

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 1
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS  
 FOR CESSNA R182 AIRCRAFT  
 WITH  
 260 HP LYCOMING IO-540-D4B5-AA ENGINE  
 OR  
 260 HP LYCOMING IO-540-AF1A5 ENGINE  
 AND  
 McCAULEY B3D36C431/80VSA-1 PROPELLER  
 OR  
 McCAULEY B3D36C433/80VSA-1 PROPELLER

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 2
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

### LOG OF REVISIONS

Revision	Description	Date	Engineer
New	Original Release	11-15-07	J. Sledge
A	Added Lycoming IO-540-AF1A5 Engine	6-20-08	J. Sledge
B	Page 6 - Changed Rev. Letter of Dwg. 1301, was Rev. C;  Page 7 – Changed P/N of Propeller and Spinner for aircraft s/n R18201314 to R18202041)	8-8-17	J. Sledge

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 3
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

LIST OF EFFECTIVE PAGES

Page Number	Date	Revision Letter
1	8/8/17	B
2	8/8/17	B
3	8/8/17	B
4	8/8/17	B
5	8/8/17	B
6	8/8/17	B
7	8/8/17	B
8	8/8/17	B
9	8/8/17	B
10	8/8/17	B
11	8/8/17	B
12	8/8/17	B
13	8/8/17	B
14	8/8/17	B
15	8/8/17	B
16	8/8/17	B
17	8/8/17	B
18	8/8/17	B
19	8/8/17	B
20	8/8/17	B
21	8/8/17	B
22	8/8/17	B
23	8/8/17	B

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 4
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

## TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
LOG OF REVISIONS	2
LIST OF EFFECTIVE PAGES	3
TABLE OF CONTENTS	4
INTRODUCTION	5
INSTALLATION AND REMOVAL INSTRUCTIONS	6
PARTS LISTING	7
Section 2 – Ground Handling, Servicing, Cleaning Lubrication and Inspection	8
Section 11 – Engine (Normally Aspirated)	10
11-11 Engine Description	10
11-14 Engine Data	10
11-43 Fuel Injection System Description	10
11-45 Fuel Injection System Maintenance Practices	12
11-46 Idle Speed and Mixture Adjustment	14
11-57 Ignition System Description	15
11-61 Magneto Removal and Installation	15
11-62 Magneto to Engine Timing Check	17
11-63 Magneto to Engine External Timing	18
Section 13 – Propeller and Governor	19
13-1 Propeller Description	19
13-4 Removal Aircraft S/N R18200002 to R18201313	20
13-5 Installation Aircraft S/N R18200002 to R18201313	20
13-6 Removal Aircraft S/N R18201314 to R18202041	21
13-7 Installation Aircraft S/N R18201314 to R18202041	22
Section 15 Instruments and Instrument Systems	23
15-43 Cylinder Head Temperature Gage Description	23

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 5
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

## INTRODUCTION

This document defines the Instructions for Continued Airworthiness (ICA) as required by FAR 23.1529 and as defined in FAR 23 Appendix G for the aircraft modifications associated with Alamo Aerospace, LP STC SA10811SC. This document is intended to be a supplement to the original aircraft Instructions for Continued Airworthiness, Cessna Aircraft Company Model R182 & TR182 Series 1978 Thru 1986 Service Manual Rev. 6 dated 7 July 2003 or later approved revision.

Alamo Aerospace, LP STC SA10811SC allows the installation of a Textron Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine and McCauley B3D36C431/80VSA-1 or B3D36C433/80VSA-1 propeller on Cessna model R182 aircraft. In addition to the engine and propeller, the other components listed below are also installed or modified as a result of this alteration.

- a) The Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine is equipped with a SkyTec, part number 149-24LS, lightweight starter in place of the Lamar starter.
- b) A Superior Labs, Inc. part number SL1010-43031-13-H02 tachometer is installed in place of the existing tachometer.
- c) The existing fuel flow/manifold pressure indicator is re-marked.
- d) A McCauley model number DC290D1/T37 propeller governor replaces the existing governor.

From time to time, Alamo Aerospace will issue revisions to these Instructions for Continued Airworthiness for the aircraft when the need arises. This information will be mailed to the address of the registered aircraft owner for each aircraft that has been modified.

The chart shown below lists all Vendor Supplied Components, the Component Model Number and Component Maintenance Manual (ICA) document number for each Engine, Propeller and Appliance (Component) installed as part of this modification.

The individual suppliers component maintenance manual should be consulted for their replacement or overhaul time intervals or overhaul procedures.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 6
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

**VENDOR SUPPLIED COMPONENT LIST**  
**Cessna R182**  
**260 HP Modification**

ITEM	VENDOR	MODEL NO.	COMPONENT MAINTENANCE MANUAL
Engine	Lycoming	IO-540-D4B5-AA	Lycoming Overhaul Manual 60294-7 Alamo Aerospace, LP Report no. 99008-5
	Lycoming	IO-540-AF1A5	Lycoming Maintenance and Overhaul Manual LOM-IO-540-AF1A5
Fuel Injection System	Precision Airmotive	RSA-5AD1	RSA-5 & RSA-10 Fuel Injection Systems Operation & Service Manual 15-338D
Propeller	McCauley	B3D36C431/80VSA-1 B3D36C433/80VSA-1	McCauley Service Manual MPC400
Propeller Governor	McCauley	DC290D1/T37	McCauley Service Manual 780401
Starter	Sky Tec	149-24LS	*N/A
Magneto L/H	Unison / Slick	6351	4300/6300 Series Magneto Maintenance and Overhaul Manual no. L-1363
Magneto R/H	Unison / Slick	6351	

\*NOTE: The SkyTec 149-24LS starter does not have an associated maintenance manual or overhaul manual and can have no maintenance performed on it in the field. This is a "remove and replace" component. See Chapter 5 for required replacement interval.

## INSTALLATION AND REMOVAL INSTRUCTIONS

The following drawings (or later approved revisions) outline the procedures for installing the equipment associated with this modification. These drawings are intended to be a part of the Instructions for Continued Airworthiness and should be followed when installing or removing equipment associated with the new powerplant installation.

For procedures not outlined by these drawings, consult the remainder of this document or the Cessna Aircraft Company Model R182 & TR182 Series 1978 Thru 1986 Service Manual Rev. 6 dated 7 July 2003 or later approved revision.

Drawing No.	Title	Revision Letter	Date
Alamo Aerospace drawing no. 1301	Installation Instructions for 260 HP IO-540-D4B5-AA or IO-540- AF1A5 Engine in Cessna R182	D	9/7/13

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 7
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

## PARTS LISTING

The following table contains a list of the part numbers of the major components (other than standard hardware) that have changed as a result of this alteration. These part numbers should be used when ordering replacement parts:

Item Name	Item Part Number	Vendor
Engine	Lycoming Model No. IO-540-D4B5	Textron Lycoming (modified per Alamo Aerospace STC SE03498AT)
	Lycoming Model No. IO-540-AF1A5	Textron Lycoming
Propeller (Aircraft S/N R18200002 to R18201313)	P4337350-03	McCauley Propeller Systems, Inc.
Spinner Assembly (Aircraft S/N R18200002 to R18201313)	D6614	McCauley Propeller Systems, Inc.
Propeller (Aircraft S/N R18201314 to R18202041)	P4317296-05	McCauley Propeller Systems, Inc.
Spinner Assembly (Aircraft S/N R18201314 to R18202041)	D7499-1	McCauley Propeller Systems, Inc.
Tachometer	SL1010-43031-13-H02 SL1010-43031-13-N00	Alamo Aerospace, LP
Fuel Flow/Manifold Pressure Indicator	United Instruments 6313-H215	Alamo Aerospace, LP
Auxiliary Electric Fuel Pump	Dukes 4140-00-450 Cessna C291504-0202	Alamo Aerospace, LP
Throttle Cable Bracket	1303	Alamo Aerospace, LP
Adapter, Induction Air	1302	Alamo Aerospace, LP
Mixture Cable Bracket	1304	Alamo Aerospace, LP
Propeller Governor	D-20893-37	McCauley Propeller Systems, Inc.
Fuel Flow Placard	1202	Alamo Aerospace, LP
Alternate Air Placard	1308	Alamo Aerospace, LP
Tube Assy – Fuel Pressure	1306	Alamo Aerospace, LP
Tube Assy – Fuel Supply	1307	Alamo Aerospace, LP

The format of the remainder of this document follows the format of the original Cessna Service Manual. Only changes to the original instructions are included. The section and paragraph labels refer to the sections and paragraphs of the original instructions. Where no changes are

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 8
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

noted the original Instructions for Continued Airworthiness for the Cessna R182 should be followed.

## **Section 2 – Ground Handling, Servicing, Cleaning, Lubrication and Inspection**

### **Airworthiness Limitations – FAA Approved Data**

NOTE: The Airworthiness Limitations section is FAA approved and specifies maintenance required under Parts 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

There are no airworthiness limitations associated with this modification.

### **Component Time Limits**

Textron Lycoming IO-540-D4B5-AA or IO-540-AF1A5 engine – Refer to Textron Lycoming Service Instruction S.I. 1009AR or latest revision for time limits for IO-540-D4B5 or IO-540-AF1A5.

SkyTec model no. 149-24LS engine starter – Replace at engine TBO

McCauley model no. B3D36C431/80VSA-1 & B3D36C433/80VSA-1 propeller – Refer to McCauley Service Bulletin 137W or the latest revision for the overhaul time limits.

McCauley D-20893-37 Propeller Governor – Any governor damaged by a propeller blade strike, propeller or engine lightning strike, engine detonation, oil contamination, or sudden engine stop must not be returned to service. All such parts must be repaired or overhauled. Refer to McCauley Service Bulletin 215C or latest revision.

Dukes 4140-00-450 and Cessna C291504-0202 Electric Fuel Pump – Replace at 10 years (if not overhauled).

6351 Slick Magnetos – Refer to Slick Service Bulletin SB2-80C or latest revision for time limits.

CH48110 Engine Oil Filter – Refer to Textron/Lycoming Service Instruction SI 1492 B, SI 1267C and Service Bulletin SB.480C, or latest revision.



By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 9
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

### Inspection Time Intervals

The inspection time intervals for the components changed/added as a result of this alteration are listed below. For inspection time intervals not shown below, consult the basic Cessna R182 Service Manual.

Item	Task	Interval
Magnetos	Complete a check of the external condition, correct installation and condition of the electrical leads. Complete a check of the engine timing (external timing). You must set the internal timing if the total of all external adjustments are more than 0.125 inch from the original factory position, or between each of the internal timing adjustments. Refer to Section 11-62 and 11-63 of this document.	Every 100 hrs.
Magnetos	Clean, inspect and adjust as required. Refer to Slick 4300/6300 Series Magneto Maintenance and Overhaul Manual.	Every 500 hrs.
Fuel Injection System	Check system for security and condition. Clean fuel inlet screen, check and clean injection nozzles and screens (if evidence of contamination is found), and lubricate throttle shaft.	Every 100 hrs.
Idle and Mixture	Run the airplane engine to determine satisfactory performance. If required, adjust the idle rpm and fuel mixture. Refer to Section 11-46 of this document.	Every 100 hrs.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 10
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

## Section 11 – Engine (Normally Aspirated)

### 11-11 Engine Description

The IO-540-D4B5-AA engine is a Textron Lycoming model IO-540-D4B5 that has been modified by Alamo Aerospace by the installation of a different oil sump and induction tubes per Alamo Aerospace STC SE03498AT. The Lycoming IO-540-AF1A5 engine is also approved for installation on the Cessna R182 per STC SA10811SC. Both engines are direct drive, six cylinder, fuel injected horizontally opposed, air cooled engines. The cylinders, numbered from front to rear, are staggered to permit a separate throw on the crankshaft for each connecting rod. The right front cylinder is number 1 and the other cylinders on the right side of the engine are identified by odd numbers 3 and 5. The left front cylinder is number 2 and the other cylinders on the left side are identified as 4 and 6.

### 11-14 Engine Data

Model: Lycoming IO-540-D4B5 (modified per Alamo STC SE03498AT)  
OR  
Lycoming IO-540-AF1A5

Rated Horsepower: 260 HP at 2700 RPM

Magnetos:

Right Magneto: Slick Model 6351 (fires at 25° BTDC)

Left Magneto: Slick Model 6351 (fires at 25° BTDC)

Fuel Injector: Precision Airmotive RSA-5AD1

Dry Weight – With Accessories: 382 lbs.

### 11-43 Fuel Injection System Description

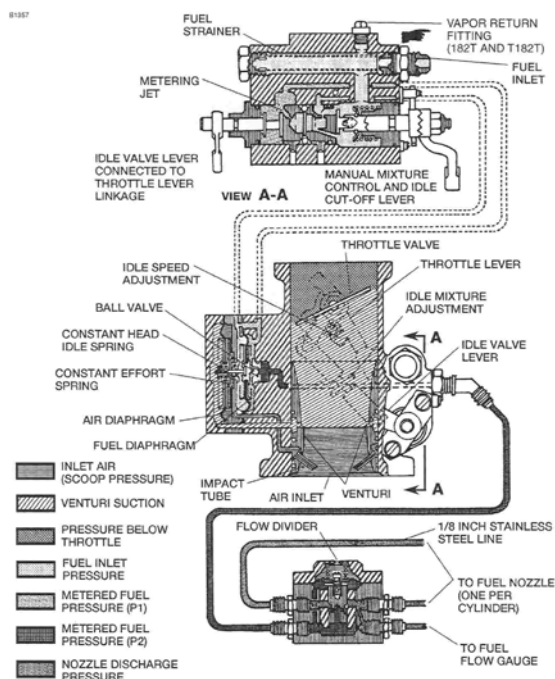
1. General
  - A. This section covers the RSA Fuel Injection system used on the IO-540-D4B5-AA or IO-540-AF1A5 engine. For a schematic of the fuel injection system, refer to the figure below.
2. Description
  - A. The fuel injection system is a low pressure, multinozzle, continuous flow system which injects raw fuel into the engine cylinder heads. The injection system is based on the principle of measuring engine air consumption to control fuel flow. More airflow through the venturi will result in more fuel being delivered to the engine, and less airflow through the venturi results in a decreased flow of fuel to the engine.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 11
Ckd:	Revision: B		Report: 99006-6
App:			Make/Model: Cessna R182

## INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

B. System components consist of the fuel/air control unit, the fuel distribution valve (flow divider), injection nozzles (6 total) and lines used to connect the components. A description of the components is as follows:

- (1) Fuel/Air Control Unit – The fuel/air control unit, also known as the “servo regulator”, is located on the aft side of the engine and integrates the functions of measuring airflow and controlling fuel flow. The control unit consists of an airflow sensing system, a regulator section and a fuel metering section.
- (2) Fuel Distribution Valve – The fuel distribution valve, also known as the “spider” or flow divider, is located on top of the engine and serves to distribute fuel evenly to the cylinders once it has been regulated by the fuel/air control unit. Also attached to the fuel distribution valve is a rigid line which feeds into the fuel flow indicator located in the cockpit.
- (3) Injector Nozzles – Each cylinder contains an injection nozzle, also known as an air bleed nozzle or a fuel injector. This nozzle incorporates a calibrated jet that determines, in conjunction with fuel pressure, the fuel flow entering each cylinder. Fuel entering the nozzle is discharged through the jet into an ambient air pressure chamber within the nozzle assembly. This nozzle assembly also contains a calibrated opening which is vented to the atmosphere, and allows fuel to be dispersed into the intake portion of the cylinder in an atomized, cone shaped pattern.



By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 12
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

## 11-45 Fuel Injection System Maintenance Practices

### 1. General

- A. This section gives instructions for removal and installation, adjustment, and cleaning of components in the fuel injection system. For more maintenance information, refer to the applicable fuel injection component maintenance manuals which are listed in the Introduction section of this document.

### 2. Precautions

- A. Obey these general precautions and rules when you refuel, defuel, clean the fuel tank, repair, assemble or disassemble system components, and do electrical system tests and repairs on the airplane fuel system.
  - 1) Put covers or caps on all disconnected hoses, lines, and fittings to prevent residual fuel drainage, thread damage, or entry of dirt or unwanted material into the fuel system.
  - 2) When the fuel system is opened, use the fuel boost pump to flush the system with ½ gallon of fuel at the inlet of the servo and flow divider.
  - 3) When you work on the fuel injection system, keep all parts clean and free from contamination.

### 3. Fuel/Air Control Unit Removal/Installation

#### A. Remove the Fuel/Air Control Unit.

- 1) Put the cockpit-mounted FUEL SELECTOR valve in the OFF position.
- 2) Remove the upper cowl.
- 3) Remove the two clamps that attach the black induction air duct to the airbox assembly and the Induction Air Adapter.
- 4) Remove the four bolts that hold the Induction Air Adapter to the Fuel Control Unit.
- 5) Disconnect the fuel inlet and outline lines from the control unit.
- 6) Remove the mixture and throttle control linkages from the control unit. Record the number and position of the washers for installation.
- 7) Remove the nuts, lock washers and flat washers that attach the control unit to the oil sump. Put a cover on the engine intake opening and put the control unit in a sealed, clean environment to prevent the collection of unwanted particles in the unit.

#### B. Install the Fuel/Air Control Unit.

- 1) Remove the engine intake cover from the sump area.
- 2) Install the control unit to the sump using washers, lock washers and nuts.
- 3) Install the Induction Air Adapter to the control unit. Safety the bolts with wire.
- 4) Connect the mixture and throttle control linkages to the control unit. Make sure that all washers are in the correct position and that the cotter pins are installed where necessary.
- 5) Connect the fuel inlet and outlet lines to the control unit.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 13
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

- 6) Attach the black induction air duct to the Induction Air Adapter and the airbox assembly. Install using two clamps.
- 7) Install the upper cowl.
- 8) Put the cockpit-mounted FUEL SELECTOR valve in the ON position.

#### 4. Fuel Distribution Valve Removal/Installation

##### A. Remove the Fuel Distribution Valve.

- 1) Remove the upper cowl.
- 2) Disconnect all lines from the fuel distribution valve.
- 3) Remove the nuts, bolts, washers and spacers that attach the fuel distribution valve to the engine case.

##### B. Install the Fuel Distribution Valve.

- 1) Attach the fuel distribution valve to the engine case using the nuts, bolts, washers and spacers.
- 2) Install all the lines to the fuel distribution valve.
- 3) Install the upper cowl.

#### 5. Injection Nozzle Removal/Installation

**NOTE:** The nozzles have two pieces. Make sure that the nozzle inserts stay with the nozzle bodies and that the nozzles are installed in the same cylinder from which they were removed.

##### A. Remove the injection Nozzles.

- 1) Remove the upper cowl.
- 2) Remove the rigid fuel lines from the individual nozzles.
- 3) Remove the nozzles from the cylinders.

##### B. Install the injection nozzles.

**CAUTION:** Use only fuel-soluble lubricants (such as engine oil) on the nozzle threads during installation.

- 1) Attach the nozzles to the intake cylinders. Torque the nozzles to between 55 and 60 inch-pounds.
- 2) Connect the rigid fuel lines to the nozzles.
- 3) Install the upper cowl.

#### 6. Injection Nozzle Flow Test

##### A. Check the Injection Nozzles for Blockages.

- 1) If you think that a nozzle is blocked, disconnect the injector lines from the nozzles.
- 2) Seal the nozzles with clean valve stem caps to protect the nozzles from contamination during removal.
- 3) Remove the nozzles. Refer to Injection Nozzles Removal/Installation Section.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 14
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

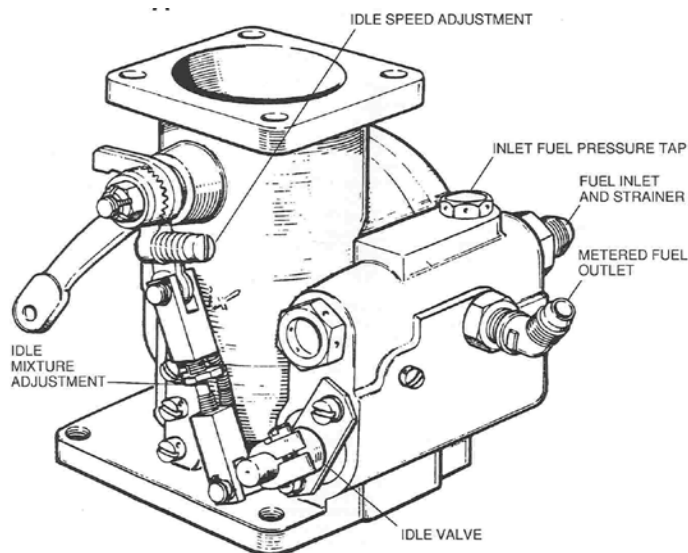
- 4) Pull the injector lines up and make sure that the lines are not kinked.
- 5) Install the nozzles back into the lines.
- 6) Let the fuel flow into clear containers (bottles with graduations are recommended) using the auxiliary fuel pump and examine the nozzle discharge pattern.
- 7) When the mixture control is put in the full rich position, the nozzles must make a pencil-stream pattern. The nozzles must also release the same amount of fuel in each cylinder. If you see an unusual flow pattern, or see that the amount of fuel in each container is different, the nozzles must be cleaned. Refer to Injector Nozzle Cleaning Section.
- 8) After cleaning the nozzles, install valve stem caps for protection. After cleaning the nozzles, it is recommended that they be installed into the injector lines and that a nozzle flow test is done to make sure that the nozzles are clean.
- 9) After a successful flow test, install the flow caps and install the nozzles in the cylinders.
- 10) Remove the flow caps and connect the injector lines to the nozzles.

#### 11-46 Idle Speed and Mixture Adjustment

Refer to the figure below.

- 1) Operate the engine until the oil temperature has increased to 150°F.
- 2) With the mixture control in the full rich position, set the idle speed to  $650 \pm 25$  by adjusting the idle speed adjustment screw on the side of the RSA-5AD1 fuel injector.
- 3) Set the throttle to approximately 1800 rpm and immediately return it to idle. The idle speed should be approximately the same as the speed in the previous step.
- 4) With the throttle at idle, observe the tachometer while slowly leaning the mixture using the mixture control in the cockpit until seeing or sensing a decrease in engine rpm. The tachometer should show an increase of 10-20 rpm prior to the decrease. If no increase is observed, the idle mixture setting is too lean. If the increase is more than 20 rpm, the idle mixture setting is too rich. Adjust the idle mixture by turning the thumbwheel on the L/H side of the RSA-5AD1 fuel injector. To help in the adjustment of the fuel mixture, a stamp on one-half of the clevis on the injector shows the direction the thumbwheel must be moved to make the mixture richer and increase the rpm rate of change. Likewise, turning the thumbwheel in the opposite direction will make the mixture leaner and will decrease the rpm rate of change.
- 5) After each adjustment is made, the engine speed must be increased to approximately 1800 rpm and held for about 10-15 seconds to clean the spark plugs and clear the cylinders of excess fuel.
- 6) If the mixture was too rich or too lean when this procedure was started, it may be necessary to adjust the engine idle speed again.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 15
Ckd:	Revision: B		Report: 99006-6
App:			Make/Model: Cessna R182



### 11-57 Ignition System Description

- A. The engine utilizes two Slick 6351 series, impulse coupled magnetos to fire dual plugs in each cylinder.
- B. For complete description, operation, troubleshooting, maintenance, overhaul and lubrication requirements of the magnetos, refer to Unison 4300/6300 Series magneto Maintenance and Overhaul Manual.
- C. For inspection time requirements of the magnetos, refer to Section 2 of this document. For inspection procedures, refer to Unison 4300/6300 Series Magneto Maintenance and Overhaul Manual latest revisions.

### 11-61 Magneto Removal and Installation

Note: The removal and installation for each magneto is typical.

- A. Remove the Magneto as follows:

- 1) Remove the engine cowl.

**WARNING: Make sure that each magneto P-lead is grounded.**

**WARNING: Before you turn the propeller, remove a minimum of one spark plug from each cylinder to prevent the start of the engine at that time.**

- 2) Remove the screws that attach the high tension outlet cover to the magneto.
- 3) Disengage the high tension cover from the magneto.
- 4) For a reference point when you install the magneto, turn the propeller in the normal direction until each impulse coupling releases near Top Dead Center (TDC) on the number one cylinder compression stroke.



By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 16
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

Note: You will hear a click sound from the impulse couplings when they release.

- 5) You can find the crankshaft position by the marks on the front or aft face of the starter ring gear support. Refer to the Lycoming Service Instruction 1437 or latest revision
  - (a) When you use the marks on the front face of the ring gear, they must be aligned with the small hole that is found at the two o'clock position on the front face of the starter housing.
  - (b) When you use the marks on the aft face of the ring gear, they must be aligned with the engine case parting line.
- 6) Turn the propeller in the opposite direction of the normal propeller operation to approximately 30 degrees BTDC (Before Top Dead Center) on the number one cylinder compression stroke.
- 7) Turn the propeller in the normal direction slowly forward to 25 degrees BTDC on the number one cylinder compression stroke.
- 8) Disconnect the P lead and ground wire from the magneto.
- 9) Examine the magneto angle to help make sure you put it in the same position for installation.
- 10) Remove the nuts, washers and clamps that attach the magneto to the engine housing.
- 11) Remove the magneto from the housing.

B. Install the Magneto as follows:

**CAUTION:** Make sure the gasket surfaces are clean to prevent oil leaks.

- 1) Apply a small quantity of silicone grease such as DC4 to each side of the new magneto base gasket, which will help future timing adjustments.
- 2) Make sure the magneto drive gear is installed correctly, that the nut is torqued correctly and the cotter pin is installed. Refer to the Lycoming Service Instructions 1437 or latest revision and the Unison 4300/6300 Magneto Maintenance and Overhaul Manual Instructions.

**CAUTION:** Make sure you remove the T-118 timing pin immediately after you attach the magneto to the accessory case and before the magneto or propeller is turned.

- 3) Insert the T-118 timing pin into the L timing hole in the magneto distributor block.
- 4) Turn the magneto rotor in the opposite of normal direction until the timing pin is engaged fully into the distributor gear.
  - (a) if the magneto rotor does not move freely and the pin will not go into the hole in the gear, the pin has hit the pointer on the gear.
  - (b) Pull the pin out far enough to continue to turn the magneto freely in the opposite direction of normal movement until the pointer has passed the pin, then insert the pin.



By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 17
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

- (c) Turn the magneto rotor until the pin engages the gear.
- 5) Do a check of the crankshaft to make sure the propeller has not moved and is still set in position with the number one cylinder at 25 degrees BTDC (Before Top Dead Center) on the compression stroke.
- 6) If the propeller has been turned and only one magneto was removed, it will be necessary to engage the impulse coupling on the magneto that is installed, and establish the crankshaft position. Refer to step A. 4) to A. 7) in this section before you continue.
- 7) With the number one cylinder at 25 degrees BTDC on the compression stroke, do the steps that follow:

**CAUTION:** Make sure you remove the T-118 timing pin immediately after you attach the magneto to the accessory case and before the magneto or propeller is turned.

- (a) Install the magneto with the new base gasket and the T-118 timing pin in position.
- (b) Engage the magneto drive gear with the engine gear, in a position that will give a range of magneto timing adjustments in each direction.
- (c) Hold the magneto in position against the accessory case and install the nuts, flat washers, clamps and new lock washers.
- (d) Finger tighten each nut by hand.
- (e) Remove the timing pin.
- 8) Before you continue, you must adjust the magneto timing. Refer to Magneto-to-Engine External Timing Adjustment procedure below.
- 9) With the magneto set in position, first tighten each nut to 8 foot-pounds.
- 10) Tighten each nut from one side to another, to a torque of 17 foot-pounds.
- 11) Connect the P lead to the magneto.
- 12) Attach a ground wire to the magneto.
- 13) Attach the high tension outlet cover to the magneto.
- 14) Tighten the P lead nut to a torque of 13 to 15 inch-pounds.

**CAUTION:** Make sure you remove the T-118 timing pin before the magneto or propeller is turned.

- 15) Install the spark plugs.
- 16) Install the cowl.
- 17) Complete a engine preflight operational check of the ignition system. Refer to the Airplane Flight Manual Supplement issued for the new engine installation.

## 11-62 Magneto to Engine Timing Check

- A. Complete a Check of the Magneto-to-Engine Timing.
  - 1) Make sure the ignition is in the OFF position.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 18
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

- 2) Remove the engine cowl.
- 3) Remove a minimum of one spark plug from each cylinder.
- 4) Connect a standard aircraft magneto timing light between an acceptable engine ground and the P lead terminal of the magneto.

NOTE: Most standard aircraft magneto timing lights indicate open points with a Light On condition and/or a signal that you can hear.

- 5) Turn the ignition switch to the BOTH position.
- 6) Turn the propeller in the normal direction of movement until each impulse coupling releases as the number one cylinder moves near TBD (Top Dead Center) on the compression stroke.

NOTE: You will hear a click sound from the impulse couplings when they release.

- 7) Turn the propeller in the opposite direction of normal movement to approximately 30 degrees BTDC (Before Top Dead Center), then slowly forward to 25 degrees BTDC.
- 8) Slowly turn the propeller in the normal direction of movement until the timing light comes on.
- 9) Examine the crankshaft to make sure it is in the correct position.

NOTE: The timing light must come on 25 degrees BTDC, with the number one cylinder on the compression stroke.

- 10) If the crankshaft is not in the correct position you will have to make an adjustment. Refer to Magneto-to-Engine External Timing section.
- 11) Turn the ignition switch to the OFF position.
- 12) Install the spark plugs.
- 13) Install the ignition leads on the spark plugs.
- 14) Install the cowl.
- 15) Complete a engine preflight operational check of the ignition system. Refer to the Airplane Flight Manual Supplement issued for the new engine installation.

## 11-63 Magneto to Engine External Timing

### A. Adjust the Magneto-to-Engine Timing.

NOTE: The Magneto-to-Engine timing can be adjusted a maximum total of 0.125 inch movement from the original factory position, or between each internal timing adjustment. The external timing movement of 0.125 inch approximately equals 5 degrees of internal timing change.

- 1) Before the first field adjustment of external timing, the magneto and accessory case must be indexed as necessary to monitor external timing adjustments.
  - (a) The magneto must be removed and internal timing adjusted in accordance with Unison 4300/6300 Series Aircraft Magnetos Maintenance and Overhaul

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 19
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

Instructions Form L-1363B or latest revision, when the external timing adjustments collect up to 0.125 inch movement change.

- 2) Make sure the ignition is in the OFF position.
- 3) Remove the engine cowl.
- 4) Remove a minimum of one spark plug from each cylinder.
- 5) Make sure that cylinder number one is at 25 degrees BTDC (Before Top Dead Center) on the compression stroke.
- 6) Connect a standard aircraft magneto timing light between an acceptable engine ground and the P lead terminal of the magneto.  
NOTE: Most standard aircraft magneto timing lights show open points with a Light On condition and/or a signal that you can hear.
- 7) Loosen the mount clamps that attach the magneto to the accessory case so that the magneto will turn on the accessory case.
- 8) Turn the ignition switch to the BOTH position.
  - (a) Look at the magneto from the aft side of the engine.
    - 1 If the timing light is luminated, turn the magneto frame clockwise until the timing light shuts off.
    - 2 Turn the magneto frame counter-clockwise until the timing light comes on, which shows that the contact breaker points are open.
- 9) With the magneto set in position, first tighten each nut to 8 foot-pounds.
- 10) Tighten each nut from one side to another, to a torque of 17 foot-pounds.
- 11) Complete a check of the magneto timing to make sure it has not changed. Refer to Magneto-to-Engine Timing Check section.

### Section 13 – Propeller and Governor

Propeller Make/Model: McCauley B3D36C433/80VSA-1 (R1820002 to R18201313)  
McCauley B3D36C431/80VSA-1 (R18201314 & ON)  
Diameter (Maximum to Minimum): 79.0 to 77.5 inches  
Pitch Range (High to Low): 29.2° to 11.5°  
Governor Make/Model: McCauley Propeller Systems DC290D1/T37

#### 13-1 Propeller Description

The airplane is equipped with a three-blade, constant-speed, metal propeller. Maintenance practices consist of removal and installation of the propeller and spinner. For additional information, troubleshooting, adjustments, and maintenance procedures not addressed in this section, see the applicable McCauley Service Manual (listed earlier in this document).

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 20
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

#### 13-4 Removal Aircraft S/N R18200002 to R18201313

**WARNING: Exercise care when working with the propeller. Always treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller. Ensure magneto switch is in the OFF position before turning propeller.**

**WARNING: Ensure magneto is grounded before turning propeller.**

- 1) Remove nose cowling.
- 2) Remove the spinner dome.
- 3) Remove the safety wire, back off bolts attaching propeller to engine crankshaft about one-fourth inch, and pull propeller forward.

NOTE: Bolts will have to be backed out evenly so propeller can be pulled forward (approximately ¼ inch each time) until all bolts are disengaged from engine crankshaft flange. As the propeller is separated from the engine crankshaft, oil will drain from the propeller and engine crankshaft cavities.

- 4) Pull propeller from engine crankshaft.
- 5) If necessary to remove the aft spinner bulkhead, remove bolts, washers and nuts attaching bulkhead to starter ring gear support, but retain shims for use in reinstallation.

NOTE: After removing the propeller, the starter ring gear assembly may be removed from the engine crankshaft to allow easier access to the aft spinner bulkhead attaching bolts. Loosen alternator adjusting arm and disengage drive belt from pulley on aft face of starter ring gear support assembly.

#### 13-5 Installation Aircraft S/N R18200002 to R18201313

**WARNING: Exercise care when working with the propeller. Always treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller. Ensure magneto switch is in the OFF position before turning propeller.**

**WARNING: Ensure magneto is grounded before turning propeller.**

- 1) If aft spinner bulkhead was removed, reinstall on ring gear support using bolts, nuts and shims.
- 2) If starter ring gear support and aft spinner bulkhead were removed, clean mating surfaces of support assembly and engine crankshaft flange.
- 3) Place alternator drive belt in pulley groove of starter ring gear support. Fit starter ring gear over propeller flange bushings on crankshaft.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 21
Ckd:	Revision: B		Report: 99006-6
App:			Make/Model: Cessna R182

NOTE: Make sure bushing hole in ring gear support, marked O, is assembled adjacent to O mark on crankshaft flange bushing. The starter ring gear must be located correctly to assure proper alignment of the timing mark on the ring gear.

- 4) Clean propeller hub cavity and mating surfaces of propeller hub and ring gear support.
- 5) Apply film of MIL-L-7711 lubricant, or equivalent to new O-Ring and engine prop shaft.
- 6) Install new O-Ring.
- 7) Carefully slide propeller assembly onto engine prop shaft and align propeller assembly to engine and secure with mounting bolts.
- 8) Torque mounting bolts incrementally in a crossing pattern to 60 foot-pounds,  $\pm$  5 foot-pounds (660-780 inch-pounds).
- 9) Safety wire mounting bolts in sets of two or three bolts.
- 10) Position shims, spinner support and spinner on prop cylinder.
- 11) Lightly press spinner snugly against spinner support and check alignment of mounting holes in spinner with holes in spinner bulkhead assembly.

NOTE: Without increasing pressure on spinner, the mounting holes in spinner need to be positioned approximately 0.05 inch forward of the true center of holes in spinner bulkhead assembly.

- 12) Add or remove shims as required to position spinner mounting holes 0.05 inch forward of holes in spinner bulkhead assembly.
- 13) Push hard on spinner until spinner mounting holes are aligned with the spinner bulkhead assembly holes and install four (4) screws and washers equally spaced around the circumference of the spinner.

NOTE: Use only the number of shims that will allow just enough alignment for screws to be installed while pushing hard against spinner.

- 14) Relax force against spinner and install remaining screws and washers. Tighten all screws uniformly around spinner.
- 15) Install cowling.
- 16) Check engine oil and service as needed.

### 13-6 Removal Aircraft S/N R18201314 to R18202041

- 1) Remove all power from the aircraft.

**WARNING: Exercise care when working with the propeller. Always treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller. Ensure magneto switch is in the OFF position before turning propeller.**

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 22
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

**WARNING: Ensure magneto is grounded before turning propeller.**

- 2) Remove twelve screws and washers securing spinner to spinner bulkhead assembly.
- 3) Remove spinner, spinner support, and shims from propeller cylinder.

NOTE: Note number of shims for use during reinstallation of spinner.

- 4) Remove cowl assemblies as required to gain access to propeller mounting bolts.
- 5) Cut safety wire from mounting bolts.
- 6) Remove mounting bolts as follows:
  - (a) Evenly back off mounting bolts approximately 0.25 of an inch.
  - (b) Pull propeller assembly forward, taking up the 0.25 inch provided by backing off mounting bolts.

NOTE: As the propeller assembly is separated from the engine crankshaft, oil will drain from the propeller and engine crankshaft cavities.

- (c) Continue evenly backing off the mounting bolts and pulling the propeller assembly forward, 0.25 inch at a time, until all bolts are completely removed.
- 7) Remove propeller assembly and O-Ring from engine prop shaft.

### 13-7 Installation Aircraft S/N R18201314 to R18202041

**WARNING: Exercise care when working with the propeller. Always treat the propeller as if the ignition switch were on. Do not stand, nor allow anyone else to stand, within the arc of the propeller. Ensure magneto switch is in the OFF position before turning propeller.**

**WARNING: Ensure magneto is grounded before turning propeller.**

- 1) Clean mating surfaces of propeller assembly, spinner bulkhead assembly, engine prop shaft and mating surfaces.
- 2) Apply film of MIL-L-7711 lubricant, or equivalent to new O-Ring and engine prop shaft.
- 3) Install new O-Ring.
- 4) Carefully slide propeller assembly onto engine prop shaft and align propeller assembly to engine and secure with mounting bolts.
- 5) Torque mounting bolts incrementally in a crossing pattern to 60 foot-pounds,  $\pm$  5 foot-pounds (660-780 inch-pounds).
- 6) Safety wire mounting bolts in sets of two or three bolts.
- 7) Position shims, spinner support and spinner on prop cylinder.
- 8) Lightly press spinner snugly against spinner support and check alignment of mounting holes in spinner with holes in spinner bulkhead assembly.

By: Jack Sledge	Date: 8-8-17	 P.O. BOX 1209 DECATUR, TEXAS 76234	Page: 23
Ckd:	Revision: B		Report: 99006-6
App:		INSTRUCTIONS FOR CONTINUED AIRWORTHINESS	Make/Model: Cessna R182

NOTE: Without increasing pressure on spinner, the mounting holes in spinner need to be positioned approximately 0.05 inch forward of the true center of holes in spinner bulkhead assembly.

- 9) Add or remove shims as required to position spinner mounting holes 0.05 inch forward of holes in spinner bulkhead assembly.
- 10) Push hard on spinner until spinner mounting holes are aligned with the spinner bulkhead assembly holes and install four (4) screws and washers equally spaced around the circumference of the spinner.

NOTE: Use only the number of shims that will allow just enough alignment for screws to be installed while pushing hard against spinner.

- 11) Relax force against spinner and install remaining screws and washers. Tighten all screws uniformly around spinner.
- 12) Install cowling.
- 13) Check engine oil and service as needed.

## Section 15 Instruments and Instrument Systems

### 15-43 Cylinder Head Temperature Gage Description

Install the CHT Probe into the cylinder number shown below:

Aircraft S/N R18200002 to R18201313: Cylinder number 6

Aircraft S/N R18201314 to R18202041: Cylinder number 3