

JAR-22 STUDY GROUP

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Background

JAR stands for the Joint Aviation Requirements and JAR-22 is the design requirements for sailplanes and powered sailplanes. The Study Group (SG) meets twice a year, the 39th meeting was held at Austro Control, the headquarters of the Austrian Civil Aviation Authority, in Vienna, from 22-24 April 1996. This meeting was attended by delegates and observers from Austria, Belgium, France, Germany, Italy, Switzerland, the U.K., USA and representatives for the manufacturers. The U.S. observer liaises with the group since there is the intent to align or "harmonize" requirements; of course many sailplanes from Europe are imported in to the USA so acceptance of the JAR-22 requirements by the Federal Aviation Authority is logical. It has the advantage that new aircraft can be issued with a national certificate of airworthiness rather than being put into the experimental category. The author attends as an operational adviser since some of the delegates are not pilots and an operational input is sometimes helpful if there is a problem or not?

By way of background information it is worth pointing out that there were design requirements before JAR-22. Apart from other national criteria, such as the British Civil Airworthiness Requirements (BCAR) the main ones influencing glider design were the German Lufttüchtigkeitsforderungen für Segelflugzeuge (und Motorsegler) (LFS and LFSM) which was entirely appropriate since many of the world's successful glider designs were, and still are, German.

There was another influence and this was the OSTIV design requirements known as OSTIVAS. This acronym stands for OSTIV Airworthiness Standards and you should know what OSTIV stands for! OSTIVAS pre-dates the JAR-22 and was prepared by the Sailplane Development Panel of OSTIV. The OSTIV SDP still continues to develop the OSTIVAS and their requirements are often incorporated into or adapted for JAR-22.

Another part of JAR-22's history is that it has always been chaired by the representative of the Luftfahrtbundesamt. The first was Heiko Frielß, then Benno Schmaljohann and, from the next meeting, Helmut Fendt. These people have one thing in common; they all started their careers at an Akaflieg, German universities at which undergraduates participate in the design, construction and development of new types; having graduated one becomes an "Alter Herr" - their ranks include most of the current designers. The three people mentioned above were at Darmstadt, Braunschweig and Munich respectively, all famous for particular design developments and a part of gliding's history. Incidentally,

Benno Schmaljohann flew a two-seater record flight in the SB10 from Lübeck to Le Blanc (near Poitiers, France), 892 kilometres.

The System

The method of working within the Joint Aviation Authority (JAA) regarding changes to requirements is relatively straightforward. A change is suggested in a paper on the topic from a national authority or the representative of the manufacturers, the sponsor relating to a perceived problem. This is considered by the study group and the members make further inputs. Experts may be consulted if the subject is beyond the expertise of the SG members, subjects such as flutter and fatigue. The proposed change is then registered with the JAA Secretariat and, after further review, the change is published as a Notice of Proposed Amendment (NPA). The NPA is sent to all national aviation authorities in JAA, and anyone else who subscribes to get copies of all NPAs, and this is the last chance for any comments. Finally, the study group considers the comments on the NPA, accepting them in whole or in part or, if rejecting them, justifying that rejection.

So, the JAR-22 requirements are refined in the light of developments, whatever they may be. In reality much of the work this represents 'fine tuning' since such long established-criteria are not likely to be subject to major changes. Even so, the review process for a single topic may continue through several meetings. The final version of any revised rule needs very careful drafting since there must not be any chance of misinterpretation. This heavy responsibility falls on the secretary and Alan Bevan, from the U.K. Civil Aviation Authority (CAA), has fulfilled this role with distinction for almost ten years.

So, what about the detail of the study group's work? Glider design has continually pushed the frontiers, just think in terms of a sailplane's improved performance over the years. This development may bring problems with the introduction of new materials, such as glass reinforced plastics (GRP) and the consequences of higher performance. For example, flight at altitude may cause problems of flutter and limiting speeds need to be considered in this context.

The recent meetings have progressed work on some of the subjects already mentioned. There have been inputs to the debate on fatigue from the Deutsche Forschungsanstalt für Luft- und Raumfahrt (DLR) who do much of the research. So much so that the LBA rely on the DLR for this work which needs little clarification. This may be a problem for some SG members since the DLR reports are in German and to translate reports of all the work would be time-consuming and expensive. Since the LBA accepts the DLR results. One of the interesting outcomes of the fatigue work has been to establish that GRP - within the accepted stress limits - has no apparent fatigue life. Any fatigue failures of the structure will generally relate to metal

fittings, such as wing attachment pins; such failures are likely to be seen on routine inspections. The results of a particular fatigue test on a Janus carried out at the RMIT (Royal Melbourne Institute of Technology) in Melbourne, Australia, and directed by Mr. C.A. Patching bear out this point. The real point at issue is the possibility of requiring a full-scale fatigue test on every new design. Imagine the increase in cost to the manufacturer and customer with such a requirement. Fortunately common sense prevails and proof that a new structure is satisfactory can be done by relating the new design to existing similar designs and their serviceability.

One of the operational considerations mentioned earlier was - "is there a problem?" Within the JAA member states there are at least 15,000 gliders; including those countries for which we do not have details, the figure is probably nearer 20,000. A lot of gliders! There are also a lot of data on accidents and from this information the extent of a "problem" can be established. One example of an operational problem was gliders causing what are termed 'tow plane upsets', where the glider climbed rapidly relative to

the tug, a situation which became rapidly divergent. Whether the tow plane pilot was able to recover from this situation depended upon the height at the time of the event. Anyway this problem appears to have been solved by the JAR-22 requirements specifying a nose or forward towing hook and a lot of emphasis on the possibility during training. Longer tow ropes, typically 55 metres or more, have also been a factor.

The debate at the SG meeting frequently becomes philosophical when trying to relate a risk, however improbable, to the need for a requirement. This is resolved to some extent by giving guidance to designers with advice material in the form of ACJs (Advisory Circular, Joint) or IEM (Interpretative and Explanatory Material). While the pragmatic view may be based on no evidence of a problem and, therefore, no need for any requirement or advice the regulatory standpoint will be to think of every possible eventuality and try to prevent it. The positions taken represent the extremes which have to be reconciled if progress is to be made on a particular proposal.