ALAMO EROSPACE
351 AIRPORT DR. DECATUR, TX 76234

FAA APPROVED
PILOT'S OPERATING HANDBOOK and
AIRPLANE FLIGHT MANUAL SUPPLEMENT
FOR
CESSNA R182 S/N R18200002 through R18202041
WITH A LYCOMING IO-540-D4B5-AA ENGINE
OR
LYCOMING IO-540-AF1A5 ENGINE

REGISTRATION NO.:_____

SERIAL NO.:_____

This Supplement must be attached to the R182 "Pilot's Operating Handbook and FAA Approved Airplane Flight Manual" Revision 1 dated 24 May 1982 (or later FAA approved revision) when the Textron Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine rated at 260 HP and McCauley B3D36C431/80VSA-1 or B3D36C433/80VSA-1 propeller are installed in accordance with Supplemental Type Certificate **SA10811SC**.

The information contained herein supplements or supercedes the information in the basic manual only in those areas listed. For limitations, procedures, performance and loading information not contained in this supplement, consult the basic "Pilot's Operating Handbook and FAA Approved Flight Manual".

FAA APPROVED _____
for Gary A. Sharon, Acting Manager
Special Certification Office
Federal Aviation Administration
Fort Worth, Texas 76137-4298

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LOG OF REVISIONS

Revision Number	Change Description	Pages Affected	FAA Approval and Date
IR	Initial Release	1-23	Gary A. Sharon for S. Frances Cox, Mgr Special Certification Office Federal Aviation Administration Fort Worth, Texas 76137-4298 December 20, 2007
A	Added IO-540-AF1A5 Engine to Installation Eligibility	1,2,4,6,18,19,21,23	S. Frances Cox, Mgr Special Certification Office Federal Aviation Administration Fort Worth, Texas 76137-4298 July 23, 2008
B	Revised Emergency Procedures to include procedures regarding auxiliary fuel pump operation & engine-driven fuel pump failure	2,8,9,10, Subsequent pages renumbered; Added page 25	for Gary A. Sharon, Acting Mgr Special Certification Office Federal Aviation Administration Fort Worth, Texas 76137-4298 August 10, 2009

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SECTION 1
GENERAL

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DESCRIPTIVE DATA

ENGINE
Engine Manufacturer: Textron Lycoming (modified per Alamo Aerospace STC SE03498AT)
Engine Model Number: IO-540-D4B5-AA

OR

Engine Manufacturer: Textron Lycoming
Engine Model Number: IO-540-AF1A5

Engine Type: Normally aspirated, direct drive, air-cooled, horizontally opposed, fuel injected, six-cylinder engine with 541 cu. In. displacement
Horsepower Rating and Engine Speed: 260 rated BHP at 2700 RPM

PROPELLER
Propeller Manufacturer: McCauley Propeller Systems
Propeller Model Number: B3D36C431/80VSA-1 or B3D36C433/80VSA-1
Number of Blades: 3
Propeller Diameter: 79.0 inches
Propeller Type: Constant speed and hydraulically actuated, with a low pitch setting of 11.5° and a high pitch setting of 29.2° (30 inch station).

SPECIFIC LOADINGS
Power Loading: 11.9 lb/hp

Note: One of the major differences associated with this modification is the change from a carbureted-engine to a fuel-injected engine. As a result, some of the procedures have changed and are therefore outlined in this document.

SECTION 2
LIMITATIONS

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POWERPLANT LIMITATIONS

Engine Manufacturer: Textron Lycoming (modified per Alamo Aerospace STC SE03498AT)
Engine Model Number: IO-540-D4B5-AA

OR

Engine Manufacturer: Textron Lycoming
Engine Model Number: IO-540-AF1A5

Maximum Power: 260 BHP rating
Engine Operating Limits for
Takeoff and Continuous Operations:
Maximum Engine Speed: 2700 RPM

Propeller Manufacturer: McCauley Propeller Systems
Propeller Model Number: B3D36C431/80VSA-1
B3D36C433/80VSA-1
Propeller Diameter: Maximum 79.0 inches
Minimum 77.5 inch minimum
Propeller Blade Angle at 30 Inch Station:
Low Pitch: 11.5° ± 0.2°
High Pitch: 29.2° ± 0.5°

POWERPLANT INSTRUMENT MARKINGS

INSTRUMENT	RED LINE (MINIMUM)	GREEN ARC (NORMAL OPERATING)	RED LINE (MAX)
Tachometer	-----	2100 – 2700 RPM	2700 RPM
Manifold Pressure	-----	15 – 24.5 In. Hg.	-----
Fuel Flow (Pressure)	-----	0 to 17.0 GPH	-----

Figure 1
Powerplant Instrument Markings

PLACARDS

In plain view of the pilot:

MAX. POWER FUEL FLOW

ALTITUDE	FUEL FLOW
S.L.	23.0 GPH
2000'	21.5 GPH
4000'	20.0 GPH
6000'	18.5 GPH
8000'	17.0 GPH
10000'	16.0 GPH
12000'	15.0 GPH

Above the Alternate Air Control Knob:

ALTERNATE AIR

SECTION 3
EMERGENCY PROCEDURES

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OPERATIONAL CHECKLISTS

AMPLIFIED PROCEDURES

OPERATIONAL CHECKLISTS

ENGINE FAILURES

ENGINE FAILURE DURING FLIGHT (Restart Procedures)

1. Airspeed – 80 KIAS
2. Alternate Air – PULL (On)
3. Fuel Selector Valve – BOTH.
4. Auxiliary Fuel Pump Switch - ON
5. Mixture – RICH (If restart has not occurred).
6. Ignition Switch – BOTH (or START if propeller is stopped).
   NOTE: If propeller is windmilling, engine will restart automatically within a few seconds. If propeller has stopped (possible at low speeds), turn ignition switch to START, advance throttle slowly from idle, and lean the mixture from full rich, as required to obtain smooth operation.
7. Auxiliary Fuel Pump Switch – OFF
   NOTE: If fuel flow indication immediately drops to zero, signifying an engine-driven fuel pump failure, return the auxiliary fuel pump switch to ON.

FIRES

DURING START ON GROUND

1. Cranking – Continue, to get a start which would suck the flames and accumulated fuel into the engine.

If engine starts:

2. Power – 1700 RPM for a few minutes.
3. Engine – SHUTDOWN and inspect for damage.

If engine fails to start:

4. Throttle – FULL OPEN.
5. Mixture – IDLE CUTOFF.
6. Cranking – CONTINUE.
7. Fuel Selector Valve – OFF.
8. Auxiliary Fuel Pump – OFF.
9. Fire Extinguisher – OBTAIN (have ground attendants obtain if not installed).
10. Engine – SECURE.
    a. Master Switch – OFF.
    b. Ignition Switch – OFF.
11. Parking Brake – RELEASE.
12. Airplane – EVACUATE.
13. Fire – EXTINGUISH using fire extinguisher, wool blanket or dirt.
14. Fire Damage - INSPECT, repair damage or replace damaged components or wiring before conducting another flight.

ENGINE FIRE IN FLIGHT

1. Mixture – IDLE CUT OFF.
2. Fuel Selector Valve – OFF.
3. Auxiliary Fuel Pump Switch – OFF.
4. Master Switch – OFF.
5. Cabin Heat and Air – OFF (except overhead vents).
6. Airspeed – 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed – within airspeed limitations – which will provide an incombustible mixture).
7. Forced landing – EXECUTE (as described in Emergency Landing Without Engine Power).

ICING

INADVERTENT ICING ENCOUNTER (revised procedural step 5)

5. Watch for signs of induction air filter icing and apply Alternate Air as required. An unexplained loss in manifold pressure could be caused by induction system ice or air intake filter ice. Adjust the throttle as desired to set manifold pressure. Adjust mixture, as required for any change in power settings.

AMPLIFIED PROCEDURES

ROUGH ENGINE OPERATION OR LOSS OF POWER

INDUCTION SYSTEM ICING

An unexplained drop in manifold pressure and eventual engine roughness may result from the formation of induction system icing. To clear the ice, apply full throttle and pull the Alternate Air knob full out until the engine runs smoothly; then remove Alternate Air and readjust the throttle. If conditions require the continued use of Alternate Air in cruise flight, use the minimum amount of heat necessary to prevent ice from forming and lean the mixture for smoothest engine operation.

ENGINE-DRIVEN FUEL PUMP FAILURE

Failure of the engine-driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication immediately prior to a loss of power, while operating from a fuel tank containing adequate fuel.

In the event of an engine-driven fuel pump failure, immediately turn the auxiliary fuel pump switch ON to restore the engine power. In this event, the flight should be terminated when practical and the fuel pump repaired.

SECTION 4
NORMAL PROCEDURES

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CHECKLIST PROCEDURES

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CHECKLIST PROCEDURES

STARTING ENGINE

1. Throttle – Open ¼ inch.
2. Propeller – High RPM.
3. Mixture – Idle Cutoff.
4. Propeller Area – Clear.
5. Master Switch – On.
6. Auxiliary Fuel Pump Switch – On.
7. Mixture – Advance for approximately five seconds, then return to Idle Cut Off position.
8. Auxiliary Fuel Pump – Off.

NOTE

If engine is warm, omit priming procedure of step 6,7 and 8 above.

9. Ignition Switch – Start (release when engine starts)
10. Mixture – Advance smoothly to RICH when engine fires.

NOTE

If engine floods, place mixture in idle cut off, open throttle ½ to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly.

11. Oil Pressure – Check
12. Flashing Beacon and Navigation Lights – On as required.
13. Avionics Master Switch – On
14. Radios – On

BEFORE TAKEOFF (revised procedural step 13)

13. Throttle – 1800 RPM.
    a. Magnetos – Check (RPM drop should not exceed 150 RPM on either magneto or 50 RPM differential between magnetos).
    b. Alternate Air – PULL OUT (Check for RPM drop); return to cool position (full in).
    c. Propeller – Cycle from high to low RPM; return to high RPM (full in).
    d. Suction Gage – Check
    e. Engine Instruments and Ammeter – Check

TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps – 0° - 20°.
2. Alternate Air – IN (Off)
3. Power – FULL THROTTLE AND 2700 RPM.
4. Mixture – RICH (mixture may be leaned to Maximum Power Fuel Flow placard value).
5. Elevator Control – LIFT NOSE WHEEL at 50 KIAS.

NOTE

When the nose wheel is lifted, the gear motor may run 1-2 seconds to restore hydraulic pressure.

6. Climb Speed – 70 KIAS (flaps 20°).
   80 KIAS (flaps 0°).
7. Brakes – Apply momentarily when airborne.
8. Landing Gear – RETRACT in climb out.
9. Wing Flaps – RETRACT.

SHORT FIELD TAKEOFF

1. Wing Flaps – 20°.
2. Alternate Air – IN (Off).
3. Brakes – APPLY.
4. Power – FULL THROTTLE AND 2700 RPM.
5. Mixture – Lean to obtain Maximum Power Fuel Flow placard value.
6. Brakes – RELEASE.
7. Elevator Control – MAINTAIN SLIGHTLY TAIL LOW ATTITUDE.
8. Climb Speed – 59 KIAS (until all obstacles are cleared).
9. Brakes – APPLY momentarily when airborne.
10. Landing Gear – RETRACT after obstacles are cleared.
11. Wing Flaps – RETRACT slowly after reaching 70 KIAS.

ENROUTE CLIMB

NORMAL CLIMB

1. Airspeed – 90-100 KIAS.
2. Power – 25 in. Hg or Full Throttle (whichever is less) and 2500 RPM.
3. Fuel Selector Valve – BOTH.
4. Mixture – 18.5 GPH or Full Rich (whichever is less).
5. Cowl Flaps – OPEN as required.

MAXIMUM PERFORMANCE CLIMB

1. Airspeed – 88 KIAS at sea level to 75 KIAS at 10,000 feet.
2. Power – FULL THROTTLE and 2700 RPM.
3. Fuel Selector Valve – BOTH.
4. Mixture – Lean in accordance with Maximum Power Fuel Flow placard value.
5. Cowl Flaps – FULL OPEN.

CRUISE

1. Power – 15-24.5 in. Hg., 2100-2500 RPM (no more than 75% power).
2. Elevator and Rudder Trim – ADJUST.
3. Mixture – LEAN.
4. Cowl Flaps – CLOSED.

BEFORE LANDING

1. Passenger Seat Backs – MOST UPRIGHT POSITION.
2. Seats, Seat Belts, Shoulder Harnesses – SECURE
3. Fuel Selector Valve – BOTH.
4. Landing Gear – DOWN (below 140 KIAS).
5. Landing Gear – CHECK (observe main gear down and green indicator light illuminated).
6. Mixture – RICH.
7. Propeller – HIGH RPM.
8. Autopilot (if installed) – OFF.
9. Air Conditioner (if installed) – OFF.
10. Radar (if installed) – OFF.

LANDING

BALKED LANDING

1. Power – FULL THROTTLE and 2700 RPM.
2. Wing Flaps – RETRACT to 20°.
3. Climb Speed – 75 KIAS.
4. Wing Flaps – RETRACT slowly.
5. Cowl Flaps – OPEN.

AFTER LANDING

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

AMPLIFIED PROCEDURES

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.

However, 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 "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 fires, and then smoothly to full rich as power develops.

Should the engine tend to die after starting, turn on the auxiliary fuel pump temporarily and adjust the throttle and/or mixture as necessary to keep the engine running. In the event of over priming or flooding, turn off the auxiliary fuel pump, open the throttle from ½ to full open, and continue cranking with the mixture full lean. 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 fire at all, and additional priming will be necessary.

After starting, if the oil pressure indicator does not begin to show pressure within 30 seconds in the summer time and approximately one minute in very cold weather, stop the engine and investigate. Lack of oil pressure can cause serious engine damage.

Recommended starter duty cycle. Crank the starter 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. Repeat cranking procedures above one more time. If the engine still fails to start, an investigation to determine the cause should be initiated.

After the completion of normal engine starting procedures, it is a good practice to verify that the engine starter has disengaged. If the starter contactor were to stick closed, causing the starter to remain engaged, an excessively high charge indication (full scale at 1000 RPM) would be evident on the ammeter. In this event, immediately shut down the engine and take corrective action prior to flight.

TAXIING

When taxiing, it is important that speed and use of the brakes be held to a minimum and that all controls be utilized to maintain directional control and balance.

The alternate air control knob should be pushed full in during all ground operations unless it is absolutely necessary for smooth engine operation. When the knob is pulled out to the "On" position, air entering the engine is not filtered.

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

BEFORE TAKEOFF

MAGNETO CHECK

The magneto check should be made at 1800 RPM as follows. Move ignition switch first to R position and note RPM. Next move switch back to BOTH to clear the other set of plugs. Then move switch to the L position, note RPM and return the switch to the BOTH position. RPM drop should not exceed 150 RPM on either magneto or show 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.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

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 2650 to 2700 RPM.

Full power runups over loose gravel are especially harmful to propeller tips. When takeoffs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it. When unavoidable small dents appear in the propeller blades they should be corrected immediately as described in Section 8 of the original Flight Manual.

After full power is applied, adjust the throttle friction lock clockwise to prevent the throttle from creeping from a maximum power position. Similar friction lock adjustment should be made as required in other flight conditions to maintain a fixed throttle setting.

ENROUTE CLIMB

Normal climbs are performed at 90-100 KIAS with flaps up, 25 In. Hg. or full throttle (whichever is less) and 2500 RPM for the best combination of performance, visibility and engine cooling. The mixture should be set to 18.5 GPH or full rich (whichever is less) until reaching the altitude at which full throttle is reached, after which no further adjustment of the mixture control is needed.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at higher altitudes, the best rate of climb speed should be used with maximum power. This speed is 88 KIAS at sea level, decreasing to 75 KIAS at 10,000 feet.

If an obstruction ahead requires a steep climb angle, a best angle of climb air speed should be used with flaps up and maximum power. This speed is 65 KIAS at sea level, increasing to 67 KIAS at 10,000 feet. This type of climb should be of minimum duration and engine temperatures should be carefully monitored due to the low climb speed and consideration should be given to cowl flap position.

For maximum power, the mixture should be set in accordance with the Maximum Power Fuel Flow placard.

NOISE CHARACTERISTICS AND NOISE REDUCTION

The certificated noise level for the Model R182 at 260 HP at 3,100 pounds maximum weight is 82.9 dB(A). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

SECTION 5
PERFORMANCE

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SHORT FIELD TAKEOFF DISTANCE

CONDITIONS:
Flaps 20°
2700 RPM, Full Throttle and Mixture set to Maximum Power Fuel Flow placard value prior to Brake Release
Cowl Flaps Open
Paved, Level Dry Runway
Zero Wind

The takeoff performance of this airplane equipped with the Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine is equal to or better than the performance listed in the original Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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MAXIMUM RATE-OF-CLIMB AT 3100 POUNDS

CONDITIONS:

Flaps Up
Gear Up
2700 RPM, Full Throttle, Mixture set to Maximum Power Fuel Flow placard value
Cowl Flaps Open

The climb performance of this airplane equipped with the Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine is equal to or better than the performance listed in the original Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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SECTION 6
WEIGHT & BALANCE/EQUIPMENT LIST

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COMPREHENSIVE EQUIPMENT LIST

ITEM No.	EQUIPMENT LIST DESCRIPTION	REF PART NO.	WT LBS	ARM INCHES
	A. POWERPLANT & ACCESSORIES			
A-01-R	ENGINE, LYCOMING IO-540-D4B5-AA		403.5	-23.6
A-02-R	ENGINE, LYCOMING IO-540-AF1A5			
A-03-R	PROPELLER, MCCAULEY B3D36C431/80VSA-1 (Aircraft S/N R18201314 and On)		76.1	-47.5
A-04-R	PROPELLER, MCCAULEY B3D36C433/80VSA-1 (Aircraft S/N R18200002 to R18201313)		73.0	-45.5
A-05-R	SPINNER ASSEMBLY, D-7499-1 (Aircraft S/N R18201314 and On)		4.5	-49.9
A-06-R	SPINNER ASSEMBLY, D-6614 (Aircraft S/N R18200002 to R18201313)		4.5	-47.9

Figure 2
Equipment List

SECTION 7
AIRPLANE AND SYSTEMS DESCRIPTION

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ENGINE

The airplane is powered by a horizontally opposed, six cylinder, overhead valve, air cooled, fuel injected engine with a wet sump lubrication system. The engine is a Lycoming Model IO-540-D4B5-AA or IO-540-AF1A5 and is rated at 260 horsepower at 2700 RPM. Major accessories include a starter and belt driven alternator mounted on the front of the engine, and dual magnetos, a single vacuum pump, and a full flow oil filter mounted on the rear of the engine accessory case.

ENGINE INSTRUMENTS

The engine driven mechanical tachometer is located on the right side of the pilot's instrument panel. The instrument is marked in increments of 100 RPM, and indicates both engine and propeller speed. An hour meter in the lower section of the dial records elapsed engine time in hours and tenths. Instrument markings include the normal operating range (green arc) of 2100 to 2700 RPM, and a maximum (red line) of 2700 RPM.

The manifold pressure gauge is part of the manifold pressure gauge/fuel flow indicator located on the right side of the instrument panel. The gauge is direct reading and indicates induction air manifold pressure in inches of mercury. It has a normal operating range (green arc) of 13 to 24.5 In. Hg. The fuel flow indicator is a fuel pressure indicator calibrated in flow rate. The fuel pressure is taken at the flow divider valve and is proportional to fuel flow. The indicator is marked in gallons per hour and has a green arc from 0 to 17.0 gal./hr. There is no red line or maximum fuel flow (pressure) limitation. There maybe some atmospheric conditions that would result in fuel flow rates that exceed the maximum marked value on the indicator (i.e., very low density altitude and full throttle). If the indicator is pegged out because of these conditions, the indicator will not be damaged, and will return to operating range when the throttle is retarded to cruise power settings.

AIR INDUCTION SYSTEM

The engine air induction system receives ram air through an intake scoop in the upper left hand engine cowling. The intake scoop is covered by an air filter which removes dust and other foreign matter from the induction air. Airflow passing through the filter enters an airbox. After passing through the airbox, induction air enters a fuel/air control unit at the rear of the engine and is then ducted to the engine cylinders through intake manifold tubes. In the event induction system icing is encountered or the intake filter becomes blocked, alternate heated air can be obtained from a shroud around the left hand muffler through a duct to a valve, in the airbox, operated by the Alternate Air control on the instrument panel. Heated air from the muffler shroud is obtained from unfiltered air inside the cowling. Use of Alternate Air at full throttle will result in a loss of approximately one inch of manifold pressure.

FUEL SYSTEM

AUXILIARY FUEL PUMP OPERATION

The auxiliary fuel pump is used primarily for priming the engine before starting. Priming is accomplished through the fuel injection system. If the auxiliary fuel pump switch is accidentally placed in the ON position for prolonged periods (with master switch turned on and mixture rich) with the engine stopped, the engine may be flooded.

The auxiliary fuel pump is also used for vapor suppression in hot weather. Normally, momentary use will be sufficient for vapor suppression; however, continuous operation is permissible if required. Turning on the auxiliary fuel pump with a normally operating engine pump will result in only a very minor enrichment of the mixture.

It is not necessary to operate the auxiliary fuel pump during normal takeoff and landing, since gravity and the engine-driven fuel pump will supply adequate flow. In the event of failure of the engine-driven fuel pump, use of the auxiliary fuel pump will provide sufficient fuel to maintain flight at maximum continuous power.