

## NORMAL PROCEDURES

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## INTRODUCTION

Section 4 provides procedures and amplified instructions for normal operations using standard equipment. Normal procedures associated with optional systems can be found in Section 9, Supplements.

## AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 3100 pounds and may be used for any lesser weight.

### TAKEOFF

Normal Climb .....	70 - 80 KIAS
Short Field Takeoff, Flaps 20°, Speed at 50 Feet .....	58 KIAS

### ENROUTE CLIMB, FLAPS UP

Normal, Sea Level .....	85 - 95 KIAS
Best Rate of Climb, Sea Level .....	80 KIAS
Best Rate of Climb, 10,000 Feet .....	74 KIAS
Best Angle of Climb, Sea Level .....	65 KIAS
Best Angle of Climb, 10,000 Feet .....	68 KIAS

### LANDING APPROACH

Normal Approach, Flaps UP .....	70 - 80 KIAS
Normal Approach, Flaps FULL .....	60 - 70 KIAS
Short Field Approach, Flaps FULL .....	60 KIAS

### BALKED LANDING

Maximum Power, Flaps 20° .....	55 KIAS
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### MAXIMUM RECOMMENDED TURBULENT AIR PENETRATION SPEED

3100 POUNDS .....	110 KIAS
2600 POUNDS .....	101 KIAS
2100 POUNDS .....	91 KIAS

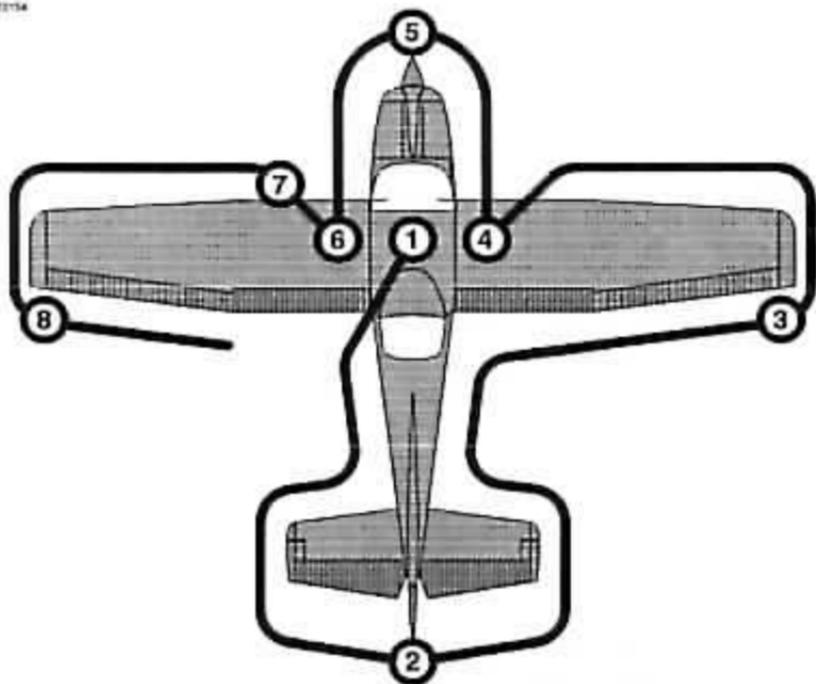
### MAXIMUM DEMONSTRATED CROSSWIND VELOCITY

Takeoff or Landing .....	15 KNOTS
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## NORMAL PROCEDURES

### PREFLIGHT INSPECTION

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#### NOTE

Visually check airplane for general condition during walk-around inspection. Airplane should be parked in a normal ground attitude (refer to Figure 1-1) to make sure that fuel drain valves allow for accurate sampling. Use of the refueling steps and assist handles will simplify access to the upper wing surfaces for visual checks and refueling operations. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to flight, check that pitot heater is warm to touch within 30 seconds with battery and pitot heat switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1

## **PREFLIGHT INSPECTION (Continued)**

### **① CABIN**

1. Pitot Tube Cover - REMOVE (check for pitot blockage)
2. Pilot's Operating Handbook - ACCESSIBLE TO PILOT
3. Garmin G1000 Cockpit Reference Guide - ACCESSIBLE TO PILOT
4. Airplane Weight and Balance - CHECKED
5. Parking Brake - SET
6. Control Wheel Lock - REMOVE

### **WARNING**

**WHEN THE MASTER SWITCH IS ON, USING AN EXTERNAL POWER SOURCE, OR MANUALLY ROTATING THE PROPELLER, TREAT THE PROPELLER AS IF THE MAGNETOS SWITCH WERE ON. DO NOT STAND, NOR ALLOW ANYONE ELSE TO STAND, WITHIN THE ARC OF THE PROPELLER SINCE A LOOSE OR BROKEN WIRE, OR A COMPONENT MALFUNCTION, COULD CAUSE THE ENGINE TO START.**

7. MAGNETOS Switch - OFF
8. AVIONICS Switch (BUS 1 and BUS 2) - OFF
9. MASTER Switch (ALT and BAT) - ON
10. Primary Flight Display (PFD) - CHECK (verify PFD is ON)
11. FUEL QTY (L and R) - CHECK
12. LOW FUEL L and LOW FUEL R Annunciators - CHECK (verify annunciators are not shown on PFD)
13. OIL PRESSURE Annunciator - CHECK (verify annunciator is shown)
14. LOW VACUUM Annunciator - CHECK (verify annunciator is shown)
15. AVIONICS Switch (BUS 1) - ON
16. Forward Avionics Fan - CHECK (verify fan is heard)

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## **PREFLIGHT INSPECTION** (Continued)

### **① CABIN** (Continued)

17. AVIONICS Switch (BUS 1) - OFF
18. AVIONICS Switch (BUS 2) - ON
19. Aft Avionics Fan - CHECK (verify fan is heard)
20. AVIONICS Switch (BUS 2) - OFF
21. PITOT HEAT Switch - ON (carefully check that pitot tube is warm to the touch within 30 seconds)
22. PITOT HEAT Switch - OFF
23. Stall Warning System - CHECK (gently move the stall vane upward and verify that the stall warning horn is heard)
24. LOW VOLTS Annunciator - CHECK (verify annunciator is shown)
25. MASTER Switch (ALT and BAT) - OFF
26. Elevator and Rudder Trim Controls - TAKEOFF position
27. FUEL SELECTOR Valve - BOTH
28. ALT STATIC AIR Valve - OFF (push full in)
29. Fire Extinguisher - CHECK (verify gage pointer in green arc)

### **② EMPENNAGE**

1. Baggage Compartment Door - CHECK (lock with key)
2. Rudder Gust Lock (if installed) - REMOVE
3. Tail Tiedown - DISCONNECT
4. Control Surfaces - CHECK (freedom of movement and security)
5. Trim Tabs - CHECK (security)
6. Antennas - CHECK (security of attachment and general condition)

### **③ RIGHT WING Trailing Edge**

1. Flap - CHECK (security and condition)
2. Aileron - CHECK (freedom of movement and security)

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## **PREFLIGHT INSPECTION** (Continued)

### **④ RIGHT WING**

1. Wing Tiedown - DISCONNECT
2. Fuel Tank Vent Opening - CHECK (verify opening is clear)
3. Main Wheel Tire - CHECK (proper inflation and general condition (weather checks, tread depth and wear, etc.))
4. Fuel Tank Sump Quick Drain Valves - DRAIN

Drain at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from **all** fuel drain points until **all** contamination has been removed. If contaminants are still present, refer to WARNING below and do not fly airplane.

#### **NOTE**

Collect all sampled fuel in a safe container. Dispose of the sampled fuel so that it does not cause a nuisance, hazard or damage to the environment.

#### **WARNING**

**IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.**

5. Fuel Quantity - CHECK VISUALLY (for desired level)
6. Fuel Filler Cap - SECURE and VENT CLEAR

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## **PREFLIGHT INSPECTION** (Continued)

### **⑤ NOSE**

1. Static Source Opening (right side of fuselage) - CHECK (verify opening is clear)
2. Fuel Strainer Quick Drain Valve (located on lower right side of engine cowling) - DRAIN

Drain at least a cupful of fuel (using sampler cup) from valve to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points, including the fuel return line and fuel selector, until all contamination has been removed. If contaminants are still present, refer to WARNING below and do not fly the airplane.

#### **NOTE**

Collect all sampled fuel in a safe container. Dispose of the sampled fuel so that it does not cause a nuisance, hazard, or damage to the environment.

#### **WARNING**

**IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.**

3. Engine Cooling Air Inlets - CHECK (clear of obstructions)

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## **PREFLIGHT INSPECTION** (Continued)

### **⑤ NOSE** (Continued)

- 4. Propeller and Spinner - CHECK (for nicks, security and no red oil leaks)

#### **NOTE**

Minor leaking of the blade seal area is possible on new propellers as the seals wear in. Any initial leakage will be visible as minor streaking on the blade or blades. Clean off oil residue and cycle propeller at least 5 times. Oil leakage should be reduced or completely stopped. If minor leaking continues after 20 hours of operation or increases remove propeller and have repaired.

- 5. Air Filter - CHECK (for restrictions by dust or other foreign matter)
- 6. Nosewheel Strut and Tire - CHECK (proper inflation of strut and general condition of tire (weather checks, tread depth and wear, etc.))
- 7. Engine Oil Dipstick/Filler Cap:
  - a. Oil level - CHECK
  - b. Dipstick/filler cap - SECURE

#### **NOTE**

**Do not operate with less than 4 quarts. Fill to 9 quarts for extended flight.**

- 8. Static Source Opening (left side of fuselage) - CHECK (verify opening is clear)

### **⑥ LEFT WING Leading Edge**

- 1. Fuel Tank Vent Opening - CHECK (blockage)
- 2. Stall Warning Vane - CHECK (freedom of movement)
- 3. Landing/Taxi Light(s) - CHECK (condition and cleanliness of cover)

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## **PREFLIGHT INSPECTION** (Continued)

### **⑦ LEFT WING**

1. Wing Tiedown - DISCONNECT
2. Fuel Quantity - CHECK VISUALLY (for desired level)
3. Fuel Filler Cap - SECURE and VENT CLEAR
4. Fuel Tank Sump Quick Drain Valves - DRAIN

Drain at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment, and proper fuel grade before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to WARNING below and do not fly airplane.

#### **NOTE**

Collect all sampled fuel in a safe container. Dispose of the sampled fuel so that it does not cause a nuisance, hazard, or damage to the environment.

#### **WARNING**

**IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATION MUST BE REMOVED BEFORE FURTHER FLIGHT.**

5. Main Wheel Tire - CHECK (proper inflation and general condition (weather checks, tread depth and wear, etc.))

### **⑧ LEFT WING Trailing Edge**

1. Aileron - CHECK (freedom of movement and security)
2. Flap - CHECK (security and condition)

## **BEFORE STARTING ENGINE**

1. Preflight Inspection - COMPLETE
2. Passenger Briefing - COMPLETE
3. Seats and Seat Belts - ADJUST and LOCK (verify inertia reel locking)
4. Brakes - TEST and SET
5. Circuit Breakers - CHECK IN
6. Electrical Equipment - OFF
7. AVIONICS Switch (BUS 1 and BUS 2) - OFF

### **CAUTION**

THE AVIONICS SWITCH (BUS 1 AND BUS 2) MUST BE OFF DURING ENGINE START TO PREVENT POSSIBLE DAMAGE TO AVIONICS.

8. Cowl Flaps - OPEN
9. FUEL SELECTOR Valve - BOTH

## STARTING ENGINE (With Battery)

1. Throttle Control - OPEN 1/4 INCH
2. Propeller Control - HIGH RPM (push full in)
3. Mixture Control - IDLE CUTOFF (pull full out)
4. STBY BATT Switch:
  - a. TEST - (hold for 20 seconds, verify that green TEST lamp does not go off)
  - b. ARM - (verify that PFD comes on)
5. Engine Indicating System - CHECK PARAMETERS (verify no red X's through ENGINE page indicators)
6. BUS E Volts - CHECK (verify 24 VOLTS minimum shown)
7. M BUS Volts - CHECK (verify 1.5 VOLTS or less shown)
8. BATT S Amps - CHECK (verify discharge shown (negative))
9. STBY BATT Annunciator - CHECK (verify annunciator is shown)
10. Propeller Area - CLEAR (verify that all people and equipment are at a safe distance from the propeller)
11. MASTER Switch (ALT and BAT) - ON
12. BEACON Light Switch - ON

### NOTE

If engine is warm, omit priming procedure steps 13 thru 15 below.

13. FUEL PUMP Switch - ON
14. Mixture Control - SET to FULL RICH (full forward) until stable fuel flow is indicated (approximately 3 to 5 seconds), then set to IDLE CUTOFF (full aft) position.
15. FUEL PUMP Switch - OFF
16. MAGNETOS Switch - START (release when engine starts)
17. Mixture Control - ADVANCE SMOOTHLY TO RICH (when engine starts)

### NOTE

If the engine is primed too much (flooded), place the mixture control in the IDLE CUTOFF position, open the throttle control 1/2 to full, and engage the starter motor (START). When the engine starts, advance the mixture control to the FULL RICH position and retard the throttle control promptly.

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### **STARTING ENGINE (With Battery) (Continued)**

18. Oil Pressure - CHECK (verify that oil pressure increases into the GREEN BAND range in 30 to 60 seconds)
19. AMPS (M BATT and BATT S) - CHECK (verify charge shown (positive))
20. LOW VOLTS Annunciator - CHECK (verify annunciator is not shown)
21. NAV Light Switch - ON as required
22. AVIONICS Switch (BUS 1 and BUS 2) - ON

### **STARTING ENGINE (With External Power)**

1. Throttle Control - OPEN 1/4 INCH
2. Propeller Control - HIGH RPM (push full in)
3. Mixture Control - IDLE CUTOFF (pull full out)
4. STBY BATT Switch:
  - a. TEST - (hold for 20 seconds, verify green TEST lamp does not go off)
  - b. ARM - (verify that PFD comes on)
5. Engine Indication System - CHECK PARAMETERS (verify no red X's through ENGINE page indicators)
6. BUS E Volts - CHECK (verify 24 VOLTS minimum shown)
7. M BUS Volts - CHECK (verify 1.5 VOLTS or less shown)
8. BATT S Amps - CHECK (verify discharge shown (negative))
9. STBY BATT Annunciator - CHECK (verify annunciator is shown)
10. AVIONICS Switch (BUS 1 and BUS 2) - OFF
11. MASTER Switch (ALT and BAT) - OFF
12. Propeller Area - CLEAR (verify that all people and equipment are at a safe distance from the propeller)
13. External Power - CONNECT (to ground power receptacle)
14. MASTER Switch (ALT and BAT) - ON
15. BEACON Light Switch - ON
16. M BUS VOLTS - CHECK (verify that approximately 28 VOLTS is shown)

#### **NOTE**

If engine is warm, omit priming procedure steps 17 thru 19 below.

17. FUEL PUMP Switch - ON

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## **STARTING ENGINE (With External Power) (Continued)**

18. Mixture Control - SET to FULL RICH (full forward) until stable fuel flow is indicated (approximately 3 to 5 seconds), then set to IDLE CUTOFF (full aft) position.
19. FUEL PUMP Switch - OFF
20. MAGNETOS Switch - START (release when engine starts)
21. Mixture Control - ADVANCE SMOOTHLY TO RICH (when engine starts)

### **NOTE**

If the engine is primed too much (flooded), place the mixture control in the IDLE CUTOFF position, open the throttle control 1/2 to full, and engage the starter motor (START). When the engine starts, advance the mixture control to the FULL RICH position and retard the throttle control promptly.

22. Oil Pressure - CHECK (verify oil pressure increases into the GREEN BAND range in 30 to 60 seconds)
23. Power - REDUCE TO IDLE
24. External Power - DISCONNECT FROM GROUND POWER (latch external power receptacle door)
25. Power - INCREASE (to approximately 1500 RPM for several minutes to charge battery)
26. AMPS (M BATT and BATT S) - CHECK (verify charge shown (positive))
27. LOW VOLTS Annunciator - CHECK (verify annunciator is not shown)
28. Internal Power - CHECK
  - a. MASTER Switch (ALT) - OFF
  - b. TAXI and LAND Light Switches - ON
  - c. Throttle Control - REDUCE TO IDLE
  - d. MASTER Switch (ALT and BAT) - ON
  - e. Throttle Control - INCREASE (to approximately 1500 RPM)
  - f. M BATT Ammeter - CHECK (verify battery charging, amps positive)
  - g. LOW VOLTS Annunciator - CHECK (verify annunciator is not shown)

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## STARTING ENGINE (With External Power) (Continued)

### WARNING

**IF M BATT AMMETER DOES NOT SHOW POSITIVE CHARGE (+ AMPS), OR LOW VOLTS ANNUNCIATOR DOES NOT GO OFF, REMOVE THE BATTERY FROM THE AIRPLANE AND SERVICE OR REPLACE THE BATTERY BEFORE FLIGHT.**

29. NAV Light Switch - ON (as required)
30. AVIONICS Switch (BUS 1 and BUS 2) - ON

### BEFORE TAKEOFF

1. Parking Brake - SET
2. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
3. Seats and Seat Belts - CHECK SECURE
4. Cabin Doors - CLOSED and LOCKED
5. Flight Controls - FREE and CORRECT
6. Flight Instruments (PFD) - CHECK (no red X's)
7. Altimeters:
  - a. PFD (BARO) - SET
  - b. Standby Altimeter - SET
8. ALT SEL - SET
9. Standby Flight Instruments - CHECK
10. Fuel Quantity - CHECK (verify level is correct)

### NOTE

Flight is not recommended when both fuel quantity indicators are in the yellow band range.

11. Mixture Control - RICH
12. FUEL SELECTOR Valve - SET BOTH
13. Autopilot - ENGAGE (push AP button on either PFD or MFD bezel)
14. Flight Controls - CHECK (verify autopilot can be overpowered in both pitch and roll axes)

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**BEFORE TAKEOFF** (Continued)

15. A/P TRIM DISC Button - PRESS (verify autopilot disengages and aural alert is heard)
16. Flight Director - OFF (push FD button on either PFD or MFD bezel)
17. Elevator and Rudder Trim Controls - SET FOR TAKEOFF
18. Throttle Control - 1800 RPM
  - a. MAGNETOS Switch - CHECK (RPM drop should not exceed 175 RPM on either magneto or 50 RPM differential between magnetos)
  - b. Propeller Control - CYCLE (from high to low RPM; return to high RPM) (push full in)
  - c. VAC Indicator - CHECK
  - d. Engine Indicators - CHECK
  - e. Ammeters and Voltmeters - CHECK
19. Annunciators - CHECK (verify no annunciators are shown)
20. Throttle Control - CHECK IDLE
21. Throttle Control - 1000 RPM or LESS
22. Throttle Control Friction Lock - ADJUST
23. COM Frequency(s) - SET
24. NAV Frequency(s) - SET
25. FMS/GPS Flight Plan - AS DESIRED

**NOTE**

Check GPS availability on AUX-GPS STATUS page. No annunciation is provided for loss of GPS2.

26. XPDR - SET

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## **BEFORE TAKEOFF** (Continued)

### **27. CDI Softkey - SELECT NAV SOURCE**

#### **CAUTION**

THE G1000 HSI SHOWS A COURSE DEVIATION INDICATOR FOR THE SELECTED GPS, NAV 1 OR NAV 2 NAVIGATION SOURCE. THE G1000 HSI DOES NOT PROVIDE A WARNING FLAG WHEN A VALID NAVIGATION SIGNAL IS NOT BEING SUPPLIED TO THE INDICATOR. WHEN A VALID NAVIGATION SIGNAL IS NOT BEING SUPPLIED, THE COURSE DEVIATION BAR (D-BAR) PART OF THE INDICATOR IS NOT SHOWN ON THE HSI COMPASS CARD. THE MISSING D-BAR IS CONSIDERED TO BE THE WARNING FLAG.

#### **WARNING**

WHEN THE AUTOPILOT IS ENGAGED IN NAV, APR OR BC OPERATING MODES, IF THE HSI NAVIGATION SOURCE IS CHANGED MANUALLY, USING THE CDI SOFTKEY, THE CHANGE WILL INTERRUPT THE NAVIGATION SIGNAL TO THE AUTOPILOT AND WILL CAUSE THE AUTOPILOT TO REVERT TO ROL MODE OPERATION. NO AURAL ALERT WILL BE PROVIDED. IN ROL MODE, THE AUTOPILOT WILL ONLY KEEP THE WINGS LEVEL AND WILL NOT CORRECT THE AIRPLANE HEADING OR COURSE. SET THE HDG BUG TO THE CORRECT HEADING AND SELECT THE CORRECT NAVIGATION SOURCE ON THE HSI, USING THE CDI SOFTKEY, BEFORE ENGAGING THE AUTOPILOT IN ANY OTHER OPERATING MODE.

28. CABIN PWR 12V Switch - OFF
29. Wing Flaps - UP - 20° (10° preferred)
30. Cowl Flaps - OPEN
31. Cabin Windows - CLOSED and LOCKED
32. STROBE Light Switch - ON
33. Brakes - RELEASE

## TAKEOFF

### NORMAL TAKEOFF

1. Wing Flaps - UP - 20° (10° preferred)
2. Throttle Control - FULL (push full in)
3. Propeller Control - 2400 RPM
4. Mixture Control - RICH (above 5000 feet pressure altitude, lean for maximum RPM)
5. Elevator Control - LIFT NOSEWHEEL (at 50 - 60 KIAS)
6. Climb Airspeed - 70 KIAS (FLAPS 20°)  
80 KIAS (FLAPS UP)
7. Wing Flaps - RETRACT (at safe altitude)

### SHORT FIELD TAKEOFF

1. Wing Flaps - 20°
2. Brakes - APPLY
3. Throttle Control - FULL (push full in)
4. Propeller Control - 2400 RPM
5. Mixture Control - RICH (above 5000 feet pressure altitude, lean for maximum RPM)
6. Brakes - RELEASE
7. Elevator Control - SLIGHTLY TAIL LOW
8. Climb Airspeed - 58 KIAS (until all obstacles are cleared)
9. Wing Flaps - RETRACT SLOWLY (when airspeed is more than 70 KIAS)

## ENROUTE CLIMB

### NORMAL CLIMB

1. Airspeed - 85 - 95 KIAS
2. Throttle Control - 23 in.hg. or FULL (if less than 23 in.hg.)
3. Propeller Control - 2400 RPM
4. Mixture Control - 15 GPH or FULL RICH (if less than 15 GPH)
5. FUEL SELECTOR Valve - BOTH
6. Cowl Flaps - OPEN (as required)

### MAXIMUM PERFORMANCE CLIMB

1. Airspeed -80 KIAS at sea level  
74 KIAS at 10,000 feet
2. Throttle Control - FULL (push full in)
3. Propeller Control - 2400 RPM
4. Mixture Control - FULL RICH (or SET to Maximum Power Fuel Flow Placard value for altitude in Amplified Normal Procedures)
5. FUEL SELECTOR Valve - BOTH
6. Cowl Flaps - OPEN

### CRUISE

1. Power - 15 - 23 in.hg. at 2000 - 2400 RPM (no more than 80% power recommended)
2. Elevator and Rudder Trim Controls - ADJUST
3. Mixture Control - LEAN (for desired performance or economy)
4. Cowl Flaps - CLOSED
5. FMS/GPS - REVIEW and BRIEF (OBS/SUSP softkey operation for holding pattern procedure (IFR))

## DESCENT

1. Power - AS DESIRED
2. Mixture - ADJUST (if necessary to make engine run smoothly)
3. Cowl Flaps - CLOSED
4. Altimeters:
  - a. PFD (BARO) - SET
  - b. Standby Altimeter - SET
5. ALT SEL - SET
6. CDI Softkey - SELECT NAV SOURCE
7. FMS/GPS - REVIEW and BRIEF (OBS/SUSP softkey operation for holding pattern procedure (IFR))

### CAUTION

THE G1000 HSI SHOWS A COURSE DEVIATION INDICATOR FOR THE SELECTED GPS, NAV 1 OR NAV 2 NAVIGATION SOURCE. THE G1000 HSI DOES NOT PROVIDE A WARNING FLAG WHEN A VALID NAVIGATION SIGNAL IS NOT BEING SUPPLIED TO THE INDICATOR. WHEN A VALID NAVIGATION SIGNAL IS NOT BEING SUPPLIED, THE COURSE DEVIATION BAR (D-BAR) PART OF THE INDICATOR IS NOT SHOWN ON THE HSI COMPASS CARD. THE MISSING D-BAR IS CONSIDERED TO BE THE WARNING FLAG.

### WARNING

WHEN THE AUTOPILOT IS ENGAGED IN NAV, APR OR BC OPERATING MODES, IF THE HSI NAVIGATION SOURCE IS CHANGED MANUALLY, USING THE CDI SOFTKEY, THE CHANGE WILL INTERRUPT THE NAVIGATION SIGNAL TO THE AUTOPILOT AND WILL CAUSE THE AUTOPILOT TO REVERT TO ROL MODE OPERATION. NO AURAL ALERT WILL BE PROVIDED. IN ROL MODE, THE AUTOPILOT WILL ONLY KEEP THE WINGS LEVEL AND WILL NOT CORRECT THE AIRPLANE HEADING OR COURSE. SET THE HDG BUG TO THE CORRECT HEADING AND SELECT THE CORRECT NAVIGATION SOURCE ON THE HSI, USING THE CDI SOFTKEY, BEFORE ENGAGING THE AUTOPILOT IN ANY OTHER OPERATING MODE.

8. FUEL SELECTOR Valve - BOTH
9. Wing Flaps - AS DESIRED (UP - 10° below 140 KIAS)  
(10° - 20° below 120 KIAS)  
(20° - FULL below 100 KIAS)

## BEFORE LANDING

1. Pilot and Passenger Seat Backs - MOST UPRIGHT POSITION
2. Seats and Seat Belts - SECURED and LOCKED
3. FUEL SELECTOR Valve - BOTH
4. Mixture Control - RICH
5. Propeller Control - HIGH RPM (push full in)
6. LAND and TAXI Light Switches - ON
7. Autopilot - OFF
8. CABIN PWR 12V Switch - OFF

## LANDING

### NORMAL LANDING

1. Airspeed - 70 - 80 KIAS (Flaps UP)
2. Wing Flaps - AS DESIRED (UP - 10° below 140 KIAS)  
(10° - 20° below 120 KIAS)  
(20° - FULL below 100 KIAS)
3. Airspeed - 60 - 70 KIAS (Flaps FULL)
4. Elevator and Rudder Trim Controls - ADJUST
5. Touchdown - MAIN WHEELS FIRST
6. Landing Roll - LOWER NOSEWHEEL GENTLY
7. Braking - MINIMUM REQUIRED

### SHORT FIELD LANDING

1. Airspeed - 70 - 80 KIAS (Flaps UP)
2. Wing Flaps - FULL (below 100 KIAS)
3. Airspeed - 60 KIAS (until flare)
4. Elevator and Rudder Trim Controls - ADJUST
5. Power - REDUCE TO IDLE (as obstacle is cleared)
6. Touchdown - MAIN WHEELS FIRST
7. Brakes - APPLY HEAVILY
8. Wing Flaps - UP

(Continued Next Page)

## **LANDING** (Continued)

### **BALKED LANDING**

1. Throttle Control - FULL (push full in) and 2400 RPM
2. Wing Flaps - RETRACT to 20°
3. Climb Speed - 55 KIAS
4. Wing Flaps - RETRACT SLOWLY (after reaching a safe altitude and 70 KIAS)
5. Cowl Flaps - OPEN

### **AFTER LANDING**

1. Wing Flaps - UP
2. Cowl Flaps - OPEN

### **SECURING AIRPLANE**

1. Parking Brake - SET
2. Throttle Control - IDLE (pull full out)
3. Electrical Equipment - OFF
4. AVIONICS Switch (BUS 1 and BUS 2) - OFF
5. Mixture Control - IDLE CUTOFF (pull full out)
6. MAGNETOS Switch - OFF
7. MASTER Switch (ALT and BAT) - OFF
8. STBY BATT Switch - OFF
9. Control Lock - INSTALL
10. FUEL SELECTOR Valve - LEFT or RIGHT (to prevent crossfeeding between tanks)

## **AMPLIFIED NORMAL PROCEDURES**

### **PREFLIGHT INSPECTION**

The preflight inspection, described in Figure 4-1 and adjacent checklist, is required prior to each flight. If the airplane has been in extended storage, has had recent major maintenance, or has been operated from rough runways, a more extensive exterior inspection is recommended.

Before every flight, check the condition of main and nose landing gear tires. Keep tires inflated to the pressure specified in Section 8, Airplane Handling, Service And Maintenance. Examine tire sidewalls for patterns of shallow cracks called weather checks. These cracks are evidence of tire deterioration caused by age, improper storage, or prolonged exposure to weather. Check the tread of the tire for depth, wear, and cuts. Replace the tire if fibers are visible.

After major maintenance has been performed, the flight and trim tab controls should be double checked for free and correct movement and security. The security of all inspection plates on the airplane should be checked following periodic inspections. If the airplane has been waxed or polished, check the external static pressure source hole for stoppage.

If the airplane has been kept in a crowded hangar, it should be checked for dents and scratches on wings, fuselage, and tail surfaces, damage to navigation, strobe lights, and avionics antennas. Check for damage to the nosewheel steering system, the result of exceeding nosewheel turning limits while towing.

(Continued Next Page)

## STARTING ENGINE

In cooler weather, the engine compartment temperature drops off rapidly following engine shutdown and the injector nozzle lines remain nearly full of fuel.

In warmer weather, engine compartment temperatures may increase rapidly following engine shutdown, and fuel in the lines will vaporize and escape into the intake manifold. Hot weather starting procedures depend considerably on how soon the next engine start is attempted. Within the first 20 to 30 minutes after shutdown, the fuel manifold is adequately primed and the empty injector nozzle lines will fill before the engine dies. However, after approximately 30 minutes, the vaporized fuel in the manifold will have nearly dissipated and some slight priming could be required to refill the nozzle lines and keep the engine running after the initial start. Starting a hot engine is facilitated by advancing the mixture control promptly to 1/3 open when the engine starts, and then smoothly to full rich as power develops.

If the engine does not continue to run, set the FUEL PUMP switch to the ON position temporarily and adjust the throttle and/or mixture as necessary to keep the engine running. In the event of over priming or flooding, set the FUEL PUMP switch to OFF, open the throttle from 1/2 to full open, and continue cranking with the mixture in the idle CUTOFF position (pull full out). When the engine fires, smoothly advance the mixture control to full rich and retard the throttle to desired idle speed.

If the engine is under primed (most likely in cold weather with a cold engine), it will not start at all, and additional priming will be necessary.

After starting, if the oil pressure gage does not begin to show pressure within 30 seconds in warmer temperatures and approximately one minute in very cold weather, stop the engine and find the cause before continued operation. Lack of oil pressure can cause serious engine damage.

### NOTE

Additional details concerning cold weather starting and operation may be found under COLD WEATHER OPERATION paragraphs in this section.

(Continued Next Page)

## **STARTING ENGINE** (Continued)

### **RECOMMENDED STARTER DUTY CYCLE**

Operate the starter motor for 10 seconds followed by a 20 second cool down period. This cycle can be repeated two additional times, followed by a ten minute cool down period before resuming cranking. After cool down, operate the starter motor again, three cycles of 10 seconds followed by 20 seconds of cool down. If the engine still does not start, try to find the cause.

### **LEANING FOR GROUND OPERATIONS**

For all ground operations, after starting the engine and when the engine is running smoothly:

1. Set the throttle control to 1200 RPM.
2. Lean the mixture for maximum RPM.
3. Set the throttle control to an RPM appropriate for ground operations (800 to 1000 RPM recommended).

#### **NOTE**

If ground operation will be required after the BEFORE TAKEOFF checklist is completed, lean the mixture again (as described above) until ready for the TAKEOFF checklist.

(Continued Next Page)

## TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (refer to Figure 4-2, Taxiing Diagram) to maintain directional control and balance.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

### NOTE

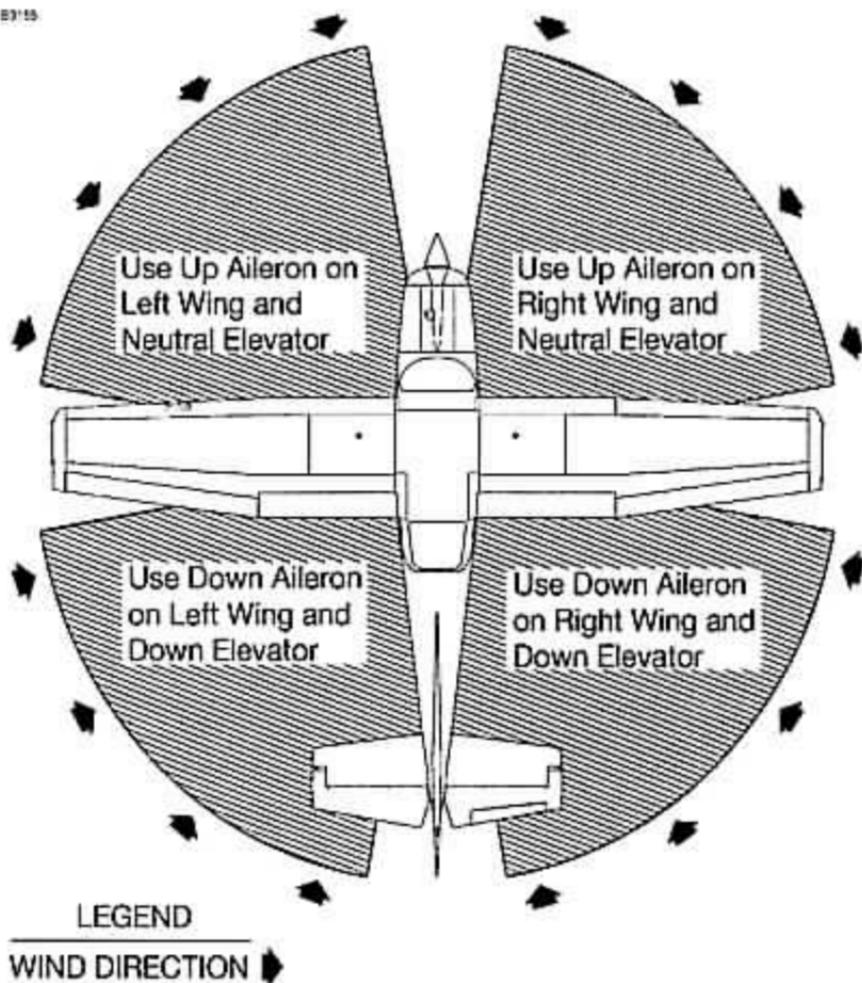
The LOW VOLTS annunciator may come on when the engine is operated at low RPM with a high load on the electrical system. If this is the case, the LOW VOLTS annunciator will go off when the engine is run at higher RPM to provide greater alternator system output. Verify that the M BATT AMPS indication shows positive (charging) current at the higher RPM.

(Continued Next Page)

**TAXIING** (Continued)

**TAXIING DIAGRAM**

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**NOTE**

Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude. Use the steerable nosewheel and rudder to maintain direction.

Figure 4-2

## **BEFORE TAKEOFF**

### **WARM UP**

If the engine idles (approximately 650 RPM) and accelerates smoothly, the engine is warm enough for takeoff. Since the engine is closely cowled for efficient in-flight engine cooling, the cowl flaps should be open and the airplane pointed into the wind to avoid overheating during prolonged engine operation on the ground. Long periods of idling may cause fouled spark plugs.

### **MAGNETO CHECK**

The magneto check must be made at 1800 RPM. Turn the MAGNETOS switch from the BOTH position to the R position. Note the new RPM, then turn the MAGNETOS switch back to the BOTH position to clear the spark plugs. Turn the MAGNETOS switch to the L position, note the new RPM, then turn the switch back to the BOTH position. RPM decrease should not be more than 175 RPM on either magneto or be greater than 50 RPM differential between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

No RPM drop may indicate a faulty ground to one magneto or magneto timing set in advance of the angle specified.

### **ALTERNATOR CHECK**

Make sure that both the alternator and alternator control unit are operating properly before night or instrument flight, or flights where electrical power is essential. Check the electrical system during the MAGNETO check (1800 RPM) by setting all electrical equipment required for the flight to the ON position. When the alternator and alternator control unit are both operating properly, the ammeters will show zero or positive current (amps), the voltmeters should show between 27 to 29 volts, and no electrical system annunciations will appear. Reduce the electrical load before reducing engine speed so the battery will not discharge while the engine is at idle.

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## **BEFORE TAKEOFF** (Continued)

### **ELEVATOR TRIM**

The elevator trim tab is in the takeoff position when the trim pointer is aligned with the index mark on the pedestal cover. Adjust the trim wheel during flight as necessary to make control wheel forces more neutral.

### **LANDING LIGHTS**

It is recommended that only the taxi light be used to enhance the visibility of the airplane in the traffic pattern or enroute. This will extend the service life of the landing light.

## **TAKEOFF**

### **POWER CHECK**

It is important to check full throttle engine operation early in the takeoff roll. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the takeoff. If this occurs, you are justified in making a thorough full throttle static run-up before another takeoff is attempted. The engine should run smoothly and turn approximately 2350 - 2400 RPM.

Full throttle run-ups over loose gravel are especially harmful to propeller tips. When takeoffs must be made over a gravel surface, advance the throttle slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown behind the propeller rather than pulled into it.

Prior to takeoff from fields above 5000 feet pressure elevation, the mixture should be leaned to give maximum RPM at full throttle, with the airplane not moving. This mixture setting should provide a fuel flow that closely matches that shown on the Maximum Power Fuel Flow placard.

After full throttle is applied, adjust the throttle friction lock clockwise to prevent the throttle from moving back from a maximum power position. Similar friction lock adjustments should be made as required in other flight conditions to hold the throttle setting.

(Continued Next Page)

## TAKEOFF (Continued)

### WING FLAP SETTINGS

Normal takeoffs use wing flaps UP - 20° (10° preferred). Using 20° wing flaps reduces the ground roll and total distance over an obstacle by approximately 20 percent. **Flap deflections greater than 20° are not approved for takeoff.** If 20° wing flaps are used for takeoff, the flaps should stay at 20° until all obstacles are cleared and a safe flap retraction speed of 70 KIAS is reached. For a short field, 20° wing flaps and an obstacle clearance speed of 60 KIAS should be used.

Soft or rough field takeoffs are performed with 20° flaps by lifting the airplane off the ground as soon as practical in a slightly tail low attitude. If no obstacles are ahead, the airplane should be leveled off immediately to accelerate to a higher climb speed. When departing a soft field with an aft C.G. loading, the elevator trim control should be adjusted towards the nose down direction to give comfortable control wheel forces during the initial climb.

### CROSSWIND TAKEOFF

Takeoffs under strong crosswind conditions normally are performed with the minimum flap setting necessary for the field length, to minimize the drift angle immediately after takeoff. With the ailerons partially deflected into the wind, the airplane is accelerated to a speed slightly higher than normal, then the elevator control is used to quickly, but carefully, lift the airplane off the ground and to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

## CRUISE

Normal cruise is performed between 55% and 80% of the rated MCP. However, any power setting within the green arc ranges on the manifold pressure indicator and tachometer may be used. The power setting and corresponding fuel consumption for various altitudes can be determined by using the data in Section 5.

### NOTE

Cruise flight should use 75% power as much as possible until the engine has operated for a total of 50 hours or oil consumption has stabilized. Operation at this higher power will ensure proper seating of the piston rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The Cruise Performance charts in Section 5 provide the pilot with flight planning information for the Model 182T in still air with speed fairings installed. Power, altitude, and winds determine the time and fuel needed to complete any flight.

The Cruise Performance Table, Figure 4-3, shows the true airspeed and nautical miles per gallon during cruise for various altitudes and percent powers, and is based on standard conditions and zero wind. This table should be used as a guide, along with the available winds aloft information, to determine the most favorable altitude and power setting for a given trip. The selection of cruise altitude on the basis of the most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

In addition to power settings, proper leaning techniques also contribute to greater range and are figured into cruise performance tables. To achieve the recommended lean mixture fuel consumption figures shown in Section 5, the mixture should be leaned using the Exhaust Gas Temperature (EGT) indicator as noted.

(Continued Next Page)

**CRUISE** (Continued)

For reduced noise levels, it is desirable to select the lowest RPM in the green arc range for a given percent power that will provide smooth engine operation. The cowl flaps should be opened, if necessary, to maintain the cylinder head temperature at approximately two-thirds of the normal operating range (green band).

**CRUISE PERFORMANCE TABLE**

## CONDITIONS:

Standard Conditions

Zero Wind

ALTITUDE FEET	80% POWER		75% POWER		65% POWER		55% POWER	
	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
4000	141	10.2	138	10.6	129	11.3	118	11.8
6000	144	10.4	140	10.8	131	11.4	120	12.0
8000	---	---	142	11.0	133	11.6	122	12.1
10,000	---	---	---	---	135	11.8	124	12.3

Figure 4-3

The Cruise Performance charts in Section 5 provide the pilot with cruise performance at maximum gross weight. When normal cruise is performed at reduced weights there is an increase in true airspeed. During normal cruise at power settings between 55% and 80%, the true airspeed will increase approximately 1 knot for every 150 pounds below maximum gross weight. During normal cruise at power settings below 70%, the true airspeed will increase approximately 1 knot for every 125 pounds below maximum gross weight.

The fuel injection system employed on this engine is considered to be non-icing. In the event that unusual conditions cause the intake air filter to become clogged or iced over, an alternate intake air door opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage. Due to the lower intake pressure available through the alternate air door or a partially blocked filter, manifold pressure can decrease from a cruise power setting. This manifold pressure should be recovered by increasing the throttle setting or setting a higher RPM as necessary to maintain desired power.

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## **CRUISE** (Continued)

### **LEANING USING EXHAUST GAS TEMPERATURE (EGT)**

The cruise performance data in this POH is based on the recommended lean mixture setting determined from the maximum or peak EGT at power settings of 80% MCP and lower. The 182T Nav III provides EGT indications for all (6) engine cylinders. The ability to monitor all cylinders is an aid in early identification and correction of fuel injection problems.

#### **NOTE**

All engine cylinders do not receive identical fuel/air mixtures (due to unequal intake pipe lengths, uneven intake air temperatures, fuel injection nozzle tolerances etc.). However, all cylinder EGTs should be within approximately 50°F of each other during normal operations. An EGT difference greater than 50°F between cylinders indicates that fuel injection system maintenance is necessary.

EGT is displayed on the EIS ENGINE and LEAN pages. The ENGINE page has a horizontal scale with a temperature indicator (inverted triangle) with a number representing the cylinder with the highest EGT.

The EIS LEAN page provides vertical bar graph displays showing EGT for all cylinders. The cylinder with the highest EGT is shown in cyan (light blue). The numerical value for the highest EGT is located below the bar. The EGT and Cylinder Head Temperature (CHT) value for any cylinder may be shown by using the CYL SLCT softkey to select the desired cylinder. After a short period without CYL SLCT softkey activity, automatic indication of the highest EGT and CHT will start again.

(Continued Next Page)

## CRUISE (Continued)

### LEANING USING EXHAUST GAS TEMPERATURE (EGT) (Continued)

To aid in leaning the mixture, push the ENGINE, LEAN and ASSIST softkeys,  $\Delta$ PEAK °F will display below the EGT °F numerical value. Lean the mixture by slowly turning the mixture control knob in the counterclockwise direction while monitoring EGTs. As EGTs increase, continue to lean the mixture until the hottest (cyan) cylinder reaches peak EGT. This is identified by the EGT bar graph for that cylinder changing to cyan with a hollow bar at the top. Note the  $\Delta$ PEAK °F and FFLOW GPH values for the first peaked cylinder. Peak EGT is represented by  $\Delta$ PEAK 0°F, if  $\Delta$ PEAK °F value is negative (-) the mixture can be on the lean side of peak. Enrichen the mixture by slowly turning the mixture control clockwise and monitor both fuel flow and EGTs until the leanest cylinder returns to peak EGT ( $\Delta$ PEAK 0°F) or desired setting based on the Exhaust Gas Temperature (EGT) Table, Figure 4-4.

$\Delta$ PEAK °F values rich of peak will also be a negative (-) value (-50°F or -125°F). The lean assist system calculation is defined such that the peak EGT is the highest value and any lesser value is represented with a negative (-) value, whether on the lean or rich side of the peak.

#### NOTE

The 182T engine manufacturer, Textron Lycoming, has not approved operation of the engine at fuel flow rates (mixture settings) less than necessary to reach peak EGT in the leanest cylinder (the first cylinder to reach peak EGT). Use FULL RICH mixture when operating the engine above 80% power.

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## CRUISE (Continued)

### LEANING USING EXHAUST GAS TEMPERATURE (EGT) (Continued)

#### EXHAUST GAS TEMPERATURE (EGT)

MIXTURE DESCRIPTION	EXHAUST GAS TEMPERATURE (EGT)
RECOMMENDED LEAN (Pilot's Operating Handbook)	50°F Rich of Peak EGT
BEST ECONOMY	Peak EGT
BEST POWER	125°F Rich of Peak EGT

Figure 4-4

Operation at peak EGT provides the best fuel economy. This results in approximately 4% greater range than shown in this POH accompanied by approximately a 3 knot decrease in speed.

Under some conditions, engine roughness may occur while operating at peak EGT. In this case, operate at the recommended lean mixture.

#### NOTE

- Any change in altitude or power setting will require a change in the recommended lean mixture setting and a recheck of the EGT setting.
- The EGT indicators take several seconds, after a mixture adjustment, to start to show EGT changes. Finding peak EGT and adjusting the mixture to the applicable setting should take approximately one minute when the adjustments are made carefully and accurately. Adjusting the mixture quickly is not recommended.

(Continued Next Page)

## **CRUISE** (Continued)

### **FUEL SAVINGS PROCEDURES FOR NORMAL OPERATIONS**

For best fuel economy during normal operations, the following procedures are recommended.

1. After engine start and for all ground operations, set the throttle to 1200 RPM and lean the mixture for maximum RPM. After leaning, set the throttle to the appropriate RPM for ground operations. Leave the mixture at this setting until beginning the BEFORE TAKEOFF checklist. After the BEFORE TAKEOFF checklist is complete, lean the mixture again as described above, until ready to perform the TAKEOFF checklist.
2. Adjust the mixture for placarded fuel flows during MCP climbs.
3. Lean the mixture at any altitude for RECOMMENDED LEAN or BEST ECONOMY fuel flows when using 80% or less power.

#### **NOTE**

Using the above recommended procedures can provide fuel savings in excess of 5% when compared to typical training operations at full rich mixture. In addition, the above procedures will minimize spark plug fouling since the reduction in fuel consumption results in a proportional reduction in tetraethyl lead passing through the engine.

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## **CRUISE** (Continued)

### **FUEL VAPOR PROCEDURES**

The engine fuel system can cause fuel vapor formation on the ground during warm weather. This will generally occur when the outside ambient air temperature is above 80°F. Vapor formation may increase when the engine fuel flows are lower at idle and taxi engine speeds. The following procedures are recommended when engine idle speed and fuel flow fluctuations show that fuel vapor may be present:

1. With the mixture full rich, set the throttle at 1800 RPM to 2000 RPM. Maintain this power setting for 1 to 2 minutes or until smooth engine operation returns.
2. Retard the throttle to idle to verify normal engine operation.
3. Advance the throttle to 1200 RPM and lean the mixture as described under **FUEL SAVINGS PROCEDURES FOR NORMAL OPERATIONS**.
4. In addition to the above procedures, the auxiliary fuel pump may be turned ON with the mixture adjusted as required to aid vapor suppression during ground operations. The auxiliary fuel pump should be turned OFF prior to takeoff.
5. Just prior to **TAKEOFF**, apply full throttle for approximately 10 seconds to verify smooth engine operation for takeoff.

#### **NOTE**

When the engine is operated above 1800 RPM, the resulting increased fuel flow results in lower fuel temperatures throughout the engine fuel system. This increased flow purges the fuel vapor and the cooler fuel minimizes vapor formation.

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## **CRUISE** (Continued)

### **FUEL VAPOR PROCEDURES** (Continued)

In addition to the previous procedures, the sections below should be reviewed, and where applicable, adhered to:

- Section 3 -Take note of the excessive fuel vapor procedures in both the checklist and the amplified procedures sections.
- Section 4 -Take note of the hot weather operational notes and procedures in both the checklist and the amplified procedures sections.
- Section 7 -Take note of the altitude operational procedures and the section on auxiliary fuel pump operation.

## **STALLS**

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations.

Power off stall speeds at maximum weight for both forward and aft C.G. positions are presented in Section 5.

## LANDING

### NORMAL LANDING

Normal landing approaches can be made with power on or power off with any flap setting within the flap airspeed limits. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds. Steep slips with flap settings greater than 20° can cause a slight tendency for the elevator to oscillate under certain combinations of airspeed, sideslip angle, and center of gravity loadings.

Landing at slower speeds will result in shorter landing distances and minimum wear to tires and brakes. Power must be at idle as the main wheels touch the ground. The main wheels must touch the ground before the nosewheel. The nosewheel must be lowered to the runway carefully after the speed has diminished to avoid unnecessary nose gear loads. This procedure is very important for rough or soft field landings.

### SHORT FIELD LANDING

For a short field landing in smooth air conditions, approach at 60 KIAS with FULL flaps using enough power to control the glide path. Slightly higher approach speeds should be used in turbulent air conditions. After all approach obstacles are cleared, smoothly reduce power and hold the approach speed by lowering the nose of the airplane. The main wheels must touch the ground before the nosewheel with power at idle. Immediately after the main wheels touch the ground, carefully lower the nosewheel and apply heavy braking as required. For maximum brake performance, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without skidding the tires.

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## **LANDING** (Continued)

### **CROSSWIND LANDING**

When landing in a strong crosswind, use the minimum flap setting required for the field length. If flap settings greater than 20° are used in sideslips with full rudder deflection, some elevator oscillation may be felt at normal approach speeds. However, this does not affect control of the airplane. Although the crab or combination method of drift correction may be used, the wing low method gives the best control. After touchdown, hold a straight course with the steerable nosewheel, with aileron deflection as applicable, and occasional braking if necessary.

The maximum allowable crosswind velocity is dependent upon pilot capability as well as airplane limitations. Operation in direct crosswinds of 15 knots has been demonstrated.

### **BALKED LANDING**

In a balked landing (go-around) climb, reduce the flap setting to 20° immediately after full power is applied and climb at 55 KIAS. Above 5000 feet pressure altitude, lean the mixture to obtain maximum RPM. After clearing any obstacles, carefully retract the flaps and allow the airplane to accelerate to normal climb airspeed.

## COLD WEATHER OPERATIONS

Special consideration should be given to the operation of the airplane fuel system during the winter season or prior to any flight in cold temperatures. Proper preflight draining of the fuel system is especially important and will eliminate any free water accumulation. The use of additives such as isopropyl alcohol or Diethylene Glycol Monomethyl Ether (DIEGME) may also be desirable. Refer to Section 8 for information on the proper use of additives.

Cold weather often causes conditions that require special care during airplane operations. **Even small accumulations of frost, ice, or snow must be removed, particularly from wing, tail and all control surfaces to assure satisfactory flight performance and handling.** Also, control surfaces must be free of any internal accumulations of ice or snow.

If snow or slush covers the takeoff surface, allowance must be made for takeoff distances which will be increasingly extended as the snow or slush depth increases. The depth and consistency of this cover can, in fact, prevent takeoff in many instances.

(Continued Next Page)

## **COLD WEATHER OPERATION** (Continued)

### **STARTING**

When air temperatures are below 20°F (-6°C), use an external preheater and an external power source whenever possible to obtain positive starting and to reduce wear and abuse to the engine and electrical system. Preheat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures.

#### **WARNING**

**WHEN TURNING THE PROPELLER BY HAND, TREAT IT AS IF THE MAGNETOS SWITCH IS IN THE ON POSITION. A LOOSE OR BROKEN GROUND WIRE ON EITHER MAGNETO COULD ENERGIZE THE ENGINE.**

Prior to starting on cold mornings, it is advisable to turn the propeller manually through several engine compression cycles by hand to loosen the oil, so the engine cranks (motors) more easily and uses less battery power. When the propeller is turned manually, turn it in the opposite direction to normal engine rotation for greater safety. Opposite rotation disengages the magneto impulse couplings and prevents possible unwanted ignition.

When using an external power source, the MASTER switch ALT and BAT sections must be in the OFF position before connecting the external power source to the airplane receptacle. Refer to Section 7, External Power Receptacle, for external power source operations.

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## **COLD WEATHER OPERATION** (Continued)

### **STARTING** (Continued)

Cold weather starting procedures are the same as the normal starting procedures. However, to conserve battery power the beacon light can be left off until the engine is started. Use caution to prevent inadvertent forward movement of the airplane during starting when parked on snow or ice.

During cold weather starting, when performing the Standby Battery energy level test, the test lamp may not illuminate and the BUS E volts may be less than 24 volts before turning on the MASTER (ALT and BAT) switch. After engine start, verify the S BATT ammeter shows a charge (positive) at 1000 RPM or greater. Prior to takeoff verify the S BATT ammeter shows a charge less than 0.4 amps.

#### **NOTE**

If the engine does not start during the first few attempts, or if engine firing diminishes in strength, the spark plugs may be frosted over. Preheat must be used before another start is attempted.

During cold weather operations, the oil temperature indicator may not be in the green band prior to takeoff if outside air temperatures are very cold. After a suitable warm up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher engine RPMs. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for takeoff.

### **WINTERIZATION KIT**

An optional winterization kit is available and may be utilized when cold weather operations are conducted. Refer to Section 9, Supplement 5 for installation and operational details.

## HOT WEATHER OPERATIONS

Refer to the general warm temperature starting information under Starting Engine in this section. Avoid prolonged engine operation on the ground.

## NOISE CHARACTERISTICS

The certified takeoff noise level for the Model 182T at 3100 pounds maximum weight is 77.7 dB(A) per 14 CFR 36 Appendix G (through Amendment 36-21) and 81.1 dB(A) per ICAO Annex 16 Chapter 10 (through Amendment 4). No determination has been made that the noise levels of this airplane are, or should be, acceptable or unacceptable for operation at, into, or out of, any airport.

The following procedures are suggested to minimize the effect of airplane noise on the public:

1. Pilots operating airplanes under VFR over outdoor assemblies of persons, recreational and park areas, and other noise sensitive areas should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.
2. During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise sensitive areas.

### NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgment, an altitude of less than 2000 feet is necessary to adequately exercise the duty to see and avoid other airplanes.