



Rockwell Commander

Model 685

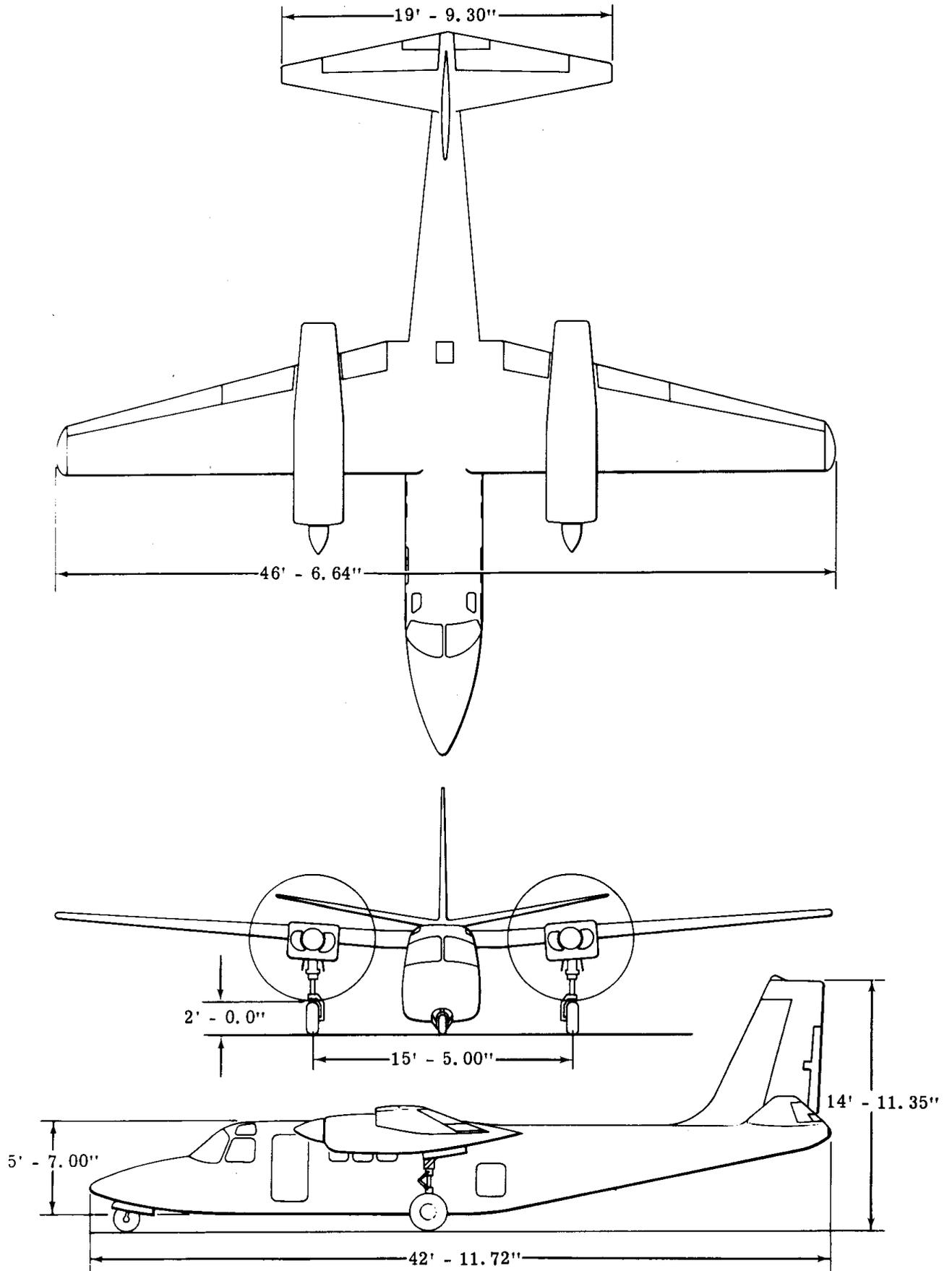
FLIGHT MANUAL

For FS2004 and FSX
By Milton Shupe & Arild Elverum





Rockwell Commander Model 685





Model 685

THE ROCKWELL COMMANDER 685 is a turbocharged high-performance piston-powered airplane designed to meet the business requirements of room and speed normally found in propjet aircraft. The seven to nine place 685 is powered by twin turbocharged 435-hp Continental engines with Hartzell constant-speed full feathering three-blade props. It can cruise at speeds of 255 mph at 24,000 feet. Its cabin can be arranged in no less than 12 different ways and can maintain sea level cabin pressure at altitudes up to 9,000 feet (4.2 psi differential). The Commander's high wing, sturdy landing gear, and 75 knot stall speed allow it to operate from short unimproved strips. With 322 gallons of fuel, the 685 has a range of 1,731 miles with a 45-minute reserve. Its simple fuel system requires no crossfeeding. All fuel feeds into a central fuselage tank.

Rockwell Commander 685 Data:

Engines: 2 x Continental GTSIO--520-K, 435hp

MAUW: 9000 lbs.

Gross weight: 9,000 lb

Empty weight: 6,021 lb

Fuel capacity: 250-322 USG

Seats: 9

Top speed: 279 mph.

Cruise speed: 256 mph

Stall speed: 86 mph

Initial climb rate: 1,490 fpm

Range: 976-1,284 sm

Ceiling: 27,500 ft

Takeoff dist (50ft): 1,943 ft

Landing distance (50ft): 2,312 ft



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LIMITATIONS

POWER PLANT

Engine: Two Continental GTSIO-520-F

Engine Operation Limitations: Maximum Power For All Operations

BHP	Engine RPM	Manifold Pressure
435	3400	44.5" Hg. *

MAXIMUM ALLOWABLE MANIFOLD PRESSURE

Altitude	MP	Altitude	MP
17,000 Ft	44.5" Hg	22,000 Ft	39.8" Hg
19,000 Ft	44.1" Hg	23,000 Ft	37.8" Hg
20,000 Ft	43.8" Hg	24,000 Ft	35.8" Hg
21,000 Ft	41.8" Hg	25,000 Ft	33.9" Hg

Oil Temperature: Maximum 240° F

Oil Pressure: Minimum (idling) 10 PSI
Maximum (cold oil) 100 PSI

Cylinder Head Temperature: Maximum 460° F

Maximum Fuel: 100/130 (Minimum) Octane Aviation Gasoline -usable capacity standard tanks 256 gallons. Usable capacity optional tanks 322 gallons.

Oil Grade: Above 400F Ambient Air (S. L.) -SAE 50

Below 400F Ambient Air (S. L.) -SAE 30 or 10W-30 Cowl Flaps -should be open for takeoff and all ground operations. Do not open cowl flaps above 224 Kts CAS. Annunciator Lights -illuminate when cowl flaps are full open.

PROPELLERS

Two Hartzell propellers with C8475+2 or FC8475+2 blades and hub model HC-H3YN-2 or HC-H3YN-2F are installed. The propellers are 3-blade, full feathering, constant speed.



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AIRSPPEED LIMITATIONS

All airspeeds are given in Knots, Calibrated Airspeed (KCAS)

Never Exceed Speed (VNE/MNE) 252 KCAS .55 Mach

Maximum Structural Cruising Speed (VNO/MNO) 224 KCAS . 49 Mach

Maneuvering Speed (VA) 136 KCAS

Flap Operation

-Full Flaps 400 (VF) 130 KCAS

-Half Flaps 200 156 KCAS

Landing Gear Operation (VLO) 200 KCAS

Landing Light Extension 156 KCAS

Minimum Control Speed (VMd 77 KCAS

NOTE

To prevent exceeding the Mach limitations, the following schedule must be observed:

Never exceed Speed: 252 Kts S. L. to 20,400 Ft. Decrease by 5 Kts for every 1000 ft above 20,400 feet.

Maximum structural cruising speed: 224 Kts S. L. to 20,200 Ft.

Decrease by 4. 5 Kts for every 1000 feet above 20,200 feet.

FLIGHT LOAD FACTORS

Maximum -Flaps UP Positive 3.36 G's

Negative 1. 35 G's

Maximum -Flaps DOWN Positive 2.00 G's

Negative 0.00 G'S

WEIGHT AND CENTER OF GRAVITY

See Weight and Balance Section for Loading Schedule. (See Figure 1-2 for Flight Envelope.)

MAXIMUM WEIGHTS

Ramp 9050 lbs

Takeoff 9000 lbs

Landing 9000 lbs

ALTITUDE LIMITATIONS

Maximum approved altitude is 25,000 Feet MSL



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FLIGHT MANUAL NORMAL PROCEDURES

VISUAL INSPECTION

A. Interior

1. Cabin Compartment -SECURE.
2. Aircraft Documents -CHECKED.
3. Landing Gear Control Lever -DOWN and LATCHED.
4. Magneto Switches -OFF.
5. Battery Switch -ON.
6. Parking Brakes -SET.
7. Cowl Flaps -OPEN.
8. Fuel Quantity -CHECK.
9. Trim Tabs -SET (at zero indication).
10. Interior & Exterior Lights -CHECK, as required.
11. Battery Switch -OFF.

B. Exterior Check(Clockwise)

BEFORE STARTING ENGINES

1. Exterior Inspection -COMPLETE.
2. Cabin Door -CLOSED and LOCKED.
3. Seat and Safety Belt -ADJUSTED.
4. Flight Controls -FREE and FULL TRAVEL.
5. Airspeed Static Selector -PRIMARY.
6. Environmental Systems Controls -SET
7. Landing Gear Control Lever -DOWN and LATCHED.
8. Parking Brake -SET.
9. Alternate Air Doors -Filtered Air -IN.
10. Cowl Flap Switches -OPEN.
11. Overhead Panel Switches -AS REQUIRED.

NOTE

Minimize electrical load prior to starting engines.

12. External Power -AS REQUIRED.

When an APU is connected power is immediately supplied to the aircraft. The aircraft battery will charge when battery is in the ON position.

13. Battery Switch -ON.

14. Generators -OFF.
15. Electrical System -CHECK.
16. Annunciator Panel -TEST
17. Fuel Quantity -CHECK.
18. Flap Control Lever -UP.
19. Hydraulic Pressure 470 to 605 PSI.
20. Circuit Breaker Panel -CHECK.
21. Oxygen Quantity and Regulator -CHECK.

STARTING

NOTE

An APU should be utilized for starting if ambient temperature is below 40 degrees F. The APU must be regulated at 28 volts, and capable of providing a minimum of 16 volts. In cold weather recommend that the props be pulled through by hand four revolutions (12 blades) prior to starting.

Anti-Collision Light Switch -ON.

Throttle Control Levers -SET (one inch ahead of idle).

Propeller Control Levers -FULL INCREASE RPM.

Mixture Control Levers -FULL RICH

Fuel and Hydraulic Emergency Shutoff Switch: NORMAL.

Fuel Boost Pump Switch -OFF.

Magneto Switch

a. BOTH, prime as required. If the engine is hot do not prime before cranking.

b. START, return to BOTH when the engine begins firing. Intermittant prime may be used as needed until the engine is running smoothly.



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BEFORE TAXI

Never engage the starter while the propeller is turning.

If the starter has been engaged for 30 seconds, discontinue cranking and allow the starter to cool for 3 to 5 minutes.

Engine RPM 900 to 1000 RPM for at least one minute in warm weather and as required in cold weather to ensure adequate lubrication. Do not exceed 1200 RPM until oil temperature is 75 degrees, minimum.

Oil Pressure -CHECK. An oil pressure rise will normally occur within 30 seconds. In cold weather pressure should be noted within 60 seconds.

Oil pressure is measured at the turbo-supercharger.

If oil pressure is not noted within the specified time period, shutdown the engine.

Hydraulic Pressure -900 to 1075 PSI.
Vacuum-3.8 to 5.0 In.HG.

Repeat items 5 through 9 to start the opposite engine.

Auxiliary Power Unit -DISCONNECTED.

Insure that the battery access door is secured before taxiing.

Generator Switches -ON.

NOTE

The generators will not come on and annunciator extinguish until the engine RPM is above approximately 1400.

1. Electrical System -CHECK.

2. Exterior and Interior Lights -AS REQUIRED.

NOTE

The landing light annunciator, adjacent to the landing light control switches, illuminates whenever the lights are out of the retracted position.

3. Avionics Switches -ON.

4. Fuel Boost Pump Switches -LOW.

5. Nav/Comm Equipment -AS REQUIRED.

6. Flight Instruments -CHECK.

7. Engine Instruments -CHECK.

8. Circuit Breaker Panel -CHECK.

9. Hydraulic Pressure -900 to 1075 PSI.

10. Annunciator Panel -CHECK.

11. Parking Brake -OFF.



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ENGINE RUNUP

1. Cowl flaps -OPEN
2. Flaps -UP.
3. Mixture Control Levers -FULL RICH.
4. Propeller Control Levers -FULL INCREASE.
5. Temperatures -CHECK. Insure that engine oil temperatures are 70°F and cylinder head temperatures are in their operating range before exceeding 1200 RPM.
6. Voltmeters -CHECK at 2250 RPM
7. Propeller Feathering -CHECK at 2250 RPM. Retard the prop control lever into the feather range and return to full increase; 1700

RPM minimum. Repeat three times in cool weather to circulate warm oil to the propeller.

8. Magnetos -CHECK at 2250 RPM. Between left and right mag checks, select BOTH to allow RPM to return to 2250. Insure that the switch is in BOTH at the completion of the check.

- a. Maximum Mag Drop -150 RPM.
- b. Maximum Differential -50 RPM.
- c. Normal Mag Drop -25 to 75 RPM.

BEFORE TAKEOFF

1. Flight Controls -FREE and FULL TRAVEL.
2. Trim Tabs -SET (elevator 7-1/2 to 15 degrees nose up, rudder zero).
3. Fuel Boost Pump Switches -LOW.
4. Nav/Com Equipment -AS REQUIRED.
5. Flight Instruments -CHECK and SET.
6. Engine Instruments -CHECK.
Insure that:
 - a. Oil Temperature -100 degrees minimum.
 - b. Oil Pressure -80 PSI maximum.
 - c. Engine Accelerates Smoothly. .

7. Air Source Selector -BOTH (for pressurized flight),
8. Pressurization Switch -DEPRESSURIZE.
9. Alternate Air Door Controls-Filtered Air -IN.
10. Friction Controls -AS REQUIRED.
11. Cowl Flaps -FULL OPEN (cowl flap annunciators illuminated).
12. Flap Control Lever -UP.
13. Annunciator Panel -CHECK.

NORMAL PROCEDURES LINEUP

1. Anti-Ice, De-Ice Switches -AS REQUIRED.
2. Pitot Heat Switches -AS REQUIRED.
3. Mixture Control Levers -FULL RICH
4. Propeller Control Levers -FULL INCREASE
5. Throttle Control Levers -ADVANCE.
 - a. MAP 44.5 inches at 3400 RPM.
 - b. Fuel Flow, 298 to 310 lbs, hr.

Advance throttle control levers slowly and smoothly to allow the turbo-superchargers to accelerate with the engine. Avoid rapid throttle movement whenever possible. Do not continue to advance the throttle if it is apparent that the manifold pressure will exceed 44.5 inches Hg. A momentary manifold pressure overboost to 46 inches Hg. for two or three seconds, or stabilized full throttle indications up to 45 inches Hg, will not harm the engine and need not be considered as overboost.

6. Engine Instruments -CHECK.



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TAKEOFF

1. Takeoff and Climb Speed -ATTAIN.
2. Power -Maintain Maximum Continuous Power.
3. Landing Gear Control Lever -UP.

CLIMB

1. Climb Speed -118 KIAS to 20,000 Ft. Scheduled climb speed thereafter (minus 2 kts/1000 ft above 20,000 ft.)
2. Recommended Climb Power (observe altitude limitations).
 - a. MAP 40. 0 inches at 3000 RPM.
 - b. Fuel Flow 230 to 247 lbs. hr.
3. Pressurization Switch -PRESSURIZE. Monitor cabin altitude and differential pressure periodically during climb and cruise.
4. Cowl Flaps -AS REQUIRED.
5. Fuel Boost Pump Switches -LOW.
6. Annunciator Panel -CHECK.

CRUISE

1. Cowl Flaps -AS REQUIRED. Cowl flaps must be fully closed above 222 KIAS.
2. Cruise Power -SET MP and RPM.
3. Mixture -SET to desired fuel flow setting after engine temperatures have stabilized (approximately 5 minutes).

Increase fuel flow slowly toward full rich before changing power settings. Do not advance to the full rich stop when at high altitudes as the mixture may become overrich and cause engine roughness.

DESCENT

1. Fuel Boost Pump Switches -LOW.
2. Gear Indicator Lights -TEST.
3. Cabin Pressure Controller -SET
4. Parking Brakes -OFF.
5. Alternate Air Doors Filtered Air -IN.
6. Power -AS REQUIRED.
7. Mixture -SET (best power or richer).

NOTE

If power is reduced above 10,000 ft. it may also be necessary to reduce fuel flow to maintain satisfactory engine operation.

Before power is increased, fuel flow must be increased to BEST POWER or greater.

Avoid prolonged descents at very low power settings. Maintain sufficient power to keep engine temperatures within' their normal operating ranges.

BEFORE LANDING

1. Pressurization Switch -DE-PRESSurize when cabin differential pressure is zero.
2. Mixture -FULL RICH. ‘
3. Propeller Controls -SET (3000 RPM or greater),
4. Landing Gear Control Lever -DOWN and LATCHED. 200 KIAS MAXIMUM
 - a. Gear Safe Lights -ILLUMINATED (intransient light extinguished)
 - b. Gear Warning Horn -SILENT.
5. Flaps -AS REQUIRED.

NOTE

Limiting airspeeds for flap operation:

One Half Flaps -156 KIAS

Full Flaps -132 KIAS

6. Hydraulic Pressure -900 to 1075 PSI.



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GO-AROUND (BALKED LANDING)

1. Propeller Control Levers -FULL INCREASE.
2. Throttles -ADVANCE (to maximum continuous power).
3. Climb Speed -ACCELERATE to and maintain 97 KIAS.
4. Flaps -RETRACT. .
5. Landing Gear -RETRACT (when definitely climbing).
Accelerate to twin-engine climb speed and perform the takeoff and climb checklist.

LANDING

1. Throttles -AS REQUIRED.
2. Propeller Control Levers -FULL INCREASE.
3. Brakes -AS REQUIRED.

AFTER LANDING

1. Anti-Ice and De-Ice -OFF.
2. Flaps -UP.
3. Cowl Flaps -FULL OPEN.
4. Hydraulic Pressure -900 to 1075 PSI.

ENGINE SHUTDOWN

1. Fuel Boost Pump Switches -OFF.
2. Parking Brakes -SET.
3. Mixture Control Lever -CUTOFF (shutdown the engine started first).

The engine should be allowed to run at idle RPM for 5 minutes (including taxi) prior to shutdown to allow the turbo-supercharger to cool

and spindown. If the engines are shutdown without delay, shaft bearings may become starved for lubrication before the turbo-superchargers stop rotating.

4. Hydraulic Pump -CHECK (after the propeller stops rotating cycle the flaps to check the adequacy of the operating hydraulic pump; 900 to 1075 PSI).
5. Remaining Engine -SHUTDOWN.
6. Magneto Switches -OFF.
7. Overhead Panel Switches -AS REQUIRED.

(WARNING!

Do not open the cabin door until the propeller stops rotating)The battery switch must be OFF, or the cabin door switch must be held in the UNLOCK position before the cabin door can be opened.

8. Heater -SHUTDOWN
9. Parking Brake -SET.
10. Battery Switch -OFF.
11. Control Locks and Pitot Covers -INSTALL.



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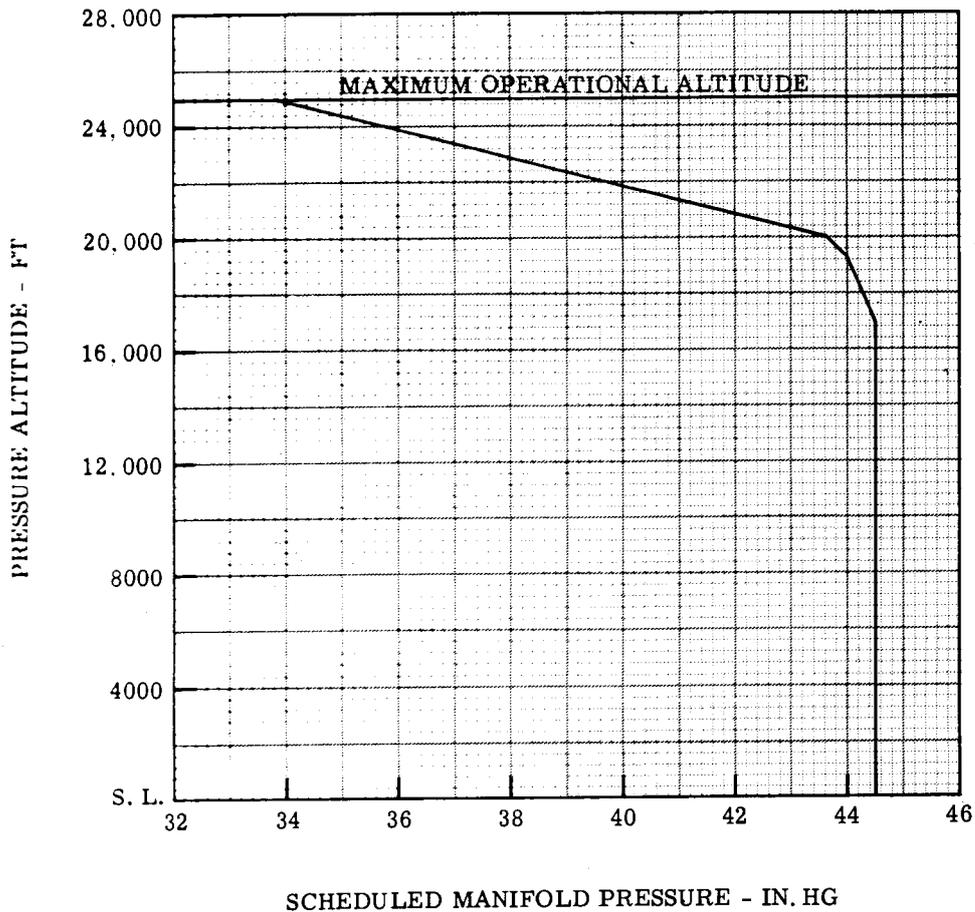
PERFORMANCE TABLES

TAKEOFF AND MAXIMUM CONTINUOUS POWER

SCHEDULED ENGINE RPM, MIXTURE AND MANIFOLD PRESSURE

Scheduled Variables: RPM - 3400
Mixture - FULL RICH
Manifold Pressure - SEE BELOW

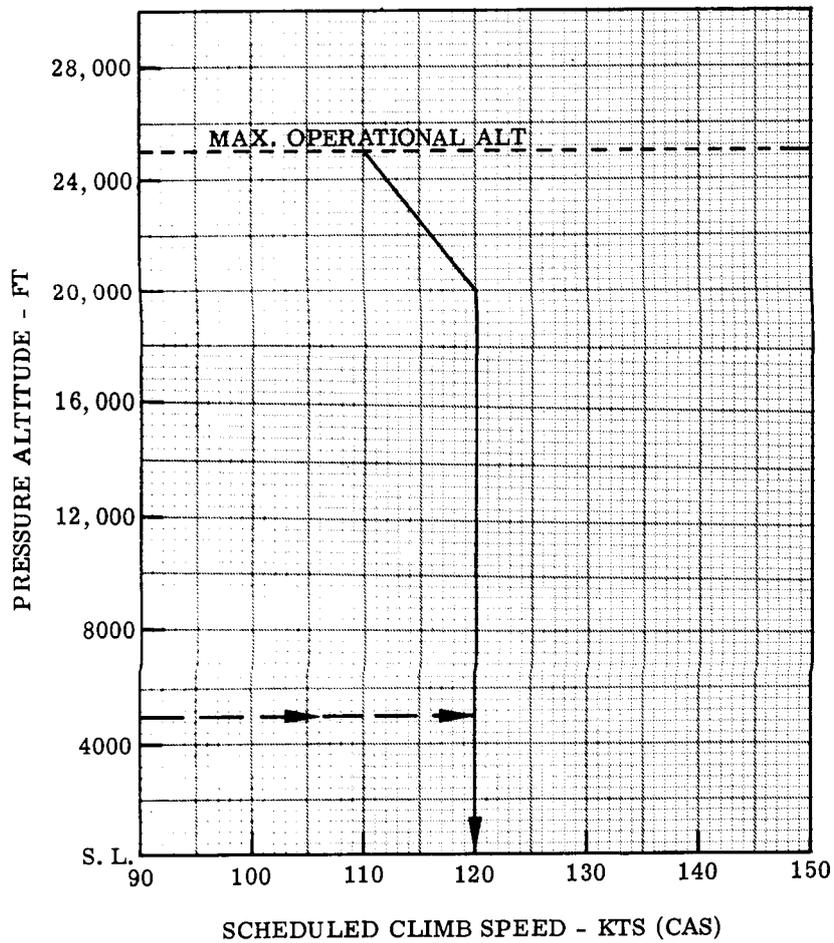
NOTE: Engine RPM, Mixture and Manifold Pressure shown on this graph are identical to certain Power Plant Limitations as shown in Section I, Page 1-1





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TWIN-ENGINE NORMAL CLIMB SPEED SCHEDULED CLIMB SPEED AT ALL GROSS WEIGHTS V_s PRESSURE ALTITUDE



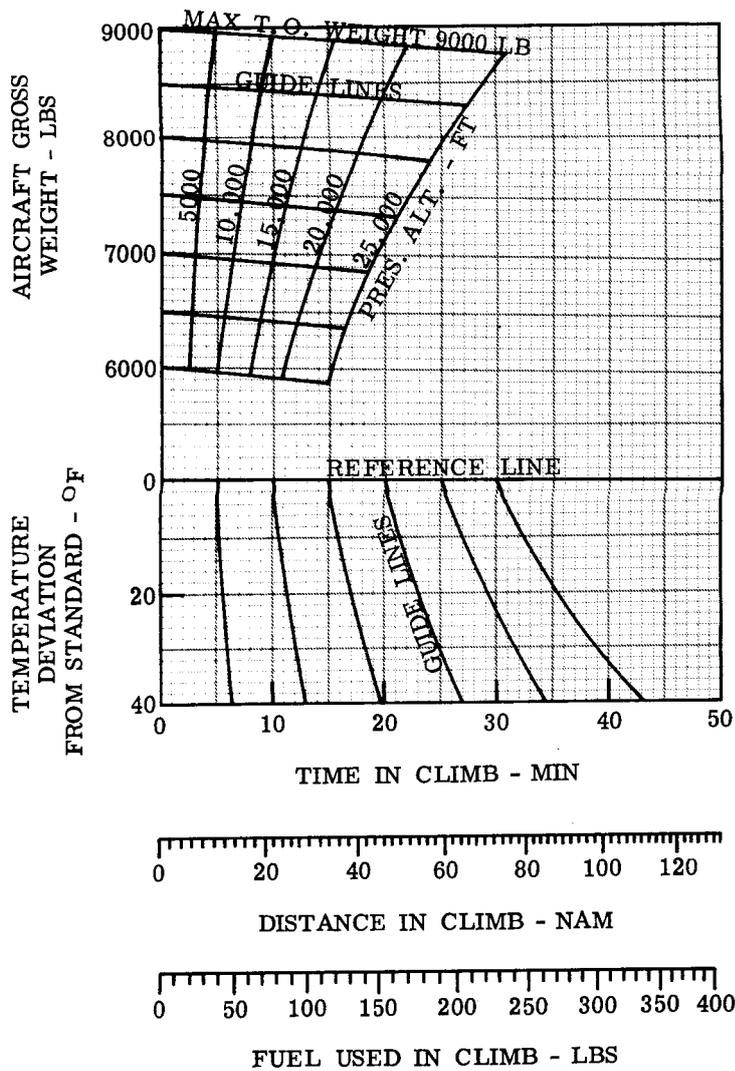


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TWIN ENGINE TIME, DISTANCE AND FUEL USED IN CLIMB

NOTES:

1. CLIMB SPEED: 120. KTS (CAS) from 0 to 20,000 FT, Decreasing 2 KTS/1000 FT above 20,000 FT.
2. For temperatures below standard use data for standard temperature.
3. Distance is presented for zero wind condition only.





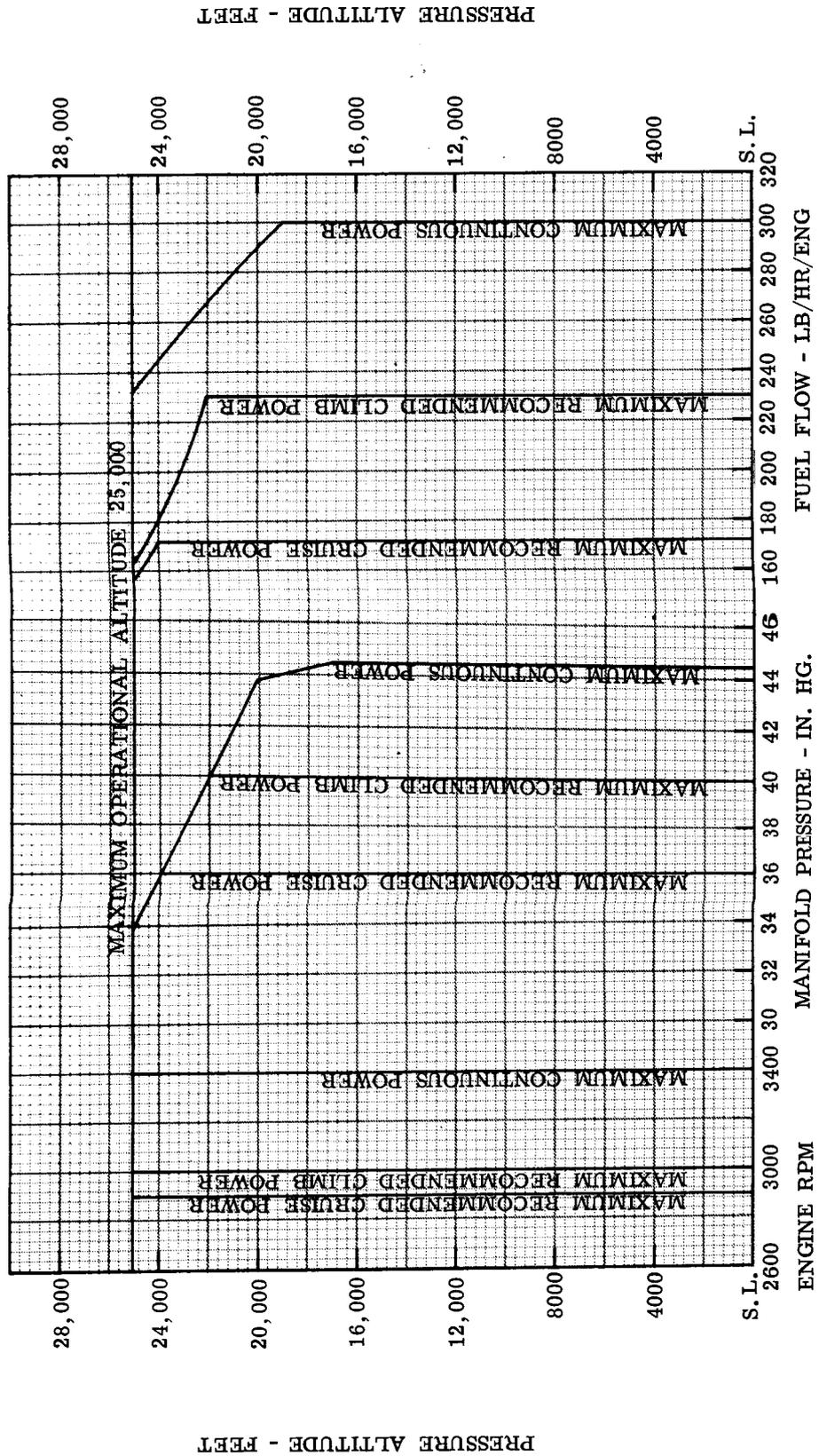
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SELECTED POWER SETTINGS

CAUTION

OBSERVE ALTITUDE LIMITATIONS ON MANIFOLD PRESSURE.

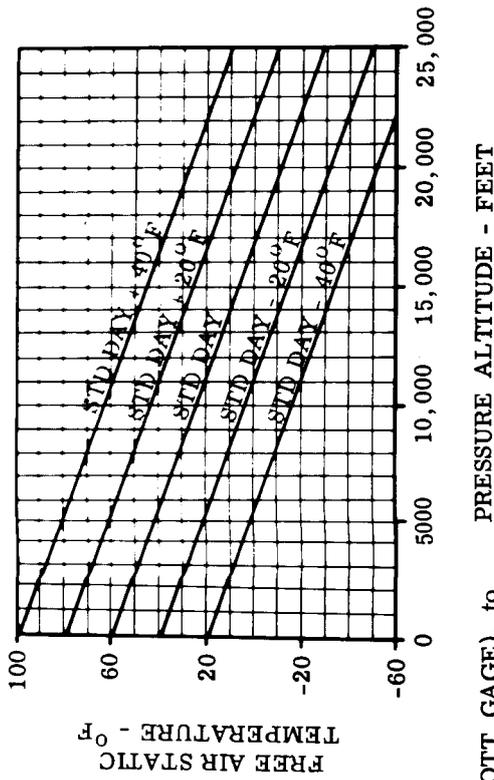
NOTE: For Additional Cruise Power Settings See FIGURE 1-16.





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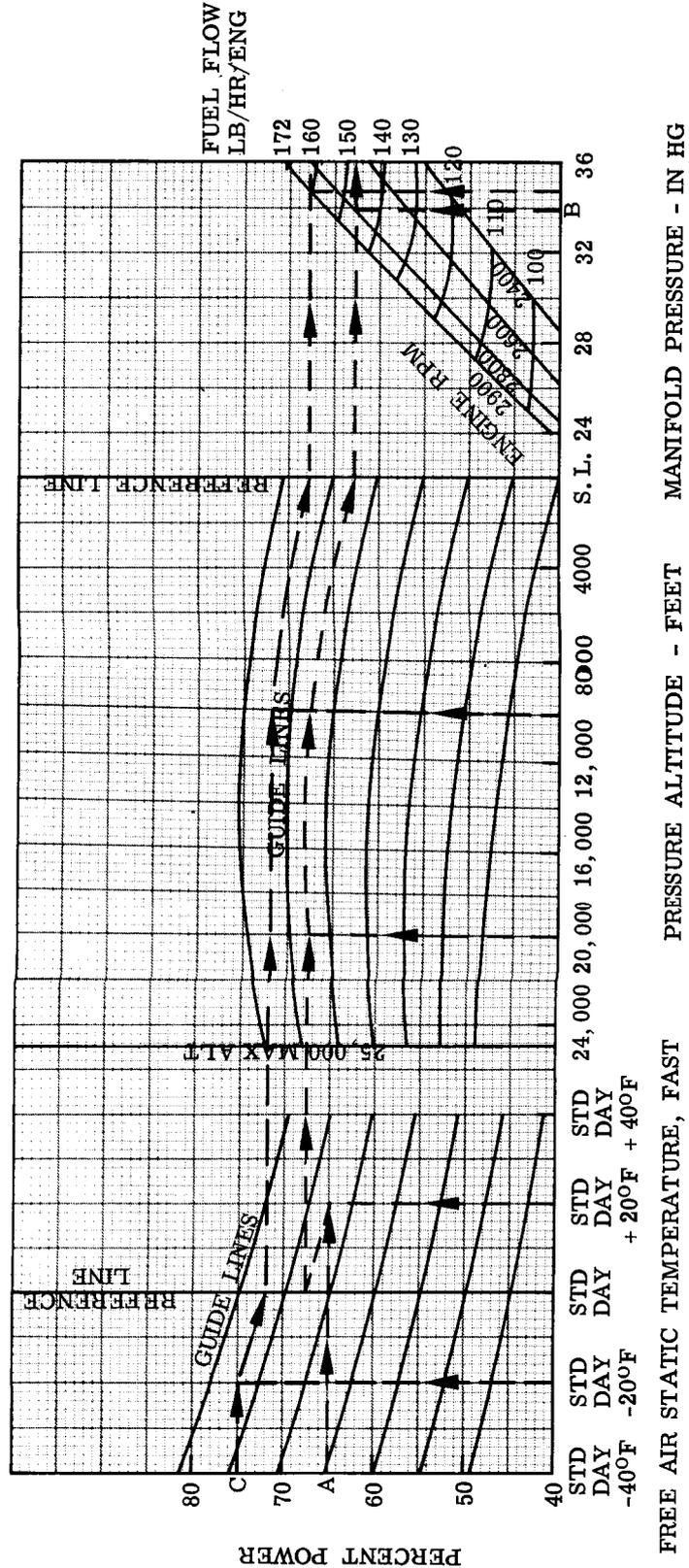
CRUISE POWER SETTINGS



CAUTION

OBSERVE ALTITUDE LIMITATIONS ON MANIFOLD PRESSURE.

NOTE: To convert Free Air Total Temperature, FATT (SCOTT GAGE), to Free Air Static Temperature, see Figure 1-4. If the temperature as read from the SCOTT GAGE is used in the charts below, the resulting error in %NRP will normally be less than 1%NRP.





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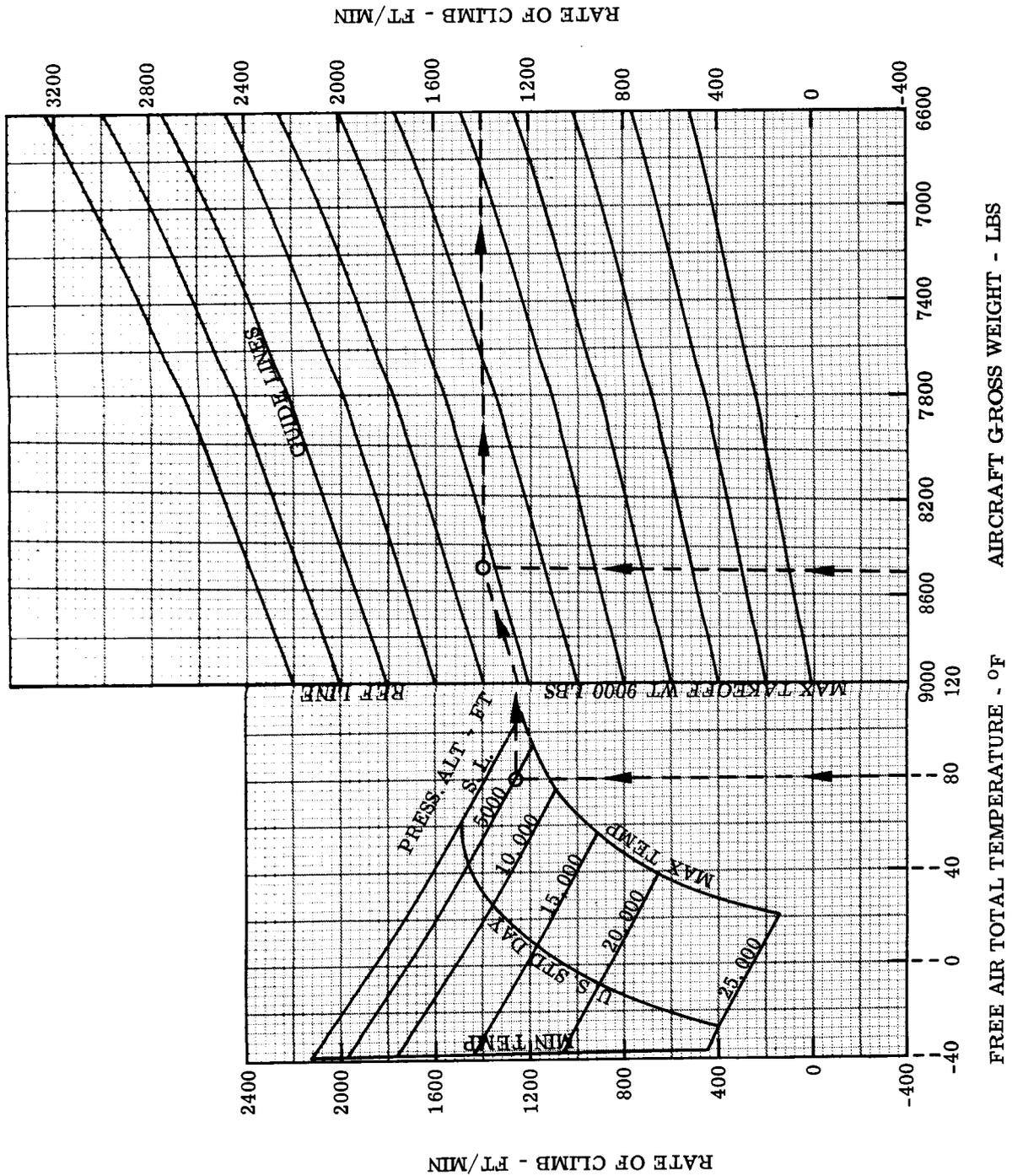
TWIN-ENGINE NORMAL CLIMB-RATES OF CLIMB

(0° FLAPS)

SCHEDULED VARIABLES

Scheduled Climb Speed: SEE FIGURE 4-4

Scheduled Power: SEE FIGURE NO. 4-1





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SINGLE-ENGINE CLEAN CLIMB-RATES OF CLIMB

SCHEDULED VARIABLES

Scheduled Climb Speed: 113 KTS (CAS (110.8 KTS (IAS)

Scheduled Power: SEE FIGURE 4-1

