



Service Bulletin 147 - Frequently Asked Questions V1.2, 19th August 2017

We appreciate the SB147 is an unwelcome complication and cost. It has been a large disruption and cost for P&M as well but our customers safety must come first – these are your lives we are protecting. We hope that these FAQs help answer common questions

Q1. Why mandate that flying wires must be change when there has only be one incident in over 30 years – is this not a knee jerk reaction?

A1. As a CAA A1 approved organisation, P&M have a responsibility to fully investigate the causes of any failure. This we did in conjunction with the BMAA and CAA. While the ultimate responsibility lies with the Design Authority (e.g. P&M Aviation) the course of action was worked out as the most appropriate action both with the BMAA and CAA.

To say that there has only ever been a single failure is NOT correct. There are at least two other incidents of partial cable failures that we have been told about but we don't think were ever officially reported. There was another non-flight failure of the external strands of a roll swaged cable in 2011 on G-CERN. Given the consequences of in-flight failures, these incidents simply cannot be ignored.

Q2. The GT450 aircraft concerned should not have been flying as the inspector should have picked up the broken strands

A2. The aircraft was operating perfectly legally and had a current permit. It must be stressed that the strands that had failed were within the core of the cable and were NOT visible to the naked eye. Stainless steel rigging can look perfect to the naked eye up to the point of failure.

It is simply not possible to inspect the core of roll swaged cables without irreparably damaging the cable. It has been suggested that if you roll or bend the cable you can SOMETIMES hear the clicking of broken strands, but that is not necessarily a proven or fool proof method of checking for broken strands. This method also requires the cables to be unfastened from the aircraft.

Q3. This is just a ploy by P&M to bolster its order book!

A3. This is completely untrue and in fact the opposite is the case. This issue is absorbing significant resources and costing the company considerable money. We have heavily discounted SB147 'packs' to help out customers as best we can. Furthermore, the only authority who can mandate changes are the CAA. If they thought we were using a safety issue as an excuse to just make money, they would not have mandated the replacement schedule of 750 hours and/or seven years. Our customer's safety is always our prime responsibility and concern. If we don't act with total integrity we would, quite rightly, lose our A1 approval.

Q4. The price of cables is higher than they were a few years ago

A4. That is true but the company was losing money then, which was not a sustainable position. Costs had to be cut and prices increased to ensure the survival of the company, which must be for the long-term good for the owners of all P&M aircraft and the microlighting community as a whole. Obviously, if P&M no longer existed then the value of customers aircraft would drop hugely due to difficulties in operating and obtaining spares. Having a strong P&M is in the long term interests of everyone in the sport.

Q5. The seven year period is way over the top and not necessary

A5. Two key factors that seem to be commonly overlooked is that corrosion is age dependent and independent of flying hours. Also, internal corrosion is not always visible externally. Airworthiness has to cover worst-case storage conditions.

It is certain that corrosion played a part in the GT450 cable failure. Given the orientation and position of the side wires, moisture will naturally wick down through the cables to the roll swages fixing the cables to the A-Frame. Thus, a combination of corrosion and fatigue led to the failure of the internal strands. On the basis of the evidence, the seven-year period was discussed and agreed both with the CAA and the BMAA.

Q6. Can the seven year life be extended?

A6. The CAA have indicated that this could be extended if there is sufficient empirical evidence to support a life extension. It is worth noting that SB 147 calls for old cables to be returned to P&M for testing. Very few sets have been returned so far. The testing of returned cables will enable us to build up that evidence. However, investigation into a number of wires has already showed that while they may look perfect from the outside, we have discovered broken strands internally.

As a case in point, within the last two days, we have had 26 year old Flash 2 Alpha cables with 280 hours returned to us. The owner had recently diligently inspected the cables with a magnifying glass and no broken strands were seen. 2 weeks later a BMAA inspector found 2 external strands broken but there was no corrosion visible externally or any other damage apparent. When we cut off the cable and splayed it out, it was found that the centre core of 7 strands had all been failed for some considerable time and 14 strands from the outer cores = 21 strands failed, so max residual strength was $(48-20)/49 \times 100 = 57\%$ of new strength. Even very gentle handling of the wire caused further failures of strands.



It has now been agreed with the CAA that the Emergency Mandatory Permit Directive No. 2017-004-E will be changed to make it compulsory for all old wires to be returned to P&M for testing.

Q7. The 750hr mandatory replacement is unnecessary.

A7. It has always been recommended that the lower flying wires should be replaced on all Mainair machines every 250 hours. This came about as the factory was discovering broken strands on machines during 300hr services in the days when people were more commonly rigging and de-rigging for every flight. While it is



more common for aircraft to be stored fully rigged these days, it would appear that a significant number of owners have not followed the 250-hour replacement recommendation. Therefore, there are elderly, high hour, Mainair machines out there still flying with the original roll swaged rigging (see Q6 above). A possible worst-case scenario is an elderly machine that has original rigging, that has, and is, subject to numerous rigging and de-rigging and, when rigged, is stored in a damp and salty environment. Fatigue can also be caused by inappropriate ground handling and incorrect rigging / derigging.

Due to the massive number of variables associated with each aircraft, It is almost impossible to accurately predict time to potential failures, so a margin of safety has to be allowed for and that was the basis that the original 750 hours was agreed with the CAA and BMAA (This is now in the process of being uplifted to 800 hours to put it in line with wing service schedules).

If an owner suffers a catastrophic wire failure, having chosen to ignore manufacturers recommendations for wire replacements, that will be their liability. But the reputational damage to P&M Aviation, the BMAA and the sport in general would be huge. Just because there haven't been catastrophic failures so far, doesn't mean that there couldn't be in the future.

Please also bear in mind that for most hang gliders it is mandatory to replace flying wires every 200 hours or within 2 years. Also, most stainless-steel yacht rigging, where roll swages are used extensively, are lifed between 5 and 8 years.

In the end, it's the cost and difficulty and risk of replacing parts vs. the probability and consequences of failure. However, doing nothing is not an option that either we as a company or the CAA can live with.

Q8. Why didn't the replacement wires for my Flash/Blade rear wires have the same kink on the roll swage (to ensure alignment) as the original wires?

A8. The first batch of wires were manufactured exactly to the original drawing which did NOT specify any kink. There was no Mainair control documentation anywhere which specified this kink. As soon as we discovered this, the BMAA technical office were informed and the drawings and manufacturing/inspection processes were amended. The few that were made incorrectly have been replaced with the correctly manufactured items.

Q9. Why didn't I receive fitting instructions with my replacement cables?

A10. Given the original incident was on a GT450, we focussed on getting the instructions for fitting cables to that aircraft first and dealing with all the issues that have arisen on the GT450. We do admit that we dropped the ball on the getting instructions out for the Mainair range. Given the pressure on our limited resources, we assumed that the owners of the older machines would be possibly have a greater familiarity with their aircraft, as there was a higher probability that owners would have owned the aircraft for considerable length of time and do most of the maintenance themselves. It turns out that this is probably not the case, so apologies for this delay.

We have created fitting instructions for all Mainair machines and these will be posted on the manuals downloads section of our website http://www.pmaviation.co.uk/manuals_new.php within the next few days.

Q.10 Why were the GT450 wire fittings instruction incompatible with the drawings?

A.10 As part of SB 147, we took the opportunity to embody approved Modification 247, which replaces a number of the plated mild steel washers with nylon washers (Part Number FWP-002) in order to reduce localised corrosion issues. However, the drawing set which is, of course, the definitive standard, was not updated sufficiently quickly. With hindsight, we perhaps shouldn't have implemented this product improvement at the same time but it was done with the best of intentions.

The current revision D of YQD – 050 is now correct. Following the rapid approval of a modification, all replacement GT450 side cables are now made with thimbles and swages and will not be limited to 800 hrs/7 years. These drawings will also be available on the manuals part of the website.

Q.11 Why is the bolt for fixing my Flash/Blade rear wires to the rear of the keel apparently now too short?

A.11 This has been found to be caused by a build-up of tolerance in the thickness of roll swage tangs. The fitting kits have been changed to increase the length of the bolt from AN4-31A to AN4-32A which will ensure that there are at least 1.5 bolt threads proud of the Nyloc nut in all circumstances, while allowing sufficient freedom of movement for the wires to align. To fit the skiffy cap, with the longer bolt, it might be necessary to punch a hole in the centre of the cap.

Q.12 Why does my Flash/Blade fastener kit have M6 skiffy rings and caps when they should be M8?

A.12 While the original drawings calls up for skiffy rings and caps they do NOT specify the size. All fastener kits now have M8 rings and caps and it is acceptable to re-use existing caps and rings if they are in good condition.

Q.13 Why are the nuts supplied in my Flash/Blade kit zinc plated not cadmium plated?

A.13 Within Europe, cadmium plating is considered a toxic material and as a result it has become too expensive for the plating industry to meet the Health and Safety and environmental requirements for its use. For this reason, within Europe, Cad plated parts are becoming increasingly forbidden. An alternative to Cadmium plating is gold plating but we can only afford to use zinc plated items! The nuts we supply are more than adequate as they are of similar strength to AN items.

Q.14 Why does my Flash/Blade fastener kit have different thicknesses of washers

A.14 The Flash and Blade drawings specify thick and thin washers for the wire retaining bolts but the drawings do not always provide sufficient clarity on the assembly. As a result, we have created separate instructions for the Flash and Blade aircraft with pictures as well as the original drawings to help ensure that the assembly of the correct configurations of washers. It is important to remember that that there is sufficient movement to allow the wires to align and that there is at least 1.5 bolt threads visible through the Nyloc. These will be in the download section of the website

Q.15 Why are the hole sizes of the GT 450 rear wire tangs or swages bigger than my original ones?

A.15 Early machines were fitted with thin walled plated steel bushes in the rear rocker assembly, which suffer from corrosion. As part of a product improvement process, these were replaced by machined thick walled brass bushes (ZSP-308) which should ensure longer life and enable sufficient movement of the rear



wire rocker assembly. These ZSP -308 bushes are used on GT450, GTRs and STARS equipped QuikR's in conjunction with Seven nylon washers (FWP-011). This is illustrated in drawing YQD-050-KIT.

Early QuikR machines that do NOT have STARS fitted use a slightly smaller bush (ZSP-342). That is fitted along with six nylon washers (FWP-011) as shown in drawing YQE-050-KIT.

Q.16 Why is the service bulletin restricted to roll-swage end fittings, ignoring Nicopress (ferrule) swages?

A.16 A strong contributing factor to the incident was most likely to have been Chloride Stress Corrosion Cracking, i.e. where surface pitting due to a chlorine environment (e.g. by the sea) initiates fatigue cracks. The stress concentration is also much greater at the edge of a roll swaged fitting. Corrosion products wick down the cable and collect at the edge of the termination where, unfortunately, the stress concentration is highest. It may be possible to prevent corrosion by treating the cable with a moisture repelling fluid e.g. gun oil or ACF-50.

Q.17 Why does the service bulletin say not to bend cables to aid inspection?

A.17 While the cables from the incident aircraft had been through a permit inspection, the strands had failed the inner core first because it is the straightest, hence stiffest tensile load path. Failed strands in the inner core are almost impossible to detect without unwinding the lay of the cable which causes further damage. There is an urgent need for a low cost, mobile and reliable non-destructive technique to be developed for use on cables in situ.

Q.18 Why do the GT450 side wires now have different thimble sizes?

A.18 Using 3mm thimbles on the 4mm cable at the control frame end makes the assembly more compact and neater, it is a product improvement. Cables are marked with a white sleeve to identify the control frame end, part number (YQD-045) and batch number.

We are doing our best working with the CAA and BMAA to ensure that you can continue to fly safely and we always welcome any direct feedback that helps us with process, product or service improvement, so please contact us if we can help at spares@pmaviation.co.uk or 01672 861350

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