

DESCRIPTION OF AIRCRAFT

AIRFRAME

Conventional strut and wire braced biplane of fabric covered all metal construction. Fuselage is constructed using 6061-T6 aluminum tubing with custom extrusions. All fuselage members are riveted with AVEX and stainless steel blind rivets. Both wings are constant NACA 23012 Airfoil sections. Sweepback of 10 degrees on upper wing only. Dihedral of 3 degrees on lower wing. Angle of incidence for both wings is 4 degrees. Front spars of rectangular 3 1/2" x 1 1/2" extruded 6061-T6 aluminum tubing; rear spars of C section 2024-T3 aluminum alloy; stamped 2024-T3 ribs. N type cabane structure and I type interplane struts; Friese type interplane struts; Friese type ailerons standard on all four wings. No flaps. Conventional wire braced tail unit.

LANDING GEAR

NON-RETRACTABLE TAIL-WHEEL TYPE LANDING GEAR. Low pressure 600-6 tires on main wheels, carried on side V's and half-axles with shock chord type shock absorption. Options include high profile, all terrain tires for added propeller clearance and rough field operation and fiberglass wheel pants.

ACCOMMODATION

Two people in tandem in open cockpits. Wind screen for front cockpit and small head fairing behind rear cockpit. All models are standard with dual stick controls. Brakes in rear cockpit only.

GENERAL

FLIGHT CONTROLS

Manually operated through mechanical linkage using a Joy Stick for the ailerons and elevator. Rudder pedals control the rudder by cables.

TRIM SYSTEM

Optional, manually operated of major structural damage for whatever reason, do not hesitate to consult your nearest dealer or the factory, depending on where you purchased your aircraft, for GENUINE MURPHY AIRCRAFT parts and supplies.

CLEANING

WINDSHIELD

Use only specially designed aircraft cleaners. NEVER USE gasoline, benzine, alcohol, acetone, carbon tetrachloride, lacquer thinner or glass cleaner to clean plastic windshields. Follow by carefully washing with mild detergent and plenty of water. Dry with clean chamois. DO NOT RUB plastic with a dry cloth since this builds up an electrostatic charge which attracts dust. Wax with a good commercial wax to finish. Polish with a soft flannel cloth.

PAINTED SURFACES

Wash with water and mild soap, rinse with water, and dry with soft clothes or chamois. Wax with good automotive wax. More wax on leading edges of wings and tail as well as engine cowling, propeller and spinner will ensure extra protection for these abrasion encountering areas.

AIRPLANE INSPECTION PERIODS

AS WITH ANY PRECISION MACHINE, your new MURPHY AIRCRAFT will take good care of you in the air as long as you take good care of it on the ground. One thing you will appreciate is that your MURPHY aircraft was designed to last a long time. However, there is no substitute for regular preflight and post flight inspections as well as preventative maintenance when it is needed.

LOG BOOKS

The best way to record and track the hours-of-operation on your engine and airframe is by accurate documentation in log books. It's a good idea to keep three books; airframe, engine and journey logs. Some pilots combine airframe and journey logs. Others combine all three, depending on local regulations act accordingly. The main point is that the aircraft history of airframe, repairs or modifications are documented so that inspections are on time and in order.

FIRST 10 HOURS

Considered as a general shake down of engine and airframe. Refer to test flying program. Adjust and tune for balance and trim. Be sure your fuel filters are clean.

FIRST 50 AND EVERY 100 HOURS AFTER

Close inspection of all components including nuts, bolts, bushings, cables, pins, tubes, bearings, hinges etc.. Service the engine in accordance to the engine manufacturers recommendations. Due to vibration during normal operation, it is important to inspect all engine mount welds, welds, fluid levels, throttle cables, fasteners, hose clamps, electric wires, exhaust system, fuel and air filters, and fuel valves. Clean and dress any nicks in propeller. Ensure balance and tracking are correct. On landing gear, remove wheels, inspect axles and bearings. Ensure bungs are tensioned properly inspect hinge bolts for wear. Ensure tire inflation is correct. After any repairs or modifications enter work completed into the airframe log and have it signed off by the mechanic. If in doubt about your own capabilities, consult professionals. A certified aircraft maintenance engineer may cost more but for any technical repairs or consultation, it could be a wise investment. In the event

INSTRUMENTS

Minimum Recommendations

FLIGHT INSTRUMENTS

- Airspeed
- Altimeter
- Compass

ENGINE INSTRUMENTS

- Tachometer
- C.H.T.
- Water Temp

GROUND CONTROL

Effective ground control while taxiing is accomplished though tail-wheel steering by using the rudder pedals. Left rudder pedal to steer left and right rudder pedal to steer right. Applying the brake will decrease the turning arc dramatically.

If brakes are not installed it is recommended to move the aircraft by hand to the take off area. This is best accomplished with two people pushing from behind on the interplane struts. If alone you may pull on the propeller near its root or lift the inboard leading edge of the horizontal stabilizer and pull.

SEATING - FORE AND AFT

SEAT BELTS

Lap and shoulder harness, front and back.

ENGINE

The Renegade II line of aircraft are powered by the Rotax 503 air cooled two cylinder, two stroke, single ignition or optional dual ignition engine. The single carburetor version is rated at 48 H.P. at 6250 R.P.M. The dual carburetor version is 53 H.P. @ 6500 R.P.M. The Spirit models are powered by the Rotax 582 liquid cooled two cylinder two stroke, dual ignition, oil injected engine. The engine is rated at 66 H.P. @ 6500 R.P.M.

The optional Rotax 912 four cylinder, four stroke is also used in the "Spirit" model. This engine incorporates liquid cooled heads with air cooled cylinders. It is rated at 80 H.P. @ 5500 R.P.M.

PROPELLER

The airplane is equipped with a two blade, fixed pitch, (or optional two and three blade ground adjustable) laminated wood propeller which is varnished.

FUEL SYSTEM - (Standard)

Fuel is stored in aluminum (wet) tanks, one located in each upper wing, 6 U.S. gallons per tank. Fuel flow by gravity through water separator to fuel pump to carburetor.

ELECTRICAL SYSTEM

The two-stroke Rotax engines are equipped with a Bosh magneto generator of 12 volts and 140 watts alternating current. Direct current operation requires installation of optional regulator rectifier. The Rotax 912 four stroke 80 H.P. comes standard with regulator rectifier and generates 250 watts at 12 volts direct current.

SPEEDS FOR NORMAL OPERATION

Unless otherwise noted the following speeds are based on a weight of 850 pounds and may be used for any lesser weight. The Rotax 582 - 64 H.P. is used as an example and air speeds are true.

TAKE OFF

Normal climb out: 60-70 MPH

Short field take off: 40 MPH

CLIMB

Best rate of climb, sea level: 60 MPH

Best rate of climb, 10,000 feet: 55 MPH

Best angle of climb sea level through 10,000 ft: 55 MPH

LANDING APPROACH

Normal approach: 55 - 65 MPH

Short field approach: 45 - 50 MPH

Maximum demonstrated crosswind velocity: 18 MPH (lower ailerons only)

Never exceed speed (VNE): 120 MPH

DITCHING

It is a good tendency to avoid flying single engine aircraft outside of gliding distance to a safe landing area. New reliability in engines and higher cruising speeds has sent many pilots venturing over mountains, forests, cities, large bodies of water and snow without consideration for emergency landings.

WATER LANDING WITH POWER

- a) Radio-transmit mayday on 121.5 Mhz giving location and intentions.
- b) Heavy objects: secure or jettison.
- c) Approach: High winds heavy seas; into wind. Light winds and swells; parallel to swells.
- d) Power: establish 200 ft/min descent at 45 MPH.
- e) Canopy: unlatch (if applicable).
- f) Touch Down: Tail low attitude at 200 ft/min descent.
- g) Face: cushion at touch down with coat or pad.
- h) Airplane: evacuate.

WATER LANDING WITHOUT POWER

SAME AS ABOVE EXCEPT:

- a) Set up descent at best glide speed.
- b) Level out just above water.
- c) Burn off excess speed and land at minimum speed.

OPERATION CHECKLIST

ENGINE FAILURES DURING TAKE OFF RUN

- a) Throttle: idle.
- b) Brakes: apply.
- c) Ignition: off.
- d) Master: off.
- e) Remove from runway and inspect.

IMMEDIATELY AFTER TAKEOFF

- a) Lower attitude of nose to maintain airspeed of 55-60 MPH.
- b) Maintain control.
- c) Fuel, ignition and master off (if time permits).
- d) Land straight ahead if possible.

DURING FLIGHT AND FORCED LANDING

- a) Airspeed (best glide) 60-65 MPH.
- b) Set up approach for field noting wind direction and velocity.
- c) Fuel on.
- d) Magnetos on.
- e) Attempt restart (if time permits).
- f) If it does not restart turn fuel off and ignition master off.
- g) Pick your spot and fly over it if possible at 1000 ft, crosswind and join down wind for regular circuit, remember you can always get rid of altitude if necessary, but you can't get it back, so plan on coming in high on your final and slipping down to your target, landing on all three wheels, keep elevator full up and apply brakes heavily while keeping straight.

PRECAUTIONARY LANDING

SAME AS SOFT FIELD LANDING.

CHECKLIST

It is recommended to make up and use checklists. Try using a word that's easy to remember and each letter stands for a check procedure. A good example in English would be the word "CIGAR" for pre take off check of aircraft:

- C CONTROLS (free and correct)
- I INSTRUMENTS (in the green and set) radio on.
- G GAS ON (quantity sufficient for flight, plus reserve)
- A ATTITUDE Trim (set)
- R RUN UP (listen to engine, watch temperature)

By using a word base for your checks your memory will be jogged. It is also a good habit to print out a total checklist for the dash or keep a card on board within the pilot's reach.

PRE FLIGHT INSPECTION

VISUALLY CHECK AIRPLANE for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris.

1. CABIN

- a) Control stick lock: REMOVE.
- b) Ignition switch: OFF.
- c) Fuel quantity indicators: CHECK QUANTITY.
- d) Master switch: OFF.
- e) Fuel shut off valve: ON.

2. EMPENNAGE

- a) Rudder gust lock: REMOVE.
- b) Tail tie-down: DISCONNECT.
- c) Control surfaces: CHECK freedom of movement and security.
- d) Tail wheel and control linkage: INSPECTED.

3. RIGHT WINGS

STARTING AT TRAILING EDGE

- a) Aileron: CHECK freedom of movement and security.
- b) All clevis pins and turnbuckles: SECURE.
- c) Wing tie-down: DISCONNECT.
- d) Before first flight of the day and after each refuelling, check for water, sediment, and proper fuel.
- e) Fuel quantity: CHECK VISUALLY for desired level.
- f) Fuel filler cap: SECURE.
- g) Main wheel tire: CHECK for proper inflation.

4. NOSE

- a) Engine oil level: check if applicable.
- b) Engine mounts: check welds for visible cracks. Check all bolts are secure, shock rubbers are good.
- c) Carburetor and throttle cables: secure, not worn out and air filter clean and tight.
- d) Exhaust: secure and free of cracks, check tail pipe for light brown colour. If colour is white or grey it is possible engine is running too lean or hot. If black or dark brown, engine could be running too rich. Refer to engine manual for more information.

- e) Electric & Spark Wires: secure.
 - f) Fuel filter or strainer: free and clear.
 - g) Cooling system: secure and full as applicable.
 - h) Make certain Magneto switches are off and always treating engine as being live, it is good practice to pull engine through with the prop. Many engine irregularities can be detected in this manner; compression, gearbox, prop, etc.
- h) Remember to always start your take off run at the very start of the runway. If full R.P.M. are not achieved, abort take off. Treat every take off with respect, realizing that the sooner you get to altitude, the safer you are. Get off fast and climb at best rate turning crosswind as soon as you consider you couldn't make a safe emergency landing straight ahead. Keep your downwind close and within gliding distance. If at your own private strip circle to gain altitude while monitoring engine temp and R.P.M.

Remember altitude and airspeed are your best friends.

AIRSPEEDS FOR EMERGENCY OPERATION

Engine failure after takeoff: 60 MPH.

Maximum Glide: 60-65 MPH.

Precautionary landing with engine power: 50-60 MPH.

Landing without engine power: 55-60 MPH.

EMERGENCY PROCEDURES

INTRODUCTION

Emergencies caused by airframe or engine malfunctions may be significantly reduced or eliminated with proper pre-flights. Emergencies can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered. However, should an emergency arise the basic guidelines should be considered and applied as necessary to correct the problem.

GENERAL RECOMMENDATIONS FOR EMERGENCY PREVENTION

- a) Hangar or cover your aircraft and maintain engine, airframe and pilot logs.
- b) Drain old fuel and replace with fresh fuel. Spoiled auto fuel will varnish your cylinders and cause rings to tick. The hotter the weather, the faster fuel will deteriorate. Check operation of valves and drain and clean float bowls as well, being sure they are replaced correctly.
- c) Run engine regularly, if possible. For long periods of down time, store engine in accordance with manufacturers recommendations.
- d) Follow your maintenance schedule and replace all parts within specified periods or when they show signs of wear.
- e) Keep current. If you don't fly for any extended period get a checkout and some tips from a professional instructor. You'll be surprised how much you will learn.
- f) Carry and use checklists or make key words like 'CIGAR' to jog your memory.
- g) Use a landing strip that matches your skill level and judgment. Avoid one way and uphill strips if possible.

5. LEFT WINGS

STARTING WITH LEADING EDGE

- a) Before first flight of the day and after refuelling, use sampler cup and drain small quantity of fuel from the gasolator to check for water, sediment and proper fuel.

- b) Fuel quantity: CHECK VISUALLY for desired level.
- c) Fuel filler cap: SECURE.
- d) Pilot tube cover: REMOVE and check opening stoppage.
- e) Fuel tank vent opening: CHECK for stoppage.
- f) Wing tie-down: DISCONNECT.
- g) Aileron: CHECK freedom of movement and security.
- h) All clevis pins and turnbuckles: SECURE.
- I) Main wheel tire: CHECK for proper inflation.

REMEMBER... Engine and airframe log books are a very important source of information for yourself, your mechanic and future owners. Update regularly, and when you have regular inspections and maintenance performed.

BEFORE STARTING ENGINE

- a) Preflight inspection: COMPLETE.
- b) Seats, belts, shoulder harnesses: ADJUST and LOCK.
- c) Fuel shut off valve: ON.
- d) Radios, electrical equipment: OFF.
- e) Brakes: TEST and SET.

STARTING ENGINE

- a) Master switch: ON.
- b) Prime: AS REQUIRED (2 to 6 strokes; none if engine is warm).
- c) Throttle: OPEN 20%.
- d) Propeller area: CLEAR.
- e) Ignition switch: START (release when engine starts).
- f) Pull cord briskly if not equipped with electric starter.

TAXING

WHEN TAXIING, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (see taxiing diagram) to maintain directional control and balance.

BEFORE TAKEOFF

- C** CONTROLS free and set.
- I** INSTRUMENTS set.
- G** GAS on and sufficient.
- A** ATTITUDE trim set.
- R** RUN UP. Refer to engine manual.

TAKE OFF

If you are not comfortable with taildraggers, a good investment would be some checkout time at a local F.B.O. or from a friend whom you consider to be competent.

AFTER THE FIRST 10 HOURS

OBJECTIVES

- a) General shake down of engine and airframe.
- b) Survey of engine temperatures and vibration variations at various R.P.M..

- c) Test performance from low to full throttle flight.
- d) Calibrate flight instruments and document actual performance figures.
- e) Establish cross wind capabilities.
- f) Stability tests for pitch roll and yaw. Note: test pilots should take care to sort out actual problems from perceived problems which are a result of unfamiliarity. The Renegade II and Spirit Biplanes are considered sport aircraft and have been designed for quick handling and maneuverability.

BEFORE LANDING

(down wind check)

- a) Seats, belts, harness adjust and lock.
- b) Check for traffic.
- c) Check for wind velocity and direction.
- d) Brief passenger to ensure security of belts and hands and feet are clear of controls.
- e) Re-check fuel is on and adequate.
- f) No loose objects to jam controls.

APPROACH

CONSIDER that most landings are usually only as good as the approach. Try to master your glide for every different wind condition. That way, should you ever have a forced landing due to an engine failure you will be prepared. Set up glide from the time you turn base leg (if possible) and concentrate on landing on the numbers (threshold) of the runway. Cycle the throttle to avoid loading up engine. The second you realize your short add power accordingly. Should you realize you are high, start your slip immediately, keeping your target in mind. If you are not current on side slips get some altitude and practice keeping constant airspeeds between 60 and 65 MPH and straight line ahead. The closer you land to the numbers the better you know yourself and your aircraft. Low and slow power on approaches should be practiced down the runway.

LANDING

NORMAL

- a) Airspeed 55-60 MPH.
- b) Level out in ground effect.
- c. 3 point touch down.
- d) Keep elevator full up and applicable aileron up into wind after landing.
- e) Refrain from braking until slowed down unless necessary.

TEST FLIGHT PROGRAM

IT IS STRONGLY RECOMMENDED that you follow this program as closely as possible to ensure that all risks are kept to a minimum. Almost 50% (972) of all amateur built aircraft accidents between 1980 and 1987 in the USA occurred within the first 40 hours of the flight test phase.

- a) COMPLETE VISUAL INSPECTION, first by builder, then by two other qualified individuals.
- b) COMPLETE INSPECTION by test pilot. If you are not experienced with testing aircraft either get the knowledge by a checkout or hire someone who is qualified. A volunteer with no documented experience could be the end to your project. A great deal can be learned from the sound of the engine at various R.P.M., the feel of the controls, the response to the

throttle and the design operational data as compared with actual performance data. By having the test pilot inspect the aircraft in the shop you could save a lot of time in modifications at the airport.

- c) THE AIRPORT: Generous runway length and width, abundance of clear space, radio or telephones, private as possible with light activity and light winds. If it is necessary to disassemble the aircraft for transportation, it is desirable to obtain a hanger to reassemble and prepare for flight.

Remember... "road rash" can ground you — so pad and tie diligently for maximum protection prior to transport.

- d) SECOND INSPECTION by builder and support team.
- e) ENGINE RUN UP AND BREAK IN should be done strictly in accordance with engine manufacturers instructions. This should be done in an area well away from other aircraft, buildings and people with the aircraft tied down securely. Someone else should be present to check for leaks and loose parts. Monitor temperatures, gauges and R.P.M. carefully. Be sure they are within proper limits. If it gets too hot shut it off immediately.

SECURING AIRPLANE

- a) Radios, electrical equipment: OFF.
- b) Ignition switch: OFF.
- c) Master switch: OFF.
- d) Fuel: OFF.
- e) Control locks installed. Tie-downs: 3 POINTS SECURED, NOSE INTO PREVAILING WIND, IF POSSIBLE.

POST-FLIGHT INSPECTION

It is strongly recommended after each flight to ensure the aircraft is airworthy and safe for its next journey. Preventative maintenance on all aircraft is imperative. **FIX IT BEFORE IT FAILS!**

FIRES

1. ON GROUND, RUNNING

- a) Fuel: OFF Power - 30% for a short time. (Which should probably suck the flames and accumulated fuel through the carburetor and into the engine).
- b) Extinguisher ready.
- c) Engine: Shut down and inspect.

2. DURING START

- a) Continue cranking for start.
- b) Extinguisher ready.
- c) Engine: secure.
 - c.1) Master: OFF c.2) Ignition: OFF. c.3) Fuel: OFF
- d) FIRE: Extinguish using extinguisher, wool blanket or dirt.
- e) Inspect and repair.

3. IN FLIGHT, ENGINE

- a) Fuel valve: OFF.
- b) Master switch: OFF.
- c) Cabin heat: OFF.

- d) Airspeed: 85 MPH (or faster if necessary).
- e) Forced Landing: Execute as described in power off forced landing.

4. IN FLIGHT, ELECTRICAL

- a) Master switch OFF.
- b) All other switches (except ignition): OFF.
- c) Vents, cabin air & heat: OFF.
- d) Fire extinguisher: ACTIVATE (if necessary), WARNING: After discharging an extinguisher within a closed cabin ventilate cabin.

IF FIRE IS EXTINGUISHED

If fire appears out and electrical power is necessary for continuance of flight:

- a) Master: ON.
- b) Circuit Breakers: CHECK FOR FAULTY CIRCUIT, DO NOT RESET.
- c) Radio/Electrical switches: ON one at a time, with delay after each until short circuit is located.