GFA AN 1
(ISSUE 3)

AIRWORTHINESS ADVICE NOTICE

TYPE AFFECTED: ES 52 Kookaburra (Short Wing) all marks and some parts may also affect the ES 52b Kookaburra (Long Wing).

SUBJECT: Miscellaneous airworthiness information.

BACKGROUND: This AN records airworthiness information which is not mandatory but which is useful to know.

MAINTENANCE NOTES: These notes are intended as a guide for the Inspector during a normal Annual Inspection. The notes in no way replace previous or subsequent instructions from the GFA or the manufacturer or normal inspection procedures.

1. GENERAL

The short wing Kookaburra is a two seat training glider, built by Edmund Schneider Pty. Ltd. of Parafield, in South Australia.

The Mk I version is now restricted to normal flight manoeuvres, including spins, and is non-aerobatic.

The Mk II and Mk III versions are certified to BCAR Section E, semi-aerobatic category allowing loops, stall turns and spins.

The Mk IV version has an increased maximum flying weight and is fitted with terminal velocity dive brakes.

Mks I, II, III were normally fitted with spoilers although two Mk I's and one Mk II were fitted with non standard dive brakes.

1.1 STRUCTURE

The airframe is of normal glued ply shell construction with longitudinal members of spruce and birch plywood skinned (mainly 1.5 mm and 2.0 mm). Secondary structural members on some aircraft may be of klinki pine from New Guinea e.g. nose stringers, curved bulkhead laminations, ribs etc. Some of the nose bulkheads are fabricated from thick (19 mm and 25 mm) klinki plywood. Main structural members should be repaired only with selected spruce.

1.2 GLUE

In general all Kookaburras were constructed with casein glue. However, individual components may have been assembled with a resorcinol-formaldehyde glue e.g. the dive-brakes of all Mk. IV Kookaburras after 1964. At least one Mk IV has the majority of its structure built with resorcinol. Casein may be identified as pale cream in colour, resorcinol is a dark brown, almost black.

Generally it is recommended that repairs should be made using modern epoxy glues with casein and with resorcinol as alternatives. If an acid glue is used, it's hardener may be neutralised by the presence of old casein in the structure, resulting in an unsatisfactory repair. Urea and phenol glues are not safe to use over casein.

1.3 FINISH

The interior of the glider is protected by a coat of clear varnish. This may not be readily apparent, but the structure will always need to be well sanded when making repairs.

Most Kookaburras will have been completely fabric covered over all plywood surfaces. However this was not always the case with some of the early production aircraft. The original doping scheme was usually four coats of red tautening dope, followed by two of silver dope (not silver finish) and then white cellulose lacquer. Individual aircraft did vary from this and most will have been repainted in service, sometimes with enamel. White upper surfaces are recommended to avoid high surface temperatures.

Cockpits are usually finished with Dulux 'Colorflek'.

Nowadays most fabric covered aircraft are covered using the modern heat shrink fabrics and their associated finishing schemes.

2. THE FUSELAGE

This is robustly constructed to resist damage in training flights. The main areas to check for damage are at the rear of the cut out for the wing and at the attachment of the tail plane to the fuselage.

Check the fore and aft attachment of the main bulkheads to the skin.

It may help to load the control column. alternately in this direction. Because the main bulkhead is used to take out the control reactions any looseness of the structure will show up as relative movement between the two control columns.

2.1 COCKPIT AREA

All floor boards should be removed to allow thorough cleaning and inspection for water damage. Usually Kookaburras will be found to

have insufficient drain holes, particularly in the cockpit area. It is possible that water can run down into the main bulkhead through the wing inspection hatch and so inspections in this area are required.

2.2 MAIN WHEEL

The main wheel should be stripped and regreased and the axle checked for straightness as a bent axle may be a sign of damaged wheel mounts. The wheel well on later aircraft will be a fibre-glass moulding. Early Kookaburras will have a plywood well and this should be inspected for water damage.

2.3 FRONT SKID

This is laminated from local hardwood, usually Mountain Ash. If the skid has been replaced, check that the dimensions have not been increased in the change over. It is quite often found that this item is substantially overweight. Similar remarks can also be made about the skid shoe. For this reason, a thin stainless steel shoe is recommended, particularly as it is non-sparking as well as providing good wear resistance.

Individual skid rubbers which show signs of splitting or substantial deterioration should be replaced because, although not a safety hazard, they usually overload the other rubbers and can damage skid mountings.

2.4 TAIL SKID

As for main skid. In addition check that the rear clip cannot rotate free from the skid. Check that protruding bolt heads, etc. cannot readily hook on a wire.

2.5 CANOPY

This was originally side hinged with a wooden frame on Mk I aircraft, welded steel tube on Mk II and rear hinged on Mk III's and IV's. Canopy attachment screws should be reasonably loose, to allow expansion of perspex and avoid cracks. Cracks should be stopped with 1/16 inch hole and fixed with perspex cement. Check canopy lock springs for correct tension.

All rear hinged canopies must be fitted with a canopy lock safety strap over the canopy opening mechanism to prevent the canopy flying open if it is accidentally unlatched in flight. When wearing a parachute the safety strap should not be used as it may not be possible to open the canopy in an emergency if the opening mechanism is actuated before the strap is removed.

It is strongly recommended that a transparent panel should be fitted to the centre-section above the instructor's seat (this panel was not fitted to all aircraft).

3. TAIL GROUP

3.1 FIN AND RUDDER

Restrain the rear fuselage with one foot on the tail skid and load the fin top by hand from side to side using about 10 kg to check the attachment of the stern post to the fuselage. Check for looseness of rudder hinges by loading the rudder against its stops. Some slop in hinge pins is inevitable, but in the case of gross wear to early type rudder hinges, these should be replaced with the newer solid type hinges which have increased bearing area. Note: These latter hinges are imported and have a 5 mm metric thread. Check that the correct stop nut is used as a ¼" BSF nut will go on and would be unsafe. If early hinges are retained, check that rotation is restrained by a screw or spigot so that rudder hinges cannot be locked.

3.2 TAILPLANE AND ELEVATOR

The torsional bracing of the tailplane is provided by diagonal members and that the ply nose is a non-structural fairing. Check elevator hinges as for fin and rudder.

Check the centre elevator spar by hand loading the elevator halves in opposite directions. Check that drain holes are provided at the tailplane spar and at each side of the ribs and diagonals in the trailing edge of the elevator.

The fit of the connecting bolt to the elevator horn will usually be fairly loose. This is acceptable provided that the surface of the connecting bolt is not too worn.

Check that the elastic stop nut securing the front tailplane bolt is safe. It should not be possible to spin the nut down with the fingers. Check for correct size of washer under nut and for crushing of wooden block under same. Briefing of club members is necessary to avoid damage in this area. Early Kookaburras were fitted with a rear mounting bolt which had a handle at one end. In some cases this could, if incorrectly installed, limit the down travel of the elevator. This should be trimmed to length so that it clears the elevator spar in all situations.

Not all ES 52's were fitted with trim tabs originally and design details vary widely between installations. Most designs incorporate hard wire which should be checked for fatigue at the elevator hinge line and at the tab horn. All Mk IV aircraft are fitted with a single hard wire drive with a coil spring tensioner. See that this has not been damaged by overenthusiastic testing during DIs.

4. WINGS

Areas to inspect particularly are beneath the spoilers and the central inspection hatch. The trailing edge in these areas also need to be

inspected for possible water damage. Check that sufficient drain holes are provided and that these have not become blocked.

4.1 FITTINGS

Check for corrosion and excessive freeplay on rigging fittings. Check access covers for damage.

4.2 AILERONS

Check hinges as for the fin and rudder. Ailerons should be rigged neutral and float upward approximately 13 mm maximum. With one aileron held at the trailing edge the other should move up 13 to 25 mm with a 2.5 kg upload. See also under 'Controls'. Check also that there is sufficient clearance around the aileron cables and that they cannot be jammed by the swaged ends catching on the fairings near the aileron horns.

4.3 SPOILERS

Spoilers are fitted only to Mks I, II, III. See under 'Spoiler Circuit'.

4.4 DIVE BRAKES

Dive brakes are fitted to Mk IV's. Check that the webs are not warped and that there is no danger of the brakes locking open by the webs catching on the rim of the dive-brake box. Check that the brake arms are not hitting the sides of the box in the fully opened position.

In the case of casein built brakes which show signs of water damage, these should be removed and scraped clean of excess glue. Epoxy resin is recommended for sealing of glue lines and end grain areas before repainting. Also ensure that the fibre bearings are not loose in the brakes. If necessary, these should be reglued with epoxy (e.g. 'ARALDITE').

The dive brakes can be adjusted for endfloat in the arm pivot bearings by tightening the pivot bolt. Access to the bolt heads can be obtained through the fabric to the rear of the brake box.

'Oilite' sintered bronze bearings are fitted to the dive-brake pivots on Mk IV aircraft. These should be wiped clean with a dry rag. Re-impregnating with oil is only required after several years of use.

5. CONTROLS

The controls are mainly cable runs so frequent adjustments may be necessary, particularly during the first 12 months of operation after new cables have been fitted. Cases of flutter in Kookaburra's have been caused by insufficient cable tension.

Regular inspections of the cables for fatigue and wear are also necessary. Dusty conditions will greatly aggravate wear. Cables should not be oiled or painted.

5.1 ELEVATOR CIRCUIT

Check for correct tension, equal travel up and down and operation of stops. Correct travel of elevator is plus or minus 22½° but may be slightly more. Inspect rear pulley attachment for overloading. Check free play between sticks. (See also under 3 Fuselage.)

5.2 AILERON CIRCUIT

The port torque tube has three bearings and the starboard has two. In Mk I and II aircraft all bearings are plain steel on steel. Inspect bearing surfaces for wear and replace with later type assemblies if necessary. Mk III and IV aircraft have ball and needle roller sealed races at ends of torque tube and a fibre bearing at the centre. In both cases slip the centre bearing back to inspect the wear on the port torque tube.

The torque tubes are connected by levers and a push rod beneath the floor. This also contains the aileron stop which should be inspected for overload damage. Correct aileron travel is 16 degrees down and 32 degrees up. Sometimes it is difficult to achieve this travel due to the geometry and therefore it is sufficient to get the central position correct and equal down movement.

Plain bearing fork end lever pins were used on Mk I and II aircraft and these were changed to rod ends with spherical bearing seats on Mk III and IV. Rod ends were connected originally with bolts and castellated nuts or stop nuts at rigging positions only. However the aileron rigging bolts may have been replaced by pip pins in service as the former were difficult to fit.

Aileron cables should be inspected particularly near the dive brake box.

5.3 RUDDER CIRCUIT

Rudder cables pass under the floor on MK I, II and III aircraft and are subject to high rates of wear in the abrasive conditions existing at the floor particularly in combination with fatigue around the below floor pulleys.

Renewing this type of cable system requires that a fuselage panel be opened up in the vicinity of the second bay aft of the wing to provide access to the terminal connection of the four rudder cables. Some early Kookaburras used 7 cwt cable and this should always be replaced by 10 cwt or 1/8" cable.

Mk IV Kookaburras have a simplified rudder system with one cable passing on each side of the cockpit through a fibre tube. For inspections, it is safe to assume that maximum wear will take place at the ends of the tube and that the cable in between is safe. To replace this cable it is necessary to cut one end and use the cable to draw through a wire or string. Alternatively a better method is to weld the new cable onto the end of the old cable. This can be done quite easily but remember to take precautions against fire especially if dopes or paints are in the vicinity.

5.4 TRIM CIRCUIT

Check for correct friction. Operating range will depend on the characteristics of the individual aircraft but it is usually from zero to fully down 15° (ie. nose up trim). See also under 'Tailplane and Elevator'. Replace the hard wire in the elevator every 2 or 3 years.

The torque tube across the rear fuselage is of relatively light construction and can be damaged by either tensioning the cables too much or by not aligning the control hook up when rigging. The maximum tension in the trim wires should be 4 kg. The torque tube should be inspected at each annual inspection.

5.5 SPOILER CIRCUIT

Spoiler drive is via 7 cwt cables. Check this for corrosion near spoiler knob. Check for wear and fatigue where it passes through a copper tube in the centre section and around some very small pulleys. Check return springs for correct tension.

5.6 DIVE BRAKE CIRCUIT

This is operated by push rods throughout. The overcentre mechanism is located in the wing centre-section with tension springs, which partly balance suction (opening) forces. Check that the spring tension is just sufficient to close the brakes from the half open position. In the case of Mk IV aircraft a rigging bolt connection is provided in the cockpit from the front pilot's operating lever.

The normal stop for dive brake operation is provided by the travel limits of the front pilot's dive brake control arm. However, as the rear pilot has considerable mechanical advantage, it is possible to over-ride this stop by bending the operating rod on the left cockpit wall until:

(a) The dive brakes hit fully open position in the wings,
or
(b) The bell crank in the fuselage hits on the operating rod.

In either case, the mounting for the fuselage bell crank is liable to be distorted so a check should be made by removing the cover over this item. Left cockpit wall behind pilots seat.

It is recommended that a tension strap be fitted to the centre section to provide a stop for the rear pilot's dive brake lever.

5.7 RELEASE

Check release cables for wear and corrosion particularly under the release knob.

Maintain releases in accordance with the relevant AD and Basic Sailplane Engineering.

6. INSTRUMENTS

These will vary with individual aircraft but must include an altimeter and an ASI. The altimeter must be calibrated in feet and the ASI in knots. If the ASI is colour coded the colours must conform to the placarded limits.

7. WEIGHT LIMITATIONS

The aircraft should be reweighed if:

(a) any heavy equipment is installed,

(b) it is repainted or

(c) repaired following major damage.

Weighing data can be found on the relevant Type Data Sheet available from the GFA Secretariat on request.