

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
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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.
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Part 1: SSR Interrogator**

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Contents

Intellectual Property Rights	6
Foreword.....	6
Modal verbs terminology.....	7
Introduction	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	8
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	12
3.3 Abbreviations	12
4 Technical requirements specifications	13
4.1 Environmental profile.....	13
4.2 Conformance requirements	13
4.2.1 Transmitter requirements	13
4.2.1.1 Maximum frequency deviation	13
4.2.1.1.1 Definition.....	13
4.2.1.1.2 Limits	13
4.2.1.1.3 Conformance	13
4.2.1.2 Transmitter power	13
4.2.1.2.1 Definition.....	13
4.2.1.2.2 Limits	13
4.2.1.2.3 Conformance	13
4.2.1.3 Transmitter power control.....	14
4.2.1.3.1 Definition.....	14
4.2.1.3.2 Limits	14
4.2.1.3.3 Conformance	14
4.2.1.4 Spectrum mask.....	14
4.2.1.4.1 Definition.....	14
4.2.1.4.2 Limits	14
4.2.1.4.3 Conformance	15
4.2.1.5 Emissions in idle mode	15
4.2.1.5.1 Definition.....	15
4.2.1.5.2 Limits	16
4.2.1.5.3 Conformance	16
4.2.1.6 Transmitted waveforms.....	16
4.2.1.6.1 Definition.....	16
4.2.1.6.2 Limits	16
4.2.1.6.3 Conformance	16
4.2.2 Receiver requirements	17
4.2.2.1 Receiver sensitivity and flatness	17
4.2.2.1.1 Definition.....	17
4.2.2.1.2 Limits	17
4.2.2.1.3 Conformance	17
4.2.2.2 Receiver Saturation Level and Dynamic Range.....	17
4.2.2.2.1 Definition.....	17
4.2.2.2.2 Limits	18
4.2.2.2.3 Conformance	18
4.2.2.3 Receiver blocking	18
4.2.2.3.1 Definition.....	18
4.2.2.3.2 Limits	18
4.2.2.3.3 Conformance	18
4.2.2.4 Receiver selectivity	19

4.2.2.4.1	Definition.....	19
4.2.2.4.2	Limits	19
4.2.2.4.3	Conformance	19
4.2.2.5	Inter-modulation response rejection.....	19
4.2.2.5.1	Definition.....	19
4.2.2.5.2	Limits	19
4.2.2.5.3	Conformance	19
4.2.2.6	Receiver co-channel rejection.....	19
4.2.2.6.1	Definition.....	19
4.2.2.6.2	Limits	20
4.2.2.6.3	Conformance	20
4.2.2.7	Receiver Noise Figure.....	20
4.2.2.7.1	Definition.....	20
4.2.2.7.2	Limits	20
4.2.2.7.3	Conformance	20
5	Testing for compliance with technical requirements.....	20
5.1	General requirements	20
5.1.1	Standard operation mode for testing	20
5.2	Environmental conditions for testing	21
5.2.1	General Requirements.....	21
5.2.2	Test Conditions	21
5.2.2.1	Normal temperature and humidity	21
5.2.2.2	Normal test power supply	21
5.3	Test specifications	21
5.3.1	Transmitter related tests	21
5.3.1.0	General requirements	21
5.3.1.1	Maximum frequency deviation	21
5.3.1.1.1	Test conditions	21
5.3.1.1.2	Procedure.....	21
5.3.1.2	Transmitter power	22
5.3.1.2.1	Test conditions	22
5.3.1.2.2	Procedure.....	22
5.3.1.3	Transmitter power control.....	23
5.3.1.3.1	Test conditions	23
5.3.1.3.2	Procedure.....	23
5.3.1.4	Spectrum mask.....	23
5.3.1.4.1	Test conditions	23
5.3.1.4.2	Procedure.....	24
5.3.1.5	Emissions in idle mode	25
5.3.1.5.1	Test conditions	25
5.3.1.5.2	Procedure.....	25
5.3.1.6	Transmitted Waveforms.....	26
5.3.1.6.1	Test conditions	26
5.3.1.6.2	Procedure.....	26
5.3.2	Receiver related tests	26
5.3.2.0	General requirements	26
5.3.2.1	Receiver sensitivity and flatness	26
5.3.2.1.1	Test conditions	26
5.3.2.1.2	Procedure.....	26
5.3.2.2	Receiver Saturation Level and Dynamic Range.....	28
5.3.2.2.1	Test conditions	28
5.3.2.2.2	Procedure.....	28
5.3.2.3	Receiver blocking	29
5.3.2.3.1	Test conditions	29
5.3.2.3.2	Procedure.....	29
5.3.2.4	Receiver selectivity	31
5.3.2.4.1	Test conditions	31
5.3.2.4.2	Procedure.....	31
5.3.2.5	Inter-modulation response rejection.....	32
5.3.2.5.1	Test conditions	32
5.3.2.5.2	Procedure.....	32

5.3.2.6	Receiver co-channel rejection	33
5.3.2.6.1	Test conditions	33
5.3.2.6.2	Procedure.....	33
5.3.2.7	Receiver Noise Figure.....	34
5.3.2.7.1	Test conditions	34
5.3.2.7.2	Procedure.....	34
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	35
Annex B (normative):	Measurement setups	37
B.1	Setup 1.....	37
B.2	Setup 2.....	38
B.3	Setup 3.....	38
B.4	Setup 4.....	40
B.5	Setup 5.....	41
Annex C (informative):	Checklist	43
Annex D (informative):	Maximum Measurement Uncertainty.....	44
History		45

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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)".

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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 finds 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

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- [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.

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