

PILOTS OPERATING MANUAL

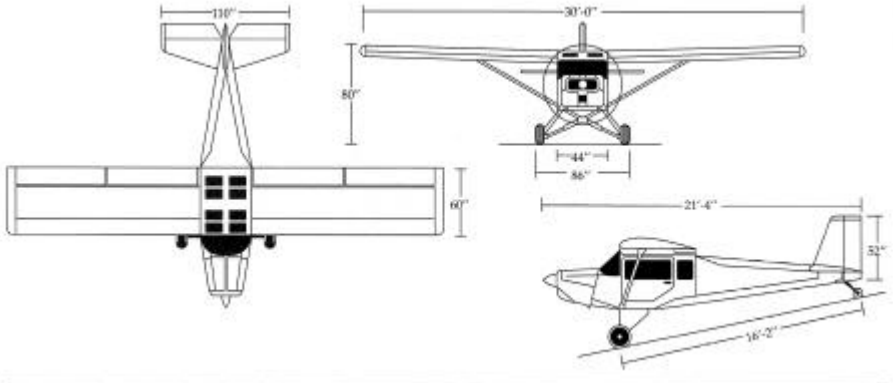
0-320 MURPHY REBEL

This manual is intended as a guide only. Amateur built aircraft vary a great deal in their construction standard, equipment and handling. If you intend to fly any aircraft with which you are unfamiliar *you must undertake a thorough checkout with a suitably qualified pilot.*

This manual refers specifically to the Murphy Rebel cabin monoplane, with tailwheel undercarriage and powered by the Lycoming 0-320E2D 150 h.p. 4 cycle aeroengine.

All information is given assuming a factory standard Rebel with no modifications.

KIT No.



■ SECTION 1

➔ LIMITATIONS

This aircraft must be operated only for V.F.R. day flights.
This aircraft is not approved for aerobatics or spins.

① ENGINE

AVCO LYCOMING 0-320 E2D.

Max. continuous r.p.m. and take off : 2700

Max. oil temp.: 245° F (118° C) desired 180° F (82° C).

Propeller - Sensenich 2 blade metal propeller, 74 diam. 56 pitch. These are fixed pitch propellers and care must be taken not to red line the engine in a dive.

② FUEL

Aviation grade 100LL.

Usable fuel 35 Imp Gals. / 159.25 Lts.

③ INSTRUMENT LIMIT MARKINGS

Oil Temp.

Caution range 50 to 100° F

Normal operating range 100 to 240° F

Oil pressure

Idle 25 p.s.i.

Caution 10 to 30 p.s.i.

Normal operating 60 to 90 p.s.i.

max. start and warm up 100 p.s.i.

Tachometer

Normal operating range 2000 to 2700 r.p.m.

Max. 2700 r.p.m.

Cylinder head temp.

Normal 200 to 460° F

Max. 500° F

④ AIRSPEED LIMITATIONS

Arc colour	KTS	M.P.H.	Operating range
White arc	40-70	44-80	Full flap operating range
Green arc	50-110	60-125	Normal operating range
Yellow arc	110-131	125-151	Operate with caution, only in smooth air
Red line	131	151	NEVER EXCEED

Speed	KTS	M.P.H.	Remarks
Never exceed V_{ne}	131	151	Do not exceed
Max. structural cruising V_{no} or V_c	110	125	Do not exceed except in smooth air.
Manoeuvring V_a	95	110	no full or abrupt control movements above this speed.
Max. flap ext. V_f/V_{fe}	70	80	No flaps above this speed.

⑤ POSITIVE MANOEUVRING LOAD FACTORS AT 1650lb. 3.8

⑥ CENTRE OF GRAVITY

Datum line = leading edge of wing

Basic distances : Pilot/passenger 15"

Baggage 45"

Fuel 23"

Theoretical forward center of gravity limit for the modified 4415 airfoil is 7.7" A.O.D., however testing has revealed that 10.85 (20% MAC) is more practical.

Forward limit = 10.85" A.O.D.

Aft limit = 18.10" A.O.D.

To determine empty weight centre of gravity:

1/ Place aircraft in level flight attitude, with a suitable scale under each wheel.

2/ Record weight on each wheel.

3/ Measure the distance from main wheel centre to tail wheel centre, 90° to main axle.

$$\frac{\text{Tail weight} \times \text{Distance(moment) to tail wheel}}{\text{Total weight}} = \text{Empty weight C of G}$$

Sample loading:

	<u>Wt. x Location</u>	=	<u>inch - lbs</u>
Pilot & Pass.	380 lbs. @ 15"	=	5700
Baggage	100 lbs. @ 45"	=	4500
Empty Weight	823 lbs. @ 9.86	=	8115
Fuel (35 imp. gal.)	<u>264 lbs. @ 23"</u>	=	<u>6072</u>
	= 1567		= 24387

$$\text{Loaded C of G} = \frac{24387}{1567} = 15.56" \text{ A.O.D.}$$

⑦ WEIGHTS

➔ Asuming standard conditions:
 15°C,dry,hard,flat runway, press/alt 10ft.
TAKE OFF ROLL.....300ft.
LANDING ROLL.....400ft.
50ft. OBSTACLE.....500ft.

Max. Take off weight 1650lbs.

Empty weight 950lbs.

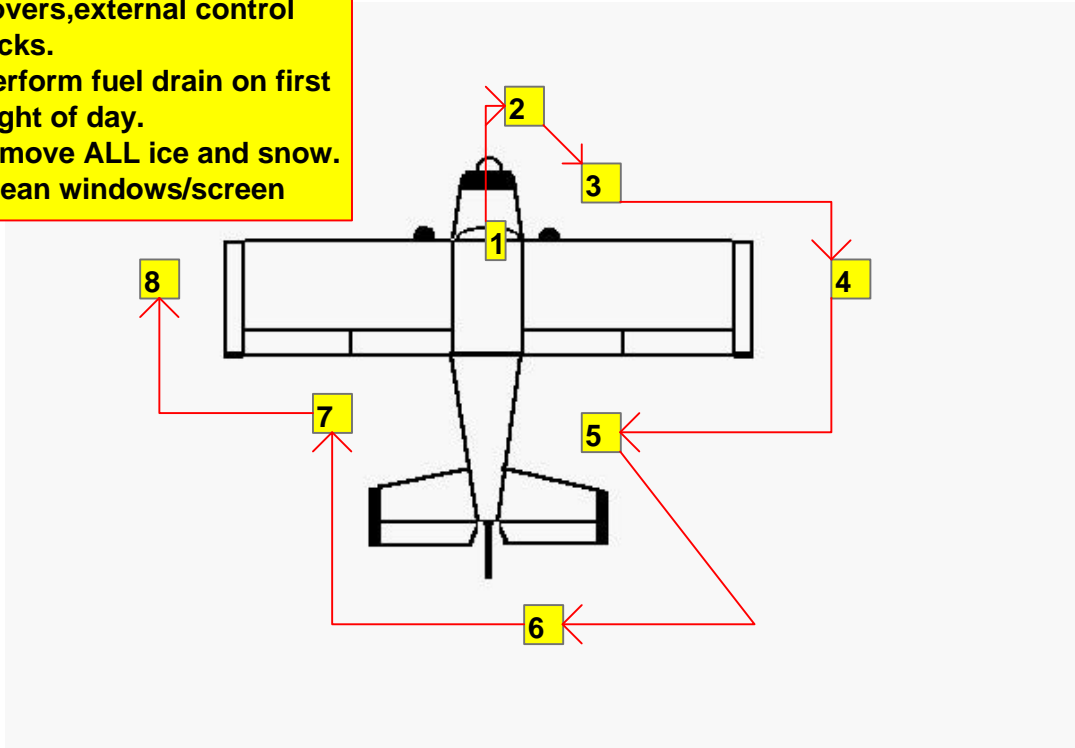
Useful load 700lbs.

SECTION II

➔ NORMAL PROCEDURES

① PREFLIGHT INSPECTION

Remove Tie downs, pitot-covers, external control locks.
Perform fuel drain on first flight of day.
remove ALL ice and snow.
Clean windows/screen



1 COCKPIT

- a) Control locks (if fitted) removed.
- b) Magneto switch OFF keys out.
- c) Master switch ON.
- d) Check strobes, landing light, fuel gauges, nav. lights, and electric trim at neutral (green).
- e) Master Switch **OFF**.
- f) Operate flapperons through range. Leave at first setting.
- g) Fuel taps both ON.
- h) First aid kit and fire extinguisher in place.
- i) Req. documents on board.

2 ENGINE + NOSE

- a) Static vent clear.
- b) Cowling secure, intake clear, landing light.
- c) Propeller leading edge & spinner condition.
- d) Oil contents not less than 4 quarts.
- e) Fuel strain.

3 UNDERCARRIAGE

- a) Condition of tyre, inflation, creep and tread.
- b) Hydraulic lines - no leaks.
- c) Condition of disc brakes.
- d) Tailwheel - condition, spring undamaged, secure.

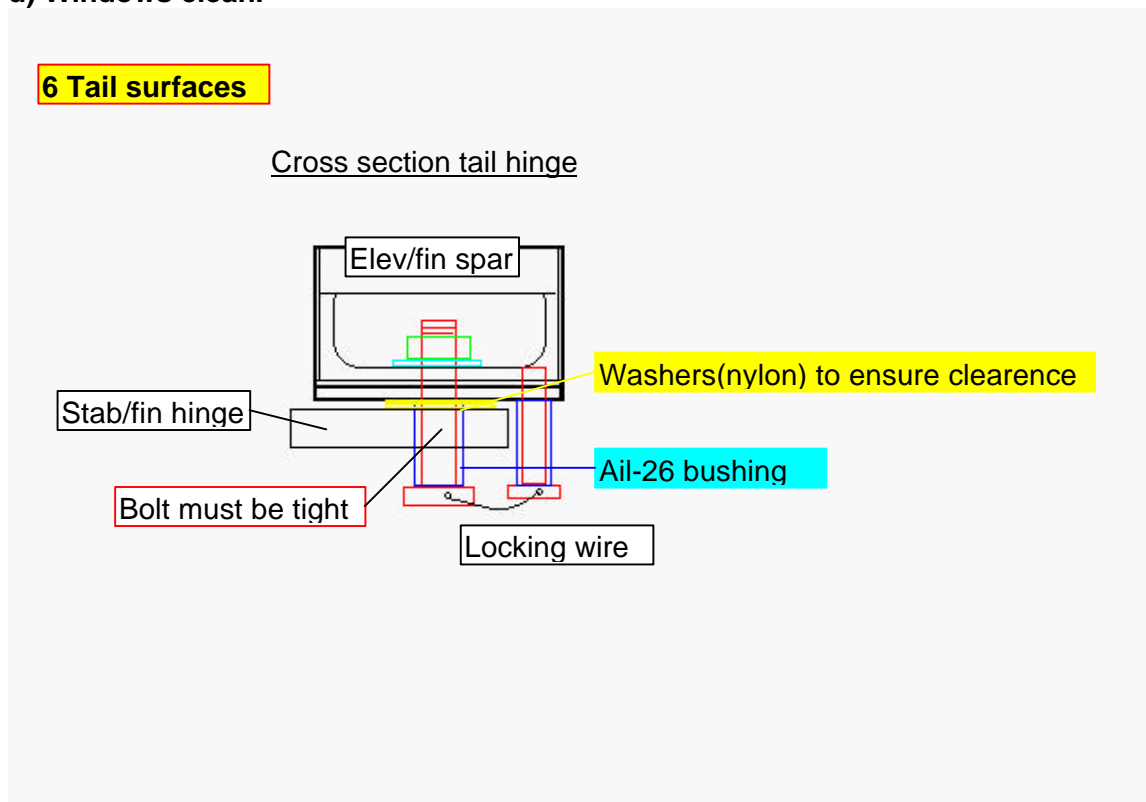
4 WINGS

- a) Strut secure.
- b) Flaperon ➔ condition (fabric/damage), hinges and linkages secure.
➔ Full and free.
- c) Wing skin condition - top, bottom and leading edge.
- d) Wing tip fairing & nav. light secure.
- e) Fuel tank contents (visual check), cap secure.
- f) Pitot head clear.

5 FUSELAGE

- a) Skin condition.
- b) Aerials secure.
- c) Door latch & hinge operative.
- d) Windows clean.

6 Tail surfaces



- a) Skin condition.
- b) Elevator linkages secure/full and free/ hinges secure.
- c) Rudder full and free/ hinges secure/ cable linkage secure.
- d) Trim tab secure/linkages secure.

2 BEFORE START

- a) Seat Adjust & lock
- b) Hatches & harness.. Secure & adjusted
- c) Fuel taps Both **ON**
- d) Flaps UP
- e) Mag. switch..... Insert key
- f) Circuit breakers..... In & secure
- g) Instruments..... Undamaged, in limits & legible
- h) Radio..... OFF
- i) Cabin heat & air..... OFF/CLOSED
- j) Mixture..... Full & free - set RICH
- k) Throttle..... Full & free - set \square " open
- l) Carb heat..... Full and free - set cold
- m) Primer..... 4 primes when cold/as required
- n) Master switch..... ON
- o) Trim..... Check O.K. & at take off(green)
- p) Beacon..... ON
- q) BRAKES..... ON
- r) Controls..... Up elevator
- s) LOOKOUT - Call "Clear prop"
- t) **START ENGINE - KEEP REVS. BELOW 1000**

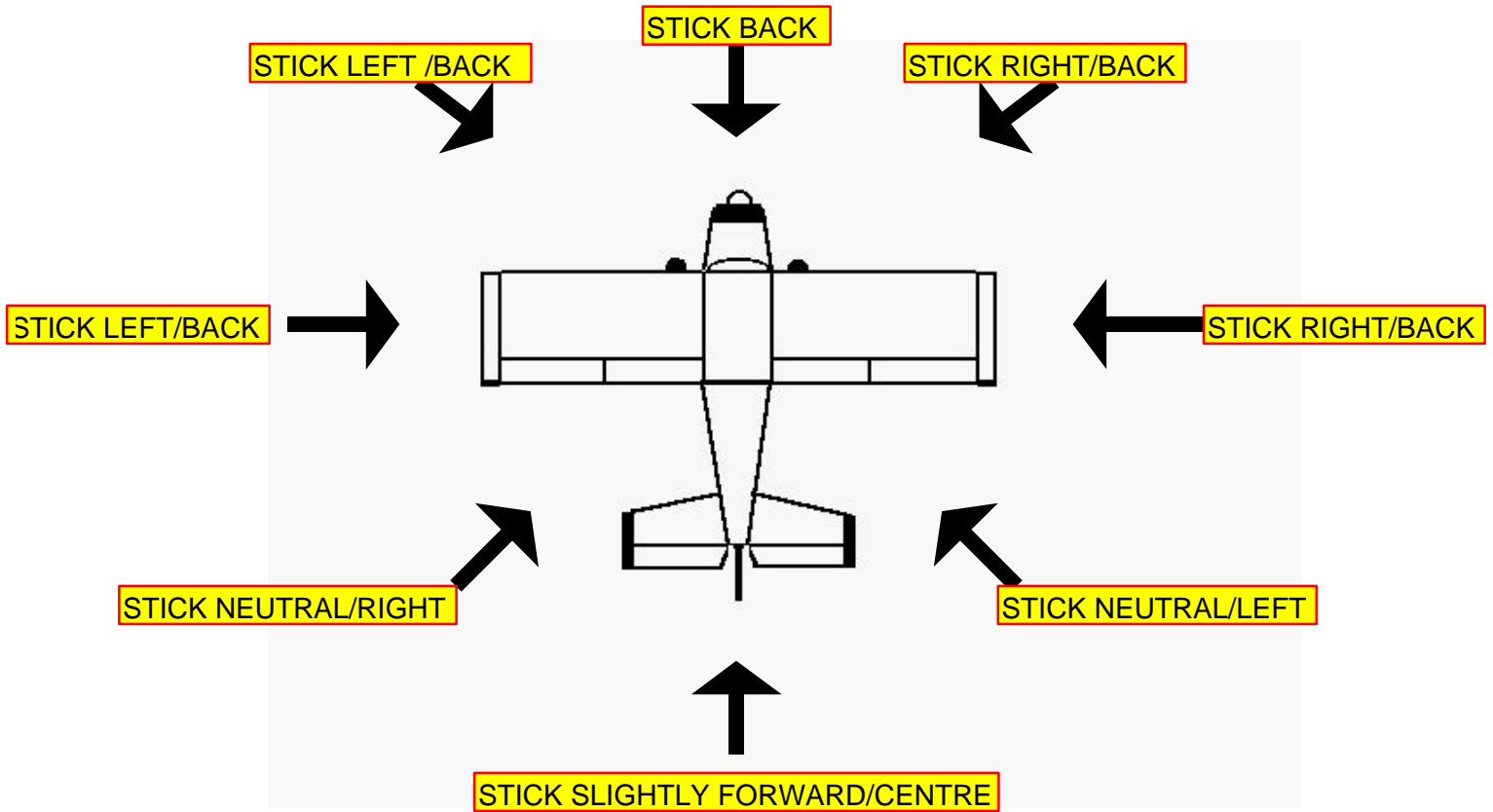
3 AFTER START

- a) R.P.M..... Set 1000
- b) Starter warning light.... OUT
- c) Oil pressure..... 60 p.s.i. in 30 secs. or shut down
- d) Ammeter..... Charging
- e) Suction..... 3" to 5"
- f) Instruments..... Set D.I.
- g) Clock..... Set time
- h) Radios..... ON
- i) Altimeter..... Set
- j) G.P.S. Set

4 TAXI

- a) Radio call - move forward
- b) Brakes..... CHECK
- c) Steering..... CHECK
- d) Compass/D.I. Increasing/decreasing

STICK POSITION DURING TAXI - REFER TO DIAGRAM



5 POWER CHECKS

- a) Position..... Into wind & clear all round
- b) Brakes ON
- c) Oil T's & P's..... Within limits
- d) R.P.M..... 1800
- e) Carb heat..... Hot-max. drop 75rpm.Set COLD
- f) Magnetos check:
 - LEFT - RIGHT - BOTH*
 - Max. drop..... 125 rpm
 - Max. diff. between mags... 50 rpm
- g) Suction..... Within limits
- h) Oil T's & P's..... Within limits
- i) Ammeter..... No discharge
- j) R.P.M..... Idle 500 - 700. Reset 1000

6 PRE-TAKE OFF AND VITAL ACTIONS

- a) Trim..... Set for take off
- b) Throttle..... Friction nut set
- c) Mixture..... RICH
- d) Fuel..... ON & sufficient
- e) Flap..... Set-10° on grass
- f) Instruments
- g) Hatches..... Closed and locked
- h) Harness's..... Secure
- i) CONTROLS..... FULL AND FREE
- j) Lookout..... Clear to proceed

7 TAKE OFF

Apply throttle gently. Move stick forward immediately. Aircraft will swing left as tail lifts. Just before rotation, the Rebel lowers its nose slightly to take up flying attitude. **DO NOT BE TEMPTED TO PULL BACK AT THIS STAGE.** Backpressure at 40 kts. Cross wind - up aileron on wing into wind - run on one wheel till speed gained.

- a) Approach and runway clear.
- b) D.I. corresponds with runway heading
- c) R.P.M. 2300 min.
- e) Oil T's & P's..... Within limits
- f) Airspeed..... Increasing

————— After take off —————

Flaps..... UP at 300ft.

ROTATE 45 kts.
CLIMB:
BEST ANGLE (10° FLAP).. 50 kts.
BEST RATE (to 4000ft)..... 60 kts.
CRUISE (2450 rpm)..... 106 kts.
APR. & LAND *initial* *final* *thresh*
normal 60 55 45 kts.
flapless 65 60 55 kts.
glide 60 60 55 kts.
MAX. CROSS WIND @ 90°... 15kts.
STALL no flaps,no power....38kts.
STALL 30° flap,no power....34kts.

8 LANDING CHECKS

- a) Mixture..... RICH
- b) Fuel..... ON
- c) Flaps..... As required - **LOWER ONLY AFTER FINAL TURN / FINALS**
- d) Hatches & harness's.. Secure
- e) Brakes..... OFF or COVERED.

Crosswind technique - Wing low, use aileron to keep wing down, USE BRAKES TO KEEP STRAIGHT.

GO-AROUND

- a) CARB HEAT COLD
- b) FULL POWER SLOWLY
- c) FLAPS 10°
- d) TRIM NEUTRAL (GREEN)

9 AFTER LANDING

- a) Carb heat..... Cold
- b) Flaps..... Up
- c) Trim..... Neutral (green)
- d) Non essential electrics..... Off

10 SHUT DOWN

- a) Brakes..... On
- b) R.P.M. 1500 for 20 secs.
- c) Radios & electrics..... Off
- d) Mixture..... Lean for 10 secs → idle cut off
- e) Magnetos..... Off
- f) Master Switch.....Off
- g) Control locks..... In place

EMERGENCY

FIRE

ENGINE FAILURE

- ENGINE FIRE ON START :
- 1800 rpm for 1 min.....SHUT DOWN
- IF FIRE CONTINUES:*
- a) Throttle.....CLOSE
 - b) Mixture.....IDLE CUT OFF
 - c) Fuel.....OFF
 - d) Magnetos.....OFF
 - e) Master switch.....OFF
- EVACUATE AIRCRAFT*

- ENGINE FIRE IN FLIGHT :
- a) Fuel.....OFF
 - b) Cabin air/heat.....CLOSE
- WHEN ENGINE STOPS :*
- c) Throttle.....CLOSE
 - d) Magnetos.....OFF
 - e) Mixture.....IDLE CUT OFF
 - f) Airspeed.....INCREASE -
to find incombustable mixture

- ELECTRICAL FIRE IN FLIGHT :
- a) Master switch.....OFF
 - b) Cabin air/heat.....CLOSE
 - c) Fire extinguisher.....ACTIVATE
 - d) VENTILATE CABIN

- AFTER TAKE OFF :
- a) Lower nose. Airspeed 60 kts.
 - b) Select landing area ahead.
- DO NOT TURN BACK**
- c) Flaps.....AS REQUIRED
 - d) Mixture.....IDLE CUT OFF
 - e) Fuel.....OFF
 - f) Magnetos.....OFF
 - g) Master switch.....OFF
 - h) Doors.....UNLATCH

- AT ALTITUDE :
- a) Airspeed.....60 kts.
 - b) Choose landing area
 - d) If enough hight ► investigate failure
- Mixture - RICH, fuel - ON / sufficient.
Magnetos - ON both, carb heat - HOT
Primer - LOCKED.

- IF ENGINE FAILS TO START :*
- a) MAYDAY CALL, squawk 7700
 - b) Mixture.....IDLE CUT OFF
 - c) Fuel.....OFF
 - d) Magnetos.....OFF
 - e) Master switch.....OFF
 - f) Hatches RELEASE Harness SECURE

NOTES