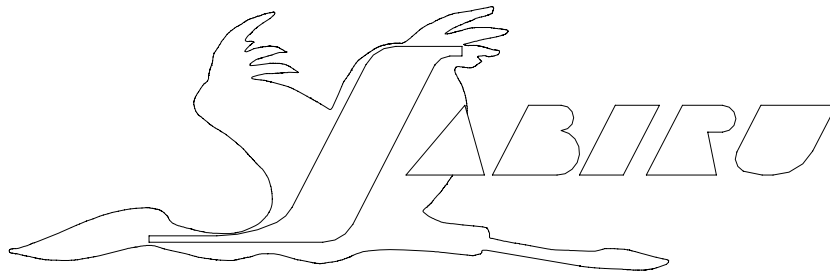


# **INSTALLATION MANUAL FOR JABIRU 2200 AIRCRAFT ENGINE**



This Manual has been prepared as a guide to correctly install the Jabiru 2200 engine into an airframe.

Should you have any questions or doubts about the contents of this manual, please contact Jabiru Aircraft Pty Ltd.

**Applicable to Jabiru 2200cc Engines, S/No. 2068 Onwards (Hydraulic Lifter Type)**



# 1 TABLE OF CONTENTS

1	<i>TABLE OF CONTENTS</i>	2
2	<i>Description</i>	5
3	<i>Specifications</i>	6
4	<i>Operating Limitations</i>	7
5	<i>Dimensions</i>	9
6	<i>Denomination Of Cylinders</i>	10
7	<i>Engine Mount</i>	11
8	<i>Controls</i>	13
9	<i>Instruments</i>	14
10	<i>Electrical Equipment</i>	17
11	<i>Fuel Supply System</i>	20
12	<i>Air Intake System</i>	22
13	<i>Exhaust System</i>	23
14	<i>Cooling Systems</i>	24
15	<i>Propeller Selection</i>	25
16	<i>Auxiliary Units</i>	26
17	<i>Appendix A – Wiring Diagrams</i>	27
18	<i>Appendix B – Supplementay Information</i>	28
19	<i>Appendix C – Jabiru Engine Installation Tips</i>	29
20	<i>Appendix D</i>	32
21	<i>Typical Installation – Jabiru Engine</i>	34



## 1.1 Table of Figures

Figure 1. Drawing 9404041/1 Engine Dimensions .....	9
Figure 2. Cylinder Firing Order .....	10
Figure 3. Engine Mount Point Locations .....	11
Figure 4 Engine Mount Assembly .....	12
Figure 5. Wiring Diagram.....	17
Figure 6. Regulator Plug.....	19
Figure 7 – Wiring Details .....	27
Figure 8. Intake Detail #1 .....	34
Figure 9. Intake Detail #2 .....	34
Figure 10. Engine Installation #1 .....	35
Figure 11. Coil Cooling Detail #1.....	35
Figure 12. Coil Cooling Detail #2.....	36
Figure 13. Engine Accessory Pack Contents .....	36
Figure 14. Upper Engine Mount Detail .....	37
Figure 16 Lower Engine Mount Detail .....	38
Figure 17. Engine Mount Detail .....	40
Figure 19. Fuel Connections General .....	40
Figure 18. Fuel Connection Detail.....	40
Figure 20. Oil Collector Bottle .....	41
Figure 21. Hot Air Plumbing – Incorrect.....	42
Figure 22 Hot Air Plumbing – Correct .....	42
Figure 24. SCAT Hose Detail #1 .....	43
Figure 23. Typical Hot Air Mixer Box .....	45
Figure 26. Control Connections to Carburettor.....	45
Figure 27. Balance Tube Detail #1 .....	46
Figure 29. Carburettor Balance Tube Nipple.....	46
Figure 31. Oil Temperature Sensor.....	47
Figure 32. Oil Pressure Sensor .....	47
Figure 33. Tachometer Sensor Installation. ....	48





## 2 Description

### 2.1 Model

All Jabiru 2200 Engine Models from S/No 2068 on.

### 2.2 Details

- 4 Stroke
- 4 Cylinder Horizontally Opposed
- 1 Central Camshaft
- Push Rods
- Over Head Valves (OHV)
- Hydraulic Valve Lifters with Automatic Adjustment
- Ram Air Cooled
- Wet Sump Lubrication
- Direct Propeller Drive
- Dual Transistorised Magneto Ignition
- Integrated AC Generator
- Electric Starter
- Mechanical Fuel Pump
- Naturally Aspirated – 1 Pressure Compensating Carburettor
- 6 Bearing Crankshaft

### 2.3 Manufacturer

Jabiru Aircraft Pty Ltd,  
 P.O. Box 5186,  
 Bundaberg West,  
 Queensland 4670

### 2.4 Manuals

Instruction and Maintenance Manual  
 Installation Manual  
 Parts Catalogue

<b>REVISION</b>	0										Dated : June 2005	Page: 5
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### 3 Specifications

#### 3.1 General

- Displacement : 2200 cc
- Bore : 97.5 mm
- Stroke : 74 mm
- Compression Ratio : 8 :1
- Direction of Rotation of Prop Shaft : Clockwise – Pilot’s view – Tractor Applications
- Ramp Weight : 61 kg (134 lbs) Complete including Exhaust, Carburettor, Starter Motor, Alternator & Ignition System.
- Ignition Timing : 25° BTDC
- Firing Order : 1 – 3 – 2 – 4
- DC Output : 10 Amps
- Fuel Consumption @ 75% Power : 13 l/hr (3.5 US gal/hr)
- Fuel : AVGAS 100/130. MOGAS with RON Octane Rating 95 or above may be used if AVGAS is not available.
- Oil : Aero Oil W Multigrade 15W-50, or equivalent Lubricant complying with MIL-L-22851C, or Lycoming Spec. 301F, or Teledyne – Continental Spec MHF-24B
- Oil Capacity : 2.3 L (2.2 quarts)
- Spark Plugs : NGK D9EA – Automotive

#### 3.2 Performance

Static sea level ratings under the following conditions:-

- International Standard Atmospheric conditions at sea level.
- Aircraft service equipment drives unloaded. (Vacuum Pump not fitted)
- Full rich fuel/air mixture.
- Maximum cylinder head temperature.
- Standard Jabiru air filter and cold air.
- Standard exhaust muffler.

##### 3.2.1 Engine Ratings

- Takeoff/Max Continuous : 85 hp / 3300 RPM
- Fuel Consumption : 21 L/hr @ Takeoff/Max Continuous Rating
- Oil Consumption : 0.1 L/hr (max)

REVISION	0									Dated : June 2005	Page: 6
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## 4 Operating Limitations

### 4.1 RPM

Continuous : 3300 RPM / Full Throttle

### 4.2 Engine Cooling

Maximum Cylinder Head Temperatures measured under exhaust spark plug.

Maximum Peak Temperature	200°C (392°F)
Continuous Operation	180°C (356°F)

### 4.3 Fuel

#### 4.3.1 Specifications

- Avgas 100LL & Avgas 100/130
- Leaded and Unleaded Automotive Gasoline above 95 Octane RON

### 4.4 Pressure to Carburettor (above ambient)

- Maximum 20 kPa (3 psi)
- Minimum 5 kPa (0.75 psi)

**WARNING – When using auto fuels, ensure all components of the fuel delivery system are cooled to prevent fuel vaporization.**

### 4.5 Oil

#### 4.5.1 Specifications

Aero Oil W Multigrade 15W-50,  
or equivalent Lubricant complying with  
MIL-L-22851C, or  
Lycoming Spec. 301F, or  
Teledyne - Continental Spec MHF-24B

#### 4.5.2 Oil Temperature

- Minimum for Take-off Power 50°C (122°F)
- Maximum 118°C (244°F)
- Continuous 80°C – 100°C (176°F - 212°F)

#### 4.5.3 Pressure

- Normal Operations: Min 220 kPa (32 psi)

REVISION	0									Dated : June 2005	Page: 7
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## 5 Dimensions



A.C.N. 010 910 077

JABIRU AIRCRAFT P/L

P.O. BOX 5186

BUNDABERG 4670

QUEENSLAND AUSTRALIA

PH 07 4155 1778 FAX 07 4155 2669

2200 JABIRU ENGINE

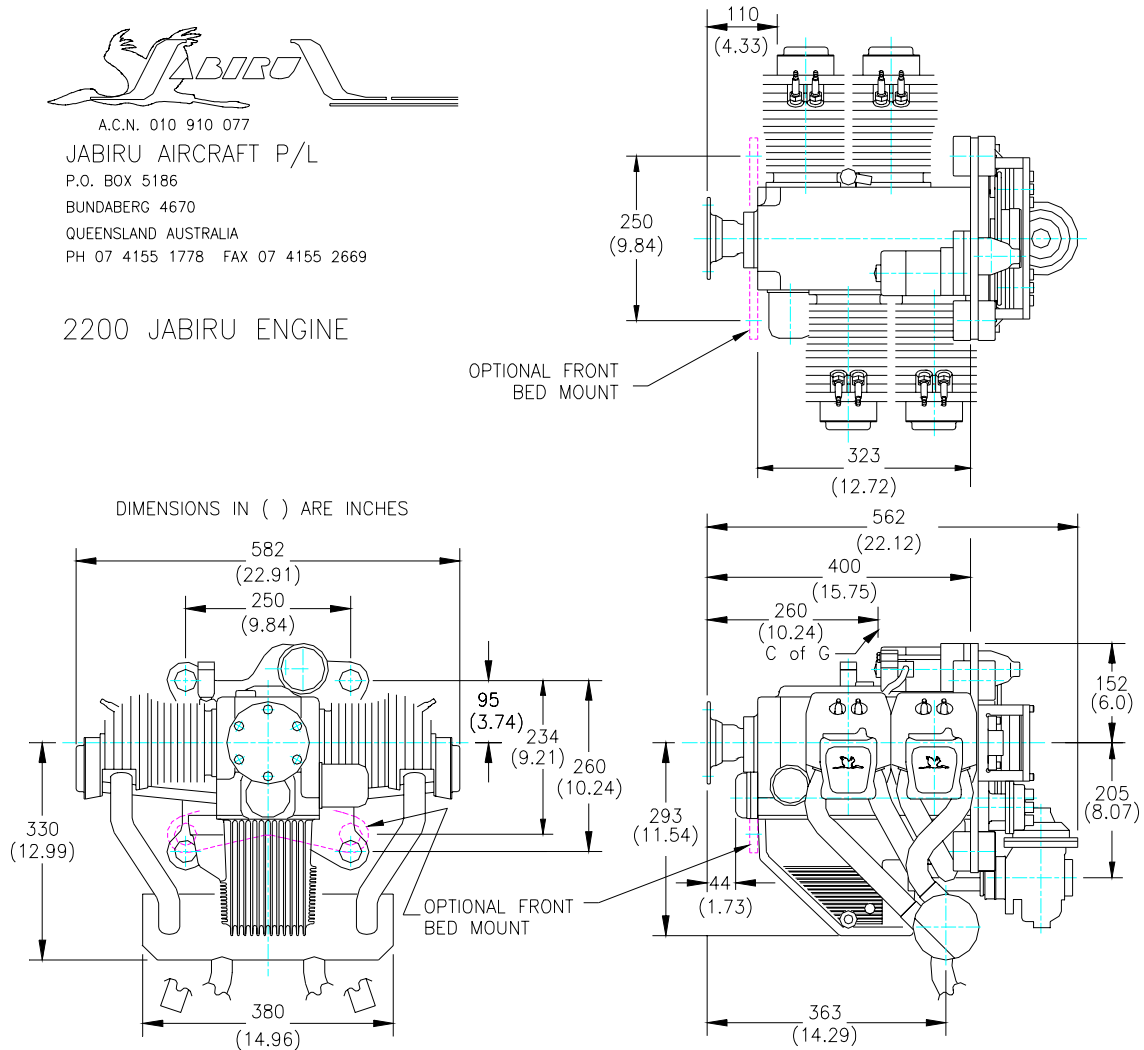
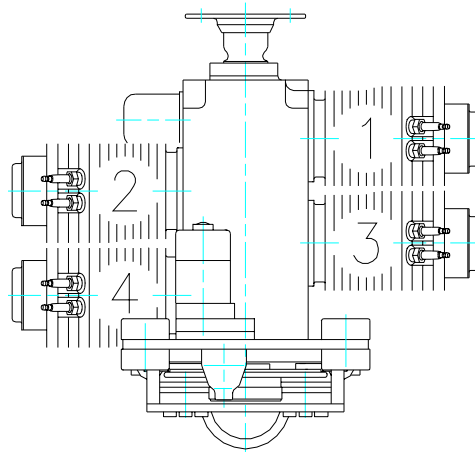


Figure 1. Drawing 9404041/1 Engine Dimensions

REVISION	0							Dated : June 2005	Page: 9
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## 6 Denomination Of Cylinders



Drawing 9483093/1

**Figure 2. Cylinder Firing Order**

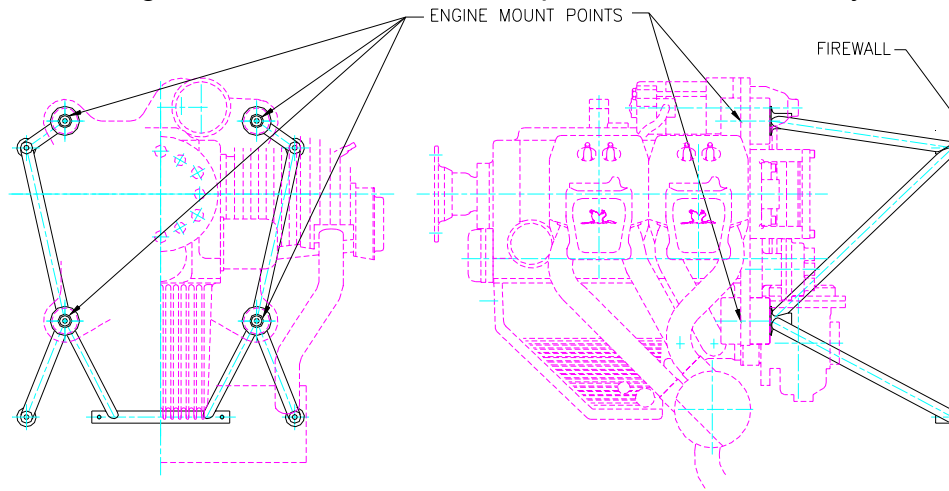
Cylinder Firing Order: 1 – 3 – 2 – 4

REVISION	0									Dated : June 2005	Page: 10
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## 7 Engine Mount

The design of the engine mount must not only take into account the structural loadings but must make allowances for accessibility of components and the removal of equipment located at the rear of the engine.

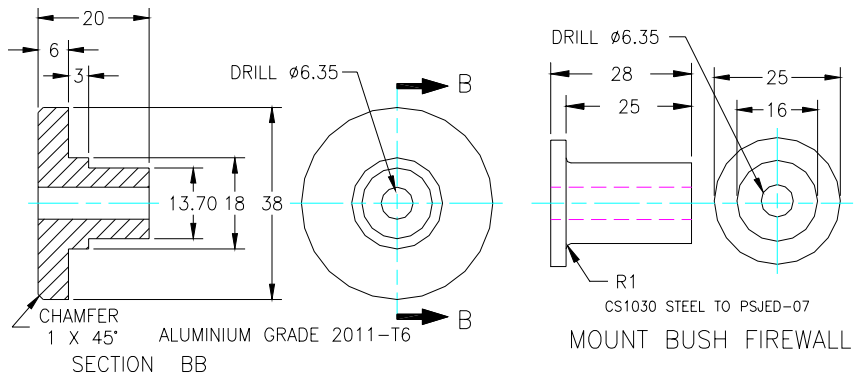
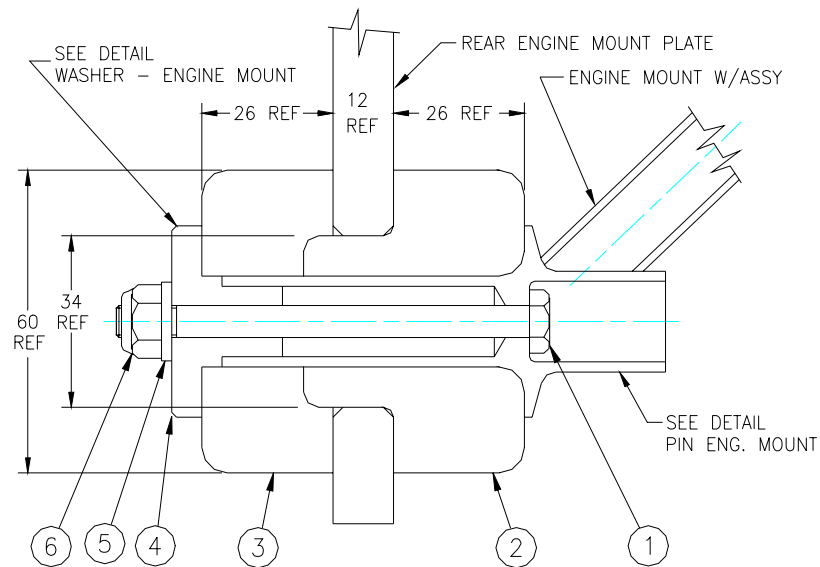
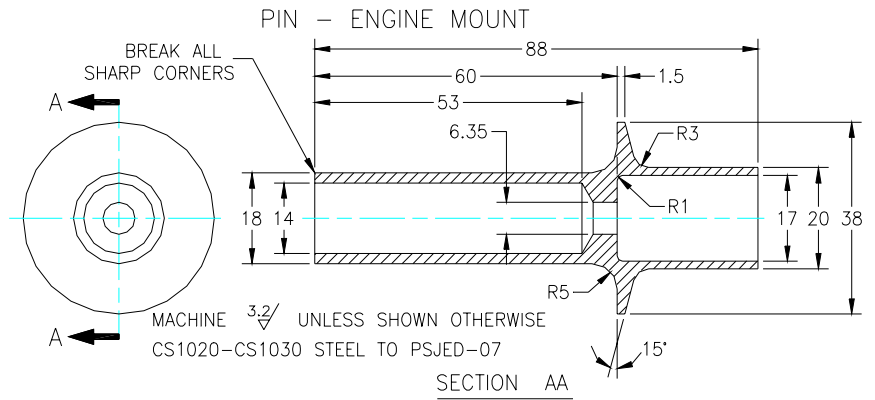
The engine has four engine mounting points located at the rear of the engine (refer to figure 1.0) from which the engine is to be mounted. An optional bed mount may be fitted.



**Figure 3. Engine Mount Point Locations**

The correct installation is shown below in Figure 4.0

REVISION	0								Dated : June 2005	Page: 11
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WASHER - ENGINE MOUNT

9467073/1

Figure 4 Engine Mount Assembly

Corrections of the engine alignment may be made using spacers under the rubber cushions. The maximum spacer thickness on any one mount is 3mm.

REVISION	0								Dated : June 2005	Page: 12
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## 8 Controls

This section comprises of the mechanical controls and electrical switches.

### 8.1 Throttle and Choke

Provisions for the connection of the throttle and choke are made on the carburettor.  
Note: Since a pressure compensating carburettor is used there is no mixture control.

### 8.2 Master Switch, Ignition Switches and Starter Button

The switches are connected as shown by the circuit diagram, on Page 10.

REVISION	0									Dated : June 2005	Page: 13
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## 9 Instruments

### 9.1 Electronic Tachometer

The tachometer picks up on 2 metal tabs attached to the inside of the flywheel. Pickup is of induction sender type.

#### 9.1.1 Tachometer Wiring

- 3 Tachometer Negative (3) to Earth
- 4 Tachometer Positive (4) to Instrument
- 8 Tachometer to Red Wire tachometer pick-up
- 7 Tachometer to Black Wire tachometer pick-up

#### 9.1.2 Oil Temperature Gauge

The Oil Temperature Gauge uses an electric probe mounted in the base of the sump. Jabiru Part No. PI10752N is recommended.

##### 9.1.2.1 Oil Temperature Wiring

- Black Oil Temperature Gauge Negative to Earth
- Red Oil Temperature Gauge Positive to Instrument
- White Oil Temperature Gauge Sensor (S) to Oil Temperature Sensor (Lower Left Eng Sump)

#### 9.1.3 Oil Pressure Gauge

An electric oil pressure sender is fitted to the engine for an Oil Pressure Gauge. Jabiru Part No. PI10762N is the recommended gauge.

##### 9.1.3.1 Oil Pressure Wiring

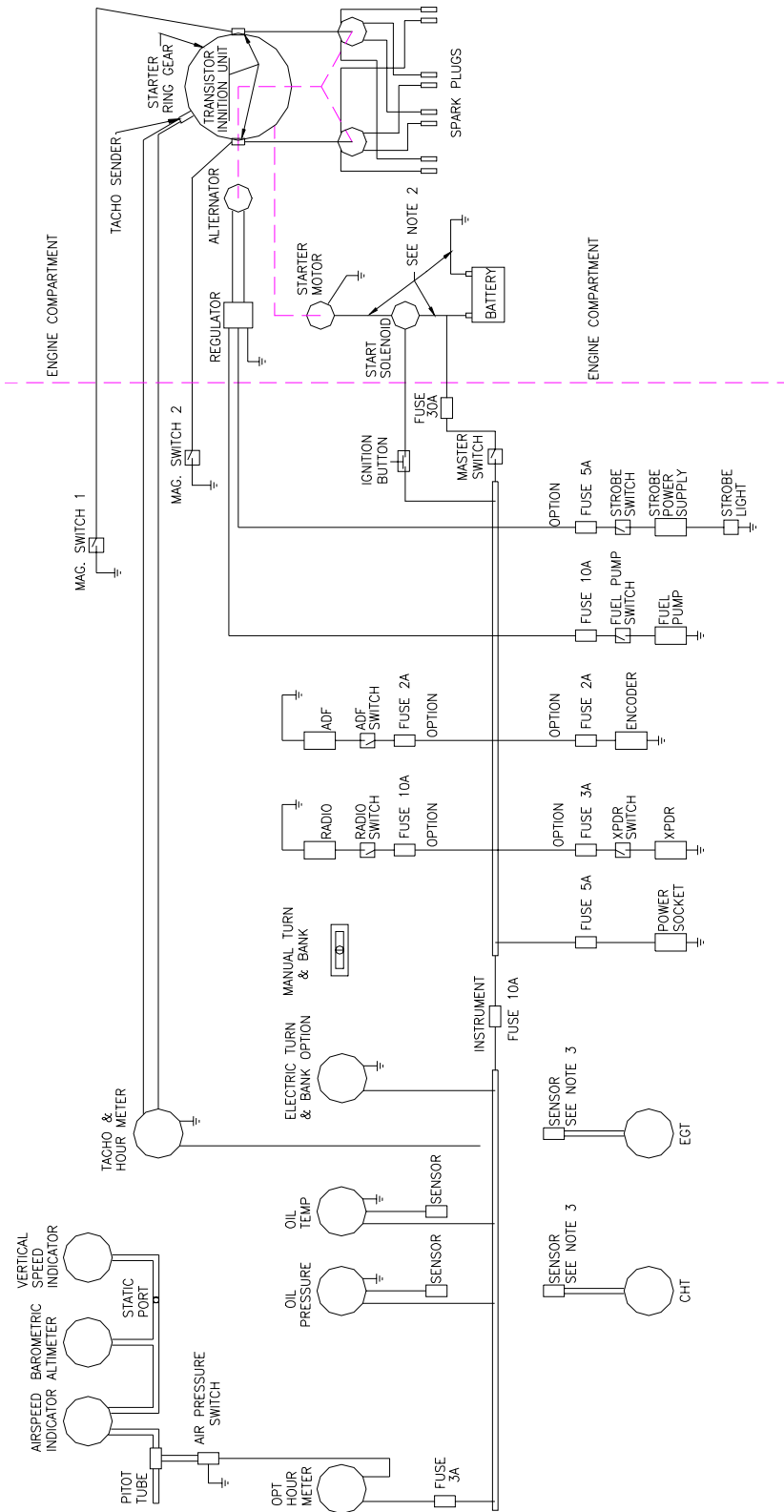
- Black Oil Pressure Gauge Negative to Earth
- Red Oil Pressure Gauge Positive to Instrument
- White Oil Pressure Gauge Sensor (S) to Oil Pressure Sensor (Fwd Top Eng)

#### 9.1.4 Cylinder Head Temperature Gauge

The Cylinder Head Temperature Gauge uses a thermocouple. An audit must be done to establish the hottest cylinder and the thermocouple probe should be fitted under the exhaust

REVISION	0									Dated : June 2005	Page: 14
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Drawing 4119234/3 ELECTRICAL WIRING

REVISION

0

Dated : June 2005

Page: 16

Figure 5. Wiring Diagram

## 10 Electrical Equipment

### 10.1 Alternator

The alternator fitted to the Jabiru 2200 engine is a single phase, permanently excited with a regulator. The rotor is mounted on the flywheel with the stator mounted on the alternator mount plate at the back of the engine. The alternator mount plate is also the mount for the ignition coils and the vacuum pump.

#### Specifications

Power (Max): 120W Continuous

Note: The electrical system is Negative Earth.

### 10.2 Regulator

The regulator has been selected to match the voltage and current of the integral alternator. Only Jabiru Part No. PI10652N should be used. (The regulator output voltage is 14 volts  $\pm$  0.8 volt.).

Recommended wiring of regulator is positive and negative of the regulator directly to the battery. A 20A fuse or circuit breaker may be used between the regulator & battery

### 10.3 Ignition

The ignition unit has dual breakerless transistorised ignition with the magnets mounted on the flywheel and the coils mounted on the alternator mount plate.

The current from the coils flows to the distributor from where it is distributed to the spark plugs. (See also Regulator Wiring at Page 12.)

- The ignition is turned off by grounding the coils via the ignition switches.
- The ignition is timed to 25° BTDC
- The temperature limit for the ignition coils is 70°C. This should be checked by the installer. It is recommended that pipes of 12mm dia be fitted to the top rear of each air duct directing air onto the coils for cooling purposes.
- Coil gaps are set at 0.25mm to 0.30mm (0.010" to 0.012").

#### 10.3.1 Transistorised Ignition 1 Wiring

No. 1 Switch – Upper to Left Transistorised Ignition

No. 1 Switch – Lower to Earth

Switch Open for Ignition ON, closed for Ignition OFF.

REVISION	0									Dated : June 2005	Page: 17
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### 10.3.2 Transistorised Ignition 2 Wiring

No. 2 Switch – Upper to Right Transistorised Ignition  
 No. 2 Switch – Lower to Earth  
 Switch Open for Ignition ON, closed for Ignition OFF.

## 10.4 Starter Motor

The starter is mounted on the top of the engine and drives the ring gear on the flywheel. The motor is activated by engaging the starter button (the master switch has to be ON) which trips the solenoid, hence current flows from the battery to the motor. The cable from Battery to starter should be minimum 16mm<sup>2</sup> copper.

### 10.4.1 Starter Wiring

Starter Button Switch (lower) to Main Bus  
 Starter Button Switch (upper) to Start Solenoid (through Grommet)

## 10.5 Battery

The battery should be of a light weight, 12V, 20 Ah type able to accept a charging voltage up to 14 V (± 0.8V) and a 10 AMP Input.

### 10.5.1 Battery Cables

Black Starter Motor Mount (Engine Rear) to Battery Negative  
 Red Battery Positive to Starter Solenoid  
 Red Starter Solenoid (Switched) to Starter Motor (Part of)

## 10.6 Additional Wiring Information

### 10.6.1 Engine Hourmeter Wiring

Red Hourmeter Positive to Positive  
 Black Oil Pressure Switch to Engine Sump Bolt  
 Black Hourmeter to Oil Pressure Switch (Fwd Eng Left)

### 10.6.2 Earth Wiring

Black Battery Earth Negative to Firewall Earth (Engine Bay)  
 Black Battery Earth Negative to Earth Bus

### 10.6.3 Master Wiring

Red Starter Solenoid to Main Fuse

<b>REVISION</b>	0									Dated : June 2005	Page: 18
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## 11 Fuel Supply System

### 11.1 Fuel Tank

The fuel tank must be fitted with an outlet strainer of between 8 and 16 mesh per inch, with a minimum total mesh area of 5 cm<sup>2</sup>.

### 11.2 Fuel Filtration

A Fuel filter capable of preventing the passage of particles larger than 0.1mm (100um) must be installed between the fuel tank outlet and the fuel pump.

The filter must be present in the system for the fuel flow test. The size of the filter should give consideration to allow adequate flow with a used filter.

A Ryco Z15 or similar filter has been used successfully.

### 11.3 Mechanical Fuel Pump

The mechanical fuel pump is mounted on the engine crankcase and is camshaft driven. It is designed to supply fuel at the pressure described in the following paragraph. If fitted, the electrical boost pump must also fulfill the fuel input criteria for the carburettor, given below.

### 11.4 Carburettor

A Bing constant depression type 94/40 is used. This carburettor has a minimum delivery pressure of 5 kPa (0.75 Psi) and a maximum pressure of 20 kPa (3 psi). To confirm that the fuel system is capable of delivering this pressure a fuel flow test must be performed.

**To check pressure, insert a 'T' piece between the mechanical pump and the carby. Test boost pump with engine off, then mechanical fuel pump with engine on, then combine with electrical boost pump as well, before first flight.**

A method for performing a fuel flow test is available from Jabiru if required. A drip deflector to deflect overflowing fuel from the exhaust system is supplied as standard equipment on the engine.

Because idle adjustments cannot accurately be made on the dynamometer (where every engine is run before delivery), some adjustment of the 7mm idle set screw may be required. A hot idle of around 900RPM is desirable. Fitting an earth strap from carby to crankcase is recommended to eliminate possible radio interference.

#### 11.4.1 Carburettor Tuning

Late in 2004 Jabiru Aircraft introduced a new system of needles and jets to the 2200 engine. The new configuration lowers fuel consumption and is now standard. Details of the configuration are given below:

REVISION	0									Dated : June 2005	Page: 20
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<b>Idle Jet</b>	Bing Jet, size 45.
<b>Idle Air Bleed</b>	Size increased to 1.6mm diameter.
<b>Idle Mixture Screw</b>	Typically, Out 1 Turn.
<b>Needle Jet</b>	Bing Jet, size 276.
<b>Main Jet</b>	Bing Jet, size 220.
<b>Needle</b>	Jabiru Needle P/No. 4A138A0D

Note that the needle used is a proprietary item developed by Jabiru specifically for use on the 2200 engine.

**Engine tuning may be significantly affected by extreme ranges of climate or propellers which incur RPM values outside suggested figures (Appendix C).**

**Carburettor tuning must not be altered other than with advice from Jabiru Aircraft. If in doubt, contact Jabiru Aircraft or our local representative**

## 11.5 Fuel Lines

Fuel lines are nominally 6mm bore. All hoses forward of the firewall require fire resistant sheathing and those between moving sections such as between engine and firewall should be flexible. Hoses must be changed every two years, though if there are visible signs of degradation (such as cracking or hardening) the hose should be changed immediately.

<b>REVISION</b>	0										Dated : June 2005	Page: 21
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## 12 Air Intake System

### 12.1 SCAT HOSE

Remove at each 50 hourly inspection one end of each scat hose. Inspect for holes, leaks and condition of helical wound in a wire former. Replace if any signs of corrosion is evident.

### 12.2 Air Filter

- The induction system must not cause positive RAM induction pressure as this will have an unpredictable affect the fuel/air mixture supplied to the engine.
- The filter must be capable of supplying 250 kg/hr (550 pph) of air
- The filter may have to be changed at regular intervals if the engine is to be used in a dusty environment.
- Air flow should be as direct as possible, no tight bends and air taken from outside the cowl. Current air filter is RAF 17 (RepcO)

REVISION	0									Dated : June 2005	Page: 22
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### 13 Exhaust System

- An exhaust system is provided with the engine. Both Pusher and Tractor systems are available.
- Muffler Volume – Capacity 3 litres
- Back pressure at Takeoff Performance – Max 0.2 bar (2.9 psi). Readings taken 70mm from muffler flange connections. Only complete mufflers supplied with Jabiru Aircraft are welded – all others require tail pipes to be TIG welded to the muffler body. NOTE: Drilled ends of pipes go inside muffler cavity. The tail pipes go completely through the muffler body and are welded on both top and bottom.
- When fitting the muffler one or more of the exhaust pipes can be loosened at the connection to the cylinder head to allow easy fit of the muffler. They then must be tightened.
- Exhaust Gas Temperature (EGT) - Nominal 650° – 750° (1202°F – 1382°F) measured 100mm from the exhaust manifold flange.

REVISION	0									Dated : June 2005	Page: 23
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## 14 Cooling Systems

### 14.1 Air Ducts

- The engine should be installed using RAM AIR ducts provided with the engine.
- Each duct must have a 25mm hole at the inside top front to bleed air over the crankcase.
- Cylinder and cylinder head cooling is achieved by ducting air over the cylinders and heads. The Static Air Pressure inside the cooling ducts must not be lower than 4.3cm (1.7”) water gauge at 1.3 times the stall speed.
- The cooling ducts provided are only a starting point in establishing effective engine cooling. The ducts may require to be increased in size and additional baffles provided to achieve the specified maximum cylinder head temperature of 180°C (see page 19).

### 14.2 Oil Cooling

- The dipstick cap must be screwed fully in before removal for reading oil level.
- An oil cooler adapter is supplied with the engine and is fitted under the oil filter.
- Oil coolers are available from Jabiru Aircraft.
- Unless operating in environments of low temperatures, oil coolers are mandatory.
- The cooler can be plumbed either way to the adaptor – flow direction through the cooler is not important.
- In continuous operation oil temperatures between 80°C and 90°C (176°F – 194°F) are desirable. 70°C (158°F) is the minimum allowable temperature for continuous running and 100°C (212°F) is the maximum allowable temperature for continuous running.
- Over filling with oil is not desirable. Over filling may result in elevated temperatures and excessive oil loss through the crankcase vent.
- When installed in a tail-dragger aircraft, recalibration of the dipstick will be required by the owner.
- Hoses should be nominally 10mm (3/8”) bore.
- Hoses must be changed every two years or when visible degradation (cracking, hardening) is visible during inspections.

**The limits in the Specification Sheet, contained in Appendix B, must be strictly adhered to. Warranty will not be paid on engine damage attributed to overheating of cylinders or oil.**

REVISION	0									Dated : June 2005	Page: 24
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## 15 Propeller Selection

- The hub of the propeller must be drilled with holes to match the flange.
- The propeller must be carefully selected to match the airframe and the engine: Propellers up to 1727mm (68”) in diameter and between 762mm (30”) and 1219mm (48”) in pitch may be used. The propeller flange is drilled with 6 holes at both 4” PCD and 100mm PCD (total of 12 holes).
- Maximum moment of inertia 0.25 kgm<sup>2</sup>

Applications outside this range should be referred to Jabiru.

**Engine MUST NEVER BE RUN WITHOUT THE PROPELLER. Damage will occur in this state.**

REVISION	0									Dated : June 2005	Page: 25
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## 16 Auxiliary Units

### 16.1 Vacuum Pump

For the installation of an artificial horizon and/or a direction gyro a vacuum pump is necessary. A Tempest 212CW (or equivalent) vacuum pump can be fitted to the alternator mounting plate and directly coupled to the crankshaft. The drive pad is dry.

The pad and spline are SAE Standard.

REVISION	0									Dated : June 2005	Page: 26
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# 17 Appendix A – Wiring Diagrams

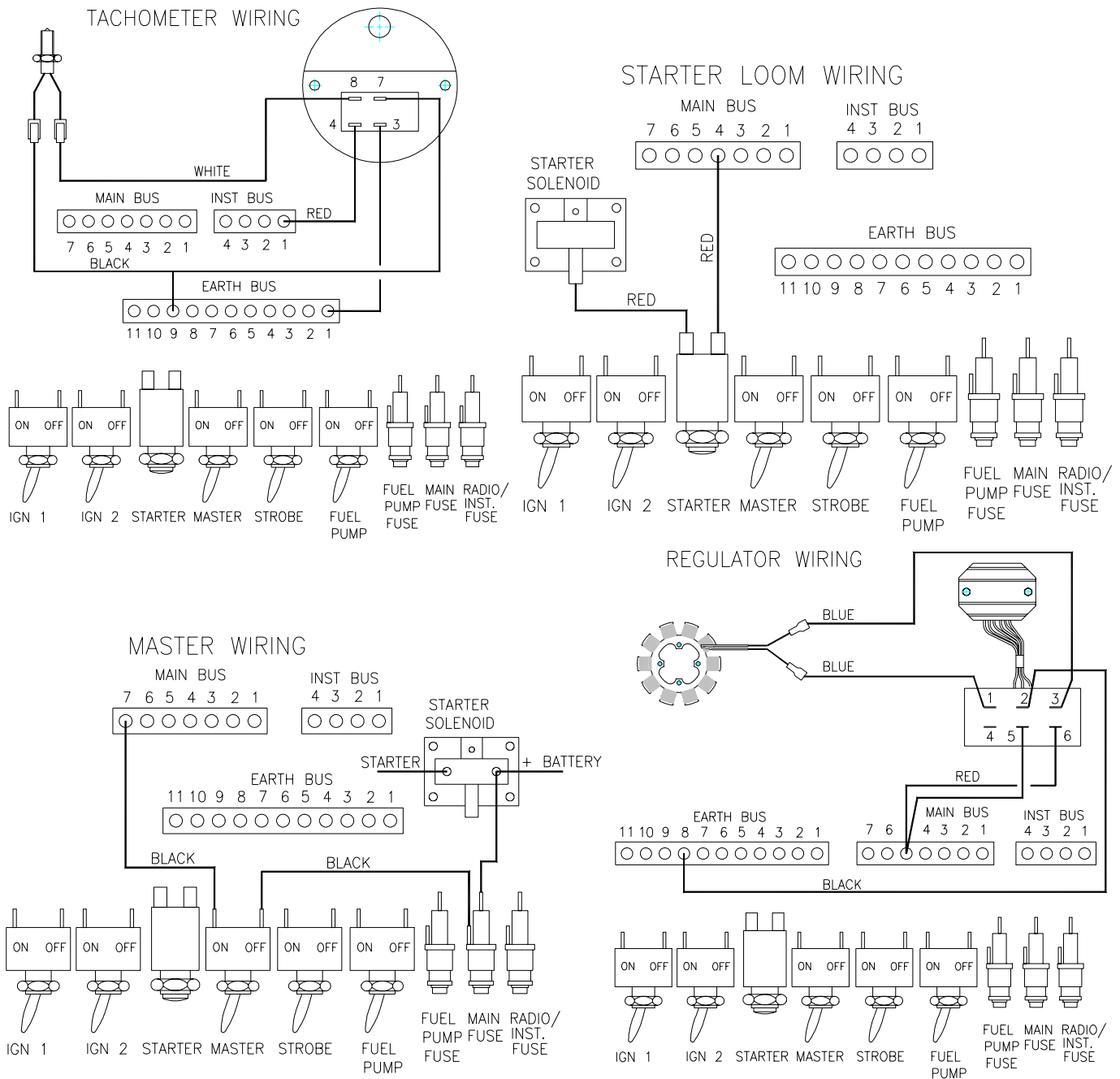


Figure 7 – Wiring Details

REVISION	0									Dated : June 2005	Page: 27
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## 18 Appendix B – Supplementay Information

### 18.1 Recommended Propeller Type

- Fixed pitch wooden propellers.
- Maximum propeller diameter 1727mm (68").

### 18.2 Equipment

The following equipment is included in the engine approval:-

- Carburettor: 1 x Bing constant Pressure carburettor type 94/40  
Main jet is Bing 220. Needle jet 276. Idle jet 45.
- Fuel Pump: Mechanical, Jabiru P/N PG10332N
- Ignition System: Jabiru dual magneto, high voltage transistorised, contactless P/N PI10522N
- Spark Plugs: NGK D9EA
- Alternator: Integrated Jabiru, permanent magnet single phase alternator, P/N 4532064/4535064 with regulator rectifier P/No. PI10652N.
- Starter: Jabiru 12V/1.5 kW, engagement via reduction gear and flywheel. Nippon Denso type, P/No. 4933023.

The following optional equipment may be driven by or fitted to the engine subject to the type number being included in the approved Jabiru Aircraft Pty Ltd engine specification:-

Vacuum Pump                      Tempest 212CW (or equivalent) vacuum pump fitted to the alternator mounting plate and directly coupled to the crankshaft. The drive pad is dry & The pad and spline are SAE Standard

REVISION	0									Dated : June 2005	Page: 28
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## 19 Appendix C – Jabiru Engine Installation Tips

### 19.1 Prop

- For optimal performance, Jabiru engines require 2800 – 2900 RPM at take off and 3200 in the air straight and level. This may vary with aircraft and prop type, but variation beyond these limits will affect tuning and in extreme cases may result in damage to the engine.
- Carby tuning must not be altered other than with advice from Jabiru Aircraft. If in doubt, contact Jabiru Aircraft or our local representative.

### 19.2 Tacho

- Ensure gauge is reading correctly. While large errors will be obvious, smaller errors are harder to pick and it is recommended to check the gauge reading with another instrument (such as a hand-held optical prop-tach)

### 19.3 Cooling

- Cowls should have adequate entry and exit areas. As a general guide, cowl outlets should have approximately 3 times as much area as the inlets.
- Care must be taken not to flood the cowl area with oil cooler air (excessive oil cooler duct size). Too much air coming in through the oil cooler will reduce the amount of air flowing through the ram air ducts & increase CHTs.
- Air ducts as supplied are starting points and for best performance must be optimized by the builder. Poor connections and air gaps around ducts/cooler etc give second rate cooling

**Damage caused by overheating due to poor installation techniques would not be covered under warranty**

### 19.4 Air Induction

- Air must enter from outside the cowl.
- All scat hoses should have only slight bends, with all sharp edges removed from the induction path (including hot air sources).
- Ensure the filter used has adequate size.

### 19.5 Carburettor

- The bowl vent line must be connected to the filtered side of air box.
- Ensure that the two sense holes on the rear of venturi (intake side of carburettor) have not been obscured.
- Set engine idle when warm.
- Ensure throttle and choke movement is correct.

REVISION	0									Dated : June 2005	Page: 29
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## 19.6 Fuel Pump

- Ensure boost pump is not capable of more than 3 lb (20 kPa) pressure.

## 19.7 Oil

- Expel inhibiting oil from cylinders and pressure up (wind engine on starter until a the oil pressure gauge shows a reading) before first start.
- Ensure correct run-in type oil is used for the first 25 – 30 hours to ensure proper ring bedding-in.
- Once past the initial 25-30 hours, ensure the oil used meets the specifications given above.
- Oil coolers are mandatory unless operating in very cold ambient temperatures. Refer to Oil Cooling section above for allowable oil operating temperature ranges.
- Do not overfill the engine – this may result in high oil temperatures.

## 19.8 Fuel

- Avgas 100LL
- MOGAS above 95 Octane RON.
- Ensure a suitable fuel filter is used.
- Ensure the fuel tank is properly vented.

## 19.9 Oil Overflow

- Use a small collector bottle to catch engine oil venting.

## 19.10 Heads/Valves

- See section on early operation
- Check Head bolt tensions at regular intervals.

## 19.11 Additives

- No Oil or fuel additives should be used.
- 

**Use of oil or fuel additives will void warranty.**

## 19.12 Temperature

- Refer to correct temperature operation of the engine

## 19.13 Connections

- “G” terminal on oil pressure sender is connected to gauge.
- “W” terminal on oil pressure sender can be connected to a warning light
- Regulator should be connected as per instructions above.
- Oil temp terminal connects to gauge per instructions included with gauge.

REVISION	0									Dated : June 2005	Page: 30
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- CHT sensor ring under spark plug connects to gauge.
- EGT (optional) connects to gauge.
- Fuel hoses/oil hoses as required. Hoses must be protected by fire sleeve.
- Throttle/choke connected & movement adjusted.
- Carburettor heat arrangement working
- Correct scat hoses and directions
- Run hose from sump vent pipe to collection bottle.

### **19.14 Contact**

- Check for contact of engine, cooler or ducts on cowl. Any contact will cause excessive vibration & if the oil cooler is rubbing it will eventually fail & leak.

### **19.15 Warranty**

**Damage caused by overheating due to poor installation techniques would not be covered under warranty.**

**Operation of the engine on non approved oils and fuel will likewise not be covered**

### **19.16 Performance**

- Overall performance of engine and airframe depends on correct installation and prop match

### **19.17 Coils**

- When installing new ignition coils the output leads go in the direction of prop rotation. RHS coil output lead is up LHS coil output lead goes down – See page 24.

### **19.18 Induction**

- It is strongly recommended that when connecting SCAT hose to the carburettor (intake system) that some form of fiberglass tube or specially manufactured “Cobra Head” made by Jabiru Aircraft be used. This will prevent air turbulence in front of the 2 sense holes on the intake of the carby. Turbulence next to these sense holes can cause the engine to run “out of tune” or “roughly” at certain revs

<b>REVISION</b>	0										Dated : June 2005	Page: 31
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## 20 Appendix D – Normal Engine Figures

The following information is intended to allow an assessment of the engine’s performance when installed in a known airframe with a known propeller.

### 20.1 Known Airframe / Engine Details

- Jabiru SP (2 Seater)
- Propeller 60” x 42” (1525mm x 1067mm) or
- 60” x 44” (1525mm x 1118mm)

### 20.2 Reference Information:

- Figures given are approximate guide only.
- Engines installed in other aircraft with different prop loads, elevation and fuel types will differ from the Jabiru airframe.
- Poor installations will result in poor performance.
- All air inlet junctions from outside the cowl to the carburettor inlet must be free of edges, ledges and tight bends.
- Carburettor inlet must have protection to the scat hose attachment (short glass tube or Jabiru produced adaptor).
- Air vent for the carburettor bowl must be routed to the filtered side of the air box.
- Engines must be fitted with an oil cooler.
- Engines work best at RPM quoted. Extended operation of the engine at other speeds may result in reduced performance or engine damage. Engines fitted with coarser or finer pitched props will cause variation from figures quoted and could cause excessive fuel consumption and higher than normal CHT’s
- Engines are jetted to a standard and must not be changed without discussion with Jabiru Aircraft or local representative.
- All figures given at sea level and at summer temp of around 25 °C O.A.T

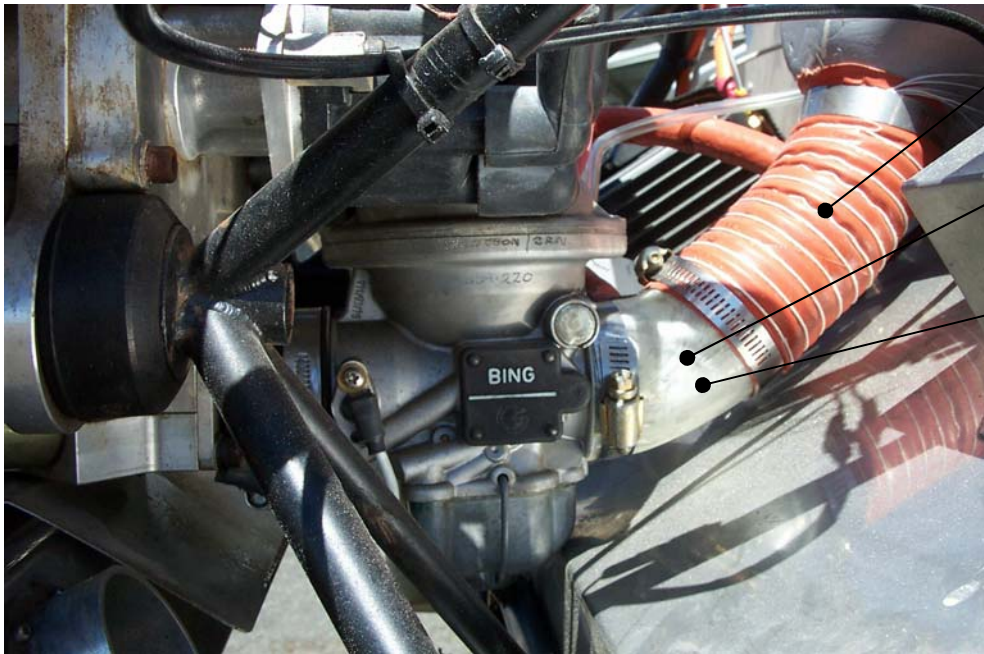
### 20.3 Normal Operation Data

Idle Hot:	900 – 950 RPM
Take Off Power:	2800 RPM (60” x 44” Propeller) 2900 RPM (60” x 42” Propeller)
Full Power S&L:	3200 RPM (60” x 44” Propeller) 3300 RPM (60” x 42” Propeller)
Cruise At 75% Power:	2750 - 2850 RPM
Oil Pressure:	226 - 525 kPa (32 psi – 76 psi)
Oil Temperature:	70°C - 100°C (158°F - 212°F) normal operation, 118°C Max (244°F)
Max Cruise CHT:	180°C (356°F)
Max Climb CHT:	200°C (392°F)
EGT:	650°C – 750°C (1202°F – 1382°F)
Mechanical Fuel Pump Pressure	3 lbs (20 kPa)

REVISION	0									Dated : June 2005	Page: 32
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## 21 Appendix E - Typical Installation

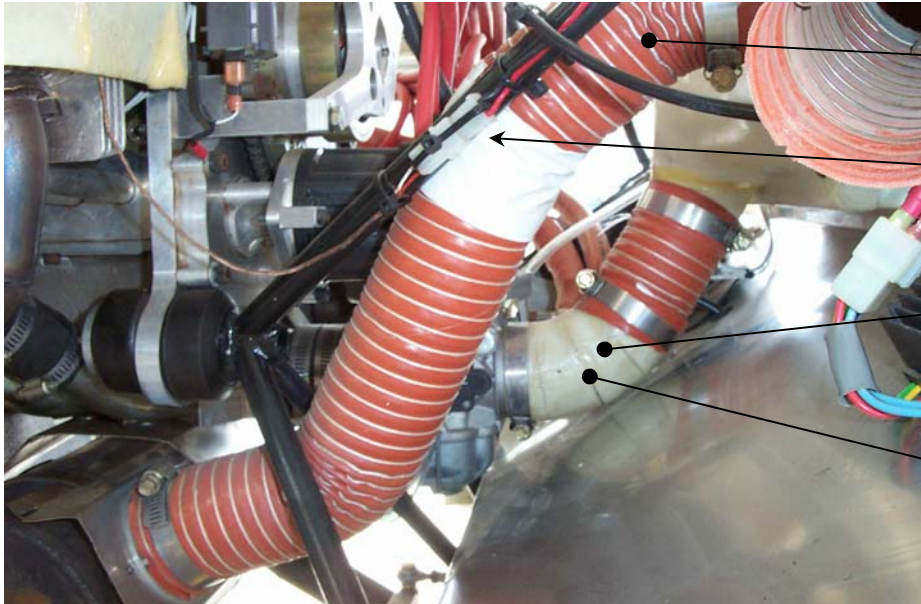


Gradual bends only in SCAT hose

Glass duct removes a sharp corner in SCAT tube

Glass duct prevents bunched SCAT hose from blocking sensor holes on carburettor inlet

Figure 8. Intake Detail #1



Gradual bends only in SCAT hose

CHT cold junction positioned well clear of engine

Glass duct removes a sharp corner in SCAT tube

Glass duct prevents bunched SCAT hose from blocking sensor holes on carburettor inlet

Figure 9. Intake Detail #2

REVISION	0								Dated : June 2005	Page: 34
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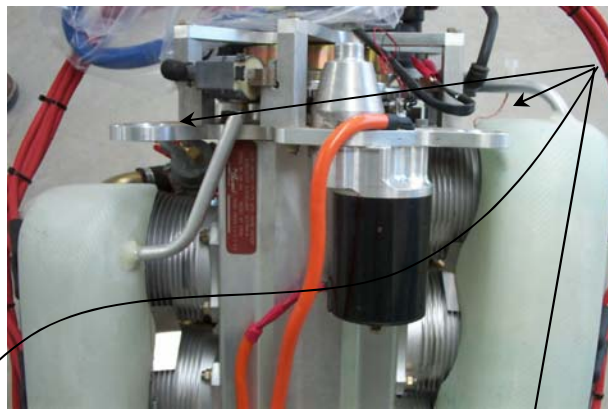
Ram air ducts fixed to engine with rocker cover cap screws front & rear.

Oil cooler "soft" mounted on rubber grommets

Torque on propeller bolts 6 ft.lb



Figure 10. Engine Installation #1



Air pipes direct cooling air from ram air ducts over coils.

Figure 11. Coil Cooling Detail #1

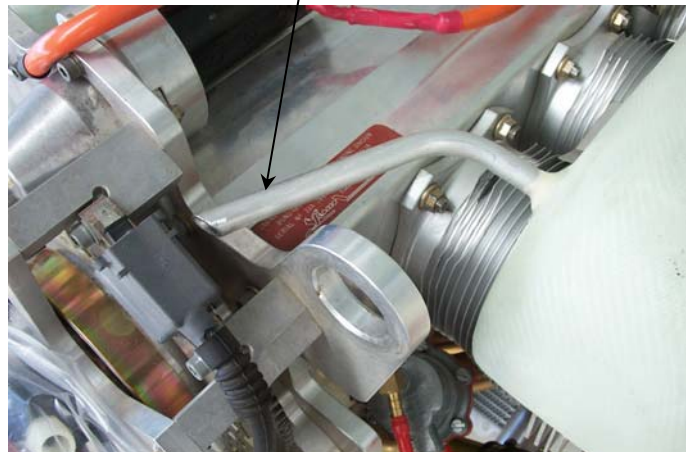
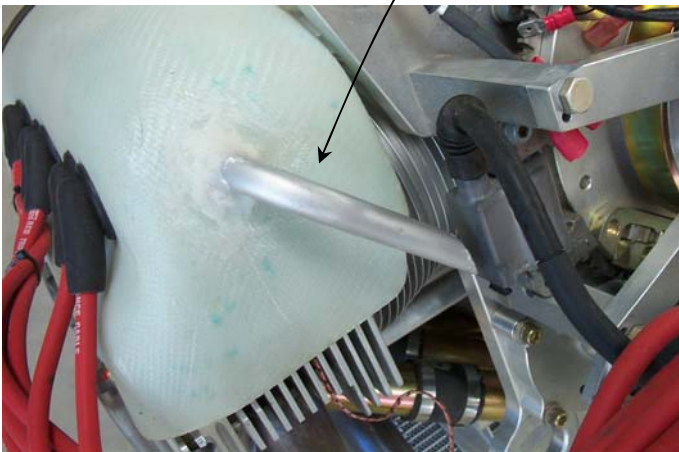


Figure 12. Coil Cooling Detail #2

## 21.1 Engine Installation Procedure

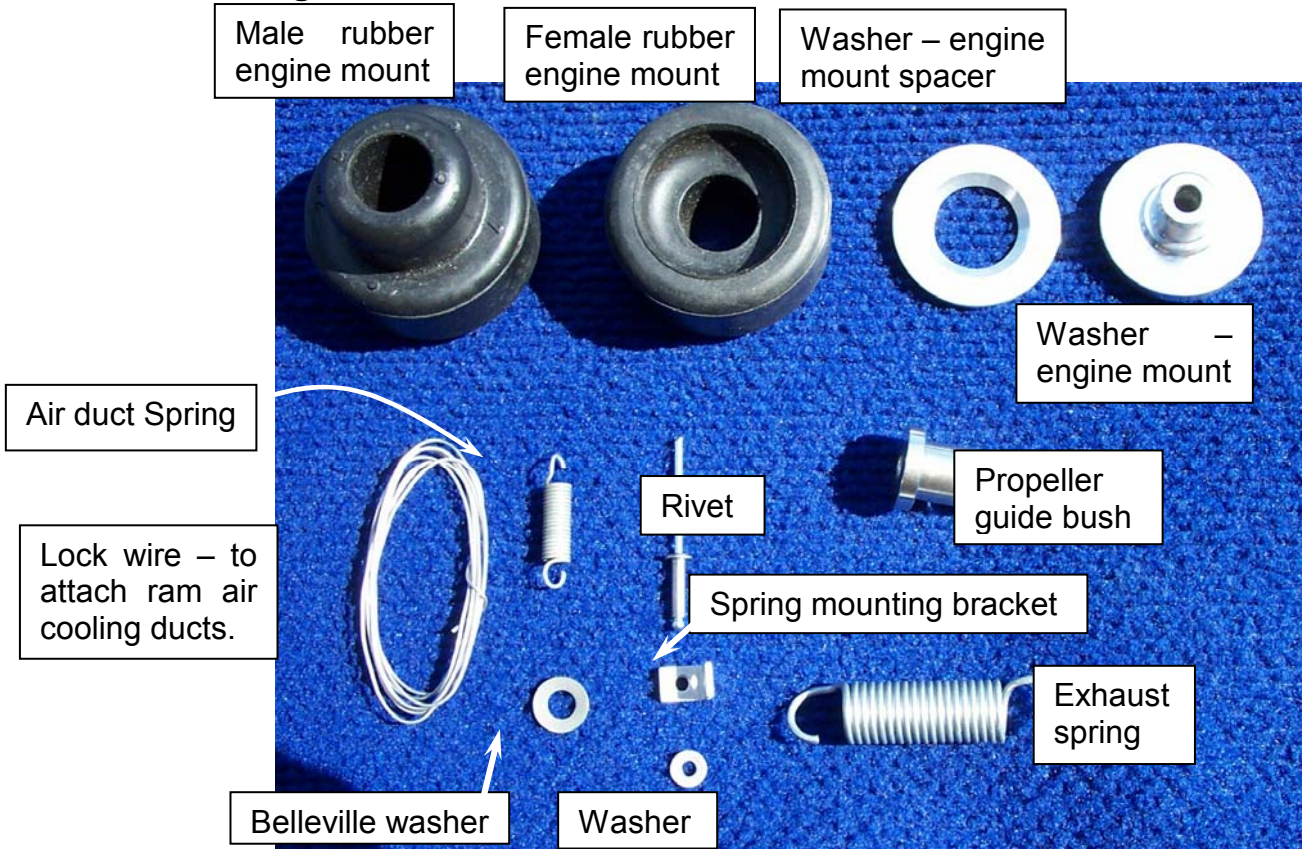


Figure 13. Engine Accessory Pack Contents

### 21.1.1 Procedure:

- a) Attach male engine mount rubbers to all engine mount pins on the engine mount. Place an AN4-31A bolt through each mount (see details below). Note that an engine mount spacer washer is fitted between the male rubber & the lower engine mount pins (Refer to Figure below).
- b) With the Back of the Aircraft Supported & the wheels chocked, lift the engine onto the engine mount.
- c) Insert the upper engine mount rubbers into the engine backing plate first by tilting the front of the engine up. Once both upper rubbers are through the engine backing plate, fit the female rubber, engine mount spacer washer, engine mount washer, 1/4" washer & Heat Proof nut.

REVISION	0								Dated : June 2005	Page: 36
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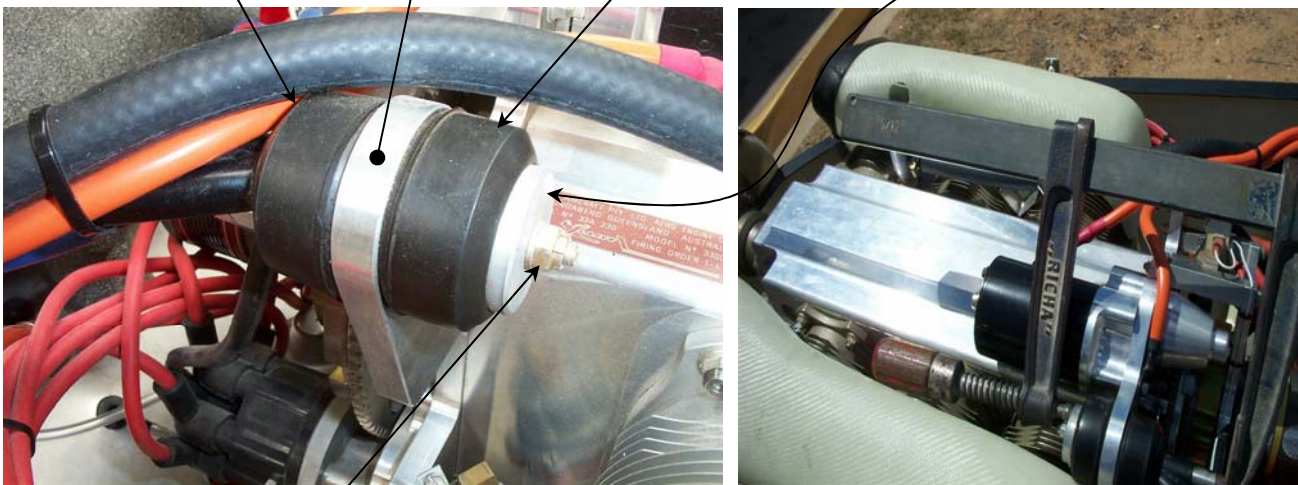
- d) To place the nuts on the mount bolts the rubbers must be compressed. Do this by using a deep reach socket inside the engine mount pins & clamping the rubber mount assembly using a G-clamp with the swivel taken off the ball. See Photo. Start nuts on both upper mount bolts.
- e) Once bolts of the upper rubbers are started, continue lowering the front of the engine & align the lower engine mount pins with the engine backing plate.
- f) Use the weight of the engine to compress the lower rubbers & fit the nuts to the bolts.

Male engine mount rubber

Engine backing plate

Female engine mount rubber

Engine mount Washer



**Figure 14. Upper Engine Mount Detail**

Heat proof nut

- g) The lower engine mount rubbers are assembled in the same way, except the male engine mount rubber is fitted to the engine mount pins first. Refer to drawing below.
- h) Tighten nuts until firm. (Engine mount washer will touch the engine mount pin as the rubbers compress)

<b>REVISION</b>	0									Dated : June 2005	Page: 37
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G-Clamp with swivel removed      Deep long reach socket

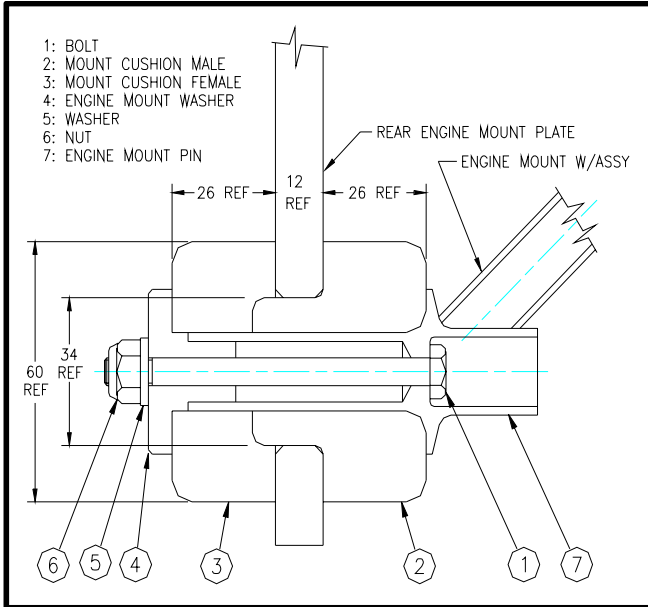


Figure 15 Lower Engine Mount Detail

REVISION	0								Dated : June 2005	Page: 38
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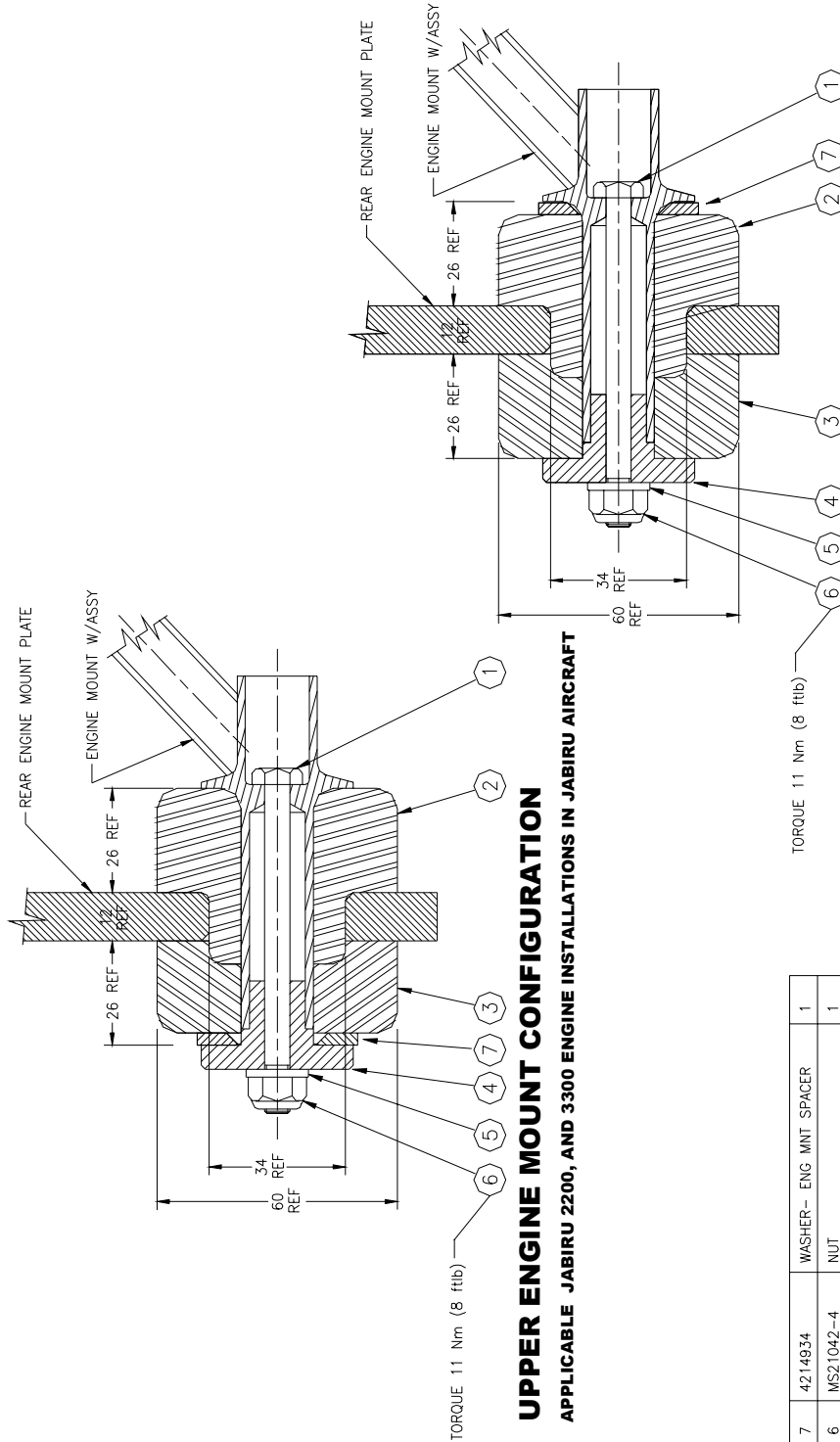


PROJECTION

DO NOT SCALE

DIMENSIONS IN MILLIMETRES

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ITEM	PART No.	DESCRIPTION	QTY.
7	4214934	WASHER- ENG MNT SPACER	1
6	MS21042-4	NUT	1
5	AN960-416	WASHER	1
4	4D94224	WASHER ENGINE MOUNT	1
3	PG10722N	CUSHION MOUNT MALE	1
2	PG10712N	CUSHION MOUNT FEMALE	1
1	AN4-31A	BOLT	1

**LOWER ENGINE MOUNT CONFIGURATION**  
 APPLICABLE JABIRU 2200, AND 3300 ENGINE INSTALLATIONS IN JABIRU AIRCRAFT

SCALE	1	001109
ISS.	1:1	DATE
DWG. NO.	9606004	
SHEET 1 OF 1	A3	

AVTECH P/L	TITLE	
A.C.N. 010 786 973	VIBRATION MOUNT INSTALLATION	
HINKLER AIRPORT	JABIRU AIRCRAFT	
BUNDBERG		
APK	APR	
PURCHASED PARTS TO PS22-10		

Figure 16. Engine Mount Detail

Fuel line from  
firewall fitting  
to mechanical  
fuel pump

Fuel line from  
mechanical  
fuel pump to  
carburettor



Figure 17. Fuel Connections General

Fuel line from firewall  
fitting to fuel pump

Fuel line from fuel  
pump to carburettor

Fuel pump breather line  
to be vented overboard



Figure 18. Fuel Connection Detail

- i) Connect the fuel line to fuel pump (Refer to photo). Ensure the fireproof sleeve is in place.

REVISION	0								Dated : June 2005	Page: 40
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- j) Ensure the fuel line from fuel pump to the carburettor is connected & protected by fireproof sleeve.
- k) Ensure that the fuel overflow line is in place, and secured to vent overboard.

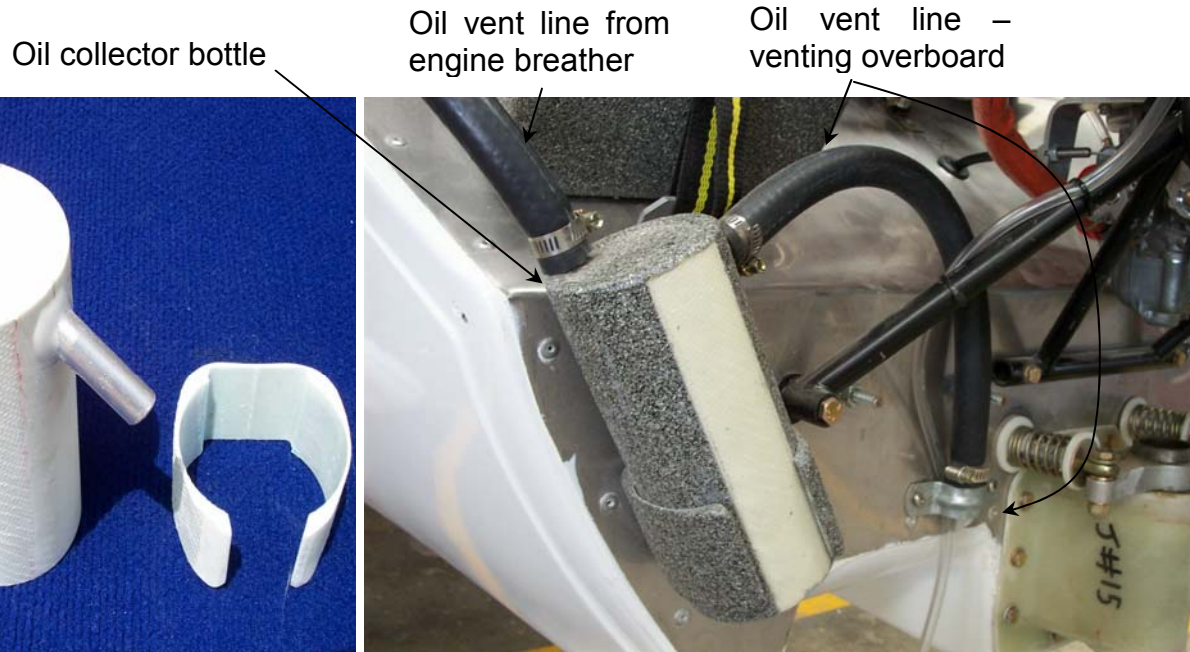


Figure 19. Oil Collector Bottle

- l) Fit the oil over flow bottle to the firewall by drilling and Riveting oil bottle holder in place using 73AS 6-6 rivets. Refer to photo.
- m) Connect the oil breather line from the engine breather.
- n) Ensure that the oil overflow line is in place and vents overboard.
- o) Fit Scat hoses from NACA duct to Air Inlet Housing Assembly, from hot air muff to carburettor heat inlet on the hot air mixer box and from the hot air mixer box to carburetor.

**Note It is most important to remove any sharp edges or lips off the inside of the mixer box cover. See Photos below**

REVISION	0									Dated : June 2005	Page: 41
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Incorrect plumbing – Note sharp lips

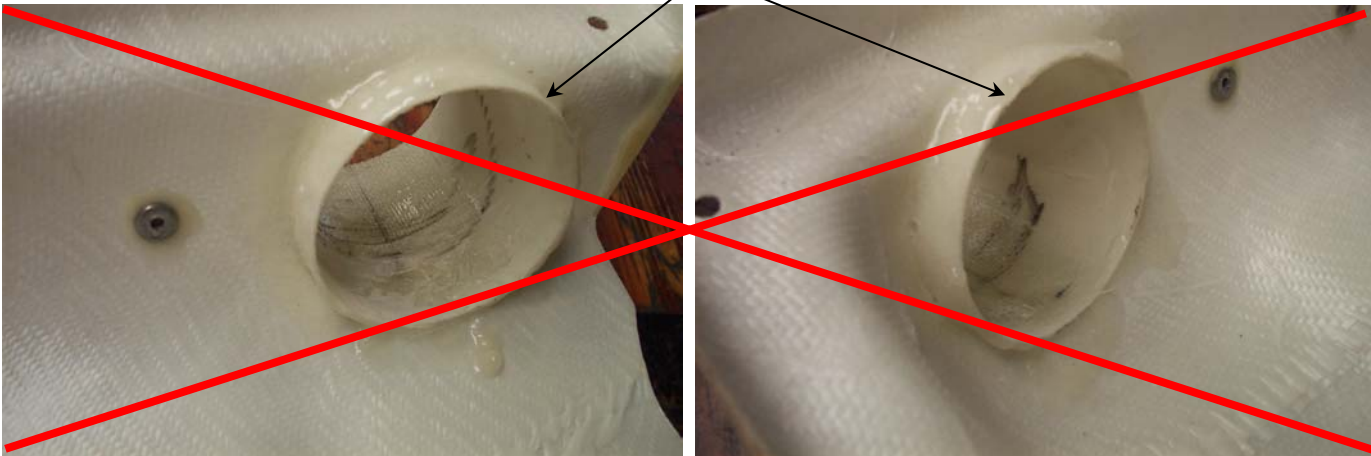


Figure 20. Hot Air Plumbing – Incorrect

Correct plumbing – sharp lips & abrupt corners rounded & smoothed off.

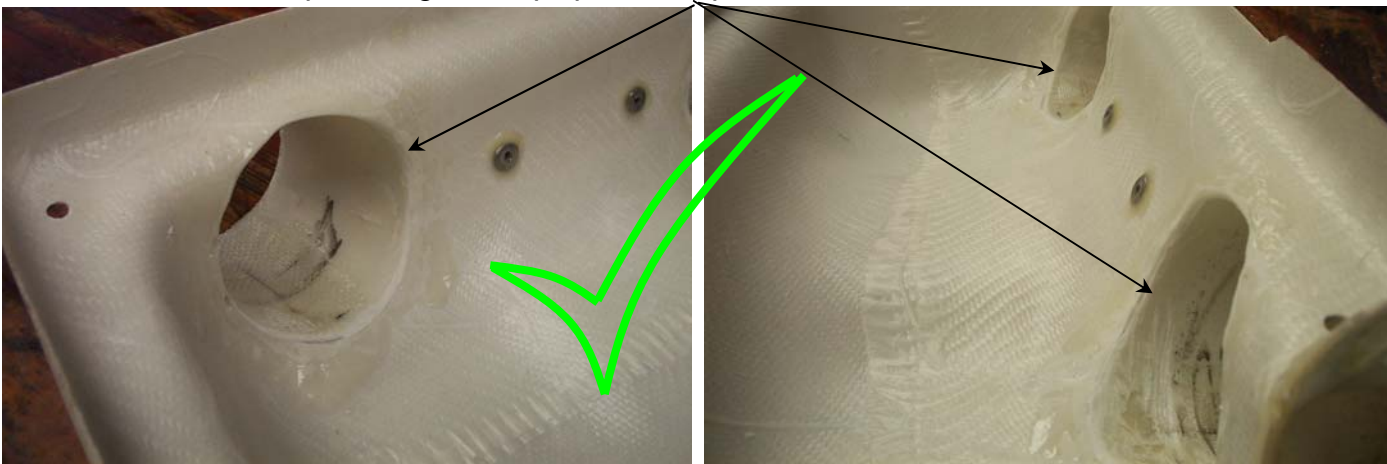


Figure 21 Hot Air Plumbing – Correct



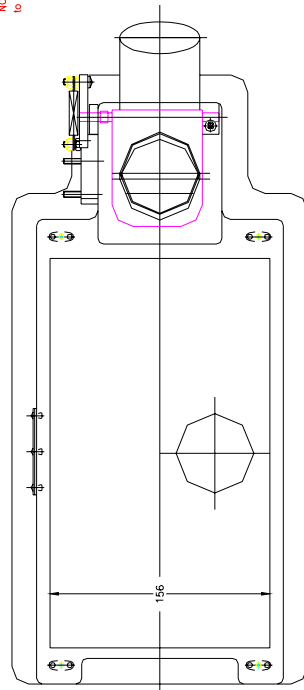
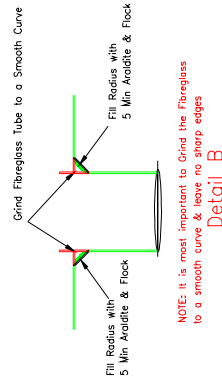
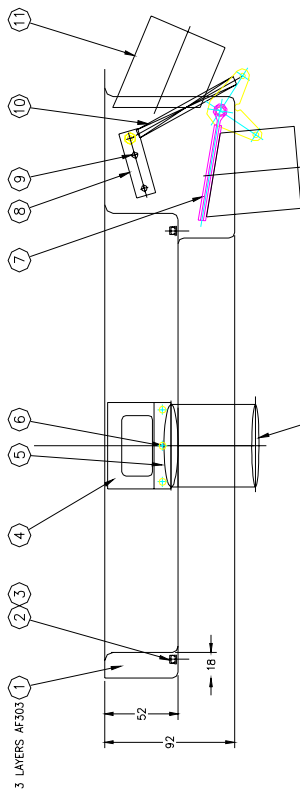
SCAT hose from NACA inlet to mixer box

SCAT hose from hot air muff on exhaust to mixer box

Figure 22. SCAT Hose Detail #1

REVISION	0									Dated : June 2005	Page: 43
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ITEM	PART No.	DESCRIPTION	QTY.
1	4790BDN	AIR INLET HOUSING	1
2	MS587ADB	2 LOC ANCHOR NUT	4
3	PH0399N	RIVET	8
4	426584N	RUBBER FLAP	1
5	426554N	BACKING STRIP	1
6	PH0399N	RIVET	3
7	4790004	FLAP ASSY	1
8	4028994	SPACER BLOCK CABLE	1
9	PH0399N	METAL THREAD M4 X 25	3
10	PK00794	SPRING	1
11	479100N	AIR INLET TUBE 57 DIA	1
12	PH0209N	NUT NYLOCK M4	4
13	NUT M4	NUT M4	2
14	PH0399N	METAL THREAD M4 X 25	1
15	4028894	LEVER	1
16		ROLL PIN $\phi$ 2.5 X 15	1
17	4028994	EXTERNAL PIVOT BLOCK	1
18		SCREW C/SUNK M4 X 12	2
19	479110N	HOT AIR INLET TUBE 57 DIA	1
20	4028894	PIVOT BLOCK	1
21	PH0199N	SCREW SELF TAPPER	2



SCALE	1	REVISE
1:2		DATE
		4028E92-1
		SHEET 1 OF 1A

NOTE: MOUNDED PARTS SHAPE AND HOLE LOCATIONS DETERMINED BY MOULD AND DRILL JIGS ATTACH TUBES WITH EPOXY

Figure 23. Typical Hot Air Mixer Box

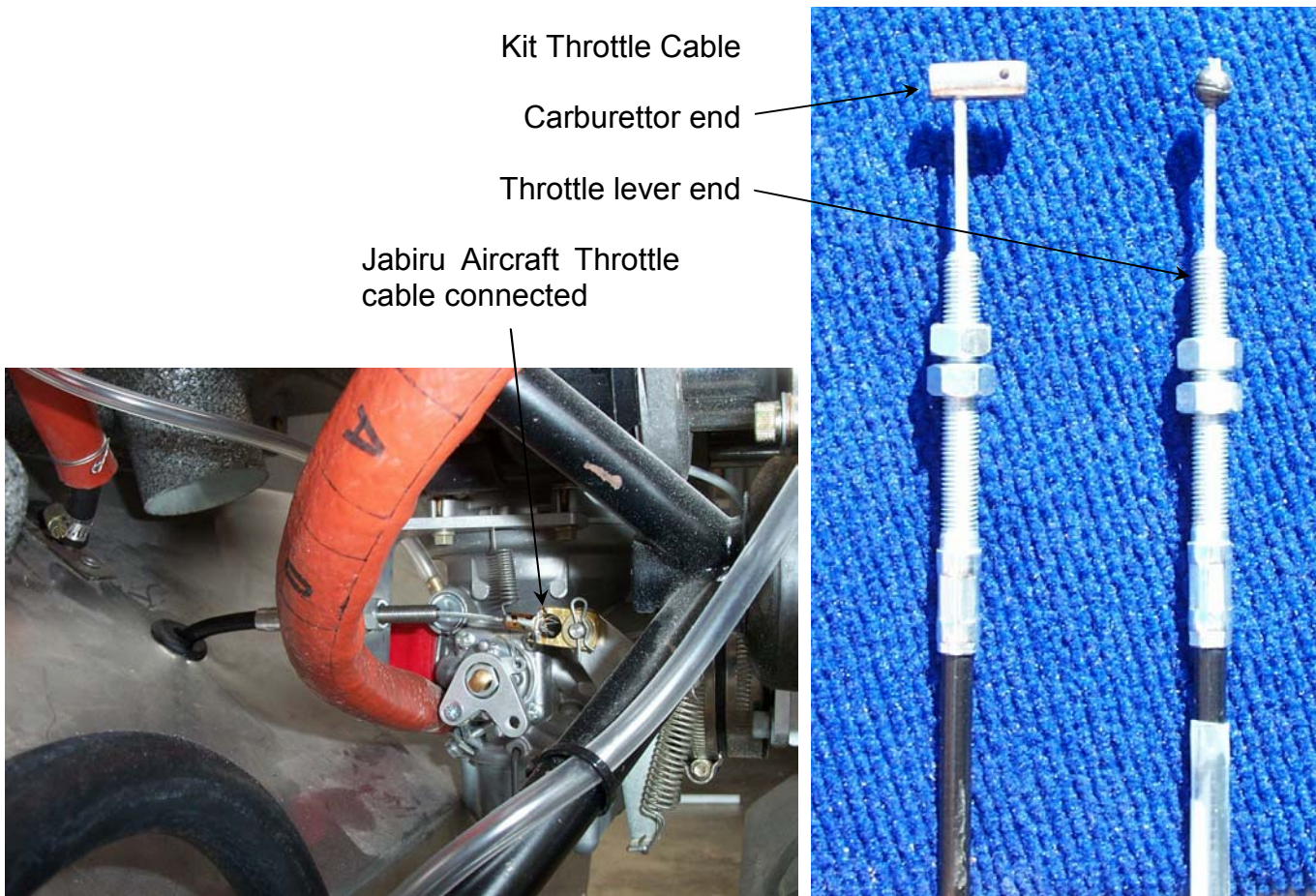


Figure 24. Control Connections to Carburettor

- p) Fit throttle cable to carburetor. Note that Jabiru Aircraft kits come with a throttle cable cut to length and with the correct end fitting attached. Engines used in firewall-forward kits will be supplied with a length of throttle cable with no end – the builder must cut the cable to length and fit the carburettor end fitting. 5/16” washers are used on the cable end fitting (one washer either side of cable end fitting) to align cable. Use R-clip to assemble.
- q) Fit choke cable to carburetor. Use an R-clip to assemble. Note that the fuel line from the fuel pump to the carburettor passes between the choke and throttle cables. Choke cable not shown on Figure above.

REVISION	0								Dated : June 2005	Page: 45
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Balance tube connecting filtered side of air mixer box to nipple on carburettor.

Figure 25. Balance Tube Detail #1

- r) Connect the fuel balance tube from the nipple on the carburettor to a fitting on the filtered air side of the air mixer box.

**Note: The balance tube must be connected to ensure proper mixture control.**



Balance tube nipple

Figure 26. Carburettor Balance Tube Nipple

- s) Fit cylinder head temperature (CHT) sensor. The CHT sensor used in Jabiru aircraft is a J-type thermocouple located under the rear spark plug of No: 4 cylinder. The VDO 310 980 Cylinder Head Temperature Gauge Kit is compatible with this sensor and is installed as standard equipment in Jabiru Aircraft. Note that to ensure an accurate temperature reading it is important to have the cold junction for the CHT (the plug between the stiff thermocouple wires and the normal, plastic-insulated gauge wires) located away from the heat of the engine. Refer to Figure at the beginning of the engine installation section above.

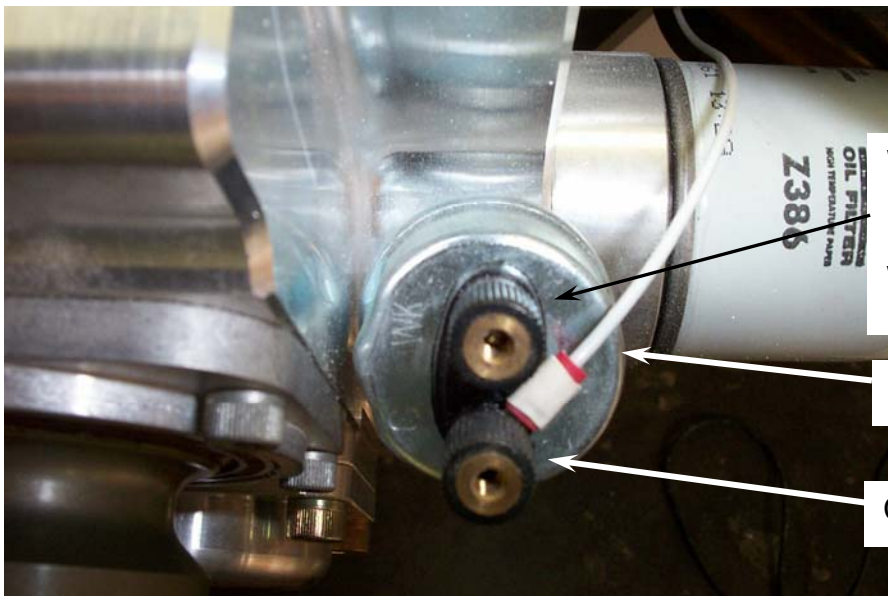
REVISION	0								Dated : June 2005	Page: 46
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Oil temperature sensor

Figure 27. Oil Temperature Sensor

- t) The Oil Temperature Sensor used is a VDO 320 028 which is located in the bottom of the sump as shown in photo.



Wire "WK" is normally not used, but can be used to power a low oil pressure warning light.

Oil pressure sender.

Connect wire "G" to gauge

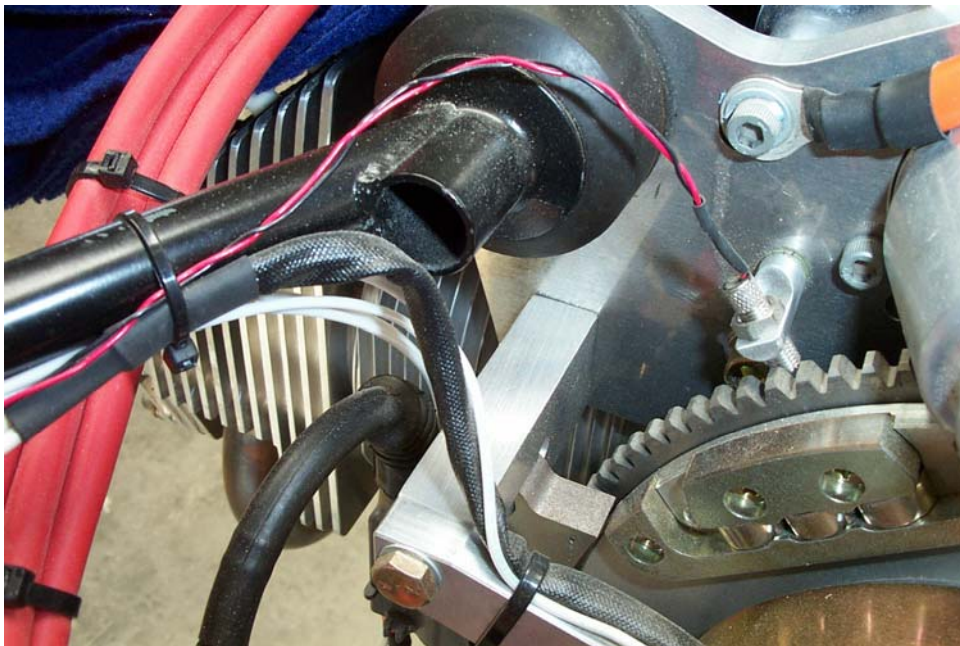
Figure 28. Oil Pressure Sensor

- u) The oil pressure sensor is located at the base of the oil filter and this can be seen in photo. The sensor used is VDO 360 001
- v) The exhaust gas probe used on Jabiru engines is a VDO 310 306 Pyrometer which is supplied as a complete kit. The probe is mounted in a fitting which is welded to an

REVISION	0								Dated : June 2005	Page: 47
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exhaust pipe. **Note that this fitting is not standard.** The installation of the fitting is best done at the time of order, though if required the exhaust pipe may be returned to Jabiru and the fitting added. Note that in this case it will normally take around 2 weeks before the pipe is returned to you. The fitting is welded to the pipe 100mm down from the exhaust manifold mounting plate.

- w) The Tachometer sensor used is a 6.35 x 22 mm analogue magnetic pick-up and is fitted to a bracket on the alternator housing. Refer to photo below. The sensor picks up on 2 tags fitted behind the flywheel.



**Figure 29. Tachometer Sensor Installation.**