AIRWORTHINESS NOTICE

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Experience from Incidents

1. From time to time incidents occur, usually in aircraft operations, which, in the opinion of the SCAA reflect the need for a general awareness of possible hazard resulting from design practices which may have a wide general application. The purpose of this Notice is to advise all concerned, particularly staff engaged in aircraft maintenance or operation, of such incidents which have come to the notice of the Civil Aviation Authority.

2. **Soft Metal Shims:**

2.1 An incident involving a transport aircraft resulted from the failure of a power control bracket fitted to the elevator.

2.2 A subsequent investigation revealed that soft metal shims were embodied between the bracket and the elevator, apparently for assembly alignment and adjustment. Small diameter special tapered bolts were embodied in shear and set bolts in tension, but the effect of these was quickly lost after initial tightening due to setting or extrusion of the soft metal shims.

2.3 In this type of assembly it is important that the initial torque loading at construction should be maintained through-out the life of the assembly. This object was defeated by the use of soft metal shims and thus a design feature which has been proved by experience to he undesirable was repeated and created a serious hazard.

3. **Crowded Ball Races:**

3.1 An incident occurred as a result of a control shaft becoming completely jammed.

3.2 Crowded ball races have no cage, and the balls are placed in position by forcing them through assembly slots in the inner and outer races. Only a small amount of interference between the ball and the slot is possible during assembly, with the result that excessive wear (which can be caused by rusting) or faulty manufacture can leave the balls free to re-enter the assembly slot. The inner race can then become locked to the outer race and, in addition, loose balls may drop out and possibly create a further hazard.

3.3 Cases have arisen with such bearings in which the clearances become sufficiently large for a ball to move from its proper track into the assembly slot and yet not escape completely because of the configuration of the bearing on the shaft. In this position, the ball completely jammed the control shaft on which it was used.

Among many ways of preventing this kind of hazard is the use of shaped washers alongside the bearing to prevent the balls moving sideways far enough to re-enter the slot.

4. **Oxygen Fire Risk:**

4.1 Serious fire damage to aircraft has been caused where fires (which would. probably otherwise have been insignificant) have been fed by oxygen from the aircraft's piped oxygen system. In some cases an oxygen leak contributed to the out-break of fire, in others the oxygen was liberated by the fire which as a result then became much more severe.

4.2 Although the increased flammability and heat of combustion of many materials in the presence of oxygen is well known, it appears that due regard for this fact is not always paid in the design of aircraft, particularly in the consideration of minor modifications after original construction.

4.3 Precautions should be taken to ensure that an oxygen leak will not create a fire hazard where none previously existed and that a minor overheat of an electrical fire condition cannot damage the oxygen system, thus promoting far more serious consequences.

5. **Flutter of Flying Control Surfaces:**

5.1 Incidents of in-flight vibration on certain light aircraft, believed to be flutter of the manually controlled stabilizer, have emphasized the need to give close attention to mass balance and rigidity characteristics of flying control surfaces.

5.2 Control surfaces on aircraft are designed to a degree of balance necessary to prevent the occurrence of control surface flutter in flight. In some cases, balance weight is added forward of the hinge line to achieve this. As it is important that this degree of balance should be retained, work on control surfaces, such as repair or repainting, should be carefully controlled.

5.3 As a general rule, any repair to, a control surface should be made in such a manner that the structure remains essentially identical to the original. Alternatively, the surfaces may be repaired in accordance with a scheme approved by the manufacturer.

5.4 The cumulative effects of repainting and use of paint fillers may seriously affect the balance of a control surface, and any manufacturer's recommendations regarding this should be followed. In the absence of such recommendations, the SCAA. Airworthiness Division should be consulted.

5.5 The balance of control surfaces should be checked after repair or repainting to ensure that the manufacturer's tolerances have not been exceeded. When it is necessary to adjust balance in order to bring the control surface balance within the tolerances, the manufacturer's procedures should be carefully followed.

5.6 Another cause of control surface flutter is slackness in hinges and linkages of the main control surfaces or tabs, and particular attention should therefore be paid to these points during routine maintenance, to ensure that any free play remains within the manufacturer's tolerances.

6. **<u>Fluids Used In Aircraft:</u>**

6.1 Aircraft are replenished with many fluids for their operation. A recent fatal accident draws attention to the need to avoid the use of incorrect fluids. In addition to the obvious risks associated with damage to systems and failure to function if they are filled with the incorrect fluids, is the risk that the damage may not become apparent until the aircraft is in flight with possible catastrophic results. Use of incorrect fluids may result from: -

(a) Incorrectly establishing the fluid required.

(b) Incorrect identification of the fluid available.

6.2 To avoid incorrectly establishing the fluid required, the following should be observed:

(a) Filling points are required to be clearly marked to indicate the fluid to be used and these markings should be maintained in a legible condition.

(b) Where it is critical that the fluid to be used is to a particular specification(s), the marking may either indicate the specification or provide sufficient information to permit servicing staff to determine which specification is applicable. Where neither is indicated, operators should ensure that the servicing staff follow the operators or the agents procedure that correctly establishes the required specification.

6.3 To avoid incorrect identification of the fluid available, the following should be observed:

(a) Containers and dispensing apparatus should be clearly marked with the identity of the fluid.

(b) If "used" container has to be re-used to contain a fluid other than that corresponding to the original identification then, the identification should removed or permanently obscured and the identification of the new fluid be clearly marked on the container.

(C) Fluids should only be obtained from sources whose integrity in respect of the contents of a container, is beyond doubt.

7. **<u>Inspection in Relation to Spillage or Collection of Fluid</u>**

7.1 Fluid spillage and accumulation of fluids due to inadequate drainage can cause serious corrosion in aircraft structures since the type and extent of corrosion or other damage will depend on the type of fluid, it is important for the fluid to be identified and the extent of contamination assessed, so that corrective action may be taken.

7.2 In some instances the fact that fluids had been present may not have been appreciated because the affected areas had been cleaned out before being seen by an inspector. 'Therefore, if fluid spillage or accumulation of fluids are reported or found these should be made known to an inspector before the area is cleaned. Accidental fluid spillage which is known to have occurred during flight should be recorded in the technical log.

7.3 Cleanliness of the aircraft internal structure is also important because dirt and dust may act as a sponge and retain fluids thus increasing the risk of corrosion

7.4 To prevent corrosion, it is essential to ensure the proper functioning of drains and drain holes. Inspectors should be aware of all the drainage means in the areas for which they are responsible and should check that these are free from obstruction.

8. Foreign Objects - Danger of Jamming:

8.1 'Foreign objects' continue to be one of the major hazards to aircraft control Systems. Recent instances include:

(a) A bolt lodged between a flying control hydraulic booster jack and its chassis:

(b) Hydraulic fluid top-up cans and meal trays fouling primary control cable runs.

(c) A sheared-off nut and stud which caused jamming of an elevator pulley assembly.

(d) A 'spare' control rod left in the base of a fin by the constructor, which caused intermittent jamming of rudder, and was not found during twelve months of operation.

(e) A2 BA nut left on a control chain which caused failure of the chain as a result of the action of sprocket teeth, and resulted in jamming of one flap surface.

(f) A double-ended ring spanner which remained undiscovered for 2½ years in a wing bay which had been opened several times during this period for control system inspection.

8.2 Whilst it is possible by good design to reduce the risk of entrapment of 'foreign objects', maintenance personnel are reminded that, during and after any work on an aircraft, it is essential that all 'foreign objects' should be removed. Personnel must carry out careful checks to ensure freedom from 'foreign objects', particularly when they have been working in the vicinity of flying control systems. Personnel should neither be content to leave missing old or new parts, or tools, unaccounted for, nor fail to check that an area they inspect is free from foreign objects, even though the nature of the most recent work would not introduce any.

9. **<u>Brake and Anti-Skid Systems:</u>**

9.1 Instances have occurred in which wheel brake systems incorporating anti-skid protection have not functioned in a fully effective manner. Subsequently, in most instances, a fault has been discovered in the braking system which has prevented the brakes from operating efficiently on all wheels. Loss of efficiency can result from a variety of causes, e.g. incorrect assembly or failure of components, in either an electrical or hydromechanical anti-skid system. In one instance a cross connection of units in combination with a dormant fault contributed to an accident.

9.2 Experience has shown that dormant faults, which the maximum energy absorption capability of the brakes, can exist without being detected during normal energy stops. These only become apparent when the full effectiveness of the brakes is called into use, such as during a rejected take-off. In order therefore, to guard against such troubles, it will be necessary to institute checks, at agreed periodic intervals and also after any disturbance or replacement of the brake or parts of the anti-skid system, to ensure that:

(a) The operation of each anti-skid sensor controls the brake on the wheel with which it is associated, and

(b) The operation of the whole braking system, including any anti-skid facility, is normal and satisfactory.

9.3 If functional checks carried out in accordance with the relevant Maintenance Manuals would not achieve the objectives stated in subparagraph 9.2 (a) & (b). the aircraft constructor should be consulted in order to agree suitable amendments to the Manuals to include tests which will verify the functional integrity of the system.

9.4 Additionally, Operators having Maintenance Schedules approved by the SCAA should review these Schedules, and if necessary forward suitable amendments which will ensure that functional checks prescribed in the Schedule will cover the particular matters stated in sub-para. 9.2 (a) & b), and that any necessary cross references to the Maintenance Manual are amended or added.

9.5 In the event of difficulty in obtaining agreement with constructors, the Airworthiness Directorate should be consulted.

10. Auto-Pilots on Light Aircraft:

10.1 The aileron controls of a light aircraft recently jammed in flight; the pilot managed to maintain control by means of the rudder. The incident was caused by the corrosion and seizure of a bearing which supported the output drive gear of an auto-pilot roll servo motor. A slipping clutch associated with this gear had also seized. There was no weak link in the drive between the servo motor and the aileron control system.

10.2 The type of auto-pilot involved in the incident is installed in many light aircraft, and the use of a slipping clutch to protect the aircraft against excess servo motor torque, or a jammed servo motor, is a feature common to other types of light aircraft auto-pilots. It must be realised that such a slipping clutch does provide protection against jamming where seizures occur in the drive between the clutch and the flying control system.

10.3 In the operating instructions for the aircraft involved in the incident, the pilot is advised to check the system prior to each flight to ensure that the clutch can be slipped. Wherever practicable a similar check should be made by pilots of all light aircraft found with auto-pilots in which slipping clutches are incorporated.

10.4 Any auto-pilot servo motor (including bearings and attachments) which is connected so as to be part of the Flying Control Installation, must be subjected to the same maintenance cheeks as those called up in the Maintenance Schedule for the Flying Control Installation.

10.5 At all times the manufacturer's recommendations for operating and maintaining the auto-pilot must be adhered to.

11. Unauthorized Alteration of Parts:

11.1 Fatal accidents to Civil Aircraft have occurred after, and at least in one instance, certainly because of the unauthorized alteration of parts in such a way as to enable their incorrect assembly and functioning. No part which could affect the safety of an aircraft may be altered other than in accordance with drawings or instructions from the constructor or an appropriately approved organization.

11.2 In the assembly of all parts, but particularly when any change which could affect interchangeability has been made, care must be taken to ensure that the correct part for the particular purpose is fitted, that it is fitted correctly, the right way round and, if a working parts, that it, and the system of which it is a part, works it the correct sense and throughout the correct range

11.3 No alteration may be made to nullify a feature provided to prevent wrong assembly.

12. Maintenance of Radio Navigation Equipment Course and Alarm Signal Current Limits:

12.1 Following an aircraft accident, it is understood that investigation of the ILS Localiser and Glide Path systems revealed that the signal current settings were set too high. This could result both in the course indicator being over-sensitive and in the flag warnings failing to appear in fault conditions.

12.2 Engineers must ensure that the instructions contained in time relevant maintenance/overhaul manuals are complied with, particularly those applicable to course deviation and alarm current settings.

12.3 Prior to installation in an aircraft, engineers must ensure that the current settings of units are compatible with the particular aircraft system.

12.4 Any adjustments found necessary must only be carried out in a workshop where the necessary test equipment and maintenance/overhaul manuals are available and by persons appropriately approved.

12.5 Most ramp test equipment, whilst capable of checking alarm circuits for some gross failures, is inadequate for checking their operation in other important cases. In particular, it will not reveal whether current setting is such as to prejudice proper flag operation. The SCAA is discussing with manufacturers the possibility of modifying such equipment e.g. by making provision for the interruption of the tone sources so as to enable a check of the operation of alarm circuits of the installation to be made, and the outcome of these discussions would be the subject of manufacturers bulletins.

12.6 It is good practice, which the SCAA will expect operators and maintenance orgamtisations to implement, that all units incorporating adjustments for variable loads, whether in aircraft or held as spares, have a label indicating the loads for which the unit has been adjusted fixed in a prominent position on the front of the unit Aircraft using such units should have a similar label fixed to the unit mounting.

13. Bonding of Strobe Lights

13.1 An incident has occurred on an American light aircraft, prior to take off; of an explosion followed by a fire. This was caused by the ignition of spilled feed aided by an electrical spark at an incorrectly bonded strobe light fitting Following this incident Emergency Airworthiness Directive 7-20- 11, covering Beech Aircraft, has been issued by the FAA.

13.2 Since this hazard could develop during service on any aircraft to which strobe lights are fitted, the attention of owners and operators is drawn to the need to ensure that such strobe light units are correctly bonded, as outlined in 3, 4 and 5.

13.3 For all aircraft, it is recommended that all strobe tights installed in areas which may be subjected to either spilled or vented fuel, or to high concentrations of fuel vapour (such as the wing tips or lower fuselage), should be inspected to ensure that a positive bond, not greater than 0-05 ohms resistance, is provided between the airframe and light housing. The inspection and any necessary rectification action should be carried out as soon as is practical, but in any event not later than the next scheduled airframe maintenance inspection.

13.4 wherever practical the bond should be a short, flexible, metal strap, attached between the light housing and the aircraft local structure and with clean metal -to-metal contacts. After completion, the bonding attachments and surrounding areas should be adequately protected against corrosion.

13.5 where the form of bending described in 4 is impractical, a good metal-to-metal contact between the light housing and the aircraft structure, must be ensured. This contact area must be clean, and free from paint. dirt or corrosion.

13.6 The recommendations of this Notice are applicable to strobe light which are fitted either during the initial build of the aircraft, or by subsequent modification action.

14. Security of Re-fuelling Point Caps

14.1 An incident has occurred in which overwing fuel leakage occurred during flight, and an adjacent engine was shut down to minimize fire risk.

14.2 Subsequent investigation showed that on completion of the re-fuelling the overwing re-fuelling point cap has been fitted with the retention chain trapped between the cap and the re- fuelling point seating ring, thereby creating a gap through which fuel was drawn by aircraft over the wing during flight.

14.3.1 Unless care is taken to ensure that the chain is not trapped when refitting re-fuelling point caps, the caps can be installed in the apparently secure and locked position, and yet be potentially hazardous.

14.4 It is essential that persons engaged on, and responsible for re-fuelling aircraft should ensure that re-fuelling point caps are correctly re-fitted.

1 4.5 Persons responsible for authorising others to refit re-fuelling point caps must ensure that such persons are aware of the correct procedure, and will avoid the hazards resulting from non-compliance.

15. **Emergency Escape Provisions - Doors and escape chutes:**

15.1 During an emergency evacuation following a collision on the ground, considerable difficulty was experienced in opening two of the aircraft doors and in deploying the associated inflatable escape chutes. Subsequent investigation showed that the difficulty was caused by incorrect stowage of the chutes and their release aprons. And, in the case of one door, by the fitment of an incorrect part. Inquiries have revealed that similar difficulties have also been experienced in the USA on various types of aircraft.

15.2 In addition to routine inspection, it is normal practice to remove inflatable chutes from aircraft at intervals of approximately 18 months and to inflate and check them, however, it is now known that this procedure does not give an indication of any deterioration of the installation which could result in an inability to open the door or to deploy and inflate the chute. Such deterioration has been shown to be the more common cause of failure in time past. It is considered therefore, that rather than the removal of chutes from the aircraft, they should be tested by opening the doors with the chutes in the 'armed condition, and checking that they deploy and inflate correctly. It is appreciated that this along will not guarantee correct future operation of all chutes on any particular aircraft, but it will provide a running check on the adequacy of chute and door operation.

15.3 For all aircraft fitted with inflatable escape chutes which arc automatically deployed by the opening of doors, each chute/door combination on the aircraft should be tested by the automatic release and inflation of the chute at intervals not exceeding 15 months. The testing should be continued until a satisfactory standard of reliability is achieved, after which progressive reduction in the testing, on a sampling basis could be applied, in consultation with the SCAA. In order not to lose valuable experience, it is desirable that the release should be made by cabin staff.

15.4 Where release and inflation test, on a sampling basis, are already being performed as part of an agreed Maintenance Reliability Programme, the programme of test may continue, provided that on each aircraft type the sample is such that 10 or 10% whichever is the greater of all the exits in the fleet at which automatically deployed inflatable chutes are installed, will have been tested within an elapsed period of not more than 2 years .The sampling may continue to be random but must be such as to ensure a reasonably uniform distribution of the exits on that aircraft type.

15.5 In addition to any prescribed mandatory defect reporting a record should be kept of failure of doors to open or chutes to deploy and inflate and should be made available to the SCAA (Airworthiness Directorate) on request.

15 .6 Operators should forward to the (SCAA (Air worthiness Directorate) amendments to their Approved Maintenance Schedules such as will take account or the tests required under paragraph 3 of this Air worthiness Notice.

16 **<u>Self-locking Fasteners:</u>**

16.1 Recent incidents on helicopters have highlighted a continuing hazard where self-locking fasteners on control system linkages have become detached, allowing control linkages to separate. Similar instances have been recorded on fixed-wing aircraft.

16.2 Maintenance personnel are reminded that careful attention must be given to the security and tightness of all self locking fasteners on control system linkages, and to such fasteners used to secure components which are frequently removed.

16.3 In every case the manufacturer's guidance should be adhered to in relation to the use and re-use of self- Locking fasteners. Such fasteners must not be re-used unless the user is satisfied that the self- locking characteristics have not deteriorated. Where no guidance is available from the manufacturer, it is recommended that the guidance given, in SCAAIP Leaflet 2-5 para. 8 including the advice not to re-use certain fasteners, should be followed.

17. **<u>Ground Handling of Transport Aircraft:</u>**

17.1 In recent years there have been a number of occurrences involving nose undercarriage failure in the older types of transport aircraft. These failures can be attributed, at least in part, to loads induced during towing or push-back. Such loads have, in a number of cases, resulted in the initiation of fatigue cracking, leading to subsequent failure under operational loads.

17.2 Aircraft constructors specify suitable ground handling equipment, compatible with the aircraft type, designed to avoid overloading e.g. employing shear pins which fail at predetermined loads. However, it is possible to induce overloading by rapid acceleration or braking, especially when employing large powerful tractors to move the smaller types of aircraft. Furthermore, certain manoeuvres now commonly employed, such as 'push-back were not anticipated in the design of some older aircraft.

17.3 Operators, especially those of the older types of aircraft ,should ensure that the correct ground handling equipment is always employed, that it is adequately and regularly maintained, and that particular care is taken when using large powerful tractors. Also operators should check with the constructor that their ground handling procedures are compatible with the aircraft design.

18. **Flap Systems on General Aviation Aircraft:**

18.1 Incidents in which aircraft have experienced a sudden asymmetric flap retraction have occurred in the U. K. Two of these incidents, one of which resulted in a fatal accident, involved different types of aircraft of United States origin and were caused by malfunctioning of a single 'down' limit micro switch. Subsequent mechanical failures in the flap operating mechanism resulted from repeated high loading when the flap drive system reached the mechanical limits of its travel.

18.2 Other incidents have been reported in which asymmetric flap retractions have resulted solely from mechanical failures of the flap drive system. e.g. Operating cables or flexible drive assemblies.

18.3 It is recommended that, during functional checks of the flap operating systems , particular attention should be paid to the correct operation of all microswitches which affect the travel limits of the flaps and to the condition of all visible elements of the operating mechanism.

18.4 Where the 'up' and 'down' limits of flap travel are governed by the operation of single microswitches and one of these microswitches is found to be faulty, the operating mechanism should be checked for any evidence of static over-loading.

18.5 Where a modification to introduce an additional microswitch is available, it is strongly recommended that it should be embodied. One manufacturer has, in fact, already produced such a modification.

19. **Single Path Control Systems:**

19.1 An incident which could easily have been a serious accident occurred because the single strand inner core of a flexible push pull mixture control failed at the mixture control lever on the carburetor and the lever subsequently vibrated into the lean position, resulting in a loss of engine power during take-off.

20. **Electrical Power Supplies – Light - Aircraft. Care and Maintenance:**

20.1 Investigations into incidents involving total loss of electrical power supplies on light aircraft have shown that insufficient care was taken in the maintenance of the major components of the electrical system.

20.2 It would appear that not everybody is sufficiently aware that a single fault, or a single fault plus a dormant fault, many cause the loss of electrical system supplies. For example:

(a) If the battery becomes disconnected from a generation system using 'commercial' type alternators, instability may occur with the subsequent loss of the output of both alternators and result in the aircraft becoming electrically 'dead'.

(b) On a twin-engined aircraft a slack drive belt may operate quite adequately when both generators/alternators (generator) are sharing the load, but may slip should the other generator fail, with the resultant loss of output from both; leaving the electrical supplies dependent on the battery. On a single engine aircraft the belt may slip with increasing electrical load on the system with similar results.

(c) Faults in the load-sharing system may affect both generators, possibly to such an extent as to result in the loss of output from them both.

20.3 while there are, obviously, many other faults which may result in generation system failures, those examples are quoted since they have occurred a number of times in-service.

20.4 It is useful to remember that should both generators fail and difficulty be experienced in re-setting, it may be possible to re-set one of them by reducing the electrical load to a minimum. Having re-set one, it is advisable not to attempt to re-set the other, since this may cause permanent loss of the output of both.

20.5 The attention of Owners and Operators is drawn to the necessity for ensuring that the following items are checked periodically: -

(a) The battery and its control relay must be correctly installed, and the battery terminals must be free from corrosion and correctly tightened.

(b) Voltage setting and load sharing adjustment (where applicable) must be correct.

(c) All cable connections must be secured with locking devices in place and with end fittings showing no signs of fatigue fracture or corrosion. Earth connections are equally as important as the positive connections.

(d) Drive belts for generators must be checked to ensure that they are in good condition and correctly tensioned.

20.6 It is recommended that these checks should be carried out approximately every 100 flying hours or three months whichever is the sooner. The appropriate Maintenance Schedules should be reviewed and where necessary amended to take account of these recommendations.

20.7 The operation of the appropriate indicator and failure warning devices should be checked daily or during the preflight drill.

20.8 Whilst the SCAA considers that to require mandatory modification action is not justified and that the situation should be contained by the diligent application of maintenance procedures. Owners and Operators may nevertheless wish to consider modifications to improve the reliability of their own particular aircraft by, for example, the introduction of an emergency battery to act as a power source for vital services should the main electrical system fail. Such batteries have already been introduced on certain aircraft, and installation information is available.

21. **Painting of Aircraft:**

21.1 Incidents have been reported of damage to aircraft structure and equipment as a result of the use of unsuitable materials and techniques during paint stripping and re-painting operations.

21.2 Damage and potential hazards can arise from such reasons as: -

(a) Use of incorrect stripping agents resulting in damage to non-metallic structural materials, sealant and transparencies.

(b) Ingress of stripping agents affecting internal protective treatments

(c) Contamination of systems such as pitot/static and fuel venting.

(d) Restriction of movement between adjacent parts because of paint build -up.

(e) Weight of finish affecting control surface balance (See Appendix NO.4) to this Notice.

(f) Removal of Lubricant as a result of the washing action of cleaning agents.

(g) Incomplete removal of masking and blanking materials after painting.

(h) Aircraft weight and centre of gravity may be significantly affected by a strip and re-paint.

Although there are no requirements for the certification of stripping and painting operations it is, nevertheless recommended that this activity should always be carried out under the supervision of a licensed aircraft engineer or an authorized member of the Staff of a SCAA Approved organization.

22. **Altimeters in General Aviation Aircraft:**

22.1 A recent incident occurred in flight in which the altimeter pressure setting scale became detached from the altimeter pointer when the pilots was attempting to set up the appropriate QNH. This resulted in a large indicated altimeter error.

22.2 Subsequent investigation revealed that satisfactory operation of the altimeter depends on the barometric adjustment control knob being attached to the spindle so that no fore or aft play exists between the knob and the instrument bezel . If such play exists, forward pressure on the knob may disengage the barometric adjustment scale from the altimeter pointer.

22.3 A number of altimeters of US manufacture are known to be prone to this particular defect. Included amongst these are the following: Aero Mechanism 8040, 8142 Series; Kollsmann Altimeter II; Narco AR 800 Series; and Bendix 3252013 Series Dial Pointer Type.

22.4 The Federal Aviation Agency is aware of this defect and is considering remedial action. In the meantime operators are advised to check that the barometric adjustment control knob is secure on the spindle and that the correct distance, as stated in the Manufacturer's Overhaul Manual, exists between knob and bezel.

22.5 It is strongly advised that before flight the following checks are made:

(a) that rotation of the barometric adjustment control knob results in a movement of both the pressure setting scale and the altimeter pointers, and that forward pressure on the knob during rotation does not disengage the barometric adjustment scale from the altimeter pointers.

(b) That the relevant altimeter pointer reading is compatible with the setting on the barometric adjustment scale.

23. **Used Components:**

23.1 It is recommended, that components including materials where deterioration due to age may occur, be inspected periodically. If signs of ageing, hardening, or deterioration of rubber components, insulation materials, or corrosion of metallic components are found, such components should be assessed and renewed as necessary.

23.2 Original servicing schedules and procedures should be used wherever available with due regard to the low utilisation of the aircraft. Operators are advised to consider additional periodic inspections for all components and equipment which may be affected by calendar time deterioration.

24. **Primary Structural Fasteners Made in H-II Steel:**

24.1 An abnormally high failure rate in service of H-Il steel bolts has been reported from the USA. Such failures are mainly caused by stress corrosion. H-Il is a *5%* chromium molybdenum tool steel to specifications such as BS4659; BH-II; TD 22L MS 488; ISI -Il Modified. Iris heat-treatable to tensile strength above 1400 Mpa (over 200,000 lbf/in^2) with good strength retention at high temperature. Typical applications are specialised bolts in engine. nacelle, flap track and undercarriage mounting structure and H-Il is also offered as a material in some standard rings of fasteners.

24.2 Aircraft constructors are asked to review their current and projected designs and take any necessary action to avoid the use of H-Il fasteners wherever practicable, particularly in locations where any fastener is:

(a) In a tension application;

(b) A single load path;

(c) Exposed to phosphate-ester hydraulic fluid above 120⁰C (250⁰F);

(d) Exposed to exhaust gases;

(e) Subject to weathering.

24.3 Owners and operators are asked to review their aircraft fleets in respect of such fasteners to ensure:

(a) Adequate maintenance of corrosion protection schemes.

(b) Implementation of any Manufacturer's SB on the subject.

(c) Correct torque tightening (without over-torque) of such fasteners on re-installation.

24.4 When in service, failures have occurred, the remaining H-Il fasteners should be replaced by a fleet campaign rather than on an attrition basis. The aircraft constructor should be consulted regarding replacement fasteners of a suitable alternative material.

25. **<u>Corrosion Inhibiting (Temporary Protective) Compounds:</u>**

25.1 In conjunction with the international activity on ageing aircraft, the SCAA has been reviewing the nature of corrosion inhibiting (temporary protective) compounds and their use in the transport aircraft operating industry.

25.2 Overall it has become clear that operators may be using such compounds that are different from those recommended or approved by the manufacturer of the aircraft they operate. Operators are reminded that in such circumstances it is their responsibility to ascertain, and technically justify, the fitness for purpose of the compound they use in their particular applications, furthermore, adequate procedures should be in place to ensure that the material procedures consistently meets its specification.

25.3 On this latter point a local authority trading standards department has advised the SCAA that in recent years one product of intermediate viscosity has been supplied to the industry with its viscosity clearly above specification maxima.

25.4 One consequence of too high viscosity is the lack of penetrating capability which could lead to areas structure, particular mating surfaces remaining unprotected. Operators are of the appropriate viscosity. Should they believe that they have used such non-conforming materials on an aircraft. the area of application should be cleaned and reprotected with appropriate confirming in material at the next maintenance opportunity.

26. **<u>Allison 250 Series Gas Turbine Engines</u>**

26.1 Resulting from an inquiry into an accident and numerous other similar incidents 'which have occurred worldwide attention is drawn to the importance of complying with the Allison engine Operation and Maintenance Manual requirements for the proper installation and assembly of pneumatic control system, lubrication, or fuel system tube assemblies, on the Model 250 engine. Particular attention is drawn to the fuel system air pressure sensing lines

(Pc sensing) as non compliance with the established manufacturer's assembly procedures can and has resulted in engine failure.

26.2 The following warning notices are clearly posted in the engine Operation and Maintenance Manuals to draw attention to the proper assembly procedures.

WARNING:

AIR LEAKS IN THE FUEL SYSTEM OR THE PNEUMATIC SENSING SYSTEM CAN CAUSE FLAME OUTS. POWER LOSS OR OVERSPEED.

WARNING:

PROPER TIGHTENING OF ENGINES TUBING CONNECTIONS IS CRITICAL TO FLIGHT SAFETY. CORRECT TORQUE VALUES MUST BE USED AT ALL TIMES. EXCESSIVE TORQUE ON PNEUMATIC SENSING SYSTEM CONNECTIONS RESULTS IN CRACKING OF THE FLARE CAUSING AN AIR LEAK WHICH CAN CAUSE FLAME OUT, POWER LOSS, OR OVERSPEED.

WARNING

FAILURE TO PROPERLY INSTALL, ALIGN AND TORQUE FUEL, OIL, AIR FITTINGS AND TUBES COULD RESULT IN AN ENGINE FAILURE.

26.3 Personnel involved in turbine engine maintenance work are, therefore, reminded that they should make particular reference to the engine and aircraft manufacturer's publications to ensure that the proper assembly, torque loading, and anti creep procedures are adhered to and applied when working on the subject Systems.

CANCELLATION:- This issue cancels all previous issues of Notice No. 26 which should be destroyed.

For/ Director General
Civil Aviation Authority