BRITISH MICROLIGHT AIRCRAFT ASSOCIATION
HOMEBUILT AIRCRAFT DATA SHEET (HADS)

NO: HM1 ISSUE: 30

TYPE **Raj Hamsa X'Air (UK)** [*] ***(sometimes known as X'Air Mk.1)***

(1)	MANUFACTURER:	Individual aircraft are amateur-constructed, BMAA is responsible for continued airworthiness.
(2)	UK IMPORTER:	UK Importer of Kits, Wessex Light Aeroplane Co. Ltd, 7 Fullands Avenue, Taunton, TA1 3DE
(3)	CERTIFICATION:	BCAR SECTION S, (in the modification state at the date of manufacture or modification of any example)
(4)	DEFINITION OF BASIC STANDARD:	"RAND KARL s.a.r.l Manuel de Montage, X'Air", as amended by BMAA list of amendments to comply with BCAR Section S (available from importer but summarised in Annex A to this HADS) **Note:** Basic build standard does not include an electric starter, radio, strobes, or a battery. Any such fitted must be separately declared to the BMAA at build, or approved as modifications later.

(5) COMPLIANCE WITH THE MICROLIGHT DEFINITION

(a) MTOW	450 kg
(b) No. Seats	2
(c) Maximum Wing Loading	28.125 kg/m²
(d) Vso	32.6 kn CAS
(e) Permitted range of occupant weights	Min 55 kg total weight Max 90 kg per seat
(f) Typical Empty Weight (ZFW)	232 kg
(g) Max allowable ZFW MTOW - 172 kg crew - 1 hr fuel (Rotax 582 is 27 litres / 20 kg)	258 kg (582, V2 variants) 260 kg (R100 variants) 262 kg (912 & Jabiru variants) 263 kg (Verner variants) 266 kg (HKS700 variants) 258 kg (Hirth 3203 variants)

[*] Note: During aircraft construction, this HADS is to be used with the X'Air stage inspection sheets, form BMAA/AW/022 (X'Air). If there is a conflict between the two, the latest HADS will always take precedence.

(6) POWER PLANTS

Designation	X'Air 582(1) [1]	X'Air 582(2)[1]	X'Air 582(3)[1]	X'Air 582(4)	X'Air 582(5)
Engine Type	Rotax 582/48-2V upright				
Reduction Gear	Rotax B-type 2.58:1			Rotax E-type 2.62:1	Rotax C-type 3:1
Exhaust System	Rotax straight exhaust with double ball-joint, plus 6" vertical extension.[2]				
Intake System	K&N dual or single combined air filter				
Propeller Type	Brolga square tip, 3 blade GA	Ivoprop 3 blade GA	Warp drive 3 blade GA	Brolga square tip, 3 blade GA	Duc Windspoon 2-blade
Propeller Dia x Pitch	68", 12° pitch	64" or 65", 14.5° at tip	64", 11.5° pitch	68", 12° pitch	68", 16° pitch[3]
Noise Type Cert No.	164M Issue 1	164M Issue 2[4]	164M Issue 3	164M Issue 2	164M Issue 10
MAAN approving	1453	1481, 1499	1482	1485 (+1521)	1592

Designation	X'Air 582(6)	X'Air 582(7)	X'Air 582(8)	X'Air 582(9)	X'Air 582(10)
Engine Type	Rotax 582/48-2V upright				
Reduction Gear	Rotax C-type 3:1	Rotax E-type 3.47:1	Rotax E-type 2.62:1	Rotax E-type 3:1	Rotax E-type 2.62:1
Exhaust System	Rotax straight exhaust with double ball-joint, plus 6" vertical extension.[2]				
Intake System	K&N dual or single combined air filter				
Propeller Type	Brolga square tip, 3 blade GA	Arplast Ecoprop wide chord, 3 blade	Ivoprop 3 blade GA	Brolga square tip, 3 blade GA	Arplast Ecoprop, 3 blade
Propeller Dia x Pitch	68", 16° pitch	170cm, pitch 19.5° @ 75% radius	65", 14.5° at tip	68", 16° pitch	174cm, pitch 8.5° at tip
Noise Type Cert No.	164M Issue 5	164M Issue 10	164M Issue 4	164M Issue 6	164M Issue 8
MAAN approving.	1530	1572	1519	1531	1516

[1] Builders should note that these combinations exceed the Rotax recommended inertia limit for the B-type gearbox, and the Rotax warranty will be invalidated.

[2] Extension essential to prevent fume ingress into cockpit at high power settings. Note that this requires modification to the exhaust from the standard Rotax part.

[3] Duc Windspoon propeller pitch is measured at the windspoon tip inside edge.

[4] Configuration X'Air 582(2) may include an after muffler and / or Rotax intake silencer without affecting noise certification or approval (MAAN 1499 refers).

Designation	X'Air 582(11)	X'Air 582(12)	X'Air 582(13) (Not yet approved)	X'Air 582(14)	X'Air 582(15)
Engine Type	Rotax 582/48-2V upright	Rotax 582/48-2V upright	Rotax 582/48-2V upright	Rotax 582/48-2V upright	Rotax 582/48-2V upright
Reduction Gear	Rotax B-type 2.58:1	Rotax E-type 3.0:1	Rotax C-type 3:1	Rotax E-type 3.47:1	Rotax C-type 3:1
Exhaust System	Rotax straight exhaust with double ball-joint, plus 6" vertical extension.[2]				
Intake System	K&N dual or single combined air filter				
Propeller Type	Duc Windspoon 2-blade		Catto, 3-blade	Duc Windspoon 3-blade	Ivoprop 3 Blade GA
Propeller Dia x Pitch	68", pitch 11.5°[3]	68", pitch 16°[3]	68", pitch tbd	68", pitch 14°[3]	68", pitch 16° at tip
Noise Type Cert No.	164M Issue 8	164M Issue 12	TBD	164M Issue 16	164M
MAAN approving.	1557	1621	TBD	1753	2734

Designation	X'Air 912(1)	X'Air V2(1)	X'Air V2(2)	X'Air 532(1)[1] (Not yet approved)	X'Air 3203(1) (G-CCES only)
Engine Type	Rotax 912UL	Simonini Victor II upright		Rotax 532-2V upright	Hirth 3203E upright
Reduction Gear	2.43:1	Simonini C-type 2.76:1		Rotax B-type 2.58:1	Hirth G50 3.16:1
Exhaust System	WLAC stainless steel, as per X'Air Falcon	Simonini twin long exhaust, p/n100301-100306		Rotax straight exhaust with double ball-joint, plus 6" vertical extension.[2]	Hirth mild steel with one ball joint
Intake System	K&N dual or single combined air filter				
Propeller Type	Arplast Ecoprop 3-blade		Duc windspoon 3-blade	Brolga square tip, 3 blade GA	Brolga square tip, 3 blade GA
Propeller Dia x Pitch	170cm, pitch 14° at ¾ radius	170cm, 9°	68", 13.5°[3]	68", pitch tbd	68", pitch 16º
Noise Type Cert No.	164M Issue 12	164M Issue 8	164M Issue 8	TBD	TBD
MAAN approving	1623	1549	1536	TBD	1793

NO: HM1 ISSUE: 30

Designation	X'Air Jabiru(1)	X'Air Jabiru(2)	X'Air Jabiru(3)	X'Air Jabiru(4)	X'Air R100(1)
Engine Type	Jabiru 2200 horizontal				BMW R100RS [5]
Reduction Gear	Direct Drive				Rotax C-type 3.47:1
Exhaust System	Jabiru part No. CM02580				2 into 1 overwing silencer, stainless steel
Intake System	Bing type 64/32 Card (Engine s/n <22A710) or Bing type 94/40 carb (Engine s/n >22A710)+ K&N filters				2 x Dellerto Carbs + K&N filters
Propeller Type	Arplast Ecoprop 166 R 4T 110/2 (2-blade)		Newton Laminated Wood	Chris Lodge 2-blade as per drawing CJL 150	Powerfin F, 3 blade GA
Propeller Dia x Pitch	166cm, 5° at tip	166cm, 7° at tip	60" x 42"	60" x 32"	75", pitch 12°
Noise Type Cert No.	164M Issue 7	164M Issue 10	164M Issue 15	164M Issue 18	164M Issue 15
MAAN approving	1529	1567	2023	2185	1568

[5] Horizontal engine. Drawings for mounts and adaptor plates for this engine and gearbox may be obtained from Ray Everitt, 30 School Lane, St Martins, Shropshire. Note that since a certificate of conformity is not available for this engine, 25hours endurance testing is required on each example.

Designation	X'Air R100(2)	X'Air R100(3)	X'Air 133(1)	X'Air 133(2)	X'Air 133(3)
Engine Type	BMW R100RS [6]		Verner 133M / 133MK		
Reduction Gear	Rotax C-type 3.0:1	Rotax C-type 3.0:1	2:1 integral		
Exhaust System	2 into 1 overwing silencer, mild steel	2 into 1 overwing silencer, stainless steel	Verner 600mm steel exhaust.		
Intake System	2xBing 40mm CV	2xBing 32mm CV	Twin Dellorto / Bing 64		
Propeller Type	Duc Windspoon, 3 blade GA	Duc Windspoon, 3 blade GA	Duc Windspoon, 2 blade GA	Newton wood	Kiev 283/1800, 3-blade
Propeller Dia x Pitch	68", pitch 12°[3]	68", pitch 12°[3]	68", pitch 12° to 16°[3]	72" x 45"	1810mm, pitch 28° @ 35cm
Noise Type Cert No.	164M Issue 13	164M Issue 13	164M Issue 15	164M Issue 15	164M Issue 19
MAAN approving	1601	1596	1722	1889	2166

[6] Horizontal engine. Drawings for mounts and adaptor plates for this engine and gearbox may be obtained from Ray Everitt, 30 School Lane, St Martins, Shropshire. Note that since a certificate of conformity is not available for this engine, 25hours endurance testing is required on each example.

Designation	X'Air 202(1) (Not yet approved)	X'Air 700(1)+ X'Air 700(1a)			
Engine Type	Zanzottera MZ 202 upright	HKS 700E V3 upright			
Reduction Gear	Zanzottera Centrifugal Clutch 3.11:1	Integral, 2.58:1			
Exhaust System	Zanzottera rear mounted 2 x 90° bend	(1) One-off (1a) HKS Std.			
Intake System	2 x Dellerto Carbs + K&N filters	Twin K&N			
Propeller Type	TBD	Duc windspoon 2-blade			
Propeller Dia x Pitch	TBD	68", 11°[3]			
Noise Type Cert No.	TBD	164M Issue 8			
MAAN approving	TBD	1543/1594[7]			

[7] Because the exhaust installation on the X'Air 700(1) initial approval is a one-off, subsequent examples, whilst considered approved from a performance and handling viewpoint, will require new approval of the exhaust design, including 25 hours for compliance with S903. Examples using the standard HKS exhaust, designated 700(1a), are approved under MAAN1594 and do not require further approval.

(7) MANDATORY LIMITATIONS:

(A) Max Take-Off Weight		450 kg		
(B) CG Limits		*Aft limit*	4.5" fwd of datum 5.2" fwd of datum (Jabiru engined variants only)[8]	
		FWD Limit	11" fwd of datum	
(C) CG datum		Mainwheel axle centreline (see annex C).		
(D) Cockpit Loadings		Port	Starboard	Total
	Min	55 kg	-	55 kg
	Max	90 kg	90 kg	180 kg
(E) Never Exceed Speed		83 kn CAS[9]		
(F) Manoeuvring Speed		65 kn CAS		
(G) Permitted Manoeuvres		45° Nose up / 30° nose down Non Aerobatic Normal acceleration limits, +4 / -2g		
(H) Fuel Contents (Max Useable)		63 litres		

[8] Jabiru engined variants have undergone spinning tests to clear an aft CG of 5.2", during the approval of MAAN1567.

[9] Flight test limit Vdf=92 kn CAS.

(I) Power Plant

Engine	Rotax 582/48-2V	Rotax 532-2V	Rotax 912UL	Simonini Victor II	Jabiru 2.2L	HKS700E	BMW R100RS	Verner 133M / 133MK
Max RPM	6,800	6,800	5,800 (5,500 cont)	6,500	3,300	6,200 (5,800 cont)	6,500 (6,000 cont)	5,500 (4,500 cont)
Max CHT	150°C	180°C	150°C	120°C (20°C differential)	250°C	230°C	250°C	230°C
Max EGT	650°C	650°C	900°C	620°C (20°C differential)	N/A	N/A	800°C	750°C
Fuel spec	83MON or 90RON min unleaded to BS(EN)228 or 97+ octane MOGAS leaded fuel to BS4040, or AVGAS 100LL					90+ RON unleaded to BS(EN)228	Unleaded MOGAS to BS(EN)228 or Avgas 100LL	95+ RON MOGAS or Avgas 100LL
Engine oil spec	as per engine manual	as per engine manual	as per engine manual	as per engine manual	as per engine manual	as per engine manual	as per engine manual	as per engine manual
Gearbox oil spec	as per gearbox manual	as per gearbox manual	as per gearbox manual	as per gearbox manual	N/A	as per gearbox manual	as per gearbox manual	As per engine (integral)
Fuel/oil mix	50:1	50:1	4-stroke, add no oil	33:1 (unleaded) 40:1 (leaded)	4-stroke, add no oil	4-stroke, add no oil	4-stroke, add no oil	4-stroke, add no oil
Max coolant temp	80°C	80°C	150° by CHT gauge	N/A	N/A	N/A	N/A	N/A
Max oil pressure	N/A	N/A	7 bar @ start, 5 bar normal	N/A	76psi	58psi	72.5psi @ 4000rpm	70psi
Min oil pressure	N/A	N/A	0.8 bar @ idle, 2 bar normal	N/A	31psi normal, 11psi @ idle	29psi @ 5000rpm, 17psi @ idle	58psi @ 4000rpm	15psi
Oil temperature	N/A	N/A	50-140°C	N/A	118°C cont	50-100°C	110°C	50-100°C
Fuel pressure at cruise power	0.2-0.4 bar	0.2-0.4 bar	0.15-0.4 bar	0.2-0.4 bar	TBD	0.2-0.5 bar	TBD	2.2-10.1psi

(8) Instruments Required:

ASI*	Altimeter*	RPM	EGT	Compass	Coolant temp	CHT	Fuel Pressure	VSI	Slip ball
Required to 88 kn CAS (calibrated) on scale, and 92kn CAS before stop[10]	Required	Required	Required (2-stroke engines)	Required	At least one required**		Required	Optional	Optional

*****An exterior static vent is to be fitted immediately forward of a leading edge wing strut at least 8 inches below the wing lower skin, serving both the ASI and altimeter, + if fitted, the VSI. If a 2-tube combined pressure head is used, the static must be shorter than, and directly below, the pitot tube.
** CHT, Oil temperature and oil pressure gauges are mandatory for 4-stroke engined aircraft.

(9) CONTROL DEFLECTIONS:

Elevator UP:	27°±2°	Tailplane trim UP:	60°-15°
Elevator DOWN:	27°±2°	Tailplane trim DOWN	60°-15°
Ailerons* UP:	22°±3°	Rudder LEFT:	20°±2°
Ailerons* Down:	22°±3°	Rudder RIGHT:	20°±2°

*Aileron deflections are measured at the outboard lower surface. The neutral position should be that with the outboard aileron lower surface 4½±1½° trailing-edge-up compared to the wingtip lower surface (with the control column vertical). This should approximately correspond to the "trailing-edge-up" turnbuckle being fully tightened.

(10) PILOT'S NOTES, MAINTENANCE MANUALS REFERENCES:

10.1 Manuals approved for use with this aircraft**.**

(a) Raj Hamsa X'Air (UK) Operators Manual, Issue 1 to AL1.
(b) Manufacturer's engine manual (contained at Annex B of the operators manual for a particular aircraft)
(c) Other manuals as listed at Annex F of the operators manual for a particular aircraft.
(d) Construction to X'Air (UK) construction manual, original issue (25 April 1999)
(e) Construction to Wessex Light Aeroplane Co. Ltd, Modifications and Additions for the X'Air Microlight Aircraft to comply with Section S Airworthiness Requirements.
(f) Maintenance may be to either Raj Hamsa X'Air(UK) operator's manual or Microlight Maintenance Schedule MMS-1 at the operator's discretion.

10.2 The following placards are to be fitted:

(a) Flight Limitations Placard (to be visible to pilot) See Annex D.

(b) Engine Limitations Placard (to be located near to engine instruments) See Annex D.

[10] To give a low risk of failing to meet this when the aircraft is calibrated in flight test, it is *recommended* that instruments with a scale to at-least 100 kn IAS (115 mph IAS) are fitted.

(c) Fuel Limitations Placard (to be located near to filler cap)

A placard is to be fitted showing fuel capacity (63 litres), fuel type(s), fuel:oil ratio (if relevant) and, if MTOW can be exceeded with full fuel and 180kg cockpit weight, the fuel loads at MTOW for cockpit weights of 180kg / 170kg / 160kg etc. at 10kg intervals down to the maximum fuel load. An example is shown at Annex D.

(d) ASI Placard

Unless at in-flight calibration all ASI readings were within 2 kn of CAS, a correction placard from 30 to 83 kn CAS at no more than 10 kn intervals, and at Vso, Va and best glide speed, must show the corrections from IAS to CAS. For values, see the approval MAAN for the particular aircraft. An example is shown at Annex D.

(e) Pitch Trimmer Instructions — See Annex D.

(f) Switches — See Annex D.

Note: It is recommended that airspeed placards are not fitted to new aircraft until after flight testing, due to the requirement for pitot-static system calibrations.

(11) MANDATORY MODIFICATIONS / SERVICE BULLETINS / AIRWORTHINESS DIRECTIVES ETC:

See Annex A for required modifications.

BMAA SB 1741.1, (Mandatory) Mandatory inspection of elevator and rudder hinge brackets.

BMAA SB 1741.2, (Mandatory) Check on correct adjustment of ailerons.
Note: Any aircraft complying with this HADS at Issue 21 or later may be considered to comply with SB 1741.2. Inspectors should note that the aileron setting datum used is different, and the two documents should not be confused.

BMAA SB 1741.3, (Advisory) Reminder to operators of correct baggage compartment fitment, and correct operators manual.

BMAA SB 2298.1, (Strongly Recommended). The three aileron turnbuckles to be inspected for deep tooling marks and replaced if found.

Annual Bettsometer test to fabric and stitching is to be carried out to 1360 grammes / 1.2mm needle with wing sails fitted and tensioned to flight. Test must be to both upper and lower surfaces. **All skin types to be tested including 'Mylar' (Approved Optional Modification 18).**

(12) MINIMUM PERFORMANCE AT MAX TAKE-OFF WEIGHT

Rate of Climb:	See approval MAAN (43 kn CAS best speed).
Stall or Minimum Flying Speed:	35 kn CAS at MTOW / 6" fod CG / idle.

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BMAA Approval:		R Pattrick Design Approval Engineer	01 February 2019

ISSUE HISTORY

BMO63 Issues A-D	Drafts, for flight test purposes only
BMO63 Issue 1	Authorised by MAAN 1453 Issue 1, configuration X'Air 582(1)
HM1 Issue 1	New format, new configuration definitions, addition of mandatory modification 23.
HM1 Issue 2	Authorised by MAAN 1481, approval of configuration X'Air 582(2).
HM1 Issue 3	Addition of optional modifications 6-8; new configurations and minor typographic corrections.
HM1 Issue 4	Approval of configuration X'Air 582(4), addition of Annex E, points 1-4.
HM1 Issue 5	Change of title to X'Air Mk.1 (due to impending import of a Mk.2). Annex E, points 5-7. Addition of configuration X'Air 582(8); authorised by MAAN 1519.
HM1 Issue 6	Clarification of Jabiru(1) configuration details. Moving of fwd CG limit from 9" to 10.5" FoD (authorised by MAAN 1515).
HM1 Issue 7	Clarification of 700(1) configuration details and engine limitations. Addition of HKS 700(E) engine limitations, addition of Annex E points 8 – 9. Addition of configuration X'Air 582(6) authorised by MAAN 1530.
HM1 Issue 8	Expansion of Annex E point 9. Alteration several configurations not yet approved. Approval of configurations V2(1), 700(1). Addition of optional modifications 9 – 11 by read-across from X'Air Mk.2. Authorised by MAANs 1543, 1549.
HM1 Issue 9	Addition of configuration V2(2), authorised by MAAN 1536.
HM1 Issue 10	Addition of configuration 582(9), authorised by MAAN 1531.
HM1 Issue 11	Addition of configuration 582(10), authorised by MAAN 1516. Also addition of Simonini engine limitations.
HM1 Issue 12	Correction of incorrect 72" and 58" diameter Duc propeller references to 68". Approval of configuration 582(11). Authorised by MAANs 1529 & 1557.
HM1 Issue 13	Addition of configuration 582(5), authorised by MAAN 1592. Minor editorial changes, including indication where configurations are unapproved.
HM1 Issue 14	Addition of configuration 582(7), authorised by MAAN 1572, and configuration Jabiru(2), authorised by MAAN 1567. Addition of further approved optional modifications (12 & 13 weight saving and 14 cockpit stowage compartment as per X'Air mk2 Falcon). Addition of Point 11 on 'Points for special attention': lateral control stops. Change in wording of Engine Limitations placard requirements. Minor changes to configurations not yet approved. Increase in forward CG range limit to 11" forward of datum, following flight testing associated with MAAN1623.
HM1 Issue 15	Addition of configuration 582(12), authorised by MAAN 1621.
HM1 Issue 16	Approval of configuration R100(3), authorised by MAAN 1596. Deletion of engine information for Rotax 503. Addition of Point 12 on 'Points for special attention': baggage compartments. Addition of note relating to modification state of Jabiru engines approved to date.
HM1 Issue 17	Approval of configuration 912(1), authorised by MAAN 1623. Addition of engine information for Rotax 912 UL.
HM1 Issue 18	Approval of configuration 700(1a), authorised by MAAN 1594. Addition of optional modification 15: installation of wide doors.
HM1 Issue 19	Approval of configuration R100(2), authorised by MAAN 1601. Addition of mandatory modification 24: exhaust extension on 582 installations.
HM1 Issue 20	Approval of configuration R100(1), authorised by MAAN 1568. Addition of Annex F. Clarification of aileron reflex setting angle and change to wording of 'Points for special attention' item 12 and addition of items 13 and 14, referenced in BMAA SB1741. Clarification of maximum zero fuel weights for different variants.

NO: HM1 ISSUE: 30

HM1 Issue 21	Approval of configuration 133(1), authorised by MAAN 1722. Modification to references used for aileron setting.
HM1 Issue 22	Addition of optional modification 16 (luggage compartment). Addition of Points for Special Attention 15 (Dellorto carburettors). Deletion of optional modification 14 (X'Air Falcon type luggage compartment). Authorised by MAANs 1683 Issue 2 and 1789 Issue 1.
HM1 Issue 23	Approval of configuration 582(14), authorised by MAAN 1753.
HM1 Issue 24	Modification to ASI requirements. Approval of configuration 133(2), authorised by MAAN 1889.
HM1 Issue 25	Addition of configuration 582(3), authorised by MAAN 1482.
HM1 Issue 26	Addition of optional modification 17 (aluminium wide doors), assessed as part of MAAN 1669. Addition to Annex E. Addition of configuration Jabiru(3), authorised by MAAN 2023. Addition of ANO mandatory placards.
HM1 Issue 27	Addition of optional modification 18 ('Mylar' covers), approved by MAAN 2112.
HM1 Issue 28	Addition of configuration 133(3) approved by MAAN 2166, configuration Jabiru(4) approved by MAAN 2185 and configuration 3203(1) approved by MAAN 1793. Improvements to formatting.
HM1 Issue 29	Addition of BMAA SB 2298.1 in Section 11 and Annex E of this document.
HM1 Issue 30	Correction to baggage wording. Improvements to ZFW wording in Section 5. Correction to Jabiru carb details. Inclusion about Betts testing of Mylar skins. Addition of configuration 582(15) approved by MAAN 2734

NO: HM1 ISSUE: 30

Illustration of Aircraft - 3 View

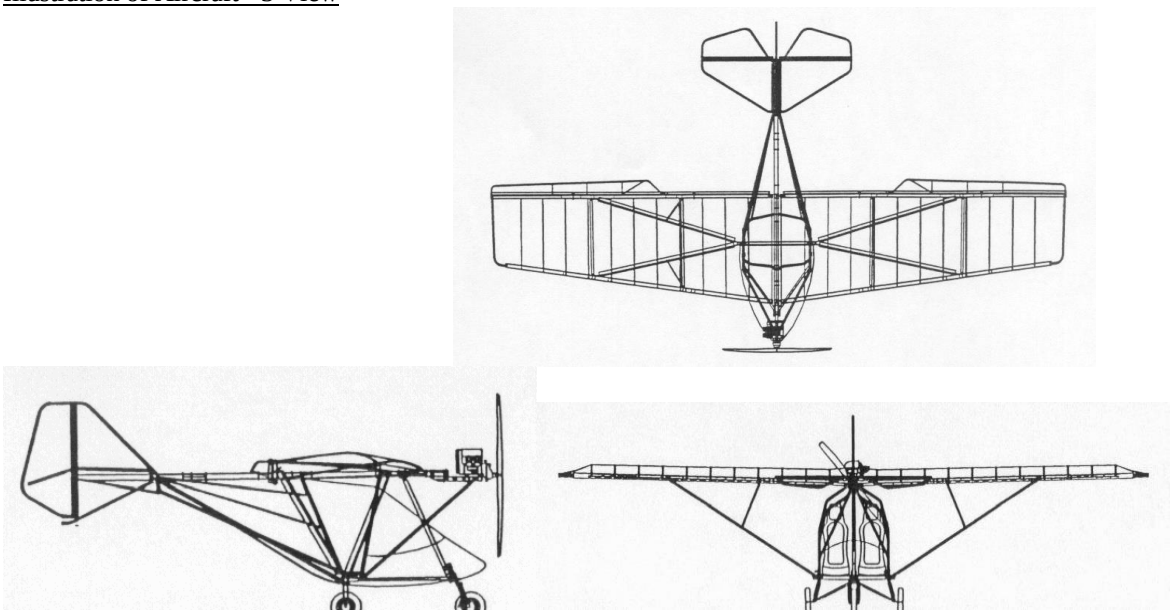
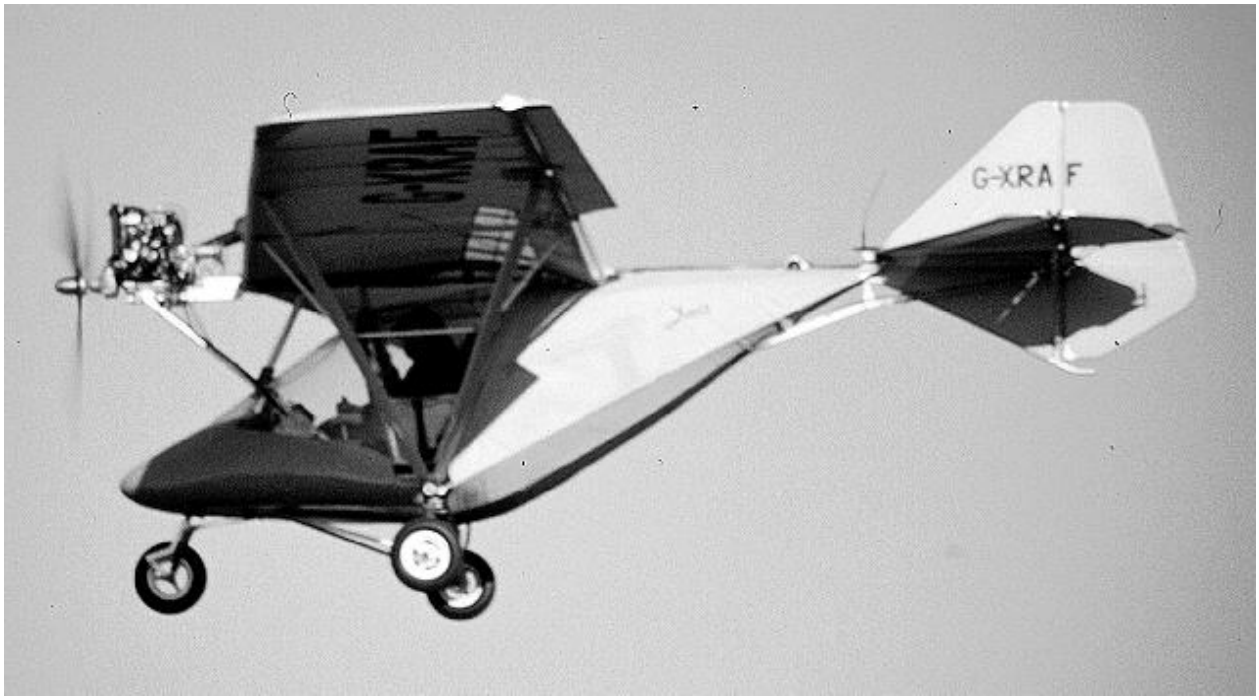


Illustration of Aircraft – Photograph



ANNEX A – MANDATORY MODIFICATIONS

1. The following bolts are to be modified.

(a) Control column pivot bolts to be drilled through 1.6mm and secured with a clevis pin outside the Nyloc nut.

(b) Trim lever pivot bolt replaced with M6 x 60mm bolt, and modified as above.

(c) QTY 5 elevator push-rod bolts, as (b) above.

2. All flying control stainless steel hinge brackets drilled through to 5mm diameter and fitted with 5mm hexagon head bolts, drilled and locked with clevis pins.[11]

3. Use of nyloc nut for securing pulley to cockpit pitch trimmer arm.

4. Groove and lug at end of cable, cockpit pitch trimmer.

5. Clear nylon runner and lubrication for pitch trim cable.

6. Wire locking of tailplane strut-bolts.

7. Control column lateral control stops - introduction of.[12]

8. Forward throttle stop - introduction of.

9. Use of cable ties to improve security of seat back..

10. Introduction of link brackets, front and rear jury struts.

11. Introduction of link between jury struts.[13]

12. Replacement of pod, instrument panel and windscreen nuts with nyloc type.

13. Replacement of sump drains with spring loaded light aircraft "Curtiss" type. (Before incorporating, note also the availablility of optional modification No.9 below).

14. Secured spacers (4 off) between pod base and cockpit floor.

15. Covering of tube between seat bases with durable protective tape.

16. Short hose between tanks to be rubber fuel-rated type.

17. Introduction of a mechanism counter-spring in each wheel brake.

18. Confirmation that the brakes and engine starting of the particular aircraft will either permit starting whilst strapped into the pilots seat, or that the aircraft can safely be started outside the aircraft without need for a person seated inside the aircraft.

19. Rudder centring springs at nosewheel, connected to short 2mm diameter swaged cables

20. Insertion of Nylon spacing washers at the pin-jointed ends of all jury and drag struts.

21. Extension of rudder central tube using internal sleeve and extension piece, using QTY 2 bolts to transfer loads to the rudder.[14]

22. Two Velcro tails, and associated velcro strip on the wing sail root underside are to be fitted to the wing

[11] Mod No.2 should be part of standard kits supplied from early 2000; specifically kits 500, 502, & 504 onwards.

[12] Mod No.7 should be part of standard kits supplied from early 2000; specifically kits 500, 502, & 504 onwards.

[13] Mods No. 10 and 11. should be part of standard kits supplied from early 2000; specifically kits 500, 502, & 504 onwards.

[14] Mod No. 21 should be incorporated (by use of a longer tube, no internal sleeve is required) from kit 559 onwards (kits supplied from August 2000).

spacer panel trailing edge.

23. Fitment of M4 bolt as cable retainer through central aileron pulley bracket. This must not be drilled and fitted in situe, the bracket must be removed to prevent accidental damage.

24. Rotax 582 engines to incorporate 6" vertical extension on exhaust.

ANNEX B - APPROVED OPTIONAL MODIFICATIONS

The installation of all optional modifications is to be inspected by a BMAA inspector and an entry made in the appropriate logbook(s). Note that other approved modifications may exist which are not listed here.

1. Installation of curved shim washers at lower of 3 rudder hinges to ensure alignment of hinges and reduce wear.

2. Parking brake, supplied by Wessex Light Aeroplane Company. Inspectors must confirm that this will hold the aircraft still on grass with 5,000 RPM set (Rotax engines), or equivalent power for non-Rotax engines.

3. Installation of a separately switched electric booster pump, located between and below the two fuel tanks. This modification becomes MANDATORY if the fuel pressure is unable to remain above 0.2 bar / 3 psi between 3500 and 6500 rpm (2-stroke engines) or between flight idle and max-continuous (4-stroke engines) and the problem cannot be fixed by other means.

4. Fitment of **narrow** doors (to be of Wessex Light Aeroplane Company manufacture, or other as approved by BMAA modification). The original Rand Karl / Raj Hamsa lightweight doors are unacceptable.

5. Installation of BRS canister subject to the following:

a. Location on centreline aft of seats, firing down-left through largest fabric panel. To be attached to the rising fuse tube, with centre of canister 23" aft of mainwheel datum, using BRS tube clamp. Before installation the BRS manufacturer must be consulted concerning whether the model fitted will pass through this fabric panel, and if necessary a sacrificial "weak" panel may need to be fitted using lacing or Velcro.

b. Main bridle to be routed around outside of all longerons, to fuse tube, S-folded using weak cable ties.

c. Two Kevlar bridles to be attached to fuse-tube / rising fuse tube junctions fore and aft of cockpit. These are to be weakly secured "S-folded" and underneath the fabric.

d. Handle to be on the centreline, between and slightly behind pilots, at roof of cabin.

e. The handle is to be red, and provided with a locking pin.

f. A new W&CG report is to be prepared with the BRS fitted, and submitted to the BMAA. If ballast is required to keep the aircraft within CG limits, a suitable metal plate is to be screwed securely to the floor pan in front of the pilots feet, as near as possible to the centreline. [Note: the BRS moves the CG significantly rearwards, it may therefore be difficulty to stay within CG limits without the mass of an electric start, battery and associated larger gearbox at the engine.]

g. The BRS manual is to be permanently attached to the aircraft operators manual.

h. There is to be a stowage point for the safety pin in front of, and in view of, the pilot.

i. The following placards are to be fitted to the aircraft. They must be large and clearly visible.

(i) Adjacent to operating handle

WARNING
EMERGENCY PARACHUTE
PULL HANDLE SHARPLY
Unapproved equipment - see Pilots Handbook

(ii) On outside of fuselage, in line with drogue gun

WARNING
BALLISTIC PARACHUTE BEHIND THIS COVER
KEEP CLEAR

6. Spats, of type supplied by Wessex Light Aeroplane Company. If fitted after manufacture, a new W&CG report is to be prepared; if this is done using existing weighing data, add 0.45kg to the recorded load at each Mainwheel.

7. Bend to top edge of wing support stainless steel brackets to avoid weld confliction i.a.w. Wessex drawings and instructions.

8. Filing 1.0 - 1.5mm from mainwheel bearing distance-piece to ensure stub-end is flush with wheel casting at the other side.

9. Use of drain cock adapators, made up i.a.w. Wessex Light Aeroplane Company drawings between original fuel tank drain cocks and required Curtiss drain cock, instead of drilling tank and fitting Curtiss drain directly.

10. Lightweight chest straps with quick-release clips to be attached just above the harness front-buckles.

11. Wider X'Air Mk.2 door opening.

12. Fitment of lightweight CFRP floor pan, replacing original plywood floor pan.

13. Fitment of lightweight alloy wheels in place of original Indian-supplied wheels.

14. [Deleted]

15. Fitment of composite framed doors for the **wide** door opening (to be of Wessex Light Aeroplane Company or X'Air Ireland manufacture, or other as approved by BMAA modification), which include catches at the bottom and mid positions. (see optional modification 4 for the narrow door option).

16. Sealed X'Air Mk.1 baggage compartment (max 5kg capacity), of type supplied by Wessex Light Aeroplane Company, modified according to the fitting instructions supplied by WLAC **and approved by MAAN 1789**. If fitted after manufacture, a new W&CG report is to be prepared; if this is done using existing weighing data, add 0.6kg at 12" aft of datum.

17. Fitment of aluminium alloy framed doors for the **wide** door opening (to be of Wessex Light Aeroplane Company or X'Air Ireland manufacture, which include catches at the bottom and mid positions. (see optional modification 4 for the narrow door option).

18. Covers manufactured from Dimension Polyant 180 LL (known as 'Mylar') supplied by Wessex Light Aeroplane Company.

ANNEX C - WEIGHING INFORMATION

1.	CG Datum:	Mainwheel axle centreline (positive forward)
2.	Weighing attitude:	All 3 wheels on a level surface.
3.	Mainwheel moment arm:	0
4.	Nosewheel moment arm:	55" fwd of datum
5.	Fuel moment arm:	-10" aft of datum (63 litres maximum capacity)
6.	Crew moment arm:	6" fwd of datum
7.	Crew weights:	Minimum 55 kg / maximum 90 kg (maximum reducible, not below 86 kg, if required).
8.	Baggage compartment (if fitted):	5 kg at a position -12" aft of datum
9.	Aft CG Limit:	4.5" fwd of datum (5.2" for Jabiru engined aircraft)
10.	Fwd CG Limit:	11" fwd of datum
11.	BRS Moment arm (if fitted):	-23" aft of datum

ANNEX D - EXAMPLE PLACARDS

(a) Flight Limitations Placard (to be visible to pilot)

X'Air *[Engine] [Registration]*	
Never Exceed Speed:	_____ IAS *
Manoeuvring Speed :	_____ IAS *
Stall Speed:	_____ IAS *
Best climb speed:	_____ IAS *
Best glide speed:	_____ IAS*
Pitch Limits:	30° nose down, 45° nose up.
Bank angle limits:	+/- 60°
Maximum Stall entry rate:	5 kn/s
Normal Acceleration Limits:	+4 / -2g
Empty Weight:	____ kg **
Max Take-Off Weight:	450 kg
Minimum Cockpit Weight:	55 kg
Maximum Cockpit Weight:	90 kg in each seat.
Aerobatics and deliberate spinning prohibited.	

*Values and units IAS will be given in the approval MAAN for the individual aircraft.
** This must match the most recent W&CG report for the aircraft.

(b) Engine Limitations Placard (to be located near to engine instruments)

All engine parameter limitations are to be shown as coloured markers (red for danger, amber for caution) on the instrument displays. A placard mounted close to the engine instruments showing these limitations is also recommended.

(c) Fuel Limitations Placard (to be located near to filler cap)

FUEL Capacity 63 Litres 50:1 2-Stroke Oil / Add No Oil[15]	
Cockpit Weight (kg)	Max. Fuel Load (litres)
180	
170	
….	
…. Or below	63 litres
83 MON or 90 RON minimum unleaded to BS(EN)228 or 97+ octane 4-star / MOGAS leaded fuel to BS 4040, or AVGAS 100LL	

(d) ASI Placard

Kn CAS (calibrated)	**33 Vs**	**40**	**43 climb/ glide**	**50 approach**	**60**	**65 Va**	**70**	**80**	**83 Vne**
mph/knots IAS (indicated)									

[15] Delete as appropriate.

(e) Pitch Trimmer Instructions

PITCH TRIM nose down ← → nose up

(f) Switches

All switches are to be marked with function and sense (up=on, down=off).

(g) Baggage Compartment (if optional modification 14 fitted)

"MAX 3 kg"

(h) Baggage Compartment (if optional modification 16 fitted)

"MAX 5 kg"

(i) Placards required by the ANO

The following mandatory placards must be fitted:

"Occupant warning – this aircraft has not been certificated to an International Requirement."

A 'no smoking' sign must be displayed.

ANNEX E - POINTS FOR SPECIAL ATTENTION

In service, the following points have been found to be commonly recurring problems, and Inspectors must give special attention to the following both during initial approval, and during later inspections.

1. Visible scores, from the manufacturing process, to stainless steel wing-strut brackets. Any parts found to display visible scores are faulty and must be replaced with new parts before any further flight.

2. Failure to provide a full 6" vertical extension to the exhaust (Rotax engined variants).

3. Failure to ensure a leak-free external static source, or inadvertent deletion of the external static source.

4. Failure to properly apply a proprietary threadlocking compound to the wheel hub bolts.

5. Poor hole fitting at tailplane bolts, which tends to cause chafing. Acceptable solutions are part replacement (recommended at initial construction) or drilling through, deburring, and fitment of a slightly larger, AN type bolt.

6. Placards must be as stated in the approval **MAAN**, and not use CAS values as given in the HADS.

7. Ivoprop propellers are defined on this HADS by actual propeller pitch as measured at the tip. Table A1 below shows the Ivoprop "nominal" pitch setting and how to obtain it for configurations used. Ivoprops are either of the "easy-adjust"screw-cam adjusting type, or the earlier spacer adjusting type.

Table A1 – Ivoprop settings

Diameter	Pitch	Nominal Pitch	Turns from Neutral	Protruding Screw (mm)	No. Spacers	
					Head side	Block Side
64 / 65"	14.5°	8.5°	1½	34mm	1	5

8. Failures to take into account the requirements of BMAA TIL 007 and 027 during the design and installation of the engine and instrument fittings.

9. Incorrect flight manual – some kits have been inadvertently provided with the incorrect, Raj Hamsa manual (issued in India), not the "Raj Hamsa X'Air (UK) Operators' Manual", which carries a BMAA approval statement on the front page, incorporating the approval MAAN, W&CG report for the aircraft, etc and be in its own binder.

10. Manufactured tear at corner of rudder and elevator hinge brackets. These should be checked during construction, and a tear, if found, is to be removed by introducing a smooth internal radius using appropriate hand tools. Subject this area to a thorough visual inspection during permit renewal / annual inspection; if fatigue crack propagation is found, *replace the bracket before further flight*. BMAA SB 1741.1 refers. **Note: It is anticipated that this point may be addressed in the future by replacement of the part, and new Service Bulletins should be monitored for this.**

11. Mandatory modification number 7 (introduction of lateral control stops) should now be incorporated in the kits, however it is important that particular attention is made to ensure that the aileron deflections are within limits: 22°±3° up, 22°±3° down from a 7.5° up datum (as noted on the stage inspection sheet).

12. It has been discovered that some X'Air kits have inadvertently been supplied with an unapproved foreign baggage compartment. This is behind the seats and is identified by two metal "stringers" at it's front and rear edges and an open top; it may be placarded at 20kg. If found fitted to any X'Air this is to be removed before further flight. Please note that a different type, sewn into the rear bulkhead and placarded with a 3kg limit is not affected. Approval of this unapproved baggage compartment is not expected and removal should be regarded as permanent. BMAA SB 1741.3 refers.

It should be noted that optional modification No.16 above is a modified version of this compartment, and may be fitted.

13. There is concern that some X'Air builders or their inspectors have modified the aileron setting turnbuckle (located in the upper fuselage just behind the wing root) due to a misunderstanding over the correct aileron settings. This turnbuckle should be checked before further flight; if there is any evidence that the item has been modified, the aircraft must not be flown until a replacement item is sourced from the Wessex Light Aeroplane Co., fitted and the ailerons reset in accordance with Section 9 above. BMAA SB 1741.2 refers.

14. It has been discovered that some X'Air aircraft are not being operated with the correct UK operators manual. This is distinguished by an approval statement from the BMAA on the front cover. If an aircraft is being operated with any other manual, that manual must be either discarded or marked "Not approved for UK use", and the Wessex Light Aeroplane Company contacted for a copy of the correct manual. SB 1741.3 refers.

15. Inspectors must ensure that any example of the type fitted with a Verner engine has a Dellorto carburettor fitted which has two black floats and not a single white float. WLAC SB WV001 refers.

16. The engine starter solenoid must be fitted as close as possible to the battery in order that the unfused/unswitched length of cable is as short as possible (build manual refers).

17. During build, inspectors must ensure that the battery is securely housed. Battery mount options 1 & 2 of the build manual need not have load tests performed. Details of any other battery installation must be supplied to the BMAA along with load test results.

18. Check that there is no damage on the structural member where the throttle lever might come into contact with it as a stop (closed throttle position).

19. Check for corrosion of rear wing attachment plates (p/n 102125) at least annually.

20. Visible scores, from the manufacturing process, to the aileron turnbuckles. Any turnbuckles that contain deep scores must be replaced. See BMAA SB 2298.1.

ANNEX F

SCHEDULED PERFORMANCE FOR APPROVED CONFIGURATIONS

Configurations	TODR, metres *(unfactored in italics)*	LDR, metres	Climb Rate, fpm	Glide Ratio
Rotax 582	350 (*269*)	230	595/625*	6.7:1
Jabiru 2.2	510 (*390*)	230/480*	380	6.7:1
Simonini V2	284 (*191*)/ 273 (*210*)*	230	595	6.7:1
HKS700E	455 (*350*)	230	290	6.7:1
BMW R100RS	*	*	*	6.7:1
Rotax 912	325 (*250*)	366	1150	6.7:1
Verner 133M	312m (240)	230	620	6.7:1
Hirth 3203	299m (230)	268	640	6.7:1

All scheduled performance values are for ISA, sea-level, still-air conditions, with a short dry –grass runway surface. Take-off and landing values are over a 15m (50ft) obstacle clearance height.

*Depends on powerplant configuration, refer to approval MAAN for individual aircraft.