Committee T1
Contribution

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Title: contributions for the revised test plan

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Issues Addressed:

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TO:	Stephen Wolf	(303) 497-5323
	Greg Cermak	(617) 890-9320
	Eric Haugh	(613) 990-4120
	Rich Baker	(508) 532-6893
	Marshall Schachtman	(908) 219-9365
	Paul Tukey	(201) 829-4391
	Dan Wirth	(201) 740-6964
	Howard Meiseles	(918) 588-5761
	Tony Schiano	(908) 234-8681

FROM: Richard Schaphorst

DATE: June 22, 1993

I am sending two documents for use in our audio conference at 2:00 p.m. today:

-- an updated verson of the "Subjective Data Analysis Plan" which was corrected at the last T1A1.5 meeting. This has now been absorbed into the overall test plan as Appendix D.

-- Neil Randall's new proposal for the viewing of test tapes.

APPENDIX D

Subjective Data Analysis Plan

1. INTRODUCTION

Working Group T1A1.5 is in the process of preparing an ANSI standard on video teleconference system performance measurement. The process includes steps to identify objective measures of video performance, to compare the objective measures with user opinion of video quality, and to select from the candidate measures those that are well-correlated with user opinion.

Subjective data on 25 different HRCs for each of 25 different video scenes will be obtained by tests performed in accordance with T1A1.5/93-14R, Video Performance Standard Subjective Test Plan.

The purpose of this document is to define the data processing and analysis that will be performed on the data obtained from the subjective tests. The steps described in Section 2 through 6 are to be performed at each lab on the data obtained at that lab.

2. DATA ENTRY

The inputs to the Data Analysis function are the score sheets filled in by the test observers at each of 3 labs. At each lab there will be 4 sessions, and for each session there will be 30 test observers. For each observer and each session there will be 64 or 65 opinion scores. Each score will be assigned an integer from 1 to 5. For the total experiment there will be 23,220 opinion scores. The original score sheets will be duplicated, and the original sheets will be stored at a central location (place TBD). All further processing will be performed on the copies.

The data from each score sheet will be keyed into a computer. The data on each sheet consists of the test observer ID, the lab ID, the session number, and 64 or 65 opinion scores. Data will be keyed in by two independent operators, and a computer program will verify that the entered data is consistent.

Laboratories should coordinate the keying procedure to simplify interlab processing (e.g., ASCII).

3. CONVERT PRESENTATION SEQUENCE

The randomization sequences for each lab, as shown in Appendix A, will be made available by Delta Information Systems in WordPerfect format. These sequences will be converted by each lab to a format that can be used for its computer program. If subsequent editing changes any sequence, the presentation sequence will be modified accordingly.

4. PERFORM NULL AND REPEAT QUALITY CHECKS

The data will be analyzed to determine the quality of the scores given by each test observer.

In each test session there is a null (HRC 1) inserted to test the observer. If on any of these nulls the observer gives a score of 3.0 or less, the observer will be disqualified. This does not apply to the HRC 1 that is used as one of the HRCs in Lab A.

In each test session one combination of HRC and scene is repeated. If for any repeated combination the absolute difference between the two opinion scores given by a test observer is 3.0 or more, the observer will be disqualified.

If an observer is disqualified, all of his opinion scores for all test sessions, are discarded and not used in further analysis. If there are more than 30 qualified observers at a lab, observers are discarded according to a prior numbering scheme, until there are exactly 30 qualified observers at each lab. Labs will keep the discarded data for possible use in other analyses.

5. REFORMAT THE DATA

Using the keyed-in score data (with disqualified observers omitted) and the presentation sequences for each session, the computer reformats the data into the following form:

HRC NO. ____

SCENE	a	b	c	d	e	.....	x	y
TEST OBSERVER								
1								
2								
3								
.								
.								
.								
29								
30								

In reformatting the data, the nulls inserted to test the observers are discarded, and only the score for the first of the repeated combinations in the session is used.

6. COMPUTE MEAN/STANDARD DEVIATION PER HRC

For each of the reformatted sheets (HRCs) obtained from Section 5, the following calculations are performed by the computer.

The mean of each column (scene) is calculated as the sum of the scores in the column, divided by the number of scores. The result is printed to 2 decimal places.

The standard deviation of each column (scene) is calculated as the positive square root of the sum of the squares of the scores in the column, less the number of scores times the square of the column mean, the difference divided by one less than the number of scores. The results are printed to 2 decimal places.

The standard error of the mean of each column is calculated as the standard deviation calculated above, divided by the positive square root of the number of samples in the column.

The maximum score in each column is determined.

The minimum score in each column is determined.

7. LAB-TO-LAB ANALYSIS

Up to this point, all analysis will be performed by each lab on the data that it has gathered. From this point on, the data will be analyzed as a whole. The results obtained from Sections 5 and 6 will be distributed to all concerned parties for further analysis.

Data from the various labs, on HRCs that are common to them, will be analyzed to determine if the Mean Opinion Scores (MOS) are consistant from one lab to another. This is done by comparing the results from two labs for a common HRC. If Chi-squared or F tests indicate that the data from the two labs can be considered to have been obtained from the same population at a 5% confidence level, then the data from the two labs will be pooled. The data would be first analyzed to determine which test is to be applied. If not, further analysis of data will be performed (TBD) to find reasons for the discrepancy (gender, position in room, time of day, occupation, etc.).

The HRCs common to labs are as follows:

LABS		HRCs	
A	B	20	15
A	C	20	4
B	C	20	17

If the above tests are passed, then the HRCs that are common to more than one lab will be pooled, providing a larger sample size for those HRCs. In addition, the data from the other HRCs will be considered to have been obtained from a common set of observers. If the tests are not passed, other procedures, not yet defined, would be resorted to. Those procedures would be agreed to by T1A1.5 using the usual contribution procedures.

8. POOL INTERLAB REPEATED DATA

To the extent that the tests of Section 7 are passed, data for HRCs common to more than one lab are pooled by creating data sheets (like that in Section 5) for those HRCs that are composites of all the observers evaluating the HRCs. These composites would have 60 or 90 observers. The calculations of Section 6 are performed for the pooled data sheets.

If there are no significant biases between labs, then the standard errors of the estimated means should be lower for the merged data than for the individual labs, since the sample size is larger.

The result of the analysis will be the following table:

SUBJECTIVE RESULTS

HRC	SCENE	a	b	c	d	e	.....	x	y
1	mean								
	s.d.								
	s.e.								
	max								
	min								
2	mean								
	s.d.								
	s.e.								
	max								
	min								
3									
.									
.									
.									
.									
25	mean								
	s.d.								
	s.e.								
	max								
	min								

s.d.	estimate of standard deviation of observer population
s.e.	estimate of standard error of mean
max	largest observed opinion score
min	smallest observed opinion score

APPENDIX A

STIMULATION PRESENTATION ORDER

CONTENT CATEGORIES

A	f j k l
B	a b e m n w
C	d g o p q r
D	c s t u v x
E	h i y

CIRCUIT GROUPS

1	1 2 3
2	4 5
3	6 7
4	8 9 10
5	11 12 13
6	14
7	15 16 17 18
8	19 20 21
9	22 23 24 25

SCENES ELIGIBLE FOR NULLS

c h s t

COMBINATIONS ELIGIBLE FOR REPEATS

19 20 21	22 23 24 25
d g o p q r	c s t u v x

NUMBER OF COMBINATIONS PER SESSION

64 65 64 65

PRESENTATION ORDER -- LAB A

HRCs 1 4 7 8 13 15 19 20 22 24

	SESSION 1	SESSION 2	SESSION 3	SESSION 4
	Scene/Type	Scene/Type	Scene/Type	Scene/Type
1	13-f 5-A	19-k 8-A	22-n 9-B	15-s 7-D
2	20-i 8-E	1-s 1-D	4-f 2-A	13-q 5-C
3	4-q 2-C	7-b 3-B	7-u 3-D	7-a 3-B
4	19-x 8-D	19-j 8-A	8-o 4-C	8-q 4-C
5	15-l 7-A	*22-c 9-D	22-t 9-D	19-m 8-B
6	8-r 4-C	19-b 8-B	7-k 3-A	4-s 2-D
7	15-e 7-B	1-k 1-A	4-v 2-D	22-i 9-E
8	1-p 1-C	24-p 9-C	8-y 4-E	8-w 4-B
9	19-n 8-B	4-y 2-E	19-l 8-A	20-s 8-D
10	4-r 2-C	19-t 8-D	8-t 4-D	24-e 9-B
11	24-c 9-D	7-y 3-E	20-w 8-B	15-p 7-C
12	8-e 4-B	4-w 2-B	7-f 3-A	22-v 9-D
13	7-q 3-C	#1-t 1-D	20-n 8-B	15-j 7-A
14	15-m 7-B	13-i 5-E	7-h 3-E	20-y 8-E
15	13-g 5-C	24-l 9-A	4-d 2-C	#1-s 1-D
16	22-k 9-A	1-b 1-B	22-s 9-D	13-l 5-A
17	8-g 4-C	22-u 9-D	4-a 2-B	24-d 9-C
18	15-x 7-D	7-l 3-A	*19-p 8-C	8-m 4-B
19	1-r 1-C	19-d 8-C	24-n 9-B	24-r 9-C
20	7-t 3-D	22-b 9-B	19-o 8-C	13-a 5-B
21	13-w 5-B	4-x 2-D	1-t 1-D	19-h 8-E
22	15-f 7-A	19-r 8-C	8-a 4-B	13-d 5-C
23	1-w 1-B	22-x 9-D	20-f 8-A	19-u 8-D
24	8-v 4-D	8-p 4-C	24-g 9-C	7-i 3-E
25	4-h 2-E	4-j 2-A	8-i 4-E	19-v 8-D
26	22-l 9-A	7-r 3-C	13-c 5-D	24-h 9-E
27	20-x 8-D	*22-c 9-D	7-o 3-C	7-d 3-C
28	22-g 9-C	7-p 3-C	1-v 1-D	*24-x 9-D
29	8-j 4-A	8-c 4-D	8-l 4-A	13-y 5-E
30	22-h 9-E	7-w 3-B	1-m 1-B	7-n 3-B
31	*20-o 8-C	24-y 9-E	15-u 7-D	24-u 9-D
32	13-e 5-B	20-p 8-C	22-e 9-B	7-j 3-A
33	15-i 7-E	4-u 2-D	13-j 5-A	15-h 7-E
34	20-l 8-A	24-a 9-B	20-r 8-C	20-c 8-D
35	15-b 7-B	4-i 2-E	1-h 1-E	24-o 9-C
36	19-y 8-E	8-k 4-A	8-s 4-D	7-e 3-B
37	15-t 7-D	15-q 7-C	1-g 1-C	24-t 9-D
38	1-e 1-B	13-x 5-D	8-u 4-D	20-m 8-B
39	15-o 7-C	4-n 2-B	15-a 7-B	24-j 9-A
40	24-v 9-D	1-q 1-C	8-f 4-A	7-m 3-B
41	1-d 1-C	22-w 9-B	20-g 8-C	24-k 9-A
42	24-b 9-B	19-c 8-D	1-a 1-B	20-a 8-B
43	8-d 4-C	24-f 9-A	7-s 3-D	*24-x 9-D
44	20-u 8-D	1-y 1-E	4-b 2-B	13-o 5-C
45	24-i 9-E	13-t 5-D	*19-p 8-C	4-l 2-A
46	#1-c 1-D	24-q 9-C	1-f 1-A	15-y 7-E

47	19-q	8-C	20-b	8-B	19-s	8-D	19-f	8-A
48	7-v	3-D	1-x	1-D	24-w	9-B	4-m	2-B
49	19-i	8-E	8-n	4-B	15-v	7-D	22-q	9-C
50	*20-o	8-C	15-d	7-C	22-p	9-C	1-j	1-A
51	1-n	1-B	22-a	9-B	13-u	5-D	20-q	8-C
52	4-t	2-D	7-c	3-D	#1-h	1-E	22-m	9-B
53	13-h	5-E	4-p	2-C	8-b	4-B	4-k	2-A
54	20-t	8-D	1-u	1-D	4-g	2-C	15-w	7-B
55	24-m	9-B	4-e	2-B	22-j	9-A	1-o	1-C
56	20-v	8-D	24-s	9-D	8-h	4-E	15-c	7-D
57	13-r	5-C	13-b	5-B	15-r	7-C	1-i	1-E
58	19-e	8-B	19-g	8-C	1-l	1-A	7-x	3-D
59	15-k	7-A	1-c	1-D	13-m	5-B	22-y	9-E
60	4-c	2-D	13-k	5-A	4-o	2-C	20-j	8-A
61	20-s	8-B	22-o	9-C	20-k	8-A	13-s	5-D
62	7-g	3-C	15-n	7-B	13-v	5-D	20-h	8-E
63	8-x	4-D	19-p	8-C	19-w	8-B	22-r	9-C
64	20-d	8-C	22-f	9-A	15-g	7-C	13-n	5-B
65			19-a	8-B			22-d	9-C

PRESENTATION ORDER -- LAB B

HRCs 2 5 6 10 14 15 16 17 20 23

	SESSION 1	SESSION 2	SESSION 3	SESSION 4
	Scene/Type	Scene/Type	Scene/Type	Scene/Type
1	2-v 1-D	2-e 1-B	10-t 4-D	6-g 3-C
2	17-k 7-A	17-q 7-C	16-d 7-C	16-h 7-B
3	14-u 6-D	5-x 2-D	20-u 8-D	20-n 8-B
4	16-e 7-B	16-g 7-C	23-a 9-B	5-u 2-D
5	2-h 1-B	#1-c 1-D	*20-q 8-C	14-e 6-B
6	23-e 9-B	16-h 7-B	17-t 7-D	2-j 1-A
7	6-q 3-C	14-x 6-D	14-m 6-B	16-x 7-D
8	17-y 7-B	16-r 7-C	2-r 1-C	20-h 8-B
9	2-p 1-C	23-x 9-D	17-i 7-A	16-f 7-A
10	15-v 7-D	16-k 7-A	10-q 4-C	14-v 6-D
11	14-y 6-B	10-i 4-B	14-a 6-B	10-h 4-B
12	10-w 4-B	14-g 6-C	15-t 7-D	23-d 9-C
13	23-g 9-C	20-m 8-B	6-m 3-B	14-f 6-A
14	5-f 2-A	15-x 7-D	17-s 7-D	20-o 8-C
15	14-h 6-B	14-n 6-B	5-y 2-B	17-j 7-A
16	*20-d 8-C	17-u 7-D	16-p 7-C	#1-h 1-B
17	6-c 3-D	14-j 6-A	23-n 9-B	5-l 2-A
18	16-n 7-B	5-s 2-D	10-g 4-C	*23-s 9-D
19	5-g 2-C	17-n 7-B	6-k 3-A	16-e 7-B
20	6-e 3-B	23-i 9-A	2-g 1-C	10-f 4-A
21	5-o 2-C	20-g 8-C	6-u 3-D	6-w 3-B
22	17-e 7-B	16-a 7-B	20-y 8-B	14-l 6-A
23	20-f 8-A	20-i 8-B	10-r 4-C	20-r 8-C
24	17-s 7-C	16-j 7-A	16-c 7-D	10-n 4-B
25	6-v 3-D	2-b 1-B	6-l 3-A	6-j 3-A
26	20-a 8-B	10-d 4-C	23-p 9-C	23-q 9-C
27	6-p 3-C	6-h 3-B	#1-e 1-D	10-l 4-A
28	20-s 8-D	14-d 6-C	10-o 4-C	15-y 7-B
29	23-k 9-A	20-v 8-D	6-x 3-D	23-w 9-B
30	5-v 2-D	10-a 4-B	2-y 1-B	16-q 7-C
31	2-i 1-B	15-c 7-D	16-u 7-D	10-x 4-D
32	5-p 2-C	5-i 2-B	6-r 3-C	17-r 7-C
33	23-y 9-B	2-k 1-A	23-j 9-A	2-f 1-A
34	20-e 8-B	17-h 7-B	20-c 8-D	5-c 2-D
35	23-l 9-A	23-v 9-D	5-d 2-C	2-m 1-B
36	15-a 7-B	14-i 6-B	2-c 1-D	*23-s 9-D
37	10-v 4-D	17-f 7-A	17-l 7-A	5-n 2-B
38	15-p 7-C	10-c 4-D	*20-q 8-C	16-y 7-B
39	20-k 8-A	16-m 7-B	5-s 2-B	2-w 1-B
40	6-t 3-D	*23-u 9-D	20-l 8-A	16-s 7-D
41	15-k 7-A	10-e 4-B	14-t 6-D	23-f 9-A
42	14-r 6-C	14-s 6-D	6-i 3-B	6-s 3-D
43	10-b 4-B	23-h 9-B	5-k 2-A	14-p 6-C
44	16-d 7-C	6-b 3-B	15-q 7-C	5-m 2-B
45	6-y 3-B	15-l 7-A	14-c 6-D	15-s 7-D

46	17-x	7-D	23-t	9-D	6-o	3-C	14-o	6-C
47	2-n	1-B	15-o	7-C	2-l	1-A	17-m	7-B
48	20-p	8-C	20-b	8-B	15-n	7-B	14-k	6-A
49	16-b	7-B	17-c	7-D	20-j	8-A	20-t	8-D
50	2-u	1-D	14-w	6-B	16-t	7-D	17-a	7-B
51	5-h	2-E	23-o	9-C	6-a	3-B	23-r	9-C
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56	16-v	7-D	16-i	7-B	6-x	3-D	10-s	4-D
57	14-q	6-C	5-q	2-C	6-d	3-C	15-j	7-A
58	23-m	9-B	16-l	7-A	16-f	7-A	2-q	1-C
59	*20-d	8-C	2-x	1-D	10-m	4-B	15-b	7-B
60	2-a	1-B	16-o	7-C	2-t	1-D	23-c	9-D
61	5-r	2-C	10-k	4-A	6-n	3-B	17-b	7-B
62	16-l	7-A	15-u	7-D	2-s	1-D	10-u	4-D
63	*1-t	1-D	5-b	2-B	14-b	6-B	5-w	2-B
64	17-p	7-C	15-r	7-C	17-v	7-D	17-g	7-C
65	20-x	8-D	*23-u	9-D	2-o	1-C	20-w	8-B
			15-m	7-B			15-g	7-C

PRESENTATION ORDER -- LAB C

HRCs 3 4 9 11 12 17 18 20 21 25

	SESSION 1	SESSION 2	SESSION 3	SESSION 4
	Scene/Type	Scene/Type	Scene/Type	Scene/Type
1	4-v 2-D	20-t 8-D	*21-o 8-C	21-b 8-B
2	20-i 8-E	4-g 2-C	3-i 1-E	11-r 5-C
3	3-s 1-D	25-n 9-B	25-c 9-D	21-k 8-A
4	4-y 2-E	17-v 7-D	9-w 4-B	#1-t 1-D
5	9-n 4-B	3-o 1-C	17-j 7-A	17-d 7-C
6	20-y 8-E	4-e 2-D	4-d 2-C	9-s 4-D
7	17-x 7-D	18-w 7-B	21-s 8-D	4-j 2-A
8	12-f 5-A	25-p 9-C	9-l 4-A	12-o 5-C
9	9-q 4-C	20-e 8-B	25-d 9-C	18-v 7-D
10	20-h 8-E	4-q 2-C	11-l 5-A	11-q 5-C
11	25-m 9-B	3-k 1-A	21-a 8-B	20-v 8-D
12	#1-h 1-E	9-h 4-E	11-u 5-D	3-e 1-B
13	18-k 7-A	12-x 5-D	4-k 2-A	12-q 5-C
14	11-m 5-B	20-d 8-C	11-t 5-D	3-m 1-B
15	18-p 7-C	3-u 1-D	3-r 1-C	12-p 5-C
16	3-t 1-D	9-b 4-B	9-s 4-D	3-a 1-B
17	21-g 8-C	25-y 9-E	4-o 2-C	18-g 7-C
18	3-k 1-E	3-m 1-B	25-w 9-B	4-l 2-A
19	9-g 4-C	17-r 7-C	25-u 9-D	9-i 4-E
20	21-w 8-B	25-x 9-D	18-y 7-E	20-o 8-C
21	17-f 7-A	3-g 1-C	25-g 9-C	9-j 4-A
22	3-y 1-E	17-e 7-B	20-u 8-D	18-e 7-B
23	9-a 4-B	12-i 5-E	12-e 5-B	*20-p 8-C
24	11-f 5-A	25-r 9-C	20-k 8-E	17-n 7-B
25	4-c 2-D	20-l 8-A	11-g 5-C	3-c 1-D
26	17-y 7-E	9-r 4-C	21-f 8-A	11-p 5-C
27	11-n 5-B	18-x 7-D	4-a 2-B	20-x 8-D
28	25-f 9-A	9-m 4-B	25-t 9-D	12-a 5-B
29	20-g 8-C	18-h 7-E	4-b 2-B	18-f 7-A
30	11-c 5-D	21-d 8-C	21-u 8-D	25-h 9-E
31	25-i 9-A	25-l 9-E	12-n 5-B	4-e 2-B
32	12-y 5-E	*21-p 8-C	4-i 2-E	9-p 4-C
33	25-j 9-A	17-t 7-D	*21-c 8-C	4-f 2-A
34	3-x 1-D	25-s 9-C	18-u 7-D	9-y 4-E
35	18-c 7-C	17-w 7-B	9-d 4-C	11-b 5-B
36	21-m 8-B	21-y 8-E	11-y 5-E	4-p 2-C
37	12-l 5-A	25-e 9-B	3-p 1-C	18-t 7-D
38	20-r 8-C	21-q 8-C	12-t 5-D	11-j 5-A
39	4-n 2-B	11-w 5-B	21-i 8-E	18-a 7-B
40	*25-v 9-D	9-f 4-A	18-g 7-D	21-c 8-D
41	11-k 5-A	11-a 5-B	12-m 5-B	4-r 2-C
42	9-u 4-D	21-t 8-D	20-j 8-A	17-h 7-E
43	12-j 5-A	9-e 4-B	#1-c 1-D	20-a 8-B
44	17-m 7-B	12-s 5-D	18-b 7-B	17-k 7-A
45	4-x 2-D	20-m 8-B	21-r 8-C	12-b 5-B

46	18-l 7-A	17-p 7-C	9-k 4-A	20-c 8-D
47	11-d 5-C	9-x 4-D	17-a 7-B	25-q 9-C
48	17-l 7-A	21-n 8-B	12-k 5-A	18-i 7-E
49	3-v 1-D	12-g 5-C	20-n 8-B	11-o 5-C
50	20-q 8-C	25-w 9-B	25-k 9-A	20-f 8-A
51	9-t 4-D	18-d 7-C	21-v 8-D	11-h 5-E
52	3-d 1-C	4-w 2-B	9-g 4-C	21-j 8-A
53	12-v 5-D	25-s 9-D	17-c 7-D	3-n 1-B
54	3-q 1-C	11-e 5-B	21-h 8-E	4-u 2-D
55	21-x 8-D	4-h 2-E	3-l 1-A	18-m 7-B
56	11-i 5-E	17-b 7-B	11-s 5-D	12-d 5-C
57	17-s 7-D	11-v 5-D	18-r 7-C	20-s 8-D
58	21-l 8-A	17-g 7-C	3-w 1-B	25-b 9-B
59	18-c 7-D	12-u 5-D	18-q 7-C	12-r 5-C
60	12-w 5-B	17-i 7-E	21-e 8-B	9-v 4-D
61	17-e 7-C	*21-p 8-C	12-c 5-D	17-q 7-C
62	*25-v 9-D	12-h 5-E	18-j 7-A	4-t 2-D
63	18-n 7-B	25-a 9-B	11-x 5-D	*20-p 8-C
64	3-f 1-A	#1-s 1-D	20-b 8-B	3-j 1-A
65		4-m 2-B		17-u 7-D

* Duplicate combination
\# Null

VIEWING ORDER OF TAPES

It is proposed that each tape be viewed by 10 observers from each [illegible] This [illegible] It does require the exchange of data between labs before analysis can begin.

In the following table A1 refers to the tape that was labeled Session 1 for Lab A, B3 is the tape for Session 3 for Lab B, etc.

PROPOSED ORDER

LAB	OBSERVER	SESSION 1	2	3	4
A	1-5	A1	B3	C2	A4
	6-10	B3	A4	A1	C2
	11-15	A2	C3	B1	B4
	16-20	B1	B4	C3	A2
	21-25	A3	C4	C1	B2
	26-30	C1	B2	A3	C4
B	1-5	C2	B3	A4	A1
	6-10	B3	A1	C2	A4
	11-15	C3	B1	A3	B4
	16-20	B1	B2	B1	A2
	21-25	B2	B4	A2	B1
	26-30	B4	A2	B2	B1
C	1-5	A4	C2	B3	A1
	6-10	C2	A4	A1	B3
	11-15	C3	A2	B4	B1
	16-20	B1	B4	C3	A2
	21-25	B2	C1	C4	A3
	26-30	C4	A3	B2	C1

The old order would have looked like:

A	1-5	A1	A4	A3	A2
	6-10	A2	A3	A4	A1
	11-15	A4	A2	A1	A3
	16-20	A3	A1	A2	A4
	21-25	A2	A1	A4	A3
	26-30	A4	A3	A1	A2
B	1-5	B2	B4	B3	B1
.					
.					
C	1-5	C3	C2	C1	C4
.					
.					