

# MURPHY REBEL

## MAINTENANCE MANUAL

### Introduction

*This manual must be used in conjunction with:*

Engine operators manual

relevant propeller handbook

Murphy construction manual

Instrument manufacturers handbook

Stits polyfibre covering manual

*This manual is intended as a guide only.*

*Maintenance of an aircraft is a specialised business. If you have any doubts, seek the advice of a professional aircraft technician.*

### Description of aircraft

The Rebel is a metal, high wing, strut braced monoplane. Its construction is by riveted, stressed skin, semi-monocoque structures. Primary structural components are bulkheads and round corners of fuselage and spars, ribs and skins of wings.

Avex blind rivets are used throughout. Refer to build manual for details on installing and removing these fasteners.

Only factory supplied parts must be used for maintenance and repair.

# DESCRIPTION OF SYSTEMS/LUBRICATION FREQUENCY OF INSPECTIONS

## ■ PRIMARY CONTROLS

Full span flaperons, operated by a system of torque tubes and push rods, via bellcranks.

The elevator is cable operated from the control stick torque tube.

The rudder is cable operated from pedals.

The flaperons are drooped via a mixer arm controlled by a teleflex cable from the flap lever.

The trim tab is mounted on the elevator, and is electrically driven by a servo mounted in the elevator via a push/pull arm. The trim rocker switch is located in the cabin.

Light grease : usually a standard auto grease applied by a grease gun.

Light oil: an aviation standard lubricating oil /machine oil.

h = Hours	<b>CONTROLS</b>		P.F. = Pre flight +all insp.	
<i>Description</i>	<i>Checks</i>		<i>Lubrication</i>	
<b>Ailerons</b>	Damage/Free movement Deflection 15 ° down 20° up Hinge bolt-security minimum free play / taken up with addit. washers	P.F. 100 h P.F. 50h	Light oil/Grease	50h
<b>Elevator</b>	Damage/Free movement Deflection 25° down 25° up Hinges-hinge bolt security locking wire in place minimum free play	P.F. 100h P.F. P.F. 50h	Light oil/Grease	50h
<b>Rudder</b>	Damage/Free movement Deflection 25° L 25° R Hinges-hinge bolt security locking wire in place minimum free play	P.F. 100h P.F. P.F. 50h	Light oil/Grease	50h
<b>Flapperons</b>	Teleflex cable free throughout range. Clevis pins and locknuts secure	P.F. 50h	Light oil on folk ends	50h

Trimmer	Full range/warning lights operational/push tube free/fork end secure	P.F. 10h	Grease on fork end	50h
Pulleys	Alignment/Freedom Cable security	P.F.	Self lubricating	
Bellcranks in fuselage	Bolts/rod ends secure Locknuts secure	P.F. 50h	Bellcranks are sealed units. Light grease on Rod ends	50h
Pushrods	Full misalignment possible Free rotation/lock nuts secure	P.F.		
Control stick torque tube	Security, Cracking, Freeplay, Cable attach., Freedom	P.F.	Light oil/grease at horns carrying turnbuckles	50h
Rudder pedals	Flexing of floor/freedom	P.F.	Light oil/grease at moving surfaces	50h

## ■ WHEELS AND BRAKES

**JDM cast wheels with differential hydraulic disc brakes fed by an external reservoir, activated by toe pedals fixed to the rudder pedals. Refer to instructions and diagrams in build manual.**

<i>Description</i>	<i>Checks</i>		<i>Lubrication</i>	
Discs	Free of grease, bolt item 17 secure. Inspect for pitting/ deformation	P.F.	Clean with trichloroethane	50h
Callipers	Free movement to allow alignment	P.F.	Copper grease on shoulder bolts(BRK-8)	50h
Brake line/ reservoir	Damage/leaks/fluid level.	10h	<b>Use only auto. transmission fluid</b>	
Tyres	Damage, tread, inflation(acc ording to tire type) creep.	10h		
Axles/bearings	Damage/condition/retaining nut and split pin secure	50h	Light oil/grease on thrust washer	50h

## ■ TAIL WHEEL

Murphy designed unit, allowing break out facility. Solid rubber tyre, with steering yoke connected to rudder control horn via springs.

Direct control from rudder pedals. Unit is full swivel with a spring pin locking mechanism.

<i>Description</i>	<i>Checks</i>		<i>Lubrication</i>	
Wheel	Damage/bearing	P.F.	Light grease	10h
Yoke/swivel	Play/freedom	P.F.	Light grease	25h
Springs/pins/shackles	Security	P.F.	Light oil/Grease	50h
Main skid	Cracking/bending	P.F.		

## ■ MAIN UNDERCARRIAGE

Two versions exist

1/ Inverted V gear with suspension by shock cord and slider tubes. Correct tension of shock cord is achieved when there is slight movement in the system on a normal 3 point landing.

In Europe this system is only recommended for 912 powered lighter Rebels.

Bungees	Condition/tension	P.F.		
Slider tubes	Damage/wear*	50h	Light oil	50h
Safety Cable	Replacement	200h		

\* Mandatory Replacement 200h-Refer to service bulletin 090795 RB

2/ Cantilevered aluminium spring gear using press formed heat treated 7075 alloy legs.

Two independent legs are bolted through bearing plates to the main fuselage cage.

Axles are bolted to the legs via flat plate pattern.

Main gear attachment	Bolts torqued to 150in.lb./replace @ 200h area + bolts well lubricated to allow flexing	50h 100h
Floor/side skins	Deformation/cracking	50h
Major inspection	Jack aircraft and remove legs	200h

7075- One of the highest strength alloys available. It may be formed in the annealed condition and subsequently heat treated. Spot or flash welding can be used, although arc and gas welding are not recommended. Used where highest strength is needed.

**Life expectancy of main undercarriage attach bolts: when these bolts are adequately pre-loaded, the cyclic loading from normal operation (ex. taxiing over rough strips) is all but eliminated, therefore fatigue life is not a major factor.**

## ■ AIRFRAME

The Rebel is constructed from 6061-T6 aluminium in the bare state, and 6061-T6 seamless extruded tubing. Misc. other alloys are used in non-structural areas. 2024-T3 is used for some high stress parts and gussets.

6061-T6 has as its major alloying element, magnesium and silicon. It offers good mechanical properties and excellent corrosion resistance. It is solution heat treated, then artificially aged.

Checks on the airframe are limited to inspections for evidence of:

### ■ CORROSION

➔ **Surface corrosion:** This will occur if the airframe is not painted, but does not represent a problem in the short term.

➔ **Galvanic:** Where two dissimilar metals are in contact. Heavy use of epoxy primer or other means must be used to prevent contact. Symptoms are heavy white powder deposits.

➔ **Fretting:** Caused by abrasion of metal under load in a humid environment. All mating surfaces must be assembled wet (while epoxy primer has not had time to dry). Symptoms are heavy black deposits and streaking.

➔ **Filiform:** Corrosion occurring beneath paint in the form of random threadlike filaments.

### ■ CRACKING

Checks at 50h and 100h all major structural areas(refer to build manual). Any areas where light structures susceptible to flexing contact solid structures (bulkheads, gussets etc.), are areas where possible cracking can occur.

Black powdery dust is a good indication of a potential crack.

Lack of deburring of edges and holes also causes cracking by providing stress raisers.

### ■ TAILCONE

Area aft of solid bulkhead. This area is subjected to enormous loads during taxi and landing. Max. intervals of 50h for thorough inspection internally and externally of entire area. Look for signs of sheered rivet heads and skin deformation.

Ensure all factory modifications are installed to reinforce this area.

### ■ LIFT STRUTS

Aluminium airfoil section extrusion, with bolted fittings at each end. Struts must be allowed to breath internally.

Remove strut fairings every 50h, and check security of bolts and for signs of corrosion.

Internal corrosion can be prevented by pushing a rag soaked in 'Tube seal' down the strut.

## ■ LEVELLING , JACKING and TOWING

The lower door sill is used as the reference for levelling the aircraft. Jacking can occur from any of undercarriage hard points. Towing point is tailwheel main spring.

## ■ GROUND HANDLING

- 1/ Pushing forward/ backwards on lift struts.
- 2/ Pulling at centre of propeller.
- 3/ Tail can be steered when pushing backwards by placing hands either side of fuselage, gently holding extreme inboard leading edges of stabiliser, with tailwheel at full swivel.

➔ **Tie down points are lift strut/ wing fitting point, usually by way of an eye bolt substituted for a strut fitting bolt.**

## ■ WINDSHIELD

**Plexiglas formed windshield. This is a delicate material. Avoid contact with any alcohol, and follow manufacturers instructions on cleaning. Use only approved cleaning products.**

## ■ FABRIC

Refer to polyfiber manual.

## ■ PRIMARY AND SECONDARY STRUCTURES

Primary : Wings, fuselage, tail surfaces, undercarriage, lift frame, rear spar carrythrough, lift struts.

Secondary : Interior furnishings, floor structure, cowling, fairings, seats.

Refer to build manual

## ■ ENGINE

The Rebel can be fitted with a number of different engines. Each engine has specific requirements and schedules for maintenance and checks. Always refer to engine manufacturer's operators handbook.

**0-235 and 0-320 models.**

Engine mount	Cracking / damage / mounting bolts secure	50h
Rubber mounts	Compression / condition	50h
Oil system : Pipes/fittings Cooler/air entry screen	Leaks, chafing, Security, clean with compressed air	50h
Baffles	Cracking	50h
Carb heat box	Linkage/ratchet/operation	50h
Heat exchangers	Secure/ no poss. of CO <sub>2</sub> contamination	50h

## ■ PROPELLER

**Murphy recommend the fitting of Sensenich metal propellers.**

Blades	Cracking / impact damage. Spinner security.	10h
Bolts	Torque settings / locking wire.	50h
	Major overhaul. Strip paint, crack test, rework leading edge, paint	200h

## ■ FUEL SYSTEM

The fuel tanks in the Rebel are mounted in the wing roots, as a wet wing system. Tank is first assembled with all joints sealed with P.R.C. The tank should then be sloshed with a suitable sloshing compound such as P.R. 1005L.

Both tanks feed the carburettor via a gascolator, with water drains fitted in the wing, and an internal finger strainer in the tank.

A cross venting tube connects the tanks across the cabin ceiling.

If a electrical fuel pump is fitted, this must have a bypass tube or fail allowing uninterrupted flow.

Fuel pump	Operation-as per manufacturers instructions	10h		
Fuel tanks	Flush /clean filters	200h		
Fuel line	Damage/kinks/perishing	50h	Replace annually*	
Fuel cap	Check breather	10h		
Gascolator	Clean screen/drain	50h		

\* if plastic or light flexible

## ■ BATTERY

The Battery is usually positioned at a suitable point in the aft fuselage due to weight and balance considerations. Check the mounting regularly, usually fixed to the aft cargo floor.

### ALL 50 HOUR CHECKS

Battery	Connection/security/corrosion
Charging	Min. 14 volts.
Alternator	Drive belt tight/ mountings secure
Connectors	Tight/corrosion/chafing of cables/intact