G-AWOF

Piper Vagabond PA17
on a LAA Permit to Fly

Aircraft Handbook
and Pilot Notes

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Aircraft Details

Manufacturer: Piper Aircraft, Lockhaven USA Built 1948
Type: Vagabond PA17 (It started life as PA15 serial 15-227 but was later converted to a PA17)
Registration: G-AWOF
Engine: Continental C90 8F
Propellor: McCauley "Kliptip" Met-L-Prop CM7144

Operating Speeds

Take-off safety speed	55 knots
Climb	65 knots
Normal cruise	90 knots
Low safe cruise	70 knots
VNE (do not exceed)	109 knots
Glide (power off)	65 knots
Stall	40 knots
Approach	60 knots

Engine and accessories

Continental C90 8F, four cylinder horizontally opposed air-cooled.

Cylinder designation:
1 -- rear passenger side
2 -- rear pilot side
3 -- front passenger side
4 -- front pilot side

Firing order: 1, 3, 2, 4

Compression Ration 7.0: 1
Capacity: 200 cu inch (3.25 Litre)

Normal rated rpm 2475 (gives 90 bhp)
Take Off rpm 2625 (gives 95 bhp) (5 minutes maximum)

Max Cylinder Head temp 525 deg F (275 deg C)
Max Oil temp 225 deg F (105 deg C)
Min Oil temp (prior to Takeoff) 75 deg F (25 deg C)

Oil pressure (cruise) 30 - 60 psi
Oil pressure (idle) 10 psi minimum

Oil: use “straight 80” oil
Change oil every 30 hours.

Oil capacity 4.8 quarts (4.5 litres)
Oil consumption: typically 1 quart (1 L) in 6 hours
When the oil is filled right up to the top mark the engine tends to blow more oil out of the breather tube, so generally the aircraft is operated with oil level slightly down. Typically it is measured at half way between Full and Low marks on the dipstick -- add half a litre of oil when it gets down to the low mark.

Magnetos

Left (pilot side) -- Bendix S4RN-21 fitted with starting impulse
Fires lower plugs, timing 28 deg BTC

Right (passenger side) -- SLICK 4230 fitted starting impulse
Fires upper plugs, timing 26 deg BTC

For starting engine, select both mags.

Carburettor

Marvel-Schlebler MA3-SPA, with throttle pump.
There is no separate Primer fitted, so the throttle is "pumped" to inject fuel into the carburettor for starting.

The mixture control should be left FULLY RICH (pushed in) all the time. Piper recommend that the mixture control is not used to stop the engine under normal circumstances (it can be used in emergency). LAA engineers recommend that mixture is used to stop engine -- I choose to do this.

Possibly because of the design of the carburettor, the aircraft seems happier to side-slip with left wing down. (With right wing down the engine may splutter).

Spark Plugs

Type: REM40E
Electrode gap: 0.015 -- 0.018 “

Stopping the engine

Allow it to idle at 1000 rpm for a few minutes, then pull Mixture Control to stop engine. Switch OFF the magnetos. Piper recommend the throttle is kept closed.

Fuel Consumption (approximate)

RPM	% power	US Gals/hr	Litres/hr
1500	20%	2.25	8.5
2000	50%	4.25	16
2100	60%	4.65	17.5
2200	70%	5.05	19
2300	80%	5.75	22
2400	90%	6.50	24.5
2500	100%	7.50	28.5

Fuel Tanks

The aircraft has two fuel tanks:

Main Tank is located in cockpit under the instrument panel. It has a capacity of 12 US Gals (45 Litres). The tank has a fuel gauge fitted to the centre, and shows 0, 1/4, 1/2, 3/4 and F marks. As an additional check, the same window permits you to see the fuel sloshing about in the tank; when the fuel falls below the level of this window the tank is less than 1/4 full.

The Auxiliary Tank is located in the port wing. It has a capacity of 18 US Gals (68 Litres). No gauge is fitted to this tank. Fuel is fed from this tank via an aluminium tube clipped to the left windscreen post, and this pipe has a transparent section to enable you to watch the fuel flowing. Fuel vapour pressure means this transparent tube can look nearly empty at times, but as long as some fuel is visible then the tank is not empty. A calibrated wooden dipstick is used during preflight to measure the amount of fuel in the wing tank.

A fuel selector tap is fitted in the cockpit under the Main Tank to enable selecting of MAIN, AUX, or OFF. The two tanks are not connected and do not cross feed.

The AUX (Wing) tank should only be used in level flight. Use the Main Tank for takeoff and landing, and any unusual manouevre. Because the AUX Tank does not have a gauge, it is normal practice to use the fuel in the AUX tank first.

If the selected tank runs out of fuel, the engine will go quiet, but the airflow will probably keep the propellor turning. Switching to the other tank should allow the engine to immediately restart -- though this is not guaranteed.

Lubrication

There are three grease nipples requiring regular lubrication; two on the tailwheel assembly, and one under the passenger side top cowling, where the drive cable for the tachometer connects to the engine through a right-angle gearbox -- the gearbox has a grease nipple.

Radio and Intercom

A Becker AR-3021 transceiver is fitted. This has 760 channels. Set the Channel knob to A, and then set frequency with the other knobs. To store a frequency that is displayed, set channel knob to 1,2,3 or 4, and press the STORE button for 2 seconds.

If the display starts flashing, this indicates low battery voltage.

Battery

A 12 volt sealed Lead-Acid battery is located behind the seats. It has a capacity of 3.5AH. A 3 amp in-line fuse is fitted in the wire connected to the battery. A quick-release connector allows the battery to easily be removed from the aircraft for recharging.

Weight & Balance

NOTES

1: Empty weight of aircraft included the following items, Radio, Battery, Oil, Seat-Belts, Instruments, Brake fluid, un-usable fuel, Fire Extinguisher

2: All weights in lbs. Arms measurements in inches. Moments in inch-lbs. CofG = Moment/Weight

3: Datum Point: Leading Edge of Wing. A plumb line dropped to floor, with a/c leveled by raising tailwheel.

4: Arms for standard features, as given in Piper manual
Pilot/Passenger: +22 inches
Main Fuel tank: –9 inches
Wing Fuel tank: +24 inches
Baggage: +48 inches
Oil –24 inches
Propellor –44 inches
Main Wheels 0 inch
Tailwheel +174 inches

5: CofG Limits as per PFA Permit
Forward: 12.50 inches Aft: 19.00 inches
Both aft of Datum.

6. Maximum Baggage Allowed, per Piper manual: 18 Kg (40 lbs)

7. Maximum Allowed Weight, per PFA Permit: 521Kg (1150 lbs).

8. Fuel weighs 6.0 lbs (2.7 Kg) per US Gal.
(1.9 lbs (0.86 Kg) per Litre)
Oil weighs 2 lbs (0.9 Kg) per Quart (Litre)

EMPTY AIRCRAFT	Weight (lbs)	Arm (inches)	Moment (lbs-ins)
Main wheels (average x 2)	703	0	0
Tail wheel	53	+174	9222
Totals	756		9222
Resulting CofG 12.20 aft of datum			

Most Forward CofG case	Weight (lbs)	Arm (inches)	Moment (lbs-ins)
Empty aircraft	756	+174	9222
Pilot	170	+22	+3740
Passenger	0	+22	+0
Fuel in Main Tank. 12 US Gals	72	–9	–648
No Fuel in Wing Tank (Aux)	0	+24	+0
No Baggage	0	+48	0
Totals	998		+12314
Resulting CofG 12.34aft of datum			

Most Rearward CofG case	Weight (lbs)	Arm (inches)	Moment (lbs-ins)
Empty aircraft	756	+174	9222
Pilot	190	+22	4180
Passenger	100	+22	2200
Fuel Main Tank (1 US gals) (empty)	6	–9	–54
Fuel Aux Tank (18 US gals)	108	+24	+2592
Baggage (max 40 lbs)	40	+48	+1920
Totals	1210		20060

Resulting CofG
16.58 aft of datum

NOTE: in the above case the aircraft is OVERWEIGHT

Conclusions -- Weight & Balance summary

Looking at the worst cases above for Most Forward and Most Rearward CofG loadings, it can be seen that both are within allowed range. In fact it would be nearly impossible to arrange loadings such that the CofG was outside limits.

For your own calculations

G-AWOF Weight & Balance

	Weight (lbs)	Arm (inches)	Moment (lbs-ins)
Empty aircraft		+174	
Pilot		+22	
Passenger		+22	
Fuel Main Tank (max 12 US gals)		–9	
Fuel Aux Tank (max 18 US gals)		+24	
Baggage (max 40 lbs)		+48	
Totals			
Resulting CofG (Moment divided by Weight)			

Allowable CofG Limits between 12.50 to 19.00

Wings

Wing span 29.3 feet
Wing area 147.5 sq feet

Overall length 18.7 feet
Height 6.0 feet

Original Handbook

The original 1943 Piper Flight Manual shows the following items, included here for interest though some of the manouevres are not allowed in this country under the Permit to Fly.

	Normal Category	Utility Category
Max Airspeed	126 mph	135 mph
Max Flight Load (positive)	3.8g	4.4g
Negative flight Load	not allowed	not allowed
Maximum weight	1150 lbs	1150 lbs
Max Baggage	40 lbs	0 lbs
C of G range	12.5 to 19”	12.5 to 17”
Aerobatic manouevres approved	none	Chandelles Lazy eights Steep Turns Spins Stalls

Take off and landing distances

According to the Piper Flight Manual 1943
(when fitted with 65 bhp engine)

Conditions Max Allowed weight, no wind, level paved runway.

Air temperature 20 deg F. Sea Level.

Take off and clear 50' obstacle: 1369 feet

Rate of climb: (airspeed 65 mph (56 Knots): 530 feet/minute

Landing over 50' obstacle and stop: 1243 feet

Stalling speed, power off: 48 mph (42 Knots) level flight
69 mph (60 Knots) at 60 deg bank angle.