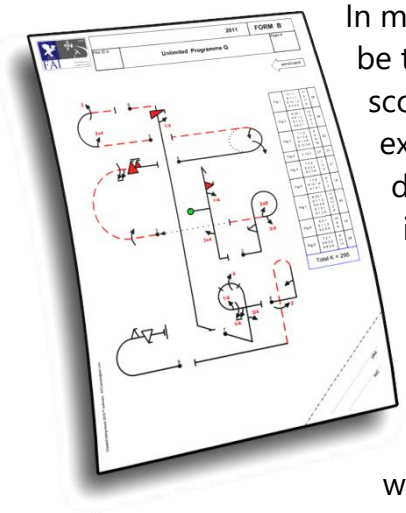
Processing Judges marks and CIVA's FairPlay System (FPS)

A thorough review of why a "system" is necessary in aerobatic competition judging, and what FPS does for us

Sports Results and Judging Systems



In most competitive sports selecting the winner is pretty easy ... it will be the first race-car past the finishing post, or the football team that scores the most goals, and so on. However some sports require experienced Judges to rank the artistic and technical skills on display, and competition aerobatics is one of many activities where it takes a trained expert to tell how well each performance has met the standard required. Where such complicated judgements are required it is normal to assume that the performance can theoretically be perfect, so we simply need to count the "errors" that are seen and calculate the mark for each item by subtracting the total of errors seen from a fixed number - the winner is the one with the highest remaining score after adjusting for complexity and other factors.

An unavoidable aspect of these subtractive marking processes is that skill variations between Judges tend to have a reversed effect. A less experienced or more timid Judge is unlikely to recognise as many errors as an 'expert' and award higher marks in a relatively narrow range, and these will influence the result more than the expert Judge with greater experience who will see more downgrades and give lower marks and with a broader spread. It is very difficult for any Judge to prevent honest preferences and dislikes from affecting his or her decisions, whether these are applied consciously or not. At international events the influence of national characteristics is unusually hard to avoid and can significantly affect the result.

Practical aerobatic judging

At aerobatic events Judges use their skill and experience to cumulate the downgrades for each figure to the nearest half-mark, then subtract this total from the 'perfect' ten to give a mark ranging from a maximum of 10.0 down to 0.0 or numeric zero. In addition there are specific occasions where fleeting and hard-to-spot technical errors are 'perceived', such as when a snap-roll, tail-slide or spin does not display some essential characteristic, and we write PZ to denote a 'Perception Zero'. If the figure flown is not the one specified on the Judges

paperwork then an HZ is used to denote that a ‘Hard Zero’ has been applied. The PZ is a personal view from each Judge and must be evaluated just like the numeric marks, whereas if any Judge has given a HZ then the Chief Judge must confer with the judging panel and decide either that the HZ should be applied for all Judges, if possible using a video recording to guide this process. If majority agreement is not reached the HZ is rejected and the figure fully marked. For occasional lapses of concentration a Judge can ask for an "average" mark to be provided by the system; this will be a simple average of the marks from the scoring Judges, to the nearest half mark.

Settling differences of opinion

Human opinions of subjective matters are almost inevitably influenced by personal pressures and influences of one sort or another to a greater or lesser extent, whether consciously or otherwise. The usual way to handle collections of potentially unreliable observations is to source as many as possible, then average them to minimise the influence of any ill-fitting or unusual elements. This is a valid strategy as long as we accept the occasional disturbance that questionable or way-out judgments can cause. Final aerobatic championship score differences between the leading pilots can however be very small, and to accept every mark without question could easily lead to publishing the wrong result. There should be a better way to identify marks that simply “don’t fit” so that they can be given the attention that they deserve, and with FPS there certainly is.

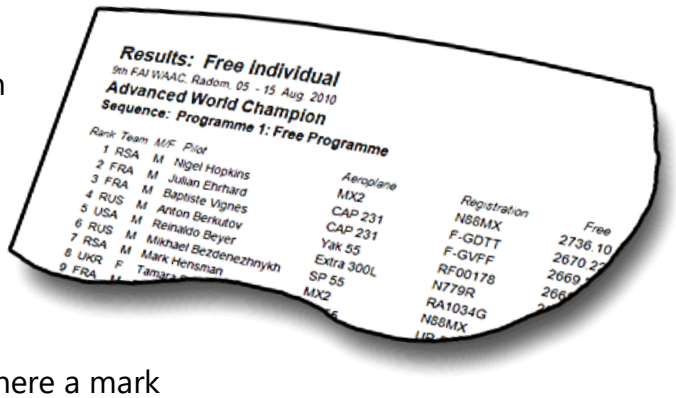
Combining this into a plan …

All the "raw" information from the Judges goes into the scoring computer. What we need now is:

- A preparation system to overcome the effect of differences in judging styles and ability.
- A way to detect ‘unusual’ marks when compared to other Judges marks for the same figure.
- A practical test so that we can evaluate unusual marks as either “OK” or “Not-OK”, and …
- A method for substituting a more suitable mark where a “Not-OK” decision requires it.
- All of this must be done in a completely open way that allows Pilots and Judges to see what has been done, and with enough supporting information for everyone to assess why any changes have been made.

Of course – the computer can not judge, but it can make very smart comparisons between the marks each Judge has awarded and, based on the reasonable assumption that the dominant panel view is the ‘correct’ one, it can painstakingly analyse every element and employ sound mathematical techniques to reach a result that treats each Judges' output in a fair and balanced way, and where necessary ensure that this always errs in favour of the pilot.

How to Compute the Results?



Over the years we have moved away from plain raw marks and its unavoidable problems, briefly through 'Bauerising', and then for some years CIVA used a statistical solution called TBLP in which a table of the marks from all Judges for all pilots and all figures was used to compare all the marks together, substituting averages from the other Judges where a mark failed the SD based acceptance test. With TBLP however every mark from every pilot affected every other mark, and while it provided some benefits it was thought that Judges could adapt their marking style to get an artificially improved result …. eventually the confidence of pilots was lost. Rather than risk a return to using raw marks, CIVA set out to create a better solution.

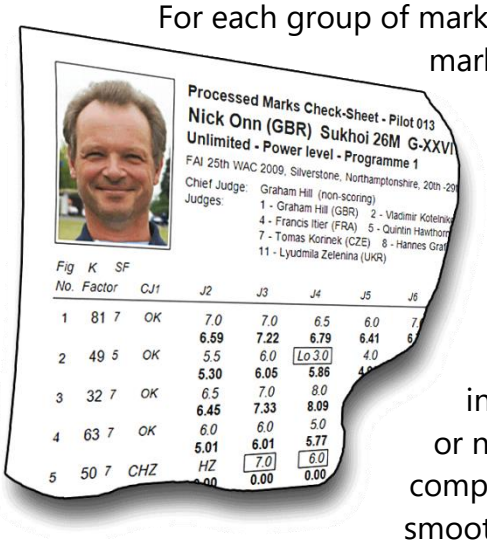
CIVA's FairPlay System

The process was developed during 2005 from a completely fresh approach that combined our comprehensive championship judging experiences with a number of robust statistical testing processes to meet the very high analytical standards required. The result has proved to be a reliable scoring system which has built a good level of trust among judges and competitors alike. It was revised in 2018 to include proportional assessment of any unusual marks, to smooth the effect of repeated results calculations on individual pilots' rankings.

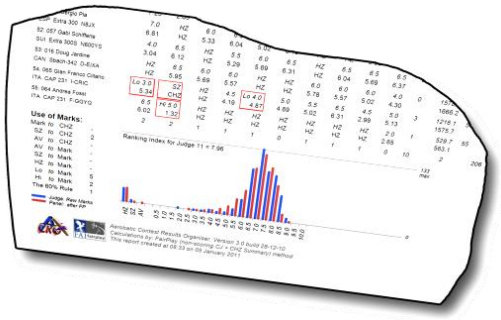
The system works within the following broad headings:

1. **Separate the Raw Marks into figure Groups**
   First the system assembles the Judges "raw" marks into groups on a figure-by-figure basis so that like is always compared to like and different opinions of the same thing can be precisely reviewed. For Free, Free Known and Free Unknown sequences where figure composition is more flexible, special systems are used to group similar types of figures together to ensure that the judgement comparisons remain on a like-for-like basis.
2. **Balance the Judges within each figure Group**
   An essential first step with each group is to re-balance the Judges marks so that every Judge has the same overall influence. The statistician's word for this balancing act is 'normalisation', and without it comparisons between the Judges would simply not be valid. In our normalisation each Judges complete set of non-zero marks is moved up or down and the scatter of the marks (based on their Standard Deviations) squeezed or expanded about their centre so each set of Judge's marks has the same overall effect as the panel average. This completely resolves the experienced / inexperienced Judge dilemma, the influence of every Judge now being equal. This is the move that changes the pilots' marks from simple whole and half numbers to many decimal places.

3. **Identify and resolve "Unusual" Marks**



For each group of marks FPS calculates an idealised table of Fitted Value (FV) marks that is closely matched to each Judges own style. An SD (standard deviation) based statistical confidence test at 98.5% is now carried out to check the validity of each normalised mark against its corresponding FV. If the test meets this confidence requirement the mark is accepted and carried forward to the next stage; if the test fails then the mark is identified for further treatment. In this way every normalised mark is in turn either accepted and carried forward unchanged, or noted for adjustment. When the figure group process is complete, any normalised mark identified for change will be smoothly blended toward the calculated FV by an amount that depends on its SD or confidence value; this change starts at the 98.5% confidence level (SD=2.43) and by 95.0% confidence (SD=1.96) the normalised mark will have been completely replaced by the FV. These adjustments are shown 'boxed' on the Pilots check-sheets to indicate where they have been made. This final set of marks can now be multiplied by the figure K-factors to build a table of scores for each pilot from each judge, ready for the next step.



4. **Identify and settle any High and Low Biased Scores**

The FairPlay System now uses the above table of scores as the basis for another Normalisation and Fitted Values validation process very similar to that of the marks assessment procedure. This time however it is used to detect and resolve any unusual scores that may have survived; the confidence levels required are now slightly more relaxed at 78.5% and 90%. Biased scores are possible because even though all unusual raw marks have been removed a Judge may still have given overall an under or over-stated assessment of a competitor, and the score can thus be unacceptably high or low when compared to the other Judges. Such bias can for example be the result of over-enthusiastic assessment of a home team pilot, or simply national likes and dislikes that have not been successfully kept in check. FPS as usual replaces any scores that fail their confidence test with the Judges Fitted Value score, and again any such changes are clearly shown on the Pilots check-sheets.

5. **Handling Penalties**

After the processing of marks and scores has been completed for all groups the penalties can be subtracted from the average of the Judges final scores, and the sequence results are now ready for publication.

6. **Create detailed feedback for the Judges**

Now the FairPlay System can turn to its other great strength – a thorough review of judging performance. An individual analysis shows for each Judge how he/she compares to his/her colleagues, while for the Chief Judge the statistics for the whole panel are collated and ranked to show which Judge most closely matched the panel view and by

how much the other Judges were out of step with all their colleagues. In this way FPS is able to provide a great deal of easily distributed feedback for the entire judging team, something not available until the advent of this system.

Publication of Results

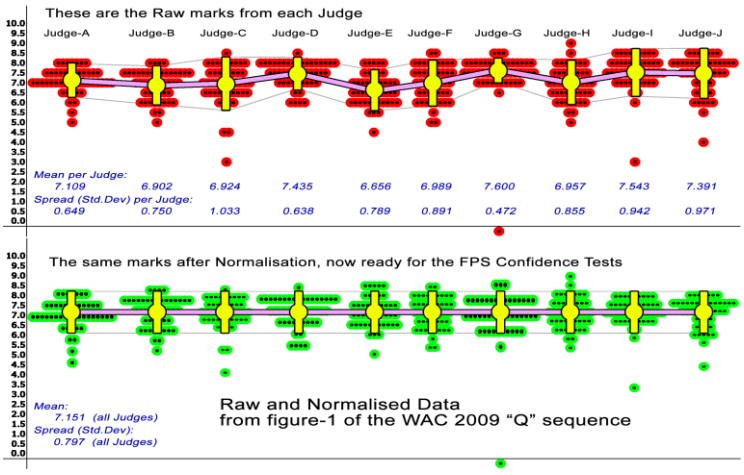
After approval from the Chief Judge and the Jury, the scorer can now publish the results on paper and to the web, and make the Chief and individual Judges sequence analysis available to the panel so the pilots and the judging panel can each see in detail just how they have all performed.

The Judges Ranking Index (RI)

In an ideal world each Judge would rank the pilots in the same order as the final result based upon the views of the whole panel. Whilst minor differences would generally be of little concern, significant mis-ranking of pilots compared to the panel's final conclusion would be a clear indication that a Judge's views are not shared and so are less likely to be correct. To measure this effect FPS determines each Judges own pilot ranking from a specially prepared set of normalised raw scores with any averages resolved and also taking into account any rejected PZ's for which judges are not penalised. It then builds a personal Ranking Index (RI) that will be zero if the Judge pilot ranking is perfectly in-tune with the panel, but is triggered upwards by each rank and score difference combined. At a major championship an RI value below about 10 for each sequence would indicate pretty good agreement with the published result, numbers above this level giving increasing cause for concern - a review of the Judges own analysis would then be the right place to try and identify where the discrepancies are appearing.

Beside the obvious advantage arising from the ease with which any Judge can now review their contest performance against the published result and see where they most need to target their personal development effort, experience shows that this system can now be used as a reliable and proven basis upon which to base the selection of Judges for international championship duty.

An example of Raw Marks Normalisation

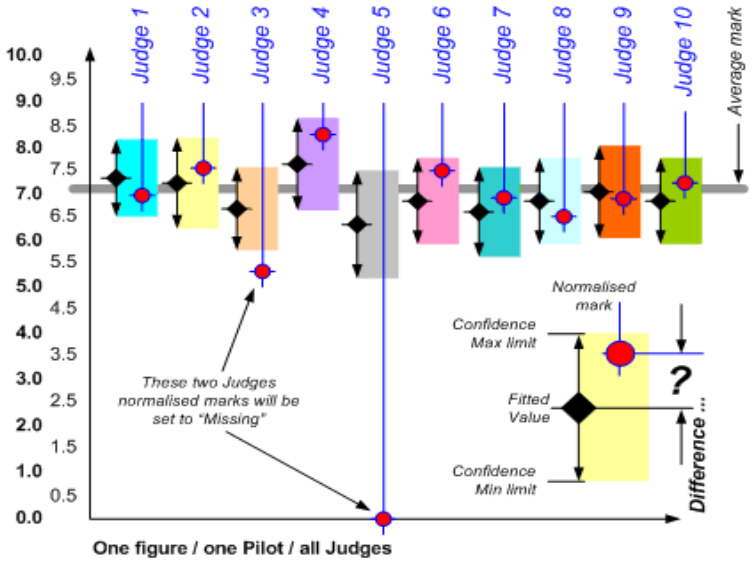


First diagram:

Each red/black dot represents one mark given by each Judge at that value. The yellow circles show the mean for each Judge, the vertical yellow strips indicate the spread of the Judges marks (this is the 'standard deviation'). The pink and grey lines emphasize the style differences between each Judge – some Judges give higher marks than others, and some Judges spread their marks over a wider range than others.

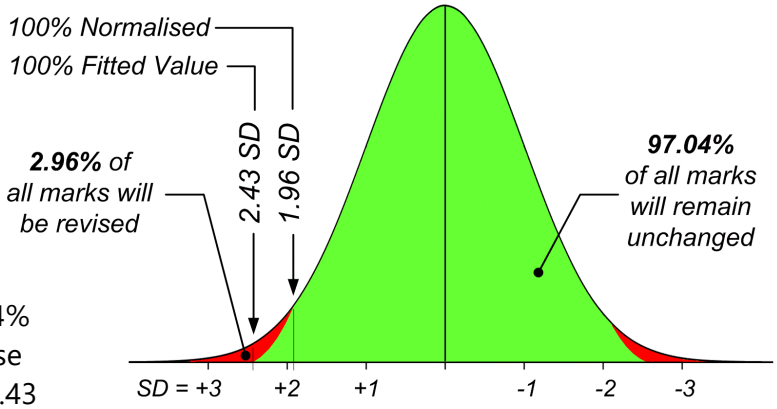
Second diagram:
During the Normalisation process each Judges block of marks has been moved up or down so that their average is equal to the average for the all of the Judges, and the spread of each Judges marks has been squeezed or expanded to be equal to the average spread for all Judges. Because all the judges now have an identical style of marking it is possible to start comparing any Judge against the others in a meaningful way.

How does the FairPlay System confidence test work?



Taking each normalised mark in turn through the whole group, FPS carries out a statistical test on each one to obtain an 'Uncertainty' valuation for it. This is done by taking the numeric difference between the mark and the Fitted Value (FV) that FPS has calculated for it and dividing by the Residual Standard Deviation (SD) for the group. In the upper diagram each judge's mark is shown as a red circle and the Fitted Value as a black diamond. The height of the black arrow indicates the 98.5% (2.43 SD) confidence range within which the mark can be accepted. Any that are outside this range are too different to the value we should expect the judge give, and they must be adjusted.

If the result of the confidence test is between 98.5% / 2.43 SD and 95% / 1.96 SD the mark is proportionately blended between its normalised value and the FV. Any that are beyond 95% are simply replaced by the FV.

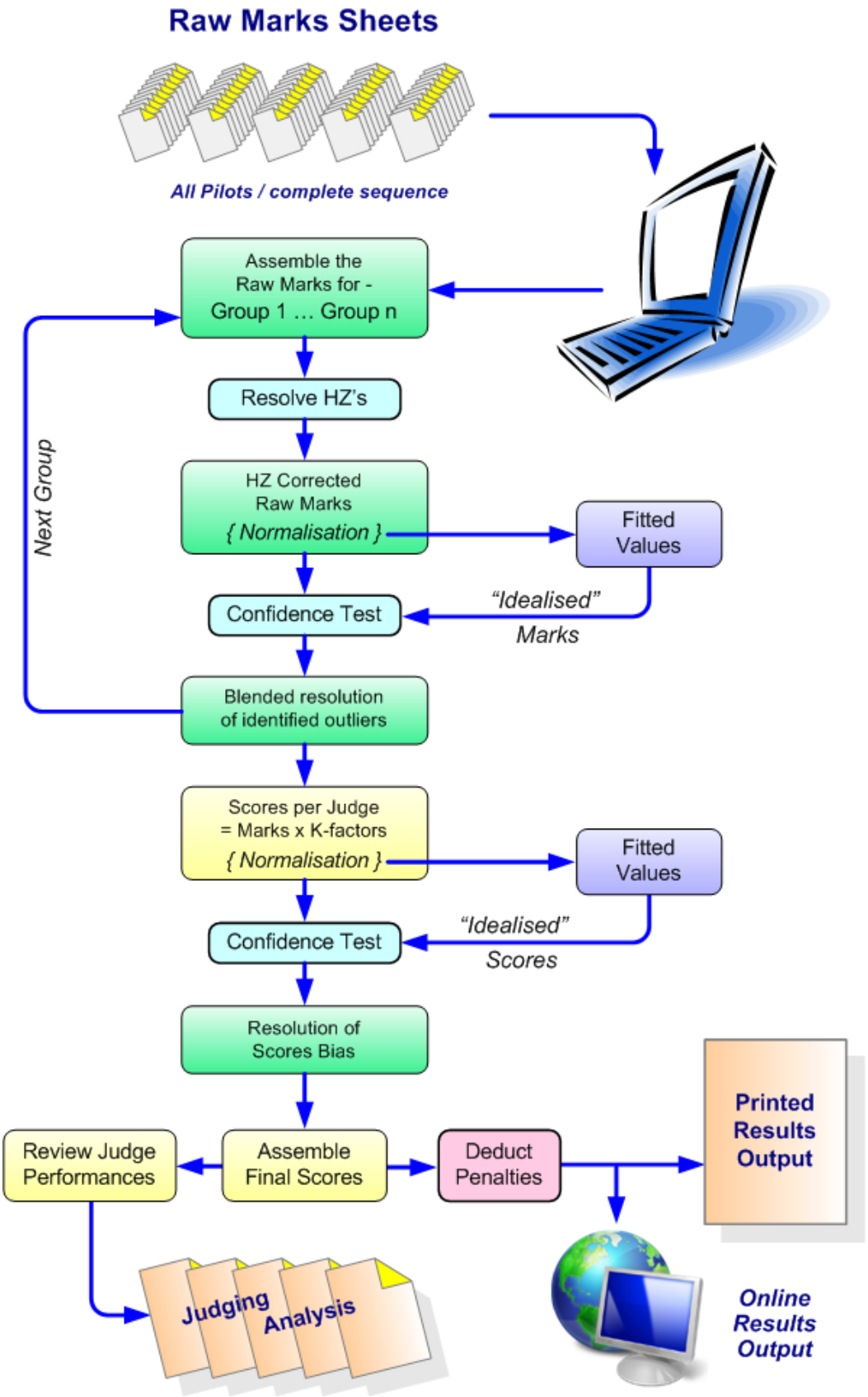


To understand this look at the idealised distribution of marks shown in the lower diagram. In FPS the marks in the central 97.04% green area are accepted without change, those in the left/right red areas between 1.96 and 2.43 SD are blended proportionately from their normalised value to the FV, while those with SD above 2.43 are directly replaced by the FV.

In response to feedback from pilots over many years regarding the extent of individual pilot rank changes that are an inevitable feature of statistical systems when results calculations are repeated as the number of pilots marks entered gradually increases, the FairPlay System was thoroughly reviewed and developed for the 2018 competition season to incorporate the above proportionate blending process. In practice this mimics the subjective methodology that humans apply to these situations as confidence in a comparison slides from high to low, and the degree of minor rank changes has now been reduced by more than half.

NHB: Rev-2 August 2020

The FairPlay System Process map



Example 1 – ACRO Pilots online FPS Score Sheet

FairPlay Processed Marks Sheet

David Kean - DR-107 G-IIDI

Advanced - Power : 2nd Unknown Sequence

2019 Advanced, Unlimited Nats at Sywell Aerodrome, 20-23 June 2019

Contest Director: Alan Cassidy, Contest Chief Judge: Nick Buckenham

Judges: 1 - Pierre Varloteaux (FRA), 2 - Laszlo Liszkay (RSA), 3 - Ian Scott, 4 - Leif Culpin, 5 - Nick Buckenham

Fig No	K factor	J1	J2	J3	J4	CJ5	CHZ	Av'ge Mark	Equiv. Score
1	28	7.5	8.5	8.0	9.0	9.0	OK	8.40	235.20
		8.15	8.36	8.18	8.98	8.40		8.41	235.58
2	22	6.5	7.5	8.5	8.5	8.5	OK	7.90	173.80
		7.21	7.58	8.38	8.22	7.88		7.85	172.80
3	30	5.0	5.0	6.5	6.5	4.5	OK	5.50	165.00
		5.16	5.52	6.83	6.12	3.62		5.45	163.54
4	28	7.0	8.0	Lo PZ	8.0	Lo PZ	OK	4.60	128.80
		7.55	7.95	8.15	7.83	7.67		7.83	219.28
5	39	7.5	8.0	8.5	8.5	6.0	OK	7.70	300.30
		8.20	7.68	9.24	8.15	6.12		7.88	307.21
6	24	7.5	7.5	7.5	8.5	8.5	OK	7.90	189.60
		8.18	7.58	7.58	8.22	7.88		7.89	189.35
7	42	7.5	7.5	8.0	8.0	7.0	OK	7.60	319.20
		8.20	7.36	8.49	7.56	7.02		7.72	324.38
8	38	7.0	7.0	7.0	8.5	8.0	OK	7.50	285.00
		7.60	7.03	6.98	8.15	7.91		7.54	286.36
9	23	7.0	8.0	7.0	7.5	AVG	OK	7.38	169.63
		7.70	8.26	7.18	7.20	7.59		7.59	174.48
Posi	30	7.0	8.5	6.0	8.0	8.5	OK	7.60	228.00
		7.60	8.00	5.48	7.56	8.36		7.40	222.02

This sequence has been completed. FairPlay scores here are FINAL

Judge Scores	2192.98	2322.68	2303.56	2428.10	2243.25

Processed score total (3040 = max.poss) 2298.11

Too Low	0.0
Too High	0.0
Box Outs	0.0
Interruptions	0.0
Insertions	0.0
Missed Slot	0.0
Trg. Violation	0.0
Other Penalty	0.0

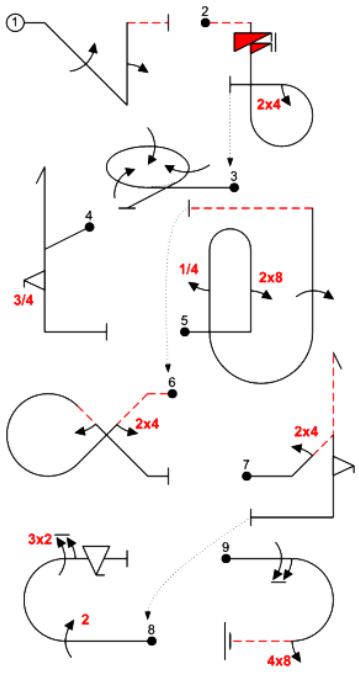
No penalties to deduct

Final score valuation 75.60 %

FairPlay System explanations

ACRO Version 4.4 Build: 03/08/20

2nd Unknown Sequence
All pilots



Example 2 – ACRO Chief Judges Overall FPS Analysis page

Analysis of Judges Combined Anomalies

Sequences: Seq01 Programme 1: Free Known, Seq02 Programme 2: Free Unknown #1 (INP), Seq03 Programme 3: Free Unknown #2 (INP), Seq04 Programme 4: Free Unknown #3

WIAC 2019
Breclav
07.07.-13.07.2019

	All Judges No	%	RSA Johnie Smith RI 7.59 [4]		GER Steff Hau RI 9.35 [4]		UKR Galyna Suprunenko RI 11.29 [4]		RUS Alexander Miakishev RI 12.99 [4]		HUN Bela Guraly RI 13.09 [4]		CZE Zuzana Danihelova RI 17.63 [4]		GBR Nick Buckenham RI 21.48 [4]	
Use of Marks:																
HZ - Hard Zeros	226	*2.2*	29	*2.0*	30	*2.1*	35	*2.4*	29	*2.0*	30	*2.1*	40	*2.8*	33	*2.3*
PZ - Perception Zeros	123	*1.2*	17	*1.2*	12	*0.8*	36	*2.5*	7	*0.5*	10	*0.7*	20	*1.4*	21	*1.4*
Marks from 0.0 to 6.5	2803	*27.6*	329	*22.6*	324	*22.3*	533	*36.7*	198	*13.6*	499	*34.3*	581	*40.0*	339	*23.3*
Marks from 7.0 to 10.0	6988	*68.7*	1071	*73.7*	1081	*74.4*	846	*58.2*	1213	*83.5*	912	*62.8*	812	*55.9*	1053	*72.5*
AV - averages	31	*0.3*	7	*0.5*	6	*0.4*	3	*0.2*	6	*0.4*	2	*0.1*	0	*0.0*	7	*0.5*
Total marks *Pilots/Judge*	10171		1453	*108*	1453	*108*	1453	*108*	1453	*108*	1453	*108*	1453	*108*	1453	*108*

Style Comparison:
Average and Style of Judges Raw Marks compared to normalised all-Judges average
Style ♡ 2 x Raw SD

Vertical axis scale:
1 mark = 94mm

		RSA	GER	UKR	RUS	HUN	CZE	GBR
	Average:	1.77	1.79	1.79	1.66	1.86	1.76	1.69	1.82
	Style:	0.49	0.46	0.45	0.53	0.38	0.53	0.61	0.46
Raw Marks Factors:	*Average %:*	100	+ 1.53	+ 1.04	− 5.78	+ 5.06	− 0.17	− 4.45	+ 2.76
	Style %:	100	− 6.40	− 8.29	+ 7.96	− 21.83	+ 9.04	+ 25.63	− 6.11

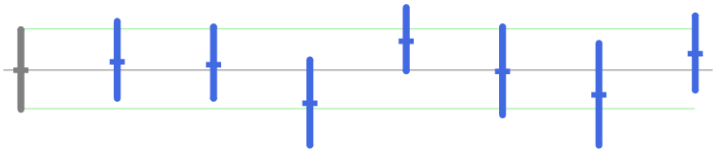


Figure anomalies

			RSA	GER	UKR	RUS	HUN	CZE	GBR
HZ to fitted value	51	*0.5*	4	8	9	6	6	11	7
Mark to confirmed HZ	37	*0.4*	3	7	5	7	7	3	5
PZ to confirmed HZ	1	*0.0*	1	-	-	-	-	-	-
PZ to fitted value	58	*0.6*	8	6	19	1	3	8	13
AV to confirmed HZ	12	*0.1*	3	3	1	2	1	-	2
AV to fitted value	19	*0.2*	4	3	2	4	1	-	5
Lo to fitted value	58	*0.6*	7	6	5	7	10	10	13
Hi to fitted value	45	*0.4*	6	4	6	8	8	2	11
The 60% Rule	28	*0.3*	4	4	4	4	4	4	4
Total figure anomalies	309		40	41	51	39	40	38	60

Sequence anomalies

Team		*Pilots assessed in FPS pass-2*	RSA	GER	UKR	RUS	HUN	CZE	GBR
AUT	Austria	12 4 Lo 3 Hi	- -	- 2 Hi	- -	- -	1 Lo -	3 Lo -	- 1 Hi
CZE	Czech Republic	28 6 Lo 7 Hi	1 Lo -	- -	- -	2 Lo 1 Hi	2 Lo -	- 6 Hi	1 Lo -
GBR	Great Britain	24 9 Lo 5 Hi	1 Lo -	1 Lo -	1 Lo -	2 Lo 1 Hi	- 1 Hi	4 Lo -	- 3 Hi
GER	Germany	4 0 Lo 1 Hi	- -	- -	- 1 Hi	- -	- -	- -	- -
HUN	Hungary	12 5 Lo 2 Hi	- 1 Hi	1 Lo -	- -	1 Lo -	- 1 Hi	2 Lo -	1 Lo -
ITA	Italy	4 1 Lo 0 Hi	- -	- -	- -	- -	1 Lo -	- -	- -
POL	Poland	12 0 Lo 4 Hi	- -	- -	- 1 Hi	- -	- 2 Hi	- -	- 1 Hi
UKR	Ukraine	12 4 Lo 2 Hi	- -	1 Lo -	- 2 Hi	1 Lo -	- -	- -	2 Lo -
Total sequence anomalies		29 Lo 24 Hi	2 Lo 1 Hi	3 Lo 2 Hi	1 Lo 4 Hi	6 Lo 2 Hi	4 Lo 4 Hi	9 Lo 6 Hi	4 Lo 5 Hi

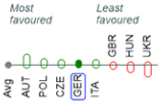
Review of Perception Zeros

	RSA	GER	UKR	RUS	HUN	CZE	GBR
PZ's accepted = 61	7	6	17	6	6	12	7
PZ's rejected = 62	10	6	19	1	4	8	14
Totals per Judge	17	12	36	7	10	20	21

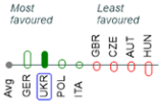
Cumulative RI contributions per Team

Johnie Smith (RSA)
Judge: max country bias = 1.37 min = -0.56 o/all avg = 0.13
Panel: = 6.45 min = -2.92

Steff Hau (GER)
Judge: max country bias = 0.85 min = -1.08 o/all avg = 0.04
Panel: = 6.45 min = -2.92

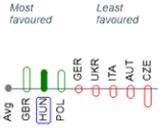


Galyna Suprunenko (UKR)
Judge: max country bias = 1.28 min = -0.85 o/all avg = 0.13
Panel: = 6.45 min = -2.92

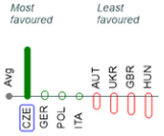


Alexander Miakishev (RUS)
Judge: max country bias = 1.10 min = -1.36 o/all avg = -0.14
Panel: = 6.45 min = -2.92

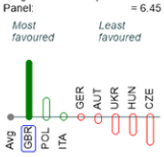
Bela Guraly (HUN)
Judge: max country bias = 2.21 min = -1.75 o/all avg = 0.26
Panel: = 6.45 min = -2.92



Zuzana Danihelova (CZE)
Judge: max country bias = 5.55 min = -2.13 o/all avg = -0.10
Panel: = 6.45 min = -2.92



Nick Buckenham (GBR)
Judge: max country bias = 6.45 min = -2.92 o/all avg = 0.22
Panel: = 6.45 min = -2.92



Example 3 – ACRO online Individual Judge FPS Analysis page

ACRO Single Sequence FPS Analysis for Judge 4: Galyna Suprunenko - UKR

WIAC 2019, Breclav, 07.07.-13.07.2019

Intermediate - Power, Programme 2: Free Unknown #1

Ranking Index = 8.56

Judges nation	High value
Panel average	Low value

Raw and *normalised / FPS revised* Marks and Scores

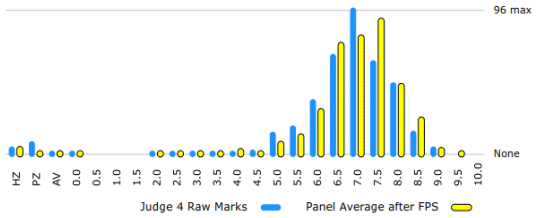
FP Rank *before* penalties		Fig-1	Fig-2	Fig-3	Fig-4	Fig-5	Fig-6	Fig-7	Fig-8	Fig-9	Fig-10	Fig-11	Fig-12	Fig-13	Fig-14	Posi	No	RI / I
1	Timur Fatkulin - UKR	7.0	7.5	7.0	7.0	7.5	7.5	8.5	7.5	8.5	9.0	8.0	9.0	7.5	7.0	8.0	0	1856.
	Extra 330LX UR-TIM	*7.14*	*7.53*	*7.34*	*7.20*	*7.42*	*7.51*	*8.48*	*7.70*	*8.37*	*9.17*	*7.88*	*9.08*	*7.67*	*6.97*	*8.64*		*1825.*
2	Igor Chernov - UKR	7.5	7.5	7.0	7.5	8.0	8.0	8.5	7.0	8.0	8.5	7.5	9.0	8.0	6.5	7.5	0	1843.
	Extra 330LX UR-TIM	*7.67*	*7.53*	*7.34*	*7.67*	*8.11*	*7.90*	*8.48*	*7.14*	*7.94*	*8.64*	*7.47*	*9.08*	*8.21*	*6.57*	*8.07*		*1814.*
3	Michal Tvrznik - CZE	7.5	8.0	7.0	7.5	7.0	7.0	8.0	7.5	8.0	7.5	6.5	7.0	7.5	7.0	7.0	0	1751.
	Z50LS OK-FAI	*7.51*	*8.09*	*7.11*	*7.42*	*7.07*	*7.14*	*8.12*	*7.84*	*8.04*	*7.70*	*6.61*	*7.12*	*7.67*	*6.97*	*7.50*		*1735.*
4	Dmitry Pogrebytskyy - UKR	7.5	7.5	7.0	7.5	8.5	7.0	8.5	7.5	8.0	8.5	6.5	7.5	7.5	7.0	8.0	0	Hi 1829.
	Extra 330LX UR-TIM	*7.67*	*7.53*	*7.34*	*7.67*	*8.79*	*7.11*	*8.48*	*7.70*	*7.94*	*8.64*	*6.67*	*7.61*	*7.67*	*6.97*	*8.64*		*1690.*
5	Tomas Petrman - CZE	9.0	9.0	7.0	8.0	8.0	6.5	7.5	6.5	6.5	7.0	7.5	7.0	7.0	PZ	6.0	1	1692.
	Z50LS OK-FAI	*8.80*	*9.21*	*7.11*	*8.11*	*7.88*	*6.62*	*7.59*	*6.84*	*6.73*	*7.14*	*7.67*	*7.12*	*7.20*	*5.52*	*6.36*		*1681.*
6	Miroslav Cerny - CZE	6.5	8.0	6.0	7.5	6.0	8.0	8.0	6.5	6.5	7.5	7.5	8.0	6.0	PZ	6.5	1	1651.
	XP30 D-ESXA	*6.64*	*8.09*	*6.33*	*7.42*	*6.26*	*8.19*	*8.12*	*6.84*	*6.73*	*7.70*	*7.67*	*8.10*	*6.25*	*5.37*	*6.93*		*1638.*
7	Trevor Dugan - GBR	7.0	6.5	7.0	8.0	6.5	7.0	8.5	5.5	8.5	6.0	6.5	7.0	6.0	4.5	6.0	0	1567.
	Extra 300SC G-IISC	*7.08*	*6.59*	*7.16*	*8.09*	*6.84*	*7.20*	*8.79*	*5.93*	*8.64*	*6.26*	*6.62*	*7.32*	*6.07*	*4.98*	*6.36*		*1575.*
8	Christian Auer - AUT	8.5	8.0	6.0	8.0	5.5	6.0	8.0	6.5	7.0	6.0	7.5	8.5	6.5	PZ	7.5	1	1594.
	Extra 300SC D-EAXY	*8.37*	*8.26*	*6.29*	*8.09*	*5.83*	*6.25*	*8.11*	*6.72*	*7.27*	*6.26*	*7.67*	*8.59*	*6.61*	*0.89*	*8.07*		*1602.*
9	David Farley - GBR	8.0	7.5	7.0	7.5	7.0	7.0	7.5	7.0	8.0	7.0	7.0	8.0	6.5	5.0	7.5	0	1722.
	CAP 231 EX G-GKKI	*7.94*	*7.70*	*7.16*	*7.52*	*7.34*	*7.20*	*7.42*	*7.11*	*8.12*	*7.07*	*7.14*	*8.10*	*6.61*	*5.37*	*8.07*		*1708.*
10	Tomas Zemanek - CZE	7.0	8.0	7.0	8.0	7.5	7.0	7.5	7.5	6.5	6.5	6.5	8.0	6.0	PZ	5.5	1	1619.
	Z50LS OK-FAI	*7.08*	*8.09*	*7.11*	*8.11*	*7.47*	*7.14*	*7.59*	*7.84*	*6.73*	*6.59*	*6.61*	*8.10*	*6.25*	*5.81*	*5.79*		*1616.*
11	Graeme Fudge - GBR	7.0	7.5	7.0	6.5	5.5	5.0	7.5	5.5	7.0	6.0	AV	8.0	6.5	6.0	7.0	1	1580.
	CAP 232 G-GODV	*7.08*	*7.70*	*7.16*	*6.41*	*5.83*	*5.31*	*7.42*	*5.93*	*7.07*	*6.26*	*7.10*	*8.10*	*6.61*	*6.17*	*7.50*		*1586.*
12	Roland Kastenhuber - AUT	8.0	8.5	7.5	8.5	5.0	PZ	8.0	7.0	8.0	7.0	7.5	8.0	7.0	5.5	8.5	1	1771.
	Extra 300 D-EPOI	*7.94*	*8.81*	*7.60*	*8.65*	*5.32*	*6.39*	*8.11*	*7.11*	*8.12*	*7.07*	*7.67*	*8.10*	*7.14*	*5.77*	*9.21*		*1641.*
13	Maciej Kulaszewski - POL	6.5	7.0	7.0	7.5	7.0	5.0	7.0	6.0	7.0	6.5	7.0	8.0	PZ	PZ	7.5	1	1519.
	Genpro HA-XEG	*6.64*	*6.97*	*7.11*	*7.42*	*7.07*	*5.05*	*7.07*	*6.33*	*7.16*	*6.59*	*7.14*	*8.10*	*6.00*	*0.00*	*8.07*		*1539.*
14	Tamas Rohacs - HUN	8.5	8.0	7.0	7.0	6.0	6.0	6.5	5.5	7.5	6.0	6.5	9.0	6.5	2.0	4.5	0	1515.
	Extra 300 D-EEXT	*8.37*	*8.26*	*7.16*	*6.97*	*6.33*	*6.25*	*6.05*	*5.93*	*7.59*	*6.26*	*6.62*	*9.08*	*6.61*	*2.99*	*4.65*		*1536.*
15	Adam Ondrejka - CZE	8.0	8.5	6.5	8.0	6.5	6.5	7.5	7.0	7.5	7.0	7.0	7.5	6.0	6.5	6.5	1	1678.
	XP30 D-ESXA	*7.94*	*8.65*	*6.72*	*8.11*	*6.67*	*6.62*	*7.59*	*7.34*	*7.60*	*7.14*	*7.14*	*7.61*	*CHZ*	*6.57*	*6.93*		*1565.*
16	Wojciech Kotulski - POL	6.5	7.5	6.5	8.0	7.0	5.5	7.0	5.0	7.0	6.5	6.5	7.5	7.0	4.0	6.5	0	1545.
	Genpro HA-XEG	*6.64*	*7.53*	*6.72*	*8.11*	*7.07*	*5.46*	*7.07*	*5.32*	*7.16*	*6.59*	*6.61*	*7.61*	*7.20*	*4.58*	*6.93*		*1550.*
17	Adrian Willis - GBR	6.5	7.0	7.5	7.0	PZ	6.5	7.0	6.0	6.5	6.0	5.0	7.0	5.0	6.5	6.0	1	1481.
	Genpro HA-XEG	*6.64*	*7.14*	*7.60*	*6.97*	*5.04*	*6.73*	*6.73*	*6.33*	*6.54*	*6.26*	*5.05*	*7.12*	*5.00*	*6.57*	*6.36*		*1491.*
18	Balazs Kiss - HUN	8.0	7.5	6.5	6.5	6.0	6.5	8.0	6.5	7.5	7.0	7.5	9.0	6R 0.0	3.5	6.5	1	1507.
	Extra 300 D-EEXT	*7.94*	*7.70*	*6.73*	*6.41*	*6.33*	*6.73*	*8.11*	*6.72*	*7.59*	*7.07*	*7.67*	*9.08*	*2.13*	*4.18*	*6.93*		*1550.*
19	Lukas Parizek - CZE	7.0	7.5	8.0	6.5	7.5	6.0	7.0	6.5	6.5	8.0	6.5	7.0	HZ	3.0	7.0	0	1511.
	Extra 300L OK-XTR	*7.08*	*7.60*	*8.26*	*6.72*	*7.53*	*6.26*	*7.14*	*6.05*	*6.84*	*8.12*	*6.61*	*7.12*	*HZ*	*3.78*	*7.50*		*1514.*
20	Francesco Adorisio - ITA	6.5	7.0	7.5	6.5	6.5	6.5	6.0	HZ	Hi 7.5	6.5	8.0	6.5	6.5		5.5	2	1438.
	CAP 21 I-CILL	*6.61*	*7.34*	*7.53*	*6.72*	*6.64*	*6.59*	*6.29*	*6.60*	*5.84*	*6.62*	*8.12*	*6.73*	*6.57*		*5.79*		*1560.*
21	Simon Wood - GBR	7.5	7.0	7.0	7.0	6.0	6.5	8.5	5.0	7.0	5.5	7.0	7.0	5.0	5.5	7.0	0	1570.
	Edge 360 G-ZVKO	*7.51*	*7.14*	*7.16*	*6.97*	*6.33*	*6.73*	*8.79*	*5.54*	*7.07*	*5.86*	*7.14*	*7.12*	*5.00*	*5.77*	*7.50*		*1577.*
22	Ivo Cervinka - CZE	6.5	7.0	6.0	Lo 3.0	3.0	Lo 0.0	6.5	6.0	6.5	7.0	6.0	7.0	7.0	PZ	6.0	2	1255.
	Z50LS OK-FAI	*6.64*	*6.97*	*6.33*	*7.44*	*3.84*	*5.81*	*6.54*	*6.33*	*6.73*	*7.14*	*6.07*	*7.12*	*7.20*	*0.00*	*6.36*		*1415.*
23	Anthony Walsh - GBR	7.0	6.5	7.0	6.5	6.0	5.5	7.5	5.0	7.0	5.5	6.5	7.5	6.0	5.0	5.0	0	1469.
	Extra 200 G-OLUD	*7.08*	*6.59*	*7.16*	*6.41*	*6.33*	*5.78*	*7.42*	*5.54*	*7.07*	*5.86*	*6.62*	*7.61*	*6.07*	*5.37*	*5.22*		*1480.*
24	Elisa Bretterebner - AUT	5.5	7.0	8.0	7.0	7.0	6.0	5.0	7.5	6.0	6.0	7.0	5.0	PZ		4.0	0	1354.
	Extra 300L D-ENVY	*5.86*	*7.14*	*8.09*	*7.08*	*7.14*	*6.29*	*5.54*	*7.42*	*6.33*	*6.25*	*7.07*	*5.00*	*0.00*		*4.08*		*1380.*
25	Darius Mazur - POL	7.0	7.0	7.0	7.0	5.5	6.5	8.0	4.5	HZ	7.0	7.0	8.0	6R 4.0	4.5	5.5	1	1266.
	Genpro HA-XEG	*7.08*	*6.97*	*7.11*	*6.73*	*5.86*	*6.62*	*8.12*	*4.82*	*HZ*	*7.14*	*7.14*	*8.10*	*3.37*	*4.98*	*5.88*		*1351.*
26	Martin Graef - GER	7.0	6.5	5.5	7.0	5.0	5.0	7.5	HZ	7.0	6.0	7.0	8.0	5.5	6.0	4.5	0	1344.
	Extra 300S N45S	*7.08*	*6.59*	*5.85*	*6.97*	*5.32*	*5.31*	*7.42*	*HZ*	*7.07*	*6.26*	*7.14*	*8.10*	*5.54*	*6.17*	*4.65*		*1367.*
27	Janos Sonkoly - HUN	7.5	7.0	7.0	8.0	5.5	6.0	8.0	HZ	7.0	HZ	HZ	7.5	6.5	2.5	5.5	3	1173.
	Extra 300 D-EEXT	*7.51*	*7.14*	*7.16*	*8.09*	*5.83*	*6.25*	*8.11*	*HZ*	*7.07*	*6.02*	*HZ*	*CHZ*	*CHZ*	*3.38*	*5.79*		*1158.*
		0	*0*	*0*	*1*	*1*	*2*	*0*	*1*	*1*	*1*	*1*	*1*	*5*	*4*	*0*	*18*	

Figure Anomalies Summary

	Judge	O/all
Mark to CHZ	3	16
PZ to CHZ	-	-
AV to CHZ	-	10
AV to Mark	1	13
PZ to Mark	7	20
HZ to Mark	2	11
Lo to Mark	2	14
Hi to Mark	1	10
The 60% rule	2	14

Judge Anomalies vs. totals from all Judges

Distribution of Raw Marks - Judge vs. Panel



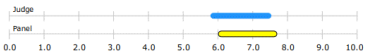
Review of Anomalies

Mark anomalies		*Judge 1*	*Judge 2*	*Judge 3*	*Judge 4*	*Judge 5*	*Judge 6*	*Judge 7*	*Judge x2*
Adam Ondrejka - CZE	Fig-13	7.0	7.0	7.0	6.0	HZ	7.5	7.5	CHZ
XP30 D-ESXA		*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	
Adrian Willis - GBR	Fig-5	5.5	Lo PZ	5.0	Lo PZ	Hi 6.5	5.0	4.0	OK
Genpro HA-XEG		*5.44*	*5.04*	*5.82*	*5.04*	*5.04*	*4.99*	*3.90*	
Balazs Kiss - HUN	Fig-13	6R 4.0	6R 3.0	6R 0.0	6R 0.0	6R 0.0	6R 0.0	6R 7.0	OK
Extra 300 D-EEXT		*2.14*	*2.43*	*2.15*	*2.13*	*2.15*	*2.15*	*2.14*	
Darius Mazur - POL	Fig-13	6R PZ	6R 6.0	6R 6.0	6R 4.0	6R PZ	6R PZ	6R 6.5	OK
Genpro HA-XEG		*3.24*	*2.70*	*3.24*	*3.37*	*3.24*	*3.24*	*3.24*	
Francesco Adorisio - ITA	Fig-8	Lo 4.0	7.0	6.0	HZ	6.5	7.0	7.0	OK
CAP 21 I-CILL		*6.60*	*6.74*	*6.55*	*6.60*	*6.51*	*6.49*	*6.72*	
Francesco Adorisio - ITA	Fig-9	3.5	5.5	6.0	Hi 7.5	7.0	6.0	Lo 2.0	OK
CAP 21 I-CILL		*4.92*	*5.47*	*6.47*	*5.84*	*6.90*	*5.61*	*5.84*	
Graeme Fudge - GBR	Fig-11	7.0	7.0	7.0	AVGE	7.5	7.5	7.0	OK
CAP 232 G-GODV		*7.59*	*6.83*	*7.07*	*7.10*	*7.18*	*7.29*	*6.67*	
Ivo Cervinka - CZE	Fig-4	7.0	8.0	7.0	Lo 3.0	7.0	8.5	7.0	OK
Z50LS OK-FAI		*7.22*	*8.05*	*7.30*	*7.44*	*6.90*	*8.18*	*6.91*	
Ivo Cervinka - CZE	Fig-6	6.0	6.5	3.0	Lo 0.0	6.5	HZ	6.5	OK
Z50LS OK-FAI		*6.49*	*6.19*	*4.35*	*5.81*	*6.26*	*5.81*	*5.75*	
Janos Sonkoly - HUN	Fig-10	6.0	AVGE	6.0	HZ	AVGE	AVGE	6.0	OK
Extra 300 D-EEXT		*6.29*	*6.02*	*6.55*	*6.02*	*6.02*	*6.02*	*5.22*	
Janos Sonkoly - HUN	Fig-12	7.0	AVGE	HZ	7.5	9.0	AVGE	7.0	CHZ
Extra 300 D-EEXT		*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	
Janos Sonkoly - HUN	Fig-13	6.5	AVGE	6.0	6.5	6.5	AVGE	7.0	CHZ
Extra 300 D-EEXT		*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	*HZ*	
Maciej Kulaszewski - POL	Fig-13	6.0	6.5	6.0	Lo PZ	6.0	6.5	5.0	OK
Genpro HA-XEG		*6.42*	*6.17*	*6.30*	*6.00*	*5.66*	*6.42*	*5.01*	
Miroslav Cerny - CZE	Fig-14	4.5	6.0	4.0	Lo PZ	6.0	6.5	7.0	OK
XP30 D-ESXA		*4.85*	*6.79*	*5.06*	*5.37*	*5.01*	*6.15*	*7.11*	
Roland Kastenhuber - AUT	Fig-6	6.0	7.0	6.0	Lo PZ	7.0	6.5	6.0	OK
Extra 300 D-EPOI		*6.42*	*6.75*	*6.30*	*6.39*	*6.52*	*6.42*	*5.91*	
Tomas Petrman - CZE	Fig-14	4.0	6.0	5.0	Lo PZ	6.0	7.5	6.5	OK
Z50LS OK-FAI		*4.44*	*6.79*	*6.06*	*5.52*	*5.01*	*7.21*	*6.36*	
Tomas Zemanek - CZE	Fig-14	7.0	5.0	5.0	Lo PZ	6.5	7.5	6.5	OK
Z50LS OK-FAI		*6.93*	*5.58*	*6.06*	*5.81*	*5.46*	*7.21*	*6.36*	

Score anomalies	*Judge 1*	*Judge 2*	*Judge 3*	*Judge 4*	*Judge 5*	*Judge 6*	*Judge 7*
Dmitry Pogrebytskyy - UKR	1723.7	Lo 1575.1	1599.0	Hi 1829.9	1755.8	1672.9	1719.9
Extra 330LX UR-TIM		*1692.4*		*1690.1*			

Review of Judge Style and RI Items

Judging style:



Judges average mark = 6.81, mean spread of marks (2xSD) = 1.72

Panel average mark = 6.99, mean spread of marks (2xSD) = 1.66

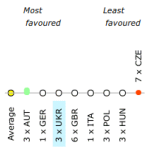
Pilots not ranked correctly	*Aeroplane*	*Judge score*	*Bias Hi/Lo*	*Panel score*	*Score difference*	*Judge rank*	*Panel rank*	*Rank diff'ce*	*RI value this pilot*	*Percent of total*	*RI elements ranked by decreasing size*
Roland Kastenhuber - AUT	Extra 300	1739.7	-	1629.0	+ 110.7	4	12	+ 8	1.56	18.2%	
Simon Wood - GBR	Edge 360	1582.7	-	1503.5	+ 79.2	13	21	+ 8	1.21	14.1%	
Ivo Cervinka - CZE	Z50LS	1335.9	-	1483.1	- 147.2	26	22	- 4	1.14	13.3%	
Trevor Dugan - GBR	Extra 300SC	1579.6	-	1669.5	- 89.8	14	7	- 7	1.08	12.6%	
Adam Ondrejka - CZE	XP30	1667.1	-	1595.5	+ 71.6	8	15	+ 7	0.90	10.5%	
Tamas Rohacs - HUN	Extra 300	1539.1	-	1613.2	- 74.1	17	14	- 3	0.40	4.6%	
Maciej Kulaszewski - POL	Genpro	1542.4	-	1616.0	- 73.6	16	13	- 3	0.39	4.6%	
Christian Auer - AUT	Extra 300SC	1601.0	-	1663.5	- 62.5	11	8	- 3	0.32	3.8%	
Martin Graef - GER	Extra 300S	1405.6	-	1342.8	+ 62.8	24	26	+ 2	0.27	3.1%	
David Farley - GBR	CAP 231 EX	1701.4	-	1659.4	+ 42.1	6	9	+ 3	0.22	2.6%	
Adrian Willis - GBR	Genpro	1512.3	-	1550.3	- 38.0	20	17	- 3	0.21	2.5%	
Miroslav Cerny - CZE	XP30	1645.6	-	1675.1	- 29.5	9	6	- 3	0.15	1.8%	
Dmitry Pogrebytskyy - UKR	Extra 330LX	1785.5	Hi	1697.3	+ 88.3	3	4	+ 1	0.15	1.7%	
Francesco Adorisio - ITA	CAP 21	1479.1	-	1515.9	- 36.8	22	20	- 2	0.14	1.6%	
Graeme Fudge - GBR	CAP 232	1590.3	-	1637.2	- 47.0	12	11	- 1	0.08	1.0%	
Anthony Walsh - GBR	Extra 200	1503.0	-	1482.8	+ 20.2	21	23	+ 2	0.08	0.9%	
Elisa Bretterebner - AUT	Extra 300L	1413.3	-	1387.1	+ 26.2	23	24	+ 1	0.05	0.6%	
Tomas Petrman - CZE	Z50LS	1677.8	-	1693.2	- 15.4	7	5	- 2	0.05	0.6%	
Wojciech Kotulski - POL	Genpro	1562.6	-	1586.7	- 24.1	15	16	+ 1	0.04	0.5%	
Michal Tvrznik - CZE	Z50LS	1724.2	-	1711.5	+ 12.7	5	3	- 2	0.04	0.5%	
Lukas Parizek - CZE	Extra 300L	1536.0	-	1518.3	+ 17.7	18	19	+ 1	0.03	0.4%	
Balazs Kiss - HUN	Extra 300	1533.2	-	1545.7	- 12.6	19	18	- 1	0.02	0.3%	

Pilots ranked correctly		*Judge score*		*Panel score*	*Score difference*	*Judge rank*	*Panel rank*
Timur Fatkulin - UKR	*Extra 330LX*	*1806.5*		*1787.9*	*+ 18.6*	*1*	*1*
Igor Chernov - UKR	*Extra 330LX*	*1796.0*		*1772.8*	*+ 23.3*	*2*	*2*
Tomas Zemanek - CZE	*Z50LS*	*1620.7*		*1645.2*	*- 24.5*	*10*	*10*
Darius Mazur - POL	*Genpro*	*1344.5*		*1352.0*	*- 7.4*	*25*	*25*
Janos Sonkoly - HUN	*Extra 300*	*1271.9*		*1162.9*	*+ 109.0*	*27*	*27*

Total RI Contribution per Nation

Judge: max nation bias = 1.29 min = -0.45 o/all average = 0.06

Panel: = 7.44 min = -4.12



Ranking Index totals per nation using the +/- rank differences to show national bias from the most to the least favoured teams of Pilots

The number of Pilots in each nation is shown with the nationality