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Issue 0.1	Feb. 4 00	First Issue, derived from the AMR-NS Characterization Test Plan version 1.7 (Tdoc. SMG11 94R2/99)
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Issue 0.4	Feb. 24 00	Fourth Issue, derived from the **AMR-WB-8a** version 0.3 (Editorial corrections inserted and harmonisation of terms)
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Reference Input Documents:

S4-000060	Subjective Qualification Test Plan for ITU-T Wideband Coding at around 16 kbit/s, Rapporteur, SG16 Q20/16, , S4#9-SMG11#14, Puerto Vallarta, Mexico, January 24-28, 2000
S4-000072	AMR wideband qualification test plan (high-level), Revision 1, Ericsson, S4#9-SMG11#14, Puerto Vallarta, Mexico, January 24-28, 2000
S4-000075	Initial thoughts on AMR permanent document AMR-5a Revision 1 (Qualification Deliverables), Nokia, S4#9-SMG11#14, Puerto Vallarta, Mexico, January 24-28, 2000

Open Issues:

Independent Distributor	Must be identified. Should the Independent Distributor sign NDAs with the different candidate test laboratories? The independent distributor is supposed to redistribute the speech samples received from the test laboratories to the different candidates, hiding to each candidate which other candidates are included in their own test. However, in some instances, it could be possible for some candidates to know who is testing their candidates just by the language used for the speech samples (one Finish candidate, one Swedish candidate, one Japanese candidate). Is that acceptable? If we really want to hide who is testing who, another possibility is for all candidates to process all speech samples.
Noise Laboratory	Arcon will deliver the noise samples.. It must be checked from Arcon whether NDAs are needed. It would be better if the Noise Laboratory did not require NDAs for the release of noise samples or if the Noise Laboratory was also the Independent Distributor
~~Error Patterns~~	~~Identify who will deliver them~~
Processing Tables	to be checked (SQ-members)
Analysis lab	t.b.d.

1. Introduction

This document contains the set of test plans for the Qualification Phase of the Adaptive Multi-Rate Wideband Speech Codec (AMR-WB).

The AMR-WB Qualification Tests are split into 2 Experiments and 6 Sub-Experiments listed in the following table. Experiments 1a, 2a & 2b are intended to compare the performances of the candidates AMR-WB speech codecs in a wideband listening environment. Experiments 1b, 2c & 2d are intended to provide GSM EFR reference performances using a narrowband listening environment.

Exp. No.	Title
1a	AMR-WB Speech Codec Performances in Clean Speech
1b	Reference Experiment: EFR Speech Codec Performances in Clean Speech
2a	AMR-WB Speech Codec Performances in Car Noise
2b	AMR-WB Speech Codec Performances in Street Noise
2c	Reference Experiment: EFR Speech Codec Performances in Car Noise
2d	Reference Experiment: EFR Speech Codec Performances in Street Noise

The 'comparative' Experiments (1a, 2a & 2b) are designed to test one candidate speech codec. Each proponent will be responsible for running every experiment three times, once with its own candidate and once for each of two additional candidates. Each candidate will be tested 3 times for the same experiment. All candidates are also supposed to run all 3 reference experiments (1b, 2c & 2d). In total, each proponent must perform 12 different experiments.

The following 9 organizations have announced their intent to participate to the AMR-WB Qualification Phase:

- COBASCA Consortium (including Matra-Nortel (leader), ST Microelectronics, Thomson CSF Communication, GET (ENST-Bretagne), Eurecom Institute)
- Ericsson
- France Telecom
- Matsushita
- Motorola
- Nokia
- Siemens
- Texas Instruments
- T-Nova Deutsche Telekom Berkom

2 Document Structure

The main body of the document starts at section 4, and is arranged as follows:

Section 4:	References, Conventions, and Contacts	References to AMR-WB permanent documents, lists of abbreviations, and contact names for the different areas of the document
Section 5:	Roles and Responsibilities	Allocation of experiments, allocation of other roles, and responsibilities for the roles identified.
Section 6:	Information relevant to all Experiments	Information relevant to all experiments.
Sections 7-10:	Test Plans	Individual test plans. Information already covered in section 6 is not repeated in the individual plans. Note that the processing tables for the experiments are collated in Annex E, and the randomizations (where required) in Annex F
Annex A:	Instructions to Subjects and Data Collection	For the ACR, and Modified DCR
Annex B:	Test results to be provided by the candidates	Defines the results that must be provided for the final analysis.
Annex C:	Filename Convention	Defines the naming convention to be used for the exchange of speech files between the coordinating lab and the candidates.
Annex E:	Processing Tables	Processing Tables for all experiments. These map which speech samples are to be processed through which conditions.
Annex F:	Presentation Orders	Randomized presentation orders for experiments.

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4. References, Conventions, and Contacts

4.1 Permanent Documents

The following documents provide additional information on the AMR Wideband development project.

[1]	AMR-WB-1	AMR-WB Overview and Open Issues Last working draft:: version 0.1 in Tdoc. S4-99314
[2]	AMR-WB-2	AMR-WB Project Schedule Last working draft:: version 0.2 in Tdoc. S4-99488R
[3]	AMR-WB-3	Adaptive Multi-Rate Wideband Speech Codec; Performance Requirements Last version: 1.2 in S4-00090
[4]	AMR-WB-4	Adaptive Multi-Rate Wideband Speech Codec; Design Constraints Last version: 1.0 in Tdoc. S4-00087
[5]	AMR-WB-5a	Adaptive Multi-Rate Wideband Speech Codec; Qualification Rules Last working draft:: version 0.2
[6]	AMR-WB-6a	Adaptive Multi-Rate Wideband Speech Codec; Qualification Deliverables Last working draft:: version 0.1 in Tdoc. S4-99359
[7]	AMR-WB-7a	Adaptive Multi-Rate Wideband Speech Codec; Processing Functions for the Qualification Phase Last working draft:: version 0.11

4.2 Reference Documents

[I]	ITU-T P-800	Methods for Subjective Determination of Transmission Quality
[I]	ITU-T P-830	Subjective performance assessment of telephone-band and wideband digital coders

4.3 Key Acronyms

ACR	Absolute Category Rating
AMR	Adaptive Multi-Rate Speech Codec for the GSM System, also called AMR Narrowband Speech Codec (AMR-NB)
AMR-NB	AMR Narrowband Speech Codec (300Hz-3kHz)
AMR-WB	AMR Wideband Speech Codec (50Hz-7kHz)
BER	Bit Error Rate
C / I	Carrier to Interference Ratio
DCR	Degradation Category Rating
DECi	Dynamic Error Condition #i for Dynamic C / I conditions
ECx	Error Condition for static C / I conditions with C / I = x dB
EFR	GSM Enhanced Full Rate Speech codec
EP	Error Pattern
FR	GSM Full Rate channel or existing GSM Full Rate Speech Codec
HR	GSM Half Rate channel or existing GSM Half Rate Speech Codec
MNRU	Modulated Noise Reference Unit
MOS	Mean Opinion Score
S / N	Signal to Noise Ratio

4.4 Contact Names

The following persons should be contacted for questions related to the test plan.

Contact Person/Email	Organization	Address	Telephone/Fax
Janne Vainio janne.m.vainio@nokia.com	Nokia	PO Box 100 33721 Tampere, Finland	Tel: +358 3 2725212 GSM: +358 40 5479153Fax: +358 3 2725888
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Any comment on the Test Plan should be forwarded through the SQ (SMG11-SQ@cselt.it), SMG11 (SMG11@list.etsi.fr) and TSG-S4 (3GPP_TSG_SA_WG4@list.3gpp.org) email exploders.

5 Roles and Responsibilities

5.1 Overview of the Qualification Test Process

The execution of the AMR-WB Qualification subjective listening tests is under the responsibility of the candidates participating to the Qualification Phase.

Each candidate must select and mandate a subjective listening laboratory to perform the tests described in this document. The candidates are allowed to perform the corresponding tests in their in-house subjective listening laboratory providing that they fully conform to the requirements set in this Test Plan. The proponents are free to use the language of their choice for the test under their responsibility, but should use the same language when performing the same experiment for different candidates.

The candidates are responsible for the funding of the tests under their responsibility.

Each listening laboratory must perform 12 Experiments (9 comparative tests and 3 reference tests). The listening laboratories should run the comparative Experiment (1a, 2a & 2b) 3 times. Once with the wideband algorithm proposed by the mandating candidate and two other times with 2 others candidates to be selected by an Independent Distributor. Each candidate will test six other candidates.

The following table shows a possible allocation of the candidate algorithms to the 3 comparative experiments to be performed by the 9 listening laboratories. Each candidate and/or its mandated listening laboratory is identified by a letter (A to I). These codes are provided as example only. They are not related to the candidate naming convention provided in Annex C. The final allocation of the candidate to the different listening laboratories is to be decided by the Independent Distributor.

Listening Lab.	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Exp. 1a	AGH	BHI	CIA	DAB	EBC	FCD	GDE	HEF	IFG
Exp. 2a	AEF	BFG	CGH	DHI	EIA	FAB	GBC	HCD	IDE
Exp. 2b	ACD	BDE	CEF	DFG	EGH	FHI	GIA	HAB	IBC

Table 5.1: Example allocation of candidate algorithms to the different Listening Laboratories for nine candidates

If for any reason the number of candidates to be tested in the AMR-WB Qualification Test is reduced, then the following tables 5.1.1 - 5.1.3 do provide information for the allocation of candidate algorithms to the different Listening Laboratories used in this case. The corresponding table is then to be used instead of Table 5.1.

Listening Lab.	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Exp. 1a	AGH	BHA	CAB	DBC	ECD	FDE	GEF	HFG
Exp. 2a	AEF	BFG	CGH	DHA	EAB	FBC	GCD	HDE
Exp. 2b	ACD	BDE	CEF	DFG	EGH	FHA	GAB	HBC

Table 5.1.1: Example allocation of candidate algorithms to the different Listening Laboratories in the case of eight candidates participating in the test

Listening Lab.	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Exp. 1a	AFG	BGA	CAB	DBC	ECD	FDE	GEF
Exp. 2a	ADE	BEF	CFG	DGA	EAB	FBC	GCD
Exp. 2b	ABC	BCD	CDE	DEF	EFG	FGA	GAB

Table 5.1.2: Example allocation of candidate algorithms to the different Listening Laboratories in the case of seven candidates participating in the test

Listening Lab.	A	B	C	D	E	F
Exp. 1a	ABC	BCD	CDE	DEF	EFA	FAB
Exp. 2a	ACD	BDE	CEF	DFA	EAB	FBC
Exp. 2b	ADE	BEF	CFA	DAB	EBC	FCD

Table 5.1.3: Example allocation of candidate algorithms to the different Listening Laboratories in the case of six candidates participating in the test

The listening laboratories should provide the pre-processed speech samples to the Independent Distributor who will then distribute these samples to other candidates. The candidates should process the received speech samples through their candidate algorithm and return the processed samples to the Independent Distributor who will then forward them to their original listening laboratory.

The candidates and their mandated listening laboratories should then complete the result workbook provided by the Analysis Laboratory and forward it through the SMG11 & TSG-S4 reflectors to allow a complete analysis of the test results before the TSG-S4#11 meeting (see Annex D for a detailed schedule of Qualification Phase).

5.2 Allocation of Additional Roles

Independent Distributor: tbd

Noise Laboratory: Arcon

Analysis Laboratory: tbd

5.3 Responsibilities

Many of the procedures to be followed are defined in this test plan, with further information being given in the Processing Functions Document [7]. In order to ensure that the tight time-scales are met, a detailed schedule of events is included in Annex D. This Schedule is to be followed as far as practically possible by all organizations participating in the AMR-WB Qualification Phase.

5.3.1 Proponents / Listening Laboratories

- Receive the noise samples from the Noise Laboratory (or the Independent Distributor).
- Perform autonomously the reference Experiments 1b, 2c & 2c and Experiments 1a, 2a & 2b for its own candidate.
- Provide 2 sets of pre-processed speech material to the Independent Distributor for each Experiment 1a, 2a & 2b (total of 6 CDs). The pre-processed material is defined as speech material filtered according to the input characteristic and level equalized to -26dBovl, including the noise mixing process for Experiments 2a & 2b.
- Perform any required processing and post-processing for the reference conditions.
- Receive the processed speech samples for two other candidates per experiment from the Independent Distributor.
- Perform Experiments 1a, 2a and 2b, each for the two other candidates.
- Provide results as defined in Annex B through the SMG11 and TSG-S4 reflectors, using the workbook provided by the Analysis Laboratory.
- Provide to TSG-S4#11-SMG11#16 a report which as a minimum includes information on the experiments conducted, the language(s) used, deviations from the procedures defined in relevant documents (including, and in particular this document and the processing document), any problems encountered and a summary of the experimental results.

5.3.2 Noise Laboratory

- Provide pre-processed noise samples as defined in the Processing Document [7] to the proponents and their mandated listening lab, or to the Independent Distributor.

5.3.3 Independent Distributor

- Receive pre-processed speech material from the proponents or their mandated listening Laboratories.
- Define the final allocation table of candidates to each listening laboratory (see table 5.1). The allocation should be performed in such a way that all candidates are tested in as many different languages as possible.
- Forward the pre-processed samples to the proponents using table 5.1.
- Receive the processed samples and forward them to their original listening laboratory.
- Provide to TSG-S4#11-SMG11#16 a report describing any unexpected event during the process and providing the key to allocation table.

5.3.4 Analysis Laboratory

- Provide a generic Excel workbook for the presentation and analysis of the results. This should be used to ensure that the results from all laboratories are presented in a common format
- Analyze the result data provided by the Listening Laboratories and provide a report to TSG-S4#11-SMG11#16.

6 Information relevant to all Experiments

6.1 General Technical Notes

Any and all deviations from the specifications contained in this document and the Processing Functions document [3] must be documented and submitted to TSG-S4-SMG11 along with the experimental results.

6.2 System Applications and Error Conditions

The following systems/applications have been identified for the AMR Wideband Speech Codec:

A GSM full-rate traffic channel (22.8 kbit/s gross bit-rate) with an additional constraint of 16 kbit/s A-ter sub-multiplexing
B GSM full-rate traffic channel (22.8 kbit/s gross bit-rate)
C EDGE phase II channels
D GSM multi-slot traffic channels (n*22.8 kbit/s)
E 3G UTRAN channels

For the purpose of the Qualification Tests, the candidate algorithms will be tested in Error Conditions corresponding to a number of these applications. To that purpose a number of Error Patterns will be prepared and provided to the proponents for the processing of the speech material.

For applications A & B, the Error Conditions are identified by a code following the format:

ECx where x represents the C/I ratio used to generate the Error Pattern

Applications C & D are not tested in Error Conditions in the Qualification Phase

For application E, the Error Patterns are identified by a code using the following format:

EP-E-x where x represents the numerical order of the Error Condition used to generate the Error Pattern as defined by the following table and in the Performance Requirements document [3]:

Error Pattern	Err. Condition [FER, RBER]
EP-E-1	[0.5%, -], DL
EP-E-2	[1.0%, 0.1%] UL
EP-E-3	[1.0%, 0.1%] DL
EP-E-4	[1.0%, 0.1%] UL

Table 6.2: Error conditions for application E

6.3 Codec Adaptation

The philosophy of the AMR system is that it is capable of dynamically altering the ratio of speech and channel coding to maximize speech performance as channel conditions change. Each of the combinations of speech and channel coding rates is known as a mode.

However, for the purpose of the AMR-WB Qualification tests, only fixed mode operation will be considered.

6.4 Speech Material

All AMR-WB Qualification Test Experiments are subjective listening experiments using pre-recorded speech passed through the candidate algorithms and simulated impairment conditions prior to use in the experiments. It is the responsibility of each proponent or their selected listening laboratory to provide the speech samples they need for the experiments they will perform. This material must be pre-processed prior to provision (see sections5.3.1, 6.4.4 and the Processing Permanent Document [7]).

Short sentence pairs, 8 seconds in length, are used in these experiments:

Information for constructing these sentences is provided in the remainder of this subsection.

Pre-recorded source speech material may possibly be purchased as described in Section 6.4.1. Preferably, the test house should provide its own source speech material. The guidelines contained in Section 6.4.2 should be followed.

To avoid noise contrast effects, any silence gaps and/or pauses added to the speech files to pad them out into the specified formats for the source speech samples described in section 6.4.3, should not be pure digital silence. Padding out should be done by adding the ambient noise present during the recording of the speech material between the sentences.

The information in section 6.4.3 should be used in the preparation of the material that the talkers will utter, as well as how the recorded material should be constructed.

6.4.1 Availability of Pre-recorded Speech Material

A "Multi-lingual Speech Database for telephonometry 1994", on 4 CD-ROM disks, was available from NTT-AT, No.7 Hakuei Buildg, 2-4-15 Naka-machi, Musashino-shi, 180 Japan (phone: +81 422 37 0823, fax: +81 422 60 4806)[1].

In this database, the speech samples consist of pairs of short sentences with a total length of 8-10 seconds. Each sentence lasts approximately 2 to 3 seconds. Four male and four female native speakers are assigned to each of the 21 languages and 96 speech samples are available for each language. The sampling rate is 16 kHz. Active speech level (as defined in ITU-T Rec. P.56) of every speech sample is adjusted to -26dBovl.

Each CD consists of two different areas: audio and data. Speech samples in the audio area are digitized by 44.1 kHz and 16 bits word length linear PCM and can be played back by a commercial CD player. All speech samples in the data area are recorded in standardized format in 16-bit, 2's complement, low-byte first (little endian) format and can be retrieved by an ordinary PC-DOS system and CD-ROM reader.

6.4.2 Recording Your Own Speech Databases

All speech recordings should be made in acoustical and electrical environments complying with the requirements given in Annex B.1.1 of ITU-T Rec. P.800 [1].

The recommended method is to record the speech with a linear microphone and a low-noise amplifier with flat frequency response, digitize the speech, and then flat filter and level equalize. To achieve optimum SNR, the microphone should be positioned 15 to 20 cm from the talker's lips. A windscreen should be used if breath puffs from the talker are noticed.

The recordings should be made directly into a computer (A/D) or via a high quality recording system such as a DAT. In either case, the A/D system must provide 16 bit, 2's complement, 16 kHz samples with 50 to 7000 Hz bandwidth and excellent distortion and dynamic range performance.

6.4.3 Format of the Speech Samples

Each source speech file will contain one pair of sentences and will last exactly 8 seconds, with a flexible time interval between the two sentences. An approximate 0.5 seconds period of silence precedes the first sentence in the file, and a similar period of silence follows the second sentence in the file. The speech files are organized as in the example shown in Figure 6.4.3. The sentences will be simple meaningful sentences as described in Annex B1.4 of ITU-T Rec. P.800 [1].

[1] Note that this CD probably is no longer available for sale, but mentioned in this document as a typical example.

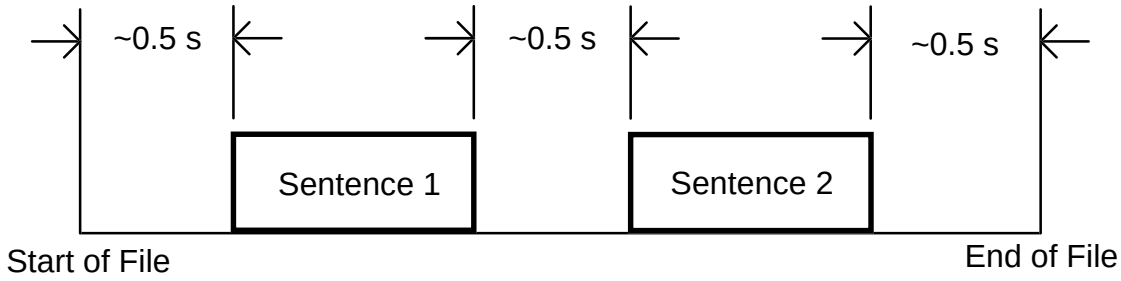

Figure 6.4.3: Example of Speech file structure for short speech samples

It must be noted that the trailing silence of 0.5s after the end of the second sentence in the file is of extreme importance, since there are (for some conditions) a series of FIR filters with large number of coefficients. If the prescribed trailing silence is not present, there is a considerable risk that speech will be clipped at the end of the file.

6.4.4 Processing of the Speech Files

All speech files will need to be pre-processed prior to being processed through the experimental conditions. This pre-processing ensures that the speech is at the correct level and has the correct input characteristic. Full details on the processing required are given in [7]. Speech levels will be measured with the P.56 algorithm and level adjusted with the gain/loss algorithm to the level required for each test condition as defined in the test plans for the individual experiments. Where the nominal level is specified, this level should be set to 26dB (±1dB) below digital overload (-26dBovl). All material supplied by the Listening Laboratories for processing will be at -26dBovl.

Some of the experiments require that the source speech material has background noise added. The Listening Laboratories should perform the mixing of noise and speech. Details on the process to be followed are given in [7]. Noise levels will be measured with the rms. computation algorithm and level adjusted with the gain/loss algorithm to the required level.

6.5 Listening Environment

For all experiments, subjects should be seated in a quiet environment; 30dBA Hoth Spectrum (as defined by ITU-T, Recommendation P.800[1], Annex A, section A.1.1.2.2.1 Room Noise, with table A.1 and Figure A.1) measured at the head position of the subject. This will help ensure consistency between the different subjects in the same laboratory as well as across the different laboratories in which these experiments will be performed.

The following points should be adhered to:

- Where the experiment design and the listening environment allows for multiple subjects in each listening session, the requirements stated above apply to each of the positions the subjects will occupy.
- Where there are multiple simultaneous subjects, they should not be able to see the responses made by other subjects.
- All test stimuli will be presented monaurally to the subjects over a high quality headphones (flat response in the audiobandwidth of interest: 50Hz-7kHz). The other ear is open.
- Subjects should be told not to discuss the experiment with subjects who are yet to participate.
- Any test house performing multiple experiments must use different listening subjects for each experiment or sub-experiment.

6.6 Experimental Procedure

Initially the experimenter should present and explain the experiment instructions to the subjects. When the subject has understood the instructions, they will first listen and give score to the preliminary conditions. After the preliminaries have been completed, there should be

sufficient time allowed for answering possible questions from the subjects. Any questions about the procedure or the meaning of the instructions should be answered, but any technical questions on matters such as the experimental methodology or details of the types of distortions they are listening to must not be answered until they have completed the experiment.

6.7 Preliminary Conditions

Preliminary conditions are included in the experiment to help acclimatize the subjects with the experimental procedure and to help reduce learning effects of the subjects, by ensuring that the subjects hear a full range of the potential qualities at the start of the experiment.

6.8 Reference Conditions

Two types of reference conditions are used in these experiments:

- MNRU references (Narrowband or Wideband, depending of the experiment): These are included in all experiments as standard references of known and well understood performance and will allow the results to be expressed in terms of Equivalent Q as well as MOS or DMOS.
- GSM EFR Speech Codec: Used to establish a reference performance degradation in high error conditions. The GSM EFR being a narrowband codec, it is tested in stand-alone reference experiments (1b, 2c & 2d).

For the Tests involving background noise conditions, the MNRU references will use clean speech (i.e. background noise should not be used with the MNRU).

The exact number of each of these types of reference in each experiment can be found in the experiment plans in the sections 7-13.

6.9 Results and Analysis

On completion of the experiments, the proponents or their mandated Listening Laboratories must provide the test results through the SMG11 & TSG-S4 reflectors, for the purpose of performing a global test analysis. The results should be provided as defined in Annex B.

6.10 Noise Material

Experiments 2a, 2b, 2c & 2d require the addition of noise to the speech material. The following types of noise are identified in this test plan:

Car Noise: This represents stationary background noise and will be typical of the noise experienced when inside a moving vehicle (car).

Street Noise: This represents a non-stationary noise and will be typical of a noise which might be experienced by someone using a mobile on a city street.

7. Experiment 1a: Candidate algorithms performances in Clean Speech and Error Conditions

7.1 Introduction

The purpose of this experiment is to evaluate the performances of a AMR-WB candidate algorithm in respect to well known references, in clean speech (free of background noise) and Error Conditions.

The details provided in this section are those that are specific to this particular experiment. Generic information, relevant to this and other experiments can be found in Section 6. Therefore Listening Laboratories should use the information in Section 6 in conjunction with the information given in this section.

7.2 Test Conditions

The following table (7.2) shows the conditions to be used in this experiment. A full list of conditions is given in section 7.11.

Main Codec Conditions		
Candidate	1	
Error Conditions for application A	5	No errors, C/I 13dB, C/I 10 dB, C/I 7 dB, C/I 4 dB (at maximum 4 different modes)
Error Conditions for application B	4	No errors, C/I 19dB, C/I 16dB, C/I 13dB (same codec mode for no errors and C/I 19 dB)
Error Conditions for application C/D	0	No errors (no errors condition is tested in application E)
Error Conditions for application E	5	No errors, EP-E-1, EP-E-2, EP-E-3, EP-E-4 (see chapter 6.2 for description) (No errors is tested with the same mode as at least one of the error conditions)
Input level	1	-26 dBov
Tandeming and noise	0	no tandeming or noise
Input characteristic	1	P.341
Codec references		
Codec references	3	G.722-64k, G.722-56k, G.722-48k (all: no errors, nominal input level, P.341)
Other references		
Direct	1	Nominal input level, P.341
MNRU	6	Q=5, 13, 21, 29, 37, 45 (all: nominal input level, P.341)
Common Conditions		
Radio Channels	2	Applications A/B & E
Number of talkers	4	2 male and 2 female
Number of speech samples	26	24 + 2 (preliminaries) sentence pairs per talker.
Listening Level	1	79dB SPL
Listeners	24	Naïve Listeners
Randomizations	6	6 groups of 4 listeners
Rating Scale	1	ACR
Replications	1	
Languages	1	
Listening System	1	Monaural headphones (flat response in the audiobandwidth of interest: 50Hz-7kHz). The other ear is open.
Listening Environment		Room Noise: Hoth Spectrum at 30dBA (as defined by ITU-T, Recommendation P.800, Annex A, section A.1.1.2.2.1 Room Noise, with table A.1 and Figure A.1)

Table 7.2: Factors and conditions for Experiments 1a

7.2.1 Preliminary Conditions

Condition	Codec and C/I or Q(dB)	Source Speech Sample
P1	G.722 64k	M1L25CL
P2	MNRU, Q=5	F2L25CL
P3	MNRU Q=37	F1L25CL
P4	MNRU, Q=13	M2L25CL
P5	Direct, No Errors	F2L26CL
P6	MNRU, Q=21	M1L26CL
P7	MNRU, Q=29	M2L26CL
P8	G.722 48k	F1L26CL

Table 7.2.1: List of preliminary conditions

7.3 Speech Material

The speech material should be as defined in Section 6.4. Twenty-six (26) speech samples (including preliminaries) are required for each talker for Experiment 1a (this includes 2 samples for the preliminary conditions in each sub-experiment). Each talker's samples must be unique so that the subjects do not hear any sentence more than once.

7.4 Experimental Design

The design is based on a restricted randomization philosophy using 6 different randomizations, each one covered by 4 of the 24 listeners. This means that up to 4 subjects can perform the experiment simultaneously.

Each subject will hear all of the conditions four times, once with speech from each of the four talkers. Over the experiment as a whole, each of the conditions will be paired with six different samples from each of the four talkers. The six groups of subjects will hear different combinations of source material and condition.

7.5 Randomizations

Randomizations for each of the presentation orders are provided to minimize differences between the laboratories. Six randomizations are provided for the presentation orders. Each one will therefore be used by four of the 24 subjects. The randomizations can be found in Annex F.

7.6 Processing

Annex E contains tables, which show how the input files and conditions need to be combined for each of the presentation orders (the preliminaries are given in Table 7.2.1). The tables have been arranged so that over all the listeners in all 6 groups of randomization, the tested codec conditions and the corresponding reference conditions use the same speech sentences. Only in conditions 23 and 24 this was not possible because the G722-48 is used as a reference codec for more than six conditions.

7.7 Duration of the Experiment

The number of stimuli per subject is:

(24 conditions x 4 talkers) + 8 preliminaries = 104

Allowing 15 seconds in total for the presentation of the sample and score collection, this gives the following **per subject times for the experiment**:

104 stimuli x 15 seconds = 26 minutes

If **four simultaneous subjects** can be accommodated, the **total time to complete the experiment** is in the order of:

26 minutes x 6 groups = 2.6 hours

7.8 Votes Per Condition

Every condition will have 24 different speech samples passed through it (4 talkers x 6 randomizations). Each of these will be voted on by the 4 subjects in the group, giving:

(24 samples x 4 subjects / group) = 96 votes per condition

From past experience of ACR tests, this is the minimum number of votes per condition needed to give enough statistical certainty to characterize the performance of the codec over the conditions and against the references.

7.9 Test Procedure

Factors important for the experimental environment are specified in section 6.5 and 6.6.

7.10 Opinion Scale

The question asked of the subject will be the ACR Listening Quality Scale. The subjects will listen to each sample and after it has completed they will be asked to give their opinion. Annex A contains an example of the instructions for the subjects in English.

7.11 Experiment Conditions

Condition	Codec	Application	Error Condition or or MNRU (Q dB)	i/p level
1	Direct	-	No Errors	-26dB ovl
2	MNRU	-	45	-26dB ovl
3	MNRU	-	37	-26dB ovl
4	MNRU	-	29	-26dB ovl
5	MNRU	-	21	-26dB ovl
6	MNRU	-	13	-26dB ovl
7	MNRU	-	5	-26dB ovl
8	G.722 64k	-	No Errors	-26dB ovl
9	G.722 56k	-	No Errors	-26dB ovl
10	G.722 48k	-	No Errors	-26dB ovl
11	AMR-WB	A	No Errors	-26dB ovl
12	AMR-WB	A	EC13	-26dB ovl
13	AMR-WB	A	EC10	-26dB ovl
14	AMR-WB	A	EC7	-26dB ovl
15	AMR-WB	A	EC4	-26dB ovl
16	AMR-WB	B	No Errors	-26dB ovl
17	AMR-WB	B	EC19	-26dB ovl
18	AMR-WB	B	EC16	-26dB ovl
19	AMR-WB	B	EC13	-26dB ovl
20	AMR-WB	C/D/E	No Errors	-26dB ovl
21	AMR-WB	E	EP-E-1	-26dB ovl
22	AMR-WB	E	EP-E-2	-26dB ovl
23	AMR-WB	E	EP-E-3	-26dB ovl
24	AMR-WB	E	EP-E-4	-26dB ovl

Table 7.11: Test conditions for Experiment 1a: Wideband Candidates Performances in Clean Speech

8. Experiment 1b: GSM EFR performances in Clean Speech and Error Conditions

8.1 Introduction

The purpose of this experiment is to evaluate the performances of the GSM EFR in Clean Speech and Error Conditions, to serve as a reference for the quality degradation of the wideband candidates in High Error Conditions.

The details provided in this section are those that are specific to this particular experiment. Generic information, relevant to this and other experiments can be found in Section 6. Therefore Listening Laboratories should use the information in Section 6 in conjunction with the information given in this section.

8.2 Test Conditions

The following table (8.2) shows the conditions to be used in this experiment. A full list of conditions is given in section 8.11.

Main Codec Conditions		
Candidate	0	
Codec references		
Codec references	5	GSM EFR (no errors, C/I 13dB, C/I 10 dB, C/I 7 dB, C/I 4 dB), -26 dBov, GSM filter characteristic
Other references		
Direct	1	Nominal input level, GSM filter
MNRU	6	Q=5, 10, 15, 20, 25, 30 (all: nominal input level, GSM Filter)
Common Conditions		
Radio Channels	1	Applications A/B
Number of talkers	4	2 male and 2 female
Number of speech samples	14	12 + 2 (preliminaries) sentence pairs per talker.
Listening Level	1	79dB SPL
Listeners	24	Naïve Listeners
Randomizations	6	6 groups of 4 listeners
Rating Scale	1	ACR
Replications	1	
Languages	1	
Listening System	1	Monaural headphone with Modified IRS receiving response (exclusive of the SRAEN filter) The other ear is open.
Listening Environment		Room Noise: Hoth Spectrum at 30dBA (as defined by ITU-T, Recommendation P.800, Annex A, section A.1.1.2.2.1 Room Noise, with table A.1 and Figure A.1)

Table 8.2: Factors and conditions for Experiments 1b

8.2.1 Preliminary Conditions

Condition	Codec and C/I or Q(dB)	Source Speech Sample
P1	Direct, No Errors	M1L13CL
P2	MNRU, Q=5	F2L13CL
P3	MNRU Q=15	F1L13CL
P4	MNRU, Q=25	M2L13CL
P5	Direct, No Errors	F2L14CL
P6	MNRU, Q=20	M1L14CL
P7	MNRU, Q=10	M2L14CL
P8	MNRU, Q=30	F1L14CL

Table 8.2.1: List of preliminary conditions

8.3 Speech Material

The speech material should be as defined in Section 6.4. Fourteen (14) speech samples (including preliminaries) are required for each talker for Experiment 1b (this includes 2 samples for the preliminary conditions in each sub-experiment). Each talker' samples must be unique so that the subjects do not hear any sentence more than once. The speech sentences in the experiment 1b should be the subset of the speech sentences that are used in the experiment 1a for the respective error conditions (C/I=13 dB, 10dB, 7dB, 4dB).

8.4 Experimental Design

Same as 7.4.

8.5 Randomizations

Same as 7.5.

8.6 Processing

Annex E contains tables, which show how the input files and conditions need to be combined for each of the presentation orders (the preliminaries are given in Table 8.2.1). The tables have been arranged so that over all the listeners in all 6 groups of randomization, the GSM EFR reference conditions and the corresponding wide band codec conditions (in experiment 1a) use the same speech sentences.

8.7 Duration of the Experiment

The number of stimuli per subject is:

(12 conditions x 4 talkers) + 8 preliminaries = 56

Allowing 15 seconds in total for the presentation of the sample and score collection, this gives the following **per subject times for the experiment**:

56 stimuli x 15 seconds = 14 minutes

If **four simultaneous subjects** can be accommodated, the **total time to complete the experiment** is in the order of:

14 minutes x 6 groups = 1.4 hours

8.8 Votes Per Condition

Every condition will have 24 different speech samples passed through it (4 talkers x 6 randomizations). Each of these will be voted on by the 4 subjects in the group, giving:

(24 samples x 4 subjects / group) = 96 votes per condition

From past experience of ACR tests, this is the minimum number of votes per condition needed to give enough statistical certainty to characterize the performance of the codec over the conditions and against the references.

8.9 Test Procedure

Factors important for the experimental environment are specified in section 6.5 and 6.6.

8.10 Opinion Scale

The question asked of the subject will be the ACR Listening Quality Scale. The subjects will listen to each sample and after it has completed they will be asked to give their opinion. Annex A contains an example of the instructions for the subjects in English.

8.11 Experiment Conditions

Condition	Codec	Error Condition or or MNRU (Q dB)	i/p level
1	Direct	No Errors	-26dB ovl
2	MNRU	30	-26dB ovl
3	MNRU	25	-26dB ovl
4	MNRU	20	-26dB ovl
5	MNRU	15	-26dB ovl
6	MNRU	10	-26dB ovl
7	MNRU	5	-26dB ovl
8	EFR	No Errors	-26dB ovl
9	EFR	EC13	-26dB ovl
10	EFR	EC10	-26dB ovl
11	EFR	EC7	-26dB ovl
12	EFR	EC4	-26dB ovl

Table 8.11: Test conditions for Experiment 1b: GSM EFR Performances in Clean Speech

9. Experiments 2a & 2b: Wideband Candidates Performances in Background Noise in Static C/I Conditions

9.1 Introduction

These experiments are designed to evaluate the performances of the wideband candidate algorithms in the presence of background noise (Car and Street Noises). This results in two sub-experiments:

Experiment 2a: Car noise

Experiment 2b: Street noise

The details provided in this section are those that are specific to this particular experiment. Generic information, relevant to this and other experiments can be found in Section 6. Therefore Listening Laboratories should use the information in Section 6 in conjunction with the information given in this section.

Four samples of the two noise types will be used, each sample having 8s length:

Exp#2a: 4 different samples of Car noise, 15 dB SNR

Exp#2b: 4 different samples of Street noise, 15 dB SNR

Each of the four 8s noise samples are allocated to each of the four talkers (see section 9.3, Table 9.3).

The method of assessment will use the modified Degradation Category Rating (DCR, [1]) where the quality reference (unprocessed Direct. Mixed with the same noise than in the processed sample) is presented to the subject before the processed sample.

9.2 Test Conditions

Table 9.2 shows all factors and reference conditions for these experiments. A full list of conditions is given in section 9.11. The total number of conditions is 24 for each sub-experiment.

Main Codec Conditions		
Candidate	1	
Error Conditions for application A	5	No errors, C/I 13dB, C/I 10 dB, C/I 7 dB, C/I 4 dB (at maximum 4 different modes)
Error Conditions for application B	4	No errors, C/I 19dB, C/I 16dB, C/I 13dB (same codec mode for no errors and C/I 19 dB)
Error Conditions for application C/D	0	No errors (no errors condition is tested in application E)
Error Conditions for application E	5	No errors, EP-E-1, EP-E-2, EP-E-3, EP-E-4 (see chapter 6.2 for description) (No errors is tested with the same mode as at least one of the error conditions)
Background Noise	2	Experiment 2a: 4 samples of Car Noise, 15 dB SNR Experiment 2b: 4 samples of Street Noise, 15 dB SNR
Input level	1	-26 dBov
Tandeming	0	no tandeming
Input characteristic	1	P.341
Codec references		
Codec references	3	G.722-64k, G.722-56k, G.722-48k (all: no errors, nominal input level, P.341)
Other references		
Direct	1	Nominal input level, P.341
MNRU	6	Q=5, 13, 21, 29, 37, 45 (all: nominal input level, P.341)
Common Conditions		
Radio Channels	2	Applications A/B & E
Number of talkers	4	2 male and 2 female
Number of speech samples	6	4 + 2 (preliminaries) sentence pairs per talker.
Listening Level	1	79dB SPL
Listeners	24	Naïve Listeners
Randomizations	3	3 groups of 8 listeners
Rating Scale	1	Modified DCR
Replications	1	
Languages	1	
Listening System	1	Monaural headphones (flat response in the audiobandwidth of interest: 50Hz-7kHz). The other ear is open.
Listening Environment		Room Noise: Hoth Spectrum at 30dBA (as defined by ITU-T, Recommendation P.800, Annex A, section A.1.1.2.2.1 Room Noise, with table A.1 and Figure A.1)

Table 9.2: Factors and conditions for Experiments 2a (Car Noise) and 2b (Street Noise)

9.2.1 Preliminary Conditions

Number of Conditions	References MNRU/Codec	Q [dB]	Background Noise	Talker	Speech Samples Exp#2a	Speech Samples Exp#2b
P1	MNRU	5	CLSP	M01	M1L01CL	M1L01CL
P2	DIRECT	-	Nb	M02	M2L02CA	M2L02ST
P3	G.722 64k	-	Nc	F01	F1L03CA	F1L03ST
P4	MNRU	37	CLSP	F02	F2L04CL	F2L04CL
P5	MNRU	29	CLSP	M02	M2L01CL	M2L01CL
P6	G.722 48k	-	Na	M01	M1L02CA	M1L02ST
P7	DIRECT	-	Nd	F02	F2L03CA	F2L03ST
P8	MNRU	13	CLSP	F01	F1L04CL	F1L04CL

Table 9.2.1: Allocation of Preliminary Conditions

9.3 Speech Material

The speech material should be prepared as detailed in Section 6.4. In a DCR test, each nominal condition is evaluated on the same corpus (generally two samples uttered by at least four talkers[2]). This results in a repetition of the same set of samples during the test, therefore the DCR method should not be used when intelligibility difficulties are suspected. In this modified version of the DCR procedure four speech samples per talker, with different sentences for each talker will be needed.

Table 9.3 shows how the speech material is allocated to the noise samples for the different experiments. In this Table;

- The different sentence pairs are denoted by the numbers 1 to 4.
- Background noise samples are denoted by Na, Nb, Nc, Nd.
- talkers by M01, F01, etc.,

Note that sample M01_S01 is not the same text as M02_S01, F01_S01 or F02_S01.

S/N Exp#2a	S/N Exp#2b	Male 1	Male 2	Female 1	Female 2
Car Noise	Street Noise	Sample Na	Sample Nb	Sample Nc	Sample Nd
15 dB	15 dB	M01_S01	M02_S01	F01_S01	F02_S01
15 dB	15 dB	M01_S02	M02_S02	F01_S02	F02_S02
15 dB	15 dB	M01_S03	M02_S03	F01_S03	F02_S03
15 dB	15 dB	M01_S04	M02_S04	F01_S04	F02_S04

Table 9.3: Allocation of talkers and environmental noises to speech samples

[2]Ideally, the sentences should be selected from a wider corpus of phonetically balanced sentences. The principle is that the mean score obtained in evaluating reference MNRU conditions with these set of sentences is about the same as that obtained for the wider corpus. This requirement might be considered as optional, the most important point in the DCR procedure is that each configuration is evaluated on the same speech material.

9.4 Design of experiment

The design of this DCR test is a split-plot factorial design where the effect of listeners and orders of presentation are mixed. Three groups of eight listeners will be used, each group of subjects listening to different randomizations.

9.5 Randomizations

Because of the presence of the reference condition (first signal) in front of each coded sample (second signal) which anchors the listener's judgment, order effects for DCR procedures are much less important than for ACR. For this reason, only three different randomizations will be used. Each of these randomized presentation orders will be presented to each of the different groups of listeners. Twenty-four listeners will participate in the experiment; they will be divided into 3 groups of eight (one for each order of presentation). The randomizations required for these experiments are provided in Annex F.

9.6 Processing

Annex E contains tables, which show how the input files and conditions need to be combined for each of the presentation orders (the preliminaries are given in Table 9.2.1). The tables have been arranged so that over all the listeners, the tested codec conditions and the corresponding reference conditions use the same speech sentences. This means that some of the sentences are used more than the others because the G722-48 is used as an reference codec for more than 6 conditions.

9.6.1 Noise Mixing Process

The procedure to apply for mixing the speech and environmental noises files is explained in the processing document [7].

The Listening Laboratories are responsible for mixing the noise with the speech prior to passing it through the codecs and reference conditions or delivering the speech samples to the Independent Distributor.

The resulting speech samples, corrupted by background noise, should be processed through the relevant codec and reference conditions, as detailed in section 9.11.

9.6.2 Processing of Quality References (DIRECT speech samples)

Additional Direct references should be produced (see Table 9.6.2) and used as the quality references in the listening sequences. The whole source data base should then be processed both as clean DIRECT (4 clean speech samples x 4 talkers) and noisy DIRECT (4 noisy speech samples allocated to 4 talkers as shown in Table 9.3). The noisy speech samples should be used as references for conditions 8-24, and the clear samples for conditions 1-7. These extra Direct references would be identified as conditions #25 to #32.

Cond	i/p level	Quality Ref. (1st signal)	Noise/Talkers Experiments 2a & 2b	Speech sample Exp. 2a & 2b
25*	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S01
26	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
27	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03
28	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
29	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
30	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S02
31	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
32	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S04

*files redundant with files for Condition #1 for Exp2a & 2b

Table 9.6.2: Table of quality references

9.7 Duration of the Experiment

For each sub-experiment, each listener will hear each sample twice, once over the quality reference (first signal), then over the codec under test or the reference conditions (second signal). Within each of experiments 2a and 2b, each listener will hear (24 conditions x 4 talkers + 8 preliminaries) 104 sentence-pairs on which a vote will be recorded. Allowing a total of 16 seconds for a sentence-pair and 5 seconds for score collection, subjects will be required to spend approximately 36 minutes listening to the material through all test conditions (including the preliminaries).

With 8 listeners per visit, the time required to perform each sub-experiment should be in the order of 1.8 hours (3 groups of listeners x 36 minutes), excluding time for breaks and instructions.

9.8 Votes Per Condition

Over the whole experiment, there will be 96 votes per condition, providing similar levels of statistical certainty as the other experiments in the Qualification Phase.

9.9 Test Procedure

Factors important for the experimental environment are specified in section 6.5 and 6.

The method of assessment will use a modified version of the Degradation Category Rating (DCR) method which standard procedure is fully described in [I].

In the DCR procedure, a quality reference (first signal, unprocessed) is always presented before the degraded sample (second signal) using the same source input speech to anchor the judgment of the listener. According to the allocation of conditions given in section 9.11, within each sub-experiment four samples of noise will be used and there will be four quality references. Where there is noise present in the degraded sample (second signal), which is for all cases except the MNRU, the noise must also be present in the quality reference (first signal).

Each of the speech samples is presented to the listener, first through the quality reference condition and then through the candidate codec or reference except for the "Null pair" conditions where the quality reference is presented twice. In this adaptation of the DCR procedure the listeners should judge the degradation of the sample to be evaluated with regard to the preceding quality reference sample which has been mixed with the same noise (Car or Street noise).

9.10 Opinion Scale

Each degradation judgment will be collected on a 5-point degradation scale with regard to the quality reference. An example of instructions to be provided to the subjects is provided in Annex A.

9.11 Experiment Conditions

Cond	Codec/Ref. (2nd signal)	Application	Error Condition/ MNRU (Q dB)	i/p level	Quality Ref. (1st signal)	Noise/Talkers Exp. 2a (Car noise at S/N = 15 dB) Exp. 2b (Street noise at S/N = 15 dB)	Speech sample
1	DIRECT	-	-	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
2	MNRU	-	45	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S04
3	MNRU	-	37	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
4	MNRU	-	29	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S04
5	MNRU	-	21	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
6	MNRU	-	13	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
7	MNRU	-	5	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
8	G.722 64k	-	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
9	G.722 56k	-	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S01

10	G.722 48k	-	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
11	AMR-WB	A	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
12	AMR-WB	A	EC13	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
13	AMR-WB	A	EC10	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03
14	AMR-WB	A	EC7	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
15	AMR-WB	A	EC4	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03
16	AMR-WB	B	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S01
17	AMR-WB	B	EC19	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
18	AMR-WB	B	EC16	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
19	AMR-WB	B	EC13	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
20	AMR-WB	C/D/E	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
21	AMR-WB	E	EP-E-1	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S01
22	AMR-WB	E	EP-E-2	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
23	AMR-WB	E	EP-E-3	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
24	AMR-WB	E	EP-E-4	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02

Table 9.11: Test Conditions for Experiments 2a & 2b – Wideband Candidates Performances under background noise conditions

10. Experiments 2c & 2d: GSM EFR Performances in Background Noise and Static C/I Conditions

10.1 Introduction

These experiments are designed on the model of Experiments 2a & 2b but intended to evaluate the performances of the GSM EFR under Background Noise (Car or Street Noise) and Error Conditions, to serve as a reference for the quality degradation of the wideband candidates in High Error Conditions. This results in two additional sub-experiments:

Experiment 2c: Car noise

Experiment 2d: Street noise

The details provided in this section are those that are specific to this particular experiment. Generic information, relevant to this and other experiments can be found in Section 6. Therefore Listening Laboratories should use the information in Section 6 in conjunction with the information given in this section.

Four samples of the two noise types will be used, each sample having 8s length:

Exp#2c: 4 different samples of Car noise, 15 dB SNR

Exp#2d: 4 different samples of Street noise, 15 dB SNR

Each of the four 8s noise samples are allocated to each of the four talkers (see section 10.3, Table 10.3).

The method of assessment will use the modified Degradation Category Rating (DCR, [1]) where the quality reference (unprocessed Direct, mixed with the same noise than in the processed sample) is presented to the subject before the processed sample.

10.2 Test Conditions

Table 10.2 shows all factors and reference conditions for these experiments. A full list of conditions is given in section 10.11. The total number of conditions is 2 for each sub-experiment.

Main Codec Conditions		
Candidate	0	
Codec references		
Codec references	5	GSM EFR (no errors, C/I 13dB, C/I 10 dB, C/I 7 dB, C/I 4 dB), -26 dBov, GSM filter characteristic
Background Noise	2	Experiment 2c: 4 samples of Car Noise, 15 dB SNR Experiment 2d: 4 samples of Street Noise, 15 dB SNR
Other references		
Direct	1	Nominal input level, GSM filter
MNRU	6	Q=5, 10, 15, 20, 25, 30 (all: nominal input level, GSM Filter)
Common Conditions		
Radio Channels	2	Applications A/B
Number of talkers	4	2 male and 2 female
Number of speech samples	6	4 + 2 (preliminaries) sentence pairs per talker.
Listening Level	1	79dB SPL
Listeners	24	Naïve Listeners
Randomizations	3	3 groups of 8 listeners
Rating Scale	1	Modified DCR
Replications	1	
Languages	1	
Listening System	1	Monaural headphone with Modified IRS receiving response (exclusive of the SRAEN filter)
Listening Environment		Room Noise: Hoth Spectrum at 30dBA (as defined by ITU-T, Recommendation P.800, Annex A, section A.1.1.2.2.1 Room Noise, with table A.1 and Figure A.1)

Table 10.2: Factors and conditions for Experiments 2c (Car Noise) and 2d (Street Noise)

10.2.1 Preliminary Conditions

Number of Conditions	References MNRU/Codec	Q [dB]	Background Noise	Talker	Speech Samples Exp#2c	Speech Samples Exp#2d
P1	MNRU	5	CLSP	M01	M1L01CL	M1L01CL
P2	DIRECT	-	Nb	M02	M2L02CA	M2L02ST
P3	DIRECT	-	Nc	F01	F1L03CA	F1L03ST
P4	MNRU	25	CLSP	F02	F2L04CL	F2L04CL
P5	MNRU	20	CLSP	M02	M2L01CL	M2L01CL
P6	DIRECT	-	Na	M01	M1L02CA	M1L02ST
P7	DIRECT	-	Nd	F02	F2L03CA	F2L03ST
P8	MNRU	10	CLSP	F01	F1L04CL	F1L04CL

Table 10.2.1: Allocation of Preliminary Conditions

10.3 Speech Material

See Section 9.3.

Table 10.3 shows how the speech material is allocated to the noise samples for the different experiments. In this Table;

- The different sentence pairs are denoted by the numbers 1 to 4.
- Background noise samples are denoted by Na, Nb, Nc, Nd.
- talkers by M01, F01, etc.,

Note that sample M01_S01 is not the same text as M02_S01, F01_S01 or F02_S01.

The speech sentences in the experiments 2c and 2d should be the subset of the speech sentences that are used in the experiment 2a and 2b for the respective error conditions (C / I=13 dB, 10dB, 7dB, 4dB).

S/N Exp#2c	S/N Exp#2d	Male 1	Male 2	Female 1	Female 2
Car Noise	Street Noise	Sample Na	Sample Nb	Sample Nc	Sample Nd
15 dB	15 dB	M01_S01	M02_S01	F01_S01	F02_S01
15 dB	15 dB	M01_S02	M02_S02	F01_S02	F02_S02
15 dB	15 dB	M01_S03	M02_S03	F01_S03	F02_S03
15 dB	15 dB	M01_S04	M02_S04	F01_S04	F02_S04

Table 10.3: Allocation of talkers and environmental noises to speech samples

10.4 Design of experiment

The design of this DCR test is a split-plot factorial design where the effect of listeners and orders of presentation are mixed. Three groups of eight listeners will be used, each group of subjects listening to different randomizations.

10.5 Randomizations

Because of the presence of the reference condition (first signal) in front of each coded sample (second signal) which anchors the listener's judgment, order effects for DCR procedures are much less important than for ACR. For this reason, only three different randomizations will be used. Each of these randomized presentation orders will be presented to each of the different groups of listeners. Twenty-four listeners will participate in the experiment; they will be divided into 3 groups of eight (one for each order of presentation). The randomizations required for these experiments are provided in Annex F.

10.6 Processing

Annex E contains tables, which show how the input files and conditions need to be combined for each of the presentation orders (the preliminaries are given in Table 10.2.1). The tables have been arranged so that over all the listeners, the GSM EFR reference conditions and the corresponding wide band codec conditions (in experiment 2a and 2b) use the same speech sentences.

10.6.1 Noise Mixing Process

The procedure to apply for mixing the speech and environmental noises files is explained in the processing document [7].

The Listening Laboratories are responsible for mixing the noise with the speech prior to passing it through the codecs and reference conditions or delivering the speech samples to the Independent Distributor.

The resulting speech samples, corrupted by background noise, should be processed through the relevant codec and reference conditions, as detailed in section 10.11.

10.6.2 Processing of Quality References (DIRECT speech samples)

Additional Direct references should be produced (see Table 10.6.2) and used as the quality references in the listening sequences. The whole source data base should then be processed both as clean DIRECT (4 clean speech samples x 4 talkers) and noisy DIRECT (4 noisy speech samples allocated to 4 talkers as shown in Table 10.3). The noisy speech samples should be used as references for conditions 8-12, and the clear samples for conditions 1-7. These extra Direct references would be identified as conditions #13 to #20.

Cond	i/p level	Quality Ref. (1st signal)	Noise/Talkers Experiments 2c & 2d	Speech sample Exp. 2c & 2d
13*	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S01
14	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
15	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03
16	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
17	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
18	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S02
19	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
20	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S04

*files redundant with files for Condition #1 for Exp2c & 2d

Table 10.6.2: Table of quality references

10.7 Duration of the Experiment

For each sub-experiment, each listener will hear each sample twice, once over the quality reference (first signal), then over the codec under test or the reference conditions (second signal). Within each of experiments 2c and 2d, each listener will hear (12 conditions x 4 talkers + 8 preliminaries) 56 sentence-pairs on which a vote will be recorded. Allowing a total of 16

seconds for a sentence-pair and 5 seconds for score collection, subjects will be required to spend approximately 20 minutes listening to the material through all test conditions (including the preliminaries).

With 8 listeners per visit, the time required to perform each sub-experiment should be in the order of 1 hours (3 groups of listeners x 20 minutes), excluding time for breaks and instructions.

10.8 Votes Per Condition

Over the whole experiment, there will be 96 votes per condition, providing similar levels of statistical certainty as the other experiments in the Qualification Phase.

10.9 Test Procedure

See section 9.9.

10.10 Opinion Scale

Each degradation judgment will be collected on a 5-point degradation scale with regard to the quality reference. An example of instructions to be provided to the subjects is provided in Annex A.

10.11 Experiment Conditions

Cond	Codec/Ref. (2nd signal)	Error Condition/ MNRU (Q dB)	i/p level	Quality Ref. (1st signal)	Noise/Talkers Exp. 2c (Car noise at S/N = 15 dB) Exp. 2d (Street noise at S/N = 15 dB)	Speech sample
1	DIRECT	-	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
2	MNRU	30	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S02
3	MNRU	25	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
4	MNRU	20	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S04
5	MNRU	15	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S01
6	MNRU	10	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S02
7	MNRU	5	-26dB ovl	DIRECT(CLSP)	CLSP(M01, M02, F01 & F02)	S03
8	GSM EFR	No Errors	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
9	GSM EFR	EC13	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S02
10	GSM EFR	EC10	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03
11	GSM EFR	EC7	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S04
12	GSM EFR	EC4	-26dB ovl	DIRECT(Noisy)	NaM01, NbM02, NcF01 & NdF02	S03

Table 10.11: Test Conditions for Experiments 2c & 2d – GSM EFR Performances under background noise conditions

Annex A: Instructions to subjects and data collection

The instructions given to the subjects will to some extent depend on the method used to collect opinion data. In this section, example instructions are given for ACR and Modified DCR experiments. To ensure consistency between the different laboratories, the actual instructions given to the subjects should be as close as possible to these examples, adapted for the number of speech files and length of the actual experiment, data collection method, and translated into the native language.

The instructions must be given prior to the commencement of the experiment, and the experimenter should ensure that the subject has understood them before starting the experiment. Questions asked by the subjects on procedural aspects of the experiment can, and should, be answered. **However questions about the experiment design or what the experiment is investigating should not be answered until the subjects have completed the experiment.** Subjects must be told not to give such information to subjects who are yet to participate in the experiment.

Subjects' responses may be collected by any convenient method: e.g. pencil and paper, press buttons controlling lamps recorded by the operator, or automatic data-logging equipment. Whichever method is used, care must be taken that subjects should not be able to observe other subjects' responses, nor should they be able to see the record of their own responses made in a previous session. Apart from the inevitable memory effects, each response should be independent of every other.

A.1 Example Instructions for the ACR Listening Quality Scale

INSTRUCTIONS TO SUBJECTS

In this experiment we are evaluating systems that might be used for telecommunication services.

You are going to hear [m] samples of speech reproduced through the telephone handset. Each sample will consist of a sequence of 2 sentences. Please listen to the complete sample, then indicate your opinion of the overall sound quality on the following 5-point scale:

Excellent

Good

Fair

Poor

Bad

After listening to a sample sequence, [please write the appropriate response on the sheet provided] which on this rating scale represents your opinion of the sound quality of the sample you just heard.

After you have given your opinion there will be a short pause before the next sample begins.

For practice, you will first hear [n] samples and give an opinion on each. There will then be a short break to make sure that everything is clear.

From then on you will have a break approximately every [p] minutes. The test will last a total of approximately [q] minutes.

Please do not discuss your opinions with other listeners participating in the experiment.

Table A.1: Example Subject Instructions for an ACR test using the Listening Quality scale.

A.2 Example Instructions for the Modified DCR Scale

The DCR method is particularly useful for assessing the performance of telecommunications systems when the input speech is corrupted by background noise. In the DCR procedure, listeners are presented with a pair of speech samples. A reference (unprocessed) sample is presented first, followed by the same speech sample processed through the relevant experimental condition. Listeners must rate the amount by which the second sample is *degraded* relative to the unprocessed (first) sample. In the Modified-DCR method (as used in the AMR-WB Qualification phase), the reference sample is not clean speech, it is also corrupted by the same noise (if any) and processed through the same preliminary processes, such as transmitter characteristic, logarithmic compounding, etc. Thus, there will be a different reference for each of the test conditions.

INSTRUCTIONS TO SUBJECTS

In this experiment we are evaluating systems that might be used for telecommunication services.

You are going to hear through the handset pairs of speech samples, most of which have been recorded in different noisy environments (for example inside a car, in an office, or on the street). The first sample you will hear will be the reference sample. You will then hear the same sample again, but this time it will have passed through a telecommunications system. These samples will each consist of two short unconnected sentences.

You should listen carefully to each pair of samples. When they have finished, please record your opinion of any degradation you can perceive on the second sample with regard to the first one (reference) using the following scale :

Degradation not perceived or even some improvement

Degradation perceived but not annoying

Degradation slightly annoying

Degradation annoying

Degradation very annoying

For practice, you will first hear [n] sample pairs and give an opinion on each. There will then be a short break to make sure that everything is clear.

From then on you will have a break approximately every [p] minutes. The test will last a total of approximately [q] minutes.

Please do not discuss your opinions with other listeners participating in the experiment.

Table A.2: Example of instructions to subjects for M-DCR test.

Annex B: Results to be provided by the Listening Laboratories

Results from the Qualification Phase should be presented using an Excel Workbook to be provided by the Analysis Laboratory. This will ensure consistency across the presentation of the test results from the different laboratories.

Once completed, the workbooks should be distributed over the relevant email reflectors by the due date, as defined in Annex D.

The information required for each experiment from each of the Listening Laboratories is:

A table containing the following information for each of the conditions in the experiment:

- The Mean Opinion Score (MOS) or Degradation Mean Opinion Score (DMOS) obtained for all the male speech samples.
- The MOS or DMOS obtained for all the female speech samples.
- The MOS or DMOS obtained for all the speech samples, both male and female.
- The Standard Deviation of the MOS or DMOS obtained for all speech samples, both male and female.

The Listening Laboratories should also prepare a Test Report identifying the conditions of the tests and any discrepancy compared to the content of this Test Plan. The delivery of this report is under the responsibility of the candidates as part of the AMR-WB Qualification Deliverables (AMR-WB-5a).

Annex C: File Naming Convention

In the course of the AMR-WB Qualification tests preparation, speech samples will be exchanged between the candidates or their mandated Listening Laboratories, the Independent Distributor and the Noise laboratory. A specific file naming convention is defined here for these files. It is mandatory for all involved parties to follow this convention.

- The files prepared by the Listening Laboratories and provided to the Independent Distributor must be pre-processed and have an extension .PRE
- The files provided to the Listening Laboratories for the execution of the test must have an extension .OUT, the preliminary (or practice) must be identified by an extension .PRA.

C.1 Filenames for Pre-Processed Files

Table C1.1 defines the naming convention for the pre-processed files, provided by the listening Laboratories to the Independent Distributor.

yyLllww.PRE		Filename format for pre-processed files (.PRE)
where		
yy	–	Indicates the talker gender and index: M1 = male #1, F1 = female #1, M2 = male #2, F2 = female #2
ll	–	Indicates the sample number
ww	–	Indicates the nature of speech : CL = Clean Speech, CA = Car Noise, ST = Street Noise

Table C1.1: Filename convention for pre-processed files

The samples must be delivered by the listening Laboratories to the Independent Distributor after pre-processing in a directory structure following the convention:

\Lab_x\Exp_ee\filename,

where x is the code of the proponent and ee is the experiment number as shown in Table C1.2.

x	Identifier for each proponent: C: COBASCA Consortium E: Ericsson F: France Telecom M: Matsushita O: Motorola K: Nokia S: Siemens T: Texas Instruments N: T-Nova Deutsche Telekom
ee	Indicates the experiment identifier, e.g. 2A for experiment #2a

Table C1.2: Naming convention for the directory structure

C.2 Filenames for Processed Files

After the processing, the speech samples must be returned to the Independent Distributor by the proponents. Table C2.1 defines the naming convention for the processed and output files.

eeyyllcc.PRA Eeyyllcc.OUT		output files for practice samples processed output files for test samples
where		
ee	–	Indicates the experiment identifier, e.g. 2A for experiment #2a.
yy	–	Indicates the talker gender and index or signal type: M1 = male #1, F1 = female #1, M2 = male #2, F2 = female #2
ll	–	Indicates the sample number
cc	–	Indicates the condition number, i.e. 08 = condition 08

Table C2.1: Filename convention for the processed material

When delivered to the Independent Distributor by the proponents, the samples should be provided in a directory structure following the convention:

\Lab_x\Exp_ee\Order_x\filename.

with the same convention as before.

For the preliminaries, the condition number should represent the index of that condition and should be provided in a dedicated directory :

\Lab_x\Exp_ee\Pratices\filenames

with the same convention as before.

Annex E: Processing Tables

The tables in this annex show on a per experiment basis which speech files need to be processed through which conditions for each of the presentation orders. The output files from this process should be named according to the agreed convention in Annex C. The source files referred to here are pre-processed and will all have a .PRE file extension.

The processing requirements for the preliminary practice samples are given in the individual experiment plans.

E.1 Processing Tables for Experiment 1a

x = 1			x = 2		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L01CL	C01	1AM10101	M1L02CL	C01	1AM10201
F1L01CL	C01	1AF10101	F1L02CL	C01	1AF10201
M2L01CL	C01	1AM20101	M2L02CL	C01	1AM20201
F2L01CL	C01	1AF20101	F2L02CL	C01	1AF20201
M1L19CL	C02	1AM11902	M1L20CL	C02	1AM12002
F1L19CL	C02	1AF11902	F1L20CL	C02	1AF12002
M2L19CL	C02	1AM21902	M2L20CL	C02	1AM22002
F2L19CL	C02	1AF21902	F2L20CL	C02	1AF22002
M1L24CL	C03	1AM12403	M1L19CL	C03	1AM11903
F1L24CL	C03	1AF12403	F1L19CL	C03	1AF11903
M2L24CL	C03	1AM22403	M2L19CL	C03	1AM21903
F2L24CL	C03	1AF22403	F2L19CL	C03	1AF21903
M1L23CL	C04	1AM12304	M1L24CL	C04	1AM12404
F1L23CL	C04	1AF12304	F1L24CL	C04	1AF12404
M2L23CL	C04	1AM22304	M2L24CL	C04	1AM22404
F2L23CL	C04	1AF22304	F2L24CL	C04	1AF22404
M1L22CL	C05	1AM12205	M1L23CL	C05	1AM12305
F1L22CL	C05	1AF12205	F1L23CL	C05	1AF12305
M2L22CL	C05	1AM22205	M2L23CL	C05	1AM22305
F2L22CL	C05	1AF22205	F2L23CL	C05	1AF22305
M1L21CL	C06	1AM12106	M1L22CL	C06	1AM12206
F1L21CL	C06	1AF12106	F1L22CL	C06	1AF12206
M2L21CL	C06	1AM22106	M2L22CL	C06	1AM22206
F2L21CL	C06	1AF22106	F2L22CL	C06	1AF22206
M1L20CL	C07	1AM12007	M1L21CL	C07	1AM12107
F1L20CL	C07	1AF12007	F1L21CL	C07	1AF12107
M2L20CL	C07	1AM22007	M2L21CL	C07	1AM22107
F2L20CL	C07	1AF22007	F2L21CL	C07	1AF22107
M1L06CL	C08	1AM10608	M1L01CL	C08	1AM10108
F1L06CL	C08	1AF10608	F1L01CL	C08	1AF10108
M2L06CL	C08	1AM20608	M2L01CL	C08	1AM20108
F2L06CL	C08	1AF20608	F2L01CL	C08	1AF20108
M1L12CL	C09	1AM11209	M1L07CL	C09	1AM10709
F1L12CL	C09	1AF11209	F1L07CL	C09	1AF10709
M2L12CL	C09	1AM21209	M2L07CL	C09	1AM20709
F2L12CL	C09	1AF21209	F2L07CL	C09	1AF20709
M1L17CL	C10	1AM11710	M1L18CL	C10	1AM11810
F1L17CL	C10	1AF11710	F1L18CL	C10	1AF11810
M2L17CL	C10	1AM21710	M2L18CL	C10	1AM21810
F2L17CL	C10	1AF21710	F2L18CL	C10	1AF21810
M1L16CL	C11	1AM11611	M1L17CL	C11	1AM11711
F1L16CL	C11	1AF11611	F1L17CL	C11	1AF11711
M2L16CL	C11	1AM21611	M2L17CL	C11	1AM21711

F2L16CL	C11	1AF21611	F2L17CL	C11	1AF21711
M1L15CL	C12	1AM11512	M1L16CL	C12	1AM11612
F1L15CL	C12	1AF11512	F1L16CL	C12	1AF11612
M2L15CL	C12	1AM21512	M2L16CL	C12	1AM21612
F2L15CL	C12	1AF21512	F2L16CL	C12	1AF21612
M1L05CL	C13	1AM10513	M1L06CL	C13	1AM10613
F1L05CL	C13	1AF10513	F1L06CL	C13	1AF10613
M2L05CL	C13	1AM20513	M2L06CL	C13	1AM20613
F2L05CL	C13	1AF20513	F2L06CL	C13	1AF20613
M1L04CL	C14	1AM10414	M1L05CL	C14	1AM10514
F1L04CL	C14	1AF10414	F1L05CL	C14	1AF10514
M2L04CL	C14	1AM20414	M2L05CL	C14	1AM20514
F2L04CL	C14	1AF20414	F2L05CL	C14	1AF20514
M1L03CL	C15	1AM10315	M1L04CL	C15	1AM10415
F1L03CL	C15	1AF10315	F1L04CL	C15	1AF10415
M2L03CL	C15	1AM20315	M2L04CL	C15	1AM20415
F2L03CL	C15	1AF20315	F2L04CL	C15	1AF20415
M1L09CL	C16	1AM10916	M1L10CL	C16	1AM11016
F1L09CL	C16	1AF10916	F1L10CL	C16	1AF11016
M2L09CL	C16	1AM20916	M2L10CL	C16	1AM21016
F2L09CL	C16	1AF20916	F2L10CL	C16	1AF21016
M1L08CL	C17	1AM10817	M1L09CL	C17	1AM10917
F1L08CL	C17	1AF10817	F1L09CL	C17	1AF10917
M2L08CL	C17	1AM20817	M2L09CL	C17	1AM20917
F2L08CL	C17	1AF20817	F2L09CL	C17	1AF20917
M1L13CL	C18	1AM11318	M1L14CL	C18	1AM11418
F1L13CL	C18	1AF11318	F1L14CL	C18	1AF11418
M2L13CL	C18	1AM21318	M2L14CL	C18	1AM21418
F2L13CL	C18	1AF21318	F2L14CL	C18	1AF21418
M1L18CL	C19	1AM11819	M1L13CL	C19	1AM11319
F1L18CL	C19	1AF11819	F1L13CL	C19	1AF11319
M2L18CL	C19	1AM21819	M2L13CL	C19	1AM21319
F2L18CL	C19	1AF21819	F2L13CL	C19	1AF21319
M1L02CL	C20	1AM10220	M1L03CL	C20	1AM10320
F1L02CL	C20	1AF10220	F1L03CL	C20	1AF10320
M2L02CL	C20	1AM20220	M2L03CL	C20	1AM20320
F2L02CL	C20	1AF20220	F2L03CL	C20	1AF20320
M1L07CL	C21	1AM10721	M1L08CL	C21	1AM10821
F1L07CL	C21	1AF10721	F1L08CL	C21	1AF10821
M2L07CL	C21	1AM20721	M2L08CL	C21	1AM20821
F2L07CL	C21	1AF20721	F2L08CL	C21	1AF20821
M1L14CL	C22	1AM11422	M1L15CL	C22	1AM11522
F1L14CL	C22	1AF11422	F1L15CL	C22	1AF11522
M2L14CL	C22	1AM21422	M2L15CL	C22	1AM21522
F2L14CL	C22	1AF21422	F2L15CL	C22	1AF21522
M1L11CL	C23	1AM11123	M1L12CL	C23	1AM11223
F1L11CL	C23	1AF11123	F1L12CL	C23	1AF11223
M2L11CL	C23	1AM21123	M2L12CL	C23	1AM21223
F2L11CL	C23	1AF21123	F2L12CL	C23	1AF21223
M1L10CL	C24	1AM11024	M1L11CL	C24	1AM11124
F1L10CL	C24	1AF11024	F1L11CL	C24	1AF11124
M2L10CL	C24	1AM21024	M2L11CL	C24	1AM21124
F2L10CL	C24	1AF21024	F2L11CL	C24	1AF21124

x = 3			x = 4		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L03CL	C01	1AM10301	M1L04CL	C01	1AM10401
F1L03CL	C01	1AF10301	F1L04CL	C01	1AF10401
M2L03CL	C01	1AM20301	M2L04CL	C01	1AM20401
F2L03CL	C01	1AF20301	F2L04CL	C01	1AF20401
M1L21CL	C02	1AM12102	M1L22CL	C02	1AM12202
F1L21CL	C02	1AF12102	F1L22CL	C02	1AF12202
M2L21CL	C02	1AM22102	M2L22CL	C02	1AM22202
F2L21CL	C02	1AF22102	F2L22CL	C02	1AF22202
M1L20CL	C03	1AM12003	M1L21CL	C03	1AM12103
F1L20CL	C03	1AF12003	F1L21CL	C03	1AF12103
M2L20CL	C03	1AM22003	M2L21CL	C03	1AM22103
F2L20CL	C03	1AF22003	F2L21CL	C03	1AF22103
M1L19CL	C04	1AM11904	M1L20CL	C04	1AM12004
F1L19CL	C04	1AF11904	F1L20CL	C04	1AF12004
M2L19CL	C04	1AM21904	M2L20CL	C04	1AM22004
F2L19CL	C04	1AF21904	F2L20CL	C04	1AF22004
M1L24CL	C05	1AM12405	M1L19CL	C05	1AM11905
F1L24CL	C05	1AF12405	F1L19CL	C05	1AF11905
M2L24CL	C05	1AM22405	M2L19CL	C05	1AM21905
F2L24CL	C05	1AF22405	F2L19CL	C05	1AF21905
M1L23CL	C06	1AM12306	M1L24CL	C06	1AM12406
F1L23CL	C06	1AF12306	F1L24CL	C06	1AF12406
M2L23CL	C06	1AM22306	M2L24CL	C06	1AM22406
F2L23CL	C06	1AF22306	F2L24CL	C06	1AF22406
M1L22CL	C07	1AM12207	M1L23CL	C07	1AM12307
F1L22CL	C07	1AF12207	F1L23CL	C07	1AF12307
M2L22CL	C07	1AM22207	M2L23CL	C07	1AM22307
F2L22CL	C07	1AF22207	F2L23CL	C07	1AF22307
M1L02CL	C08	1AM10208	M1L03CL	C08	1AM10308
F1L02CL	C08	1AF10208	F1L03CL	C08	1AF10308
M2L02CL	C08	1AM20208	M2L03CL	C08	1AM20308
F2L02CL	C08	1AF20208	F2L03CL	C08	1AF20308
M1L08CL	C09	1AM10809	M1L09CL	C09	1AM10909
F1L08CL	C09	1AF10809	F1L09CL	C09	1AF10909
M2L08CL	C09	1AM20809	M2L09CL	C09	1AM20909
F2L08CL	C09	1AF20809	F2L09CL	C09	1AF20909
M1L13CL	C10	1AM11310	M1L14CL	C10	1AM11410
F1L13CL	C10	1AF11310	F1L14CL	C10	1AF11410
M2L13CL	C10	1AM21310	M2L14CL	C10	1AM21410
F2L13CL	C10	1AF21310	F2L14CL	C10	1AF21410
M1L18CL	C11	1AM11811	M1L13CL	C11	1AM11311
F1L18CL	C11	1AF11811	F1L13CL	C11	1AF11311
M2L18CL	C11	1AM21811	M2L13CL	C11	1AM21311
F2L18CL	C11	1AF21811	F2L13CL	C11	1AF21311
M1L17CL	C12	1AM11712	M1L18CL	C12	1AM11812
F1L17CL	C12	1AF11712	F1L18CL	C12	1AF11812
M2L17CL	C12	1AM21712	M2L18CL	C12	1AM21812
F2L17CL	C12	1AF21712	F2L18CL	C12	1AF21812
M1L01CL	C13	1AM10113	M1L02CL	C13	1AM10213
F1L01CL	C13	1AF10113	F1L02CL	C13	1AF10213
M2L01CL	C13	1AM20113	M2L02CL	C13	1AM20213
F2L01CL	C13	1AF20113	F2L02CL	C13	1AF20213
M1L06CL	C14	1AM10614	M1L01CL	C14	1AM10114

F1L06CL	C14	1AF10614	F1L01CL	C14	1AF10114
M2L06CL	C14	1AM20614	M2L01CL	C14	1AM20114
F2L06CL	C14	1AF20614	F2L01CL	C14	1AF20114
M1L05CL	C15	1AM10515	M1L06CL	C15	1AM10615
F1L05CL	C15	1AF10515	F1L06CL	C15	1AF10615
M2L05CL	C15	1AM20515	M2L06CL	C15	1AM20615
F2L05CL	C15	1AF20515	F2L06CL	C15	1AF20615
M1L11CL	C16	1AM11116	M1L12CL	C16	1AM11216
F1L11CL	C16	1AF11116	F1L12CL	C16	1AF11216
M2L11CL	C16	1AM21116	M2L12CL	C16	1AM21216
F2L11CL	C16	1AF21116	F2L12CL	C16	1AF21216
M1L10CL	C17	1AM11017	M1L11CL	C17	1AM11117
F1L10CL	C17	1AF11017	F1L11CL	C17	1AF11117
M2L10CL	C17	1AM21017	M2L11CL	C17	1AM21117
F2L10CL	C17	1AF21017	F2L11CL	C17	1AF21117
M1L15CL	C18	1AM11518	M1L16CL	C18	1AM11618
F1L15CL	C18	1AF11518	F1L16CL	C18	1AF11618
M2L15CL	C18	1AM21518	M2L16CL	C18	1AM21618
F2L15CL	C18	1AF21518	F2L16CL	C18	1AF21618
M1L14CL	C19	1AM11419	M1L15CL	C19	1AM11519
F1L14CL	C19	1AF11419	F1L15CL	C19	1AF11519
M2L14CL	C19	1AM21419	M2L15CL	C19	1AM21519
F2L14CL	C19	1AF21419	F2L15CL	C19	1AF21519
M1L04CL	C20	1AM10420	M1L05CL	C20	1AM10520
F1L04CL	C20	1AF10420	F1L05CL	C20	1AF10520
M2L04CL	C20	1AM20420	M2L05CL	C20	1AM20520
F2L04CL	C20	1AF20420	F2L05CL	C20	1AF20520
M1L09CL	C21	1AM10921	M1L10CL	C21	1AM11021
F1L09CL	C21	1AF10921	F1L10CL	C21	1AF11021
M2L09CL	C21	1AM20921	M2L10CL	C21	1AM21021
F2L09CL	C21	1AF20921	F2L10CL	C21	1AF21021
M1L16CL	C22	1AM11622	M1L17CL	C22	1AM11722
F1L16CL	C22	1AF11622	F1L17CL	C22	1AF11722
M2L16CL	C22	1AM21622	M2L17CL	C22	1AM21722
F2L16CL	C22	1AF21622	F2L17CL	C22	1AF21722
M1L07CL	C23	1AM10723	M1L08CL	C23	1AM10823
F1L07CL	C23	1AF10723	F1L08CL	C23	1AF10823
M2L07CL	C23	1AM20723	M2L08CL	C23	1AM20823
F2L07CL	C23	1AF20723	F2L08CL	C23	1AF20823
M1L12CL	C24	1AM11224	M1L07CL	C24	1AM10724
F1L12CL	C24	1AF11224	F1L07CL	C24	1AF10724
M2L12CL	C24	1AM21224	M2L07CL	C24	1AM20724
F2L12CL	C24	1AF21224	F2L07CL	C24	1AF20724

x = 5			x = 6		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L05CL	C01	1AM10501	M1L06CL	C01	1AM10601
F1L05CL	C01	1AF10501	F1L06CL	C01	1AF10601
M2L05CL	C01	1AM20501	M2L06CL	C01	1AM20601
F2L05CL	C01	1AF20501	F2L06CL	C01	1AF20601
M1L23CL	C02	1AM12302	M1L24CL	C02	1AM12402
F1L23CL	C02	1AF12302	F1L24CL	C02	1AF12402
M2L23CL	C02	1AM22302	M2L24CL	C02	1AM22402
F2L23CL	C02	1AF22302	F2L24CL	C02	1AF22402
M1L22CL	C03	1AM12203	M1L23CL	C03	1AM12303
F1L22CL	C03	1AF12203	F1L23CL	C03	1AF12303
M2L22CL	C03	1AM22203	M2L23CL	C03	1AM22303
F2L22CL	C03	1AF22203	F2L23CL	C03	1AF22303
M1L21CL	C04	1AM12104	M1L22CL	C04	1AM12204
F1L21CL	C04	1AF12104	F1L22CL	C04	1AF12204
M2L21CL	C04	1AM22104	M2L22CL	C04	1AM22204
F2L21CL	C04	1AF22104	F2L22CL	C04	1AF22204
M1L20CL	C05	1AM12005	M1L21CL	C05	1AM12105
F1L20CL	C05	1AF12005	F1L21CL	C05	1AF12105
M2L20CL	C05	1AM22005	M2L21CL	C05	1AM22105
F2L20CL	C05	1AF22005	F2L21CL	C05	1AF22105
M1L19CL	C06	1AM11906	M1L20CL	C06	1AM12006
F1L19CL	C06	1AF11906	F1L20CL	C06	1AF12006
M2L19CL	C06	1AM21906	M2L20CL	C06	1AM22006
F2L19CL	C06	1AF21906	F2L20CL	C06	1AF22006
M1L24CL	C07	1AM12407	M1L19CL	C07	1AM11907
F1L24CL	C07	1AF12407	F1L19CL	C07	1AF11907
M2L24CL	C07	1AM22407	M2L19CL	C07	1AM21907
F2L24CL	C07	1AF22407	F2L19CL	C07	1AF21907
M1L04CL	C08	1AM10408	M1L05CL	C08	1AM10508
F1L04CL	C08	1AF10408	F1L05CL	C08	1AF10508
M2L04CL	C08	1AM20408	M2L05CL	C08	1AM20508
F2L04CL	C08	1AF20408	F2L05CL	C08	1AF20508
M1L10CL	C09	1AM11009	M1L11CL	C09	1AM11109
F1L10CL	C09	1AF11009	F1L11CL	C09	1AF11109
M2L10CL	C09	1AM21009	M2L11CL	C09	1AM21109
F2L10CL	C09	1AF21009	F2L11CL	C09	1AF21109
M1L15CL	C10	1AM11510	M1L16CL	C10	1AM11610
F1L15CL	C10	1AF11510	F1L16CL	C10	1AF11610
M2L15CL	C10	1AM21510	M2L16CL	C10	1AM21610
F2L15CL	C10	1AF21510	F2L16CL	C10	1AF21610
M1L14CL	C11	1AM11411	M1L15CL	C11	1AM11511
F1L14CL	C11	1AF11411	F1L15CL	C11	1AF11511
M2L14CL	C11	1AM21411	M2L15CL	C11	1AM21511
F2L14CL	C11	1AF21411	F2L15CL	C11	1AF21511
M1L13CL	C12	1AM11312	M1L14CL	C12	1AM11412
F1L13CL	C12	1AF11312	F1L14CL	C12	1AF11412
M2L13CL	C12	1AM21312	M2L14CL	C12	1AM21412
F2L13CL	C12	1AF21312	F2L14CL	C12	1AF21412
M1L03CL	C13	1AM10313	M1L04CL	C13	1AM10413
F1L03CL	C13	1AF10313	F1L04CL	C13	1AF10413
M2L03CL	C13	1AM20313	M2L04CL	C13	1AM20413
F2L03CL	C13	1AF20313	F2L04CL	C13	1AF20413
M1L02CL	C14	1AM10214	M1L03CL	C14	1AM10314

F1L02CL	C14	1AF10214	F1L03CL	C14	1AF10314
M2L02CL	C14	1AM20214	M2L03CL	C14	1AM20314
F2L02CL	C14	1AF20214	F2L03CL	C14	1AF20314
M1L01CL	C15	1AM10115	M1L02CL	C15	1AM10215
F1L01CL	C15	1AF10115	F1L02CL	C15	1AF10215
M2L01CL	C15	1AM20115	M2L02CL	C15	1AM20215
F2L01CL	C15	1AF20115	F2L02CL	C15	1AF20215
M1L07CL	C16	1AM10716	M1L08CL	C16	1AM10816
F1L07CL	C16	1AF10716	F1L08CL	C16	1AF10816
M2L07CL	C16	1AM20716	M2L08CL	C16	1AM20816
F2L07CL	C16	1AF20716	F2L08CL	C16	1AF20816
M1L12CL	C17	1AM11217	M1L07CL	C17	1AM10717
F1L12CL	C17	1AF11217	F1L07CL	C17	1AF10717
M2L12CL	C17	1AM21217	M2L07CL	C17	1AM20717
F2L12CL	C17	1AF21217	F2L07CL	C17	1AF20717
M1L17CL	C18	1AM11718	M1L18CL	C18	1AM11818
F1L17CL	C18	1AF11718	F1L18CL	C18	1AF11818
M2L17CL	C18	1AM21718	M2L18CL	C18	1AM21818
F2L17CL	C18	1AF21718	F2L18CL	C18	1AF21818
M1L16CL	C19	1AM11619	M1L17CL	C19	1AM11719
F1L16CL	C19	1AF11619	F1L17CL	C19	1AF11719
M2L16CL	C19	1AM21619	M2L17CL	C19	1AM21719
F2L16CL	C19	1AF21619	F2L17CL	C19	1AF21719
M1L06CL	C20	1AM10620	M1L01CL	C20	1AM10120
F1L06CL	C20	1AF10620	F1L01CL	C20	1AF10120
M2L06CL	C20	1AM20620	M2L01CL	C20	1AM20120
F2L06CL	C20	1AF20620	F2L01CL	C20	1AF20120
M1L11CL	C21	1AM11121	M1L12CL	C21	1AM11221
F1L11CL	C21	1AF11121	F1L12CL	C21	1AF11221
M2L11CL	C21	1AM21121	M2L12CL	C21	1AM21221
F2L11CL	C21	1AF21121	F2L12CL	C21	1AF21221
M1L18CL	C22	1AM11822	M1L13CL	C22	1AM11322
F1L18CL	C22	1AF11822	F1L13CL	C22	1AF11322
M2L18CL	C22	1AM21822	M2L13CL	C22	1AM21322
F2L18CL	C22	1AF21822	F2L13CL	C22	1AF21322
M1L09CL	C23	1AM10923	M1L10CL	C23	1AM11023
F1L09CL	C23	1AF10923	F1L10CL	C23	1AF11023
M2L09CL	C23	1AM20923	M2L10CL	C23	1AM21023
F2L09CL	C23	1AF20923	F2L10CL	C23	1AF21023
M1L08CL	C24	1AM10824	M1L09CL	C24	1AM10924
F1L08CL	C24	1AF10824	F1L09CL	C24	1AF10924
M2L08CL	C24	1AM20824	M2L09CL	C24	1AM20924
F2L08CL	C24	1AF20824	F2L09CL	C24	1AF20924

E.2 Processing Tables for Experiment 1b

x = 1			x = 2		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L13CL	C01	1BM11301	M1L14CL	C01	1BM11401
F1L13CL	C01	1BF11301	F1L14CL	C01	1BF11401
M2L13CL	C01	1BM21301	M2L14CL	C01	1BM21401
F2L13CL	C01	1BF21301	F2L14CL	C01	1BF21401
M1L07CL	C02	1BM10702	M1L08CL	C02	1BM10802
F1L07CL	C02	1BF10702	F1L08CL	C02	1BF10802
M2L07CL	C02	1BM20702	M2L08CL	C02	1BM20802
F2L07CL	C02	1BF20702	F2L08CL	C02	1BF20802
M1L12CL	C03	1BM11203	M1L07CL	C03	1BM10703
F1L12CL	C03	1BF11203	F1L07CL	C03	1BF10703
M2L12CL	C03	1BM21203	M2L07CL	C03	1BM20703
F2L12CL	C03	1BF21203	F2L07CL	C03	1BF20703
M1L11CL	C04	1BM11104	M1L12CL	C04	1BM11204
F1L11CL	C04	1BF11104	F1L12CL	C04	1BF11204
M2L11CL	C04	1BM21104	M2L12CL	C04	1BM21204
F2L11CL	C04	1BF21104	F2L12CL	C04	1BF21204
M1L19CL	C05	1BM11905	M1L20CL	C05	1BM12005
F1L19CL	C05	1BF11905	F1L20CL	C05	1BF12005
M2L19CL	C05	1BM21905	M2L20CL	C05	1BM22005
F2L19CL	C05	1BF21905	F2L20CL	C05	1BF22005
M1L24CL	C06	1BM12406	M1L19CL	C06	1BM11906
F1L24CL	C06	1BF12406	F1L19CL	C06	1BF11906
M2L24CL	C06	1BM22406	M2L19CL	C06	1BM21906
F2L24CL	C06	1BF22406	F2L19CL	C06	1BF21906
M1L23CL	C07	1BM12307	M1L24CL	C07	1BM12407
F1L23CL	C07	1BF12307	F1L24CL	C07	1BF12407
M2L23CL	C07	1BM22307	M2L24CL	C07	1BM22407
F2L23CL	C07	1BF22307	F2L24CL	C07	1BF22407
M1L18CL	C08	1BM11808	M1L13CL	C08	1BM11308
F1L18CL	C08	1BF11808	F1L13CL	C08	1BF11308
M2L18CL	C08	1BM21808	M2L13CL	C08	1BM21308
F2L18CL	C08	1BF21808	F2L13CL	C08	1BF21308
M1L17CL	C09	1BM11709	M1L18CL	C09	1BM11809
F1L17CL	C09	1BF11709	F1L18CL	C09	1BF11809
M2L17CL	C09	1BM21709	M2L18CL	C09	1BM21809
F2L17CL	C09	1BF21709	F2L18CL	C09	1BF21809
M1L01CL	C10	1BM10110	M1L02CL	C10	1BM10210
F1L01CL	C10	1BF10110	F1L02CL	C10	1BF10210
M2L01CL	C10	1BM20110	M2L02CL	C10	1BM20210
F2L01CL	C10	1BF20110	F2L02CL	C10	1BF20210
M1L06CL	C11	1BM10611	M1L01CL	C11	1BM10111
F1L06CL	C11	1BF10611	F1L01CL	C11	1BF10111
M2L06CL	C11	1BM20611	M2L01CL	C11	1BM20111
F2L06CL	C11	1BF20611	F2L01CL	C11	1BF20111
M1L05CL	C12	1BM10512	M1L06CL	C12	1BM10612
F1L05CL	C12	1BF10512	F1L06CL	C12	1BF10612
M2L05CL	C12	1BM20512	M2L06CL	C12	1BM20612
F2L05CL	C12	1BF20512	F2L06CL	C12	1BF20612

x = 3			x = 4		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L15CL	C01	1BM11501	M1L16CL	C01	1BM11601
F1L15CL	C01	1BF11501	F1L16CL	C01	1BF11601
M2L15CL	C01	1BM21501	M2L16CL	C01	1BM21601
F2L15CL	C01	1BF21501	F2L16CL	C01	1BF21601
M1L09CL	C02	1BM10902	M1L10CL	C02	1BM11002
F1L09CL	C02	1BF10902	F1L10CL	C02	1BF11002
M2L09CL	C02	1BM20902	M2L10CL	C02	1BM21002
F2L09CL	C02	1BF20902	F2L10CL	C02	1BF21002
M1L08CL	C03	1BM10803	M1L09CL	C03	1BM10903
F1L08CL	C03	1BF10803	F1L09CL	C03	1BF10903
M2L08CL	C03	1BM20803	M2L09CL	C03	1BM20903
F2L08CL	C03	1BF20803	F2L09CL	C03	1BF20903
M1L07CL	C04	1BM10704	M1L08CL	C04	1BM10804
F1L07CL	C04	1BF10704	F1L08CL	C04	1BF10804
M2L07CL	C04	1BM20704	M2L08CL	C04	1BM20804
F2L07CL	C04	1BF20704	F2L08CL	C04	1BF20804
M1L21CL	C05	1BM12105	M1L22CL	C05	1BM12205
F1L21CL	C05	1BF12105	F1L22CL	C05	1BF12205
M2L21CL	C05	1BM22105	M2L22CL	C05	1BM22205
F2L21CL	C05	1BF22105	F2L22CL	C05	1BF22205
M1L20CL	C06	1BM12006	M1L21CL	C06	1BM12106
F1L20CL	C06	1BF12006	F1L21CL	C06	1BF12106
M2L20CL	C06	1BM22006	M2L21CL	C06	1BM22106
F2L20CL	C06	1BF22006	F2L21CL	C06	1BF22106
M1L19CL	C07	1BM11907	M1L20CL	C07	1BM12007
F1L19CL	C07	1BF11907	F1L20CL	C07	1BF12007
M2L19CL	C07	1BM21907	M2L20CL	C07	1BM22007
F2L19CL	C07	1BF21907	F2L20CL	C07	1BF22007
M1L14CL	C08	1BM11408	M1L15CL	C08	1BM11508
F1L14CL	C08	1BF11408	F1L15CL	C08	1BF11508
M2L14CL	C08	1BM21408	M2L15CL	C08	1BM21508
F2L14CL	C08	1BF21408	F2L15CL	C08	1BF21508
M1L13CL	C09	1BM11309	M1L14CL	C09	1BM11409
F1L13CL	C09	1BF11309	F1L14CL	C09	1BF11409
M2L13CL	C09	1BM21309	M2L14CL	C09	1BM21409
F2L13CL	C09	1BF21309	F2L14CL	C09	1BF21409
M1L03CL	C10	1BM10310	M1L04CL	C10	1BM10410
F1L03CL	C10	1BF10310	F1L04CL	C10	1BF10410
M2L03CL	C10	1BM20310	M2L04CL	C10	1BM20410
F2L03CL	C10	1BF20310	F2L04CL	C10	1BF20410
M1L02CL	C11	1BM10211	M1L03CL	C11	1BM10311
F1L02CL	C11	1BF10211	F1L03CL	C11	1BF10311
M2L02CL	C11	1BM20211	M2L03CL	C11	1BM20311
F2L02CL	C11	1BF20211	F2L03CL	C11	1BF20311
M1L01CL	C12	1BM10112	M1L02CL	C12	1BM10212
F1L01CL	C12	1BF10112	F1L02CL	C12	1BF10212
M2L01CL	C12	1BM20112	M2L02CL	C12	1BM20212
F2L01CL	C12	1BF20112	F2L02CL	C12	1BF20212

x = 5			x = 6		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L17CL	C01	1BM11701	M1L18CL	C01	1BM11801
F1L17CL	C01	1BF11701	F1L18CL	C01	1BF11801
M2L17CL	C01	1BM21701	M2L18CL	C01	1BM21801
F2L17CL	C01	1BF21701	F2L18CL	C01	1BF21801
M1L11CL	C02	1BM11102	M1L12CL	C02	1BM11202
F1L11CL	C02	1BF11102	F1L12CL	C02	1BF11202
M2L11CL	C02	1BM21102	M2L12CL	C02	1BM21202
F2L11CL	C02	1BF21102	F2L12CL	C02	1BF21202
M1L10CL	C03	1BM11003	M1L11CL	C03	1BM11103
F1L10CL	C03	1BF11003	F1L11CL	C03	1BF11103
M2L10CL	C03	1BM21003	M2L11CL	C03	1BM21103
F2L10CL	C03	1BF21003	F2L11CL	C03	1BF21103
M1L09CL	C04	1BM10904	M1L10CL	C04	1BM11004
F1L09CL	C04	1BF10904	F1L10CL	C04	1BF11004
M2L09CL	C04	1BM20904	M2L10CL	C04	1BM21004
F2L09CL	C04	1BF20904	F2L10CL	C04	1BF21004
M1L23CL	C05	1BM12305	M1L24CL	C05	1BM12405
F1L23CL	C05	1BF12305	F1L24CL	C05	1BF12405
M2L23CL	C05	1BM22305	M2L24CL	C05	1BM22405
F2L23CL	C05	1BF22305	F2L24CL	C05	1BF22405
M1L22CL	C06	1BM12206	M1L23CL	C06	1BM12306
F1L22CL	C06	1BF12206	F1L23CL	C06	1BF12306
M2L22CL	C06	1BM22206	M2L23CL	C06	1BM22306
F2L22CL	C06	1BF22206	F2L23CL	C06	1BF22306
M1L21CL	C07	1BM12107	M1L22CL	C07	1BM12207
F1L21CL	C07	1BF12107	F1L22CL	C07	1BF12207
M2L21CL	C07	1BM22107	M2L22CL	C07	1BM22207
F2L21CL	C07	1BF22107	F2L22CL	C07	1BF22207
M1L16CL	C08	1BM11608	M1L17CL	C08	1BM11708
F1L16CL	C08	1BF11608	F1L17CL	C08	1BF11708
M2L16CL	C08	1BM21608	M2L17CL	C08	1BM21708
F2L16CL	C08	1BF21608	F2L17CL	C08	1BF21708
M1L15CL	C09	1BM11509	M1L16CL	C09	1BM11609
F1L15CL	C09	1BF11509	F1L16CL	C09	1BF11609
M2L15CL	C09	1BM21509	M2L16CL	C09	1BM21609
F2L15CL	C09	1BF21509	F2L16CL	C09	1BF21609
M1L05CL	C10	1BM10510	M1L06CL	C10	1BM10610
F1L05CL	C10	1BF10510	F1L06CL	C10	1BF10610
M2L05CL	C10	1BM20510	M2L06CL	C10	1BM20610
F2L05CL	C10	1BF20510	F2L06CL	C10	1BF20610
M1L04CL	C11	1BM10411	M1L05CL	C11	1BM10511
F1L04CL	C11	1BF10411	F1L05CL	C11	1BF10511
M2L04CL	C11	1BM20411	M2L05CL	C11	1BM20511
F2L04CL	C11	1BF20411	F2L05CL	C11	1BF20511
M1L03CL	C12	1BM10312	M1L04CL	C12	1BM10412
F1L03CL	C12	1BF10312	F1L04CL	C12	1BF10412
M2L03CL	C12	1BM20312	M2L04CL	C12	1BM20412
F2L03CL	C12	1BF20312	F2L04CL	C12	1BF20412

E.3 Processing Tables for Experiment 2a &2b

Test = 2A			test = 2B		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L01CA	C01	2AM10101	M1L01ST	C01	2BM10101
F1L01CA	C01	2AF10101	F1L01ST	C01	2BF10101
M2L01CA	C01	2AM20101	M2L01ST	C01	2BM20101
F2L01CA	C01	2AF20101	F2L01ST	C01	2BF20101
M1L04CA	C02	2AM10402	M1L04ST	C02	2BM10402
F1L04CA	C02	2AF10402	F1L04ST	C02	2BF10402
M2L04CA	C02	2AM20402	M2L04ST	C02	2BM20402
F2L04CA	C02	2AF20402	F2L04ST	C02	2BF20402
M1L03CA	C03	2AM10303	M1L03ST	C03	2BM10303
F1L03CA	C03	2AF10303	F1L03ST	C03	2BF10303
M2L03CA	C03	2AM20303	M2L03ST	C03	2BM20303
F2L03CA	C03	2AF20303	F2L03ST	C03	2BF20303
M1L04CA	C04	2AM10404	M1L04ST	C04	2BM10404
F1L04CA	C04	2AF10404	F1L04ST	C04	2BF10404
M2L04CA	C04	2AM20404	M2L04ST	C04	2BM20404
F2L04CA	C04	2AF20404	F2L04ST	C04	2BF20404
M1L01CA	C05	2AM10105	M1L01ST	C05	2BM10105
F1L01CA	C05	2AF10105	F1L01ST	C05	2BF10105
M2L01CA	C05	2AM20105	M2L01ST	C05	2BM20105
F2L01CA	C05	2AF20105	F2L01ST	C05	2BF20105
M1L03CA	C06	2AM10306	M1L03ST	C06	2BM10306
F1L03CA	C06	2AF10306	F1L03ST	C06	2BF10306
M2L03CA	C06	2AM20306	M2L03ST	C06	2BM20306
F2L03CA	C06	2AF20306	F2L03ST	C06	2BF20306
M1L03CA	C07	2AM10307	M1L03ST	C07	2BM10307
F1L03CA	C07	2AF10307	F1L03ST	C07	2BF10307
M2L03CA	C07	2AM20307	M2L03ST	C07	2BM20307
F2L03CA	C07	2AF20307	F2L03ST	C07	2BF20307
M1L04CA	C08	2AM10408	M1L04ST	C08	2BM10408
F1L04CA	C08	2AF10408	F1L04ST	C08	2BF10408
M2L04CA	C08	2AM20408	M2L04ST	C08	2BM20408
F2L04CA	C08	2AF20408	F2L04ST	C08	2BF20408
M1L01CA	C09	2AM10109	M1L01ST	C09	2BM10109
F1L01CA	C09	2AF10109	F1L01ST	C09	2BF10109
M2L01CA	C09	2AM20109	M2L01ST	C09	2BM20109
F2L01CA	C09	2AF20109	F2L01ST	C09	2BF20109
M1L02CA	C10	2AM10210	M1L02ST	C10	2BM10210
F1L02CA	C10	2AF10210	F1L02ST	C10	2BF10210
M2L02CA	C10	2AM20210	M2L02ST	C10	2BM20210
F2L02CA	C10	2AF20210	F2L02ST	C10	2BF20210
M1L02CA	C11	2AM10211	M1L02ST	C11	2BM10211
F1L02CA	C11	2AF10211	F1L02ST	C11	2BF10211
M2L02CA	C11	2AM20211	M2L02ST	C11	2BM20211
F2L02CA	C11	2AF20211	F2L02ST	C11	2BF20211
M1L02CA	C12	2AM10212	M1L02ST	C12	2BM10212
F1L02CA	C12	2AF10212	F1L02ST	C12	2BF10212
M2L02CA	C12	2AM20212	M2L02ST	C12	2BM20212
F2L02CA	C12	2AF20212	F2L02ST	C12	2BF20212
M1L03CA	C13	2AM10313	M1L03ST	C13	2BM10313
F1L03CA	C13	2AF10313	F1L03ST	C13	2BF10313
M2L03CA	C13	2AM20313	M2L03ST	C13	2BM20313
F2L03CA	C13	2AF20313	F2L03ST	C13	2BF20313
M1L04CA	C14	2AM10414	M1L04ST	C14	2BM10414
F1L04CA	C14	2AF10414	F1L04ST	C14	2BF10414

M2L04CA	C14	2AM20414	M2L04ST	C14	2BM20414
F2L04CA	C14	2AF20414	F2L04ST	C14	2BF20414
M1L03CA	C15	2AM10315	M1L03ST	C15	2BM10315
F1L03CA	C15	2AF10315	F1L03ST	C15	2BF10315
M2L03CA	C15	2AM20315	M2L03ST	C15	2BM20315
F2L03CA	C15	2AF20315	F2L03ST	C15	2BF20315
M1L01CA	C16	2AM10116	M1L01ST	C16	2BM10116
F1L01CA	C16	2AF10116	F1L01ST	C16	2BF10116
M2L01CA	C16	2AM20116	M2L01ST	C16	2BM20116
F2L01CA	C16	2AF20116	F2L01ST	C16	2BF20116
M1L02CA	C17	2AM10217	M1L02ST	C17	2BM10217
F1L02CA	C17	2AF10217	F1L02ST	C17	2BF10217
M2L02CA	C17	2AM20217	M2L02ST	C17	2BM20217
F2L02CA	C17	2AF20217	F2L02ST	C17	2BF20217
M1L02CA	C18	2AM10218	M1L02ST	C18	2BM10218
F1L02CA	C18	2AF10218	F1L02ST	C18	2BF10218
M2L02CA	C18	2AM20218	M2L02ST	C18	2BM20218
F2L02CA	C18	2AF20218	F2L02ST	C18	2BF20218
M1L02CA	C19	2AM10219	M1L02ST	C19	2BM10219
F1L02CA	C19	2AF10219	F1L02ST	C19	2BF10219
M2L02CA	C19	2AM20219	M2L02ST	C19	2BM20219
F2L02CA	C19	2AF20219	F2L02ST	C19	2BF20219
M1L04CA	C20	2AM10420	M1L04ST	C20	2BM10420
F1L04CA	C20	2AF10420	F1L04ST	C20	2BF10420
M2L04CA	C20	2AM20420	M2L04ST	C20	2BM20420
F2L04CA	C20	2AF20420	F2L04ST	C20	2BF20420
M1L01CA	C21	2AM10121	M1L01ST	C21	2BM10121
F1L01CA	C21	2AF10121	F1L01ST	C21	2BF10121
M2L01CA	C21	2AM20121	M2L01ST	C21	2BM20121
F2L01CA	C21	2AF20121	F2L01ST	C21	2BF20121
M1L02CA	C22	2AM10222	M1L02ST	C22	2BM10222
F1L02CA	C22	2AF10222	F1L02ST	C22	2BF10222
M2L02CA	C22	2AM20222	M2L02ST	C22	2BM20222
F2L02CA	C22	2AF20222	F2L02ST	C22	2BF20222
M1L02CA	C23	2AM10223	M1L02ST	C23	2BM10223
F1L02CA	C23	2AF10223	F1L02ST	C23	2BF10223
M2L02CA	C23	2AM20223	M2L02ST	C23	2BM20223
F2L02CA	C23	2AF20223	F2L02ST	C23	2BF20223
M1L02CA	C24	2AM10224	M1L02ST	C24	2BM10224
F1L02CA	C24	2AF10224	F1L02ST	C24	2BF10224
M2L02CA	C24	2AM20224	M2L02ST	C24	2BM20224
F2L02CA	C24	2AF20224	F2L02ST	C24	2BF20224

E.4 Processing Tables for Experiment 2c & 2d

test = 2C			**Test = 2D**		
Source	**Cond.**	**Output File**	**Source**	**Cond.**	**Output File**
M1L01CA	C01	2CM10101	M1L01ST	C01	2DM10101
F1L01CA	C01	2CF10101	F1L01ST	C01	2DF10101
M2L01CA	C01	2CM20101	M2L01ST	C01	2DM20101
F2L01CA	C01	2CF20101	F2L01ST	C01	2DF20101
M1L02CA	C02	2CM10202	M1L02ST	C02	2DM10202
F1L02CA	C02	2CF10202	F1L02ST	C02	2DF10202
M2L02CA	C02	2CM20202	M2L02ST	C02	2DM20202
F2L02CA	C02	2CF20202	F2L02ST	C02	2DF20202
M1L03CA	C03	2CM10303	M1L03ST	C03	2DM10303

F1L03CA	C03	2CF10303	F1L03ST	C03	2DF10303
M2L03CA	C03	2CM20303	M2L03ST	C03	2DM20303
F2L03CA	C03	2CF20303	F2L03ST	C03	2DF20303
M1L04CA	C04	2CM10404	M1L04ST	C04	2DM10404
F1L04CA	C04	2CF10404	F1L04ST	C04	2DF10404
M2L04CA	C04	2CM20404	M2L04ST	C04	2DM20404
F2L04CA	C04	2CF20404	F2L04ST	C04	2DF20404
M1L01CA	C05	2CM10105	M1L01ST	C05	2DM10105
F1L01CA	C05	2CF10105	F1L01ST	C05	2DF10105
M2L01CA	C05	2CM20105	M2L01ST	C05	2DM20105
F2L01CA	C05	2CF20105	F2L01ST	C05	2DF20105
M1L02CA	C06	2CM10206	M1L02ST	C06	2DM10206
F1L02CA	C06	2CF10206	F1L02ST	C06	2DF10206
M2L02CA	C06	2CM20206	M2L02ST	C06	2DM20206
F2L02CA	C06	2CF20206	F2L02ST	C06	2DF20206
M1L01CA	C07	2CM10107	M1L01ST	C07	2DM10107
F1L01CA	C07	2CF10107	F1L01ST	C07	2DF10107
M2L01CA	C07	2CM20107	M2L01ST	C07	2DM20107
F2L01CA	C07	2CF20107	F2L01ST	C07	2DF20107
M1L04CA	C08	2CM10408	M1L04ST	C08	2DM10408
F1L04CA	C08	2CF10408	F1L04ST	C08	2DF10408
M2L04CA	C08	2CM20408	M2L04ST	C08	2DM20408
F2L04CA	C08	2CF20408	F2L04ST	C08	2DF20408
M1L02CA	C09	2CM10209	M1L02ST	C09	2DM10209
F1L02CA	C09	2CF10209	F1L02ST	C09	2DF10209
M2L02CA	C09	2CM20209	M2L02ST	C09	2DM20209
F2L02CA	C09	2CF20209	F2L02ST	C09	2DF20209
M1L03CA	C10	2CM10310	M1L03ST	C10	2DM10310
F1L03CA	C10	2CF10310	F1L03ST	C10	2DF10310
M2L03CA	C10	2CM20310	M2L03ST	C10	2DM20310
F2L03CA	C10	2CF20310	F2L03ST	C10	2DF20310
M1L04CA	C11	2CM10411	M1L04ST	C11	2DM10411
F1L04CA	C11	2CF10411	F1L04ST	C11	2DF10411
M2L04CA	C11	2CM20411	M2L04ST	C11	2DM20411
F2L04CA	C11	2CF20411	F2L04ST	C11	2DF20411
M1L03CA	C12	2CM10312	M1L03ST	C12	2DM10312
F1L03CA	C12	2CF10312	F1L03ST	C12	2DF10312
M2L03CA	C12	2CM20312	M2L03ST	C12	2DM20312
F2L03CA	C12	2CF20312	F2L03ST	C12	2DF20312

Annex F: Presentation Orders

The tables in this section show (for those experiments where this information is to be provided) the presentation orders for all subjects participating in the experiment. These orders, where provided, must be followed by the Listening Laboratories when performing their experiments. Where no such table is provided in this section for an experiment, the Listening Laboratory must provide its own randomized presentation order according to the details given in the test plan for the experiment, in particular the contents of the sub-section on Randomizations.

F.1 Presentation Orders for Experiment 1a

Listening Laboratory provides its own randomized presentation.

F.2 Presentation Orders for Experiment 1b

Listening Laboratory provides its own randomized presentation.

F.3 Presentation Orders for Experiment 2a & 2b

Listening Laboratory provides its own randomized presentation.

F.4 Presentation Orders for Experiment 2c & 2d

Listening Laboratory provides its own randomized presentation.