FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

Univair 415-C and 415-CD

REG. NO. [illegible]

SER. NO. [illegible]

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the airplane is operated using unleaded automotive gasoline in accordance with STC No. SA821GL. The information contained herein supplements or supersedes the basic manual only in those areas listed. For limitations, procedures and performance information not contained in this Supplement, consult the basic Airplane Flight Manual.

FAA APPROVED: W. F. Horn

W. F. Horn, Manager
Chicago Aircraft
Certification Office
FAA Central Region

Not Valid
Without
Raised Seal

DATE: September 14, 1984

EAA Aviation Foundation
Wittman Airfield
Oshkosh, Wisconsin 54903-3065



## SECTION I - LIMITATIONS

A. Unleaded automotive gasoline per ASTM Specification D-439, the Antiknock Index must be 87 or more.

B. Placard Required

Located on each wing forward of fuel cap, adjacent to aviation gasoline/fuel tank capacity placard:

| |
|---|
| Approved Fuel: Unleaded<br>Automotive Gasoline,<br>87 Min. Antiknock Index<br>Per ASTM Spec. D-439. |

## SECTION II - PROCEDURES

A. Normal

1. Preflight Inspection

It is the pilot-in-command's responsibility to insure that the tank sumps are drained and that the fuel strainer is drained before each flight. It is also his responsibility to take corrective action if water or any other contaminant is found when draining at those points.

2. Fueling with Unleaded Automotive Gasoline

Use the same care as when fueling with aviation fuel to insure that only contaminant-free, water-free fuel enters the tank. It is the responsibility of the pilot-in-command to insure that the fuel conforms to unleaded automotive gasoline per ASTM Specification D-439, 87 minimum antiknock index.

3. Mixing Fuels

Aviation gasoline may be mixed with unleaded automotive gasoline. Any mixture containing unleaded automotive gasoline must be operated in accordance with the placards or precautions established for unleaded automotive gasoline.

FAA APPROVED
DATE: September 14, 1984

4. Carburetor Ice

When using unleaded automotive gasoline, the onset of carburetor ice may occur earlier under the same atmospheric conditions than when using 80/87 minimum grade aviation gasoline. There is no change in the techniques for recognizing and correcting for carburetor ice.

5. Engine Operation

Engine operation must conform to Teledyne Continental Motors recommendations except that fuel per this STC is approved.

6. Contamination Control

The following guidance is taken from Advisory Circular (AC) 20-43C, "Aircraft Fuel Control":

> Keep fuel tanks full; water condenses on the walls of partially filled tanks and enters the fuel system. Filter all fuel entering the tank. Drain fuel sumps regularly. Periodically inspect and clean all fuel strainers (screens) and occasionally flush the carburetor bowl as recommended by the aircraft manufacturer. The best insurance against fuel problems is to practice good housekeeping in your routine maintenance and be constantly alert.

The operator is referred to this AC for more detail.

B. Emergency

No change.

SECTION III - PERFORMANCE

No change.

United States of America

Department of Transportation — Federal Aviation Administration

# Supplemental Type Certificate

*Number* SA821GL

*This certificate, issued to* EAA Aviation Foundation
Wittman Airfield
Oshkosh, Wisconsin 54903-3065

*certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part* 4a *of the* Civil Air *Regulations.* (See Aircraft Specification No. A-718 for complete certification basis.)

*Original Product — Type Certificate Number:* A-718

*Make:* Univair Aircraft Corporation

*Model:* 415-C, 415-CD

*Description of Type Design Change:* Modify airplane to fly on unleaded automotive gasoline, 87 minimum antiknock index, per ASTM Specification D-439. Supplemental Type Certificate SE634GL approves unleaded automotive gasoline, 87 minimum antiknock index, per ASTM Specification D-439 for certain Teledyne Continental Motors engines.

*Limitations and Conditions:* 1. Airplane Flight Manual Supplement dated September 14, 1984, or subsequent FAA approved revision is required. 2. FAR 43 combined with the Airplane Flight Manual Supplement is adequate to ensure continued airworthiness of this modification. 3. This approval should not be extended to other aircraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the interrelationships between this change and any of those other previously approved modifications will introduce no adverse effect on the airworthiness of that aircraft.

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application:* April 4, 1984

*Date of issuance:* September 14, 1984

*Date reissued:*

*Date amended:*

*By direction of the Administrator*

W. F. Horn *(Signature)*
Manager, Chicago Aircraft Certification Office, ACE-115C
Central Region *(Title)*

*Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.*

*This certificate may be transferred in accordance with FAR 21.47.*

FAA Form 8110-2 (10-68)

United States of America
Department of Transportation—Federal Aviation Administration

# Supplemental Type Certificate

*Number* SE634GL

*This certificate, issued to* EAA Aviation Foundation, Inc.
Wittman Airfield
Oshkosh, WI 54903-3065

*certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part* 13 *of the* Civil Air *Regulations.* (See applicable Type Certificate Data Sheets for complete certification basis.)

*Original Product—Type Certificate Number:* E-190, E-205, E-213, E-233, E-252, ATC72, ATC174
*Make:* Teledyne Continental Motors Reciprocating Engines
*Model:* All

*Description of Type Design Change:* Add the following approved fuel: unleaded automotive gasoline, 87 minimum antiknock index, per ASTM Specification D-439 of any Volatility Class, A through E.

*Limitations and Conditions:* This approval should not be extended to other engines of this model that incorporate any other previously approved modification, unless it is determined that the interrelationship between this change and any other previously approved modification will introduce no adverse effect on the airworthiness of this engine model. This approval is limited to normally aspirated piston engines in power outputs up to 100 brake horsepower only. Specific approval must be obtained for each model aircraft to insure compatibility with its fuel system.

*This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.*

*Date of application:* February 15, 1982 *Date reissued:*

*Date of issuance:* August 5, 1982 *Date amended:* June 20, 1983; January 4, 1988

FEDERAL AVIATION ADMINISTRATION

*By direction of the Administrator*

W. F. Horn *(Signature)*
Manager, Chicago Aircraft Certification Office
FAA Central Region, ACE-115C
*(Title)*

*Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.*

*This certificate may be transferred in accordance with FAR 21.47.*

FAA Form 8110-2 (10-68)

US Department of Transportation
Federal Aviation Administration

# MAJOR REPAIR AND ALTERATION
## (Airframe, Powerplant, Propeller, or Appliance)

| For FAA Use Only |
|---|
| Office Identification |

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in a civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

| | | |
|---|---|---|
| 1. Aircraft | Make: EAGLE | Model: 415 CD |
| | Serial No.: 3955 | Nationality and Registration Mark: N 33304 |
| 2. Owner | Name (As shown on registration certificate): RICHARD LYONS | Address (As shown on registration certificate): 923 FOLSOM AVE SACRAMENTO, CA. 95818 |

3. For FAA Use Only

| 4. Unit Identification | | | | 5. Type | |
|---|---|---|---|---|---|
| Unit | Make | Model | Serial No. | Repair | Alteration |
| AIRFRAME | (As described in Item 1 above) | | | | X |
| POWERPLANT | CONTINENTAL | C-75-12F | 4100-6-12 | | X |
| PROPELLER | | | | | |
| APPLIANCE | Type | | | | |
| | Manufacturer | | | | |

6. Conformity Statement

| A. Agency's Name and Address | B. Kind of Agency | C. Certificate No. |
|---|---|---|
| DANA ENZ P.O. BOX 1275 WILLOWS, CA. 95988 | X U.S. Certificated Mechanic | 569272986 AP |
| | Foreign Certificated Mechanic | |
| | Certificated Repair Station | |
| | Manufacturer | |

D. I certify that the repair and/or alteration made to the unit(s) identified in Item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

| Date | Signature of Authorized Individual |
|---|---|
| 10-4-89 | |

7. Approval for Return To Service

Pursuant to the authority given persons specified below, the unit identified in Item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is X APPROVED ☐ REJECTED

| BY | | | | | | Other (Specify) |
|---|---|---|---|---|---|---|
| | ☐ | FAA Flt. Standards Inspector | ☐ | Manufacturer | X Inspection Authorization | |
| | ☐ | FAA Designee | ☐ | Repair Station | Person Approved by Transport Canada Airworthiness Group | |

| Date of Approval or Rejection | Certificate or Designation No. | Signature of Authorized Individual |
|---|---|---|
| 10-4-89 | 569272986 | |

FAA Form 337 (4-87)

**NOTICE**

*Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.*

**8. Description of Work Accomplished**
*(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

1. INSTALLED E.A.A. AUTOFUEL S.T.C. # SA8216L IN ACCORDANCE WITH INSTRUCTIONS PROVIDED, BY PLACARDING FUEL LOADING POINTS.

2. MODIFIED ENGINE IN ACCORDANCE WITH E.A.A. AUTOFUEL S.T.C # SE6346L

3. INSTALLED FLIGHT MANUAL SUPPLEMENT AS REQUIRED IN AIRCRAFT FLIGHT MANUAL.

END

☐ Additional Sheets Are Attached

# AVIATION FOUNDATION

## Service Bulletin

**Bulletin No. 2000-1**
**Revision No. (-)**
**Date: March 1, 2000**
**Revised: (-)**

**SUBJECT: INSTALLATION OF REVISED FUEL PLACARDS**

**APPLICABILITY**: This Service Bulletin applies to all aircraft previously modified in accordance with automotive fuel Supplemental Type Certificates (STC'S) supplied by EAA Aviation Foundation. See attached list aircraft models approved under EAA automotive gasoline STC's.

**REASON:** A new aviation fuel known as 82UL has been approved for use in the United States. Due to the possibility of 82UL having a higher volatility than previous aviation fuels and because of other differences from previous aviation fuels, it has been determined that some method of airframe re-certification was needed. Since, among many other things, volatility testin was conducted as an integral part of automotive gasoline STC testing and 82UL has a lower volatilit requirement than automotive gasoline, the FAA has approved the use of 82 UL aviation gasoline in aircraft which hold an Automotive Gasoline STC.

However 82UL is not suitable for every airplane which utilizes a automotive gasoline STC. The octane of 82UL is more than adequate for use in engines that were originally rated on 80/87 octane or lower octane fuel. EAA STC's only cover engines that were certificated to 80/87 grade or lower gasoline. However STC's issued for some higher compression engines require the use of 91 octane minimum. Airplanes so equipped are NOT eligible for the use of 82UL. Installation of revised fuel placards is intended to clarify the minimum fuel octane requirement of each airplane modified to use automotive fuel and prevent the introduction of 82UL into higher compression engines.

**COMPLIANCE:** No later than August 1, 2000, replace previously installed fuel placards with revised fuel placards which specifically states:

"THIS AIRCRAFT IS APPROVED TO USE
THE FOLLOWING UNLEADED GASOLINES
Automotive Gasoline 87 MIN. AKI
Per ASTM Spec. D-4814
**AND**
82 UL Aviation Gasoline
Per ASTM Spec. D-6227 (Color purple)
**DO NOT USE AUTOMOTIVE GASOLINE CONTAINING ALCOHOL"**

**AVAILABILITY:** Revised placards are available from EAA Aviation Foundation. (920) 426 4843 or STC@eaa.org.

**WEIGHT & BALANCE**: No change to weight and balance.

**INSTRUCTIONS**: Remove and replace existing fuel placards with revised placards in accordance with this Service Bulletin.

| **AirFrame Models Approved** | Revised 5/20/96 |
|---|---|
| AERONCA Inc. Bellanca Champion, Trytek Wagner, B & B Aviation, Citabria | Most models, 7 series and 11 series. *7KCAB |
| ARCTIC AIRCRAFT CO, Inc., Interstate | S-1A, *S-1B1 S-1132 |
| BEECHCRAFT Inc. Bonanza | 35, A-35, B-35, C-35, D-35, E-35, F-35, G-35, 35R |
| CESSNA | 120, 140, 140A, 150, 150A-H, 150J-M, A-150K-M, 152**, A152**, 170, 170A, 170B, 172, 172A-E, 172E (T-41A), 1726, H, P172, 1721, K, L, M, 175, 175A, B, C, 177,180, 180A-H, 180J 182, 182A-P, 305A (0-1 A), 305B, 305E (TO-1 D, O-1 D, O-1 F), CP-55 CP-65 CS-65 |
| COMMONWEALTH, Inc.Skyranger and Rearwin | 175, 180, 185 |
| ERCOUPE, Inc. Airco Skyranger and Rearwin | 415C, D, E, G, 415-CD, F-1, F-1A, A-2, A-2A, M10 |
| FUNK | B-85C |
| GRUMMAN, Inc. Gulfstream American | AA-1, -1A, -1B, -1C, AA-5, -5A |
| LUSCOMBE, Inc. Temco | 8 Series, 11A |
| MAULE | M-4, Most models |
| MOONEY | M-1 8C, -18C55, -18L, -18LA |
| PIPER | E-2, J-2, J-3 (Most models), J-4 (Most models), J-5 (Most models), PA-11 (Most models), PA-12 (Most models), PA-14, PA-15*, PA-16, PA-17, PA-18 (All models), PA-19 (All models), PA-20 (All models), PA-22(Most models), PA-28-140, -150, -151 |
| PORTERFIELD, Inc. Rankin & Northwest | 305C (O-1E), 305D (O-1G), 305E |
| STINSON | 108 Series*, HW-75 10 |
| SUPERIOR AIRCRAFT CO, Inc. | LCA LFA* Culver, Cadet |
| TAYLORCRAFT | A, BC (Most models) |
| VARGA | 2000C, 2150, 2150A, 2180 |
| NOTE: *Airframe approvals only. "Requires engine modification | |

EAA AirVenture FOUNDATION

OCTOBER 2, 1985

# AUTOGAS FIELD ALERT

The following are situations which have surfaced recently. These may occur with either autogas or avgas. Although the EAA has addressed these in *Sport Aviation* on several occasions, this Field Alert is being sent as a service to all EAA autogas STC holders of record. For additional information, call the EAA STC department at (414) 426-4800.

## USE OF ALCOHOL IN GASOLINE

Any form of alcohol, including ethanol and methanol, is not approved for use since it can attack the synthetic materials in the fuel system. For emphasis, a placard should be placed by each fuel filler cap, reading "DO NOT USE GASOLINE CONTAINING ALCOHOL." Servicing fuels containing alcohol must be used in accordance with approved instructions.

## USE OF LEADED GASOLINE IN FRESHLY OVERHAULED CONTINENTAL ENGINES

After an overhaul affecting the valves, use 2 to 3 hours of leaded aviation gasoline per Continental Motors recommendation. Then use unleaded autogas thereafter. Although this procedure was not used in our flight test program and no problems were incurred, we recommend it.

*Reference: Continental Motors Special Bulletin M46-32.*

## SWELLING OF BENDIX CARBURETOR FLOAT NEEDLE VALVES IN CONTINENTAL A-65 SERIES THROUGH C-90 SERIES ENGINES

The use of obsolete neoprene float needle valves with either autogas or 100LL avgas may cause continual leaning unknown to the pilot, contributing to possible engine damage. If this is suspected, verify needle valve has Bendix part number 2523047.

*Reference: Bendix Service Bulletin ACSB-84.*

## POTENTIAL DETERIORATION OF MARVEL-SCHEBLER CARBURETOR FLOATS

Any avgas or autogas may cause deterioration of the cellular plastic floats in Marvel-Schebler carburetors resulting in any of the following: flooding of carburetor, rough engine at low power settings or inconsistent engine shutdown. If symptoms occur, contact A&P mechanic.

## POSSIBLE SEPARATION OF GASCOLATOR RUBBER PLUNGER

The rubber plunger in the gascolator drain assembly in some Cessna models may separate from the metal shaft, causing a potential leak. This problem, caused by either avgas or autogas, is being reviewed by the manufacturer. Inspect for proper fit.

## POTENTIAL ATTACK OF VARNISH ON OLD CORK FUEL TANK FLOATS

The varnish on older aircraft cork floats may be attacked by either avgas or autogas. Inspect floats and, if indicated, recoat with polyurethane type of varnish. (Use 2-part urethane varnish such as Stits UV-550.)

## POTENTIAL DEGRADATION OF HOT DAY ENGINE PERFORMANCE

After any prolonged period of heat soak, such as hot day ground idling or engine restart a short time after a long period of engine operation, perform a full power check before taking off. Ensure recommended fuel pressure is indicated on aircraft so equipped.

EAA FOUNDATION
DEDICATED TO THE EDUCATION, HISTORY AND DEVELOPMENT OF AVIATION

No. [illegible]
12/15/84
EAA Flight Research Center

Confirmation: Procedures for

FLIGHT EXPERIENCE INFORMATION

SUBJECT: FLOAT NEEDLE VALVES TO PREVENT CARBURETION

The purpose of this bulletin is to disseminate information of interest to people operating aircraft with Continental engines from the A-65 series through the O-90 series engines.

We have had an incident reported to us involving a Cessna 120 which had a new carburetor float needle installed in 1983, which however, was the obsoleted part with the neoprene tip. The swelling of the tip eventually increased to the point where the engine was too lean to operate. One of the dangers is that a continual leaning can be taking place without knowledge of the operator. This could lead to engine damage from excessively lean operation. Checking with a carburetor overhaul shop reveals that this has been a long standing and continuing occurrence prior to the approval of autogas.

The above mentioned engines are fitted with Bendix [illegible] type carburetors which have been subject to two Service Bulletins pertaining to the float needles and the float needle seats. The first Bulletin is Bendix Aircraft Carburetor Service Bulletin #71 issued in April 1945. It points out that a sharp edged needle seat is to be used with the all steel needles and a round edged seat to be used with synthetic rubber tipped needles.

Bendix Service Bulletin ACSB-84, revised 7-15-72, refers to the replacement of the float needle valve with the synthetic rubber tip. The reason for the Bulletin, which was issued initially in June of 1964, is "to provide a float needle valve made of Delrin, an ivory colored acetal plastic, in lieu of the rubber tipped stainless steel needle. Material change made to remove rubber age control requirement, reduce cost and provide an improved service life material. Reason for Revision in July 1972: to add instructions for float lever weight, and to add seat part number under application". Delrin valves are a direct replacement of the neoprene tipped valves and, require no seat change if the condition of the seat is satisfactory.

As indicated in the November 1983 Hotline in Sport Aviation magazine, the Bendix carburetor alert advised that the neoprene tipped needles have not been manufactured by Bendix for more than twenty years. However, Bendix advises us that the neoprene material used on these valves were of a higher grade than

-OVER-

that used in their automobile carburetors and should not be influenced by higher aeromatic fuels such as 100 low lead avgas or approved automobile gasoline. They also highly recommend the use of the new Delrin valve.

Neoprene tipped valves now on the market must be viewed with skepticism even if they are certified by the vendor as genuine Bendix parts. After all, would you put a 20 year old tire on your car?

If the valves are of new manufacture, Bendix has no knowledge of them and, more importantly, no one knows the type of synthetic rubber used and it's compatibility with either 100 low lead avgas or autogas.

> NOTE: Alcohol is not compatible with materials in present aircraft fuel systems. DO NOT USE GASOLINE CONTAINING ALCOHOL.

Another cause for concern regarding the authenticity of these valves is the question of why their selling price was in the range of $35.00 twenty years ago -- and they are now on the market for $14.00, it doesn't make sense.

If you have been operating successfully with 100 low lead avgas or autogas, the need for changing parts is not indicated. When you do overhaul and the float needle and seat require attention the safe and conservative way to go is to change to a Delrin valve in accordance with Bendix Service Bulletin 84, revised 7-15-72.

For an NA-S3B, NA-S3A1, NA-90A1, the parts called out are as follows:

| BENDIX SERVICE BULLETIN REFERENCE NEEDLE | NEEDLE P/N | SEAT | SEAT P/N |
|---|---|---|---|
| No 71 (4-8-45) steel | P-14221 | sharp edge seat | out of production since 4-45, replace by matched pair only. |
| No 71 (4-8-45) synthetic rubber tip | 390077 | radiused seat | 383911, 383912, 384585 |
| No 84 (Rev 7-15-72) Delrin. (requires weight added to float lever) | 2523047 | radiused seat | 383911, 383912, 384585 |

Delrin float needle valves (Bendix part no. 2523047) are no longer available at Bendix, South Bend, Indiana. A licensee has taken over this aircraft carburetor responsibility and tooling and parts are available from Precision Airmotive, Snohomish County Airport, Everett, Washington 98204. The current list price is $113.72.

FAA - GREAT LAKES FORM GL 8000-3.6 (1-77)

AN ACCIDENT PREVENTION PROGRAM SAFETY SUGGESTION
DEPARTMENT OF TRANSPORTATION

# FUEL CONTAMINATION

WATER IS THE PRINCIPAL CONTAMINANT OF AVIATION FUEL. THE ACTUAL CONTAMINATION OCCURS THROUGH:

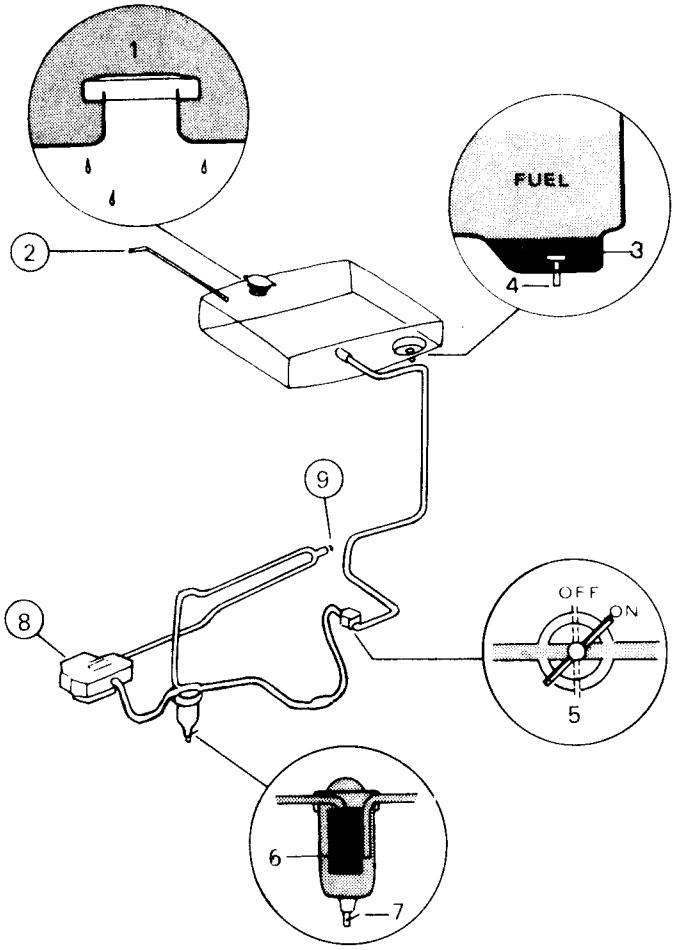
1. **CONDENSATION.** OCCURRING IN PARTIALLY FILLED AIRCRAFT FUEL TANKS AND IN STORAGE AND DISPENSING FACILITIES SUCH AS UNDERGROUND TANKS AND FUEL TRUCK TANKS.

2. **ENTRY OF OUTSIDE MOISTURE.** SUCH AS RAIN OR SNOW ENTERING THROUGH THE AIRCRAFT TANK GUAGE OR VENT SYSTEM.

# REMEMBER

FOR A SAFE FLIGHT, DRAIN FUEL SUMPS AT EACH PREFLIGHT (AND DRAIN FUEL SCREENS AS RECOMMENDED BY AIRCRAFT MANUFACTURER) TO PREVENT WATER CONTAMINATION.

AFTER REFUELING IT IS WISE TO WAIT ABOUT 20 MINUTES BECAUSE IT MAY TAKE THAT LONG FOR WATER TO SETTLE LOW ENOUGH TO SHOW UP AT THE SUMPS. IF THIS IS NOT FEASIBLE, MAKE TAKEOFF ON A TANK THAT HAS NOT BEEN ADDED TO.




1. Fuel Filler Cap
2. Fuel Vent
3. Sump
4. Sump Drain (Use of Quick Drain Recomended)
5. Fuel Selector
6. Fuel Screen
7. Fuel Drain Valve (Usually Quick Drain Valve)
8. Carburetor
9. Primer

SIMPLIFIED GRAVITY FEED HIGH WING FUEL SYSTEM. LOW WING FUEL SYSTEMS REQUIRE ENGINE DRIVEN FUEL PUMP AND AN AUXILLILARY FUEL PUMP. (USUALLY ELECTRICALLY OPERATED)

GPO 819-963

EAA Aviation FOUNDATION

FIELD INFO.
NO. 8501
3-15-85
REV. 6-20-85
REV. 9-16-85

# FIELD TEST FOR DETERMINING PRESENCE AND AMOUNT OF ALCOHOL IN GASOLINE

***This test is based on a field test procedure which is used by Conoco, Inc. The EAA Aviation Foundation appreciates Conoco's permission to publish the following on their field procedure.***

## 1 SCOPE

This method determines the amount, if any, of alcohols present in gasoline. This test is designed specifically for field testing where time and simplicity are important factors.

## 2 SUMMARY OF METHOD

A sample of gasoline is shaken at room temperature with an amount of added water. The volume increase of the water layer is proportional to the amount of alcohol initially in the fuel sample. Nine (9) parts of the gasoline sample are combined with one (1) part of water.

## 3 APPARATUS REQUIRED FOR EITHER OF THE METHODS BELOW

**Graduated Cylinder Method**

One (1) one-thousand milliliter (1000 ml) transparent plastic graduated cylinder (can be purchased at photo supply store).

**Measuring Cup Method**

One (1) two quart clear plastic container such as a fruit juice container purchased from a supermarket. One (1) 4 fluid ounce measuring cup (1/2 cup). One (1) 32 fluid ounce measuring cup (1 quart).

## 4 PREPARATION

Clean containers.

On the 2 quart juice jar mark the level of exactly 4 fluid ounces (1/2 cup) permanently on the side (a piece of masking tape may be used).

## 5 PROCEDURE

**Graduated Cylinder Method**

To nine (9) parts of the gasoline sample (900 ml) add 100 ml of water for a total of 1000 ml in the graduate. Shake thoroughly, let stand for ten minutes or until the gasoline is again bright and clear. Record the apparent level of the line between the gasoline and water. This "Final Volume" is used in calculation number 6 below.

**Measuring Cup Method**

To nine (9) parts of the gasoline sample (36 ounces or 1 quart plus 1/2 cup), add 4 fluid ounces (1/2 cup) of water for a total of 40 fluid ounces in the 2 quart juice container. Shake thoroughly, let stand for ten minutes or until the gasoline is again bright and clear. Record the apparent level of the line between the gasoline and water. This "Final Volume" used in the calculation below.

The **Measuring Cup Method** is intended to indicate the presence of alcohol and it is not practical to evaluate the **amount** of alcohol. If the final line between gasoline and water is measurably higher than the 1/2 cup mark, the presence of alcohol is indicated.

***NOTE: Erroneous results are probable if sample and water are not thoroughly shaken and mixed.***

## 6 CALCULATION

**Graduated Cylinder Method**

Note the final volume and calculate the percent of alcohol in the sample using the following equation:

$$\% \text{ Alcohol in Gasoline} = \frac{V - 100}{900} \times 100$$

Where: V = Final volume of water (read at separation line between water and gasoline).

## 7 PRECISION

Within ± 1% alcohol if you measured and recorded accurately.

## 8 ACTION TO BE TAKEN

In the opinion of the EAA and in the interest of most conservative operation the following observations are offered:

**If alcohol content is less than 1%**, fuel will probably have no effect on aircraft.

**If fuel contains up to 5% alcohol**, caution must be exercised. Do not permit it to remain in tanks or fuel system more than 24 hours, then, drain and refill with alcohol-free fuel, insuring that no alcohol concentration remains in fuel lines or sump.

**If alcohol content is more than 5%**, drain fuel system, flush all parts, replace with clean alcohol-free fuel and run up engine long enough to exchange fuel in carburetor bowl.

Known problems are: Alcohol attacks some seal materials and varnishes on cork floats of fuel level indicators. This could cause leakage of seals, release particles of varnish from floats; causing blocked screens in the fuel lines or blocked carburetor jets. Excessive entrained water carried by alcohol could lead to fuel line blockage at screens or valves when operating at low ambient temperatures at ground level or at high altitude. Fuel volatility is also increased with the addition of alcohol. These effects of alcohol in turn could cause engine power loss and even engine damage from high combustion temperatures caused by excessively lean operation.

## 9 PRECAUTIONARY

Gasohol -- Volatile and extremely flammable. Harmful or fatal if swallowed. Avoid prolonged or repeated breathing of vapor or contact with skin or eyes. If swallowed, do not induce vomiting, get medical care immediately.

Ethylene glycol -- Harmful or fatal if swallowed. Induce vomiting if swallowed. Wash thoroughly after handling.

Dear STC Recipient:

Thank you for your application for the two Supplemental Type Certificates for your aircraft.

The EAA is very pleased to be able to provide you with these STC's. Enclosed you will find your flight manual, supplemental type certificates, and placards.

It is our hope that our efforts have helped you. If you have any further questions, please do not hesitate to contact me.

Sincerely,

EAA AVIATION FOUNDATION, INC.

Harry Zeisloft /gj

Harry Zeisloft
Director of Engineering

Enclosures

WITTMAN AIRFIELD, OSHKOSH, WISCONSIN 54903-3065 — PHONE 414/426-4800

7-11-84

# DIRECTIONS FOR APPLYING SUPPLEMENTAL TYPE CERTIFICATES FOR THE USE OF AUTOMOBILE GASOLINE IN APPROVED AIRCRAFT

The enclosed Supplemental Type Certificates approved by the FAA for both your engine and your airframe are the result of several years of research and hundreds of hours of flight engineering tests by the EAA Aviation Foundation.

As you know, the unleaded automobile fuel which you purchase for your aircraft must comply with ASTM Specification D-439. While fuel meeting these specifications is widely available and, in fact, required by the laws of many states, it must be noted that it is the pilot-in-command's responsibility to insure that the fuel meets the specifications. We recommend that you use gasoline from known and reliable suppliers and especially to observe precautions against fueling your airplane with contaminated fuel. Do not use gasoline that contains alcohol.

In order to apply these STC's to your aircraft, you and your mechanic must take the following steps:

1. Determine that the enclosed Approved Flight Manual Supplement or the Supplemental Approved Flight Manual has a raised EAA-STC seal in the lower left hand corner of the document. If it does not have this seal it is not a valid document and should not be processed.

2. Determine that previous STC's interrelated to these, do not introduce any adverse effects upon the airworthiness of the aircraft.

3. The enclosed placards regarding approved fuels must be located at the fuel tank inlets.

NOTE: Be sure that the gallon capacity of each tank is labeled as required. This can be done for your specific aircraft by an additional simple placard if the old placard reading is not satisfactory.

4. The aircraft must be inspected for compliance with the Supplemental Type Certificate, and an appropriate entry must be made in the aircraft and engine log.

5. 2-FAA 337 Forms must be completed and submitted to the FAA by an IA Mechanic since the FAA considers this change a major modification of the aircraft.

6. The Approved Flight Manual Supplement or the Supplemental Flight Manual, which ever applies to your aircraft must carry your aircraft registered "N" number and the aircraft serial number which is applied by the EAA. This STC is good for the life of the airplane and will not be transferred. The Supplement must be carried in the aircraft at all times and its requirements must be observed.

OVER

Your aircraft may now be used for all flight operations with no additional or new operating limitations. It is most important using either avgas or autogas to insure that fuel in the aircraft is not contaminated with water or dirt. There is a greater risk of this if you must fuel your airplane using portable cans. The FAA Advisory Circular AC 20-43 is an excellent discussion of the problem and suggested procedures. Be particularly cautious if you are operating aircraft with bladder fuel cells since ripples can form in the bottom of these cells under normal operations with either avgas or autogas and cause additional difficulty in being sure all of the water is drained from the fuel system.

N O T E : 3-19-85

Your _____ MODEL AIRCRAFT WAS APPROVED ON THE BASIS OF,

a) Flight Test

b) Similarity to Aircraft Flight Tested.