

AEROPLANE FLIGHT MANUAL

**Van Grunsven RV-9A
Serial number 91400
Registered VH-LPL**

APPROVED FLIGHT MANUAL

Nationality & Registration Marks	VH – LPL
Manufacturer/Builder	Ivan Salisbury
Registered Owner	Albany Aero Club Inc
Designation of Aircraft	Van Grunsven RV-9A
Aircraft Serial Number	91400
Place and Year of Manufacture	ALBANY, WA – 2006
Certification Category	AMATEUR BUILT
Kit Manufacturer	VANS AIRCRAFT 14401 NE Keil Rd AURORA OR 97002 USA (503) 678 6545

This Manual has been ISSUED BY THE BUILDER,
and is the Flight Manual referred to in
Certificate of Airworthiness number.....

Date : 7 April 2007

.....
Ivan Salisbury

Any person finding this Manual should return it to Sport Aircraft
Association of Australia, or to the nearest Regional Office of the
Civil Aviation Safety Authority Australia

GENERAL AMENDMENT RECORD SHEET

AMENDMENT NUMBER	PARAGRAPH(S) AFFECTED	SIGNATURE	DATE OF INCORPORATION
0	All – Initial issued		18/12/2001

Incorporation of a Particular Amendment must be certified by inserting the date of incorporation and signature in the appropriate columns. All amendments must be embodied consecutively. This page will be reissued with each General Amendment, and previous copies should be retained in the Flight Manual to serve as a record of amendments issued. Superseded Flight Manual pages should be removed and destroyed.

7th April 2007

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Ivan Salisbury

PARTICULAR AMENDMENT RECORD SHEET

AMENDMENT NUMBER	PARAGRAPH(S) AFFECTED	SIGNATURE	DATE OF INCORPORATION
0	All – Initial issued		18/12/2001

NOTE: Amendment numbers may not be consecutive

7th April 2007

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Ivan Salisbury

INTRODUCTION

This Flight Manual applies only to the particular aeroplane identified by registration marking and serial number on page (i) and contains the airworthiness limitations and essential data for that aeroplane. Special operations requiring additional limitations and instructions are listed in "Section 8 - Supplements" and this section shall be consulted before undertaking any such operations. For operating information not included in this manual, reference should be made to the appropriate operations or manufacturers manual.

The Flight Manual shall be carried in the aeroplane on all flights. It is the responsibility of the pilot in command to be familiar with the contents of this Manual and to comply with all directives contained herein relating to the operations of the aeroplane as specified in CASR 61.385.

Amendments will be issued by the Civil Aviation Safety Authority Australia as necessary and will take the form of replacement pages, with changes to the text indicated by a vertical line in the margin together with the amendment number. It is the owner's responsibility to incorporate in this Manual all such amendments and to enter the date of incorporation and his/her signature on the appropriate Amendment Record Sheet.

The aeroplane has been certificated on the basis of the equipment fitted at the time of certification. Any changes in equipment are subject to approval by the Civil Aviation Safety Authority Australia.

No entries or endorsements may be made to this Flight Manual except in the manner and by persons authorised for the purpose by the Civil Aviation Safety Authority Australia.

DEFINITIONS

The following definitions shall apply throughout this Manual:

AIRFIELD PRESSURE HEIGHT

The Airfield Pressure Height is that height registered at the surface of an aerodrome by an altimeter with the pressure sub-scale set at 1013.2 millibars.

I.A.S.

Indicated Airspeed, which is the reading obtained from an airspeed indicator having no calibrated error.

TAKE-OFF SAFETY SPEED,(TOSS)

The Take-off Safety Speed is a speed chosen to ensure that adequate control will exist under all conditions, including turbulence and sudden and complete engine failure, during the climb after take-off. It is usually close to V_x (best angle of climb).

APPROACH SPEED, (V_{ref})

The Approach Speed is a speed chosen to ensure that adequate control will exist under all conditions, including turbulence, to carry out a normal flare and touchdown. It is calculated as $1.3 \times V_{so}$.

NORMAL OPERATING LIMIT SPEED (MAXIMUM STRUCTURAL CRUISING SPEED, V_{no})

This speed shall not normally be exceeded. Operations above the Normal Operating Limit Speed shall be conducted with caution and only in smooth air. Light turbulence only.

MANOEUVRING SPEED, V_a

Maximum for manoeuvres involving an approach to stall conditions or full application of the primary flight controls. It is derived from $V_s \times \text{sq.rt of LF}$ (3.8) and so varies with weight and power (V_s). This is also the limiting IAS in moderate turbulence.

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SECTION 1 – AIRPLANE GENERAL DATA

1.1 ENGINE

MANUFACTURER.....Lycoming
TYPE..... 0-320-D1A
HORSEPOWER.....160
Carburetted
Dual magneto

1.2 PROPELLER

MANUFACTURER	TYPE	DIA	FULL THROTTLE RPM
Sensenich	METAL – 2 BLADE	72 INS	2600 RPM MAX
	PITCH		

1.3 FUEL

GRADE Aviation Grade Fuel, MIN 91 / 96

CAPACITY Left tank.....68 litres
Right tank.....68 litres
Total Useable.....136 litres

1.4 OIL

AMBIENT AIR TEMPERATURE	VISCOSITY GRADE
Above 26°C	SAE 50 or SAE 60
15°C to 26°C	SAE 40 or SAE 50
0°C to 15°C	SAE 40
Below 0°C	SAE 30

Capacity 8 US. Quarts
Minimum level 4 qts
Normal operations..... 6 qts

1.5 STARTING PROCEDURES

COLD: Prime by electric pump until fuel pressure in green arc

Throttle retarded

Crank until it fires, then advance throttle to hold 1000rpm

HOT: No priming required

Throttle set to approx 1000rpm position

1.6

ENGINE POWER SETTINGS

FUEL AND POWER CHART LYCOMING MODEL O-320-B SERIES

Press Alt. 1000 Feet	Std. Alt. TEMP Deg.C	88 HP 55% Rated Approx Fuel 28.4 Lit. per Hour RPM & MAN. PRESS				104 HP 65% Rated Approx Fuel 32.2 Lit. per Hour RPM & MAN. PRESS				120 HP 75% Rated Approx 37.9 Lit. per Hr. RPM & MAN. PRESS			
		2100	2200	2300	2400	2100	2200	2300	2400	2200	2300	2400	
S.L.	15	21.9	21.0	20.2	19.5	24.2	23.3	22.5	21.7	24.9	24.0		
1	13	21.6	20.8	19.9	19.2	23.9	23.0	22.2	21.4	24.6	23.8		
2	11	21.3	20.4	19.6	19.0	23.6	22.7	21.9	21.2	25.1	24.3	23.5	
3	9	20.9	20.1	19.3	18.7	23.3	22.4	21.7	21.0	24.8	24.0	23.3	
4	7	20.6	19.8	19.1	18.5	23.0	22.1	21.4	20.7	24.5	23.7	23.0	
5	5	20.3	19.6	18.8	18.3	22.7	21.8	21.1	20.5	F.T.	23.4	22.8	
6	3	20.0	19.3	18.6	18.0	22.4	21.5	20.9	20.3	22.4	F.T.	22.6	
7	1	19.8	19.1	18.3	17.8	22.1	21.2	20.6	20.0	F.T.	F.T.	F.T.	
8	-1	19.5	18.8	18.1	17.6	F.T.	21.0	20.4	19.8				
9	-3	19.2	18.6	17.8	17.4		F.T.	20.2	19.6				
10	-5	19.0	18.3	17.6	17.2			F.T.	19.4				
11	-7	18.7	18.1	17.4	17.0				F.T.				
12	-9	18.4	17.9	17.2	16.8								
13	-11	F.T.	17.6	17.0	16.6								
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15	-15			F.T.	16.2								

F.T. = Full Throttle

Fuel consumption is with carburetor leaned to best power with standard altitude temperature and pressure at carburetor inlet
To maintain constant power, correct manifold pressure add/subtract approximately 1% for each 6 Deg C above/below standard

1.7 TYRES AND PRESSURES

Tyres on LPL are only small, (5.00 x 6), hence they deflate much faster than do your average C172 tyres. You will recognise below desirable inflation if the aircraft is difficult to handle in the hangar, the tyres bulge outwards when viewed from front or rear, and have a 'flat' on the ground longer than 75-80mm, viewed from the side.

Desirable pressure is above 35 psi. **35 to 40 psi** is normally used. Use highest pressures when operating near gross weight.

Ensure LPL is chocked before inserting the valve 'extension' into the wheel spat hole, and screwing it onto the valve.

SECTION 2 - OPERATING LIMITATIONS

2.1 AIRSPEEDS (I.A.S.)

Never exceed.....(Vne)	183 kts
Normal operating limit.....(Vno)	158 kts
Max. Manoeuvring.....(Va)	112 kts
Maximum, wing flaps extended.....(Vfe)	78 kts
Best angle of climb.....(Vx)	65 kts
Best rate of climb.....(Vy)	85 kts
Stall in ldg config – full flap/pwr off.....(Vso)	46 kts
Stall, clean – nil flap, pwr off.....(Vs)	53 kts

2.2 MANOEUVRES PERMITTED

(a) **Normal** operations up to maximum take off weight as stated in section 2.5 are limited to normal flying manoeuvres, but include straight and steady stalls, and turns in which the angle of bank does not exceed 60 degrees. Spins are prohibited.

(b) **Aerobatic** manoeuvres: Due to flight testing not having been reported – aerobatic manoeuvres are not permitted.

A placard shall be displayed in the cockpit in full view of the pilot

<p style="text-align: center;">THIS AIRCRAFT HAS NOT BEEN SHOWN TO MEET THE REQUIREMENTS FOR AN AEROBATIC AIRCRAFT. ABRUPT OR FLICK MANOEUVRES AND TAILSLIDES ARE PROHIBITED</p>

2.3 CROSSWIND COMPONENT

The maximum permissible crosswind component for take-off and landing is **15** knots.

2.4 POWER PLANT

(a) Oil Pressure:

Normal – MAX	90 psi
Minimum safe in flight	60 psi
Minimum safe idling	25 psi

(b) Oil Temperature:

Minimum safe in flight	82° C (180°)
Maximum in flight (red line)	118° C (245°)

(c) Fuel Pressure:

MIN	3 psi
-----	-------

2.5 WEIGHT AND BALANCE

(a) Weight

Maximum take-off weight (normal category).....	795 kg
Maximum take-off weight (aerobatic operations).....	N/A
Maximum landing weight.....	795 kg

(b) Centre of Gravity:

(i) Normal Category

Forward limit.....1980 mm

Rear limit.....2155 mm

(ii) Aerobatic Operations – (not approved)

Forward limit..... mm

Rear limit..... mm

(c) Datum:

1778 mm forward of the wing leading edge

(d) Baggage Compartment loading:

Maximum permissible baggage compartment load:.....45kg

NB: uniformly distributed – front to rear.

2.6 SMOKNG

Smoking is Not Permitted.

SECTION 3 - HANDLING

This Section contains essential information relating to the handling characteristics and operation of the aeroplane and its systems.

3.1 STALLING SPEEDS (I.A.S.)

Power idle @ gross weight of 795 kgs

CONFIGURATION		ANALOG ASI	DYNON ASI
Flaps UP	(0°)	53 KIAS	51 KIAS
Flaps HALF	(15°)	50 KIAS	48 KIAS
Flaps FULL	(30°)	46 KIAS	44 KIAS

3.2 STALL WARNING

Slight aerodynamic buffet occurs 5 knots above stall in all configurations. Recovery is conventional. An aural warning sounds between 7-10 kts above actual stall, and remains on until the wing is un-stalled.

3.3 FLAPS

Flaps are powered by an electric motor.

Maximum flap operating speed is 78 KIAS

Flaps should be retracted for all taxiing, especially on gravel strips.

Flaps should be fully extended for parking and in hangar

The take off and landing weight charts in Section 4 of this Flight Manual are based on the following flap settings:

Take-off hard surface.....0° flaps

 soft or rough.....15° flaps

Landing30° flaps

Touch and Go.....leave flaps 30 until airborne

3.4 ELECTRICAL POWER

Do not turn off the alternator in flight except in an emergency.
In event of alternator failure – reduce power load.

EFIS has battery backup for min 2 hrs operation

SECTION 4 – PERFORMANCE

4.1 STRIP LENGTH REQUIREMENTS

Operations shall be conducted from strips of length not less than 500 meters plus 50 meters increase for each 1000 feet the strip is above sea level.

Take-off Safety Speed (TOSS) 65 knots Flaps 0°

Minimum Approach Speed (Vref) 60 knots Flaps 30°

4.2 TAKE-OFF

MTOW = 795 kg
TOSS = 65 kts
TOD = from brakes off to 50ft agl

Max tailwind component = 10 kts

Subtract 10% length for each 5 kts headwind or 2% downhill slope.

Add 10% for each 1000ft of density altitude, soft surface or long wet grass.

Use half flap and rolling start for short, rough or soft strips – lifting the nosewheel clear as soon as there is elevator command.

4.3 LANDING

The RV9A requires careful power and trim management to obtain a 500 fpm R-O-D.

An acceptable technique is to reduce power to idle on turning base, then extend FULL FLAP as aircraft decelerates below V_{fe} of 78 KIAS, then adjust power and attitude to hold 65 KIAS and 500 fpm down base and most of final.

Speeds greater than 65 KIAS will result in a decrease in ROD.

MLW = 795 kg
MAS V_{ref} = 58 kts
LD = distance from 50ft agl to full stop

Max tailwind component = 5 kts

Subtract 10% length for each 5 kts headwind **or** for 2% uphill slope, or soft surface, or long wet grass.

Add 10% length for each 1000 ft DA, or 5 kts tailwind, **or** 2% downslope.

Short field landings should be made with the aircraft IAS reduced to 1.2 V_{ref} , (approx. 55 KIAS) but with sufficient power to enable the aircraft to be flared sufficiently to touchdown on mainwheels.

Pilots should be aware that windshear around vegetation and buildings may increase R-O-D and require timely increase in power.

SECTION 5 - INSTRUMENT AND EQUIPMENT INSTALLATIONS

5.1 MANDATORY INSTRUMENTS AND INDICATORS

The aeroplane shall not be operated unless, in addition to the minimum flight and navigational instruments required by Civil Aviation Orders Section 20.18, the following indicators and instruments are also installed.

- (a) **Position Indicators:**
 - (i) Trim Position Indicator

- (b) **Power Plant Instrument and Indicators:**
 - (i) Fuel quantity Indicator
 - (ii) Oil pressure Indicator
 - (iii) Oil temperature Indicator
 - (iv) Tachometer
 - (v) Voltmeter
 - (vi) Fuel Pressure indicator
 - (vii) Manifold Pressure

- (c) **Other Airworthiness Instruments:**
NIL

5.2 DYNON D-100 EFIS

An Electronic Flight Information System is fitted instead of the traditional vacuum attitude instruments. However, an analog ASI, ALT and VSI are also fitted.

QNH must be set before flight. Heading must be cross-checked against both compass and GPS.

Complete details on the operation of the Dynon D-100 EFIS are available in the printed copy of the Pilot Manual, located in the aircraft accessories box.

5.3 JPI FS-450 FUEL COMPUTER

As an aid to fuel management in this RV9A, a JPI FS-450 fuel computer has been fitted. It presents LPH, L used, L remaining, and time remaining.

The computer has been calibrated, but pilots should not rely solely on this unit. Tanks must still be dipped, and en route calculations of fuel burn should continue to be made.

The computer should be reset to 'FULL' (136L) after tanks are topped off and drained. Check that display shows 'FUEL USED = 0 and 'FUEL REM = 136' after this reset is made.

Complete details on the operation of the JPI FS-450 Fuel Computer are available in the printed copy of the Pilot Manual, located in the aircraft accessories box.

5.4 AUTOPILOT – TRUTRAK DIGIFLIGHT + ALTRAK AH

This aircraft is fitted with a Tru-trak Digiflight autopilot which can maintain a magnetic track, or it can navigate to a waypoint from the coupled GPS. A flight plan can be inserted into the GPS and the autopilot will follow it via all of the intermediate waypoints.

Altitude hold is available from an Altrak unit operated off a separate switch. It is advisable to establish the aircraft is stable cruise before engaging altitude hold.

Complete details are available in the Pilot Notes located in the baggage compartment box.

5.5 CHT/OAT/EGT INSTRUMENT

This instrument should be used in CHT mode while taxiing and climbing the aircraft. Once it has stabilized in cruise, the instrument may be used in EGT mode for mixture management.

Lean mixture slowly so that an accurate 'peak' EGT can be determined. Richen the mixture to some 75 degrees F below peak and then switch to CHT mode. Monitor both CHT and oil temperature rise after leaning.

Check that the EFIS is showing the correct OAT in the TAS/DA box in the top LH corner. If not, insert the OAT off the CHT/EGT instrument into the EFIS. 2nd L button>MORE>MORE>OATSET.

SECTION 6 - LOADING DATA

6.1 GENERAL

This Section contains basic weight and centre of gravity information necessary to ensure correct loading of the aeroplane and comprises Aeroplane Weight and Loading System pages.

Both of these documents, separately approved by CASA or an aircraft weight control authority, are to be carried in this Flight Manual at all times.

6.2 LOADING DATA

LOAD DATA SHEET

Authorised	Date	Date of Expiry	Issue
IS	7 th April, 2007	INDEFINITE	1

Aircraft Weight and Centre of Gravity Data

ITEM	WEIGHT	ARM	MOMENT	CONFIGURATION
Basic Aircraft	485.4kg	1965mm	935025	Basic

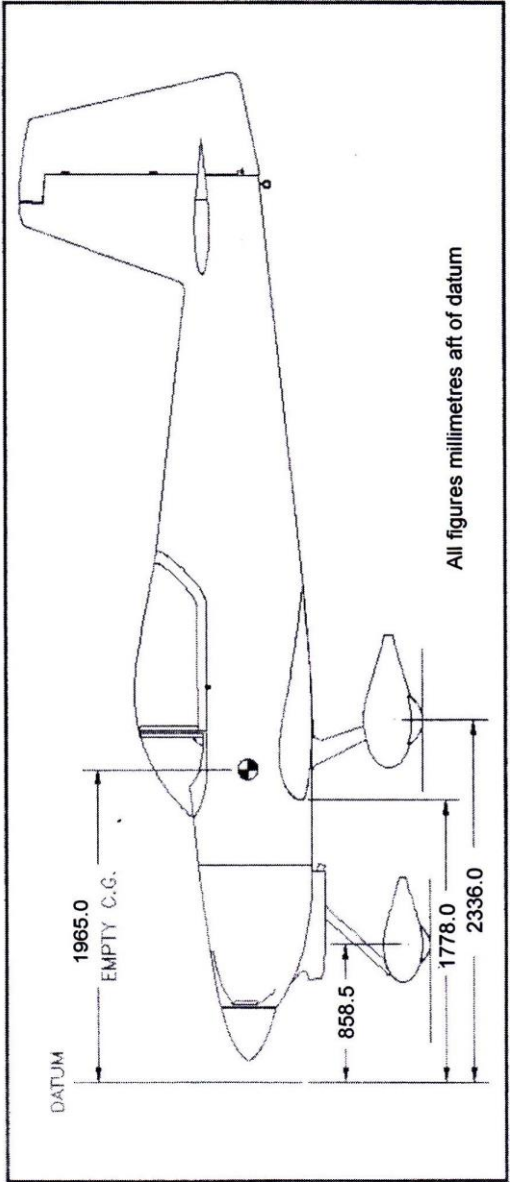
DATUM: 1778mm, (70ins), forward of the wing leading edge. The levelling datum is the fuselage top longeron at the cockpit.

The basic weight includes unusable fuel and oil at normal operating levels.

6.3 AIRCRAFT DIAGRAM

MAKE: VAN GRUNSVEN MODEL: RV9A SERIAL: 91400
REGISTRATION: VH-LPL

Aircraft weighed empty in level flight attitude. Includes 6 quarts of oil, no fuel



6.4 ORIGINAL WEIGHT & CG CALCULATIONS

Datum	1778mm forward of wing leading edge
Design CG Range	15-28% of wing chord , or 201.9mm-376.9mm from leading edge, or 1979.9mm – 2154.9mm aft of datum
Wing Leading Edge	1778mm aft of datum
Fuel	1949mm aft of datum
Crew Seats	2355 mm aft of datum
Baggage	3098 mm aft of datum
Main wheel -RHS	2336 mm aft of datum
Main wheel – LHS	2336 mm aft of datum
Nosewheel	858.5 mm aft of datum

EMPTY CG CALCULATION

Right Wheel	182.5kg	2336mm	426320 units
Left Wheel	180.9	2336	404512
Nosewheel	122.0	858.5	104776
TOTALS	485.4		1435608

CG= 1965mm

Maximum all-up weight	795 kg	(non-aerobatic operations)
Baggage limitations	45 kg	(non-aerobatic operations)

6.5 W & B EXAMPLES

Example A – light crew, max bags

Empty wt.....	485 kg
Crew of 2, each 90kgs.....	180 kg
Baggage	45 kg
Zero Fuel Wt.....	710 kg
Allowable Fuel load.....	85kg, (110L)

Example B – light baggage, full fuel

Empty wt.....	485 kg
Baggage.....	20 kg
Full fuel load, (136L usable).....	99 kg
Allowable crew wt.....	191 kg
Zero Fuel Wt must be.....	704 kg

This loading system is valid only for the Aircraft Weight and CG of 7th April 2007, and is based on Centre of Gravity Limits as follows

Forward limit.....	1980 mm.
Aft limit.....	2155 mm.

See following pages for further W&B examples

VANS RV-9A S/N91400 VH-LPL
FWD CG max =1980mm AFT CG max =2155mm

SITUATION 1 – FULL FUEL+FULL BAGS+MAX CREW WTS

Aircraft	485.4kg	1965mm	935025 units
Avgas	99.3kg	1949	193553
Pilot	80.0	2355	188400
Co-pilot	84.0	2355	197820
Baggage	45.0	3098	139410
TOTALS	793.7		1681628

CG = 2106mm SAFE

SITUATION 2 – MOST AFT CG WITH MINIMUM FUEL+MAX BAGS

Aircraft	485.4kg	1965mm	935025 units
Avgas 20L	14.4	1949	28065
Pilot	110.0	2355	259050
Co-pilot	110.0	2355	259050
Baggage	45.0	3098	135410
TOTALS	764.8		1616600

CG = 2114 SAFE

SITUATION 3 – FULL FUEL+SINGLE CREW+MAX BAGS

Aircraft	485.4kg	1965mm	935025 units
Avgas 138L	99.3	1949	193553
Pilot	85.0	2355	200175
Baggage	45.0	3098	135410
TOTALS	714.7		1464163

CG = 2049 SAFE

SITUATION 4 – AVERAGE CREW+FULL BAGS+EXHAUSTED FUEL

Aircraft	485.4kg	1965mm	935025 units
Avgas 0.0L	0	0	0
Pilot	75.0	2355	176625
Co-Pilot	75.0	2355	176625
Baggage	45.0	3098	135410

TOTALS 680.4

CG = 2092 SAFE

SITUATION 5 – MOST FWD CG+STD WT PILOT+FULL FUEL+NIL BAGS

Aircraft	485.4kg	1965mm	935025 units
Avgas 138L	99.3	1949	193553
Pilot	98.0	2355	230790

TOTALS 682.7 1359368

CG = 1991 SAFE

SITUATION 6 – SINGLE PILOT+MAX BAGS+LOW FUEL

Aircraft	485.4kg	1965mm	935025 units
Avgas 20L	14.4	1949	28065
Pilot	70.0	2355	164850
Baggage	45.0	3098	135410

TOTALS 614.8 1263350

CG = 2055 SAFE

SECTION 7 - RADIO SYSTEMS - OPERATIONAL LIMITATIONS

7.1 GENERAL

The radio communication and radio navigation systems in the aeroplane are approved for the types of operation and maximum operating altitudes shown in the Radio Systems Approval table of this Section. Approval of a radio system for a particular type of operation is signified in this table by inclusion of the maximum operating altitude of the equipment (expressed in thousands of feet) under the appropriate headings.

Before the aeroplane may engage in the types of operation for which the radio systems are approved, the instruments, radio systems and equipment which are required, in accordance with the appropriate Sections of Civil Aviation Orders Part 20, for the operation to be performed, shall be installed and airworthy to the standards required for that operation.

NOTE: Reported unserviceability of instruments, radio systems and equipment will be indicated on the Maintenance Release.

7.2

RADIO SYSTEMS APPROVAL

SYSTEM	EQUIPMENT TYPE	I.F.R.	LIMITED I.F.R.	V.F.R. and NIGHT V.M.C.
VHF COM	ICOM A200	N/A -VFR only	N/A – VFR only	NL
INTERCOM	PS Engineering PM-1000	“	“	NL
TXP & ENCODER	GARMIN GTX-320A + AMERIKING AK-350	“	“	NL
GPS	GARMIN 196	“	“	NL
NOTE / THE CARRIAGE OF HEADPHONES IS MANDATORY				

SECTION 8 - SUPPLEMENTS

8.1 GENERAL

Flight Manual Supplements covering the special operations for which this aeroplane is approved are listed below.

The operations listed shall be conducted in accordance with the limitations and instructions contained in the appropriate Supplements included in this Manual.

SUPPLEMENT TITLE

No supplements applicable to this aircraft.

8.2 RESTRICTIONS

This aircraft is not approved for aerobatics.

This aircraft is not approved for Night or Instrument flight.

This aircraft must be slowed to below V_a when in moderate turbulence. The VANS V_a , (112 KIAS), is not calculated as we understand it should be. Our calculation is $V_s (52) \times 1.95 = 101\text{KIAS}$, which is the highest speed permissible @ MTOW.

This aircraft must be operated in accordance with the AAC Conditions of Hire - which all pilots must complete prior to hire of the aircraft.

8.3 FLIGHT PLANNING INFO

Use 65% settings as per charts

136L usable when tanks filled carefully to bottom of metal neck.
Gentle rocking of wing will ensure all air is displaced by fuel.

45 mins fixed reserve = 24L

Flight fuel of 112L = 3.5 hrs @ 32 lph

140 ktas is good for conservative planning