

**NARROGIN FLYING CLUB (Inc)**

# **Jabiru J160 D**

**OPERATING NOTES**

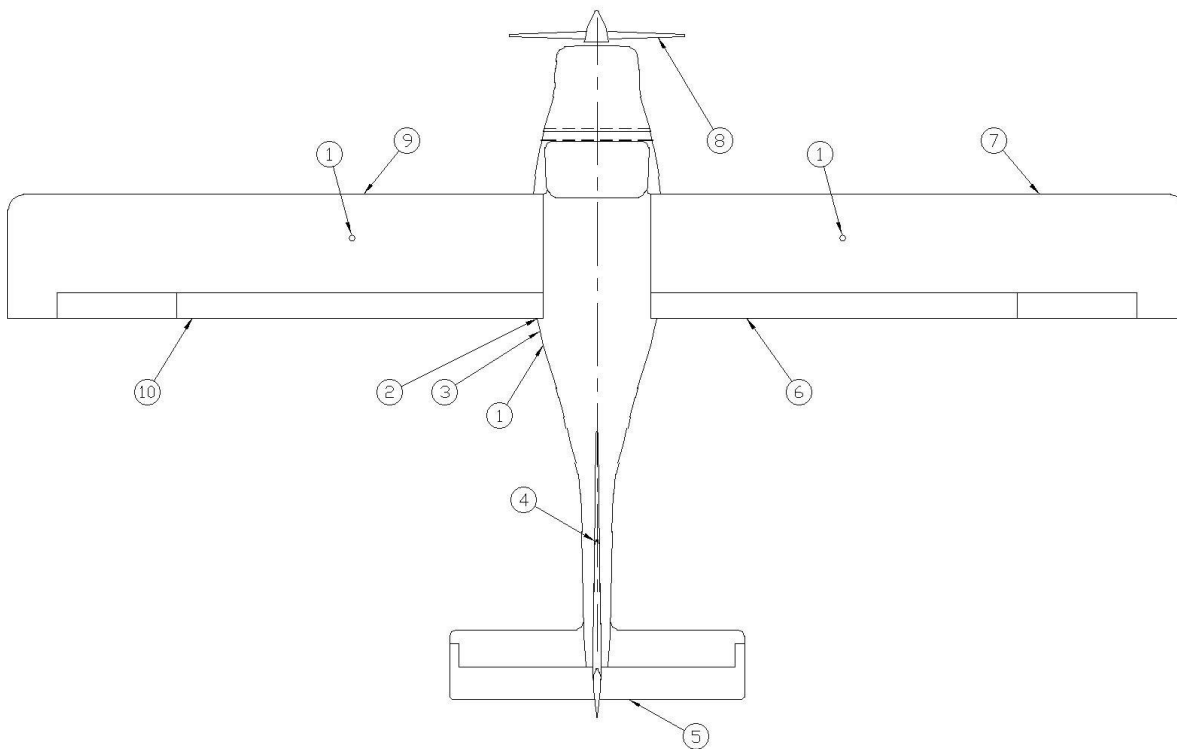


# Jabiru Aircraft CASA APPROVED Model J160



## 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 steering 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.

## 4.4 NORMAL PROCEDURES CHECK LISTS

### 4.4.1 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

### 4.4.2 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.

#### 4.4.3 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 50°C

#### 4.4.4 Take-Off

Carburettor heat .....OFF  
 Throttle.....FULL OPEN  
 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.

#### 4.4.5 Initial Climb

Throttle.....FULL OPEN  
 Airspeed .....70 KIAS

#### 4.4.6 Cruise

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

#### 4.4.7 Descent

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

#### 4.4.8 Before Landing (and flight below 1000ft AGL)

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

#### 4.4.9 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*

#### 4.4.10 Baulked Landing

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

#### 4.4.11 After Landing/Securing

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

### Cruise.

This Section is provided By JABIRU for information purposes. It is not CASA Approved.  
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 litres/hr	TAS
2600	10.7	80
2700	12.1	87
2800	13.0	95
2900	14.3	100
3000	16.1	103
3100	21	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.

#### 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

Weight & Balance

### EXAMPLE

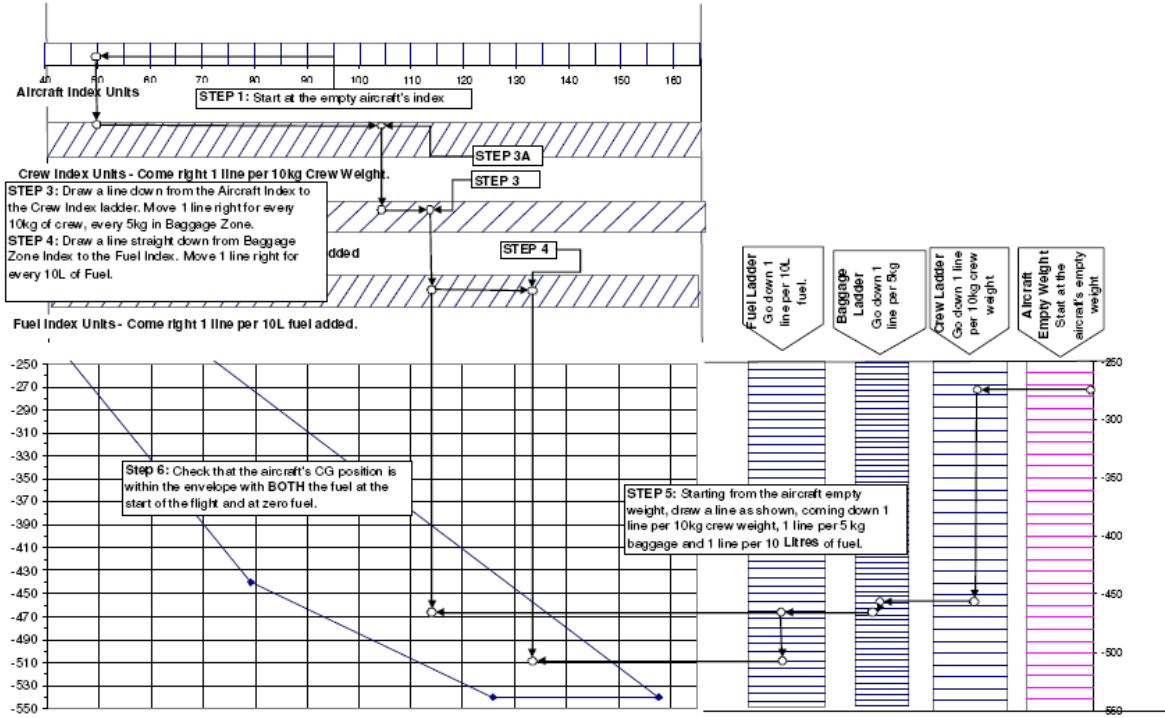
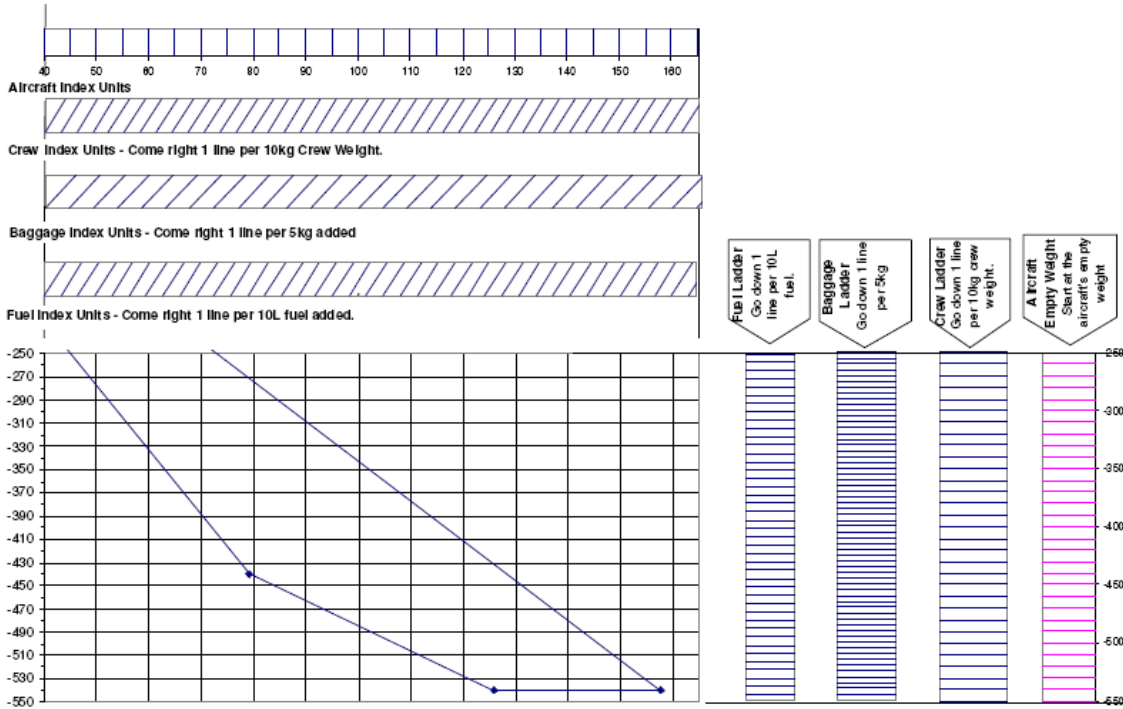


Figure 6-3a – Loading Trim Sheet Example (Metric Units)

### ORIGINAL



## 2.2 AIRSPEED LIMITATIONS

The indicated airspeeds in the table below are based on airspeed calibration data from Section 5.

SPEED	KIAS	REMARKS
Max Manoeuvring Speed ( $V_A$ )	112	Do not make full or abrupt control movements above this speed.
Never Exceed Speed ( $V_{NE}$ )	140	Do not exceed this speed in any operation.
Max Structural Cruising Speed ( $V_{NO}$ )	112	Do not exceed this speed except in smooth air and then with caution.
Maximum Flap Extension Speed ( $V_{FE}$ )	84	Do not exceed this speed with the flaps deployed.

Table 2.2

## 2.3 AIRSPEED INDICATOR MARKINGS

The airspeed indicator markings in the table below are based on airspeed calibration data from Section 5.

MARKING	IAS VALUE or RANGE	SIGNIFICANCE
White Arc	48 - 84	Full Flap Operating Range. Lower limit is the maximum weight stalling speed in the landing configuration. Upper limit is the maximum speed with flaps fully extended.
Green Arc	58-112	Normal Operating Range. Lower limit is the maximum weight stalling speed with flaps retracted. Upper limit is the maximum structural cruising speed.
Yellow Arc	112-140	Operations must be conducted with caution and only in smooth air.
Red Line	140	Maximum speed for all operations ( $V_{NE}$ ).

Table 2.3

### 2.5.3 Engine 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.

Table 2.4.2

Other limits are as follows:

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

### 2.5.4 Fuel Grade

- Avgas 100LL
- Avgas 100/130
- MOGAS with minimum Octane Rating of 95 RON<sup>1</sup> may be used.
- Do not use fuel additives such as Octane Boosters.

### 2.5.5 Lubricating Oil

#### 2.5.5.1 Engine Oil Specification:

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

#### 2.5.5.2 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 as indicated

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

Table 2.4.4.2-1

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

Table 12.4.4.2-3

#### 2.5.5.3 Capacity:

Total: 2.3 litres (2.4 US quarts)

2.6 POWER PLANT 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	-	-

Table 2.5

2.7 WEIGHT LIMITS

Maximum Take-Off and Landing Weight: 540 kg (1190 lb)

2.8 BAGGAGE LIMIT

Maximum Baggage 18kg behind each seat – 36kg total.

2.10 MANOEUVRE LIMITS

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.

2.11 FLIGHT LOAD FACTOR LIMITS

Flap Position	Speed	Positive	Negative
UP	V <sub>A</sub>	+ 3.8g	-1.9g
UP	V <sub>NE</sub>	+ 3.8g	-1.9-g
DOWN	V <sub>FE</sub>	+ 2.0g	0g

Table 2.9

2.14 FUEL LIMITATIONS

	Fuel Quantity	
	Total	Useable
Wing Tanks (each)	67.5 litres (17.8 US Gal)	67 litres (17.6 US Gal)
Sump Tank	6 litres (1.6 US Gal)	0 litres (0 US Gal)
Cumulative System Capacity	140 litres (37.3 US Gal)	135 litres (35.2 US Gal)

Table 2.12

NOTE:

- The total contents of the sump tank are considered to be unusable fuel.
- For Fuel Grade refer to section 2.4.3 Fuel Grade
- Fuel pickups are in wing roots. Care must be taken to maintain balanced flight at low fuel levels to ensure that fuel can be drawn from both tanks. If the aircraft is flown for extended periods in an unbalanced condition, it is possible to fully drain one tank while there is still fuel in the other.

2.16 OTHER LIMITATIONS

- As the seat beside the pilot's seat is equipped with a functioning set of flight controls, refer to operational requirements for the occupation of this seat by a passenger.
- Cockpit doors may not be opened in flight except for emergency smoke/fume evacuation purposes.
- Maximum operating altitude is 10 000 feet.
- The maximum ambient operating temperature is 38°C.
- Smoking is not permitted.
- The aircraft may be operated onto and from hard sealed, gravel and grass surfaces.
- In-cabin noise levels exceed 95db. Hearing protection must be worn.

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.

### 3.2 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.

### 3.3 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 AFTER 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