## CLAIMS

**1.** Jamming device (1) for the protection of targets on the earth's surface against radiofrequency threats of the space, satellite or air type;

said jamming device (1) comprising:

- radio-frequency threat detection means (11);
- radio-frequency jamming means (12); and
- a control system (13);

wherein the radio-frequency threat detection means (11) include:

- a plurality of receiving antennas (111);
- a radiofrequency threat detection unit (112); and
- one or more predefined radiofrequency-threat-related libraries (113);

wherein the receiving antennas (111) are configured to receive radiofrequency signals having elevation angles of arrival that are equal to, or greater than, a given minimum elevation angle, thereby providing an elevation angle coverage of interest;

wherein the radiofrequency threat detection unit (112) is configured to:

- detect the presence of a radiofrequency threat based on the radiofrequency signals received by the receiving antennas (111) and on the predefined radiofrequency-threat-related library(ies) (113); and,
- in the event of detection of a radiofrequency threat,
  - determine a respective type of the detected radiofrequency threat based on the radiofrequency signals received by the receiving antennas (111) and on the predefined radiofrequency-threat-related library(ies) (113),
  - estimate a respective direction of arrival of the detected radiofrequency threat based on the radiofrequency signals received by the receiving antennas (111) and
  - alert the control system (13) about the detected

radiofrequency threat, providing said control system (13) with the respective type and the respective direction of arrival of said detected radiofrequency threat;

wherein said predefined radiofrequency-threat-related library(ies) (113) contain(s) information related to one or more radiofrequency threats of interest so as to enable the radiofrequency threat detection unit (112) to detect the presence of said radiofrequency threat(s) of interest and to determine the respective type thereof based on the radiofrequency signals received by the receiving antennas (111);

wherein the control system (13) includes:

• a control unit (131); and

• one or more predefined radiofrequency-jamming-actions-related libraries (132);

wherein the control unit (131) is configured, in case of detection of a radiofrequency threat by the radiofrequency threat detection unit (112), to:

• determine a radiofrequency jamming action to be performed against the detected radiofrequency threat based on the respective type determined by the radiofrequency threat detection unit (112) and on the predefined radiofrequency-jamming-actions-related library(ies) (132); and

• operate the radiofrequency jamming means (12) so that said radiofrequency jamming means (12) perform the determined radiofrequency jamming action against the detected radiofrequency threat;

wherein said predefined radiofrequency-jamming-actions-related library(ies) (132) contain(s), for each radiofrequency threat of interest inserted in the predefined radiofrequency-threat-related library(ies) (113), respective information related to one or more respective radiofrequency jamming actions to be performed against said radiofrequency threat of interest;

and wherein the radiofrequency jamming means (12) are

operable by the control unit (131) in case of detection of a radiofrequency threat by the radiofrequency threat detection unit (112) and include:

• a plurality of transceiver antennas (121) configured to

- also provide said elevation angle coverage of interest,
- track the detected radiofrequency threat and
- transmit radiofrequency jamming signals against said detected radiofrequency threat so as to perform the radiofrequency jamming action determined by the control unit (131); and

• a radiofrequency jamming signal generation unit (122) configured to generate the radiofrequency jamming signals to be transmitted by the transceiver antennas (121) against the detected radiofrequency threat so as to perform said radiofrequency jamming action;

characterized by consisting of a single apparatus/device which the radiofrequency threat detection means (11), the radiofrequency jamming means (12) and the control system (13) are integrated into.

**2.** The jamming device of claim 1, wherein:

• the receiving antennas (111) are configured to receive radiofrequency signals having elevation angles of arrival that are included in a given elevation angle range defined by the given minimum elevation angle and by a given maximum elevation angle greater than said given minimum elevation angle; and

• the given elevation angle range corresponds to the elevation angle coverage of interest.

**3.** The jamming device according to claim 1 or 2, wherein the given minimum elevation angle is equal to, or greater than, 20°.

**4.** The jamming device of claim 2, wherein the given minimum elevation angle is comprised between 20° and 65°, and the given maximum elevation angle is comprised between 40° and 90°.

**5.** The jamming device according to any preceding claim, wherein:

• the receiving antennas (111) are configured to receive radiofrequency signals having said elevation angles of arrival and azimuth angles of arrival in the range 0°-180° or 0°-360°, whereby said receiving antennas (111) provide an azimuth angle coverage of 180° or 360° around a zenith direction of the jamming device (1); and

• the transceiver antennas (121) are configured to also provide said azimuth angle coverage.

**6.** The jamming device according to any preceding claim, wherein the predefined radiofrequency-threat-related library(ies) (113) contain(s) information and/or data which is/are:

• related to various types of radiofrequency threats of interest; and

• indicative of respective operating parameters of said radiofrequency threats of interest;

and wherein the predefined radiofrequency-jamming-actions-related library(ies) (132) contain(s), for each radiofrequency threat of interest inserted in the predefined radiofrequency-threat-related library(ies) (113), respective information and/or respective data which is/are:

• related to one or more respective radiofrequency jamming techniques to be implemented against said radiofrequency threat of interest; and

• indicative of respective operating parameters to be used to implement said respective radiofrequency jamming technique(s) against said radiofrequency threat of interest.

**7.** The jamming device according to any preceding claim, comprising, or coupled to, a mechanical pointing system operable to:

• vary the pointing in elevation of said receiving antennas (111) and of said transceiver antennas (121) so as to modify the elevation angle coverage of interest; or

• vary the inclination of the entire jamming device (1) so as to vary the pointing in elevation of said receiving

antennas (111) and of said transceiver antennas (121), thus modifying the elevation angle coverage of interest.

**8.** The jamming device according to any preceding claim, wherein:

• the receiving antennas (111) are horn-type directional antennas;

• the transceiver antennas (121) are active electronically steered/steerable high-gain antennas;

• the radiofrequency threat detection unit (112) is a digital receiver; and

• the radiofrequency jamming signal generation unit (122) is based on Digital Radio Frequency Memory technology.

**9.** Jamming system for the protection of targets on the earth's surface against radiofrequency threats of the space, satellite or air type, comprising:

• one or more jamming devices (1) as the one claimed in any preceding claim; and

• user interface means (2) connected to said jamming device(s) (1) and configured to allow a user/operator to

- monitor and control operation of said jamming device(s) (1),
- set the elevation angle coverage of interest of said jamming device(s) (1) and
- define and modify the predefined radiofrequency-threat-related library(ies) (113) and the predefined radiofrequency-jamming-actions-related library(ies) (132) of said jamming device(s) (1).

**10.** Jamming system for the protection of targets on the earth's surface against radiofrequency threats of the space, satellite or air type, comprising two jamming devices (1) as the one claimed in claim 5; wherein each jamming device (1) is configured to provide a respective azimuth angle coverage of 180° around a respective zenith direction of said jamming device (1); and wherein said jamming devices (1) are arranged with respect to each other so as to provide as a whole an azimuth angle coverage of 360° around a zenith axis of the jamming system.

**11.** Jamming system for the protection of targets on the earth's surface against radiofrequency threats of the space, satellite or air type, comprising:

• one or more jamming device(s) (1) as the one claimed in claim 7;

• in the case of a mechanical pointing system external to said jamming device(s) (1), also said mechanical pointing system; and

• user interface means (2) connected to said jamming device(s) (1) and configured to allow a user/operator to

- monitor and control operation of said jamming device(s) (1),
- set the elevation angle coverage of interest of said jamming device(s) (1),
- define and modify the predefined radiofrequency-threat-related library(ies) (113) and the predefined radiofrequency-jamming-actions-related library(ies) (132) of said jamming device(s) (1)
- operate the mechanical pointing system to modify the elevation angle coverage of interest of said jamming device(s) (1).

**12.** Land or naval platform, either fixed or mobile, equipped with the jamming device (1) as claimed in any claim 1-8 or with the jamming system as claimed in any claim 9-11.