Air-Cam

Flight Manual

Wednesday, February 14, 2001

Contents

Speeds For Normal Operation

Unless otherwise noted, the following speeds are based on a maximum takeoff weight or maximum landing weight, and may be used for any lesser weight. However, to achieve the performance specified for takeoff distance, climb performance, and landing distance, the speed appropriate to the particular weight must be used.

Takeoff:
Twin-Engine, Normal Climb Out ..... 60 mph
Short Field Takeoff, Flaps 2/3, obstructed Clearance (Vx) ..... 50 mph
Single Engine Best Rate of Climb, Flaps 5 ..... 55 mph

Enroute Climb, Flaps Up:
Normal..... 60-70 mph
Sea Level to 10,000 ft. ..... 60 mph

Landing Approach:
Normal Approach, Flaps Up..... 65 mph
Normal Approach, Flaps Down ..... 60 mph
Short Field Approach, Flaps Down Full..... 45-50 mph
Note: When making a low speed approach, use caution. Speed will bleed off very rapidly at idle.

Balked Landing:
Maximum Power, slowly retract flaps to 0
Full throttle to 60 mph

Maximum Demonstrated Crosswind:
Takeoff or Landing .....12 knots

Va Maximum Turbulent Air Penetration Speed..... 75 mph

Vf Maximum Flap Speed..... 70 mph

Vse Minimum Single Engine Speed..... 50 mph

Vmc Minimum Controllable Single Engine Speed..... 43 mph

Specifications

(Specifications are at gross weight, at MSL, and no wind except where specified)

	Rotax 912S
Horsepower	100 (200)
Gross Weight	2100 lbs
Empty Weight	1395 lbs
Useful Load	705 lbs
Stall Speed	39 mph (34 kias)
Vmc	40 mph (35 kias)
VYse	60 mph (52 kias)
Top Speed	Vne
Cruise Speed	50 to 100 mph TAS (43 to 87 ktas) (100 mph @ 11000')
Vne	110 mph (96 kias)
Rate of Climb	1,500 fpm
Solo, 50% fuel	2,000 fpm
Single Engine Rate of Climb	300 fpm
Fuel Capacity	28 gallons
Range	340 mi @ 70 mph
Endurance (60 mph with VFR reserve)	6 hours
Landing Roll	300 ft
Takeoff Roll	under 200 ft

Dimensions:

Wingspan .....36'
Length .....27'
Height.....12'4"
Center Section Width .....7'

Checklist Procedures

Preflight Inspection

Cabin
1. Brakes -- test
2. Electrical, and Ignition Switches --off
3. Master Switch -- on

   WARNING
   When turning on the master switch, using an external power source, or pulling the propeller through by hand. Treat the propeller as if the ignition switch were on. Do no stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

4. Avionics Master On.
5. Fuel Quantity Indicators -- check quantity and operation.
6. Flaps Full Down
7. Battery Switch -- off.
8. Trim Controls (2) -- neutral.

Right Wing
1. Main Gear and Tire -- check (21 psi)
2. Fuel Tank Sump Quick-Drain Valve (2) - drain with sampler cup.
3. Tie Down and/or Chocks -- remove.
4. Fuel Quantity -- check visually and cap secure.

Right Wing, Trailing Edge
1. Fuel Vent -- clear
2. Aileron Gap Seal -- check security and freedom of movement.
3. Aileron Gap Seal -- check security and fit.
4. Flaps -- check security and attachment.
5. All Cables - check

Right Engine
1. Burp Eninge
2. Oil Level -- check oil reservoir (oil quantity)
3. Fuel Strainer -- drain
4. Engine Compartment General Conditon -- check
5. Propeller and Spinner -- examine for nicks, security and delaminations
6. Coolant Level – check (Should be half full)

Right Float.
1. Remove any water in the floats
2. Install caps and close hatch
3. Inspect Main and Nose wheels
4. Inspect all cabling

Empennage
5. Tie Down -- remove.
6. Control Surfaces -- check condition, freedom of movement, and tab position.

Left Wing, Trailing Edge
1. Flaps -- check security and attachment.
2. Aileron -- check security and freedom of movement.
3. Aileron Gap Seal -- check security and fit.
4. Fuel Vent -- clear.
5. Check condition of tail wheel and cables

Left Wing
1. Fuel Quantity -- CHECK VISUALLY and CAP SECURE.
2. REMOVE tie downs and/or wheel chocks.
3. Fuel Tank Sump Quick-Drain Valves(2)—DRAIN with sampler cup.
4. Main Gear and Tire --CHECK (21 psi).

Left Engine
1. Burp Eninge
2. Oil Level -- check oil reservoir (oil quantity)
3. Fuel Strainer -- drain
4. Engine Compartment General Conditon -- check
5. Propeller and Spinner -- examine for nicks, security and delaminations
6. Coolant Level – check (Should be half full)

Right Float.
1. Remove any water in the floats
2. Install caps and close hatch
3. Inspect Main and Nose wheels
4. Inspect all cabling

Rear Seat if Flying Solo
1. Remove anything that can blow out into the props or that can jam controls
2. Secure rear seatbelt

Before Starting Engines

1. Preflight Inspection -- complete
2. Brakes -- test
3. Seats, Belts, Shoulder Harnesses -- adjust and secure.
4. Intercom Connections plugged in.
5. Avionics Power Switch -- off.
6. Everything Secure inside cabin and cargo area.
7. Circuit Breakers -- in.
8. Electrical Equipment -- off.
9. Master Switch – on
10. Avionics Switch -- On
11. Fuel Quantity -- check

Starting Engines

1. Throttles 1/8.
2. Auxiliary Fuel Pump -- on.
3. Primer -- prime during cranking if engine does not start with out.
4. Propeller Area -- clear
5. Starter - on
6. Tap primer if necessary.

   The engine should start in two or three revolutions. If it does not continue running, start again with primer.

7. Throttle -- 3000 rpm Warm up.
8. Oil Pressure -- check. green arc
9. Temperature -- check green Arc.
10. Other Engine -- repeat.
11. Radios -- set.

Before Takeoff

1. Flight Controls -- free and correct.
2. Flight Instruments --set and checked.
3. Flaps -- Up
4. Fuel --recheck.
5. Elevator Trim -- set.
6. Gear -- Up
7. Water Rudders -- Up
8. Engine Run up:
   (a) Throttles -- 3500 rpm
   (b) Magnetos -- check (rpm drop should not exceed 150 rpm on either magneto or 50 rpm difference between magnetos).
   (c) Alternators -- check.
   (d) Engine Instruments -- check.
9. Strobe and Nav Lights -- as required.

Normal Takeoff

1. Flaps -- up to 1/3 down.
2. Full Power
3. Power instruments -- check for adequate power from both engines.
4. Climb Speed 60 mph.
5. Flaps -- retract (if extended) after obstacles are cleared.
6. Retract Gear after no runway remaining

Short Field Takeoff

1. Flaps -- 2/3 down.
2. Brakes -- apply and hold.
3. Auxiliary fuel pump on.
4. Brakes -- release
5. Roll off 45 mph.
6. Power -- full
7. Elevator Control -- maintain

8. Climb Speed -- 50 mph (at maximum weight) until all obstacles are cleared.
9. Flaps -- retract after obstacles are cleared.

Normal Enroute Climb

1. Airspeed -- 60 mph.
2. Power -- full

Maximum Performance Enroute Climb

1. Airspeed -- 55 mph
2. Power -- full

Cruise

1. Power -- 4500 rpm
2. 70 mph
3. Elevator Trim -- adjust
4. Fuel burn approximately 7 gallons per hour at 5300 / 3.5 per engine.
5. Auxiliary fuel pumps off.

Before Landing

1. Gear down for Runway Landing / Gear Up for Water Landing
2. Flaps -- up to 2/3, below 70 mph.
3. Auxiliary Fuel Pump Switches -- on

Normal Runway Landing

1. Flaps -- up to 2/3 below 70 mph
2. Maintain 3100 RPM to touchdown.
3. Airspeed -- 60-70 mph
4. Airspeed -- 60 mph (flaps down).
5. Trim -- adjust
6. Landing Roll -- maintain control stick into the wind if cross wind.

Short Field Runway Landing

1. Airspeed -- 45 mph.
2. Flaps -- full down
3. Maintain 3100 RPM to touchdown
4. Airspeed -- Maintain 45-50 mph.
5. Trim -- adjust.
6. Touchdown -- main wheels first.
7. Brakes -- apply heavily.
8. Flaps -- retract for maximum brake effectiveness.

Normal Water Landing
1. Gear Up for Water Landing
2. Flaps -- up to 2/3 below 70 mph
3. Maintain 3100 RPM to touchdown.
4. Airspeed -- 60-70 mph
5. Airspeed -- 60 mph (flaps down).
6. Power to Idle after touchdown

Glassy Water Landing
1. Gear Up for Water Landing
2. Flaps -- up to 1/3 below 70 mph
3. After Last Visual Reference Point Maintain Positive Pitch
4. Maintain 3400 RPM to touchdown.
5. Airspeed -- 60-70 mph
6. Airspeed -- 60 mph (flaps down).
7. Adjust Power slightly to control descent
8. Power to Idle after touchdown

Confined Area Landing
1. Gear Up for Water Landing
2. Flaps -- up to 2/3 below 70 mph
3. Maintain 3100 RPM to touchdown.
4. Airspeed -- 60-70 mph
5. Airspeed -- 60 mph (flaps down).
6. Power to Idle after touchdown

Rough Water Landing
1. Gear Up for Water Landing
2. Flaps -- up to 1/2 below 70 mph
3. Maintain 3200 RPM to touchdown.
4. Airspeed -- 60-70 mph
5. Airspeed -- 60 mph (flaps down).
6. Power to Idle after touchdown

Balked Landing - Go Around
1. Power -- full
2. Flaps -- retract 1/3.
3. Airspeed -- 60 mph until clear of obstacles
4. Accelerate to 70 mph
5. Bring flaps up after reaching safe Altitude and Air speed.

After Landing

1. Flaps -- retract.
2. Auxiliary Fuel Pumps - off.

Securing Airplane

1. Record Time
2. Avionics Power Switch -- off
3. Electrical Equipment -- off
4. Control Lock -- use the seat belts.
5. Block Tires.
6. Tie Down

Abbreviated Pre-Flight Check List

1. Adjust seats
2. Unblock & untie
3. Drain fuel 4 places.
4. Check oil
5. Master switch on.
6. Check fuel gauges.
7. Check voltage.
8. Check elevator trim and movement.
9. Master switch off.
10. Check brake fluid level and rear brake master cylinders.
11. Inspect left landing gear leg and left wheel and brake assembly.
12. Inspect belly-mounted antennas and airspeed pick up on nose underside.
13. Visually check fuel quantity in left fuel tank.
14. Inspect left wing and control surfaces.
15. Inspect left engine and propeller. Check oil and coolant levels.
16. Inspect fuselage.
17. Inspect tail section and tail wheel.
18. Inspect right engine and propeller. Check oil and coolant quantities.
19. Inspect right wing and right control surfaces.
20. Visually check fuel quantity in right fuel tank.
21. Check right landing gear, wheel and brake assemblies.

Refer to the Air Cam preflight inspection checklist with explanations for a more thorough preflight.

Pre-Flight Check List with Explanations

Begin the pre-flight inspection of your Air Cam on the left side of the fuselage adjacent to the forward cockpit position.

Momentarily turn on the master switch checking the fuel quantity and the voltmeter. The voltmeter should show at least 12 volts. If the voltage is low then charging the battery may be necessary prior to starting. Note the fuel level indicated by your dual fuel gauge. You will want to reference that with the amount you see in the fuel tanks visually later on in your pre-flight. Also note that the fuel gauges will indicate a slightly higher level than you actually have on board since the airplane is tilted back in the landing configuration and the fuel sending units are in the rear of the fuel tanks. You can expect to indicate approximately 1/8 to 1/16 more fuel than you actually have while on the ground. In-flight, properly functioning fuel gauges should be accurate.

With the fuel pumps off, activate the electric primer solenoid on each side, you should hear a click indicating that the solenoids are working properly. Move the control stick forward and aft while noting the elevator has proper movement. This must be done now on the ground since you cannot see the elevator movement while in the cockpit. Now check to make sure that the elevator trim tab is moving properly by actuating the trim switch forward and aft.

If going on a night flight, you might want to check your strobes and navigation lights at this time.

You may now turn off the master switch. It is a good idea to remove the key from the master key switch whenever it is in the off position. This habit will make it less likely for you to leave the master switch on inadvertently. Leaving the master switch on when the aircraft is not in operation will cause the hour meter to run and the electric gauges to be activated. This will drain the battery and also cause inaccurate hour meter registration.

Now check the throttles for proper movement forward and aft.

Check front and rear rudder pedals. Make sure there is nothing loose.

Check the level of brake fluid in the brake fluid reservoir.

Check the rear brake master cylinders for leakage.

Check the rear seat position.

Check the rear throttle quadrant and the throttle cable connections.

Check the aileron bell crank located in the center section which can be viewed through the clear lexan panel.

Check all connections are proper and correct.

Climb up on the left side of the fuselage just ahead of the wing and on the wing struts near their attachment to the fuselage.

Visually inspect the forward sections of the engines from this position.

Remove the left fuel cap and visually inspect fuel level.

Inspect the left landing gear leg, the left tire wheel and brake assembly.

If tire pressure is questionable, check it. It should be approximately 21 psi.

Check condition of wing struts and attachment fittings.

Look inside the wing through the NACA cooling inlet.

Visually inspect hose fittings. Look for leaks.

Check the wing leading edge for possible damage and if you are going to fly immediately after the pre-flight, then untie the left wing.

Unzip the wing tip zipper and look inside the wing, checking the aileron bell crank to make sure that all the connections look good and looking to make sure that all the x-cables are in place, and look for anything unusual.

Check the wing tip for condition and damage.

Check the left aileron for proper movement.

Inspect the hinges, and if they are dry make that they receive lubrication.

Make sure that the rod ends connecting the ailerons are free and well lubricated.

Check the left trailing edge wing to fuselage cable. Make sure that it is properly tensioned.

Check the condition of the left flap and all of its hinged attachments.

Visually inspect the left engine. Pay particular attention to the carburetor mounting, carburetor throttle, cable attachments and the point at which the throttle cable attaches to the carburetor throttle arm should be lubricated regularly.

The exhaust system should be thoroughly checked, making sure that all springs are safety wired and no cracks exist anywhere in the exhaust system.

Look for any unusual or excessive oil leaks.

Look for loose engine mounting bolts.

Check the oil level in the remote oil sump. If the oil level is unusually low, look for oil that may have run out of the engine. If no such oil is noted, it is possible that some of the oil has siphoned back into the engine block, since when sitting on the ground, the oil sump is elevated above the engine slightly. If you suspect that the oil level is correct, however, it shows low on the dipstick you may start the engine immediately looking for oil pressure indication on the gauge. If oil pressure is correct, run the engine for approximately two minutes, shut it down and then recheck the oil level. This should be sufficient time to pump any oil that has drained back into the engine block back into the oil reservoir.

Oil levels should be somewhere within the flat section of the dipstick. We recommend operating it halfway to three-quarters of the way up the dipstick. Both the 912 and 912S engines use very little oil. Any appreciable amount of consumption should be noted and could be cause for concern.

NOTE: Oil should be changed every 50 hours and a typical consumption should not exceed one quart in 50 hours of operation.

Check coolant level. This may require the removal of the coolant reservoir cap which is located on the top of the engine. The coolant reservoir should be full. The recovery of the clear recovery bottle should be approximately 1/3 full.

Carefully inspect all visible fuel lines, oil lines, and throttle cable connections.

Carefully inspect the propeller for any damage. Pay particular attention to the propeller leading edge towards the propeller tips.

Drain the two sumps on the left side of the wing center section. The forward one being the fuel tank sump and the rear one being the gascolater drain. Check for water and contamination.

Inspect fuselage for damage.

Check flap actuator attachment between the two flaps.

Check GPS and ELT antennas.

Inspect the vertical stabilizer leading edge and the left horizontal stabilizer leading edge.

Tension horizontal stabilizer attachment cables as necessary by moving the nylon slider up from the lower attachment point.

Inspect the horizontal stabilizer and elevator fiberglass tips for damage.

Inspect hinge points moving elevator up and down checking for freeness and play.

Note whether or not hinges need to be lubricated. Lubricate as necessary.

Check the rudder for free movement and condition

Check the elevator actuation linkage between the two elevators.

Untie tail.

Check the condition of the tail wheel and tail wheel spring and lower aft section of fuselage.

Inspect right engine duplicating the inspection of the left engine.

Drain right wing tank sump and right fuel gascolator sump checking for water and debris.

Inspect cargo bay, pay special attention to any cargo that may be on board, being sure that it is properly secured and that nothing can possibly come free while in flight, possibly damaging a propeller.

Check right flap for condition and check hinge points.

Check right aileron for condition and check hinge points for lubrication.

Check right aileron push rod. Make sure that the aileron push rod ends are free and properly lubricated.

Check wing tip for condition, look in outer wing tip inspection panel and aileron bell crank and make sure everything looks normal inside of the wing.

Check right wing leading edge.

Untie the right wing.

Check strut attachments and condition of wing struts.

Visually look into the cooling inlet on the right side of the wing and check fuel line attachments.

Check right landing gear leg, wheel and brake assemblies. Make sure that the tires are properly inflated.

Climb up on the wing strut attachment and/or the fuselage to visually inspect the right fuel tank level and inspect the engine for anything unusual.

If flying solo, be sure that the rear seat belts are fastened and tightened.

Make sure that there is nothing in the rear seat that could be blown free in flight.

Remove pitot cover if installed.

Before Take-Off Check List with Explanations

Check to make sure your cargo is secure one last time.

Check to make sure your passenger is properly secured with harness and helmet in place.

Check to make sure your altimeter is set to field elevation.

VSI should indicate zero.

Air speed should indicate zero.

Carefully look back & clear your propeller blades. This is particularly important in a pusher aircraft, since people and/or animals could wander up to the propellers without you being aware of it.

Once you have visually cleared the propellers, turn the master switch on, turn the magneto switches on, auxiliary fuel pumps on, crack throttles to allow engines to jump immediately to 2,500 rpm.

One more time, look back to the left engine, make sure it is clear. Initiate cranking of the left engine, and if engine does not start immediately, begin pulsing of the primer until engine starts.

Holding the primer on can flood the engine.

If outside air temperature is cool, it may be required to continue pulsing the timer lightly until engine is warm enough to run without it.

Check for oil pressure on the left engine. When engine is cold its usually on the high side up towards 75 psi.

Turn off left fuel pump.

Double check right propeller blade is clear and initiate cranking on the right engine.

Pulse primer as necessary while cranking.

Once engine starts, check for oil pressure and turn off auxiliary fuel pump.

Check operations of radio and intercom check frequencies.

Turn on lights and equipment as necessary.

Taxi to appropriate run up area.

Check brakes.

Run engines up to approximately 3,400 rpm and turn one magneto off and on at a time. rpm drop should not exceed 200 rpm. There should not be more than 50-rpm difference between the two engines.

Oil pressure will drop once engines are warm and should settle in between 45 and 55 psi.

Indicated fuel level should not be less than ¼ fuel for a safe take off.

Form control check with stick to the left noting that the left aileron is up and right is down. With stick to the right it should result in left aileron being down and right aileron being up.

Check elevator trim, position correct flaps up, note flaps may work their way down during taxiing, however they will not move in flight.

Check auxiliary fuel pumps on and you are ready for take off!

Normal climb at 60 mph.

Getting A Good Pilot Check Out In Your Air Cam

A thorough check out is important in any aircraft and the Air Cam is no exception. No matter what you're flying background or level of experience. Receiving a good check out in your Air Cam will lessen the chances of an accident and help to insure that your Air Cam flying experience will be safe and pleasurable.

Pilots who are accustomed to flying heavier and faster aircraft often find a few small surprises when transitioning to the Air Cam. Because of the Air Cam's light weight and high level of drag, particularly when the engines are at idle (the two fixed pitch propellers are creating a considerable amount of drag) the Air Cam will slow rapidly.

This means that you have much less time to make your transition to level flight and actually land the aircraft than you may be expecting. This is characteristic is to your advantage once you have become accustomed to it. It actually makes short landings much easier to accomplish.

We recommend that you make your first landings while carrying some power, approximately 3000 rpm, for example. This will allow more time to make the transition and work your way down to a smooth landing. When employing this trick you must remember to cut power just prior to or upon touch down. Because the Air Cam will slow rapidly when the power is reduced to idle and the aircraft is in level flight, a higher than expected approach speed may be safely utilized.

Even though a typical Air Cam stall speed may be approximately 38 mph, you may approach at 60 mph or higher. Approaching at even 70 or 80 mph is not uncommon. Remember that your maneuvering speed for rough air is 77 mph and your maximum flap extension and operating speed is 70 mph. So if you wish to make a short field approach utilizing full flaps, you must be below 70 mph before you may deploy the flaps and you must stay below 70 mph while the flaps are deployed.

Approaches at higher speeds, such as 80 mph, can be made with flaps up. This may be done provided you have relatively smooth air in order to expedite your approach and mix with faster traffic. As previously mentioned, you will find that as soon as you level off the aircraft and reduce your power to idle, even with the flaps up, your air speed will bleed off very rapidly. The point is that even though 60 mph is the normal approach speed, higher speeds can be employed if required.

If approaching in rough air, you must keep your speed below 77 mph, which is maneuvering speed Va. Even though our engineering data shows that the plane can be safely flown in rough air at 77 mph, practical experience has shown 65 to 70 mph to be much more comfortable speed when penetrating turbulent air while still providing ample control and margin over stall. This advice applies to cross-country flight as well. I recommend that you make your first approaches and landings without flaps, as flaps are only required to make extremely short landings.

Once normal landings have been mastered short field approaches may be made at indicated stall speed plus 15 mph with full flaps. While performing a short field landing touch down should be made in the three point or full stall attitude.