

## **MAINAIR SPORTS AIRCRAFT INSPECTION GUIDELINES**

These notes have been produced as a guide for the inspection of Mainair Aircraft, specifically the Gemini Flash, Gemini Flash 2, Gemini Flash 2 Alpha, Mercury, Blade, Rapier and Blade 912 Series. They are not an exhaustive list and must be used in conjunction with the standard BMAA inspection procedures. They cover the more common areas where problems have been observed. In addition to these notes Mainair Service Bulletins and the Aircraft Manual should also be referred to. If any doubt exists about the safety of an item consult the factory.

## Wing Inspection Checks

1. *Leading Edge Front and Rear Sections.* These should be checked for any local bending. This check should be carried out with the wing de-rigged, that is sail tension relaxed. Look particularly at the ends of sleeving. (Note: It is normal for a wing which is kept permanently rigged, or which has done a considerable number of hours, to develop a permanent set in the leading edge [most noticeable in the outer section], but this should be gradual with no sudden local changes in the bend and should be the same for both wings.)

2. *Leading Edge/Side Wires Protection Sleeves.* A plastic protection sleeve is fitted to the leading edge, check that the sleeve is properly located to offer protection from chafing of the leading edge and cross tube when de-rigged. If this is missing or has slipped then check the leading edge and cross tube for deep scoring.

3. *Index Tip Adjusters.* On Flash and Flash 2 wings check that the roll tips have been assembled correctly, and that the bearing is not jammed. The roll tips should allow the tip to washout, but be limited the other way. Check that the button pin is fully located in one of the index holes. The wing should normally be trimmed with the button pin located in the N position, but adjustments may have been made and it is permissible for the pin to be located in the other holes. Check with the aircraft log book for the definitive position, if you find that they are not in N and nothing is in the log book, check with the owner and then annotate the log book. Note that some of the early wings did not have the N marked, and on the Flash range of aircraft the N position is the second hole from the top. On the Blade the N position is the middle of the 5 holes. On later Blade wings the index tip has been replaced with a fully adjustable tip. Check that this is secure and that the position of the tip has been marked with a pencil.

*Wash Out Rod.* On Blade wings check that this is free to rotate up and down.

5. *Plastic Sleeve.* Check location of protective plastic sleeve on the front of the main keel.

6. *Hang Point Assembly.* Check that the hang point position locating bolt is fully engaged. Check the hang strap for distortion and that it is free to rotate. Check the apex block ear brackets for distortion and bolts for tightness.

7. *Webbing Strap.* Check location of the cross tube webbing (looped over each cross tube and passing under the keel.)

8. *Cross Tube Hinge.* Check split pin and castellated nut; check eyebolts nuts at the front of the cross tubes. Check that the brackets are not damaged or distorted, and that the cross tubes butt upto each other with a clean surface. The center hinge bolt is also recommended to be changed at 100 hours on wings that are de-rigged and rigged all the time.

9. *Fin Tube* (not on Blade wings). Check that the fin tube is straight.

10. *A Frame Corner*. Check fore and aft lower wires are fitted on the correct side of the A frame upright. (Forward rigging wires are on the inside, rear rigging wires on the outside). Check bolts are not over tightened, the cables must be free to rotate.
11. *Fin Wire*. Check that the fin to keel rigging wire is fitted and also that the trailing edge/fin cord is fitted and tight (not on Blade wings)
12. *Wing Keel*. Check the keel for straightness with the wing de-rigged. If the aircraft has been reported to have blown over then the keel should be checked carefully for bending, usually this can only be done properly by removing the wing sail. Check location of the rear keel straps (three) and engagement of the fiberglass rod located at the root (not on Blade wings).
13. *Cross Tube*. Check cross tubes for straightness.
14. *'A' Frame Uprights*. Check straightness, dents and distortion due to torsional loads at the top monobolt fitting. Check also for play in the top fitting with the ear bracket.
15. *Base bar*. Check for straightness, elongation of holes and corrosion at the end fittings.
16. *Top Rigging*. Check rigging wires for condition and check that the side/top rigging is fitted in the top hole on the king post fitting and the fore and aft rigging is fitted in the lower hole (not Blade). On Blade aircraft check the bolt for the side wires and ensure that there is not an excessive amount of wear.
17. *Top Rear Rigging*. Check the over-center catch and adjuster lock nut (not on Blade wings). At least seven threads must be within the adjuster.
18. *Leech Line Adjuster*. Check leech line adjuster (not on Blade wing). Check adjuster pins and rings fitted, check for chafing of the luff/leech lines in the adjuster area.
19. *Nose Assembly*. Check the swan nose catch for operation and corrosion. Check the ball-lock action in the pip pin if fitted. Check nose plates are flat.
20. *Leading Edge Front*. Check self tapping screws fitted through the sail eyelet at the leading edge root.
21. *Leech Line End Fittings*. On Flash and Flash 2 wings check condition of the dished washer and ring at the end of the luff/leech lines for any corrosion. On the Flash 2 Alpha and Blade wings check the attachment webbing for signs of damage caused by rubbing at the eyelet.
22. *Wires*. With the wing de-tensioned check all cable ends for signs of frayed strands.
23. *Pull Back Assembly*. Check routing of cross tube tension wires and pull back assembly. Check also the condition of the retraction cord assembly and bungee. The cables must pass either side of the king-post.

24. *Wing Battens*. Check battens against the batten profile. If any look obviously well out of shape ask the owner why. It may be that the battens one side have been altered to correct for undetected damage. A small amount of reflex or camber is acceptable and has probably been in from new to adjust for a slight turn. The original batten profile supplied with the aircraft should show the alteration, if not mark the profile accordingly.

Check the end fitting of all battens, if damaged the end fitting should be replaced. Check for cracking of the batten on the older swaged end fittings. Check condition of the batten cord, and ensure that the tensions are even particularly one side against the corresponding batten on the other wing.

25. *Wing sail*, check for overall condition and cleanliness. Check all patches, in particular check the nature of the damage beneath the patch by feel if possible. Only authorised factory repairs are acceptable.

26. *Bettsometer* check the wing, the factory limit, which has been load tested is 1050 grams. This applies to all Mainair manufactured wings.

27. Check overall symmetry of the wing, this is carried out by having the wing held level and standing behind the wing approximately 10 –15ft and eye the trailing edge for symmetry. If necessary disconnect the washout rods on the Flash and Blade wings.

28. *Placards*. Ensure that the correct main placard is on the upright, a Red placard for the Flash and Flash2 and Black for the Scorcher, Flash 2 Alpha and Blade.

## Trike Basic Frame Inspection

1. *Front Stub and Steering Head Assembly.* Check for deformation of the front stub, particularly just behind the fork attachment. Use a mirror to check for compression buckling on the underside of the stub. Check the stub for security in the keel tube. Check the steering head assembly for play both side to side and front to back.
2. *Nose Wheel and Front Forks/Suspension.* On Flash, Flash 2 and early Mercury aircraft check that the forks are straight along the leg. On early Alphas check the slider tubes for damage, and dampers feel secure. On trailing link suspension check for security of all bolts and trailing links for damage. On Flash 2 Alpha wheels with cup/cone bearings check for excessive play.
3. *Main Keel.* Check for deformation, especially at the base of the seat frame.
4. *Lower Seat Frame.* Check for signs of heavy landing damage indicated by bending of the lower seat frame. On early aircraft check for security of ignition switch and wiring.
5. *Axle Drag Link Attachment.* Check bolts for security. Check the ear bracket for signs of bending and cracking at the main horizontal bolt. Check drag link security to ear bracket, particularly on Alphas without additional sleeving (modification available).
6. *Forward Seat Belt Attachment.* Check seat belt is in accordance with Service Bulletin 37, upto the Alpha. Check for correct location of seat belt around main keel and restrained from moving forward by the plastic covered wire loop. Check bolts attaching seat telescopic to main keel. Check R clip for fitting and security, check also telescopic top fitting for security. The cut out must face rearwards otherwise damage to the bolt and seat frame will occur during folding.
7. *Keel/Monopole Attachment Plates.* If these plates have been removed check that they have been installed correctly, i.e. monopole bolt hole to the front. Check for distortion due to heavy landings or ground looping, if any damage is found or suspected check the monopole bolt for straightness. Check that the castle nut is secure with a split pin.
8. *Monopole Type.* On early aircraft including Flash check that the monopole is a Mk2 monopole identified by a 2 stamped at the base. If a MK1 monopole is fitted refer to Bulletin 17 and 17a as these are subject to a mandatory 200 hours check.
9. *Rear Wheel and Axle Assembly.* Check axle for security, on early Alphas check for extra monobolt fitting on stub axle assembly, if not fitted advise owner to keep an eye on axle for security. Also on Alphas with Cup and Cone wheel bearings, check stub axle for play. Both of the above can be modified to the current standard). Check all bolts and brackets for security. Check wheel spat for security. On Blade aircraft ensure that the rear wheel brake is held securely, otherwise it could snatch on.

10. *Side Strut*. Check fittings top and bottom for security. On Flash, Flash 2, Mercury and Rapier trikes check for wear and for play in the rubber ball suspension. On the Alpha and Blade check the suspension for excessive play in the slider tube, and signs of wear. Check also top of aerofoil section for signs of heavy landing damage. Early Alphas check spring colour, if Gold or White recommend uprate to Red.

11. *Monopole/Seat Frame Area*. Check for bolt security and condition of ear brackets. If monopole has been changed check that all bolts are 5/16". Early Flash and Flash 2 aircraft had 1/4" bolts securing side struts. All monopoies now produced with 5/16" holes! Check for signs of damage approximately 18" up from channel, as this is the end of one of the internal sleeves.

12. *Rear Seat Belt and Seat Webbing*. Check seat belt conforms with Service Bulletin 37. Check routing around monopole and below the lower engine mounting plate. Check seat webbing straps for security and ensure that they are not being cut through by the engine cowling or name plate.

13. *Seat Frame Top*. Check for damage to the seat frame around the mounting points. Check also for security of the ignition cables where they emerge from the frame.

14. *Engine Box Mounts*. Check general condition of box mounts, and for straightness. Check for signs of crushing at the mounting points. Check around all welds for signs of cracking.

15. *Engine Mounts*. Check all Lord mounts for signs of failure or pulling, check also all supporting brackets for cracks and bends. Check also that the washer assembly is correct with large washers to secure the Lord mount in case of failure.

16. *Rear Engine Support Wires*. Check integrity of wires and for elongation of thimbles. Bolts through the box mounts should be adjusted such that the cable can just rotate. Not on the Blade 912 Series.

17. *Throttle Cables*. Check hand throttle cable for signs of fraying on ratchet type levers.

18. *Fuel Line and Carburetor*. Check fuel line for hardening and perishing. Check the primer bulb, and in particular check that the one way valve inside the bulb has not come loose. Check the carburetor needle for wear.

19. *Exhaust and Bracket*. Check exhaust for cracks, particularly around all brackets and welds. Check mounting brackets for cracks and ensure bolts are secure.

20. *Fold Trike*. With the trike unit folded check for overall symmetry. On Alpha and Blade aircraft some leaning is quite normal. If excessive check suspension for wear and for play in the monopole/keel plates.

21. *Hang Bracket Assembly*. Check for distortion, especially twisting. If any found, remove items and check monopole for similar damage. Check also bush for cracking. Check front strut ear bracket and bolts for security.

22. *Front Strut*. Check strut is straight, and check for excessive wear in holes and on all sliding surfaces. Check security of lower section, and ensure that it is assembled correctly. Check front strut fits properly without excessive force being required.

23. *Placards*. Ensure that the correct main placards are in place, and visible. Red placards for the Flash and Flash 2, black for all the others.

24. *Propeller*. On wooden three blade propellers check the clamping shells for cracking. On Warp Drive propeller check that all blades have been pulled out properly. Check the pitch on adjustable blades and ensure all are set the same.