BRITISH GLIDING ASSOCIATION

TECHNICAL COMMITTEE

TNS 1/2/80

1. AIRWORTHINESS "AGGRO"

1.1. Please amend the GREEN Pages to eliminate the following drafting errors and omissions:-

Page 4 T.61 "Falke" - should read TI.81.

Page 5 "Vega" - add TI.89.

Page 7 "PIK 20" - line 3 should read FOKKER PIN

Page 7 "PIK 20D" - line 4 should read U/C LEVER

Page 13 "ASK Series" - line 5 should read K6E/14/10

Page 21 "IS.29" - line 1 should read TAILPLANE MASS

(LAST YEAR'S YELLOW PAGES SHOULD HAVE BEEN SCRAPPED!)

1.2. Pirat: Control Cables. There is some evidence that control cables may have become contaminated with glue/hardner in production and suffered some premature deterioration. (Reported by Southdown Aero Services) Previously recorded in "Green" Pages.

1.3. Super-Falke: Tube fractured, in rear fuselage. Excess movement of the tailplane tip with associated "clicking" noise was found to be caused by fractured vertical metal tube between main port tailplane pin and bottom longeron. (Reported by Joe Podolski, Norfolk)

1.4. Bergfalke III: Fatigue cracks at weld on aileron spar tube. (Glider had 23,638 launches). Found on C. of A. renewal inspection by Brian Weare.

1.5. Slingsby T.59 Kestrel : T.I. No 89 (herewith)
Slingsby T.65 Vega :

Has been issued to rectify loose bolt groups that may arise in critical areas, into "blind" nuts.

1.6. Scheibe Series Gliders. (MU 13E Bergfalke, Bergfalke II, Bergfalke II-55, Bergfalke III and IV). Attachment of C.G. Hook - cracks and/or deformation of structure. AD 75-501 and T/Note 104-15 require inspection annually. (Copy herewith)

1.7. T.53/Sovereign/YS53 Series: Further cracks have been reported at top of Frame 6 where centre section bolts to the fuselage, notwithstanding previous modifications. (Reported by G. Bailey-Woods to B.G.A. and Slingsby Engineering). TI. No. 90 attached.

2. GENERAL MATTERS.

2.1. Construction of Gliders from Kits and Part Kits: B.G.A. Technical Procedure Manual Section 17, provides guidelines for the construction of the above, supervised by B.G.A. (Ordinary) Inspectors. (Copies of B.G.A. Technical Procedure Manual from the B.G.A. Office, price 75p plus 15p Postage and Packing)

3. TUGS/MOTOR GLIDERS.

3.1. Severe Corrosion - Tailplane spars - Rallye. The attached extract from C.A.S.I. is self explanatory. Unless exceptional anti-corrosive preventive maintenance is applied to Rallye series aeroplanes, the consequences will be catastrophic both commercially and airworthiness wise. Chromate protection or repeated spraying with an acceptable corrosion inhibitor (Rocket W.D. 40?) should be considered (Chromate in aerosol cans from Van Dusen etc.)

3.2. Gypsy Major 10-2: Connecting Rods. The B.G.A. have successfully appealed to the Airworthiness Requirements Board (A.R.B.) Light Aeroplane Committee against the ruling in C.A.A. Notice No. 35, that connecting rods to Mod. 2994 Pt. 1 Standard, are required before T.B.O. extension beyond 120%. C.A.A. Notice No. 35 will be amended in due course. (Authority C.A.A. letter to B.G.A. Ref. 9/80/EE3/SHA dated 25/1/80).

3.3. "Ceconite" Covering of U.K. Light Aircraft. As the result of representations made by the B.G.A. to the C.A.A. at the General Aviation Consultative Committee (G.A.C.C.), C.A.A. Notice No. 20 will be amended to permit the use of "Ceconite" in accordance with Ceconite Manual 101. (From Van Dusen Aircraft Supplies - Bicester 43381).

3.4. Radio Transmitter Crystal Checks. The C.A.A. requirement for an annual check of crystals (Light Aircraft Maintenance Schedule - LAMS - Section 8, Item 2), in respect of Aircraft Certificate in the "Private and/or Aerial work categories, has been withdrawn as the result of representations made by the B.G.A. to the G.A.C.C. The I.C.A.O. requirement for a frequency check of transmitter crystals at 48 month intervals, remains. (Where equipment is repaired and the frequencies checked at the same time, the 48 month period will re-commence at that date, so it will pay to keep a record of that transaction. (L.A.M.S. will be amended in due course). (Authority Minutes of G.A.C.C. Meeting 4.12.79).

3.5. Tug Managers Advisory Package. (T.M.A.P.) The C.T.O. has put together some guidelines on tug ownership/operating cost calculations/management of overhauls and spares/the selection of tugs/insurance/utilisation etc. Available from the B.G.A. office price 75p + 15p p.&p.

3.6. Tug Cylinder Head Temperatures, Compression Checks etc.

Extracts from AVCO-LYCOMING "FLYER" (June 1979) are attached herewith.

Please draw to the attention of your:- TUG PILOTS

PARISH NOTICES

1. **B.G.A. Inspectors List for 1980.**

   This is enclosed herewith, please notify sins and omissions to B.G.A. Office.

2. **Price List for 1980.**

(a)	Inspector's renewal.	£7.50
(b)	Glider C. of A. renewal	£11.50
(c)	Motor glider C. of A. (3 yr) PIK 20E	£85.00
(d)	Motor glider C. of A. (3 yr) Falke/S-Falke	£120.00
(e)	C.A.I.P. leaflets (selection)	£6.35
(f)	Standard Repairs	£2.80
(g)	B.G.A. Technical Procedure Manual (Gliders)	90p
(h)	B.G.A. Technical Procedure Manual (T) Tugs	90p
(i)	Winch and Auto-tow Equipment	90p
(k)	Forms 267 (blocks of)	£3.05

HAPPY NEW YEAR

R.B. STRATTON
CHIEF TECHNICAL OFFICER.

Encs.

TECHNICAL INSTRUCTION NO. 89

SLINGSBY T59 KESTREL AND T65 VEGA GLIDERS

INSPECTION OF STIFF ANCHOR NUTS

INTRODUCTION

A case has been reported of a loose bolt group on a Vega Glider. This instruction requires that an inspection of critical areas be carried out and that bolts lacking in stiffness be locked.

APPLICABILITY

This Technical Instruction is applicable to all Kestrel T59 and Vega T65 gliders.

COMPLIANCE

This inspection has been made mandatory by the Civil Aviation Authority and must be carried out before the next flight and at subsequent annual inspections. This Instruction is to be kept with the glider manual to form part of the maintenance instructions for the glider.

PROCEDURE

At all the following positions ensure that the quoted break out torques are exceeded by applying the stated torques using a torque measuring device or spring balance and spanner/screw driver.

REQUIRED BREAK OUT TORQUE

T59 KESTREL GLIDER

1.	Elevator root rib attachment fitting	6 screws	1.2lb ins
2.	Rudder pedal carrier rear fixing	1 bolt	1.2lb ins
3.	Aft of cockpit on frame 1 rudder bar mounting	4 bolts	1.2lb ins
4.	Aft of wheel box, aileron layshaft mounting	4 bolts	1.2lb ins

T65 VEGA GLIDER

1.	Belcrank mount on wing root rib	4 screws each wing	.5lb ins
2.	Rudder pedal carrier rear fixing	1 bolt	1.2lb ins
3.	Aileron belcrank at stb. side of cockpit under control column access panel	3 bolts	1.2lb ins
4.	Attachment of layshafts to fuselage side	8 bolts	.5lb ins
5.	Access panel cover in tail wheel bay	9 screws or 3 bolts 6 screws	.5lb ins

cont'd......

Bolts and screws which meet these torque limits require no further action.

Bolts and screws which do not meet these requirements must be locked by one of the following methods:

1. Drill bolt heads 1/16" dia and wire lock using soft iron wire (DTD189) 24 swg

2. Reassemble with Locktite 636 following instructions on the container.

Following removal of any of the critical bolts referred to above, the bolts are to be locked with Locktite 636 when replaced or alternatively wire locked on replacement.

This Technical Instruction must be kept with the glider manual to ensure continued compliance throughout the life of the aircraft.

TNS/1/80

AIRWORTHINESS DIRECTIVE

79-501 Scheibe

Date of issue:
November 23, 1979

Affected sailplanes:
German Type Certificate no. 104
Mü 13E "Bergfalke"
Bergfalke II
Bergfalke II-55
Bergfalke III
Bergfalke IV
all serial numbers

Subject:
Attachment of the c.g. release hook

Reason:
Cracks and/or deformation in the attachment structure of the release hook as a result of insufficiently tightened attachment bolts.

Action and compliance:
1. During the next annual inspection but not later than April 1, 1980, check the attachment structure for cracks and deformation as well as the attachment bolts for sufficiently tight fit.
   If one of the above mentioned defects is found, repair it prior to the next winch launch as described in the working instruction to "Technische Mitteilung" 104-15.
2. Insert the following sentence on the page of the respective operating manual specified in "Technische Mitteilung":
   "During every annual inspection check the attachment structure of the c.g. release hook for deformation and cracks".
3. During a general overhaul or a corresponding repair as well as in the case of a new construction install the release hook in accordance with drawing no. 104-C-11-S12/2 (reinforcement of the attachment structure).

Technical information of the manufacturer:
Technische Mitteilung no. 104-15 of August 8, 1979,
which becomes herewith part of this AD and may be obtained from
Messrs. Scheibe Flugzeugbau GmbH, August-Pfaltz-Str. 23, 8060 Dachau, W. Germany.

Accomplishment and log book entry:
Action to be accomplished by authorized persons only and to be entered and certificated in the glider's log.

Note:
This Airworthiness Directive replaces AD no. 77-25 of February 3, 1977.

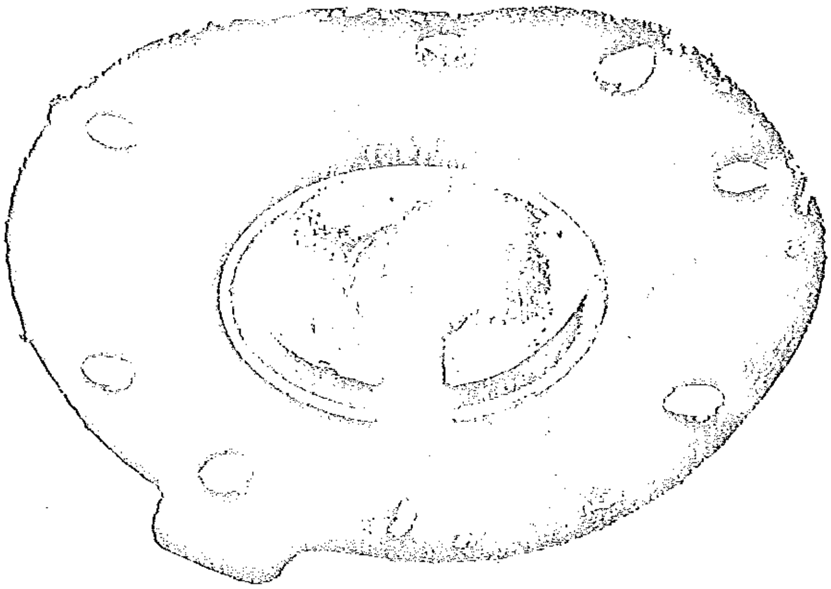
TNS 11/80

FUEL PUMP FAILURES

13. Mechanical Fuel Pumps

Aircraft : Jodel-Wassmer D120 Paris-Nice, Registration G-AXDX
Date : October 1979 (applicable to many other aircraft)
Engine : Rolls-Royce Continental C90
Notifiable Accident near Tholthorpe, Yorkshire

The engine stopped when the aircraft was at about 850 ft. The pilot attempted to make a forced landing into undulating farmland, but the aircraft struck the ground very heavily destroying the fuselage and wings. The wooden cockpit area to which the shoulder harness was attached also collapsed. The pilot received severe head injuries and both occupants received severe leg injuries. The cause of the engine stoppage was failure of the AC mechanical fuel pump. A back-up electric pump is not fitted to this aircraft type.



CAA Comment:
The AC mechanical pump (AC 1539867, Continental Part No 40585) had failed because the end of the slotted spindle had broken away, thus freeing the actuating lever. The likely cause was corrosion resulting from wear in the slot which removed the protective copper plating. This is the second failure of this type that we know of to this type of mechanical pump. The previous failure was on a Lycoming O-320 engine in a Glos Airtourer (see GASIL 8/77 p.1), the Lycoming Part No being 75246. All operators of aircraft with this pump should check the condition of the slot at the next convenient opportunity. This particularly applies to those aircraft types which do not have a back-up electric pump.

Aircraft : Aerospatiale Rallye
Date : October 1979

CORRODED Tailplane Spar.

During C of A renewal on two aircraft, very serious corrosion of the L section booms of the tailplane spars was found, such that there was total disintegration over several inches. There was also quite serious corrosion of various extrusions used as stringers in the upper and lower fuselage spine members. The tailplanes of both aircraft are to be scrapped and it may well be that both aircraft will be written off, or at least need very extensive repairs. The aircraft were manufactured in 1974.

CAA Comment:
Both aircraft were recently flown, and were undoubtedly in an un-airworthy condition, such that had they been subjected to extreme manoeuvres or loads, a failure could have resulted. The manufacturer issued relevant SB133 in November 1977. The CAA has for some time been in touch with the manufacturer over this continuing problem (see GASIL 1/78 p.3) and is reviewing the need for mandatory CAA action.

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CHECKING ON HIGH CYLINDER HEAD AND OIL TEMPERATURES

Our personnel at the factory receive queries from time to time from operators about the cause and cure of high oil and cylinder head temperatures. In a number of cases it was not an engine problem causing the high readings, but the oil or cylinder head instrument or systems giving false readings.

As an example of what can cause erroneous high readings, we have found loosely connected oil temperature sensors which would give false high readings. Similarly, loose cylinder head temperature leads with intermittent contact will give false CHT readings too. In some cases the gages fluctuate, which tends to indicate a loose connection. We have also had reported high cylinder head temperatures as a result of the cylinder head temperature lead passing too close to an exhaust stack.

In sharing this information with our readers, we are trying to save operators time and cost when investigating a problem concerning oil or cylinder head temperatures. Always begin an investigation of an engine problem of this nature with the easiest, least costly check, which means that the engine instrument or instruments must be investigated first to determine their accuracy.

CHECK A/S. BAFFLES, SEALS, COWLINGS, etc etc.

WATER BOILS at 100°C –! so tests can be made with a kettle!!

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THE COMPRESSION CHECK AS A MAINTENANCE AID

Those of us who visit many maintenance organizations in General Aviation can't help noticing that the compression check is used quite universally as a maintenance aid. It has also been used for many years by the military and airline maintenance people on their reciprocating engines.

Why A Compression Check?

A compression test can be made any time faulty compression is suspected, and should be made if the pilot notices a loss of power in flight, finds high oil consumption, or observes soft spots when hand pulling the prop. It is also considered part of the 100-hour engine inspection and the annual inspection. But most experienced maintenance personnel feel that the compression check is best used to chart a trend over a period of flight hours. A gradual deterioration of charted compression taken during routine maintenance checks would be a sound basis for further investigation and possible cylinder removal. This maintenance attempt to reduce the possibility of engine failure is generally called preventive maintenance.

How Is It Accomplished?

As all maintenance people know, there are two basic equipments in use. (1) The direct compression (Old automotive type), and (2) the differential, using an input of 80 psi of air. Of these two, the differential is considered best in that it is a more precise method of locating specific areas of trouble, it is simple to use, and it is better than the direct method for locating combustion chamber problems in an early stage of their development.

It has been our experience that either method of compression investigation can be handled in such a way as to give almost any reading. This does not infer that there are necessarily dishonest mechanics, but it is an attempt to advise operators that cylinders should not be pulled indiscriminately, based on a single set of readings.

(CONTINUED ON NEXT PAGE)

AVOID SUDDEN COOLING OF YOUR ENGINE

Pilots must avoid fast letdowns with little or no power and rich mixtures which causes sudden cooling and a number of engine problems. The Avco Lycoming *Flyer* has published a number of articles over the years, recommending good operating techniques to prevent sudden cooling of the engines.

Investigation of bent pushrods in our engines reveals that sudden cooling during operation can cause this problem. Engineering was able to produce like conditions that result in the exhaust valves sticking, which in turn causes bent pushrods.

Spark plug fouling is another of the problems brought on by sudden cooling during operation which we have written about in past issues. In order to avoid plug fouling, we have recommended during descents maintaining the mixture at the leaned cruise condition with a gradual richening of the mixture, carrying some power, and at a sensible airspeed in order to maintain the most efficient engine temperatures possible.

In another related article from the *Flyer*, we noted that Air Traffic Control had advised pilots to expedite their descent in some instances, which resulted in sudden cooling and engine problems. Aircraft used to tow gliders or drop parachutists have also been vulnerable to the effects of sudden cooling after their drops and the descent to the airport. Investigation of a number of these engines at the factory revealed broken piston rings, cracked cylinders at the spark plug and valve ports, and warped exhaust valves due to *sudden cooling*.

TUG PILOTS

Recommended pilot technique to prevent engine problems of this type suggests maintaining at least 15 inches MP (or higher with pressurized aircraft), and setting the RPM at the lowest power chart cruise position which will prevent piston ring flutter. Letdown speed should not exceed high *cruise* speed or approximately 1000 feet per minute rate of descent. During close-in letdowns, the aircraft can be "dirtied" by dropping the gear, or some flaps, or both. This technique will prevent high airspeed and sudden cooling, and yet provide a good rate of descent. Any technique that prevents sudden cooling during descent will be helpful.

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COMPRESSION CHECK—*Continued*

Mechanics make honest errors, equipment becomes inaccurate, and since there is little or no standardized information for reference purposes, it is relatively easy to incur unnecessary maintenance charges.

Therefore, suppose we list some key points to observe concerning differential compression checks, review some cross checks which should be made when low compression readings are observed, and state a brief logical conclusion.

Differential Compression Test

We will not attempt to repeat the operating instructions which accompany the equipment. This should be read and followed carefully for best results. The following recommendations will supplement the instructions accompanying the equipment:

1. A standard 80 psi of input air is recommended. More pressure makes it difficult to hold the prop.
2. A loss in excess of 25 percent of the 80 psi, or reading of 60/80 is the recommended maximum allowable loss.
3. The engine should have been run up to normal operating temperatures immediately preceding the compression check. In other words, we recommend a hot engine check.
4. The differential compression equipment must be kept clean and should be checked regularly for accuracy. Check equipment with the shutoff valve closed and regulated pressure at 80 psi (the cylinder pressure gage must indicate 80 psi or minus 2 psi) and hold this reading for at least 5 seconds. Homemade equipment should be carefully calibrated.
5. The differential equipment does not consistently show excessive wear or breakage where 5 piston rings are involved.
6. If erratic readings are observed on the equipment, inspect compressor system for water or dirt.
7. If low readings result, do not remove the cylinders without a re-check after running up the engine at least three minutes, and refer to the cross checks listed later herein.
8. Caution. Take all necessary precautions against accidental firing of the engines.

Cross Checking Is Important

Rather than rely on one source of information concerning the condition of the combustion chamber, it is wise to make crosschecks, particularly when the compression readings are questionable. Therefore, we would like to recommend the following before removing a cylinder.

1. Remember that spark plugs tell a story. Carefully check the spark plugs removed from any cylinder with a low reading.
2. Use at least a gooseneck light or preferably a boroscope and carefully check the top of the piston and cylinder walls.
3. Consider the health history of the engine. Has it had previous difficulty of this nature?
4. Has the pilot observed any loss of power in the engine during flight or during runup?
5. How has the engine been maintained and operated during its life? If the maintenance and care have been proper and consistent there is less likelihood of trouble.
6. The supervisor of maintenance should evaluate as many of the known factors such as discussed here and make a recommendation to the pilot.

Conclusion

Whatever your opinion of the compression check as a maintenance aid, it is probable that no pilot or mechanic would care to omit it during a 100-hour or annual inspection. On the other hand, since most everyone seems to use it on the flat opposed engines, we ought to share our experiences with its application to our powerplants. This has indicated that the differential is the best of the two equipments currently is use, and particularly so when the readings are charted as a trend over a number of routine inspections. It is a good tool for preventive maintenance and aiding in avoiding inflight failures. Cross checking is good procedure rather than relying on one source of information concerning the condition of the combustion chamber.

USE OF TCP AS A FUEL ADDITIVE

After awaiting additional field experience on TCP (tricresyl phosphate), Avco Lycoming issued Service Letter No. L190, dated March 16, 1979 giving qualified approval of the use of the fuel additive in our engines. It may only be used with normally aspirated engines (not with turbocharged or supercharged), and requires approval by the aircraft manufacturer prior to use. TCP must be mixed according to the instructions provided by Alcor, Inc.

Aircraft engines using grade 100 octane aviation fuel and experiencing spark plug fouling have been aided by mixing TCP with the fuel. Alcor requests that the pilot or mechanic judge TCP by its performance in an engine rather than by visual observation of the quantity of deposits. TCP's effectiveness is based on changing the character of the deposits, and very often a change in the quantity of deposits cannot be visually observed.

An Alcor booklet titled, "TCP As A Lead Scavenger For Reciprocating Piston Aircraft Engines—A Summary of 25 Years Experience," tells the story of TCP. It was introduced as a fuel additive for piston aircraft engines 25 years ago for the purpose of making the combustion chamber deposits from TEL (Tetraethyl lead) less conductive and thereby reducing spark plug fouling. It has been in use, according to Alcor, to varying degrees ever since.

When TCP was introduced as an AvGas additive, it was soon approved by the big engine manufacturers who needed a solution to the lead digestion problem. Turbochargers and superchargers tend to accumulate excessive deposits with use of TCP, therefore these types of engines should not use TCP.

The Alcor booklet pointed out that the effectiveness of TCP in reducing spark plug fouling is due to several factors. The plug deposits formed are softer in texture and less tenacious, so that they are more readily blown out of the combustion chamber during the exhaust stroke. The deposits themselves have a higher electrical resistance and are less corrosive—which means less spark plug gap growth.

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FUEL CONTAMINATION–Water (says the FAA) is the principal contaminant of aviation fuel. For a safe flight, carefully drain fuel sumps at each preflight.

Slingsby Engineering Limited

Kirkbymoorside

York YO6 6EZ

TECHNICAL INSTRUCTION NO.90

SLINGSBY T53B AND LATER VARIANT YS53

IMMEDIATE INSPECTION OF ATTACHMENT OF WING CENTRE SECTION TO FRAME 6

Introduction

A case has recently been reported of a fatigue crack occurring in the welded bracket which holds the rear spar member of the centre section to the fuselage frame 6. This is a recurrance of the type of failure described in Slingsby Sailplanes Technical Instruction No.69 which has reoccurred on a modified aircraft.

Applicability

This instruction is applicable to all T53B gliders and to later variant YS53 by Yorkshire Sailplanes.

Compliance

This inspection has been made mandatory by the Civil Aviation Authority and must be completed before the next flight.

Procedure

Inspect the welded bracket which holds the rear spar member of the centre section to the fuselage frame 6. Cracks have occurred at the corner of the fitting where the attachment flanges begin.

Also inspect the metal lugs and channel section on frame 6 which are attached to this fitting (see attached sketch).

If any cracks are found the aircraft is to be grounded. All findings are to be reported to Slingsby Engineering Limited marked for the attention of the Chief Designer.