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STN	**Radarové snímače sledovania letovej prevádzky Sekundárny prehľadový radar (SSR) Harmonizovaná norma pre prístup k rádiovému spektru Časť 1: Snímač SSR**	**STN EN 303 363-1 V1.1.1** 87 3363

Air Traffic Control Surveillance Radar Sensors; Secondary Surveillance Radar (SSR); Harmonised Standard for access to radio spectrum; Part 1: SSR Interrogator

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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Contents

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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in Table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document is part 1 of a multi-part deliverable covering ATC Secondary Surveillance Radar systems for civil air navigation operating in the frequencies 1 030 MHz and 1 090 MHz, as identified below:

Part 1: "SSR Interrogator";

Part 2: "Far Field Monitor (FFM)".

National transposition dates	
Date of adoption of this EN:	14 February 2022
Date of latest announcement of this EN (doa):	31 May 2022
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2022
Date of withdrawal of any conflicting National Standard (dow):	30 November 2023

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The SSR system provides ground-based surveillance of transponder fitted aircraft and in addition may allow data link communication between ground stations and aircraft, where both are fitted with appropriate equipment.

Secondary Radar surveillance is exploited through two essential elements: the SSR interrogator, normally ground-based, and the aircraft SSR transponder. When aircraft are within the antenna beam of the ground station, its interrogations elicit replies from transponders.

Civil use systems have different modes of interrogation/reply: Mode A, Mode C, Mode S and intermode. Mode A, Mode C and Intermode interrogations consist of Pulse Amplitude Modulated (PAM) signals, Mode-S interrogations have an additional pulse, with Differential Phase Shift Keying (DPSK) modulation.

Ground stations will be either Mode A/C ground stations, which can interrogate and receive replies on Mode A/C only, or Mode S ground stations, for which the present standard founds its applicability, which can interrogate and receive replies on all modes. On the other side, there are two classes of transponders: Mode A/C transponders, which can respond to Mode A, Mode C and Intermode interrogations only, and Mode S transponders, which can respond to all modes. Mode-S interrogation/replies have different data block depending on the information they have to support.

As far as Mode S is concerned, for the purpose of the present document it is assumed that the SSR can transmit interrogations at least in the uplink formats (UF) UF11, UF4 and UF5 and can process replies in the downlink formats (DF) DF11, DF4, DF20, DF5 and DF21.

The replies to all modes of interrogation are used to determine aircraft 2D position by measurement of the range and bearing of the reply. The performance towards the radar parameters are determined on the basis of the number of correct and validated replies received and decoded, in the operating environment.

Performances are affected by interference effects, which can result in a degradation of the signal causing lost or wrong information. RF signals on either uplink or downlink can be distorted by other overlapping RF signals, which can make correct decoding of wanted signals impossible. The degree of degradation is a function of the channel loading.

The SSR system requires a 3 dB receiver bandwidth of approximately 8 MHz centered on 1 030 MHz and 1 090 MHz for the airborne transponder and ground SSR receiver respectively. This bandwidth is sufficient to permit significant co-channel interference from transmitters operating on adjacent frequencies.

This interference can be minimized by ensuring adequate frequency or spatial separation between the interfering transmitters and the SSR receivers. In this specific case, two air traffic service systems, DME and primary radars, can be the cause of interference.

1 Scope

The present document specifies technical characteristics and methods of measurements for the following equipment used in ground-based ATC Secondary Surveillance Radar systems for civil air navigation.

Secondary Surveillance Radar (SSR) with Mode S capabilities which includes mode A/C, transmitting in the 1 030 MHz band with a power not exceeding 4 kW (66 dBm), and receiving in the 1 090 MHz band, used for air traffic control and connected to a rotating antenna. The SSR Interrogator transmits interrogations to aircraft equipped with transponder, receives the corresponding replies, and operates in the frequency bands as indicated in Table 1.

Table 1: SSR interrogator service frequency bands

Signals	Service frequency bands
Transmitted signals	1 030 MHz
Received signals	1 090 MHz

NOTE 1: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in Annex A.

NOTE 2: Systems making use of an electronic scanned antenna are not covered by the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments).

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.2] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.3] ECC/Recommendation (02)05 (2012): "Unwanted emissions".

[i.4] ETSI EG 203 336: "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.5] ICAO Annex 10, Volume IV: "Surveillance and Collision Avoidance Systems", 5th edition, 16th July 2018, including amendments up to amendment 90.

[i.6] Eurocontrol SUR/MODES/EMS/SPE-01: "European Mode S Station Functional Specification", edition 3.11, 9th May 2005.

[i.7] ERC/Recommendation 74-01 (2019): "Unwanted emissions in spurious domain".

[i.8] ITU Radio Regulations (2020).

[i.9] ICAO DOC-9924: "Aeronautical Surveillance Manual", edition 2, 2017.