

SERVICE BULLETIN NUMBER 147, issue 3.

TITLE Rigging cables with roll-swaged end terminals.
CLASSIFICATION Pegasus Sport Aviation Ltd have classified this service bulletin as essential.
COMPLIANCE Cables under 800hrs/7 years old –annual inspection
 Cables over 800hrs/7 years old – in addition, special inspection and test every 2 years.
APPLICABILITY Lower side, lower front and lower rear rigging cables with roll-swaged terminal ends fitted to the aircraft types below.

- [BM4](#) Gemini Flash
- [BM10](#) Pegasus Flash
- [BM14](#) Gemini Flash 2
- [BM16](#) Scorcher
- [BM17](#) Pegasus Flash 2
- [BM23](#) Gemini Flash 2 Alpha
- [BM43](#) Mainair Mercury
- [BM47](#) Mainair Blade
- [BM51](#) Mainair Blade 912
- [BM54](#) Mainair Rapier
- [BM60](#) Mainair Blade 912S
- [BM70](#) Quik GT450
- [BM77](#) QuikR
- [BM80](#) Quik GTR
- [BM81](#) PulsR

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REVISION HISTORY

Issue	Date	Changes
1	15/5/17	Initial issue by P& M Aviation Ltd
2	30/11/17	750 hours revised to 800 in line with P&M recommended inspection schedule for wings. Duplicate inspection text changed to BMAA SIGMA protocol.
3	9/08/23	Possibility to extend cable life by special inspection and test off the airframe every 2 years.

1. INTRODUCTION

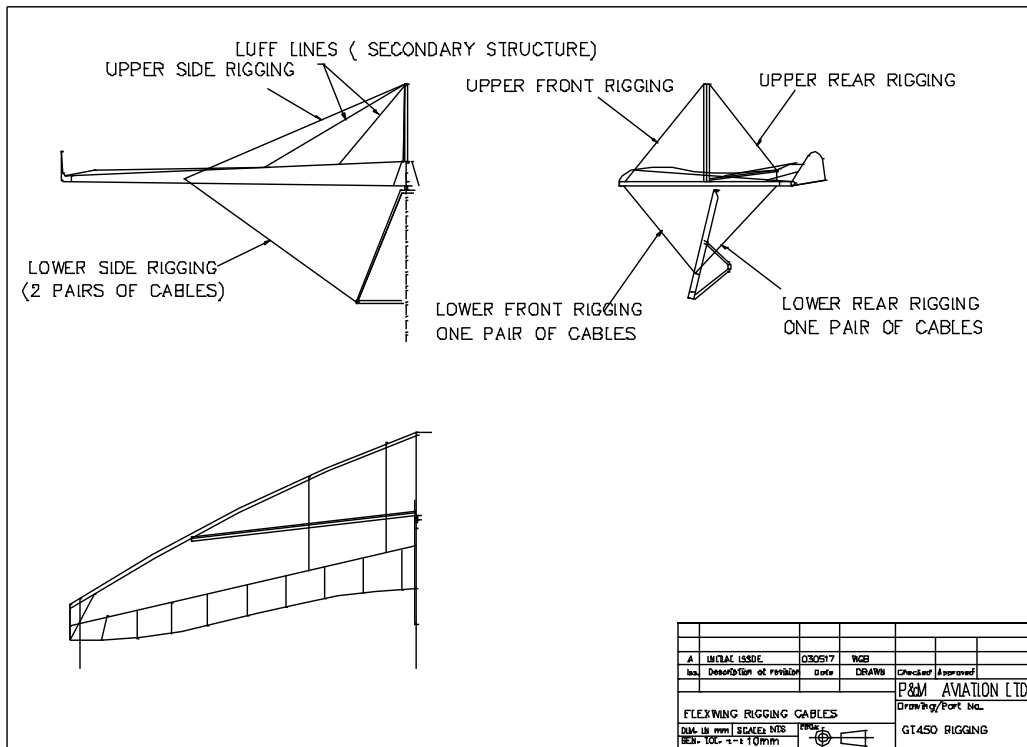
A P&M GT450 in a flying school had a partial failure of a lower side rigging cable (Part No. YQD-045) when recovering from a spiral manoeuvre, within the limits of the flight envelope. These cables are arranged in pairs, to give a backup load path. The second cable carried the load and the aircraft landed safely. This is the only P&M production lower side cable failure we have been aware of since 1984. See fig 1. for cable definitions. The partial failure was at the edge of the roll-swaged terminal end shown in fig 2. The alternative cable terminations using Nicopress sleeves and thimbles allow more progressive flexing of the cable. See fig 3.

The incident GT450 lower side rigging cables had been in use for 1050 hours and 9 years. The aircraft had been subject to an accident and rebuilt once in its life. It was also operated quite near the coast where it has been considered that sea air Chlorides could have affected the material. There were corrosion pits in the S316 stainless steel material which accelerate fatigue failures. CLSCC (Chloride Stress Corrosion Cracking) is known to affect stainless steel.

The cable fitting was at the bottom end of the cable, where solutions can wick down it and collect. The strand failures were caused by bending and tensile fatigue because of cracks propagating from scratches and corrosion pits on the surface. See figs 4 & 5.

All the remaining cables had broken strands at the edge of the roll-swaged terminals. Some of these strands had been failed for some time, as shown by discolouration of the failure surfaces. The cable is 7 cores of 7 strands construction.

The central core, being straight, can pick up more tensile load than the others and can fail before the outer ones. The broken strands are hard to spot, especially in the inner core of the cable. A special test and inspection has been designed to find cable damage.



MASTER IN COLOUR

Fig 1. Structural airframe cables



Fig 2. Overall general arrangement of the GT450 lower side rigging cables with roll-swaged terminal ends. The arrow shows the point of partial failure. The attachment bolt at the control frame knuckle should be just loose enough to allow each cable to align with the load. Note the plating on the bolt head is shiny in this example.



Fig 3. A thimble and Nicopress sleeve type fitting. The blue plastic shroud can be pulled back for inspection of the sleeve.

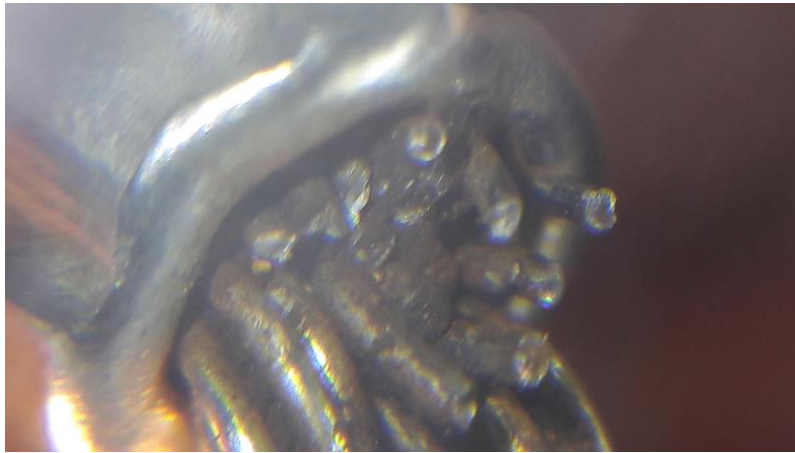


Fig 4. Magnification of edge of the roll-swaged terminal of the partially failed cable. Note dirty surfaces of old failures and corrosion marks especially in the central area, which is hard to inspect externally. Several strands had been broken for some time before the failure.



Fig 5. Failed cable strands showing wear grooves and corrosion pits.



Fig 6. The corroded bolt (Part No. FBA5-21A) that held the partially failed side cable to the control frame.

As can be seen from Fig 6, this bolt displays clear evidence of corrosion and pitting. This is indicative of the general environment in which the aircraft has been operated. This also MAY be indicative of the probability of corrosion occurring within the cable itself. The corrosion on the bolt head is not uncommon for such fittings that are exposed to a salty atmosphere over a long period of time. A clean and bright bolt may well indicate corrosion of the cable is less likely to be an issue. If in doubt replace the cable.

All Mainair aircraft manuals already have a recommended replacement 250hrs on lower side cables + major inspection on all other rigging cables every 250hrs/3yrs. The Pegasus Quasar 2 manual also recommends replacement at 500hrs on side cables (Nicopress swage). These recommendations remain unaffected by this service bulletin. All cables, especially the lower side rigging, must be checked to be undamaged and free of kinks as part of the Daily Inspection, especially at the edge of roll-swaged terminals.

The application of bending loads on the cable end connections must be avoided, e.g. the aircraft should NOT be manoeuvred on the ground by pulling or pushing on the cables. If the rigged aircraft needs to be picketed down, then wherever possible avoid using tiedowns to the lower side cables but rather use a suitable strap through the cross boom inspection panel (where they exist) and over the tubing. Great care must also be taken when packing the wing to ensure that the lower side cables are not subject to bending in the vicinity of the roll-swaged fittings i.e. they must always remain unkinked.

2. ACTION

This Service Bulletin only relates to the lower side cables, lower front cables and lower rear cables that use roll-swaged fittings as the lower cables are subject to the most fatigue loading cycles and so are the most susceptible to failure due to bending and tensile fatigue. Only Mainair aircraft use roll-swaged fittings on the lower front cables.

For applicable cables with less than 800 hours or 7 years' service, annually inspect for freedom from kinks, corrosion and broken strands. A small drop of corrosion proofing fluid such as ACF50 at the cable to swage junction will lubricate the strands and help prevent corrosion.

In addition, at least every 2 years, for applicable cables with more than 800 flying hours or 7 years of service, whichever comes first, inspect and test the cables as follows:

- a) Detach the roll swaged terminal from the airframe. If the fasteners are corroded, they must be replaced.
- b) Visually inspect at the edge of the roll-swaged terminal(s) using a magnifying glass with a power of at least 3x. Inspect closely for damage i.e. broken strands, corrosion, mechanical damage or slippage.

- c) Rotating bend test - flex the cable no more than 30° and holding it between the fingers, keeping it bent, slowly rotate it, listening and feeling for clicking noises which indicate broken strands, observing closely especially at the bend where the cable leaves the end fitting.

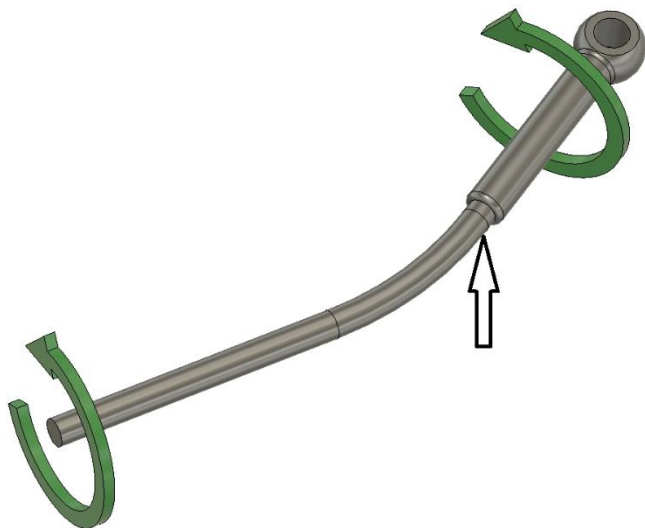


Fig 7. Rotating bend test.

If any damage is found, replace the affected cable before further flight. When fitting replacement cables, new nyloc nuts must be used or new split pins, if castle nuts are fitted. Note the cable end fittings must be free enough to rotate and rock enough to allow alignment with the load, so avoiding bending of the cable.

A flowchart of the process to be followed is shown in Appendix 1.

Instructions for replacement of cables and associated fasteners can be downloaded from Pegasus Sport Aviation Ltd website under the “manuals” section, see http://www.pmaviation.co.uk/manuals_new.php

3. DOCUMENTATION

Removal and replacement of any airframe structural cable requires a duplicate inspection, one of which can be by an owner/operator. The second inspection must be by a person the owner considers qualified to inspect the work done.

The aircraft technical log must be signed “Service bulletin SB147 issue 3 (roll-swaged cables) carried out” by the owner/operator and the qualified person.

4. CONTINUED AIRWORTHINESS

At each permit revalidation and as per the appropriate maintenance manual, all roll-swaged cables are to be checked that they are unknicked and in good condition with no sign of corrosion or broken strands.

Pegasus Sport Aviation Ltd.

CAA approval ref: DAI/9970/19

BCAR A8-1 & A8-9 (F1)

SB 147 Cable life issue 3.

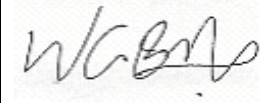
Cables exceeding 800 hours/7 years life must be removed from the airframe every 2 years, tested, inspected and if necessary replaced as described in section 2 above.

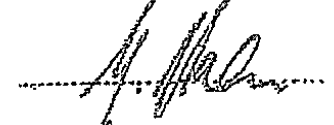
Replacement GT450 lower side rigging cables are now being provided as a kit featuring thimble and sleeve type ends and a longer control frame knuckle bolt (minor modification M313).

Note - for cables with thimble and Nicopress sleeve type ends, replacement at 800 hours/7 years is recommended *but not mandatory*, provided detailed inspection is carried out at each permit revalidation.

ISSUED BY W.G.Brooks

Graham Slater

Approved		Date 9/08/23
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APPENDIX 1

ACTION - FOR LOWER RIGGING CABLES WITH ROLL-SWAGED TERMINAL ENDS ONLY

