



**SLOVENSKI STANDARD**  
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8 [[ [HJb]`W] b]`hY`\_ca i b]\_UW`g\_]`g]ghYa `fZUnU&ZL`E`DfYg\_i yU`bUnUdcfYX`UnU  
d]`U[ cX`1j]j Y \ ]f`cglb]`f5 AFŁ[ c]`cfb]`\_cXY\_`f GA`\$\*`+(`žfUn`] ]WJ+`\$" ž]nXUU  
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Digital cellular telecommunications system (Phase 2+) (GSM); Test sequences for the Adaptive Multi-Rate (AMR) speech codec (GSM 06.74 version 7.0.3 Release 1998)

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**ICS:**

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)
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# ETSI EN 301 713 V7.0.3 (2000-10)

European Standard (Telecommunications series)

**Digital cellular telecommunications system (Phase 2+);  
Test sequences for the Adaptive Multi-Rate (AMR)  
speech codec  
(GSM 06.74 version 7.0.3 Release 1998)**

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

Test sequences in PC (little-endian) byte order for a bit exact implementation of the Adaptive Multi-Rate (AMR) speech transcoder are contained in the archives T.TGZ, S.TGZ, T\_A.TGZ, T\_U.TGZ, S\_A.TGZ and S\_U.TGZ which accompany the present document.

The present document specifies the digital test sequences for the GSM adaptive multi-rate speech codec for the digital cellular telecommunications system.

The contents of the present document is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will be re-released with an identifying change of release date and an increase in version number as follows:

Version 7.x.y

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- 7 indicates Release 1998 of GSM Phase 2+.
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

### National transposition dates

Date of adoption of the present document:	1 September 2000
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Date of withdrawal of any conflicting National Standard (dow):	30 June 2001

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# 1 Scope

The present document specifies the digital test sequences for the GSM adaptive multi-rate (AMR) speech codec. These sequences test for a bit exact implementation of the adaptive multi-rate speech transcoder (GSM 06.90 [4]), Voice Activity Detection (GSM 06.94 [8]), comfort noise (GSM 06.92 [6]), and the discontinuous transmission (GSM 06.93 [7]).

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 06.71: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate (AMR) speech processing functions; General description".
- [3] GSM 06.73: "Digital cellular telecommunications system (Phase 2+); ANSI-C code for the GSM Adaptive Multi-Rate speech codec".
- [4] GSM 06.90: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate speech transcoding".
- [5] GSM 06.91: "Digital cellular telecommunications system (Phase 2+); Substitution and muting of lost frame for Adaptive Multi-Rate speech traffic channels".
- [6] GSM 06.92: "Digital cellular telecommunications system (Phase 2+); Comfort noise aspects for Adaptive Multi-Rate speech traffic channels".
- [7] GSM 06.93: "Digital cellular telecommunications system (Phase 2+); Discontinuous transmission (DTX) for Adaptive Multi-Rate speech traffic channels".
- [8] GSM 06.94: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detection (VAD) for Adaptive Multi-Rate speech traffic channels".

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# 3 Definitions and abbreviations

## 3.1 Definitions

Definition of terms used in the present document can be found in GSM 06.90 [7], GSM 06.91 [8], GSM 06.92 [9], GSM 06.93 [10] and GSM 06.94 [11].

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive Multi-Rate
DTX	Discontinuous Transmission
ETS	European Telecommunication Standard
GSM	Global System for Mobile communications

For abbreviations not given in this subclause, see GSM 01.04 [1].

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## 4 General

Digital test sequences are necessary to test for a bit exact implementation of the adaptive multi-rate speech transcoder (GSM 06.90 [4]), voice activity detection (GSM 06.94 [8]), comfort noise generation (GSM 06.92 [6]) and discontinuous transmission (GSM 06.93 [7]).

The test sequences may also be used to verify installations of the ANSI C code in GSM 06.73 [3].

Clause 5 describes the format of the files which contain the digital test sequences. Clause 6 describes the test sequences for the speech transcoder. Clause 7 describes the test sequences for the VAD, comfort noise and discontinuous transmission.

Clause 8 describes the method by which synchronisation is obtained between the test sequences and the speech codec under test.

Clause 9 describes the alternative acceptance testing of the speech encoder and decoder in the TRAU by means of 8 bit A- or  $\mu$ -law compressed test sequences on the A-Interface.

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## 5 Test sequence format

This clause provides information on the format of the digital test sequences for the GSM adaptive multi-rate speech transcoder (GSM 06.90 [4]), voice activity detection (GSM 06.94 [8]), comfort noise generation (GSM 06.92 [6]) and discontinuous transmission (GSM 06.93 [7]).

### 5.1 File format

The test sequence files in PC (little-endian) byte order are provided in archive files (ZIP format) which accompany the present document.

Following decompression, three types of file are provided:

- Files for input to the speech encoder: \*.INP
- Files for comparison with the encoder output and for input to the speech decoder: \*.COD
- Files for comparison with the decoder output: \*.OUT
- One mode control file for the mode switching test T21.MOD

All file formats are described in GSM 06.73 [3].



## 5.2 Codec homing

Each \*.INP file includes two homing frames (see GSM 06.73 [3]) at the start of the test sequence. The function of these frames is to reset the speech encoder state variables to their initial value. In the case of a correct installation of the ANSI-C simulation (GSM 06.73 [3]), all speech encoder output frames shall be identical to the corresponding frame in the \*.COD file. In the case of a correct hardware implementation undergoing testing, the first speech encoder output frame is undefined and need not be identical to the first frame in the \*.COD file, but all remaining speech encoder output frames shall be identical to the corresponding frames in the \*.COD file.

The function of the two homing frames in the \*.COD files is to reset the speech decoder state variables to their initial value. In the case of a correct installation of the ANSI-C simulation (GSM 06.73 [3]), all speech decoder output frames shall be identical to the corresponding frame in the \*.OUT file. In the case of a correct hardware implementation undergoing testing, the first speech decoder output frame is undefined and need not be identical to first frame in the \*.OUT file, but all remaining speech decoder output frames shall be identical to the corresponding frames in the \*.OUT file.

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## 6 Speech codec test sequences

This clause describes the test sequences designed to exercise the GSM adaptive multi-rate speech transcoder (GSM 06.90 [4]).

### 6.1 Codec configuration

The speech encoder shall be configured to operate in the non-DTX mode.

### 6.2 Speech codec test sequences

#### 6.2.1 Speech encoder test sequences

Twenty-two encoder input sequences are provided. Note that for the input sequences T00.INP to T03.INP, the amplitude figures are given in 13-bit precision. The active speech levels are given in dBov.

- T00.INP - Synthetic harmonic signal. The pitch delay varies slowly from 18 to 143.5 samples. The minimum and maximum amplitudes are -997 and +971.
- T01.INP - Synthetic harmonic signal. The pitch delay varies slowly from 144 down to 18.5 samples. Amplitudes at saturation point -4096 and +4095.
- T02.INP - Sinusoidal sweep varying from 150 Hz to 3400 Hz. Amplitudes  $\pm 1250$ .
- T03.INP - Sinusoidal sweep varying from 150 Hz to 3400 Hz. Amplitudes  $\pm 4000$ .
- T04.INP - Female speech, active speech level: -19.4 dBov, flat frequency response.
- T05.INP - Male speech, active speech level: -18.7 dBov, flat frequency response.
- T06.INP - Female speech, ambient noise, active speech level: -35.0 dBov, flat frequency response.
- T07.INP - Female speech, ambient noise, active speech level: -25.0 dBov, flat frequency response.
- T08.INP - Female speech, ambient noise, active speech level: -15.6 dBov, flat frequency response.
- T09.INP - Female speech, car noise, active speech level: -35.5 dBov, flat frequency response.
- T10.INP - Female speech, car noise, active speech level: -26.1 dBov, flat frequency response.
- T11.INP - Female speech, car noise, active speech level: -15.8 dBov, flat frequency response.
- T12.INP - Male speech, ambient noise, active speech level: -34.9 dBov, flat frequency response.
- T13.INP - Male speech, ambient noise, active speech level: -24.8 dBov, flat frequency response.
- T14.INP - Male speech, ambient noise, active speech level: -15.0 dBov, flat frequency response.