Dyn' Aéro MCR4S

Distributor:

Lyndhurst Touchdown Services Limited
64 Wellands Rd
Lyndhurst
Hampshire
SO43 7AD
✆ : *023 8028 2619*
FAX : *023 8028 2611*

http://www.Ban-bi.com **info@ban-bi.com**

Manufacturer:

DYN AERO SA
19 rue de l'Aviation
21121 DAROIS
FRANCE
✆ : *00 33 380 35 60 62*
FAX : 00 33 380 35 60 63

This information pack can be downloaded in colour from our internet site

Contents

revised 09 February 2001

Introduction

The MCR range of aircraft is a result of 20 years research and development by Michel Colomban and the modern manufacturing techniques developed by Dyn' Aéro. Michel Colomban was for many years an engineer and aerodynamicist and was associated with Morane-Saulnier, Potez and Aerospatiale, he later designed the now famous single seat twin engine Cricri, recently of jet powered notoriety.

At 65 kgs empty the Cricri showed Michel Colomban's talents.

For more than ten years he worked on a new two seat side by side aircraft which was eventually named the MC100 or Ban-bi (Ban comes from Colomban and bi from the French word biplace meaning two seats). His objective was to design and build the fastest, most economic and safe two seat aircraft. Dedication to detail had taught him in his earlier single seat design that enormous improvements over conventional thinking could be achieved.

Objective

Michel Colomban believed he could attain a speed of 300 km/hr with an empty aircraft weight near to 200 kgs using an 80 hp engine. All this should be possible with no sacrifice to safety or usability. To ensure the aircraft was easy to fly he also opted for a fixed undercarriage and traditional dual controls

All Aluminium
MC100
2 Seat side by side
un-cramped cockpit
300 km/hr on 80 hp
200 kg empty weight

Realisation

Of course he drew on his earlier experience and of the design of the Cricri but incorporated more sophistication. The first MC100 built by Michel Colomban was built with an all aluminium primary structure. The actual weight of the aircraft fitted with a three blade composite propeller was around 204 kgs. That's less than two thirds the weight of many similar two seat Rotax 912 powered aircraft! The wings have a

sophisticated aerofoil section and to extend the speed range large slotted flaps were used to reduce stall speeds from 65 mph clean to nearer 50 mph with 25° of flap.

The all flying T-tail, another throw back to the Cricri, gives excellent pitch authority but the exceptional speed range necessitates unusual pitch trim control to ensure the aircraft controls remain light and positive at all speeds. Control response is provided by elastic bands ensuring that control input remains progressive and predictable even with a minimum to maximum speed ratio approaching four to one.

Alliance

An alliance was formed between Michel Colomban and Christophe Robin the director of Dyn' Aéro in Darois France.

Dyn' Aéro

Chistophe Robin is the son of Pierre Robin who had founded and later sold Avions Robin and who had produced aircraft like the ROBIN - DR400 which was the first control stick aircraft that I flew. Dyn' Aéro had already produced the CR100 a two seat aerobatic aircraft designed by Christophe Robin and now holder of many French championships. Built mainly from wood but with primary spars in Carbon this design pointed towards Dyn' Aéro's future.

As a young energetic designer Christophe wanted to design a modern aircraft using the latest materials. It was decided to develop a composite version of the Ban-bi to have all the qualities of the original aluminium design but to incorporate modern materials and where possible to use them to improve the design.

In keeping with Dyn' Aéro's aerobatic aircraft the MCR01 as it was to become would have carbon spars but the original foam ribs and aluminium wing skin of the Ban-bi would be retained. Unlike the original the MCR01 would have an all carbon fuselage and would be noticeably roomier with smooth aerodynamic lines. The larger cockpit, canopy and carbon structure slightly increase weight but aerodynamic improvements and a tuned exhaust maintain the original sparkling performance.

A prototype composite fuselage was on show for the first time at the RSA rally in 1995 gaining immediate interest from potential French builders. Initially sales were limited to six customers who were used to help refine the design and identify problems. The first composite aircraft P-FKIT flew for the first time in 1996.

The 2 seat range was extended with CLUB and ULTRALIGHT versions later followed by a tail dragger version named the MONTAGNE. Now over 200 aircraft have been sold of which around 150 are flying. Not content with the range of 2 seat versions Christophe announced in 1999 that he planned a 4 seat version which would have the same excellent qualities but overcome the criticisms levelled at many two seat designs.

4 Seats Impossible?

Many people scorned Dyn' Aéro's announcement that they would design and build a 4 seat aircraft with a useful disposable load, short take off distance and fast cruise using the Rotax 912S engine. Previously this engine had been considered suitable for 2 seat aircraft only. Less than eighteen months later Dyn' Aéro proved their design when their 4 seat prototype took to the air on 14th June 2000.

First flights made without main-wheel spats

The design allows for an all up weight of 750 kgs which is not much higher than some two seat aircraft using the Rotax 912S engine. Bearing in mind the advanced aerodynamics employed by Dyn' Aéro its no surprise therefore that their design should be successful. Many builders have found their two seat aircraft restrictive, either because of their range, payload or cabin space. Although the two seat aircraft designed by Dyn' Aéro offer more range, payload and cabin space than many of their competitors, some of today's builders are looking for more and they expect to be able to build aircraft that look as good as or better than factory built certified aircraft.

Prototype MCR4S Made its public debut at the PFA rally at Cranfield June 2000

The 4S carries fuel in two wing tanks, releasing valuable cabin space and allowing the instrument panel to be pushed further forwards. Compared to its two seat brothers the cabin is much longer offering much more than “two plus two” accommodation for crew and passengers. Not just longer the cabin is noticeably wider than the two seat versions giving a real feel of space. For those looking for the ultimate in baggage space the back seat back can be folded forward like an estate car giving extra room for bulky or awkward baggage. Moving the centre of the panel forwards and widening the cabin extends the size of the instrument panel offering enough space for the most ardent gadgeteur. Pilot visibility has been an important feature on earlier Dyn' Aéro kit aircraft and the 4S continues to provide excellent visibility in all taxiing and flight conditions. Altogether this new aircraft offers accommodation that exceeds that provided in certified aircraft costing more than twice the price of building a new 4S.

The Instrument panel is designed to give plenty of room

Not only did the 4S have to be spacious but it had to carry a useful load. With an empty weight under 350 kgs and a maximum weight of 750 kgs it has a payload of at least 400 kgs or over 880 lbs. With aircraft built light and kept simple this payload could easily increase to 425 kgs or 935 lbs which bearing in mind the frugal economy of the 912S, range and payload are better than most people could wish for. Typically two people at 85 kgs and two people at 70 kgs could fly with 40 kgs of baggage and have a range in excess 500 nm with 30 minutes reserve. That’s with a cruise speed around 125 kts.

Performance two up is sparkling and even at max all up weight will exceed many peoples expectations.

Features

Lightweight construction gives superior performance
Fuselage constructed from lightweight carbon fibre micro-sandwich
Fixed tricycle undercarriage gives easy ground handling
Steerable nose-wheel with telescopic suspension
Large canopy gives superior vision
Dual control – dual sticks and rudders
Dual throttle

Advanced wing design
Carbon fibre micro sandwich skin
Advanced double slotted flap design
Wing tips designed to maximum lift and provide stability

All flying aluminium skin “T” tail
Comfortable lightweight carbon seat shells
Adjustable rudder pedals for pilot comfort
Electric flaps and pitch trim as standard
Large 120 litre fuel capacity.
Wing root fairings incorporated in fuselage moulding
NACA cabin air ducts incorporated in fuselage moulding
Locking hand-brake (two lever differential)

Choice of Rotax 912, 912S, 914
Optional very comprehensive engine installation kits
Quick adjust seats gives 5 height adjustments

Sensible luggage space (behind seats)
Additional luggage space with rear seats folded forward
Carbon control rods with rose joint bearings

Options
Constant speed propeller
Low cost harness
Tuned stainless steel exhaust
Cabin heater (simple low cost)
Cabin ventilation (simple low cost)

Choice of instrumentation and communications equipment

Construction

The wing structure is formed from carbon fibre spars, foam ribs and a carbon fibre micro-sandwich wing skin. Fuel cells are formed within the wing structure and aluminium fuel lines are supplied in the kit. Flaps and ailerons are formed from foam spars and ribs in an aluminium skin. The wing flaps are of double slotted design much like modern airliners. The upper slot is formed from a small aerofoil fitted to the top of the main flap. Fuselage frames are lightweight formed from carbon fibre wood and foam and the fuselage itself is formed from a carbon fibre reinforced micro sandwich construction. Tailplane and rudder are also skinned in aluminium with internal foam ribs supported on carbon spars in the case of the tailplane.

Ancillary mouldings such as seats, cowls, spats, wingtips are manufactured from either Carbon Fibre, Kevlar or Glass depending on the part and its usage. Composite parts have a working gel finish designed to ease construction, eliminating time consuming filling required on some kits. Aluminium skinned flying surfaces are ready white prime painted to improve bond quality and reduce labour.

The Kit

The kit is supplied in an advanced state and the builder is not expected to manufacture any parts. All composite parts are supplied complete requiring trimming fitting and painting only. In general there is no filling required for composite parts except where small faults exist or to cover joints for example across the main fuselage joint.

Metal parts are supplied fully machined and most are supplied finished (painted, plated or anodised) ready for fitting. Cables are supplied ready to mount and in general most bearings are pressed into place in the appropriate part.

Standard Fast Build Kit – Requires around 2 – 3 weeks work in the factory for two people working together.

Initial structure
The wing is built up from ribs composite skin and carbon spar all of which are ready made. Flaps and ailerons are made from aluminium skin, carbon pieces, foam ribs and spar. The rudder is assembled from aluminium skin and foam ribs and the tailplane is assembled from aluminium skin foam ribs and carbon spar. The fuselage frames are bonded in place and the fin is completed. These operations involve the use of complicated jigs.

Advanced structure
Includes mounting flaps to wings, rudder to fuselage, fuel tank assembly, mounting wing and tailplane wing tips. These operations can be undertaken at or away from the factory.

Finishing
Includes Canopy assembly mounting all mechanical and control parts, the engine and propeller. Fitting all instrumentation and radio equipment. Adjusting all control and mechanical systems. Painting and preparation for painting.

It is possible to buy the kit in a STANDARD form, or with the INITIAL structure complete or with the ADVANCED structure complete where local regulations permit.

Included in the Kit

All three versions of the kit include the following components:

fuselage mouldings
structural frames
bulkheads
seat mouldings
undercarriage
wheels, tyres & brakes
fuel cells (formed in wing)
fuel lines, tap & filters
canopy and latches
control sticks
control linkages
electric trim motor
electric flap motor
instruments panel (blank)
anti-vibration panel mounts

wing skins
wing ribs
carbon spars
wing tips
wing attach brackets
wing pins and safety pins
flap skins, ribs & spars
flap brackets
aileron push rods
flap control rods
elastic control bands
brake control levers
brake control pedals
brake hydraulic system
epoxy glue / resin

tailplane skin
tailplane ribs
carbon spars
rudder skin & ribs
rudder cables and pulleys
rudder pedals and floor
tailplane control rods
tailplane bell cranks
throttle control levers
choke control levers
throttle control wires
choke control cables

All rivets, screws, bolts, nuts and washers.

Options

Engine installation kit
cowls insulation & fitting kit
engine mounts
starter battery
starter leads
main solenoid
starter solenoid
battery brackets
overflow bottle & brkt
oil tank brackets
oil filler cover
aluminium fuel lines
fuel line fittings
flexible fuel lines
oil cooler & radiator
supports for above
replacement ignition leads
baffles (aluminium& rubber)

Wheel fairing kit
wheel spats
undercarriage fairings
fitting kit for above

Strobe kits
Control unit
wiring and plugs
strobe lamps and covers

Cabin heater
trap, support and hinge
cable, lever & fitting kit

Remote rudder adjust kit
cables, controls & fitting kit

Chabourd Tuned Exhaust
4 into 1 tuned exhaust
silencer, final pipe,
brackets and clips

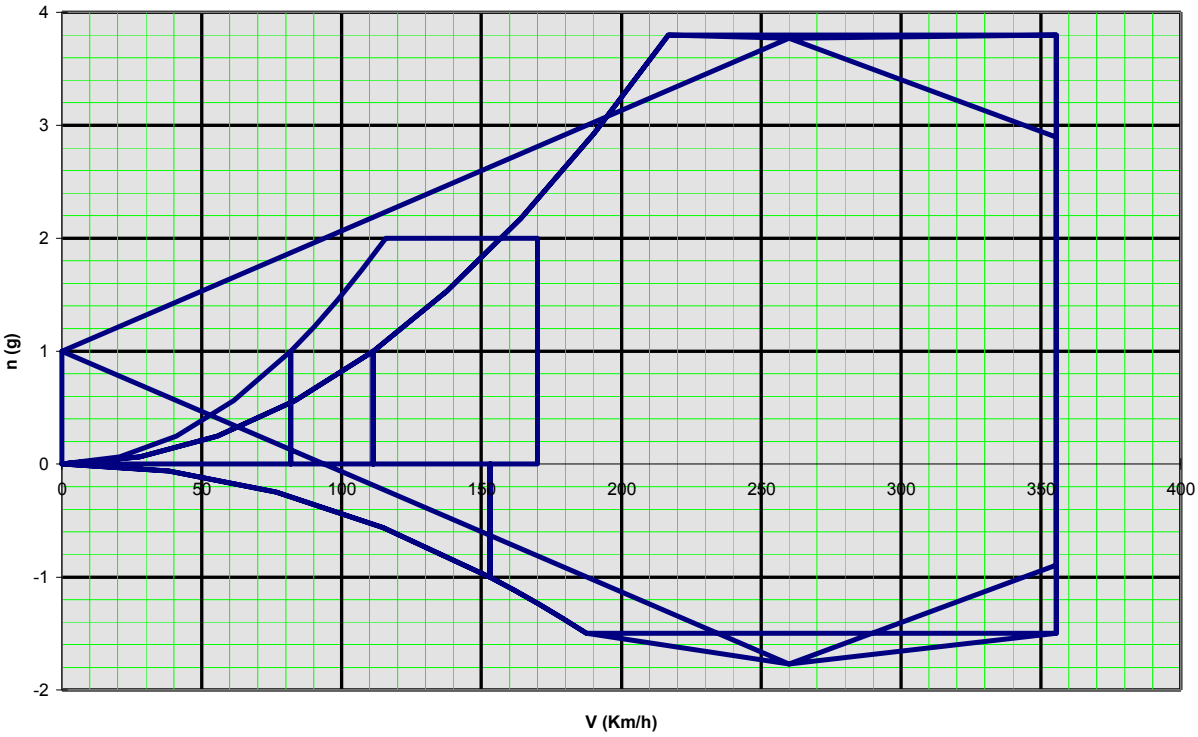
Internal paint
one US gallon of grey
speckle paint, enough to
paint inside cockpit

Cabin ventilation
flaps and hinges
cables, control & fitting kit

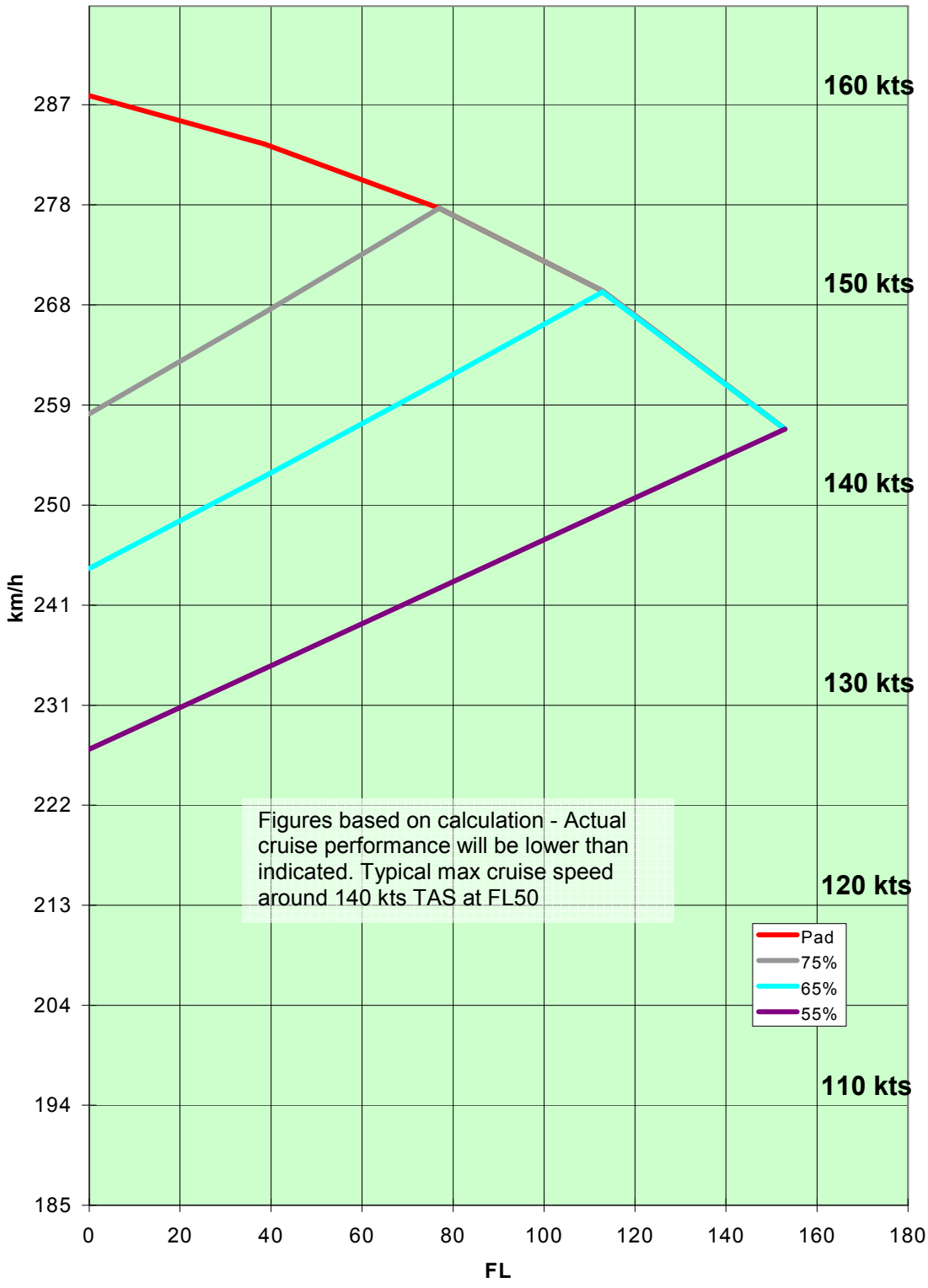
Flight Envelope

		Km/hr	kts	mph
Vmini	Stall Speed	82	44	51
	Minimum Take Off Speed	93	50	58
	Minimum cruise speed	111	60	69
Vfe	Speed limit for flaps	170	92	106
Va	Manoeuvring Speed	217	117	135
Vno	Turbulent air Speed	260	140	161
Vne	Never Exceed Speed	320	173	199
Vd	Dimensional Speed	356	192	221
np/nn	Limit loading factors (g)	+3.8/-1.5	+3.8/-1.5	+3.8/-1.5

V=V(n) diagram at MTOW

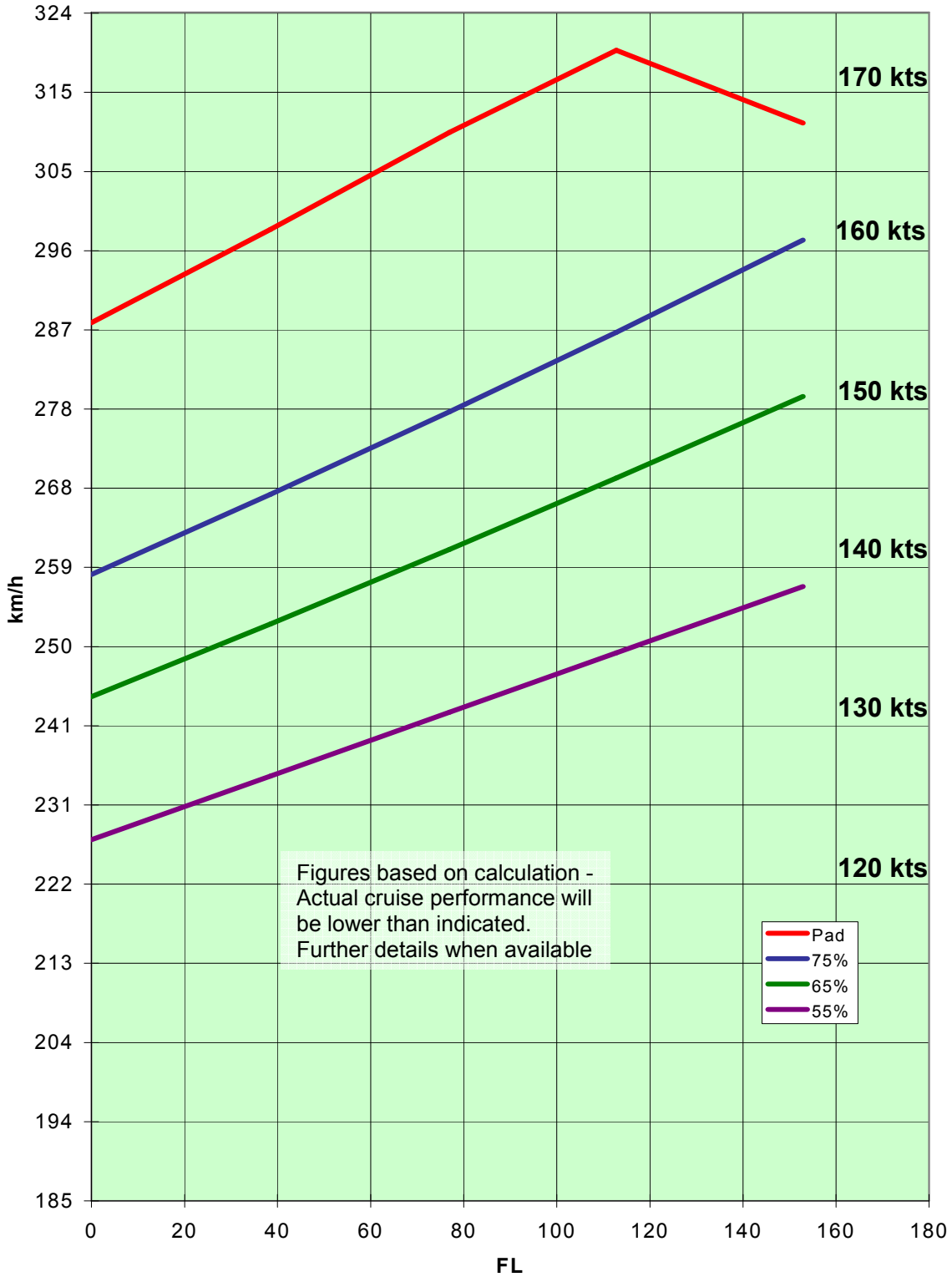


100hp Engine (ROTAX912S) TAS / FL / Power



PAD = Full throttle / Performance from calculation / Actual performance will be close to that shown

100hp Turbo (ROTAX914) TAS / FL / Power



PAD = Full throttle / Performance from calculation / Actual performance will be close to that shown

Performance

Design performance with different engines

	100 hp normally aspirated engines Rotax 912S		100 hp Turbo Charged engines Rotax 914	
Maximum level speed	288 km/h	155 kts	320 km/h	173 kts *
Cruise speed 75% FL0	258 km/h	139 kts	258 km/h	139 kts
Cruise speed 75% FL80	277 km/h	150 kts	287 km/h	155 kts
Cruise speed 65% FL0	244 km/h	132 kts	244 km/h	132 kts
Cruise speed 65% FL110	270 km/h	146 kts	270 km/h	146 kts
Range 75% FL80	1,521 km	821 nm	1,572 km	849 nm
Range 65% FL110	1,707 km	922 nm	1,706 km	921 nm
Take off distance with VP Prop	203 m	665 ft	153 m	503 ft
Distance to clear 15m	295 m	968 ft	221 m	724 ft
Take off distance with cruise prop	304 m	997 ft		
Distance to clear 15m (cruise prop)	420 m	1,378 ft		

* 914 Turbo maximum level speed quoted at 11000 ft

These figures are those used in the initial aircraft design. Modifications including increased cabin width have reduced cruise performance. Actual performance figures will be available later. Take off and climb performance is close to that shown.

Information correct at time of publication all specifications may change without notice.

Aircraft Dimensions

Weights

Minimum empty weight	300 kg	661 lbs
Equipped aircraft empty weight	350 kg	771 lbs
Maximum take off weight	750 kg	1,652 lbs
Wing loading	77 - 90 kg/m²	15.94 lbs/ft²

General

Length	6.72 m	22’
Height	1.9 m	6’ 3”
Cabin width	1.2 m	47”
Fuel capacity	120 l	25.4 imp gal

Wing

Wing Span	8.72 m	28’ 7”
Wing area	8.30 m²	89.39 ft²
Aspect Ratio	9.20	9.20
Mean wing chord	0.96 m	38”
Dihedral	3 °	3 °

All Flying T tailplane

Tailplane span	2.5 m	8’ 2”
Tailplane area	1.375 m²	20.23 ft²
Tailplane mean chord	0.55 m	22”
Max Upward deflection	5 °	5 °
Max downward deflection	10 °	10 °

Double slotted Flaps

Span	2.52 m	8’ 3”
Chord	0.395 m	16”
Cruise setting	0 °	0 °
Take off setting	17 °	17 °
Landing setting	45 °	45 °

Aileron

Span	0.84 m	33”
Chord	0.385 m	15”
Max upward deflection	20 °	20 °
Max downward deflection	10 °	10 °