SECTION 1 - AIRFRAME AND ENGINE LIMITATIONS

Airspeeds - all speeds are Indicated Air Speeds (IAS)

V_{NE}, Never Exceed Speed:	139 mph, 121 kt
V_A Max. manoeuvring speed,	94 mph, 82 kt
V_{S0} Stall speed, full flaps:	37 mph, 32 kt.
V_{S1} Stall speed, flaps retracted:	47 mph, 41 kt
V_{FE} Max speed :	72 mph, 63 kt

V_{NE} & V_A limitations are affected when flying with doors removed Aerosport MOD C42/019

VNE (Velocity Never Exceed): 103 mph, 90 kt.
VA (Maximum Speed for Full Deflection of Controls / Rough Air): 80 mph, 70 kt.

Weights:

Empty weight (max):	265.5 kg 100 hp 912S 268 kg 80hp 912
Max gross weight:	450 kg.

Areas:

Wing area	135 sq ft, 12.5 sq.m

Structural limitations:

Positive limit load	4g (at all speeds)
Negative limit load	-2g

Centre of gravity limits: (Zero datum at the wing leading edge root)

Forward centre of gravity	350 mm aft of datum.
Rearward centre of gravity	560 mm aft of datum.

Airspeed markings:

White Arc:	37 to 72 mph (32 to 63 kt) —full flap operating range.
Green Arc:	47 to 94 mph (41 to 82 kt) — normal operating range.
Yellow Arc:	94 to 139 mph (82 to 121 kt) CAUTION, DO NOT USE IN TURBULENCE.
Red Line:	139 mph (121 kt) V_{NE} VELOCITY NEVER EXCEED.
Yellow Triangle:	60 mph, 52 kt - Recommended Minimum Approach Speed

Control Deflection Limits

At V_{NE} control surfaces should not be deflected more than one third full range.

V_A is the maximum speed permitted in turbulent conditions. Full deflection of the controls at speeds above V_A is prohibited.

Engine Limitations:

Max. Engine RPM. 5800 rpm (5 minutes max)
5500 rpm max continuous (80 HP)
5300 rpm max continuous (100 HP)

RPM Meter Markings: yellow 5500-5800 rpm (80 HP)
5300-5800 rpm (100HP)
red 5800 rpm

Propellers:

80hp: Warp Drive 2-blade 68" (1,72 m Ø)
Pitch 25º at R = 400 mm from hub edge (blade root point of entry)
Full throttle ground static RPM 5000 rpm (prop = 2203 rpm)

Warp Drive 3-blade 68'' (1,72 m Ø)
Pitch 21º at R = 400mm from hub edge (blade root point of entry)
Full throttle ground static RPM5000 rpm (prop = 2203 rpm)

Ecoprop 170R 110/3, 3 blade
170cm x 20º @ 75% radius.
Full throttle ground static RPM5000 rpm (prop = 2203 rpm)

Neuform CR3 3 blade (1,75 m Ø) **When cleared for use**
Pitch 23º @ 310mm from hub edge
Full throttle ground static RPM4700 rpm (prop = 2070 rpm)

100hp: Warp Drive 3-Blade 68" (1,72 m Ø)
Pitch 25º–26º at R = 400 mm from hub edge (blade root point of entry)
Full throttle ground static RPM5000 rpm (prop = 2057 rpm)

Ecoprop 170R 130/3, 3 blade
170 cm, pitch 22º at 75% radius.
Full throttle static rpm, max. 5000 rpm (prop = 2057 rpm)

GSC Tech-III 3 blade
68" x 25º@400mm from hub edge.
Full throttle static rpm, max. 5000 rpm (prop = 2057 rpm)

Neuform CR3 3 blade (1,75 m Ø) **When cleared for use**
Pitch 27º @ 310mm from hub edge
Full throttle ground static RPM4700 rpm (prop = 1934 rpm)

Neuform CR3-V-R2H 3 blade variable pitch prop (1,80 m Ø) **When cleared for use**
Pitch 24º-31º @ 310mm from hub edge
Full throttle ground static RPM5400 rpm (prop = 2222 rpm)
Propeller pitch control lever position fully fine *

* Please note the Neuform Variable pitch propeller has specific maintenance schedules detailed in Neuform Variable Pitch Propeller Operating Manual NOM/C42/001.

Slight adjustment to the pitch of each of the above propellers may be necessary to obtain the correct ground static rpm. An optical tacho on the propeller is the preferred method of measuring the engine speed.

Engine

According to ROTAX Manual:

Oil Pressure:		2 - 5 bar
Oil Temperature:	min.	50° C
	max.	140° C (80hp), 130° C (100 hp)
	preferred range	90 - 110° C

Maximum coolant temperature 115°C

Maximum Cylinder Head Temp. (CHT)

912 (80hp)	150°C
912S (100hp)	135°C

Above CHT and coolant temperatures assume 50% glycol/water coolant mixture.

SECTION 2 - OPERATIONAL LIMITATIONS

This aircraft

- must not be flown in aerobatic manoeuvres.
- must not be flown at bank angles beyond 60 degrees.
- must be flown under daylight, VFR conditions only.
- must not be flown in known airframe icing conditions.
- must not be flown in conditions of moderate turbulence or above, or in winds exceeding 22 kts, at surface level, less if gusty.

Always follow the appropriate regulations for this category of aircraft.

Permitted Manoeuvres

Non-aerobatic operation only.
Any manoeuvre necessary for normal flight.
Stalls.
Steep turns with bank angles not exceeding 60°

Placarded limitation must be observed at all times. Additionally pilots should only fly in conditions which are compatible with their own ability.

Maximum permitted dry empty weight:	100 hp 912S	265.5 kg
	80 hp 912	268 kg

SECTION 3 - OPERATION OF THE POWERPLANT

Description:

The Rotax 912 and 912S are 4 cylinder, four stroke, horizontally opposed engines. They are cooled by a combination of air-cooled cylinders and liquid cooled heads. The engine oil is also air-cooled with a small radiator.

Fuel Type: Min 91 Octane for the 80 hp, Min. 95 Octane for the 100 hp engine (RM/2 method) automotive gasoline leaded or unleaded or AVGAS 100 LL . Prolonged use of AVGAS can cause damage to the Rotax 912, precludes use of fully synthetic oil and requires more frequent oil and oil filter changes. Please study the Rotax engine operating manual.

CAUTION: Never handle the propeller with the ignition on.

To Start:	Main fuel valve,	OPEN
	Master switch	ON
	Electric fuel pump	ON
	Throttle at idle	FULL AFT
	Brakes	ON
	Mags (both)	ON
	Propeller area	CLEAR
	Rear of aircraft	CLEAR
	Choke (pulled out)	ON Start
	After engine starts, choke	OFF
	Check:	OIL PRESSURE RISING.

Note: If the engine doesn't start, repeat the procedure. If the engine floods, close the main fuel valve, half open the throttle and turn over the engine. When it starts, reduce the throttle quickly to idle (2000 rpm) and turn on the fuel.

Open the main fuel valve - don't forget!

Note: A water-cooled four stroke engine requires a fairly long warm up period. Run the engine at 2000 rpm for 2 minutes minimum then at 2500 rpm until the oil temperature is at least 120°F (50° C). Perform an ignition system check at 3500 rpm by turning off each ignition switch in turn. The engine speed drop should not exceed 300 rpm with a maximum difference of 120 rpm.

Failure to let the oil temperature reach 50°C can result in carburettor ice forming during takeoff. It is imperative that this procedure is followed otherwise serious injury or death may result.

SECTION 4 - FLIGHT

4.01 Taxiing:

The nose wheel steering is conventional and is directly connected to the rudder pedals. Push the right pedal to turn right. Push the left pedal to turn left. Taxiing is simple; the turning radius of the C42 is small, and the aircraft handles cross winds during taxiing very well.

When taxiing with a strong tail wind, hold the control stick firmly in the neutral position.

When taking off or landing on bumpy grass strips, exercise caution to avoid striking the propeller. This may require performing soft field take-off and landing procedures.

Note: with a fully aft cg it is possible for the aircraft to tip back and sit on its tail skid, particularly if taxiing over uneven ground.

4.02 Takeoff and climb:

Complete the pre-take checklist 'VITAL ACTIONS'. Ensure the trim is set to one step above neutral, as indicated by a centre-scale reading on the trim indicator and the flaps are set as required (Max 1 stage, 15 degrees). Always take off into the wind when possible. The maximum demonstrated 90 degree crosswind component is 17 mph (15 knots).

The stick position should be positively aft of neutral and maintained during the ground roll to minimise the loading on the nose wheel. Smoothly bring the throttle to the full forward position, check the tachometer for full throttle rpm.

It will be necessary to hold right rudder to counteract slipstream effect and engine torque during the ground roll and climb out. The nose wheel lifts off at approximately 30 mph, (26 kt). Accelerate with the nose wheel off the ground 2-4 inches, (5-10 cm). The aircraft will take off at 44 mph (38 kt).

After takeoff, let the aircraft accelerate to the best rate of climb speed Vy 70 mph, (60 kt), 1 stage flap extended. At between 150 and 200 ft raise the flaps to the cruising flight position (0 degrees or no flaps). Be ready for the pitch trim change to nose-down. Trim the aircraft as required for the climb. Recommended full power climb 80 hp 62 - 66 kts. Recommended full power climb 100 hp 66 - 70 kts.)

Best angle of climb speed Vx is 55 mph, (48 kt) (1 stage flaps). However this climb speed and angle are not recommended because in the event of an engine failure it is possible that control of the aircraft may be lost. The aforementioned procedure is therefore recommended. This should ensure full control is maintained in the event of an engine failure shortly after takeoff providing immediate engine failure action is taken.

Cross wind take off :

Take off should be made as described above but with into wind aileron. Maintain track down the centreline with rudder and further maintain into wind aileron as required to stop your drift during the take off roll and rotation. (Out of wind wing main wheel can lift off first during take off). Resume wings level balanced flight after take off.

The maximum demonstrated 90 degree cross wind component is 17 mph (15 kts)

4.03 Cruising flight:

Note: Typical economic cruise speeds lie in the range 80 to 105 mph (70 to 90 kt); 109 mph (95 kt) with the 100 hp engine.
Maximum continuous engine speed is 5500 rpm for the 80 hp 912, and 5300 rpm for the 100 hp 912S.

Variations in rpm and cruise performance occur with different loads.

Typical cruising flight (80 hp)

Engine speed:	4500 rpm.
Airspeed:	95 mph (83 kt)
Fuel flow:	2.8 Imp. gallons per hour, (12.7 l/h)

The maximum speed in cruising flight is 118 mph (103 kt).

Note: ***This maximum speed applies only in smooth conditions with no turbulence. In turbulent air, speed must be kept below V_A = 94 mph (82 kt).***

4.04 Turning flight:

In turning flight, it is necessary to co-ordinate the use of the ailerons and the rudder. At normal cruising speeds 80 mph (70 kts) to 103 mph (90 kts) initiate the turn with aileron maintaining balance as necessary with rudder. At bank angles exceeding 45 degrees the pitch trim force required to maintain level flight increases noticeably. Banks exceeding 60 degrees are prohibited. In steep bank turns remember to maintain the attitude at entry and maintain airspeed with power. Failure to maintain correct attitude can result in a spiral dive developing. At 60 degrees of bank the stall speed is multiplied by a factor of 1.41 and you will be pulling 2g.

4.05 Slow flight, stalling and use of flaps:

In cruising flight configuration with the landing flaps retracted and at speeds below 60 mph (52 kt) the top of the engine cowl will be well above the horizon. Control inputs of the aileron and rudder will be severely dampened and the overall response of the aircraft markedly reduced. Only gentle turns should be made of up to 20 degrees of bank ensuring the aircraft remains in balance. In slow flight if a wing drops, centrally reduce back pressure on the stick and lower the nose. Prevent further yaw with the rudder and do not attempt to lift the wing by aileron input. At approximately 48 mph (42 kt) there will be a slight buffeting of the airframe. The aircraft is still controllable. However, aileron input should not be used and the stick kept central with any tendency for the wing to drop use opposite rudder to prevent yaw.

If stalls are entered very gently the aircraft can enter a controlled mushing descent, control can still be maintained with rudder. (It is important not to over use rudder and potentially put the aircraft into a reverse spin entry).

When the aircraft stalls the nose will drop. By removing back pressure the aircraft should recover. Typical height loss in the wings-level stall is approximately 100 ft., and max. Pitch attitude change 25° below the horizon. In turning flight stalls the typical height loss is 120 ft. At full flap (40 degrees) the pre-stall buffet, 39 mph (34 kts), is markedly more noticeable and there is an increased tendency for the wing to drop if balanced flight is not maintained.

Speeds are as follows:

VS1 flaps retracted (0°) 47 mph, (41 kts)

VS2 first notch of flaps (15°) 42 mph, (36 kts)

VS0 full flaps (40°) 37 mph, (32 kts)

The above specified stall speeds will vary slightly depending on the all up weight.

4.06 Inadvertent Spinning

Spin recovery – Immediately fully close the throttle. If full flap is set raise the flaps otherwise leave. Apply rudder opposite to the direction of rotation until rudder is centralised and then release back pressure from the stick. If the spin continues apply full opposite rudder then move the stick forward until the spin stops.
Avoid over speeding the aircraft during the pull out.

4.07 Descents, landing and roll out:

Entering a conventional circuit in the cruise 92 mph (80 kts) when on the base leg reduce power, maintaining attitude allowing a reduction in airspeed to 72 mph (63 kts) (white arc) select 15 degrees flap (1 stage) simultaneously lowering the nose to maintain 67 mph (58 kts) and trim.

On final approach if the crosswind component is less than 12 mph (10 kts) you can select full flaps simultaneously lowering the nose to maintain 55 kts. Continue your approach at 63 mph (55 kts) and trim if required. Minimum approach speed in this configuration is 60 mph (52 kts).

In calm conditions it is acceptable to use side slip technique to increase your rate and angle of descent, but it is recommended the aircraft is returned to a standard approach configuration before reaching 100 ft above the runway.

In the landing phase during the hold off when the main wheels touch ensure that the nose wheel is maintained clear of the runway during the landing roll bringing the stick steadily rearward until it reaches the backstop and allow the nose wheel will settle onto the runway as the speed decays.

Caution should be exercised when applying brakes as it is possible to lock the main wheels under certain conditions. It is preferable to allow the aircraft to de-accelerate to a walking pace before applying any braking action.

Cross wind landing technique

Establish the aircraft on a powered approach, tracking the centreline and allowing for drift. For crosswind components of 12 mph (10 knots) or above only 1 stage of flap (15 degrees) is recommended. Approach speed should be 66 mph (58 kts).

The generic wing down approach is recommended. If you are not fully aware of crosswind techniques you should consult an approved instructor. The following description is for guidance and not a substitute for proper instruction.

Below 200 feet on the approach, apply rudder to align the nose of the aircraft with the centreline of the runway simultaneously lowering the into-wind wing with aileron to maintain your track down the centreline (preventing drift).

Smoothly allow the aircraft to settle on to the runway, the into wind wheel will contact the runway first maintaining directional control with the rudder and progressively increase the into-wind aileron deflection as the airspeed reduces.

Allow the nose wheel to settle on to the ground earlier than normal to transfer steering authority. Avoid "fully holding off" before touchdown as drift angle increases and airspeed decays, the control authority also reduces.

4.08 Shutting down the engine:

During the descent and subsequent taxiing, the engine will have cooled down enough to permit immediate shut-down after parking.

Turn off all electrical accessories and radios before shutting down the engine.

4.09 Sudden loss of engine power:

Set attitude for best glide at 58 kts and trim (This is a good compromise speed and easy to achieve quickly). Asses the wind direction and select a suitable landing area into wind. Plan your approach and execute this action.
If you have time check the reason for engine failure:

Master switch ON
Magneto switches ON
Fuel tap ON
Choke OFF

Try restart:

Auxiliary fuel pump ON
Throttle set 1/4 open
Press starter

If restart not achieved and you still have sufficient height and time make a MAY DAY call. Stay on the frequency you are already on if contact established. Remember it is more important to keep flying the aircraft on your planned approach than any other action.

Do not turn your back on the planned landing site or make a 360 degree. A constant aspect approach is recommended coupled with beats and turns and or sideslip to increase rate of descent.

IMPORTANT: SHUT DOWN CHECKS (Prior to landing)

Throttle closed
Master OFF magnetos OFF
Fuel OFF
Security - harnesses tight, reassure passenger

1 Stage of flap can be applied at any time during your descent.
During your initial approach you should be aiming at the middle off the landing site bringing your aiming point back to one third in after applying full flap. All emergency landings should be made into wind with full flap to minimise landing speed.

Remember - KEEP FLYING THE AIRCRAFT AT ALL TIMES.

4.10 Emergency procedures:

I Should you lose elevator control due to a mechanical failure, trim the aircraft to 65 mph (56 kt). With a reduced power setting, make a shallow power-on landing approach, throttle back and flare using the trim. Avoid use of the flaps.

II If you lose aileron control, you can fly the aircraft with rudder alone.

III If you lose rudder control, the aircraft can be flown with the ailerons alone.

IV In the event of carburettor or engine fire:

Main fuel valve off .
Electric fuel pump off.
Full throttle, (to burn the remaining fuel fast).
Maximum permissible airspeed to put out the flames.
Call MAYDAY
Follow emergency landing procedures.

C42 CHECK LIST

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START CHECKS
Brakes ON facing safe direction, area all clear
Flaps neutral
Main fuel tap ON
All switches OFF, radio, transponder OFF
*Carb heat OFF
Master switch ON
Aux fuel pump ON for 5 secs when cold
Magnetos ON
Throttle set and choke if required
Check area clear
Shout 'CLEAR PROP'
START engine set 2000 rpm, when cold set at 2500 rpm
Strobe ON
Check aux fuel pump OFF and choke OFF
Record Hobbs reading and time
Radio ON transponder on standby

DURING TAXI
Check brakes, slip ball and compass

PRE FLIGHT (VITAL ACTIONS)
Park into wind
Brakes on and locked
Set throttle at 2000 rpm (when cold set 2500 rpm)
Controls full and free and correct sense
Harnesses and hatches secure (no light visible at bottom of door)
Loose items stowed
Flight instruments set and correct
Engine temperatures and pressures within limits
Magneto check at 3500 rpm (max drop 200 rpm)
Throttle to idle
Reset throttle to 2000 rpm
*Carb heat ON
Fuel ON, Aux fuel pump ON, contents sufficient
Trim set for take off and flaps set as required
*Carb heat OFF (should have been on a minimum 15 secs)
Check all clear for take off
Check full power during take off roll (min 5000 rpm)

AFTER TAKE OFF
Flaps neutral above 100 feet
Aux fuel pump off above 1000 feet
Engine temperatures and pressures within limits

*If fitted

SPEEDS
In the climb:
Flaps set 1 stage: 58 kts
Flaps set neutral: 70 kts

In the approach:
Flaps set neutral: 60 kts
Flaps set 1 stage: 58 kts (xwind 10 kts +)
Flaps set 2 stage: 55 kts

C42 CHECK LIST

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ON ROUTE
Location and heading
Instruments both flight and engine good
Fuel sufficient
Elapsed time and time remaining
*Carb heat ON for 15 secs and turn OFF

DOWNWIND / *AIRFIELD APPROACH*
Altimeter set to QFE
Brakes OFF
Aux fuel pump ON
Fuel sufficient for go around
*Carb heat ON
Engine temperatures and pressures good
Activity

BASE LEG
Flaps set 1 stage

FINAL
Flaps set 2 stage if required
*Carb heat OFF
Clear to land

RUNWAY CLEAR
Flaps up (neutral)
Aux fuel pump OFF
Lights OFF

SHUTDOWN
Brakes ON
Magneto check at 2000 rpm
Radio, Transponder, Nav aids OFF
Throttle to idle
Aux fuel pump OFF, Lights OFF
Check Hobbs reading and record time
Magnetos OFF
Strobe OFF
Master switch OFF

*If fitted

EMERGENCY SHUT DOWN
T Throttle closed
I Ignition and magnetos OFF
F Fuel OFF
S Security Harnesses Hatches

EXTREME MANOEUVRE
H Height sufficient
A Airframe suitable
S Security and loose items
E Engine temps and pressures
L Location
L Lookout

SECTION 9 - FLIGHT PERFORMANCE

All versions:

Best climb rate speed (flaps 15 degrees, 1 stage)	70 mph (60 kt)
Min. sink rate at max. AUW (flaps 15 degrees, 1 stage)	450 fpm
Min. sink rate speed	52 mph (45 kt)
VS1 flaps up stall speed	47 mph (41 kt)
VS2 flaps 1 stage (15 degrees)	41 mph (36 kt)
VSo full flaps stall speed	37 mph (32 kt)
Roll rate at Va	±45 degrees in 2 sec's
Landing distance, from 15m fence	205 metres
Fuel consumption	See Rotax data.
Best glide angle	11:1

C42 FB 100 (Rotax 912S, 100 hp)

Take off distance, to clear 15m fence	205metres
Max. climb rate at max. AUW	1000 fpm
V_h max level speed at max. AUW	124 mph (108 kt)

C42 FB80 (Rotax 912, 80 hp)

Take off distance, to clear 15m fence	220metres
Max. climb rate at max. AUW	700 fpm
V_h Max level speed at max. AUW	120 mph (105 kt)