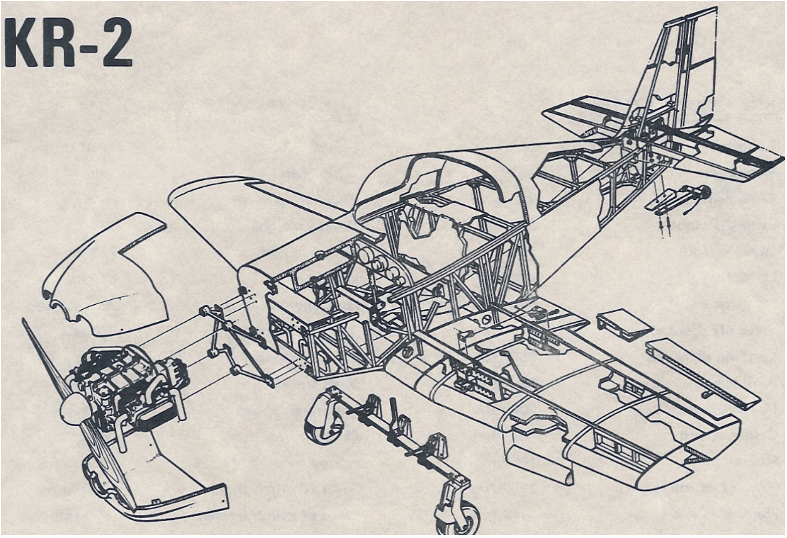
OWNERS HANDBOOK FOR OPERATION AND MAINTENANCE OF KR-2S AIRPLANE

July 28, 2021

NOTICE :
This handbook is not designed, nor can any handbook serve, as a substitute for adequate and competent flight instruction, or knowledge of the current airworthiness directives, the applicable air regulations and advisory circulars. It is not intended to be a guide of basic flight instruction nor a training manual.

Published by:
BUZZA Aerospace


KR-2

Contents

Part I
DESIGN FEATURES

1 Specifications

MANUFACTURER	BUZZA Aerospace
MANUFACTURE DATE	2021
MODEL	KR-2S
SERIAL	???
EMPTY / GROSS WEIGHT	341 / 545 kg
USEFUL LOAD	???kg
PAYLOAD (MAX FUEL)	??? kg
ENGINE	Jabiru 3300 (120 HP)
RPM MAX	???3400
CHT MAX	???180-220 (max 250) ºC
EGT MAX	???460-580 (max 650) ºC
FUEL PRESSURE RANGE	???0.2 - 0.4 bar
INDUCTION	Single Carburetor
PROPELLER	??? Fixed pitch
TIRES	???4.00x6 (main), 4” solid rubber (tail)
AIRFOIL	RAF-48
WINGSPAN	7.0 m (23’)
WING AREA	7.6 m^2 (82 sq. ft)
WING LOADING	???kg/m^2
POWER LOADING	??? kg/kW
LENGTH	4.88 m (16’)
HEIGHT	???1.7 m level (1.2m parked)
WHEELBASE	???w x ???l m

G LIMIT	+4.4 / -1.7 g
FUEL CAPACITY	Main: 59 lit Header: 14 lit
FUEL FLOW	lit/hr (75% @ 3000 RPM) lit/hr (100% @ 3400 RPM)
TAKEOFF DISTANCE	120 m
LANDING DISTANCE	200 m
RATE OF CLIMB	1,200 fpm
CEILING	15,000 ft
RANGE	1080 nm (75% @ 8000 ft)
BAGGAGE	16 kg

General

The KR-2S is a high-performance, amateur built aircraft. Its compact size and efficient design results in superb performance and unequaled fuel economy using a relatively low horsepower engine. Pitch control is provided by elevators mounted on the horizontal stabilizer. Roll capability is provided by ailerons on the outboard wing panels. Yaw control is provided by a rudder mounted on the vertical stabilizer, and is actuated by conventional rudder pedals. The pitch and roll capability is provided by control sticks in a conventional configuration.

The tail wheel steering is provided by differential braking and steering chains attached to the rudder cables providing positive steering at all times while on the ground. Even though the KR2-S has relatively low horsepower, it can outperform many general aviation aircraft while retaining unequaled fuel economy. The maximum speed (Vne) is 195 mph IAS.

The structure of The KR-2S is a wooden frame with urethane foam and glass finish. The outboard wing panels were finish with preformed vinylester “Diehl” wing skins bonded to the spars as an upper and lower half with a glassed over “joggle” at the leading edge. The inboard wing skins were preformed using the same construction method, except the Saf-T-Poxy II was used in place of the vinylester and the parts were not molded under vacuum

The flaps were cut out of the trailing edge of the inboard wing skins, then an aerodynamic fairing bonded on to fair the flaps for cruise.

Limitations

Operating Speeds

VREF	Flight Regime (gross weight)	kts
V_s	Stall, flap retracted	48
V_r	Takeoff rotate	55
V_{ref}	Final approach (~ 1.3 Vso)	60
V_x	Best angle climb	68
V_y	Best rate climb	87
V_z	Best cruise climb	100
V_{bg}	Best glide angle (6:1)	65?
V_a	Maneuvering	116
V_{no}	Max structural cruise	126
V_{ne}	Never exceed	173

VNE vs ALTITUDE

Airspeed Indicator markings

MARKING	ANALOG ASI (kts)	EFIS ASI (kts)	SIGNIFICANCE
Green Arc			Normal Operating Range. Lower limit is maximum weight stall speed. Upper limit is the maximum structural cruising speed.
Yellow Arc			Operations must be conducted with caution and only in smooth air.
Red Line			Maximum speed for all operations.

NOTES:

1. The analog airspeed indicator markings are based on position error estimates. These markings do not account for the analog ASI instrument error.
2. The EFIS airspeed tape markings are to be revised to incorporate actual position errors once these have been determined.

Fuel Quantity data (liters)

Tanks	Usable fuel	Unusable fuel	Total fuel
Left wing			
Right wing			
Internal		57	57

2 Engine and Propeller

KR-2S is fitted with a Jabiru 3300 engine.

The Jabiru 3300 engine is a four cycle, six cylinder boxer engine rated at 90 kW (120 HP) with a single carburetor.

Standard engine controls are the throttle and magneto switch in the cockpit, and the choke, with the choke control located either on the carburetor or in the cockpit. Starting is by handing propping or with electric starter.

The Jabiru 3300 engine in the KR-2S can use 91/96 MOGAS or 100 LL AVGAS fuel.

> Note:
> Prolonged presence of MOGAS in the fiberglass fuel tank may affect the lining of the tank.

The engine on the standard KR-2S is equipped with an electric starter, 12V 14A alternator, two magnetos, shielded harness, shielded spark plugs, diaphragm fuel pump, tachometer pickups, and thermostats for oil, cylinder head and exhaust gas temperatures.

Engine mounts are of steel tubing construction and incorporate vibration absorbing load mounts. Engine cowls are largely interchangeable and are cantilever structures attached at the firewall. The nose section is split for quick removal. Cowls are quickly removable by means of piano hinge fasteners.

The propeller on the KR-2S is a ??? fixed pitch. Part Number = ???.

3 Fuselage and Wing Structures

The KR-2S airframe is foam and fiberglass sandwich construction.

Wings are foam core, fiberglass main spars with glass fiber spar caps. The airfoil is RAF-48 series airfoil.

The primary bending loads of the wing are carried by the single main spar and the fore and aft wing struts. Wing torsional and drag loads are carried by the core material and skins.

4 Landing Gear

The KR-2S is fitted with a fixed landing gear.

The main landing gear is a composite structure that is attached to the front of the main spar and uses 30” scotchply legs from Dan Diehl and 5:00x5 Cleveland wheels. The tailwheel is a steerable full swivel type.

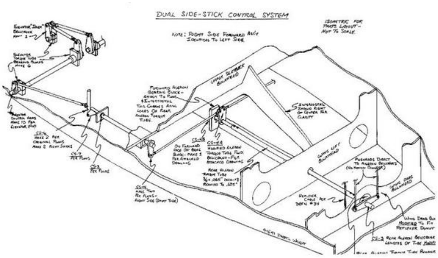
The tail wheel is steerable and the aircraft is steered with with the rudder pedals.

5 Hydraulic System

<TBD>

6 Control System and Surfaces

Dual stick and rudder flight controls are provided in the KR-2S as standard equipment. All controls are light yet solid and effective in flight at all speeds down through the minimum speed (where the canard stalls). The front set of rudder pedals is equipped with toe brakes.

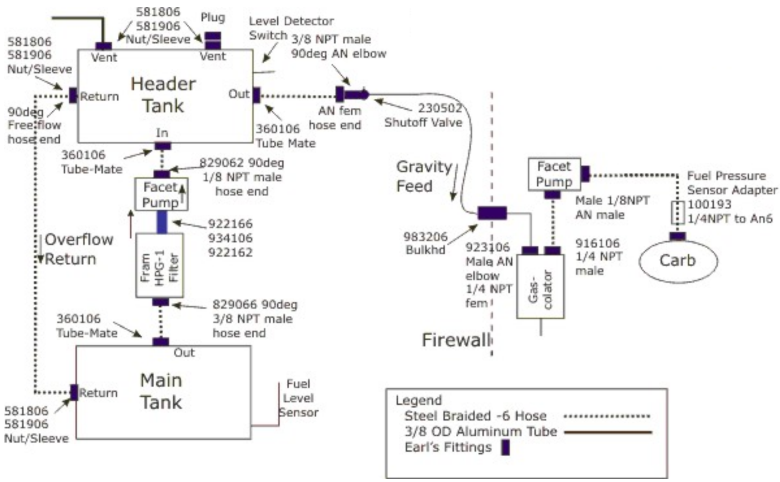


Pitch and roll control is actuated either control stick located between the pilot or passengers legs. The rudder pedals are conventional with toe brakes actuated on the left pedal set only. The ailerons are actuated by cables. The rudder actuated by cables. The elevator is configured with a push/pull rod system.

Trim is provided by an electrically actuated trim servo with the actuator switch located on the top of the left control stick and a position indicator mounted in the instrument panel. It should be noted that both flaps and cowl flap have significant impact on the elevator trim.

7 Fuel System

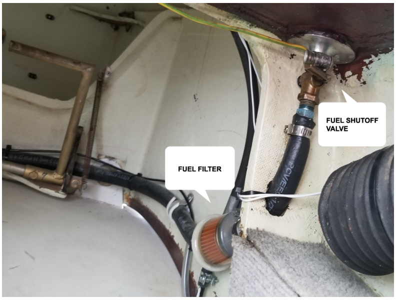
The fuel system in the KR-2S consists of a main tank, a header tank, an electric fuel pump, a gascolator and a fuel shut-off valve. The tanks should be kept full of fuel during storage of the airplane to prevent accumulation of moisture and to prevent deterioration of the seals. For long term storage without fuel, the seals should be coated with light engine oil to keep from drying out.



The fuel system in the KR-2S is simple, but completely effective. Fuel is drawn up from the main tank by the fuel pump, the pump supplies fuel to the header tank which supplies the engine providing a reserve in case of the pump failing..

A shut-off valve is used to stop the flow of fuel to the engine. This valve must be left in the OPEN position at all times, except in the case of fire.

Water is drained from the drain valve fitted to the under-surface of the fuselage and to the gascolator. The fuel filler is located behind a lockable access door on the left side of the fuselage.



A fuel strainer is located on the left bottom side of the firewall. It is fitted with a quick drain and should be drained regularly through the access ports. In order to check the fuel system for possible moisture content, the quick drain valve on the fuel strainer should be opened and drained. This procedure should be conducted prior to every flight. Fuel screens are provided at the tank outlets, in the throttle body and in the fuel pumps.

8 Electrical System

The master switch for the electrical system is located on the lower left side of the control panel, along with the magneto and starting switch. Other electrical switches and circuit breakers are grouped <on the lower right side console below of the instrument panel.>

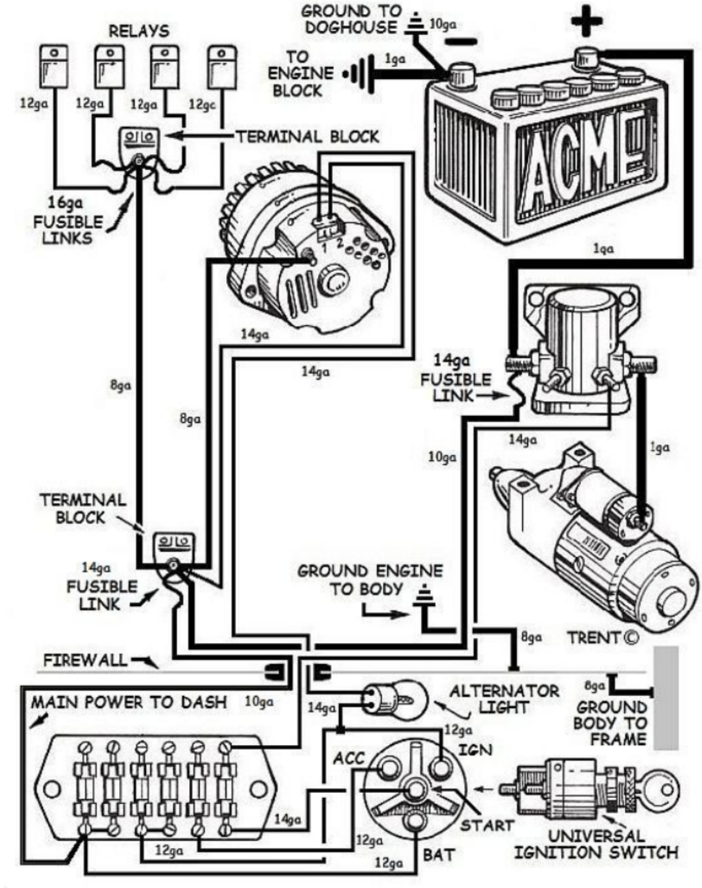
The starter switch is incorporated into the ACS switch located immediately above the master switch on the extreme right side of the instrument panel. This switch is spring loaded and is used to select the magneto OFF, LEFT, RIGHT, BOTH and also engage the starter motor in the START position. To operate, turn the ignition key to the right (START). After starting, release the key and it will return to the BOTH position.

Automatic circuit breakers are provided for all electrical circuits. These units automatically break the electrical circuit if an overload is applied to the system, preventing damage to the wires. To reset the circuit breakers, simply push in the buttons. Continual popping out of a circuit button indicates trouble in the electrical system and should be investigated.

A 12V, 8 AH primary battery, is mounted behind the seat. (See Section IV, Sub Section III for maintenance.) A 12 Volt 14 Ampere alternator is installed as standard equipment.

A voltage regulator is included into the alternator itself. The alternator provides charging current for the battery.

ELECTRICAL DIAGRAM



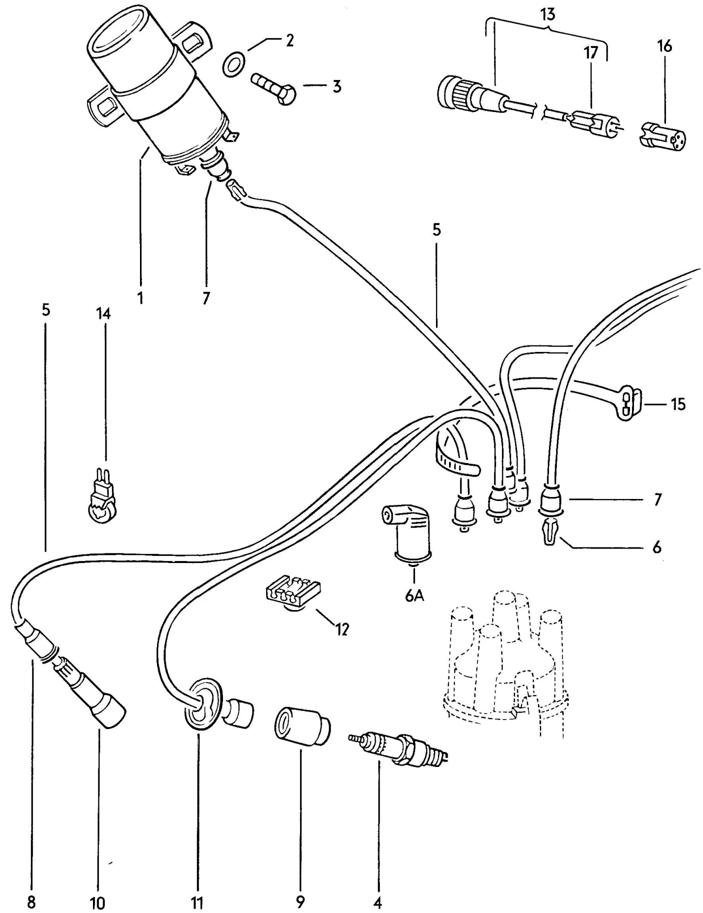
ELECTRICAL LOAD ANALYSIS

A. MAXIMUM PROBABLE CONTINUOUS LOAD - (less radio equipment):

ITEM	NUMBER USED in KR-2S	TOTAL CURRENT 12.0 Volts	14.3 Volts
Fuel Contents Gauge	1		
Fuel Pressure Gauge1			
Alternator Contactor	1	0.6	0.7
Master Contactor	1	0.6	0.7
Navigation Lights			
Landing Lights			
Instrument Flood Lights			
Strobe (Whelen)			

B. INTERMITTENT LOADS

- Landing Lights
- Fuel Pump
- Starter Solenoids
- Cigar Lighters



PRIMARY FLIGHT INSTRUMENTS

The KR-2S is equipped with basic VFR instrumentation. These include a whiskey compass, slip ball, an airspeed indicator (in kts) and a sensitive altimeter.

9 Finish

The resin used is subject to deterioration from exposure to sunlight. The aircraft should be finished with a process which includes an ultraviolet shield coat. Also, the aircraft should be hangared out of the sun. it possible. The skin should be inspected annually to ensure its condition.

External surfaces are coated with a durable synthetic enamel paint.

10 Instrument Panel

The instrument panel of the KR-2S has been designed to accommodate all of the customary conventional flight instruments in front of the pilot.

All required engine instruments are available on the EFIS and an additional tachometer is provided as part of the analog cluster. The flight instrument group is in an easily visible sub-panel. All instruments are accessible for maintenance by removing the instrument panel.

A Hobbs meter is provided to eliminate the need for constant reference to aircraft and engine log books.

11 Seats

The KR-2S has a single fixed seat provided with impact absorbing high density foam cushions. The seat is constructed of fiberglass compiste. The seat-back is reclined and allow access to the baggage compartment behind the pilot.

- The distance from the front seat to the rudder pedals can be adjusted by the choice of cushions.
- The seat is fitted with full four point harness restraints.

12 Radio Equipment

In the standard model of the KR-2S, provisions for radio installations include a microphone and headset jacks, a microphone and headset mounting bracket. Radios, in different combinations, are available and are specifically chosen to provide in the KR-2S all of the most recent radio developments normally desired in this type of aircraft.

Part II

OPERATING INSTRUCTIONS

1 Preflight

Be sure that you have been thoroughly checked out before operating this aircraft. The following safety procedure instructions must become an integral part of the pilot's operational routine and/or preflight inspection. Before each flight, visually inspect the airplane and/or determine that:

1. The tires are satisfactorily inflated and not excessively worn.
2. The landing gear pants are free of debris and do not interfere with the wheels.
3. The propeller is free of detrimental nicks.
4. The ground area under propeller is free of loose stones, cinders, etc.
5. The cowling and inspection opening covers are secure.
6. There is no external damage or operational interference to the control surfaces, wings or fuselage.
7. The windshield is clean and free of defects.
8. The tow-bar and control locks are detached and properly stowed.
9. The fuel tanks are full or are at a safe level of proper fuel.
10. The fuel tank caps are tight.
11. The fuel system vents are open.

12. The fuel strainers and fuel lines are free of water and sediment by draining once a day.
13. The fuel tanks and throttle body is free of water and sediment by draining sumps once a week.
14. There are no obvious fuel or oil leaks.
15. The engine oil is at proper level.
16. The brakes are working properly.
17. The radio equipment is in order.
18. All required papers are in order and in the airplane.
19. Upon entering the plane, ascertain that all controls operate normally.

2 Starting

Before starting the engine, the pilot should set the parking brake and turn on the master switch and check fuel valve is on.

After making sure that the propeller is clear, turn the magnetos on, apply full choke and engage the starter. As the engine fires, gradually reduce the amount of choke. If the above procedure does not start the engine, repeat the process. Continue to load cylinders by priming or unload by turning the engine over with the throttle open. If the engine still doesn't start, check for malfunctioning of ignition or fuel system.

If the engine is hot, the choke steps should be omitted.

Starter manufacturers recommend that cranking periods be limited to ten seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

Cold engine

1. Fuel valve OPEN
2. Mixture FULL RICH
3. Carb Heat FULL COLD
4. Crack throttle
5. Master ON
6. Starter ENGAGE

Warm engine

1. Fuel valve OPEN
2. Mixture FULL RICH
3. Carb Heat FULL COLD
4. Crack throttle
5. Master ON
6. Starter ENGAGE

Hand starting

1. Stand in front of the canard on the left side of the fuselage facing the engine cowing
2. Place right leg against the leading edge of the canard.
3. Place right hand flat on the fuselage
4. Use left hand to flick propeller anti-clockwise (looking from the cockpit)

After start

1. Set holding RPM (1000 - 2000 RPM)
2. Check oil pressure (> 500KPa), Ammeter and Battery indicator.
3. Avionics ON

3 Warm-Up and Ground Check

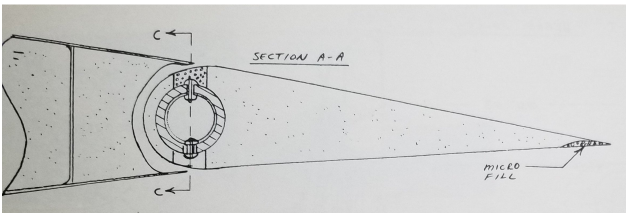
As soon as the engine starts, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble. (If a very cold temperature exists (-12 °C or below) a little longer period of time may be necessary).

Warm-up the engine at 1000-1200 RPM for approximately two minutes. Avoid prolonged idling at low RPM as this practice may result in fouled spark plugs.

The magnetos should be checked at 1500 RPM, the drop not to exceed 100 RPM. The engines are warm enough for take-off when the throttles can be opened without engine faltering.

Pre-Take Off

1. Throttle set to 1500 RPM
2. With **EMER IGN** switch to ON, press **IGN TEST** button; RPM should drop by no more than 100 RPM.
3. Check carburetor heat. Drop no more than 50 RPM.
4. Check for smooth idle at 600 to 700 RPM.
5. Check elevator full up movement.
6. Check elevator full down movement.
7. Check control stick for comfortable neutral position.
8. Check aileron deflection (amount) for smooth positive action in proper direction.
9. Check rudder, rudder pedals for complete and smooth positive action.
10. Seat belt and shoulder harness adjusted and secure.
11. Clear for traffic.



4 Take-Offs Climbs and Stalls

After the take-off has proceeded to the point where a landing can no longer be made in event of power failure. The throttle should be brought back to climbing power of 3000 RPM. The best rate of climb is obtained at 87 kts (Vy). All controls are effective at speeds down through the stalling speed and stalls are gentle and easily controlled.

STALL SPEED TABLE

Configuration	Power Off
Flaps Extended	45
Flaps Retracted	48

These figures are at gross weight (310 kg) in knots (kts).

NORMAL PROCEDURES

Takeoff roll should be started with the control stick slightly aft to keep the tailwheel on the ground to improve tailwheel steering. The plane should be allowed to accelerate to 40 mph IAS at which time rudder authority is sufficient to overcome most crosswind conditions. The tail is normally allowed to lift to improve forward visibility down the runway as the plane continues to accelerate to 55 IAS. At 55 IAS, the tail may be slightly lowered allowing the plane to fly lift off the runway. It is recommended to use a shallow climb while the plane accelerates to 87 (90 mph) IAS or higher to facilitate cylinder head cooling.

5 Cruising

The cruising speed of the KR-2S is determined by many factors including power setting, altitude, temperature, load and equipment installed on the airplane.

The normal recommended economy cruising power setting of the KR-2S is at 3000 RPM (3400 is max continuous). At 7,500 feet this gives a True Air Speed of 126 kts. This power setting produces 75% power obtained under standard conditions. Fuel consumption is about ??? liters per hour.

While the KR series of aircraft are known for extremely light elevators, pitch instability and lack of feedback to the pilot, this aircraft has been modified with an 8 foot span tail to replace the original 6 foot tail and using the 0009 airfoil. The rudder cord was also significantly lengthened to improve rudder authority. While the elevator control is still light at low speeds, it provides good feedback and feel to the pilot and is dynamically stable in flight.

Flight through heavy rain or continuous flight in rain may cause erosion of the leading edge of the propeller.

In a cruise configuration, the aircraft is extremely clean aerodynamically. Care should be taken to plan ahead for descents as the aircraft can easily exceed Vne during a light descent.

6 Approach and Landing

Approaching power-off at 60 kts, the view of the runway ahead is unobstructed so the combination of responsive controls and excellent visual cues means the aircraft can be placed on the ground very accurately either three point or with a wheeled landing.

Three point landings are the recommended method of landing the KR-2S. A typical landing roll-out can be as little as 150 meters, which is about the same as the distance to get airborne. This makes the KR-2S suitable as a short strip machine.

During the roll-out it is prudent to be aware of of the fairly high CoG and narrow wheel track, which will create a tendency to tip up on a wingtip in case of a ground-loop.

During the approach the airplane trimmed to a gliding speed of 65? kts. Normally about ??? RPM should be maintained to give a reasonable approach angle.

The amount of sideslip used during landings and the speed of the airplane at contact should be varied according to the wind, the landing surface and other factors. It is always best to contact the ground at the minimum practicable speed consistent with landing conditions.

In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds.

Notes:

1. Clear the engine often (rev it up momentarily) during long descents to avoid spark plug fouling and excessive cooling.
2. Recommended minimum approach speed 60 kts.
3. Use slips and throttle to control descent.
4. Land with stick full back to ensure directional control.

7 Stopping the Engine

After parking, the radios should also be turned off and the engine stopped by switching off the magneto's. The throttle should be left full aft to avoid engine vibration while stopping. Then the ignition and all master switches must be turned off and the aircraft secured.

Securing Aircraft:

1. Shut engine down with mag switch, throttle at idle.
2. Fuel valve off (if installed), ensure prop is horizontal.
3. Tie aircraft down securely attaching tie down ropes from the top of the wing struts and from the tail spring.

Prior to shutdown, the engine should be run for 2 minutes at 3,000 RPM, then 15 seconds at idle (2,000 RPM) to allow latent heat build-up to dissipate.

8 Emergency Procedures

8.1 ENGINE FAILURE

An engine failure on the KR-2S during flight will require an emergency landing to be performed. Trim the aircraft for the best glide speed of 39 kts. Locate a suitable landing area within the gliding range and establish an approach.

If altitude permits, an engine re-start should be attempted. If the engine does not start, close the throttle and set the mixture to cutoff. Switch off the fuel pump, close the fuel valve and continue with the emergency landing. Care should be taken to maintain the best gliding speed by using the elevator and control the descent by maneuvering and using sideslip.

8.2 BRAKE FAILURE

Main gear differential braking is the primary means of directional control below 15 kts, landing with one brake out poses a special kind of problem. If possible, select a runway with a crosswind coming from the side of the failed brake. The aircraft will weather vane into the crosswind and by careful application of the remaining good downwind brake, adequate directional control can be maintained. If it is inevitable that the aircraft will exit the runway surface and enter rough terrain or strike an obstacle, a ground loop performed using the remaining brake may be the better option and should be considered.

8.3 ALTERNATOR FAILURE

The alternator indicator warning light will illuminate indicating that the alternator is producing insufficient energy to run accessories and/or charge the battery. Also the Low Volt warning will be issued when main bus voltage drops below 13V.

Cycle the alternator field switch to see if the alternator will come back online. Pull and reset the 70A alternator B lead circuit breaker. If alternator output is not able to be restored, the remaining battery power will need to be rationed for the remainder of the flight.

Switch OFF the alternator relay to shed all alternator loads and isolate the auxiliary battery. All non-essential equipment should be switched OFF to conserve power.

8.4 EMERGENCY LANDINGS

Establish a glide at a airspeed of at least 65? kts. If you are climbing, immediately lower the nose to the glide altitude. Pick a suitable landing spot. The KR-2S glides at about a 6:1 angle, but any turbulence will strongly effect this. Consider the wind shear (gradient) as you approach the ground, and *keep your airspeed up in a strong wind.*

Perform a normal power off landing. Minimum airspeed as you begin your flare should be approximately 35 kts.

> *Any lower airspeed and you may not have enough energy to arrest your sink rate.*

8.5 SPIN REVOVERY

The KR-2S is not intended to be spun intentionally, although spins have been performed in testing.

Spin recovery from an unintentional spin is conventional. Full rudder opposite the spin direction is applied concurrently with forward stick to break the stall. The throttle should be at idle.

The engine may stop from fuel starvation, and if the propeller stops due to the low airspeed, a restart may be impossible, therefore plan for a forced landing.

8.6 EMERGENCY DESCENT

If an immediate, rapid descent is required from altitude, roll the airplane into 45 degrees of bank or more (60-70 degrees desired) and apply 2-3 G's while simultaneously reducing the power to idle. Maintain a maximum of maneuvering speed (116kts) during the spiral descent. The propeller will provide some drag at idle power. Operating at or near Cl_{max} will increase induced drag and assist with increasing descent rate and controlling airspeed. If practical, slow below 87kts, maintain 2 to 2.5 g maximum, or buffet onset, whichever occurs first.

8.7 IN-FLIGHT DOOR CLOSING PROCEDURE

In the event the door is inadvertently unlocked in flight or should the handle not be pushed forward to its full locked position before take-off and becomes dislodged from its latching mechanism, the following procedure has been determined to be practicable for closing the cabin door while in flight, assuming adequate altitude has been attained.

1. Retard throttle
2. Reduce airspeed to 87kts or less
3. Open air vent (left of pilot)
4. Close door
5. Recover power and airspeed

Other conditions, take-off, landing approach and general low altitude flight, will require action at the discretion of the pilot.

9 Ground Handling and Mooring

The KR-2S should be moved on the ground with the aid of the steering bar provided with each plane and installed in the baggage compartment.

Tie down ropes for mooring the airplane can be fastened to the wing tie down rings and at the tail skid.

The aileron and elevator controls should be secured by means of a safety belt or control locks to prevent control surface damage. The rudder is held in position by its connections with the rudder pedals and does not need to be secured except under unusually high wind conditions.

10 Weight and Balance

For weight and balance data, see the Weight and Balance Form, which gives the exact weight of the airplane and permissible center of gravity conditions.

11 Operation Tips

In the operation of the KR-2S, as in that of any other type of aircraft, there are a few points of technique and information that apply particularly to this model. The following Operating Tips may be helpful in the operation of the KR-2S:

1. Learn to trim the airplane for take-off so that only a very light back pressure on the wheel is required to lift the ship off the ground.

2. The best speed for take-off is at about 55 kts under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in event of engine failure.

3. Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.

4. Before starting the engine ascertain that all radio switches, light switches and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.

5. The trim tab on the KR-2S is very responsive and a small adjustment in trim control gives a rapid trim change attitude.

12 Radio Operation

Communication and Transponder equipment controls are located in the center of the instrument panel. Associated auxiliary switches are located on a separate panel on the right side console. Circuit breakers are located on the same panel as the other circuit breakers.

All sets may be turned ON by the switch located on the control head of each particular unit, with the exception of the EFIS which has its switch located on the right hand console panel.

After power is supplied, the pilot may wish to operate the transmitter by moving the transmitter selector switch to the proper position. The switch is located on the selector switch panel.

13 Carburetor

2 x BING 36mm (1.42 in) hand lever choke

14 Flight Operations

Operation	RPM	Power (kW)	Speed (kts)	Fuel flow (l/hr)
Normal max rated	6800	37	75	25
Performance cruise @ 75% pwr	5000	26	126	21
Cruise @ 55% power	4500	20		20
Approach (V_{ref})			60	

Engine limits

Operation	Normal	Max	Min	Unit
Cylinder Head Temp	170-210	220 (235 for 5 sec)		°C
Oil Temp	90			°C
Oil pressure	250		50	KPa

Flight in rain

The Rand Robertsonhas a canard that is loaded heavier than the aft wing. About two thirds of the aircraft weight is carried by the canard. The Rand Robertson supports a large laminar flow. When the laminar flow is disturbed the airfoils produce less lift and more drag. There can be up to 6kts loss of airspeed. In sever cases the loss of lift can cause a pitch down moment due to the heavier loading of the canard.

Since it requires more aft stick for level flight under these conditions, the aft stop will be reached at a higher airspeed which in turn produces a increase in minimum airspeed. Consequently, in rain, landing speed can be increased by 7 to 9 kts.

It should be noted, but is no cause for concern. Flight in rain requires nothing more than re-trimming the pitch system.

> Note:
>
> Takeoff in rain can cause the takeoff roll to be as much as 50% longer than normal.

As a precaution, be sure to inspect the leading edges and especially the top surfaces of the canard and wing for any contamination before and after every flight.

Part III
CHARTS

1 Performance Charts

CRUISE SPEED

CONDITIONS:
Standard atmosphere
Mixture set to best power for 75% power.

STALL SPEED GROSS WEIGHT

CONDITIONS:
Idle power
Deceleration 1 kt/s

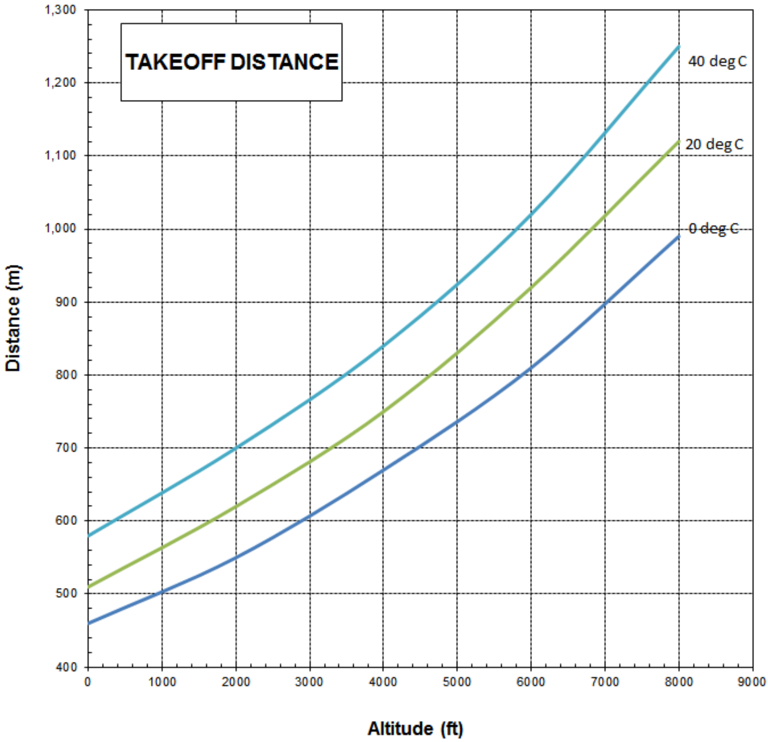
CRUISE RANGE

CONDITIONS:
Standard atmosphere
Mixture leaned

2 Power Charts

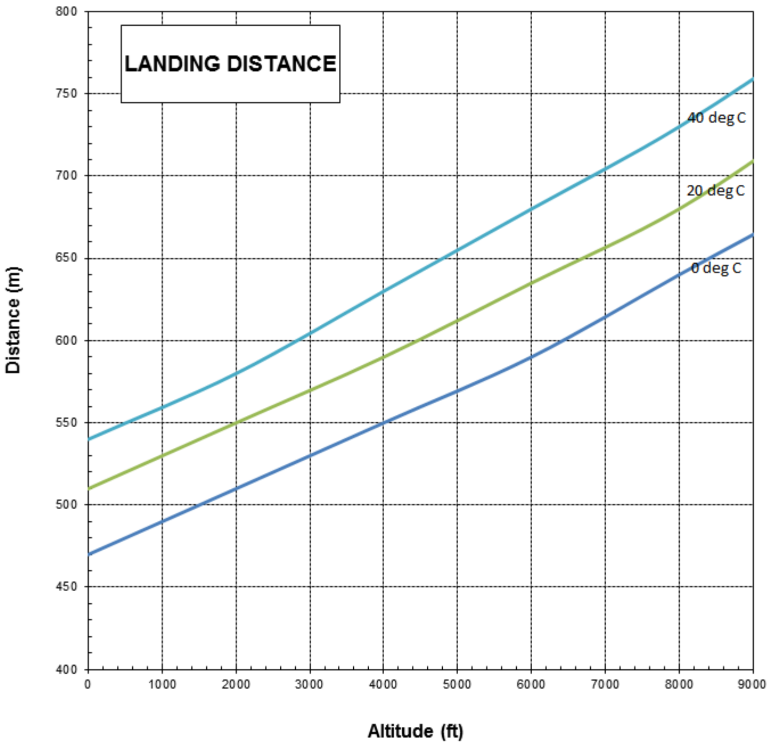
TAKEOFF DISTANCE

6800 RPM
Paved, Level, Dry Runway Zero Wind



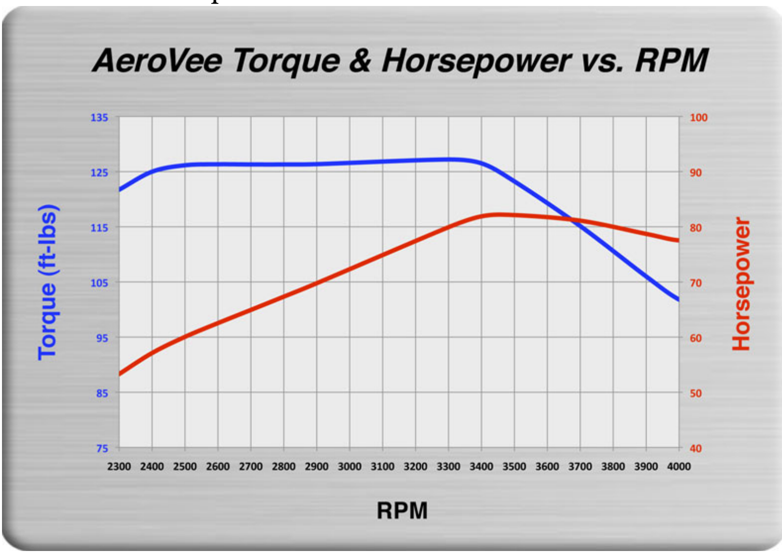
LANDING DISTANCE

Power OFF
Maximum Braking
Paved, Level, Dry Runway Zero Wind



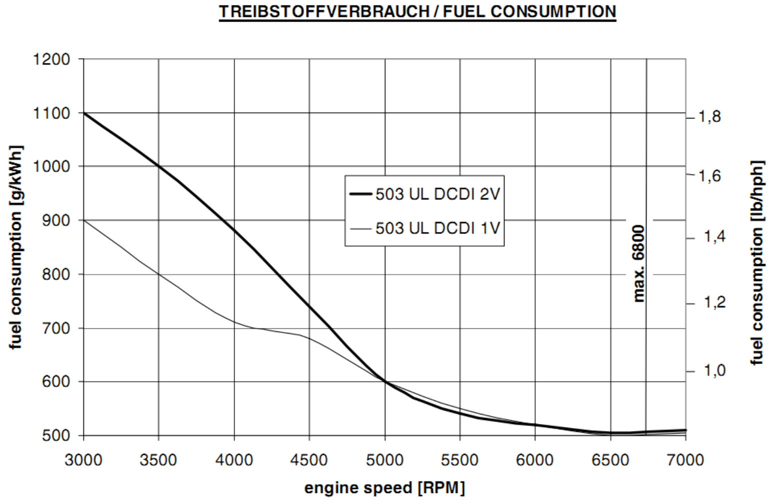
POWER REQUIRED - TAS

Standard atmosphere



FUEL FLOW

Standard atmosphere



Part IV

GENERAL MAINTENANCE

1 Leveling and Rigging

Leveling the KR-2S for purposes of reweighing or rigging is accomplished as follows:

(1) Put the airplane on jacks to obtain the longitudinally level position.

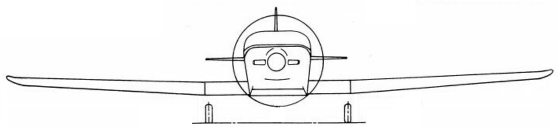
(3) To level the airplane laterally, place a bubble-protractor on a straight-edge held along the front spar on the under surface of the wing. Raise or lower the wing by pushing up or down on the tip until five degrees of dihedral is indicated on the protractor. The smooth, easy action of the landing gear makes it possible to position the wing laterally with very

little effort. After checking the first wing at 3.5° dihedral, the opposite wing should also be checked to make sure it has equal dihedral.

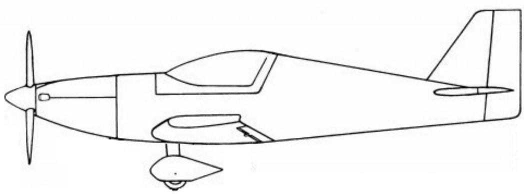
RIGGING INSTRUCTION:

Although the fixed flight surfaces on the KR-2S obviously cannot be adjusted in position for rigging purposes, it may be necessary on occasion to check the positions of these surfaces. The movable control surfaces have adjustable stops, as well as adjustments on their cables or push-pull connections, so that their range of movement can be altered. The positions and travels of the various surfaces are as follows:

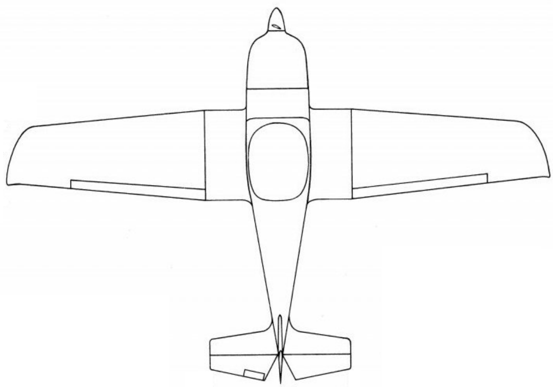
1. Wings: ??? 3.5° dihedral, washout 0°. ???
2. Canard: ??? 3.5° anhedral. Incidence is 0° in relation to horizontal. ???



3. Fin: Should be vertical and in line with centerline of fuselage.
4. Ailerons: Travel -30° up, 17° down.
5. Elevator: -30° up and 15° down.



6. Rudder: Travel -35° left and 35° right.



For the purpose of adjusting the lateral trim on the KR-2S, aileron tabs are incorporated on both ailerons. These tabs can be bent to position the aileron in flight, changing the lateral trim as desired.

2 Tire Inflation

For maximum service from the tires, keep the KR-2S main wheels inflated to 2(?) bar. Reverse the tires on the wheels, if necessary, to produce even wear. All wheels and tires are balanced before original installation and the relationship of tire, tube and wheel should be maintained upon re-installation. Out-of-balance wheels can cause extreme vibration in the landing gear during take-off and landing. In the installation of new components, it may be necessary to re-balance the wheels with the tires mounted.

3 Battery Service

Access to the 12 volt, 8 ampere hour main battery is obtained by folding the seat-back forward. The battery is installed on an aluminium and wood tray and secured with a clamp. The battery is of sealed gel type and requires no routine maintenance.

If the battery is not up to proper charge, recharge starting with a charging rate of 4 amps and finishing with 2 amps. Quick charges are not recommended.

4 Brake Service

Periodic adjustment of brake clearances may be necessary on the KR-2S brakes. If after extended service, braking action requires too much movement of the toe pedal, new brake linings can easily be installed by removing the four bolts which attach the brake units, then replacing the brake linings held in place by brass rivets.

Main wheels are quickly removed by first cutting the safety wire and removing eight bolts to drop the brake lining. Remove the dust cover, cotter pin and axle nut. The wheel will slip off the axle. The nose wheel is removed by taking off the hub nut and withdrawing the axle bolt, the axle retainer cups and the axle from the nose wheel fork.

Tires are dismounted from the wheels by deflating the tube, then removing the wheel through bolts, allowing the wheel halves to be separated. In reassembling the wheels, care should be taken to torque the bolts properly, according to instruction on the wheels.

5 Landing Gear Service

In jacking the KR-2S up for landing gear and other service, the Jack Kit (available through the BRADY Distributor Service Department) should be used. This kit includes two hydraulic jacks and a tail support; the jacks are placed under the main gear near the hinge points and the tail support attached to the tail skid.

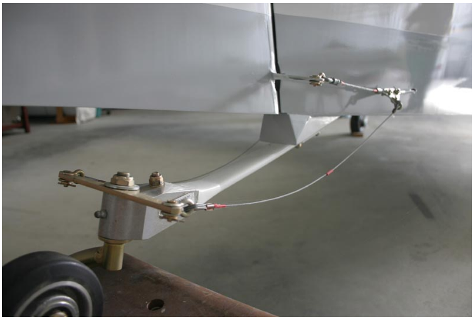
The right and left landing gear units on the KR-2S are completely interchangeable.

All inside components are identical on both nose and main gears.

The operation of the landing gear is standard for the sprung type; and requires no maintenance apart from checking for cracks.

To check shimmy of the nose wheel, if it should develop:

1. Ensure that the wheel and tire assemblies are properly balanced.
2. Check for uneven tire wear.
3. Check the engine mount and gear leg for any cracks or play. The gear leg attach bolt, at the top of the leg, may be loose allowing movement of the leg in the mount socket.



6 Hydraulic System Service

N/A

7 Fuel Requirements

Aviation grade 100LL octane or automotive at least RON 90 should be used in the KR-2S. The use of lower grades of fuel can cause serious engine damage in a very short period of time.

European standard	American standard	Canadian standard
min. RON 90		min AKI 87
EN 228 Regular	ASTM D 4814	CAN/CGSB-3,5
EN 228 premium		Quality 1
EN 228 premium plus		
AVGAS 100 LL		

8 Care of Air Filter

The air filters must be cleaned at least once every fifty hours and depending on the type of condition existing, it may be necessary to clean the filters daily or every five hours. Extra filters are inexpensive and should be kept on hand and used for rapid replacement.

The following cleaning procedure is recommended by the manufacturer of the filter:

1. Remove filter, inspect and clean by tapping it against a hard surface to remove grit, sand and dirt. (Do not blow out with an air hose, soak in oil, or cleaning fluid).
2. If the filter is found to be in good condition and is not obstructed after being properly cleaned, reinstall filter.

Two K&N RC 1200 filters fitted to Jabiru 3300

9 Care of Windshield and Canopy

The windshield and canopy are made of Plexiglas and a certain amount of care is required to keep them clean and clear. The following procedure is suggested:

1. Flush with clean water and dislodge excess dirt, mud, etc. with your hand.
2. Wash with mild soap and warm water. Use a soft cloth or sponge. (Do not rub)
3. Remove oil, grease or sealing compounds with a cloth soaked in kerosene.
   CAUTION - Do not use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner or window cleaning sprays.
4. After cleaning, apply a thin coat of hard polishing wax. Rub lightly with a soft dry cloth.

5. A severe scratch or mar can be removed by using jewelers rouge to rub out scratch, smooth on both sides and apply wax.

10 Serial Number Plate

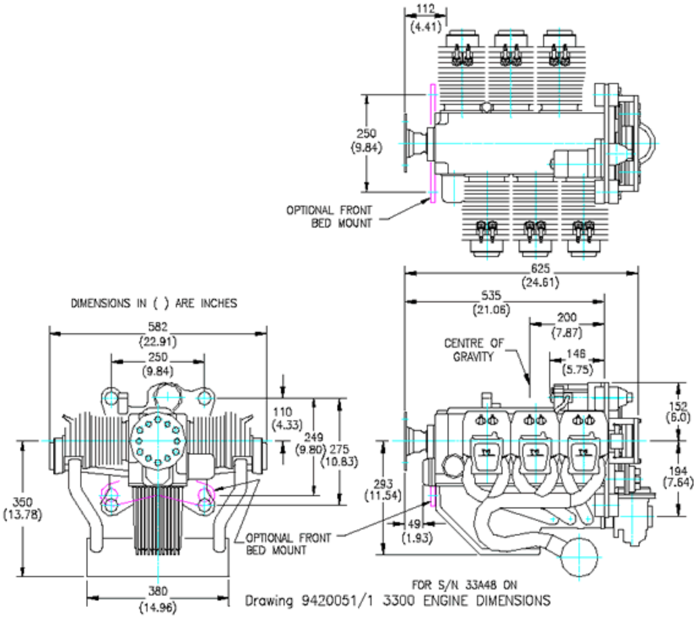
The serial number plate on the KR-2S is located against the upper right corner of the firewall. The serial number of the plane should always be used in referring to the airplane in service or warranty matters.

11 Jabiru 3300 Engine

Technical Specifications

TYPE	Horizontally opposed, four-cycle,four-cylinder
MODEL	Series III
DISPLACEMENT	1835 cc
BORE	92 mm ???

STROKE	69 mm ???
COMPRESSION RATIO	Theoretical 10.8 - effective 6.2 ???
INDUCTION	Single carburetor.
IGNITION	Single electronic Hall Effect system
RAMP WEIGHT	72 kg
POWER RATING	60 HP @ 3400 RPM
COOLING:	Air cooled



Part V

WEIGHT AND BALANCE DATA

1 Loading Sheet

Make: Rand Robertson

Model: KR-2S

Serial Number: 000

Datum:	???
Design CG Range:	52.0 to 72.2 cm
Wing LE:	
Main wheel right:	
Main wheel left:	
Tail Wheel:	
Fuel Main:	76.2
Fuel Header:	20.30
Pilot and Pax:	106.7
Aft Baggage:	

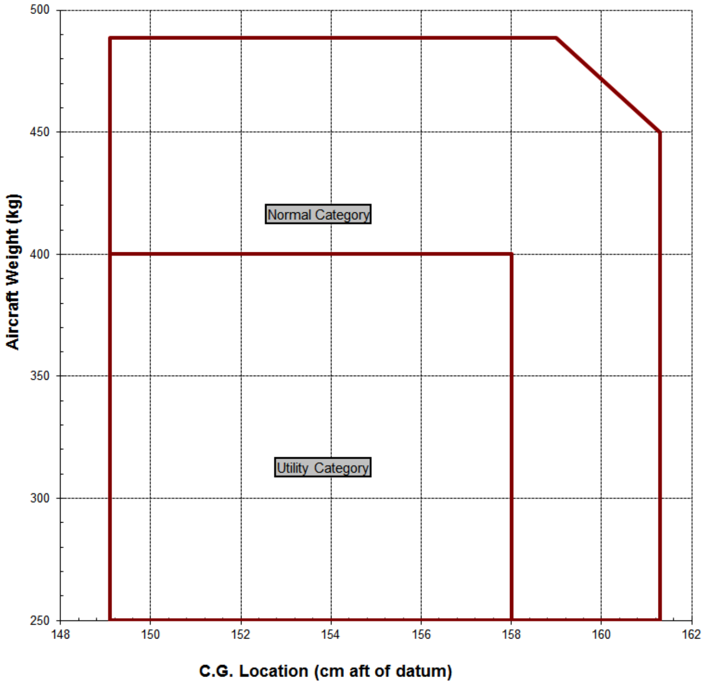
Aircraft weighed empty in level attitude. (Includes ? lit of oil plus unusable fuel)

	Weight (kg)	Arm (cm)	Moment
Right Wheel			
Left Wheel			
Tail Wheel			

Total:	340.8 kg
Empty CG:	49.0 cm

2 W&B Envelope

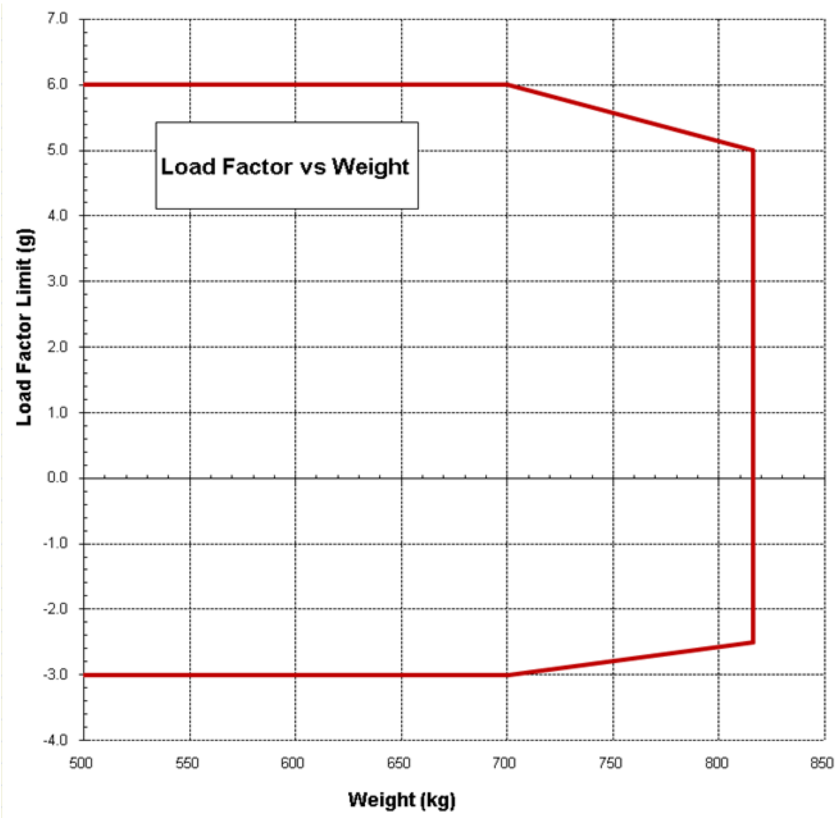
Datum: <In words> ???



Category	Description	Maneuver	Load factors
Normal	Non aerobatic	Stall from level flight Steep turn of 60 deg	+3.8g and -1.5g
Utility	Limited aerobatics	Wingover / Lazy-8 / Chandelle	+4.4g and -1.8g
Acrobatic	None permitted		

3 Load Factor Limits

Weight 700 kg (1550 lb) and below: educing linearly to 820 kg (1800 lb):	+6g to -3g +4.4g to -2g
Flaps Extended:	N/A

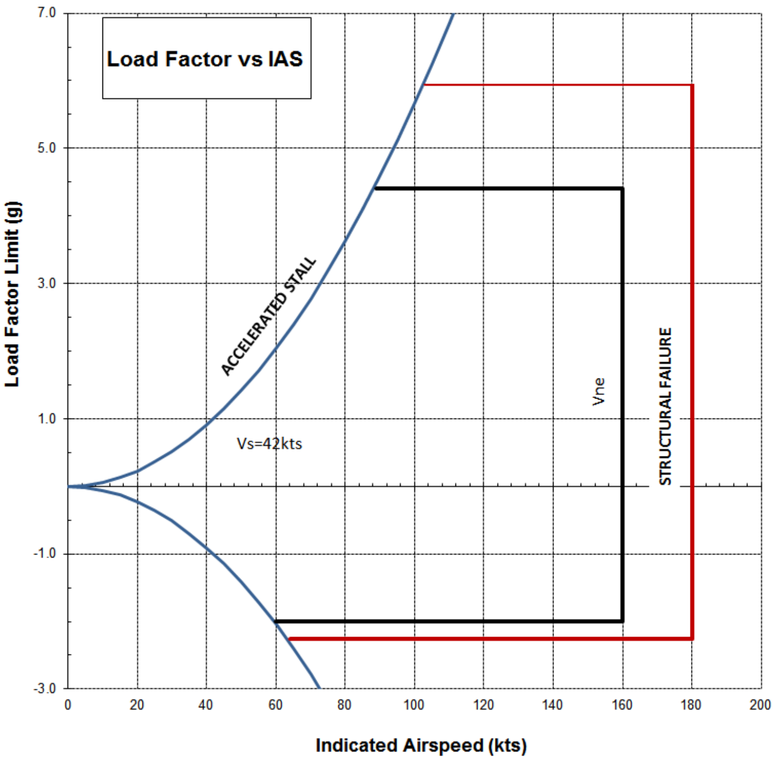


The load factor limit varies linearly between 820 kg and 700 kg.

NOTES:

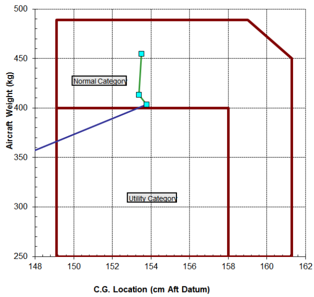
1. The load factor limits for flaps extended are based on FAR 23 structural design criteria, which the KR-2S aircraft is designed to.

4 Flight Envelope



5 Worked Examples

Normal loading - Solo



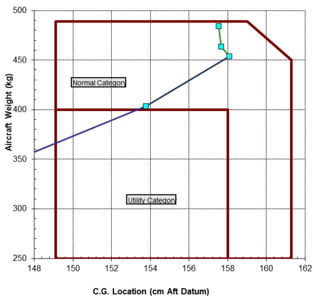
DRAGONFLY

	Qty	kg Weight	cm Arm	Moment
Basic Empty Weight	314 kg	313.5	142.5	44,674
Pilot	90 kg	90 kg	193.0	17,370
Pax	0 kg	0 kg	193.0	0
Aft Baggage (10 kg Max)	0 kg	0 kg	232.0	0
Fuel Header Lit. (14 Lit Max)	14 lit	10	137.2	1,345
Fuel Lit. (59 Lit Max)	59 lit	41.3	154.9	6,397
Total (M.G.W. = 489 kg)		454.6	153.5	69,786

Note: Max Landing Wt
489 kg

227.5

Cross country loading - Payload



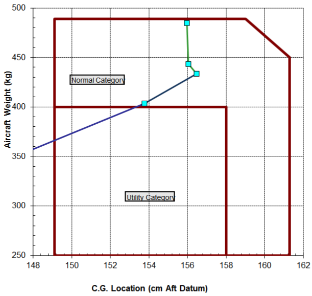
DRAGONFLY

	Qty	kg Weight	cm Arm	Moment
Basic Empty Weight	314 kg	313.5	142.5	44,674
Pilot	90 kg	90 kg	193.0	17,370
Pax	50 kg	50 kg	193.0	9,650
Aft Baggage (10 kg Max)	0 kg	0 kg	232.0	0
Fuel Header Lit. (14 Lit Max)	14 lit	10	137.2	1,345
Fuel Lit. (59 Lit Max)	30 lit	21	154.9	3,253
Total (M.G.W. = 489 kg)		484.3	157.5	76,291

Note: Max Landing Wt
489 kg

227.5

Cross country loading - Range

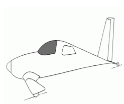


DRAGONFLY

		kg	cm	
	Qty	Weight	Arm	Moment
Basic Empty Weight	314 kg	313.5	142.5	44,674
Pilot	90 kg	90 kg	193.0	17,370
Pax	30 kg	30 kg	193.0	5,790
Aft Baggage (10 kg Max)	0 kg	0 kg	232.0	0
Fuel Header Lit. (14 Lit Max)	14 lit	10	137.2	1,345
Fuel Lit. (59 Lit Max)	59 lit	41.3	154.9	6,397
Total (M.G.W. = 489 kg)		484.6	156.0	75,576

Note: Max Landing Wt
489 kg

227.5



Part VI

APPENDIX

1 WEIGHT AND BALANCE

Once your aircraft is fully assembled for the first time, the initial order of business (before flying) must be to determine the weight and balance of the aircraft.

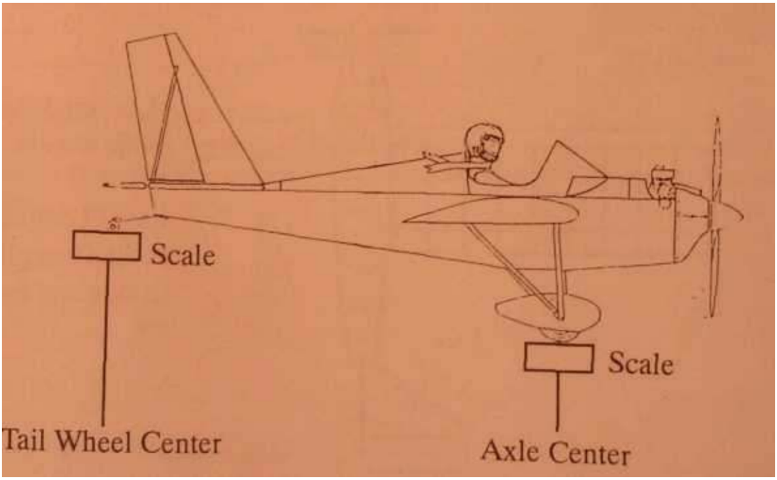
The location of the center of gravity is critical to the handling of the aircraft.
The process is very simple, if you have access to a couple of accurate scales which will measure up to about half the aircraft weight each.

1. Place the aircraft on scales in a level flight position, longerons level to the horizon (spanwise and chordwise).
2. Drop a plumb bob over the leading edge of the wing near the wing root and mark location on the floor.
3. Locate a second point on the floor directly below the centerline of the front axle tube.
4. Also locate a third point on the floor using the plumb bob or equivalent, directly under the centerline of the tailwheel.
5. The distance in inches between points located in Step 2 and Step 3 can be called DM (Distance Main wheels).
6. The distance in inches between points located in Step 2 and Step 4 can be called DT (Distance Tail wheel).
7. With the pilot seated in the cockpit, record the total weight on the scales of both front wheels. This can be called WM (Weight Main wheels).
8. With pilot still on board, record weight on the tail wheel. This can be called WT (Weight Tail wheel).

9. Next, multiply (WM) x (DM). This figure is called a Moment MMW (Moment Main Wheels).
10. Do the same for (WT) x (DT) to get MTW (Moment Tail Wheel).
11. Now add together (WM) + (WT). This is the TAW or total aircraft weight.
12. Add the two moments determined in Steps 9 and 10 (MMW + MTW) to get TM (Total Moment).
13. Divide this figure. TM, by the total aircraft weight TAW (from Step 11).
14. The answer will be the distance in inches from the wing leading edge to the Center of Gravity (C.G.).
15. To find the C.G. in percent of the wing chord, divide this answer by the chord 137 cm (54" inches).

For all VIKING aircraft, the C.G. should be between 28.7 and 41.1 cm (11.3" and 16.2"), or 21% to 30%. Optimum flight characteristics have been obtained with the C.G. at approximately 28-29%.

Fuel weight will have a slight effect as it burns off, and you may wish to calculate the C.G. location with both empty and full tank(s).



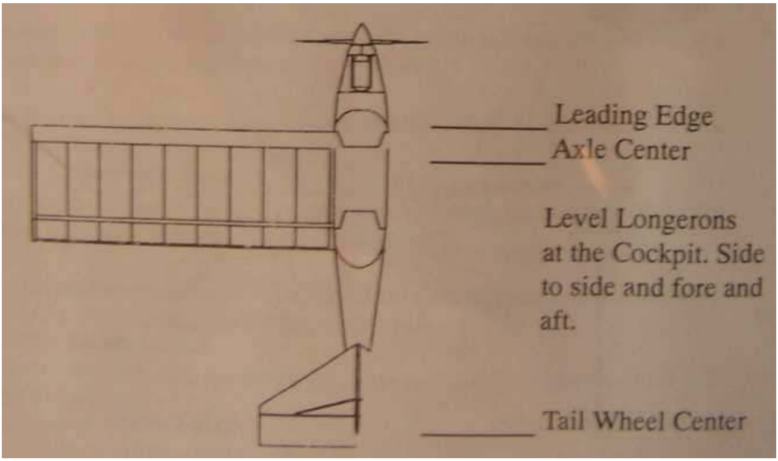
Now refer to the correct weight and balance envelope for your model Draw a line straight up from the "total weight." and a horizontal line straight across from the C.G. location.

If these lines intersect in area "A", your aircraft falls into the equivalent "utility" category, and is safe for maneuvers not exceeding a load factor of +4.4 and -1.8 G‘s.

If you fall within area "B", your aircraft falls within the "Standard" category, and is good to +3.8 and -1.5 G’s.

In many cases, you may find that, with empty tanks you fall within one category and with full tanks, the other. If this is so you may need to experiment with partially filled tanks to determine your actual limits.

If you have installed optional tanks (for example an additional 5 gallon tank behind the seat), you may fall within the proper weight and balance envelope with tanks empty and full, but the center of gravity may actually be too far aft with the forward tanks empty and the rear tank full. In this case, you should always use fuel from the rear tank first.



LOADED WEIGHT AND BALANCE CHART

DM = _________ DT = __________ WM= __________ WT= _________

Main Wheel Moment:

WM _________ x DM __________ = MMW __________

Tail Wheel Moment:

WT _________ x DT __________ = MTW __________

Total Aircraft Weight:

WM _________ + WT___________ = TAW __________

Next, add the two moments:

MMW __________ + MTW __________ =__________ TM

Next, divide total moment by total weight:

TM _________ / TAW ___________ = __________ CG.

CG _________ / 54 ___________ % Chord.

CG should be between 149.1 and 161.3 cm aft of datum. Optimum flight characteristics have been obtained with the C.G. at approximately 28-29%.

2 FLIGHT TEST PROCEDURES

Flight test of your new Rand Robertson aircraft must be preceded by a very careful preparation.

First, prepare yourself. You should have a reasonable proficiency in flying tail-dragger airplanes such as Piper Cubs. Aeronca Champs, or the like. At least some of your flight time in such airplanes should be at least proficient to solo these airplanes. Also read the following section "Reflections on your first flight." to get an idea of what your fellow builders have learned from their experiences.

Next, perform the weight and balance calculations of appendix A. Do not attempt any flights, even high speed taxi, before completing this step.

Now perform the most thorough preflight you have ever done. Have your pilot friends, and any one else available perform a thorough preflight. At least one of you should find the loose nut, the empty gas tank, loose prop bolts, unsafetied wing pins, or other discrepancies you forgot during assembly.

Engine run-in should have been performed per the engine manual instructions.

The first order of business is simply to practice taxiing the aircraft, which will familiarize you with the ground attitude and handling characteristics. A grass runway is preferable for the early testing and flights, especially for low time tail-dragger pilots. Tail down and tail up taxiing should be done, with several runs up and down the runway. Note the tachometer and airspeed readings. You should probably burn at least one-half a tank of gasoline during this phase. Just in case, be mentally prepared to fly, since the aircraft is probably much lighter than anything else you've flown, and you will be airborne before you expect it.

Now, repeat the thorough preflight to detect any looseness that developed during the taxi runs. Vibration may have loosened any improper glue joints or improperly tightened or safetied fittings by this time.

Refill the gas tank, and *prepare for your first flight*!

There are two common approaches to the first flight. One approach is to make a series of "flea skips", where you fly a short distance at just a few feet of altitude and then land straight ahead before reaching the end of the runway. This is advantageous in case anything goes wrong (such as an engine failure), but has the disadvantage of keeping the aircraft in the most hazardous regime (close to the ground at low speed) for a relatively long time. We would recommend this approach if you arc an experienced pilot with a long runway available.

The other approach is to make the first flight a complete circuit of the pattern. The disadvantage is, of course, that if anything goes wrong (again, such as an engine failure or missing nut or bolt), you are further from mother earth. The advantage is that you have more space to learn the feel of the airplane without worrying about inadvertently contacting something hard (like the ground).

Whichever approach you choose, you eventually have to get away from the runway! Plan your first flight so as to have a place to land at all times if the engine fails.

Perform your takeoff checks using the printed list as a guideline. Taxi to the runway centerline, just as you did on the taxi runs or your "flea skips", but this time you fly.

Smoothly add power until the throttle is fully open, correcting for "torque" effects (note that left - not right - rudder will probably be required with the Rand Robertson and Volkswagen powered models).

First Flight

[Vaughan Askue CHAPTER 5]

At this point you've checked out all the aircraft systems critical to flight. You've practiced takeoffs and landings, you've verified control effectiveness, you understand how trim changes with power, and you have some idea of stability. The first flight should be anticlimactic, and that's the whole idea.

You've developed the necessary skills in yourself and know how the airplane will perform, so far as you can, so all that remains is to plan what to do on that first flight. The purpose of the first flight is to open an envelope large enough to allow a safe pattern and landing. This envelope will then serve as the starting point for the development of the of your airplane's envelope, as described in Chapter 6.

Flight Card

Planning the first flight consists of completing what is known in the testing business as a flight card. The flight card is a written plan that describes what intend to accomplish on a given flight. It goes with you in the cockpit and serves as a checklist to ensure that you do all you have planned and nothing more.

Fig 5.1 show a typical flight card as written for our example airplane, (150 horsepower, 45-knot Vs). Your flight card may differ because of in speed or other factors, but the approach should be the same. As before, use a step-by-step or building-block approach to minimize surprises and to enable you to back off to a condition you have already flown, in case a maneuver or condition causes trouble.

The card for a first flight should be organized around a baseline speed; let's call it V0. This will serve as your climb-out speed, the starting point of your envelope, and the speed you fall back to in case of trouble, V0 should be equal to or greater than 1.4 Vs and should be fast enough to allow good visibility and engine cowling. Conversely, it should be slow enough to allow a good rate of climb. For some airplanes with poor climb performance, this might mean climbing at the predicted best-rate-of-climb speed.

The flight card should also include a list of limitations, This list is to prevent you from doing something you shouldn't under the pressure of the moment. In Figure 5.1, for example, we had set out very strict limits on winds, c.g., and bank angle. These limits should be adhered to absolutely. Recheck your c.g. calculations before each flight. If the winds are over your limits, don't let anyone pressure you into flying. Only a major crisis should induce you to exceed a bank angle of more than 30 degrees below 1,500 feet.

The first item on your flight card should be something you've already done, in this case a full-power land-back. This will not only help you loosen up and shake out the mental cobwebs but will also indicate to you that the airplane is up to snuff.

After the land-back, taxi back and prepare to take off. As you sit on the end of the runway, run through a short mental exercise. Check control freedom and note the fuel level. Check the abort point intend to use. Then imagine all the emergency landing spots for this direction of takeoff and decide which ones you will go for if the engine fails at 500 feet or at 1,000 feet.

First Flight Procedure

It's time to go. Apply full power and accelerate as you have done so many times before, lift off and accelerate to V0. Then pull the nose up and climb, maintaining V0. In case of a problem, a landing on the runway is probably possible at or before V0. Once you have started to climb you are are committed to an off-field landing.

Climb straight ahead at V0 to 1,000 feet and the execute a 180 climbing turn at a 30 degree angle of bank (AOB). This will put you in

a position, so that, in case of a problem. a simple power reduction will set up the downwind leg for landing. Check the engine gauges at this point, with special attention to the cylinder head temperatures. If anything is at or in the red, simply reduce power, execute a normal pattern. and land. If all the gauges are good, continue to climb, using 30- degree AOB turns for positioning to 4,000 feet above ground level (AGL).

There are several philosophies as to where to do the flying for your first flight. If the airport authorities nave no objection, I suggest flying immediately over the airfield. My next choice would be upwind of the field. Both of these areas give you the best chance of getting back to tho field in case of a major problem. In any case, your flying should be done at least 4,000 feet AGL over an unpopulated area.

At 4,000 feet, level off and reduce power to maintain level flight at V0. There should be no large pressures on the stick or pedals, and the controls should be about at mid travel Execute 30- and 45 degree AOB turns to both right and left. This is where the marks on your windscreen pay off. You should be able to fly pitch and roll attitudes accurately by placing the appropriate marks on the horizon.

Entering the turns should require only gentle roll and yaw inputs in the direction of the turn. Only minor longitudinal inputs should be required to hold altitude. The airplane should not pitch strongly up or down or have a strong tendency to roll into the turn.

Slow to 60 knots. The stick should come back a noticeable amount as yon slow down. Again, do left and right turns but only to a 30 degree AOB.

Level your wings and very gently do one or more full stalls. Note the indicated stall speed (Vs) and any warning the airplane might be trying to give you. You should be able to hold the wings level with rudder, and there should be little or no wing drop at the stall.

If your airplane does not satisfy the criteria in the last three paragraphs, it is your first indication of a stability and/or control problem. If the problem area is minor and easily controlled, continue the flight and fly the landing pattern with special care. If the problem appears to be severe, skip the flap-down portion of the flight, descend and land. You will be using the techniques of Chapter 7 to analyze the problem and devise fixes. If there are no apparent problems, repeat the 80 knot (V0) turns, 60 knot turns and stalls with the flaps in the intended landing position. If any of the criteria appear appear appreciably worse with the flaps down, fly the pattern and land with zero flaps.

Descend at V0 and about 500 feet per minute (fpm) to pattern altitude. Opposite your touchdown point, reduce power, lower landing flaps, and slow to 1.4 Vs· On final, slow to 1.3 Vs·

If at this point everything is under control, you will want to do a missed approach. At about 100 feet smoothly apply full power, accelerate to V0, retract the flaps, and climb at V0. Execute the same pattern, using 30-degree bank turns and slowing to 1.4 Vs on downwind and to l.3 Vs on final to the landing.

FLIGHT CARD

FLIGHT NUMBER 1 FUEL full
TAKEOFF WEIGHT 1,230 lbs. CG 129 in

LIMITATIONS:
10 kts. wind '
45 deg. maximum angle of bank
30 deg. maximum bank below 1,500 ft. AGL
100 kts. maximum speed

MANEUVERS:
1. Land-back from 80 kts
2. Takeoff
3. Climb, 80 kts.
4. LT in climb, 30 deg. AOB, to climbing downwind
5. RT, 30 deg. AOB
6. Level, 80 kts., 4,000 ft.
7. LT, 30 deg. AOB
8. LT, 45 deg. AOB
9, RT, 30 deg. AOB
10 RT, 45 deg. AOB
11. Level, 70 kts.
12. Level, 60 kts.
13 LT, 30 deg. AOB
14. LT, 30 deg. AOB
15. Stall, wings level.
16. Descend, V0
17. Downwind, V0
18. Final, V0
19. Go-around, V0
20. Downwind, V0
21. Final, V0
22. Landing.

KEY
LT=left turn, RT=right turn, AOB=angle of bank

Follow-up

You will probably taxi in with the biggest grin you have ever had to find yourself showered with congratulations! Enjoy it-you've earned it. It's important, though, to resist the temptation to make another flight. You're not prepared for it, and you have other things to do first.

After the idolizing crowds have cleared out, sit down with a few knowledgeable friends and discuss the flight. In your mind, go back over everything you did and the numbers you saw, looking for any signs of trouble. Any potential problem needs to be fixed or to be investigated on the next flight.

The other thing that must be accomplished at this point is a full structural inspection. This is the first time your airplane has seen full flight aerodynamic, and vibration loads for any significant length of time. Any problems that show up now should be considered serious and should be dealt with promptly.

Pay special attention to any evidence of rubbing or wear in the engine compartment or fairings. This kind of problem is simple to fix now and can cause a lot of aggravation if let go. Also check all fittings for slop or evidence of motion. Poor fits and joints will show up more readily after a flight.

Further Reading

Bingelis, Tony, 1989. Testing Homebuilts, Stage Two: Making the Initial •:,qc,c1t ,;l11/11tlm1 (February), 27.

Chamberlain, Brad. "Dragonfly Fever," Sport Aviation (March 1985), 51.

II' "11"1 n°mr1mmhlp , , , The Second Time Around," Sport Aviation (May), 52.

Reflections on Your First Flight

With many VIKING aircraft now flying, we have had an opportunity to receive feedback about many of your fellow builders first flights and how they went. Some of this accumulated wisdom may help you on your first flight.

1. If a soft grass area is available for first flights, by all means use it. The aircraft (and any light taildragger)

will handle much more smoothly and be more docile on grass, whereas on pavement, it can be much more sensitive.

2. Very little forward stick is needed to raise the tail on takeoff. For a pilot accustomed to flying a Champ or Piper Cub, the tail of a MAX will come up much faster than you think, in fact, just about everything will happen much faster than you expect! Stick slightly forward is sufficient, and apply power slowly.

3. After your initial take-off and climb-out, if the cylinder head temperature is OK and the engine is running smoothly, take your time and don't be in a rush to land. Get some altitude and feel out the airplane's handling.
   Shoot two or three long, leisurely approaches to accustom yourself to how the aircraft responds to the controls and the throttle.
   The elevator trim tab will need to be adjusted (unless you have the optional electric adjustable tab), and you will need time to relax in the air and evaluate your specific needs.

4. Even high time pilots accustomed to flying heavier, faster airplanes will need to re-adjust their reactions in ultralight aircraft.
   First of all, the plane will react faster to changes in the throttle, and will slow down faster than anything else you have flown. The power off glide will be much steeper than you think, and you will need extra airspeed to have enough energy to flare for the landing - and when you begin to flare, you will slow down very quickly!

5. Many of you have called after your first flights and commented on how strong the landing gear is. In our conversations with you, we have found several common reasons for frequent hard landings:

   (a) Many people are making their approach too slow, resulting in, again, running out of elevator power in the flare. One reason for this might be an erroneous airspeed indication, since in many of these cases, the pilot claimed a top speed, with a Jabiru 3300 engine, of about 85 mph! You can certainly rest assured that such an airspeed is incorrect, since the top speed of a 277 powered MAX-103 should be about 70 mph. The cause of the inaccuracy is probably the location of the static pressure pick-up. The section labeled "STATIC PRESSURE MEASUREMENT" may enlighten you on improving this situation.

(b) Third, the MAX planes, being small and light, have a relatively sleep glide angle with power off. For example, a Cessna 150 will glide about 10 feet forward for each foot of altitude loss, whereas a MAX will only manage about 6.5 feet forward for each foot of altitude.

If you are accustomed to typical light planes, you may be fooled into flying a too shallow approach and getting too slow. To avoid this, make your first approaches with power on at an airspeed of about 50-55 mph. Make a few practice approaches first a high altitude so you will have a chance to evaluate the glide and airspeed control without worrying about contacting the ground.

After you have made a few power on landings, try a power off (or idle) glide at altitude to see what nose down attitude is necessary to maintain an airspeed of about 53 kts (60 mph), which is a good airspeed for your initial power off approaches. It will probably be a lot steeper than you expect.

Incidentally, don't perform power off glides for more than 20-30 seconds at a time without adding power, otherwise, you may load up the engine and have to shoot a real power off approach before you really want to!

3 AIRFRAME MAINTENANCE SCHEDULE

Component	25	50	100	200
Seat				2
Seat belt				2
Spar carry through			2	2
Wing root fittings			2	2
Tail braces				
Tail spring				2/4
Wing struts				2
Fuselage strut fittings			2	3
Landing gear hinges				2/4
Bowden cable fittings		1		2
Elevator horn				2
Bowden cables			2	
Rudder horn				2
Control stick		2/4		2/4
Control stick brackets		2		2
Rudder pedals				2/4
Control surface hinges		1/4	1/2/4	
Wheel bushings			1/2	
All channels, brackets			2	
Strut to axle bolts	4		2/4	
Spar pins			2	
All other bolts			2	4
All other hardware			2	4
Wheel pants				2
Fabric				2

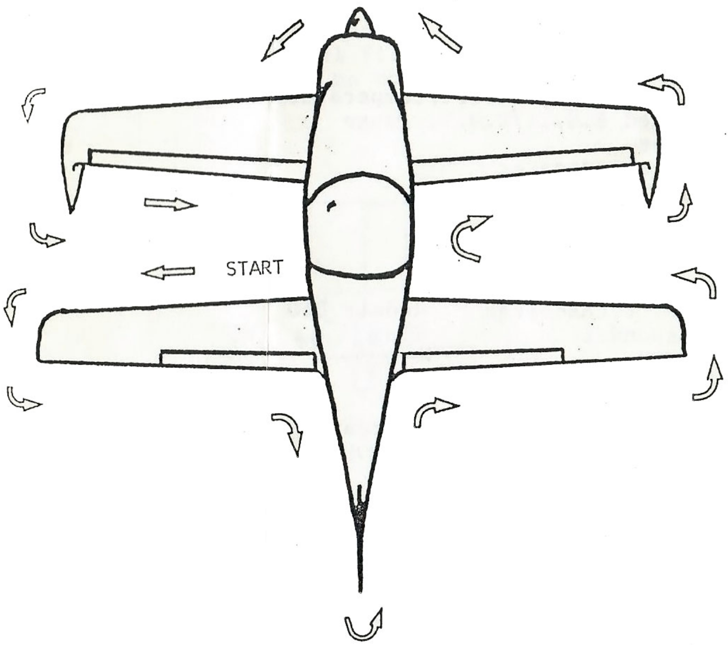
1. Lubricate and service
2. Inspect, replace if required
3. Replace
4. Check: bolt tensions/pin wear

4 DOCUMENTATION

Part VII
CHECKLISTS

PREFLIGHT INSPECTION

DAILY INSPECTION
As per ANO 100.5.1 Appx 4



BEFORE STARTING ENGINES

- Ballast CHECK
- Baggage SECURE
- Mass & balance CHECK

- Performance CHECK
- Documentation CHECK
- Maps & charts CHECK
- Cabin door LOCKED
- Seat belts SECURE
- Seats LOCKED and SECURE
- Park brake ON
- Altimeter SET
- Controls FREE
- Fuel ON
- Circuit breakers CHECK
- Avionics OFF

STARTING ENGINES

COLD START

- Master ON
- Magnetos ON
- Choke ON
- Throttle 1/4 OPEN
- Propeller CLEAR
- Starter ENGAGE
- Choke OFF

HOT START

- Master ON
- Magnetos ON
- Throttle 1/4 OPEN
- Propeller CLEAR
- Starter ENGAGE

FLOODED START

- Master ON
- Magnetos ON
- Choke OFF
- Throttle Full OPEN
- Propeller CLEAR
- Starter ENGAGE

TAXI

- Radio SET
- Park brake OFF
- Brakes TEST
- Lights AS REQUIRED
- Flight Instruments CHECK

PRE-TAKEOFF

- Park brake ON
- Fuel CHECK
- Hatches and Harnesses SECURE
- Engine - RUN-UP
  - Throttle 1500 RPM
  - Magneto CHECK (drop < 100 RPM)
  - Carb Heat CHECK (drop < 50 RPM)
  - Instruments GREEN
- Trim SET
- Test Controls
- Magnetos BOTH
- Fuel pump ON
- Gear CHECK
- Instruments CHECK
- Attitude Indicator SET
- Altimeter SET
- Autopilot OFF

Engine failure after takeoff briefing:
Speed - 65? kts
Field - 30 degree of nose
Fault - Fuel-Air-Mags-Engine
Final - Fuel off, Mayday call

TAKEOFF

- Transponder and Radar ON
- Power FULL POWER
- Rotate uvr kts (Vr)
- Accelerate to 68 kts (Vx)
- Positive ROC Toe brakes
- Undercarriage RETRACT
- Accelerate to 87 kts (Vy)
- Power CLIMB POWER
  – Throttle - 3000 RPM
- Fuel pump OFF

AIRFIELD JOINING

- Fuel SELECT
- Radio's SET
- Engine SET
- DI ALIGN
- Altimeter SET
- Approach REVIEW
- Security Harnesses SECURE
- Speeds REVIEW

CIRCUIT

- Brakes ON and OFF
- Undercarriage DOWN and LOCKED
- Mixture SET
- Pitch SET
- Throttle 3000 RPM ???

FINAL APPROACH

- Vref 60 kts
- Undercarriage DOWN and EPOXIED

POST LANDING

- N/A

PARKING

- Electrics OFF
- Magneto's CHECK DEAD CUT
- Mixture IDLE CUTOFF
- Magneto's OFF
- Master OFF
- Fuel OFF
- Radio OFF