

## FRED SERIES 2 AND SERIES 3

Issue 3 Warning about VW prop hub added at section 12 dated 8.1.07

1. UK contact

Nil. Drawings available from the designer, Eric Clutton, 913 Cedar Lane, Tullahoma, TN 37388 USA

2. Description

The Fred (Flying Runabout Experimental Device) is a small single seat all-wood parasol monoplane, with fabric covered fuselage and flying surfaces. The wings are designed to fold for road towing. It is available in the form of a set of drawings for amateur construction. The Series 2 model is the original version released as a set of plans (to differentiate it from the original Series 1 prototype). The Series 3 is the latest plans set which differs in showing a controllable elevator trim tab, quick-release aileron controls, reduced span tailplane, optional swept forward undercarriage, optional dihedral and optional reserve fuel tank

The VW engine is standard, of between 1500cc and 1834cc capacity – 1834 cc being preferred for performance reasons. The Continental A65 engine has also been used, although giving better performance but at the expense of payload, due to the heavier engine weight. Despite its small size and light weight, all FREDs are SEP Aeroplanes, not microlights.

Alternative rounded or angular shape all-moving rudder designs are shown on the drawings. Due to poor directional stability with the all-moving rudder, an alternative arrangement with a fixed fin and conventional rudder (either rounded or angular type) has been cleared by the PFA, and is strongly recommended. Drawings of the fixed fin modification are available from the PFA.

3. Fast Build Kit 51% Compliance

Not applicable to plans built aircraft.

4. Build Manual

Nil. Construction drawing set provides all required information, consisting of the following:

Sheet	1	GA
	2	Wing Ribs
	3	Fuselage Basic
	4	Fuselage Detail
	5	Top Decking
	6	Rudder
	7	Tailplane
	8	Wing Assy and Spars
	9	Wing Root Fittings
	10	Engine Mount and Cabane
	11	Undercarriage
	12	Stick Assy
	13	Aileron Controls (fuselage)
	14	Aileron Controls (wings)
	15	Rudder Controls
	16	Elevator Controls (front)
	17	Elevator Controls (rear)
	18	Tailplane Fittings
	19	Flying Wires and Fittings
	20	Firewall and Fairing
	21	Fuel System

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22	Tailskid and Pitot
23	Rigging and Balance
24	Road Fittings
25	Optional Extra Fuel tank
26	Wing and Undercart Fairings
27	Cabane Bracing

5. Build Inspections

Build inspection schedule 1 (wood aircraft).

Inspector approval codes A-A or A-W. Inspector signing off final inspection also requires 'first flight' endorsement

6. Maintenance Manual

Nil. In the absence of a manufacturer's schedule, recommend using LAMS schedule.

7. Flight Manual

Nil. An information pack available from PFA Engineering includes details of flying characteristics.

8. Mandatory Permit Directives

None applicable specifically to this aircraft type, but note

MPD: 1998-019-R1 Flexible Fuel Tubing Applies to all aircraft

9. PFA Mandatory Modifications

Nil.

10. Service Bulletins

Nil

11. Standard Options

Angular or rounded shape all-moving rudder

Angular or rounded conventional rudder with separate fixed fin (recommended)

Increased max gross weight of 800 Lbs (subject to climb performance)

Swept forward main undercarriage for use with wheel brakes.

2 ½" Wing Dihedral

Reserve fuel tank (subject to weight considerations)

Controllable elevator trim tab

Firewall location moved to suit direct firewall-mounted VW engine, avoiding welded engine mount

12. Special Inspection Points

- With VW engine, design of conversion to be agreed with PFA Engineering as there is no standard design of VW conversion. 'Peacock' VW conversion drawings are available from PFA Engineering, but these drawings are now many years old and not all parts called up are still available. Dual ignition system (of an accepted type) required. PFA VW Engine Build checklist to be completed during build up of engine to record critical measurements. Refer to SPARS section

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on VW engines. Oil cooler will almost certainly be required, and careful ducting to achieve adequate cylinder cooling. Compression ratio must be set up (usually no more than 8.0:1) using choice of cylinder base shims if required. With 1834cc conversions, failing to use base shims usually results in excessively high compression ratio and consequent excessively short engine life.

- With VW conversion, if gravity feed is used, check gravity flow from downstream side of carburettor float valve (by removing float chamber bowl or float chamber drain plug) rather than at carburettor fuel inlet. If an automotive carburettor (eg Stromberg CD150) is used with gravity feed, the carburettor float valve is often found to provide inadequate or very marginal flow. This is because automotive carburettors are set up for use with a pump-fed installation not gravity feed. The fuel pressure from a pump allows a carb float jet of only about 1.5 mm diameter to be used, this restricts the flow too much with the much lesser fuel pressure in a typical gravity fed system. This is a common cause of lean running and engine failure. This is cured by fitting a larger diameter jet to the float valve, (typically 2.5 to 3mm diameter) or carefully opening up the existing jet and lapping it in with a household brass polish
- With VW engine, quality of fit of propeller hub on crankshaft nose is critical to security of propeller mounting in flight.

13. Operating Limitations and Placards

Maximum number of occupants authorised to be carried: One

The aircraft must be operated in compliance with the following operating limitations, which shall be displayed in the cockpit by means of placards or instrument markings:

## Aerobatic Limitations

- Intentional spinning is prohibited
- Aerobatic manoeuvres are prohibited

## Loading Limitations

- Maximum Total weight Authorised: 770 Lbs \*
- CG Range: 15 inches to 21 inches aft of datum.
- Datum Pointis: Leading edge of the wing

## Engine Limitations

- Maximum Engine RPM: 3300

## Airspeed Limitations

- Maximum Indicated Airspeed: 92 mph

## Other Limitations

- The aircraft shall be flown by day and under Visual Flight Rules only.
- Smoking in the aircraft is prohibited.

\* max gross weight may be increased to 800 Lbs subject to climb performance exceeding CS-VLA minimum requirement of 390 ft/min at max gross weight, standard day conditions.

## Additional Placard

“Occupant Warning - This Aircraft has not been Certificated to an International Requirement”

Fireproof identification plate must be fitted to fuselage, engraved or stamped with aircraft’s registration letters.

14. Additional Engine Limitations/Placards

With VW :                      Max CHT: 225C Max  
    EGT: 800C Max  
    Oil temp: 90C Max  
    Oil pressure Min 2.5 Kg/sq cm @3000 RPM

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15. Maximum Permitted Empty Weight

Fuel tank contents may vary slightly between examples so it is not possible to define a universal maximum empty weight. With full fuel tank, aircraft must be able to carry a pilot weighing 170 Lbs without exceeding max permitted gross weight.

16. Special Test Flying Issues

Satisfactory engine cooling  
Satisfactory climb performance

17. Control Surface Deflections

Ailerons	Up:	TBD degrees
	Down:	TBD degrees
Elevators	Up:	TBD degrees
	Down:	TBD degrees
Rudder	Left	TBD degrees
	Right	TBD degrees

18. Significant Airworthiness Approval Notes

PFA-029-198	VW 1834 engine, 770 Lbs max gross weight
PFA-029-198 Sup 1	VW 1834 engine, 800 Lbs max gross weight

Approved :



F.R. Donaldson  
Chief Engineer

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