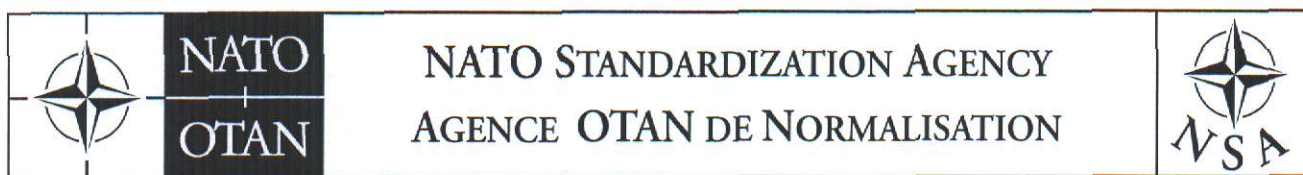


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29 September 2008

NSA/1016(2008)-C3/4204

STANAG 4204(EDITION 3) – TECHNICAL STANDARDS FOR SINGLE CHANNEL VHF
RADIO EQUIPMENT

Reference: MAS/142-EL/4204 dated 30 May 1988

1. The enclosed NATO Standardization Agreement, which has been ratified by nations as reflected in the NATO Standardization Document Database (NSDD), is promulgated herewith.
2. The reference listed above is to be destroyed in accordance with local document destruction procedures.
3. AC/322 (SC/6) considers this an editorial edition of the STANAG; previous ratifying references and implementation details are deemed to be valid

A handwritten signature in dark ink, appearing to read 'Juan A. Moreno', is written over a horizontal line.

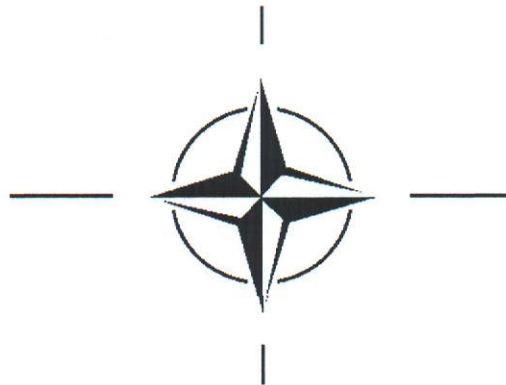
Juan A. MORENO
Vice Admiral, ESP(N)
Director, NATO Standardization Agency

Enclosure:
STANAG 4204 (Edition 3)

NATO Standardization Agency – Agence OTAN de normalisation
B-1110 Brussels, Belgium Internet site: <http://nsa.nato.int>
E-mail: c3s@hq.nato.int – Tel 32.2.707.4311 – Fax 32.2.707.5709

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**NORTH ATLANTIC TREATY ORGANIZATION
(NATO)**



**NATO STANDARDIZATION AGENCY
(NSA)**

**STANDARDIZATION AGREEMENT
(STANAG)**

SUBJECT: TECHNICAL STANDARDS FOR SINGLE CHANNEL VHF
RADIO EQUIPMENT

Promulgated on 29 September 2008



Juan A. MORENO
Vice Admiral, ESP(N)
Director, NATO Standardization Agency

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RECORD OF AMENDMENTS

No.	Reference/date of Amendment	Date Entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director NATO Standardization Agency under the authority vested in him by the NATO Standardization Organisation Charter.
2. No departure may be made from the agreement without informing the tasking authority in the form of a reservation. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.
3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

4. Ratification, implementation and reservation details are available on request or through the NSA websites (internet <http://nsa.nato.int>; NATO Secure WAN <http://nsa.hq.nato.int>).

FEEDBACK

5. Any comments concerning this publication should be directed to NATO/NSA – Bvd Leopold III - 1110 Brussels - BE.

NATO STANDARDIZATION AGREEMENT
(STANAG)

TECHNICAL STANDARDS FOR SINGLE CHANNEL VHF RADIO
EQUIPMENT

Annexes:

A - Terms and Definitions

B – Technical Standards to Ensure Interoperability of Single Channel VHF Radio Equipment

Related Documents:

ACP 167(H) Glossary of Communications-Electronics Terms - April 1998

ITU Recommendation: ITU-R SM.329-9 Spurious Emissions – July 2001

AIM

1. The aim of this agreement is to define the technical standards required to ensure interoperability of land, air and maritime single channel VHF radio equipment.

AGREEMENT

2. Participating nations agree to use the standards defined in this STANAG for the traffic mode or modes in which interoperability is required.

GENERAL

3. The terms and definitions are detailed in Annex A. The technical standards are in Annex B.

IMPLEMENTATION OF THE AGREEMENT

4. This STANAG is implemented by a nation when the single channel VHF radio equipment in that nation's forces comply with the standards described in this STANAG and are placed in service.

TERMS AND DEFINITIONS

BASEBAND

1. In the process of modulation, the frequency band occupied by the aggregate of the transmitted signals when first used to modulate a carrier.

CARRIER (See also ACP-167(H))

2. A electromagnetic wave suitable for modulation by the intelligence to be transmitted over a communication system.

FREQUENCY TOLERANCE (See also ACP-167(H))

3. The maximum permissible departure by the centre frequency of the frequency band occupied by an emission from the assigned frequency, or by the characteristic frequency of an emission from the reference frequency.

MODULATION (See also ACP-167(H))

4. The process of varying one or more characteristics of the carrier wave in accordance with the instantaneous value of the signal to be transmitted. See CARRIER.

MODULATION, FREQUENCY (FM) (See also ACP-167(H))

5. The form of modulation in which the instantaneous frequency of a sine wave carrier is caused to depart from the carrier frequency by an amount proportional to the instantaneous value of the modulating signal.

NECESSARY BANDWIDTH (See also ITU-R SM.329-9)

6. For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

OUT-OF-BAND (OOB) EMISSION (See also ITU-R SM.329-9)

7. Emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions. Any unwanted emission which falls at frequencies separated from the centre frequency of the emission by less than 250% of the necessary bandwidth will generally be considered out-of-band emission.

SPURIOUS EMISSION (See also ITU-R SM.329-9)

8. Emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

SQUELCH (See also ACP-167(H))

9. A term indicating the ability of a radio receiver to suppress an audio frequency output in the absence of an input signal having predetermined characteristics.

RECEIVER ATTACK TIME

10. The time interval from the application of a step input RF signal (for all signal levels within the receiver input range) to the receiver input until the receiver output amplitude reaches 90 per cent of its steady-state value. This time delay includes the time for the receiver to unsquelch, if applicable.

TRANSMITTER ATTACK TIME

11. The time interval from keying-on a transmitter until the transmitter RF signal amplitude has increased to 90 per cent of its steady-state value. This delay excludes any necessary time for automatic antenna tuning.

TRANSMITTER RELEASE TIME

12. The time interval from keying-off a transmitter until the transmitted RF signal amplitude has decreased to 10 per cent of its key-on steady-state value.

TECHNICAL STANDARDS TO ENSURE INTEROPERABILITY OF SINGLE
CHANNEL VHF RADIO EQUIPMENT

FREQUENCY RANGE

1. The frequency range shall be from 30MHz to at least 87.475MHz and it is desirable that it extend to 107.975MHz.

TUNING

2. Equipment shall tune to integral multiples of 25kHz, starting at 30MHz.

FREQUENCY ACCURACY

3. The radio frequency accuracy, including tolerance and long-term stability but not any effects due to Doppler shift, shall be within $\pm 500\text{Hz}$.

FREQUENCY RESPONSE

4.
 - a. For analogue voice and in-band data, the baseband frequency response of the transmitter and of the receiver over the range 300Hz to 3000Hz shall be within $\pm 4\text{dB}$ of the response at 1000 Hz for manpack equipment and within $\pm 2\text{dB}$ for all other equipment.
 - b. For digital voice/data at 16kbps, in the form of a polar non-return-to-zero signal (see CCITT V10, V11, V28), the baseband frequency response of the transmitter and of the receiver over the range 20Hz to 11kHz shall be within $\pm 3\text{dB}$ of the response at 1000 Hz.
 - c. The recommended receiver IF selectivity characteristics are:

not less than $\pm 11\text{kHz}$ at -6dB
not more than $\pm 25\text{kHz}$ at -60dB
not more than $\pm 1\text{MHz}$ at -100dB

MODULATION

5. (a) For analogue voice and in-band data, the carrier shall be frequency modulated with a peak deviation of $6.5\text{kHz} \pm 1\text{kHz}$; it is recommended that there be no pre-emphasis for voice or data.

(b) For digital voice/data at 16kbps, the carrier shall be frequency modulated with a peak deviation of $5\text{kHz} \pm 1\text{kHz}$; the “mark” or “1” frequency shall be below the centre frequency and the “space” or “0” frequency shall be above the centre frequency and neither the transmitter nor the receiver shall invert the polarity of the baseband signal.

NECESSARY BANDWIDTH

6. 99% of the total mean radiated power shall be contained within a bandwidth of 25kHz.

OUT-OF-BAND EMISSION

7. The out-of-band power shall not be greater than -40dBc within $\pm 25\text{kHz}$ of the centre frequency and not greater than -60dBc between 25kHz and 62.5kHz from the centre frequency, as depicted in Figure B.1.

SPURIOUS EMISSION

8. The power of spurious emissions shall not be greater than -60dBc at any frequencies beyond 62.5kHz from the centre frequency, as depicted in Figure B.1.

MODE OF OPERATION

9. Equipment shall be capable of operating in the single-frequency simplex mode.

SWITCHING TIME

10. (a) Transmitter attack-time shall not be more than 25ms and release-time not more than 10ms.

(b) Receiver attack-time shall not be more than 40ms.

SQUELCH AND RETRANSMISSION

11. (a) The transmitter shall be able to superimpose on transmissions in the analogue voice mode a tone modulation of $150\text{Hz} \pm 4\text{Hz}$ with a peak frequency deviation of $1600\text{Hz} \pm 350\text{Hz}$, which shall be contained within the total deviation specified in paragraph 5; the receiver shall be able to provide adequate suppression of this tone at the audio output.

(b) The receiver squelch action shall be able to control the switching of another radio for retransmission.

(c) The specification of the 150Hz squelch tone in 11(a) is mandatory for the fixed-frequency mode of radio operation. Corresponding squelch tones in national proprietary VHF combat-net radio frequency-hopping waveforms may differ in specifications.

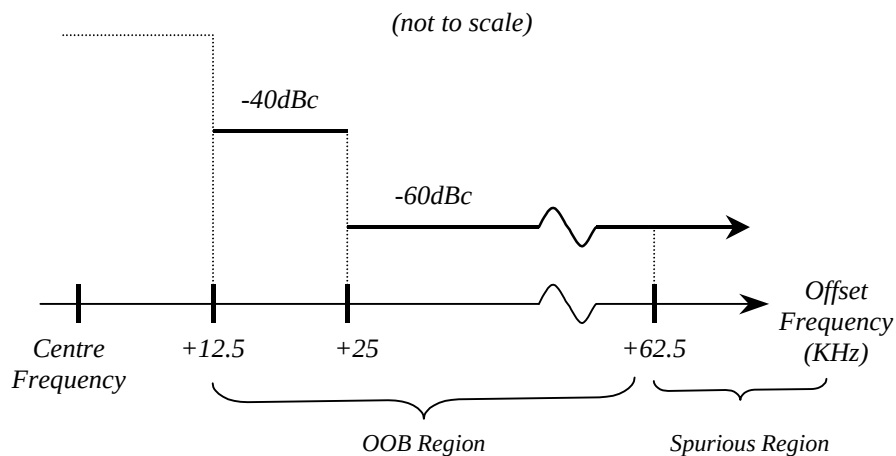


Figure B.1 Depiction of OOB and spurious emission limits above centre frequency, with frequencies labeled as offsets from centre frequency. Limit regions below centre frequency are symmetric to those shown.