

Discussion document to support President's Proposal #2 at the CIVA 2025 plenary

Create a CIVA Scoring System Working Group

CIVA Scoring System History

Three main systems can be identified as being used at CIVA championships to capture judging data and calculate interim and final results as follows -

- Until 2002 US-based Rudy Penteado had been the CIVA scoring director, using computer based software to create championship results from judges marks. Perceived judging bias in results was managed through use of the TBL (Tarasov-Bauer-Long) and then TBLP (TBL progressive or perhaps Penteado) statistical processes.
- From 2003 onwards the ACMS software solution from Frenchman Michel Dupont was adopted, initially employing TBLP to address grading bias and other anomalies.
- Around 2004 CIVA commissioned British statistician Dr Derek Pike to submit an analysis based on typical contest aerobatic judging situations, this process developing into formal use of what we now call the FairPlay System. FPS was employed in ACMS from 2005 onwards for all Aresti programmes but not the 4m Final Freestyle.
- The British ACRO software system authored by Nick Buckenham was subsequently adopted from 2008 onwards, providing FPS or raw grades results calculation options per programme. Since 2018 FPS has operated in an amended 'progressive' format to minimise ranking disturbances as pilots marks are added during each programme.

These solutions and all before have almost entirely worked with traditional paper-based judging sheets, the judges marks subsequently being hand entered by the scorer. There were some early operations with IBM cards marked-up by judges that were machine-scanned using specially purchased equipment, though this approach was subsequently abandoned.

Apart from the brief IBM-card period therefore the data-entry and results calculation processes operated by CIVA have involved judges using traditional paper judging sheets (originally Forms A+B+C but more recently the improved L+R versions), with either regular physical transport of collected sheets or rapid electronic transmission of sheet images to the scorer for hand entry of the data, timely updated results creation being made via statistically adjusted processes.

The potential for electronics and automation

Although slick electronic transmission of scanned judges score-sheets reliably enables pilots to review their printed check-sheets by the time they have landed and reached the scoring office, followed by release of updated results at regular intervals, this system unavoidably involves -

- Generation of many thousand printed paper judging sheets and control documents
- Time-consuming distribution of this paperwork to the appropriate judges and assistants
- Regular physical collation and transfer of completed judging sheets to the scorer
- Hand-entry of every mark by the scorer, inevitably with some potential for errors

Operating in this well-developed traditional manner has become the bedrock solution at CIVA championships. It does not however provide a basis that can be easily adapted to satisfy modern expectations in world sports, where "instant results" and analysis of competitors performances via broadcast and streamed channels has become the norm. Assuming that CIVA wishes to move toward such a solution, how can we evaluate and – if deemed possible - move to implement the development and introduction of an appropriate system?

There have been some notable attempts to create and operate electronic paperless solutions to enable aerobatic judges opinions (their marks and comments) to be captured and delivered to an automated central score calculation process for rapid output and/or publication.

- French tablet system: Operating in conjunction with with the ACMS software a French system with an e-ink tablet for each judge was introduced to capture their figure grades, data from the whole panel being assembled on conclusion of each performance in a laptop operated by the Chief Judge. Following assessment of the assembled data to detect and manage Hard Zeros and other anomalies assessed as requiring attention, the complete data package was transmitted to the central scoring computer for automated output of pilot check sheets and updated results.
 - Judges however found the tablets too demanding to successfully operate in the dynamic environment of a contest flight, especially when a post-flight review was often needed to finalise and sign-off each "sheet". Consequently each judge/assistant pair reverted to using standard paper judging forms to record and finalise their grades and comments, and a secrétaire (scribe) was added to manage each tablet. The completed and signed judging sheets were passed to the scribe for data entry into the tablet and the data transmitted to the CJ for collation and review prior to electronic transfer to the central scoring system. The addition of scribes and the extra time for post-flight data entry was considered an acceptable compromise to enable automated management in the scoring computer and avoid time consuming duplicated hand-entry of all the data.
- Czech Republic tablet system: A system that used e-ink tablets, highly readable even in bright sunlight, was developed to record judges marks and comments through the 1990's by Vladimir Machula. It was trialled at several CIVA-based aerobatic displays in the far-East, and subsequently operated in 2009 at the Norwegian nationals using ACRO as the central host to send and receive structured data. This initially appeared successful, but when back-checking of some judges marks became necessary it was realised that the lack of physical marks records (i.e. the usual paper judging sheets) made these vital confirmations impossible, and all development was abandoned. The quick-reaction code to create outgoing structure files and manage the returning judging data from the remote tablet system remains embedded in ACRO for potential future operations.
- **Spanish tablet system:** In recent years a comprehensive tablet-based solution has been developed in Spain and used at events including their nationals to present highly effective instant scoring output. Operated in conjunction with real-time video streaming, it has received very positive feedback from competitors and enabled competition aerobatics as a sport to be more widely appreciated. This tablet system together with a similar British video-streaming solution has been used by British Aerobatics, though equipment issues appear to have compromised the time taken to finalise output and a less effective result has been achieved.

This system currently provides the sole example known by this author of a reliable electronic tablet based data capture and results creation solution, though the FAI aeromodellers commission CIAM and almost certainly others have operated various paperless electronic data management systems for several years.

Software / hardware scope and competence: To cover the full spectrum of tasks that must be efficiently addressed by the computer management system at a CIVA championship demands an extremely broad set of abilities. In software it is good practice to centralise all aspects around a common database as far as this is possible, as trying to match the output of several distinct applications (viz spreadsheets etc.) can lead to duplication and potential errors.

We should also consider the natural benefits provided by each type of hardware – essentially here pc laptops and tablets – to make sure that every part of the target solution is ideally suited to each job. Task sharing between laptops and tablets is relatively straightforward, whereas using laptops for everything is clearly inappropriate and it is likely that expecting tablets to be ideal for every aspect – especially their operation in direct sunlight – may be similarly misguided. The approach established for remote tablet operations by both ACMS and ACRO is to use a base scoring computer operating in conjunction with a suite of tablets for data capture by the judging panel, with either a laptop or a master tablet run by the Chief Judge to manage connectivity transactions in the field.

The way forward for CIVA: This resumé summarises those systems known to this author, errors and omissions excepted, though of course others may have been used or perhaps are in development right now. We should also mention the JasPer (Java Scoring Program) software from Bob Buckley operated by by IAC in the USA in this summary, though it produces results only from judges raw grades and no tablet activity is associated with it. There may be others worthy of further review by CIVA, both from within and also external to the sport of competition aerobatics with its complex and uniquely defined data handling requirements.

It is very likely that for CIVA the FairPlay System will remain an essential part of processing of championship results for the foreseeable future. It must also be borne in mind that the computer management of all the sequence programmes, K-factors, people, aircraft details, nations, photos, sequence diagrams, judging panels, flight orders and many other unavoidable printed documents form an essential part of championship organisation and management, for which a central computer-based integrated management system will always be necessary.

The concept and development of a new computer and/or electronic tablet system fully suited to CIVA's operational needs thus presents a formidable project requirement. We must never forget that while a pilot can easily ruin their performance and a judge can occasionally provide a poor standard of marking, any significant failure in the calculation of championship results would trigger a catastrophic situation from which recovery could be extremely problematic, and the negative influence on CIVA's confidence and reliability as an international sports body would be very hard to overcome.

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