Jabiru Aircraft

Model: J160-D

PILOT'S OPERATING HANDBOOK

JP-FM-11

Revision 2

28th October 2014

Airplane Registration Number: ________________

Airplane Serial Number: ________________

THIS DOCUMENT MUST BE CARRIED IN THE AIRCRAFT AT ALL TIMES

THIS AIRCRAFT MUST BE OPERATED IN ACCORDANCE WITH THE APPROVED DATA AND LIMITATIONS CONTAINED IN THIS MANUAL AT ALL TIMES.

ANY PERSON FINDING THIS MANUAL IS REQUESTED TO RETURN IT TO JABIRU AIRCRAFT

Record of Manual Revisions

This manual is revised as a complete document. All pages must display the same revision number.

Revision Notes:

0	Initial Issue
1	Layout revised as per ASTM F2746-12
2	Omissions and Errors corrected Minimum Take-off Oil temp corrected to be 40°C (104°F)

TABLE OF CONTENTS

0. INTRODUCTION

0.1 PILOT'S OPERATING HANDBOOK

The POH handbook consists of the following:

Basic POH

The basic POH provides all the information, procedures and limitations required to operate the aircraft as a Light Sport Aircraft. This basic POH is applicable to all Jabiru J160-D Aircraft.

The operating procedures presented herein are the result of Jabiru Aircraft's knowledge and experience gained up to the date of issue of this handbook. The handbook may be used for operational purposes only if kept in a fully amended state. It contains all the information considered necessary to safely operate the aircraft.

The operator must be thoroughly familiar with the aircraft and the contents of this handbook before initial operation. Thereafter the handbook should be reviewed periodically to enable the operator to maintain the highest level of familiarity with the aircraft, its controls and recommended operating procedures.

This POH also includes the information required of the Flight Training Supplement: there is no separate FTS for the J160-D.

Supplements

Self contained supplements are provided in Section 9 of the POH to provide details and procedures associated with the fitment of specified optional and special purpose equipment. Supplements are specific to the particular aircraft S/No. displayed on their title page.

Amendments

This manual is revised as a complete document. When a new issue of the manual becomes available operators must transfer the aircraft-specific data (such as aircraft weight and balance information and supplements) to the new manual. The old manual must not be used for further operation of the aircraft.

Operators must then familiarise themselves with the new revision of the manual. Those sections of the manual which have been revised are shown with a vertical line in the right margin.

0.2 SUPPORTING DOCUMENTATION

The following manuals are required for correct operation & maintenance of the Jabiru J160-D. The current revisions are available free of charge from the Jabiru Aircraft website www.jabiru.net.au :

- Pilot's Operating Handbook
- Aircraft Technical Manual (incorporating Propeller Maintenance Manual)
- Engine Maintenance Manual
- Engine Overhaul Manual

In addition, the operator and maintainer must be aware of all current supplemental service information issued by Jabiru Aircraft – again, the latest revisions are available from the Jabiru Aircraft website. These documents include:

- Service Bulletins
- LSA Safety Directives
- Service Letters

Finally, operators and maintainers must be aware of any requirements issued by Airworthiness Authorities and available from their respective web sites:

- Airworthiness Directives issued by the Civil Aviation Safety Authority
- Recreational Airworthiness Notice issued by Recreational Aviation Australia

0.3 MANUFACTURER DETAILS

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0.4 STANDARDS LIST

Design & Performance	The Jabiru J160-D has been designed to comply with the requirements of ASTM F2245-13b.
Quality Assurance	The Jabiru J160-D has been constructed under a Quality System meeting the requirements of ASTM F2279-10.
Continued Airworthiness	The continued airworthiness of the J160-D is monitored by Jabiru Aircraft P/L in accordance with the requirements of ASTM F2295-10.
POH	This POH has been prepared to comply with the requirements of ASTM F2746-12

0.5 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

A	Ampere
AGL	Above Ground Level
AMSL	Above Mean Sea Level
AVGAS	Aviation Gasoline
BHP	Brake Horse Power
CASA	Civil Aviation Safety Authority (Australia)
CAO	Civil Aviation Order (Australia)
CAR	Civil Aviation Regulation (Australia)
°C	Degrees Celsius
CHT	Cylinder Head Temperature
cm	Centimetre, centimetres
DC	Direct Current
FAA	Federal Aviation Administration (USA)
°F	Degrees Fahrenheit
FAR	Federal Aviation Regulation (USA)
FTS	Flight Training Supplement
ft	Foot, feet
ft/min	Feet per minute
g	Acceleration due to gravity
Gal	Gallon
hPa	Hectopascal, hectopascals
HF	High Frequency
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
in	Inch, inches
in Hg	Inches of mercury
in lbs	Inch pounds
ISA	International Standard Atmosphere
kg	Kilogram
kg/l	Kilogram per litre
kHz	Kilohertz
kts, K	Knots
kPa	Kilopascals
kW	Kilowatt, kilowatts
l	Litre, litres
lb	Pound, pounds
LH	Left hand
LHS	Left hand side

m	Metre
m²	Square metre
m³	Cubic metre
mA	Milli ampere
MAC	Mean Aerodynamic Chord
max	Maximum
MHz	Megahertz
mm	Millimetre
min	Minimum or minute
MOGAS	Automotive Fuel
nm	Nautical mile, nautical miles
OAT	Outside Air Temperature
PAX	Passenger
POH	Pilots Operating Handbook
PROP	Propeller
psi	Pounds per square inch
QTY	Quantity
qts	Quarts
RH	Right Hand
RHS	Right Hand Side
RON	Fuel Octane Rating Scale (Research Octane Number)
RPM	Revolutions per minute
SAE	Society of Automotive Engineers
sec	Seconds
SQ	Square
STBY	Standby
TBO	Time between overhauls
T/O	Take Off
U/S	Unserviceable
USG	US Gallon
US Gal	US Gallon
V	Volts
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions

General Airspeed Terminology and Symbols

- **CAS** *Calibrated Airspeed:* the indicated speed of an aircraft corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

- **KCAS:** Calibrated Airspeed expressed in knots.
- **IAS** *Indicated Airspeed:* the speed of an aircraft as shown on the airspeed indicator. IAS values in this manual assume zero instrument error.
- **KIAS** Indicated Airspeed expressed in knots.
- **TAS** *True Air Speed:* the airspeed of an aircraft relative to the undisturbed air through which it passes.
- **T.O.S.S** *Take-Off Safety Speed:* the airspeed chosen to ensure that adequate control will exist under all conditions, including turbulence and sudden and complete engine failure during the climb after take-off. It is the speed required at 50 feet.
- **V_A** *Manoeuvring Speed:* the maximum speed at which application of full available aerodynamic control will not damage or overstress the aircraft.
- **V_{FE}** *Maximum Flap Extended Speed:* the highest speed permissible with wing flaps in a prescribed extended position.
- **V_{NE}** *Never Exceed Speed:* the limiting airspeed that may not be exceeded at any time.
- **V_C** *Maximum Structural Cruising Speed:* the speed that should not be exceeded except in smooth air and then only with caution.
- **V_S** *Stalling Speed:* or the minimum steady flight speed at which the aircraft is controllable.
- **V_{SO}** *Stalling Speed:* or the minimum steady flight speed at which the aircraft is controllable in the landing configuration.
- **V_X** *Best Angle-of-Climb Speed:* the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
- **V_Y** *Best Rate-of-Climb Speed:* the airspeed which delivers the greatest gain in altitude in the shortest possible time.

Meteorological Terminology

- **OAT –** *Outside Air Temperature* – the outside free air static temperature.
- **Airfield Pressure Height –** The height registered at the surface of an aerodrome by an altimeter with the pressure sub-scale set to 1013 hPa (29.92 inches Hg).
- **Pressure Altitude –** Altitude measured from standard sea-level pressure (1013 hPa/29.92 inches Hg) by a pressure or barometric altimeter corrected for position and instrument error.
- **Indicated Pressure Altitude –** the altitude actually read from an altimeter when the pressure barometric sub-scale has been set to 1013 hPa (29.92 inches Hg).
- **QNH –** The local pressure setting that if set on the subscale of an altimeter will cause the altimeter to indicate local altitude above mean sea level.

- **Wind** – The wind velocities to be used as variables on aircraft performance are to be understood as the headwind or tail wind components of the reported winds.

Aircraft Performance and Flight Planning Terminology

- **Climb Gradient** – The ratio of the change in height during a climb, to the horizontal distance travelled.
- **Demonstrated Crosswind Component** – The crosswind component, during take-off and landing, for which adequate control of aircraft was actually demonstrated during certification tests.

Weight and Balance Terminology

- **Datum –** An imaginary vertical plane from which all horizontal distances are measured for balance purposes.
- **Station –** A location along the aircraft fuselage usually given in terms of distance from the reference datum.
- **Arm –** The horizontal distance from the reference datum to the centre of gravity (C of G) of an item.
- **Moment** – The product of the weight of an item multiplied by its arm.
- **Index Unit** – Moment divided by a constant. Used to simplify balance calculations by reducing the number of digits.
- **Centre of Gravity** (C of G) – The point at which an aircraft would balance if suspended. The distance from the C of G to the reference datum can be found by dividing the total moment by the total weight of the aircraft.
- **C of G Arm** – The arm obtained by adding the aircraft's individual moments and dividing the sum by the total weight.
- **C of G Limits –** The extreme centre of gravity locations within which the aircraft must be operated at a given weight.
- **Useable Fuel –** The quantity of fuel available for flight planning purposes.
- **Unusable Fuel –** The quantity of fuel (determined under adverse fuel flow conditions) that is not available for flight.
- **Empty Weight –** Weight of aircraft with unusable fuel and full oil.
- **Useful Load –** Difference between take-off weight, and basic empty weight.
- **Maximum Take-Off Weight –** Maximum weight approved for take-off.
- **Maximum Landing Weight** – Maximum weight approved for the landing.
- **Header Tank –** Fuel tank plumbed between the wing tanks and the engine. Also known as **Collector Tank** or **Sump Tank.**

0.6 USE OF METRIC/IMPERIAL UNITS

This POH uses the metric system as the basic system of measurement. Where common usage or available instrumentation refer to the Imperial/US unit system, both units are quoted. The following conversion factors are presented as a ready reference to the conversion factors that have been used in this manual as well as supplying some others that may be found useful.

1 Pound (lb)	=	0.4536 Kilogram (kg)
1 Pound per sq in (psi)	=	6.895 Kilopascal (kPa)
1 Inch (in)	=	25.4 Millimetres (mm)
1 Foot (ft)	=	0.3048 Metre (m)
1 Statute mile	=	1.609 Kilometres (km)
1 Nautical mile (NM)	=	1.852 Kilometres (km)
1 Millibar (mb)	=	1 Hectopascal (hPa)
1 Millibar (mb)	=	0.1 Kilopascal (kPa)
1 Imperial gallon	=	4.546 Litres (l)
1 US gallon	=	3.785 Litres (l)
1 US quart	=	0.946 Litre (l)
1 Cubic foot (ft^3)	=	28.317 Litres (l)
1 Acre	=	0.4047 Hectares
1 Degree Fahrenheit (EF)	=	[1.8 x EC]+32
1 Inch Pound (in lb)	=	0.113 Newton Metres (Nm)
1 Foot Pound (ft lb)	=	1.356 Newton Metres (Nm)

0.7 WARNINGS, CAUTIONS & NOTES

Definitions used in the POH such as **WARNING, CAUTION, NOTE** are employed in the following context:

WARNING

Operating procedures, techniques, etc. which if not followed correctly, may result in personal injury or death.

CAUTION

Operating procedures, techniques, etc. which if not strictly observed, may result in damage to the aircraft or to its installed equipment.

NOTE

Operating procedures, techniques, etc. which it is considered essential to highlight.

1. GENERAL INFORMATION

1.1 LIGHT SPORT AIRCRAFT NOTIFICATION

There are inherent risks in the participation in recreational aviation aircraft. Operators and passengers of recreational aviation aircraft, by participation, accept the risks inherent in such participation of which the ordinary prudent person is or should be aware. Pilots and passengers have a duty to exercise good judgment and act in a responsible manner while using the aircraft and to obey all oral or written warnings, or both, prior to or during use of the aircraft, or both.

WARNING:

THIS AIRCRAFT WAS MANUFACTURED IN ACCORDANCE WITH LIGHT SPORT AIRCRAFT AIRWORTHINESS STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY AIRWORTHINESS REQUIREMENTS.

Jabiru Aircraft Pty Ltd has devoted significant resources and testing to develop the Jabiru J160-D aircraft. The Jabiru J160-D is designed to be operated and maintained only in strict accordance with its supporting documentation – consisting of Pilot's Operating Handbook, Aircraft Technical Manual (Including Maintenance Manual), Engine Maintenance Manual, Propeller Maintenance Manual, Jabiru Australia Service Bulletins, Service Letters and any other documents produced by Jabiru Aircraft Australia or the appropriate regulatory authorities.

Any variation in procedure or failure to operate or maintain the aircraft according to the supporting documentation may cause damage or harm to the aircraft, its parts, or components and may lead to injury or death. Any such actions may render the aircraft un-airworthy and will void any warranty issued by Jabiru.

Any variation to the aircraft of any kind, including alteration to any component at all, whether replacement, relocation, modification or otherwise which is not strictly in accordance with these documents may lead to dramatic changes in the performance of the aircraft, may cause damage or harm to other parts of the aircraft and may lead to injury or death. Jabiru Aircraft Pty Ltd does not support any modifications to the aircraft, its parts, or components. Any such actions may render the aircraft un-airworthy and will void any warranty issued by Jabiru.

Maintenance cannot be supervised by the manufacturer. Maintenance requires extreme cleanliness, exact parts, precise workmanship and proper consumables. It is your responsibility to ensure absolute attention to detail no matter who may become involved in work on this aircraft. Your safety, your life and your passenger's lives rely on precise and accurate following of the maintenance documentation for this aircraft.

1.2 ABOUT THE JABIRU J160-D

Jabiru Aircraft have been built in Bundaberg, Australia since the early 1990's. The original was a small 2 seat aircraft powered by a 2-stroke engine; it had limited range, basic equipment and little room to spare in the cabin. But this aircraft introduced the Jabiru ideal to the world – an aircraft which was light and efficient with good handling, good performance and excellent occupant protection. An aircraft which met all these goals while using modern technology to be cost effective to own and operate and to introduce newcomers to aviation – people who always thought that aviation was beyond their reach. Since the time of those first aircraft, Jabiru Aircraft have evolved dramatically. The current Jabiru models are all far more powerful, spacious and better equipped than their ancestor while still meeting the Jabiru Ideal.

The Jabiru J160-D was developed to be a very comfortable training aircraft. The very wide and high cockpit and side-by side seating with extra leg room makes training student pilots a comfortable and relaxed experience. The aircraft also makes a very good cross-country machine resulting from the high aspect ratio wing and very low parasitic drag, combined with two large wing tanks gives the J160-D an endurance exceeding 8 hours and cruise speeds of 100knots (TAS). The powerful engine is smooth and quiet so that the crew can fly for hours without fatigue from noise or vibration.

On the ground the J160-D is also an excellent performer – The simple robust design allows maintenance to be carried out quickly and easily to get the aircraft back into the air as soon as possible. The same Jabiru 2200 engine which provides powerful performance in the air is also light, simple, easy to maintain and so quiet that people living near the airport barely hear it. The composite construction allows the aircraft to be both light and very strong – with the J160-D being designed to an ultimate factor of around +8g / -4g. The fibreglass structure won't rust or corrode, has an almost infinite fatigue life and like all Jabirus, the J160-D has been designed with a very strong cabin structure to provide a safety cell for its crew.

Today's J160-D is the latest design of an aircraft model which has been a popular choice with pilots for many years. The design is thoroughly proven and thoroughly tested – both by Jabiru test pilots and demanding customers all over the world. It can be extensively customised and thanks to the wide range of interior options, instrument systems and other optional extras every Jabiru J160-D is unique. Most importantly, the J160-D still embodies the original Jabiru Ideal and continues to show people who never thought they could have an aircraft of their own that anything is possible.

1.3 OWNER/OPERATOR RESPONSIBILITES

The following responsibilities for the owner/operator of a LSA listed are prescribed in the ASTM standard F2295:

- Each owner/operator of a LSA shall read and comply with the maintenance and continued airworthiness information and instructions provided by the manufacturer.
- Each owner/operator of a LSA shall be responsible for providing the manufacturer with current contact information where the manufacturer may send the owner/operator supplemental notification bulletins.
- The owner/operator of a LSA shall be responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery.
- The owner/operator of a LSA shall be responsible for complying with all manufacturer issued notices of corrective action and for complying with all applicable aviation authority regulations in regard to maintaining the airworthiness of the LSA.
- An owner of a LSA shall ensure that any needed corrective action be completed as specified in a notice, or by the next scheduled annual inspection.
- Should an owner/operator not comply with any mandatory service requirement, the LSA shall be considered not in compliance with applicable ASTM standards and may be subject to regulatory action by the presiding aviation authority.

1.4 J160-D PERFORMANCE & SPECIFICATION SUMMARY

Gross Weight	540kg (1190 lb)
Top Speed at Sea Level	120 KCAS
Cruise Speed, V_C	90 KCAS at 2800 rpm
Full Fuel Range[1]	800nm at 2800 rpm, 5000' ASL (if achieving 15 lt/hr fuel consumption)
Rate of Climb at Sea Level[2]	500 fpm (V_Y) 450 fpm (V_X)
Take-Off Distance	600 m
Landing Distance	517 m
Stall Speed Clean	55 KCAS
Stall Speed Flaps Full Down	45 KCAS
Fuel Capacity	140 L (37 USgal) Total Capacity 135 L (35.6 USgal) Useable
Approved Fuels	AVGAS 100LL, AVGAS 100/130 or MOGAS with RON of 95 or higher
Maximum Engine Power	80 hp @ 3300 RPM.

Refer to the main body of this handbook below for more information.

[1] Range with 45 minute reserve at stated power setting
[2] At Gross Weight, ICAO Standard Atmosphere

2. LIMITATIONS

2.1 GENERAL

This section of the Pilot's Operating Handbook presents the various operating limitations, instrument markings, colour coding, and basic placards necessary for the safe operation of the aircraft, it's engine, standard systems and standard equipment. For specific operations, or for operations with equipment fitted that is covered by a supplement in Section 9 of the POH, limitations applicable will be found in the relevant supplement.

2.2 AIRSPEED LIMITATIONS

The indicated airspeeds in the table below are based on airspeed calibration data from Section 5.2.1. Note: Refer to Section 5.2.1 for conversion to Calibrated Airspeed (KCAS)

SPEED	KIAS	ASI MARKINGS	REMARKS
Design Manoeuvring Speed (V_A)	116	-	Do not make full or abrupt control movements above this speed.
Operating Manoeuvring Speed at MTOW ($V_{O\ MTOW}$)*	116	-	Do not make full or abrupt control movements above this speed at MTOW.
Operating Manoeuvring Speed at Minimum weight ($V_{O\ MIN}$)**	95	-	Do not make full or abrupt control movements above this speed at Minimum weight.
Never Exceed Speed (V_{NE})	140	Red Line at upper end of yellow arc	Do not exceed this speed in any operation.
Max Structural Cruising Speed (V_C)	112	Upper end of green arc/ start of yellow arc	Do not exceed this speed except in smooth air and then with caution.
Maximum Flap Extension Speed (V_{FE})	84	Upper end of white arc	Do not exceed this speed with the flaps deployed.
Stalling Speed (V_S)	58	Lower end of green arc	in Cruise Configuration
Stalling Speed (V_{S0})	48	Lower end of white arc	in Landing Configuration

***** Operating Manoeuvring speed at **'MTOW'** refers to maximum gross weight = **540kg (1190lb).**

****** Operating Manoeuvring speed at **'Minimum weight'** is calculated based on typical light empty weight (300kg), a single lightweight occupant (55kg) and 45 minutes reserve fuel (10kg) = **365kg (805lb).** Typical operating weight will usually always be much heavier.

2.2.1 ASI Markings:

White Arc: Flap extended speed range (V_{S0} to V_{FE}) – flapped stall speed to maximum allowable with flaps deployed (48-84 KIAS)

Green Arc: Normal operating Speed range (58-112 KIAS)

Yellow Arc: Caution speed range – Do not exceed this speed except in smooth air and then with caution. (112-140 KIAS)

Red Line: Do not exceed this speed in any operation. (140 KIAS)

2.3 AIRCRAFT SERVICE CEILING

10 000 feet ASL

2.4 LIMIT LOAD FACTORS

Flap Position	Speed	Positive	Negative
UP	V_A	+ 3.8g	-1.9g
UP	V_{NE}	+ 3.8g	-1.9-g
DOWN	V_{FE}	+ 2.0g	0g

Table 2.9

2.5 FLIGHT OPERATION LIMITATIONS

Manoeuvres in the course of normal flying are approved.
Stalls may be carried out at bank angles of up to 60°.
All aerobatic manoeuvres including spins are prohibited.
Flight Operations are limited to VMC (Visual Meteorological Conditions).
Flight Operations in IMC (Instrument Meteorological Conditions) are prohibited.

2.6 FUEL

Total Capacity: 140L (37 USgal) Total (2 OFF 67.5L Wing Tanks + 5L Header Tank)
Usable Capacity: 135L (35.6 USgal) Useable
Grade: Avgas 100LL, Avgas 100/130 or MOGAS with RON of 95 or higher See Section 8.8
Max zero wing fuel weight (W_{ZWF}): Equal to gross weight, 540kg (1190 lb)

2.6.1 POWERPLANT LIMITATIONS

	POWER	RPM	Maximum Temperatures		Fuel Pressure Limits		Oil Pressure Limits	
			Cyl Head	Oil	Min	Max	Min	Max
Absolute Limits	Maximum Take-Off (80 BHP)	3300	200 °C (392°F) (Note #1)	118°C (244°F)	5 kPa (0.75psi)	20 kPa (3psi)	220 kPa (31 psi)	525 kPa (76psi)
Continuous Limits	Maximum Cont (80 BHP)	3300	180°C (356°F)	100°C (212°F)	5 kPa (0.75psi)	20 kPa (3psi)	220 kPa (31 psi)	525 kPa (76 psi)
Limits For Ground Running	N/A	N/A	180°C (356°F) (Note #2)	100°C (212°F) (Note #2)	5 kPa (0.75psi)	20 kPa (3psi)	80 kPa (11 psi)	525 kPa (76 psi)

Note #1 Time with CHT at between 180°C and 200°C is not to exceed 5 Minutes

Note #2 If temperature limits are reached, shut the engine down or cool it by pointing the aircraft into wind.

Other limits are as follows:

- Minimum oil pressure at idle: 80 kPa (11 psi)
- Maximum oil pressure at start: 525 kPa (76 psi)

2.7 CROSSWIND

The maximum allowable crosswind velocity is dependent on many factors including:

- Aircraft limitations
- Pilot capability.
- Ground conditions – i.e. turbulence from structures or trees
- Wind state – i.e. steady wind or gusting / thermal conditions.

With average pilot technique, steady, direct crosswinds of up to 14 knots can be handled with safety.

2.8 OTHER CLIMATIC RESTRICTIONS

Maximum Ambient Operating Temperature	38°C (100°F)
Flight into known icing conditions	Prohibited

2.9 KINDS OF OPERATION

The standard J160-D, as detailed within this POH, is approved for Day VFR Operations only

2.10 POWER GENERATION SYSTEM LIMITATIONS

When the engine is turning at approximately 2000 RPM and above the alternator produces sufficient power for all lights to be run continuously. However, below this RPM the alternator cannot produce this power output and power must be drawn from the battery if all electrical systems are running. To reduce the load on the alternator, Jabiru Aircraft recommend only using the Landing Light for takeoff and landing – turning it off during normal cruise operations and wherever safe while taxiing.

2.11 OTHER LIMITATIONS

- Smoking is prohibited.
- In-cabin noise levels exceed 95db. Hearing protection must be worn.

3. EMERGENCY PROCEDURES

Section 3 of this handbook describes the procedures to be adopted in the event of an emergency or abnormal situation occurring in the J160-D aircraft.

The procedures are arranged in the sequence considered to be the most desirable in the majority of cases. Steps should be performed in the order listed unless good reasons for deviation exist.

It should be remembered however, that all conceivable eventualities cannot be foreseen by the manufacturer. Particular circumstances such as multiple or unanticipated emergencies, adverse weather etc. may require modification to these procedures. A thorough knowledge of the aircraft and its systems is essential to analyse the situation correctly and determine the best course of action in any particular circumstance.

The following **basic rules** apply to all aircraft emergencies:

1. **Maintain** Aircraft Control.
2. **Analyse** the situation and take appropriate action.
3. **Land** as soon as practicable.

3.1 AIRSPEEDS FOR EMERGENCY OPERATIONS

Manoeuvring Speed ....102 KIAS
Maximum Glide ………………………………………………… .65 KIAS*
Landing Without Engine Power (Flaps Full) …………… .60 KIAS

* - A slightly higher speed may give better distance over the ground if gliding into wind; a slightly slower speed if gliding downwind.

3.2 CARBURETTOR ICING

Carburettor icing occurs when moisture in the air forms ice within the carburettor – typically in the venturi throat and around the throttle butterfly. The ice restricts airflow and prevents the proper function of the carburettor.

Carburettor icing can occur in temperatures between around +30°C (86°F) and -15°C (5°F). Icing most often occurs at cruise, descent or idle power settings, in humid air (including fog, light rain or cloud) and at ambient temperatures between 0°C (32°F) and 20°C (68°F). However, icing can occur at other times and the pilot must be aware of the potential at all times.

Applying carburettor heat is the recommended first corrective measure to be tried in almost any situation for the engine.

Carburettor icing symptoms include:

1. RPM / power reducing for given throttle setting
2. Increased throttle opening required to maintain RPM / power
3. Rough, uneven or surging engine.
4. Engine stoppage

If Carburettor icing is suspected:

1. Throttle .... FULL
2. CARB HEAT .... FULL ON

NOTE

Carburettor heat may be used at any power setting, but will result in a slight power loss. When icing is eliminated, return CARB HEAT to OFF. Carburettor heat should not be used for take-offs.

Maintain carburettor heat in ON position for a minimum of 1 minute to allow all ice to melt.

Carburettor heat may be used on the ground except during take-off.

CAUTION

Do not use partial carburettor heat as this may exacerbate ice accretion.

3.3 EMERGENCY PROCEDURES CHECK LISTS

3.3.1 Engine Failures

Engine Failure During Take-off Run

1. Throttle..CLOSED
2. Brakes ....APPLY
3. Ignition ....OFF
4. Wing Flaps ....UP
5. Master Switch ....OFF
6. Fuel Shutoff Valve..OFF

Engine Failure Immediately After Take-off

1. Airspeed…………………………………………………..65 KIAS.
2. Ignition………………………………………………….OFF (As time permits)
3. Fuel Shutoff Valve……………………………………OFF (As time permits)
4. Wing Flaps……………………………………………..FULL RECOMMENDED
5. Master Switch…………………………………………OFF
6. Braking………………………………………………… HEAVY <u>AFTER</u> TOUCHDOWN

Engine Failure During Flight

1. Airspeed………………………………………….65 KIAS*.
2. Carburettor Heat……………………………….. ON
3. Fuel Pump……………………………………….ON
4. Fuel Shutoff Valve……………………………..CONFIRM ON
5. Fuel Quantity……………………………………CHECK
6. Oil………………………………………………..CHECK TEMP AND PRESSURE
7. Ignition…………………………………………..CYCLE BOTH ON
8. Throttle…………………………………………...CHECK LINKAGE OPERATION
9. Airstart…………………………………………..ATTEMPT IF PROP STOPPED

* - A slightly higher speed may give better distance over the ground if gliding into wind; a slightly slower speed if gliding downwind.

3.3.2 Airstart & Limitations

In the event that the engine is stopped during flight, it may be restarted by application of fuel & ignition, provided that the propeller is still windmilling. The propeller may stop windmilling below 50 KIAS

The Jabiru 2200 engine is a high compression (7.8:1) engine & therefore airstarts when the propeller has stopped rotating, without the use of the starter, are unlikely before reaching V_{NE}. Therefore, the following procedure addresses only airstarts by use of the starter motor.

IMPORTANT – NO NOT depress starter button while propeller is rotating.

1. Ignition…………………………………………OFF
2. Cabin………………………………………….. CLEAR
3. Airspeed……………………………………….REDUCE UNTIL PROPELLER STOPS TURNING.
4. Establish Glide…………………………………..65 KIAS
5. Fuel………………………………………………ON
6. Fuel Pump………………………………………ON
7. Master…………………………………………… ON
8. Ignition Switches……………………………….. ON
9. Starter Button……………………………………Depress
10. Throttle…………………………………………...Open
11. Repeat as necessary, ensuring propeller has stopped before each restart attempt.

Notes:
(a) If engine does not restart commence forced landing procedure.
(b) If clear symptoms of a mechanical failure exist, or if the engine has seized due to the loss of oil pressure, do not attempt a restart.
(c) If engine operates with only L or R ignition selected, leave the ignition switch in this position whilst a suitable landing area is selected.
(d) The engine cools quickly with the propeller stopped. Choke may needed to achieve a start.

3.3.3 Forced Landings

Emergency Landing Without Engine Power

1. Airspeed……………………………………..... 65 KIAS
2. Ignition…………………………………………OFF
3. Fuel Shutoff Valve……………………………OFF
4. Fuel Pump……………………………………..OFF
5. Throttle………………………………………...CLOSED
6. Wing Flaps…………………………………… FULL PRIOR TO TOUCH DOWN
7. Master Switch………………………………...OFF AFTER LOWERING FLAPS
8. Braking………………………………………...HEAVY AFTER TOUCH DOWN

Precautionary Landing With Engine Power

1. Airspeed.. 70 KIAS
2. Fuel Pump.. ON
3. Wing Flaps... TAKE-OFF
4. Selected field .... OVERFLY & INSPECT
5. Wing Flaps... FULL ON FINAL APPROACH
6. Airspeed.. 60 KIAS
7. Braking.. HEAVY AFTER TOUCH DOWN
8. Ignition .... OFF
9. Fuel Shutoff Valve.................................... OFF
10. Master Switch .... OFF

Ditching

1. Airspeed.. 65 KIAS
2. Power (if available)................................... ESTABLISH 50 ft/min @ 55 KIAS
3. Approach
   High Winds, Heavy Seas........................... INTO WIND
   Light Winds, Heavy Swells…………………PARALLEL TO SWELLS
4. Wing Flaps... FULL PRIOR TO TOUCH DOWN
5. Doors .... OPEN
6. Face... CUSHION AT TOUCH DOWN
7. Touch Down... SLOWEST PRACTICAL SPEED
8. Evacuate.. IF REQUIRED BREAK WINDOWS
9. Life Jackets / Life Rafts .... INFLATE
10. EPIRB (If Carried) .... ACTIVATE

3.3.4 Fires

On Ground

1. Ignition .... OFF
2. Fuel Shutoff valve .... OFF
3. Fuel Pump.. OFF
4. Master Switch .... OFF
5. Abandon aircraft
6. Fire .... EXTINGUISH

Engine Fire In Flight

1. Throttle .... CLOSE
2. Fuel Valve.. OFF
3. Fuel Pump .... OFF
4. Ignition... OFF
5. Master Switch .... OFF AFTER FLAPS DEPLOYED
6. Cabin Heat Vent .... CLOSE
7. Cabin Air Vent.. OPEN BOTH
8. Airspeed .... INCREASE UP TO V_{NE}* if required to extinguish fire.
9. Forced Landing.. EXECUTE. Refer 3.3.3

* - If it necessary to increase airspeed above V_{FE} (to no more then V_{NE}) in order to extinguish a fire, the flaps must **NOT** be lowered.

Electrical Fire In Flight

1. Master Switch .... OFF
2. Ignitions .... ON
3. Electrical Switches .... OFF
4. Extinguisher.. ACTIVATE

If fire goes out:

5. Smoke .... VENTILATE CABIN (DOORS MAY BE OPENED SLIGHTLY)
6. Precautionary Landing .... AS SOON AS PRACTICAL

If fire does not go out:

4. Land .... EXECUTE IMMEDIATELY

WARNING

With the Master Switch turned off the wing flaps will not deploy.

Cabin Fire

1. Master Switch .... OFF
2. Cabin Heat Vent .... CLOSE
3. Cabin Air Vent... OPEN BOTH
4. Extinguisher (if fitted) .... ACTIVATE
5. Land .... AS SOON AS PRACTICAL
6. Smoke/Fume Evacuation........................... VENTILATE CABIN. DOORS MAY BE OPENED SLIGHTLY.

Once fire is extinguished:

1. Power .... REDUCE
2. Airspeed .... APPROX 80 KIAS
3. Cockpit Door(s)... CLOSE
4. Power .... ADJUST to maintain approx 80 KIAS
5. Land .... AS SOON AS PRACTICAL

NOTE

Doors should only be opened for emergency fume evacuation

3.3.5 Other Emergencies

In some of the cases described below there is more than 1 potential cause for a given situation. For example, if the oil pressure gauge indicates zero, it may be due to a failure of the gauge or sender instead of an actual problem with the engine.

The procedures given below in all cases assume that the indications given are true and correct.

It is important to remain calm and think as clearly as possible. Again: The following **basic rules** apply to **all** aircraft emergencies:

1. **Maintain** Aircraft Control.
2. **Analyse** the situation before taking appropriate action. Don't act without thinking.
3. **Land** as soon as practicable.

Loss of Oil Pressure

1. Airspeed..65 KIAS
2. Power..IDLE
3. Precautionary landing.......................................AS SOON AS PRACTICAL

High Oil Pressure

1. RPM..REDUCE UNTIL PRESSURE DROPS
2. Precautionary landing.......................................AS SOON AS PRACTICAL

Emergency Descent – Type 1

1. Power..IDLE
2. Carburettor Heat..ON
3. Airspeed..120+ KIAS (less than V_{NE})
4. Flaps...UP

NOTE

This descent gives high vertical speeds but may make controlling the aircraft difficult when passing through narrow holes in clouds etc. Type 1 descents are for clear, smooth air only.

Emergency Descent – Type 2

1. Power..IDLE
2. Carburettor Heat..ON
3. Airspeed..84 KIAS (V_{FE})
4. Flaps...FULL DOWN

NOTE

This type of descent gives high vertical speeds while minimising loads on the aircraft structure and improving controllability around obstacles (such as cloud etc).
S-Turns or Side slips may be used to increase descent rate; see Section 4.8

Precautionary Descent

1. Power .... IDLE
2. Carburettor Heat .... ON
3. Airspeed .... 75 KIAS
4. Flaps... UP
5. Bank Angle .... 30°

NOTE

This descent gives moderate vertical speeds. It allows good airspeed control & is suited to a descent in a confined area (such as a hole in a cloud layer).

Alternator Failure

1. Non-essential electrical equipment.................... OFF
2. Land... AT NEAREST AIRPORT

NOTE

The Jabiru Engine does not require external power to run: the engine will not stop if the aircraft battery runs flat.

Overvoltage

1. Electrical equipment... ALL ON – MONITOR VOLTAGE
2. RPM... REDUCE – MONITOR VOLTAGE
3. Land... AS SOON AS PRACTICAL

Inadvertent Spin

Intentional spins are prohibited in this aircraft. Should an inadvertent spin occur, the following recovery procedure should be used:

1. **Retard the throttle to idle**
2. **Centralise ailerons**
3. **Apply <u>and hold</u> full rudder opposite to the direction of rotation**
4. **Move stick progressively forward far enough to break stall**
5. **Hold these control inputs until rotation stops**
6. **As rotation stops, centralise rudder and make a positive, smooth recovery from the resulting dive**

WARNING

If the spin is encountered with flaps extended, DO NOT retract flaps until rotation ceases. Premature flap retraction will delay recovery.

Inadvertent Icing Encounter

1. Carburettor heat... ON
2. Altitude... REDUCE if safe
3. Aircraft position / heading................................. TURN BACK
4. Aircraft Performance .... MONITOR

Flight into known icing conditions is prohibited. If icing is inadvertently encountered, change flight level or turn back to a region less conducive to icing. Monitor ice formation on the airframe and its effects on aircraft performance.

Inadvertent Operation in Light Rain

1. RPM .... REDUCE: 2200 – 2400 RPM
2. Flaps .... TAKE-OFF (first stage)
3. Carburettor heat .... ON
4. Aircraft Position / heading .... AWAY FROM RAIN

WARNING

The J160-D is not designed or approved to fly in heavy rain. The above is included for inadvertent operation in light rain only.

Loss of Primary Instruments

1. Circuit breakers .... CHECK. RE-SET ONCE ONLY.
2. Master Switch .... CYCLE OFF-ON
3. Land .... AS SOON AS PRACTICAL

WARNING

Breakers should only be re-set once. If there is a serious fault in an electrical system repeated re-setting of the breaker can result in an electrical fire.

Landing With a Flat Main Tyre

1. Landing Area .... SUITABLE
2. Approach .... NORMAL
3. Wing Flaps .... FULL DOWN
4. Touchdown .... GOOD TYRE(S) FIRST, hold aircraft off flat tyre as long as possible with aileron and/or elevator control
5. Ignition .... OFF
6. Fuel Shutoff Valve .... OFF
7. Master Switch .... OFF

3.3.6 Fuel Low Level Warning Light Illuminates (where equipped)

If fuel low level warning light illuminates:

1. Throttle .... Reduce to approx 2400RPM
2. Fuel gauges .... Check level. Fly aircraft with the wing with the most fuel above the other.
3. Precautionary Landing .... As soon as safe

Loss of Flight Controls
It is a requirement of the design standard that the following section be included in this manual, however such failures are extremely rare. As always, the 3 key rules apply:

1. **Maintain** Aircraft Control.
2. **Analyse** the situation before taking appropriate action. Don't act without thinking.
3. **Land** as soon as practicable.

Primary flight controls failures can potentially be caused by the following:

1. Failure caused when either end of the cable becomes free of its clamp
2. Failure of the cable connecting hardware (bolts, rod ends etc)
3. Failure of the cable itself.
4. Jamming of the controls within the cabin
5. Jamming of the external controls
6. Structural failure of the control
7. Failure of autopilot mechanism

In an emergency the secondary effect of controls may be used to direct the aircraft:

1. The secondary effect of the rudder is to roll the aircraft. Loss of aileron control can be partially addressed through the use of the rudder.
2. The secondary effect of the aileron is to yaw the aircraft. Loss of rudder control can be partially addressed through the use of the ailerons.
3. The trim mechanism is separate to the elevator system and can be used to control the pitch and attitude of the aircraft.
4. In some cases the autopilot mechanism (where equipped) may still function and can be used to control the aircraft.
5. Wing flap position and engine power setting also affect the pitch of the aircraft and can be used to assist in control.

In some cases, shaking a jammed control can free it. However it can also potentially exacerbate the problem. Shaking is therefore not recommended until other troubleshooting techniques have been attempted.

The following steps are recommended:

1. Secondary control .... APPLY
2. Cabin end of control cable................................ CHECK CLAMP & HARDWARE
3. Control mechanism inside cabin........................ CHECK. Clear any obstructions
4. Control .... SHAKE
5. Brute Force .... APPLY
6. Land... AS SOON AS PRACTICAL

WARNING

Where possible have a passenger carry out checks. Complicated or awkward trouble-shooting measures which divert the pilot's attention should be avoided if possible.

3.4 AMPLIFIED EMERGENCY PROCEDURES

This section is provided to supply the pilot with additional information concerning emergency procedures in general. Elaboration of the procedures specified in the EMERGENCY PROCEDURES CHECK LISTS as well as the inclusion of some more generalised emergency procedures that can be better covered by a general descriptive procedure rather than a formal check list are included in this section. This will give the pilot a more complete understanding of these procedures.

3.4.1 Fuel Gauges / Low Level warning Light (where equipped)

The J160-D may be fitted with electronic fuel gauges on the instrument panel. In addition, the sender units which drive these gauges are visible in the wing root area and incorporate an analogue needle showing fuel level. While the gauges on the instrument panel are designed so that only extended changes in fuel level are shown, the sender units in the tank show the current level directly and so will change in flight as the fuel sloshes in the tank. These senders can be used as a direct confirmation of the level indicated on the gauges. Note that due to the shape of the wing tank the gauges will read full from when the tanks are full (67 Litres) until the level falls below approximately 50 litres.

The optional low fuel level warning light will illuminate when around 3 litres of fuel remain in the header tank. This will allow the crew around 10 minutes (at cruise power consumption) to attempt to fix the problem with the fuel feed (such as flying out of balance, with the wing containing more fuel higher to encourage fuel flow from it into the header tank) or to locate a suitable place for a precautionary landing. While false indications are possible from this system they are unlikely, and unless the pilot is confident that he has sufficient fuel **and** that it is reaching the header tank, he should immediately reduce fuel consumption and seek a suitable place to carry out a precautionary landing. Note that this is a separate system from the fuel pressure warning light.

3.4.2 Engine Failure

If an engine failure occurs during the take-off run, the most important action is to stop the aircraft on the remaining runway. The extra items in the checklist will provide additional safety after an engine failure on take-off.

If the engine fails shortly after lift off the initial response <u>must</u> be prompt lowering of the nose in order to maintain safe airspeed. In most cases, the landing should be executed straight ahead with only small changes in direction to avoid obstructions. After an engine failure on take-off, altitude and airspeed are seldom sufficient to execute a 180° gliding turn to return to the runway of departure. The checklist procedures assume that adequate time exists to secure the fuel and ignition systems prior to touch down.

After an engine failure in flight, the best glide speed should be established as quickly as possible. While gliding toward a suitable landing area, an effort should be made to identify the cause of the failure. If time permits, an engine restart should be attempted. If the engine cannot be restarted a forced landing must be executed.

3.4.3 Forced Landings

If all attempts to restart the engine fail and a forced landing is imminent, a suitable landing area should be selected and the EMERGENCY LANDING WITHOUT ENGINE POWER checklist should be completed if at all possible.

3.4.4 Ditching

The aircraft has not been flight tested in actual ditchings, therefore the recommended procedure is based entirely on the best judgement of the manufacturer.

If available, life jackets should be donned **but not inflated** until after evacuating the aircraft. Inflating the life jackets prematurely increases the risk of damage to them exiting the aircraft. Additionally their bulkiness adds to the difficulty of evacuating the aircraft.

Plan the approach into wind if the winds are high and the seas are heavy. With heavy swells and light winds, land parallel to the swell. If possible maintain a constant descent rate of approximately 50 ft/min almost until touchdown but reducing speed to the minimum practical immediately prior to touchdown. Water pressure may hold the doors closed, so the crew should be prepared to break out windows if necessary to equalise pressure and allow egress. An orderly evacuation of the aircraft should then be conducted.

3.4.5 Fires

Although engine fires are extremely rare in flight, the checklist procedures should be followed if one is encountered. After completion of this procedure, execute a forced landing. Do not attempt to restart the engine after an engine fire.

The initial indication of an electrical fire is usually the smell of burning insulation. Turning off the Master Switch should result in the elimination of the cause of this type of fire, but it will also result in the loss of all power to instruments & controls.

3.4.6 Rough Engine/Loss of Power

1. USE OF POWER Continuous RPM up to 3300 is allowed in normal operations. In emergencies engine RPM in excess of 3300 may be used, but this will only be available at speeds above about 100 KIAS.

2. SPARK PLUG FOULING Slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by selecting each ignition switches momentarily to OFF. An obvious power loss in single ignition operation is evidence of spark plug or ignition system trouble. Assuming that the spark plugs are the more likely cause, applying full throttle may clear the plug fouling. If this does not solve the engine problem, plan to land at the nearest practical airfield to have the situation investigated.

3. IGNITION MALFUNCTION A sudden engine roughness or misfiring is usually evidence of carburettor icing or ignition system problems. In the case of ignition system trouble, switching each ignition switch off in turn should identify which system is malfunctioning. Different power settings may alleviate the problem. If not, plan to land at the nearest practical airfield to have the situation investigated.

4. CARBURETTOR ICING Rough running and loss of power may be caused by carburettor icing. This is most likely in conditions of high humidity and at low power settings. If not corrected, ice build up in the carburettor throat will cause complete power loss. If carburettor icing is suspected, immediately apply full carburettor heat until normal engine operation is restored, and the heat can be selected OFF. Carburettor heat should only be selected ON or OFF, as partial heat application may exacerbate ice build-up. The aircraft can be safely operated with carburettor heat applied for indefinite periods, but there will be a slight power loss. Hence, carburettor heat should not be used when full power is required; e.g. for take-off.

5. LOW OIL PRESSURE If low oil pressure is accompanied by normal oil temperature, there is a possibility that the oil pressure gauge or the relief valve is malfunctioning, and an immediate precautionary landing is not warranted. A landing at the closest practical airfield is advisable however so that the source of the trouble can be investigated. If a total loss of oil pressure is accompanied by a rise in oil temperature, an engine failure is probably imminent. Reduce engine power immediately and select a suitable forced landing area. Use only the minimum power required to reach the desired touch down point.

3.4.7 Electrical Systems Malfunctions

The electrical system is straight forward but to obtain the necessary degree of reliability and redundancy the system must be operated correctly. Normal operation is with the Master Switch in the ON position. Should the need to shed electrical loads arise the pilot should use their discretion to turn off all non-essential electrical equipment. More severe electrical system failures, such as those resulting in fire, require the Master Switch to be switched off. In addition to the general guide above specific failures may be dealt with as follows.

1. INSUFFICIENT RATE OF CHARGE If the “CHG FAIL” light illuminates in flight, minimal or no electrical power is being supplied by the alternator. If the battery charge drops sufficiently electrical systems will fail. While the Jabiru engine does not require external power while running, devices such as radios, transponders, GPS units, and intercoms will eventually drain the battery. If this light illuminates, consideration should be given to landing at the nearest practical airfield, though – provided the eventual total loss of electrical services will not affect the safety of flight – the flight may continue.

2. CIRCUIT BREAKERS Failure of an individual circuit will, in most circumstances, result in opening of the relevant circuit/switch breaker. To ensure a permanent fault exists in the circuit the breaker should be reset once. If the breaker again pops the circuit is faulty and the flight should be continued without that service.

4. NORMAL PROCEDURES

4.1 GENERAL

Section 4 of this handbook describes the procedures to be adopted for normal operations of the J160-D aircraft.

The procedures are arranged in the sequence considered to be the most desirable and therefore steps should be performed in the order listed unless good reasons for a deviation exist.

4.2 SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 540 kg (1190lb) and may be used for any lesser weight.

Take-Off:

T.O.S.S. (Speed @ 50 ft) .... 66 KIAS

Normal Climb Out .... 70 KIAS (Take Off Flap)

Climb, Flaps Up:

Initial (scheduled climb)................................ 70 KIAS

Enroute .... 70-80 KIAS

Landing Approach:

V_{REF} (Speed @ 50 ft).................................. 63 KIAS

Baulked Landing .... 65 KIAS Initially

Maximum Recommended in Turbulence:

All Weights.. 112 KIAS

Maximum Demonstrated Crosswind Velocity:...... 14 knots

4.3 BEST ANGLE OF CLIMB SPEED

V_X – Best Angle of Climb Speed.................. 65 KIAS

4.4 BEST RATE OF CLIMB SPEED

V_Y – Best Rate of Climb Speed .... 68 KIAS

4.5 PREFLIGHT INSPECTION

Before flight, a careful visual inspection is to be carried out to ensure that the aircraft and its systems are serviceable. The following Figure is to be used in conjunction with the preflight inspection checklist:

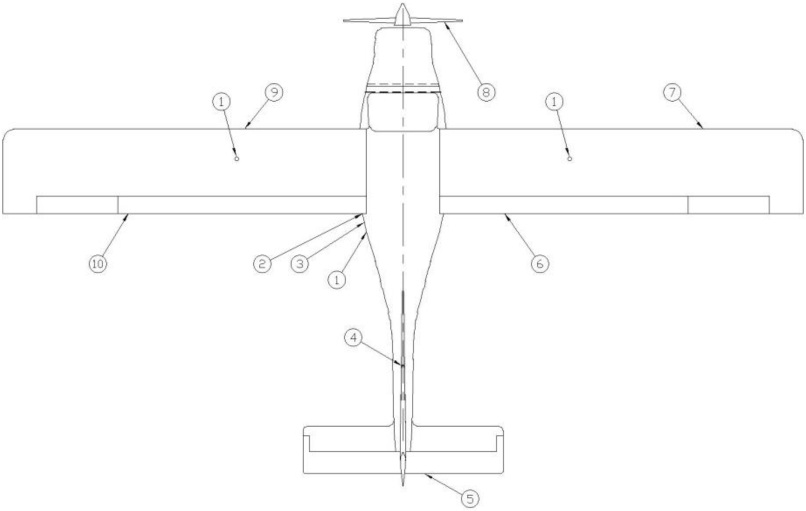


Figure 4-1. Pre-flight Inspection

1. Fuel

Quantity in both tanks ....Check
Fuel caps ....Secure
Water Check ....Both tanks and header tank

2. Cockpit

Ignition Switches ....OFF
Control lock (if fitted) ....REMOVE
Fuel...CHECK CONTENTS
Fuel valve ....ON
Master switch ....ON
Alternator Warning Light...........................CONFIRM ON Before Start
Master Switch ....OFF
Aileron and elevator cables & fasteners ...CHECK
Rudder and nose wheel steerage linkage.CHECK
Rudder centring springs ....CHECK
Controls (all)..CHECK full travel, free movement.
Harnesses & Seats ....CHECK CONDITION
Windshield ....CLEANLINESS
Cockpit area..GENERAL CONDITION
Loose objects..SECURE
Cockpit Doors/Latches ....CONDITION & OPERATION
Flight Manual ....AVAILABLE

3. Left Undercarriage

Mount bolts .... CHECK SECURE*
Tyre .... CHECK CONDITION / INFLATION

* - Lock the hand brake on, then pull the aircraft forwards. Some flexing of the undercarriage legs is normal, but there should be no movement of the top of the leg relative to the fuselage.

4. Static Source

Static Source .... CHECK FOR BLOCKAGE

5. Empennage

Tail tie-down .... DISCONNECT
Control surfaces...................................... CHECK Security & Full & Free Movement
Rudder, Elevator & Trim Cables.............. CHECK Security & Full & Free Movement

6. Right Wing – Trailing Edge

Aileron .... CHECK Security & Full & Free Movement
Flap .... CHECK Security
Control rods & cables.............................. CHECK Security. Check rod ends for freedom of rotation & excess movement.

7. Right Wing

Wing Tie-Down .... DISCONNECT
Wing Strut Mount Bolts .... CHECK Security**
Wing Root Mount Bolts .... CHECK Security***
Pitot Tube .... REMOVE COVER, CHECK for blockage.

** - Wing strut bolts must not be tightened. Nut should just bear on washer.
*** - Holding the wingtip, push the tip up & down, forwards & backwards. If a wing / strut attachment is degrading, slop will be felt.

8. Nose

Propeller & Spinner................................. CHECK for nicks & security
Cowl .... CHECK Security, rubbing on engine.
Engine Oil .... CHECK using oil filler door.
Nose Wheel .... CHECK condition & pressure.

9. "Pulling Through" The Engine

Before the first flight of the day the engine must be "pulled through" by hand. This is the process of turning the engine over by turning the propeller by hand. The compression of each cylinder in turn will be felt a resistance as the propeller is turned. The engine should be rotated for a count of at least 8 compressions.

Master Switch .... OFF
Ignitions .... OFF
Throttle .... Closed
Propeller .... TURN by hand & observe engine for odd noises or heavy movements. Check for regular compression.

CAUTION:

Prior to pulling through the propeller by hand, the engine must be cold, both ignition circuits & the Master Switch must be switched OFF, the brakes applied & throttle closed.

WARNING
A hot engine may fire with the ignition/s switched OFF.
DO NOT pull through a hot engine.

CAUTION
Several causes of irregular compression – such as poorly sealing valves – can lead to extensive engine damage if not addressed. The Jabiru 2200 Engine Instruction & Maintenance Manual provides additional details.

10. Left Wing

Wing Tie-Down ....DISCONNECT
Wing Strut Mount Bolts.............................CHECK Security**
Wing Root Mount Bolts.............................CHECK Security***

11. Left Wing – Trailing Edge

Aileron ....CHECK Security & Full & Free Movement
Flap..CHECK Security
Control rods & cables...............................CHECK Security. Check rod ends for freedom of rotation & excess movement.

4.6 NORMAL PROCEDURES CHECK LISTS

4.6.1 Before Starting Engine

Pre flight Inspection .... COMPLETED
Passenger Briefing .... COMPLETED
Harnesses .... SECURE
Brakes .... ON/PARK
Avionics .... OFF
Circuit Breakers .... IN
Fuel Level Warning Light (if fitted)........... CHECK OPERATION using test switch

4.6.2 Starting Engine - Cold

Master Switch .... ON
Fuel Shutoff Valve .... ON
Carburettor Heat .... OFF
Choke .... ON*
Throttle .... CLOSED
Fuel Pump .... ON
Ignition switches .... ON
Starter... ENGAGE when engine fires RELEASE**
Oil Pressure.. CHECK (pressure to be indicated within 10 secs)
Choke .... Closed
Throttle .... 900 – 1000 RPM
Alternator Warning Light .... CHECK OFF
Avionics .... ON

* - If the engine is hot, proceed as for cold engine, but do not use choke.
** - If the engine is turning at less than 300 RPM it will not start.

4.6.3 Taxiing

Power 1000-1200rpm
Speed... FAST WALKING PACE MAXIMUM
Strobe... ON
Landing Lights .... OFF UNTIL ENTERING RUNWAY
Position... STAY RIGHT on taxiways
Carburettor heat..................................... AS REQUIRED
Brakes .... AS REQUIRED. Do not apply continuously.

If required, brakes should be applied periodically: allow the speed to build up to a fast walking pace then apply brakes to reduce to a slow walking pace. Release the brakes and allow the speed to gradually build up again. This allows the brakes time to cool down between applications & minimises wear.

For more details regarding taxiing refer to section 8.5

4.6.4 Before Take-Off

Park Brake...ON

Ground Check & Run Up

Warm Up..1000-1200 RPM avoid prolonged idle at low RPM
Ignition Check..2000 RPM Both-L-Both-R-Both. Max drop 100RPM
Carburettor heat.....................................2000 RPM – ON – slight drop in RPM
Carburettor heat.....................................2000 RPM – OFF – RPM restored
Power Check..2850 RPM +/- 150 RPM
Idle Check..700 – 900 RPM
Trim..SET – Neutral

Pre Take-Off

Master Switch..ON
Ignition switches.....................................BOTH ON
Fuel Shutoff Valve..................................ON
Fuel Quantity..CHECK sufficient for task
Fuel Pump...ON
Flaps...TAKE OFF (first stage)
Instruments..SET AND CHECK ALL
Switches..SELECTED as required
Circuit Breakers.....................................CHECK
Controls..FULL & FREE TRAVEL, CORRECT SENSE
Hatches...CLOSED & LOCKED
Harnesses..SECURE all seat belts correctly fastened and adjusted
Oil temperature......................................ABOVE 40°C (104°F)

4.6.5 Take-Off

Carburettor heat.....................................OFF
Throttle..FULL OPEN (3000 rpm)*
Elevator Control.....................................NEUTRAL
Directional Control.................................NOSEWHEEL STEERING & RUDDER
Rotate..30 – 40 KIAS raise nosewheel clear of ground
Take Off Safety Speed............................66 KIAS
Accelerate to Climb Speed......................70 KIAS
Flaps...UP… Accelerate to 70 KIAS
Fuel Pump...OFF at top of climb.
Power..SET as required.

* - 3000 rpm is typical at full power on takeoff. Variation will exist between individual aircraft and depending on atmospheric conditions. Regardless FULL POWER should always be used at takeoff so long as maximum continuous engine speed (3300 rpm) is not exceeded.

4.6.6 Initial Climb

Throttle..FULL OPEN
Airspeed..70 KIAS

4.6.7 Cruise

75% Power .... 2800 RPM (14-16 L/hr)

4.6.8 Descent

Power .... As required
Carburettor heat..................................... As required

4.6.9 Before Landing (and flight below 1000ft AGL)

Brakes .... OFF
Harnesses .... SECURE
Fuel Pump .... ON

4.6.10 Landing

Airspeed @ 50ft...................................... 63 KIAS
Wing Flaps... FULL
Directional Control .... RUDDER & NOSEWHEEL STEERING
Power .... AS REQUIRED
Touchdown .... Main wheels first
Braking .... AS REQUIRED

NOTE

If the aircraft is contaminated by build up of insects or other debris, increase approach speed @ 50ft to 68 KIAS

4.6.11 Baulked Landing

Power .... FULL THROTTLE
Carburettor heat .... COLD
Wing Flaps... RETRACT **SLOWLY**
Airspeed .... ESTABLISH NORMAL CLIMB SPEED

4.6.12 After Landing/Securing

Wing Flaps... UP
Fuel Pump .... OFF
Parking Brake .... ON/AS REQUIRED
Avionics .... OFF
Ignition... OFF
Master Switch .... OFF
Controls .... SECURE

4.7 AMPLIFIED PROCEDURES

This section is provided to supply the pilot with additional information concerning normal procedures in general. Elaboration of the procedures specified in the NORMAL PROCEDURES CHECK LISTS as well as the inclusion of some more generalised procedures that can be better covered by a general descriptive procedure rather than a formal check list are included in this section. This will give the pilot a more complete understanding of these procedures.

4.7.1 Preflight Inspection

The Preflight inspection as covered by the PREFLIGHT INSPECTION CHECKLIST is recommended prior to the first flight of the day. Inspection procedures for subsequent flights can be abbreviated provided essential items such as fuel and oil quantities, security of fuel and oil filler caps are satisfactory. After refuelling fuel samples must be taken from all drain points, three in total, one in each of the two wing fuel tanks and one under the fuselage.

Aircraft operated from rough strips, especially at high altitudes, are subject to abnormal undercarriage abuse. Frequent checks of all undercarriage components, tyres and brakes is warranted in these situations.

4.7.2 Electric Fuel Gauges (where equipped):

The fuel gauges used in the J160-D use a sender unit which has a built-in analogue needle indicator for fuel level. These senders are located in the wing roots and are visible to the crew. these units may be used to confirm the fuel level being displayed by the gauges fitted to the instrument panel. Note that due to the shape of the wing tanks, the gauges will read full from when the tank is full until it’s level has dropped below around 50 litres. This must be taken into account by manually checking fuel quantity (dipping the tanks) before a long flight.

4.7.3 Starting Engine

The Jabiru 2200 engine is fitted with a dual electronic ignition system. The engine will not start below 300 RPM, which precludes the option of hand swinging or "propping" an engine when there is insufficient charge available in the aircraft battery for a normal start. Starting using an external power source involves removing the upper engine cowl, attaching jumper leads to the battery terminals and proceeding with the normal start sequence.

WARNING

When the engine is started, and battery charge restored, shut down before re-fitting the engine cowl

After starting, oil pressure should start to rise within 10 seconds. If it does not rise within this time stop the engine and investigate the cause.

4.7.4 Taxiing

Positive control is available to the pilot when taxiing the J160 due to the direct linkage type nosewheel steering. Care should be exercised in strong winds, particularly in quartering tail wind conditions. As with any high wing configuration aircraft, appropriate elevator and aileron control positions are essential during taxiing operations particularly during strong tail wind conditions.

Taxiing over loose gravel or stones should be done at low engine RPM to minimise propeller damage.

4.7.5 Engine Management – Ground Running

The 2200 engine fitted to the J160-D is cooled by air flowing over the engine and oil cooler. During ground running care must be taken to ensure that there is adequate airflow and that safe engine temperatures are maintained. The guidelines presented below will assist in controlling temperatures.

- Minimise ground running times – especially in hot weather[3].
- Carry out as many checks as possible before starting the engine.
- Always carry out engine run-up tests with the aircraft pointing into wind.
- In hot weather, after performing run-up checks, leave the aircraft pointing into wind and idling at 1200rpm for 30 seconds to aid cooling.
- If the aircraft is required to wait – such as for runway clearance – temperatures must be monitored, and if they approach ground running limits (listed in Section 7.13.1 of this flight manual & displayed as yellow markings on engine gauges) the aircraft must be turned into wind or shut down to prevent any further temperature increase.
- Wind must be coming from within approximately 45° of the aircraft heading to be effective in aiding engine cooling.
- If there is no wind or low wind the engine must be shut down if ground-running temperature limits are reached.

[3] 30°C and above

4.7.6 Before Take-Off

Warm Up

Most of the warm up will have occurred during taxiing and whilst conducting the Before Take-Off checks. The engine is warm enough for take-off when the cylinder head and oil temperatures are in the green arcs.

Ignition System Check

The magneto check should be made at 2000 RPM as indicated by the tachometer with the carburettor heat set to COLD. Select the LEFT ignition OFF and note the RPM drop, return to BOTH until the engine regains speed. Select RIGHT ignition OFF and note the RPM drop, return to BOTH. Drop in RPM should not exceed 100 RPM. Do not operate on a single ignition source for an extended period; a few seconds is usually sufficient to check RPM drop and will minimise spark plug fouling.

4.7.7 Take-Off

Power Check

Full throttle runups over loose gravel are especially harmful to the propeller and should be avoided. When take-offs must be made from a gravel surface, it is very important that the throttle be advanced slowly and a rolling start take-off technique be used to minimise propeller damage.

It is important to check full throttle engine performance early in the take-off run. Any sign of rough engine operation or sluggish acceleration is good cause for discontinuing the take-off and conducting a full power runup to confirm normal engine operation prior to the next take-off attempt.

Wing Flap and Power Settings

Normal take-offs are accomplished at full throttle, and TAKE-OFF flap selected. The flaps should not be retracted until a safe height is achieved and all obstacles have been cleared. Take-offs may be made with flaps up but this will increase the take-off distance and will result in a more pronounced nose up attitude at lift off.

4.7.8 Climb

Initial climb

Initial climb is performed with flaps up full throttle 71 KIAS.

Enroute climb

Enroute climbs are performed with flaps up, full throttle, and at speeds 5 to 10 knots higher than the initial scheduled climb speed. This provides better engine cooling with little loss of climb performance.

4.7.9 Cruise

The power setting and cruising altitude are the two major factors that will affect the cruising speed and range of the J160. Other influencing factors include the weight and loading, temperature and equipment installed in a given aircraft. The maximum power setting normally used for cruise is 75% of the engine's rated power. Power settings below this will result in increased range and endurance corresponding with the reduced fuel consumption. At a power setting of 45% the J160 is capable of attaining an endurance of close to 13 hours, for a range of over 1000 nautical miles. For efficient and economical operation as well as to achieve maximum engine service life the engine must always be operated in accordance with the procedures and specifications set out in the engine manufacturer's operator's manual.

4.7.10 Stalls

In any attitude or under any loading condition there is no natural stall warning. An artificial stall warning horn is set to activate 5 to 10 KIAS above the stall speed in any configuration. All controls are effective up to and completely through the stall and there is no noticeable tendency to enter a spin after the stall.

4.7.11 Approach and Landing

Landings are normally conducted with full flaps. The landing approach is conventional. Care must be taken to ensure airspeed is accurately maintained during the final landing approach. Timely and appropriate use of power should be exercised to maintain the desired flight path and airspeed. Excessively high approach speeds will result in prolonged floating and increased landing distance. Normally the throttle should be fully closed during the 'flare' to reduce the tendency to float and prolong the touchdown. Touchdown should occur on the main wheels initially, followed by the nose gear which should be held clear of the ground during the initial ground roll. Positive braking may then be applied depending on requirements and circumstances. For maximum braking effectiveness the wing flaps should be retracted and back pressure applied to the control column.

4.7.12 Cross Wind Landing

The J160-D has been approved for operations in crosswinds of up to 14 Knots.

When landing in a strong cross wind use a wing low, crab, or a combination method of drift correction. Avoid a prolonged hold off by allowing the aircraft to settle onto the runway in a slightly nose high and wing low attitude, touching down on the into wind mainwheel first followed by the other mainwheel and then the nose gear in quick succession. In strong and/or gusty wind conditions it may be desirable to make the final approach at a slightly higher than normal airspeed with partial or no flap selected.

4.7.13 Baulked Landing

In a baulked landing (go-around), the wing flaps should be retracted to take-off immediately after full power has been applied. Upon reaching a safe airspeed, the flaps should be smoothly retracted to the full up position and a normal climb established.

4.7.14 Flight Over Water

When life preservers and rafts are required, crew life preservers should be worn at all times. Life rafts can be stowed in the baggage compartment.

4.8 Advanced Procedures

The following procedures are advanced techniques designed for special circumstances. To carry them out successfully the pilot must be well trained and experienced in the particular aircraft being used. Before attempting them the pilot must realistically assess the circumstances and their skills.

WARNING

The following procedures are used in less than optimal conditions. They are inherently less safe than normal procedures. The operator attempts them at their own risk.

4.8.1 Short Field Take-Off

Crew ....HARNESS SECURE / BRACE
Aircraft Weight ....MINIMISE
Measure runway length............................MARK TAKE-OFF ABORT POINT
Wheel Spats...ON FOR LONG GRASS
OFF FOR SOFT SURFACE
Elevator Trim..NEUTRAL
Fuel Shutoff value ....ON
Fuel Pump ....ON
Carburettor Heat ....OFF (COLD)
Wing Flaps...TAKE OFF (1^{st} Stage)
Position..FOR MAX POSSIBLE RUNWAY LENGTH
Engine ....WARM THOROUGHLY
Brakes ....HOLD FULL ON BY HAND
Throttle...FULL. Wait for engine RPM to peak
Brakes ....RELEASE
Elevator..FULL BACK until nose wheel lifts 25mm (1”). AS REQUIRED after
Abort ....IF NOT AIRBORNE BY ABORT POINT
Rotate ....AS SOON AS POSSIBLE
Lift-off..BEST ANGLE OF CLIMB SPEED until clear of obstacles.

NOTE

Short field take-offs are potentially high risk manoeuvres. Reducing rotation and climb speeds lower the aircraft’s safety margins, especially in a cross wind, wind gust or if the engine fails. Where possible, they should only be attempted in good conditions. If students are being taught short field take-offs the weather conditions must be appropriate and a long runway used.

WARNING

If high power is applied when the propeller is over loose gravel, grass etc propeller damage will result.

WARNING

It is possible to over-rotate the aircraft in ground effect to a dangerously nose-high pitch, resulting in a stall once clear of ground effect. Allow pitch angle & airspeed to stabilise out of ground effect before applying aggressive pitch inputs.

4.8.2 Short Field Landing

Approach .... FLAT. Aim for wheels to touch as near to the target point as possible. Approach under power.
Power .... APPROX 1500 RPM
Airspeed .... 60 KIAS
Touch-down .... AT TARGET POINT. Wheel brakes are the best way to slow the aircraft. Touching down positively and slightly fast then braking heavily will give shortest landing distances.
Power .... IDLE
Brakes .... HEAVY. DO NOT LOCK WHEELS.

NOTE

Short field landings are potentially high risk manoeuvres. Reducing approach speeds and approaching under power lower the aircraft's safety margins, especially in a wind gust or if the engine fails. Where possible, they should only be attempted in good conditions. If students are being taught short field landings the weather conditions must be appropriate and a displaced threshold used.

NOTE

Short field approaches require great precision in airspeed and height control. Pilots must be prepared to go-around early.

NOTE

After heavy braking such as that required for a short field landing brake temperatures will rise dramatically and afterwards brake effectiveness may be significantly reduced.

WARNING

If the aircraft overruns the runway stop the engine to minimise propeller and engine damage

4.8.3 Soft Field Take-Off

Crew .... HARNESS SECURE / BRACE
Aircraft Weight .... MINIMISE
Ground Inspection .... COMPLETE
Measure runway length............ MARK TAKE-OFF ABORT POINT
Wheel Spats .... OFF FOR SOFT SURFACE
Elevator Trim .... NEUTRAL
Fuel Shutoff Valve .... ON
Fuel Pump .... ON
Carburettor Heat .... OFF (COLD)
Position............ FOR MAX POSSIBLE RUNWAY LENGTH
Engine .... WARM THOROUGHLY
Brakes .... HOLD FULL ON BY HAND
Throttle .... FULL. Wait for engine RPM to peak
Brakes .... RELEASE
Elevator .... FULL BACK until nose wheel lifts 25mm (1"). AS REQUIRED after
Wing Flaps............ UP DURING INITIAL GROUND ROLL
Abort............ IF NOT AIRBORNE BY ABORT POINT
Wing Flaps............ FULL DOWN at 48-50 KIAS
Rotate............ AS SOON AS POSSIBLE
Lift-off .... BEST ANGLE OF CLIMB SPEED until clear of obstacles.

NOTE

Soft field take-offs are potentially high risk manoeuvres with reduced safety margins, especially in a cross wind, wind gust or if the engine fails. Where possible, they should only be attempted in good conditions. If students are being taught soft field take-offs the weather conditions must be appropriate and a long runway used.

WARNING

It is possible to over-rotate the aircraft in ground effect to a dangerously nose-high pitch, resulting in a stall once clear of ground effect. Allow pitch angle & airspeed to stabilise out of ground effect before applying aggressive pitch inputs.

WARNING

If high power is applied when the propeller is over loose gravel, grass etc propeller damage will result.

4.8.4 Soft Field Landing

Crew .... HARNESS SECURE / BRACE

Surface Test:

Wing Flaps .... TAKE-OFF (1st Stage)
Approach .... FLAT. Aim for wheels to touch as near to the target point as possible. Approach under power.
Power .... APPROX 1500 RPM
Airspeed.. 5 KIAS ABOVE STALL
Main Wheels .... TOUCH.
Go-Around .... EXECUTE

Landing:

Wing Flaps .... FULL
Approach .... FLAT. Aim for wheels to touch as near to the target point as possible. Approach under power.
Power .... APPROX 1500 RPM
Touch Down.. MINIMUM / STALL SPEED
Go-Around .... APPLY IF NEEDED
Power .... IDLE
Brakes .... AS REQUIRED

NOTE

Soft field landings are high risk manoeuvres with potential for the aircraft to flip or become un-controllable due to the soft surface. Where possible, they should only be attempted on a known runway in good conditions. If students are being taught soft field landings the weather conditions must be appropriate and a long runway used.

NOTE

Soft field approaches require great precision in airspeed and height control. Pilots must be prepared to go-around early.

4.8.5 Crosswind Take-Off

Normal take-off checks	COMPLETE
Aileron	POINT FULLY TOWARDS WIND.
Normal take-off procedure	APPLY
Aileron	EASE AS REQUIRED as speed increases
Nose wheel	ON GROUND to maintain directional control until approximately 50 KIAS.
Rotate & climb	CARRY OUT. Avoid aggressive pitch input until aircraft is clear of ground effect.

4.8.6 Crosswind Landing – "Wing Low" Method

Jabiru Aircraft recommend using the "wing low" method of landing in crosswinds as it allows the strength of the crosswind to be continually assessed during the final approach and is less likely to cause directional control issues on touch-down.

Wind Strength	CHECK using the wind sock.
Runway & Surrounds	ASSESS. If the crosswind is strong carry out a low pass over the runway to check for control authority, areas of sink or turbulence. Note trees, hangars, hills etc will cause turbulence. Consider displacing threshold to avoid turbulence if safe.
Wing Flaps	AS NEEDED. Landing with less flap angle increases approach speed and improves control authority. Angle of attack increases and approach angle decreases however.
Approach Speed	HIGH. Add 5 – 10 KIAS to improve control authority & stall speed margin.
Direction	CHOOSE. Pilots flying from the left (command) seat normally prefer a cross wind from the left.

WARNING

Do not attempt to land with a tail-wind component.

Runway Alignment	SET EARLY. Allow a long final leg.
Aileron on Final	APPLY: lower the wing on the wind side of the aircraft. i.e. if the wind is coming from the left apply left aileron & lower the left wing.
Rudder on Final	APPLY AS NEEDED to keep the aircraft aligned with the runway.
Control Authority	ASSESS. If the aircraft centreline cannot be held on the runway centreline during final the crosswind is too strong & the landing must be aborted.
Power	APPROX 1500 RPM
Touch-down	1 MAIN WHEEL FIRST: the wing low orientation is maintained during flare & landing. Align nose wheel with runway before the wheel touches.
Nose Wheel	LOWER EARLY. Do not hold off nose wheel in crosswind conditions: lower it to improve directional control.
Power	IDLE

Brakes ....AS NEEDED. DO NOT LOCK WHEELS.
Aileron / Elevator Deflection ....MAINTAIN: in strong wind the aircraft must be "flown" during ground operations to minimise the risk of being flipped. See Section 8.5

NOTE

When flying with "crossed controls" such as left Aileron with right Rudder the aircraft will be out of balance and experience higher than normal drag. Descent rates will increase. Aircraft response to control inputs may be slower than normal.

4.8.7 Crosswind Landing – "Crab" Method

Situation Assessment...............................AS FOR "WING LOW" METHOD
Aircraft positioning & configuration ....AS FOR "WING LOW" METHOD
Runway Alignment ....SET EARLY. Allow a long final leg.
On Final ...."CRAB" AIRCRAFT: Adjust aircraft heading so that its course over the ground aligns with the runway. The aircraft nose points off to the windward side. Aircraft is in balance.
Power ....APPROX 1500 RPM
Wing into wind..LOWER BEFORE STRAIGHTENING
Touch-down ....STRAIGHTEN BEFORE TOUCHDOWN: Use the rudder to align the aircraft with the runway just before the wheels touch.
Nose Wheel ....LOWER EARLY. Do not hold off nose wheel in crosswind conditions: lower it to improve directional control.
Power ....IDLE
Brakes ....AS NEEDED. DO NOT LOCK WHEELS.
Aileron / Elevator Deflection ....MAINTAIN: in strong wind the aircraft must be "flown" during ground operations to minimise the risk of being flipped. See Section 8.5

4.8.8 S-Turns

S-turns are a means of losing excess height during the landing approach to position the aircraft correctly for touch-down. Essentially the pilot flies the aircraft through a sequence of left and right turns within an arc of 90° left to 90° right of the desired heading. In a turn the aircraft has significantly higher drag than normal and so descent rates increase considerably. In addition the turns effectively increase the distance from the aircraft to the threshold, allowing more time to lose height.

Remember that stall speed increases with bank angle – in a 60° bank with full flaps the J160-D will stall in still air at around 67 KIAS. An airspeed margin of around 10 KIAS above stall speed is recommended – more in gusty or turbulent conditions.

Power .... IDLE
Speed.. 77 KIAS
Flaps .... FULL DOWN
Bank Angles .... DO NOT EXCEED 60°
Ground Conditions.................................. ALLOW FOR TURBULENCE / GUSTS

WARNING

Repeated banks at low height and relatively low speed can lead to a stall / spin accident if the pilot allows speed to drop too much. Monitor airspeed, bank & pitch angles carefully; note the raised stall speed during banks. Initial training must be carried out at a safe altitude (recommended 8000' AGL) to allow time for recovery in the event of an inadvertent spin.

4.8.9 Side Slips

Side slips are a means of losing excess height during the approach to landing. A side slip is where a pilot deliberately inputs "crossed controls" – i.e. right rudder with left aileron. Note that this is an extension of the "wing low" method of carrying out cross wind landings – except instead of applying the minimum control input to direct the aircraft along the runway the pilot applies excess inputs resulting in an exaggerated "wing low" configuration. With this combination of controls the aircraft will experience relatively high drag and associated sink rates. Because of the propeller wash most aircraft will slip better in one direction than another – typically a J160-D will prefer to be configured with the left wing low – i.e. apply left aileron and right rudder.

Power .... IDLE
Speed.. 77 KIAS
Flaps .... FULL DOWN
Bank Angles .... DO NOT EXCEED 60°
Ground Conditions.................................. ALLOW FOR TURBULENCE / GUSTS
Recover / straighten................................ EARLY: aircraft will take time to recover

WARNING

Deliberately crossing controls at low height and relatively low speed can lead to a stall / spin accident if the pilot allows speed to drop too much. In this configuration the aircraft has high drag and will require time to recover and to respond to new inputs. Monitor airspeed carefully. Aggressive slipping should be avoided as it may cause turbulence and vibration over the tail. Initial training must be carried out at a safe altitude (recommended 8000' AGL) to allow time for recovery in the event of an inadvertent spin.

5. PERFORMANCE

5.1 GENERAL

The performance data on the following pages is presented so that you may know what to expect from the aircraft under various conditions, and also to facilitate the planning of flights in detail and with reasonable accuracy. The data has been computed from actual flight tests with the aircraft and engine in good condition and using average piloting techniques.

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

Cruise performance data assumes that the aircraft is clean the engine is operating correctly, and the propeller is undamaged. Some indeterminate variables such as carburettor settings, engine and propeller condition, and air turbulence may account for variations in range and endurance. It is therefore important to utilise all available information to estimate the fuel required for a particular flight.

5.2 APPROVED DATA

5.2.1 Airspeed Indicator System Calibration

Conditions:

Power: As required for level flight or maximum rated RPM as appropriate.

KIAS	KCAS		
	Flaps UP	Flaps Take-off	Flaps Landing
48	-	-	45
50	-	48	48
56	53	54	54
57	54	55	55
63	60	60	60
73	70	70	70
85	81	82	82
94	90	-	-
106	101	-	-
117	112	-	-
125	120	-	-
135	129	-	-
146	140	-	-

NOTE

Indicated airspeed assumes zero instrument error

5.2.2 Stall Speeds

Associated conditions:

Power: Idle
Centre of Gravity: Forward Limit
Weight: 540 kg (1190 lbs)

	Angle of Bank							
	0°		30°		45°		60°	
Flaps	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
Up	58	55	60	57	66	63	79	75
T/0	51	48	54	52	59	57	71	68
Land	48	45	50	48	56	54	67	64

NOTE

Stalling speeds will reduce as weight is reduced.

Stalling speed will reduce as centre of gravity is moved aft, however the reduction is small.

5.2.3 Take-Off Performance

The following table contains data enabling the take-off distance to be determined for a variety of operating conditions. The take-off distances are given in metres.

The table is based on take-off distances from rest to a height of 15 metre (50 foot) with the engine operating at take-off power which is with throttle in the fully open position, and with the flaps extended to the take-off setting which is a 17 degree extension. .

The distances presented are for operating on a level bitumen surface. When taking off from short dry grass increase the take-off distance by 7%. When taking off from soft ground or unusually long and/or wet grass the take-off distance will be even longer. The pilot should therefore ensure that adequate strip length is available to cover these conditions.

The technique used in establishing the data in the take-off distance table involves accelerating the aircraft along the ground with the elevators held neutral, then rotating and commencing a climb so that the take-off safety speed (T.O.S.S.) 66-KIAS is achieved and maintained at or before the 15 metre (50 foot) height point.

The data is presented for the maximum permitted take-off weight of 540-kg.

Extrapolation outside the boundaries of the Take-Off Distance Table is not permitted. When the outside air temperature and/or pressure height is below the lowest range included in the table, the aircraft performance shall be assumed to be no better than that appropriate to this lowest range. The performance information is not valid when the outside air temperature and/or pressure height exceeds the maximum values for which this information is scheduled.

Take Off Distance								
Weight (kg)	Pressure Altitude (ft)	Outside Air Temperature (degC)						
		-20	-10	0	10	20	30	38
540	0	369	391	415	439	464	490	511
	2000	413	438	465	493	523	553	579
	4000	464	494	525	559	593	630	661
	6000	524	560	598	638	680	726	764
	8000	598	641	687	737	790	847	897

For every 1 knot of head-wind component, the take-off distance can be reduced by 11-metres.

For every 1 knot of tail-wind component the take-off distance required **MUST** be increased by 16 –metres.

5.2.4 Landing Distances

The landing distance table presented below provides information to achieve the minimum landing distance for a variety of operating conditions. The data is applicable when using a power off glide approach with the flaps extended to the "Landing Flap" or fully extended position, and is based on landing distances from a height of 15 metre (50 feet) to stop.

The landing distance is provided for a hard bitumen surface. Wet and/or slippery surfaces will increase the landing distance over that scheduled and the pilot should therefore ensure that adequate strip length is available to cover these conditions.

The technique used in establishing the Power Off Approach Landing Chart distance is such that the aircraft approaches with idle power down to the 15 metre (50 foot) height point at 63 KIAS. After touch down maximum wheel braking is used to bring the aircraft to a stop.

When the outside air temperature and/or pressure height is below the lowest range scheduled on the charts, the aircraft performance shall be assumed to be no better than that appropriate to this lowest range. The performance information is not valid when the outside air temperature and/or pressure height exceeds the maximum values for which this information is scheduled.

Landing Distance (metres)								
Weight (kg)	Pressure Altitude (ft)	Outside Air Temperature (degC)						
		-20	-10	0	10	20	30	38
540	0	432	440	448	456	464	472	478
	2000	447	456	464	473	481	490	497
	4000	464	473	482	491	500	510	517
	6000	482	492	502	511	521	531	539
	8000	501	512	523	533	544	555	563

For every 1 knot of head-wind component, the landing distance can be reduced by 11-metres.

For every 1 knot of tail-wind component the landing distance required MUST be increased by 17 –metres

5.2.5 Climb

5.2.5.1 Best Rate of Climb Speed
The speed to obtain the best climb gradient when the flaps are fully retracted is 68 KIAS. This speed does not vary with altitude.

5.2.5.2 Scheduled Climb

Associated conditions:
Power: Full Throttle
Airspeed: 71 KIAS
Flaps: UP

Rate of Climb (ft/min)								
Weight (kg)	Pressure Altitude (ft)	Outside Air Temperature (degC)						
		-20	-10	0	10	20	30	38
540	0	453	461	680	623	570	520	482
	2000	685	624	566	513	463	416	381
	4000	570	512	459	409	362	318	285
	6000	460	407	357	310	266	225	194
	8000	357	306	259	216	174	136	106
520	0	856	788	724	665	610	559	520
	2000	730	666	607	552	500	452	416
	4000	610	551	496	444	396	351	317
	6000	498	442	390	342	297	255	223
	8000	391	339	290	245	203	163	133
500	0	908	837	772	711	654	601	561
	2000	778	712	651	594	541	491	453
	4000	654	593	536	483	433	386	351
	6000	538	480	427	377	331	287	254
	8000	427	374	324	277	234	192	161
480	0	965	892	824	761	702	646	605
	2000	830	761	698	639	584	533	494
	4000	702	638	579	524	473	425	388
	6000	581	522	467	415	367	322	288
	8000	467	412	360	312	267	224	192
	10000	359	307	259	214	171	131	101
460	0	1026	950	880	814	753	696	653
	2000	886	815	750	689	632	578	538
	4000	753	688	626	569	516	466	429
	6000	628	567	510	457	407	360	325
	8000	510	453	399	350	303	259	226
440	0	1094	1015	941	873	810	750	705
	2000	948	874	806	742	683	628	586
	4000	810	741	678	619	563	512	473
	6000	680	616	557	502	450	402	365
	8000	557	498	442	391	342	297	263

5.2.5.3 Take-Off Configuration Climb

Associated conditions:

Power: Full Throttle

Airspeed: 68 KIAS

Flap: 17°

Rate of Climb (ft/min)								
Weight (kg)	Pressure Altitude (ft)	Outside Air Temperature (degC)						
		-20	-10	0	10	20	30	38
540	0	818	746	679	616	558	503	461
	2000	685	617	554	495	441	389	350
	4000	558	495	436	381	329	281	244
	6000	438	378	323	272	223	178	143
	8000	323	268	216	167	122	79	46
520	0	871	796	727	662	601	545	502
	2000	733	663	598	537	481	428	388
	4000	602	536	476	419	366	316	279
	6000	478	417	360	307	257	210	174
	8000	360	303	249	199	152	108	75
500	0	927	850	778	711	649	590	546
	2000	784	712	645	583	524	469	428
	4000	649	582	519	461	406	354	316
	6000	521	458	399	344	293	245	208
	8000	399	340	285	234	186	140	106
480	0	988	908	834	765	700	640	594
	2000	840	766	696	632	571	515	472
	4000	700	631	566	505	449	396	356
	6000	568	503	442	386	332	283	245
	8000	442	381	325	271	222	175	139
460	0	1055	972	895	823	756	693	646
	2000	901	824	752	685	622	564	519
	4000	756	684	617	554	496	441	399
	6000	619	551	489	430	375	324	285
	8000	489	426	367	312	261	212	175
440	0	1128	1041	961	886	817	752	703
	2000	968	887	813	743	678	617	571
	4000	817	742	672	607	547	490	447
	6000	675	605	540	479	422	369	328
	8000	540	474	413	357	303	253	215

5.2.5.4 Landing Configuration Climb Associated conditions:

Power: Full Throttle

Airspeed: 60 KIAS

Flap: **Land**

Sea Level Gradient of Climb: 6.8% (1:14.6)

5.3 ADDITIONAL INFORMATION

5.3.1 Cruise.

The JABIRU 2200 engine has an altitude compensating carburettor which ensures that the fuel flow is constant at all operating altitudes. This feature has been examined by flight testing, and verified for altitudes between sea level and 5000 ft.

RPM	Fuel Flow (litre/hr)	IAS (knots)
2600	10.7	80
2700	12.1	87
2800	13.0	95
2900	14.3	100
3000	16.1	103
3100	21.0	107
Full Power	25.6	120

NOTE

The JABIRU 2200 engine has an altitude compensating carburettor which provides for a fuel flow that is constant at all operating altitudes. This feature has been examined by flight testing, and verified for altitudes between sea level and 5000 ft. Fuel flow values have not been verified above 5,000 ft therefore pilots will need to monitor fuel flows to ensure accuracy when operating above that altitude.

For flight planning purposes when the flight is above 5,000 ft, pilots should program a fuel burn which is for the next highest rpm range in the table above.

5.3.2 Endurance

Aircraft endurance can be calculated using the information presented in paragraph 5.3.1 “Cruise” above. When calculating endurance, an allowance should be made for engine start, taxi, take-off and climb. IN normal circumstances a total allowance of 5-litres for these would be adequate. This allowance should be subtracted from the actual fuel on board prior to flight. i.e.

Fuel on Board – Allowance = Fuel assumed for endurance calculations.

5.3.3 Balked Landing Climb

Conditions
Power: Full Throttle
Flap: Full Down
Airspeed: 53-KIAS
Weight: 540-kg

	Rate of Climb (ft/min)							
Weight (kg)	Pressure Altitude (ft)	Outside Air Temperature (degC)						
		-20	-10	0	10	20	30	38
540	0	795	723	656	594	536	481	440
	2000	662	595	532	474	419	368	329
	4000	536	473	414	360	308	260	224
	6000	416	357	302	251	203	157	123
	8000	302	247	195	147	101	59	26

5.3.4 Performance Effects of Dirt / Insects

While normal in-service dirt build-up and insect residue does not significantly affect performance, in extreme cases, performance can be reduced. It is therefore recommended that the aircraft is maintained in a clean condition.

When flying with heavy insect contamination or in rain the following factors must be considered:

- Increase landing approach speed by 5 KIAS
- Take-off distances may increase by up to 50-meters
- Climb performance may be reduced by up to 50-ft/min with heavy insect contamination

5.3.5 Demonstrated Crosswind Performance

14 Kts

5.3.6 Noise Data

The aircraft has been approved to operate in Australia under a noise permit issued by Air Services Australia

6. WEIGHT AND BALANCE INFORMATION

6.1 GENERAL

This section provides the current empty/basic weight and describes the procedure for establishing the basic empty weight and moment of the aircraft. Procedures for calculating the weight and moment for various operations are also provided. A list of all equipment available from the manufacturer is included in the equipment list.

Each item of equipment fitted to the aircraft when originally delivered from the factory is indicated in the equipment list. These items are all included in the empty/basic weight of the aircraft as delivered. Any subsequent changes to the equipment fit must be recorded and the empty/basic weight and moment data amended as required by the appropriate regulations applicable in the particular country of registration.

It is the responsibility of the pilot to ensure that the aircraft is loaded correctly.

6.1.1 Aircraft Weighing Procedures

1. Preparation

(a) Drain all fuel from the aircraft using the fuel drain points as required to ensure that **all the fuel** is removed, including that in the sump tank.
(b) Service engine oil as required to obtain a normal full indication.
(c) Raise flaps to the fully retracted position.
(d) Place all control surfaces in a neutral position.
(e) Ensure that any equipment, loose items etc. that are not considered to be part of the aircraft are removed.

2. Jacking and Levelling

NOTE

The following procedure assumes that a conventional aircraft weighing kit utilising individual electronic wheel load pads under each wheel is used to weigh the aircraft. If such a system is not available appropriate variations to the procedures will be required.

(a) Roll or lift the aircraft onto the weighing pads.
(b) Chock the wheels to prevent the aircraft from rolling. DO NOT use the park brake as this can lead to inaccurate readings.
(c) Level the aircraft. Use light packers under wheels to change the aircraft's attitude.

NOTE

The aircraft's longitudinal level datum is the lower rim of the pilot's side door frame.

3. Weighing

With the aircraft level, record the weight shown for each wheel making any adjustments required for zero error or cell calibration.

4. Measuring

With the aircraft still level, drop a plumb bob from the leading edge of the right wing to the ground. Drop a second plumb bob from the right wing. Both plumb lines must be approximately 300mm (1 foot) outboard of the main wheels. Use a string line or chalk line to mark a straight line between the points placed above.

Measure from this line to each of the main wheels and to both sides of the nose wheel. Note that the nose wheel distances are taken as negative for the purposes of calculation.

5. Calculation

Use the weights and the measurement obtained to calculate the Empty Weight and C.G. The sample form given in Figure 6-1 may be used to assist in correctly recording and calculating these weights.

NOTE

Empty weight includes unusable fuel and full oil

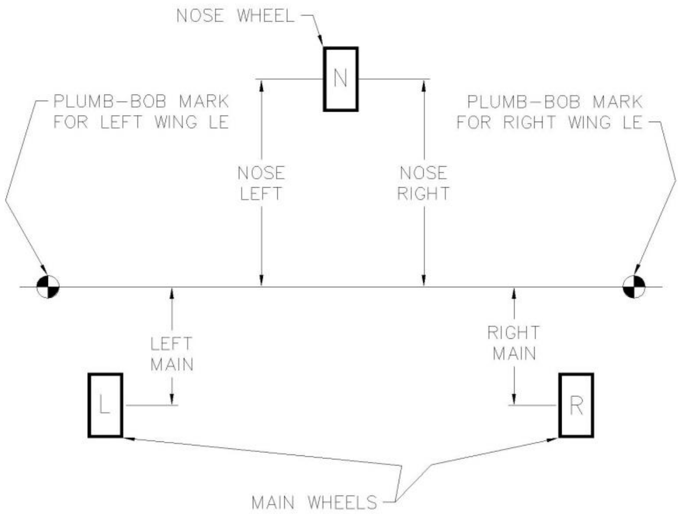


Figure 6.1.1 – Weighing Aircraft

Aircraft Registration:_____________________ **Date:**_______________

MEASURED DATA

Wheel	Distance (mm)	Reading (kg)	Adjustment (±kg)	Nett Load (kg)
Left Main	D_L =			L =
Right Main	D_R =			R =
Nose	D_N = (Average) -			N =
			Sum of Nett Loads	S=

X = CG position = $(L \times D_L + R \times D_R + N \times D_N) \div S$

Remember – Nose wheel distances are negative!

i.e. X = (__ x __ + __ x __ + __ x __) ÷ __

X = _________mm

Item	Weight (kg)	Arm (mm)	Moment (kg.mm)
Aircraft as weighed	S =	X =	
Add unusable fuel	(Header Tank) 4kg	304	1216
Empty Weight			

6.2 AIRCRAFT WEIGHT

6.2.1 Weight and Balance Record

Subsequent to each weighing and the establishment of new Empty and Basic Weight data, the revised data is to be recorded in the "Summary of Empty Weight Changes" section of the airframe log book. Additionally this section of the airframe log book is to be used to calculate and record any subsequent changes to the weight and balance data that may occur as a result of the installation or removal of equipment, or of changes to the aircraft structure.

The "Weight and Balance Record" (Figure 6-2) is to be amended after every change in weight and balance so that a continuous history of the current weight and balance data is available to the pilot. The latest entry will therefore be the current data.

INSERT FIGURE 6.2 FROM WEIGHING SPREADSHEET IN PLACE OF THIS PAGE

INSERT WEIGHT & BALANCE RECORD FROM WEIGHING SPREADSHEET IN PLACE OF THIS PAGE.

6.3 LOADING SYSTEM

The Loading Trim Sheets on the following pages will assist the pilot in ensuring that the J160-D is operated within the prescribed weight and centre of gravity limitations. The chart is a graphic representation of the weight and balance calculations for the aircraft. It performs two functions – the vertical scales on the right hand side of the chart provide a graphical method to calculate the operating weights of the aircraft, while the horizontal scales and the crew index chart at the top of the chart provide a graphical method to calculate the cg positions.

The aircraft is loaded correctly, only if **BOTH** the **zero fuel** and the **takeoff** cases fall inside the boundary line on the graph.

The chart is based on an aircraft "EMPTY WEIGHT TRIM INDEX" which is calculated using the following formula:

$$\text{Empty Weight Trim Index} = \frac{\{(\text{Aircraft Empty Weight}) * (\text{Empty Weight Arm})\}}{1000}$$

Example Trim Index Calculation:		
Aircraft Empty Weight	=	275-kg
Aircraft Empty Weight Arm	=	180-mm aft of datum
Empty Weight Trim Index	=	(275 x 180) / 1000
	=	49.5

6.3.1 Baggage Zones

The cabin has one baggage zone:

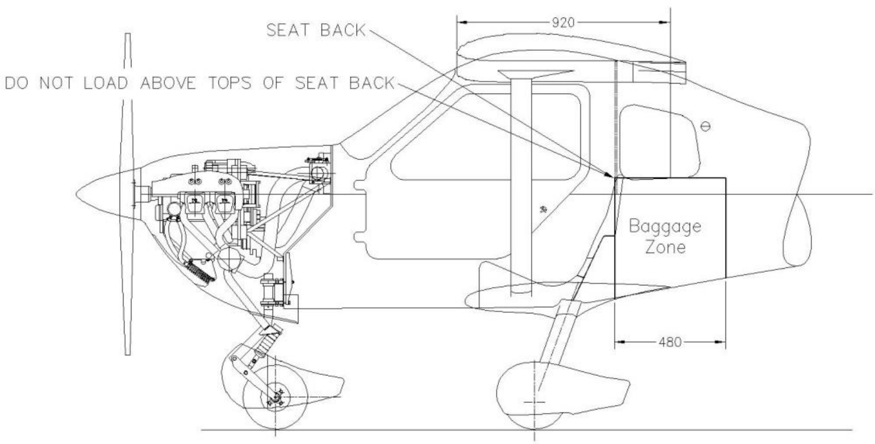


Figure 6.3.1 – Baggage Zones

Baggage is restrained using the straps fitted in the baggage areas.

Trim Sheet

Two trim sheets are provided – one in metric units and the other in imperial units. An example loading has been worked through for reference.

Calculate Aircraft Weights

1-1 Use the Aircraft Empty Weight obtained from the latest aircraft weighing records to enter the vertical "Aircraft Empty Weight Scale" on right hand side of the chart.

1-2 Move horizontally to the left into the next scale which is the "Crew Weight" Scale.

1-3 Move vertically downward one line on this scale for each 10-kg of weight that is placed on the front seats, and mark a point.

1-4 Move horizontally to the left from the point made in Step 1-3 to enter the next scale which is the "Baggage Weight" Scale.

1-5 Move vertically downward one line on this scale for each 5-kg of weight that is placed in Baggage Zone and mark a point.

1-6 Move horizontally to the left from the point made in Step 1-7 to enter the next scale which is the "Fuel Quantity" Scale and mark a point, This point is the "Zero Fuel Weight Reference Point"

1-7 Move Horizontally to the left of the "Zero Fuel Reference Point" and Mark a "Zero Fuel Weight Line" across the "Aircraft Trim Condition" Graph.

1-8 From the "Zero Fuel Point" on the "Fuel Quantity Scale" (marked in Step 1-8), move vertically downward one line for each 10-***litres*** of fuel being carried at the take-off condition. Mark this "Take-Off Fuel Point" on the scale.

1-9 Move horizontally to the left, and mark a "Take-Off Fuel Weight Line" across the "Aircraft Trim Condition" graph.

Calculating the Operating CG Locations

2-1. Take the calculated Empty Weight Trim Index and mark it's position on the Aircraft Index Units Ladder at the top of the sheet.

2-2 Draw a vertical line down from the point marked above to intersect with a sloping line in the "Crew Index Units" scale and mark this point.

2-3 Calculate the weight of the crew and round this value to the nearest 10-kg.

2-4 Move horizontally to the right from the point marked in Step 2-2 one line for each 10-kg of load calculated. (i.e. 60-kg = 6 lines) and mark a point at this location.

2-5 Draw a vertical line down from the point marked above to intersect with a sloping line in the Baggage Area scale and mark this point.

2-6 Calculate the weight that will be placed Baggage Area and round this value to the nearest 5-kg.

2-7 Move horizontally to the right from the point marked in Step 2-5 one line for each 5-kg of load calculated. (i.e. 20-kg = 4 lines) and mark a point at this location.

2-8 Drop a vertical line down from the point marked in Step 2-10 to intersect a sloping line in "Fuel Chart", and mark a point at this location.

2-9 Continue the Vertical Line began in Step 2-11 down to intersect with the "Zero Fuel Weight Line" drawn in Step 1-9. mark this point as the "ZERO FUEL Condition"

2-10 Move horizontally to the right from the point marked in Step 2-11 in the "Take-Off Fuel Box", one line for each 10 liters of take-off fuel, and mark this point.

2-11 Move vertically downward from the take-off fuel point marked in Step 2-13 to intersect with the "Take-Off Fuel Weight Line" marked in Step 1-9. Mark this point the "Take-Off Condition"

6.3.2 Allowable Loading Conditions

An allowable loading condition exists when both the "Zero Fuel Condition", and the "Take-Off Condition" fall with the area bounded by the Line in the Aircraft Trim Conditions Box.

For reference, the example below shows two 90kg people, 5kg in Baggage Zone and 60L of fuel. The aircraft's starting Index Unit is 49.5 at 275kg.

6.3.1 Operation Equipment List

Table 2.11.2 summarises the equipment required for airworthiness under the listed type of operation. Refer to relevant local operating rule requirements for additional equipment that may be necessary operationally.

Additional equipment may be fitted to the aircraft but which is not essential for flight.

System Instruments and/or Equipment	VFR Day	Remarks
Communications		
VHF Comm	A/R	As required per local operating regulations
Electrical Power		
Alternator Battery Voltage Indicator	1 1 1	
Equipment & Furnishings		
Pilot seat and harness	2	Pilot seats are integral to the main structure
Fire Protection		
Portable Fire Extinguisher	A/R	As required per local operating regulations
Flight Controls		
Pitch Trim Indicator Pitch Trim System Flap System Stall Warning System	1 1 1 1	
Fuel		

System Instruments and/or Equipment	VFR Day	Remarks
Fuel Quantity Indicator	2	
Fuel On/Off Valve	1	
Ice & Rain Protection		
Engine Alternate Air Induction System	1	
Navigation & Pitot Static		
Altimeter	1	
Airspeed Indicator	1	
Magnetic Compass	1	
Time Piece	1	May be carried on the pilot
Turn Co-ordinator	A/R	As required per local operating regulations
Pitot/Static System	1	
Transponder	A/R	As required per local operating regulations
Engine Indicating		
Cylinder Head Temperature	1	
Tachometer	1	
Oil Pressure	1	
Oil Temperature	1	
Fuel Pressure	1	
Oil Quantity (Dip Stick)	1	
Caution Warning System	1	Fuel, electrical, and vacuum systems
Approved Flight Manual	1	

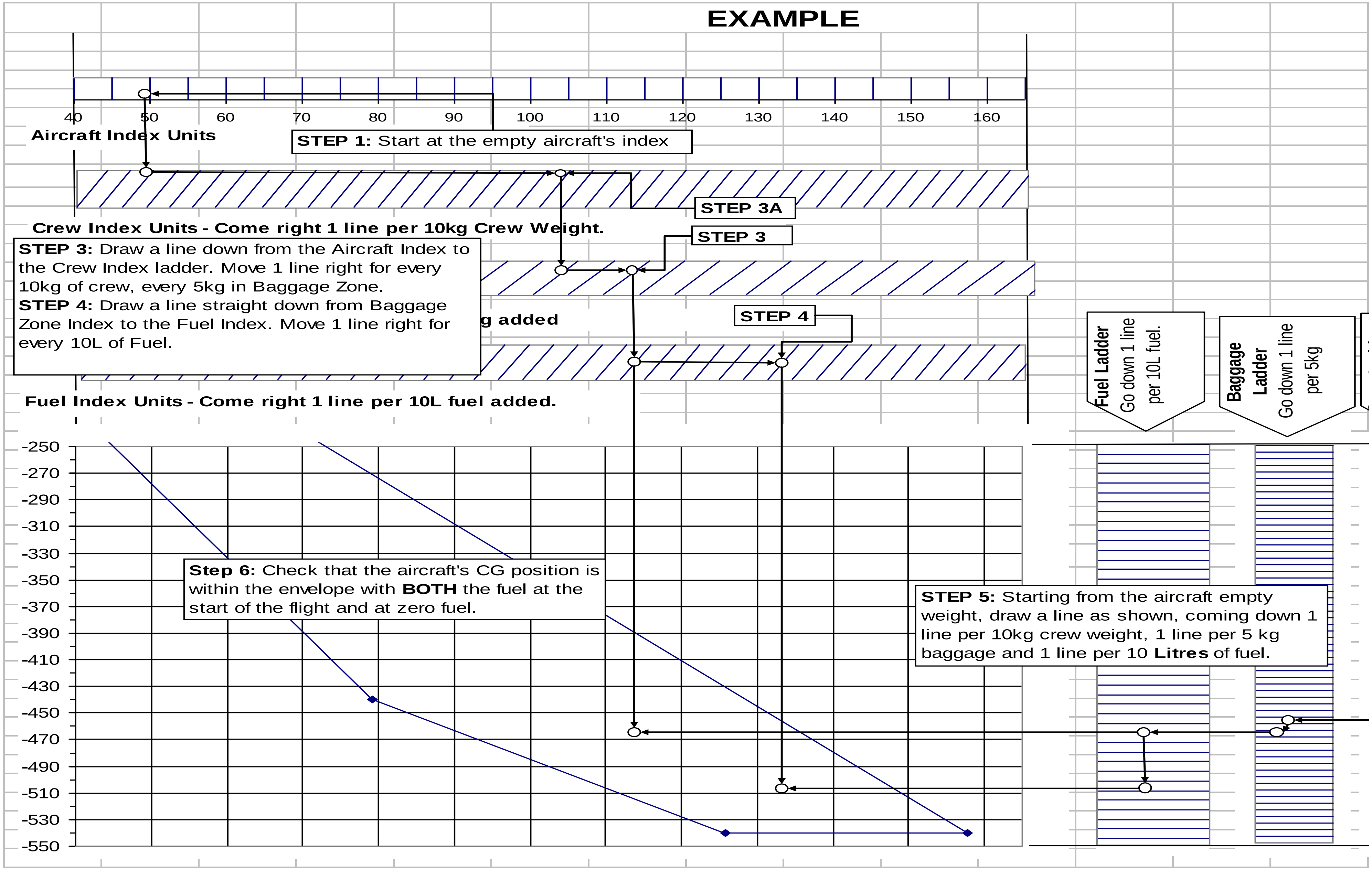


Figure 6-3a – Loading Trim Sheet Example (Metric Units)

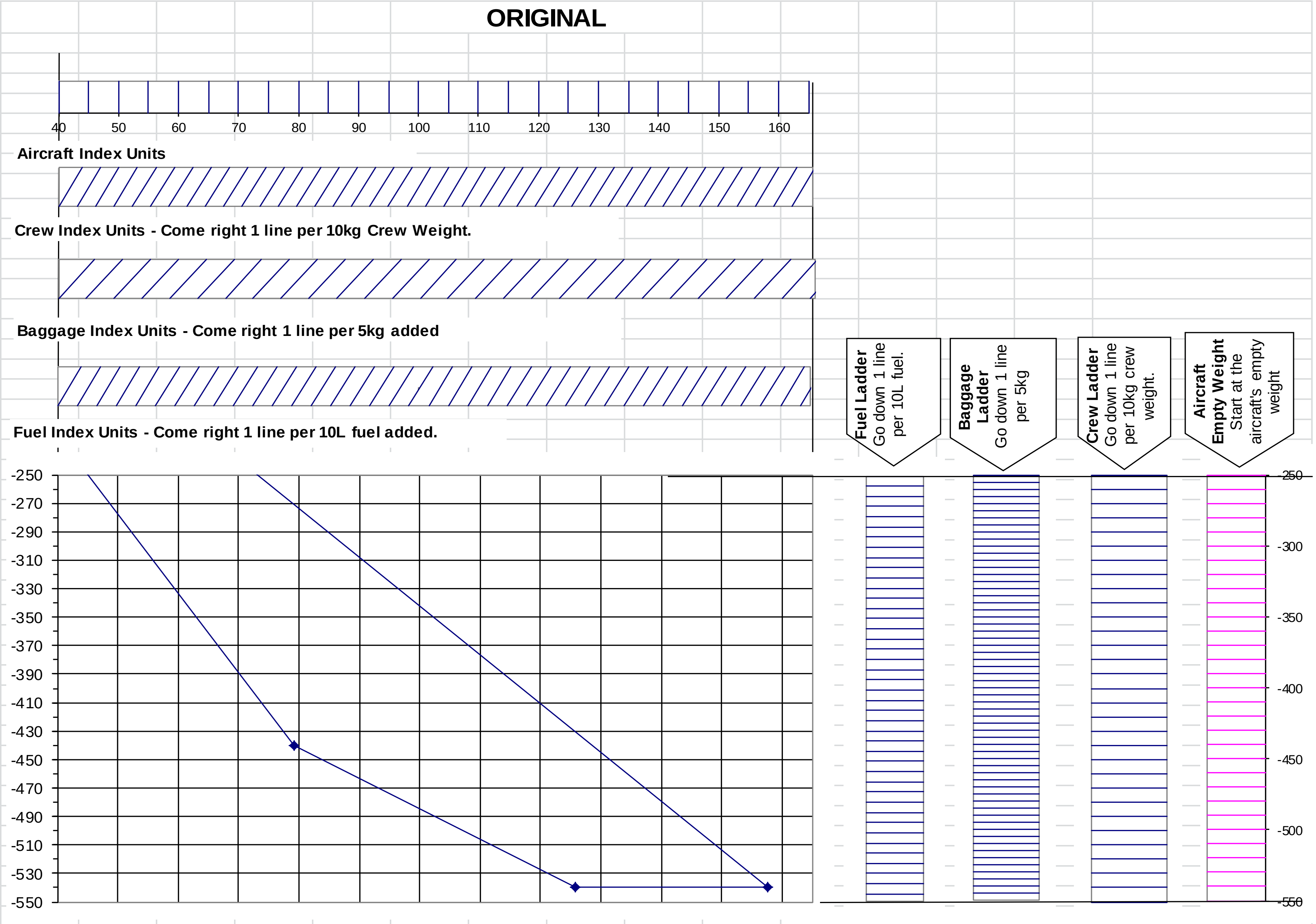


Figure 6.3b – Blank Trim Sheet – Metric Units

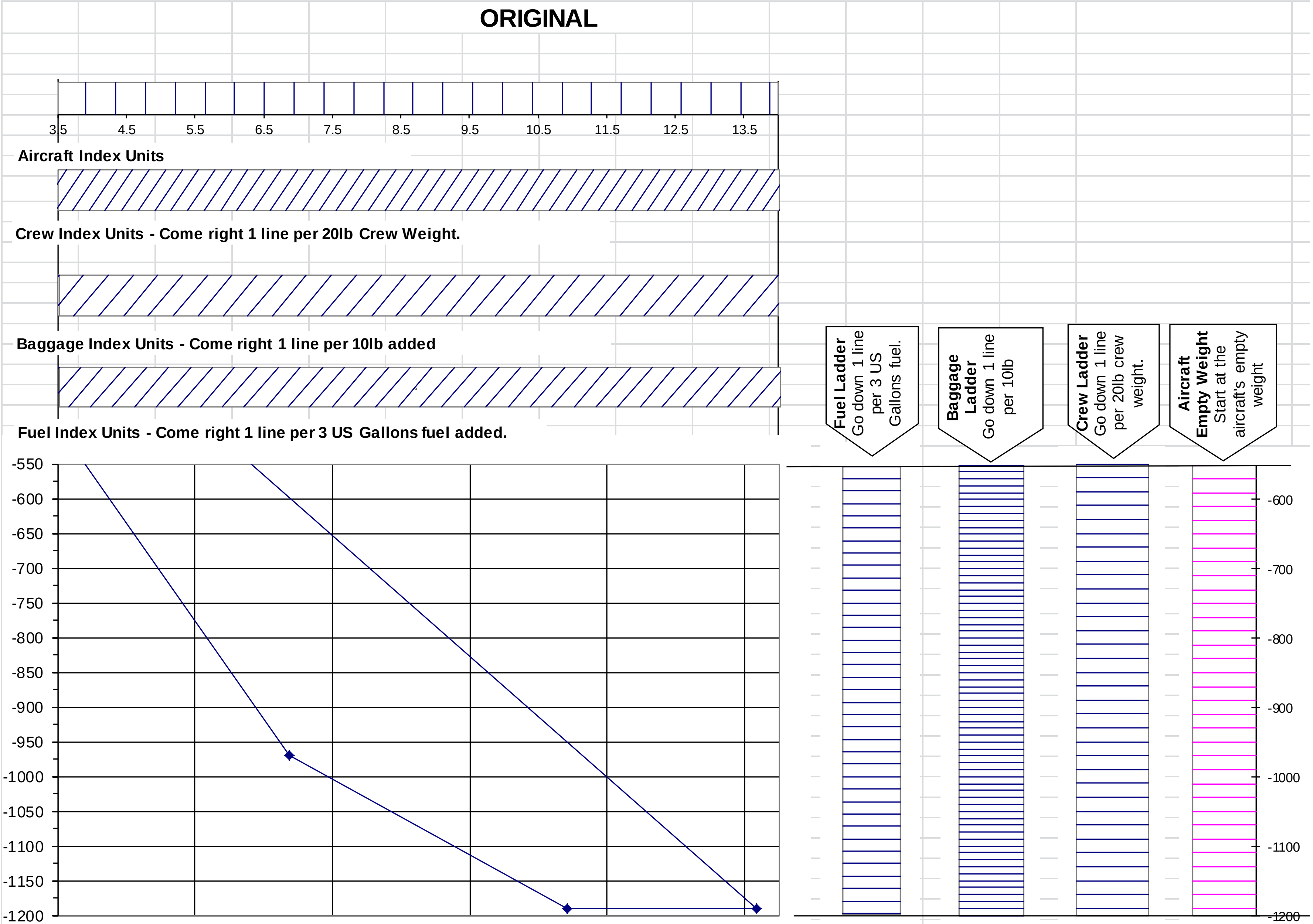


Figure 6.3c – Blank Trim Sheet – Imperial Units

6.3.2 Baggage Area

The restraint of freight in the cabin baggage shelf area is achieved through the use of baggage straps.

6.4 CENTRE OF GRAVITY LIMITS

Forward Limit:	180-mm (7.09", 18.2%MAC) aft of datum up to & including 440 kg (970lb) 233-mm (9.17", 23.5%MAC) aft of datum at 540kg (1190lb) Linear variation between points.
Aft Limit	292-mm (11.50", 29.5%) aft of datum at all weights
Datum	Wing Leading Edge
Leveling Means	
Longitudinal	Spirit Level placed on the trim control lever decal.
Lateral	Spirit Level placed across the upper engine mount attachment bolts.
Arms	
Arm for Front Seat Station	297-mm aft of datum
Arm for Baggage Zone	920-mm aft of datum
Header Tank Fuel Station	840-mm aft of datum
Wing Fuel Station	451-mm aft of datum

Table 6.4 – Centre of Gravity Limits

6.5 EQUIPMENT LIST

The following equipment list provides details of equipment that is fitted as standard in the J160-D aircraft, or is available from the manufacturer as an option. A separate list of all equipment fitted in each particular J160 is provided in the aircraft log book.

The columns in the equipment list contain the following information:

1. Opt.Code An **O** indicates that the item of equipment is available as an optional fitment from the manufacturer.

2. Description Description of the item of equipment and the relevant manufacturer's or Jabiru Aircraft part number.

3. Weight Weight of the item of equipment in kilograms (and pounds).

4. Arm Arm of the item of equipment in millimetres (and inches).

Unless otherwise indicated, the installation certification basis for the equipment included in this list is the aircraft's approved type design. Equipment fitted in the field after delivery must be fitted in accordance with approved data. This can be approved data obtained from the manufacturer, or data approved locally in accordance with appropriate regulations.

Opt. Code	Description	Weight kg (lb)	Arm mm (in)
	Firewall Fwd		
	Engine: Jabiru 2200. Includes starter, alternator, carburettor, muffler, spark plugs, prop flange extension and oil filter assembly	61kg (135lb)	-1085mm (-42.72in)
	Oil Cooler (empty): P/No. PH4A015N	0.5kg (1.1lb)	-1050mm (-41.34in)
	Propeller: P/No. C000242-60D42P	1.7kg (3.7lb)	-1420mm (-55.91in)
	Spinner Assembly: 4A189A0D	0.6kg (1.3lb)	-1467mm (-57.76in)
	Instruments		
	Electronic Turn Co-ordinator	1.0kg (2.2lb)	-266mm (-10.47in)
	Airspeed Indicator	0.5kg (1.1lb)	-266mm (-10.47in)
	Altimeter	0.8kg (1.8lb)	-266mm (-10.47in)

Opt. Code	Description	Weight kg (lb)	Arm mm (in)
	Vertical Speed Indicator	0.6kg (1.3lb)	-266mm (-10.47in)
O	EFIS: Dynon EFIS-D10A	0.7kg (1.5lb)	-266mm (-10.47in)
	LED Fuel Gauge (where equipped)	0.1kg (0.2lb)	-266mm (-10.47in)
O	Header tank low level warning light	0.1kg (0.2lb)	-266mm (-10.47in)
	Fuel Pressure Indicator (UMA 1-1¼")	0.1kg (0.2lb)	-266mm (-10.47in)
	Oil Pressure Gauge	0.2kg (0.4lb)	-266mm (-10.47in)
	Oil Temperature Gauge	0.2kg (0.4lb)	-266mm (-10.47in)
	Tachometer	0.4kg (0.9lb)	-266mm (-10.47in)
	Cylinder Head Temperature	0.2kg (0.4lb)	-266mm (-10.47in)
O	Exhaust Gas Temperature	0.2kg (0.4lb)	-266mm (-10.47in)
O	Outside Air Temperature	0.1kg (0.2lb)	-216mm (-8.50in)
	Electrical Equipment		
	Battery (Odyssey PC625)	6.7kg (14.8lb)	-675mm (-26.57in)
	Intercom	0.4kg (0.9lb)	-266mm (-10.47in)
	VHF COMM #1:	0.5kg (1.1lb)	-266mm (-10.47in)
O	VHF COMM #2:	0.5kg (1.1lb)	-266mm (-10.47in)
O	Transponder	0.7kg (1.5lb)	-266mm (-10.47in)
	Headsets	0.6kg (1.3lb)	304mm (11.97in)
O	Ameri-King Altitude Encoder (AK-350)	0.8kg (1.8lb)	-500mm (-19.69in)
	Miscellaneous		
	Baggage Restraint Straps (Each)	0.1kg (0.2lb)	804mm (31.65in)
	Seat Covers Cloth:	1.0kg (2.2lb)	304mm (11.97in)

Opt. Code	Description	Weight kg (lb)	Arm mm (in)
O	Seat Covers Sheepskin	1.5kg (3.3lb)	304mm (11.97in)
O	Tool Kit	1.5kg (3.3lb)	804mm (31.65in)
	Flight Manual	0.4kg (0.9lb)	-210mm (-8.27in)
	Compass	0.4kg (0.9lb))	-266mm (-10.47in)
	Door Pockets	0.1kg (0.2lb)	-210mm (-8.27in)
	Additions/Deletions		

7. DESCRIPTION OF AIRPLANE AND SYSTEMS

7.1 INTRODUCTION

This section provides descriptions of the aircraft and it's systems as well as methods of operation where appropriate. Optional equipment that may be installed is described in Section 9.

7.2 THREE-VIEW DRAWING

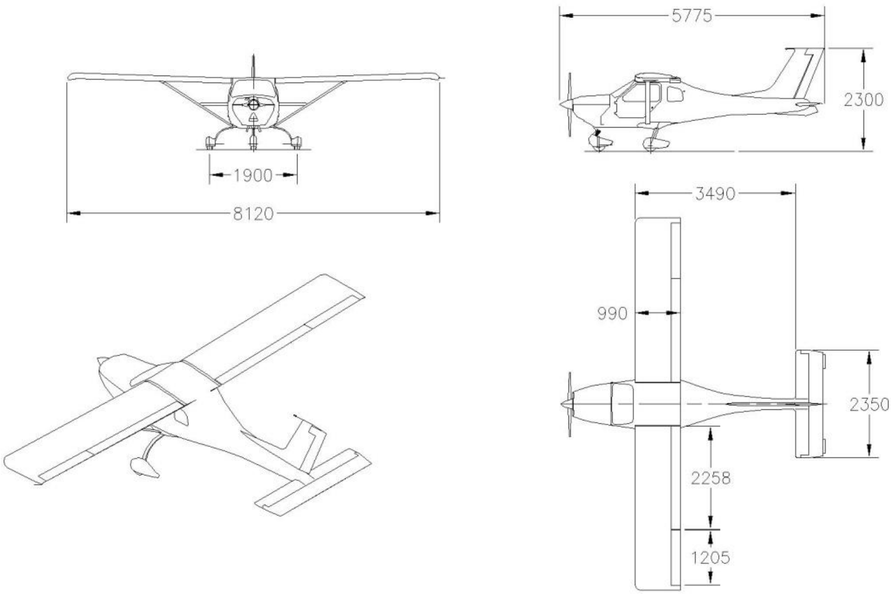


Figure 7-1 Three View of the J160

Note: ***All dimensions in millimetres***

7.3 AIRFRAME

The J160 is a two place, single engine, high wing monoplane GRP construction. The aircraft is designed for pilot training and recreational type operations.

WINGS: The wings are of GRP skin construction, and are externally braced with a streamline section strut that bolts to the lower fuselage members and wing spar fittings. The main fuel tanks are incorporated in the inboard section of the wings between the spar and the rear of the wing. The ailerons are controlled via push-pull Teleflex cables. The wing flaps are powered by an electric motor driving through a mechanical linkage.

FUSELAGE: The fuselage is of GRP construction. The fixed horizontal and vertical tail surfaces are bonded to the structure.

EMPENNAGE: The empennage consists of the fin, rudder, horizontal stabiliser, and elevators. All are constructed of GRP.

7.4 FLIGHT CONTROLS

The aircraft's flight control system consists of conventional aileron, rudder and elevator control surfaces. These are manually operated by push-pull Teleflex cables. The control column is a centrally mounted stick, with separate handgrip for each pilot. The control column actuates the ailerons and elevators in the conventional manner while the rudder pedals operate the rudder.

The aileron and elevator controls may be locked by securing the control column with the pilot's seat belt when the aircraft is parked on the ground. This will prevent damage to these systems by wind buffeting.

7.4.1 Trim System

The elevator trim control is controlled via levers mounted on either side of the cockpit centre console. The system consists of a cable operated system which uses springs connected to a friction lock to control the elevator control force. Selection of nose up trim pivots the trailing edge of the elevator upwards.

7.5 INSTRUMENT PANEL

Although the instrument panel spans the width of the cockpit, flight instruments are on the left hand side in front of the pilot. Radio and transponders are located in the upper panel close to the centre of the aircraft – offset slightly towards the pilot. The engine tachometer is located centrally on the lower section of the panel, while the other engine instruments are placed in a vertical row slightly to the right of the centre of the panel. Where electric fuel gauges are fitted they are located centrally – below the radios. The right side of the panel is left empty to allow owner’s to fit their choice of GPS system or other instrumentation.

A push-pull throttle knob is located at either side of the panel. Pushing the knob forwards increases engine power.

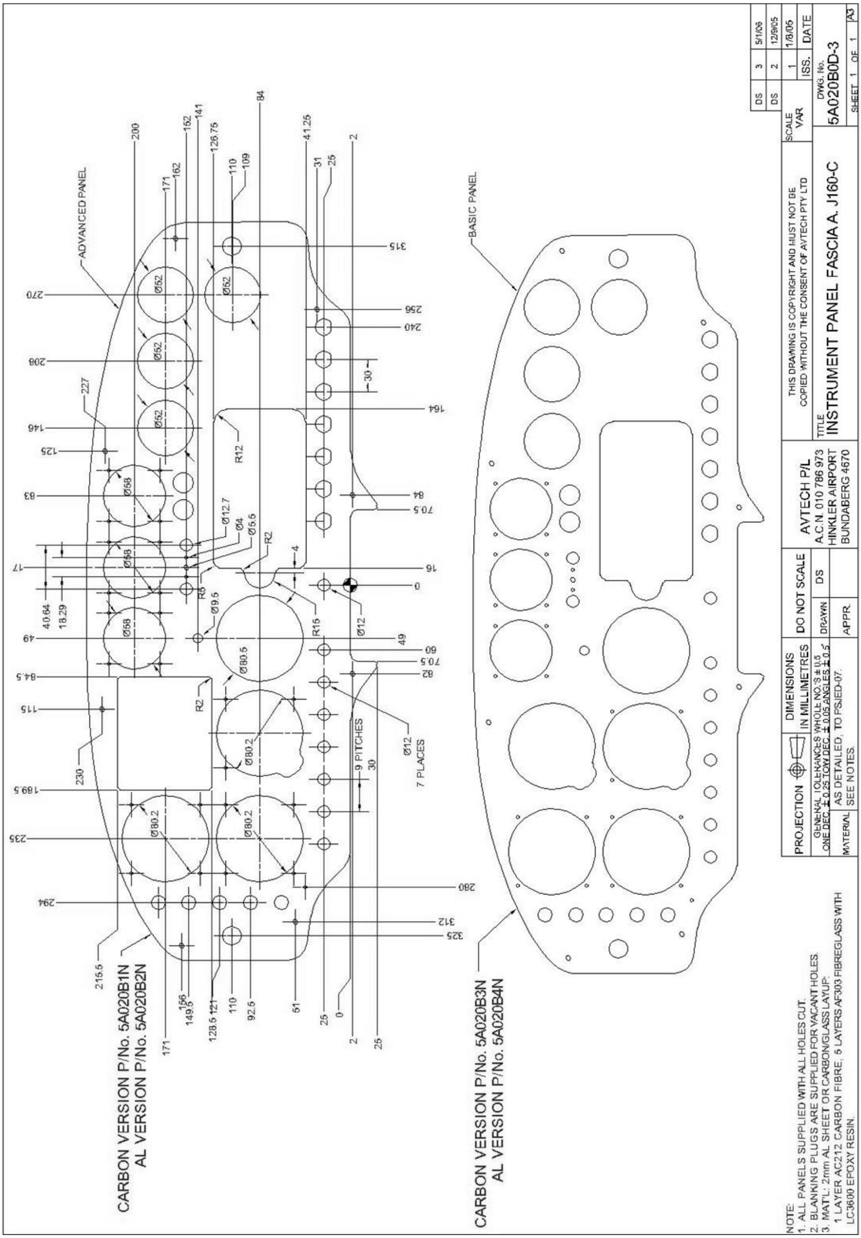


Figure 7.4 – Instrument Panel Layouts

7.6 GROUND CONTROL

The J160-D is fitted with mechanical linkage from the rudder pedals to the nose wheel. This gives ground steering control. The minimum turning radius is approximately 5m (or approximately 1m outboard of the wingtip). When shut down, the aircraft is easily manoeuvred on level ground by one person without the aid of special ground handling equipment.

7.7 WING FLAP SYSTEM

The wing flaps are of the single slotted type with three indicated positions; Up, Take-Off and Land. The position of the flaps is controlled manually by the pilot – a position indicator is fitted on the pilot's side "A" pillar (between the windscreen and the front of the door opening). The selected position can be easily confirmed by visual observation of the flaps.

The flap system is electrically actuated. The flaps are extended by mechanical force provided by the flap motor operating on a torque tube and push rod mechanism. The flap structure is of GRP material and has been designed to withstand all air loads within the approved operating envelope.

7.8 UNDERCARRIAGE SYSTEM

The main undercarriage is of GRP. Jabiru wheel and brake assemblies are fitted, using 500 x 6 6-ply tyres. The nose wheel undercarriage is a rubber compression spring – steering is via pushrods direct from the rudder pedals. The nose wheel is a Jabiru assembly with 500 x 6 6-ply tyre. Refer to Section 0 for the recommended tyre pressures.

7.9 SEATS

Seats in the J160-D are an integral part of the moulded structure. The seat base contains foam which is designed to crush in the event of an accident, absorbing energy from large vertical decelerations.

7.10 OCCUPANT RESTRAINT HARNESSES

Both front seats are fitted with three point restraint harness.

7.11 BAGGAGE SHELF

The baggage storage shelf is located behind the seats. This shelf is fabricated from composite materials and also forms part of the fuel system header tank enclosure. Tie down points are provided on the sides of this shelf onto which baggage restraint straps can be attached. As the seat backs provide a barrier against forward movement of the baggage, items which are narrower than the full width of the shelf should be located centrally behind a seat back.

7.12 ENTRANCE DOORS

A forward opening cockpit door is fitted to each side of the aircraft. The door latch is a simple locking pin operated by a handle on both the inside and out. These doors also act as emergency exits.

Opening of the doors in flight is approved in an emergency such as for smoke or fume evacuation.

7.13 ENGINE

The aircraft is fitted with a Jabiru 2200 horizontally opposed, four cylinder, overhead valve, air cooled, normally aspirated with an air cooled wet sump oil system. Fuel/air metering is through an altitude compensating carburettor. The engine is rated for continuous operation at 80 BHP @ 3300 RPM.

7.13.1 Powerplant Instrument Markings

Instrument	Red Line Minimum Limit	Green Arc Normal Operating	Red Arc/Line Maximum Limit	Yellow Arc Precautionary Range
Tachometer	-	-	3300 RPM	-
Cylinder Head Temperature	-	Up to 180°C (356°F)	200°C (392°F)	180°C - 200°C (356° - 392°F)
Oil Pressure	80 kPa (11 psi)	220 - 525 kPa (31 – 76 psi)	525 kPa (76 psi)	80 - 220 kPa (11- 31psi)
Oil Temperature	15°C (59°F)	80 - 100°C (176° - 212°F)	118°C (244°F)	100°C - 118°C (212 °- 244°F)
Fuel Pressure	5 kPa (0.75psi)	5 – 20 kPa (0.75 – 3 psi)	20 kPa 3 psi	-
Voltage	-	10.5 – 15 Volts	-	-

7.13.2 EFIS & EMS LIMITATIONS DISPLAY

Where aircraft are equipped with EFIS or EMS displays, they are programmed to display limitations

7.13.3 Engine Controls

Throttle

Engine power is controlled by a throttle located on the left and right sides of the instrument panel. It is readily identified by smooth black cylindrical knobs. The throttle operates in the conventional sense in that when fully forward the throttle is full open, and in the fully aft position, the throttle is closed.

Choke

The choke is a push-pull control located in the centre of the lower section of the instrument panel and is only used for engine starting. It is fitted with a black knob. The choke ON position is full back, and full forward is choke OFF, or normal.

Carburettor Heat

The carburettor heat control is a push-pull control located in the centre of the lower section of the instrument panel. With the control pushed fully forward (in), cold filtered air is selected. Fully aft (heat ON) selects heated filtered air from a muff around the exhaust pipes. The knob is a rectangular shape.

7.13.4 Engine Instruments

Engine operation is monitored by a tachometer, oil pressure and oil temperature, fuel pressure and cylinder head temperature gauges. These instruments are located in the instrument panel in front of the pilot and are marked with green arcs to indicate the normal operating range, yellow arcs to indicate precautionary ranges and red lines at the maximum/minimum allowable limits. These limits and gauge markings are also given in 7.13.1 of this manual.

7.13.5 Engine Oil System

Oil for engine lubrication is supplied from a sump at the bottom of the engine. The oil capacity of the engine is 2.3 litres (2.02 US quarts). Oil is drawn from the sump through an oil suction strainer screen into the engine driven oil pump. An adaptor on the engine underneath the oil filter directs oil through the oil cooler. On returning to the engine, the oil passes through the full flow replaceable element oil filter. The filtered oil then enters a pressure relief valve that regulates the engine oil pressure by allowing excessive oil to return to the sump, while the remaining oil under pressure is circulated to the various engine components for lubrication. Residual oil returns to the sump by gravity flow.

An oil filler cap/dipstick is located on the top of the engine and is accessible through an access door in the engine cowling. The dipstick is marked to show upper and lower oil level limits. To minimise possible loss of oil through the breather, filling the sump to the low mark on the dipstick instead of the high is sufficient for routine operations. The upper dipstick mark should be used for flights of 3 hours endurance or longer. For engine oil grade and specifications, refer to Section 8 of this manual. An oil pressure indicator is provided on the instrument panel.

WARNING

The oil level must be visible on the dip stick. Do not run the engine if the sump oil level is below the bottom of the dipstick.

7.13.6 New Engine Break-in and Operation

The engine has undergone a run-in at the factory and is ready for normal operation. It is however suggested that a minimum of 65% and preferably 75% power be used for cruising until a total of 50 hours has accumulated or until the oil consumption has stabilised. This will assist with proper seating of the rings and minimise the possibility of cylinder wall glazing. This procedure also applies following cylinder replacement or top overhaul of one or more cylinders.

CAUTION

Straight mineral oil should be used during the break-in period. Refer to Section 8 of this manual for specifications.

7.13.7 Ignition System

Engine ignition is provided by two engine driven transistorised magneto coils, each running a single spark plug in each cylinder. Normal operation is conducted with both magnetos on due to the more complete burning of the fuel-air mixture with dual ignition sources. The individual magnetos are selected using the two ON – OFF toggle switches located on the left hand side of the instrument panel.

7.13.8 Starting System

The electrically driven starter motor is mounted at the rear of the engine. When energised, the starter motor pinion engages a ring gear that is fitted to the flywheel. When the master switch is on, pushing the start button energises the starter motor.

If the engine turns at less than 300rpm no spark will be generated and it will not fire. The engine requires choke to start when cold. When hot it does not require choke and may be started with the throttle just cracked open. Experience with the individual engine will enable the pilot to make the correct judgment on this. Weak intermittent firing followed by puffs of black smoke from the exhausts usually indicates excess choke or flooding. If the engine is flooded, leave it to stand for approximately 10 minutes before attempting re-start.

7.13.9 Air Induction System

The engine induction air normally enters through a NACA duct on the left side of the lower engine cowl. The air is then directed to a filter box where dust and other contaminants are removed by a replaceable paper filter element. On the inlet side of the filter box there is a flapper valve which allows the pilot to select normal cold induction air or hot induction air. The hot air is drawn through the muff fitted to the muffler.

7.13.10 Exhaust System

Each cylinder feeds directly to the muffler via an extractor pipe. The extractors fit to the head using a metal-metal gasket-less connection which also allows a degree of freedom to the extractor position. A muff is fitted to the muffler to supply hot air for the carburettor heat system. A separate hot air muff is fitted to the tail pipe to provide air for the cabin heat. The exhaust tailpipe exits out through the lower left side of the engine cowl.

Fuel Supply System

The aircraft has a fuel tank in the inboard section of each wing, and a small header tank which is located in a sealed compartment underneath the baggage shelf. The wing tanks gravity feed into the header tank and there is no provision for the pilot to select and/or isolate a particular wing tank. A single shut off vale is provided to stop all fuel flow to the engine. Figure 7.13 is a schematic diagram of the fuel system.

The engine is equipped with a Bing altitude compensating carburettor. There is no mixture control adjustment available to the pilot. A choke is provided for engine starting purposes only.

7.13.11 Cooling System

Ram air for engine cooling enters through two intakes at the front of the engine cowl. The cooling air is directed around the cylinders and other areas of the engine by appropriate baffles and is then exhausted through an opening in the rear of the lower cowl. Air for oil system cooling enters the lower intake chamber and flows through an oil cooler mounted below the sump. The air then exhausts out the lower cowl opening with the engine cooling air.

7.14 PROPELLER

7.14.1 Jabiru Fixed Pitch Wooden Propeller

Manufacturer:	Jabiru Aircraft Pty Ltd
Model:	C000262-D60P42
Type:	Wooden, Fixed Pitch
Number of blades:	2
Diameter:	1524 mm (60 in)
Pitch	1067 mm (42 in)
Max RPM:	3300

7.14.2 Jabiru Fixed pitch Composite Scimitar Propeller

Manufacturer:	Jabiru Aircraft Pty Ltd
Model:	4A482U0D
Type:	Composite, Fixed Pitch
Number of blades:	2
Diameter:	1524 mm (60 in)
Pitch (typical)	965 mm (38 in)
Max RPM:	3300

7.15 FUEL SYSTEM

The J160-D fuel system consists of an integral fuel tank in each wing, a sump fuel tank below the baggage shelf and associated plumbing. Fuel gravity feeds from the front and rear inboard corner of each tank. The two delivery pipes from each side join together in the fuselage wall below the wing. The resulting single delivery lines from each side continue down, to the area below the passenger's side of the baggage shelf to the header tank. From the sump tank fuel flows through an electric boost pump then forward through the filter and shutoff valve to the engine driven mechanical fuel pump and carburettor. All wing and sump tank outlets have finger filters. The three fuel tanks are fitted with fuel drains.

The wing tanks are fitted with vented caps located at the outboard end of the tank. The vent for each cap is directional and provides a pressure head to the tanks. Breathers for the wing tanks, which pick up from the outboard end of the tank are connected with lines that run between the tanks. The header tank breather is connected into this breather line. This system ensures that the air space pressure in each tank is the same, preventing uneven fuel feed rates.

The J160-D may use either two fuel sight gauges (one in each wing root) or two electric fuel gauges on the instrument panel to show fluid levels in each wing tank. The sump tank does not have a fuel gauge as its contents are deemed to be unusable and should not to be considered for flight planning. As an option, a low level warning light may be installed in the header tank.

Refer to Figure 7.13 for a schematic drawing of the system.

NOTE

As ground and flight attitudes are essentially the same the fuel gauge indications are valid in either case.

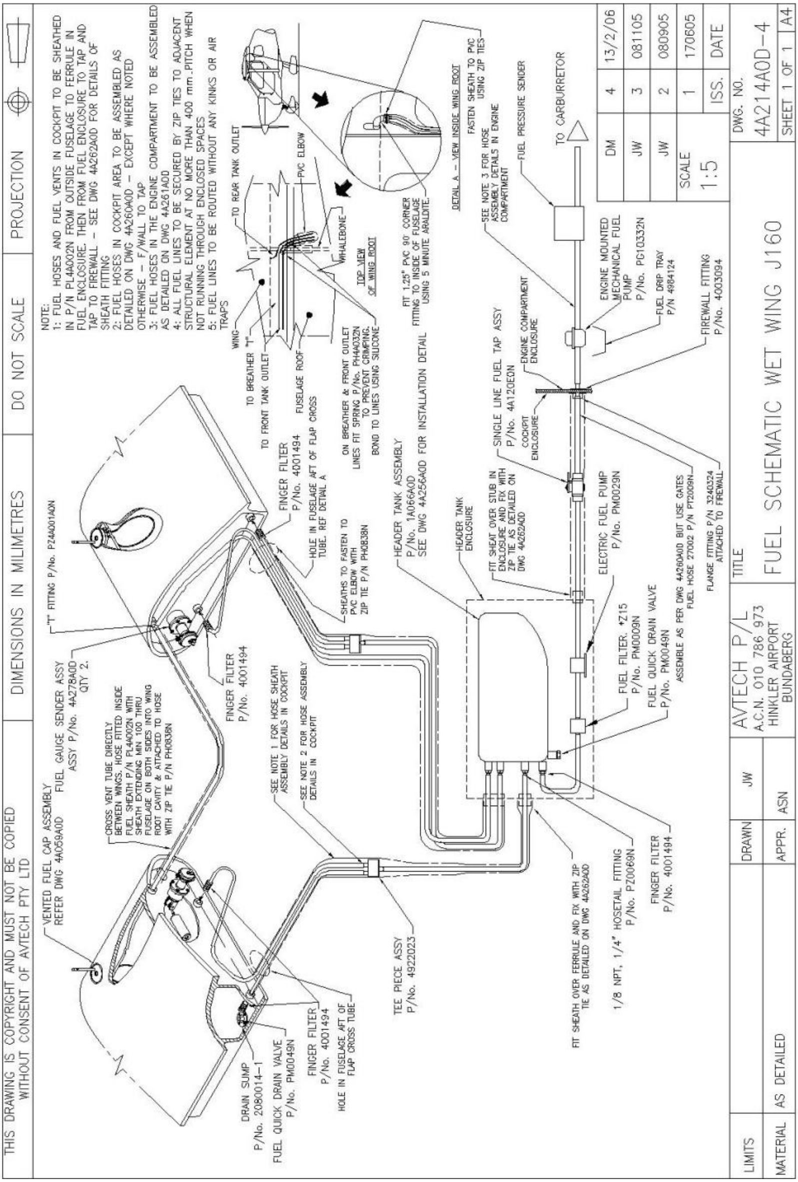


Figure 7.13 – Fuel System Schematic

7.16 Fuel Ethanol Content

Jabiru Aircraft allow fuels with an Ethanol content of up to 10% to be used in the J160-D. While Ethanol boosts the fuel's octane rating and is becoming increasingly common in automotive fuels there are important issues caused by its use. The following points are given as a basic introduction to using Ethanol. Note that while this information was current at the time of writing.

- Use of a fuel with an Ethanol content higher than 10% **IS NOT PERMITTED** in the J160-D.
- Ethanol is hygroscopic (i.e. it will absorb water). This can be water vapour from the air, condensation inside tanks or free water. While very small amounts of water can be absorbed without significantly affecting the fuel's combustion, at higher levels the mixture will not be combustible. In addition, because this incombustible fuel is formed from a mixture of the Ethanol in the fuel and the water it can have a large volume – so a small amount of water will result in a much larger amount of incombustible Ethanol/water mix. This may give false readings in the fuel tank sumps or exceed the volume of the sump altogether.
- Ethanol mixed with water is somewhat corrosive and may attack fittings etc of the fuel system.
- In long-term storage, Ethanol may oxidise with exposure to air. This process produces a mild acid solution (vinegar) which can attack fuel system fittings.
- Long term exposure to Ethanol damages some types of plastics. The aircraft's Technical Manual details replacement times for fuel lines which are designed with Ethanol fuel blends in mind, however increased monitoring of fuel lines is recommended in an aircraft using Ethanol blends.
- Some fuel testers (including the type supplied by Jabiru Aircraft at the time of writing) have a scale on their side which allows the Ethanol content of a fuel to be checked & assessed.

Several CASA documents discuss Ethanol, and Jabiru Aircraft strongly recommend that owners considering using an Ethanol fuel blend read and understand this information before using a fuel of this type. The following CASA document is current at the time of writing:

- Airworthiness Bulletin AWB 2828-003003

7.17 BRAKE SYSTEM

The aircraft has a single disc, hydraulically actuated brake on each main undercarriage wheel. Each brake is connected by a hydraulic line to a master cylinder fitted to the front of the centre console in the cabin. The wheel brakes operate simultaneously. When the aircraft is parked, the parking brake is set by pulling the brakes on and engaging the park brake cam fitted to the lever. To release the park brake, pull the brake lever back and release the cam.

CAUTION

Check park brake is OFF prior to landing.

7.18 ELECTRICAL SYSTEM

The J160-D has a 12 volt electrical system consisting of a 12 volt battery, starter motor, regulator, alternator with a nominal 14 volt output, electric flap, electric fuel boost pump, circuit breakers, oil temperature gauge, optional strobe lights, switches and related wiring. The electrical system is constructed as a dual bus system. An instrument bus, powered from the main bus, powers the instruments and radios. The master bus powers all other electrical systems in addition to the instrument bus.

The master switch (mounted on the lower left hand side of the instrument panel) controls power to the main bus. Another switch controls the connection between the main bus and the instrument bus. The Master bus connects with the battery. The feed from the alternator goes to the battery, which acts as a filter, reducing noise in the bus system. All other switches are located along the lower left side of the panel. The circuit breakers are fitted along the lower right side of the instrument panel.

A warning light connected to the regulator illuminates to provide an indication should the alternator cease charging. The regulator delivers a regulated nominal 14 volts to the aircraft battery. Refer to Figure 7.15 and 7.16b for a simplified schematic of the electrical system.

NOTE

The master switches are not switch breakers and their circuits are protected by circuit breakers found in the lower right side of the instrument panel.

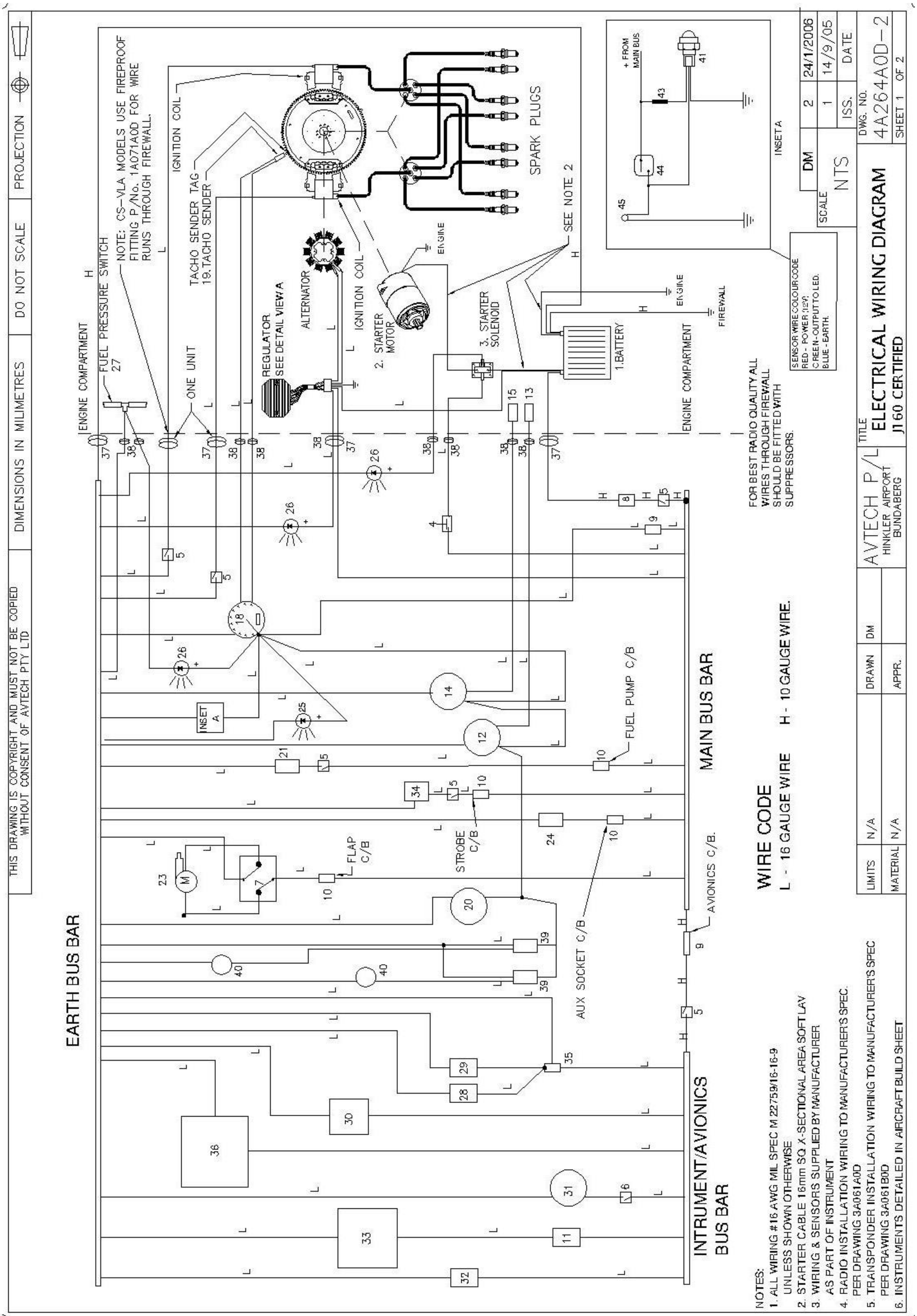


Figure 7.15 – Electrical System Sheet 1.

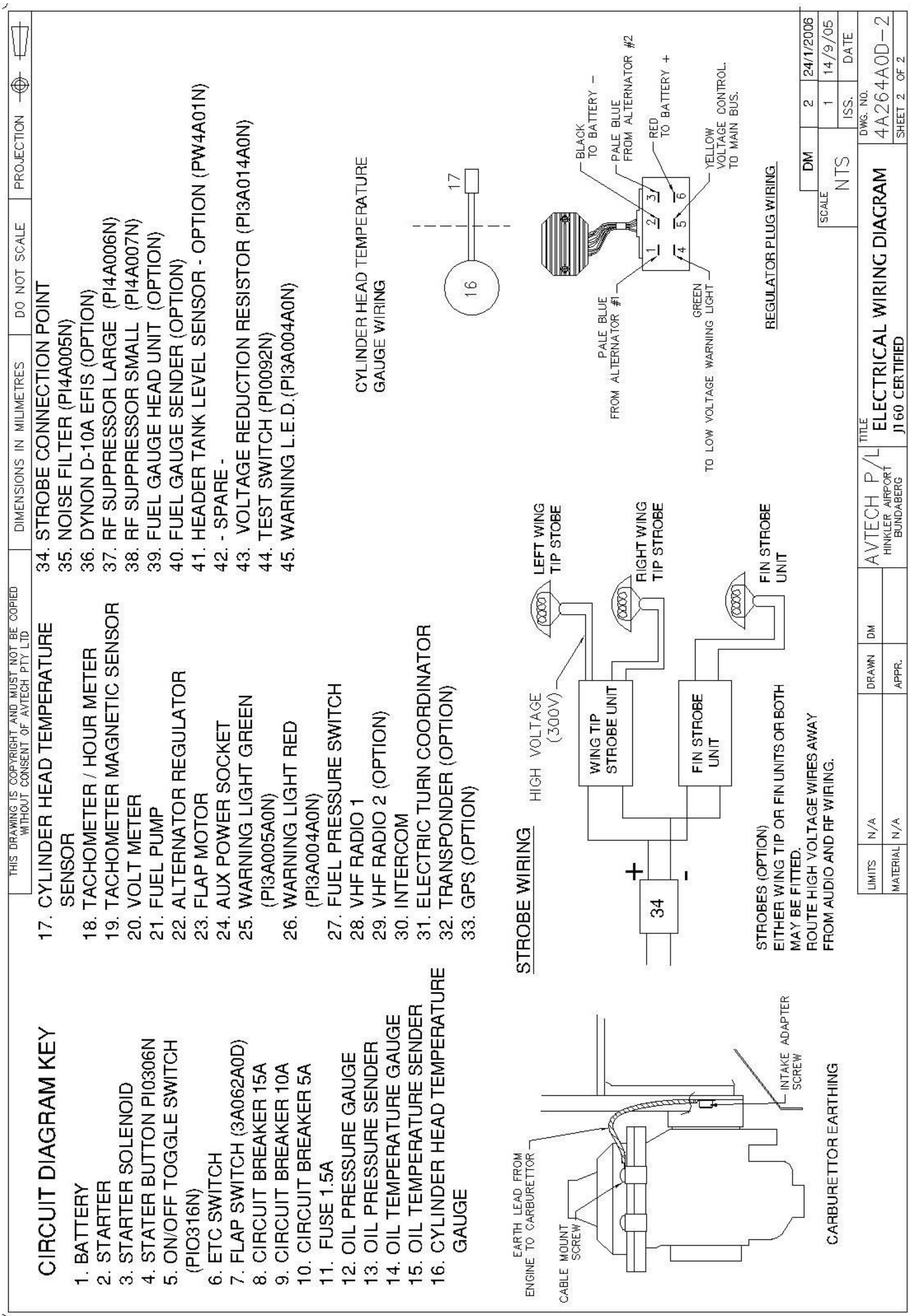


Figure 7.16b – Wiring Diagram Sheet 2.

7.19 COCKPIT VENTILATION

Ventilation air is provided by vents located beside the rudder pedals. The volume of the air supply can be regulated by sliding the vent shutters as desired using your foot.

7.20 PITOT-STATIC SYSTEM AND INSTRUMENTS

The pitot-static system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator and the altimeter. The system is composed of a Pitot probe mounted on the right wing strut.

7.20.1 Airspeed Indicator

The airspeed indicator is calibrated in knots. Limitations and range markings (in KIAS) are incorporated on the instrument as specified in Section 2.

7.20.2 Altimeter

Aircraft altitude is depicted by a barometric type altimeter. A knob near the lower left portion of the altimeter allows the ambient barometric pressure sub-scale to be adjusted to the current value. This sub-scale has a dual calibration of millibars (mb) and inches of Mercury (in Hg).

7.20.3 Vertical Speed Indicator

The vertical speed indicator indicates the aircrafts rate of climb or descent in feet per minute. The pointer is actuated by changes in ambient barometric pressure as sensed by the static source.

7.21 STALL WARNING SYSTEM

The aircraft is equipped with an air operated artificial stall warning system. A vent is located on the leading edge of the left wing with a small lip protruding below. As the aircraft approaches the stall the angle of the airflow flowing past the lip produces a suction in the vent which sucks air through a reed “squawker” located in the wing root area of the cabin. The “squawker” produces an audible note which increases in volume as the stall deepens. The speed at which the warning activates is adjusted by changing the height f the lip below the vent on the wing, and is set to go of 5-10 knots below the stall. The system will operate reliably in any loading condition or flap setting.

7.22 AVIONICS

The aircraft may be fitted with a variety of avionics equipment. Refer to Section 9 for information on the avionics fitted to each aircraft.

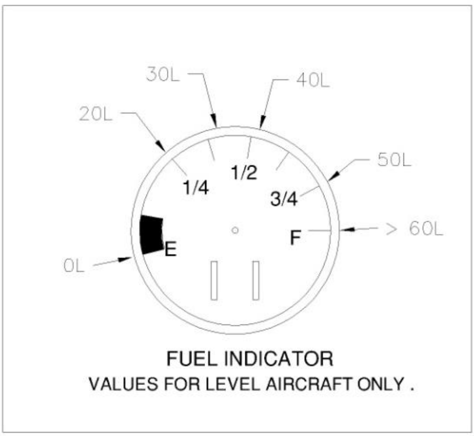
All avionic services are powered from the instrument bus that is energised by turning ON the Master and Instrument Switches on the instrument panel.

7.23 PLACARDS

The following placards are required, and are to be located in the proximity indicated. Each placard is to contain wording conforming with the illustrations. The shape and layout of production items may vary between individual aircraft. Consult the manufacturer for individual aircraft placard variations.

7.23.1 Cockpit Placards General

Warning Placard P/No. 5A016A0D	JABIRU AIRCRAFT MODEL J160 — DESIGNED AND MANUFACTURED BY JABIRU AIRCRAFT PTY LTD BUNDABERG, QUEENSLAND, AUSTRALIA OPERATIONAL LIMITS: THIS AEROPLANE IS CLASSIFIED AS A VERY LIGHT AEROPLANE APPROVED FOR DAY VFR ONLY, IN NON-ICING CONDITIONS. ALL AEROBATIC MANOEUVRES INCLUDING INTENTIONAL SPINNING ARE PROHIBITED. SEE FLIGHT MANUAL FOR OTHER LIMITATIONS. SPEED LIMITATIONS: V_{NE} 140 KIAS (DO NOT INTENTIONALLY EXCEED THIS SPEED) V_{NO} 112 KIAS (EXCEED THIS SPEED ONLY IN CALM AIR) V_A 102 KIAS (DO NOT MAKE FULL AND ABRUPT CONTROL SURFACE MOVEMENTS ABOVE THIS SPEED) V_{FE} 84 KIAS (DO NOT EXTEND FLAPS ABOVE THIS SPEED) LOADING LIMITATIONS: • MAXIMUM GROSS WEIGHT OF AIRCRAFT IS NOT TO EXCEED 540 KG • ALL BAGS MUST BE STOWED ON THE PASSENGER SEAT OR IN BAGGAGE AREA BEHIND SEATS. ALL ITEMS MUST BE LOWER THAN THE SEAT BACK. • PILOT MUST USE LOAD AND TRIM SHEET IN SECTION 6 OF FLIGHT MANUAL TO CHECK TRIM. • ENSURE ALL BAGGAGE IS ADEQUATELY RESTRAINED INFLIGHT ENGINE STARTS: DO NOT ENGAGE STARTER MOTOR IF PROPELLOR IS SPINNING WARNING: NOISE LEVEL EXCEEDS 95dba WHEN ENGINE IS AT FULL POWER EAR PROTECTION MUST BE WORN EMPTY WEIGHT [ ] MINIMUM COCKPIT LOAD 55kg MAX WEIGHT IN BAGGAGE AREA 38kg REFER TO FLIGHT MANUAL SECTION 6 WHEN LOADING Fitted on the rear Face of the Forward Wing Spar Carry-through Beam in the Cabin Ceiling.
EFIS Warning P/No. 5A042A0D 1 OFF	NON-CALIBRATED SECONDARY INSTRUMENT Fit to upper frame of DYNON EFIS if installed
No Smoking P/No. 5A035A0D	NO SMOKING Fit to instrument panel.
LSA Placard P/No. 5A060A0D	THIS AIRCRAFT WAS MANUFACTURED IN ACCORDANCE WITH LIGHT SPORT AIRCRAFT AIRWORTHINESS STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY AIRWORTHINESS REQUIREMENTS. Fitted on the rear Face of the Forward Wing Spar Carry-through Beam in the Cabin Ceiling.
No Intentional Spins. P/No. 5A072A0D	NO INTENTIONAL SPINS Fit to Instrument Panel
No Aerobatics, No Operations in IMC. P/No 5A141A0D	AEROBATIC MANOEUVRES ARE PROHIBITED FLIGHT OPERATIONS IN IMC ARE PROHIBITED Fit to Instrument Panel

Owners Manual P/No 5036094	FLIGHT MANUAL Fitted to Inside of RH Door above the Door Pocket.
Door Open LHS P/No 5027094	**OPEN** Fitted to the Outsides of LH Door Above the Door Catch Lever
Door Open RHS P/No 5028094	**OPEN** Fitted to the outside of RH Door Above the Door Catch Level
Door String Placard P/No 5026094	**PULL TO OPEN** Fitted on Inside of both Doors Above Door Handle.
Fuel Contents P/No. 5A022A0D Where Equipped	 Fitted to sight glasses of wing fuel tanks.
Fuel Gauge P/No. 5A050A0D Where Equipped	FUEL LEVEL WING TANKS Fitted on the instrument panel immediately below fuel gauges.
Electric Fuel Gauge Quantities. P/No. 5A053A0D Where Equipped.	

<table>
<tr><td></td><td>Fit inside wing root immediately aft of windows through to electric fuel gauge senders</td></tr>
<tr><td>Compass Card
P/No. 5123024</td><td>
<table>
<tr><td>For</td><td>N</td><td>30</td><td>60</td><td>E</td><td>120</td><td>150</td></tr>
<tr><td>Steer</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>For</td><td>S</td><td>210</td><td>240</td><td>W</td><td>300</td><td>330</td></tr>
<tr><td>Steer</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Correction for radio on in standby mode
Date P/N 5123024

Fit in compass card holder attached to compass.</td></tr>
<tr><td>Baggage
P/No. 5A037A0D</td><td>BAGGAGE COMPARTMENT
18KG MAXIMUM BEHIND EACH SEAT BACK
TOTAL BAGGAGE CAPACITY – 36KG

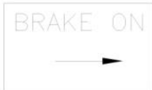
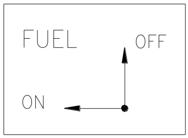
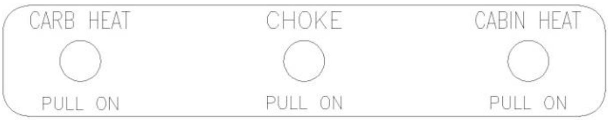
Fit to right side fuselage wall immediately below window.</td></tr>
<tr><td>Baggage
P/No. 5111154</td><td>BAGGAGE
LOAD BEHIND SEATS ONLY
DO NOT LOAD AFT OF THIS POINT →
REFER TO SECTION 6 OF AIRCRAFT FLIGHT MANUAL
WHEN LOADING TO DETERMINE AIRCRAFT TRIM.

Fit to inside of fuselage on right side just below rear quarter window. Locate vertical line in line with rear of baggage shelf.</td></tr>
<tr><td>Loading Limitations
P/No 5098854</td><td>LOADING LIMITATIONS
1. Maximum Gross weight of aircraft is not to exceed 540 kg.
2. All baggage must be stowed either on the passenger seat, or in the compartment behind the rear of the seats.
3. ADEQUATELY SECURE ALL ITEMS
4. Pilots must use Load & Trim Sheet given in Section 6 of the Flight Manual to check trim before flight.

Fitted on inside of fuselage of RHS of cabin below rear quarter window.</td></tr>
</table>

Table 2.15.1

7.23.2 Cockpit Controls

Trim Position P/No. 5A031A0D (1 OFF)	 Fit to centre console beside of elevator fwd stop, between trim levers.
Brake On P/No. 5A031B0D	 Fit to centre console beside brake lever, arrow pointing aft.
Fuel Tap Position P/No 502319N	 Fitted on the Main Beam in front of the Fuel SELECTOR Valve
Carby Heat P/No 5A030A0D	 Fitted to lower central section of instrument panel.

7.23.3 External Fuselage

Static Port P/No 5043094	**STATIC VENT KEEP CLEAR** Attach to LHS of Vertical Fin in line with Static Tube
Fuel Grade- Wing Tanks P/No 5091344 2 OFF	FUEL AVGAS 100LL 67 LITRE CAPACITY EARTH ON POST Attach to top skin of wing adjacent to Fuel Filler Cap.

Nose Wheel Inflation. P/No. 5A017A0D	INFLATE NOSE WHEEL TO 28 psi (193 kPa) Attach to left side of nose wheel spat.
Main Wheel Inflation. P/No. 5A018A0D	INFLATE MAIN WHEEL TO 33 psi (228 kPa) Attach to outsides of main wheel spats
Engine Oil P/No. 5A008A0D	ENGINE OIL AEORSHELL W100 – SUMMER AEROSHELL 15W50 – WINTER OR EQUIVALENT AIRCRAFT GRADE DETERGENT ENGINE OIL DO NOT USE AUTOMOTIVE GRADE OILS Attach to inner face of door in top engine cowl.
Dipstick Inside P/No. 5A007A0D	DIPSTICK INSIDE Fit to outside of oil door in upper engine cowl.
Door Lean. P/No. 5A013A0D	DO NOT LEAN ON DOOR Fit to top of doors.
Wing Bolt Tightening P/No 5039094 Qty 8 Required	**DANGER DO NOT TIGHTEN** Attach to the fuselage and wings beside each wing, and lift strut attachment fitting.
Earth on Post P/No. 5A066A0D	EARTH ON POST Attach to upper wing skin beside fuel filler earth post.
No Step P/No. 5A006A0D Qty 2 required.	NO STEP Fit to top of main wheel spats
Earth on Exhaust P/No. 5029094	EARTH ON EXHAUST Attach to the lower fuselage on the pilot's side immediately above the exhaust outlet pipe.

8. HANDLING AND SERVICING

8.1 INTRODUCTION

This section contains factory recommended procedures for proper ground handling and routine care and servicing of your J160-D aircraft. It also identifies certain inspection and maintenance requirements that fall into two basic categories:

1. Mandatory Inspection and Maintenance Requirements
2. Recommended Preventative Maintenance and Minor Field Repairs

All inspections, maintenance, and repairs must be conducted in accordance with the applicable regulations in the country of registration of the aircraft. Regulations usually require that all **Mandatory Inspection and Maintenance Requirements** be carried out and certified for only by appropriately trained and licensed personnel, whereas, to the extent limited by the regulations, **Factory Recommended Preventative Maintenance and Minor Field Repairs** may be carried out by a suitably licensed pilot on an aircraft they own or operate.

8.2 IDENTIFICATION PLATE

All correspondence with the factory regarding your aircraft should include the **Serial Number**. This is the only identification recognised by the factory as it is possible that the aircraft registration and/or owner has changed since the aircraft was originally delivered. The Serial Number and Model Number can be found on a fireproof identification plate located on the left hand side of the tail fin where the fin attaches to the fuselage.

8.3 AIRCRAFT DOCUMENTS

The following documents are supplied with the aircraft when delivered from the factory:

< **PILOT'S OPERATING HANDBOOK & APPROVED FLIGHT MANUAL**
< **JABIRU AIRCRAFT 2200 ENGINE MAINTENANCE & INSTRUCTION MANUAL**
< JABIRU AIRCRAFT 2200 ENGINE INSTALLATION MANUAL
< **AIRFRAME LOG BOOK**
< **ENGINE LOG BOOK**
< **PROPELLER LOG BOOK**
< AIRFRAME TECHNICAL MANUAL (Includes Service & Maintenance Manual)

8.4 AIRCRAFT INSPECTION, MAINTENANCE & REPAIR

8.4.1 MANDATORY INSPECTION AND MAINTENANCE

Although the applicable regulations in the country of registration of the aircraft may vary the requirements somewhat, the aircraft will normally be required to undergo a mandatory annual/100 hourly inspection and maintenance in accordance with approved maintenance schedules. In addition some components, in particular the engine and it's accessories, will be subject to complete overhaul based on time in service.

Jabiru Aircraft recommend that all Mandatory Inspection and Maintenance Requirements be conducted in accordance with the details laid out in the Jabiru Airframe Technical Manual.

From time to time other mandatory inspections may be required in the light of in service experience. In this event airworthiness directives relating to the airframe, engine, propeller or other components/equipment as appropriate will be issued. It is the responsibility of the owner/operator to ensure compliance with all applicable airworthiness directives and, when the inspections are repetitive, to take appropriate action to prevent inadvertent non-compliance.

All maintenance carried out must be correctly recorded and certified for in the relevant log books.

8.4.2 PREVENTATIVE MAINT. & MINOR FIELD REPAIR

Depending on the applicable regulations in the country of registration of the aircraft, limited maintenance and minor repairs may be carried out by a suitably licensed pilot on an aircraft they own or operate. Reference should be made to the relevant regulations to determine the specific maintenance operations that are authorised. Although the remainder of this section provides the majority of the information that should be required by the pilot to enable them to conduct limited maintenance and minor repairs, it is nevertheless desirable that a copy of the Jabiru Airframe Technical Manual be available to the pilot to ensure that proper procedures are followed at all times or to provide additional details where required.

Where permitted by appropriate regulations, Jabiru Aircraft recommend the following preventative maintenance:

DAILY:

a. Check fairings for loose screws.
b. Carry out daily inspections as detailed in Section 4 of this manual.
c. Ensure correct tyre pressures to prevent premature wear.

In addition to the preventative maintenance recommendations listed above, the pilot must always be diligent when carrying out their inspections and be prepared to rectify any defects found to the extent permitted by the appropriate regulations.

8.5 GROUND HANDLING – TAXIING

When taxiing, it is important that speed and use of brakes be kept to a minimum. All controls must be utilized (see Figure below) to maintain directional control and balance; this is particularly important in windy conditions but is good practice at all times. Using the controls in this manner makes it less likely for a gust of wind to catch the aircraft and deflect or flip it.

The carburettor heat control knob should be pushed full IN (that is, NOT selected) during all ground operations unless heat is absolutely necessary.

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

DO NOT accelerate over loose gravel or cinders or propeller damage will result

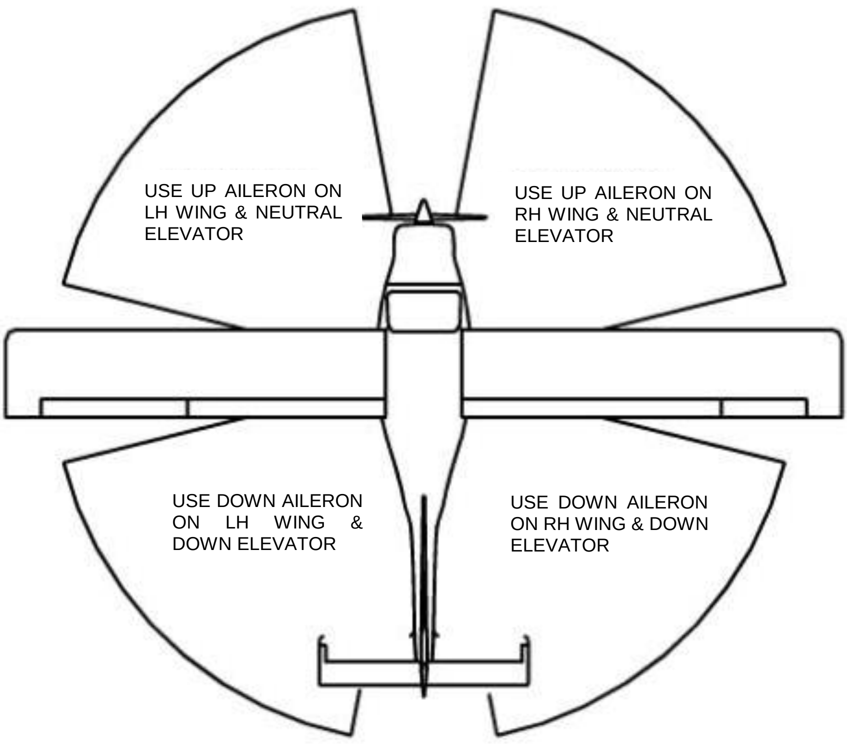


Figure 8-1 – Use Of Controls During Taxi

8.6 TOWING INSTRUCTIONS

The Jabiru J160-D is a relatively small and light aircraft and should be towed by hand only. The recommended method is to grasp the propeller immediately beside the spinner and tow the aircraft forwards from there. Alternatively the aircraft may be pushed backwards by pressing against the front of the horizontal tail close beside the fuselage.

WARNING

Do not push on control surfaces

8.7 Securing The Aircraft

8.7.1 TIE-DOWN INSTRUCTIONS

The J160-D is equipped with 3 built-in tie-down points: 1 under the tail and another under each wing at the top of the wing strut. To secure the aircraft ropes must be tied from each of these to hard-points on the ground.

In very exposed conditions or where strong winds are predicted it is recommended that the aircraft be secured by a fourth point at the nose leg. Pass a rope around the nose leg within the nose leg housing and attach to a hard-point on the ground. Nose and tail ropes should not have slack but must not be too tight.

NOTE

Always leave sufficient slack in the wing ropes so that the ropes would not be over-tight if a tyre deflated overnight.

8.7.2 Control Locks

In Australia it is a requirement that an aircraft anti-theft device be fitted. For the J160-D this consists of a small padlock which is passed through a throttle shaft, preventing high power settings being applied.

It is recommended that the crew harnesses are looped around the control yoke while the aircraft is unattended to prevent the controls blowing in the wind.

8.7.3 Security

Whenever an aircraft is unattended it is recommended that valuables be removed or placed out of sight if possible. Ensure that all cabin doors are locked.

8.7.4 PARKING

When possible park the aircraft into the anticipated wind and set the parking brake. Do not set the parking brake when they are very hot. Lock the controls using the lower portion of the pilot's restraint harness around the control column to secure it. Install wheel chocks when available. When severe weather conditions or high winds are anticipated, the best precaution is to hangar the aircraft. In less severe conditions, or when hangarage is not available the aircraft should be tied down as outlined in the following paragraph.

8.7.5 JACKING

The aircraft may be jacked in order to service the landing gear, change wheels/tyres and to perform other service functions. The procedure for jacking the aircraft is as follows:

Nose Wheel:

a. Place a rag on the top of the horizontal stabiliser immediately beside the fuselage to protect the paint. Place a soft container (such as a bag) containing approximately 20kg of lead shot on the tail and ease it to rest on the ground.

Main Wheel:

a. Lifting from the wingtip, lift the wheel clear of the ground.

c. Use a wing stand to hold the wheel off the ground. Note that if a wing stand is not available, a brick or similar may be placed under the bottom end of the undercarriage leg to hold the wheel clear of the ground while the wheel is fixed.

CAUTION

Always take care when working on an aircraft on jacks. Ensure the stands are not bumped and that the aircraft's CG is not altered significantly (such as by a person entering the cabin).

8.7.6 FLUID SERVICING

8.7.6.1 Fuel System

Filling Fuel Tanks

Observe all the required precautions for handling fuel and filling tanks. Ensure that the aircraft is bonded to Earth using the muffler tailpipe tip. Additionally, prior to opening the fuel cap the earth strap on the refuelling nozzle should be attached to the earthing point adjacent to the tank filler neck. Fill the tank to within 15 mm of the top of the tank. Note that when the each wing tank has more than approximately 50 litres inside, the fuel level will be above the top of the sight glass.

Fuel Draining/Sampling

Three quick fuel drain fittings are provided in the J160 fuel system. There is one for each main fuel tank and these are located in the wing-root area on the lower wing surface, The drain for the header tank is located on the belly of the fuselage aft of the main undercarriage and is most easily accessed from the right hand side of the aircraft.

Fuel should be drained/sampled from all of these points before the first flight of the day and after each subsequent refuelling.

Draining Fuel System

The complete fuel system may be drained by the using the fuel drain points.

8.7.6.2 Engine Lubrication System

Filling the Engine Sump

The engine sump should be filled to the operating level with the lubricating oil specified in Section 2. This may be accomplished by using a suitable funnel inserted in the oil filler tube located on the top of the engine. An access cover is provided in the engine cowl for this purpose.

Draining the Sump

The engine sump is drained by removing the lower engine cowl and removing the sump drain plug. Ensure that the sump plug is correctly replaced **and lock wired** prior to refilling the engine with oil. Do not remove hoses to drain the oil cooler during a normal oil change. After replacing oil, turn the engine over on the starter with the ignitions OFF until oil pressure registers before starting engine.

Fuel Ethanol Content

Jabiru Aircraft allow fuels with an Ethanol content of up to 10% to be used in the J160-D. While Ethanol boosts the fuel's octane rating and is becoming increasingly common in automotive fuels there are important issues caused by its use. The following points are given as a basic introduction to using Ethanol. Note that while this information was current at the time of writing.

- Use of a fuel with an Ethanol content higher than 10% **IS NOT PERMITTED** in the J160-D.
- Ethanol is hygroscopic (i.e. it will absorb water). This can be water vapour from the air, condensation inside tanks or free water. While very small amounts of water can be

absorbed without significantly affecting the fuel's combustion, at higher levels the mixture will not be combustible. In addition, because this incombustible fuel is formed from a mixture of the Ethanol in the fuel and the water it can have a large volume – so a small amount of water will result in a much larger amount of incombustible Ethanol/water mix. This may give false readings in the fuel tank sumps or exceed the volume of the sump altogether.

- Ethanol mixed with water is somewhat corrosive and may attack fittings etc of the fuel system.
- In long-term storage, Ethanol may oxidise with exposure to air. This process produces a mild acid solution (vinegar) which can attack fuel system fittings.
- Long term exposure to Ethanol damages some types of plastics. The J160-D details replacement times for fuel lines which are designed with Ethanol fuel blends in mind, however increased monitoring of fuel lines is recommended in an aircraft using Ethanol blends.
- Some fuel testers (including the type supplied by Jabiru Aircraft at the time of writing) have a scale on their side which allows the Ethanol content of a fuel to be checked & assessed.

Several CASA documents discuss Ethanol, and Jabiru Aircraft strongly recommend that owners considering using an Ethanol fuel blend read and understand this information before using a fuel of this type. The following CASA document is current at the time of writing:

- Airworthiness Bulletin AWB 2828-003003

8.8 APPROVED FUEL GRADES & SPECIFICATIONS

- Avgas 100LL
- Avgas 100/130
- MOGAS with minimum Octane Rating of **95 RON** may be used but is not recommended (the fuel specification placard; P/No 5091344, does not explicitly state ‘MOGAS’ because it is not recommended).
- Do not use fuel additives such as Octane Boosters.

WARNING

For the reasons noted below Jabiru Aircraft do not recommend using MOGAS. It is important to realise that due to the lower QA standards, even following best practice it is still possible for a particular tank-full of MOGAS to be unsuitable or unsafe for use. Jabiru Aircraft may choose to void any warranty for engines which have been damaged due to “bad” MOGAS. Operators who choose to use this fuel do so at their own risk.

CAUTION

Using a fuel which is not recommended may have detrimental effects on airworthiness, maintenance and safety.

a. Compared to AVGAS the chemical, delivery and storage quality control requirements for MOGAS are much less stringent. Because of this, there is no practical way for an operator to know that any given volume of MOGAS bought through normal sources will be compatible with use in a Jabiru Aircraft Engine.
b. A large amount of testing using MOGAS has been carried out by Jabiru Aircraft under controlled conditions and this has shown that MOGAS can be a suitable fuel. However, experience in service where conditions are not controlled has shown it to be inconsistent and inherently risky – contributing to many different service difficulties.
c. Do not mix AVGAS with MOGAS. The two fuels are chemically distinct and the qualities of a mixture impossible to predict. Refer to Jabiru Service Letter JSL007 for more information.
d. Alcohol levels in MOGAS must be monitored. Operators must test each batch before use to ensure alcohol levels are within limitations. Do not trust that the fuel is what the seller claims.
e. Further information on fuels is given in Jabiru Service Letter JSL007. Any operator considering using MOGAS must read, understand and follow the requirements it contains.

8.9 APPROVED OIL GRADES & SPECIFICATIONS

Jabiru Aircraft approves lubricating oils of any brand name conforming to specifications MIL-L-6082 for straight mineral oil and MIL-L-22851 for ashless dispersant oil.

Straight mineral oil must be used during the first 25-50 hours of operation for new and overhauled engines, or until the oil consumption has stabilised. After the first oil change it is recommended that ashless dispersant oil be used.

8.9.1 Engine Oil Viscosity Grade:

The following chart is intended to assist in choosing the correct grade of oil and must be considered as a guide only. Multiviscosity grades can also be used.

Average Ambient Temperature	Mineral Grades	Ashless Dispersant Grades
Above 35° C (95°F)	SAE 60	SAE 60
15° C to 35°C (59° to 95°F)	SAE 50	SAE 50
-17°C to 25°C (1° to 77°F)	SAE 40	SAE 40

Equivalence of SAE and commonly used Commercial Grade designations:					
SAE:	20	30	40	50	60
Commercial:	55	35	80	100	120

8.9.2 WHEEL BRAKE SYSTEM

Brake System
The brake system utilises a single or dual master cylinder (depending on the aircraft serial number) with an integral fluid reservoir. The brake callipers require periodic inspection to adjust the pad-disc clearances and check pad wear. If the brake pads show signs of excessive wear, they should be replaced.

Park Brake
The park brake is a mechanical lock applied to the brake handle. The park brake is actuated by applying the brakes, then engaging the locking cam on the brake handle. To release the brakes, pull the handle back and release the locking cam.

Filling Brake Cylinders

This is accomplished from inside the cockpit by removing the cap from the top of the reservoir and filling with DOT-3 automotive brake fluid. Ensure that no contaminants are allowed to enter the reservoir.

8.9.3 UNDERCARRIAGE

Because of its simplicity, the undercarriage does not require complicated maintenance. The main undercarriage leg requires no maintenance except for an occasional clean around the fairing to remove dirt, grime and grass and inspection of the brake hoses. The nose gear requires the leg to be clean for smooth operation. Bolts and bushes should be inspected regularly and if worn excessively, replaced.

8.9.4 TYRES

The tyres should be carefully checked for correct inflation, cuts, abrasions, wear, slippage and other obvious defects and replaced if necessary. After removing the wheels from the aircraft, the tyres may be demounted by deflating the tubes, then removing the wheel through-bolts, allowing the wheel halves to be separated.

WARNING

Removal of the wheel through-bolts without first deflating the tube may result in death or injury.

The recommended tyre inflation pressures are:

MAIN WHEELS	214-228 kPa (31-33 psi)
NOSE WHEEL	186-193 kPa (27-28 psi)

8.9.5 INDUCTION AIR FILTER

Dust and dirt must be prevented from entering the engine induction system. Dust and dirt ingested into the engine is probably the greatest single cause of premature engine wear. *The value of maintaining the air filter in good clean condition cannot be overstressed.*

Visual Inspection

A visual inspection of the paper cartridge should be made at intervals of approximately 50 flying hours. Under extreme conditions, daily cleaning with compressed air may be necessary. During inspections, the cartridge must be checked to see if it has been dislodged or damaged or is suffering an excessive build up of debris.

Cleaning

To some extent, the cartridge can be blown out using clean compressed air, however periodic replacement, depending on condition, is required.

8.9.6 BATTERY SERVICE

The J160 must be fitted with a "no maintenance" 12 volt, PC625 Odyssey Sealed Lead Acid Battery (Jabiru P/No. PM0095N).

The battery is located inside the engine bay. Access is gained by removing the top cowl.

WARNING

Do not perform any maintenance on the electrical system in conjunction with work on the fuel system. The escape of fuel fumes under the floor and/or in the aircraft may cause an explosion.

As the name implies, the "no maintenance" battery requires no routine maintenance other than to check its security occasionally and to clean the terminals if required.

8.10 ALTERATIONS OR REPAIRS

All alterations and repairs to this J160-D aircraft must be done using data which is approved by the NAA.

8.10.1 LEVELLING

The aircraft is longitudinally level when an accurate level placed on the lower section of the pilot's side door frame gives a level indication.

The aircraft is laterally level when an accurate level placed between the upper engine mount attachments gives a level indication.

8.11 FLYABLE STORAGE

Aircraft in non-operational storage, for a maximum of 30 days, are considered to be in flyable storage status. Every seventh day during these periods, the propeller should be rotated by hand through five revolutions. This action "limbers" the oil and prevents any accumulation of corrosion on engine cylinder walls. An aircraft being parked in flyable storage should have the engine stopped by turning off the fuel valve, ensuring there is no fuel left in the carburettor bowl.

WARNING

For maximum safety, check that both ignitions are OFF, the throttle closed and the aircraft is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

After 30 days, the aircraft should preferably be flown for 30 minutes. As well as helping to avoid engine problems, this also helps to reduce accumulations of water in the fuel system, tops up the battery charge, and exercises the other aircraft systems. If it is not possible to fly the aircraft a ground run up should be made just long enough to produce an oil temperature within the lower green arc range. Excessive ground run up should be avoided.

If the aircraft is to be out of service for long periods, refer to the J160 TECHNICAL MANUAL for proper storage procedures.

8.12 CLEANING AND SIMILAR CARE

8.12.1 Windshield and Windows

The windshield and windows are made from a plastic material and consequently a certain amount of care is required to keep them clean. The following procedure is recommended:

1. Flush with clean water to remove excess dirt, bugs and other loose particles.
2. Wash with a mild soap and warm water. Use a soft cloth or sponge. Do not rub excessively.
3. Rinse thoroughly, then dry with a clean moist chamois. Do not rub with a dry cloth as this builds up an electrostatic charge which attracts dust. Oil and grease may be removed by rubbing lightly with a soft cloth moistened with kerosene. **Do not use volatile solvents** such as acetone, gasoline, alcohol, benzine, carbon tetrachloride, lacquer thinner or most commercial window cleaning sprays, as they will soften and craze the plastic.

8.12.2 Painted Surfaces

The painted exterior surfaces of the aircraft can be washed using a mild detergent and water. Special aircraft cleaning detergents may be used or alternatively an automotive liquid detergent provided it is non-corrosive and contains no abrasive materials. Stubborn oil and grease may be removed using a small amount of solvent such as kerosene.

CAUTION

Do Not use silicone based cleaning products as they may be adsorbed by the composite structure and affect repairability.

8.12.3 Propeller Care

Preflight inspection of propeller blades for nicks, and wiping them occasionally with a damp cloth to clean off grass and bug stains will ensure long and trouble free service. If a nick occurs which exposes an edge of the urethane or fibreglass the edge should be sealed using a small amount of superglue to prevent air pressure from lifting the edge off the propeller body. Take care when using superglue to apply the minimum amount required and to avoid leaving lumps etc which may affect airflow over the blade.

8.12.4 Engine Compartment

The engine compartment should be kept clean to minimise any danger of fire, and to allow proper inspection of engine components. The engine and engine compartment may be washed down with a suitable solvent, then dried thoroughly.

CAUTION

Particular care should be given to electrical equipment before cleaning. Solvent should not be allowed to enter starter, alternator, and the like. These components should not be saturated with solvent. Any oil, fuel, and air openings on the engine and accessories should be covered before washing the engine with solvent. Caustic cleaning solutions should be used cautiously and should always be properly neutralised after their use.

9. SUPPLEMENTS

9.1 FLIGHT TRAINING SUPPLMENT

There is no separate FTS for the J160-D. Refer to the normal and emergency procedures detailed above for handling & operating recommendations.

9.2 INFORMATION FOR THE OWNER

9.2.1 IMPROVEMENTS OR CORRECTIONS

In the interests of product development, we encourage owners to make suggestions related to design improvements. However, the final decision on their adoption or otherwise rests with JABIRU AIRCRAFT Pty Ltd.

Any issues or corrections required of Jabiru publications are requested to be passed on to Jabiru in writing to incorporation in subsequent revisions. Emails to info@jabiru.net.au are recommended.

9.2.2 CONTINUED OPERATIONAL SAFETY REPORTING

The owner/operator of a LSA is responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery. The following proforma may be used:

Date:	
Aircraft Model	
Aircraft Registration	
Aircraft S/No.	
Engine S/No.	
Details of item:	
Name of Reporter:	
Preferred Contact Details of Reporter	

9.2.3 OWNER CHANGE OF ADDRESS NOTICE

Each owner/operator of a LSA is responsible for providing the manufacturer with current contact information where the manufacturer may send the owner/operator supplemental notification bulletins. The following proforma may be used & sent to Jabiru Aircraft at info@jabiru.net.au or the contact details given in Section 0.3.

Aircraft Model	
Aircraft Registration	
Aircraft S/No	
Previous Owner:	
New Owner:	
Contact Details of New Owner	

9.3 SUPPLEMENTS

This section consists of a series of supplements, each being self contained and providing details and procedures associated with the fitment of optional and special purpose equipment.

Each supplement contains a brief description, and where applicable, operating limitations, emergency and normal procedures, and the effect on aircraft performance. The data contained in a supplement adds to, supersedes, or replaces similar data in the basic POH when operating in accordance with the provisions of that supplement.

The Log of Supplements shows the CASA Approved Jabiru Aircraft Supplements available for the J160-D at the date of publication of this POH. The Log of Supplements page can be utilised as a Table of Contents for this section. A check mark (✓) in the Install column indicates that the corresponding supplement is incorporated in the POH.

It is the owner's responsibility to ensure that new Jabiru Aircraft Supplements received after receipt of the POH are recorded on the Log of Supplements page.

In the event that the aircraft is modified at a non Jabiru Aircraft facility through an STC or other approval method, it is the owner's responsibility to ensure that the proper supplement, if applicable, is installed in the handbook and the supplement is properly recorded on the Log of Supplements page as amended from time to time.

9.4 LOG OF SUPPLEMENTS – JABIRU AIRCRAFT SUPPLEMENTS

Applicable to aircraft serial number J160-D _____________

Install	Doc. No.	Title	Date