

Fernseh-Systeme

NICAM 728: Übertragung von 2-Kanal-Digitalton mit den
terrestrischen Fernsehsystemen B, G, H, I, K1 und L
Englische Fassung EN 300163 V1.2.1 (1998-03)

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Television systems –

NICAM 728: transmission of two-channel digital sound with terrestrial television
systems B, G, H, I, K1 and L;

English version EN 300163 V1.2.1 (1998-03)

**Die Europäische Telekommunikationsnorm EN 300163:1998 hat den Status einer
Deutschen Norm.**

Nationales Vorwort

Die vorliegende Norm enthält die vom Europäischen Institut für Telekommunikationsnormen (ETSI) heraus-
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Änderungen

Gegenüber DIN ETS 300163:1995-06 wurden folgende Änderungen vorgenommen:

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Frühere Ausgaben

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Foreword

This European Standard (Telecommunications series) has been produced by the Joint Technical Committee (JTC) of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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1 Scope

The present document concerns the technical arrangements for the transmission of digital sound with certain terrestrial television systems, and allows for one stereo channel or up to two mono channels, in each case with a small amount of additional data capacity.

The present document defines the characteristics of the NICAM 728 system which allows for the transmission of two-channel digital sound and/or data services with terrestrial television systems B, G, H, I, K1 and L defined in ITU-R Recommendation BT 470 [1].

NICAM is an acronym for Near-Instantaneously Companded Audio Multiplex; 728 refers to the digital bit-rate of 728 kbit/s. The application of the present document to television systems D and K is under study.

The present document concerns the technical arrangements for the transmission of digital sound with certain terrestrial television systems, and allows for one stereo channel or up to two mono channels, in each case with a small amount of additional data capacity.

- a) It is sufficiently rugged to ensure that reception of the vision fails before reception of the digital sound in difficult reception conditions.
- b) It fulfils the criteria for compatibility with existing services and receivers in over-air transmission and is adequately compatible in distribution on cable systems.
- c) It provides two high-quality digital sound channels and a small amount of additional data capacity. The two sound channels may be used to transmit two independent monophonic signals, which could be received simultaneously, or a single stereophonic signal. Alternatively, one or both sound channels may be used for the transmission of data.
- d) The sound coding is identical with that of one option available in the Multiplexed Analogue Component (MAC)/packet family of systems defined in ETS 300 250 [2].
- e) The baseband coding and digital frame format are identical for all of the television systems considered; the differences in modulation parameters shown in subclause 5.2 are the minimum required to accommodate the existing differences between these television systems.

The present document allows some scope for the addition of further features in a compatible fashion in the future.

2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case 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.

- [1] ITU-R Recommendation BT 470: "Television systems".
- [2] ETS 300 250: "Television systems; Specification of the D2-MAC/Packet system".
- [3] ITU-T Recommendation J.17 (1988): "Pre-emphasis used on sound-programme circuits".

- [4] ITU-T Recommendation 645: "Test signals and metering to be used on international sound programme connections". 1994 BS Series Volume (Green Book), pp 208-212.
- [5] ITU-T Recommendation 574: "Use of the decibel and neper in telecommunications". 1994 V Series Volume (Green Book), pp 99-109.
- [6] ITU-T Recommendation J.31: "Characteristics of equipment and lines used for setting up 15 kHz type sound-programme circuits".

3 Symbols and abbreviations

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

AM	Amplitude Modulation; referring to the existing analogue, amplitude modulated carrier, monophonic sound signal (television system L)
$\oplus$	denotes exclusive-or (XOR) boolean operation which is equivalent to modulo-two binary addition
A	left-hand sound signal when in "stereo" mode
$AD_0 - AD_{10}$	Additional Data bits (11 bits) Bright-hand sound signal when in "stereo" mode
B	right-hand sound signal when in "stereo" mode
$C_0 - C_4$	control information (5 bits)
$D_1 - D_{64}$	64 sound samples in one frame
DPSK	4-phase differentially-encoded phase-shift keying (same as Differentially-encoded Quaternary Phase-Shift Keying)
FAW	Frame Alignment Word
FE	(Facteur d'Echelle) This denotes a 3-bit scale factor word (R_2, R_1, R_0); FE1 and FE2 denote the 3 bit scale factors applicable to the first and second sound companding blocks, respectively, in a given frame
FM	Frequency Modulation; referring to the existing analogue, frequency modulated carrier, monophonic sound signal (television systems B, G, H and I)
$H(f)$	filter amplitude-frequency response
LSB	Least Significant Bit
M1	first digital mono sound signal when in "dual sound" or "mono sound + data" modes
M2	second digital mono sound signal when in "dual sound" mode
MAC	Multiplexed Analogue Component
MSB	Most Significant Bit
PPM	Peak Programme Meter
QPSK	Quaternary Phase-Shift Keying
R_2, R_1, R_0	scale factor bits associated with a given 32-sample sound companding block
t_s	symbol period = 1/364 ms
VSB	Vestigial Side Band

4 Specification of the sound/data multiplex and sound coding methods

4.1 Baseband format

4.1.1 Frame structure

The transmitted serial data stream is partitioned into 728 bit frames which are transmitted continuously without gaps. One frame is transmitted every millisecond; the overall bit-rate is thus 728 kbit/s made up as follows:

