT MANUAL

BENDIX "300" SERIES FLIGHT DIRECTOR SYSTEM (Continued)

MODE SELECTOR SWITCH.

The four-position mode selector switch gives a choice of OFF, HEADING, LOC-VOR and GS modes. Their individual functions will be discussed under Operating Instructions.

INTERLOCK FUNCTIONS.

1. The pitch trim command will have no effect with the altitude hold switch in ON position nor when the mode selector switch is in Glide Slope mode.
2. The altitude hold switch will return to OFF position when the mode selector switch is in OFF or GS mode.
3. The mode selector can be returned to OFF mode manually.

KOLLSMAN INTEGRATED FLIGHT INSTRUMENT SYSTEM (KIFIS)

This system consists of air actuated instruments (airspeed indicator, altimeter and machmeter for each pilot) to which are added the signals to furnish angle of attack (on airspeed indicators), instrument scale error correction (for the altimeters) and outside air temperature (on a single, separate static air temp. indicator). No static system error correction is provided.

The system is controlled by separate Flight Instrument System panels on the main instrument panel.

1. The Power switch provides electrical power to the system.

NOTE

Without electrical power to the system, the conventional pitot and static supplied indications of airspeed, mach number and altitude will continue to be presented.

2. The Servo Check-Out switch will drive the angle of attack, altitude and static air temperature to predetermined values on the indicators. This will serve as a preflight or in-flight check of the functioning of the electrical portion of the system.
3. The Static Source Sel switch ties the co-pilot's air actuated instruments into independent external static vents in STATIC position and into an internal (but ambient) static source in ALT STATIC for use if ice or other failure of the primary static vents should occur.

NOSE BOOM AIR DATA SYSTEM

The pilot's airspeed, altimeter, rate of climb and the autopilot are connected to the airplane nose boom air data system.

AIRPLANE FLIGHT MANUAL

OPERATING PROCEDURES

B. EMERGENCY PROCEDURES

ENGINE FAILURE

DURING TAKE-OFF.

Before Reaching V_1

If an engine fails before reaching critical engine failure speed, observe the following:

1. Throttles - IDLE
2. Speed brakes switch - OUT
3. Brakes - APPLIED
4. Nose wheel steering - ENGAGED
5. No. 1 and No. 4 throttles - CLOSE

If unable to stop on remaining runway:

6. No. 2 and No. 3 throttles - CLOSE
7. Four firewall shutoff "T" handles - PULL
8. Fire extinguisher - AS NEEDED
9. Power select switch - PARKED when assured of no fire.
10. Battery switch - OFF when deplaning.

After Reaching V_1

Accelerate to V_R , lift-off and as soon as definitely airborne, complete the following:

1. Landing gear handle - UP
2. Attempt no unnecessary turns or climb until safe airspeed is attained.
3. Flap switch - UP
Retract flaps as soon as a safe airspeed is attained.
4. Failed engine - SHUTDOWN
 - a. Throttle - CLOSE
 - b. Firewall shutoff "T" handle - PULL
5. Dump fuel if immediate landing is necessary.
6. Trim for landing.

DURING FLIGHT.

1. Positively determine which engine has failed and check visually for indications of trouble.
2. Throttle - CLOSE
3. Attempt to determine cause of engine failure.

If failure can be attributed to other than mechanical failure, an airstart may be attempted.

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ENGINE FAILURE (Continued)

If mechanical failure was the cause of engine failure:

4. Firewall shutoff "T" handle - PULL

DOUBLE ENGINE FAILURE.

In the event that two engines fail, the electrical load must be reduced and, if an inboard and outboard engine on opposite sides fail, the crossfeed must be used to maintain balance of fuel in the outboard wing tanks.

1. Throttles on failed engines - CLOSE
2. Windshield heat - OFF

NOTE

If pilot requires windshield anti-icing, pull the R/H windshield inverter control circuit breaker and turn windshield heat ON.

3. Firewall shutoff "T" handle - PULL (failed engines only)

AIRSTART.

NOTE

A flame-out is indicated by a sharp decrease in exhaust temperature and a gradual decrease in engine RPM.

1. Throttle on failed engine - CLOSE
2. Firewall shutoff "T" handle - IN
3. Power select switch - NORMAL
4. Master ignition switch - ON
5. Engine RPM in proper range for airstart; vary airspeed if necessary.
6. Advance throttle on affected engine to an intermediate position between CLOSE and IDLE and modulate to keep exhaust temperature within limits.
7. Exhaust temperature gage - CHECK WITHIN LIMITS

NOTE

The exhaust temperature should be continuously monitored during airstarts. It may be necessary to retard the throttle from the IDLE position to prevent the exhaust temperature from exceeding limits.

8. Successful airstart is indicated by an increase in engine RPM and exhaust temperature.

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ENGINE FAILURE (Continued)

9. If engine does not start:
 - a. Throttle - CLOSE
 - b. Allow engine to windmill one minute to clear excess fuel.
 - c. Airstart ignition button - DEPRESS
 - d. Repeat steps 5 thru 8.
10. Oil pressure - CHECK
11. At 25% RPM or above, generator switch - CYCLE - select RESET, then ON.

LANDING WITH ONE ENGINE INOPERATIVE.

Landing with one engine inoperative is basically the same as a normal landing except that the pattern is expanded to avoid steep turns, and the final approach speeds are slightly increased to allow for slower acceleration. Make all turns away from bad engine if it is convenient to do so.

NOTE

Do not completely trim out all rudder forces for landing. If all rudder forces are trimmed out, the airplane will tend to turn into the good engines when power is reduced for touchdown.

Do not reduce speed below VMC until committed to landing.

GO-AROUND PROCEDURE

WITH THREE OR FOUR ENGINES OPERATING.

1. Throttles - OPEN
2. When climb indicator shows definite climb established, retract landing gear.
3. At 150 knots IAS, flaps - UP
4. Reduce power to desired setting for traffic pattern.
5. Perform pre-landing check list prior to landing.

WITH TWO ENGINES OPERATING.

NOTE

With only two engines operating, considerable anticipation and planning must be exercised so as not to get too far along in the approach before starting the pull-up...especially at the higher gross weights.

Burn off or dump fuel to a reasonably low level and make approach with landing gear down and holding flaps up until absolutely certain of making the runway. If conditions permit, a flap setting between Up and Approach

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GO-AROUND PROCEDURE (Continued)

may be used. Hold an approach speed as recommended for no flaps landing.

1. Add take-off thrust on good engines. If both good engines are on the same side, trim on final approach in anticipation of a possible go-around so that reasonable pilot effort can overcome asymmetric trim with full power.
2. When climb indicator shows definite climb established - retract gear.
3. At 150 knots IAS "milk up" flaps (if used).
4. Set thrust as required when at a safe altitude, and avoid steep turns.
5. Perform pre-landing check list prior to landing.

WITH MINIMUM FUEL ABOARD.

In the event it should be necessary to execute an aborted approach with minimum fuel load, use the following procedure;

1. Accelerate as necessary.
2. Retract gear.
3. Retract flaps.
4. Execute a minimum radius turn without excessive speed or climb attitude.
5. Expedite return to approach position.

NOTE

With proper procedure a go-around can be accomplished under ideal circumstances with 300 pounds of fuel. However, due to unuseable fuel and steep turns, a go-around should not be attempted with **less than 1000 pounds of fuel evenly distributed between the two wing tanks.**

POWERED RUDDER FAILURE

If the normal powered rudder fails due to loss of hydraulic pressure, an emergency hydraulic system will take over. When main system pressure falls to 325 psi \pm 50 a sensing switch automatically starts an electric motor driven pump with its own hydraulic reservoir and the rudder system continues to function normally.

If a second failure should render this system inoperative, or if the original system trouble was with a component common to both systems, pull the "Rudder Power Control" circuit breaker on the overhead panel and the rudder system can be operated unpowered.

This airplane has flown many hours with an unpowered rudder without encountering any dangerous flight conditions. A yaw oscillation is rather easily started at higher altitudes and Mach numbers, but it is controllable and not dangerous. Rudder pedal forces increase noticeably in all phases of flight, especially with asymmetric power conditions. Rudder lock in ex-

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POWERED RUDDER FAILURE (Continued)

treme side-slips can be encountered but moderate pilot effort will overcome it.

When using unpowered rudder, the electrical trim feature should not be used. Instead, use the manual trim knob located on the floor just aft of the pedestal. The locking pin must be removed prior to use.

POWERED ELEVATOR FAILURE

In the event that the powered elevator system becomes inoperative, no serious problem confronts the pilot. Forces will be a little higher, especially in the full aft position on the landing flare. However, they will still be well within reasonable limits. Make certain that all longitudinal forces are trimmed out on the final approach. This will require at least 10° nose-up trim under normal center of gravity conditions. If there should be any trouble holding the nose up, leave engine power on until just about touch-down to take advantage of the low thrust line.

SPOILER FAILURE

If a complete hydraulic failure or system failure renders the spoilers inoperative, there is no emergency operation available. In smooth air, no particular precaution is necessary since basic lateral control will be adequate. It would be expedient for the pilot to exercise care in avoiding any possible slip-stream from another aircraft. If turbulence is encountered, get well established on final approach with plenty of straight-away and increase airspeed accordingly to gain lateral control. Again, watch for slip-stream and be ready to add power for a go-around if the lag in lateral control becomes critical during the final stages of the approach. The rudder is effective in bringing a wing up and a flaps-up approach permits improved lateral control.

FIRE

ENGINE FIRE DURING STARTING.

If the fire warning light(s) illuminate or there is evidence of fire during starting:

1. Throttle(s) - CLOSE
2. Advise control to alert fire trucks.
3. Master ignition switch - OFF
4. Allow engine to continue cranking for 30 seconds.
5. Engine start switch - STOP-START
6. Firewall shutoff "T" handle - PULL
7. Check engine visually for indication of trouble.
8. Use fire extinguishers as necessary.

ENGINE FIRE DURING TAKE-OFF.

If a fire warning light illuminates during take-off roll, it is preferable

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FIRE (Continued)

to abort immediately if below V_1 speed.

1. Throttles on outboard engines and engine indicating fire - CLOSE
2. Brakes - APPLIED
3. Nose gear steering - ENGAGED
4. Windshield heat - OFF
5. Firewall shutoff "T" handle - PULL
6. Make visual inspection of engine indicating fire.
7. If fire is detected, discharge fire extinguishers as necessary.

ENGINE FIRE AFTER TAKE-OFF.

NOTE

The following procedures are applicable only to the phase immediately after take-off. If these procedures do not eliminate the emergency, refer to Engine Fire During Flight.

1. Throttle (engine indicating fire) - IDLE
2. Landing gear handle - UP
3. Attempt no unnecessary turns or climb until safe airspeed is attained.
4. After safe airspeed is attained, flap switch - UP
5. Make visual inspection on engine indicating fire.
6. If light continues to glow or there is visual indication of fire, shut-down affected engine:
 - a. Throttle - CLOSE
 - b. Firewall shutoff "T" handle - PULL
 - c. Use fire extinguishers as necessary.

ENGINE FIRE DURING FLIGHT.

1. Throttle (engine indicating fire) - IDLE
2. Visually check engine from cockpit and cabin for indications of fire.
3. Check all instruments, telelights and circuit breakers.
4. If fire warning light goes out, continue flight at reduced thrust and land as soon as possible.
5. If fire warning light does not go out, throttle - CLOSE
6. Firewall shutoff "T" handle - PULL
7. Visually check engine.
8. If fire warning light is still on or there is visual indication of fire, discharge No. 1 extinguisher bottle.
9. If visual indication of fire remains, discharge No. 2 extinguisher bottle.

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Section II
Operating Procedures
B. Emergency Procedures

FIRE (Continued)

ENGINE FIRE AFTER SHUTDOWN.

1. External electrical power - CONNECTED
2. Throttle - CLOSE
3. Power selector switch - NORMAL
4. Master ignition switch - OFF
5. Engine start switch - START
6. Allow engine to crank approximately 30 seconds.
7. Engine start switch - STOP-START
8. Firewall shutoff "T" handle - PULL
9. Use fire extinguishers as required.
10. Evacuate passengers as soon as possible.

ELECTRICAL FIRE.

1. If flying VFR below 35,000 feet and fire is severe, disconnect electrical power sources.
 - a. Generator switches - OFF
 - b. Battery switch - OFF

NOTE

If flying IFR, omit step 1 and proceed with steps 2 thru 8 below.

With the generator and battery switches OFF, electrical power to all circuits (fuel boost pumps, fuel pressurization, flight instruments, radios, etc.) is disconnected. However, below 35,000 feet, gravity feed should provide sufficient fuel to preclude flame-out.

2. All unnecessary electrical equipment - OFF
3. Check circuit breakers and reset as expediency demands.
4. Power selector switch - NORMAL
5. Stand by with fire extinguisher in critical area.
6. If affected circuit can be determined, turn the equipment off and pull the applicable circuit breaker.
7. Generator switches - ON
8. If cause of fire cannot be found, continue flight with only essential equipment operating and land as soon as possible.

NOTE

If smoke in cockpit becomes excessive, refer to Elimination of Smoke and Fumes.

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ELIMINATION OF SMOKE AND FUMES

If smoke or fumes are excessive:

1. Oxygen regulator diluter lever - 100% OXYGEN
2. Pilots don smoke masks and connect oxygen hoses.
3. Cabin pressure dump switch - DUMP

NOTE

When the dump valve is actuated, considerable physical strains are experienced. Therefore, if conditions permit, follow procedures for Minor Smoke or Fumes.

When the dump valve switch is actuated, the cabin dump valve is opened, the hot air shutoff and bypass valves are closed and the ram air valve is opened. To get maximum airflow through the cockpit, depressurize manually or pull shutoff valve, bypass valve and ram air valve circuit breakers before actuating dump switch. This procedure dumps pressure without cutting off airflow. If smoke is still excessive, open pilot compartment door, remove over wing hatch and open pilot's window. Aircraft should be slowed to 150 knots IAS for this operation.

If smoke and fumes are minor:

1. Oxygen regulator diluter lever - 100% OXYGEN
2. Pilots don smoke masks and connect oxygen hoses.
3. Bleed air switch - OFF

Placing the bleed air switch to OFF closes the hot air valves and opens the ram air valve to purge the cockpit. The airplane will depressurize slowly.

If smoke and fumes are coming from the air conditioning and pressurization system, perform the following if time and conditions permit:

4. Oxygen diluter switch - 100%
5. Bleed air switch - NORMAL
6. Dump valve switch - NORMAL
7. Pull either one of the two "Bleed Air Shutoff" circuit breakers to cut down on air flow from the applicable engines.
8. If smoke and fumes do not stop, reset this circuit breaker and pull the remaining circuit breaker.
9. By elimination, this will determine which pair of engines is responsible for the smoke or fumes.

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ELIMINATION OF SMOKE AND FUMES (Continued)

NOTE

If smoke is excessive, dump pressurization, open pilot compartment door, remove over wing hatch and open pilot's window. Aircraft should be slowed to 150 KIAS for this operation.

OIL SYSTEM FAILURE

An oil system failure is recognized by a drop or a complete loss of oil pressure. If an oil pressure of 10 psi cannot be maintained, shut down affected engine and land as soon as practical.

FUEL SYSTEM FAILURE

BOOST PUMP FAILURE.

If fuel boost pumps fail, fuel will be supplied to the engine by gravity feed. If boost pumps fail above 35,000 ft., flame-out of the affected engines may occur. Boost pump failure is indicated by illumination of the boost pump warning light when pressure drops below 6 psi. Upon illumination of a boost pump warning light, perform the following:

1. Check circuit breaker.
2. Boost pump relay in R/H equipment bay top shelf may be inspected or tapped for possible sticking.

FUEL SYSTEM LEAKAGE.

1. Transfer or crossfeed fuel from leaking tank as soon as fuel space becomes available in other tanks.
2. If leak occurs on engine or in pylon area, shut down engines and pull firewall shutoff "T" handle.
3. Land as soon as possible.

TRANSFER PUMP FAILURE.

The failure of one transfer pump will be indicated by the slow transfer of center wing tank fuel to the outer wing tanks and failure of transfer light to illuminate. If transfer pump failure is detected:

1. Use crossfeed system to transfer fuel from the outer wing tank which is receiving more fuel. Experience has proved that transfer will be reasonably even with only one pump operating.
2. Monitor all three tanks and stop crossfeed when center tank is empty. (Fuel is transferred to both wing tanks from one pump but at a reduced rate.)

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FUEL SYSTEM FAILURE (Continued)

In the event that both transfer pumps become inoperative, it is impossible to transfer center wing tank fuel to the outer wing tanks. Approved loading schedule must be maintained. Therefore in the event that normal transfer does not empty the center wing tank, fuel from this tank must be dumped.

EMERGENCY FUEL DUMPING.

If it becomes necessary to dump fuel in flight, proceed as follows:

1. Fuel dump switch - DUMP

NOTE

Transfer pumps will be stopped if they are operating when the fuel dump switch is actuated.

2. Monitor all three tanks while dumping.
3. Check that each wing tank stops dumping automatically when fuel level in that tank reaches approximately 3100 lbs. (500 gallons).
4. Keep visual check when dumping. After dump switch is returned to NORMAL, check for positive cutoff.

ELECTRICAL SYSTEM EMERGENCY OPERATION

GENERATOR OVERHEAT.

In the event a generator overheat warning light illuminates, perform the following:

1. Check voltage and amperage of overheated generator.
2. Generator switch - OFF
3. If generator overheat warning light does not go out, reduce thrust on that engine and follow steps 4 and 5 for Single Generator Failure.

SINGLE GENERATOR FAILURE.

Failure of one generator will be indicated by illumination of a "Generator Out" light on the telelight warning panel. The remaining generators are sufficient to support the entire electrical load. In the event of generator failure, perform the following:

1. Generator circuit breaker - CHECK
2. Generator switch to RESET and then ON.
3. If the generator is still off the line, generator switch - OFF
4. Turn off all other unnecessary electrical equipment.
5. Check remaining generators to see that none are carrying a 300 amp load and that the existing load is evenly divided among the remaining generators.

AIRPLANE FLIGHT MANUAL

ELECTRICAL SYSTEM EMERGENCY OPERATION (Continued)

DOUBLE GENERATOR FAILURE.

If two generators fail, perform the following:

1. Check generator circuit breakers.
2. Windshield heat - OFF

NOTE

If pilot requires windshield anti-icing, pull the R/H windshield power control circuit breaker and turn windshield heat on.

3. Attempt to reset generators. If not possible, turn bad generators OFF.
4. If neither generator can be reset, turn off all unnecessary electrical equipment and reduce electrical load as much as possible.

INVERTER FAILURE.

The loss of an inverter is indicated by illumination of a "Windshield Inverter Out" warning light on the telelight panel. In the event of an inverter failure, perform the following:

1. Inverter circuit breakers - CHECK
2. If main inverter is out:
 - a. Inverter transfer switch - TRANS
Placing the inverter transfer switch to TRANS position transfers the copilot's windshield inverter to the main a-c bus.
 - b. Turn windshield heat switch OFF if heat is not needed for anti-icing on the pilot's windshield.

HYDRAULIC SYSTEM EMERGENCY OPERATION

SINGLE HYDRAULIC PUMP FAILURE.

Failure of either hydraulic pump is indicated by illumination of a warning light on the telelight panel. Either pump is capable of supplying sufficient pressure for operation of all systems. If a hydraulic pressure low warning light illuminates, check the hydraulic pressure gage. If the hydraulic pressure is normal, only the indicated pump has failed. If pressure has dropped to zero, check hydraulic fluid level. If hydraulic fluid level is low, perform the following:

1. Windshield wiper - OFF
2. Spoiler selector - OFF
3. Spoiler hydraulic power - CUT OFF
4. Flaps selector - OFF
5. Elevator power - CUT OFF

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HYDRAULIC SYSTEM EMERGENCY OPERATION (Continued)

This could possibly isolate the faulty system. Refill the reservoir if time permits and actuate each system to determine the trouble. If trouble can be ascertained, do not use that system. If trouble cannot be found:

1. Spoiler hydraulic power - CUT OFF
 2. Elevator hydraulic power - CUT OFF
 3. Extend landing gear on emergency system.
 4. Extend flaps on emergency system as desired.
 5. Check that both emergency gear and flap selectors are in NORMAL position.
 6. Use hydraulic hand pump for brake pressure after landing. Brake pedals should not be pumped. Use as few maximum allowable brake applications as possible to stop the aircraft.
- } Unless pilot deems operation essential regardless of possible leakage.

DOUBLE HYDRAULIC PUMP FAILURE.

In the event both hydraulic pumps are lost, no hydraulic pressure is available, and the spoilers, elevator power, windshield wipers and nose gear steering are lost. The landing gear, flaps and brakes have emergency methods of operation. Refer to Landing Gear System Emergency Operation, Flap System Emergency Operation and Brake System Emergency Operation. The emergency rudder power system will cut in automatically.

LANDING GEAR SYSTEM EMERGENCY OPERATION

If normal gear operation fails, the gear can be lowered by using the following procedures:

1. Landing gear circuit breaker - CHECK IN
2. Hydraulic pressure gage - CHECK
3. Hydraulic reservoir level - CHECK
4. If hydraulic pressure is up (3000 psi):
 - a. Landing gear handle - DOWN
 - b. Landing gear circuit breaker - PULL
 - c. Landing gear valve "T" handle - PULL
 - d. If gear is not down, perform the steps 5d and 5e below.
5. If hydraulic pressure is low:
 - a. Landing gear handle - DOWN
 - b. Landing gear circuit breaker - PULL
 - c. Three emergency uplock release "T" handles - PULL
 - d. If gear does not lock after free fall, slight yawing or slipping may lock gear. Main gear can be visually checked from cabin windows.

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LANDING GEAR SYSTEM EMERGENCY OPERATION (Continued)

If gear is still not down and locked:

6. Emergency landing gear selector valve - DOWN
7. Operate hand pump to release uplatches, lower and lock gear.

NOTE

Approximately 200 hand pump cycles are required to release, extend and lock landing gear if it does not free fall. Only six to eight cycles are required if it free falls normally.

8. Return emergency landing gear selector valve to NORMAL position so that hand pump can be used to supply hydraulic power for brakes after landing if necessary.

LANDING EMERGENCIES

FORCED LANDING.

WARNING

All forced landings shall be made with the gear extended regardless of terrain. Water landings should be made with gear up.

If a landing is unavoidable, proceed as follows:

1. Burn off or dump excess fuel.
2. Make sure passengers are secure and that there is no smoking. Have passengers remove spectacles. Secure all loose gear in the aircraft. Remove emergency hatches prior to landing. Pilot's and co-pilot's shoulder harnesses LOCKED.
3. Make normal approach and landing at minimum safe speed.
4. At touchdown - CLOSE THROTTLES
5. Firewall shutoff "T" handles - PULL
6. Power select switch - PARKED when assured of no fire.
7. Battery switch - OFF
8. Leave airplane as soon as possible.

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LANDING EMERGENCIES (Continued)

LANDING GEAR UNSAFE INDICATION.

1. Check hydraulic pressure.
2. Check airspeed below 185 knots IAS.
3. Recycle gear.
4. Attempt to lower gear by Emergency Gear Lowering Procedure.

If gear still indicates unsafe:

5. Make fly-by gear check or have another aircraft make a visual check.
6. If gear appears safe, make a normal landing and observe the following precautions:
 - a. Shoulder harness inertia reel handle - LOCKED
 - b. Land on side of runway opposite indicated unsafe gear. Land on center of runway for unsafe nose gear.
 - c. No. 2 and No. 3 throttles IDLE at touchdown; No. 1 and No. 4 throttles - CLOSE
 - d. With main gear unsafe indication, lower nose gear to runway immediately upon touchdown to take advantage of nose gear steering.
 - e. With nose gear unsafe indication, hold nose gear "off" until approximately 95 knots IAS and then lower gently to runway.

NOTE

The elevator begins losing control effectiveness at approximately 95 knots IAS.

- f. Allow aircraft to roll straight ahead and do not taxi after completing landing roll until maintenance personnel have installed the ground safety locks.

LANDING WITH ONE MAIN GEAR UP OR UNLOCKED.

In the event one main gear remains up or in an intermediate position and all procedures to extend have failed, proceed as follows:

1. Burn off or dump excess fuel.
2. Make sure passengers are secure and that there is no smoking. Have passengers remove spectacles. Secure all loose gear in the aircraft. Remove emergency hatches prior to landing. Pilot's shoulder harness - LOCKED
3. Make normal approach.
4. Make normal touchdown on side of runway opposite to failed gear.
5. Throttles - CLOSE
6. Hold unsafe gear "off" runway as long as possible.
7. Use nose gear steering for directional control if right gear is up or unlocked. The cutout switch for nose gear steering is on the L/H main gear.
8. Power select switch - PARKED

AIRPLANE FLIGHT MANUAL

LANDING EMERGENCIES (Continued)

9. Battery switch - OFF
10. Master ignition switch - OFF
11. Generator switches - OFF
12. Leave airplane as soon as possible.

LANDING WITH NOSE GEAR UP OR UNLOCKED.

In the event that the nose gear remains up or in an intermediate unlocked position and all procedures to extend it fail, proceed as follows:

1. Burn off or dump excess fuel.
2. Make sure passengers are secure, and that there is no smoking. Have passengers remove spectacles. Secure all loose gear in the aircraft. Remove emergency hatches prior to landing. Pilot's shoulder harness - LOCKED
3. Make normal approach.
4. Make touchdown in center of runway.
5. Throttles - CLOSE
6. At about 95 knots IAS, gently ease the nose to the runway.
7. Any load changes to move the c.g. aft will help to ease the nose down more gently and minimize damage.
8. Power select switch - PARKED
9. Battery switch - OFF
10. Master ignition switch - OFF
11. Generator switches - OFF
12. Leave airplane as soon as possible.

LANDING WITH BOTH MAIN GEAR UP OR UNLOCKED.

In the event both main gear remain up or in an intermediate position and all procedures to extend have failed, proceed as follows:

1. Burn off or dump excess fuel.
2. Make sure passengers are secure and that there is no smoking. Have passengers remove spectacles. Secure all loose gear in the aircraft. Remove emergency hatches prior to landing. Pilot's shoulder harness - LOCKED
3. Make normal approach and landing at minimum safe speed.
4. At touchdown - CLOSE THROTTLES
5. Power select switch - PARKED when assured of no fire.
6. Battery switch - OFF

BLOWN TIRE LANDING

1. Make normal final approach.
2. Land on side of runway opposite blown tire.
3. Make normal touchdown.
4. Use nose gear steering for directional control.
5. Use light opposite braking to slow aircraft.

AIRPLANE FLIGHT MANUAL

LANDING EMERGENCIES (Continued)

CAUTION

If possible do not shut down inboard engines until adequate fire fighting equipment is available. The damaged wheel may be either very hot or on fire and fuel drained overboard after engine shutdown could contact the hot wheel causing fire.

NO FLAPS LANDING.

A no flaps landing is basically the same as a normal landing except that the final approach speeds are increased 15 knots to preclude high sink rates.

AFCS EMERGENCY OPERATION

All three channels of the AFCS are individually protected by circuit breakers. Failure in any one channel will not prevent use of the other two since the failed channel may be deactivated by pulling the circuit breaker. A failed trim amplifier may be disengaged by use of the trim cut-off switches on the AFCS Accessory Box, however, transients are to be expected upon disengagement of the AFCS if either trim system is not operating.

RUNAWAY STABILIZER TRIM

In the event that either pilot's or copilot's stabilizer trim runs away, immediately move the stabilizer cut-off lever (one outboard of left and right throttles) to the EMERGENCY position. This mechanically disengages the trim motor from the screw jack that operates the stabilizer.

NOTE

In case of runaway stabilizer trim, airplane limit load factor will be exceeded in 2 to 2 1/2 seconds if constant elevator position is held without corrective action.

STABILIZER JAMMED IN AIRPLANE NOSE-UP POSITION.

With the stabilizer jammed in the full airplane nose-up position, speed should be maintained at the minimum compatible with safe operation. When flaps and gear are lowered for landing, the aircraft will be in near perfect trim. If a go-around is required, reasonable forces will be required to counteract the nose-up tendency. Gear and flaps may be left down if desired and thrust reduced to minimum necessary for about a 150 knot IAS traffic pattern.

STABILIZER JAMMED IN AIRPLANE NOSE-DOWN POSITION.

With the stabilizer jammed in the full nose-down position (actually 0° on the stabilizer position indicator) the aircraft will be more nearly in trim at the higher airspeeds. Every effort should be made to move the c.g. as far aft as possible by rearrangement of passengers and baggage. If the spoilers are extended when airspeed is reduced during landing approach, a significant

AIRPLANE FLIGHT MANUAL

RUNAWAY STABILIZER TRIM (Continued)

nose-up transient will be encountered which will help the situation. The extension of the landing gear will contribute a slight nose-up transient. The approach should be made with flaps up. Elevator power for flare will be marginal so make the approach flat and do not chop the throttles until the aircraft is just about on the ground since the nose will have a definite tendency to fall through at this time.

STABILIZER TRIM EMERGENCY OPERATION.

Unstow the handcrank on the left side of the pedestal near the pilot's right knee. This crank can be used to move the stabilizer to any desired position and the position indicator in the top of the center instrument panel will continue to function. It takes approximately 132 complete turns of the crank to move the stabilizer through its full range of travel. Rotating the crank clockwise as viewed from the left side looking inboard will move the stabilizer aircraft nose up. The lower the airspeed the less effort required to move the crank at a given surface setting.

To avoid having to crank on the final approach, trim to about 9° nose-up, lower gear and flaps and then crank the stabilizer to $11-12^{\circ}$ nose-up which will put the aircraft in good trim under normal c.g. conditions for final approach.

Control forces for a go-around will not be excessive. Power can be reduced after go-around is complete to reduce forward control forces.

GROUND EGRESS - EMERGENCY HATCH

OPERATION FROM INSIDE AIRCRAFT.

To Open Hatch

1. Turn handle 90° clockwise.
2. Pull door in and remove from hatch-way area.

To Close Hatch

1. Place lower edge of hatch into hatch-way making certain that hatch lugs engage on outboard side of sill lugs.
2. Rotate hatch outboard to fully closed position.
3. Turn handle 90° counterclockwise.

OPERATION FROM OUTSIDE AIRCRAFT.

To Open Hatch

1. Press button to unstow handle.
2. Turn handle 90° counterclockwise.
3. Push hatch in and remove from hatch-way area.

AIRPLANE FLIGHT MANUAL

GROUND EGRESS - EMERGENCY HATCH (Continued)

To Close Hatch

1. Place lower edge of hatch into hatch-way making certain that lugs engage on outboard side of sill lugs.
2. Rotate hatch outboard to fully closed position.
3. Turn handle 90° clockwise and stow handle.

EMERGENCY DESCENT

An emergency descent may be required due to a sudden loss of cabin pressure. This type of emergency will generally be evidenced by a loud noise, explosion or indication of rapid descent on the cabin altimeter.

1. Pilot wearing oxygen mask will initiate the descent and other pilot and passengers will don oxygen masks. Pilots switch to 100% OXYGEN.
2. Throttle to IDLE.
3. Initiate moderate turn to clear letdown area.
4. Speed brakes full out, landing gear extended
5. Descend at .83 Mach to 35,000 feet altitude.
6. Co-pilot check that cabin oxygen is flowing properly. If not, move toggle switch to EMERGENCY OXYGEN position.
7. Below 35,000 feet altitude, descend at 302 knots IAS.

NOTE

One pilot should always be on oxygen when flying above 25,000 feet if regular masks are used, or 30,000 feet if quick don masks are available.

<u>Altitude</u>	<u>Time of Useful Consciousness</u> <u>(Sitting Quietly)</u>
25,000 ft.	2 minutes
28,000 ft.	1 minute
30,000 ft.	45 seconds
35,000 ft.	30 seconds
40,000 ft.	23 seconds

OXYGEN SYSTEM EMERGENCY OPERATION

COCKPIT.

1. Oxygen supply lever - ON
2. Diluter lever - 100% OXYGEN
3. Emergency lever - EMERGENCY
4. Check pressure and flow indicator operation.

CABIN.

If cabin oxygen is required due to loss of pressurization or any other emergency in the cabin, such as a sick passenger, etc.:

1. Check that the main oxygen shutoff valve is ON. This is the normal position for the lever during all flights above 10,000 feet.

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Section II
Operating Procedures
B. Emergency Procedures

OXYGEN SYSTEM EMERGENCY OPERATION (Continued)

2. Check pressure gage for approximately 70 psi operating pressure.
3. Move the guarded bypass toggle switch to the EMERGENCY OXYGEN position. When this switch is in the NORMAL position and the main shutoff valve is ON, if cabin pressurization is lost, the oxygen to the cabin masks will start to flow automatically through the action of a barometrically actuated valve. If the automatic function fails, placing the bypass toggle switch in the EMERGENCY OXYGEN position will drop out the masks and open the valve electrically. The flow indicator will glow (steady green light) indicating the system is pressurized.

DEICER SYSTEM EMERGENCIES

There is no emergency operation of any deicing equipment if the normal system becomes inoperative. However, pertinent precautions and possible corrective actions are listed below.

WARNING

The airplane is not approved for flight in known icing conditions. Such flight should be avoided when possible.

WINDSHIELD DEICING.

If two engines are inoperative and the electrical load is cut down by eliminating the #3 inverter (circuit breaker pulled), only the pilot's windshield will have heat. If during normal flight the No. 1 inverter fails and the inverter transfer switch is moved to the transfer position, the same condition will exist. Under these circumstances the right windshield panel will probably fog over in penetration.

ENGINE INLET DEICING.

No provisions for duct deicing are incorporated on this airplane. If duct icing is encountered reducing airspeed and engine RPM will minimize compressor damage due to ice ingestion.

WING DEICING.

Loss of one or two engines will reduce air flow and reduce system performance. Keeping the good engines at the highest practical RPM during icing conditions will help this situation somewhat.

Failure of one distributor valve on the wing system will only affect one segment of the boot. However, one distributor valve controls both stabilizer and fin boots. A failure here would render all tail surface deicing inoperative.

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FLAP SYSTEM EMERGENCY OPERATION

If normal flap operation fails, the flaps can be lowered by using the following procedure:

1. Flap control circuit breaker - CHECK IN
2. Flap position indicator circuit breaker - CHECK IN
3. Hydraulic pressure gage - CHECK
If hydraulic pressure is normal (3000 psi), either the selector valve or electrical controls have probably malfunctioned.
4. Hydraulic reservoir level - CHECK
5. Reduce airspeed below 180 knots IAS.
6. Flap switch - DOWN
7. Flap control circuit breaker - PULL
8. After landing gear is down and locked, emergency flap valve selector - DOWN
9. Use hand pump to extend flaps to desired setting.
10. Return emergency flap valve selector to NORMAL so that hand pump can be used for braking after landing.

CAUTION

If flaps are not extended and the emergency flap valve selector is not returned to the normal position, hand pump will continue to extend flaps before full emergency brake pressure is available.

NOTE

Flap position indication is taken from left flap.
Flaps cannot be retracted with the emergency system.

BRAKE SYSTEM EMERGENCY OPERATION

In the event of hydraulic system failure, brake hydraulic pressure is supplied by a brake accumulator. The brakes operate in the normal manner but are limited to 10 full applications. Additional applications of the brake can be obtained by recharging the brake accumulator with the hand pump. Recharge the brake accumulator as follows:

1. Emergency landing gear valve selector - NORMAL
2. Emergency flap valve selector - NORMAL
3. Actuate hydraulic hand pump.

NOTE

With the emergency landing gear and flap valve selectors in NORMAL, all hand pump pressure goes directly to the brake accumulator. This pressure will not register on the pressure gage.

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TEMPERATURE OR PRESSURIZATION MALFUNCTION

NOTE

Since the system is protected by a thermal overheat switch set at 175°F which closes the mixing valves and also a thermal overheat switch set at 200°F which closes the main shutoff valve, any overheat condition can usually be attributed to excess flow of moderately high temperature air rather than extremely hot air.

FULL HOT OR FULL COLD - AUTOMATIC OPERATION.

1. Move temperature control switch from AUTO to HOLD position and correct condition manually. This operation bypasses the temperature controller which is probably the cause of the trouble. It takes approximately 30 seconds to cycle a mixing valve from full open to full closed.

FULL HOT OR FULL COLD - MANUAL OPERATION.

1. Place the bleed air switch in the BYPASS position.
2. In the NORMAL position, an automatically variable flow control valve governs the amount of air allowed to enter the system. If it malfunctions and the bleed air switch is placed in the BYPASS position, air flow bypasses the automatic flow control valve and is metered by a fixed area flow controller. If still too hot, proceed to step 3 below. If too cold, descend to a lower altitude.
3. Pull either one of the two "Bleed Air Shutoff" circuit breakers to cut down on air flow from the applicable engines. If still too hot, proceed to step 4 below.
4. Place the bleed air switch in the OFF position to close the hot air shutoff valve and open the ram air valve. By cycling this switch between NORMAL and OFF a reasonable temperature can be maintained. Pressurization will be lost in the OFF position so use oxygen on 100%.

SURGES IN AIR FLOW SYSTEM.

1. Go to manual temperature control first. If condition is not corrected:
2. Bleed air switch to BYPASS. If still no improvement, trouble is probably in cabin pressure controller.

OVER-PRESSURIZATION.

1. Set cabin pressure controller to a higher altitude to decrease pressure differential to 8.9 psi max. If no results,
2. Turn manual pressure control knob counterclockwise and modulate as required to maintain acceptable pressure differential.
3. Dump cabin pressure with dump switch as a last resort.

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TEMPERATURE OR PRESSURIZATION MALFUNCTION (Continued)

UNDER-PRESSURIZATION.

1. Check dump switch in NORMAL.
2. Check manual pressure control in full INCREASE position.
3. Check bleed air switch in NORMAL.
4. Check setting on cabin pressure controller.
5. Check cabin door, all hatches and windows closed tightly.
6. Check all circuit breakers.
7. Increase temperature settings of cabin and cockpit temperature control in order to increase air flow.
8. Increase engine thrust if practical.

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SECTION III
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AIRPLANE FLIGHT MANUAL

INTRODUCTION

All performance data in this manual is based on a full temperature range except for landing distance performance, which is based on standard day temperatures.

The performance data in this manual is based on pertinent thrust ratings less installation losses, air bleed, and accessory losses.

Humidity has no appreciable effect on the thrust of the Westinghouse J34-WE-34 (24C4D - 2E) engine. Therefore, it has not been considered in the performance data.

Performance data in this manual is based on the following trailing edge flap positions:

Take-Off
Approach
Landing
Up

The spoilers (speed brakes) are opened 10° degrees during landing approach and 60° degrees during ground roll deceleration.

Take-off and landing data are based on smooth, dry, hard surface runways.

AIRSPEED DEFINITIONS

Airspeed values in this manual are presented as CAS (calibrated airspeed) and TMN (True Mach No.) or IAS (indicated airspeed) and M_1 (indicated Mach).

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

IAS - Airspeed indicator reading, as installed in the airplane, uncorrected for position and instrument errors.

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

M_1 - Machmeter indicator reading, as installed in the airplane, uncorrected for position and instrument errors.

Critical engine failure speed, V_1 is defined as the speed at which if an engine failure occurs, the distance required to continue the take-off and clear a height of 35 feet is equal to the distance required to stop.

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AIRSPEED DEFINITIONS (Continued)

V_2 climb speed is equal to 1.2 times the stall speed with flaps in the pertinent take-off position or is equal to 1.1 times the minimum control speed, whichever is greater.

The minimum control speed, V_{MC} , is defined as the minimum flight speed at which the airplane is controllable when one outboard engine suddenly loses thrust and the remaining three engines are operating at take-off thrust.

CAR Landing Distance, is defined as the actual landing distance from the point where the airplane is at an altitude of 50 feet, with an airspeed equal to 1.3 V_{S1} to the point at which the airplane is fully stopped.

CAR Landing Field Length, is the same actual landing distance divided by a factor of 0.6 for destination airport and 0.7 for alternate airport.

Landing Approach Speed, figure 3-25, is defined as the speed at the 50 feet altitude point.

DEMONSTRATED CROSSWIND

Satisfactory controllability has been demonstrated in landings and take-offs in crosswinds up to 17 knots. This crosswind value is not considered to be limiting.

DETERMINATION OF MAXIMUM ALLOWABLE TAKE-OFF
WEIGHTS AND ASSOCIATED TAKE-OFF SPEEDS

1. Determine take-off flap setting, figure 3-1 for ambient conditions and gross weight.
2. Determine if sufficient runway length is available for ambient conditions, including wind and runway gradient for desired take-off weight by using charts in figures 1-5 or 1-6 depending on flap setting.
3. Determine if desired take-off weight is less than climb gradient weight limits in Section I in figures 1-2 through 1-4.
4. If obstacle clearance is a consideration, a flight path as shown in figure 3-6 must be used to determine if the obstacle path is limiting. An example flight path (figure 3-7) is included in this section to be used as a guide for determining obstacle clearance. This section also includes complete information to permit calculation of a flight profile for any combination of gross weight, thrust, and atmospheric conditions within the certificate limits. If it is

AIRPLANE FLIGHT MANUAL

DETERMINATION OF MAXIMUM ALLOWABLE TAKE-OFF (Continued)

- limiting, the desired take-off weight must be reduced until the required obstacle clearance is obtained.
5. For a particular operational flight, take-off gross weight may be limited by the maximum allowable landing gross weight, see figure 3-26.
 6. When obtaining V_2 speeds, figure 3-2 or 3-3 and engine failure speeds V_1 , figure 3-4 or 3-5, determine whether or not they are limited by minimum control speeds shown on these pages.

DETERMINATION OF MAXIMUM ALLOWABLE LANDING WEIGHT

Maximum allowable landing gross weight is determined by the runway length available, figure 3-26. The approach climb and landing climb are not limiting up to the maximum landing gross weight and landing altitude.

TAKE-OFF CLIMB PROFILES

Sufficient information is provided to construct take-off flight paths as shown in figure 3-6. The weight of the airplane has not been decreased by the amount of fuel used in each segment of the take-off path calculations, therefore the original take-off gross weight is always used when calculating a take-off flight path.

In dispatching an airplane in which a given take-off climb path profile is to be followed the pilot should be given an airspeed schedule versus altitude appropriate to the pertinent segments of the flight path profile.

AIRPLANE FLIGHT MANUAL

TAKE-OFF CLIMB PATH PROFILEEXAMPLE CALCULATION

GIVEN

Gross Weight = 44,000 lbs.

Outside air temperature = 60°F

Wind Velocity = + 10 knots (headwind)

Runway slope = +.5% (uphill)

Take-off thrust

Field elevation at start of ground run = 2,000 Ft.

Flaps = UP (determine correct flap setting from figure 3-1)

Engine failure at V_1 speedAt end of second (2nd) segment accelerate horizontally to speed for best climb gradient (approximately 1.6 V_S flaps up) then climb to 1,500 feet altitude.

FIND

Distance and altitude traversed from start of ground run to enroute configuration for given take-off flight path profile.

SOLUTION

Break profile down into five separate parts, as shown in Figure 3-7 and solve as follows:

Part A Take-Off and climb to 35 Ft. (CAR Field Length)

- (1) Determine CAR field length from figure 1-6.

$$\text{Field Length} = \underline{7,400 \text{ Ft.}}$$

- (2) Find altitude at 35 ft. height.

$$\text{Altitude} = \text{Altitude at start of ground run} + \text{runway slope} \times \text{CAR field length} + 35 \text{ ft.}$$

$$= 2,000 + (.005) (7,400) + 35 = \underline{2,072 \text{ ft.}}$$

Part B Climb to landing gear up altitude at V_2 (end of first segment)

- (1) From figure 3-15 determine time from lift-off to 35 ft. altitude.

$$\text{Time to 35 ft.} = \underline{3.8 \text{ sec.}}$$

Total time from lift-off to gear up is 12.0 seconds; (gear retraction time of 9.0 seconds plus a 3.0 second delay) therefore:

$$\text{Time from 35 ft. to gear up} = 12.0 - 3.8 = \underline{8.2 \text{ seconds}}$$

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EXAMPLE CALCULATION (Continued)

- (2) Determine V_2 (TAS) at 35 ft. altitude at 44,000 lbs., where V_2 is $1.2V_S$ (V_S is the stall speed with flaps up; figure 3-28).

$$V_S = 128.9 \text{ knots CAS}$$

$$V_2 = 1.2V_S = 154.7 \text{ knots CAS}$$

$$V_{TAS} = V_{CAS} \times \frac{1}{\sqrt{\sigma}} = 154.7 \times 1.036 = \underline{\underline{160.3 \text{ knots TAS}}}$$

NOTE

σ is density ratio see figure 3-29.

- (3) Determine effective wind

$$\begin{aligned} V_W \text{ effective} &= 50\% \times V_W \text{ reported} \\ &= (.50)(10) = \underline{\underline{5 \text{ knots}}} \end{aligned}$$

- (4) Find horizontal distance covered from end of CAR field length (35 ft.) to gear up, assuming that the climb angle is small and the cosine is unity.

$$\begin{aligned} \text{Horizontal distance} &= \text{ground speed} \times \text{time} \\ &= (V_{TAS} - V_W \text{ effective}) (t) \\ &= (160.3 \text{ knots} - 5.0 \text{ knots}) \\ &\quad (1.689 \text{ ft./sec.}) \\ &\quad \text{knots} \\ &= (8.2 \text{ sec.}) = \underline{\underline{2,151 \text{ ft.}}} \end{aligned}$$

- (5) From figure 3-17 determine altitude above projected runway at gear up point.

$$\text{Height} = \underline{\underline{160 \text{ ft.}}}$$

- (6) Find altitude at gear up point.

$$\begin{aligned} \text{Altitude} &= \text{Altitude at end of runway} + \text{slope} \times \text{horizontal distance} + \text{height above projected runway} \\ &= (2072 - 35) + (.005)(2151) + 160 \\ &= 2037 + 11 + 160 = \underline{\underline{2,208 \text{ ft.}}} \end{aligned}$$

Part C Climb to 400 ft. at V_2 speed (second segment)

- (1) Find V_2 (CAS) at beginning of second segment gear up at 44,000 lbs.

$$V_2 = 1.2 V_S = 1.2 \times 128.9 = 154.7 \text{ knots CAS}$$

$$V_2 = V_{CAS} \times \frac{1}{\sqrt{\sigma}} = 154.7 \times 1.041 = \underline{\underline{161.0 \text{ knots TAS}}}$$

- (2) From figure 3-9 determine second segment climb gradient

$$\text{Gradient} = 7.48 - 1.00\% = \underline{\underline{6.48\%}}$$

*Per SR-422B Paragraph 4T.117a.

- (3) Find height to be gained during second segment

$$\begin{aligned} \text{Height gained} &= 400 - \text{airplane height above end of runway at gear point.} \\ &= 400 - 171 = \underline{\underline{229 \text{ ft.}}} \end{aligned}$$

AIRPLANE FLIGHT MANUAL

EXAMPLE CALCULATION (Continued)

- (4) Find horizontal distance in second segment

$$\begin{aligned}\text{Horizontal distance} &= \frac{\text{height gained}}{\text{gradient}} \times \frac{\text{ground speed}}{\text{true airspeed}} \\ &= \frac{229}{.0648} \times \frac{161.0 - 5.0}{161.0} \\ \text{Horizontal distance} &= \frac{229}{.0648} \times \frac{156.0}{161.0} = \underline{\underline{3,422 \text{ ft.}}}\end{aligned}$$

- (5) Find second segment time

$$\text{Time} = \frac{\text{horizontal distance}}{1.689 \times \text{ground speed}} = \frac{3422}{1.689 \times 156.0} = \underline{\underline{13.00 \text{ sec.}}}$$

Part D Level off, retract flaps and accelerate to speed for best angle of climb.

- (1) Find
- V_2
- (CAS) at beginning of Part D using a gross weight of 44,000 lbs. (figure 3-28).

$$\begin{aligned}V_2 &= 1.2 V_S = 1.2 \times 128.9 = 154.7 \text{ knots CAS} \\ V_2 &= V_{\text{CAS}} \times \frac{1}{\sqrt{\sigma}} = 154.7 \times 1.044 = \underline{\underline{161.5 \text{ knots TAS}}}\end{aligned}$$

- (2) From figure 3-9 determine climb gradient at beginning of Part D

$$\text{Gradient beginning} = \underline{\underline{7.33\%}} - 1.00 = \underline{\underline{6.33\%}}$$

- (3) From figure 3-12 determine climb gradient at end of Part D

$$\text{Gradient end} = \underline{\underline{9.03\%}} - 1.00 = \underline{\underline{8.03\%}}$$

- (4) Find average climb gradient for Part D

$$\frac{\text{Gradient beginning} + \text{Gradient end}}{2} = \frac{6.33 + 8.03}{2}$$

$$\text{Gradient average} = \underline{\underline{7.18\%}}$$

- (5) From figure 3-13 determine average acceleration, using gradient average as total climb gradient and "0" residual climb gradient (horizontal flight)

$$\text{Average acceleration} = 1.37 \frac{\text{knots}}{\text{sec.}^2}$$

- (6) From figure 3-11 find velocity at end of Part D using a gross weight of 44,000 lbs.

$$V_{\text{final}} = 210.8 \text{ knots CAS} = V_{\text{CAS}} \times \frac{1}{\sqrt{\sigma}} = 210.8 \times 1.044 = \underline{\underline{220.1 \text{ knots TAS}}}$$

- (7) Find
- ΔV
- for Part D

$$V = V_{\text{final}} - V_2 = 220.1 - 161.5 = \underline{\underline{58.6 \text{ knots}}}$$

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AIRPLANE FLIGHT MANUAL

EXAMPLE CALCULATION (Continued)

- (8) Find time in Part D

$$\text{Time} = \frac{\Delta V}{\text{Average acceleration}} = \frac{58.6}{1.37} = \underline{\underline{42.8 \text{ secs.}^*}}$$

*Must exceed 12 seconds (flap retraction time)

- (9) Find horizontal distance in Part D

Horizontal distance = average ground velocity x time

$$= (V_2 + \frac{\Delta V}{2} - V_W)(t)(1.689)$$

$$= (161.5 + \frac{58.6}{2} - 5)(42.8)(1.689)$$

$$= (185.8)(42.8)(1.689) = \underline{\underline{13,420 \text{ Ft.}}}$$

Part E Climb to 1,500 ft. at best climb angle speed with take-off thrust (end of take-off path)

- (1) From figure 3-12 find gradient at the beginning of Part E

$$\text{Gradient initial} = \underline{\underline{9.03\%}} - 1.00 = \underline{\underline{8.03\%}}$$

- (2) Find velocity at beginning of Part E, using a gross weight of 44,000 lbs.

$$V_{\text{initial}} = 210.8 \text{ knots CAS} = 210.8 \times 1.044 = \underline{\underline{220.1 \text{ kt.TAS}}}$$

- (3) From figure 3-12 find gradient at the end of Part E

$$\text{Gradient final} = 8.39\% - 1.00 = \underline{\underline{7.39\%}}$$

- (4) Find velocity at end of Part E, using gross weight of 44,000 lbs.

$$V_{\text{final}} = 210.8 \text{ knots CAS} = 210.8 \times 1.066 = \underline{\underline{224.7 \text{ knots TAS}}}$$

- (5) Find average gradient in Part E

$$\text{Gradient Average} = \frac{\text{Gradient initial} + \text{Gradient final}}{2}$$

$$\frac{8.03 + 7.39}{2}$$

$$\text{Gradient Average} = \underline{\underline{7.71\%}}$$

- (6) Find horizontal distance

$$\text{Horizontal distance} = \frac{\text{vertical distance}}{\text{gradient avg.}} \times \frac{\text{average ground speed}}{\text{average airspeed}}$$

$$= \frac{1100}{.0771} \times \frac{V_{\text{initial}} + V_{\text{final}}}{2} - V_{\text{wind}}$$

$$= \frac{1100}{.0771} \times \frac{220.1 + 224.7}{2} - 5 = \frac{1100}{.0771} \times \frac{222.4}{2} - 5 = 13,950 \text{ ft.}$$

AIRPLANE FLIGHT MANUAL

EXAMPLE CALCULATION (Continued)

Final altitude equals $2,000 + 37 + 1,500$ equals 3537 ft.

Total horizontal distance covered equals

$7,400 + 2,151 + 3,422 + 13,420 + 13,950 =$ 40,343 ft.

TAKE-OFF CLIMB INFORMATION

Climb gradients for First Segment, Second Segment, Final Take-Off Segment, Maximum Climb Segment, Acceleration Climb Trade, Time from Lift-Off to 35 ft., and Height above Projected Runway are shown on figures 3-8 through 3-17.

ENROUTE CLIMB FLIGHT PATHS

Net flight path three engine and two engine enroute climb gradients are shown on figures 3-18 and 3-19. The three engine and two engine enroute climb speeds are shown on figures 3-20 and 3-21 respectively.

APPROACH AND LANDING PROCEDURE

The landing distances shown in this manual are based on an $1.3V_s$ approach speed with the gear down, the flaps in the landing position and approximately 1000 ft./min. rate of descent during the last portion of the final approach.

During the flare for the landing touchdown, the engine thrust should be reduced to idle. As soon as the main gear touches the runway, the wheel brakes may be applied, the speed brakes raised to 60° , and the nose wheel should be rapidly lowered to the runway.

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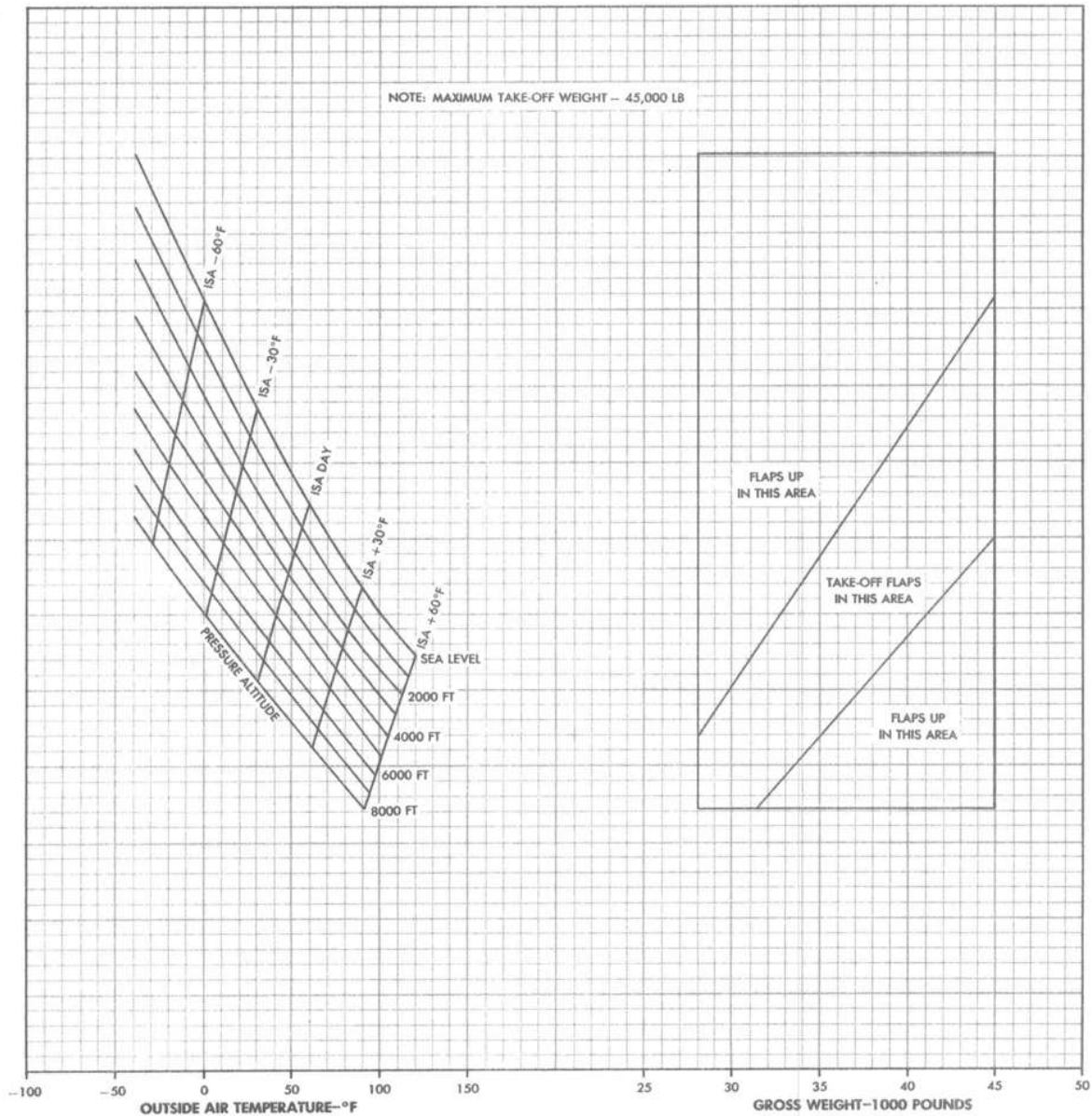
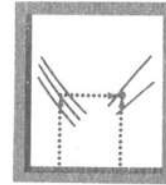
AIRPLANE FLIGHT MANUAL

FLAP SETTING FOR TAKE-OFF TAKE-OFF THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS AS NOTED, GEAR DOWN



GUIDE



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Figure 3-1

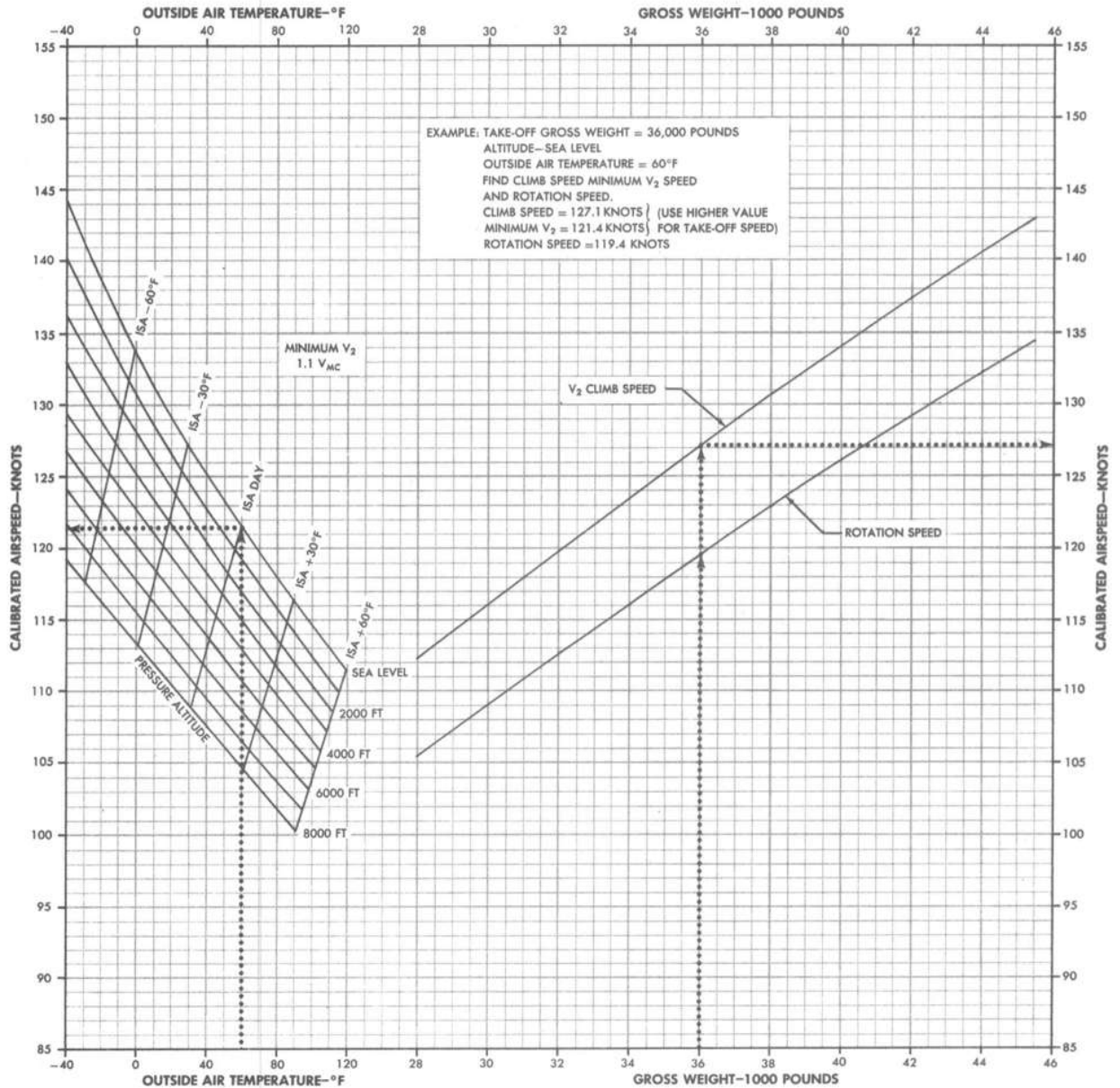
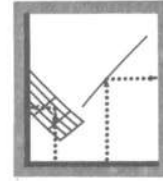
AIRPLANE FLIGHT MANUAL

TAKE-OFF SPEEDS TAKE-OFF THRUST TAKE-OFF FLAPS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR DOWN



GUIDE



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Figure 3-2

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AIRPLANE FLIGHT MANUAL

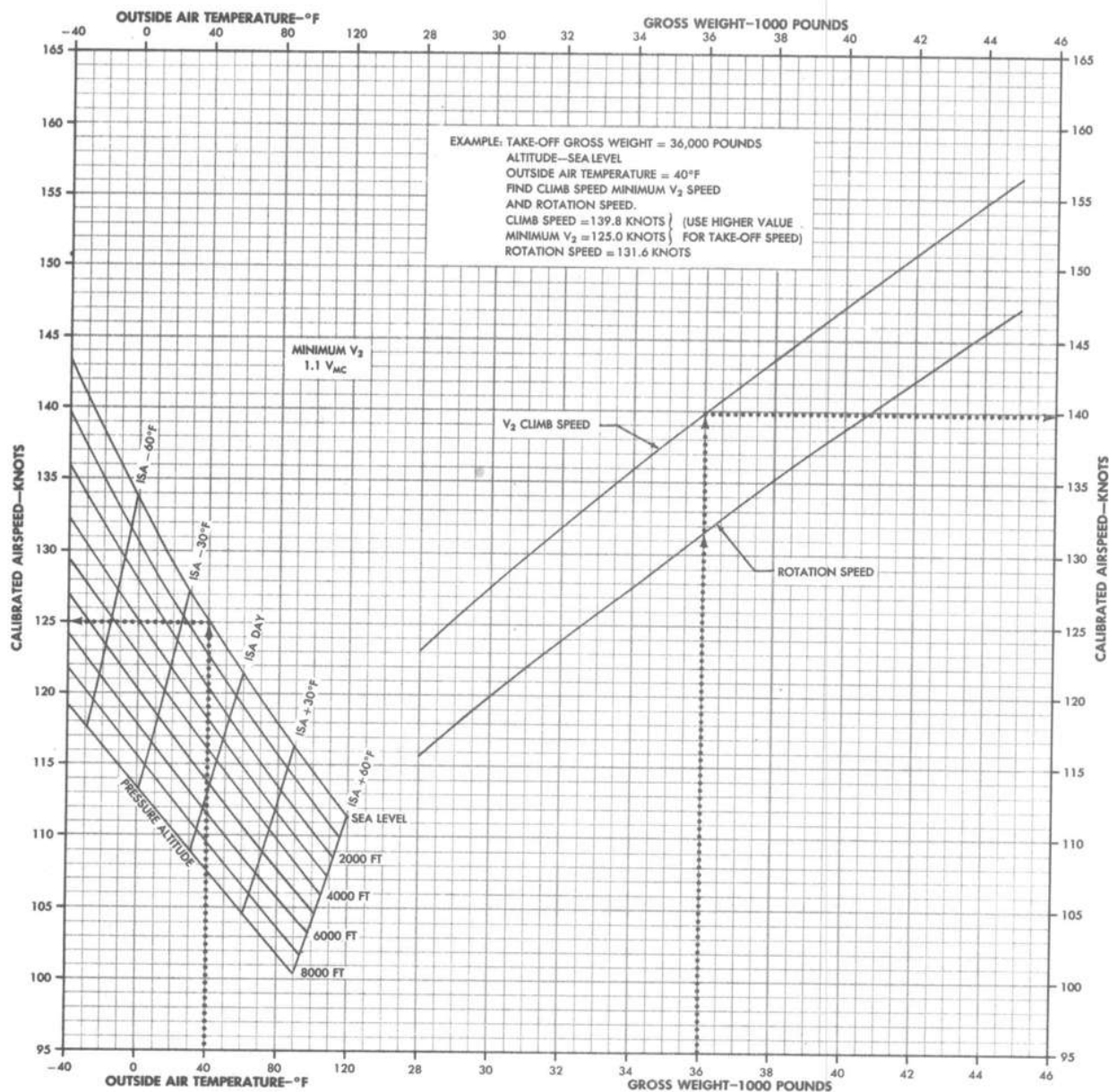
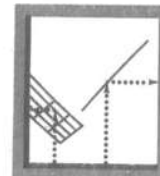
AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR DOWN



TAKE-OFF SPEEDS

TAKE-OFF THRUST FLAPS UP

GUIDE



M220-S4-P203

Figure 3-3

AIRPLANE FLIGHT MANUAL

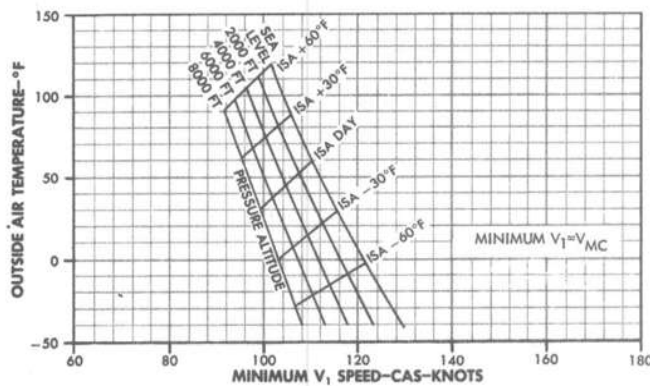
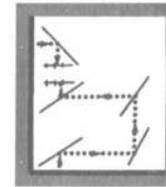
CRITICAL ENGINE FAILURE SPEEDS

TAKE-OFF THRUST
TAKE-OFF FLAPS

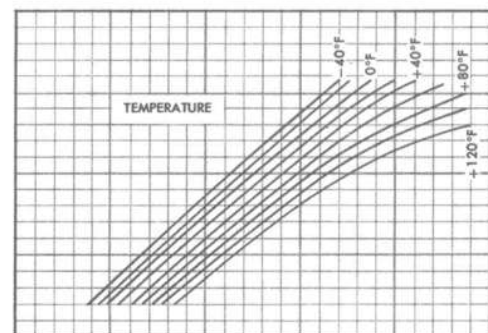
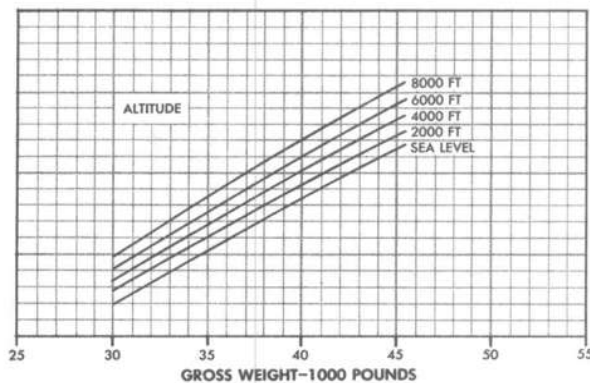
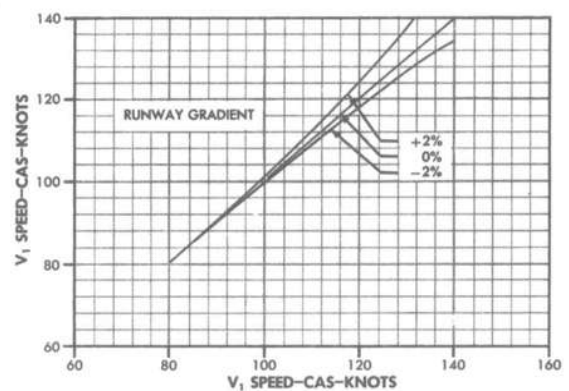
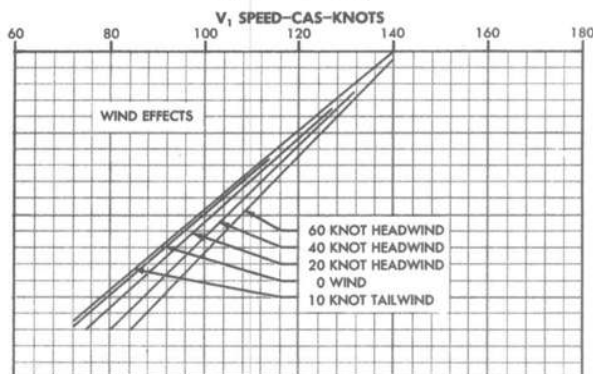
AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR DOWN



GUIDE



* (USE HIGHER VALUE)



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Figure 3-4

AIRPLANE FLIGHT MANUAL

CRITICAL ENGINE FAILURE SPEEDS

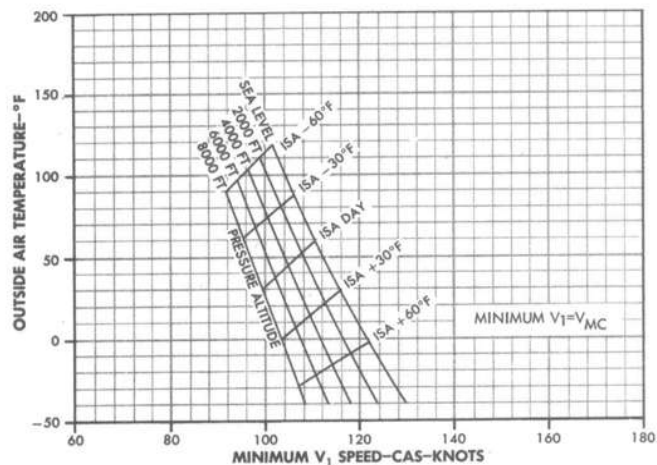
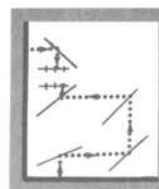
TAKE-OFF THRUST

FLAPS UP

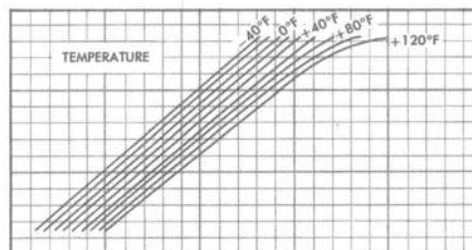
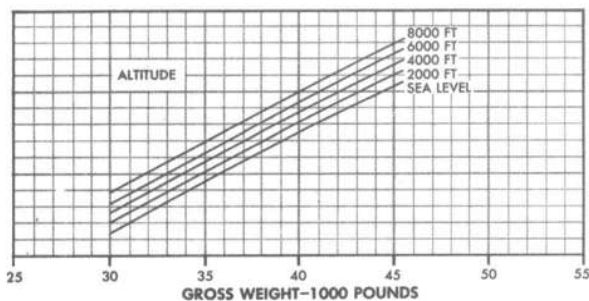
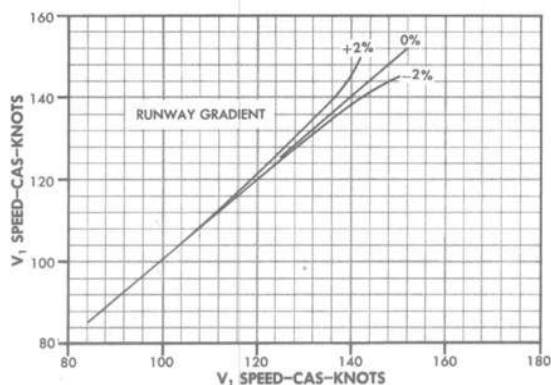
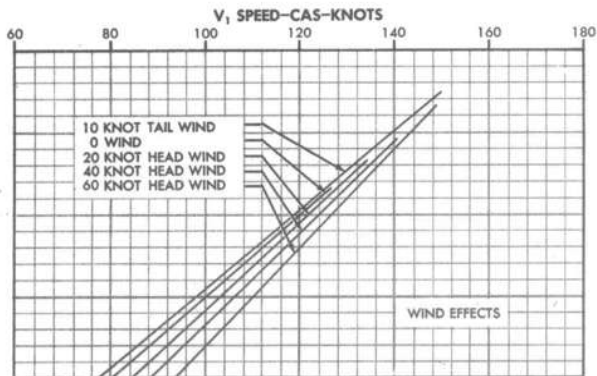
AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR DOWN



GUIDE



*(USE HIGHER VALUE)



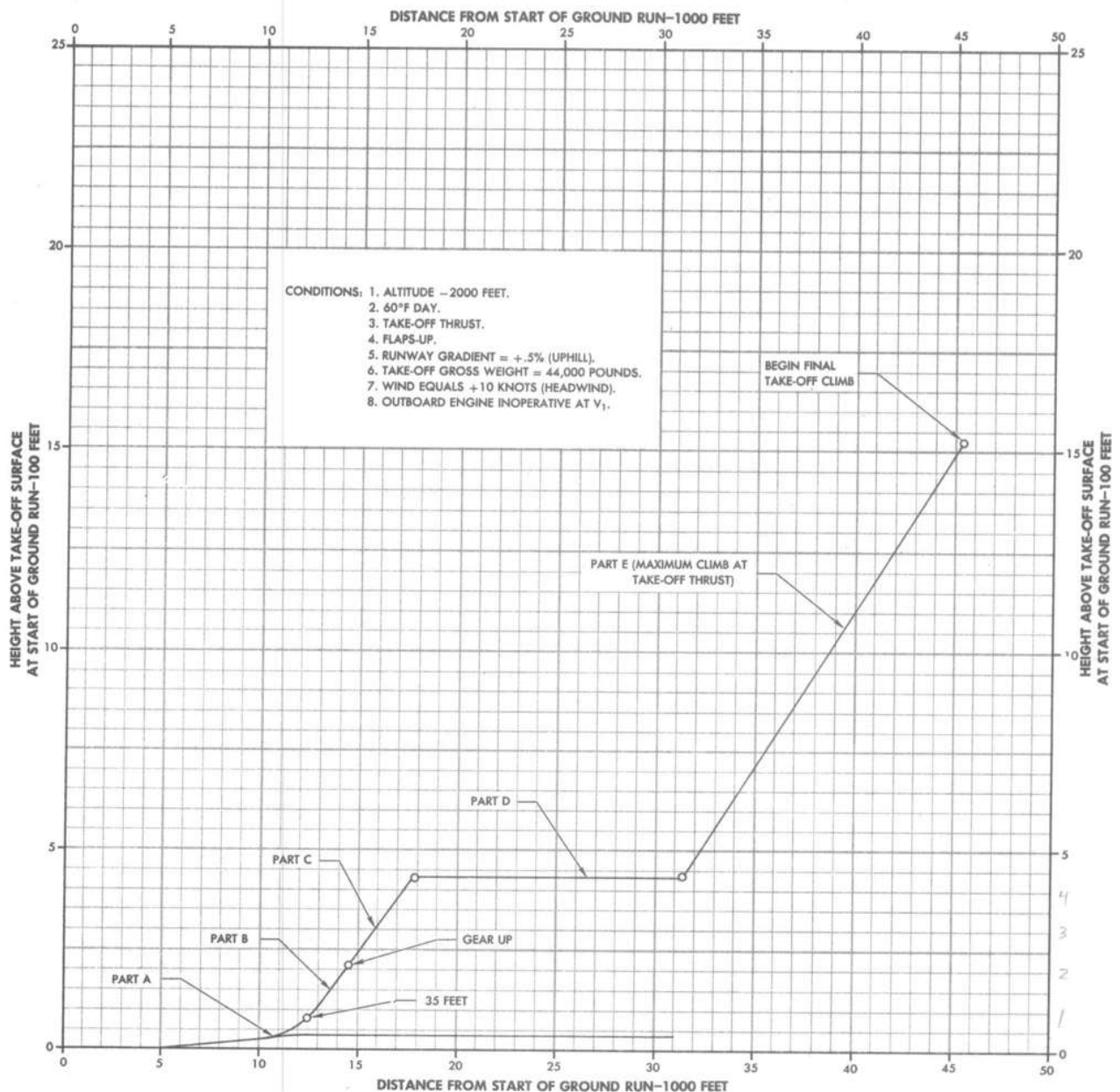
M220-54-P205

Figure 3-5

AIRPLANE FLIGHT MANUAL

TAKE-OFF CLIMB PROFILE TAKE-OFF THRUST

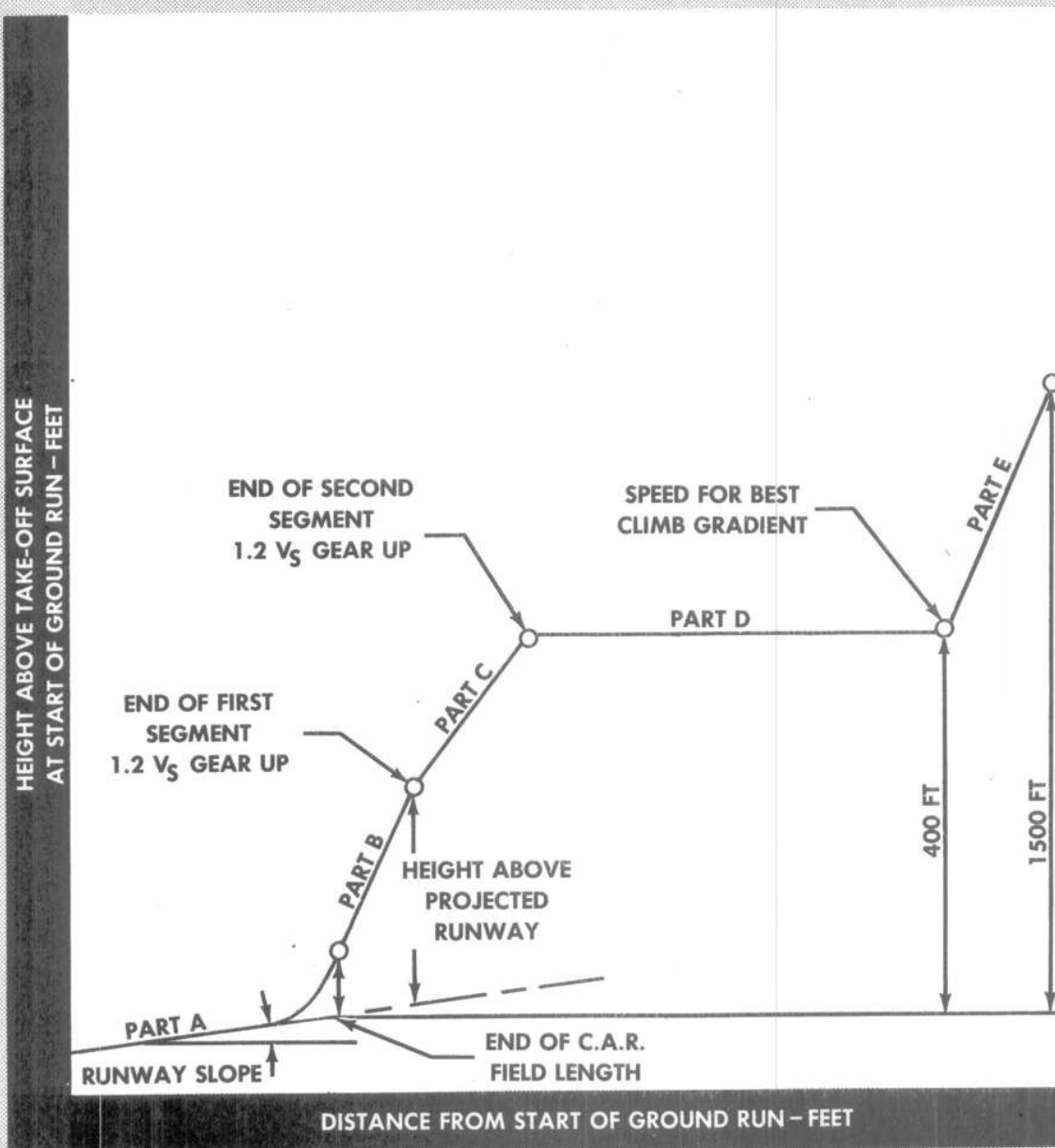
AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR AS NOTED



M220-54-P306

Figure 3-6

SAMPLE TAKE-OFF CLIMB PROFILE



M220-PS306

Figure 3-7

AIRPLANE FLIGHT MANUAL

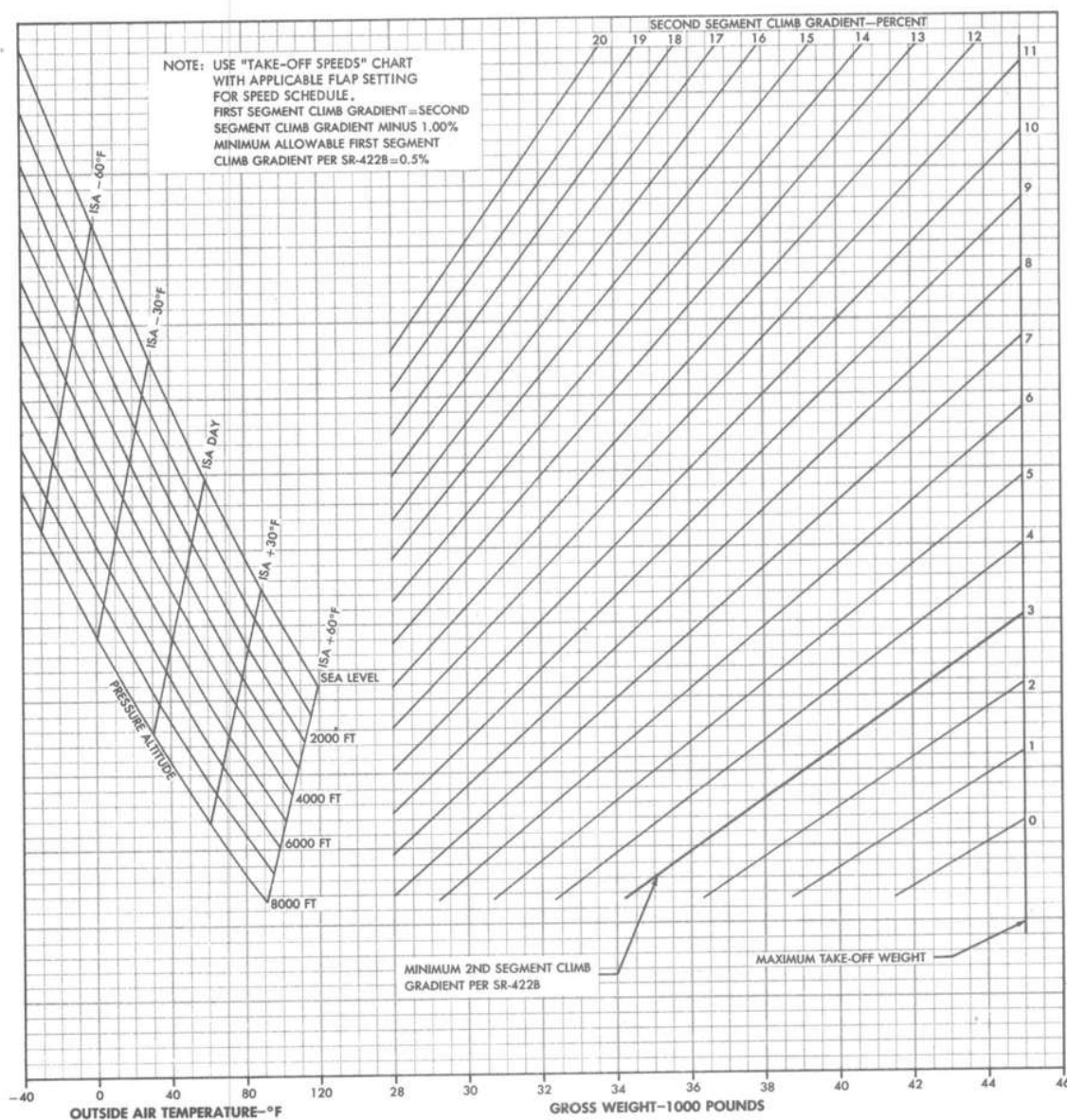
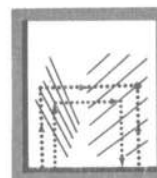
FIRST AND SECOND SEGMENT CLIMB GRADIENT

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, FIRST SEGMENT GEAR DOWN
SECOND SEGMENT GEAR UP



TAKE-OFF THRUST
TAKE-OFF FLAPS

GUIDE



M220-54-P307

Figure 3-8

AIRPLANE FLIGHT MANUAL

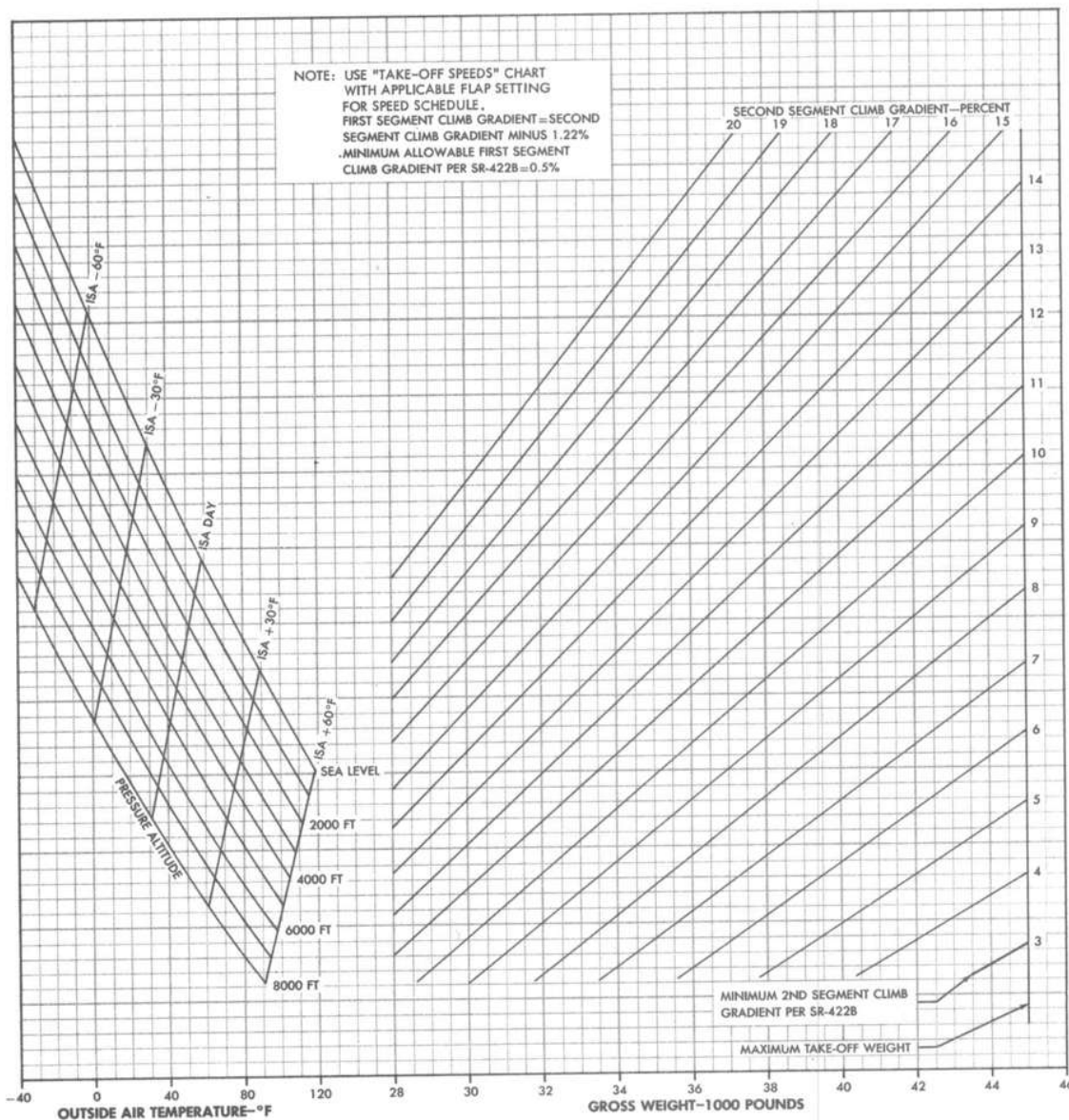
FIRST AND SECOND SEGMENT CLIMB GRADIENT

TAKE-OFF THRUST
FLAPS UP

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, FIRST SEGMENT GEAR DOWN
SECOND SEGMENT GEAR UP



GUIDE



M220-S4-P308

Figure 3-9

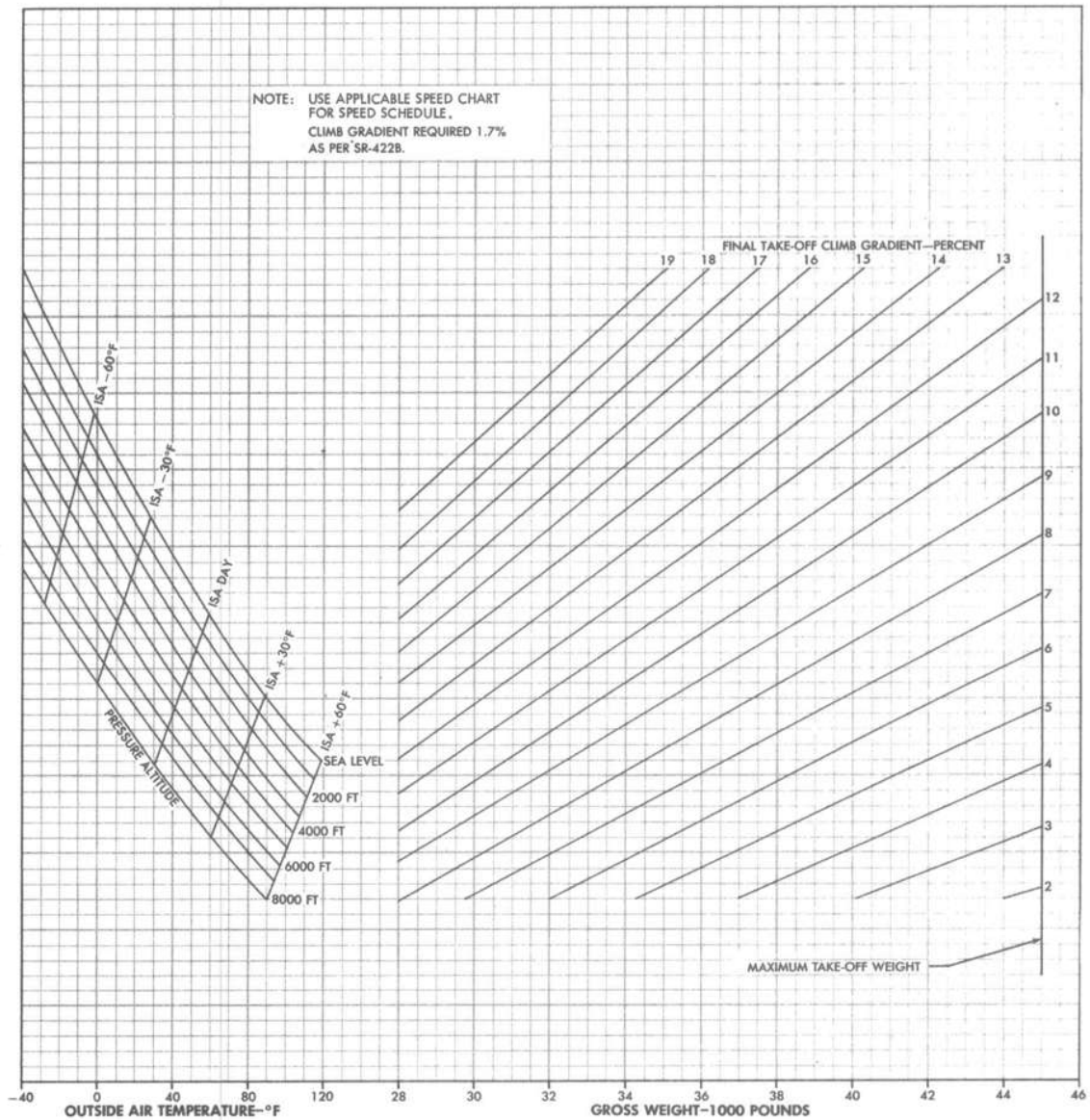
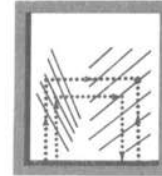
AIRPLANE FLIGHT MANUAL

FINAL TAKE-OFF CLIMB GRADIENT MAXIMUM CONTINUOUS THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



GUIDE



M220-S4-P309

Figure 3-10

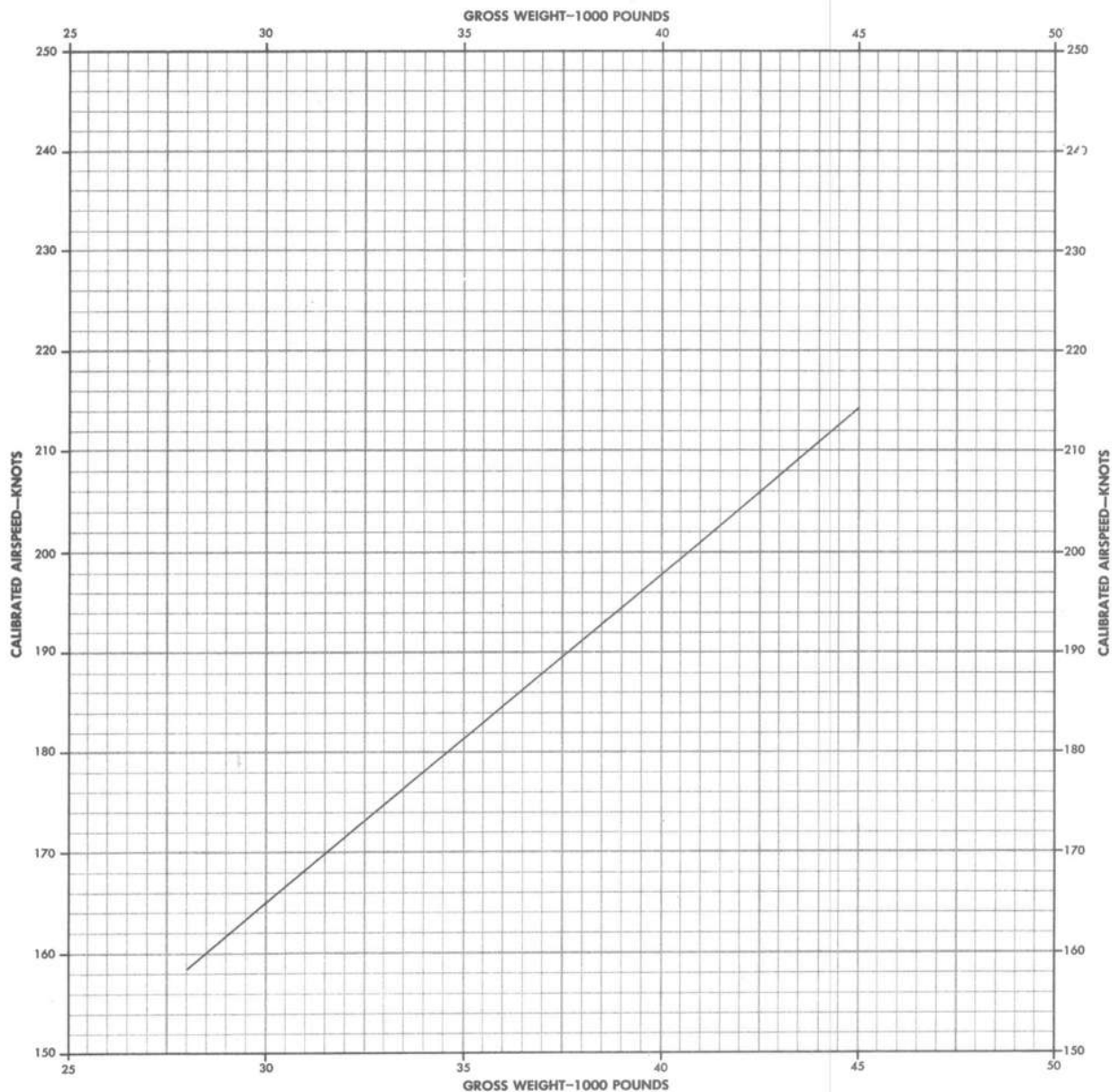
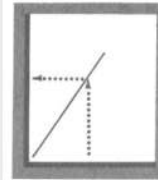
AIRPLANE FLIGHT MANUAL

**FINAL TAKE-OFF CLIMB SPEED
MAXIMUM CONTINUOUS THRUST**

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



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Figure 3-11

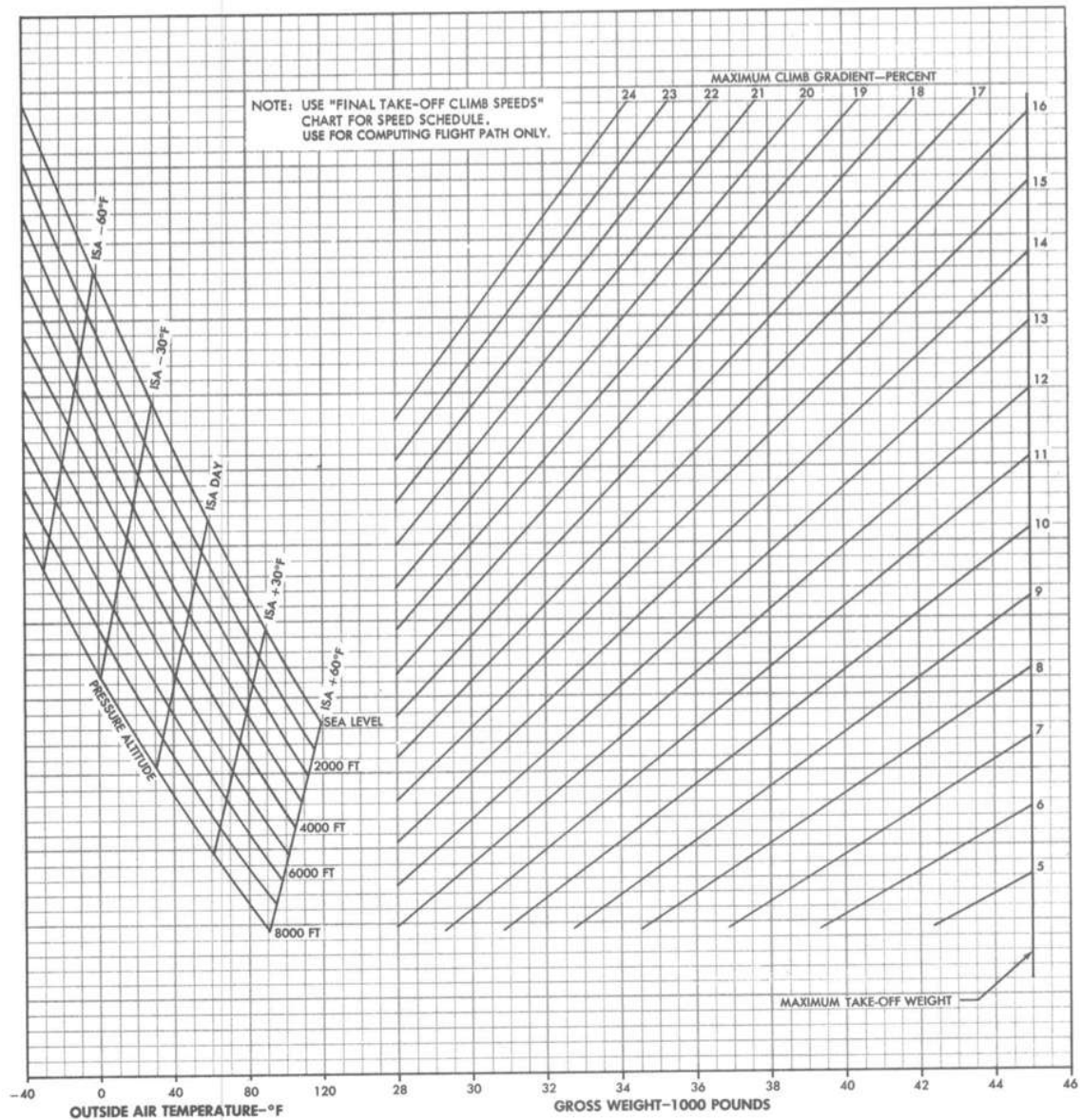
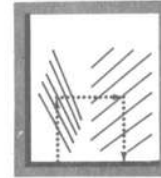
AIRPLANE FLIGHT MANUAL

MAXIMUM CLIMB GRADIENT TAKE-OFF THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



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Figure 3-12

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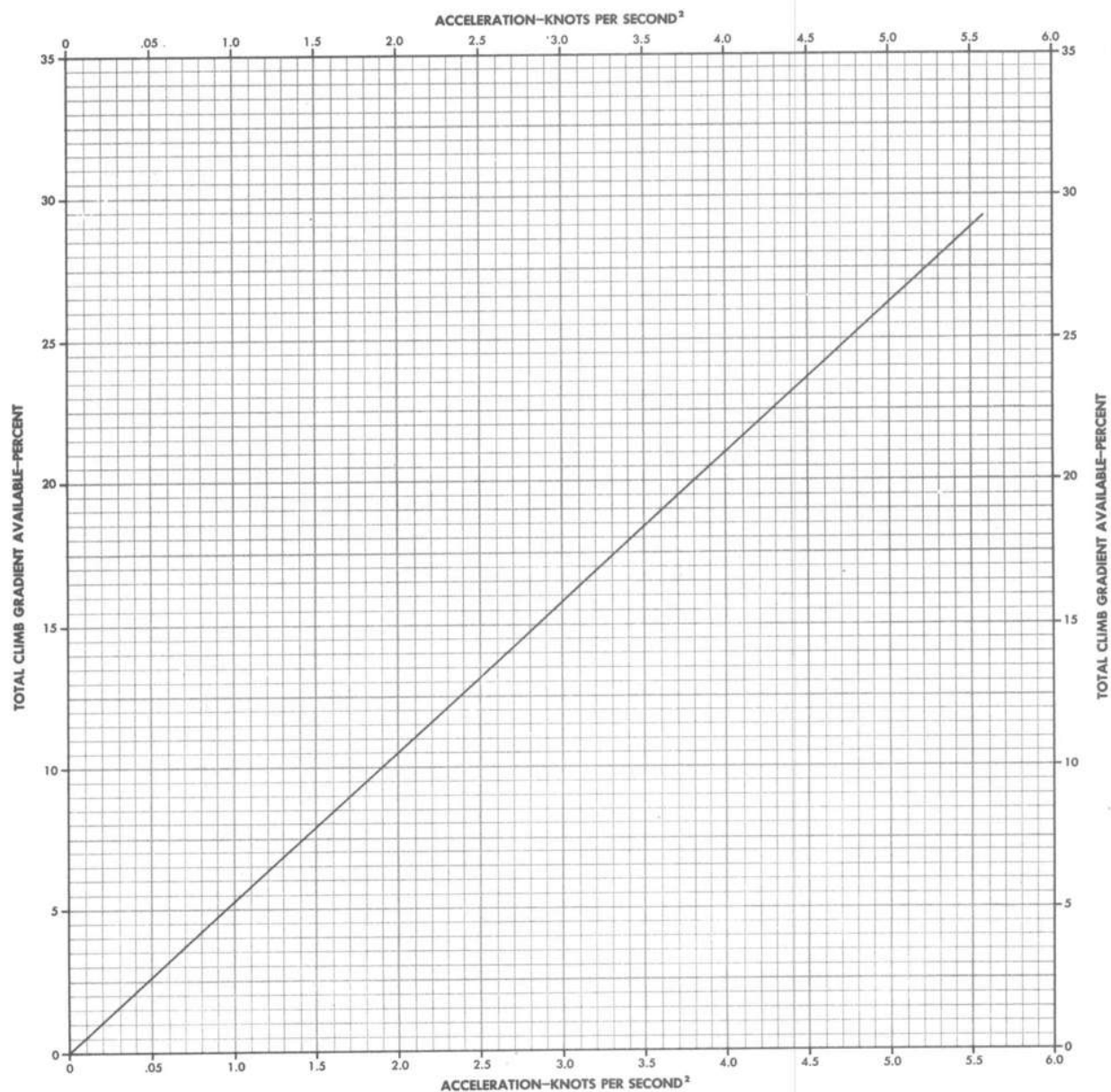
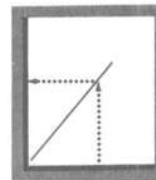
AIRPLANE FLIGHT MANUAL

ACCELERATION AND CLIMB TRADE

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



GUIDE



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Figure 3-13

AIRPLANE FLIGHT MANUAL

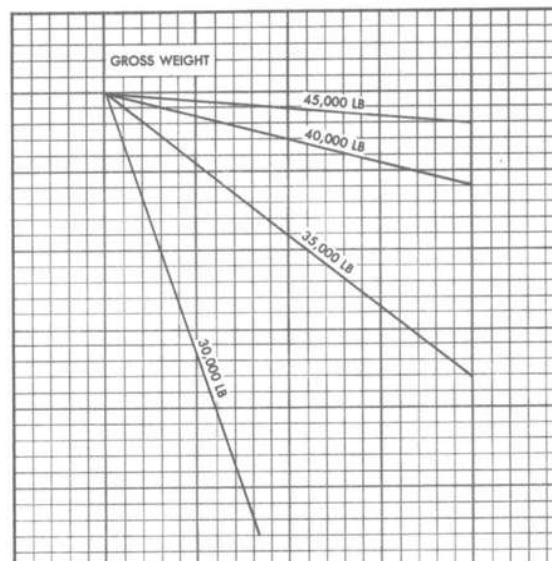
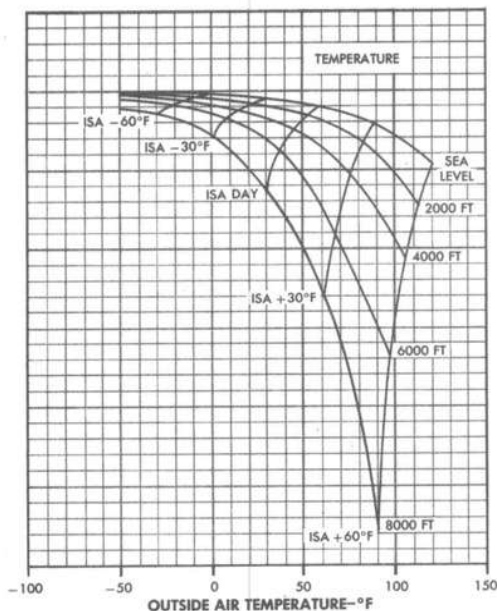
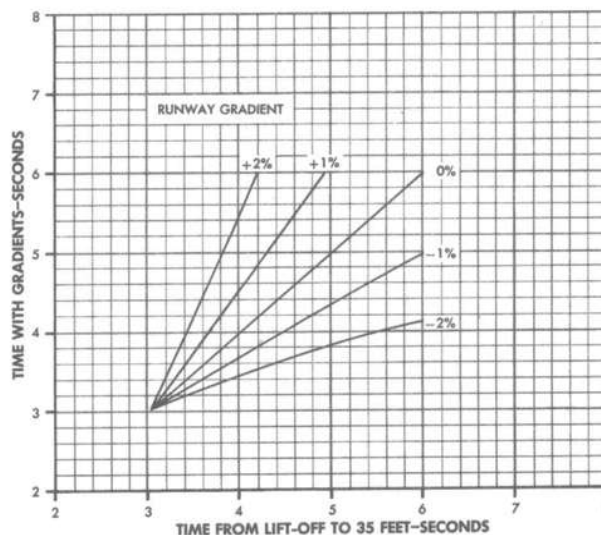
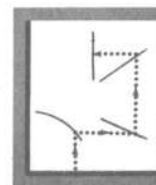
TIME FROM LIFT-OFF TO 35 FEET

TAKE-OFF THRUST
TAKE-OFF FLAPS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR UP



GUIDE



M220-S4-P313

Figure 3-14

AIRPLANE FLIGHT MANUAL

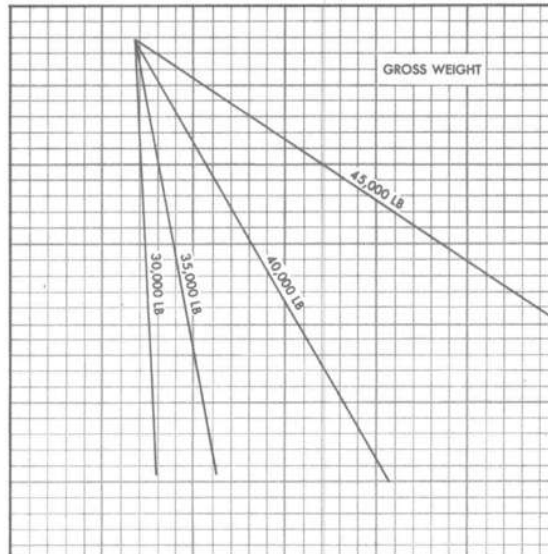
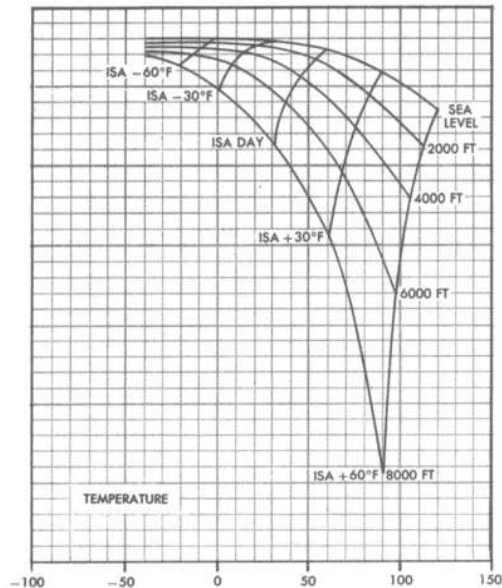
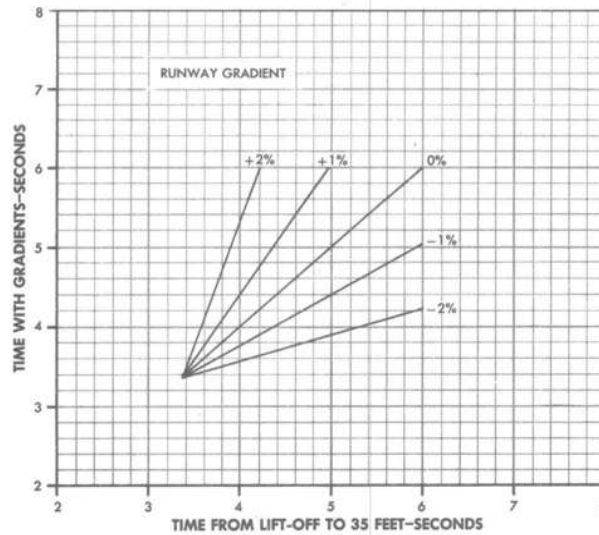
TIME FROM LIFT-OFF TO 35 FEET

TAKE-OFF THRUST
FLAPS UP

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



GUIDE



M220-54-P314

Figure 3-15

AIRPLANE FLIGHT MANUAL

HEIGHT ABOVE PROJECTED RUNWAY SURFACE

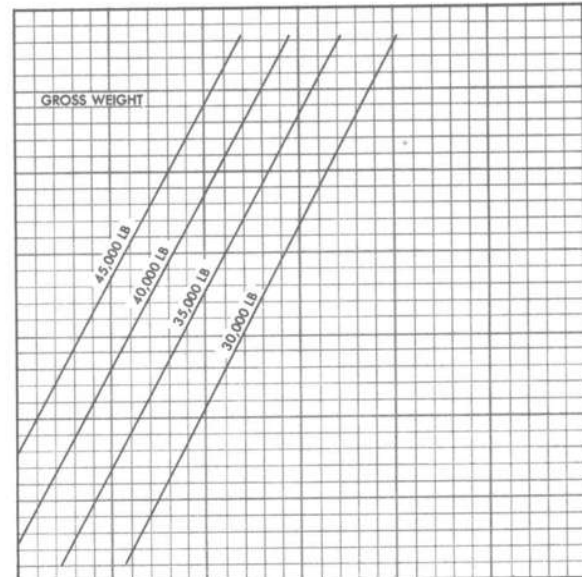
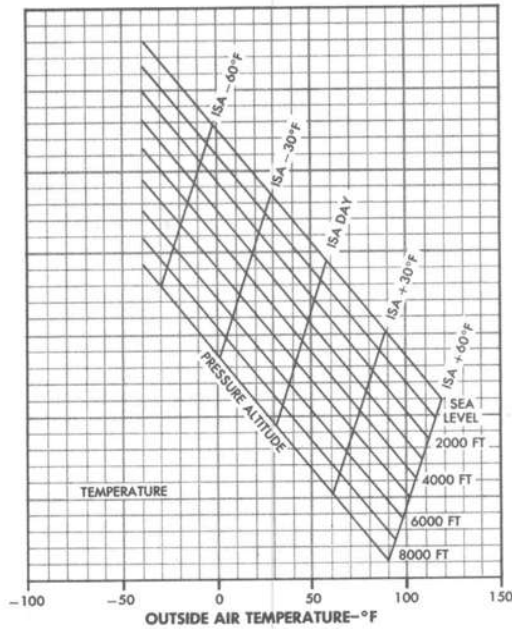
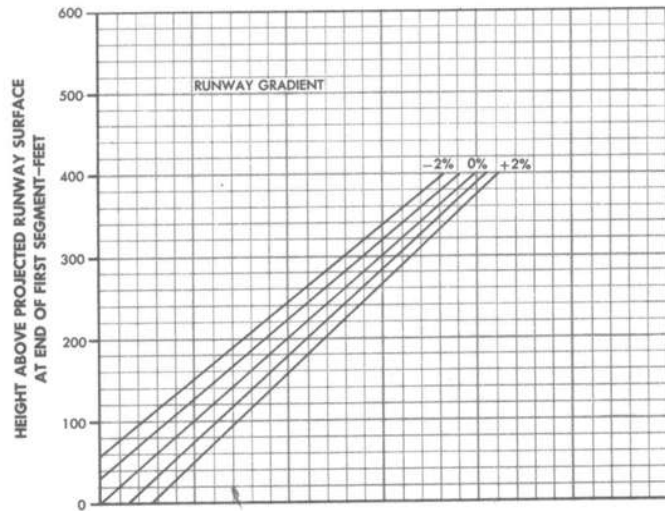
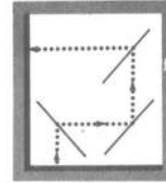
AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
TAKE-OFF FLAPS, GEAR UP



AT END OF FIRST SEGMENT

TAKE-OFF THRUST
TAKE-OFF FLAPS

GUIDE



M220-S4-P315

Figure 3-16

AIRPLANE FLIGHT MANUAL

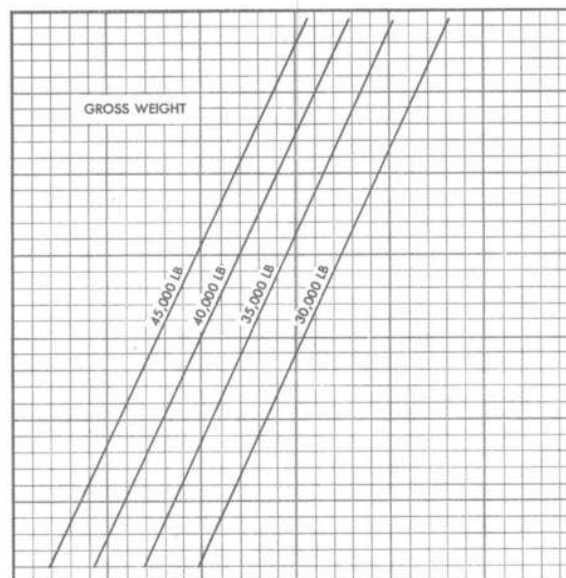
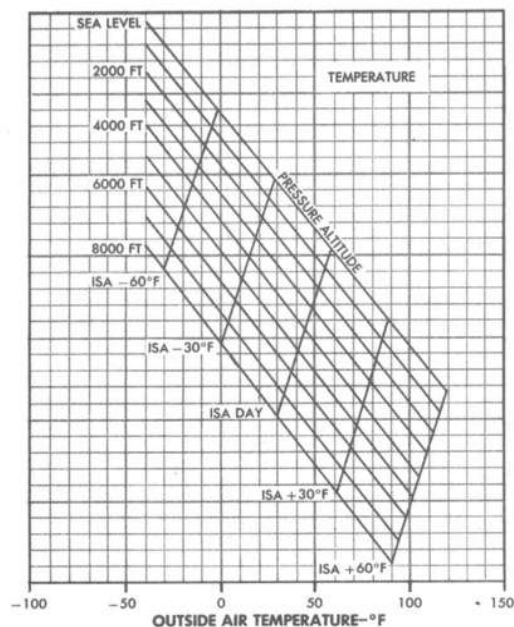
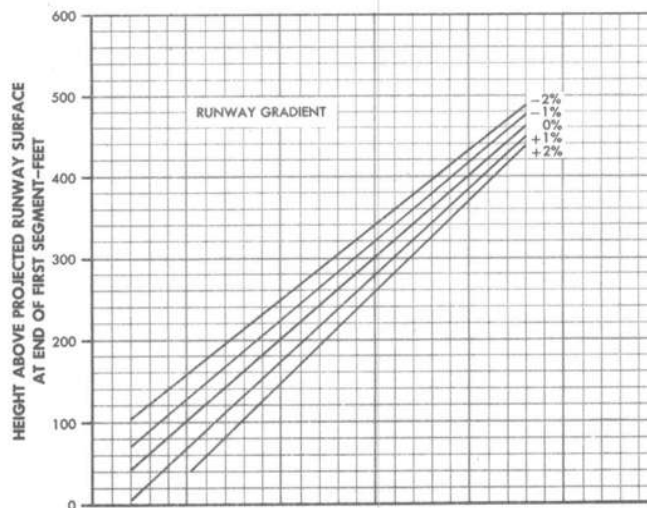
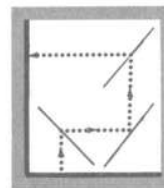
**HEIGHT ABOVE PROJECTED RUNWAY SURFACE
AT END OF FIRST SEGMENT**

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



**TAKE-OFF THRUST
FLAPS UP**

GUIDE



M220-54-P316

Figure 3-17

AIRPLANE FLIGHT MANUAL

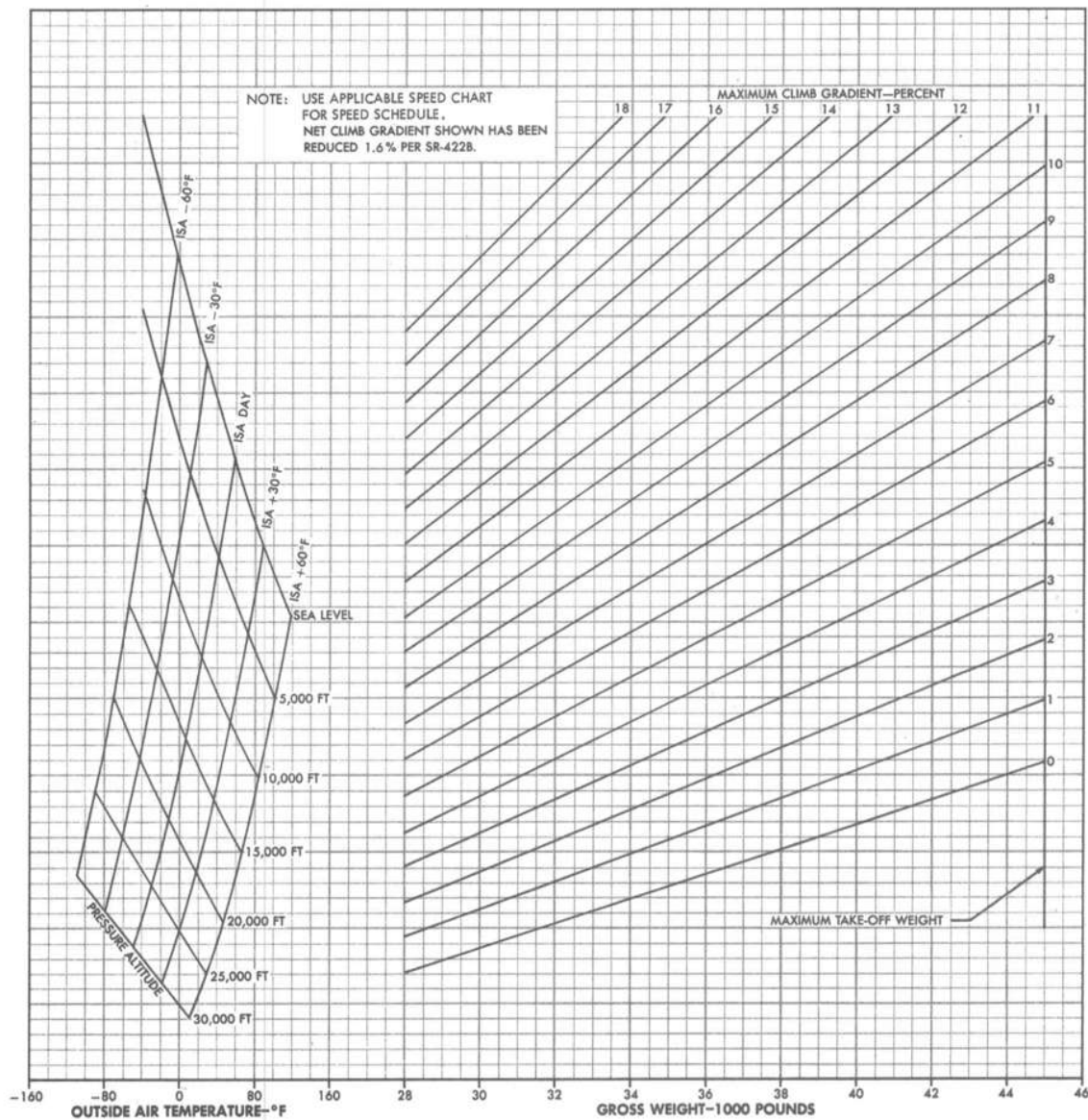
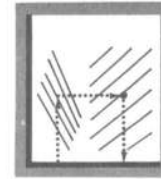
ENROUTE CLIMB FLIGHT PATH GRADIENTS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP



MAXIMUM CONTINUOUS THRUST
OUTBOARD ENGINE INOPERATIVE

GUIDE



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Figure 3-18

AIRPLANE FLIGHT MANUAL

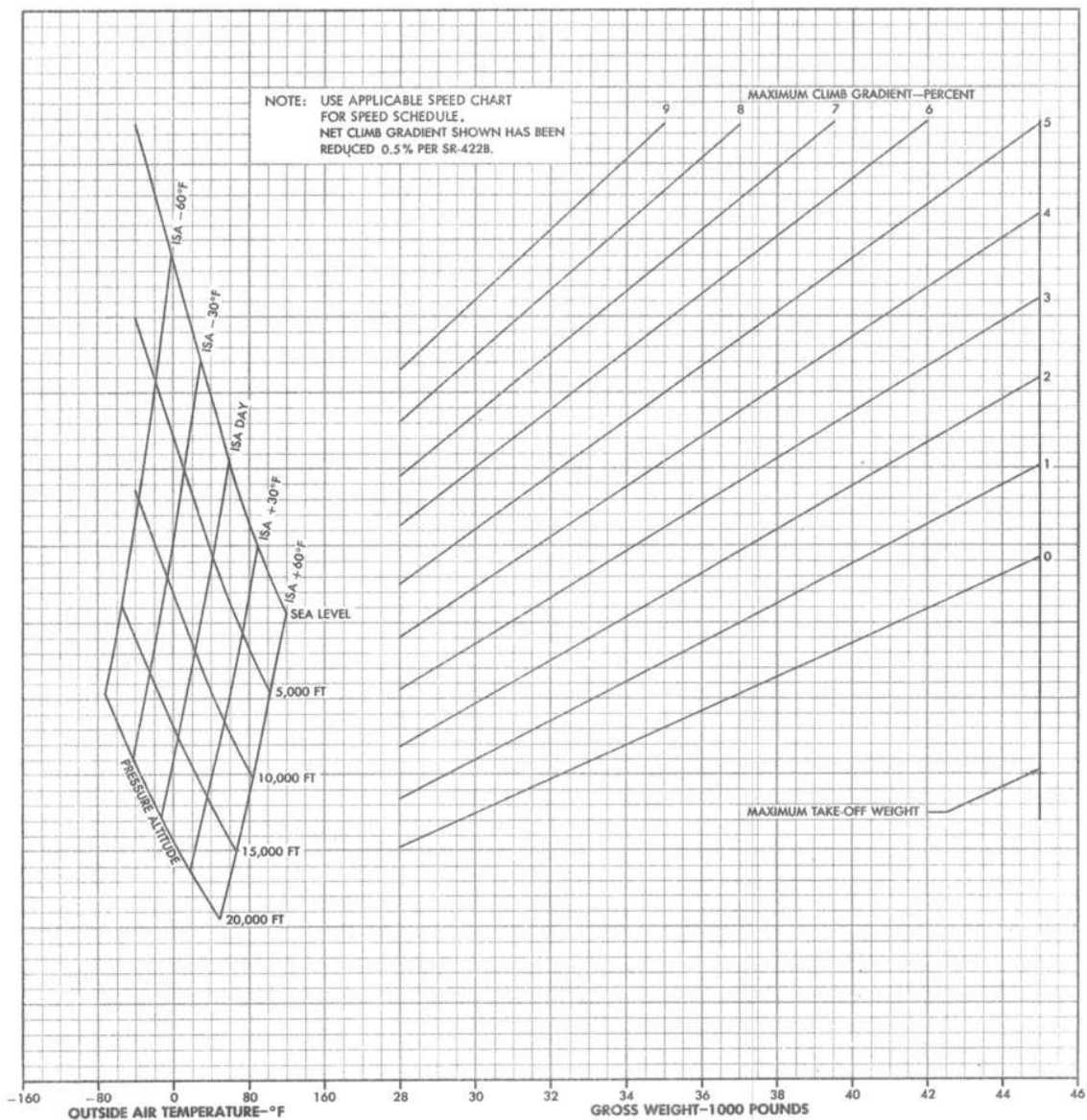
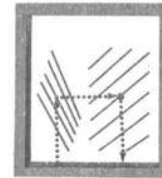
ENROUTE CLIMB FLIGHT PATH GRADIENTS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
TWO ENGINES ON SAME SIDE INOPERATIVE
FLAPS UP, GEAR UP



**MAXIMUM CONTINUOUS THRUST
TWO ENGINES ON SAME SIDE
INOPERATIVE**

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Figure 3-19

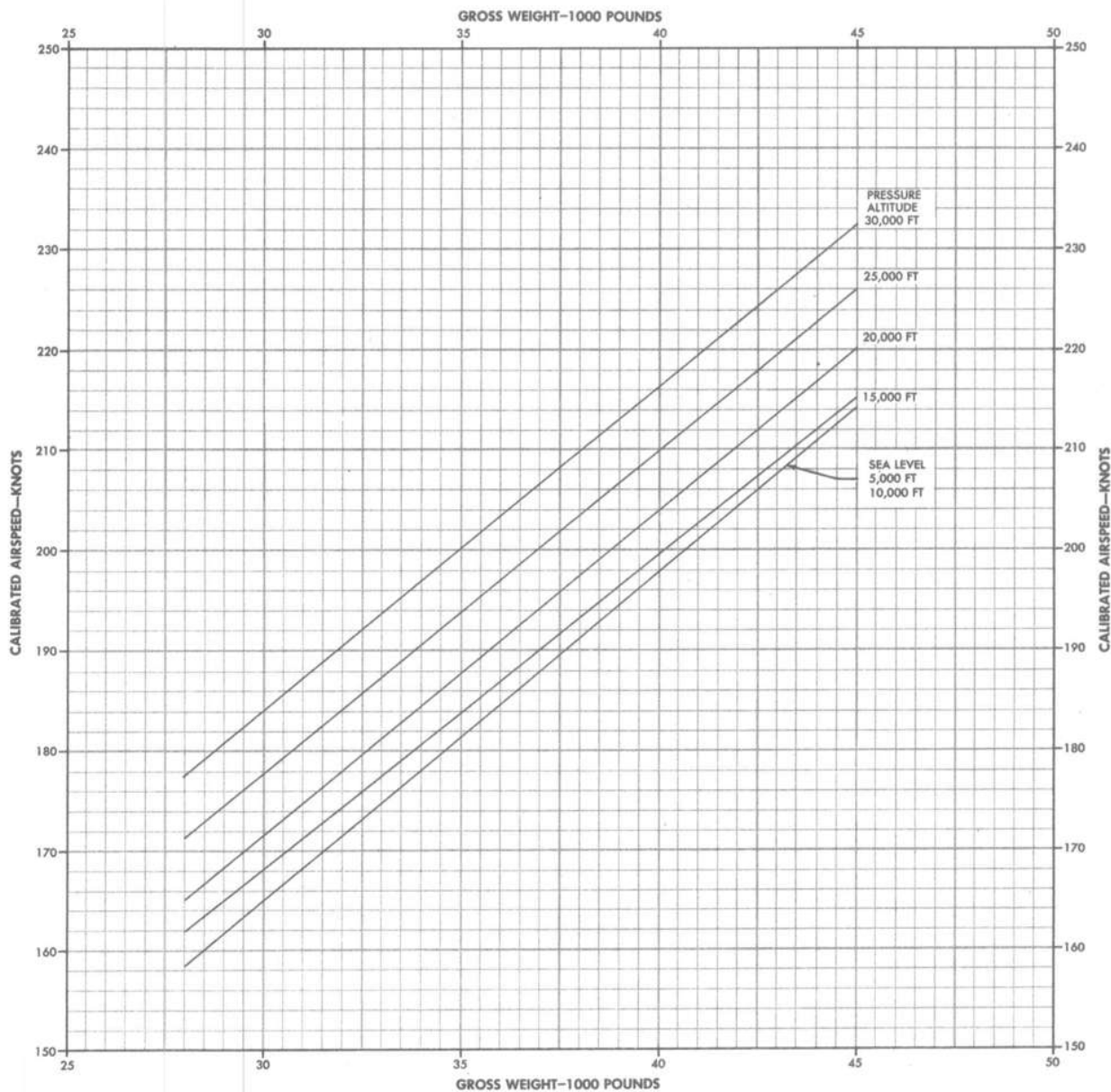
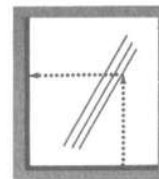
AIRPLANE FLIGHT MANUAL

ENROUTE CLIMB FLIGHT PATH SPEEDS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
FLAPS UP, GEAR UP

MAXIMUM CONTINUOUS THRUST
OUTBOARD ENGINE INOPERATIVE

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Figure 3-20

MCDONNELL 220

AIRPLANE FLIGHT MANUAL

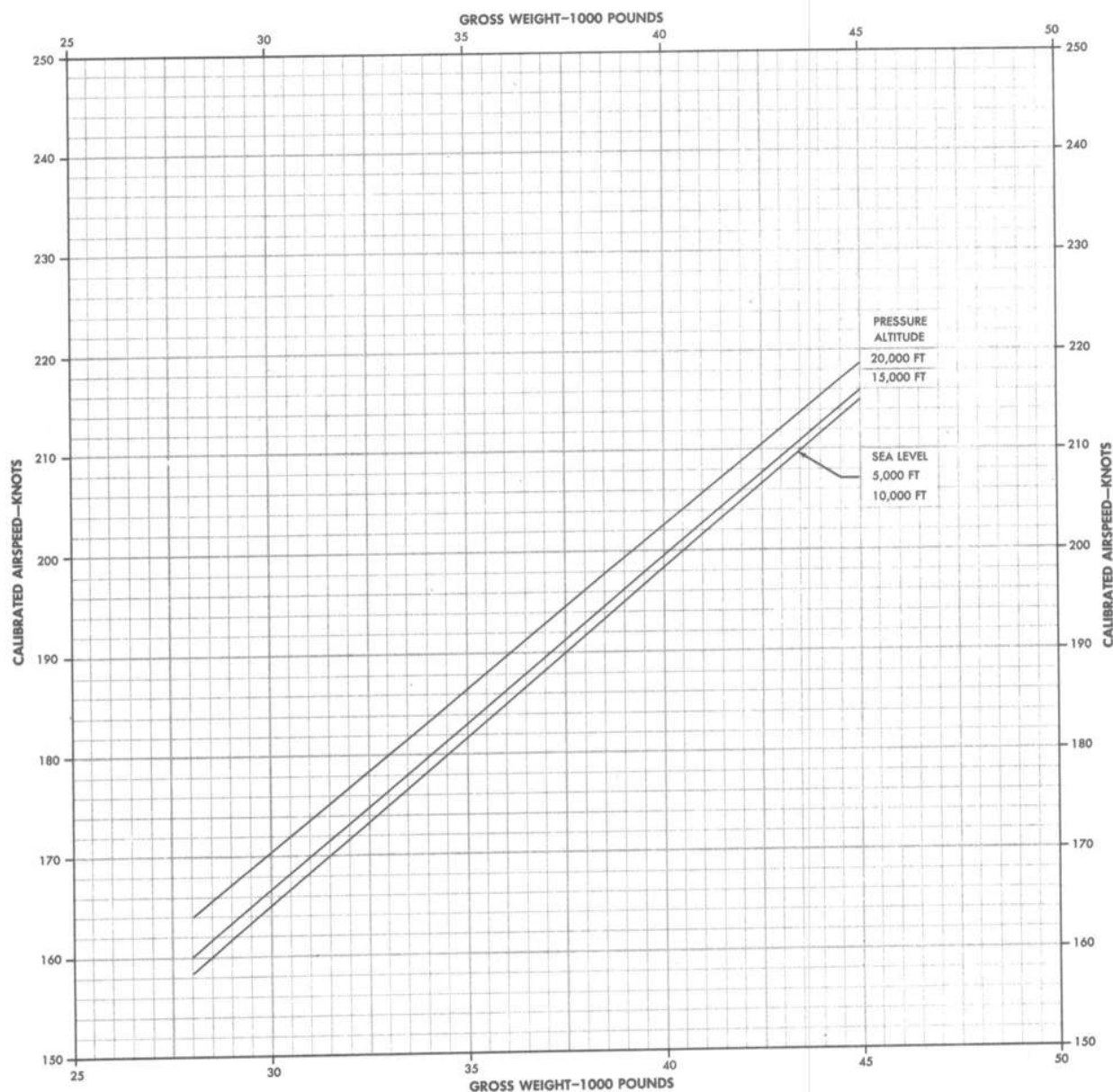
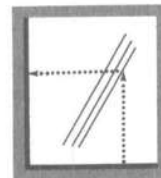
ENROUTE CLIMB FLIGHT PATH SPEEDS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
TWO ENGINES ON SAME SIDE INOPERATIVE
FLAPS UP, GEAR UP



MAXIMUM CONTINUOUS THRUST
TWO ENGINES ON SAME SIDE
INOPERATIVE

GUIDE



M220-54-P420

Figure 3-21

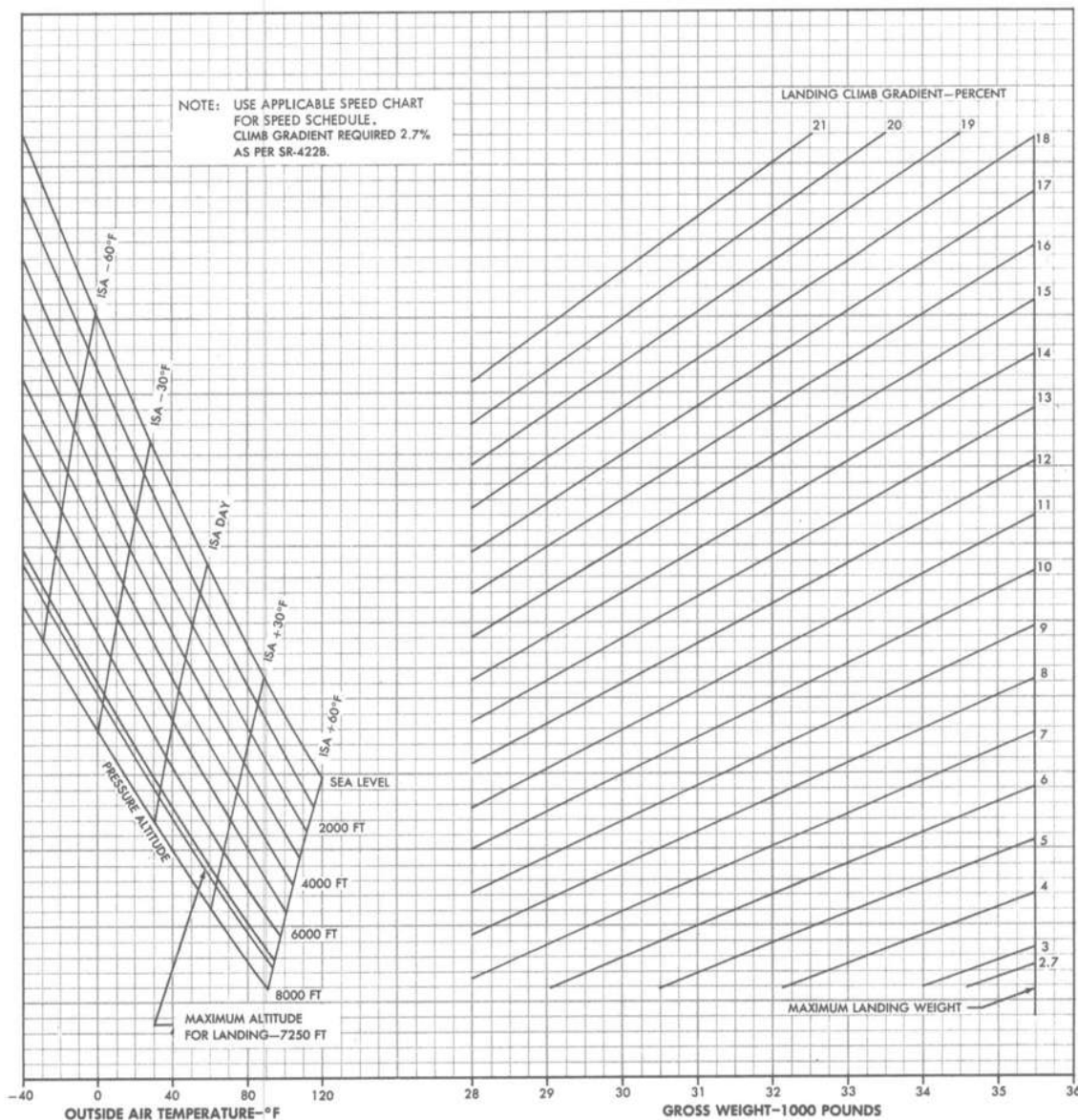
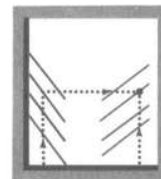
AIRPLANE FLIGHT MANUAL

APPROACH CLIMB GRADIENT TAKE-OFF THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
OUTBOARD ENGINE INOPERATIVE
APPROACH FLAPS, GEAR DOWN



GUIDE



M220-54-P621

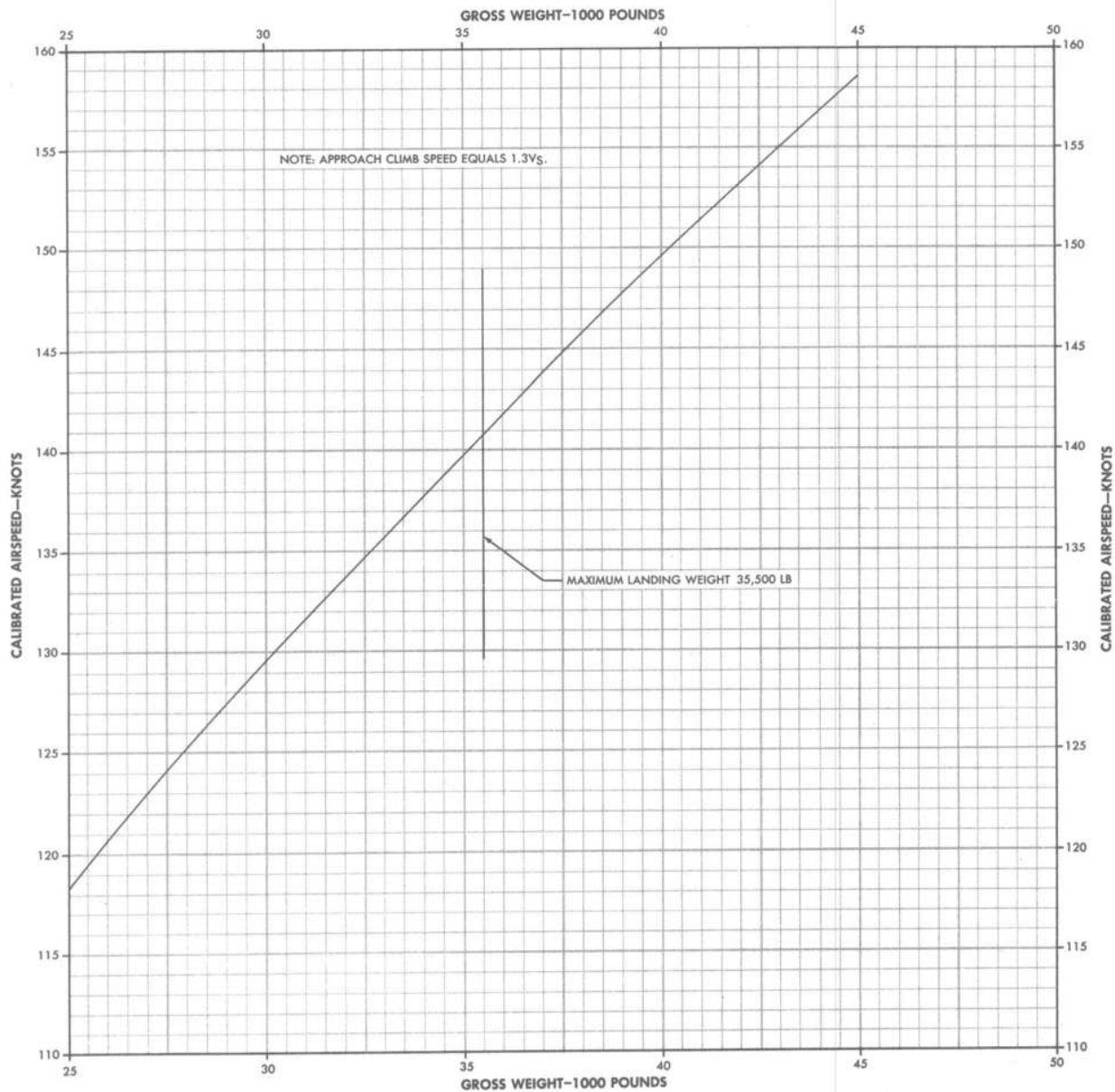
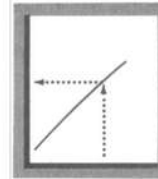
Figure 3-22

APPROACH CLIMB SPEED

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
APPROACH FLAPS, GEAR DOWN



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Figure 3-23

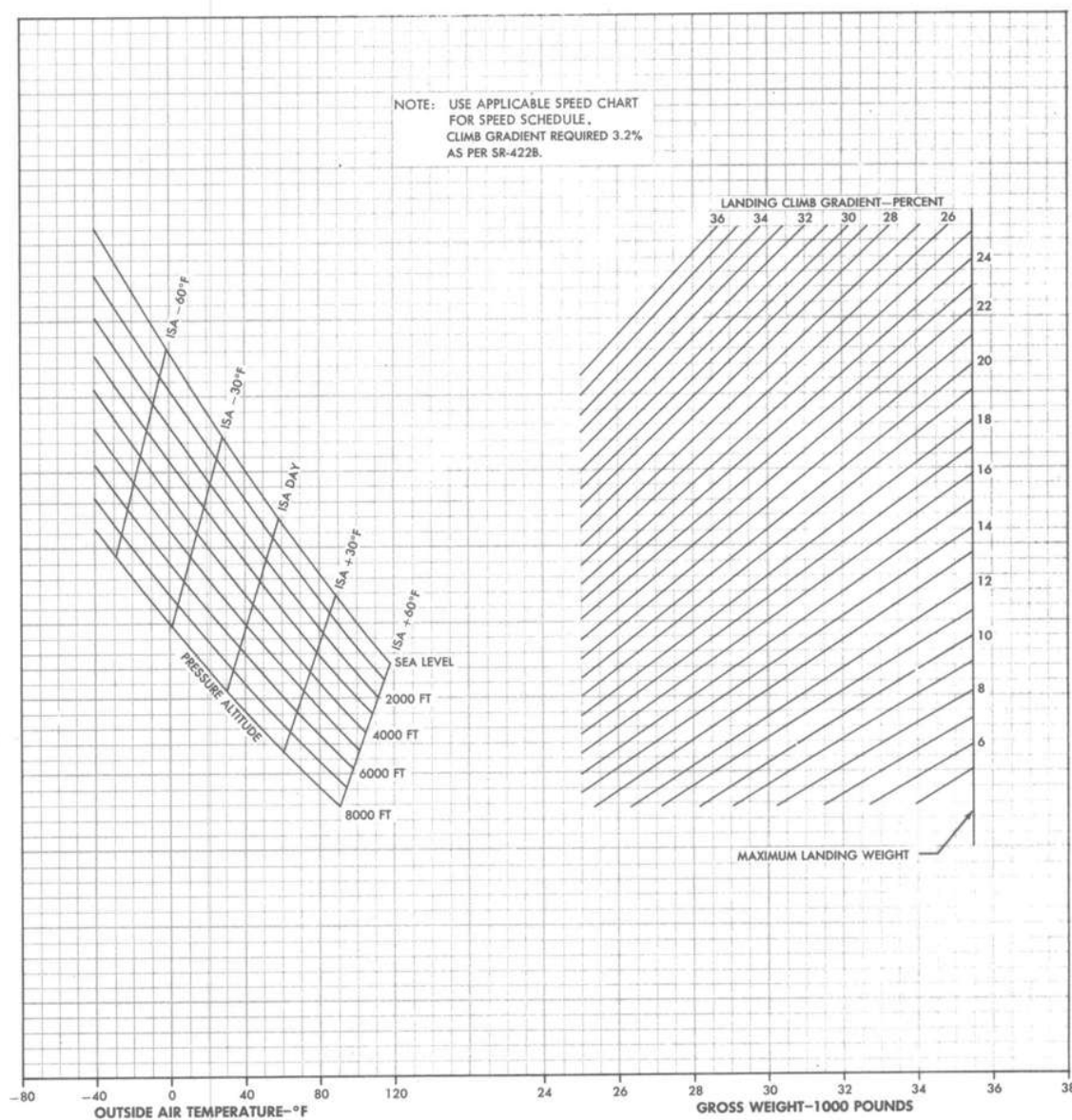
AIRPLANE FLIGHT MANUAL

ALL-ENGINE-OPERATING LANDING CLIMB GRADIENTS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
LANDING FLAPS, GEAR DOWN

TAKE-OFF THRUST
GO AROUND

GUIDE



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Figure 3-24

AIRPLANE FLIGHT MANUAL

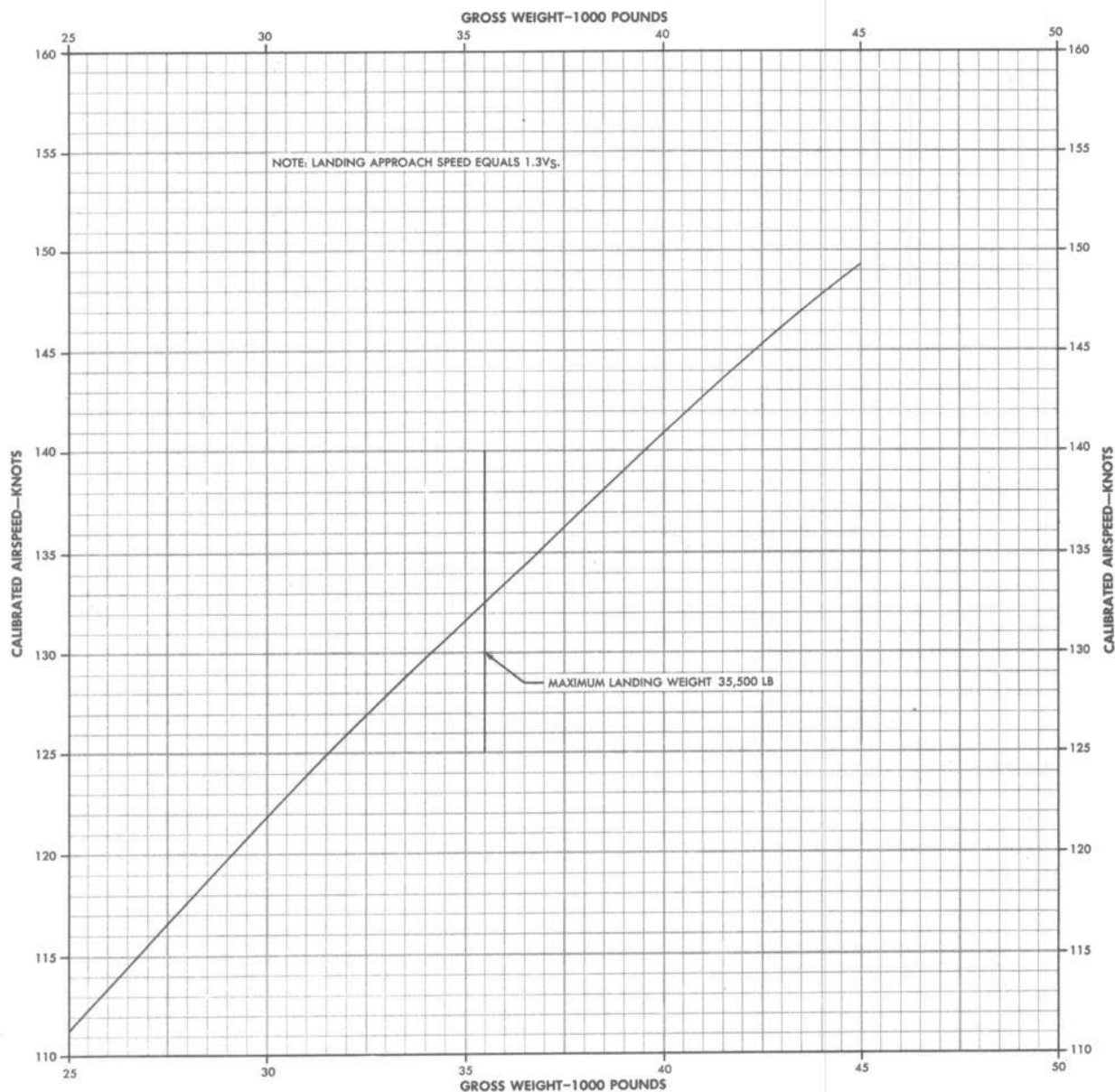
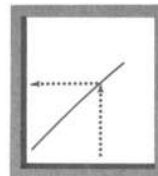
ALL-ENGINE-OPERATING LANDING CLIMB SPEEDS

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
LANDING FLAPS, GEAR DOWN



TAKE-OFF THRUST
GO AROUND

GUIDE



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Figure 3-25

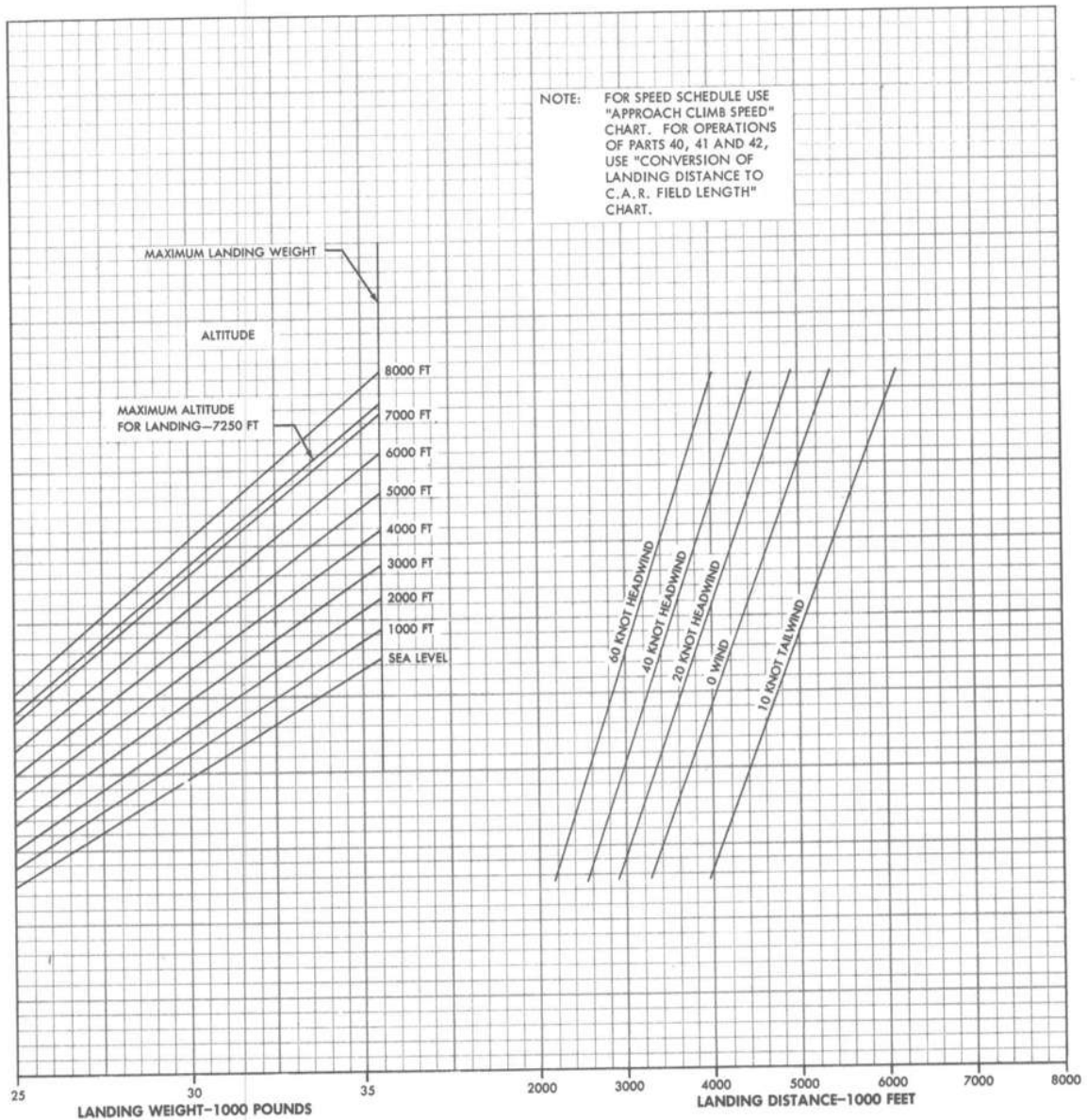
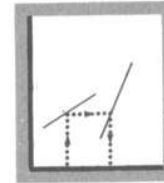
AIRPLANE FLIGHT MANUAL

TOTAL LANDING DISTANCE

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
LANDING FLAPS, GEAR DOWN



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M220-54-P725

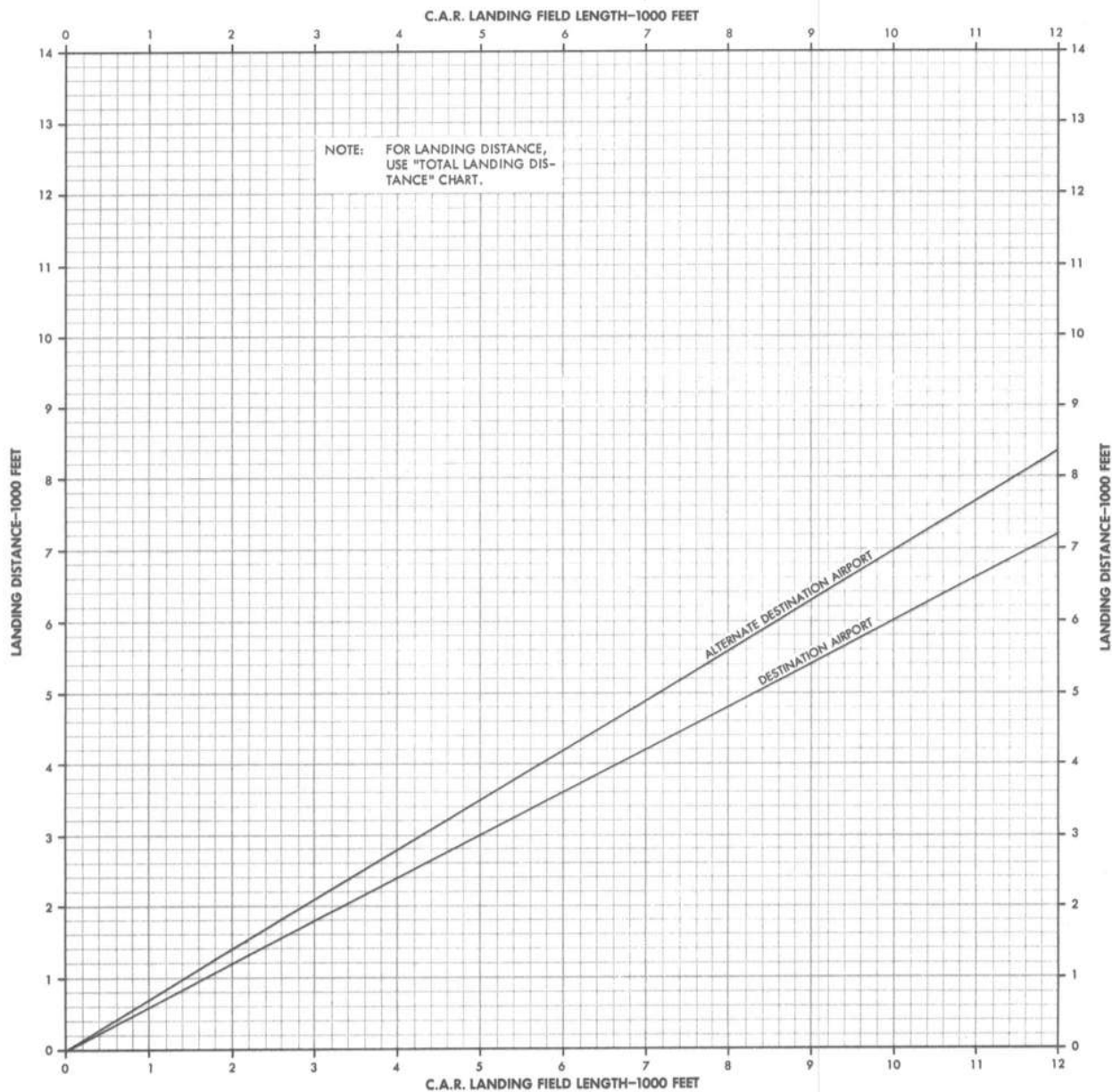
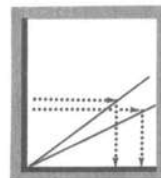
Figure 3-26

CONVERSION OF LANDING DISTANCE TO C.A.R. FIELD LENGTH

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
LANDING FLAPS, GEAR DOWN



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Figure 3-27

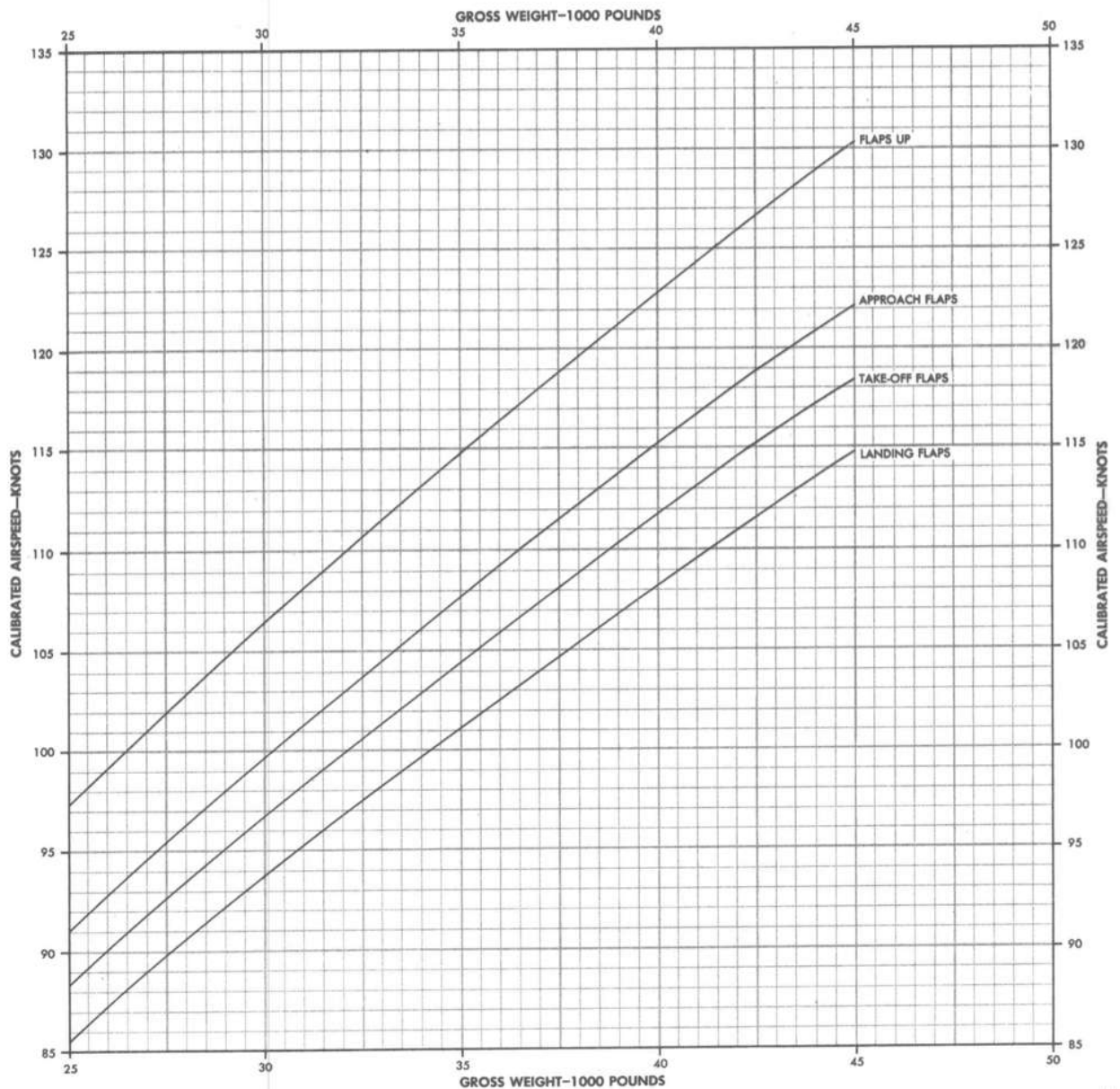
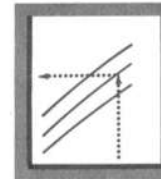
AIRPLANE FLIGHT MANUAL

STALL SPEEDS IDLE THRUST

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES



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Figure 3-28

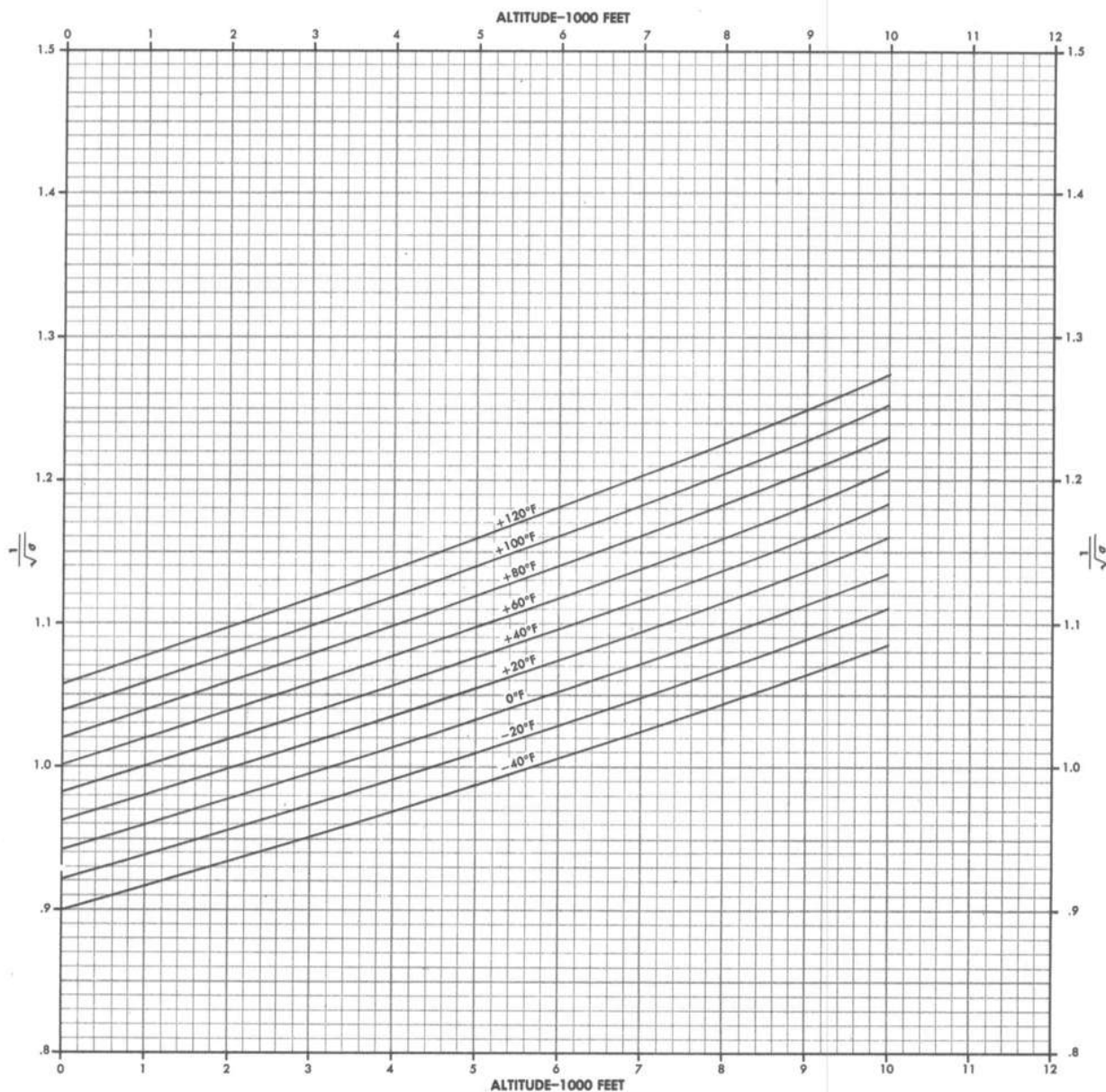
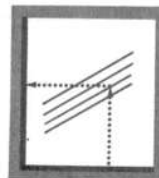
AIRPLANE FLIGHT MANUAL

DENSITY RATIO VARIATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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Figure 3-29

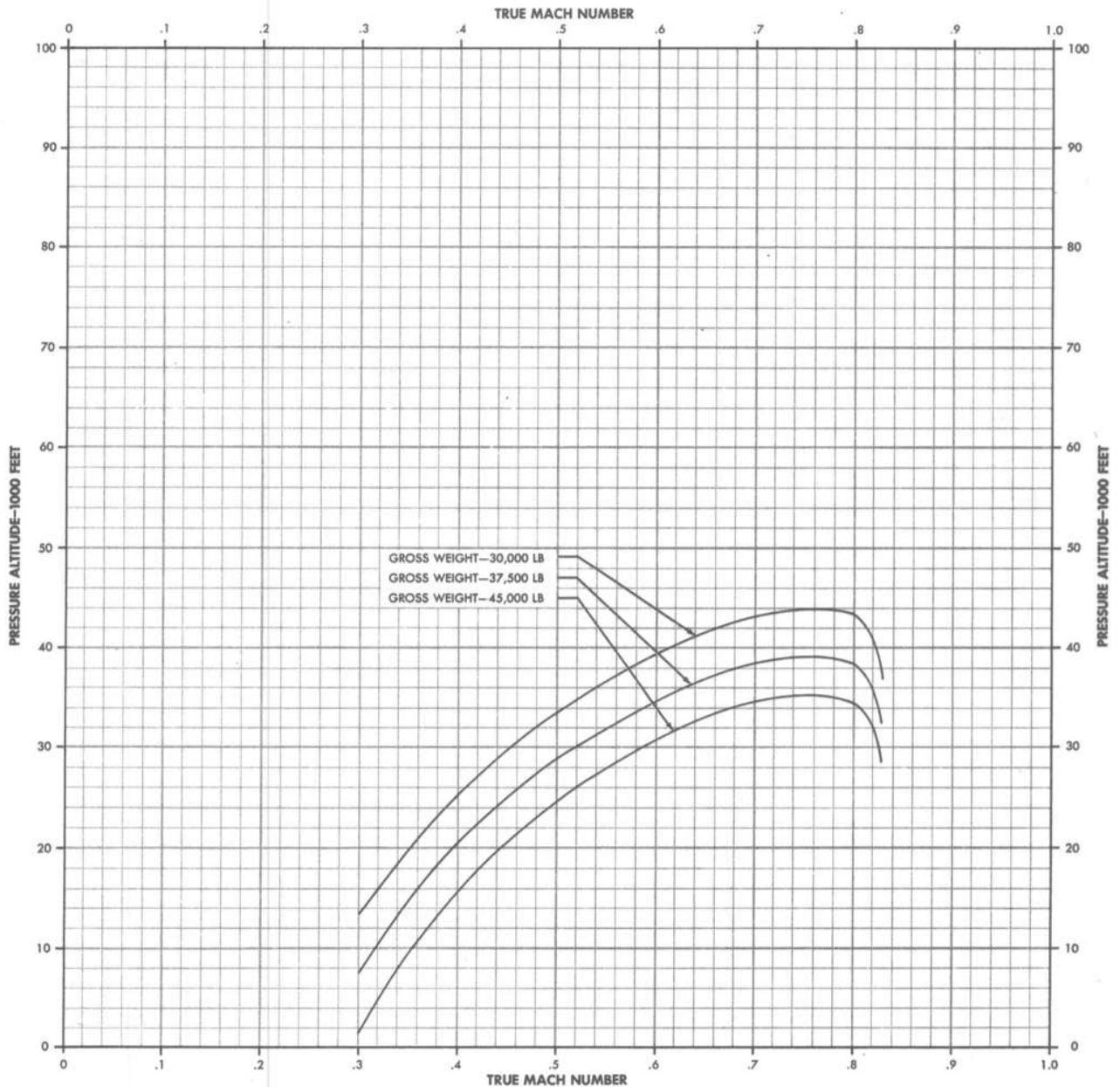
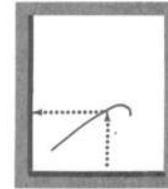
AIRPLANE FLIGHT MANUAL

MANEUVERING ENVELOPE CHART INITIAL BUFFET FOR 1.5g MANEUVER

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
FLAPS UP, GEAR UP



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Figure 3-30

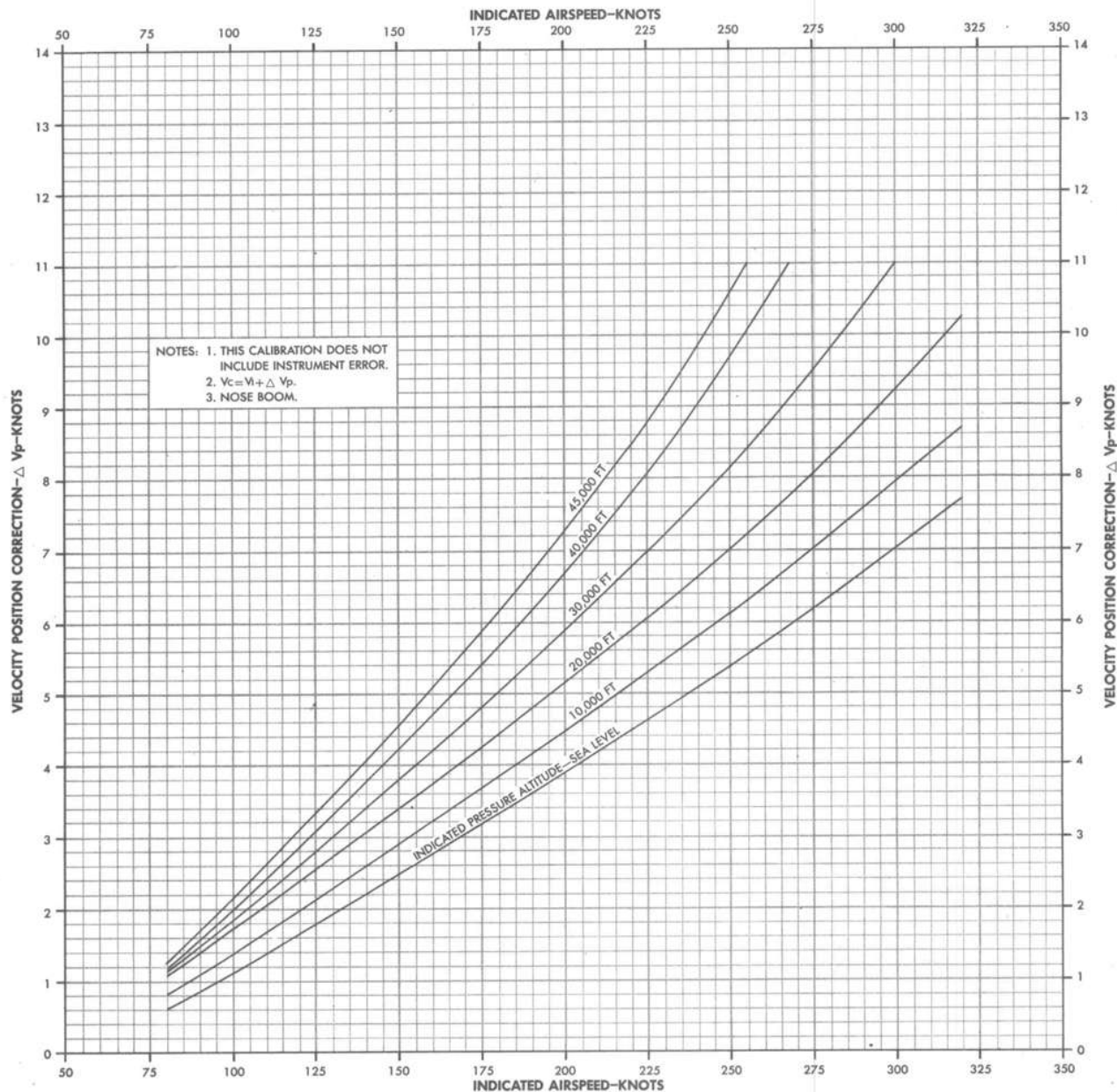
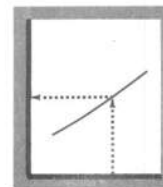
AIRPLANE FLIGHT MANUAL

PILOT'S AIRSPEED CALIBRATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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Figure 3-31

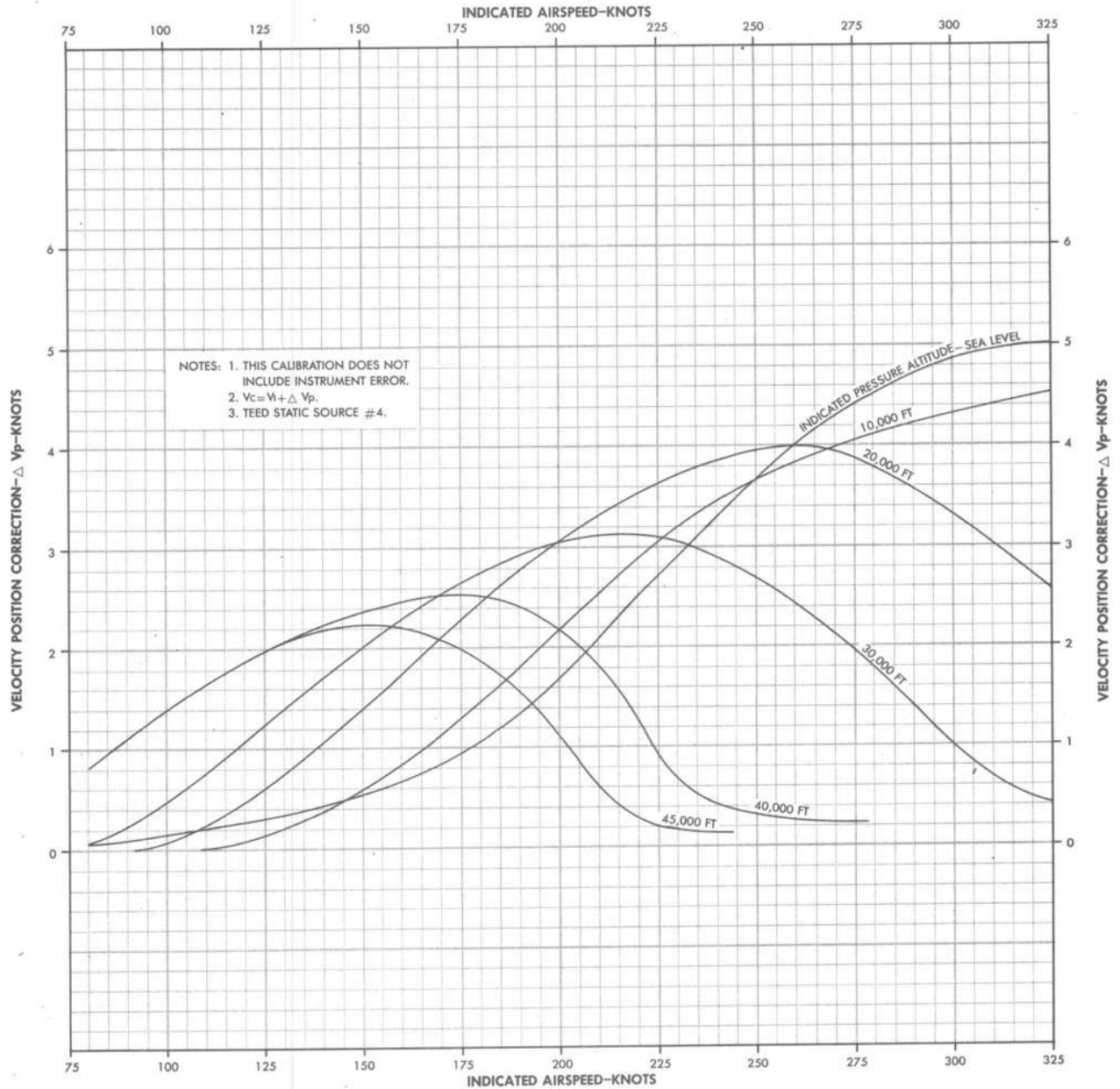
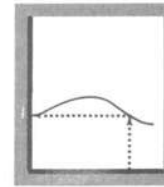
AIRPLANE FLIGHT MANUAL

CO-PILOT'S AIRSPEED CALIBRATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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Figure 3-32

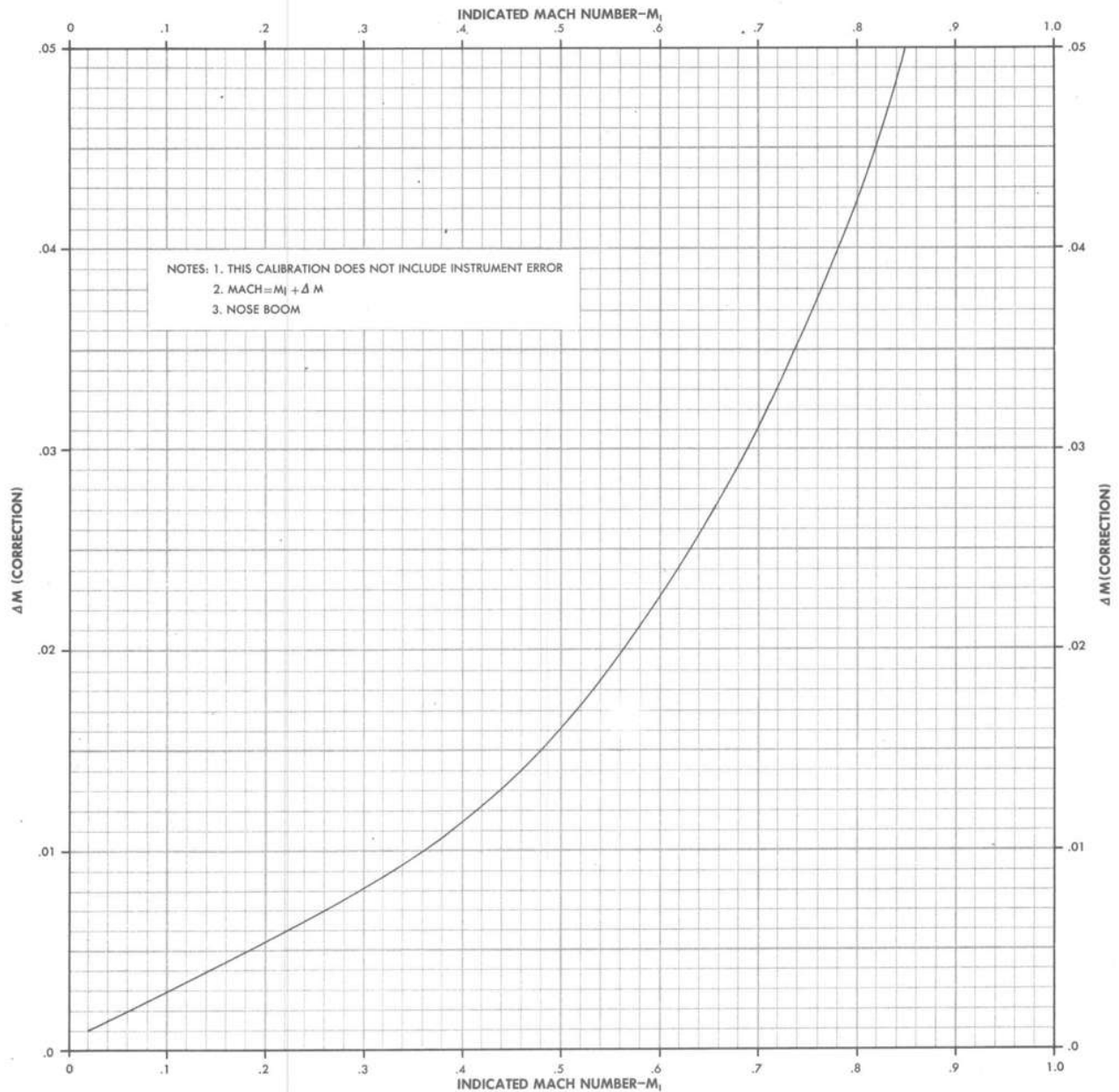
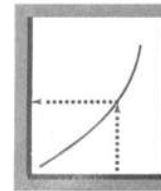
AIRPLANE FLIGHT MANUAL

PILOT'S MACH METER CALIBRATION CHART

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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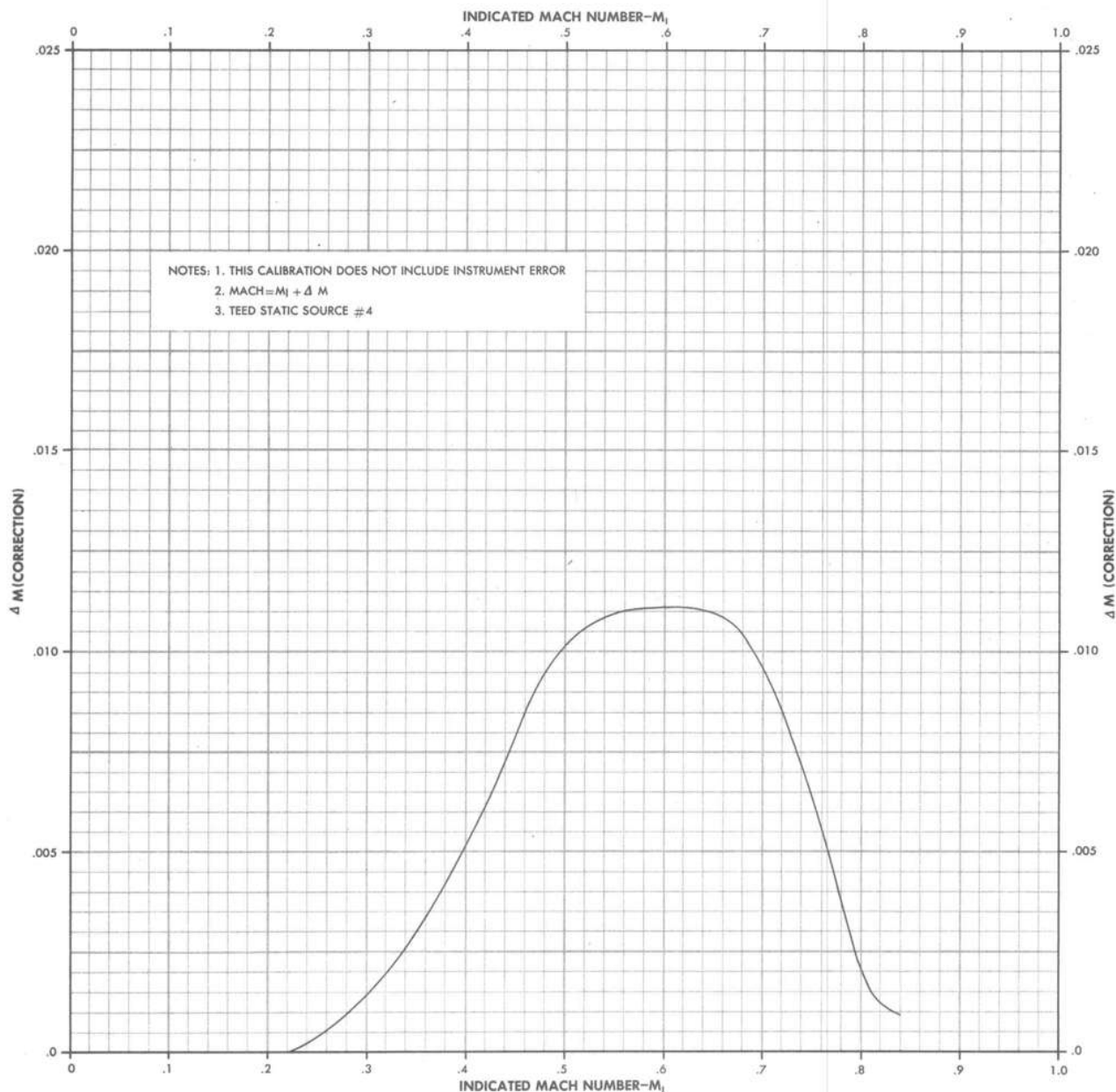
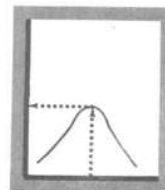
Figure 3-34
33

CO-PILOT'S MACH METER CALIBRATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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Figure 3-35³⁴

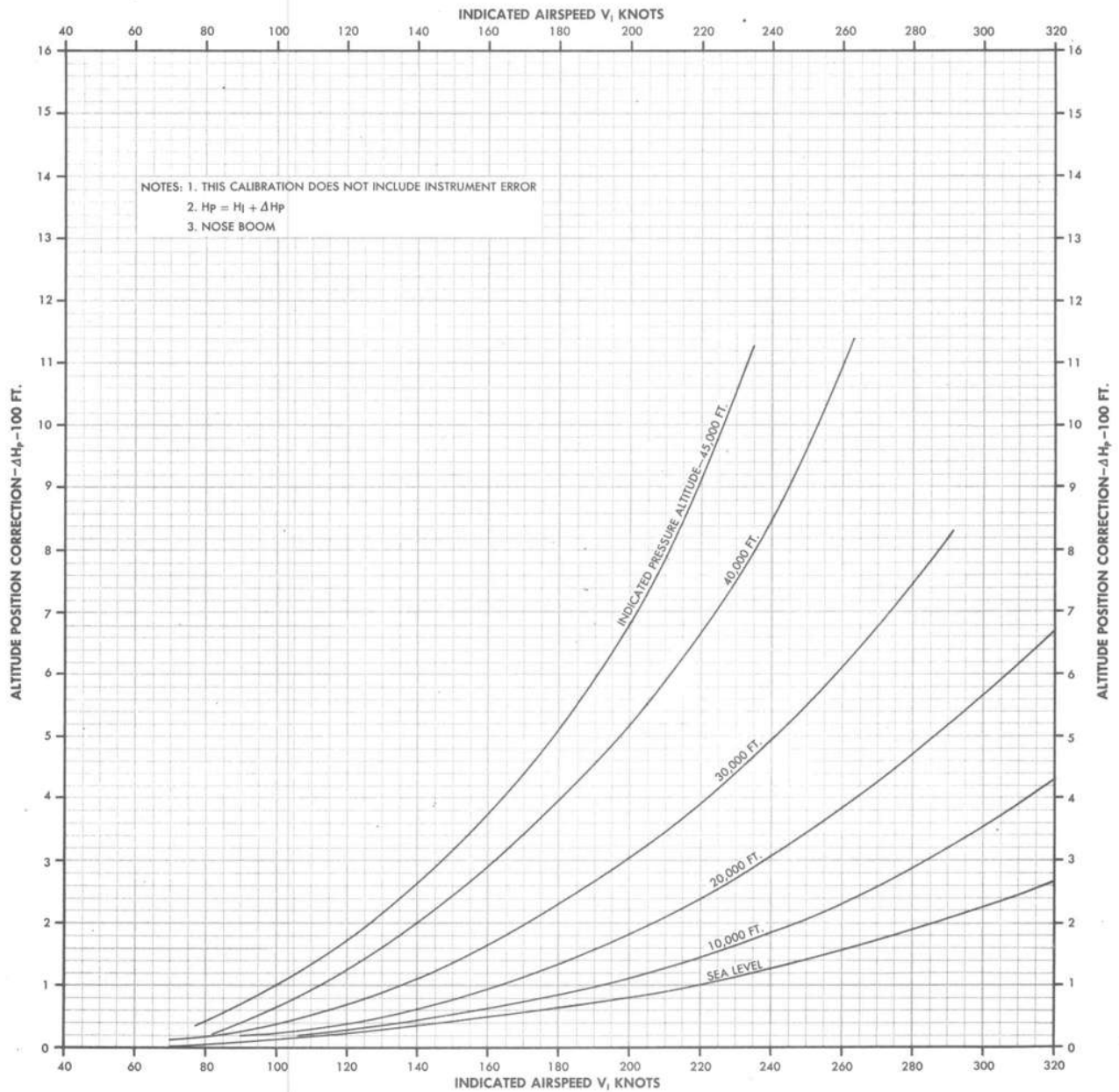
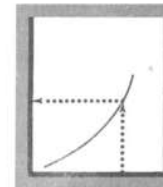
AIRPLANE FLIGHT MANUAL

PILOT'S ALTITUDE CALIBRATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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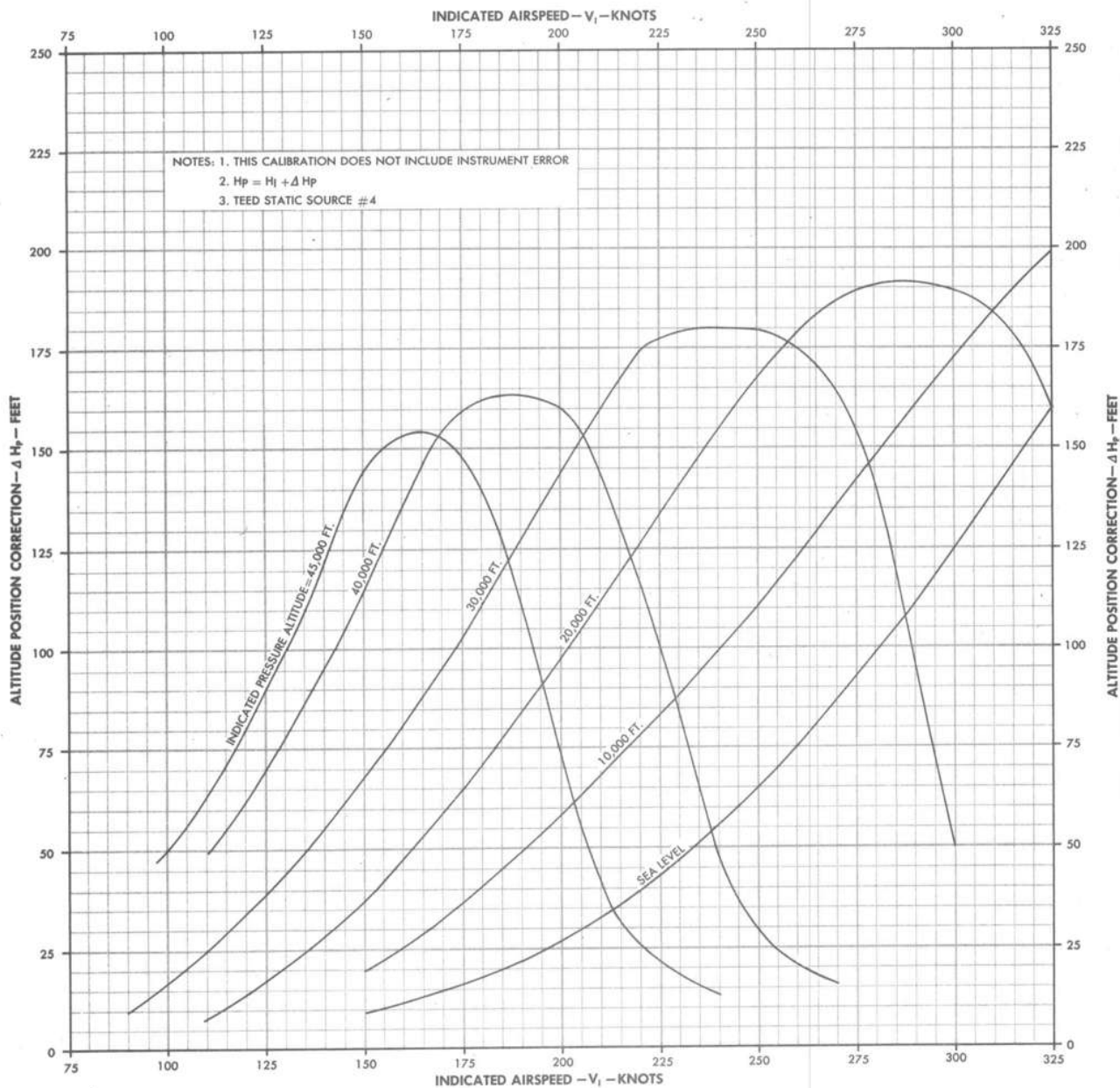
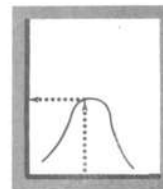
35
Figure 3-36

CO-PILOT'S ALTITUDE CALIBRATION

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
ALL CONFIGURATIONS



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Figure 3-37

Section III
Performance Data

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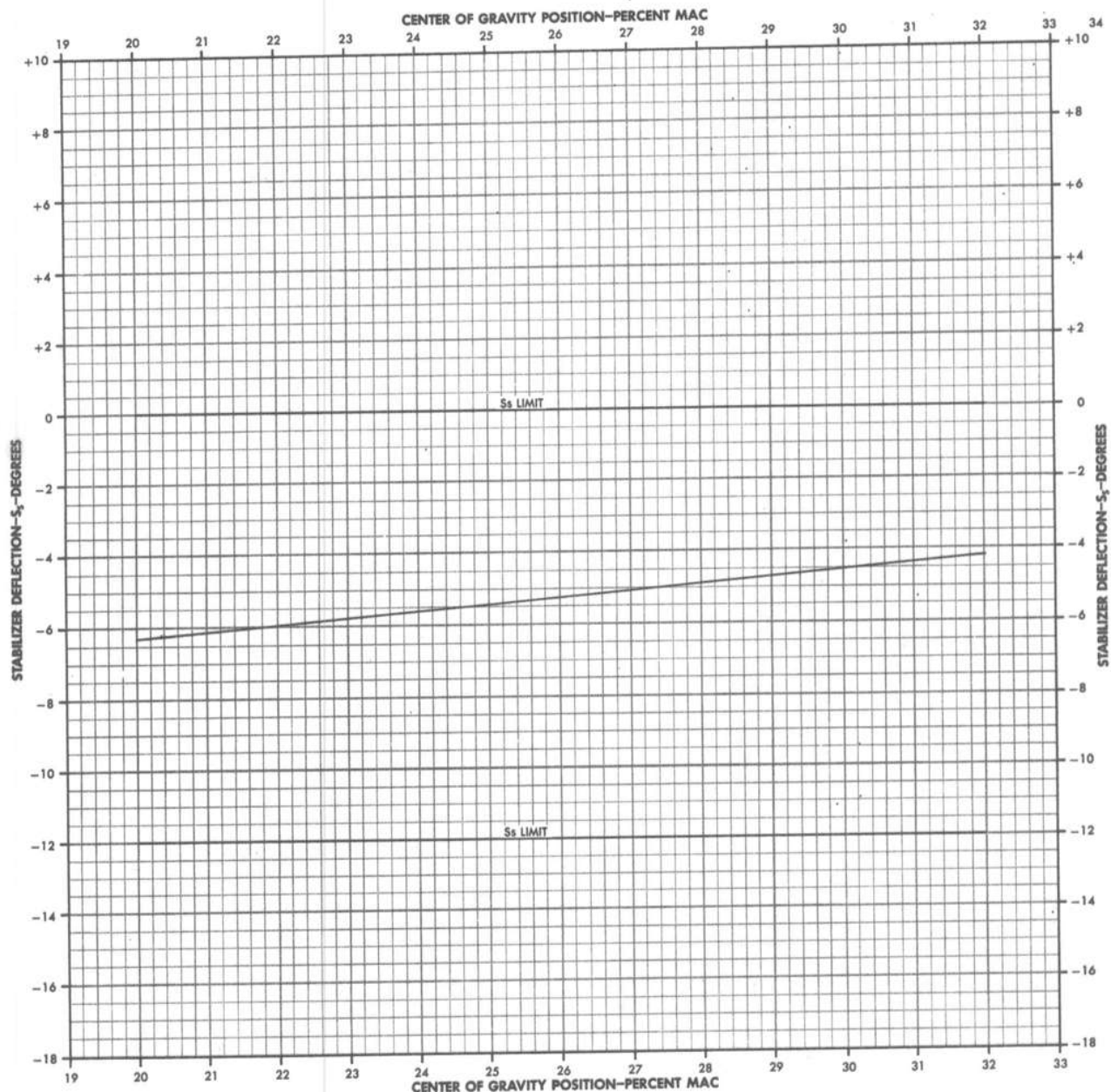
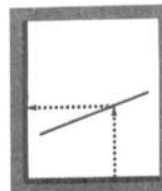
AIRPLANE FLIGHT MANUAL

TAKE-OFF STABILIZER SETTING

AIRPLANE CONFIGURATION
WESTINGHOUSE J34-WE-34 (24C4D-2E) ENGINES
TAKE-OFF FLAPS, GEAR DOWN



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Figure 3-33

