C42

Owner's Manual

OHB/C42/001

Issue 5

C42 Owner's Manual

FLIGHT, OPERATION AND MAINTENANCE MANUAL

This Manual belongs to aircraft reg : ________________________

Type IKARUS C42 FB : ______________________

Serial No. : ______________________

Kit Build Aircraft.

Kit Microlight Aircraft Types: **IKARUS** Ikarus C42 FB80K ,Ikarus C42 FB100K ,

Series Build Aircraft .

Microlight Aircraft Types: **IKARUS** C42 FB 80, C42 FB100,

Type Approval Data Sheet No. BM 68

Manufacturer: Flybuy Ultralights Ltd.,
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This handbook should be kept with the aircraft.

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ISSUE AMENDMENTS

Issue No.	Change/Description	Date	Signature
1	Derived from Draft 3, format was A5; 7.1, placards were on dash.	3/10/03	
2	Format change only	30/10/03	
3	Tyre pressure change	05/05/04	
4	Warp Drive 3 blade prop – 80hp Version	22/06/04	
5	50 hour Inspection schedule Change (Item 7 Stub Axle) Format change from CTP	29/09/04	

IKARUS C-42 FLIGHT AND OPERATOR'S MANUAL

Preamble

A record of all amendments is to be found in the front of this manual.

The C42 aircraft is a microlight, conforming to the definition within BCAR Section S, 1999. To operate the aircraft the pilot must hold at least a minimum of a Microlight PPL. The aircraft is not to be flown unless it is registered, carries registration markings in accordance with the CAA requirements, and has a valid Permit to Fly. The aircraft is to be flown under daytime VFR conditions only.

All Group A (conventional light aircraft) rated pilots should be checked out by an approved instructor prior to flying this aircraft as it possesses characteristics that are unique to microlight type aircraft. These characteristics include low inertia, susceptibility to turbulence and wind gradient and special engine considerations.

The engine of this aircraft is not certified, and could fail at any time. For this reason NEVER fly over congested areas or other areas on to which a safe landing cannot be made in the event of an engine failure. On cross country flights, ALWAYS keep an emergency landing field in sight.

Changes to the control system, structure, wings and engine are prohibited.

All operating difficulties and equipment failures should be reported to FlyBuy Ultralights Ltd.

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. maneuvering 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_{FE1} Max speed 1 stage flap extended:	94 mph, 82 kt
V_{FE2} Max speed 2 stage flap extended:	72 mph, 63 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 RPM 5000 rpm (prop = 2203 rpm)

Ecoprop 170R 110/3, 3 blade
170cm x 20º @ 75% radius.
Full throttle ground static RPM 5000 rpm (prop = 2203 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 RPM 5000 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)

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.
- must not be flown with the doors removed.

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.

SECTION 4 - FLIGHT

4.1 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.

4.2 Takeoff and climb:

After completing the "before take- off" checklist, make certain the runway and circuit are clear before you take up your position.

Before taking off:

Set the trim to neutral, as indicated by a centre-scale reading on the trim indicator.

Set wing flaps to first stage (15 degrees).

Always take off into the wind when possible. The maximum demonstrated 90 degree crosswind component is 17 mph (15 knots).

Gently 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 take off roll and climb out.

Pull slightly aft of neutral on the stick during the initial roll. The nose wheel comes off at 30 mph, (26 kt).

Accelerate with the nose wheel off the ground 2-4 inches, (5-10cm).

The aircraft will take off at 44 mph (38 kt)

After takeoff, let the aircraft accelerate to 62-65 mph (54– 56 kt).

The best rate of climb speed V_Y is 70 mph, (60 kt); (1 stage flap extended). Maintain this speed at approximately 150 ft (and below 70 mph) raise the flaps to the cruising flight position (0 degrees or no flaps). Be ready for the pitch trim to change to more nose-down.

Trim the aircraft as required for a climb at 65-70 mph (56 – 61 kt).

Make certain that you maintain adequate speed to avoid stalling should the engine stop during the initial climb. Under 250 ft. (85m) do not attempt to turn more than 90 degrees should the engine stop.

Best angle of climb speed V_X is 55 mph, (48 kt) (1 stage flaps).

Should you approach a stall during initial climb, put the stick forward leaving full power on.

If executing an emergency landing, as soon as it is clear that the emergency landing field can be reached, use full flaps (40 deg.) to shorten the landing roll and steepen the glide. The aircraft can also be side-slipped to increase the descent angle.

Before executing an engine-off emergency landing, turn off the main fuel valve and master switch.

Cross wind take off

In cross wind components approaching 15 knots, start the take off run with the flaps retracted, full into wind aileron and elevator neutral. Smoothly apply full power; let the aircraft accelerate, taking care to keep straight with the rudder. Hold the aircraft on the ground a little longer than usual and rotate positively at around 57 mph (50 kts) to break ground cleanly; adopt a shallow climb attitude. During the ground run the aileron deflection can be reduced slightly as the airspeed increases. Lift off with the into-wind wing low to counteract drift, then ease the nose round into wind a little so that the aircraft sets up a drift angle. Relax the aileron to neutral, and assume balanced flight, tracking the runway centre line.

4.3 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).***

4.4 Turning flight:

In turning flight, it is necessary to coordinate the use of the ailerons and the rudder, with increased airspeed the need for coordination is less.

Banks exceeding 45 degrees are not recommended, banks exceeding 60 degrees are prohibited. In steep banks keep the nose and airspeed under control with the use of the rudder and elevators and increased power where necessary.

4.5 Slow flight, stalling and use of flaps:

In cruising flight configuration with the landing flaps retracted and at speeds below 50 mph (43 kt) the engine cowl will be well above the horizon.

At approximately 45 mph (40 kt) there will be a slight buffeting of the airframe. When flown in this condition the aircraft is fully controllable. However, directional (course) corrections should be made mainly with the rudder.

If stalls are entered slowly the aircraft will enter a controlled mushing descent, the aircraft can still be controlled in direction with large rudder movements.

With the control stick fully aft the aircraft will stall and drop its nose. By removing back pressure the aircraft will recover. Typical height loss in the wings-level stall is 100 ft., and max. pitch attitude change 25° below the horizon. In turning flight stalls typical height loss is 120ft.

The aircraft will perform stalls in the same manner regardless of flap settings. Speeds are as follows:

V_{S1} flaps retracted (0°) 47 mph, (41kt)

V_{S2} first notch of flaps (15°) 42 mph, (36kt)

V_{S0} full flaps (40°) 37 mph, (32kt)

The above specified stall speeds will be affected slightly with variations in flight weights.

4.6 Descents, landing and roll out:

Make your circuit and approach as large as required to obtain the correct landing configuration without hurrying.

Before you deploy full flaps, reduce airspeed below 72 mph (63 kt)

For the final part of the landing approach maintain an airspeed of at least 60 mph (52kt).

For landings at short strips, use full flaps. Side-slip by applying opposite rudder and aileron can be used to increase the descent angle further.

The glide angle with full flaps (40deg.) is much steeper than that with one notch of flaps (15 deg.).

At approximately 8-10 ft. (2-3m) height, begin rounding out to the landing flare. At 2 ft.(1/2 m) begin your final flare to land. The landing should occur at 37 mph (32 kt) in a full stall.

Cross wind landing technique

When landing with significant crosswinds, the following technique is recommended:

Establish the aircraft on a powered approach, tracking the centreline and allowing for drift. For crosswind components of 10 knots or above only 1 stage of flap (15 degrees) should be used. Set the airspeed for the approach a little higher than normal, typically 69 mph (60 kts) for crosswind components approaching the maximum recommended limit of 15 knots, or even a little higher if the general wind strength is high or gusting.

Below 200 feet on the approach, apply rudder to bring the nose of the aircraft in line with the runway lowering the into-wind wing with aileron to stop your drift. Round out slightly lower than normal and commence a low hold-off keeping the aircraft aligned with the runway with the rudder and maintaining sufficient wing down to stop any drift. Smoothly allow the aircraft to settle on to the runway, into wind wheel first, and maintain the into-wind (up) aileron pressure. Maintain directional control with the rudder and progressively increase the into-wind aileron deflection as the airspeed reduces. Allow the nosewheel to settle on to the ground earlier than normal to give good steering authority. Avoid “fully holding off” before touchdown because drift angle increases as airspeed decays, and control authority also reduces, making it difficult to handle the crosswind.

4.7 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.

4.8 Sudden loss of engine power:

In planning cross country flights, take care to avoid unnecessary flight over dangerous terrain or congested areas.

In the event of an engine failure, take into account speed and altitude, lower the nose.

Establish best glide speed, look for a suitable landing field. The best glide ratio is 11 to 1 at 60 mph (52 kt); from 2000 ft. this gives a still-air range of 6.7 km. (4.2 statute miles).

For minimum sink speed, set 15 degrees of flaps and 52 mph (45 kt). With flaps fully down, expect a lower glide ratio.

Do not attempt to turn back to the airfield unless you have a minimum of 500 ft. Below 500 ft., make only shallow banked direction changes.

Before landing shut off the main fuel valve and the master switch if there is time, and concentration and altitude permits it.

When landing in high grass or fields, perform a full stall landing. Use full flaps (40 degrees) and full aft stick during the final flare.

With sufficient altitude you may attempt to restart the engine, check:

1. The main fuel valve is open.
2. Both mag switches are on.
3. You have sufficient fuel.
4. The auxiliary fuel pump is on.

Air restarts; check:

1. Both mags switches on.
2. Auxiliary fuel pump on.
3. 1/4 throttle.
4. Keyed starting/master switch on.

4.9 Emergency procedures:

I 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.

II Spin recovery – Reduce power to idle centralising the controls and then apply full opposite rudder, lowering the nose until stalled wing has recovered and then gently raise the nose. Avoid overspeeding the aircraft during the pull out.

III Should you lose elevator control due to a mechanical failure, trim the aircraft to 65mph (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.

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

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

VI 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.

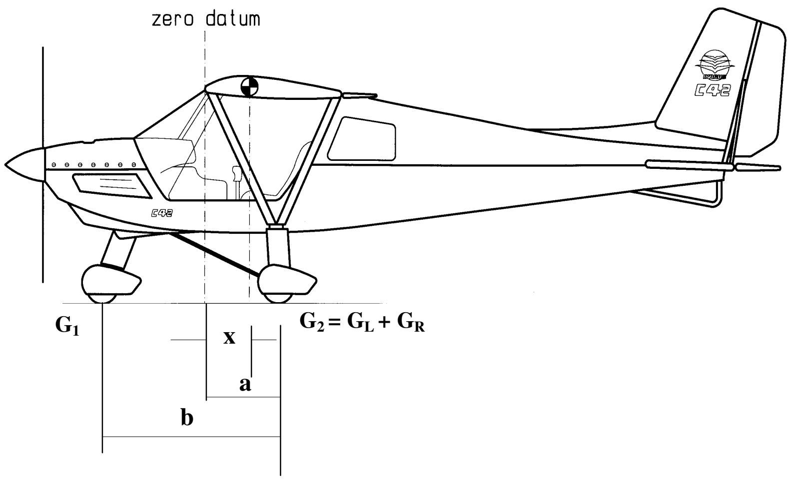
SECTION 5 - MINIMUM REQUIRED EQUIPMENT:

a. Four point harness.
b. Airspeed indicator 0-150 mph (0 - 130kt)
c. Altimeter.
d. Data placard and weight and balance document.
e. Pre flight check list.
f. Tachometer
g. Cylinder head temp. or coolant temperature gauge.
h. Oil pressure gauge
i Oil temperature gauge

6.1 Weight and Balance Calculations

The centre of gravity is measured in mm behind the zero datum. Zero datum is the leading edge root.

The aircraft's empty weight and cg are derived first: Place the aircraft in a level position on three scales, such that the stabilizer is horizontal, as shown below. Push down on the rear fuselage, just in front of the tail, and chock the nose wheel to level the aircraft. Record the reading of each scale.



Calculate the position of the empty cg, from the formula:

$$X = a - \frac{G_1 \times b}{G_1 + G_2} = ...mm$$

(a and b are values to be measured for the specific aircraft).

Insert the values for total empty weight, (G_1 + G_2) and cg distance aft of datum, (X), into the table below. Multiply Empty Weight (kg) by cg distance aft of datum (mm) to derive empty weight moment (kg.mm) in the last column.

Complete the remaining weights for seat loads, fuel and baggage and multiply these by the lever arm lengths (given below).

Add up the weights and moments, then divide the total weight by the total moment to give laden cg location aft of datum.

Ensure that this cg location lies within the limits 350 to 560 aft of datum.

Loading plan

Position	weight	x lever arm =	moment
	kg	mm	kg.mm
Empty weight			
1. Seats		400	
2. Fuel		950	
3. Baggage		1300	
Total Weight	kg	Total Moment	kg.mm
centre of gravity CG =	Total Moment --- Total Weight	kg.mm = kg	mm

Allowable CG range is 350 - 560 mm behind zero datum (leading edge)

6.2 Conditions of Weighing

The dry empty weight of the aircraft is defined under the following conditions:

All normal installed equipment fitted.
Oil and coolant levels normal.
No usable fuel.

Note: **Remaining within the Maximum Take-off Weight (MTOW) of 450 kg is the pilot's responsibility.**

SECTION 7 - DATA PLACARDS

The following placards are fitted to the aircraft, in the locations indicated:

7.1 In View of the Pilot:

For the 100hp:

V_{NE}	139 mph (121 kt)
V_{FE1}	94 mph (82 kt)
V_{FE2}	72 mph (63 kt)
RPM max. (5 mins)	5800 rpm
RPM max. continuous	5300 rpm
Oil pressure	2 – 5 bar
Oil Temp.	Min. 50°C
Oil Temp.	Max. 130°C
CHT	Max. 135°C

For the 80hp:

V_{NE}	139 mph (121 kt)
V_{FE1}	94 mph (82 kt)
V_{FE2}	72 mph (63 kt)
RPM max. (5 mins)	5800 rpm
RPM max. continuous	5500 rpm
Oil pressure	2 – 5 bar
Oil Temp.	Min. 50°C
Oil Temp.	Max. 140°C
CHT	Max. 150°C

7.2 Secondary Control Markings

The following secondary controls are marked for function and operation:

Trim - next to the trim rocker switch.

NOSE DOWN

TRIM

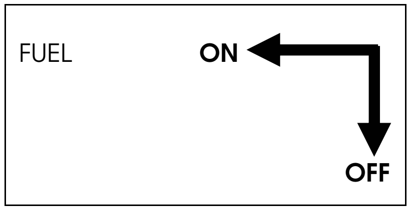
NOSE UP

Flaps - next to the flaps control lever:

FLAPS

UP DOWN

Fuel Tap- next to the fuel tap:



Starter - next to the starter button STARTER (switch)

Choke - next to the choke: CHOKE

7.3 Fuel Filler - next to the fuel filler:

For the 100 hp Rotax:

Unleaded MOGAS
Minimum Fuel Grade
MON 85, RON 95, AKI 91
AVGAS 100LL
Avoid prolonged use of Avgas

For the 80 hp Rotax:

Unleaded MOGAS
Minimum Fuel Grade
MON 83, RON 91, AKI 87
AVGAS 100LL
Avoid prolonged use of Avgas

7.4 Oil Filler - near the oil filler:

Use synthetic or semi-synthetic oil.
Specification API SG, SF or higher.
See Rotax manual for oil recommendations

7.5 Fuel Tank – near the fuel filler

Usable fuel capacity 50 litres

7.6 Loading: Within pilots view

Empty weight	
Date of Weighing	
Max. weight	**450 kg**
Max cockpit load	**172 kg**
Min. cockpit load	**55 kg**
Max. permitted fuel at max. cockpit load	**Lt**
Max. permitted cockpit load with max. fuel	**kg**

7.7 Occupant Warning – Within occupants view

This aircraft has not been certified to an international requirement.
Aerobatics and spinning prohibited.
Flight by day and in VFR only.
Smoking prohibited.

7.8 Unleaded Fuel Warning – Within pilots view

USE OF UNLEADED MOGAS
(See Airworthiness Notice 98B & C)
* Only legal in aircraft specifically approved for the purpose.
* Fuel to be fresh, clean, alcohol and water free.
* Check for leaks and deterioration of pipes, fittings, valves.
* Verify take-off power prior to committing to take-off.
* Tank fuel temperature not above 20°C.
* Fly below 6000 ft.
CARB ICING AND VAPOUR LOCK MORE LIKELY

SECTION 8 – CHECKLISTS

The following checklists are suggested; however your Flying Instructor may prefer these checks to be carried out in a different order or to include other items.

Pre-Start

Brakes ON
Facing safe direction and area clear all around
Flaps neutral
All switches OFF
Fuel ON
Master switch ON
Aux fuel pump ON (If engine warm leave OFF)
Magnetos both ON
Throttle set and choke if required (cold engine only)
Shout "CLEAR PROP"
Start engine.

After Start

Aircraft holding on brakes
Aux fuel pump OFF
Oil pressure within limits
Set rpm to 2000 (2500 rpm if cold and requires warming)
Choke is OFF
Check idle
Charging lamp showing OFF
Radio ON
Check clear for taxi
Reduce throttle to idle before releasing brake

During Taxi

Brakes operating properly
Check compass and slip ball
Use elevator as necessary to keep the weight off the nose-wheel

Pre-Flight – Vital Actions

Park into wind
Brakes on and locked
Set throttle at 2000 rpm (If still warming 2500 rpm)
Controls full and free and correct sense
Harnesses and hatches secure (no light visible along 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 (1450 -1600 rpm)
Reset throttle to 2000 rpm
Fuel ON and contents sufficient for flight
Aux fuel pump ON
Trim set for take off
Flaps set 1 stage (15 degrees) if required
Check ALL CLEAR
Check full power during take off roll (min 5000 rpm)

After Take Off

Flaps up above 150 feet
Aux fuel pump off above 1000 feet
Engine temperatures and pressures within limits

SECTION 9 - FLIGHT PERFORMANCE

All versions:

Best climb rate speed	70 mph (60 kt)
Min. sink rate at max. AUW (flaps up)	450 fpm
Min. sink rate speed	52 mph (45 kt)
V_{S1} flaps up stall speed	47 mph (41 kt)
V_{So} full flaps stall speed	37 mph (32 kt)
Roll rate at $V_{A,}$	±45º in 2 secs
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
Time to 1000 ft. (from standing start)	1min 5 secs
Max. climb rate at max. AUW	1020 fpm
V_C cruise speed at max. AUW	92 mph (80 kt)

C42 FB80 (Rotax 912, 80 hp)

Take off distance, to clear 15m fence	220metres
Time to 1000 ft. (from standing start)	1min 5 secs
Max. climb rate at max. AUW	960 fpm
V_C cruise speed at max. AUW	85 mph (74 kt)

SECTION 10 - DESCRIPTION OF SYSTEMS

The C42 is a simple aircraft whose structures and systems are readily inspected and maintained. However, since some of its systems differ from those found on conventional aircraft; this section should be studied before dismantling, repair or inspection.

10.1 Airframe

Fuselage

A 165 mm diameter aluminium tube runs from nose to tail and carries all the major assemblies: engine, seats, undercarriage, fuel tank, and tail empennage. The cockpit structure, consisting of a thin walled aluminium tube frame, includes a welded aluminium box-section frame at its top to which the wing spars' roots attach, and which provides compression load carry-through for both spars.

The composite seats are supported around their edges by attachment to the cockpit frame. Around the outboard edges of the seats, some of these loads are passed via the composite lower fairing to a lateral beam consisting of a 56mm reinforced box section. The ends of this beam accommodate the wing struts and withstand tension loads from them.

All load carrying (structural) members of the airframe are aluminium alloy tubes; most of which terminate in spherical bearings.

Wing

The wing has a ladder construction comprising leading and trailing edge tubes, connected by compression struts at intervals along its span. The triangulated wing struts, terminating at a fixed point at the top of the undercarriage, brace the wing against fore and aft loads. In normal +g flight these struts are under tension.

In +g flight both leading and trailing edge tubes inboard of the wing struts junctions, experience compression loads from the wing struts, as well as direct bending from lift loads.

The wing, tail empennage and all control surfaces are constructed of thin walled aluminium tubing. They are covered by a reinforced polyester fabric, sewn into complete envelopes and fitting tightly over their frames.

Undercarriage

The tricycle undercarriage has suspension on all wheels and damping on the main wheels. The front fork is directly connected to the rudder pedals. Hydraulic disc brakes operate on the main wheels only.

Main wheels' suspension stiffness can be adjusted by varying the air pressure in the damper units via the valves in their bases. A special high pressure pump is required for this purpose.

10.2 Power Plant

The 80 hp Rotax 912 or the 100 hp Rotax 912S is installed and drives the propeller via a gearbox with a reduction ratio of 2.27:1 or 2.43:1 respectively. Both power plants are flat 4 cylinder, 4 stroke engines with air and oil cooled cylinders and water-cooled heads. Full descriptions of the engine, its performance and maintenance requirements are to be found in the Rotax manual. Engine limitations are given in Section 1.

Propellers

The following propeller types are approved for use:

<u>With the 80 hp Rotax:</u>

Warp Drive CS68 composite 2 blade 68″ diameter propeller.
Warp Drive CS68 composite 3 blade 68′′ diameter propeller.
Arplast Ecoprop 170R 110/3, 3 Blade 170cm diameter composite propeller.

<u>With the 100 hp Rotax:</u>

A Warp Drive CS68 composite 3 blade 68″ diameter propeller.
An Arplast Ecoprop 170R 3 blade propeller with a diameter of 170 cms (67″)
GSC Tech-III 3 Blade 68″ diameter wooden propeller.

All approved types have blades with ground-adjustable pitch and are set to the pitch angles given in Section 1. This pitch angle is prescribed at a specific radius from the point at which the blade exits from the hub.

The propellers have aluminium alloy hubs machined to close tolerances. This permits secure clamping of the blade roots under the high centrifugal forces experienced by the blades in service. Proper blade root securing bolt tension is essential to maintain this security.

Warp Drive and Arplast propellers blades are moulded in composite material, either carbon or glass fibre in epoxy resin. Blades of this type carry all of their strength and rigidity in the external skin, which is carbon or glass fibre braid or fabric. See Section 11.

Exhaust system

The engine is fitted with a Hagerman Exhaust and Silencer System. This system is built largely from stainless steel components.

10.3 Control Systems

Pitch

A central control stick, accessible by both occupants, is located over the fuselage between the seats. Fore and aft movement of this stick is transferred, via longitudinal push tubes, to a motion reversal lever installed midway between the cockpit and tail. This installation also accommodates the pitch stops. A second push tube, of similar length, runs from this lever to the elevator horn. A rearward movement of the stick lifts the elevator; forward movement depresses it.

Each push rod terminates in a spherical bearing (Rose joint) maintaining loads through the centres of the tubes. The threaded roots of these fittings can be susceptible to failure if bending loads are applied; it is important to ensure complete freedom of the joints at extremes of their movements, such that bending loads cannot be applied.

Roll

The stick is also connected to a torque tube mounted on top of the fuselage tube between the seats, and turning on a Rose joint at each end. The rear of the torque tube carries a pair of horns from which run control cables, one for each side. These cables are led behind and over the cockpit, via pulleys, to a central bellcrank. From here, motion is transferred via push tubes to a bellcrank in each wing, mounted on a wing compression strut forward of the aileron. A second tube links this bellcrank to the aileron horn.

The geometry of the aileron control system produces some asymmetry in the deflections of the ailerons, effectively eliminating adverse yaw.

Movement of the stick to the right results in a lifting of the right hand aileron and depression of the left, and vice versa.

Yaw

Dual rudder pedals are mounted on common torque tubes, bearing in bushes installed directly into the fuselage tube. Control cables run from points near the top of the pedals' arms direct to the rudder horns.

Push rods connected to arms on the font fork, permit direct steering to be made via the rudder pedals. These push rods are curved to permit slight bending in the event of large opposing forces from two pilots being applied to the rudder pedals. In this event, a large proportion of the load is borne by the rudder cables themselves.

Two light springs are fitted to the rudder pedals to aid centering.

Pushing the right rudder pedal forward results in the rudder moving to the right; pushing the left pedal forward results in the rudder moving to the left.

Trim

An electric pitch trim system is controlled from a rocker switch in the dash. Pressing the top of the rocker switch lifts the trailing edge of the trim tab and results in a pitch down trim; pressing the bottom depresses the trim tab and results in a pitch up trim. The switch controls a small servo motor near the trailing edge of the fixed stabilizer. A short push rod runs from this servo motor to the trim tab horn. Raising the trim tab in flight results in a down deflection of the trailing edge of the elevator and a nose down pitch. A panel-mounted meter indicates trim position.

If the trim runs away to one extreme or fails in one position, no undue stick force is required to maintain control.

Brakes

The control stick carries a brake lever with an integrated master cylinder. Hydraulic lines carry pressure to a small disc brake on each of the main wheels. The brakes work together.

10.4 Electrical System

Electrical circuit diagrams are given on the following pages. Note that the MIPS electronic engine monitoring system is optional.

Battery

A small lightweight lead acid battery is installed beneath the seats for engine starting. It has a capacity of 5 amp hours and very high current capability. No maintenance is required, apart from keeping the contacts clean and dry. The battery is charged from the engine's in-built alternator, via a rectifier-regulator unit.

The engine ignition system is independent of the rest of the electrical system and does not require the battery to operate.

Fuses

Fuses are provided to protect wiring to all the electrical services with the exception of the starter motor. If a fuse blows, it is important to determine the cause of the failure before replacing the fuse. Under no circumstances replace the fuse with one of a higher rating.

Instruments

A variety of electrical instrument configurations is available, with an essential minimum as follows:

Fuel gauge
Tacho
Cylinder Head Temperature gauge (CHT) *

**** Note: there may be a significant difference between the CHT reading and that of the coolant temperature, with the CHT gauge likely to read low, and to have a slower response. Although the CHT gauge may indicate an acceptable temperature, it must not be assumed that the coolant temperature lies within limits.***

Switches

A master switch provides isolation of the battery from the main bus. The master switch must be closed (on) before attempting to start the engine, and must remain on to ensure that the battery is charged properly.

Separate isolating switches are provided for the remaining services or groups of services. Where a radio is installed, it is wise to turn off the radio switch before starting to reduce the risk of high spurious voltages damaging the radio.

NOTE: - The ignition switches stop the engine by grounding the ignition circuit. The engine is started and runs with the switches open, and is stopped by closing the switches. The ignition switches are therefore mounted in the reverse sense to the other switches to enable the normal aviation switch sense to be maintained. ie. up for ON, down for OFF.

It is also important to note that disconnection of the ignition switch wires, by accident or during maintenance, renders the engine live. Great care must be exercised in this case to ensure that the engine cannot be started accidentally. Normally remove the spark plugs' caps.

SECTION 11 - INSPECTION AND MAINTENANCE

11.1 Daily Inspection / Pre-flight Inspection

1. Engine and cowling secure and undamaged.
2. Check coolant level correct.
3. Check oil level within limits.*
4. Propeller clean and undamaged[1], bolts secure.
5. Front gear; tyre pressure, tyre condition and tyre creep.
6. Left main gear; tyre pressure and condition.
7. Left side wing, structure and covering.
8. Left wing strut attachment secure.
9. Left aileron, control linkage and hinges secure.
10. Left flap, control linkage and hinges secure.
11. Left side of the fuselage, undamaged
12. Tail group secure and surfaces undamaged.
13. Elevator hinges and control linkage secure.
14. Trim tab and linkage secure.
15. Rudder hinges and control cables secure.
16. Repeat items 4 thro' 9 for right side.
17. Fuel filler cap secure.
18. Windscreen clear and undamaged.
19. ASI pitot unobstructed and extended to end of red mark.
20. Cockpit area inside and out, check controls full movement, free and correct sense.
21 Instruments serviceable.
22. Open fuel tank sump drain and check for contamination.
23. Check tank water drain for leaks.

**When checking the oil level it may be necessary to pump the oil back into the reservoir to obtain a correct reading and to avoid overfilling. This can be done by removing the oil filler cap and ensuring the master switch and magnetos are off and rotating the propeller ONLY in the operating direction until a gurgling sound is heard from the reservoir tank.*

[1] With composite propellers, minor damage to the external surface, such as a deep scratch which breaches the outside fabric, can result in significant loss of strength and a dangerous condition. For this reason it is important to inspect the blades carefully before flight. Look particularly for scratches along the chord of the blade which may have severed one or more yarns of fibre. When in doubt, seek expert advice.

11.2 Periodic Maintenance and Inspection

Servicing, maintenance and repair work on this class of aircraft can be performed by the pilot, provided such work is signed off in the Engine and Airframe Logbook by a PFA or BMAA Inspector. Use only approved spare parts and never fit damaged parts.

Every 25 hours inspection

Engine: Check 25 hour inspection items in accordance with the ROTAX manual.

Fuel system

1. Check tank internally for cleanliness.
2. Check fuel filter for cleanliness.

Airframe

1. Check control stick for freedom without undue friction.
2. Check safety lock plates at the bearings at front and rear ends of control stick torsion tube.
3. Check that rod end bearings on elevator push rods suffer no bending at each extreme lateral position of stick (aileron limits).
4. Check all lock nuts for tightness.

Wing

1. Check internal bracing wires for adequate tension.
2. Check freedom of ailerons.
3. Check aileron and flap hinges for wear.
4. Check aileron and flap hinge bolts for tightness (cannot rotate)

Tail Empennage

1. Check rudder hinges for wear.
2. Check elevator hinges for wear.
3. Check rudder and elevator hinge bolts for tightness (cannot rotate)
4. Check rudder cables for wear at fairleads.

50-Hours Inspection

Engine and Fuel System

Check inspection items in accordance with the ROTAX manual.

Additionally:

1. Check rudder and aileron cables for wear and damage.
2. Check brake pads, brake disks and brake function.
3. Lubricate the nose leg bearings with a grease gun at the upper and lower grease nipples.
4. Check rudder cable tension, 25 to 35 kgf.
5. Check aileron cable tension, 18 to 24 kgf
6. Change the fuel filter.
7. Check stub axles. (OSB 18 refers)

100-Hour or Annual Inspection

Engine

Perform 50 hours checks in accordance with ROTAX manual.

Additionally:

1. Clean, grease and check security of ball joints on steering rods at foot pedals and operating bar of front wheel.
2. Clean, grease and check security of rod end bearings at stick torsion tube.
3. Clean grease and check freedom of throttle control; ensure that the cable cannot stick, even when closed slowly.
4. Clean, grease and check security of all ball and fork hinges at each aileron push rod end.
5. Check all hinges for excess play.
6. Check all lock nuts for proper installation; check 2 threads showing.
7. Check central and internal wing-mounted aileron bellcranks for freedom and security. Clean and grease bellcrank ball connections, and, if necessary, bellcrank bearings.
8. Check cross bolt and connections of elevator motion reversal lever for security and wear. (Mounted on rear fuselage).
9. Check bearing of reversing lever for wear and freedom. Clean and grease central bearing.
10. Clean, grease and check security of rod-end bearings of elevator push rods; tighten and Loctite locking nuts.

11.3 Jacking the Aircraft

Either of the main wheels can be brought clear of the ground by one person lifting the wing at the top of the wing struts. (Never apply any significant up load to the centre of the struts). The aircraft can then be chocked by placing a wooden block under the bottom part of the stub axle. This is also a suitable jacking point where a second person is not available to lift the wing.

The nose wheel is easily lifted by applying a load to the rear fuselage, just forward of the tail. Where one person only is available, place weights on the tail, suitably padded to prevent damage to the fabric, until the nose wheel becomes light. Place a piece of timber under the tail skid, then push the tail down on to it. Add further weights to the tail to stabilise the aircraft in this attitude.

11.3 Cleaning and Repair of the wing fabric

Cleaning

Clean the wing coverings with warm water and a mild detergent, such as washing up liquid, to remove oil. Never use solvents. All metal parts are anodized aluminum or stainless steel and need no special attention.

Dirt or mud on wing surfaces should be removed with clean water. Avoid the use of a pressure washer or hose pipe as this can introduce water into places it shouldn't go, (engine, fuel tank, pitot head, pilot's seat).

Repair

Repair even the smallest tears in the covering fabric.
Carefully clean the area around the tear, then attach a small patch with contact adhesive covering an area at least 15 mm larger than the damage all round. Alternatively apply a small patch of self-adhesive material. For larger areas of damage, consult the importers, Fly Buy Ultralights.

In the event of technical problems, contact FlyBuy Ultralights. Ltd.

SECTION 12 - WING RIGGING AND DE-RIGGING

12.1. Attaching the wings to the folding mechanism. (Optional).

The C-42 has an optional folding wing which minimises hangar space. For road transport however you must remove the wings completely. To attach the wings to the folding system:

Step 1. Fit the jockey wheel to the sterm post, fit the trangular wooden support brackets to the bottom of the tailplane struts, with the aluminium strip uppermost.

Step 2. Remove the stop ring from the slide tube in the cockpit roof.

Step 3. Place a wing parallel to the fuselage with its tip supported on the tail by the wooden support bracket.

(With both wings folded back and supported by the tail, the aircraft will rock back to sit on its tail. With only one wing on the tail, the aircraft can be tipped forward to a stable attitude resting on its nose wheel. Be aware of these movements during rigging and derigging operations. Take care to protect the wing from damage by contact with the ground).

Step 4. Lift the wing root and slide the attachment block (roller) 2 inches (5cm) over the slide tube.

Step 5. Attach the stop cable on the leading edge to the quick link on the slide tube.

Step 6. Attach the stop ring to the end of the slide tube.

If both wings are in the folded back position the C42 can be easily moved by one person into a small hangar space.

12.2 Rigging the wings

If you are tall but weak, it may be easier to manipulate the wing during rigging by holding it at its tip. If you are short and strong, the better handling point is the top of the wing struts. If you are short and weak, fetch a friend. If you are short, weak and friendless, don't derig.

Before attempting rigging, take a look at the wing roots and the way in which the rigging mechanism works. Note that the fulcrum (the roller bracket) is located near the wing root, and also in line with the rear spar attachment point. The front spar attachment point however is located some way inboard. This means that lifting the wing tip will reult in the front spar clearing its fitting before the rear one. This can be used to advantage during rigging.

Step 1. Ensure that the spar channels in the cockpit roof are aligned with the top surface of the cockpit roof frame. Lock the controls, place the flap lever in the fully up position and ensure the brake is on.

Step 2. Bring the left wing strut into its correct position on the left wing and attach the auxiliary (jury) struts on the front and rear wing struts to the leading and trailing edge fittings.

Step 3. If this is the first side to be rigged and the second wing half is still resting on the tail, lift the wing at its tip with one hand. With the other hand, steadily lift the tail so that the aircraft rests on its nosewheel.

Step 4. Carry the wing into its 90° position relative to the fuselage, taking care not to damage the door and fuselage with the front spar.

Step 5. Turn the wing into a horizontal position and push it gently towards the fuselage.

Step 6. Lifting the tip, slowly insert the wing roots into position in their channels, leading edge first. It may be necessary to gently rock and twist the wing to engage the spar hooks on to their pins.

Step 7. Ensure that front and rear wing spars are properly engaged in their channels. Then insert the lower end of the wing struts into the open box-section end at the top of the shock absorbers.

Step 8. Attach front wing bolt and safety pin, using the tool provided.

Step 9. Attach rear wing bolt and safety pin.

Step10.Attach the strut bolt through the box-section end and lower steel block of the wing struts ends. Install the safety pin.

Step11.Check that all three bolts have their safety pins installed.

Step12.As a final check, lift the wing at the wing tip to ensure proper attachment of the wing strut block to the box-section end.

Step 13.Connect the pitot tube to its fitting situated to the left of the pilot's headrest. Pull out the pitot tube forwards to its full extent.

Step 14.Repeat steps 1 through 12 for the other wing. Now you may remove the control lock.

Step15.Attach right and left aileron push rods to the central bellcrank connection. Carefully ensure that the slide mechanisms of the special link connectors are properly engaged (closed and locked).

Step 16.On the flap drive tube, take the split sleeve fitted around the sprung taper pins (and through which they protrude), spread it a little, then rotate it over the pins. Using this sleeve as an aid, squeeze it, thus compressing the pins. Then move the sleeve so that the drive fitting moves freely on its tube.

Step 17.Align the flap root tube and its drive fitting on the fuselage. Slide the flap drive fitting over the junction so that its cutaways engage snugly in the roots of the flap frame tubes and the sprung pins are fully out. Rotate the split sleeve so that its holes align with the tips of the pins again, permitting the pins to spring out fully. Left and right landing flaps must be securely locked and it may be necessary to wiggle the fitting a little to ensure proper engagement, particularly when the aircraft is new.

Step 18.Position and fasten the wing centre section (cockpit roof).

12.3 Folding the wings to hangar the aircraft:

Step 1. Apply the brake. Fit the dolly wheel to the stern post.

Step 2. Push in the pitot tube on the left wing.

Step 3. Remove wing centre section.

Step 4. Disconnect the pitot tube from its fitting above the pilot's seat back.

Step 5. Place a triangular wooden support bracket (supplied) on to the lower part of the tailplane strut at each side, with the aluminium strip uppermost.

Step 6. Set the flap control in its fully up position.

Step 7. Disconnect the landing flaps by first spreading and rotating the aluminium split sleeve on the flap drive fitting. Then push in the spring loaded pins by squeezing the split sleeve.

Step 8. With the trailing edge of the flap resting on your shoulder, squeeze the split sleeve with one hand and, holding the knurled ring in the other, push the assembly inboard until it clears the drive tube junction. Lower the flap gently.

Step 9. Unlock the aileron push rods from central bellcrank connections.

Step 10. Remove the keep rings from the front and rear spar pins and the lower strut pin, at each side, (total 6 rings).

Step 11. Unlock the strut block from lower box section end by removing the strut pin, using the special tool provided.

Step 12. Unlock the rear wing spar by removing its pin.

Step 13. Unlock front wing spar by removing its pin, hold down the top of the screen to prevent damage.

Step 14. Close the door.

Step 15. Lift the left wing at its wing tip, or strut tops, so that wing strut block leaves the square box-section end. By lifting the wing high you will first disconnect the front spar hook from its pin and frequently the rear spar at the same time. If the rear spar does not disengage, gently rock the wing from side to side, pulling gently and twisting it until it does.

Step 16. Pull out the wing until it stops on the stop wire. Ensure that the stop wire runs over the TOP of the aileron operating push tube before folding back the wing.

Step 17. Draw back the wing away from the fuselage until the movement is stopped by the stop ring on the slide tube.

Step 18. Rotate the wing into a vertical position - underside of the wing to the front; trailing edge down.

Always hold the wing tip higher than the root to prevent damage to the door and fuselage with the spars' ends.

Step 19. Carry the wing tip back into a position parallel to the fuselage. If the wing has been supported at the strut tops, it will be necessary to set it down and pick it up again by its tip for the next step. During this operation, ensure that the wing cannot tip forwards by walking your hands along the leading edge to the tip.

Note that the aircraft will tip back upon folding the second wing.

Step 20. Separate the Velcro for 2 or 3 inches (50 to 75 mm) along the aileron root at a point where the support bracket meets it.

Step 21. Place the wing trailing edge onto the retainer bracket on the tail.

Step 22. Remove the pin from the top of each jury strut.

Step 23. Rotate the jury struts carefully so that they lie parallel and next to each other.

Step 24. Undo the inboard zip on the wing's lower surface, adjacent to the jury struts.

Step 25. Fold in the main struts to lie flat against the lower wing surface. Secure the strut bottom with the bungee attached to the wing root.

Step 26. Fold back the right wing according to steps 1 to 25.

SECTION 13 - SETTING (RIGGING) AND MISCELLANEOUS DATA

13.1 Incident angle of wing with respect to main fuselage tube: 8°

Note: The incident angle is defined as the angle between a line parallel to the fuselage tube and a line joining the undersides of the leading and trailing edge tubes at their roots.

13.2 Angle of stabilizer with respect to the main fuselage tube: 7°

Note: The stabilizer angle is defined as the angle between a line parallel to the fuselage tube and a line joining the undersides of the leading edge and trailing edge of the stabilizer.

Angle difference between wing and stabilizer: 1°

13.3 Control Surface Deflections

Aileron Up 20 ±2° or 85 mm, ±9 mm measured 250 mm from the hinge axis.

Down 14° ±2° or 60 mm, ±9 mm measured 250 mm from the hinge axis.

Area 0,58 m^2 per side.

Elevator Up 30° ±3° or 205 mm ± 21 mm measured 410 mm from the hinge axis.

Down 20° ±3°. Or 140 mm ± 21 mm measured 410mm from the hinge axis.

Area 0.82 m^2 total

Rudder L/R 32° ±3° or 217 mm ± 21 mm measured 410mm from the hinge axis.

Area 0.44 m^2

Fin Area 0.61 m^2

Stabilizer Area 1,42 m^2 total

Flaps - 4.5° -15° - 42°
Relative to the fuselage tube.

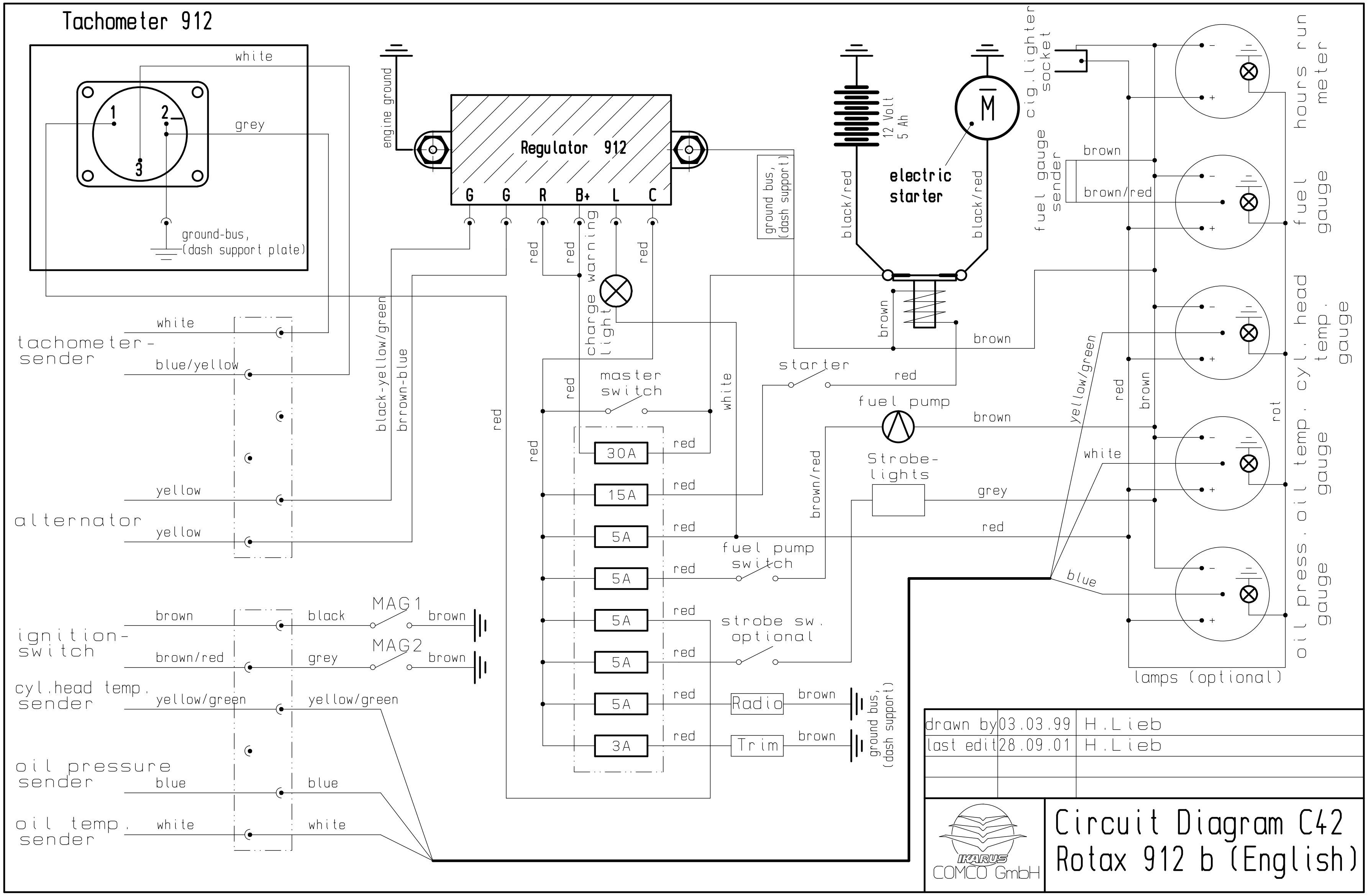
Area 0.46 m^2 per side.

Elevator Trim Tab Up 1 to 5º
Down 25º±3º (relative to elevator)

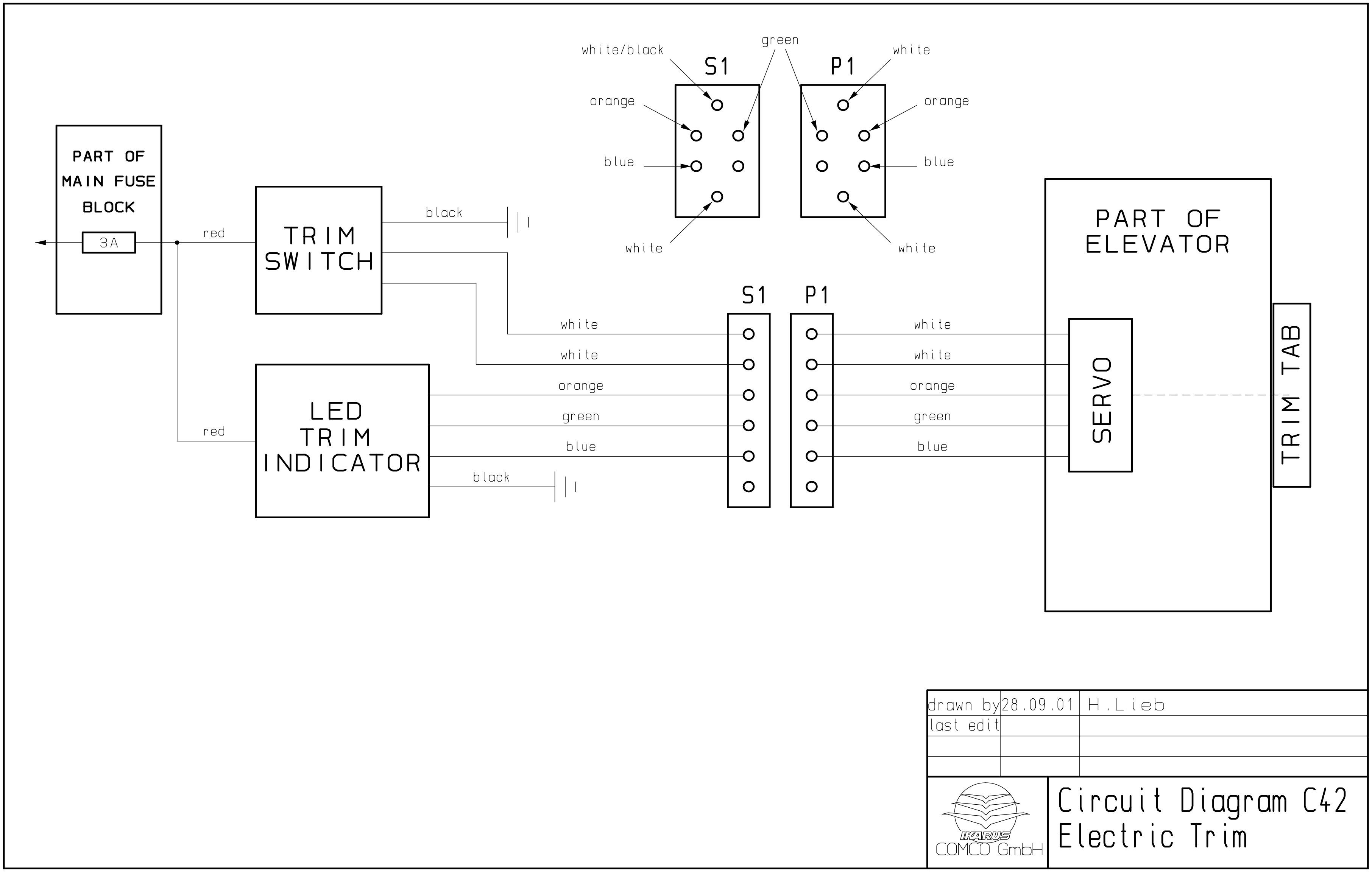
13.4 Air pressure for tyres and shock absorber:

Main wheels	1.5 bar	22 psi.
Front wheel	1.5 bar	22 psi.
Shock absorbers	29 - 33 bar	425 to 486 psi

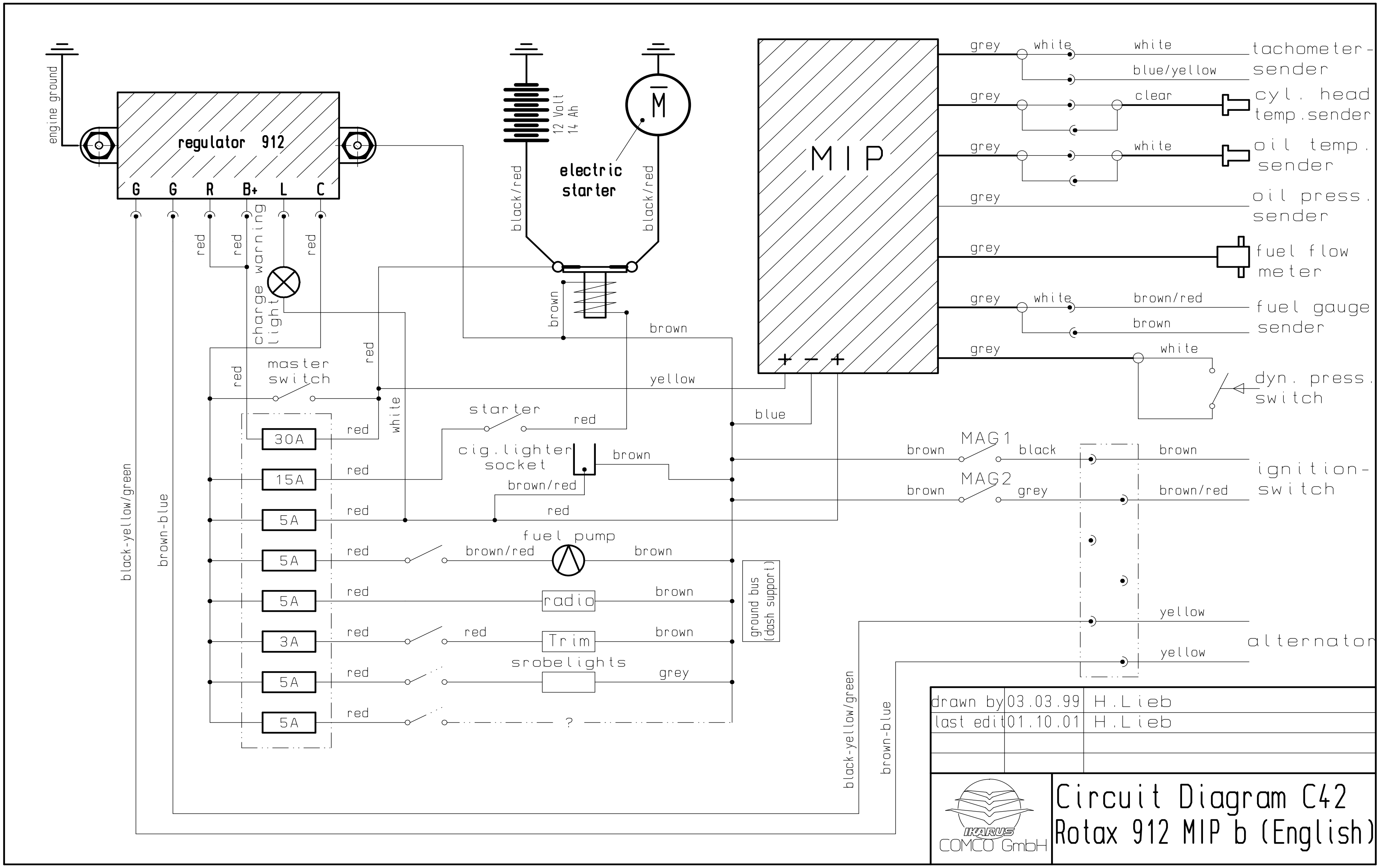
A special pressure pump, available from FlyBuy Ultralights, is used for setting the shock absorber pressures.



Circuit Diagram – Standard Installtion.



Circuit Diagram – Trim Tab



Circuit Diagram – MIP installation.