04.1. Swiss System Based on Rating (The Dutch System)

New version (2011-07-20) as proposal to the FIDE Congress Krakow 2011

A. Introductory Remarks and Definitions

A.1 Rating

It is advisable to check all ratings supplied by players. If no reliable rating is known for a player the arbiters should make an estimation of it as accurately as possible before the start of the tournament.

A.2 Order

For pairings purposes only, the players are ranked in order of, respectively

a. score
b. rating
c. FIDE-title (IGM-IM-WGM-FM-WIM-CM-WFM-WCM-no title)
d. alphabetically (unless it has been previously stated that this criterion has been replaced by another one)

The order made before the first round (when all scores are obviously zero) is used to determine the pairing numbers; the highest one gets #1 etc.

A.3 Score Brackets

Players with equal scores constitute a homogeneous score bracket. Players who remain unpaired after the pairing of a score bracket will be moved down to the next score bracket, which will therefore be heterogeneous. When pairing a heterogeneous score bracket these players moved down are always paired first whenever possible, giving rise to a remainder score bracket which is always treated as a homogeneous one.
A heterogeneous score bracket of which at least half of the players have come from a higher score bracket is also treated as though it was homogeneous.

A.4 Floats

By pairing a heterogeneous score bracket, players with unequal scores will be paired. To ensure that this will not happen to the same players again in the next round this is written down on the pairing card. The higher ranked player receives a downfloat , the lower one an upfloat.

A.5 Byes

Should the total number of players be (or become) odd, one player ends up unpaired. This player receives a bye: no opponent, no colour , 1 point or half point. A bye is considered to be a downfloat.

A.6 Subgroups, Definition of P0

A.6.a **To make the pairing, each score bracket will be divided into two subgroups, to be called S1 and S2.**
In a heterogeneous score bracket S1 contains all players moved down from a higher score bracket.
In a homogeneous score bracket S1 contains the higher half (rounded downwards) of the number of players in the score bracket.
In both cases S2 contains all other players of the score bracket.

A.6.b **P0 is the maximum number of pairs that can be produced in each score bracket.**
P0 is equal to the number of players divided by two and rounded downwards.

A.7 Colour differences and colour preferences

The colour difference of a player is the number of games played with white minus the number of games played with black by this player.
After a round the colour preference can be determined for each player who has played at least one game.

a. **An absolute colour preference occurs when a player's colour difference is greater than 1 or less than -1, or when a player has played with the same colour in the two latest rounds. The preference is white when the colour difference is << 0 or when the last two games were played with black. The preference is black when the colour difference is >> 0, or when the last two games were played with white.**

b. **A strong colour preference occurs when a player's colour difference is +1 or -1. The strong colour preference is white when the colour difference is -1, black otherwise**

c. **A mild colour preference occurs when a player's colour difference is zero, the preference being to alternate the colour with respect to the previous game. Before the first round the colour preference of one player (often the highest one) is determined by lot.**

d. **While pairing an odd-numbered round players having a strong colour preference (players who have had an odd number of games before by any reason) shall be treated like players having an absolute colour preference as long as this does not result in additional floaters.**

e. **While pairing an even-numbered round players having a mild colour preference (players who have had an even number of games by any reason) shall be treated and counted as if they would have a mild colour preference of that kind (white resp. black) which increases the number of players who get their strong colour preference.**

f. **Players who did not play the first rounds have no colour preference (the preference of their opponents is granted)**

A.8 Definition of X0

Provided there are P0 (see A.6) pairings possible in a score bracket, the minimum number of pairings which must be made in the score bracket, not fulfilling all colour preferences, is represented by the symbol X0.
X0 can be calculated as follows:

In odd rounds:
W = number of players having a colour preference white
B = number of players having a colour preference black
w= 0
b= 0
a= number of players who have not played a round yet

In even rounds:
W = number of players having a colour preference white
B = number of players having a colour preference black
w = number of players who had an odd number of unplayed games which have a mild colour preference for white
b = number of players who had an odd number of unplayed games which have a mild colour preference for black
a = number of players who have not played a round yet.

if B > W then X0 = P0 – W –b – w - a, else X0= P0 – B –b – w - a.
If X0 <0 then X0 = 0

A.9 Transpositions and exchanges

a. In order to make a sound pairing it is often necessary to change the order in S2. The rules to make such a change, called a transposition, are in D1

b. In a homogeneous score bracket it may be necessary to exchange players from S1 to S2. Rules for exchanges are found under D2. After each exchange both S1 and S2 are to be ordered according to A2.

A.10 Definiton: Top scorers

Top scorers are players who have a score of over 50 % when pairing the last round

A.11 Quality of Pairings, Definition of X and P

The rules C1 to C14 describe an iteration algorithm to find the best possible pairings within a score bracket.
Starting with the extreme requirement:
P0 pairings with P0 – X0 pairings fulfilling all colour preferences and meeting all requirements B1 to B6
If this target cannot be managed the requirements are reduced step by step to find the best sub-optimal pairings.
The quality of the pairings is defined in descending priority as

- the number of pairs
- In odd numbered rounds fulfilling the current setting of criterion A.7.d
- the number of pairs fulfilling the colour preference of both players
- fulfilling the current criteria for downfloaters
- fulfilling the current criteria for upfloaters

During the algorithm two parameters represent the progress of the Iteration:
P is the number of pairings required at a special stage during the pairings algorithm. The first value of P is P0 (but see the exception for heterogeneous bracket) and is decreasing.
X is the number of pairings not fulfilling all colour preferences which is acceptable at a special stage during the pairings algorithm. The first value of X is X0 (see A.8) and is increasing

B. Pairing Criteria

Absolute Criteria

(These may not be violated. If necessary, players will be moved down to a lower score bracket.)

B.1

a. Two players shall not meet more than once

b. A player who has received a point without playing, either through a bye or due to an opponent not appearing in time, shall not receive a bye.

B.2

Two players with the same absolute colour preference (see A7.a) shall not meet (therefore no player's colour difference will become >+2 or < -2

Relative Criteria

(these are in descending priority. They should be fulfilled as much as possible. To comply with these criteria transpositions or even exchanges may be applied, but no player should be moved down to a lower score bracket).

B.3

The difference of the scores of two players paired against each other should be as small as possible and ideally zero.

B.4

As many players as possible receive their colour preference

B.5

No player shall receive an identical float in two consecutive rounds

B.6

No player shall have an identical float as two rounds before

Note: If it is helpful to reduce the number of floaters when pairing top scorers B2 may be ignored.

C. Pairing Procedures

Starting with the highest score bracket apply the following procedures to all score brackets until an acceptable pairing is obtained. The colour allocation rules (E) are used to determine which players will play with white.

C.1 Incompatible player

If the score bracket contains a player for whom no opponent can be found within this score bracket without violating B1 (or B2 except when pairing top scorers) then:

- If this player was moved down from a higher score bracket apply C12
- If this score bracket is the lowest one apply C13
- In all other cases: move this player down to the next score bracket

C.2 Determine P0, X0

Determine P0 according to A.6
Determine X0 according to A8
Definition of P1 see C.3.a

C.3 Set requirements X, B5/B6, A7d

C.3.a In a homogeneous score bracket set P = P0
In a heterogeneous score bracket set P = P1 = number of moved down players
C.3.b Install B2 for top scorers
C.3.c (odd rounds) Install A7.d
C.3.d Set X=X0
C.3.e If the bracket produces downfloaters, install B5 for downfloaters
C.3.f If the bracket produces downfloaters, install B6 for downfloaters
C.3.g (heterogeneous groups) install B5 for upfloaters
C.3.h (heterogeneous groups) install B6 for upfloaters

C.4 Establish sub-groups

Put the highest P players in S1, all other players in S2

C.5 Order the players in S1 and S2

According to A2

C.6 Try to find the pairing

Pair the highest player of S1 against the highest one of S2, the second highest of S1 against the second highest one of S2, etc.
If now P pairings are obtained in compliance with the current requirements the pairing of this score bracket is considered complete.

In case of a homogeneous or remainder score bracket: remaining players are moved down to the next score bracket. With this score bracket restart at C1

In case of a heterogeneous score bracket: only players moved down were paired so far.
Mark the current transposition (it may be useful later).
Redefine P = P2 = P0 – P1
Continue at C4 with the remainder group.

C.7 Transposition

Apply a new transposition of S2 according to D1 and restart at C6

C.8 Exchange

In case of a homogeneous (remainder) group: apply a new exchange between S1 and S2 according to D2 and restart at C5

C.9 Go back to the heterogeneous score bracket (only remainder)

Terminate the pairing of the homogeneous remainder. Go back to the transposition marked at C6 (in the heterogeneous part of the bracket) and restart from C.7 with a new transposition.

C.10 Lowering the requirements in homogeneous and heterogeneous score brackets

C.10.a (heterogeneous bracket) Drop B6 for upfloaters and restart from C.4
C.10.b (heterogeneous bracket) Drop B5 for upfloaters and restart from C.3.h
C.10.c Drop B6 for downfloaters and restart from C.3.g
C.10.d Drop B5 for downfloaters and restart from C.3.f
C.10.e If X < P, increase X and restart from C.3.e
C.10.f In odd rounds, drop A7.d and restart from C.3.d
C.10.g For top scorers drop B2 and restart from C.3.c

Any criterion may be dropped only for the minimum number of pairs in the score bracket.

C.11 deleted

(see 10. e)

C.12 Change previous Score bracket

In case of a heterogeneous group: undo the pairing of the previous score bracket. If in this previous score bracket a pairing can be made whereby another set of players of the same size will be moved down to the current one, and this now allows P pairings to be made then this pairing in the previous score bracket will be accepted.

C.13 Lowest Score Bracket

In case of the lowest score bracket: the pairing of the penultimate score bracket is undone. Try to find another pairing in the penultimate score bracket which will allow a pairing in the lowest score bracket. If in the penultimate score bracket p becomes zero (i.e. no pairing can be found which will allow a correct pairing for the lowest score bracket) then the two lowest score brackets are joined into a new lowest score bracket. Because now another score bracket is the penultimate one C13 can be repeated until an acceptable pairing is obtained.
Such a merged score bracket shall be treated as a heterogeneous score bracket with the latest added score bracket as S1.

C.14 Decrease P

For homogeneous score brackets:
As long as P0 is greater than zero, decrease P0 by 1.
If P0 equals zero the entire score bracket is moved down to the next one.
Start with this score bracket at C1
Otherwise, as long as X0 is greater than zero, decrease X0 by 1 and restart from C3.a

For heterogeneous score brackets:
If the pairing procedure has got to the remainder at least once, reduce P0 and X0 as in the homogeneous score brackets and restart from C.3.a
Otherwise reduce P and P1 by 1 and start from C.3.b

D. Transposition and exchange procedures

D1. Transpositions

D1.1 Homogeneous or remainder score brackets

Example: S1 contains 5 players 1, 2, 3, 4, 5 (in this sequence)
S2 contains 6 players 6, 7, 8, 9, 10, 11 (in this sequence)

Transpositions within S2 should start with the lowest player, with descending priority

0. 6 – 7 – 8 – 9 – 10 – 11
1. 6 – 7 – 8 – 9 – 11 – 10
2. 6 – 7 – 8 – 10 – 9 – 11
3. 6 – 7 – 8 – 10 – 11 – 9
4. 6 – 7 - 8 – 11 – 9 – 10
5. 6 – 7 – 8 – 11 – 10 – 9
6. 6 – 7 – 9 – 8 – 10 – 11
7. 6 – 7 – 9 – 8 – 11 – 10
8. 6 – 7 – 9 – 10 – 8 – 11
9. 6 – 7 – 9 – 10 – 11 – 8
10. 6 – 7 – 9 – 11 – 8 – 10
11. 6 – 7 – 9 – 11 – 10 – 8
12. 6 – 7 – 10 – 8 – 9 – 11
13. 6 – 7 – 10 – 8 – 11 – 9
14. 6 – 7 – 10 – 9 – 8 – 11
15. 6 – 7 – 10 – 9 – 11 – 8

16. 6 – 7 – 10 – 11 – 8 – 9
17. 6 – 7 – 10 – 11 – 9 – 8
18. 6 – 7 – 11 – 8 – 9 – 10
19. 6 – 7 – 11 – 8 – 10 – 9
20. 6 – 7 – 11 – 9 – 8 – 10
21. 6 – 7 – 11 – 9 – 10 – 8
22: 6 – 7 – 11 – 10 – 8 – 9
23. 6 – 7 – 11 – 10 – 9 – 8
24. 6 – 8 – 7 - …..

To be continued . (at all 720figures)

719. 11 – 10 – 9 – 8 – 7 – 6

D1.2 Heterogeneous score brackets

The algorithm is in principle the same as for homogeneous score brackets (See D1.1), especially when S1 = S2, If S1 < S2 the algorithm must be adapted to the difference of players in S1 and S2.

Example: S1 contains 2 players 1, 2, (in this sequence)
S2 contains 6 players 3, 4, 5, 6, 7, 8 (in this sequence)

The transpositions within S2 are the same as in D1.1. But only the S1 first listed players of a transposition may be paired with S1. The other S2 – S1 players remain unpaired in this attempt.

D2: Exchange of players (homogeneous or remainder score bracket only)

When applying an exchange between S1 and S2 the difference between the numbers exchanged should be as small as possible. When differences of various options are equal take the one concerning the lowest player of S1. Then take the one concerning the highest player of S2.

General procedure:

= Sort the groups of players of S1 which may be exchanged in decreasing lexicographic order as shown below in the examples (List of S1 exchanges)
= Sort the groups of players of S2 which may be exchanged in increasing lexicographic order as shown below in the examples (List of S2 exchanges)
= The difference of numbers of players concerned in an exchange is:
  (Sum of numbers of players in S2) – (sum of numbers of players in S1).
  This difference shall be as small as possible.
= When differences of various options are equal:
  - Take at first the option top down from the list of S1 exchanges.
  - Take then the option top down from the list of S2 exchanges.
= After each exchange both S1 and S2 should be ordered according to A2

Remark: Following this procedure it may occur that pairings already checked will appear again. These repetitions are harmless because they give no better pairings than at their first occurrence.

Example for the exchange of one player:

		S1				
		5	**4**	**3**	**2**	**1**
S2	**6**	1	3	6	10	15
	7	2	5	9	14	20
	8	4	8	13	19	24
	9	7	12	18	23	27
	10	11	17	22	26	29
	11	16	21	25	28	30

1. exchange player 5 from S1 with player 6 from S2 : difference 1
2. exchange player 5 from S1 with player 7 from S2 : difference 2
3. exchange player 4 from S1 with player 6 from S2 : difference 2

Etc.

Example for the exchange of two players:

		S1									
		5,4	**5,3**	**5,2**	**5,1**	**4,3**	**4,2**	**4,1**	**3,2**	**3,1**	**2,1**
S2	**6,7**	1	3	7	14	8	16	28	29	45	65
	6,8	2	6	13	24	15	27	43	44	64	85
	6,9	4	11	22	37	25	41	60	62	83	104
	6,10	9	20	35	53	39	58	79	81	102	120
	6,11	17	32	50	71	55	76	96	99	117	132
	7,8	5	12	23	38	26	42	61	63	84	105
	7,9	10	21	36	54	40	59	80	82	103	121
	7,10	18	33	51	72	56	77	97	100	118	133
	7,11	30	48	69	90	74	94	113	115	130	141
	8,9	19	34	52	73	57	78	98	101	119	134

	8,10	31	49	70	91	75	95	114	116	131	142
	8,11	46	67	88	108	92	111	126	128	139	146
	9,10	47	68	89	109	93	112	127	129	140	147
	9,11	66	87	107	123	110	125	137	138	145	149
	10,11	86	106	122	135	124	136	143	144	148	150

1. Exchange 5,4 from S1 with 6,7 from S2: difference = 4
2. Exchange 5,4 from S1 with 6,8 from S2: difference = 5
3. Exchange 5,3 from S1 with 6,7 from S2: difference = 5
4. Exchange 5,4 from S1 with 6,9 from S2: difference = 6
5. Exchange 5,4 from S1 with 7,8 from S2: difference = 6
6. Exchange 5,3 from S1 with 6,8 from S2: difference = 6

Etc.

Example for the exchanges of three players:

List of S1 exchanges:
5,4,3 5,4,2 5,4,1 5,3,2 5,3,1 5,2,1 4,3,2 4,3,1 4,2,1 3,2,1

List of S2 exchanges:
6,7,8 6,7,9 6,7,10 6,7,11 6,8,9 6,8,10 6,8,11 6,9,10 6,9,11 6,10,11 7,8,9 7,8,10
7,8,11 7,9,10 7,9,11 7,10,11 8,9,10 8,9,11 8,10,11 9,10,11

1. Exchange 5,4,3 from S1 with 6,7,8 from S2: difference = 9
2. Exchange 5,4,3 from S1 with 6,7,9 from S2: difference = 10
3. Exchange 5,4,2 from S1 with 6,7,8 from S2: difference = 10
4. Exchange 5,4,3 from S1 with 6,7,10 from S2: difference = 11
5. Exchange 5,4,3 from S1 with 6,8,9 from S2: difference = 11
6. Exchange 5,4,2 from S1 with 6,7,9 from S2: difference = 11

Etc.

Exact procedure for exchange of N (N= 1,2,3,4..) players in a scoregroup of P players,

= Sort all possible subsets of N players of S1 in decreasing lexicographic order to an array S1LIST which may have S1NLIST elements.

= Sort all possible subsets of N players of S2 in increasing lexicographic order to an array S2LIST which may have S2NLIST elements

= To each possible exchange between S1 and S2 can be assigned a difference which is a number defined as:

(Sum of numbers of players in S2, included in that exchange) - (Sum of numbers of players in S1, included in that exchange).

In functional terms:

DIFFERENZ (I,J) = sum of numbers of players of S2 in subset J – sum of numbers of players of S1 in subset I

This difference has a minimum DIFFMIN = DIFFERENZ (1,1) and a maximum DIFFMAX= DIFFERENZ (S1NLIST, S2NLIST)

Now the procedure to find the exchanges in correct order:

1 DELTA = DIFFMIN
2 I=1 J=1
3 If DELTA = DIFFERENZ(I,J) then do this exchange, after that goto 4

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4     if J < S2NLIST then J=J+1 goto 3
5     if I<S1NLIST  then  I=I+1, J=1 goto 3
6     DELTA =DELTA+1
7     if DELTA > DIFFMAX  goto 9
8     goto 2
9     The possibilities to exchange N players are exhausted
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After each exchange both S1 and S2 should be ordered according to A2

E. Colour Allocation Rules

For each pairing apply (with descending priority):

E.1 Grant both colour preferences

E.2 Grant the stronger colour preference

E.3 Alternate the colours to the most recent round in which they played with different colours

E.4 Grant the colour preference of the higher ranked player

E.5 In the first round all even numbered players in S1 will receive a colour different from all odd numbered players in S1

F. Final Remarks

F.1 After a pairing is complete sort the pairing before making them public

The sorting criteria are (with descending priority)

The score of the higher player of the pairing involved
The sum of the scores of both players of the pairing involved
The rank according to A2 of the higher player of the pairing involved

F.2 Byes, and pairings not actually played, or lost by one of the players due to arriving late or not at all, will not be taken in account with respect to colour. Such a pairing is not considered to be illegal in future rounds.

F.3 A player who after round five has a colour history of BWW-B (i.e. no valid game in round 4) will be treated as –BWWB with respect to E.3. SO WB-WB will count as –WBWB and BWW-B-W as –BWWBW

F.4 Because all players are in one homogeneous score bracket before the start of round one and are ordered according to A2 the highest player of S1 will play against the highest player of S2 and if the number of players is odd, the lowest ranked player will receive a bye.

F.5 Players who withdraw from the tournament will no longer be paired. Players known in advance not to play in a particular round are nor paired in that round and score 0.

F.6 A pairing officially made public shall not be changed unless it violates the absolute pairing criteria (B1 and B2)

F.7 If either
result was written down incorrectly, or
a game was played with the wrong colours, or
a player's rating has to be corrected
then this will only affect pairings yet to be made.

Whether it will affect a pairing already made public but not yet played should be decided by the arbiter.

Unless the rules of the tournament state otherwise

F.8 Players who are absent during a round without notification to the arbiter will be considered to have withdrawn themselves.

F.9 Adjourned games are considered draws for pairing purposes only.