FAA APPROVED

AIRPLANE FLIGHT MANUAL

MODEL 500S

Mfrs. Serial No. VH-TFW

Registration No. 1798

NOTE

This airplane must be operated in compliance with the OPERATING LIMITATIONS set forth herein.

FAA Approved by: Kenneth L Hale

Delegation Option PC-203

Date of Approval: 3/15/68 Manual No. _____

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Approved: July 22, 1985

A. C. Jackson

A. C. Jackson
Delegation Option PC-203

SECTION I
LIMITATIONS

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LIMITATIONS

POWER PLANT

1. ENGINE

a. Manufacturer: Lycoming

b. Model: IO-540-E1B5

c. Fuel: 100/130 Octane (Minimum grade)

d. Oil Grade: Per Mil-L-22851. See Lycoming Service Instructions 1014

e. Engine Operation Limitations:

CONDITION	BHP	RPM	TIME
Takeoff	290	2575	No Limit
Max Cont at SL	290	2575	No Limit

f. Oil Temperature: Maximum 118°C

g. Oil Pressure: Minimum 60 PSI
Maximum 90 PSI

h. Fuel Pressure: Minimum 20 PSI
Maximum 26 PSI

i. Cylinder Head Temp: Maximum 232°C

2. PROPELLER

a. Manufacturer: Hartzell

b. Model:

Hub HC-A3XK-2/Blades (3) 8433-4/Spinner C-2513
Hub HC-A3XK-2A/Blades (3) 8433-4/Spinner C-2513
Hub HC-A3VK-2/Blades (3) V8433-4/Spinner C-2513
Hub HC-A3VK-2A/Blades (3) V8433-4/Spinner C-2513
Hub HC-C3YR-2/Blades (3) C8468-6R/Spinner C-3258
Hub HC-C3YR-2F/Blades (3) FC8468-6R/Spinner C-3258
Hub HC-C3YR-2U/Blades (3) C8468-6R/Spinner C-3258
Hub HC-C3YR-2UF/Blades (3) FC8468-6R/Spinner C-3258

NOTE

80-inch Diameter - No cutoff permitted.

Both propellers on a given airplane must be of the same model (hub) number. It is not permissible to mix model numbers.

INSTRUMENT MARKINGS

		RED LINE MINIMUM	GREEN ARC NORMAL	RED LINE MAXIMUM
1.	Engine Tachometer		2000-2575 RPM	2575 RPM
2.	Cylinder Head Temperature		100-232°C	232°C
3.	Oil Temperature		24-118°C	118°C
4.	Oil Pressure	60 PSI	60-90 PSI	90 PSI
5.	Fuel Pressure	20 PSI	20-26 PSI	26 PSI
6.	Hydraulic Pressure			1250 PSI
7.	Vacuum	3.8" Hg	3.8 - 5.0" Hg	5.0" Hg
8.	Landing Gear Down Emergency Air Pressure	275 PSI	275-350 PSI	350 PSI

			WHITE ARC	GREEN ARC	YELLOW ARC	RED LINE
9.	Airspeed (TIAS)					
	a.	Flap Operation	72-136 MPH (63-118 Kts)			
	b.	Normal Operation		82-230 MPH (71-200 Kts)		
	c.	Caution (Smooth air only)			230-288 MPH (200-250 Kts)	
	d.	Max Operation				288 MPH (250 Kts)

AIRSPEED LIMITATIONS

1. Never exceed speed (V_{NE}) - 288 mph CAS (250 Kts CAS).
2. Maneuvering speed (V_P) - 163 mph CAS (141 Kts CAS).
3. Maximum structural cruising speed (V_{NO}) - 230 mph CAS (200 Kts CAS).
4. Flap operation (V_{FE}) -

   Full Flaps - 136 mph CAS (118 Kts CAS).

   1/2 Flaps - 150 mph CAS (130 Kts CAS).
5. Landing gear operation (V_{LO}) - 180 mph CAS (156 Kts CAS).
6. Minimum control speed (V_{MC}) -

   Minimum speed at which the aircraft is controllable in flight, with sudden failure of one engine and takeoff power on remaining engine - 75 mph CAS (65 Kts CAS).

FLIGHT LOAD FACTOR

Maximum positive load factor: 4.40 G's.

NOTE

A minimum of 250 feet of altitude is required to recover from power off stalls with a maximum gross weight at any approved center of gravity location.

MINIMUM CREW

One pilot is required for all operations.

TYPE OF OPERATION

This aircraft is approved for normal category Day/Night-VFR/IFR operation and limited acrobatic maneuvers. These maneuvers are lazy eights, chandelles, and steep turns, subject to the following limitations:

1. Maximum entry - 163 MPH (141 Kts).

2. Flaps - UP.

WEIGHT AND CENTER OF GRAVITY LIMITATIONS

Maximum Weight - 6750 pounds (Normal and Utility).
See Aircraft Weight and Balance Report for loading schedule.

Center of Gravity Limits: Limits are given for landing gear down. Moment due to gear retraction is 10,073 inch-lbs. Datum location is 152 inches forward of the wing leading edge at the center section. Mean Aerodynamic Chord is 70.05 inches. % MAC = (inches aft of datum - 152)/0.7005.

Aircraft Serial No. 1755 thru 3155 without Service Bulletin No. 128 or No. 129 installed.

Forward - 166.0 inches aft of datum (20% MAC)
Aft - 174.40 inches aft of datum (32% MAC)

Aircraft Serial No. 1755 thru 3155 with Service Bulletin No. 128 or No. 129 installed, and Serial No. 3156 & Subs.

Forward - 161.8 inches aft of datum (14% MAC) at 5600 lbs.
- 166.0 inches aft of datum (20% MAC) at 6750 lbs.
Straight line variation between points.

Aft - 173.0 inches aft of datum (30% MAC) at 6750 lbs.
C.G. variation at lighter weights:
Inches aft of datum = 174.5 - 10,073/Wt.

See Figure 1-1 for Flight Envelope.

FUEL LIMITATIONS

Total Capacity - 159.6 Gallons.

Useable Quantity - 156 Gallons.

PLACARDS

A. Located at left side of pilot compartment:

THIS AIRPLANE MUST BE OPERATED AS A NORMAL AND UTILITY CATEGORY TYPE IN COMPLIANCE WITH THE AIRPLANE FLIGHT MANUAL. INTENTIONAL SPINS, SNAP AND INVERTED MANEUVERS ARE PROHIBITED.

SHUT OFF LEFT ENGINE WHEN ENTERING AND LEAVING CABIN

MAXIMUM SPEED GEAR EXTENDED 180 MPH (156 KNOTS)

MINIMUM CONTROL SPEED ONE ENGINE 75 MPH (65 KNOTS)

MAXIMUM FULL MANEUVERING SPEED - 163 MPH (141 KNOTS)

CAUTION USE AIRSPEED AND ALTIMETER CALIBRATIONS WHEN USING ALTERNATE SOURCE

B. Located on overhead switch panel:

RELEASE SWITCH IF STARTER DOES NOT ENGAGE IMMEDIATELY

PITOT & FUEL VENT HEAT GROUND CHECKS - 30 SEC. MAX.

BOOTS TO BE OFF DURING TAKEOFF AND LANDING

DO NOT TURN ALTERNATORS OFF IN FLT EXCEPT IN EMER

C. Located on trim tab control panel:

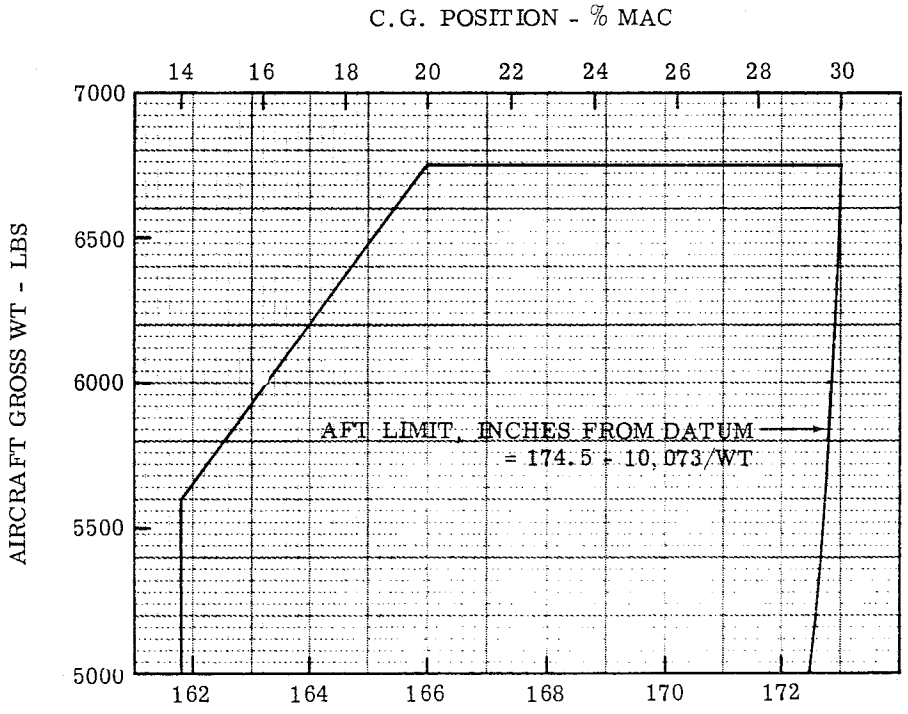
BATTERY SW MUST BE ON TO OPERATE VALVES (S/N 3211 and Subsequent)

MASTER SWITCH MUST BE ON TO OPERATE FUEL VALVES (Prior to S/N 3211)

APPROVED GROSS WEIGHT - CENTER OF GRAVITY ENVELOPE.
OPERATION OF THE AIRCRAFT OUTSIDE ENVELOPE IS PROHIBITED.

ENVELOPE MUST BE OBSERVED WITH LANDING GEAR EXTENDED.
ALLOWANCE FOR LANDING GEAR RETRACTION IS AUTOMATIC.

LEADING EDGE OF MAC	152.00 INCHES AFT OF DATUM
MAC LENGTH	70.05 INCHES



NOTE

This Flight Envelope effective Serial No. 1755 thru 3155 with Service Bulletin No. 128 or No. 129 installed, and Serial No. 3156 & Subs.

Figure 1-1. Flight Envelope

SECTION II
NORMAL PROCEDURES

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CONDENSED PROCEDURES

EXTERIOR INSPECTION

1. Nose landing gear - CHECK.
   a. Strut and tire - PROPERLY INFLATED.
   b. Nose landing gear and wheel well - GENERAL CONDITION.
2. Right windshield - GENERAL CONDITION.
3. Right pitot cover - REMOVED.
4. Right cabin windows - GENERAL CONDITION.
5. Right engine - CHECK.
   a. Engine oil quantity - PROPER LEVEL.
   b. Propeller - PULL THROUGH (4 or more revolutions).
   c. Oil cooler - CLEAR.
   d. Right engine cowling - SECURE.
   e. Right engine fuel drains - CLEAR.
6. Right main landing gear - CHECK.
   a. Strut and tire - PROPERLY INFLATED.
   b. Landing gear uplock springs - GENERAL CONDITION.
   c. Main landing gear, door, and wheel well - GENERAL CONDITION.

7. Right wing - CHECK.
   a. Deice boot - GENERAL CONDITION.
   b. Refueling cap - SECURE.
   c. Fuel vent - CLEAR.
   d. Wing and flaps - GENERAL CONDITION.
8. Fuel tank sumps - DRAIN.
9. Right static ports - CLEAR.

NOTE

Drain static vent line after aircraft has been exposed to rain or extremely humid conditions.

10. Empennage - CHECK.
    a. Deice boots - GENERAL CONDITION.
    b. External rudder gust lock - REMOVE (if installed).
    c. Empennage area - GENERAL CONDITION.

NOTE

Attempt to move rudder. Resistance to movement by the internal controls lock should be encountered. If there is no resistance, the rudder control system may have been damaged by the wind.

11. Left side of aircraft - REPEAT STEPS 2 THROUGH 9.
12. Emergency landing gear extension bottle pressure - CHECK 275 to 350 PSI.
13. Baggage compartment door - SECURE.

BEFORE STARTING ENGINES

1. Exterior inspection - COMPLETED.
2. Cabin doors - CLOSED and LOCKED.
3. Internal controls lock - REMOVED and STOWED.
4. Flight controls - FREEDOM OF MOVEMENT.
5. Landing gear safety lock - LOCKED.
6. Battery - Ext power switch - AS APPLICABLE.
7. Generator/Alternator switch - OFF.

8. All other switches - OFF.

9. Static source selector - NORMAL

10. Hydraulic pressure - 470 to 605 PSI.

NOTE

When the engine-driven hydraulic pumps are not operating, an electrically-driven auxiliary hydraulic pump automatically provides hydraulic pressure for operation of the brakes and wing flaps when the battery-external power switch is placed in BAT or EXT POWER position. Check auxiliary hydraulic pump by applying brakes several times and observing the hydraulic system pressure gage. Auxiliary hydraulic system pressure should return to 470 to 605 psi when brakes are released. It is normal for this pump to cycle with the hydraulic system in a static condition.

11. Parking brakes - SET.

12. Press-to-test indicators - TEST.

13. Fuel quantity - CHECK.

14. Landing gear safe lights - ILLUMINATED.

15. Trim tabs - SET (for takeoff).

    a. Elevators: Maximum forward CG - 9^{o} NOSE UP.
    Maximum aft CG - 0 to 1^{o} NOSE UP.

    b. Rudder - 0^{o}.

16. Wing flaps - UP.

17. Fuel-Hydraulic emergency shutoff switch - NORMAL

NOTE

When switch guard is down and safety wired the switch is in the NORMAL position.

STARTING ENGINES

Engine starts can be made with aircraft battery power or with auxiliary dc electrical power. However, it is recommended that an auxiliary power unit (APU) be used when starting a cold engine (40^{o}F and below). Assure that APU is regulated to 28-volts dc and capable of providing a minimum of 16-volts dc, 800 amperes during starting cycle.

STARTING WARM ENGINE

1. Propeller pitch control - HIGH RPM (full forward).

2. Mixture control - IDLE CUTOFF.

3. Alternate air control - NORMAL.

4. Propellers - CLEAR.

5. Cowl flaps - 2/3 OPEN.
6. Throttle lever - 1/8 OPEN.
7. Fuel shutoff switch - OPEN. (This switch deleted on S/N 3211 and Subsequent).
8. Fuel boost pump switch - ON.
9. Fuel pressure - 20 to 26 PSI.
10. Ignition switch - START.
11. Mixture control - OPEN.
12. Ignition switch - BOTH (after engine start).

CAUTION

If oil pressure is not indicated on engine gage within 30 seconds, stop engine and determine cause.

13. Fuel boost pump switch - OFF (momentarily to check operation of engine-driven fuel pump).
14. Generator/Alternator switch - ON (reset if necessary).

NOTE

If the alternator fails to reset, depress flash switch momentarily. (Aircraft equipped with alternator flash switch.)

15. Hydraulic pressure - 900 to 1075 PSI.
16. Repeat steps 1 thru 14 for starting second engine.

STARTING COLD ENGINE (40°F or Below)

1. Propeller pitch control - HIGH RPM (full forward).
2. Mixture control - IDLE CUTOFF.
3. Alternate air control - NORMAL (cold).
4. Propellers - CLEAR.
5. Cowl flaps - CLOSED.
6. Throttle lever - 1/8 OPEN.
7. Fuel shutoff switch - OPEN. (This switch deleted on S/N 3211 and Subsequent).
8. Fuel boost pump switch - ON (fuel pressure 20-26 psi).
9. Mixture control - FULL RICH (3 to 5 seconds for priming engine).
10. Ignition switch - START.
11. Ignition switch - BOTH (after engine start).

NOTE

Additional priming will be required to start an extremely cold engine in sub-zero weather. Placing alternate air controls in HEAT position will expedite engine warmup.

CLEARING ENGINE

Clearing an engine of excess fuel which has created an engine flooding condition may be accomplished by the following procedure:

1. Fuel boost pump switch - OFF.
2. Mixture control - IDLE CUTOFF.
3. Ignition switch - START.
4. Mixture control - FULL RICH (when engine starts to fire).
5. Fuel boost pump switch - ON.
6. Ignition switch - BOTH (after engine start).

ENGINE RUNUP

1. Throttle lever - OPEN (to 1500 RPM after engine temperatures have obtained operating limits).
2. Propeller pitch control - FULL FEATHERING (allow engine rpm to drop to 1000 (no lower) on the engine tachometer. Advance propeller pitch control to full forward position. Repeat three or four times on cold engines, once on warm engines.
3. Mixture control - FULL RICH (and engine rpm set at 2000). Check magnetos individually. Normal engine rpm drop is 100. Maximum engine rpm drop is 125. The difference in magneto performance when operated separately should not exceed 50 rpm. Apply alternate air heat for five seconds and note drop in RPM.
4. Engine operation - CHECK (increase engine RPM to approximately 2200). All engine instruments must be within green arc. Check ammeter, hydraulic pressure and vacuum pressure.
5. Aircraft equipped with alternators
   Alternator test (perform prior to first flight of the day).
   a. Engine RPM - 2000 - Alternator annunciators EXT.
   b. Alternator test switch - DEPRESS momentarily. The annunciator should illuminate momentarily and extinguish. A satisfactory test indicates that the alternator will self excite.

TAXIING

1. Wheel brakes - CHECK.
2. Nose wheel steering - CHECK.
3. Flight instruments - NORMAL.
4. Power plant instruments - NORMAL.

BEFORE TAKEOFF

1. Flight controls - FREEDOM OF MOVEMENT.
2. Mixture controls - FULL RICH.
3. Propeller pitch controls - HIGH RPM (full forward).
4. Fuel boost pump switches - ON.
5. Gyros - SET and UNCAGED.
6. Instruments - CHECKED.

7. Wing flaps - SET (1/4 down).

8. Cowl flaps - AS REQUIRED.

NOTE

If ambient temperature is below 60°F, cowl flaps may be closed for takeoff. Above 60°F, cowl flaps should be approximately 2/3 open.

9. Landing gear safety lock - UNLOCKED.

10. Trim tabs - SET FOR TAKEOFF.

11. All safety belts - FASTENED.

12. Throttle and propeller friction control - AS DESIRED.

TAKEOFF

1. Throttle levers - FULL THROTTLE (2575 RPM).

2. Fuel flow - DETERMINE (from fuel flow indicator).

AFTER TAKEOFF

1. Wheel brakes - BRAKE.

2. Landing gear - UP.

3. Wing flaps - UP.

4. Best climb power - MAXIMUM CONTINUOUS (full throttle - 2575 RPM).

5. Best climb speed - 110 MPH (96 Knots).

6. Secondary climb power setting - FULL THROTTLE AND 2450 RPM.

7. Secondary climb speeds - 130 to 150 MPH (113 to 130 Knots).

8. Mixture control - AS REQUIRED (to maintain correct fuel flow for takeoff, climb, and cruise power setting).

NOTE

Set fuel flow to obtain best power for the altitude involved when climbing.

9. Cowl flaps - AS REQUIRED (to maintain engine temperatures within limits).

CRUISE

1. Cowl flaps - CLOSED.

2. Cruise power - ESTABLISH.

3. Mixture control - SET:

   a. BEST POWER - The high limit of the appropriate fuel flow indicator green arc represents best power.

b. BEST ECONOMY - After engine temperatures stabilize best economy power may be used which is presented by the low limit of the appropriate green arc.

NOTE

Mixture should be set to best power prior to increasing power.

4. Fuel boost pump switches - OFF.

NOTE

Place fuel boost pump switches in ON position whenever fuel pressure or fuel flow indications are erratic.

BEFORE MANEUVERING

Accomplish the following items prior to conducting the limited acrobatic maneuvers approved for the Model 500S. Not applicable to normal maneuvering.

1. Safety belts - FASTENED.
2. Gyros - CAGED.
3. Cabin heat blower - OFF
4. Cabin - CHECK FOR LOOSE ARTICLES.
5. Mixture controls - RICH.
6. Fuel boost pump switches - ON.
7. Wing flaps - UP.
8. Propeller pitch controls - 2450 RPM.
9. Throttle levers - AS DESIRED.
10. Autopilot - DISENGAGED.

NOTE

Recommended minimum terrain clearance for these maneuvers - 3000 feet.

AFTER MANEUVERING

1. Fuel boost pump switches - OFF.
2. Gyros - UNCAGE.
3. Cabin heater - AS DESIRED.

BEFORE LANDING

1. Safety belts - FASTENED.
2. Fuel boost pump switches - ON.
3. Mixture controls - FULL RICH.
4. Landing gear warning horn - CHECK (before extending landing gear).

5. Landing gear - DOWN.

   a. Landing gear safe lights - ILLUMINATED.

   b. Hydraulic pressure - NORMAL.

   c. Landing gear warning horn - SILENT.

CAUTION

Do not extend landing gear when airspeed is above 180 MPH (156 Knots).

6. Wheel brakes - CHECK.

7. Wing flaps - DOWN 1/2 (20^{o}) below 150 MPH (130 Knots).

8. Desired landing pattern speed - 100 MPH (87 Knots).

FINAL APPROACH

1. Reduce power - Propeller pitch controls FULL FORWARD.

2. Wing flaps - AS DESIRED (normally full down).

AFTER LANDING

1. Fuel boost pump switches - OFF.

2. Wing flaps - UP (leave flap lever in UP position).

3. Landing gear safety lock - LOCKED.

ENGINE SHUTDOWN

1. Parking brake - SET.

2. Ignition switch - OFF (momentarily to check magneto grounding).

3. Mixture control on left engine - IDLE CUTOFF.

4. Right engine hydraulic pump - CHECK (by pumping brakes).

5. Mixture control on right engine - IDLE CUTOFF.

6. Fuel shutoff switches - CLOSED, If a long period of inactivity is anticipated. (These switches deleted S/N 3211 and Subsequent).

7. Ignition switches - OFF.

8. All other switches - OFF.

9. Control locks, pitot covers, and wheel chocks - INSTALL.

PROPELLER FEATHERING (PILOT TRAINING)

Either propeller may be feathered whenever it is deemed necessary by the pilot.

FEATHERING PROCEDURE

1. Fuel boost pump switch - OFF.
2. Throttle lever - CLOSED.
3. Mixture control - IDLE CUTOFF.
4. Propeller pitch control - FEATH RANGE.

NOTE

The above feathering procedure is for normal operation. For emergency see Section III.

UNFEATHERING PROCEDURE

1. Propeller pitch control - LOW RPM.
2. Generator/Alternator - OFF (on operating engine before starting feathered engine).
3. Engine - START (refer to Engine Starting Procedures).
   Propeller will unfeather in approximately seven seconds after engine has started.
4. Engine - WARMUP (at 2000 rpm - 13 inches Hg).

CAUTION

Avoid continuous operation below 2000 RPM.

SYSTEMS OPERATION

CABIN HEATER (Aircraft 1755 thru 3075)

The cabin heater provides heated air for the cabin and for windshield defroster operation. Operation of the vent blower is automatically discontinued when the aircraft is in flight.

Ground Operation

1. Battery/Ext power switch - AS REQUIRED.
2. Left engine fuel boost pump switch - ON.
3. Cabin blower switch - ON (delay 10 seconds before proceeding to step 4).
4. Cabin heat switch - ON (momentarily).

NOTE

Generator/Alternator operation is required for prolonged periods of heater operation.

5. Windshield defroster - CLOCKWISE (for defroster operation).

CAUTION

Do not operate windshield defroster for prolonged periods on the ground or windshield distortion may result.

After Takeoff

If cabin heat is to be engaged after takeoff.

1. Cabin blower switch - ON.
2. Cabin heat switch - ON (momentarily).
3. Windshield defroster - CLOCKWISE (for defroster operation).

Heater Malfunction

If heater becomes inoperative, pull out reserve heater ignition points switch button.

NOTE

If engine operation is discontinued for the left engine the left engine boost pump must remain on for heater operation.

Heater Shutdown

If cabin heater operation is to be discontinued:

1. Cabin heat control - CLOCKWISE (to stop).
2. Cabin blower switch - OFF.

CABIN HEATER (Aircraft 3076 And Subs. Not Equipped With Automatic Reset Overheat Switch On Heater)

The cabin heater provides heated air for the cabin and for windshield defroster operation. Operation of the vent blower is automatically discontinued when the aircraft is in flight unless the blower override switch is on.

Ground Operation

1. Battery/Ext power switch - AS REQUIRED.
2. Cabin vent control knob - IN.
3. Cabin, pilot and copilot air controls - OUT.
4. Left engine fuel boost pump switch - ON.
5. Cabin blower switch - ON (delay 5 seconds before proceeding to step 6).
6. Cabin heat switch - ON (momentarily).

NOTE

Generator/Alternator operation is required for prolonged periods of heater operation.

7. Windshield defroster - CLOCKWISE (for defroster operation).

CAUTION

Do not operate windshield defroster for prolonged periods on the ground or windshield distortion may result.

After Takeoff

If cabin heat is to be engaged after takeoff;

1. Cabin vent control knob - IN.
2. Cabin blower switch - ON.
3. Cabin, pilot and copilot air controls - OUT.
4. Cabin heat switch - ON (momentarily).
5. Windshield defroster - CLOCKWISE (for defroster operation).

NOTE

Windshield defroster air flow may be increased by closing cabin air and/or pilot and copilot air outlet.

6. Cabin blower override switch - ON (for increased cabin air flow).

NOTE

If engine operation is discontinued for the left engine the left engine boost pump must remain on for heater operation.

CABIN HEATER (Aircraft 3076 and Subs. Equipped With Automatic Reset Overheat Switch On Heater)

The cabin heater provides heated air for the cabin and for windshield defroster operation. Operation of the vent blower is automatically discontinued when the aircraft is in flight unless the blower override switch is ON.

NOTE

Cockpit and cabin air outlets must be open to assure adequate ventilating air flow during heater operation. Inadequate ventilating air flow can result in actuation of the heater overheat switch. If the heater fails to cycle ON due to actuation of the overheat switch (as evidenced by cold air at the ventilating air outlets), the heater must be restarted by momentarily holding the cabin heat switch ON. Failure of the heater to restart indicates some malfunction other than an overheat condition.

CAUTION

Discontinue heater operation if the overheat condition continues.

Ground Operation

1. Battery/Ext power switch - AS REQUIRED.
2. Cabin vent control knob - IN.
3. Cabin, pilot and copilot air controls - OUT.
4. Left engine fuel boost pump switch - ON.
5. Cabin blower switch - ON (delay 5 seconds before proceeding to step 6).
6. Cabin heat switch - ON (momentarily).

NOTE

Generator/Alternator operation is required for prolonged periods of heater operation.

7. Windshield defroster - CLOCKWISE (for defroster operation).

CAUTION

Do not operate windshield defroster for prolonged periods on the ground or windshield distortion may result.

After Takeoff

If cabin heat is to be engaged after takeoff.

1. Cabin vent control knob - IN.
2. Cabin, pilot and copilot air controls - OUT.
3. Cabin blower switch - ON.
4. Cabin heat switch - ON (momentarily).

5. Windshield defroster - CLOCKWISE (for defroster operation).

NOTE

Windshield defroster air flow may be increased by closing cabin air and/or pilot and copilot air outlets.

6. Temperature control - AS DESIRED.

7. Cabin blower override switch - ON (for increased cabin air flow during takeoff and landing).

NOTE

If engine operation is discontinued for the left engine, the left engine boost pump must remain on for heater operation.

Heater Shutdown

If cabin heater operation is to be discontinued.

1. Cabin heat control - CLOCKWISE (to stop).

2. Cabin blower switches - OFF.

CABIN VENTILATION (Aircraft 1755 thru 3075)

Ground Operation

1. Battery/Ext power switch - AS REQUIRED.

2. Cabin blower switch - ON.

After Takeoff

1. Cabin heater switch - OFF.

2. Pilots fresh air outlets - OPEN.

CABIN VENTILATION (Aircraft 3076 and Subs)

Ground Operation

1. Battery/Ext power switch - AS REQUIRED.

2. Cabin vent control knob - OUT.

3. Cabin, pilots, and copilots air controls - OUT.

4. Cabin blower switch - ON.

After Takeoff

1. Cabin vent control knob - OUT.

2. Cabin, pilots, and copilots air controls - OUT.

If additional air flow is desired

3. Cabin blower switch - ON.

4. Cabin blower override switch - ON.

SECTION III
EMERGENCY PROCEDURES

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BALKED LANDING

If it is necessary to execute a Go-Around just prior to landing:

1. Throttle levers - FULL THROTTLE (2575 RPM).
2. Climb - ESTABLISH at 85 MPH (74 Knots).
3. Landing gear - RETRACT.
4. Wing flaps - RETRACT (slowly).
5. Normal takeoff procedures - FOLLOW.

ENGINE FAILURE DURING TAKEOFF

Loss of engine before reaching 90 MPH (78 Knots).

1. Throttle levers - CLOSE.
2. Wheel brakes - BRAKE.

Loss of engine after 90 MPH (78 Knots).

1. Propeller pitch controls - FULL FORWARD.
2. Throttle levers - FULL FORWARD.
3. Landing gear - UP.
4. Wing flaps - UP.
5. Heading and airspeed - MAINTAIN.
6. Inoperative engine - DETERMINE (separately with throttle).
7. Failed engine propeller - FEATHER.
8. Best angle of climb speed - ESTABLISH 100 MPH (87 Knots)
9. Fuel boost pump switch - ON (operating engine).

10. Mixture control - SET (to best power for operating engine).

11. Inoperative engine:

    a. Mixture control - IDLE CUTOFF.

    b. Fuel-Hydraulic emergency shutoff switch - EMER. OFF.

    c. Fuel boost pump switch - OFF.

    d. Ignition switch - OFF.

    e. Generator/Alternator switch - OFF.

    f. Cowl flaps - CLOSED.

12. Aircraft - TRIM.

13. Land - AS SOON AS POSSIBLE.

ENGINE FAILURE DURING CRUISE

1. Inoperative engine - DETERMINE (separately with throttles).

2. Inoperative engine - FEATHER (as outlined in Propeller Section of Normal Procedures).

3. Operative engine - MAINTAIN POWER (at 70% for best cruise, with best power fuel flow).

NOTE

If left engine has failed, left engine fuel boost pump must be on for heater operation.

ENGINE-DRIVEN FUEL PUMP FAILURE - CRUISE (Fuel Boost Pump Switch 'OFF')

The failure of a engine-driven fuel pump will be indicated by a loss of fuel pressure (ice formation over the fuel flow gage vent may cause gage fluctuation, however, this does not effect engine operation), followed by a complete loss of power from the engine. Placing the boost pump switch in the ON position will keep the engine running provided it is turned on before fuel pressure drops to zero. If the engine is lost before corrective action can be taken, follow this air start procedure:

1. Throttle lever - 1/8 OPEN.

2. Propeller pitch control - LOW RPM.

3. Mixture control - IDLE CUTOFF.

4. Fuel boost pump switch - ON.

5. Ignition switch - START (if required).

6. Mixture control - ADVANCE.

7. Ignition switch - RELEASE (after engine start).

8. Fuel flow - ADJUST (in accordance with power setting).

9. Land - AS SOON AS POSSIBLE.

ENGINE-DRIVEN FUEL PUMP FAILURE - TAKEOFF OR BALKED LANDING CONDITION (Fuel Boost Pump In ON Position).

Should the engine-driven fuel pump fail when fuel boost pump switch is in ON position, the fuel boost pump will automatically maintain engine power. The only indication of an engine-driven fuel pump failure with the fuel boost pump switch ON will appear when the fuel boost pump switch is turned off. A loss in fuel pressure and engine power will result. Replace fuel boost pump switch to ON position immediately.

HYDRAULIC SYSTEM FAILURE

The aircraft is equipped with two engine-driven hydraulic pumps. The failure of one hydraulic pump will not normally be noticed by the pilot since either pump will maintain system pressure. Since the wheel brake and wing flap system pressure is registered on the hydraulic system pressure gage, the pilot always has a visible indication of the pressure available for braking purposes. A check valve isolates the wheel brake and wing flap system in the event of main hydraulic system failure; therefore, a loss in main system pressure due to line rupture or defective engine-driven hydraulic pumps may not be immediately apparent. The nose landing gear is held in the up position by hydraulic pressure only. Lack of hydraulic pressure will cause it to droop and the red uplock indicator light on the landing gear position indicators will be illuminated. This indicates the possibility of a ruptured hydraulic line. After lowering the wing flaps, the hydraulic system pressure gage reading should be observed and if hydraulic pressure has fallen to the auxiliary pump pressure range of 470-605 psi, the pilot will know that he has only auxiliary hydraulic pressure for brake operation.

NOTE

If the electrically-driven auxiliary hydraulic pump fails to maintain a hydraulic pressure of 470-605 psi a complete hydraulic failure exists.

EMERGENCY LANDING GEAR EXTENSION

1. Airspeed - 95-100 MPH (83-87 Knots).

2. Landing gear - DOWN.

NOTE

The main landing gear will extend to down and locked position under the influence of air pressure from the landing gear emergency air storage cylinder. The nose gear will free fall to down and locked position. Allow 3 minutes for full extension of gear.

3. Landing gear - CHECK (down and locked).

For a "flaps up" landing, a power-on approach at 85 MPH (74 Knots) is recommended.

ELECTRICAL SYSTEM FAILURES

GENERATOR/ALTERNATOR FAILURE

The aircraft is equipped with dual generators or alternators. In the event of failure of one generator, place that generator or alternator switch in the OFF position.

INADVERTENT SHUTOFF OF BOTH ALTERNATORS (BATTERY CHARGED)

1. Battery switch - ON
2. Alternator switches - ON

INADVERTENT SHUTOFF OF BOTH ALTERNATORS (BATTERY DISCHARGED OR DAMAGED)

1. Electrical switches - OFF, to reduce load.
2. Battery switch - OFF
3. Alternator switches - ON
4. Electrical load - ON, as applicable.

INADVERTENT SHUTOFF OF ONE ALTERNATOR

1. Alternator switch - ON

ENGINE FIRE

In the event of a fire in either engine compartment:

1. Mixture control - IDLE CUTOFF.
2. Fuel-Hydraulic emergency shutoff valve - EMER. OFF.
3. Fuel boost pump switch - OFF.
4. Propeller pitch control - FEATHER.
5. Ignition switch - OFF.
6. Generator/Alternator - OFF.

EMERGENCY BRAKE OPERATION

1. Throttle levers - RETARD.
2. Wheel brakes - AS REQUIRED.

NOTE

Do not pump brakes. Maintain a steady brake pressure until aircraft is stopped.

SECTION IV
PERFORMANCE

TABLE OF CONTENTS

INTRODUCTION

The graphs and tables in this section present FAA approved performance information at various weights, powers, altitudes and temperatures. Examples of the use of each graph or table are illustrated.

VARIABLE FACTORS AFFECTING PERFORMANCE

The effects of temperature, gross weight, pressure altitude, airspeed and airplane configuration have been accounted for in this data. Variable factors that have not been accounted for include the following: humidity, runway slope or wet runways.

POWER OFF STALL SPEEDS

The variation of Power-Off Stall Speeds with Bank Angle and Flight Configuration is shown in Figure 4-1 for airplane gross weight of 6750 lb.

ASSOCIATED CONDITIONS

Power	POWER OFF	POWER OFF
Wing Flaps	UP	DOWN
Landing Gear	UP	DOWN

EXAMPLE

GIVEN:	Gross Weight	6750 LB
	Configuration	FLAPS UP, GEAR UP
	Bank Angle	20 DEG
FIND:	Stall Speed Fig. 4-1	80 MPH (CAS)

CALIBRATED AIRSPEED ~ MPH

GROSS WEIGHT 6750 LB

		ANGLE OF BANK ~ DEGREES				
		0	20	40	50	60
Flaps UP	MPH	78	80	89	97	110
	Knots	68	70	77	84	96
Flaps DOWN	MPH	68	70	78	85	96
	Knots	59	61	68	74	84

Figure 4-1.

ALTERNATE STATIC SOURCE CORRECTION

The airspeed and altimeter correction charts presented in Figure 4-3 must be completed before the alternate static system is used. The alternate static system must be recalibrated every 200 hours of flight and each recalibration check must be recorded in the aircraft Log Book.

Alternate static source may be selected at the pilots discretion or whenever the airspeed and altimeter indicate erratic or erroneous readings. Corrections from Figure 4-3 must be applied when the alternate static source is selected.

To calibrate the airspeed and altimeter indicators for the alternate static source during flight, use the following procedures:

1. Set static source selector valve to PRIMARY and establish an indicated airspeed and altitude on a calibrated airspeed and calibrated altitude point.

2. Turn static source selector valve to ALTERNATE and record indicated airspeed and indicated altitude versus calibrated airspeed.

3. Repeat steps 1. and 2. at 10 knots increments of calibrated airspeed, from just above stall to maximum cruise speed for the aircraft at any altitude between 2000 and 6000 feet.

4. With wing flaps and gear down, repeat steps 1., 2., and 3., up to the maximum allowable airspeed for full flaps.

EXAMPLE:

ALTERNATE STATIC SOURCE - FLAPS & GEAR-UP

PRIMARY SOURCE FLY IAS MPH	PRIMARY SOURCE FLY IAS KTS	PRIMARY SOURCE FOR CAS MPH	PRIMARY SOURCE FOR CAS KTS	ALTERNATE SOURCE IAS (MPH)	ALTERNATE SOURCE ALT (± FEET)
80	70	82	71	84	-85
90	78	92	80	97	-80
100	87	102	87	108	-70
110	96	112	97	120	-90
120	104	121	105	134	-70
220	191	218	189	352	0

ALTERNATE STATIC SOURCE - FLAPS & GEAR-DN

PRIMARY SOURCE FLY IAS MPH	PRIMARY SOURCE FLY IAS KTS	PRIMARY SOURCE FOR CAS MPH	PRIMARY SOURCE FOR CAS KTS	ALTERNATE SOURCE IAS (MPH)	ALTERNATE SOURCE ALT (± FEET)
85	74	85	74	81	-100
90	78	90	78	93	-75
100	87	99	86	104	-75
130	113	127	110	151	-60

Figure 4-2.

ALTERNATE STATIC SOURCE CORRECTION CARD

AIRPLANE SERIAL NO._____ N _____ FLIGHT HRS._____

ALTERNATE STATIC SOURCE - FLAPS & GEAR-UP					
PRIMARY SOURCE FLY IAS		PRIMARY SOURCE FOR CAS		ALTERNATE SOURCE IAS	ALTERNATE SOURCE ALT
MPH	KTS	MPH	KTS	( )	(± FEET)
80	70	82	71		
90	78	92	80		
100	87	102	87		
110	96	112	97		
120	104	121	105		
130	113	131	114		
140	122	141	123		
150	130	150	130		
160	139	160	139		
170	148	170	148		
180	156	179	156		
190	165	189	164		
200	174	199	173		
210	182	209	182		
215	187	214	186		
220	191	218	189		

ALTERNATE STATIC SOURCE - FLAPS & GEAR-DN					
PRIMARY SOURCE FLY IAS		PRIMARY SOURCE FOR CAS		ALTERNATE SOURCE IAS	ALTERNATE SOURCE ALT
MPH	KTS	MPH	KTS	( )	(± FEET)
85	74	85	74		
90	78	90	78		
100	87	99	86		
110	96	108	94		
120	104	118	103		
125	109	123	107		
130	113	127	110		

NOTE

Altimeter corrections do not vary significantly with change in aircraft altitude.

Figure 4-3.

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TAKEOFF DISTANCE TO 50-FT HEIGHT

The Takeoff Distances to 50-Ft Height with 1/4 Flaps (10 DEG) are shown in Figure 4-4 for varying Outside Air Temperatures, Pressure Altitudes, Wind Speeds, and Airplane Weights. A table of Scheduled Speeds versus Airplane Weight is presented on the chart.

ASSOCIATED CONDITIONS

Power	TAKEOFF (FULL THROTTLE, 2575 RPM)
Wing Flaps	EXTENDED 1/4 (10 DEG)
Landing Gear	EXTENDED
Cowl Flaps	2/3 OPEN
Runway Condition	PAVED, DRY, LEVEL

TECHNIQUE

Obtain takeoff power prior to brake release. Release the brakes and accelerate. Lift off and accelerate to the scheduled 50 Ft. height speed.

EXAMPLE

GIVEN:	Airplane Weight	6600 LB
	Outside Air Temperature	13 DEG C (ISA)
	Pressure Altitude	1000 FT
	Wind Component (Headwind)	19 MPH
FIND:	Distance to 50-Ft Height, Fig. 4-4	1325 FT
	50-FT Height Speed, Fig. 4-4	94 MPH (CAS)

NOTES:
1. IAS assumes zero instrument error.
2. Allowance must be made for wet runways, grass or sod runways, or other actual associated conditions which may differ from those above.

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Revised 11/21/77

TAKEOFF DISTANCE TO 50-FT HEIGHT
DRY, LEVEL, PAVED RUNWAYS

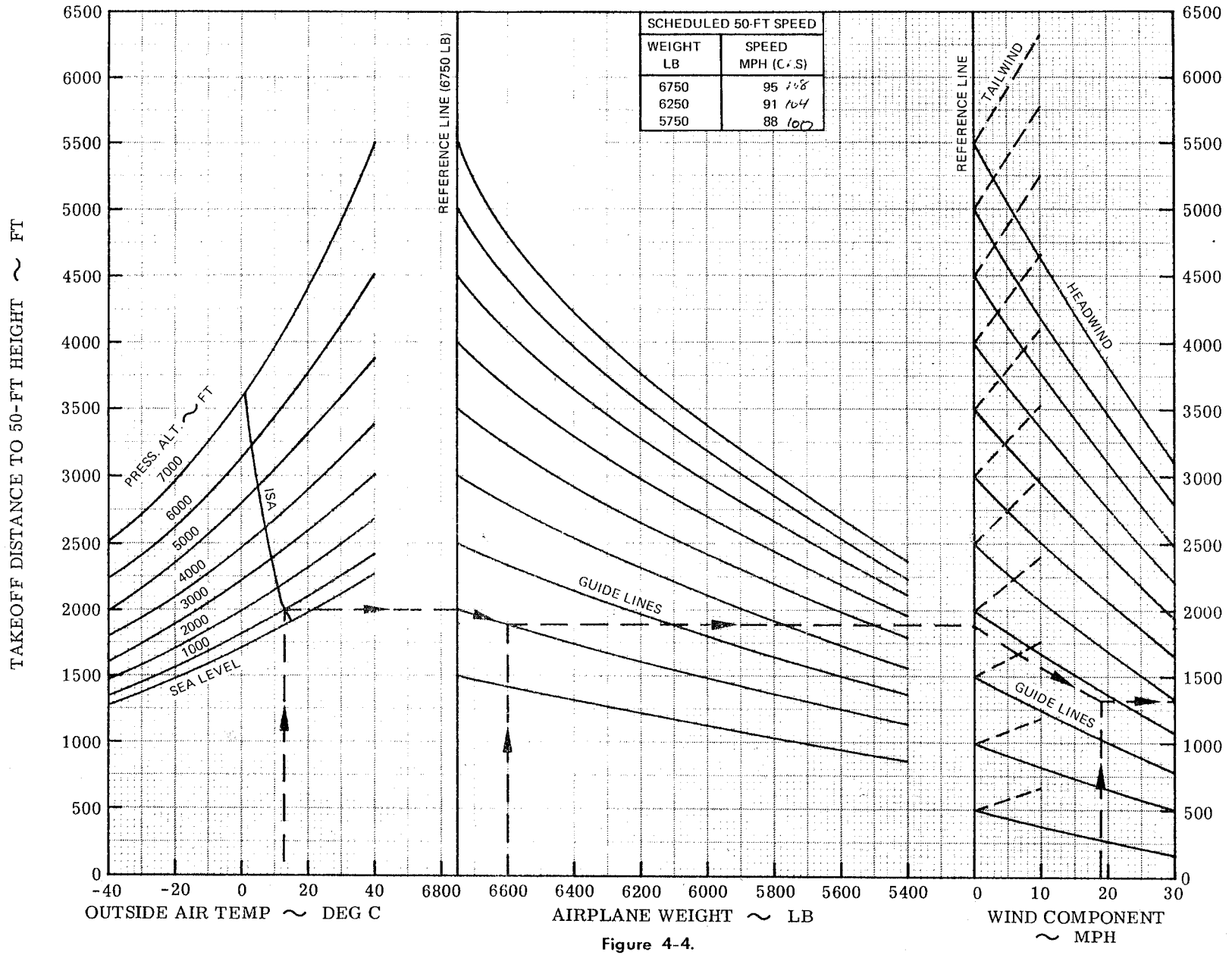

Figure 4-4.

TWO ENGINE RATE OF CLIMB

Two Engine Rate of Climb is presented in Figure 4-5 as a function of Pressure Altitude, Outside Air Temperature and Airplane Weight.

ASSOCIATED CONDITIONS

Power	MAXIMUM CONTINUOUS
Mixture	FULL RICH BELOW 9000 FT BEST POWER ABOVE 9000 FT
Wing Flaps	EXTENDED 1/4 (10 DEG)
Landing Gear	RETRACTED
Cowl Flaps	FULL OPEN

TECHNIQUE

Establish the airplane in a steady climb at the scheduled climb speed and obtain maximum continuous power. Observe the Climb Speed versus Pressure Altitude Table as the climb progresses.

EXAMPLE

GIVEN:	Pressure Altitude	3000 FT
	Outside Air Temperature	15 DEG C
	Airplane Weight	6200 LB
FIND:	Rate of Climb, Fig. 4-5	1370 FT/MIN
	Scheduled Climb Speed, Fig. 4-5	112 MPH (CAS)

TWO ENGINE RATE OF CLIMB

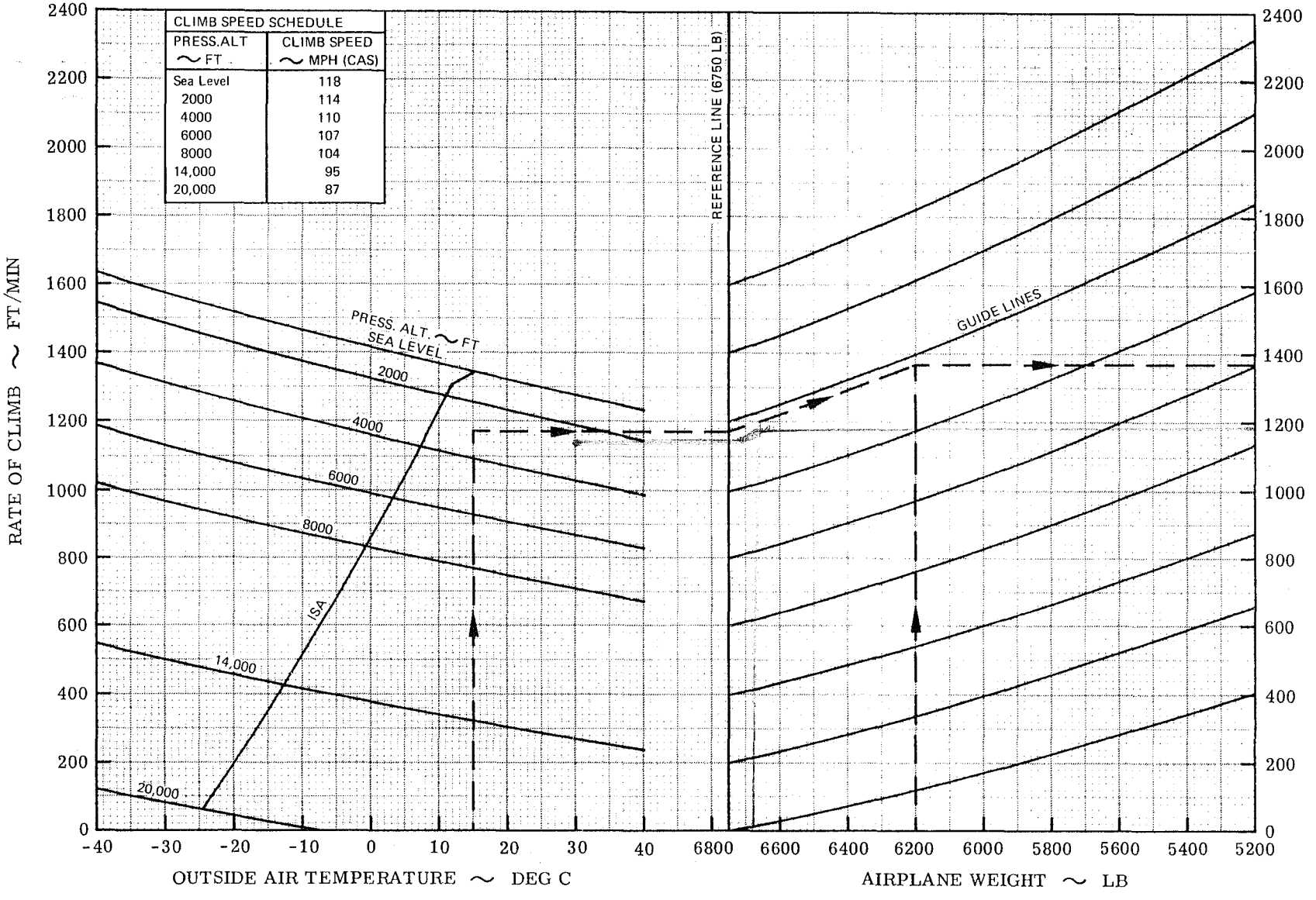

Figure 4-5.

ONE ENGINE INOPERATIVE RATE OF CLIMB

The One Engine Inoperative Rate of Climb is shown in Figure 4-6 for varying Indicated Outside Air Temperature, Pressure Altitudes, and Airplane Weights.

ASSOCIATED CONDITIONS

Power (Operative Engine)	MAXIMUM CONTINUOUS POWER
Power (Inoperative Engine)	PROPELLER FEATHERED
Wing Flaps	0 DEG
Landing Gear	RETRACTED
Cowl Flaps	OPEN

TECHNIQUE

Feather the propeller on the inoperative engine and establish the airplane in a steady climb at the Scheduled Climb Speed of Figure 4-6. Obtain Maximum Continuous Power on the operative engine. Maintain the Scheduled Climb Speeds.

EXAMPLE

GIVEN:	Outside Air Temperature	20 DEG C
	Pressure Altitude	3000 FT
	Airplane Weight	6400 LB
FIND:	Rate of Climb, Fig. 4-6	223 FT/MIN
	Scheduled Climb Speed, Fig. 4-6	105 MPH (CAS)

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ONE ENGINE INOPERATIVE CLIMB

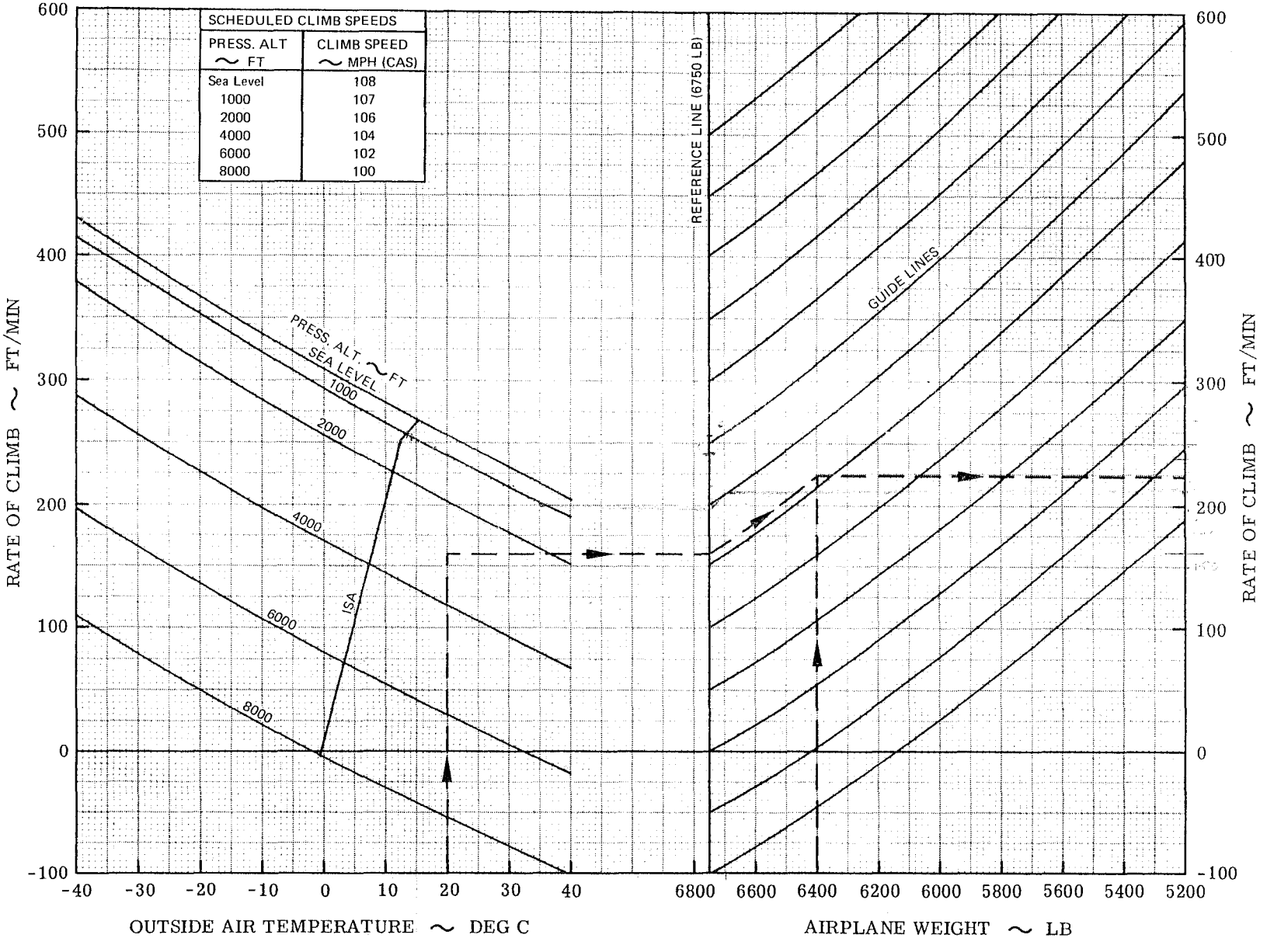

Figure 4-6.

LANDING DISTANCE FROM 50-FT HEIGHT

The Landing Distance from 50-Ft Height, to rest, is shown in Figure 4-7 for varying conditions of Outside Air Temperature, Pressure Altitude, Wind Speed, and Airplane Weight.

ASSOCIATED CONDITIONS

Power	12-13 IN.HG. MP, PROP PITCH CONTROL FULL FORWARD
Wing Flaps	40 DEG
Landing Gear	EXTENDED
Cowl Flaps	CLOSED
Runway Conditions	PAVED, DRY, LEVEL

TECHNIQUE

Make the final approach with the landing gear extended and the wing flaps at 40 degrees, arriving at the 50-FT height at the Scheduled Airspeed. Touchdown should be made on the main wheels first, with the nose wheel being lowered smoothly during the landing roll. Immediately upon touchdown, close throttle levers, lower nose wheel, raise wing flaps, and use maximum braking.

EXAMPLE

GIVEN:	Airplane Weight	6388 LB
	Outside Air Temperature	18 DEG C
	Pressure Altitude	1000 FT
	Wind Component	15 MPH (Headwind)
FIND:	Landing Distance from 50-Ft. Fig. 4-7	1650 FT

NOTES: 1. IAS assumes zero instrument error.
2. Allowance must be made for wet runways, grass or sod runways, or other associated conditions which may differ from those above.

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LANDING DISTANCE FROM 50 FT HEIGHT
DRY, LEVEL, PAVED RUNWAYS

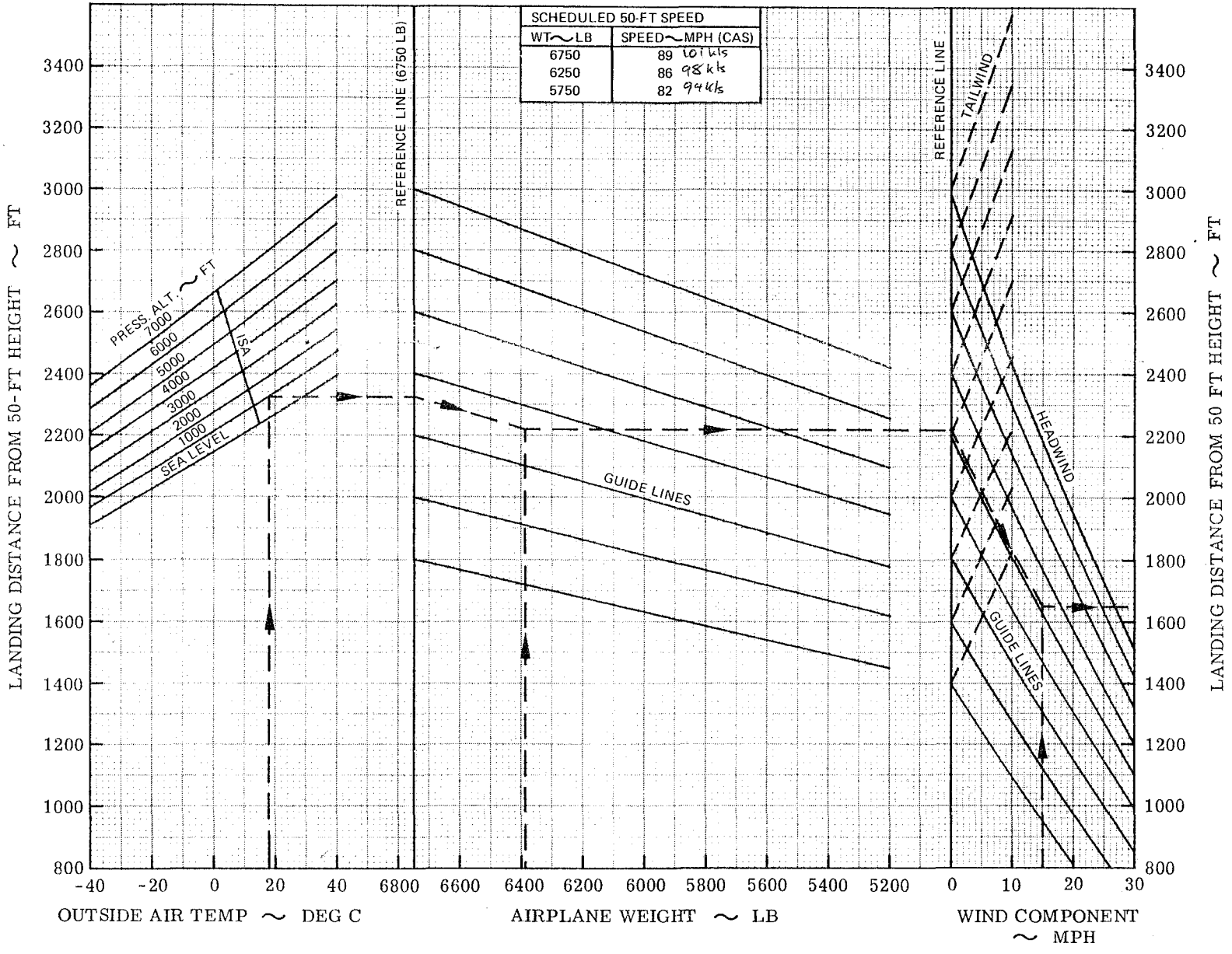


Figure 4-7.

TWIN ENGINE BALKED LANDING RATE OF CLIMB

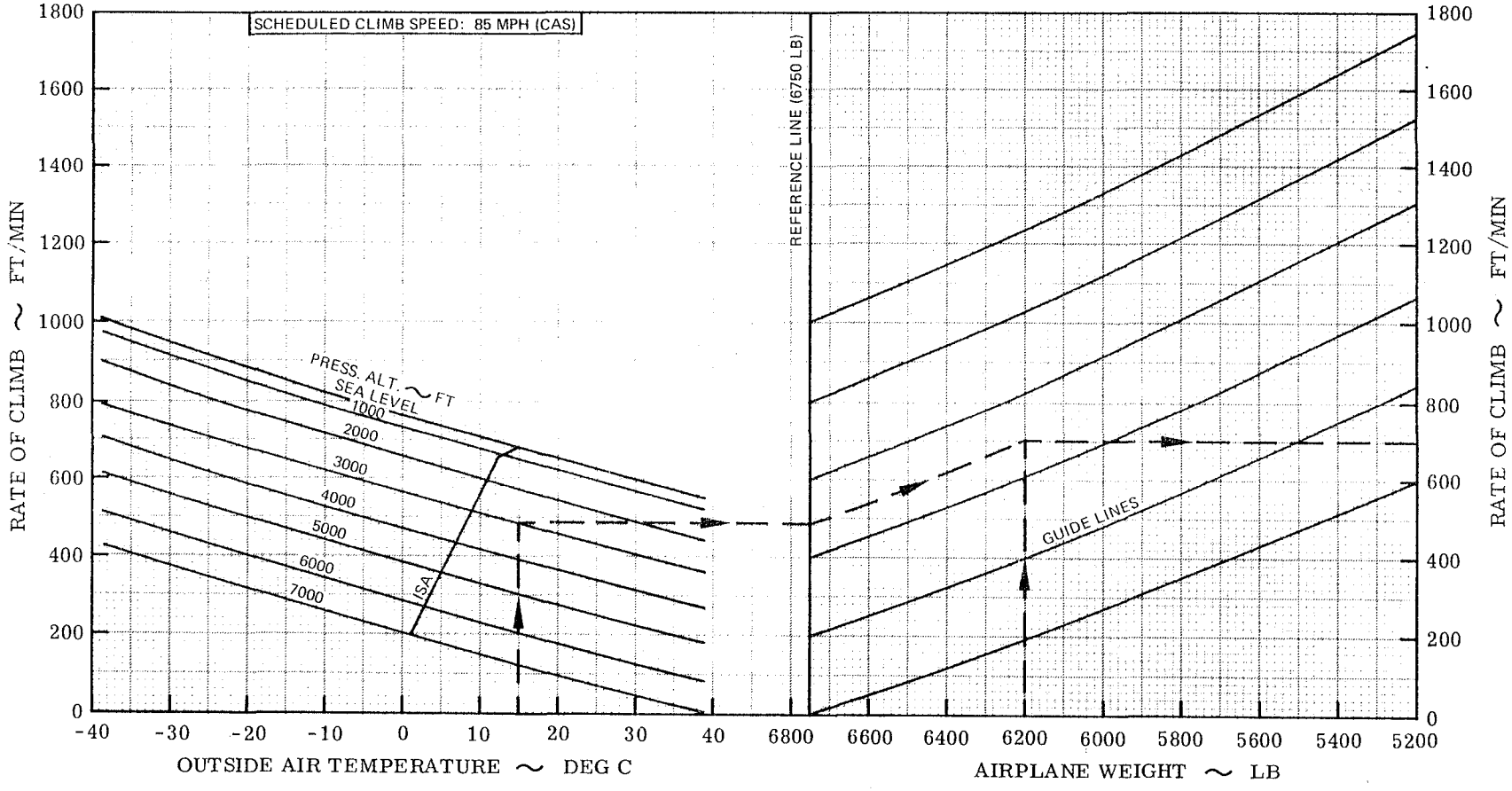


Figure 4-8.

LOG OF SUPPLEMENTS

Supplement No.	Title	FAA Approved	Date
1	Propeller Deicing System (Electric) (Page 1-1 thru 1-2)	Kenneth L Hale DEL OP PC-203	3/15/68
2	Aircraft Radio Corporation Model AF-520B Autopilot (Pages 2-1 thru 2-7)	Kenneth L Hale DEL OP PC-203	11/11/68
3	H-14 Autopilot System - Honeywell (Pages 3-1 thru 3-4)	Kenneth L Hale DEL OP PC-203	2/15/72
4	Flight Into Known Icing Conditions (Pages 4-1 thru 4-2)		
5	Wing and Empennage Deicer System (6890279) (Pages 5-1 thru 5-2)		
6	Windshield Alcohol System (5890280) (Page 6-1)	Kenneth L Hale DEL OP PC-203	8/4/72
7	King KN-74 Area Navigation System (Pages 7-1 thru 7-3)	Kenneth L Hale DEL OP PC-203	12/21/73
8	Emergency Locator Transmitter (ELT) (SHARC-7) (Pages 8-1 thru 8-2)	Kenneth L Hale DEL OP PC-203	9/22/75
9	Oxygen System (Page 1 of 3 thru 3 of 3)	Larry L. McHugh DEL OP PC-203	1/20/78
10	Recognition Lights (Page 1 of 1)	A. C. Jackson DEL OP PC-203	10/14/80
11	Propeller Unfeathering System (Page 1 of 1)	A. C. Jackson DEL OP PC-203	

LOG OF REVISIONS TO SUPPLEMENTS

Revision Number	Revised Supplement Number	Description of Revision	FAA Approved	Date
1	3	Revised Page 3-1.	Kenneth L Hale Del Op. PC-203	8/19/70
1	1	Revised Page 1-1.	Kenneth L Hale Del Op. PC-203	1/22/71
2	3	Revised Page 3-1.	Kenneth L Hale Del Op. PC-203	3/15/73
1	5	Revised Pages 5-1, 5-2.	Kenneth L Hale Del Op. PC-203	6/29/73
3	3	Revised Page 3-3.	Larry L. McHughes Del Op. PC-203	5/9/75
2	5	Revised Page 5-2.	Larry L. McHughes Del Op. PC-203	5/9/75
1	4	Revised Page 4-2.	A.C. Jackson Del Op. PC-203	5/31/85
2	4	Revised Pages 1, 2; added Pages 3, 4.	A. J. Pasion, Manager Special Certification Branch	6/16/97
	P5	AUX OUTBOARD FUEL TANKS		15/12/87
	P5	OPERATION WITH EMERGENCY EXIT REMOVED		15/12/87
	P1	OPERATION WITH REAR CABIN DOOR REMOVED		10/2/92
	P1	OPERATION WITH PACKAGE DESPATCH OPEN		26/3/90
	P5	AIRCONDITIONING		15/12/87
	P1	AIRCONDITIONING DEMISTER		26/3/90

SUPPLEMENT 1

PROPELLER DEICING SYSTEM (5890294)

INTRODUCTION

When the propeller deicing system is installed on the Model 500S Aero Commander, this Supplement must be placed in the Airplane Flight Manual.

A neoprene ice guard which contains embedded electrical heating elements, is bonded to each propeller blade. When the propeller deice switch is placed in the ON position, an electronic timer alternately directs 28 volts dc, in thirty-second intervals, to the outboard and inboard heating elements of the right propeller blades. The timing sequence is then repeated for the left propeller before returning to the right propeller.

SECTION I

LIMITATIONS

Ambient temperatures must be below 40°F for continuous operation of propeller deicing system.

Placard - ACFT NOT FULLY EQUIPPED FOR FLT INTO KNOWN ICING.

SECTION II

NORMAL PROCEDURES

Before Takeoff

1. Propeller deice switch - ON (2 minutes minimum).
2. Ammeters - OBSERVE.
   The total ammeter reading for both ammeters must increase 14-18 amps with a momentary deflection of the ammeter pointer every thirty seconds.

After Takeoff

1. Propeller deicing - AS DESIRED.
   The propeller deice system may be operated at the pilots discretion at temperatures below 40°F.
2. Ammeters - OBSERVE.
   The total ammeter reading for both ammeters must increase 14-18 amps when the propeller deicer switch is in the ON position.

SECTION III

EMERGENCY PROCEDURES

Engine Failures

1. Electrical loads - MONITOR.
   Do not exceed generator capacity.

System Failures

Propeller Deicing System

1. Zero amperage indication.
   After 30 seconds reset circuit breaker. If ammeter does not indicate deicer operation turn system OFF.
2. Low amperage indication.
   Propeller deicer operation may continue unless serious propeller unbalance results from irregular ice throw-off.

3. Amperage indication between 18-23 amps.
   Propeller deicer operation may continue unless serious propeller imbalance results from irregular ice throw-offs.
4. Amperage indication in excess of 23 amps.
   Propeller deicing must be discontinued unless required for safety of flight.

SECTION IV

PERFORMANCE

No Change.

SUPPLEMENT 2

AIRCRAFT RADIO CORPORATION MODEL AF-520B AUTOPILOT

INTRODUCTION

This Supplement must be attached to the FAA Approved 500S Flight Manual when the ARC AF-520B Autopilot System is installed in the airplane in accordance with approved Aero Commander data. The information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

Placard - AUTOPILOT MUST BE OPERATED IN ACCORDANCE WITH APPROVED FLIGHT MANUAL.

SECTION I

LIMITATIONS

1. Maximum speed for autopilot operation - 230 MPH CAS.
2. Pilot must remain in pilots seat with seat belt fastened during autopilot operation.
3. Do not use autopilot for takeoff or landing.
4. Do not use omni coupler for ILS approach.
5. Extend and retract flaps in 10^{o} increments when autopilot is engaged.
6. Adjust rudder trim to compensate for asymmetric power in the event of a failed engine.

SECTION II

NORMAL OPERATION

Before Takeoff

1. All circuit breakers - IN.
2. Autopilot - OFF.

After Takeoff

Climb may be performed with autopilot after reaching 200 feet above terrain.

1. Power and elevator trim - ADJUST (for desired climb altitude).
2. Pull-Turn control knob - PULL (retain knob in detent position).
3. Pitch control knob - ROTATE (toward up position).

NOTE

The airplane or autopilot trim should be adjusted as necessary to assure maximum servo clutch life by preventing "ACFT TRIM" light from staying on continuously. To maintain coordinated flight alternately adjust rudder trim and autopilot lateral trim control to center turn-and-bank ball.

4. Autopilot switch - ON.

5. Autopilot engage switch - PRESS.

6. Lateral trim lever - ADJUST (for wings level condition).

7. Select climb out heading - IF DESIRED (a selected heading or omni bearing may be used, refer to MAGNETIC HEADING OPERATION procedures).

Cruise

1. Aircraft - TRIM.

2. Pull-Turn control knob - PULL (retain knob in detent position).

3. Autopilot pitch and lateral controls - CENTER.

4. Autopilot engage button - PRESS.

5. Autopilot pitch trim and lateral trim controls - ADJUST (for straight and level flight).

Autopilot Command Turns

Autopilot command turns may be made with the function selector switch in either INTERCEPT, TRK, or HDG position.

1. Pull-Turn control knob - PULL and rotate toward L (left) or R (right) to initiate turn.

NOTE

When initiating a maximum turn with the autopilot, the aircraft will make an approximate 20^{O} banked turn. Bank angle can be regulated by varying the position of the turn control.

2. Pull-Turn control knob - IN (after returned to center detent position). Autopilot will regain omni or heading function.

Magnetic Heading Operation

1. Pull-Turn control knob - PULL (retain knob in detent position).

2. Heading control - SELECT (desired heading).

3. Function selector switch - HDG.

4. Pull-Turn control knob - IN (aircraft will turn to and maintain the selected heading).

5. Directional gyro - CHECK (precession of directional gyro against magnetic compass, reset gyro as necessary).

NOTE

If aircraft does not assume selected heading, one of the following conditions probably exists:

a. Aircraft is out of trim: Pull out Pull-Turn control knob, adjust rudder trim and autopilot lateral trim to center ball, and push control knob in.

b. Heading knob is not set exactly on desired course: If aircraft was in trim, make fine adjustment to the Heading knob to correct heading.

Cruise Climb

1. Pitch control - ROTATE UP (adjust power setting as required).
2. Pitch control - CENTER (in detent position for level flight).

Descent

1. Pitch control - ROTATE DOWN (adjust power setting as required).
2. Pitch control - CENTER (in detent position for level flight).

Altitude Hold

1. Aircraft - LEVEL OFF (at desired altitude).
2. Cruise procedure - PERFORM.
3. Altitude switch - ON.
   Aircraft will hold altitude during turns or level flight. Periodically turn system off and check aircraft trim. If necessary, manually retrim aircraft and autopilot.

NOTE

Altitude hold is disabled whenever pitch control is out of detent position. When pitch control returned to detent altitude hold will function if altitude switch is ON.

Landing

1. Autopilot - DISENGAGE.
2. Autopilot switch - OFF.

NOTE

Periodically check that aircraft trim and autopilot trim are coordinated so that pitch trim light is out, or barely flickering, and that ball is centered in turn-and-bank indicator. Pull out Pull-Turn control knob and retain in detent position when adjusting lateral trim. The pitch control must be centered when adjusting pitch trim for level flight.

Omni Coupler Operation

1. Pull-Turn control knob - PULL (leave in detent).
2. VOR station - TUNE and IDENTIFY.
3. Desired radial - SET (in course selector).
4. Heading control - SELECT (radial bearing).
5. Function selector switch - INTERCEPT.
6. Pull-Turn control knob - IN.
   Aircraft will intercept desired radial at a 35 to 55 degree angle. For best intercept performance engage coupler when aircraft is on a heading ($\pm$ 30) degrees to selected radial. The aircraft will make a slow turn to complete the interception.
7. Function selector switch - TRK (after interception is completed).

NOTE

The omni coupler compensates for crosswinds up to approximately a 10° crab angle. However, extremely high crosswinds may result in a slight deflection off center of the omni course deviation pointer. If necessary, set the Heading knob 5° into the wind for additional compensation. If this value is insufficient, increase the setting 5° more. Periodically reset D. G.

8. Function selector switch - HDG.
Approach station in Heading mode to avoid random heading changes while in the cone of confusion.

9. Function selector switch - TRK.
After flying beyond cone of confusion and outbound course remains unchanged.

10. If outbound course is to be changed:

    a. Outbound radial - SELECT.

    b. Heading control - SELECT (outbound radial). Aircraft will turn to selected heading.

    c. Function selector switch - INTERCEPT (after flying beyond cone of confusion).

    d. Function selector switch - TRK (when aircraft is on outbound course).

NOTE

Enroute, prior to changing omni bearing or station, pull out Pull-Turn control knob. Push in control knob after new course is established.

Throughout operation of the autopilot use magnetic compass to monitor precession and reset D. G. as necessary.

ILS approaches using autopilot must be manually controlled. Do not use omni coupler for ILS.

Autopilot Ground Check

To ground check the AF-520B, start engines and proceed as follows:

Allow 3 to 5 minutes for gyros to stabilize at operating speeds.

Level Flight Check:

1. Pull-Turn control knob - PULL (retain knob in detent position).

2. Autopilot master switch - ON.

3. Autopilot pitch and pitch trim controls - CENTERED.

4. Lateral trim control - CENTERED.

5. Heading control - SELECT (same as reading on directional gyro (DG).

6. Function selector switch - HDG.

7. Altitude switch - OFF.

8. Autopilot switch - ON.

9. Autopilot engage button - PRESS.
Actuator should move ailerons to level flight position.

Turn Check:

1. Pull-Turn control knob - PULL and rotate to full right. Rotate knob full left. Control wheels should rotate in direction of turn and then slowly return to a setting part way back to level flight attitude. Reset Pull-Turn control knob to center detent position.

2. Pilots control wheel - TURN and release from left and right position. Control wheel should return to level flight position.

NOTE

Ailerons may not return to level flight attitude if control wheel is deflected to full left position. This is due to the variation in control system rigging permitting the follow-up potentiometer of the auto-pilot to be rotated more than 180 degrees. By slightly turning control wheel toward neutral, the ailerons will return to level flight position. This condition cannot occur in flight due to air loads.

Heading Control and Directional Gyro Check:

1. Heading control - SET (to agree with directional gyro).

2. Pull-Turn control knob - IN (to engage heading lock).

3. Heading control - TURN TO RIGHT.
Aircraft control wheel should turn right.

4. Heading control - TURN TO LEFT.
Aircraft control wheel should turn left. (Leaving Heading knob in left position.)

5. Directional gyro - CAGE (and reset DG to agree with Heading shown on autopilot). Control wheel should return to level flight position (control wheels slightly deflected to right).

Pitch Check:

NOTE

While performing pitch check, manually exert a small amount of pressure on the control wheel to hold the elevators in a neutral position. As the actuator is engaged, reduce pressure until actuator controls elevator.

1. Pull-Turn control knob - PULL (retain knob in detent position).

2. Pitch control - ROTATE DOWN.
Elevators should move down and the Trim lamp should light while the elevators are in motion.

3. Pitch control - ROTATE UP (while providing some manual help from the control wheel).
Elevators should move up and Trim lamp should light while the elevators are in motion.

4. Pitch control - CENTER.
Elevators should move to neutral and the Trim lamp should not light.

Disengage Check:

1. Pilots disconnect button - PRESS.

2. Flight controls - CHECK (for free movement).

3. Autopilot switch - OFF.

SECTION III

EMERGENCY PROCEDURES

1. In the event of engine failure with the autopilot engaged, the resulting yaw will be less than 3^{0} per second. Apply rudder as necessary to coordinate the aircraft until engine failure procedure is completed. Retrim aircraft and autopilot for single-engine operation.

2. The following are the maximum control forces required to overpower the autopilot in flight:

Elevator	33 lbs.
Aileron	30 lbs.

3. Maximum altitude loss during malfunction tests:

   a. Cruise, single-engine - 300 feet

   b. Cruise, twin-engine - 100 feet

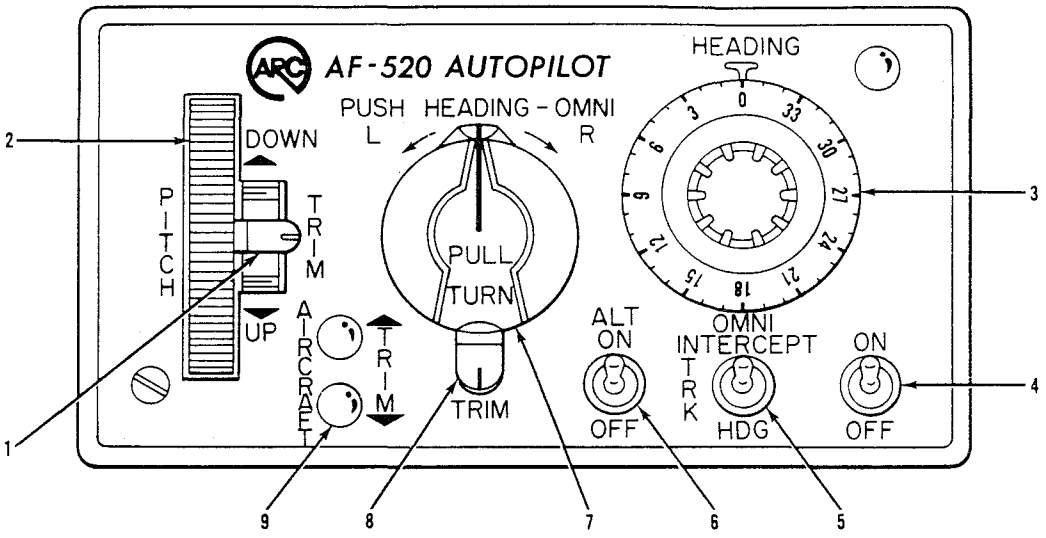
   c. Approach, twin-engine - 100 feet

   d. Approach, single-engine - 70 feet

SECTION IV

PERFORMANCE

No Change.



DESCRIPTION

1. PITCH TRIM - Used only when PITCH control is in detent to trim aircraft for level flight.

NOTE

Rotating the pitch control knob out of the level flight detent, toward either nose up or nose down may result in the autopilot attempting to obtain an airplane attitude that requires more elevator control force than the autopilot can produce. Under these conditions an ACFT TRIM light is illuminated, the pitch servo clutch is slipping and the autopilot will maintain an intermediate climb or descent attitude. This condition could be corrected by selecting an intermediate pitch attitude with the autopilot pitch control or by trimming the airplane with the elevator trim wheel toward the desired climb or descent attitude as indicated by the trim light until the ACFT TRIM light goes out. The airplane or autopilot trim should be adjusted as necessary to assure maximum servo clutch life by preventing ACFT TRIM light from staying on continuously. To maintain coordinated flight alternately adjust rudder trim and autopilot lateral trim control to center turn-and-bank ball.

2. PITCH CONTROL - Controls pitch attitude of aircraft. When rotated toward UP, elevator will rise. When rotated toward DOWN, elevator will lower. Pitch attitude depends on displacement of control from detent (level flight) position.

3. HEADING CONTROL KNOB - Selects desired magnetic heading or VOR radial.

4. AUTOPILOT SWITCH - Controls power to the autopilot. Roll control immediately effective, pitch effective in 2 to 3 seconds.

5. FUNCTION SELECTOR SWITCH - Selects mode of operation. At HDG, heading lock circuits are engaged. At TRK and INTERCEPT, coupler is engaged.

6. ALTITUDE SWITCH - When at ALT ON, with PITCH control in detent, maintains the selected altitude. Movement of the PITCH control from the level flight detent disengages the altitude hold circuit.

7. PULL-TURN CONTROL KNOB - When pulled out and turned, aircraft can be banked right (R) or left (L). When in detent and pushed in, intercepts and maintains selected heading or VOR radial.

8. LATERAL TRIM - Used only when PULL-TURN control knob is pulled out and in detent to trim aircraft for wings level attitude.

9. PITCH TRIM LIGHTS - Light intermittently as the actuator corrects toward the selected attitude or when the aircraft is out of trim and the pitch actuator is not able to correct attitude. The light burns steadily when autopilot is overpowered.

SUPPLEMENT 3

H-14 AUTOPILOT SYSTEM-HONEYWELL OR KING

INTRODUCTION

When the Honeywell H-14 Autopilot System is installed in the Model 500S Aero Commander, this Supplement will apply and become a part of/and must be placed in the Airplane Flight Manual. For illustrated flight procedures, see Honeywell's Pilot Guide for H-14 Adaptive Autopilot System.

SECTION I

LIMITATIONS

1. Maximum speed for autopilot operation V_{no}.
2. Pilot must remain in pilot's seat with seat belt fastened during autopilot operation.
3. Do not override autopilot to increase angle of bank and/or pitch.
4. Extend and retract flaps in 10-degree increments.
5. Autopilot must not be used during takeoff or landing.

Placard - AUTOPILOT MUST BE OPERATED IN ACCORDANCE WITH APPROVED FLIGHT MANUAL.

SECTION II

NORMAL OPERATION

Before Takeoff

1. All circuit breakers - IN.
2. Autopilot master switch - ON.
3. Autopilot ground check - COMPLETED.
4. Autopilot engage switch - OFF.

After Takeoff

1. Aircraft - TRIM.
2. Autopilot turn control knob and pitch trim indicator - CENTER.
3. Autopilot engage switch - ON.

NOTE

The aircraft can be maneuvered through 20 degrees up or down pitch with the pitch command wheel and up to 30 degrees of bank with the autopilot turn control knob. Rudder is automatically coordinated during turns.

4. Altitude switch - ON (after level flight is attained).
   Pressure altitude of aircraft will be held when autopilot altitude switch is placed in ON position. Altitude switch will automatically disengage when pitch of the aircraft is changed with autopilot pitch command wheel or when altitude switch is placed in OFF position.
5. Desired heading - SET.
6. Heading select switch - ON.
   Aircraft will turn to the selected heading at a 22^{O} bank angle (maximum).

NOTE

Further heading changes can be made by repositioning heading selector to any heading desired. The autopilot heading select function may be disengaged by: (1) moving turn control out of center (detent) position, (2) engaging ILS/VOR mode, or (3) by placing the heading select switch to the OFF position.

AUTOMATIC OMNI COUPLING

1. OMNI bearing selector and heading selector - SET (to desired radial).
2. ILS/VOR switch - ON (approximately 30 seconds after setting OMNI bearing selector). Aircraft will intercept desired radial at a 45° angle.

NOTE

When the aircraft is within 10° of the selected radial, it will begin a gradual intercept of the radial and track.

AUTOMATIC ILS APPROACH

1. Fly outbound and begin procedure turn - INITIATE.
   Fly outbound and start procedure turn with heading control or turn control knob and descend to authorized procedure turn altitude and level off using pitch command wheel.
2. Altitude switch - ON.
   Complete procedure turn with turn control knob.
3. ILS switch - ON (with turn control knob centered and ILS localizer needle off the peg).
   The aircraft will automatically bracket the beam.
4. Landing gear - DOWN.
5. Wing flaps - AS REQUIRED.
6. Aircraft attitude - CHECK.
   Check aircraft attitude by momentarily placing altitude switch in OFF position and trimming aircraft with pitch command wheel if necessary.

NOTE

When aircraft intercepts glide path, altitude switch will automatically disengage and glide slope coupler will command the proper pitch control to hold aircraft on the glide path.

8. Power levers - AS DESIRED.

NOTE

If glide slope transmitter of ILS system is inoperative or if a glide slope receiver is not included in the aircraft equipment, fly letdown with the pitch command wheel.

9. Autopilot - DISENGAGE (before landing).

AUTOMATIC BACK COURSE LOCALIZER COUPLING (Autopilot equipped with automatic back course localizer coupler).

1. Localizer - INTERCEPT (at 45° or less).
   After localizer has been intercepted fly the descent with the pitch command wheel.

NOTE

The initial orientation of the approach may be flown as noted in the Automatic ILS Approach procedure.

2. ILS REVERSE course switch - PRESS (during procedure turn or when flying inbound to localizer on a radar-vectored approach).
3. Altitude switch - ON (at authorized altitude).
4. ILS switch - ON (when localizer needle begins to move).
   The aircraft will smoothly bracket the back course localizer.
5. Landing gear - DOWN (when descent fix or marker is reached).
6. Wing flaps - AS REQUIRED.
7. Aircraft altitude - DESCEND (with pitch command wheel).
8. ILS switch - OFF (when aircraft reaches authorized minimum for back course localizer).
9. Autopilot - DISENGAGE (before landing).

After Landing

1. Reverse course indicator - EXTINGUISHED.

SECTION III

EMERGENCY PROCEDURES

Maximum Altitude Loss (during malfunction tests):

1. Cruise - 210 ft.
2. ILS approach (with ILS coupled) - 100 ft.
3. ILS approach (without ILS coupled) - 50 ft.
4. ILS approach (engine out, with ILS coupled) - 100 ft.
5. ILS approach (engine out, without ILS coupled) - 100 ft.

Autopilot Disengagement

The autopilot may be disengaged by performing one of the following:

1. Pilots control wheel disconnect button - PRESS.
2. Autopilot engage switch - OFF.
3. Autopilot master switch - OFF.

Overpower of Autopilot

The autopilot may be overpowered by forces on control wheel or rudder pedals proportional to the amount of overpower needed up to a maximum of:

Rudder - 48 lbs
Aileron - 18 lbs
Elevator - 25 lbs

Engine-Out Procedures

1. For any single-engine emergency occurring at other than automatic ILS coupler approaches, handle the emergency and then trim aircraft rudder with autopilot still engaged. When autopilot is disengaged, there will be a slight tendency of aircraft to bank into dead engine.
2. For engine failure during approach (ILS) with autopilot on, monitor heading and trim rudder manually for ball center.
3. With one engine or generator inoperative, select continuous electrical services so that generator output does not exceed current rating.

SECTION IV

PERFORMANCE

No Change

SUPPLEMENT 4

FLIGHT INTO KNOWN ICING CONDITIONS

INTRODUCTION

This Supplement must be attached to the FAA Approved 500S Aero Commander Flight Manual. The information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this Supplement, consult the basic Airplane Flight Manual.

When deicing and anti-icing equipment (alternate static source, pitot tube, approved antennae, heated nose cap or mod nose installation PER 6890312-1755, -1876, heated fuel vents, heated lift detector, iceshields, propeller deicing, windshield alcohol system, wing and empennage deicer, wing ice inspection light, windshield wiper, 90 amp generator or 100-amp alternator) are installed and operable, in accordance with Aero Commander drawing 6890279, the placard "THIS AIRPLANE NOT FULLY EQUIPPED FOR FLIGHT INTO KNOWN ICING", can be removed from the aircraft.

SECTION I

LIMITATIONS

1. Windshield alcohol reservoir usable capacity - 3 U.S. Gallons.
   Minimum Flow - 2.06 GPH (85 minute usage)
   Maximum Flow - 2.92 GPH (60 minute usage)
2. Intentional stalls are prohibited when the wing and empennage deicer system is in operation.

Placard - DEICER TO BE OFF DURING TAKEOFF AND LANDING.

SECTION II

NORMAL OPERATION

Flight In Icing Conditions

This airplane is approved for flight in icing conditions, when the equipment listed is installed and operational. (Also see Service Letter 242.) This approval is based on tests conducted in natural and simulated icing conditions. These conditions do not include, nor were tests conducted in, all icing conditions that may be encountered (i.e., freezing rain, freezing drizzle, mixed conditions or conditions defined as severe). Such icing conditions have the potential of producing hazardous ice accumulations, which: 1) exceed the capabilities of the airplane's ice protection equipment; and/or 2) create unacceptable airplane performance. Flight into icing conditions that lie outside those tested is not prohibited; however, prolonged flight in these conditions is prohibited. Therefore, pilots must be able to identify when the airplane has entered icing conditions more severe than the tested conditions and promptly exit the condition before hazardous ice accumulations occur.

Icing conditions may exist in visible moisture when the static or outside air temperature is below freezing; therefore, it is necessary to closely monitor outside air temperature when flying in clouds or precipitation. The heaviest icing found in stratus type clouds is generally associated with a well-defined cloud formation. Ice will generally form approximately 200 to 400 feet below the tops of such clouds, especially when the temperature is just below freezing. Freezing rain or freezing drizzle can occur outside of clouds.

When icing is encountered, the recommended procedure to depart these conditions is to change to an altitude where icing conditions are not present, particularly if it is known that the icing conditions at that particular altitude are wide spread. Course changes may also be made to exit icing conditions. As a general rule, ice accumulations which have the most adverse effect are those which occur at temperatures between 15°F (-10°C) and freezing, particularly in the 25°F (-4°C) to 30°F (-1°C) range. Areas of reduced temperatures (usually associated with increasing altitude)--below 15°F (-10°C), will generally be a region of reduced icing conditions. Freezing rain or freezing drizzle conditions have been observed at outside air temperatures as low as 0°F (-18°C).

WARNING

Ice accumulation on an airfoil surface causes distortion of the airfoil. This can lead to significant loss in rate of climb and in speed performance, as well as increases in stall speed. Even after cycling the deicing boots, the ice accumulation remaining on the boots and unprotected areas of the airplane can cause large performance losses. For the same reason, the stall warning system may not be accurate and should not be relied upon.

In some icing conditions, aerodynamic stall may occur suddenly at an angle of attack below the normal stall angle without pre-stall buffet or stall protection; therefore, maintain 25 knots above the normal stall airspeed or stall warning when ice is visible anywhere on the airplane. To minimize ice accumulation on unprotected surfaces of the wing, maintain a minimum of 113 KCAS during operations in sustained icing conditions.

Prior to a landing approach, cycle the deicing boots to shed any accumulated ice.

Exterior Inspection

1. Windshield alcohol level - CHECK.

Before Starting Engines

1. Pitot and fuel vent heaters - ON (10 seconds). Operation of heated lift detector and alternate static source heater is controlled by pitot and fuel vent switches.

Before Takeoff

1. Propeller deicing system - CHECK (see Supplement 1).
2. Wing and empennage deicer system - CHECK (see Supplement 5).
3. Windshield alcohol system - ON (momentarily).

After Takeoff

Anti-icing and deicing equipment may be operated at pilots discretion when temperatures are below 40°F.

1. Propeller deicing - AS REQUIRED (see Supplement 1).
2. Wing and empennage deicer system - AS REQUIRED (see Supplement 5).
3. Windshield alcohol system - AS REQUIRED (see Supplement 6).
   For optimum results the windshield wiper should be positioned with the blade to the outboard end of its stroke.

4. Windshield wiper - AS REQUIRED.
5. Pitot and fuel vent heat - AS REQUIRED.
6. Alternate static source - AS REQUIRED.
   If airspeed and altimeter indicate erratic or erroneous readings the alternate static source should be selected and the alternate static source correction for the airspeed and altimeter indicators given in Section IV of the basic Flight Manual must be applied.

SECTION III

EMERGENCY PROCEDURES

SEVERE ICING

Icing conditions that lie outside the FAA defined icing envelope include freezing rain, freezing drizzle, mixed conditions, or conditions defined as severe. Freezing rain, freezing drizzle and mixed conditions may result in extreme ice build-up on protected surfaces, exceeding the capability of the ice protection system. Freezing rain, freezing drizzle, mixed conditions (snow and/or ice particles and liquid droplets), descent into icing clouds from above-freezing temperatures and in some cases, exposure to icing clouds within a narrow range of indicated outside air temperature close to freezing may result in ice forming beyond the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade performance and controllability of the airplane.

WARNING

If ice is observed forming beyond protected surfaces, or unusual lateral trim requirements or autopilot trim warnings are encountered, the pilot should:

-Leave the icing area as soon as possible.
-If flaps are extended, do not retract until airframe is clear of ice.
-Increase speed as much as configuration and weather will allow.
-If autopilot is engaged, hold controls firmly and disengage autopilot.
Do not re-engage autopilot until airframe is clear of ice.

The pilot should be continuously alert to the possibility that icing conditions that lie outside the FAA defined icing envelope may produce hazardous accumulations of ice. Divert the flight immediately when such conditions are encountered. The following may be used to identify possible severe icing conditions:

-Accumulation of ice on the lower surface of the wing aft of the protected area.
-Accumulation of ice on the propeller spinner farther back aft than normally observed.
-Unusually extensive ice accreted on the airframe in areas normally not collecting ice.
-Visible rain at temperatures at or slightly below freezing.
-Droplets that splash or splatter on impact at temperatures below zero degrees centigrade.

When operating in icing conditions, monitor the outside air temperature. While severe icing may form at temperatures as cold as 0°F (-18°C), increased vigilance is warranted at temperatures around freezing, with

visible moisture present. Consider the preceding described means to identify possible severe icing conditions. If you are in the described conditions:

-Avoid use of the autopilot when in conditions conducive to severe icing. The autopilot may mask unusual control system forces.
-If an unusual roll response or uncommanded input is observed, reduce the angle of attack by lowering the nose and applying additional power if needed.
-Avoid excessive maneuvering, which can result in exacerbating an aileron stall condition.
-Avoid using flaps during extended operation in icing. Operation with flaps extended can result in a reduced wing angle of attack, and ice forming farther aft on the wing, possibly aft of the protected area.
-Exit the severe icing conditions as quickly as possible to avoid extended exposure to icing conditions outside those which the airplane has been certificated. Declaration of an emergency can assist in getting expeditious assistance and clearance to depart severe icing conditions and is fully justified.

SECTION IV

PERFORMANCE

Alternate static source corrections - CHECK (see Section IV of approved 500S Flight Manual).

SUPPLEMENT 5

WING AND EMPENNAGE DEICER SYSTEM-PNEUMATIC (6890279)

INTRODUCTION

When the 6890279 Wing and Empennage Deicer System is installed on the Model 500S Aero Commander This Supplement must be placed in the Airplane Flight Manual.

The wing and empennage deicer system utilizes regulated air pressure for surface boot inflation and vacuum from the airplane vacuum system for deflation. Normal inflation and deflation of the surface boots is automatically controlled by an electric timer.

SECTION I

OPERATING LIMITATIONS

Intentional stalls are prohibited when the surface deicer system is in operation.

Placard - DEICER TO BE OFF DURING TAKEOFF AND LANDING.

SECTION II

NORMAL PROCEDURES

The surface deicer system is controlled by the deicer switches located in the overhead control panel.

The DE-ICING PRESS gage indicates deicing system regulated pressure. Normal operation of the wing and empennage deicer system will be indicated by the pressure dropping from approximately 15 psi to approximately 3 psi and then building back up to approximately 15 psi in preparation for the next cycle.

Before Taxiing

1. Single cycle deicer switch - SINGLE CYCLE (press for 5 seconds and observe inflation and deflation of deicer boots).
2. Deicing pressure gage - CHECK (Approx 15 PSI).

NOTE

Deicing pressure gage will only indicate pressure when the deicer system is operating SINGLE CYCLE or AUTO. While not in operation the pressure gage will indicate zero pressure.

3. Auto deicer switch - AUTO (observe inflation and deflation of deicer boots).

After Takeoff

Single Cycle Operation

1. Single cycle deicer switch - SINGLE CYCLE (momentarily).
2. Deicing pressure gage - CHECK (Approx 15 PSI).

NOTE

Single cycle operation provides a pulse to the wing boots which is followed by a pulse to the empennage boots. After completion of a single cycle the pilot may re-energize the single cycle operation at his discretion.

Automatic (AUTO) Cycle Operation

1. Auto deicer switch - AUTO.
2. Deicing pressure gage - CHECK (Approx 15 PSI).

WARNING

It is recommended that surface boots be operated when the ice formation on wing leading edge is approximately 1/2-inch thick. When switching from automatic cycle to single cycle operation, allow switch to rest in OFF position for 1 second.

SECTION III

EMERGENCY PROCEDURES

No Change.

SECTION IV

PERFORMANCE

No Change.

SUPPLEMENT 6

WINDSHIELD ALCOHOL SYSTEM

INTRODUCTION

This supplement must be attached to the FAA Approved 500S Aero Commander Flight Manual when the Windshield Alcohol System is installed in accordance with Aero Commander drawing 5890280. The information contained herein supplements the basic Airplane Flight Manual. For limitations, procedure, and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

SECTION I

LIMITATIONS

Alcohol reservoir usable capacity 3 U. S. Gallons.
Minimum Flow 2. 06 G. P. H.
Maximum Flow 2. 92 G. P. H.

Placard - THIS ACFT NOT EQUIPPED FOR FLIGHT INTO KNOWN ICING.

SECTION II

NORMAL PROCEDURES

Exterior Inspection:

1. Windshield alcohol level - CHECK.

After Takeoff:

1. Windshield alcohol switch - ON (if desired).
2. Windshield alcohol flow control - AS REQUIRED.

SECTION III

EMERGENCY PROCEDURES

No Change.

SECTION IV

PERFORMANCE

No Change.

SUPPLEMENT 7

KING KN-74 AREA NAVIGATION SYSTEM

INTRODUCTION

The information in this supplement is FAA approved material which together with the basic Airplane Flight Manual is applicable to the King KN 74 Area Navigation System. This supplement becomes part of and must be placed in the Airplane Flight Manual.

SECTION I

LIMITATIONS

1. Instrument approaches must be conducted in accordance with approved instrument approach procedures.
2. DME and VOR ground station facilities selected must be at one common location when in the RNAV or APPR modes.
3. Do not use approach mode when the distance-to-waypoint is greater than 50 nautical miles.

SECTION II

NORMAL PROCEDURES

A. Area Navigation Computer Control

1. Function switch

a. VOR/DME Mode

VOR and DME function in a conventional manner and the waypoint selectors are inoperative. The distance display on the DME indicates distance to or from the VOR/DME.

b. R NAV ENROUTE Mode

Electronically establishes a waypoint from a selected ground VORTAC facility at a location from the VOR/DME indicated by the BEARING AND DISTANCE displays. The Course deviation indicator (CDI) coupled to the area navigation system indicates bearings to or from the waypoint and not the VOR/DME. The distance display on the DME indicates to or from the waypoint. Off course indications on the CDI are constant width. Deviations are distance from track. Full scale deflection of the CDI is 5 miles regardless of position along the selected track.

c. R NAV Approach Mode

Same as Enroute mode except CDI sensitivity is increased to aid in runway alignment during approach to an airport. Full scale deflection of the CDI is 1-1/4 miles.

d. TEST Mode

Pressing the test button in either the Enroute or Approach mode causes the nautical miles display to indicate the waypoint distance set in the DISTANCE display. Some error between the two displays can be expected but it should not exceed one nautical mile. With the TEST button depressed the omni bearing selector (OBS) is set to produce zero deviation and a TO indication. The resulting OBS setting should match the waypoint bearing set in the BEARING display. The test should be performed with a waypoint distance setting greater than ten nautical miles.

2. BEARING Control and Display

Used to set the bearing in degrees from the VOR/DME ground station to the waypoint. A digital display of the bearing is operated by the control. The control works from 000 degrees clockwise to 360 degrees and cannot be run forward (clockwise) through the 360 degree position because of a mechanical stop.

3. DISTANCE Control and Display

Used to set the distance in nautical miles from the VOR/DME ground station to the waypoint. A digital display of the distance is operated by the control. The control will set from 000 to a maximum of 150 nautical miles.

4. DME Warning

When in the Enroute or Approach mode the DME warning will appear if either or both VOR and DME inputs are invalid. In the VOR/DME mode the warning operates only on an invalid DME input.

5. ANNUNCIATOR

An annunciator light on the pilot's panel will illuminate whenever the Enroute or Approach modes are selected.

B. Horizontal Situation or Course Deviation Indicator

1. Course or Omni Bearing Selector
Used to set the magnetic course to the waypoint in Enroute or Approach mode. Set magnetic course to the VOR ground facility in the VOR/DME mode.

2. Course Deviation Indicator
Represents the selected magnetic course to the waypoint in the Enroute or Approach mode and to the VOR in the VOR/DME mode. Pointer moves off center as the aircraft deviates from the selected magnetic course. Full scale deflection is 10 degrees in VOR/DME mode, 5 nautical miles in the Enroute mode, and 1-1/4 nautical miles in the Approach mode.

3. TO/FROM INDICATOR
Indicates whether the selected magnetic course will take the aircraft to or from the waypoint or VOR ground facility.

4. Warning flag in course indicator
Appears if VOR input data are invalid in the VOR/DME mode and if VOR and/or DME input data are invalid in either enroute or approach mode. The course deviation bar will center when the warning appears.

C. System Test

1. NAV and DME frequency selectors - SET, warning flags retracted
2. Function Switch - ENROUTE
3. Bearing Control - 000.00
4. Distance Control - 25.0
5. Function Switch - TEST

   a. Course deviation Indicator - CENTERED, with a TO indication. The resulting setting on the omni bearing selector should be 0 ± 3 degrees.
   b. DME Distance - 25 ± 1 nautical miles
6. Function Switch - As Desired

D. Area Navigation Checklist

1. NAV and DME - ON and TUNED to same frequency, off flags retracted
2. System test - As REQUIRED.
3. Function Switch - AS REQUIRED.
4. Waypoint Bearing - Set
5. Waypoint DISTANCE - Set
6. Omni Bearing Selector - SET, Desired magnetic course

NOTE

1. If an ILS channel is selected on the NAV receiver, the Area Navigation System equipment automatically functions as an ILS Localizer. If a VOR channel is selected thereafter the Area Navigation System equipment automatically returns to the mode selected on the function switch. If a DME ground station is frequency paired with the ILS the VOR/DME mode must be selected to activate the DME distance display.

2. If it is required to observe bearing and distance to the ground station, set the function switch to the VOR/DME mode and set the Course Selector for a centered left-right deviation bar and a TO pointer. Bearing to the station is the selected course and distance to station is the DME distance display. Return the function switch to its previous position when finished.

3. For approaches to runways the Horizontal Situation or Course Deviation Indicator Course Selector control should be set to magnetic heading of the desired runway, to the nearest degree, as taken from published FAA data.

CAUTION

The controls on the Area Navigation Computer should not be adjusted in flight while autopilot coupled to the Area Navigation Computer. This includes the TEST function.

SECTION III

EMERGENCY PROCEDURES

No Change.

SECTION IV

PERFORMANCE

No Change.

SUPPLEMENT 8

EMERGENCY LOCATOR TRANSMITTER (ELT) (SHARC-7)

INTRODUCTION

This Supplement must be attached to the FAA Approved 500S Rockwell Shrike Commander Airplane Flight Manual when the SHARC-7 Emergency Locator Transmitter (ELT) is installed in the airplane in accordance with approved Rockwell Commander data. The information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this Supplement consult the basic Airplane Flight Manual.

SECTION I

LIMITATIONS

Placard - Located adjacent to Emergency Locator Transmitter Switch - WARNING - FOR AVIATION EMERGENCY USE ONLY. UNLICENSED OPERATION UNLAWFUL. OPERATION IN VIOLATION OF FCC RULES SUBJECT TO FINE OR LICENSE REVOCATION.

SECTION II

NORMAL PROCEDURES

Before Takeoff

1. Emergency Locator Transmitter - ARM.

SYSTEMS OPERATION

The ELT is a self-contained transmitter mounted just inside the environmental access door. Its purpose is to automatically transmit a sweeping audio signal on 121.5 MH_Z when subjected to a 5 (+2, -0) G deceleration for a duration of 11 (+5, -0) ms, or more, along the airplane line of flight. The transmitter may be remotely controlled from the pilot cockpit location. With the remote control switch in the ARM position, the ELT is armed for transmitting when the "G" switch in the transmitter is activated. With the remote control switch in the ON position, signals can be manually transmitted regardless of the "G" switch position. The remote control switch must be lifted to reposition from either position.

It is recommended that the transmitter be checked, following landing by turning the aircraft VHF communication receiver to 121.5 MH_Z and listening for ELT audio sweeps. The control switch must be placed in ON position to accomplish ground test. After this check the control switch should be placed in the ARM position.

NOTE

The ELT will not transmit (when tested with the remote control switch in the ON position) unless the switch located on the transmitter is in the ARM position.

The ELT may be tested following maintenance or repair but certain precautions must be observed, as follows:

1. Tests should be no longer than three audio sweeps.
2. Tests should be conducted only within the time period made up of the first five minutes after any hour.
3. If the operational test must be made at a time not included within the first five minutes after the hour, the test(s) should be coordinated with the closest FAA tower or flight service station.

SECTION III

EMERGENCY PROCEDURES

Inadvertent Actuation of ELT "G" Switch:

Should the ELT "G" switch be inadvertently triggered proceed as follows:

1. Emergency Locator Transmitter - ON, momentarily
   then
2. Emergency Locator Transmitter - ARM. This will reset the "G" switch.

SECTION IV

PERFORMANCE

No Change.

Reg.No._____
Ser.No._____

FAA APPROVED SUPPLEMENT 9

OXYGEN SYSTEM

INTRODUCTION

This Supplement must be attached to the FAA Approved 500S Rockwell Shrike Commander Airplane Flight Manual when a Manual or Automatic Compensating Oxygen Regulation System is installed in the airplane in accordance with approved Rockwell Commander data. The information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures, and performance information not contained in this supplement consult the basic Airplane Flight Manual.

SECTION I

LIMITATIONS

No Change.

SECTION II

PROCEDURES

A. System Description

MANUAL OR AUTOMATIC. Oxygen for the flight crew and passengers is supplied by an oxygen cylinder or cylinders located in the aft fuselage. Single (48.3 Cubic Ft) or dual (96.6 Cubic Ft) cylinder installations are offered. Either installation is available with Manual or Automatic Altitude Compensating Oxygen Regulation. Both systems incorporate two (2) pressure gages to indicate oyxgen cylinder pressure. One pressure gage is located in the aft fuselage and the other gage is located on the right cabin side wall just below the copilot side window.

MANUAL CONSTANT FLOW REGULATOR (Dual Cockpit Gages). Regulation of oxygen flow to the oxygen outlets is accomplished by adjusting the oxygen altitude gage to the aircraft altitude. Clockwise movement of the knob increases gage altitude and oxygen flow. Oxygen will flow immediately to the masks when the face mask supply line is connected to an oxygen outlet.

AUTOMATIC ALTITUDE COMPENSATING REGULATOR (Single Cockpit Gage). This system is a constant flow, altitude compensated oxygen system. No altitude adjustment is necessary when it is turned on. The regulator senses aircraft altitude and automatically increases or decreases flow of oxygen to all outlets. This flow is based on a predetermined altitude flow schedule, which meets all FAA requirements.

Crew and passenger oxygen masks are "Oronasal" type and are supplied with inline flow indicators to verify oxygen flow. Oxygen flow chart shows supply duration vs personnel using oxygen (see Figure 1.).

DURATION IN HOURS & TENTHS AT THE FOLLOWING O_2 REGULATOR SETTINGS										
Altitude		8000 FT		10,000 FT		15,000 FT		20,000 FT		25,000 FT	
Cylinder Capacity		Cu.Ft. 96.6	48.3	Cu.Ft. 96.6	48.3	Cu.Ft. 96.6	48.3	Cu.Ft. 96.6	48.3	Cu.Ft. 96.6	48.3
Personnel Using Oxygen	1	38.0	19.0	31.4	15.7	22.8	11.4	18.2	9.1	14.2	7.1
	2	19.0	9.5	15.6	7.8	11.4	5.7	9.0	4.5	7.0	3.5
	3	12.6	6.3	10.4	5.2	7.6	3.8	6.0	3.0	4.6	2.3
	4	9.4	4.7	7.8	3.9	5.6	2.8	4.4	2.2	3.4	1.7
	5	7.6	3.8	6.2	3.1	4.4	2.2	3.6	1.8	2.8	1.4
	6	6.3	3.1	5.4	2.7	3.8	1.9	3.0	1.5	2.3	1.1
	7	5.4	2.7	4.6	2.3	3.2	1.6	2.6	1.3	2.0	1.0

Figure 1. Oxygen Supply Duration - 1800 PSIG

B. Normal Operation

1. Exterior Inspection (Aft Fuselage)

   a. Oxygen Cylinder Supply Valve - Safety wired OPEN.
   b. Oxygen Supply Pressure - 1800 PSIG.

2. Before Starting Engines

   a. Oxygen Regulator
      (1) Manual Regulator - ON. Adjust knob to indicate intended flight altitude on gage.
      (2) Automatic Regulator - ON.
   b. Oxygen Mask - CONNECT to oxygen outlet.
   c. Regulator - CHECK ON (Manual - check altitude setting).
   d. Flow Indicator - CHECK GREEN. Indicator must indicate green to verify oxygen flow.

NOTE

Quantity of flow on ground will be minimal with automatic system.

   e. Oxygen Mask - DON.

WARNING

Do not smoke or ignite any flame while oxygen system is being used.

NOTE

With Manual Regulator, oxygen flow may be increased by selecting a higher altitude on oxygen altitude gage.

   f. Oxygen Quantity Gage - OBSERVE. Observe quantity gage for approximately 30 seconds. A steady drop in pressure indicates a system malfunction.
   g. Oxygen Mask - DISCONNECT from oxygen outlet.

SECTION III

EMERGENCY PROCEDURES

No Change.

SECTION IV

PERFORMANCE

No Change.

FAA Approved: September 22, 1975

Larry L. McHughes
DELJOP PC-203

SUPPLEMENT 10

RECOGNITION LIGHTS

INTRODUCTION

When an airplane is equipped with Recognition Lights, this supplement must be included in the Airplane Flight Manual.

The Recognition Lights consist of two Quartz Halogen lights mounted on the top of each horizontal stabilizer, a control switch located in the overhead switch panel and a circuit breaker. Power is provided by the airplane electrical system.

The lights illuminate both sides of the vertical stabilizer during the hours of darkness and provide improved recognition of airplane position and direction of travel, in flight and on the ground. The light beams are directional and do not present a hazard or annoyance to other pilots or ground observers during ground operations.

SECTION I

LIMITATIONS

Turn OFF when operating on a single alternator.

SECTION II

NORMAL PROCEDURES

RECOG LIGHTS Switch - On, as desired.

SECTION III

EMERGENCY PROCEDURES

Not applicable.

SECTION IV

PERFORMANCE

Not applicable.

SUPPLEMENT 11

PROPELLER UNFEATHERING SYSTEM

INTRODUCTION

The information in this supplement is FAA approved material. When an airplane is equipped with an optional Propeller Unfeathering System, this supplement must be included in the Airplane Flight Manual.

The optional unfeathering system consists of an electric motor-driven pump mounted in each engine section, a three position switch spring-loaded to OFF and oil hoses and electric wiring. Holding the switch to left or right, depending on which propeller is to be unfeathered, turns on the unfeathering pump for that propeller. The pump supplies engine oil at high pressure through the propeller governor to the propeller piston, causing the propeller blades to rotate toward the low pitch (high RPM) position. As the propeller blades leave the feathered position, airflow will cause the propeller to start windmilling making it unnecessary to engage the starter for in-flight engine start.

SECTION I

LIMITATIONS

Not applicable.

SECTION II

NORMAL PROCEDURES

1. Fuel Boost Pump - ON.
2. Fuel Selector Valves - TO DESIRED TANKS.
3. Magneto Switch - BOTH.
4. Throttle - OPEN approximately 1/2 inch.
5. Propeller Control Lever - POSITION just forward of feathering detent into OPER range.
6. Airspeed - ESTABLISH 100 MPH MIN. to ensure adequate airflow to windmill propeller.
7. Unfeathering Pump Switch - PLACE to L (left) or R (right) until propeller is windmilling.
8. Release unfeathering switch and place mixture control lever to FULL RICH (full forward).
9. Engine - WARM UP at 2000 RPM - 13 Inches Hg.

CAUTION

Avoid continuous operation below 2000 RPM.

SECTION III

EMERGENCY PROCEDURES

Not applicable.

SECTION IV

PERFORMANCE

Not Applicable.

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PART I
FLIGHT PLANNING DATA

TABLE OF CONTENTS

INTRODUCTION

The graphs and tables in this section supplement the FAA Approved Performance Data contained in Section IV of this manual and when used together provide complete information appropriate for flight planning purposes.

VARIABLE FACTORS AFFECTING PERFORMANCE

The effects of temperature, gross weight, pressure altitude, airspeed and airplane configuration have been accounted for in this data. Variable factors that have not been accounted for include the following: humidity, runway slope or wet runways.

FLIGHT PLANNING EXAMPLE

The flight planning data presented on the following pages provides complete information from brake release to final stop. Descriptive text explains the use of each chart. The data presented is for normal operation and when combined with the "FAA Approved" information will provide the necessary background for flight planning. Most flight planning information is based on flight tests and is consistent with the operating procedures and limitations set forth in the "FAA Approved" information.

The flight planning example presents procedures which utilize takeoff, climb, cruise and landing performance charts. The sample flight log on page 7 will aid in following each step of the procedure.

The flight planning example represents a typical IFR flight from Chicago's Meigs Field to the Detroit City Airport with the Toledo Express Airport designated as the alternate. The routes and distances were determined by selecting the most probable routing currently portrayed by the low altitude enroute structure. Other routings, of course, are conceivable, but the techniques discussed in the following example would be applicable.

Runway Data at (CGX)	
Outside Air Temperature	13°C
Available Runway Length	3948 FT
Field Pressure Altitude	1000 FT
Reported Wind	150°/17 KTS (20 MPH)
Runway Direction	170°
Airplane Ramp Weight	6625 LBS
Cruise Data	
Outside Air Temperature	-3°C
Cruise Pressure Altitude	9000 FT
Reported Winds Aloft	210° (MAG)/30 MPH
*Magnetic Course	082°
Distance	253 Statute Miles
Runway Data at (DET)	
Outside Air Temperature	18°C
Available Runway Length	5091 FT
Field Pressure Altitude	1000 FT
Reported Surface Wind	150°/13 KTS (15 MPH)
Runway Direction	150°
Assume Fuel Required for Start, Taxi, Runup and Takeoff at 25 lbs., therefore; Airplane Takeoff Weight	6600 LBS
Takeoff	
Takeoff Performance can be determined as follows:	
From Figure 3. using 20 MPH wind 20° left of the runway - headwind component	19 MPH
From Figure 4-4 determine total takeoff distance to 50 Ft.	1325 FT

* Due to the slight course changes encountered during a trip using the airway system, this value represents an average.

Climb

A climb at maximum continuous power is assumed; enter Figure 5. at 1000 Ft. and determine time, distance and fuel required; then using the cruise altitude of 9000 Ft., again determine time, distance, and fuel required. The difference between these two sets of data is the time, distance and fuel required to climb from field pressure altitude to cruise pressure altitude.

	Sea Level to Cruise Altitude		Sea Level to Field Pressure Altitude		Field Pressure Altitude to Cruise Altitude
Time	8.6 MIN	MINUS	0.7 MIN	Equals	7.9 MIN
Zero Wind Distance	17 SM	MINUS	1.5 SM	Equals	15.5 SM
Fuel	34 LB	MINUS	3 LB	Equals	31 LB (5.2 U.S.GAL)

From Figure 3. using a wind velocity of 30 MPH from 210° determine tail wind component . . . 19 MPH

The distance covered in the climb, taking into account the tailwind, can be computed as follows:

Distance = 15.5 SM + (19 SM/HR) X (7.9 MIN/60 MIN/HR) = 18 SM

Weight at level off (including start, taxi and climb allowances) is 6569 LBS

Cruise

Select the cruise type desired: 55% MCP at 2200 RPM at a pressure altitude of 9000 Ft., determine the cruise true airspeed from Figure 7.

Cruise True Airspeed . . . . . 178 MPH

In order to determine the manifold pressure and fuel flow appropriate to 55% MCP and 2200 RPM at 9000 Ft., refer to the cruise power setting chart, Figure 6.

Manifold Pressure . . . . . 19.3 IN.HG.
Best Power Fuel Flow . . . . . 13.2 GAL/HR/ENG.

NOTE

The cruise power chart is only accurate for Standard Day temperatures and best power mixtures. If non-standard temperatures exist, increase or decrease manifold pressure by 0.3 IN. HG. for each 11°C above or below standard, respectively. If a best economy mixture is selected, a slight reduction in horsepower can be anticipated with a resultant 2 - 3 MPH decrease in cruise airspeed.

The distance to Detroit at level off is 253 SM less the climb distance of 18 SM or 235 SM. Enter Figure 3. using a wind velocity of 30 MPH from 210° (MAG) to determine the tailwind component.

Tailwind Component . . . . . 19 MPH

FLIGHT PLANNING EXAMPLE (CONTD)

Compute the ground speed as the true airspeed plus the tailwind component:

178 MPH + 19 MPH = 197 MPH

Compute the cruise time enroute by dividing the distance after level off by the ground speed:

*235 SM ÷ 197 MPH = 1.2 HRS

Compute the cruise fuel requirement by multiplying the cruise time enroute by the flows selected:

*1.2 HRS X 13.2 GAL/HR/ENG X 2 ENG = 190 LBS (31.7 GAL)

* These are intermediate calculations which do not include the descent distance, time, or fuel. The final cruise calculations with descent allowances are presented on the following pages.

Descent

In order to compute time, distance and fuel required during the descent, refer to Figure 10. First, determine the time, distance and fuel required from a cruise altitude of 9000 Ft. to sea level. Then determine the time, distance and fuel required from the landing airport pressure altitude to sea level. The difference between the two, represents the time, distance and fuel required to descend from cruise altitude to the airport of intended landing. The calculations are presented below.

	Cruise Altitude to Sea Level	Field Pressure Altitude to Sea Level	Cruise Altitude to Field Pressure Altitude
Time	9 MIN	1 MIN	8 MIN
Distance	29.5 SM	3 SM	26.5 SM
Fuel	16.8 LB	1.8 LB	15 LB (2.5 GAL)

To determine the effects of the tailwind on the descent distance, perform the following calculation.

No wind descent distance $\pm$ (Headwind/tailwind) X (Time for descent) = Distance

OR

26.5 SM + (19 SM X 8 MIN/60 MIN) = 29 SM

The distance from Detroit to begin the letdown is then 29 SM.

The total cruise time and fuel consumption can now be calculated.

Time = (Distance from level off to destination - distance in descent)/ground speed

OR

(235 SM - 29 SM) / 197 MPH = 63 MIN.

Fuel consumed = fuel flow X 2 eng. cruise time

OR

13.2 GPH X 2 ENG X 1.05 HRS = 27.7 GALS (166 LBS)

Landing

The airplane weight at touchdown can be determined as follows: Airplane ramp weight -fuel consumed during taxi -fuel consumed during climb -fuel consumed during cruise -fuel consumed during descent = landing weight, OR

6625 LBS -25 LBS -31 LBS -166 LBS -15 LBS = 6388 LBS

Landing performance can be determined from Figure 4-7. First determine the headwind component from Figure 3.

Headwind	15 MPH

Then with a pressure altitude of 1000 Ft., a headwind component of 15 MPH and an outside air temperature of 18°C:

From Figure 4-7:

Approach Speed	87 MPH (CAS)

(NOTE: Use Linear interpolation to determine approach speeds for intermediate weights.)

Landing distance from 50 Ft	1650 FT

Missed Approach and Flight to Alternate

If a landing is not completed in Detroit, it is assumed that the airplane would divert to it's alternate, Toledo. The flight planning for this segment is done in a similar manner to the previously mentioned examples, so for the sake of brevity, a detailed explanation of each enroute segment will be deleted. A summary, however, will be presented based on the following data:

CRUISE DATA	
Outside air temperature	-3°C
Cruise pressure altitude	9000 FT
Reported winds aloft	210° (MAG)/30 MPH
Magnetic course	213°
Distance	81 SM
RUNWAY DATA AT TOLEDO	
Outside air temperature	20°C
Available runway length	5600 FT
Field pressure altitude	1000 FT
Reported surface wind	160°/5 KTS (6 MPH)
Runway direction	160°

Time, distance and fuel required in climb, see Figure 5.

Time	7.9 MIN
Distance *	15.5 SM
Fuel	31.2 LBS (5.2 GAL)

* Zero wind distance only. When a 30 MPH headwind is taken into account, the distance to climb becomes 11.6 SM

FLIGHT PLANNING EXAMPLE (CONTD)

Cruise (55% MCP at 2200 RPM)

Cruise true airspeed, see Figure 7	178 MPH
Manifold pressure, see Figure 6	19.3 IN.HG.
Best power fuel flow, see Figure 6	13.2 GAL/HR/ENG
Headwind component, See Figure 3	30 MPH
Ground Speed	148 MPH
Distance (cruise only)	47 SM
Time enroute (cruise only)	19 MIN
Fuel required (cruise only)	8.4 GAL (50.4 LB)

Time, distance and fuel required in descent, see Figure 10.

Time	8 MIN
Distance *	26.5 SM
Fuel	15 LB (2.5 GAL)

* Zero wind distance only. When a 30 MPH headwind is taken into account, the distance to descend becomes 22.5 SM.

Landing Distance, See Figure 4-7.

Landing Weight	6291 LB
Approach Speed	86 MPH
Landing Distance from 50 Ft.	1970 FT

EXAMPLE FLIGHT LOG AND TRIP SUMMARY

LEG	DISTANCE (SM)	TRUE AIRSPEED (MPH)	WIND COMP (MPH)	GROUND SPEED (MPH)	TIME LEG/TOTAL (MIN)	FUEL USED/REMAINING (LBS)	WEIGHT (LBS)
RAMP	——	——	——	——	——	0/936	6625
START, TAXI RUNUP and TAKEOFF (CGX)	1325 FT	——	+19	——	——	25/911	6600
CLIMB	18	117 (Average)	-19	135	7.9/7.9	31/880	6569
CRUISE	206	178	-19	197	63/70.9	166/714	6403
DESCENT	29	206	-19	225	8/78.9	15/699	6388
LANDING (DET)	1650 FT	——	+15	——	——	0/699	6388
MISSED APPR. AND CLIMB	11.6	118	+30	88	7.9/91.8	31.2/668	6357
CRUISE	54	178	+30	148	22/113.8	50.4/617	6306
DESCENT	22.5	199	+30	169	8/121.8	15/602	6291
LANDING (TOL)	1950 FT	——	+6	——	——	0/602	6291

+ Indicates Headwind
- Indicates Tailwind

Figure 1.

TEMPERATURE CONVERSION

Temperature in Degrees Celsius is presented in Figure 2. for varying temperature in Degrees Fahrenheit.

EXAMPLE

GIVEN:	Temperature Deg C	20 DEG C
FIND:	Temperature Deg F, Fig. 2	68 DEG F

TEMPERATURE CONVERSION

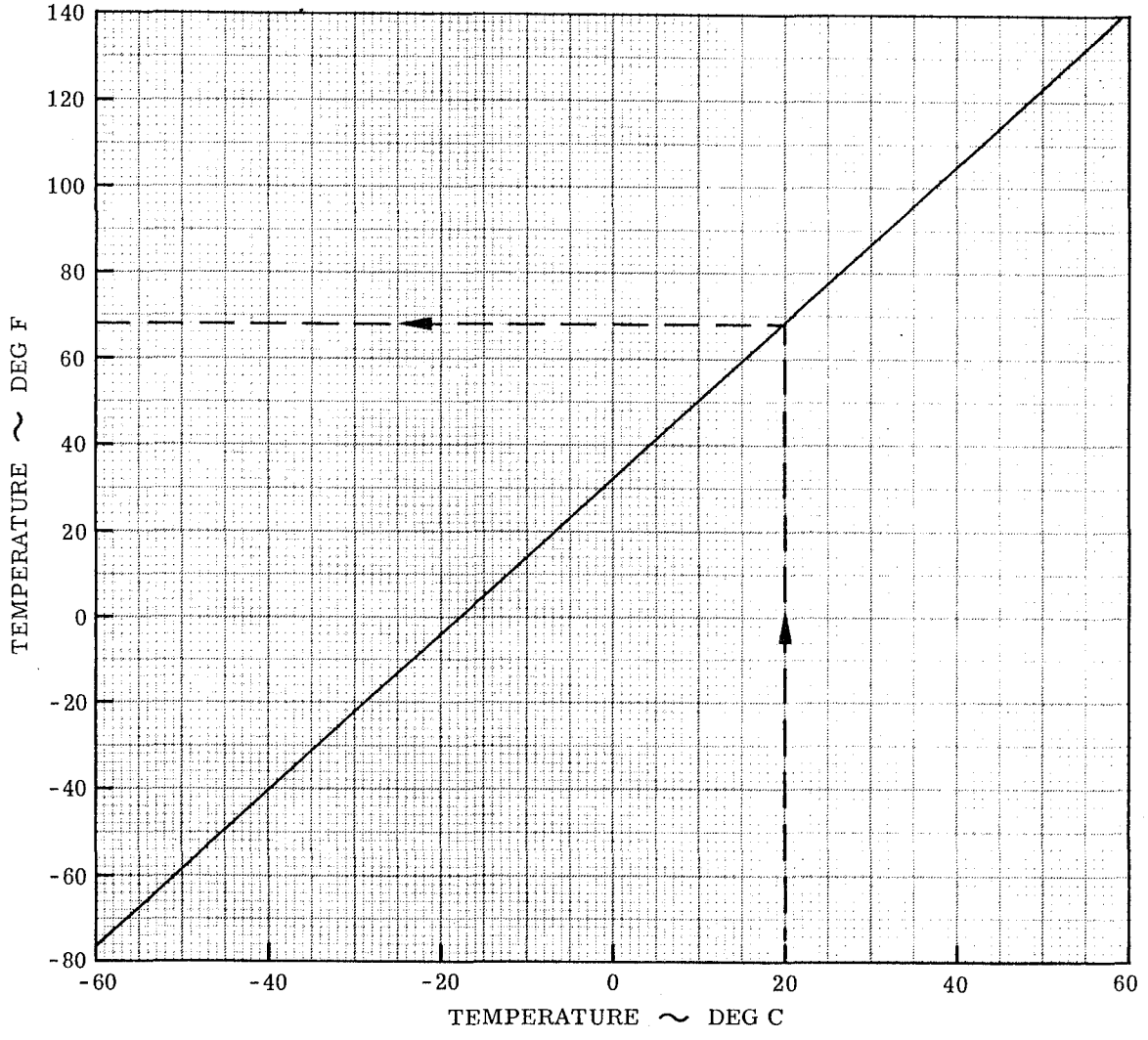


Figure 2.

WIND COMPONENTS

Wind Components are presented in Figure 3. for various wind speeds and angles relative to the airplane's heading.

EXAMPLE

GIVEN:	Reported Wind Speed	14 MPH
	Relative Angle	45 DEG
FIND:	Headwind Component, Fig. 3	10 MPH
	Crosswind Component, Fig. 3	10 MPH

WIND COMPONENTS

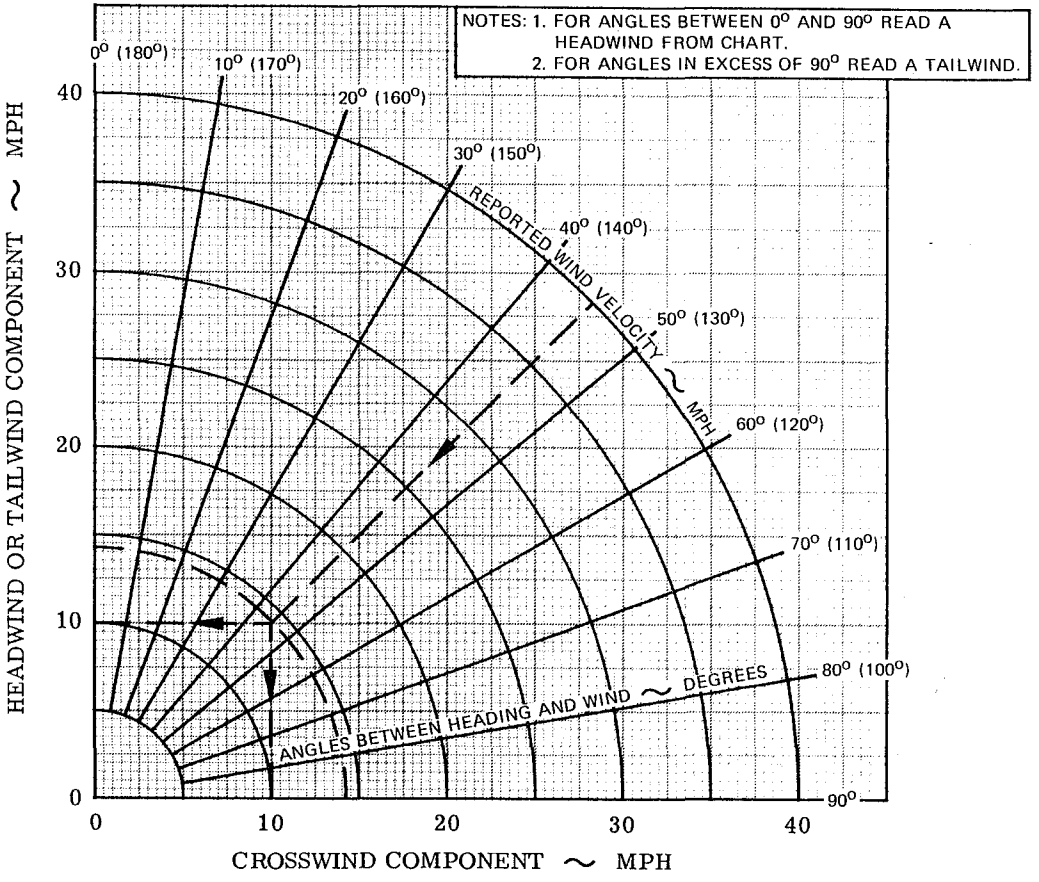


Figure 3.

AIRSPEED CALIBRATION (PRIMARY STATIC SOURCE)

The variation of Calibrated Airspeed with Indicated Airspeed is shown in Figure 4. for gear and flaps retracted and gear and flaps extended. It applies only when the Primary Static Pressure Source has been selected.

ASSOCIATED CONDITIONS

Power (Both Engines)	SUFFICIENT FOR LEVEL FLIGHT	
Configurations		
Wing Flaps	RETRACTED	EXTENDED
Landing Gear	RETRACTED	EXTENDED
Cowl Flaps	CLOSED	OPEN

TECHNIQUE

Select the Primary Static Pressure Source. Read the airspeed indicator and determine the calibrated airspeed from the chart. Note that this technique assumes zero instrument error for the airspeed indicator.

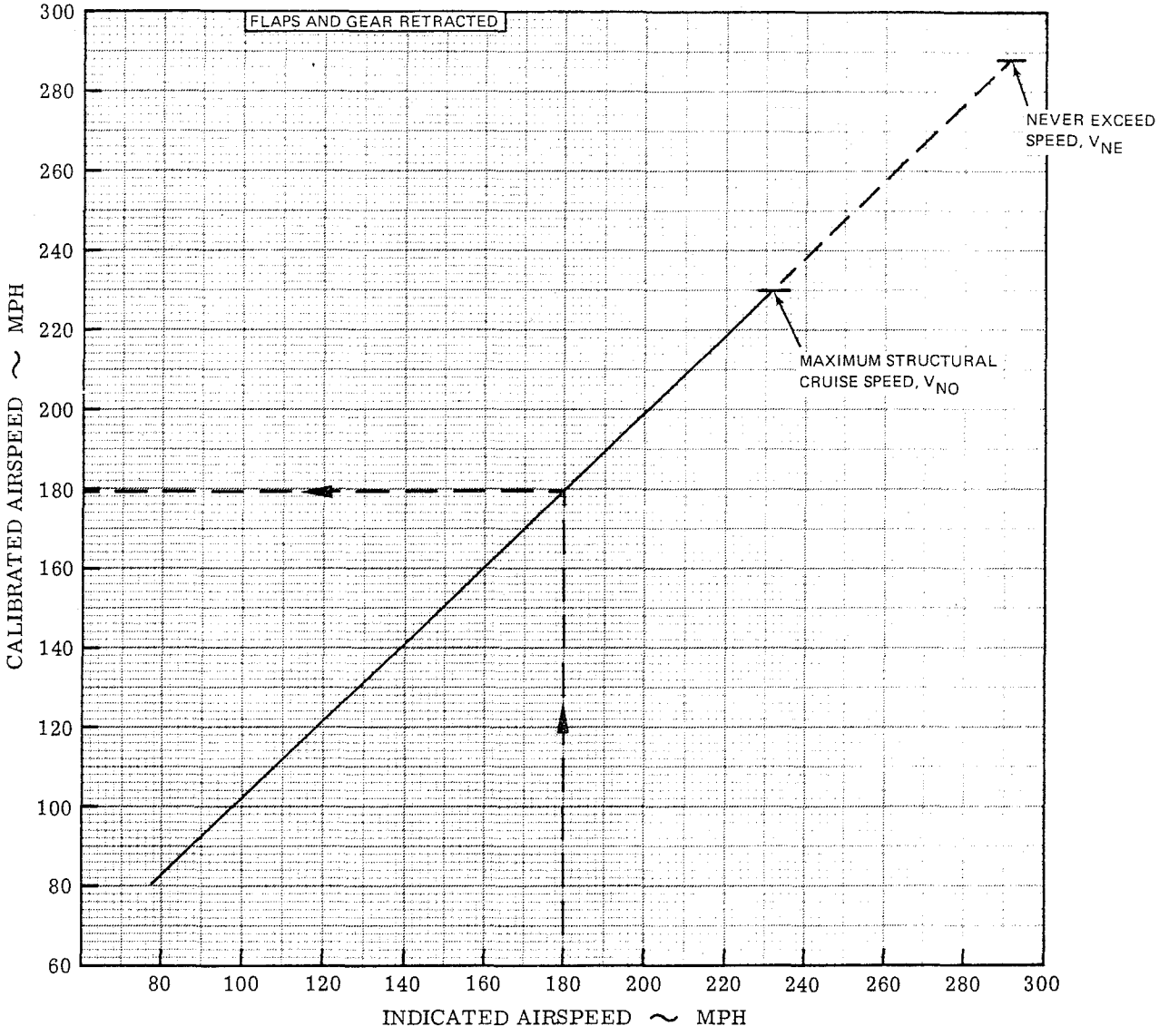
EXAMPLE

GIVEN:	Indicated Airspeed	180 MPH
	Configuration	FLAPS AND GEAR RETRACTED
FIND:	Calibrated Airspeed, Fig. 4	179 MPH

NOTES: 1. If the actual airspeed indicator instrument mechanical errors are known, apply these to the indicated airspeed before entering the chart.
2. The static source selector valve handle should be in the vertical position for use of the primary static source.

AIRSPEED CALIBRATION
PRIMARY STATIC SOURCE

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.



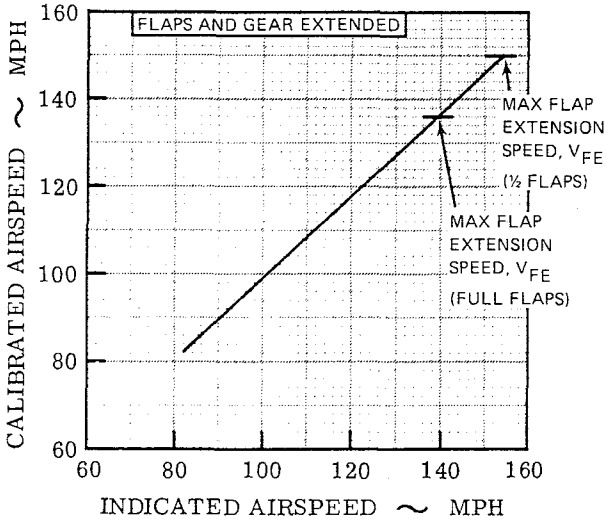


Figure 4.

TIME, DISTANCE, FUEL USED IN CLIMB, TWO ENGINES

The Time, Distance and Fuel used in Climb for gear up and 10 Degree Wing Flaps configuration is shown in Figure 5. for standard day conditions and airplane takeoff weight of 6750 lb. A table of Scheduled Climb Speeds versus Pressure Altitude is presented on the chart.

ASSOCIATED CONDITIONS

Power	MAXIMUM CONTINUOUS, 2575 RPM
Wing Flaps	10 DEG
Landing Gear	RETRACTED
Cowl Flaps	AS REQUIRED

TECHNIQUE

Establish a steady climb at the scheduled climb speed and obtain maximum continuous power.

EXAMPLE

GIVEN:	Airplane Takeoff Weight	6600 LB
	Outside Air Temperature	Standard Day
	Field Pressure Altitude	1000 FT
	Cruise Altitude	9000 FT

FIND: The total time, distance and fuel to climb from 1000 Ft. to 9000 Ft. from Figure 5.

	CRUISE ALTITUDE		FIELD PRESSURE ALTITUDE		NET
Time	8.6 MIN	Minus	0.7 MIN	Equals	7.9 MIN
Distance	17 SM	Minus	1.5 SM	Equals	15.5 SM
Fuel	34 LB	Minus	3 LB	Equals	31 LB (5.2 U.S.Gal)

TIME, DISTANCE, FUEL USED IN CLIMB, TWO ENGINES

MAXIMUM CONTINUOUS POWER, 2575 RPM
INTERNATIONAL STANDARD ATMOSPHERE

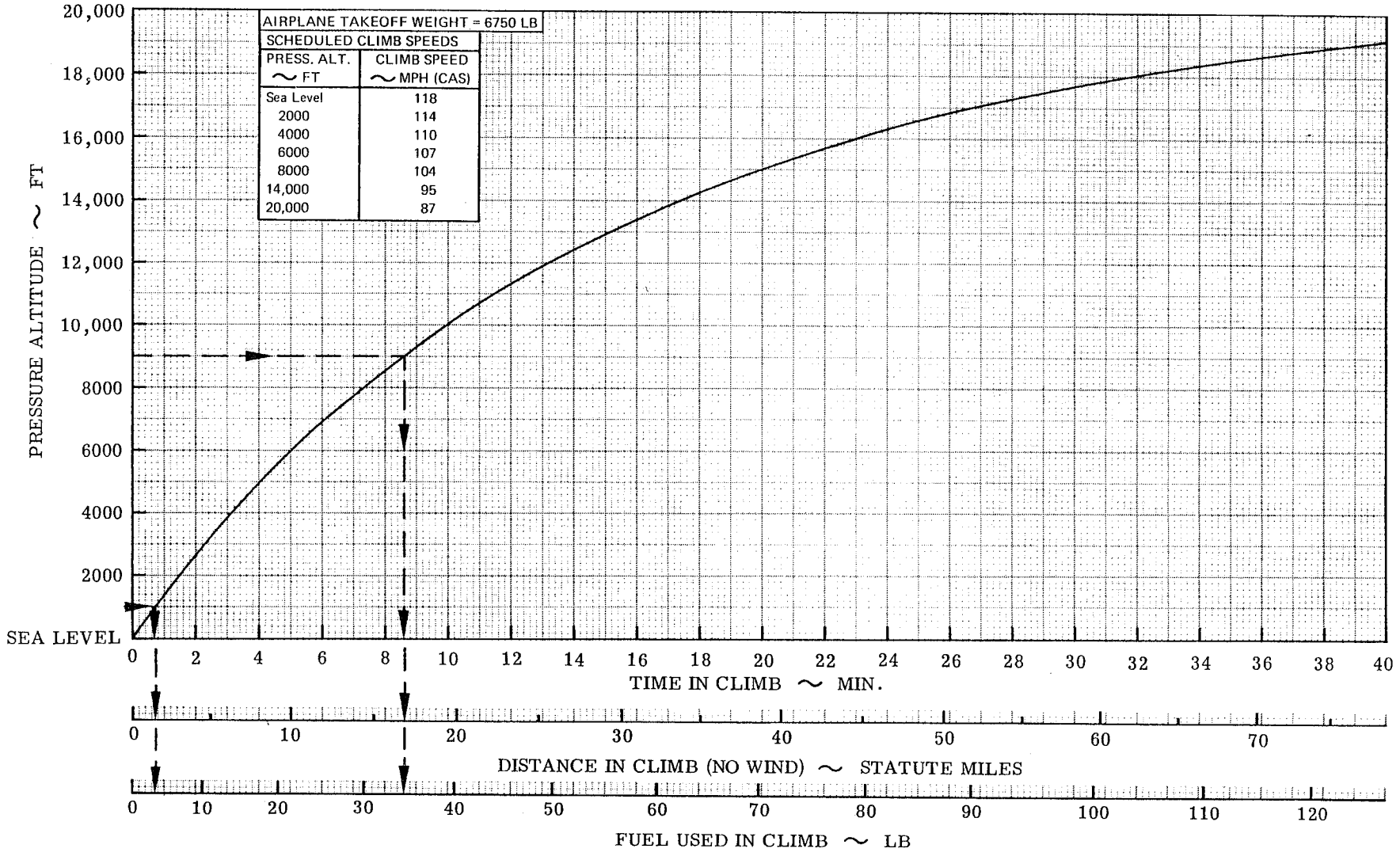


Figure 5.

CRUISE POWER SETTING CHARTS

The level flight cruise performance for standard day conditions is summarized in Figure 6. Fuel flow and manifold pressure are presented as a function of percent MCP, pressure altitude, engine RPM and mixture.

ASSOCIATED CONDITIONS

Power (Both Engines)	AS REQUIRED FOR LEVEL FLIGHT
Wing Flaps	0 DEG
Landing Gear	RETRACTED
Cowl Flaps	CLOSED

TECHNIQUE

Obtain and maintain the power setting from the chart. Approach the cruise altitude from a slightly higher altitude with a shallow dive. Trim the airplane in a stabilized condition with zero rate of climb.

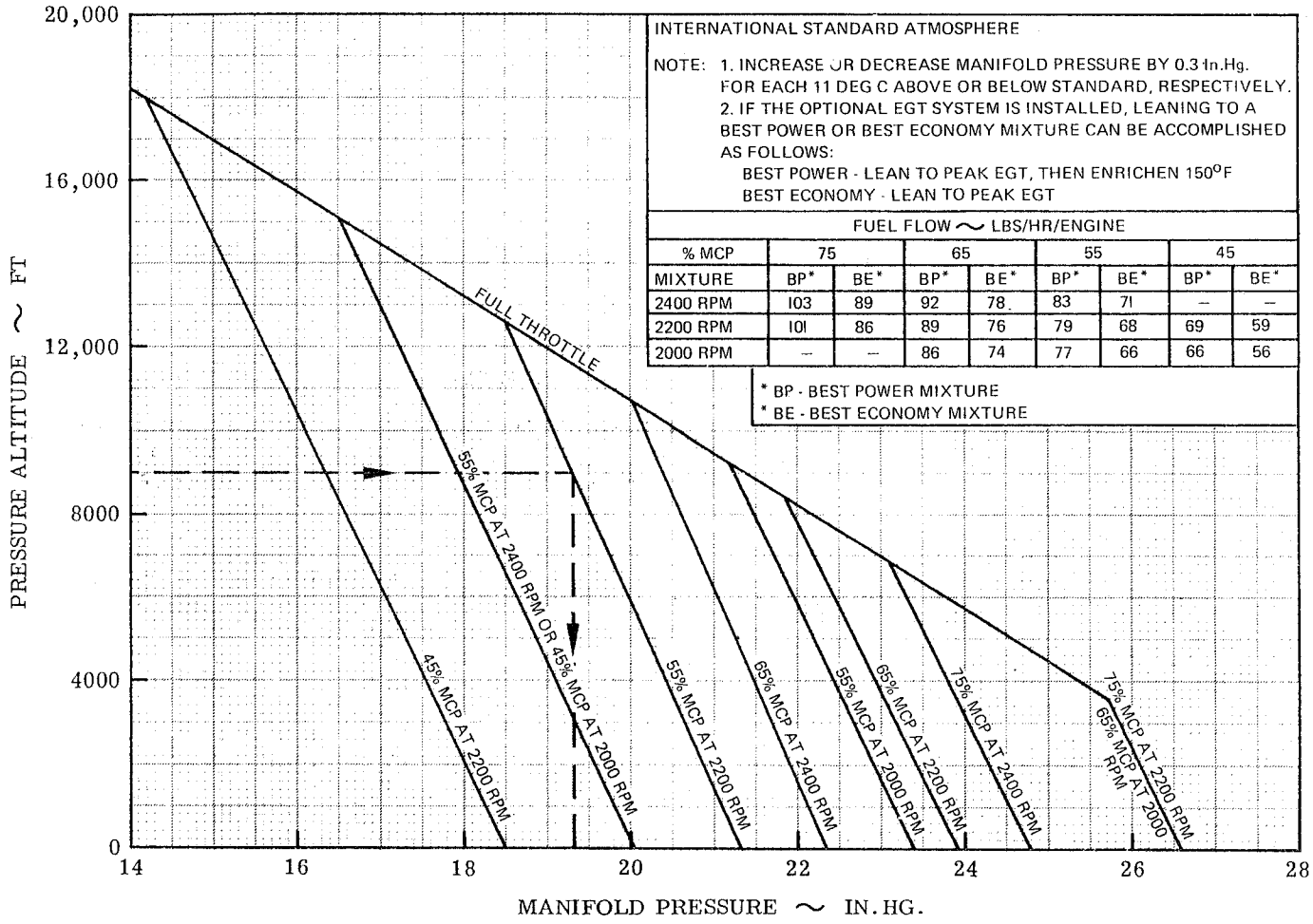
EXAMPLE

GIVEN:	Percent Power	55 PERCENT
	Pressure Altitude	9000 FT
	Engine RPM	2200 RPM
	Mixture	BEST POWER
FIND:	Manifold Pressure, Fig.6	19.3 IN.HG.
	Fuel Flow, Fig. 6	79 LBS/HR/ENGINE

NOTES: 1. Increase or decrease manifold pressure by 0.3 In.Hg. for each 11 Deg. C above or below standard, respectively.
2. If the optional EGT system is installed, leaning to a Best Power or Best Economy mixture can be accomplished as follows:
Best Power - lean to peak EGT, then enrichen 150°F
Best Economy - lean to peak EGT.

CRUISE POWER SETTING CHART

INTERNATIONAL STANDARD ATMOSPHERE



% MCP	75		65		55		45	
MIXTURE	BP*	BE*	BP*	BE*	BP*	BE*	BP*	BE*
2400 RPM	103	89	92	78	83	71	–	–
2200 RPM	101	86	89	76	79	68	69	59
2000 RPM	–	–	86	74	77	66	66	56

Figure 6.

165 – LT
+ 1.58 = LT

CRUISE TRUE AIRSPEEDS

The Cruise True Airspeed is presented in Figure 7. for varying Outside Air Temperature, Pressure Altitude and Power Setting at Maximum Gross Weight of 6750 Lb.

ASSOCIATED CONDITIONS

Power	AS REQUIRED
Mixture	BEST POWER
Wing Flaps	0 DEG
Landing Gear	RETRACTED
Cowl Flaps	CLOSED

TECHNIQUE

Obtain and maintain power setting desired. Approach the cruise altitude from a slightly higher altitude with a shallow dive. Trim the airplane in a stabilized condition with zero rate of climb.

EXAMPLE

GIVEN:	Outside Air Temperature	STANDARD DAY
	Pressure Altitude	9000 FT
	Power Setting	55% MCP, 2200 RPM
FIND:	True Airspeed, Fig. 7	178 MPH

NOTES: 1. See Figure 6. for Cruise Power Setting Chart.
2. If a best economy mixture is selected, a 2-3 MPH speed reduction can be expected from the cruise true airspeeds presented.

CRUISE TRUE AIRSPEEDS

AIRPLANE WEIGHT: 6750 LB

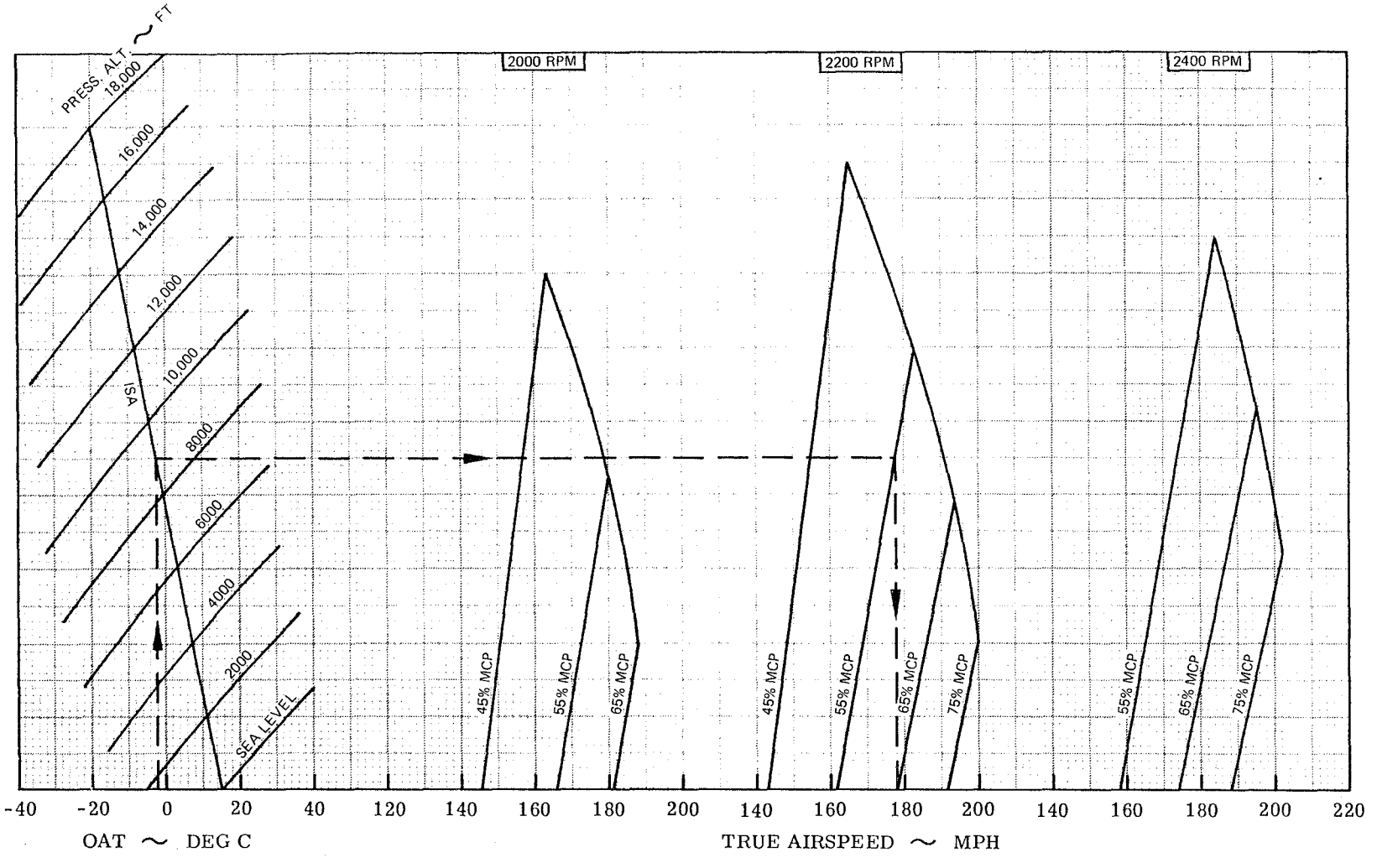


Figure 7.

RANGE PROFILES

The Maximum Range is presented in Figure 8. for various Cruise Altitudes and Power Settings. These charts are for Zero Wind, Sea Level Runway and International Standard Atmosphere. Range fuel is 156 U.S. gal (936 Lb).

FUEL ALLOWANCES

1. Start and Taxi (4.2 U.S. Gal., 25 Lb).
2. Climb to Cruise Altitude at Maximum Continuous Power.
3. Cruise at Best Economy Mixture.
4. 45 Minute Reserve based on 45% MCP at 2000 RPM.
5. Descend from Cruise Altitude to Sea Level at 45% at 2000 RPM.

ASSOCIATED CONDITIONS (Cruise)

Power (Both Engines)	AS DESIRED
Wing Flaps	0 DEG
Landing Gear	RETRACTED
Cowl Flaps	CLOSED

EXAMPLE

GIVEN:	Outside Air Temperature	ISA
	Cruise Pressure Altitude	9000 FT
	Cruise Power Setting	55% MCP, 2200 RPM
	Total Ramp Fuel	156 U.S. GAL (936 LB)
FIND:	Range, Fig. 8	1066 SM

NOTE: 1. The range data is presented for best economy mixture. If a best power mixture is selected, the range will decrease 16%.

RANGE PROFILES
(156 U.S. GAL)

INTERNATIONAL STANDARD ATMOSPHERE
45 MIN RESERVES

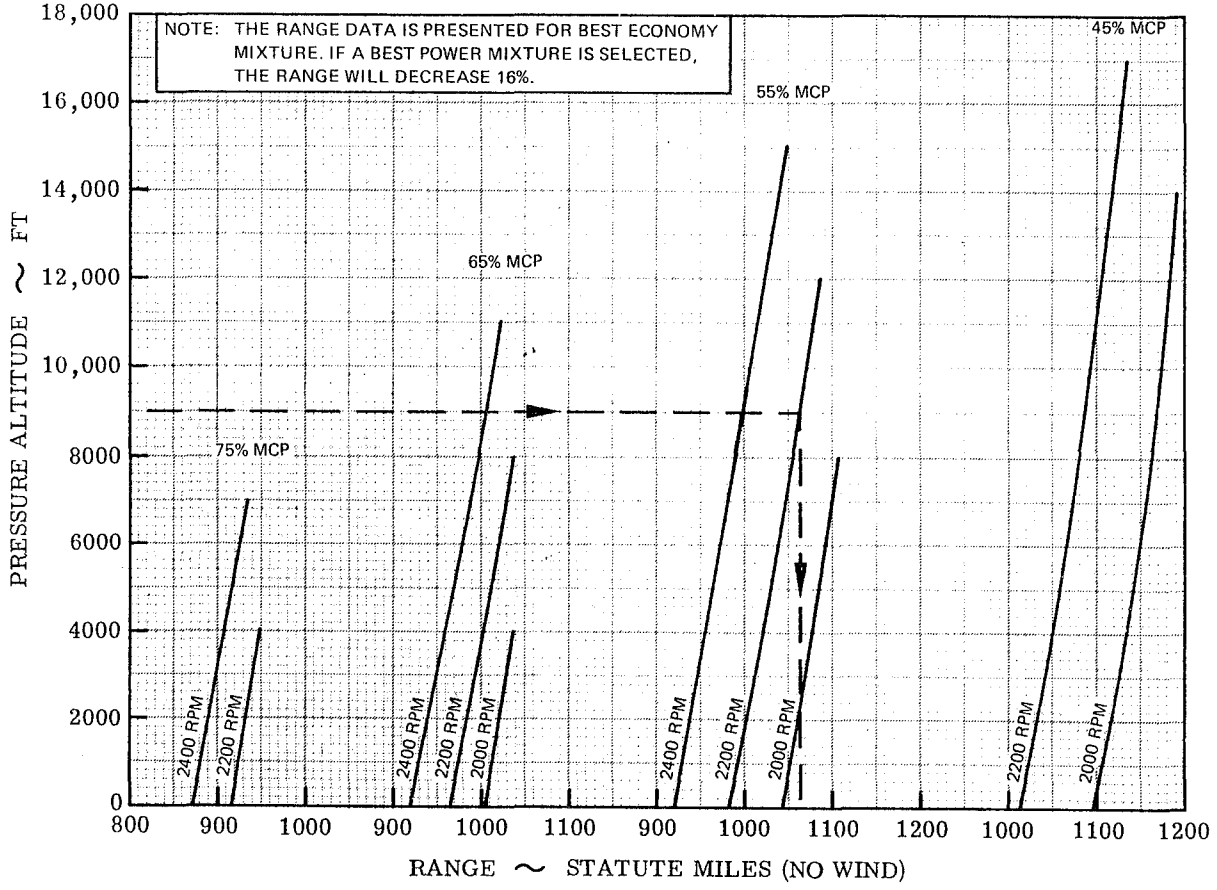


Figure 8.

ENDURANCE PROFILES

Figure 9. presents the Maximum Endurance for Standard Day conditions with varying Pressure Altitude and Percent Power.

ASSOCIATED CONDITIONS

Power (Both Engines)	AS DESIRED
Wing Flaps	0 DEG
Landing Gear	RETRACTED
Cowl Flaps	CLOSED
Mixture	BEST ECONOMY

TECHNIQUE

1. Start, warmup, and taxi-out (4.2 U.S. Gal (25 Lb), 10 Min, and 0 NM).
2. Climb from sea level to cruise altitude at maximum continuous power and best rate of climb speed.
3. Cruise at desired power setting at Best Economy mixture at cruise altitude.
4. Descend from cruise altitude to sea level at 1000 Ft/Min (45% MCP at 2000 RPM).
5. 45 Minute reserve based on a power setting of 45% MCP at 2000 RPM (14 U.S. Gal).

EXAMPLE

GIVEN:	Pressure Altitude	9000 FT
	Power Setting	55 PERCENT MCP (2200 RPM)
	Usable Fuel Capacity	156 U.S. GAL (936 LB at 6.0 LB/U.S.GAL.)
FIND:	Endurance, Fig. 9	6.14 HRS = 6 HR 8 MIN

NOTE: 1. The endurance data is presented for best economy mixture. If a best power mixture is selected, the endurance will decrease 17%.

ENDURANCE PROFILES
(156 U. S. GAL)

INTERNATIONAL STANDARD ATMOSPHERE

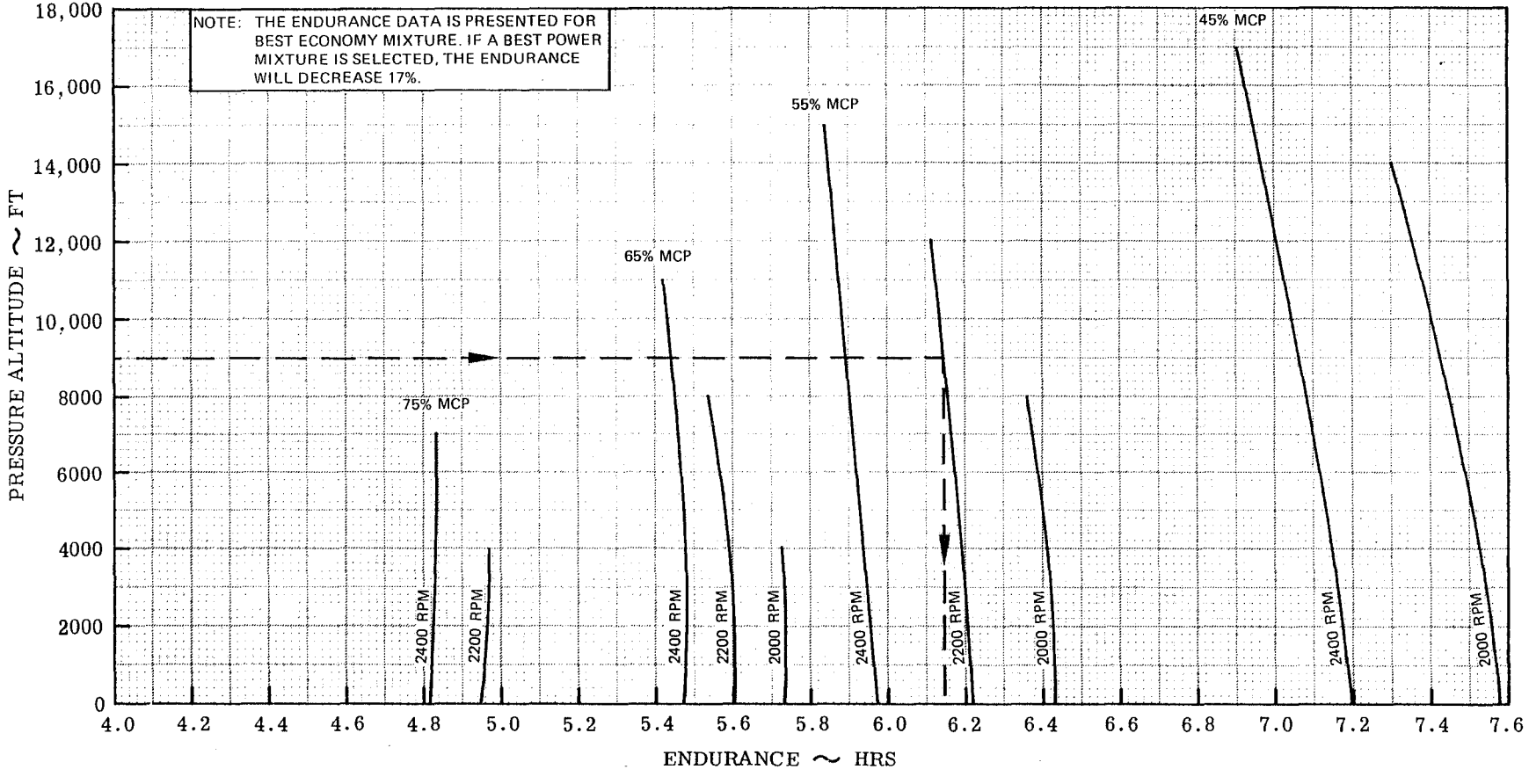


Figure 9.

TIME, DISTANCE AND FUEL USED IN DESCENT

The Time, Distance and Fuel used in Descent are presented in Figure 10. for varying Pressure Altitude at 1000 Ft/Min rate of descent. A table of Scheduled Descent Speed versus Pressure Altitude is presented in upper portion of chart.

ASSOCIATED CONDITIONS

Power	45% MCP, 2000 RPM
Wing Flaps	0 DEG
Landing Gear	RETRACTED

TECHNIQUE

Maintain a 1000 Ft/Min rate of descent at the scheduled RPM and power setting.

EXAMPLE

GIVEN: Field Pressure Altitude 1000 FT
Cruise Pressure Altitude 9000 FT

FIND: The total time, distance and fuel to descend from cruise to field altitude from Figure 10.

	CRUISE PRESSURE ALTITUDE TO S.L.		FIELD PRESSURE ALTITUDE TO S.L.		NET
Time	9 MIN	Minus	1 MIN	Equals	8 MIN
Distance	29.5 SM	Minus	3 SM	Equals	26.5 SM
Fuel	16.8 LB	Minus	1.8 LB	Equals	15 LB (2.5 U.S.GAL)

NOTE: 1. Descent data is presented for zero wind conditions only.

TIME, DISTANCE, FUEL USED IN DESCENT

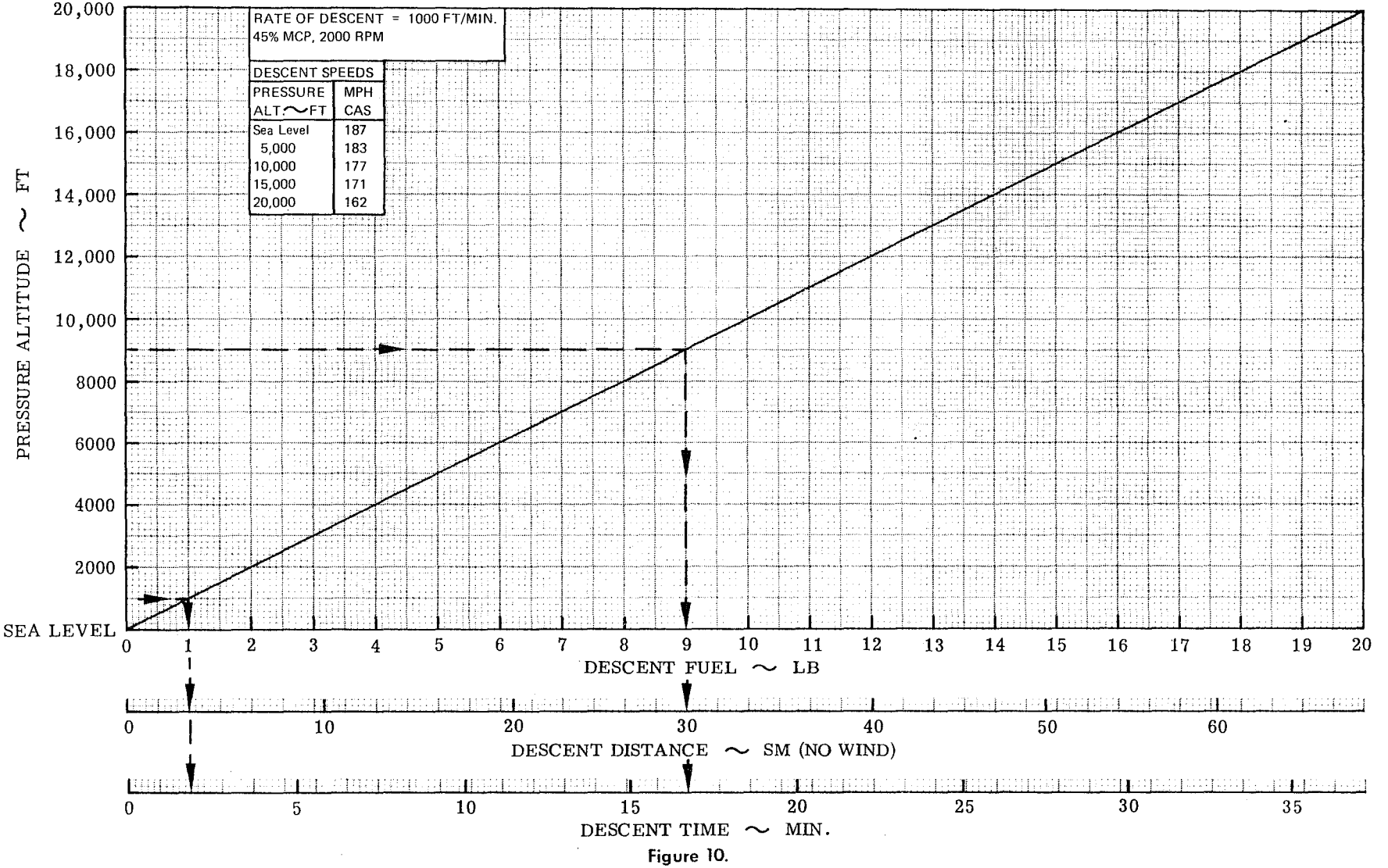


Figure 10.

PART II
WEIGHT AND BALANCE INSTRUCTIONS

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WEIGHING INSTRUCTIONS

The basic weight condition is established with unusable fuel and undrainable oil in the tanks and with wheels down and flaps up. A scale of minimum 3000 lbs. capacity will be required under each main wheel and a 1000 lb. scale will be required under the nose wheel.

LEVELING

a. The airplane is approximately level when the struts are in static position. Exact level is obtained by compressing or extending the nose gear strut. Lateral leveling is accomplished by placing a spirit level across the seat tracks on the cabin floor forward of the rear seat and deflating the tire or strut on the high side of the aircraft until the bubble in the spirit level is centered.

b. Longitudinal leveling is accomplished by placing a spirit level on the center line on top of the fuselage in a fore and aft position between stations 180. 0 and 198. 0. Inflating or deflating the nose wheel tire or strut raises or lowers the nose of the aircraft until the bubble of the spirit level is centered.

MEASURING

Measurements are taken to locate the reactions during weighing by measuring 152 inches forward of the wing leading edge. This locates the reference datum. Measurements can then be taken to the center of the nose gear and main gear wheels.

FUEL DRAINING

Fuel can be drained from the center tank by opening the main sump drain valve located in the fuselage beneath the right wing. Airplane must be level when draining fuel. Drains in strainers should be drained to empty all lines.

a. The fuel remaining aboard after defueling in this manner is trapped fuel.

b. The basic weight is established with "unusable" fuel and "undrainable" oil aboard. If the aircraft is weighed after draining fuel and oil from the tank drains, the following amounts shall be added to the "as weighed" condition to obtain the basic weight.

ITEM	WEIGHT	ARM	MOMENT
Unusable Fuel	9	187	1,683
Undrainable Oil	0	146	0

INSTRUCTIONS FOR COMPLETING WEIGHT AND BALANCE REPORT

At the bottom of Sheet 1 of the Weight and Balance Report is the Loading SUB-TOTAL'S table. This table shows how the Sub-Total Weight and Moment/1000 is obtained and consists of the following:

(1) CORRECTED EMPTY WEIGHT OF AIRPLANE

(Empty weight of an aircraft includes all operating equipment that has a fixed location and is actually in the aircraft. It includes the weight of the airframe, power plant, required equipment, optional and special equipment, fixed ballast, hydraulic fluid, and only unusable and undrainable fuel and oil.)

(Arm is the horizontal distance in inches from the datum to the center of gravity of an item.)

(Moment is the product of a weight multiplied by its arm.)

(2) DRAINABLE OIL

(3) WEIGHT OF PILOT

LOADING SUB-TOTAL Weight and Moment
Consists of the total of Items (1), (2), and (3).

(1) Determine the number of passengers and their location. Each seat is given a number in the figure at the top of Page 2 of the Aircraft Weight and Balance Report (Form 118S). The respective passenger weights and moments are listed in a table below the sketch. Passenger weight is figured at 170 lbs per person.

(2) Determine the amount of baggage to be carried, then refer to column under BAGGAGE for its weight and moment.

(3) Determine the amount of fuel to be added, then refer to column under FUEL for its weight and moment.

(4) Add passenger, baggage, and appropriate fuel weights and moments to the LOADING SUB-TOTAL to get TOTAL WEIGHT and MOMENT.

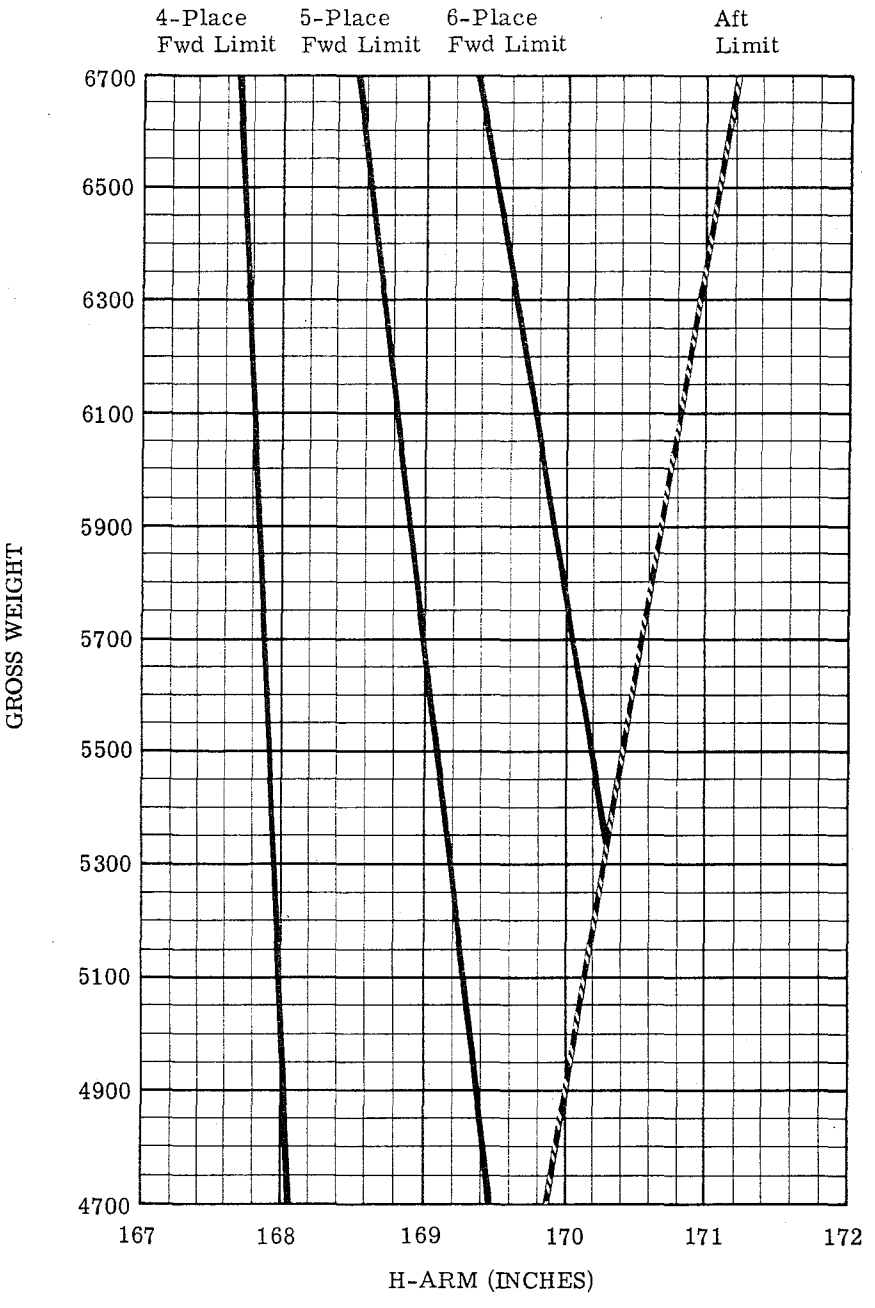
(5) Compare each of these TOTAL WEIGHTS to the nearest weight listed within the WEIGHT and MOMENT table on Page 2 of the Aircraft Weight and Balance Report (Form 118S). The TOTAL MOMENT must be within the allowable range listed.

AIRCRAFT LOADING CALCULATION EXAMPLES

	WEIGHT	MOMENT
SUB-TOTAL weight and moment	4231	725
PASSENGERS		
Rear Seat No. (1)	170	29
Rear Seat No. (2)	170	29
Copilot Seat	170	16
130 GALLONS FUEL	780	148
BAGGAGE	100	20
Total	5621	967

Take this total 5621 lbs. and check the WEIGHT and MOMENT table for nearest weight which is 5600 lbs. The 967 total moment is between the Min. and Max. limits of this weight. This indicates that the airplane is loaded within the allowable limits.

The SUB-TOTAL weight and moment entered in the weight and balance report indicates the status of the airplane as it left the factory. Major changes or alterations affecting weight and balance are required by the FAA to be recorded in the Repair and Alteration Form ACA-337. The weight and balance information from the Form ACA-337 should be entered in the LOADING SUB-TOTALS CHART (bottom of Sheet 1 of Weight and Balance Report) and the SUB-TOTAL weight and moment totals should then be corrected. It is the responsibility of the airplane owner and the pilot to assure that the airplane is loaded properly.



If the Loading Sub-Total Weight & C. G. (as listed at the bottom of Sheet 1 of the Weight and Balance Report) lies to the left of the forward limit line applicable to the installed seating arrangement, the loading should be checked for low fuel condition with passengers, ballast added as required. If it lies to the right of the Aft Limit reference line, the aft loading conditions should be checked with full fuel.