BRITISH GLIDING ASSOCIATION

TECHNICAL COMMITTEE

TECHNICAL NEWSHEET 11/12/89

PART 1 AIRWORTHINESS "AGGRO"

1.1 ASW 15. Extension of Service Life from 6,000 hours to 12,000 hours. Subject to detailed inspection at 6,000 hours. Letter from Schleicher dated 18/10/89 refers to a submission made to LBA.

1.2 ASW 24. Aileron Restriction caused by interference with speed-brake machinery in the centre section. Failure of the support stop forward of the speed-brake control handle in the cockpit, allowed the speed-brake mechanism to rotate too far. Notified to owners and to Schleicher (RAFGSA report). (Gliders below serial number 24025 are affected).

1.3 Grob G.102's. (Club Astir II, Standard Astir II, G.102, Club Astir III, G.102 Club Astir III B, G.102 Standard Astir III). Service Bulletin TM 306-27 requires inspection for "parting of the inner elevator hinges", caused mainly by improper handling during pre-flight check.

1.4 Centrair 101 (Pegasus). Failiure of the Trim Spring. There have now been several cases of fracture of the trim spring, without any prior evidence of corrosion or distress. The spring should be replaced where doubt exists as to its integrity. Pilots should be warned of this potential failure. (Southdown G.C.)

1.5 Grob G.103C Twin II Accro. Service Bulletin TM315 - 41. Replacement of SLAVING Guide and Spindle on Rudder Pedal Unit.

1.6 Grob G.103C Twin III Accro. Service Bulletin TM 315 - 40 requires amendment to English translated flight manuals and placards.

1.7 Schleicher K.2, K.6, K.7, Ask 13. LBA A/D 72-7/2 requires inspection of elevators for "loose glue joints."

1.8 Degredation of Wooden Propellers. AAIB extract 10/89 gives useful information on disasterous degredation of wooden propellers.

1.9 Eon 460. (BGA 1371). AAIB Bulletin 10/89 gives a full accident investigation into this fatal accident. ALL owners of Oly 460/463 series should check the validity of their weight and balance.

1.10 T.49 Capstan. Weak Link Ratings. The BGA have approved an increase to 600kgs, to accommodate the more energetic winches.

1.11 Winter Warnings. The extract from G.A.S.I.L. is well worth reading.

1.12 Fatal Towing Accident. AAIB Bulletin 10/89 includes many lessons that need to be learned by all concerned.

1.13 Piper PA18/19 Supercubs. Piper Service Bulletin 910 A now requires an annual test of the wing lift struts, and replacements within 24 months.

1.14 Piper PA-2C5 (Pawnee). Piper Service Bulletin 528 C requires annual inspection of wing lift struts (previously 5 years).

The BGA have suggested to the CAA that N.D.T. techniques are available as an alternative to replacement.

The above Service Bulletins are made mandatory by the L.A.M.S. Please consult your maintenance organisation.

1.15 Removal of FOREIGN Registrations from aircraft operating in the U.K. Article 5 of the Air Navigation Order is self explanatory:

Nationality and registration marks

5 (1) An aircraft (other than an aircraft permitted by or under this Order to fly without being registered) shall not fly unless it bears painted thereon or fixed thereto, in the manner required by law of the country in which it was registered, the nationality and registration marks required by that law.

(2) The marks to be borne by aircraft registered in the United Kingdom shall comply with Part B of Schedule 1 to this Order.

(3) An aircraft shall not bear any marks which purport to indicate:

(a) that the aircraft is registered in a country in which it is not in fact registered; or

(b) that the aircraft is a State aircraft of a particular country if it is not in fact such an aircraft, unless the appropriate authority of that country has sanctioned the bearing of such marks.

PART 2. General Matters.

2.1 Cracking of Cylinders (Lycoming Engines).

The enclosed letter from Lycoming has been kindly made available by Lasham.

The BGA do not recommend the use of reconditioned / reconstituted / "retread" cylinders obtained from the USA since their prior life is totally unknown. BGA TNS/9/10/89 refers.

2.2 DTI Wireless Telegraphy Checks have been made in the Oxford area, not only for licences, but also of frequency checks for spurious omissions! You have been warned!

2.3 Glider and Motor Glider Repair Procedures and Repair Reports. All concerned are reminded of the requirements of BGA Technical Procedure Manual Section 7. For product liability protection reasons, well documented repair reports should be compiled and retained. A copy is required by the BGA office, and a further copy should be secured in the log books.

WEIGHING reports must be secured in the log books and a copy sent to the BGA office. The validity of the weight and balance of all gliders must be checked not exceeding 5 years.

2.4 Spare Parts. A Pilatus B4 (as spares) is available from Mr. Merritt, Nutkin Farm, Kingsclere, Newbury, Berkshire. RG15 8SS.

2.5 Mogas. Non-dedicated Mogas from the "Filling Station Forecourt" will be approved in CAA Airworthiness Notice No. 98A due to be issued in December 1989. (Nine years since the Mogas Airedale G-AVKP first flew on the BGA Trials programme!).

2.6 This is the last TNS for 1989, and will be the last you ever receive if you have failed to renew your BGA Inspection Approval. (£15.00). This fee includes your insurance indemnity cover!

Club Technical Officers (and BGA Inspectors) please communicate the airworthiness advice in BGA Technical Newsheets to your club members.

The BGA Technical Committee wish you all a Happy Christmas and an Airworthy New Year, and thank you for your contribution to the maintainance of safety and airworthiness.

R.B. STRATTON

CHIEF TECHNICAL OFFICER

(1)

G-102

INNER Elevator HINGES

GROB TFE	Service Bulletin TM 306-27	GROB ASTIR II G 102

Subject: Inspection of all elevator hinges

Effectivity:

Club Astir II	as of s/n 5001C
Standard Astir II	as of s/n 5001S
G 102 Club Astir III	as of s/n 5501C
G 102 Club Astir IIIb	as of s/n 5501Cb
G 102 Standard Astir III	as of s/n 5502S

Urgency: before next flight

Reason: During operation of the above gliders parting of the inner elevator hinges has occured on occasion, caused mainly by improper handling during preflight check.

Actions: For precaution all elevator hinges, either on the elevator or on the rudder,are to be checked for delamination. Especially attention should paid for hairline cracks and small buckles around the hinges.
Any defect found should be mended by a professional repair before next flight.
Referring to pre-flight inspections in the future, please do never push the elevator over its constructional stop by force.

Material: for repairs: see Repair Manual

Weight and Balance: No effect

Remarks: The action can be carried out by a competent person and has to be certified in the log-book

Mattsies, 13 September 1989 LBA approved

The German original of this service bulletin has been approved by the LBA on the 20.10.89, 1989 and is signed by Mr. Skov..
The translation has been accomplished to our best knowledge and judgement. In case of doubt, the German original is authoritative.

signed i.A. R. Rischer
(Airworthiness engineer certification staff)

P.S.: If in the interim you have sold your glider, we ask you kindly to forward this information immediately to the new owner and let us know his address and serial number.

Datum	ersetzt Ausgabe vom	Bearbeitung	Musterprüfer	Seite
13 Sept 1989		J. Altmann		1 of 1

GROB	Service Bulletin TM 315-41	GROB G 103 C TWIN III ACRO

G103C (2)
Rudder Pedal Unit.

Subject:	Substitution of slaving guide and spindle in rudder pedal unit.
Concerning:	GROB G 103 C TWIN III ACRO all serial numbers, except those already equipped. (refer to list, page 2)
Urgency:	Next annual inspection
Procedure:	Supplier used wrong material for manufacture of slaving guide and spindle. As precautionary measure those parts have to be replaced by new ones.
Actions:	Remove, mark, respectively destroy present slaving guide and spindle and replace them by new parts.
Material:	Material necessary for SB can be obtained from manufacturer free of charge.
Weight and Balance:	No influence
Remarks:	Installation can be carried out by an expert according to Installation Instruction No. 315-41. Correct execution is to be certified into logbook by an authorized inspector.

Mattsies, 28 Sept 1989

signed i.A. R. Rischer
(Airworthiness engineer
certification staff)

LBA approved
The German original of this service bulletin has been approved by the LBA on the 09 Oct. 1989 and is signed by Mr. SKOY.
The translation has been accomplished to our best knowledge and judgement. In case of doubt, the German original is authoritative.

P.S.: In case you have meanwhile sold your glider, we ask you kindly to forward this information immediately to the new owner and let us know his address and s/n of his aircraft.

(3)

G.103.C
Flight Manual

GROB TFE	Service Bulletin TM 315-40	GROB G 103 C TWIN III ACRO

Subject: Revision 1 of the following manuals:
- Flight Manual (German issue)
- Maintenance Manual (German issue)
- Flight Manual (English Issue)

Effectivity: GROB G 103 C TWIN III ACRO
all s/n

Urgency: latest at the annual inspection

Reason: For rectifying differencies between the German and English issue, which caused mainly by translation, the above mentioned manuals are revised as follows.

Actions:

Action 1:
Exchange of the following pages (dated: 18 July 1989):

1. Flight Manual (German issue)
   0.2, 0.3, 0.4, 2.11, 2.12, 4.15
2. Maintenance Manual (German issue)
   0.1, 0.2, 0.3, 3.5, 4.1, 4.4, 5.3, 6.5, 7.5, 7.8, 8.2, 8.4
3. Flight Manual (English issue)
   0.2, 0.3, 0.4, 0.5, 2.3, 2.5, 2.11, 2.12, 3.3, 4.3, 4.15, 6.4

Action 2:
Exchange of the placard concerning "Towing Cable Weak Link" on English cockpit placards

Material: The material for performing the SB will be supplied with the Service Bulletin.

Weight and Balance: No effect

Remarks: The actions can be carried out by a competent person.

Mattsies, 18 July 1989

signed i.A. R. Rischer
(Airworthiness engineer certification staff)

LBA approved
The German original of this service bulletin has been approved by the LBA on the 8. Sept. 1989 and is signed by Mr. A. Skov.
The translation has been accomplished to our best knowledge and judgement. In case of doubt, the German original is authoritative.

P.S.: If in the interim you have sold your glider, we ask you kindly to forward this information immediately to the new owner and let us know his address and serial number.

Datum	ersetzt Ausgabe vom	Bearbeitung	Musterprüfer	Seite
18 July 1989		J. Altmann		1 of 1

(4)

Schleicher Series

Airworthiness Directive

Elevators
Loose Glued Joints

72-7/2 Schleicher

Date of issue:
24. AUG. 1968

Affected gliders:
German Type Certificate No. 140
Ka 2, all serial nos.
German T. C. No. 203,
Ka 2 b, all serial nos.
German T. C. No. 205,
Ka 6, K6/0, K6B, K6BR, Ka6C, Ka6CR, alle serial nos.
German T. C. No. 205a,
Ka 6B-S, serial no. E 1
German T. C. No. 211,
K7, all serial nos.
German T. C. No. 216,
K8, all serial nos.
German T. C. No. 267
AS-K 13, all serial nos.

Subject:
Elevator

Reason:
On the elevator structure of some of the afore mentioned gliders loose glue joints have been detected, which could have been caused by moisture or by aging process.
The affected site is the joint between nose rip No. 1 on the nose skin on both elevator halves.

Action:
1. Remove elevator and inspect glue joints between rip No. 1 and the plywood nose skin using a small penknife. An additional check can be made by applying a suitable load into the rudder lever.
2. In case a faulty joint is detected remove rip No. 1 in its entirety and prepare for a new glue joint. Faultless roughning of the surfaces to be glued is essential. For adequate protection against moisture, cover joints between rip and nose skin with fabric.
3. Make an entry on appropriate page of the Service Manual with the following text: Action 1 and 2 to be repeated at every 3rd annual inspection.

Compliance:
Before the next start

Accomplishment and log book entry:
Action 1 and 3 to be accomplished by a skilled person.
Action 2 to be accomplished by an approved service station.
All action to be entered in the sailplane's log by a licensed inspector.

Note:
This Airworthiness Directive replaces [illegible] No. 72-7 of February 9, 1972

For technical questions regarding repa[illegible] methods please contact Manufacturer, Messrs. Alexander Schleicher, Segelflugzeugbau, 6416 Poppenhausen/Wasserkuppe, Federal Republic of Germany.

(5)

Piper SB. 528C and 910A.

LIFT STRUTS

PURPOSE: Piper Aircraft has determined that the five (5) year repetitive inspection interval, required in Service Bulletin No. 528B or Service Bulletin 910, may be inadequate for the timely detection of serious wing lift strut corrosion. Therefore the compliance time for the corrosion inspection and treatment is reduced to intervals not exceeding twelve (12) months, one (1) year from the last inspection or the first use of a new lift strut. This corrosion, if allowed to progress, may lead to failure of the wing lift strut with the possibility of loss of wing structural integrity.

This Service Bulletin provides an inspection and treatment procedure to detect and treat the corrosion which may appear in the wing lift strut assemblies.

APPROVAL: The technical contents of this Service Bulletin have been approved by the F.A.A.

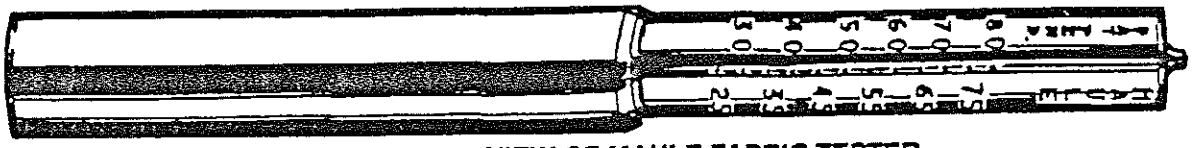
INSTRUCTIONS:

1. Remove wing lift struts and accomplish the inspection per Inspection Procedure on Sketch "A". Caution: All aircraft utilizing "cuffs" at the wing lift strut roots (top and/or bottom) should take extra care in inspection for external corrosion in the areas covered by the cuffs.
2. Inspect forks, clamps, fairleads and jury struts for condition and replace as necessary. All attaching hardware should be replaced.
3. After completion of the Inspection Procedure but prior to the corrosion impediment procedure of the wing lift struts, turn each wing lift strut upside down and tap gently. This procedure is necessary to remove any water, debris or corrosion particles.
4. Lift strut tubes indicating presence of internal corrosion and which fail the inspection procedure must be replaced with new wing lift struts or repaired per F.A.A. Advisory Circular 43.13-1A (Repair of wing and tail brace struts by an F.A.A. approved facility.) Note: Should corrosion be apparent from the outside, (rust pin holes or large rust stained areas) strut must be replaced or repaired even if strut passes the Inspection Procedure.
5. Treat (corrosion impediment) each wing lift strut per the instruction procedure note on Sketch "A". Treatment (corrosion impediment) must coincide with each inspection as outlined in the compliance time above.
6. Lift Strut assemblies which have been factory treated with corrosion preventive measures are identified by the installation of a cherry lock rivet installed at the upper (wing attachment) end.

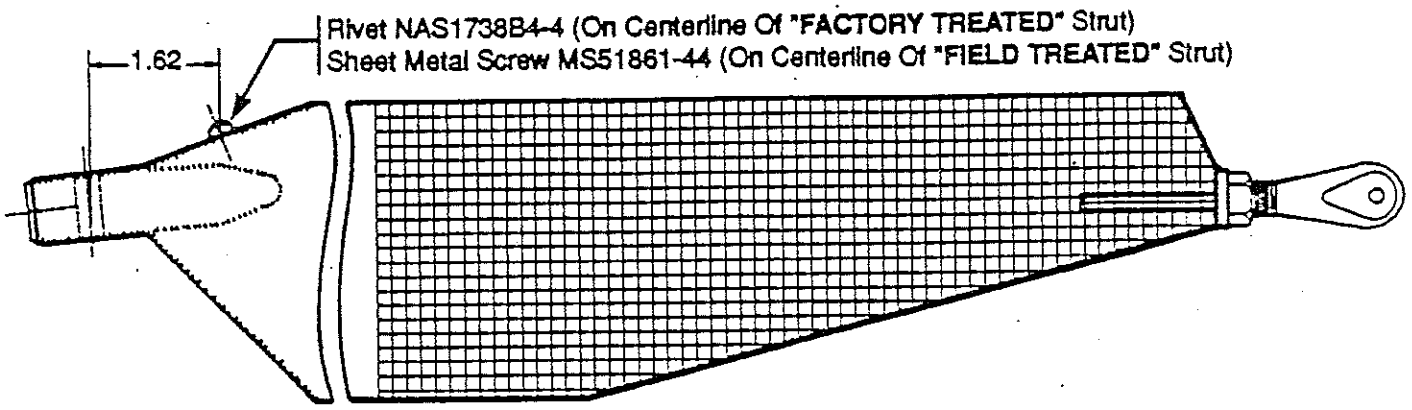
NOTE:

Alternate preservative materials: In addition to the "Val oil" and "Lionoil" (preservatives), it is permissible to use the following alternate preservatives - Paralketone, linseed oil or any alternate preservatives that satisfy the requirements of Federal Specification TT-S-176D.

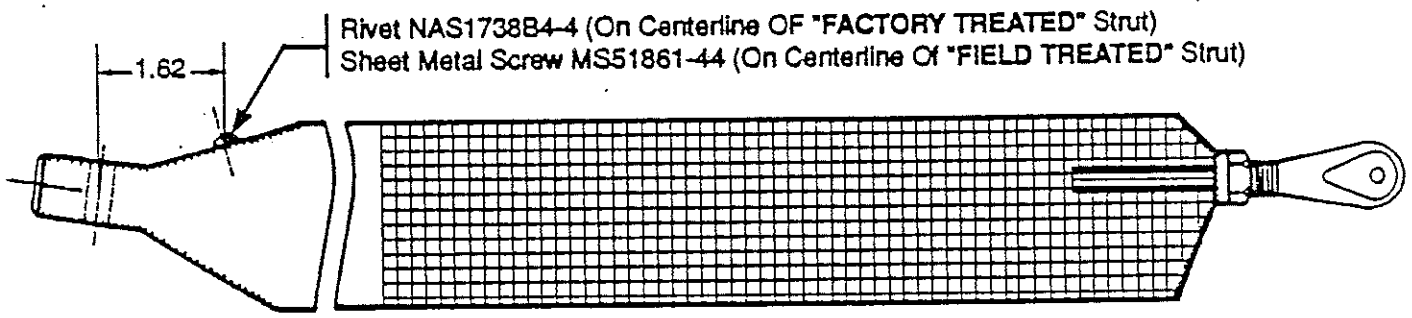
7. Upon successful completion of the inspection procedure and treatment reinstall lift struts on the aircraft.
8. Check aircraft rigging and adjust as necessary. (Use appropriate Piper Service Memo and Owner Handbook as required to accomplish proper rigging.)
9. Make a appropriate log book entry of compliance with this Service Bulletin.



VIEW OF MAULE FABRIC TESTER



BOTTOM VIEW OF FRONT LIFT STRUT ASSEMBLY



BOTTOM VIEW OF REAR LIFT STRUT ASSEMBLY

INSPECTION PROCEDURE

1. Securely tape a sheet of thin 1/4 inch graph paper to the lower 11 inches of the top and bottom surface on all wing lift struts.
2. Using a Maule "FabricTester" and holding tool normal to strut contour, apply pressure at a scale reading of 80 in in each of the grid blocks.
3. Remove the paper and inspect the lift strut tubes. A perceptible dent will appear if internal corrosion is present. If any dents are found, be certain the dent are in the metal by carefully removing the paint.
   a. Lift strut tubes indicating the presence of any preceptible dent in the metal must either be repaired per FAA Advisory Circular 43.13-1A by an approved FAA repair facility or replaced with new lift strut assembly before further flight.
   b. If no dents appear in the metal, the lift strut may be considered airwothy.

   NOTE

   Further internal corrosion may be impeded per the following procedure:
   a. Remove lift strut from aircraft.
   b. Inject one quart of Valoil, Lionoil Multi-Purpose L-1, Linseed Oil, Paralketone or any alternate preservative conforming to Federa lSpecification TT-S-176D, into the bolt hole at the top of the strut.
   c. Plug the bolt holes and slosh oil until interior of strut is throughly coated.
   d. Drain oil from strut (through bolt holes) and install MS51861-44 sheet metal screw, as shown, for future identification.
   e. Reinstall strut to aircraft and rig.
4. Record lift strut inspection in aircraft logbook.

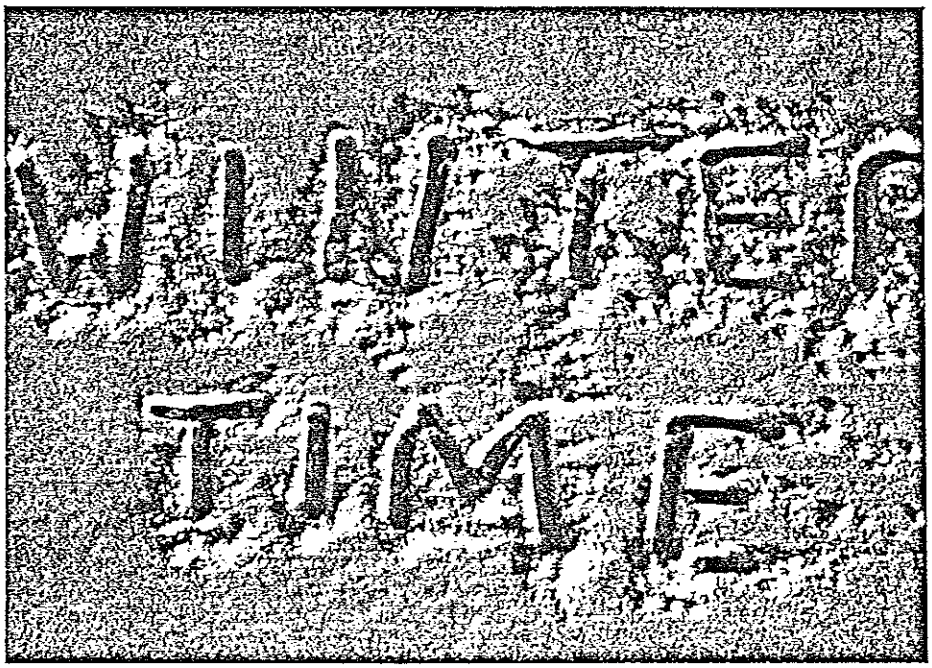
SKETCH "A"

12. WINTER WARNINGS

P/E (7)

Over the last 2 years, we've all become rather complacement about winter time and perhaps do not put enough preparation into winter flying.

However, for those who watch Nature's way of preparing for the winter, you will notice that all the bushes and trees have very heavy crops of berries and this can herald a hard winter.



Let us consider some of the basic precautions which must be taken before winter flying.

- You must remember that **ANY** snow or ice on aerofoil surfaces can seriously impair the efficiency and characteristics of the aircraft. This is especially important for aircraft which have "laminar flow" aerofoil section.

- Check carefully that there is no build-up of snow in any of the landing gear bays and that there is no build-up of ice in places like the spinner or aerofoil sections. In the latter case, check that all the vent holes are clear and thus able to allow water to escape. This is an essential precaution to be carried out now.

- Make certain that the pitot heater control is fully operational. If you don't have pitot heat, don't fly when there is a risk of being caught in a snowstorm.

- Remember, if planning a take-off from a snow covered runway, the take-off distance to 50ft can be increased by 25% or more. In some cases, the snow might prevent take-off altogether. Read carefully AIC 52/1985 and Safety Sense Leaflet No.7.

- In flight, you must remember to make **REGULAR** use of the carburettor heat control. Carburettor icing forms slowly and insidiously, so regular checking of your engine gauges for loss of rpm or manifold pressure is essential. The engine might run roughly after selection of carburettor heat since it takes a little while, often 10 to 15 seconds, for any build up of ice to melt. Give the carburettor heater a chance to work.

- On long flights, make certain that the heater in your aircraft is functioning properly and keeps the windshield demisted and the pilot and occupants warm. CAA recently heard of a case where the heater in the aircraft didn't function and the pilot started suffering from hypothermia to such an extent that his decision-making abilities and motor functions were seriously affected.

Cont....

- Beware of static electricity discharges when refuelling on a crisp, clear winter's day. The very low humidity can be conducive to static build-up.

- When back on the ground, particularly if the apron or taxiway is icy, take care when dismounting from the aircraft. Jumping from the aircraft walkway to icy ground might lead to a painful tumble.

- And finally, although you might feel happy that your aircraft is safely hangared, do check the overall structural soundness of the hangar in which your aircraft is based. In the winter of 1986, no less than 7 hangars collapsed under the weight of snow.

11. ENGINE FIRE - OIL COOLER HOSE FAILURE

Could apply to Tugs + Motor Gliders P/E

Aircraft : Piper PA23 Aztec
Date : May 1989
Engine : Lycoming T10-540-CIA

Shortly after landing the tower reported that smoke was coming from the right-hand engine so the pilot shut down the engine and the small localised fire was put out by the airport fire service.

It appeared that the fire was fed by engine oil and on examination, one of the oil hose was found to be leaking. The hose was laboratory examined by the makers and after removal of the outer braid a circumferential "slit" about half an inch long was discovered , located half an inch behind one of the securing sockets. The wire braid surrounding the slit area showed no signs of abrasion, cutting etc. It was not evident what caused this type of failure, since it was not typical of hose failures which had been reported previously.

Further examination revealed longitudinal cracks on the internal bore of the tube. These cracks generally ran the entire length of the hose assembly. However, the cracking was more pronounced in the failed area. This type of cracking typically indicates that hot fluid in excess of design limits had passed through the hose assembly.

There is no mention in the aircraft maintenance records of any high oil temperatures, and the aircraft owner has stated that the oil temperature had not exceeded the red line limits.

CAA Comment: It is in the interests of all pilots to ensure that engines do not over heat since this could be one of the problems which would result. Should any of the engine gauges indicate above their normal operating range, it is advisable to have an engineer check the aircraft.

E2 LOSS OF TORQUE ON PROPELLER BOLTS

Aircraft type : Piper PA-25 Pawnees (and other Glider Tugs)
Date : August 1989

During routine inspection, it was noticed that the propeller bolts on 2 Hoffman HOV-4 wooden propellers had lost torque. In both cases, severe fretting between the hub faces and propeller faces was found. In one case the locking wire was broken due to movement of the bolts and signs of material overheating of the propeller boss was found. Cracks were found running from the stud holes in the propeller boss rear face. The likely cause for this is shrinkage of the wood due to the continued hot weather during the summer of 1989.

The UK agents for these propellers have written to all of their customers and have referred them to the owners manual NR E0110.74 Page 10 which details the inspection procedures or these propellers.

CAA Comment:
The same problems of wood shrinkage and possible loss of torque applies to all

AAIB

No: 11/89 Ref: EW/C1133 Category: 1c

9

Aircraft Type and Registration:	PA 18 Super Cub 150 G-BBDI
No & Type of Engines:	1 Lycoming C 320 piston engine
Year of Manufacture:	1965
Date and Time (UTC):	24 August 1989 at 1813 hrs
Location:	Portmoak Airfield, Scotlandwell, Near Kinross, Scotland
Type of Flight:	Glider towing
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (fatal) Passengers - 1 (fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence with IMC and night rating
Commander's Age:	22 years
Commander's Total Flying Experience:	750 hours (of which 520 were on type)
Information Source:	AAIB Field Investigation

Tug Fatal Accident

History of the flight

The aircraft was regularly used to tow gliders at the Scottish Gliding Union gliding site at Portmoak Airfield. It had been used throughout the day of the accident and in the evening was towing gliders as part of a programme of air experience flights for the staff of a nearby hotel. After the towing aircraft had been fully refuelled, the first aerotows took off in a westerly direction towards Loch Leven but, due to a change in the weather, the tug pilot had changed the direction of take-off to an easterly one. The pilot was joined by another private pilot who was to be given some experience of aerotowing and he occupied the rear seat of the aircraft. At 1810 hours the aircraft with its tow rope was hooked up to a 2-seat glider and took-off to the east, turning right after take-off and then heading west. At a height of about 450 ft the glider pilot decided that the cloud base was too low and cloud cover too extensive to permit a further climb and so he carried out a normal release of the tow rope and turned left as is standard practice. The tug aircraft continued turning right and was seen to fly across the airfield from south to north at a height between 300 and 400 feet. The tow line was seen to be trailing normally behind the aircraft. As it reached the northern boundary of the airfield, it banked to the left and, according to some eyewitnesses, the nose of the aircraft was raised. As the turn continued the aircraft nose dropped and it spun to the left rotating two or three times before striking the ground almost

vertically. Both occupants sustained fatal injuries at impact and the aircraft was completely destroyed by fire. Examination of the pilots at autopsy did not reveal any medical condition that may have contributed to the accident.

Club members and their visitors immediately ran from the launching point and attempted to extinguish the fire using hand held fire extinguishers and a small light water trailer. More extinguishers were brought across from the club house but the fire was too severe for them to be effective. The Kinross fire service arrived after some 15 minutes and finally extinguished the fire.

Meteorological information

An aftercast obtained from the Meteorological Office, Bracknell showed a weak cold front with minor waves was lying east to west some 5 to 7 miles south of the area and moving slowly south. The weather was mainly dry with patches of drizzle. Visibility was greater than 10 km. The surface wind was assessed as 090°/ 6 kt and that at 1000 feet was 270°/23 kt. The temperature was +13°C but it would have been some 4°C warmer about one hour earlier before the southerly passage of the weak front. It was noted that these conditions of temperature and humidity were conducive to the formation of carburettor ice at low power settings. With the surface front in its assumed position relative to Portmoak there would have been discontinuity at about 500 to 800 feet above the site. The low level wind associated with the cold undercut would have been the first to veer to north or northeast and be reinforced by flow up the Forth of Tay, coupled by any sea breeze component which would have veered the surface flow even further but still probably at less than 10 kt. From the wind structure a flight through the discontinuity could have been uncomfortable.

Examination of the wreckage

The aircraft had crashed on a southerly heading just inside the northern boundary of the airfield onto a strip of rough ground bordering a drainage ditch. An examination of the wreckage and accident site revealed that its attitude at impact had been steeply nose down, estimated at 75° to 80° to the horizontal, and that it had been yawing to the left and drifting to the west. The flaps were found set in their mid position and there were signs that the propellor had been rotating at the time but under low power. A partial strip examination of the engine and its related systems showed that they were mechanically sound with no defects apparent, although fire damage had occurred. The carburettor air intake heat system was set to COLD AIR, and the fuel selector valve was found to be set for the right hand tank position. The extent and severity of the post impact fire left no doubt that a considerable quantity of fuel was being carried at the time of the accident.

Although the aircraft had suffered an intense post accident fire, sufficient debris remained to establish that at the time of impact its structure had been complete and intact and that all the flying control systems were correctly connected. The tailplane trim mechanism was found close to its mid-travel position and no evidence of any control system jams was discovered. One of the left wing attachment strut fittings at the fuselage was found broken but a close examination revealed this to be a bending failure; this and all other observed damage being as a result of the impact. The front pilot's seat was found securely locked

in the forward position.

During the wreckage examination it was noticed that the tow rope was threaded between the left tailplane and its elevator with evidence to show that it had been there during the fire. The rope had been burned through just behind the elevator trailing edge leaving some 12 ft of rope to the tug attachment rings, which were found directly behind the aircraft's tail. Although it initially appeared that the rope may have influenced the operation of the elevator, the position in which the rope was found on the ground, i.e. curving out to the left and then to the right in front of the wreckage, made it most likely that it had caught on the elevator during the several turns of the spin to the ground.

6. YOUR RESPONSIBILITIES AS AN EMPLOYER (LEGAL LIABILITY) P/E

Aircraft : Cessna 152
Date : 8 May 1988

An aircraft cleaner, who had been given a limited amount of training on a Piper Tomahawk, was subsequently allowed to taxi a Cessna 152 in which he had no practical experience. He lost control of the aeroplane and, in a panic attempt to slow down the engine, he inadvertently selected full power. The aeroplane was finally halted when it crashed into a building on the airport.

The Flying Club was prosecuted by the Health and Safety Executive under Section 3 (1) of the Health and Safety at Work Act 1974 because they failed to ensure the Health and Safety of persons not in their employment, namely a self-employed aircraft cleaner and other members of the public. Inadequate instruction, training and supervision were exercised in respect of the cleaner and there was inadequate control over the use of the aeroplane as the keys were readily available to anyone.

The Flying Club pleaded guilty at the Crown Court and were fined £5,000. In addition, they were required to pay the Health and Safety Executive costs of £2,145.

No: 11/89 Ref: EW/G89/07/12 Category: 1c

THROTTLE CABLE FAILURE

Aircraft Type and Registration:	Scheibe SF25E Super Falke, G-BKVG
No & Type of Engines:	1 Limbach SL 1700-EAI piston engine
Year of Manufacture:	1983
Date and Time (UTC):	14 July 1989 at 1805 hrs
Location:	North Hill Airfield, Nr Honiton, Devon
Type of Flight:	Private (pleasure)
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Substantial to left wing, propeller destroyed, slight damage to engine and right wing.
Commander's Licence:	Private Pilot's Licence
Commander's Age:	74 years
Commander's Total Flying Experience:	1,253 hours (of which 22 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot reported that whilst about to stop the aircraft after taxiing from the launch point, the engine suddenly increased in power. He therefore closed the throttle. Unfortunately it came off in his hand. Before he was able to take further action the aircraft travelled down a slope, collided with the club house and struck his car.

The throttle control system on the aircraft takes the form of a cable which, at the cockpit end, passes inside a tube forming the shaft of a plunger type throttle control. The cable has a nipple on its end which locates it in the tube and in turn is locked there by means of the spherical operating knob screwed onto the end of the tube.

Examination revealed that the nipple had separated from the cable. More detailed examination indicated that the nipple was attached to the cable by means of a soldered joint of doubtful quality, few of the strands appearing to have been joined effectively. Failure had occurred at the soldered joint.

The company responsible for repairing the aircraft noted that the design of the throttle permitted twisting to occur in this area when the throttle friction control was operated.

WRIGHT & BRAKE NOT A FACTOR! (13) 13/12/89

No: 10/89 Ref: EW/C1123 Category: 5

FATAL Accident

Aircraft Type and Registration:	EoN 460 (Olympia glider) BGA 1371	
No & Type of Engines:	None	
Year of Manufacture:	1966	
Date and Time (UTC):	2 July 1989 at 1448 hrs	
Location:	Parham near Pulborough, Sussex	
Type of Flight:	Private (pleasure)	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - Fatal	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	BGA approval	
Commander's Age:	37 years	
Commander's Total Flying Experience:	42 hours of which 5 were on type (107 launches)	
Information Source:	AAIB Field Investigation	

History of the flight

The pilot of the glider was a qualified pilot with a total of 42 hours flying time and 107 launches. She had completed all relevant training and check flights. She was 5 feet 2 inches tall and weighed 112 lb. Because of her light weight, she was required to fly with a ballast weight of 43 lb to ensure that the aircraft's CG was within the permitted range. This weight was found properly attached in the aircraft wreckage. The aircraft is said to be sensitive to elevator control and this sensitivity increases as the CG of the aircraft moves aft. AAIB calculations indicated that, on the accident flight, the CG of the aircraft was towards the aft limit but safely within the permitted range. However, there was some margin of error in these calculations since no record of aircraft weighing could be found since 1972.

The pilot had recently joined the syndicate which owned and operated the accident aircraft. Prior to the accident flight she had flown one sortie of just over 2 hours in the accident aircraft. On the day of the accident the aircraft was launched by aero-tow at 1145 hours. Soaring conditions were good and she remained airborne in the Parham area until at 1448 hours, she was seen in a gentle turn to the right at a height of about 3000 feet agl. The aircraft was then seen to pitch violently nose down until it was well past the vertical. It then recovered to the vertical which it maintained while gaining speed. At a height estimated to be just below 2000 feet, the aircraft was seen to pitch up for a short time as if attempting to

pull out of the dive. The pitch rate was not sustained however and the aircraft returned towards the vertical adopting a pitch attitude that was less steep than before the original pitch-up. This manoeuvre was repeated twice more until on the third pitch-up at a height estimated by witnesses as about 500 feet, the left wing separated from the aircraft. The fuselage and right wing continued vertically downwards and impacted in dense woodland. The impact was not survivable.

A search of the wreckage revealed that no objects were present in the cockpit which could have interfered with the controls. It was also noted that despite it being a hot sunny day the pilot had not taken any liquid refreshment with her. Her sun-hat was later found in her car. The pilot's restraint harness was found in the unlocked position. A post mortem examination revealed that the pilot had sarcoidosis, a condition that affects the vital organs and has the potential to cause sudden death. There was no evidence, however, that this condition contributed to the accident.

Examination of the wreckage

Examination of BGA 1371 at the accident site showed that it had struck the ground at an angle of about 75° to the horizontal and that it had been rotating rapidly to the left. In addition to the main wreckage, there was further wreckage spread over a distance of some 400 metres to the west and this included the outboard 15 feet of the left-hand wing, the fragmented remains of the inboard section of that wing and portions of the fin.

Reconstructing the wreckage at AAIB Farnborough, it became apparent that the initial structural failure had occurred within the port wing and had been a nose-down torsional failure leading to an immediate downward bending failure of that wing. The fin had then been struck by the inboard portion of the wing and had become detached in several pieces, although the rudder had remained loosely attached to the aft fuselage by the rudder cables. The structural failures had not occurred along glue lines but within virgin wood and there was no sign of any previous damage or abnormality within the failed structure; the torsional failure of the wing was, however, consistent with structural overload at high speed.

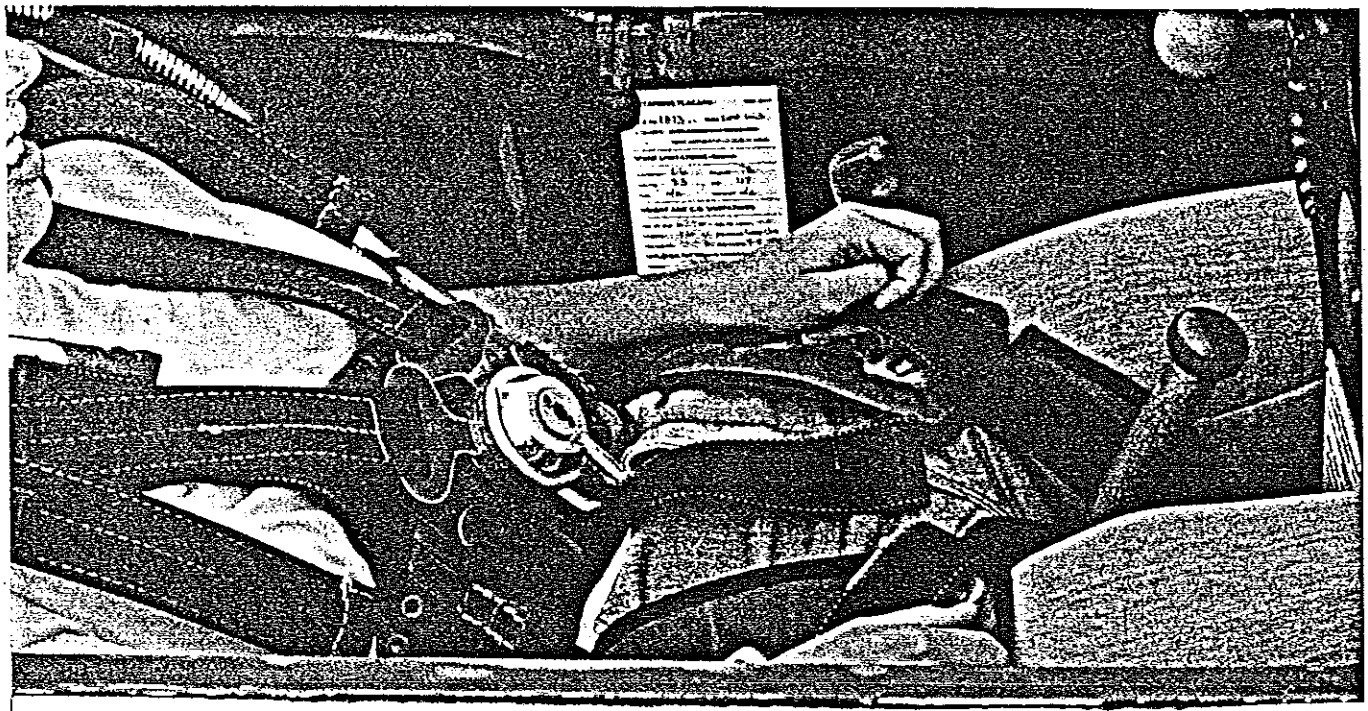
Using the plotted positions of some 40 items of wreckage and the results of a series of drop tests on the items, a simple analysis shows that the in-flight structural failure occurred at an altitude lower than 1000 feet, probably at a height between 600 and 800 feet.

The flying controls of the glider, being mostly cable, had remained largely intact and the failures which had occurred were consistent with the in-flight break-up sequence and the subsequent ground impact. The left-hand airbrake "paddles" were extensively damaged and appear to have opened when the left-hand wing failed; there was no corresponding damage to the right-hand airbrake system and it was found "closed" in the wreckage, indicating that the airbrakes had not been operated. The rudder pedals are simple horizontal bars and were found with the correct adjustment for a short pilot.

Pieces of the cockpit canopy and frame were identified in the wreckage and the distribution of the transparency pieces indicated that this had partially fractured in the air. The canopy locking mechanism showed that at impact, the canopy was still locked although when the pilot was removed it was noted that the lugs at the ends of the shoulder straps and one lap belt were not engaged with the buckle on the other lap belt. The pilot's lead ballast weight, weighing 43 lbs, was identified and was still attached to the lap retention cables, which had only failed in the final impact.

Ground tests

Subsequent to the accident, trials were conducted in a similar aircraft using a female subject of the same height and weight as the deceased. The ballast weight from the accident aircraft was fitted to the trial aircraft and it was demonstrated that it would not have interfered with the flying controls. The four point safety harness was adjusted to the same size as that in the accident aircraft and the subject was strapped in using cushions from the accident aircraft and a parachute of the same type as that used by the deceased. It was found that the harness was a loose fit with the buckle sitting high up on the torso and that with pilot movement the cushions moved allowing further slackening of the harness. When simulating the forces that would be present with the aircraft vertical, it was found that the subject's body could slide through the harness forcing the control column forward (see photograph). The gap between the lower edge of the rudder pedals and the cockpit floor was sufficiently large to allow the subject's feet to pass beyond the pedals to an area where there was no support for the feet with the aircraft vertical. Had the deceased got into this position in the air there would be little chance of her regaining control of the aircraft. The flight path of the aircraft during its final dive was consistent with the pilot being in this position. It was determined that it was possible to jettison the cockpit canopy from this position. There was no evidence of any attempt having been made to jettison the canopy.



DEGRADATION OF Wooden Propellers (16)

No: 10/89 Ref: EW/G89/06/10 Category: 1c

Aircraft Type and Registration:	DH82A Tiger Moth, G-ANCS
No & Type of Engines:	1 De Havilland Gipsy Major 1 piston engine
Year of Manufacture:	1939
Date and Time (UTC):	16 June 1989 at 1915 hrs
Location:	Halvergate Marshes, near Great Yarmouth, Norfolk
Type of Flight:	Private (pleasure)
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to engine, lower wings and landing gear
Commander's Licence:	Private Pilot's Licence
Commander's Age:	44 years
Commander's Total Flying Experience:	662 hours (of which 320 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot and AAIB enquires

After a gentle descent from 1000 ft to about 500 ft, and whilst over Breydon Water, the engine suddenly began to shudder violently to such an extent that the pilot was in no doubt that it had to be shut down. This was carried out, by which time the pilot realised that the first available field was full of sheep and he was forced to accept a much rougher field for the forced landing. Despite attempting a full stall landing, the aircraft sustained damage to the landing gear, lower mainplanes, engine and forward fuselage.

From the pilot's initial examination of the aircraft it was apparent that the outer 6 - 12 inches of each blade of the wooden propeller had been seriously damaged, or was missing, and that little of its debris was present around the aircraft.

The remaining part of the wooden propeller, which is believed to have been manufactured in 1948, was sent to the AAIB for investigation. This, together with a specialist examination, revealed the following:-

The propeller was marked with the following information:-

RS/11/61, DRG J1.5220/l/18, Gipsy 111 and Major, D6 - 4.P4 - 9, LP 546.

Examination of the fracture faces showed that, on one blade, the fracture had run along a glue line between wood laminates where the glue was uneven in distribution. In addition, there was an absence of wood fibres on the upper face of this glue line. When dissected, it was noticed that three laminates in one blade offered little resistance to separation, particularly near the failure, and that in the other blade two laminates fell apart whilst the section was being sawn. Closer examination of these glue lines revealed that:-

a) there were no wood fibres adhering to the top surface of the glue.

b) the surface of adjacent laminates on any one glue line had glue present, indicating that both surfaces had been coated or that the transfer of glue from one surface to the other during pressing had been inadequate.

c) the distribution of glue was uneven, and occasionally absent.

d) the thickness of the glue line was variable, in some places very thin and in others quite thick. Where the glue was thick, it had a "crazed" appearence.

The wood used for this propeller was birch, in six laminates, and the adhesive was urea-formaldehyde (UF).

In addition, removal of the copper strip from the leading edge and dissection of the wood indicated the presence of oil penetration to a depth of 15 - 20 mm in several places. This appeared to be associated with screw holes or small cracks and indentations along the leading edge. The presence of spare screw holes indicated that this was not the original leading edge strip. Also, examination of all laminates at the point of failure indicated that in one blade, one laminate possessed markedly sloping grain, whilst in the other blade two laminates had sloping grains. This would have resulted in a 50% reduction in tensile strength, but the presence of adjacent straight-grained laminates would have reduced this effect.

Sloping grain, inadequate glue spread and uneven thickness of the glue line could not, together, satisfactorily account for the failure, since the propeller would have failed early in its service life. Thus these deficiences were considered latent weaknesses, capable of contributing to the propogation of cracks once initiated.

With regard to the primary cause of failure, two factors would appear to have some significance:-

1) Loss in strength with time: Tests have indicated that UF adhesives in an unstressed state lose a high proportion of their initial strength, the amount depending upon the formulation of the glue. Even a good glue of the type used in aircraft construction has been found to lose up to 40% of its initial strength over a 40 year period, where stored under constant environmental conditions of 20°C /25%

RH. It is also known that such deterioration is accelerated at higher humidities, and especially so under cyclic changes in humidity.

2) Loss in strength under stressing: Laminated products, as well as solid wood, lose strength with time under load, usually of the order of 50% over 50 years. This may be insignificant in this case, but the effect is greater where the load is cyclic.

It was therefore considered that a combination of such factors probably accounted for this propeller failure, including inherent weaknesses in construction, deterioration in the glue with time and induced stresses in service.

5. PENNYWISE RPM FOOLISH

P/E

FAILURE OF INDUCTION HOSE.

Aircraft : Piper PA28 Cherokee 140
Date : July 1989

After persistent problems with the loss of 250 RPM and rough running from the engine, the aircraft was examined by a licensed engineer.

It is was discovered that the SCAT double walled hose from the air filter to the carburettor heat box had collapsed internally due to engine suction. A new hose had not been fitted because the owner was advised that the cost of the Piper part number item was excessive. In an effort to obtain the proper power from the engine, the pilot had taken to leaning the mixture.

Cont.....

THIS IS THEIR REPLY

(19)

TNS 91/12/89

TEXTRON Lycoming

Williamsport Plant
Textron Lycoming
Subsidiary of Textron Inc.

8 September 1989

652 Oliver Street
Williamsport, PA 17701
(717) 323-6181

Mr. David A. Oliver
3 Knights Way
Alton
Hants GU34 1PJ
ENGLAND

TMR Cylinders.

Dear Mr. Oliver:

With regard to your correspondence of 8/30/89, we will attempt to provide you with our opinions regarding the cylinder head cracking problems which you have encountered.

Lycoming experiences very few instances of cylinder head cracking on the O-360-A engine and has no active programs toward corrective action. A leading cause of cylinder head cracking in new cylinders is rapid thermal change; "shock cooling" perhaps better described. From your description, it would seem that there is good opportunity for this to occur during your normal take-off and landing cycle. The tendency to return to the airport as quickly as possible following glider release is easy to understand. Closing the throttle and nosing the aircraft over to descend with an engine which is operating at maximum CHT provides a good mechanism to initiate cylinder cracking. In the past, Lycoming has been asked what constitutes an acceptable cylinder cooling rate. Generally, a guideline is 50°F/minute. Assuming that after climb, the CHT is 500°F and that during power off descent it runs approximately 300°F. Then a period of approximately 4-5 minutes in level flight attitude is necessary to allow the cylinder heads to cool reasonably. To further minimize rapid temperature changes, the operators might try maintaining 40-50% power during the descent. Of course this would significantly extend your operation cycle.

Lowering the redline temperature during climb by 10-20°F might help alleviate this problem somewhat, since this temperature is reached during each operating cycle. However, this probably is not as productive as improving the rate of temperature change. It would be of value to ensure that the thermocouple indication is on the hot cylinder head during climb. It is not uncommon to have different heads become the "hot head" during different flight modes. If you find that a different head is hotter during climb, take steps to insure that this cylinder remains within limits.

(201)

TEXTRON Lycoming

8 September 1989

Mr. David A. Oliver
3 Knights Way
Alton
Hants GU34 1PJ
England

Certainly cylinder head integrity is most important. Many reused cylinders are welded or may contain undetected micro cracks which with extreme temperature cycling will result in failure. Your experience would seem to indicate that this is indeed the case. This is one of the reasons that Lycoming does not use reconditioned cylinders on its rebuilt engines.

The remainder of the items which you suggest such as the difference between steel or chrome bores or painting cylinders black would be of little benefit in eliminating the cracking.

In summary, try to eliminate rapid rate changes in temperature and ensure that you are indeed operating within CHT limits. Please advise us as to your success, or if we can provide additional assistance.

Very truly yours,

TEXTRON LYCOMING
WILLIAMSPORT PLANT

Richard N. Moffett
Manager-Project Engineering

RNM:jll