ISSUE NO :- 2

SHERWOOD RANGER Series

P I L O T S O P E R A T I N G M A N U A L

Issued by :-
The Light Aircraft Company Ltd.
Applicable only to
Sherwood Ranger

Serial No ....

Reg. no ....

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INTRODUCTION

General

This manual has been written for the benefit of all persons who intend to operate or fly Sherwood Ranger LW series, single or dual seat aircraft, and contains the information necessary to enable pilots who possess the required skill and experience, to successfully fly the aircraft in a safe and efficient manner. Together with the appropriate manufacturers Engine Operating Manual, it forms part of the mandatory documentation necessary for the issue of a British permit to fly. It is only applicable to the aeroplane whose serial and registration No. is shown on the front cover.

It is not intended that any information contained herein be regarded as constituting a manual of flying instruction, and it is assumed that all persons intending to fly the Sherwood Ranger possess the qualifications and knowledge required by current legislation with respect to pilot licensing. See Section 8 for recommended experience requirements and type conversion details.

Amendments are published by THE LIGHT AIRCRAFT COMPANY LTD.
The current amendment state of this copy is given on the Amendment Record Sheet, page 1 - 2.
Amendments to the text will be indicated by a marginal line together with the amendment number, which will appear at the foot of the page.

Additional information, which may be relevant to the operation of a particular aeroplane by virtue of deviations from the standard build specification, or other appropriate reason, is supplied in the form of supplements to this manual. With the exception of supplement No.1, which should be initiated and maintained up to date by the builder/operator, and lists the various airframe, options fitted to this aeroplane, they are published either by THE LIGHT AIRCRAFT COMPANY LTD. or by any other person or organisation producing a modification to the aircraft which has been approved by the United Kingdom Civil Aviation Authority or other appropriate authority.

Supplement No.2 is reserved for details of engine and propeller installations which differ from those covered in this manual.

A list of the approved supplements which have been embodied in Section 9 of this copy is recorded on page 9 - 2.

It is essential that this manual is read completely and fully understood before any attempt is made to fly the aeroplane.

NOTE :-
In common with all other kit built aircraft operating in the United Kingdom, it is not possible for the Sherwood Ranger to obtain a Certificate of Airworthiness, and can only be operated on a Permit to Fly, issued by the C.A.A. under the auspices of the Light Aircraft Association (LAA).

It is the aircraft owner or operator's responsibility to ensure that all persons are made fully aware of these facts before they fly the aeroplane.

AMENDMENT RECORD SHEET

AMENDMENT NUMBER	DATE OF APPROVAL OR ISSUE		DESCRIPTION OF AMENDMENT	PAGES AFFECTED
4-3	19.12.2017	Issue 2	Increased in C of G Limit	

SYMBOLS ABBREVIATIONS AND TERMINOLOGY

General Airspeed Terminology and Symbols

CAS	Calibrated Airspeed is indicated airspeed corrected for position and instrument error and expressed in mph. Calibrated airspeed is equal to TAS in standard atmosphere at sea level.
IAS	Indicated Airspeed is the speed shown on the outer scale of the airspeed indicator and expressed in mph.
TAS CAS	True Airspeed is the airspeed expressed in mph.relative to undisturbed air which is corrected for altitude and temperature.
VA	Maneuvering Speed is the maximum speed at which application of full available control will not over stress the aeroplane.
VNE	Never Exceed Speed is the speed limit that may not be exceeded at any time.
VS	Stalling Speed is the minimum steady flight speed at which the aeroplane is controllable.
VY	Best Rate-Of-Climb Speed is the speed which results in the greatest gain in altitude in a given time.

Meteorological Terminology

OAT	Outside Air Temperature is the free air static temperature. It is expressed in either degrees Celsius (Centigrade) or degrees Fahrenheit.
STANDARD TEMP	Standard Temperature is 15^{o} C (59 F) at sea level pressure altitude and decreases by 2^{o} C (4 F) for each 1000 feet of altitude.
PRESSURE ALTITUDE	Pressure Altitude is the altitude read from an altimeter when the barometric subscale has been set to (1013 mb).

Engine Power Terminology

BHP	Brake Horsepower is the power developed by the engine.
RPM	Revolutions Per Minute is the engine speed (number of revolutions engine turns per minute.)

SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

Aeroplane Performance & Flight Planning Terminology

DEMONSTRATED CROSSWIND VELOCITY	Demonstrated Crosswind Velocity is the velocity of the crosswind component for which adequate control of the aeroplane during take-off and landing was actually demonstrated during certification tests.
USABLE FUEL	Usable fuel is the fuel available for flight.
UNUSABLE FUEL	Unusable fuel is the quantity of fuel that cannot be used in flight.
G P H	Gallons per hour is the amount of fuel (imperial gallons) consumed per hour.
G	G is a unit of acceleration equivalent to that produced by a force of gravity.

Weight and Balance Terminology

REFERENCE	Reference Datum is an imaginary vertical plane from DATUM which all horizontal distances are measured for balance purposes.
STATION	Station is a location along the aeroplane longitudinal axis given in terms of the distance from the reference datum.
ARM	Arm is the horizontal distance from the reference datum to the centre of gravity (C of G) of an item.
MOMENT	Moment is the product of the weight of an item multiplied by its arm.
CENTRE OF GRAVITY (C of G)	Centre of Gravity is the point at which an aeroplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the aeroplane.
C of G ARM	Centre of Gravity Arm is the arm obtained by adding the aeroplane's individual moment and dividing the sum by the total weight.
C of G LIMITS	Centre of Gravity Limits are the extreme centre of gravity locations within which the aeroplane can be operated at a given weight, usually documented as distances from the reference datum.
BASIC WEIGHT.	Basic Weight is as determined in the Weight and Centre of Gravity Schedule, see Section 7.
MAXIMUM AUTHORISED WEIGHT	Maximum Authorised Weight (MAW) is the maximum weight to which the aeroplane is Certified.

SYMBOLS ABBREVIATIONS AND TERMINOLOGY

The following units of measurement are used throughout this manual.

Primary Units

Units used on graphs and in the text are as follows:-

Quantity	Unit Name	Symbol
Distance: Horizontal - Large	Mile	mile
Linear Dimension	Inch	in.
	Foot	ft.
	Metre	m
Speed: Horizontal	Miles per hour	mph.
Vertical	Foot Per Minute	ft/min
Temperature	Degree Celsius	^{o}C
Weight	Pound	lb.
	Kilograms	kg
Moment	Inch Pound	in/lb
Pressure	Pound Per Square Inch	lb/in ^{2}
Liquid Quantity	Imp. Gallon	gal
Liquid Flow	Imp.Gallon Per Hour	gal/h

DESCRIPTION AND DESIGN FEATURES

General

The " Sherwood Ranger series" are conventional open cockpit Biplanes of tailwheel configuration. Designed for home construction from pre-fabricated kits, produced by TLAC Ltd, they can be built for single or tandem two seat operation. Solo operation is carried out from the rear cockpit only.

Their lightweight structure and low wing loading enables the basic aeroplane the ST to be defined in the microlight category and the XP with higher wing loading due to the clipped wing as a Cat A aircraft.

The tough, durable construction, coupled with excellent performance and handling qualities, ensures that the Sherwood Ranger is equally suited to a variety of operational requirements, such as circuit training from minimum length rough grass strips, or cross-country flying from paved airport runways.

One of the main features is that the wings can be folded by removing four securing pins. No disconnection of flying control circuits is necessary, and the overall folded width is such that the aircraft can be transported by road on a simple trailer. The rigging operation from trailer to preflight check can be accomplished by one person in about three minutes.

With the exception of the plywood wing ribs and spruce trailing edge, the airframe is mainly constructed of 6082 Aluminium tubing, with joints formed by plates and extrusions, bolted and riveted together to form the structure. Fibreglass mouldings are used for the engine cowlings, forward turtle decking and other small non-structural items, the complete airframe being covered in heat shrink polyester fabric.

Fuel is carried in either one or two tanks the main tank being fuselage mounted with a secondary option being in the cabaine overhead

A "Truss" type undercarriage is attached to the fuselage, with rubber "0" rings providing shock absorption.

Conventional three axis dual flying and engine controls are fitted with differential frise ailerons on all wings, steering during taxiing being effected by either steerable tailwheel or skid, or optional differential braking of the main wheels. Solo flying is carried out from the rear seat.

The Sherwood Ranger series of aircraft can be powered by variety of engines, this manual deals with the most commonly used, a fully enclosed two-stroke engine driving a two or three blade fixed pitch propeller through a reduction gearbox. A variety of engines and propellers may be fitted, see supplement No.2 for details of which engine and propeller combination are fitted to this aeroplane.

Primary flight controls

Ailerons and elevators are operated in the conventional manner through stick type control columns, centrally mounted in each cockpit. The upper ailerons are connected by a control rod to the lower ailerons which are driven directly by a cable and bellcrank system. The elevator is operated through a combination of control rods and cable. Non adjustable rudder pedals are fitted in each cockpit, interconnected through control cable to the rudder. Cable tension in the system is maintained by springs attached to the front pedals. Brakes are externally adjusted such that they operate at the extremities of rudder pedal operation.

Trim

Fixed trim tabs, ground adjustable by bending, are fitted to the elevator and lower starboard aileron. An optional cockpit adjustable elevator trim tab may be fitted, operated from a lever situated on the right hand side of the rear cockpit. The lever is pushed forwards for nose down trim, and vice-versa.

Control locks

The elevator and ailerons can be locked by securing the rear control column using the harness lap strap.

Stall warning

Due to the docile stalling characteristics, a stall warner is not normally fitted.

Instruments

Instruments may be fitted in both front and rear cockpit panels. Instruments mounted at either side of the front panel can be viewed from the rear cockpit over the passengers shoulders, however the basic minimum instruments as listed below are fitted in the rear cockpit.

Flight Instruments	Engine Instruments
* Altimeter	* Tachometer
* Airspeed Ind.	* Water temperature or
* Compass	* C.H.T. if air cooled
	* Exhaust gas temp.

Accommodation

Accommodation is provided for a maximum of two occupants in a tandem seating arrangement. Basic seats are non adjustable and consist of a plywood base and backrest. Optional cushions may be fitted.

Entrance to the rear cockpit is facilitated by a foot support on the lower right hand rear fuselage longeron. Stand upright on the seat and grasp both rear cockpit uprights. Using these to support the body weight, step down onto the cockpit floor structure and slide into the seat. Try to avoid placing significant weight on the fibreglass combing. Exit by reversing the procedure.

To enter the front cockpit it is necessary to stand on the reinforced walkway area of the lower right hand wing. This is marked by a black non-slip surface. Grasp the front fuselage upright and diagonal for support, and lean forwards to clear the top wing whilst standing up. Place the left leg onto the cockpit seat, move across through the cockpit uprights and pull the other leg onto the seat. Using the sides of the fibreglass combing for support, step down onto the floor structure and slide into the seat. Avoid placing undue weight on the fibreglass combing. Exit by reversing the procedure.

Provided that cushions are not installed, a sit-on type parachute can be accommodated in both cockpits, however it may impede access to and from the front cockpit, depending on the size of the occupant.

Both cockpits are fitted with quick release lap straps. The rear seat has a full shoulder harness, whilst the front is fitted with a single diagonal shoulder strap.

Baggage

No provision is made for baggage.

Fire extinguisher

No provision is made for a fire extinguisher.

Engine

A variety of modern lightweight two stroke power plants and accessories can be installed subject to approval by the appropriate authorities, however the standard LW series aircraft is fitted with a ROTAX 532 or 582 liquid cooled, two cylinder, single or twin carburetor engine, developing 64 BHP at 6500 RPM, and drives the propeller through a 2.58:1 "B" type reduction gearbox. (Note:- The Rotax 532 is only fitted with a single ignition system). See supplement No.2 to determine which engine and accessories are fitted to this aeroplane.

Engine controls

The engine is controlled by quadrant throttle levers, interconnected by a control rod and mounted on the left hand side of each cockpit. Pushing the lever forwards opens the throttle. A single mixture control (Choke), marked ON - OFF is used for starting only. Mounted midway between cockpits on the left hand side, it is accessible from either position. Ignition switches, and battery master switch if electrics are fitted, are mounted on the instrument panel in the rear cockpit only and marked OFF in the down position.

Engine starting on the basic aeroplane is by hand swinging the propeller, however an optional manual pull start operated from the rear cockpit, or an electric starter operated from a button mounted on the rear cockpit instrument panel, can be fitted. A carburettor HOT-AIR control is not normally fitted.

Propeller

The recommended propeller is an Arplast, 3 blade, 65 ins. diameter ground adjustable pitch type. A spinner and backplate is optional. Different propellers may be fitted subject to approval by the appropriate authorities. See Supplement No.2 for details of the propeller fitted to this aeroplane.

Fuel system

Kevlar fuel tank is mounted in the front fuselage section it has 41 ltr capacity, there is an option for ann overhead tank fitted to the cabaine structure . A filler cap position situated on the top surface of the tank and is accessible for re-fueling from the ground or by standing on a low level lader. Markings near the filler indicate grade of fuel, grade of oil and required oil/fuel ratio.

Tank contents are indicated by either a gauge or float and wire system dependant on builder. Whilst on the ground, an accurate display of the fuel contents can be obtained by lifting the tail until the aeroplane is in the approximate flying attitude. The tank is vented separately through vented fuel caps.

The outlet, into which a coarse finger filter is fitted, is situated in a small sump at the rear inboard corner of the tank. A gascolator with Curtis water drain valve is also fitted into the lower surface of firewall.
Fuel is gravity fed to the engine compartment through a directly operated lever type fuel cock, mounted on the right hand side of the fuselage and positioned such that it can be operated from the rear cockpit.
When one tank only is fitted, ON - OFF markings indicate lever positions. When two tanks are fitted, lever positions are marked UPPER - OFF - LOWER, to indicate fuel feed from either tank. It is not possible to feed from both tanks simultaneously.
A bulb type primer pump may sometimes be fitted next to the fuel cock. See details applicable to specific engine installations for further details.

Pitot-static system

Airspeed and altitude are measured by an unheated pitot-static head located on the starboard interplane strut.

Picketing

Specific picketing points are not fitted, tie down ropes can be attached to the main and tail undercarriage positions. In the event of strong winds, the aeroplane should be loaded and secured to its trailer.

Leveling

The top longerons in the rear cockpit should be used as a base for longitudinal and lateral leveling.

NORMAL OPERATING PROCEDURES

Introduction

This section provides the procedures and check lists for the conduct of normal operation of Sherwood Ranger series aircraft.

Airspeeds For Safe Operation

WARNING:- All airspeeds given in this manual should be used as a guide only. They are based on flight testing the prototype aeroplane in typical operating conditions.

With light aircraft in this weight catagory, the variable load represents a significant percentage of the all up weight, for example, the combined weight of pilot and passenger can be greater than that of the aeroplane itself. Large variations in crew weight will therefore have a considerable effect on aircraft performance, particularly climb rate and stall speeds.
Air temperature, pressure, humidity, turbulence and pilot skill will also affect the optimum speeds for a particular operation.

In this section, a range of airspeeds are recommended for each phase of flight. The first figure will relate to the aeroplane being flown solo with an average weight pilot, whilst the second figure refers to operation at gross weight.

It is strongly recommended that very early in the flight testing of each aeroplane, the indicated stall speeds for that particular aircraft be determined. In general, it should not be flown during normal operations at speeds less than 1.3 x VS

Take off	IAS MPH
Normal Climb Out	55 - 60
Climb	
Best Rate of Climb (Sea level)	55 - 60
Best Angle of Climb (Sea level)	50 - 55
Landing Approach	
Normal approach	55 - 60
Short field approach	50 - 55
Maximum Turbulent Air Penetration Speed (VNO)	70
Maximum Demonstrated Crosswind	10
Never Exceed Speed (VNE)	100

NORMAL OPERATING PROCEDURES

Checklist Procedures

Pre-Flight Inspection

R.H. Cockpit (Start here, move round aeroplane anti-clockwise)

1.	Control locks (if fitted)	Remove
2.	Ignition Switch	Off
3.	Battery Master (If fitted)	Secure, Clean
5.	Front harness (solo operation)	Secured, condition
6.	Rear harness	Condition
7.	Front seat and cushion	Secure
8.	Fuel cock	On
9.	Control System	Full and free, undamaged Correct sense
10.	Centre section	Secure, undamaged
11.	Fuel contents	Sufficient

R.H. Top and Bottom wings (Starting at T.E.)

1.	Overhead Fuel tank (If fitted)	Drain sump for water vent into airflow
2.	Wing fabric	Undamaged,no wrinkles
3.	Trailing edges	Undamaged, drain holes clear.
4.	Aileron operating cables	Free, undamaged
5.	Pitot/static lines	Chaff damage
6.	Wing hinges	Lubrication, split pinned
7.	Ailerons	Fabric secure, security of attachment, freedom of movement, T.E undamaged, operating push rod secure, ball joints free, interconnecting push rod secure, ball joints free
8.	Interplane strut	Undamaged, secure.
9.	Wing tips	Secure, undamaged.
10.	Pito/static head	Secure, cover removed
11.	Flying and Landing Wires	Tension, condition, wirelocking on turnbuckles clevis pins, split pins.
12 .	Leading edge	Undamaged, secure.
13.	R.H. front wing retaining pins	Inserted and locked top and bottom.
14.	R.H. Undercarriage	Undamaged, tyre pressure, creepmarks, bungee chords, security
15.	R.H.Brake	Cable and unit secure
16.	Tie-down	Removed
17.	Wheel chocks	As required
18.	Lower fuselage fabric	Damage

NORMAL OPERATING PROCEDURES

Checklist Procedures

Pre-Flight Inspection

Nose

Note :- Some of the components in the engine compartment may not be visible through the inspection hatch, and will require removal of the top cowling for thorough inspection. Unless the installation has flown less than 25 hrs, or relevant maintenance work has recently been carried out, these items need only be inspected at the first flight of the day, or after every 3 flying hours, whichever occurs sooner.

1.	Engine (Ensure Ign'n switches off)	Check security of rubber mounts by lifting at prop hub. Pull through with prop to check gear box, compression etc.
2.	Engine mount	Inspect for security, cracks in tubes/brackets
3.	Cooling system	Radiator for damage and obstruction, leaks, coolant level, hoses.
4.	Inlet valve	Oil level
5.	Carburetors and fuel lines	Security,leaks,wear in operating cables
6.	Air filters	Clean and secure
7.	Exhaust	Secure, cracks near manifold, freedom of ball joints, missing or broken springs, tail pipe colour
8.	Electrical components	Security, chaffing of wiring, plug caps.
9.	Propeller	Secure, undamaged
10.	Spinner and backplate	Secure, cracks
11.	Cowlings	Secure, cracks
12.	Gascolator (If fitted)	Drain for water/sediment

NORMAL OPERATING PROCEDURES

Checklist Procedures

Pre-Flight Inspection

L.H. Top and Bottom wings (Start at L.E)

1.	Wheel chocks	As required
2.	Tie-down	Removed
3.	Fabric beneath fuselage	Damage
4.	L.H.Brake unit (If fitted)	Cable and unit secure
5.	L.H. Undercarriage	Undamaged, Tyre pressure, creep marks, security, bungee chords
6.	L.H. front wing retaining pins	Inserted and locked top and bottom.
7.	Flying and Landing Wires	Tension, condition, wirelocking of turnbuckles, clevis pins, split pins.
8.	Leading edge	Undamaged, secure.
9.	Wing tips	Secure, undamaged.
10.	Interplane strut	Undamaged, secure
11.	Ailerons	Fabric secure, security of attachment, freedom of movement, T.E Undamaged, operating push rod secure, ball joints free, interconnecting push rod secure, ball joints free
12.	Wing hinges	lubrication, split pinned.
13.	Aileron operating cables	Free, undamaged
14.	Trailing edges	Undamaged, drain holes clear.
15.	Wing fabric	Undamaged
16.	Overhead fuel tank (If fitted)	Drain sump for water, check vent into airflow.

Rear Fuselage

1.	Fabric	Condition, undamaged, wrinkles
2.	Stringers	Undamaged
3.	Tailwheel	Tyre pressure, security, suspension chords, swivel freedom, steering cable and spring. (If fitted)

Empannage

1.	Rudder	Security, full and free movement, cable linkage, clevis pins, split pins, fabric secure.
2.	Tailplane and Elevator	Security, full and free movement, cable linkage, Clevis pins, split pins, fabric secure, tension of wire bracing, trim tab secure. (If fitted)

NORMAL OPERATING PROCEDURES

Checklist Procedures

Pre-Flight Inspection

Front Fuselage

1.	Check propeller	Damage and security
2.	Cooling inlets	Any foreign object
3.	Cowlings	Fasteners and security
4.	Gascolator	Drain
5.	Fuel tank	Contents, cap and vent

R.H. Rear cockpit.(Stand on seat)

1.	Upper fuel tank filler cap	Security and correct orientation.
2.	Top wing upper surface	Visual inspection

Before Starting Engine

1.	Aircraft position	Propeller wash, Clear area ahead, into wind
2.	Pre-flight Inspection	Complete
3.	Chocks	In position
4.	Harness	Adjust and lock
5.	Electrics (If fitted)	Radios and electrical equipment off.
6.	Throttle	Full movement, Friction

Starting Engine

1.	Fuel cock	On
2.	Throttle	Closed
3.	Choke	Set
3.	Stick	Back
5.	Propeller	Clear
6.	Master switch (If fitted)	On
7.	Ignition switches	On
8.	Engine start	Press start button or pull starter chord. See page 3-10 for hand swing procedure.
9.	Engine	Warm up, Power check,EGT
10.	Ignition	Check dead cut
11.	Chocks	Remove
12.	Choke	Off

NORMAL OPERATING PROCEDURES

Checklist Procedures

Taxiing

1.	Steering	Left and Right
2.	Compass (if fitted)	Turn left - decrease, turn right -increase
3.	Slip Indicator	Turn left -slip right, turn right - slip left.

Vital Actions

Before Take - off

1.	Trim (If fitted)	Set neutral
2.	Fuel	On, sufficient
3.	Instruments	Altimeter set, engine temperatures
2.	Harness	Tight
4.	Controls	Full and free
5.	Runway and approach	Clear

During Take - off

1.	Engine	Developing full rpm
2.	Instruments	A.S.I. reading

Climb - out and Cruise

1.	Engine	Monitor Engine temps. particularly exhaust gas after changing throttle setting.

Before Landing

1.	Fuel	On - sufficient for overshoot.
2.	Instruments	Altimeter set
3.	Harness	Tight

After Landing

1.	Position	Clear of runway, into wind.
2.	Engine	Run for short period at 2500 rpm
3.	Ignition	Off.
4.	Throttle	Closed
5.	Chocks/Tie downs	In position.

NORMAL OPERATING PROCEDURES

Trailering

When trailering the aeroplane, use only trailers that have been built to a design approved by The Light Aircraft Company Ltd. These can be easily towed by an average family saloon at up to the maximum recommended speed of 50 mph. The main wheels and tail wheel should be secured to the trailer, and the wing support yoke and cradles must be in position. To prevent the ingress of foreign objects, it is strongly recommended that fabric covers are fitted over the cockpits, wing root ends and pitot/static heads.

Do not trailer during wet weather unless unavoidable, in which case a lightweight shaped reinforced plastic cover should be used to cover the aeroplane. This may reduce the towing speed considerably. After removal, carefully inspect the aircraft surface for signs of damage caused by chaffing of the cover. Do not leave a damp aeroplane covered for long periods of time. The best way to dry it out is to either fly it, or trailer it in dry weather with the cover removed

Rigging and Derigging

It is normal practice to store, rig and de-rig the aeroplane whilst on the trailer. If full time hangarage is available, a trailer is not essential and the wings can be folded to minimise storage space, in which case refer to steps 2 to 9.

Rigging

1.) Position trailer on level surface, check that jockey wheel is fully retracted and uncouple from towing vehicle. Ensure that both wheel wells are laying flat on ground surface.

2.) Working on one side of the aeroplane first, withdraw the top and bottom wing retaining pins to their full extent.

3.) Unclip the Interplane Strut from the wing support yoke, and slide the wing support cradle outwards whilst applying upwards pressure on the Interplane Strut.

4.) Grasp the lower wing at the tip and supporting the aileron to prevent damage, swing the wing assembly forwards.

5.) Move round to the wing root. Maintain the wing in position by pulling on the bracing wires.

6.) Insert the top and bottom fixing pins and lock into position.
Note :- Inspect pins for security, lubrication, damage ie. evidence of bending. If unusual insertion or withdrawal force is necessary, investigate thoroughly.

Rigging (Contd.)

7.) Collapse and remove the jury strut

8.) Move round to the opposite side and carry out operation 1.

9.) Remove the wing support yoke from the fuselage.

10.) Repeat operations 2 to 6 for the opposite side.

11.) Remove securing clamps from mainwheels if fitted.

12.) Remove securing clamp from tailwheel position and grasping the tailwheel, push the aeroplane forwards, over the trailer towball until well clear.

Carry out a thorough check "A" and pre-flight inspection before flight.

De-rigging

Securing the aircraft onto the trailer and de-rigging is accomplished by carrying out the above procedures in reverse order.

NORMAL OPERATING PROCEDURES

Pre-flight Inspections

Refer to the Maintenance Schedule Check "A" if first flight of the day.
Whilst approaching the aeroplane, take general note of any unusual stance, symmetry or wrinkled fabric which may indicate airframe damage.
Visually check the aircraft for general condition using a walk-round inspection as detailed in the Checklist Procedures. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces.

Starting at the cockpit, carry out inspections in sequence as listed in the Checklist Procedures.

Engine Operation

Precautions before starting

Before any attempt is made to start the engine, the following golden rules must be observed:-

1. Always treat the propeller as live, even with the magneto switch off.

2. Unless the aeroplane is fitted with an effective park brake system, never attempt to start the engine without chocks under the mainwheels. These should have rope attached so that they can be pulled clear with the propeller rotating. If it is intended to carry out ground running at high engine power, it is recommended that in addition to chocks, the aircraft is secured to a substantial structure by the tailwheel assembly. At high rpms, the propeller could generate well over 300lbs thrust.

5. Ensure that all spectators are behind the line of the propeller. A broken propeller blade will project forward of its line. This rule also applies to taxiing.

6. Always start the engine with the throttle in the tick-over position.

7. If at all possible, have a fire extinguisher handy.

8. Monitor engine temperatures.

9. If the engine refuses to start, refer to the Engine Maintenance Manual.

NORMAL OPERATING PROCEDURES

Engine Operation

Starting Procedures

Carry out relevant checklist procedures.
Ensure that THROTTLE lever is in idle position, ie closed.
Set CHOKE LEVER to fully open. This may not be necessary if engine is warm.
Ensure that ignition switches are ON, ie UP.
Start the engine by one of the following methods, depending upon which options are fitted :-

Electric start

Ensure that battery master switch is ON, ie UP.
Push start button until engine starts.

Recoil pull start

Gradually pull handle until it becomes heavy ie. until it reaches the compression point. Continue pulling it slightly until it becomes loose. Let the handle return to the reset position under spring pressure, and then pull forcibly. If the engine starts, let the handle reset. If the engine does not start, let the handle reset and repeat the procedure.

Hand swinging

WARNING:- Starting the engine by swinging the propeller should be carried out with great caution, and practical instruction should be obtained from a suitably qualified person if at all possible. Unless in dire emergency, always ensure that there is a competent person in the cockpit to operate throttle and magneto switches, and that they understand the signaling procedure, usually thumbs up for switches on, down for off. Secure all loose clothing from any possibility of fouling the propeller.

Viewed from the front, the propeller should be swung in a clockwise direction (Rotax engines with reduction gearbox).

Ensure that all checks listed have been carried out and that magneto switches are <u>OFF</u>. Double check that chocks are in position. Rotate the propeller so that the engine is just coming up on compression with the top blade in approximately the 2 - O Clock position.

Stand at sufficient distance such that as the arm swings through, it is starting to move away from the propeller past the horizontal position. The right foot should be slightly forward but well clear of the arc. Try not to let the upper torso bend forward.

Shout and signal SWITCHES ON to the cockpit operator. Wait for a similar reply and signal.

NORMAL OPERATING PROCEDURES

Engine Operation

Starting Procedures

Hand swinging (Contd.)

Do not grip the blade, but hook the fingers of the right hand round the trailing edge about half an inch from the end, and checking body balance swing the arm swiftly downwards clearing the blades as the arc of the arm dictates, continuing the arc until the arm is by the right hand side of the body. At the same time, push back with the right foot to move the body away from the propeller and towards the right hand side. During the entire period, the left arm should be by the left hand side of the body, pointing slightly backwards to maintain balance.

Repeat the process until the engine starts.

If it is necessary to re-position the propeller to obtain the correct blade positioning with respect to engine compression, shout and signal to the cockpit operative; SWITCHES OFF, and wait for a similar signal and reply, before touching the propeller.

Running

Immediately after the engine starts, open the throttle slightly. As it warms up, gradually close the choke whilst monitoring the engine for smooth running. Let the engine run at low power until minimum operating temperatures are reached, but never allow idle at speeds which produce excessive vibration, usually not less than 2500 rpm.

Depending on the OAT, it could take several minutes before minimum operating temperature is reached, especially with water cooled systems. See operating limitations.

Running the engine at r.p.m.'s greater than 4000 r.p.m. with the aircraft stationary should be restricted to engine testing and running in. Always run up into wind.

Stopping

Reduce engine speed and allow to run at smooth idle speed for 2 or 3 minutes before stopping. This allows the temperature distribution to stabilize and reduces the risk of thermal shock during cooling. Close throttle fully and switch off ignition.

Do not stop engine suddenly whilst running at high speed.
Close FUEL COCK.

Taxiing

The Sherwood Ranger has been demonstrated capable of successful ground control in wind velocities exceeding 20 MPH, however taxiing speed should be reduced and care taken accordingly in wind strengths exceeding 10 MPH.

To assist in preventing the aircraft nosing over, it is generally advisable to hold the control stick fully backwards during taxi-ing and any time when the engine is running, particularly when the throttle is opened. This puts a down load on the tailplane, counteracting the overturning moment generated by the thrust from the propeller and drag from the wheels. When taxiing downwind in strong wind or gusty conditions, there may be a tendency for the wind to generate lift on the tail surface with the elevator in the full up position, in which case the stick should be moved forward sufficiently to prevent this.

Ailerons should be held neutral whenever facing or taxi-ing into or down wind. As a turn commences cross wind, move the stick towards the wing tip which is coming into wind. Up aileron will be applied to that wing, reducing the possibility of sufficient force being generated to overturn the aircraft. This means that when turning from a down wind direction, the stick will follow the direction of the turn, and conversely when turning from an into wind direction, the stick would be moved in the opposite direction to the turn.

Directional control during the take-off and landing run, or during taxiing is effected by the rudder pedals, moving the left rudder forwards will turn the aeroplane left, and vice versa. At high airspeeds or large throttle openings, the airflow over the rudder generates the necessary turning force, otherwise it is supplied by differential brakes where fitted, or steerable tailwheel or skid, depending on the options fitted.

The technique for taxiing when brakes and a fully castoring tailwheel is fitted, is to use rudder and a relatively small amount of throttle. Pushing the rudder pedal to its limit will progressively apply the brake, which coupled with increased throttle, will tighten the turn.

To slow the aeroplane down by use of brakes, use alternate left and right brake to maintain directional control. Caution! applying the brakes too harshly may tip the aeroplane onto its nose, especially if the wind is on the tail quarter. It is advisable not to use brakes unless necessary.

The combination of brakes and fully castoring tailwheel will give the tightest turning circle and the shortest stopping distance.

Where a steerable skid is fitted without mainwheel brakes, similar techniques are used to steer at low speeds, however higher throttle openings will be required due to the skid giving a permanent braking effect.

Taxiing (Contd.)

When taxiing on a long straight, it is good practice to steer the aeroplane on a gentle zig-zag course to clear the blind spot forwards of the nose.

In the interests of safety and good airmanship, the following rules should be adhered to before and during taxi-ing:-

1. Ensure that chocks have been removed from wheels.

2. Open the throttle gradually and slowly, if the aircraft does not begin to move after about the 1/2 throttle position, stop the engine and investigate for obstructions such as chocks, long grass, wheel in a ditch, etc.

3. Ensure that the area ahead of the aircraft is clear of persons and unobstructed.

4. Never Taxi faster than walking pace.

5. If unable to stop, for any reason, i.e. strong following wind, steep gradient, jammed throttle or brake failure, switch off engine and steer for largest open space. Try to turn the aircraft into wind before coming to rest.

6. Never taxi in a confined space or within the close vicinity of persons. Try to ensure that the direction of movement is always away from persons, particularly crowds.

7. If a collision is obviously inevitable, switch off engine and try to swing the aircraft around at the last second such that the wing tip strikes first and absorbs the impact.

Take Off

Power check

It is important to check full-throttle engine operation early in the take-off run. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off. Smooth and uniform throttle application should be used to ensure best engine acceleration and give long engine life.

High throttle run-ups over loose gravel are especially harmful to propeller tips, avoid take off runs over this type of surface if at all possible.

Normal take off

Note :- Before take off, always ensure that the wind velocity is within the limits of aircraft and piloting skills. As a general rule, do not operate in wind speeds higher than 20 MPH.

Normal take off (Contd.)

Conventional tailwheel techniques are used during take off.
Before beginning the roll, align the nose of the aircraft with the take-off direction, as near into wind as possible. Choose some fixed object ahead with which to maintain directional reference.

With the stick full back, open the throttle slowly and progressively, maintaining directional control with the rudder. As the aircraft starts to accelerates, gently push the stick fully forwards until the tailwheel lifts clear of the ground. Gradually back off the forward stick so as to maintain the flying attitude. Be ready to prevent the aircraft from nosing over due to retarding action on the wheels caused by long grass or ditches etc., by applying the necessary amount of backward movement of the stick.

As the tailwheel rises, there may be a tendency to swing due to propeller gyroscopic, torque and slipstream effects. Rudder will have to be applied to counteract this. Keep the nose aligned with the previously fixed object during the take-off run by use of the rudder.

The acceleration will be very rapid, and the aircraft will lift from the runway as the airspeed passes through about 35 - 40 MPH indicated airspeed. Once airborne, allow airspeed to increase to 55 - 60 MPH and adopt the climb attitude to maintain.

Soft field or long grass take off

Use similar techniques, but to counteract the nose over moment caused by increased mainwheel drag, maintain the tailwheel just clear of the ground during the take-off roll. The aircraft will become airborne at a lower flying speed, and it will be necessary to ease the stick forward to allow acceleration to the normal climb speed.

Note:- The take-off run may be longer. It is recommended that for this type of operation, the aeroplane be fitted with the larger mainwheel tyre option, and flown as lightly loaded as possible.

Crosswind take off

The aeroplane has been demonstrated to be capable of operating in cross winds of 10 MPH. without undue piloting skills being required. Operation in higher cross wind velocities will depend on pilot skill.

At the start of the take-off run, apply full up aileron to the into wind wing, ie, control stick into wind. As speed builds up, reduce aileron to maintain the wings level. In a strong cross wind, it may be necessary to allow slight bank into wind to prevent drift.
Allow the aircraft to accelerate to a speed slightly higher than normal by maintaining the tailwheel as high a possible, but without endangering the propeller by ground proximity. Fly the aircraft positively off the ground to prevent possible settling back to the runway while drifting. When clear of the ground make a coordinated turn into the wind to correct the drift.
Note: The aircraft will tend to weathercock into the wind, especially as the tail lifts; be prepared to correct with rudder.

NORMAL OPERATING PROCEDURES

Climb

A normal climb speed of 55 - 60 MPH is recommended once all ground obstacle have been cleared. This speed offer good visibility and rate of climb, plus adequate engine cooling. The best angle of climb for obstacle clearance will be obtained at 50 - 55 MPH. Carefully monitor engine temperatures and avoid overheating.

It is not normally advisable to make prolonged climbs at full throttle. Throttling back above 1000ft above ground level to a power setting which still gives an acceptable climb rate will give greater economy, increase engine life and decrease the noise factor.

Cruise

Depending on which engine is fitted, the recommended cruise speeds are 60 - 80 MPH. It will be found that greatly improved fuel economy can be obtained by flying at the lower practical cruise speeds, refer to appropriate engine manual for more details.

Always approach the desired cruising speed from a slightly higher speed, this will produce a more efficient aircraft attitude. Trim out using the cockpit elevator trim tab if fitted, otherwise stick trim forces are very light.

Mixture control is not fitted on the standard aircraft, consequently operating at high altitude will cause the engine to run rich. In general it will be found that engines adjusted in accordance with the maintenance manual for particular ground level conditions will operate satisfactorily up to 5000ft above ground level.

Monitor engine temperatures regularly, particularly the exhaust gas temperature during a change in throttle setting.

WARNING:- Avoid cruising at any engine rpms which induce vibration.

Descent

Since the standard aircraft is not fitted with carburetor heat control, it is advisable to carry out descent with power on whenever there is likely to be a risk of carburetor icing.

Carry out the before landing checklist procedures when in the downwind position.

Caution :- The engine will cool rapidly during a low power descent, apply power accordingly to prevent temperatures falling below minimum operating. Do not exceed limit speeds shown in Section 4.

Turns

Turns are carried out as for a conventional 3 axis controlled aircraft. A high rate of roll is achieved by coordinating ailerons and rudder.

NORMAL OPERATING PROCEDURES

Aerobatic manoeuvres

AEROBATIC MANEUVERS ARE NOT APPROVED.

Stalls

The stalling characteristics are docile at all throttle openings provided that the aeroplane is in balance on entry. A power off stall will result in the nose pitching down slightly at the break, coupled with a high rate of descent. A stall at high engine power may not produce a noticeable nose down pitch. The nose attitude will be very high and the aircraft may still be gaining height. Relaxing back pressure on the stick will give an immediate increase in speed and rate of climb. No stall warning device is fitted, however, a slight elevator buffet may be felt just before the stall.

Recovery from a power off stall is immediately effected by applying power and lowering the nose until flying speed is regained. Height loss is less than 50 ft. from initiation of recovery procedure.

Although the ailerons are effective in the stall, it is good aviation practice to counteract any tendency for a wing to drop by using <u>RUDDER</u> only, maintaining the ailerons central.

Landing

Normal Landing

Both power on and power off approaches at 55 - 60 MPH can be made, but whilst controlling the rate of descent with power will be found most comfortable and less demanding, it is strongly recommended that all pilots become thoroughly proficient at glide approaches, using sideslipping techniques to control the rate of descent. Reduce speed by 5 MPH as the threshold is crossed. Increase all speeds by 5 - 10 MPH in turbulent conditions.

It is good practice to contact the ground at as low a speed as possible. Ideally, the main wheels and tailwheel will touch together, with the stick full back. Close the throttle immediately that the main wheel have touched the ground and maintain directional control using rudder until the aircraft has stopped.

Taxi clear of the runway.

<u>NOTE:</u>- In common with all tailwheel aircraft, if the mainwheels touch down before the stick is full back, and whilst the aircraft is in a flying attitude, the tail will descend rapidly thus increasing the angle of attack of the wings. Unless checked immediately by forward movement of the stick, this will lead to a situation where the aircraft balloons into the air with a high nose attitude and very low airspeed. If this occurs execute the Baulked Landing Procedure.

NORMAL OPERATING PROCEDURES

Short field landing

When making a landing where obstacle clearance or ground roll is a factor, a powered approach with the normal approach speed reduced by up to 5 MPH. will produce the best results. Control the speed so that the aeroplane is almost stalled at the round out. Close the throttle and apply full up elevator. Hold full up elevator and if fitted,brake as heavily as possible without nosing over. Land directly into wind if possible. The approach path can be made more steep by side-slipping.
Caution :- Exercise care when flying the approach at reduced airspeeds in turbulent conditions.

Crosswind landing

When landing in a strong crosswind, the wing down or crab method of drift control can be used. Judge the wind velocity and establish the drift early in the approach. The success of the landing will depend almost entirely on the skill and technique of the pilot. Do not operate in cross-wind or turbulent conditions until fully familiar with the flying characteristics.

Baulked landing

If it is decided that a landing cannot be made successfully from a particular approach due to such reasons as obstructed runway, overshoot picture or balloon landing, apply full power immediately and establish a positive rate of climb at 55 - 60 MPH.

Side slips to landing

Side slips are effective in either direction in the Sherwood Ranger, but see caution below. Rapid descents with high sink rates can be obtained through a properly executed slip. It is recommended, however, that slips are practiced at a safe altitude until the pilot is familiar with the aircraft. A safe slip speed will depend on load, pilot proficiency and local conditions, but in general, 5 MPH should be added to the normal approach speeds.

Caution :- Side slipping any aeroplane with wing mounted fuel tanks, in an adverse direction, can cause fuel flow problems. This is due to the fuel being forced away from the tank outlet, and may become critical at low fuel levels. The design of the Sherwood Ranger fuel gauge makes it immediately obvious whether fuel is being forced to or from the tank outlet.
When the active fuel tank is less than half full, always sideslip in the direction which forces the fuel towards the outlet. This will show as an increase in fuel contents on the fuel gauge.

LIMITATIONS

Introduction

This section presents the operating limitations, instrument markings and basic placarding necessary for the safe operation of the aircraft, its engine, standard systems and standard equipment.

The aircraft must only be operated in day, V.M.C. conditions, and over terrain where, in the event of engine failure during any phase of flight, a safe landing can be made.

Airspeed Limitations

Airspeed limitations and their operational significance are shown below:-

SPEED		IAS(MPH)	REMARKS
VNE	Never exceed speed	100	Do not exceed this speed in any operation.
V_{NO}	Maximum structural cruising speed	70	Do not exceed this speed except in smooth air, and then only with caution.
VA	Manoeuvring speed	80	Do not make full or abrupt control movements above this speed.

Airspeed Indicator Markings

MARKING	RANGE IAS(MPH)	SIGNIFICANCE
Green Arc (May not be marked)	38 - 80	Normal operating range. Lower limit is V_S. Upper limit is maximum manoeuvring speed.
Yellow Arc (May not be marked)	80 - 100	Operations must be conducted with caution and only in smooth air.
Red Line	100	Maximum speed for any operation.

LIMITATIONS

Engine Limitations

Note :- These limitations are only applicable to ROTAX 532 and 582 engines. Where other engines are installed, refer to Supplement No.2.

Engine manufacturer: Rotax

Model No:	532/582

Operating Limits

Maximum continuous RPM.	6800 RPM
Maximum take-off RPM	6800 RPM
Cruise not permitted in any rev. band which produces excessive vibration.	
Maximum water temperature.	90° C
Maximum exhaust gas temp	1200° F

Engine Instrument Markings

INSTRUMENT	GREEN ARC Normal operating	YELLOW ARC Caution Range	RED LINE Max. Limit
	(------ May not be marked ------)		
Tachometer	2500-6000 RPM	6000-6800 RPM	6800 RPM
Water temp.	60° - 80° C	80° - 90° C	90° C
Exhaust gas temp.	1100° - 1200° F	------------	1200° F
Cyl Hd.temp.	80° – 180° C	180° - 200° C	200° C 1200° F

Weight Limits

Maximum take-off weight	990 lbs (450 kg)
Maximum pilot weight (Rear cockpit)	198 lbs (90 kg)
Minimum pilot weight (Rear cockpit)	120 lbs (55 kg)

Maximum pass. weight (Front cockpit)	198 lbs (90 kg)
Minimum pass. weight (Front cockpit)	0 lbs (0 kg)

LIMITATIONS

Centre of Gravity Limits

Forward	2.16 inches (55 mm.) aft of datum
Aft.	7.7 inches (196 mm.) aft of datum

Reference Datum

The reference datum is the centre line of the fuselage cross member which carries the main undercarriage leg and lower wing mainspar attachments.

Manoeuvre Limits

The aircraft is not cleared for Aerobatic Manoeuvres. The following manoeuvres are approved:-

Manoeuvre	Recommended Entry Speed
Steep turn (not exceeding 60^{o} angle of bank)	65 - 70 MPH
Stalls	Slow deceleration
Abrupt use of the controls is prohibited above	80 MPH
Spins	Prohibited

Note : - SPINS ARE PROHIBITED. In the case of an inadvertent spin, standard spin recovery techniques should be used.

Flight Load Factor Limits

Flight load factor (Gross weight) + 4 g - 2 g

Fuel Limitations

Maximum usable Fuel (Single tank)	9 Imp. Gallons	41 ltrs
Maximum usable Fuel (Two tanks)	+6.8 Imp. Gallons	31 ltrs

Unusable Fuel: Negligible, but see Normal Operating Procedures, section 3, sideslips to landing.

LIMITATIONS

Placards

The following information is displayed in the aircraft in the positions described :-

1. In full view of the pilot (Rear cockpit)

Maximum pilot weight (Rear cockpit)	198 lbs (90 kg)
Minimum pilot weight (Rear cockpit)	120 lbs (55 kg)
Maximum pass. weight (Front cockpit)	198 lbs (90 kg)
Minimum pass. weight (Front cockpit)	0 lbs (0 kg)

Max. manoeuvring speed	VA	80 MPH IAS
Never exceed speed	VNE	100 MPH IAS
Stall speed	VS	42 MPH IAS
Aerobatic manoeuvres (including spins)	PROHIBITED	
Max. flight load factors	+ 4 g - 2 g	

2. Near each fuel tank filler.

Fuel 4 star or unleaded
Oil 2 stroke Castrol GTX
Mix Ratio 50:1

3. Each fuel tank sight gauge.

Dependant on fit

4(a). Near fuel cock.(Single Tank)

ON OFF -

4(b). Near fuel cock.(Two Tanks)

UPPER OFF LOWER

5. Near Trim Lever (If fitted) <- Nose Dwn. Nose up ->

LIMITATIONS

Placards (Contd.)

6. On Rear Instrument Panel as follows: -

(a) Near each ignition switch. (and battery master switch if fitted)

ON
|__|
| |
OFF

(b) Below engine start button. (If fitted)

ENGINE START

(c) Below Water Temperature gauge. (If fitted)

WATER TEMP.
MAX. 90^{o} C

(d) Below Cylinder Head Temperature gauge. (If fitted)

CYL.HEAD
MAX.200^{o} C

(e) Below Exhaust Gas temperature gauge

EXH.GAS
MAX.1200^{o} F

EMERGENCY PROCEDURES

Introduction

This section recommends procedures that will enable the pilot to cope with emergencies which may be encountered during operation of the aeroplane. If proper pre-flight inspections, operating procedures, and maintenance practices are used, emergencies due to airframe or engine malfunction are extremely unlikely. Likewise, careful flight planning and good pilot judgment can minimise enroute weather emergencies. However, should any emergency develop, the guide-lines in this section should be considered and applied as necessary to correct the problem.

Airspeeds for safe operation (IAS)

Engine failure after take-off.	55 - 60 MPH
Maneuvering speed	80 MPH
Maximum glide	60 - 65 MPH
Precautionary landing with engine power	50 - 55 MPH
Landing without engine power	55 - 60 MPH

Engine Failures

See EMERGENCY CHECKLIST PROCEDURES for appropriate checks.

If the engine fails during the take-off, prior to lift-off, the aeroplane should be stopped as soon as possible. Carry out appropriate procedures. In cases of partial failure, resulting in slight loss of power, the pilot may have the option of continuing the take-off or aborting it. Obviously this is a decision that must be made by the pilot in light of existing conditions, however, an aborted take-off in most case is the safest option.

If the engine fails, either completely or partially, shortly after take-off, it is essential that the nose of the aeroplane be lowered promptly so that a safe airspeed can be maintained, see section 3, Airspeeds For Safe Operation. At low altitudes, in most cases, the aeroplane should be flown straight ahead for a landing, with only small directional changes to avoid obstructions. Seldom is there sufficient altitude available for a 180^{o} gliding turn back on the runway. Carry out the appropriate checks if time permits. These checklists are based upon the assumption that the pilot will have adequate time to secure the fuel and ignition system prior to touchdown, however, the overriding priority is to maintain control of the aeroplane.

If the engine fails in flight (complete loss of power) the best glide speed as shown in Speeds For Safe Operation, should be established as quickly as possible. Turn the aircraft downwind, and select a suitable landing area. If time permits an effort should be made to determine the cause of the engine failure and an engine restart should be attempted as per the appropriate checklist. Otherwise prepare for a forced landing.

EMERGENCY PROCEDURES

Forced landings

If the engine cannot be restarted and a forced landing is imminent, select a suitable landing zone and carry out the checks as listed in the Emergency landing without engine power, checklist. Give priority to maintaining control and landing into wind.

If engine power is available and a landing is to be attempted at an area other than an airport, the landing area should be observed from a low but safe altitude. Inspect the terrain for obstruction and surface conditions prior to attempting a landing. Carry out checks as shown in the Precautionary landings with engine power, checklist.

NOTE:- If a landing is made on a very rough surface, it is possible that the aircraft will nose over and come to rest upside down. If this happens, hold onto the structure whilst releasing harness to prevent possible injury caused by falling onto head or neck.

Flight in Icing Conditions

Flight in known icing conditions is prohibited, however, carburettor icing may be encountered at any time. Normally, the first indications of carburettor ice is a drop in engine RPM, which may be accompanied by slight engine roughness.

Applying a higher throttle setting may cure this, however, since carburettor heat is not available, a forced landing without power is likely to be necessary and should be planned for.

Airspeed Indicator Failure

If erroneous readings are suspected on the instruments associated with the pitot static system (airspeed indicator, altimeter and vertical speed indicator), a possible cause is ice or water accumulation in the pitot head,

Obviously in a situation such as this, a landing should be planned as soon as is practicable. With the throttle closed, a good approximation of airspeed can be obtained from the sound of the air passing through the rigging wires and structure. Practice flying without reference to the ASI at safe altitude.

Engine Fires

See EMERGENCY CHECKLIST PROCEDURES.

EMERGENCY PROCEDURES

Emergency Checklist Procedures

Engine failure during take off run

1.	Throttle	Idle
2.	Ignition	Off
3.	Fuel	Off
4.	Position	Clear Runway

Engine failure immediately after take off

1.	Airspeed	55 - 60 MPH
2.	Fuel	Off
3.	Ignition	Off
4.	Harness	Tight
5.	Landing	Straight Ahead

Engine failure during flight

1.	Airspeed	60 - 65 MPH
2.	Select landing area	Unobstructed- into wind
3.	Fuel	On
4.	Throttle	Open
5.	Choke	On / Off
6.	Ignition	On
7.	Starting	Try engine start if prop. stopped

<u>NOTE</u>:- If propeller stops, it may be possible to re-start by diving aircraft. Do not attempt this below 1500ft A.G.L. Observe airspeed and flight load factor limitations.

Gliding distance with no wind is approximately 1 nautical mile for each 1000ft of altitude above terrain.

Emergency landing without engine power

1.	Airspeed	55 - 60 MPH
2.	Fuel	Off
3.	Ignition	Off
4.	Battery master (If fitted)	Off
5.	Harness	Tight
6.	Touchdown	Into wind - as slow as possible

EMERGENCY PROCEDURES

Emergency Checklist Procedures

Precautionary landing with engine power

1.	Select field	Fly over, noting terrain and obstructions. Plan circuit and final approach into wind.
2.	Harness	Tight
3.	Airspeed	50 - 55 MPH
4.	Touchdown	Slow as possible
5.	Fuel	Off
6.	Ignition	Off

Engine fire (on ground)

1.	Fuel	Off
2.	Power	High as possible until engine stops.
3.	Ignition	Off
4.	Crew	Evacuate aircraft.
5.	Position	Pull clear of other aircraft
6.	Action	Extinguish fire

Engine fire (in flight)

1.	Fuel	Off
2.	Ignition	Off
3.	Action	Side slip to prevent flames spreading to cockpit. Attempt to blow out by increasing airspeed to limit.
4.	Forced landing	Execute (as described in without power)

PERFORMANCE SPECIFICATIONS (ROTAX 532/582)

GROSS WEIGHT		990 LBS (450 KG.)
TOP SPEED AT SEA LEVEL		90 MPH
RATE OF CLIMB AT SEA LEVEL		1200 - 800 FT/MIN
TIMED CLIMB TO 1000 FEET ABOVE SEA LEVEL		50 secs - 80secs
TAKE OFF: (Short grass)		
Ground Roll		60 M (198 ft)
Total distance over 50ft obstacle		215 M (700 ft)
LANDING: (Short grass)		
Ground Roll (Brakes fitted)		80 M (260 ft)
Total distance over 50ft obstacle		245 M (800 ft)
STALL SPEEDS:		
Power Off		42 MPH
Power On		39 MPH
POWER LOADING (Rotax 582)		13 lbs/b.h.p.
FUEL CAPACITY TOTAL		9 Imp. Gal. 41 ltrs
PROPELLER		ARPLAST 65" dia. TYPE 4875 / 3 Blade
ENGINE		ROTAX 532/582
BASIC EMPTY WEIGHT	Max. Rotax	572 lbs. 260kgs
	Max. Jab2200	589lbs. 268kgs
USEFUL LOAD	Min	400 lbs. 182 kg.

Performance specifications are based upon standard atmosphere zero wind and gross weight condition

WARNING.

Performance figures can vary with any aircraft depending on pilot skill, weight, c of g, air temperature, pressure, humidity, surface condition, wind speed, turbulence and wind shear conditions. Kit built aeroplanes may also vary substantially. It is the pilot's responsibility to asses these factors before flying.

WEIGHT AND BALANCE

Introduction

As with any other flying machine, it is essential that the balance of the aeroplane is correct, and the maximum authorised weight (MAW) is not exceeded. Flying with the centre of gravity (C of G) outside specified limits is potentially hazardous; the stability and control of the aircraft may be seriously impaired. If the aircraft has been built exactly in accordance with the instructions, it is most likely that under all normal loading conditions the limits will not be exceeded, however, it is essential to become familiar with procedures for calculating the C of G, and aware of factors which influence it.

General

To enable accurate calculations to be made, it is necessary to know the weight of the basic aeroplane, and the position of its C of G relative to the datum point. This is determined by weighing the aeroplane and producing a Weighing Report, from which, a Weight and Centre of Gravity Schedule can be compiled. These documents contain the information necessary to calculate the loaded C of G. The maintenance manual gives details of how to weigh the aeroplane and produce them.

The aeroplane should be weighed and a Weighing Report produced after initial build, and at intervals of not less than three years, or at anytime after major repair or modification work, including painting, has been carried out.
A copy of the latest Weight and Centre of Gravity Schedule should be inserted at the back of this manual and forms Appendix 2. It relates only to the specific aeroplane for which this manual is applicable.

Note :- The basic aeroplane is defined as the aeroplane fitted with minimum equipment. The basic aeroplane weight includes the weight of unusable fuel and all essential fluids.
The empty weight is the basic aeroplane weight, plus the weight of optional equipment and fixed ballast, fitted to that particular aeroplane.

The weight and position of the load that the aeroplane is to carry will affect its loaded C of G. The load can be split into two types:-

1) The variable load, which will depend upon the particular role for which the aeroplane is equipped. It will consist of the pilot plus any optional equipment which is fitted. Items and their relevant arms are shown in Part B of the Weight and C of G Schedule.

2) The disposable load, which consists of the weight of fuel, other consumable fluids, and passengers, and is shown under Part C of the Weight and C of G Schedule.

Ready to fly weight is obtained by adding the variable and disposable loads to the basic aeroplane weight. The important C of G position is that obtained with the aircraft in this condition, and will vary depending on the weight and position of these loads.

WEIGHT AND BALANCE

General (Contd.)

Note:- British Civil Airworthiness Requirement, section "S", with which microlight aircraft operated in the U.K. must comply, stipulates that the empty aeroplane weight, plus the weight of full fuel, plus the placarded maximum weight of crew and passengers, must not exceed the Maximum Authorised Weight (MAW). This means that it is not possible to carry additional fuel instead of a passenger, or carry additional optional equipment instead of full fuel, even though operating well below the (MAW). In addition, the C of G must remain within permitted limits whilst carrying any placarded combination of pilot weight, passenger weight and fuel load, without the requirement for removable ballast. Where optional equipment is fitted, it may be necessary to fit fixed ballast to achieve this condition, see maintenance manual for details.

By knowing the weight and C of G of the aeroplane in its basic condition, and the weight and position relative to the datum, of the variable and disposable items , it is possible, by calculation, to determine the position of the loaded C of G relative to that datum.
Obviously the further the load is away from C of G, the more it will influence its position. A heavy load placed on the C of G will not cause a change in the C of G, however a relatively light load placed at the tail or nose of the aircraft, could cause significant change. Bear this in mind if repairs, modifications or equipment installations are carried out.

In general, it is only necessary to investigate the maximum weight and maximum fore and aft C of G positions.
With the Sherwood Ranger, the maximum forward position will occur under the following loading conditions:-

1. Minimum weight pilot. (rear cockpit) 55 kg. (121 lbs.)
2. Maximum weight passenger (front cockpit) 90 kg. (198lbs).
3. Max. fuel.

The maximum aft or rear C of G position will occur under the following conditions:-

1. Maximum weight pilot. (rear cockpit) 90 kg. (198 lbs.)
2. No passenger (front cockpit).
3. Min fuel

If calculations show that the C of G limits are not exceeded at either of these loading conditions, it can be assumed that any combination of loads which do not exceed placarded figures or MAW will fall within.

The MAW should not be exceeded under the following conditions :-

1. Maximum weight pilot. (rear cockpit) 90 kg. (198 lbs.)
2. Maximum weight passenger (front cockpit) 90 kg. (198lbs).
3. Maximum fuel.

Determining The Weight and Centre of Gravity of The Loaded Aircraft

Whenever the aeroplane is weighed, or optional equipment is fitted or removed, the weight and centre of gravity position of the loaded aeroplane should be checked for the extremes of loading conditions shown above. It may be necessary to fit fixed ballast at the foreword or rear positions so that the C of G remains within limits.

To determine the loaded weight and centre of gravity, a load sheet should be prepared for each loading condition, as shown in the Sample Load Sheet Calculation, page 7-4.
A blank Load Sheet is provided in Appendix 2. This can be copied as required.

Enter the data and calculate in the appropriate columns as follows :-

1. From the Weight and Centre of Gravity Schedule, Part A, obtain the weight, the arm (C of G), and the total moment about the datum, of the basic aeroplane.

2. From the Weight and Centre of Gravity Schedule Part B, obtain the weight, arm and moment, of the applicable variable load items.
Note :- The arm is the distance of the load from the datum. The moment is the arm multiplied by the weight.
Some arms, and consequently moments, may be negative.

3. From the Weight and Centre of Gravity Schedule Part C, obtain the weight, arm and moment, of the applicable disposable load items.

4. Add the weights of the basic aeroplane, the variable load items and the disposable load items to give the total weight.

This is the Loaded Weight of the aeroplane and must not exceed the MAW.

5. Add the moments of the basic aeroplane, the variable load items and the disposable load items to give the total moment.
Divide the total moment by the total weight to give the total arm.

This is the position of the loaded C of G. It must lie within the limits relative to the datum as shown in Section 3.

SAFETY INFORMATION

Introduction

This section on safety information has been added to refresh owners and pilots knowledge of a number of safety subjects applicable to any type of flying. In addition, specific information is given on type conversion and test flying the Sherwood Ranger.
It is strongly recommended that these subjects be reviewed periodically.

Flight Testing

Unless the appropriate certifying authorities supply their own flight test schedule, the flight test schedule shown on Page 7-9 should be completed for each aircraft and a copy attached to this manual.

The initial flight tests of any aircraft must be approached with extreme caution. There are four main factors which are likely to affect the success or otherwise of early flights, as follows:-

The Flying Site

The runway should be long enough to allow a straight ahead landing from an initial climb out to at least 500 feet, with the circuit area free from turbulence producing obstructions such as hills, large buildings or tall trees. It must be possible to force land onto a smooth surface from any phase of the flight.

The Weather

Ideally, 5 knots of steady wind straight down the runway with no thermal turbulence, a cloud base above 2000 feet and good visibility. Generally these conditions are more likely to be found in the early morning or late afternoon.

The Aircraft

Obviously the machine should have been fully inspected in accordance with the maintenance manual and the engine run in accordance with the manufacturers recommendations. For the first few flights, inspect everything particularly carefully. Problems encountered during flight must be thoroughly investigated before further flight.

The Pilot

Probably the most important factor of all is the experience of the pilot. In the U.K, the initial test flying must be carried out by a pilot approved by the appropriate authorities, usually the PFA. Ideally they should have several hundred hours flying experience, a considerable proportion of which is on tailwheel type aircraft, preferably of the older generation i.e. Auster, Tiger Moth, Piper Cub etc, and ideally several hours on Sherwood Rangers.

It is essential that they are in current flying practice on several different types of aircraft, and in addition to reading this manual thoroughly, at least have had a verbal briefing from a pilot who has previously flight tested the Sherwood Ranger.

SAFETY INFORMATION

Flight Testing

Recommended Procedure

All initial test flying should be carried out solo.
Start by taxi-ing the aircraft until the ground steering and all control operations become familiar. Carry out several fast taxi runs into wind with just sufficient speed to raise the tail, ensuring that directional control is easily maintained by use of rudder. Check all instruments for correct functioning and that engine temperatures remain well below limits.

The first flight should be carried out by taking off on about 2/3 throttle. As soon as the aircraft become airborne, close the throttle gently and round out checking that sufficient elevator authority is available to rotate the aeroplane into the landing attitude. Carry out a similar take off and allow the airspeed to increase to approximately 60 MPH, without adopting the climb attitude. Reduce the power to maintain a height of about 10-15 feet above the runway at not less than 60 MPH, and gently feel the effect of the controls. (Read the chapter on conversion)

If the aircraft appears to be handling satisfactorily, check all engine temperatures, and if well in limits, gradually apply full throttle and adopt a climb attitude to give a climb speed of approximately 60 MPH. Monitor engine temperatures and RPM's throughout the climb. If the aircraft seems reluctant to climb, or you are not happy with any aspect of the handling, lower the nose, carry out a landing straight ahead and investigate.

Climb out to a height of at least 1000 feet a.g.l. before attempting any turns. Monitor engine temperatures and R.P.M.
Before carrying out any extreme maneuvers, fly around at normal operating speeds for 10-15 minutes to get the feel on the controls. When you are conversant with the general handling of the aeroplane, commence the flight test schedule as shown on Page 7-9. It is not essential or desirable to carry out all of the sections within one flight, however, the test flying must not be regarded as completed until each section has been complied with and acceptable results recorded.

Any operating characteristics which differ from those described in this manual or from any other Sherwood Ranger LW series aircraft, must be investigated and if necessary, further flight tests carried out.

WARNING: Flight tests entail greater risk than normal flight.

SAFETY INFORMATION

Type Conversion

It must be stressed that whilst the Sherwood Ranger is a very simple and easy aeroplane to fly, for safe and reliable operation, it requires similar levels of skill, discipline, airmanship and knowledge to that required for any tailwheel type light aircraft.

As a general guide, unless having carried out a dual check with a pilot suitably experienced on the Sherwood Ranger, pilots should have undertaken training to at least solo stage on tailwheel aircraft such as Chipmunk, Piper Cub, Auster or similar, and be in current flying practice, before attempting to fly the aeroplane.

It is strongly recommended that the aircraft is operated from an area, and in such a manner that in the event of engine failure during any phase of flight, the aircraft can be easily positioned such as to enable a glide landing to be carried out onto a suitable surface, preferably into wind. (Note:- An aircraft operating on a Permit to Fly is not allowed to overfly a congested area in the U.K.)

All pilots, irrespective of experience, should carry out their initial flying under the guidance and supervision of a fully rated group "A" flying instructor who has had flying experience in the Sherwood Ranger.

The factors and circumstances relating to flight testing, i.e. flying site, weather and aircraft conditions are just as applicable as type conversion.

The main characteristics which may differ slightly from the aircraft you have previously flown are detailed below. Discuss these with your instructor before first flight.

Take-Off Run

Unless experienced on tailwheel type aircraft, maintaining directional stability may be found difficult, particularly with a cross wind. A certain amount of anticipation is necessary and practice makes perfect.

Controls (Flying)

The controls are light, i.e. low stick forces, and sensitive.
There may be an initial tendency to overcontrol.

Controls (Engine)

The throttle is on the left hand side on the standard aircraft, the control stick being operated with the right hand.

SAFETY INFORMATION

Type Conversion (Contd.)

Cockpit Environment
Wearing a crash helmet with visor, slip stream and noise in an open cockpit can initially seem disconcerting, but soon becomes familiar. In particular, if your only experience is with four stroke engines, the high operating engine revs of a two stroke engine may seem to be excessive. Lots of practice taxi-ing will help. Also the ground below and the sensation of flying may seem different when not viewed through perspex from an enclosed cabin.

Approach
In common with most Bi-Planes, the approach without power will be steeper than a clean flapless monoplane.

Rules and Regulations

Below is a checklist of the recommended and legal requirements before flight.

Recommended checklist:

1) All information circulars issued by The Light Aircraft Company Ltd.

2) Read Sherwood Ranger Pilots Manual.

3) Read Sherwood Ranger Maintenance Manual.

4) Current solo experience on tailwheel aircraft.

5) Supervision by group "A" rated flying instructor.

6) Aircraft inspected by approved inspector.

7) At least Third Party insurance.

Legal Requirements:

1) A current pilots licence and certificate of experience.

2) Registration and correct display of registration letters. (CAA Doc.245).

3) A current medical certificate.

4) The airfield or landowners permission to fly.

5) A current permit to fly.

SAFETY INFORMATION

Turbulence

Turbulent Weather

All Microlight aircraft are particularly susceptible to turbulence. A complete weather briefing prior to beginning a flight is an essential element of a safe trip.

Updating the weather information enroute is another safety aid. However, the wise pilot also knows weather conditions change quickly at times and treats weather forecasting as professional advice rather than an absolute fact. He obtains all the advice he can, but stays alert by using his knowledge of weather conditions.

Thunderstorms, squall lines and violent turbulence should be regarded as extremely dangerous and avoided. The hail and tornadic wind velocities encountered in thunderstorms can destroy any aeroplane, just as tornadoes destroy nearly everything in their path on the ground.

NOTE: Conditions which are regarded as slightly turbulent in a light aircraft can be severe in a Microlight.

A roll cloud ahead of a squall line or thunderstorms is visible evidence of violent turbulence, however, the absence of roll cloud should not be interpreted as denoting the lack of turbulence.

Flight in turbulent air

Even though flight in severe turbulence is to be avoided, flight in turbulent air may be encountered under certain conditions.

Flying through turbulent air presents two basic problems, to both of which the answer is correct airspeed. If you maintain an excessive airspeed, you run the risk of structural damage or failure, or if your airspeed is too low, you run the risk of stalling.

If turbulence encountered in cruise or descent becomes uncomfortable to the pilot or passenger, the best procedure is to reduce speed to VNO, the maximum turbulent air penetration speed, listed in the limitations section of this handbook. This speed gives the best assurance of avoiding excessive stress loads, and at the same time provides a margin of airspeed to prevent inadvertent stall due to gusts.

Beware of over controlling in attempting to correct for changes in attitude. Applying control pressure abruptly will build up g-forces rapidly and could cause damaging structural stress loads. You should watch particularly your angle of bank, making turns as wide and shallow as possible, and be equally cautious in applying forward or back pressure to keep the nose level. Maintain straight and level attitude in either up or down drafts.

SAFETY INFORMATION

Turbulence

Flight in turbulent air (Cont'd)

Avoid flight at low altitude over mountainous terrain, particularly near the lee slopes. If wind velocity near the level of the ridge is in excess of 25 knots and approximately perpendicular to the ridge, mountain wave conditions are likely over and near the lee slopes. If the wind velocity at the level of the ridge exceeds 50 knots, a strong mountain wave is probable with strong up and down drafts and severe or extreme turbulence, quite capable of destroying a microlight aircraft.

The worst turbulence will be encountered in and below the rotor zone which is usually 8 to 10 miles downwind from the ridge. This zone is characterized by the presence of "roll clouds" if sufficient moisture is available. Altocumulus standing lenticular clouds are also visible signs that a mountain wave exists, but their presence is likewise dependent upon moisture.

Mountain wave turbulence can, of course, occur in dry air and the absence of such clouds should be taken as any assurance that mountain wave turbulence will not be encountered. A mountain wave downdraft may exceed the climb capability of your aeroplane. Avoid mountain wave downdrafts.

Vortices - Wake Turbulence

Every aeroplane generates wakes of turbulence while in flight. Part of this is from the propeller or jet engine and part from the wing tip vortices. The larger and heavier the aeroplane, the more pronounced and turbulent the wakes will be. Wing tip vortices from large heavy aeroplanes are very severe at close range, degenerating with time, wind and space. These are rolling in nature from each wing tip. In tests, vortex velocities of 133 knots have been recorded. Exhaust velocities from large aeroplanes at take-off have been measured at 25 MPH, 2000 feet behind medium large aeroplanes.

Encountering the rolling effect of wing tip vortices within two minutes or less after passage of large aeroplanes is the most hazardous to light aircraft. This roll effect can exceed the maximum counter roll obtainable in an aeroplane. The turbulent areas remain for as long as three minutes or more, depending on wind conditions, and may extend several miles behind the aeroplane. Plan to fly slightly above or to the side when following large aircraft.

Because of the wide variety of conditions that can be encountered, there is no set rule to follow to avoid wake turbulence in all situations. Use prudent judgment and allow ample clearance, time and space following or crossing the wake of large aircraft and in all take-off, climb out, approach and landing operations. This information is particularly applicable to Microlight aircraft operating from airfields at the same time as general aviation aircraft.

SAFETY INFORMATION

Stalls, Spins and Slow Flight

Stalls, and slow flight should be practiced at safe altitudes to allow for recovery. Either of these maneuvers should be performed at an altitude in excess of 2000 feet above ground level. Wing drops near the stalls should be corrected with rudder only. Maintain aileron neutral.

Spins are prohibited in this aeroplane. Since spins are proceeded by stalls, a prompt and decisive stall recovery protects against inadvertent spins.

Take Off and Landing Conditions

Use caution when landing on runways that are covered by water or slush which cause hydroplaning (aquaplaning), a phenomenon that renders braking and steering ineffective because of the lack of sufficient surface friction. Snow and ice covered runways are also hazardous.

Use caution when taking off and landing during high wind conditions. Also be aware of special wind conditions caused by buildings or other obstructions located near the runway in a crosswind pattern.

Medical Facts

When piloting an aeroplane, an individual should be free of conditions which are harmful to alertness, ability to make correct decisions and rapid reaction time.

Vertigo - Disorientation

Disorientation can occur in a variety of ways. During flight, inner ear balancing mechanisms are subject to varied forces not normally experienced on the ground. This combined with loss of outside visual reference can cause vertigo. False interpretations (illusions) result and may confuse the pilot's conception of the attitude and position of his aeroplane.

Under VFR conditions the visual sense, using the horizon as a reference, can override the illusions. Under low visibility conditions (night, fog, clouds, haze, etc.) the illusions predominate. Only through awareness for these illusions and proficiency in instrument flight procedures, can an aeroplane be operated safely in a low visibility environment. The Sherwood Ranger must only be flown under VFR conditions.

All pilots should check the weather and use good judgment in planning flight. The VFR pilot should use extra caution in avoiding low visibility conditions.

Motion sickness often proceeds or accompanies disorientation and may further jeopardize the flight.

SAFETY INFORMATION

Medical Facts

Fatigue

Fatigue generally slows reaction times and causes errors due to inattention. In addition to the most common cause of fatigue, insufficient rest and loss of sleep, the pressures of business, financial worries and family problems, can be important contributing factors. If your fatigue is marked prior to a given flight, do not fly.

Hypoxia

Hypoxia is simple terms is a lack of sufficient oxygen to keep the brain and other body tissues functioning properly. Wide individual variation occurs with respect to susceptibility to hypoxia. In addition to progressively insufficient oxygen at higher altitudes, anything interfering with the blood's ability to carry oxygen can contribute to hypoxia (anemia, carbon monoxide, and certain drugs). Also alcohol and various drugs decrease the brain's tolerance to hypoxia.

Your body has no built in alarm system to let you know when you are not getting enough oxygen. It is impossible to predict when or where hypoxia will occur during a given flight, or how it will manifest itself. A major early symptom of hypoxia is an increased sense of well-being (referred to as euphoria). This progresses to slow reactions, impaired thinking ability, unusual fatigue, and a dull headache feeling.

The symptoms are slow but progressive, insidious in onset, and are most marked at altitude starting above 10,000 feet. Night vision, however, can be impaired starting at altitudes lower than 10,000 feet. Heavy smokers may experience early symptoms of hypoxia at altitudes lower than is so with non-smokers. It is unlikely that the Sherwood Ranger will normally be operated at sufficient altitude for hypoxia to become a problem.

SAFETY INFORMATION

Medical Facts

Hyperventilation

Hyperventilation or overbreathing, is a disturbance of respiration that may occur in individuals as a result of emotional tension or anxiety. Under conditions of emotional stress, fright, or pain, breathing rate may increase, causing increased lung ventilation, although the carbon dioxide output of the body cells does not increase. As a result, carbon dioxide is "washed out" of the blood. The most common symptoms of hyperventilation are, dizziness, hot and cold sensations, tingling of the hands, legs and feet, nausea, sleepiness, and finally unconsciousness.

Should symptoms occur, consciously slow your breathing rate until symptoms clear and then resume normal breathing rate. Breathing can be slowed by breathing into a bag, or talking out loud.

Alcohol

Common sense and scientific evidence dictate that you do not fly as a crew member while under the influence of alcohol. Even a small amount of alcohol in the human system can adversely affect judgment and decision making abilities.

Drugs

Self-medication or taking medicine in any form when you are flying can be extremely hazardous. Even simple home or over-the-counter remedies and drugs such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquilizers, and appetite suppressers, may seriously impair the judgment and co-ordination needed while flying. The safest rule is to take no medicine except on the advice of your Aviation Medical Examiner.

S U P P L E M E N T S.

This section contains, in the form of supplements, information applicable to any particular feature or use of the aeroplane which is not covered by the information and data included in the manual.

The particular supplements embodied in this copy of the manual are recorded on the record sheet on Page 6-2.

RECORD OF SUPPLEMENTS

The following approved supplements have been embodied in this copy.

SUPPLEMENT NO	SUPPLEMENT ISSUE	NAME OF PUBLISHER	DATE OF APPROVAL	EMBODIMENT DATE	SIGNATURE
2		TLAC		13.03.08	PFA

SHERWOOD RANGER (LW series)

F L I G H T T E S T S C H E D U L E

I S S U E N O 1

1. **GENERAL.**

The aeroplane and its engine are at all times to be operated within the limitations imposed by the pilots operating manual, cockpit placards and instruments colour coding. The normal operating checks and drills must be followed. During the flight test, monitor the behavior of all instruments and report any unserviceable items.

Test Report No .... Air Temp ^{o}C ....

Flight Date .... Q F E ....

Pilot .... Wind ....

Aircraft Reg. No .... Cloud Base ....

Location .... Turbulence ....

2. **LOADING.**

Take-Off Weight .... C of G Position ....

3. **PRE-FLIGHT**.

All legal & recommended requirements complied with ....

Pilots operating Manual read & understood ....

4. **GROUND TESTS.**

4.1 Check flying controls: Full travel, freedom and correct

functioning. ....

4.2 Check engine controls: ....

Full travel, freedom & correct functioning ....

4.3 Check safety harness/lap strap/seat harness for safety and

correct functioning ....

4.4 **ENGINE RUN.**

The aeroplane should face cross-wind, if wind strength makes operating hazardous, face into wind. Ensure chocks in position and aeroplane securely anchored.

Test Conducted: Cross Wind ....
Into Wind ....

Maximum Power Check RPM ....

5. **TAXI-ING.**

Taxi-ing, including steering ....

6. **TAKE-OFF.**

Behavior during take-off:- ....

Record any abnormal features ....

e.g. unusual tendency to swing, ...

ease or difficulty of raising ....

tailwheel. Wing heaviness etc. ....

7. **CLIMB PERFORMANCE.**

Flight conditions: Clear of cloud and well clear of any hill which could produce wave conditions.

Power: Max Continuous

Altimeter: 1013 mb

Climb speed: See Manual .... IAS

Air Temp: .... ^{o}C

Weight ....

Propeller size & type ....

Altitude 1:
Climb Commence: .... ft Time 1 ....Mins
(not above 150ft a.g.l.)

Altitude 2 = Altitude 1+1000ft.
Climb finish: .... ft Time 2 ....Mins

7. **<u>CLIMB PERFORMANCE.</u> (Contd.)**

Towards end of climb record: RPM ....

Cylinder head temp ....

Average Altitude 3 = Altitude 1 + (Altitude 2 - Altitude 1) = ...ft

$$\text{Average Altitude 3} = \text{Altitude 1} + \frac{(\text{Altitude 2} - \text{Altitude 1})}{2}$$

Rate of climb at altitude 3 = 1000 / (Time 2 - Time 1) = ...ft/min.

$$\text{Rate of climb at altitude 3} = \frac{1000}{(\text{Time 2} - \text{Time 1})}$$

8. **<u>STALLS.</u> (Above 3000 ft.)**

Approach stall with throttle closed and airspeed reducing at a rate of approximately 1 MPH per sec.

Scheduled stall speed IAS ....

Any stall warning? IAS ....

Stall. IAS ....

Did control column reach back stop ....

Sequence of nose and wing drop (if any) ....

Angle of wing drop ....

Height lost in recovery ....

i.e. from moment of stall to regaining level flight.

Other characteristics ....

....

....

....

9. **DIVE TO VNE.**

This test must only be done in smooth air conditions.
Accelerate the aeroplane in level flight to full throttle.

Record IAS .... RPM ....

Increase speed to VNE. Keep RPM within maximum permissible. If any unusual airframe or control vibration is felt, immediately reduce speed by gradually pulling the control column back and closing the throttle.

RECORD: Any unusual
behavior ....

Maximum RPM ....
Maximum IAS ....

Regain cruising flight by closing throttle and gradually pulling the control column back.

10. FUNCTIONING CHECKS.

10.1 During the flight, check the controls for excessive friction, backlash and normal control forces.

....
....
....
During normal cruise, check that the aeroplane flies level without tendency to drop a wing, and flies straight with the slip indicator central.

10.2 Using the indications on the fuel tank, calculate the fuel

consumption during normal cruise .... GPH

10.3 Fly the aeroplane at various cruise speed throughout the normal cruising range. Note

which speed/throttle setting gives highest Exh.gas temperature. ....

10.4 Check all instruments
for satisfactory functioning ....

11. APPROACH AND LANDING.

Carry out a normal approach and landing at the speeds specified in the manual.
Record any abnormal features ....

FLIGHT TEST CERTIFICATE.

I certify that I have carried out all the tests specified in this schedule ISS.1 and that the behavior of the aeroplane was* was not*
satisfactory.

I encountered the features listed below which I consider
{ Undesirable } *
{ Could render the aeroplane unsafe } *

* Delete as appropriate

....

....

....

....

The following defects occurred and should be rectified I (DO) *(DO NOT) *consider that a further flight is necessary.

....

....

....

....

....

PILOT ....

LICENCE CAT. AND NO. ....

DATE. ....

SIGNED ....

PLEASE FORWARD A COPY OF THIS COMPLETED FLIGHT TEST SCHEDULE TO TLAC Ltd.

Supplement Issue 2 Jabiru 2200 Powered Sherwood Ranger Series

Maximum Total Weight Authorised: 450 Kgs

CG Range: Limits 3.8 inches to 7.7 inches aft of the datum point.
Datum Point is: The centreline of the lower wing mainspar tube at the fuselage side.

Engine Limitations (Jabiru 2200A engine)

Maximum Engine RPM: 3300 rpm.

Jabiru propeller / Hercules

Airspeed Limitations `Maximum Indicated Airspeed: 100 mph (87 knots)

With Jabiru 2200A: Max CHT: 210C
Oil temp: 50-110C
Oil pressure 125-525 kPa @3100 RPM

Model	Engine	Max empty weight
ST/XP	Jabiru 2200A	268 kg
ST/XP	Rotax 532	260 kg
ST/XP	Rotax 582	260 Kg

Adequate engine cooling with Jabiru 2200A engine.
With Jabiru engine it is imperative that the cylinder head bolts and tappets are checked at 5, 10, 15 and 20 hours. Omitting this check can lead to head leaks and damage at around 25-50 hours.

Have a good look around the rocker boxes and make sure oil is present and that there are no signs of overheating in the form of burnt lacquered oil.

New engines with hydraulic tappets need only to have the head bolts checked. With Jabiru engine, encourage test pilot to work the engine quite hard to avoid glazed piston bores, vary rpm settings and do not fly at low power settings for too long.