

Australian Standard™

Electronic animal identification— Radiofrequency methods



This Australian Standard was prepared by Committee IT-028, Electronic Animal Identification and Data Capture Systems. It was approved on behalf of the Council of Standards Australia on 4 May 2001 and published on 7 June 2001.

The following interests are represented on Committee IT-028:

Australian Animal Registry
Australian Companion Animals Council
Australian Electrical and Electronic Manufacturers Association
Australian Horse Industry Council
Australian Information Industry Association
Australian National Kennel Council
Australian Veterinary Association
Canine Control Council (Queensland)
Department of Local Government (N.S.W.)
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PREFACE

This Standard was prepared by the Standards Australia Committee IT-028, Electronic Animal Identification and Data Capture Systems. It has been reproduced from ISO 11785:1996, *Radio-frequency identification of animals—Technical concept*.

Additional requirements for application in Australia are given in Annex ZA and considerations relating to these requirements are set out in Annex ZB.

The objective of this Standard is to provide manufacturers and users of radiofrequency-based animal identification systems with a set of product specifications for the design, deployment and use of implanted radiofrequency transponder technology.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A 'normative' annex is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text 'this International Standard' should read 'this Australian Standard'.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to equivalent Australian Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
ISO		AS	
11784	Radio-frequency identification of animals—Code structure	5018	Electronic animal identification—National coding scheme

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NOTES

AUSTRALIAN STANDARD

Electronic animal identification—Radiofrequency methods**1 Scope**

This International Standard specifies how a transponder is activated and how the stored information is transferred to a transceiver.

2 Conformance

Transponders are in conformance with this International Standard provided they meet the requirements given in clause 6 of this International Standard. Transceivers are in conformance with this International Standard provided they meet the requirements given in clause 6 and annex A, if the latter is applicable.

In order to allow a smooth transition from the different transponders presently in use to those complying with this International Standard, transponders meeting the requirements of annex A may be applied for a transition period of two years from the date of the first edition of this International Standard.

3 Normative references

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 11784:1996, *Radio-frequency identification of animals — Code structure*.

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 activation field: Electromagnetic field transmitted by a transceiver to energize and/or activate a transponder.

4.2 activation frequency: Frequency of the activation field.

4.3 activation period: Time duration of the activation signal.

4.4 bit rate: Number of bits transmitted per second.

4.5 differential bi-phase encoding: Method of encoding in which data bit 0 is represented by a mid-bit transition; data bit 1 is represented by no transition; and there is always a transition in between two bits.

4.6 encoding: One to one relationship between basic information elements and modulation patterns.

4.7 error detection code: Bits that contain information which can be used to detect errors.

4.8 frequency shift keying: Binary information is superimposed onto a carrier electromagnetic field by shifting between discrete frequencies of the field.

4.9 full duplex: Method of information exchange in which the information is communicated while the transceiver transmits the activation field.

4.10 half duplex: Method of information exchange in which the information is communicated after the transceiver has stopped transmitting the activation field.

4.11 header: Bits transmitted before the useful information, uniquely identifying the start of a page, which may also be used for synchronization of the transponder and the transceiver.

4.12 identification code: 64 bits of the identification telegram which are specified in ISO 11784.

4.13 identification telegram: The total identification message (header, identification code, error detection code and trailer), possibly repeatedly transmitted by the transponder upon activation.

4.14 mobile transceiver: Transceiver that is not connected to other transceivers when these are in its vicinity to synchronize activation periods and pauses.

4.15 modulation: Method of superimposing information onto an electromagnetic field by means of varying a specific parameter of the field.

4.16 non-return to zero encoding: Method of encoding in which data bit 1 is a high signal and data bit 0 is a low signal.

4.17 page: A coherent part of the communicated information.

4.18 phase shift keying: Binary information is superimposed onto a carrier electromagnetic field by introducing discrete phase shifts of the field.

4.19 stationary transceiver: Transceiver that is connected to other transceivers when these are in its vicinity to synchronize activation periods and pauses.

4.20 trailer: Bits transmitted after the error detection code; the content of which is dependent upon the value of the flag for an additional data block which is specified in ISO 11784.

4.21 transceiver: Device used to communicate with a transponder.

4.22 transponder: Device which transmits its stored information when activated by a transceiver and may be able to store new information.

5 Abbreviations

AM	amplitude modulation
BCC	block control character
CRC	cyclic redundancy check
DBP	differential bi-phase encoding
FDX	full duplex
FSK	frequency shift keying
HDX	half duplex
LSB	least significant bits
MSB	most significant bits
NRZ	non-return to zero encoding
PSK	phase shift keying
RFID	radio-frequency identification

6 Requirements

The system shall be defined in such a way that the FDX and HDX transponders can be read by one transceiver. Annex A describes the method that can be used to enhance the functionality of this transceiver to read certain installed base transponders which are not compatible with the FDX and HDX transponders described in this clause.

A stationary transceiver shall activate transponders using an activation field with an activation frequency of $(134,2 \pm 13,42 \times 10^{-3})$ kHz. The activation period shall be 50 ms. If an FDX signal is received during activation but is not validated, the activation period shall be extended until the identification telegram is validated, but not longer than 100 ms. Consecutively, there shall be a pause in the activation signal. If an HDX signal is received the pause shall last for 20 ms. If no HDX signal is detected within 3 ms after a 3 dB decay of the activation field, activation shall be resumed. For synchronization reasons, each tenth activation cycle shall have a fixed pattern of 50 ms activation and 20 ms pause (see annex C).

A mobile transceiver shall be able to detect the presence of additional active transceivers through the reception of activation signals. If no activation signal is detected within 30 ms, the mobile transceiver is out of reach of other active transceivers and shall use the activation protocol defined above for a stationary transceiver. If the mobile transceiver does detect an activation signal it shall wait for the rising edge of the next activation signal and shall activate during a fixed period of 50 ms.

The identification code shall be in accordance with ISO 11784. The identification code, the CRC error detection bits (see annex B) and the trailer shall be transmitted starting with the LSB and ending with the MSB.

In view of future enhancements, for example multi-page transponders incorporating sensors and/or writable memory, the identification telegram shall terminate in 24 trailer bits in which, for instance, information from sensors or the contents of trailing pages may be stored. If the flag for additional data blocks, which is specified in ISO 11784, is binary 0 the value of most of the trailer bits is unspecified. The value of the trailer bits for additional data blocks which have a flag equal to binary 1 will be defined by a future International Standard.

NOTES

- 1 Since errors in the trailer will not be detected by the error detection protocol of the identification telegram, it is not necessary to read these bits in order to correctly detect the identification code.
- 2 In most countries the use of transceivers as described in this International Standard is subject to regulations. Type approval from the national regulatory agencies may be required before they can be operated or traded in these countries.

6.1 Full duplex system

An FDX transponder receiving the activation field shall transmit its code during the activation period. The FDX transponder uses a modified DBP encoded sub-carrier which is amplitude modulated upon the radio frequency