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Foreword

This draft second edition European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

This ETS consists of 7 parts as follows:

Part 1: "General aspects";

Part 2: "Service aspects";

Part 3: "Network aspects";

Part 4: "Air interface specification";

Part 5: "Receiver conformance specification";

Part 6: "Base station specification";

Part 7: "Operation and maintenance aspects".

This part, ETS 300 133-6, gives the European Radio Message System (ERMES) base station conformance specification and includes the technical characteristics of the transmitters.

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IPRs:

EP Patent No. 0090851:	Decoder for Transmitted Message Activation Codes;
EP App. No. 89909668,9:	Multiple Frequency Message System;
EP App. No. 89913131,2:	Power Conservation Method and Apparatus for a Portion of Information Signal;
EP App. No. 92901376,1:	Multiple Format Signalling Protocol for a Selective Call Receiver;
EP App. No. 90915018,7:	Nationwide Paging with Local Modes of Operation;
EP App. No. 91904526,0:	Multiple Frequency Scanning.

IPR owner:

MOTOROLA Ltd, 110 Bath Road, Slough, GB-BERKSHIRE SL1 3SZ

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

This second edition part of the seven part European Telecommunication Standard (ETS) 300 133 defines the requirements for base stations operating on the European Radio Message System (ERMES). A general description of the base station is given and detailed Radio Frequency (RF) characteristics defined.

2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] prETS 300 133-1 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 1: General aspects".

[2] prETS 300 133-2 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 2: Service aspects".

[3] prETS 300 133-3 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 3: Network aspects".

[4] prETS 300 133-4 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 4: Air interface specification".

[5] prETS 300 133-5 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 5: Receiver conformance specification".

[6] prETS 300 133-7 (1996): "Radio Equipment and Systems (RES); European Radio Message System (ERMES); Part 7: Operation and maintenance aspects".

[7] I-ETS 300 113: "Radio Equipment and Systems - Land mobile service - Technical characteristics and test conditions for non-speech and combined analogue speech/non-speech equipment with an internal or external antenna connector, intended for the transmission of data".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this part of ETS 300 133, the following definitions apply:

base station: Comprises one or more transmitters together with the associated control and timing equipment.

I1 interface: The radio interface between the base stations and the paging receivers.

I2 interface: An interface between the Paging Area Controller (PAC) and the Base Station (BS) supporting both telecommunication and operation & maintenance services (see ETS 300 133-7 [6]).

Paging Area Controller (PAC): The functional block which communicates to the Paging Network Controller (PNC) and manages one Paging Area (PA) through the I2 interface.

symbol: Two bits of information which are the basic unit of information on the air interface. It corresponds to one of the four modulation levels specified in subclause 8.3.1 of ETS 300 133-4 [4].

3.2 Abbreviations

For the purposes of this part of ETS 300 133, the following abbreviations apply:

BS	Base Station
ERMES	European Radio MEssage System
PA	Paging Area
PAC	Paging Area Controller
PNC	Paging Network Controller
RF	Radio Frequency

4 Base station description

Base Stations (BSs) shall consist of one or more transmitters combined with associated control and timing equipment.

Transmissions shall be made on one or more of the sixteen ERMES channels and shall comply with ETS 300 133-4 [4].

Control and data information may be communicated to a BS from a PAC via a variety of transmission system types and may be connected via an optional standard interface I2 (as specified in ETS 300 133-3 [3]).

BS using the I2 interface are expected to receive a combination of paging and control information. The control information shall indicate the channel to be used. The required timing (subsequence and batch) within the transmission protocol shall be indicated within the system information part of the paging information. BSs of this type shall be responsible for the addition of preamble, synchronisation, address partition terminators and message delimiters to the paging data. Error correction coding and interleaving as specified in ETS 300 133-4 [4] shall also be performed by such BSs.

5 RF requirements

5.1 General

Unless otherwise specified in this clause, all relevant requirements of I-ETS 300 113 [7] shall be fulfilled. Some requirements over and above the recommendations of I-ETS 300 113 [7] and specific to the present application are described in more detail in this clause.

5.1.1 Extreme test conditions

The extreme temperature range shall be - 10 °C to + 55 °C.

5.2 Modulation

The modulation format shall be 4-PAM/FM as specified in ETS 300 133-4 [4].

5.2.1 Symbol transition shaping

The rise (or fall) time for the frequency transition between two successive symbols shall be 88 µs ± 2 µs.

5.2.2 In-channel RF spectrum

The RF spectrum of the continuous component at the output of the BS shall conform with the mask defined in table 1.

Table 1: Limits of in-channel RF spectrum

Frequency from carrier (kHz)	Upper mask (dB)	Lower mask (dB)
0,0	2,5	-2,5
4,5	2,5	-2,5
6	2,5	-
8	- 23	-
10	- 23	-
12,5	- 42	-

5.3 Frequency tolerances

The nominal frequency of the transmissions shall be within ± 200 Hz of the centre frequency (see ETS 300 133-4 [4], subclause 8.2) under all circumstances.

Transmitters that are intended for use in a quasi synchronous network shall be capable of being configured so that relative offsets of less than 10 Hz are avoided in areas where overlapping radio coverage occurs.

The difference between any two adjacent symbol frequencies shall be 3 125 ± 15 Hz.

5.4 Symbol rate

The short term symbol rate shall be 3 125,00 baud ± 1 ppm over periods of up to one second. For long term stability, the requirements of ETS 300 133-4 [4], subclause 12.3 shall apply.

6 Test methods

6.1 General

Measurements shall be performed with the test arrangement shown in figure 1.

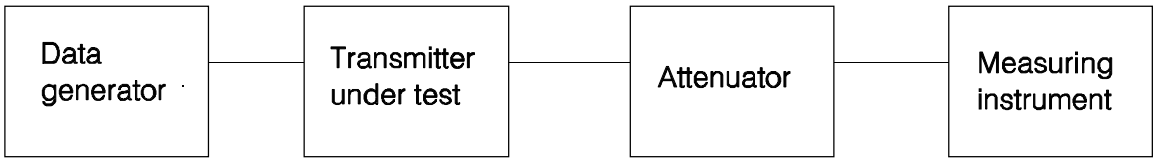

Figure 1: General test arrangement

All tests shall be carried out at the nominal power level specified by the manufacturer.

6.2 Modulation

6.2.1 Symbol transition shaping

The transmitter shall be modulated with each of the following six repetitive data streams in turn:

. . . 10 11 10 11 . . .
. . . 10 01 10 01 . . .
. . . 10 00 10 00 . . .
. . . 11 01 11 01 . . .
. . . 11 00 11 00 . . .
. . . 01 00 01 00 . . .

or with the following repetitive data stream:

. . . 00 01 01 11 01 00 10 10 01 10 00 11 11 10 11 00 . . . .

The transmitted signal shall be demodulated with a modulation analyser used as a reference frequency demodulator. Symbol transition shaping shall be checked on the demodulated signal.

For each transition of the data streams the 10 % to 90 % of the steady state value rise and fall times shall be measured. Each of the twelve measured values shall be the average of (at least) 100 individual transitions.

6.2.2 RF spectrum

The transmitter shall be modulated with a repetitive binary pseudo random sequence of length 2^{20} -1.

The RF spectrum shall be measured using a spectrum analyzer with the parameter settings shown in table 2.

Table 2: Spectrum analyzer settings

Parameter	Setting
mode:	normal
centre frequency:	intended centre operating frequency
frequency span:	50 kHz
vertical scale:	10 dB/div.
reference level:	to be adjusted so that the spectrum is between the upper and lower mask
resolution bandwidth:	100 Hz
video bandwidth:	3 Hz

6.3 Frequency tolerances

6.3.1 Centre frequency

The transmitter shall be modulated with the following continuous data stream:

10 00 10 00 10 00 10 00 . . . . . .

The average frequency of the transmission shall be measured using a suitable instrument.

6.3.2 Symbol frequency

Frequencies representing the four symbols (signalling frequencies) shall be measured by transmitting each of the following continuous data streams in turn.

- 10 10 10 10 10 10 for signalling frequency A;
- 11 11 11 11 11 11 for signalling frequency B;
- 01 01 01 01 01 01 for signalling frequency C;
- 00 00 00 00 00 00 for signalling frequency D.

The difference between adjacent symbol frequencies shall then be calculated as follows:

- Delta f(A/B) = f(B) - f(A);
- Delta f(B/C) = f(C) - f(B);
- Delta f(C/D) = f(D) - f(C).

6.4 Symbol rate

The symbol rate shall be measured using an appropriate access to the baud rate generator if such an access is provided on the BS equipment. Otherwise the following test shall be conducted:

- a continuous data stream of 10 00 10 00 10 00 .... shall be transmitted. The transmitter output shall be terminated in a power attenuator and demodulation equipment as shown in subclause 6.1. The demodulated signal shall be applied to a suitable frequency measuring equipment. The frequency measured shall be equal to half of the specified short term symbol rate.

The test shall be repeated at maximum and minimum operating voltages and at the extremes of temperatures specified.

History

Document history			
July 1992	First Edition		
April 1996	Public Enquiry	PE 105:	1996-04-08 to 1996-08-30