Peterson's Performance Plus, Inc.
1465 SE 30th
El Dorado Municipal Airport
El Dorado, KS 67042



# F.A.A. APPROVED
## Supplemental Airplane Flight Manual
## Or
## Airplane Flight Manual Supplement

**Registration Number** _____
**Serial Number** _____

This Supplement must be attached to the FAA approved Airplane Flight Manual when the Continental (TCM) IO-550-D engine with a McCauley D3A34C401/90DFA-8 or D3A34C401/90DFA-4 propeller with HIGH/OFF/LOW Auxiliary Electric Boost Pump Configuration is installed in accordance with Supplemental Type Certificate SA3825SW. For those airplanes without a basic Airplane Flight Manual, the Supplemental AFM must be in the aircraft when the TCM IO-550-D engine with a McCauley D3A34C401/90DFA-8 or D3A34C401/90DFA-4 propeller is installed.

The information contained in this Airplane Flight Manual Supplement/Supplemental Aircraft Flight Manual supplements or supersedes the basic manual/placards only in those areas listed. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual, Markings and Placards.

**FAA APPROVED:** _____
for **Margaret Kline, Manager**
**Aircraft Certification Office**
**Federal Aviation Administration**
**Wichita, Kansas**

## LOG OF REVISIONS

| Rev. No | Pages | Description | Date | Approved* |
|---|---|---|---|---|
| N/C | All | Initial Release | 7/29/2010 | |

*Manager
Aircraft Certification Office
Federal Aviation Administration
Wichita, Kansas

## INDEX

## I. GENERAL

### DESCRIPTIVE DATA

**ENGINE**

Engine Manufacturer: Teledyne Continental Motors
Engine Model Number: IO-550-D
Engine Type: Normally-aspirated, direct-drive, air-cooled, horizontally-opposed, fuel-injected, six-cylinder engine with 550 cu. in. displacement.
Horsepower rating and engine speed: 292 BHP at 2600 RPM or 265 BHP at 2450 RPM

**PROPELLER**

Propeller Manufacturer: McCauley Propeller Systems
Propeller Model Numbers: D3A34C401/90DFA-8 or -4
Number of Blades: 3

Propeller Diameter D3A34C401/90DFA-8, Maximum: 82 inches
Minimum: 80 inches
Propeller Type: Constant speed and hydraulically actuated, with a low pitch setting of 11.2° and a high pitch setting of 28.5° at the 30 inch station.

Propeller Diameter D3A34C401/90DFA-4, Maximum: 86 inches
Minimum: 84 inches
Propeller Type: Constant speed and hydraulically actuated, with a low pitch setting of 10.0° and a high pitch setting of 28.0° at the 30 inch station.

**FUEL**

Approved Fuel Grades (and colors)
100LL Grade Aviation Fuel (blue)
100 Grade Aviation Fuel (green)

## II. LIMITATIONS

**POWERPLANT LIMITATIONS**

Engine Manufacturer: Teledyne Continental Motors
Engine Model Number: IO-550-D

Engine Operating Limits for Takeoff and Continuous Operations:
Maximum Power: 292 BHP at 2600 RPM or 265 BHP at 2450 RPM
Maximum Engine Speed: 2600 RPM (-8 propeller)/2450 RPM (-4 propeller)
Maximum Cylinder Head Temperature: 460° F
Maximum Oil Temperature: 240° F
Oil Pressure, Minimum: 10 psi
Normal: 30-60 psi
Maximum: 100 psi

**CAUTION**

ENGINE OPERATION WITH INDICATED OIL PRESSURE BELOW THE GREEN BAND RANGE WHILE IN CRUISE OR CLIMB CONFIGURATION IS CONSIDERED ABNORMAL AND SHOULD BE INSPECTED BY QUALIFIED MAINTENANCE PERSONNEL BEFORE NEXT FLIGHT.

Engine Operating Limits for Ground (Static):
Minimum Idle: 825 +50/-0 RPM

Fuel Grade: See Fuel Limitations

Propeller Manufacturer: McCauley Propeller systems
Propeller Model Numbers: D3A34C401/90DFA-8 or -4

Propeller Diameter D3A34C401/90DFA-8, (182E,F,G, H,J,K,L,M,N,P,Q,R)
Maximum: 82 inches
Minimum: 80 inches
Propeller Blade Angle at 30 Inch Station, Low: 11.2°
High: 28.5°

Propeller Diameter D3A34C401/90DFA-4 (Limited to Models 182P, Q and R)
Maximum: 86 inches
Minimum: 84 inches
Propeller Blade Angle at 30 Inch Station, Low: 10.0°
High: 28.0°

Propeller Operating Limits: Continuous operation between 1900--2100 RPM at or above 26 in. Hg. manifold pressure is prohibited

**POWERPLANT INSTRUMENT MARKINGS**

## 182 E thru R with IO-550-D

| INSTRUMENT | RED LINE | GREEN ARC | YELLOW ARC | RED LINE |
|---|---|---|---|---|
| | MINIMUM LIMIT | NORMAL OPERATING | | MAXIMUM LIMIT |
| Tachometer | | | | |
| Idle (Static RPM) | 825 +50 / -0 | | | |
| Propeller: D3A34C401/90DFA-8 (82") | | 1900–2600 | | 2600 |
| Manifold Pressure (In. Hg.) | | 15 – 24.5 | 24.5 – 29.5 | 29.5 |
| Oil Temperature (°F) | | 100 – 240 | | 240 |
| Cylinder Head Temperature (°F) | | 200 – 460 | | 460 |
| Oil Pressure (psi) | 10 | 30 – 60 | | 100 |
| Fuel Flow (Pressure*) | (3.5 psi) | 7.0 –17.0 gph | | 25.2 gph (19.5 psi) |

Note*: Fuel pressure values are information only.

## 182 P, Q and R with IO-550-D

| INSTRUMENT | RED LINE | GREEN ARC | YELLOW ARC | RED LINE |
|---|---|---|---|---|
| | MINIMUM LIMIT | NORMAL OPERATING | | MAXIMUM LIMIT |
| Tachometer | | | | |
| Idle (Static RPM) | 825 +50 / -0 | | | |
| Propeller: D3A34C401/90DFA-4 (86") | | 1900–2450 | 1900–2100 ★ | 2450 |
| Manifold Pressure (In. Hg.) | | 15 – 24.5 | 24.5 – 29.5 | 29.5 |
| Oil Temperature (°F) | | 100 – 240 | | 240 |
| Cylinder Head Temperature (°F) | | 200 – 460 | | 460 |
| Oil Pressure (psi) | 10 | 30 – 60 | | 100 |
| Fuel Flow (Pressure*) | (3.5 psi) | 7.0 –17.0 gph | | 25.2 gph (19.5 psi) |

Note*: Fuel pressure values are information only.

**NOTE ★:** Continuous operation between 1900–2100 RPM at or above 26 in. Hg. manifold pressure is prohibited.

### CENTER OF GRAVITY LIMITS

**WITH IO-550-D**
Center of Gravity Limits
Center of Gravity Range (Reference Datum front face of firewall):
The Center of Gravity Range remains unchanged except for the aft CG which is 46 inches for all models at all weights.

Cessna 182E-M:
Forward: 33.0 inches aft of datum at 2250 lbs. or less with straight line variation to 38.4 inches at 2800 lbs.
Aft: 46.0 inches aft of datum at all weights.

Cessna 182N:
Forward: 33.0 inches aft of datum at 2250 lbs. or less with straight line variation to 38.4 inches at 2800 lbs. (landing) and 29.9 inches at 2950 lbs. (takeoff)
Aft: 46.0 inches aft of datum at all weights

Cessna 182P-Q:
Forward: 33.0 inches aft of datum at 2250 lbs or less with straight line variation to 39.5 inches at 2950 lbs.
Aft: 46.0 inches aft of datum at all weights

Cessna 182R:
Forward: 33.0 inches aft of datum at 2250 lbs. or less with straight line variation to 40.9 inches at 3100 lbs.
Aft: 46.0 inches at all weights

**FUEL LIMITATIONS**

Approved Fuel Grades (and colors): All minimum 100 Octane
100LL Grade Aviation Fuel (blue)
100 Grade Aviation Fuel (green)

**OTHER LIMITATIONS**

Cessna part number 1232040-3 unsymmetrical abrasion boot is not approved for the Cessna 182 with the TCM IO-550-D engine installation. The Cessna 182 with the TCM IO-550-D installation can have either a horizontal stabilizer with no abrasion boots installed or the Cessna part number 1232040-5 symmetric abrasion boots installed.

**PLACARDS**

Above the tachometer, in full view of the pilot (D3A34C401/90DFA-4 propeller only):

CONTINUOUS OPERATION BETWEEN 1900-2100 RPM AT
OR ABOVE 26" MANIFOLD PRESSURE IS PROHIBITED

At the fuel tank filler locations (L/R):

APPROVED FUEL GRADES:
100LL GRADE AVIATION FUEL (BLUE)
100 GRADE AVIATION FUEL (GREEN)

Next to the auxiliary electric boost pump switch.

BOOST PUMP

HIGH / OFF/ LOW

## III. EMERGENCY PROCEDURES

**ENGINE FAILURE DURING FLIGHT (RESTART PROCEDURES)**
**(HIGH/OFF/LOW Auxiliary Electric Boost Pump Configuration)**

1. Airspeed - - 75 KIAS
2. Fuel Selector Valve - - BOTH
3. Mixture - - RICH
4. Boost Pump Switch - - HIGH for 3-5 seconds with throttle half open; then OFF

**NOTE**

If the fuel flow indication immediately drops to zero, signifying an engine driven fuel pump failure, place the boost pump switch to HIGH. Thereafter leave in the HIGH position. If throttle is subsequently reduced, place the boost pump switch in the LOW position for reduced fuel flow for those power settings. Adjust mixture as required for smooth engine operation.

5. Ignition Switch - - BOTH (or START if propeller is stopped)

**NOTE**

If propeller is windmilling, engine may restart automatically within a few seconds. If propeller is stopped (possible at low speeds), turn ignition switch to START, advance throttle slowly from idle, and (at higher altitudes) lean the mixture from full rich.

6. Throttle - - as required.
7. Mixture - - as required as power is restored.
8. Fuel Selector Valve - - as desired after fuel flow is stabilized.

**FIRES**

**DURING START ON GROUND**

1. Cranking - - CONTINUE cranking to obtain a start.
2. Boost Pump Switch - - OFF verify.
3. Power - - 1700 RPM for a few minutes,
4. Engine - - SHUTDOWN and inspect for damage.

**IF ENGINE FAILS TO START:**

No change to existing procedures in owner's manual or POH/AFM

**AMPLIFIED PROCEDURES**

**ENGINE - DRIVEN FUEL PUMP FAILURE**

Failure of the engine driven fuel pump will be evidenced by a sudden reduction in the fuel flow indication 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 during takeoff immediately place the auxiliary electric boost pump switch in the HIGH position until the airplane is well clear of obstacles. The electric boost pump (in the HIGH position) will provide adequate fuel flow for powers up to approximately 85%. Manual leaning may be required at lower power settings to achieve smooth engine operation. Upon reaching a safe altitude and reducing power to a cruise setting, place the electric boost pump switch in the LOW position. The low position will then provide sufficient fuel to maintain engine operation while maneuvering for a landing.

If an engine driven fuel pump failure occurs during cruise flight apply full rich mixture and momentarily place the auxiliary electric boost pump switch in the HIGH position to reestablish fuel flow. Then the LOW position may be used to sustain level flight. If necessary, additional fuel flow is obtainable by placing the electric boost pump switch in the HIGH position.

The auxiliary electric boost pump should not be used during normal takeoff, climb or approach. It is for engine starting and an emergency backup only.

**ALTERNATE AIR**

The fuel injection system employed on these engines 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 valve opens automatically for the most efficient use of either normal or alternate air, depending on the amount of filter blockage. This results in a power loss of approximately 10% at full throttle.

## IV. NORMAL PROCEDURES

**WARNING**

The airplane is equipped with an accumulator tank downstream of the fuel selector. Takeoffs are to be performed with the fuel selector in the BOTH position. Inadvertently leaving the fuel selector in the OFF position may permit the engine to be started and run off the accumulator tank and potentially lead to premature engine stoppage in-flight.

**STARTING ENGINE**

1. Throttle - - CLOSED.
2. Propeller - - HIGH RPM.
3. Mixture - - RICH.
4. Propeller AREA - - CLEAR.
5. Master Switch - - ON.
6. Boost Pump Switch - - HIGH
7. Throttle - - ADVANCE to obtain 3-4 gph fuel flow then immediately return to CLOSED position.
8. Boost Pump Switch - - OFF.
9. Ignition Switch - - START.
10. Throttle - - ADVANCE slowly.
11. Ignition Switch - - RELEASE when engine starts.

NOTE

The engine should start in two to three revolutions. If it does not continue running, start again at Step 4 above. If the engine does not start, leave the auxiliary boost pump switch off, set mixture to idle cut-off, open throttle and crank until engine fires or for approximately 15 seconds. If still unsuccessful, start again using the normal starting procedure after allowing starter motor to cool. If prolonged cranking is necessary, allow the starter motor to cool at frequent intervals.

NOTE

After starting, check oil pressure within 30 seconds in normal temperatures and 60 seconds in cold temperatures (approximately 32°F or less). If no indication appears, shut off engine and investigate.

**BEFORE TAKEOFF**

Add to existing checklist:
Verify Boost Pump Switch - - OFF

**DESCENT**

Add to existing checklist:
Verify Boost Pump Switch - - OFF

**BEFORE LANDING**

Add to existing checklist:
Verify Boost Pump Switch - - OFF

**NOISE ABATEMENT**

The takeoff noise levels established in compliance with FAR 36 Appendix G are:

--Model 182E,F,G, H,J,K,L,M,N,P,Q,R with propeller D3A34C401/90DFA-8,
at 2600 RPM is: 86.2 dB (A)
--Model 182P, Q and R only with propeller D3A34C401/90DFA-4,
at 2450 RPM is: 84.6 dB (A)

No determination has been made by the FAA that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of any airport.

## AMPLIFIED PROCEDURES

**STARTING ENGINE**

In operating your Cessna 182 with the IO-550 engine, you will need to be aware of the fact that the fuel to the engine is no longer gravity fed. As with all fuel-injected engines, there is an engine-driven fuel pump and an auxiliary electric boost pump. The electric boost pump is to be used to prime the engine for starting and as an emergency fuel pump should the engine-driven pump fail. Do not turn on the electric boost pump during normal operation as the fuel/air ratio will be considerably richer than that required for efficient operation.

Proper fuel management and throttle adjustments are the determining factors in securing an easy start from your continuous flow fuel-injected engine.

Conventional full-rich mixture and high RPM propeller settings are used for starting. The throttle, however, should be fully closed initially. When ready to start, the normal starting procedure should be used with these exceptions. After the master switch is turned on, the electric boost pump should be momentarily turned on high and the throttle advanced to provide priming for the engine. Retard the throttle and turn the auxiliary boost pump switch off. Turn the ignition switch to the start position.

Engine starting in hot weather or with a hot engine is sometimes hampered by vapor formation in the fuel lines. A normal hot start is accomplished with the mixture full rich and the throttle retarded. Do not use the electric boost pump. After the engine starts, it is sometimes necessary to momentarily turn the

electric boost pump on to help prime the engine and purge any remaining vapor. If engine starting is hampered by vapor formation, purge the vapor by moving the mixture control to full rich, open the throttle 1 ½" to 2" and prime with the electric boost pump until the indicator reads 3-4 gph. At this point, shut off the electric boost pump and engage the starter. As the flooded mixture becomes progressively leaner reaching a combustible mixture, the engine will start. If the engine tends to die, turn the electric boost pump switch on momentarily at appropriate intervals until the vapor is fully cleared and the engine runs smoothly.

The Pilot's Operating Handbook/FAA Approved Flight Manual and applicable markings and placards should be used for all other information.

## V. PERFORMANCE

The takeoff, climb and landing performance of this airplane equipped with the Continental IO-550-D with McCauley propeller model D3A34C401/90DFA-8 or D3A34C401/90DFA-4 is equivalent to the performance as listed in the original flight manual. Use the existing take-off, climb and landing performance values provided in the owner's manual or Pilots Operating Handbook and FAA Approved airplane flight manual.

Cruise performance of the IO-550-D has not been flight tested.

At the higher IO-550 power settings, range and endurance will be decreased.

Plan for increased fuel consumption in all regimes, at all powers and altitudes.

Plan for reduced range.

## VI. WEIGHT AND BALANCE

See Peterson's Performance Plus, Inc. "IO-550 Weight and Balance Form".

EQUIPMENT LIST
Engine Manufacturer: Teledyne Continental (TCM)
Engine Model Number: IO-550-D
Propeller Manufacturer: McCauley Propeller Systems
Propeller Model Numbers: D3A34C401/90DFA-8, or -4
Number of Blades: 3

## VII. AIRPLANE & SYSTEMS DESCRIPTIONS

### AIRFRAME

The modification includes the addition of a tail weight installation.

### ENGINE

The airplane is powered by a horizontally-opposed, six cylinder, fuel injected engine with a wet sump oil system. The engine is a TCM IO-550-D rated at 292 HP at 2600 RPM or 282 HP at 2450 RPM. Major engine accessories include a propeller governor on the front of the engine and dual magnetos, starter, and belt driven alternator on the rear of the engine. Provisions are also made for a vacuum pump and a full flow oil filter.

### ENGINE INSTRUMENTS

The manifold pressure/fuel flow gauge is a dual indicating instrument displaying manifold pressure on the left side and fuel flow on the right side. The manifold pressure side is a direct reading and indicated induction air pressure in inches of mercury. The fuel flow side of the fuel pressure gauge is calibrated to indicate the approximate gallons per hour of fuel being metered to the engine. The tachometer is remarked with the appropriate range markings.

**AIR INDUCTION SYSTEM**

The engine air induction system receives ram air through an intake in the lower front portion of the engine cowling. The intake is covered by an air filter which removes dust and other foreign matter from the induction air. The airflow passing through the air filter enters an adapter that contains a spring-loaded alternate air door. If the induction air filter should become blocked the alternate air door will automatically open and draw unfiltered air from inside the cowl. Air flow through this adapter is channeled to the fuel injection throttle body by means of a flexible hose.

**FUEL INJECTION SYSTEM**

The engine is equipped with a fuel injection system. The system is comprised of an engine driven fuel pump, fuel/air control unit, fuel manifold, fuel flow indicator and air bleed type injector nozzles. Fuel is delivered by the engine driven fuel pump to the fuel/air control unit on the bottom of the engine. The fuel/air control unit correctly proportions the fuel flow to the induction air flow. After passing through the control unit, induction air is delivered to the cylinder through intake manifold tubes and metered fuel is delivered to a fuel manifold. The fuel manifold, through spring tension on a diaphragm and valve, evenly distributes the fuel to an air-bleed type injector nozzle in the intake valve chamber of each cylinder. A pressure line is also attached to the fuel manifold and is connected to a fuel flow indicator on the instrument panel.

**PROPELLER**

The airplane is equipped with a three-blade, all metal, constant speed, governor regulated propeller for the IO-550-D. The IO-550-D engine has two different length propellers certified; either the McCauley D3A34C401DFA-8 (82" diameter) for Cessna 182 Models E thru R, or the D3A34C401DFA-4 (86" diameter) for Cessna 182 Models P thru R. The D3A34C401/90DFA-4 propeller installation has a prohibited range of operation as defined in the Limitations section of this Airplane Flight Manual Supplement. Both propeller installations require propeller RPM to be limited by governor stop adjustment.

**FUEL SYSTEMS (Refer to Figure 1)**

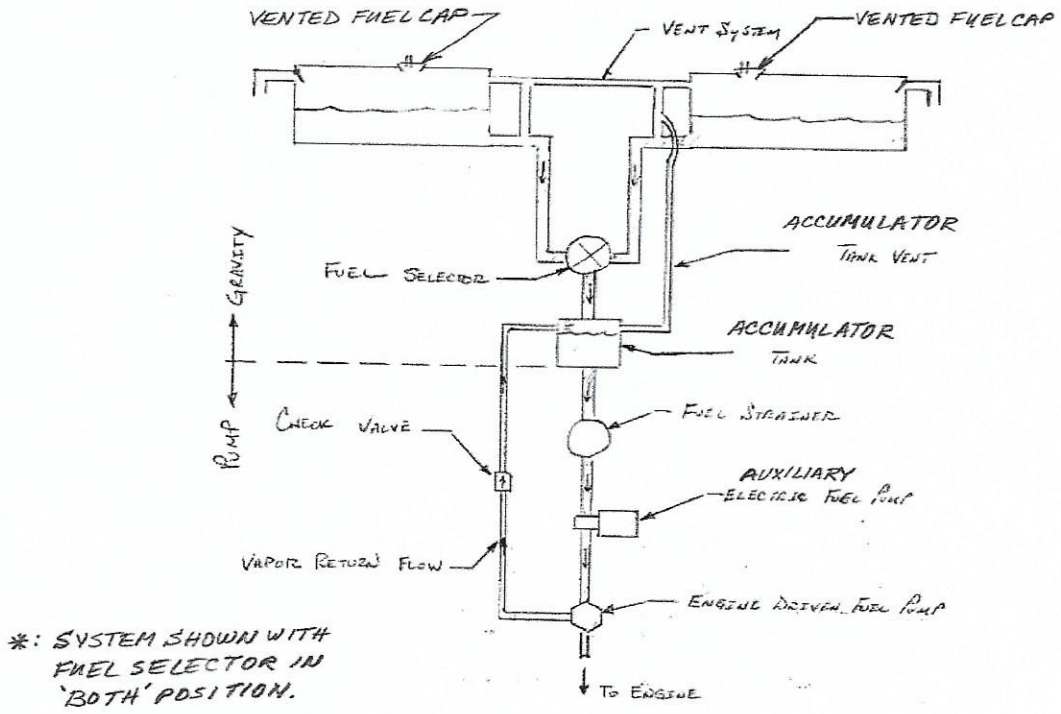


Figure 1
Fuel System Schematic – Modified Aircraft

Fuel flows by gravity from the wing tanks to a four position fuel selector valve labeled BOTH, RIGHT, LEFT and OFF. With the fuel selector in the LEFT TANK, RIGHT TANK, or BOTH positions fuel flows from the fuel selector valve to the accumulator tank, located in the firewall tunnel aft of the firewall, from the accumulator tank to the fuel strainer and through a bypass in the auxiliary electric fuel pump (when it is not in operation) to an engine driven fuel pump. The engine driven fuel pump delivers the fuel to the fuel control unit where it is metered and directed to a manifold which distributes it to each cylinder. Vapor and excess fuel from the engine driven fuel pump and fuel control unit are returned by way of a vapor return line to the accumu8lator tank to the right wing tank. Vented fuel caps are installed on both the left and right fuel tanks.

**NOTE**

Wing heavy conditions may occur during cruise. Wing heavy conditions can be alleviated gradually by turning the fuel selector to the heavy wing until balance is achieved, then returning the fuel selector to BOTH.

The auxiliary electric fuel pump, located on the lower left forward side of the firewall, is used for normal engine start priming, extreme vapor purging and continued engine operation in the event of an engine driven fuel pump failure (HIGH position). The electric boost pump can also be used for minor vapor purging and to increase fuel flow (LOW position). A manual three-position boost pump switch is used. With the three-position toggle switch (HIGH/OFF/LOW) the up position is high boost, the down position is low boost and the middle position is off. With the boost pump switch in the up position, the electric boost pump operates at a high enough output to supply a sufficient supply of fuel flow to allow power settings of up to 85% with an inoperative engine driven fuel pump. When the throttle is moved toward the closed position, the boost pump switch should be moved to the low position when the throttle is reduced to 16 in. Hg. manifold pressure or below. This prevents an excessively rich mixture during those periods of reduced engine power. The manual primer system has been removed.

**NOTE**

With the engine pump operating and the electric boost pump placed in the HIGH position an excessively rich fuel mixture will be produced unless the mixture is leaned. The electric boost pump switch should be OFF for takeoff and landing.

**NOTE**

Operating the electric boost pump with the engine off will result in flooding of the intake manifold. If a fuel tank is completely exhausted of fuel the electric boost pump will be needed to assist in restarting the engine. Prior to running a fuel tank dry an operational check of the electric boost pump should be accomplished by momentarily switching the pump on and watching for a slight rise in fuel flow.

## VIII. HANDLING, SERVICE & MAINTENANCE

### SERVICING

#### FUEL

Approved Fuel Grades (and colors)
100LL Grade Aviation Fuel (blue)
100 Grade Aviation Fuel (green)

#### AIRFRAME AND SYSTEMS

For all additional service and maintenance instructions refer to the Instructions for Continued Airworthiness document, 1000-100.