

Recommendation T/R 60-01 (Malaga-Torremolinos 1975, revised in Stockholm 1976)

**LOW-POWER RADIOLOCATION EQUIPMENT FOR DETECTING MOVEMENT AND
FOR ALERT**

Recommendation proposed by the "Radiocommunications" Working Group T/WG 3 (R)

Text of the revised Recommendation adopted by the "Telecommunications" Commission:

"The European Conference of Postal and Telecommunications Administrations,

considering

- (a) that low-power radiolocation equipment for detecting movement and for alert is available to users,
- (b) that this equipment is being used more and more, raising technical and regulatory problems for Administrations,
- (c) that in order to simplify these problems, it would be desirable for common administrative rules and technical specifications to be applied,
- (d) that it would be advantageous to Administrations, users and manufacturers of this equipment for there to be an exchange of type-approval test reports between Administrations which so wish,
- (e) that the aim should be the mutual recognition by the CEPT Member Administrations of test reports and type-approval certificates,

recommends

1. that, to the extent that their national regulations permit, the CEPT Member Administrations should authorise the use of this equipment in accordance with the conditions set out in Annex I to this Recommendation,
2. that the technical characteristics of this equipment should conform to those indicated in Annex II to this Recommendation,
3. that type-approval tests should be performed in accordance with the methods of measurement described in Annex III to this Recommendation,
4. that the test report should contain what is needed for the precise identification of the equipment and for the performance of the tests. To this end, the applicant should supply at least the information specified in Annex IV to this Recommendation, and this information shall be passed on when the test reports are exchanged,
5. that in preparing test reports, the Administrations should follow, as far as possible, the sequence of tests and numbering of paragraphs used in Annex III and adopt the terminology used in Annexes II and III to this Recommendation."

Left blank

Annex I

CONDITIONS FOR THE USE OF LOW-POWER RADIOLOCATION EQUIPMENT FOR DETECTING MOVEMENT AND FOR ALERT

1. The use of equipment with a peak envelope power of less than 25 mW e.i.r.p. should be authorised as of right (general authorisation). If national laws or regulations do not so permit, individual licences should be granted subject to the least possible restriction. More powerful equipment would remain subject to individual licensing.
2. When an individual licence is required, it should be granted irrespective of the applicant's nationality.
3. The equipment shall be type-approved. Type-approval tests shall be carried out with the antenna(s) supplied with the equipment by the manufacturer. Only antennas of this type shall be authorised.
4. The equipment shall carry the type-approval number and, where physically possible, the following information:
 - a) the manufacturer
 - b) the type
 - c) the serial number
 - d) the frequency/frequencies
5. The use of this equipment may be covered by further national regulations because of the possible physiological danger from their electromagnetic radiation.

Annex II

TECHNICAL SPECIFICATIONS FOR LOW-POWER RADIOLOCATION EQUIPMENT FOR DETECTING MOVEMENT AND FOR ALERT

1. FREQUENCY BANDS IN WHICH THE FREQUENCIES USED SHOULD BE CHOSEN

1.1. First-choice bands

9.500 MHz - 9.975 MHz, preferred frequency 9.520 MHz;
13.4 GHz - 14.0 GHz, preferred frequency 13.55 GHz;
24.05 GHz - 24.25 GHz, preferred frequency 24.125 GHz.

1.2. Second-choice bands

2.400 MHz - 2.500 MHz, preferred frequency 2.450 MHz;
9.200 MHz - 9.500 MHz;
10.5 GHz - 10.6 GHz.

2. TOTAL BANDWIDTH USED

The total bandwidth used (see paragraph 2.1. in Annex III) shall not exceed 0.4% of the frequency at the upper limit of the frequency band concerned, taking into account simultaneous variations in the ambient temperature between one of the following limits (choice optional):

- 25° C to + 55° C
- 20° C to + 55° C
- 10° C to + 55° C
- 5° C to + 40° C

and in the supply voltage of $\pm 10\%$ relative to the value stated by the manufacturer.
If a frequency is assigned, this frequency shall be within the total bandwidth used.

3. CLASSES OF EMISSION

Any class for which the emission is within the total bandwidth used, as indicated in paragraph 2.1.

4. MAXIMUM PEAK ENVELOPE POWER

500 mW e.i.r.p.

5. SPURIOUS EMISSIONS FROM THE TRANSMITTER AND THE RECEIVER

- (a) The power of spurious emissions from the transmitter and of emissions outside the total bandwidth used shall not exceed 10 μ W e.i.r.p.
- (b) The power of spurious emissions from the receiver shall not exceed 10 μ W e.i.r.p.

Annex III

METHODS OF MEASUREMENT FOR LOW-POWER RADIOLOCATION EQUIPMENT FOR DETECTING MOVEMENT AND FOR ALERT

1. TEST SITE AND GENERAL ARRANGEMENTS

1.1. Test site

The test shall be carried out on a reasonably level surface or piece of ground. At one point of the site there shall be a flat area of at least 5 m diameter. At the centre of this area, a non-conducting support shall be used to hold the equipment being tested at a height of 1.5 m above the ground.

The test site shall be of sufficient dimensions to enable a measuring antenna to be erected no less than 5 m away from the equipment being tested.

Precautions shall be taken to ensure that reflections caused by objects close to the test site and ground reflections do not alter the measurements.

1.2. Test antenna and receiver

The test antenna is used to receive emissions from the equipment being tested or from the substitution antenna. It shall be mounted on a support enabling the antenna to be used with horizontal or vertical polarisation at a height of 1.5 m above the ground.

The receiver shall be capable of being tuned to each of the frequencies under investigation and of measuring the relative levels of signals at its input.

1.3. Substitution antenna

The substitution antenna shall be an antenna which has been calibrated against an isotropic antenna. The centre of this antenna shall coincide with a reference point which is the centre of the space occupied by the equipment being tested when the equipment antenna is integral.

This antenna shall be connected to a calibrated signal generator operating at the frequencies concerned, via matching and balancing networks.

2. TOTAL BANDWIDTH USED

2.1. Description

For the purpose of these specifications, the total bandwidth used shall be the frequency difference corresponding to the separation between two points on the transmission spectrum envelope beyond which the power level remains lower than 10 μW e.i.r.p. in a bandwidth as specified in point 2.2., plus the frequency drift (difference between the maximum and minimum frequency of the carrier wave) as a result of specified variations in temperature and supply voltage.

2.2. Method of measurement

Measurements shall first be taken at a test site (paragraph 1.), and the test antenna shall be connected to a spectrum analyser. The resolution bandwidth of the spectrum analyser shall be 100 kHz for operating frequencies below 10 GHz and 1 MHz for operating frequencies above 10 GHz. The frequencies corresponding to points on the spectrum envelope beyond which the power level remains below 10 μW e.i.r.p. shall be noted. The difference between the frequencies obtained shall be increased by the frequency drift of the carrier wave as a result of specified environmental conditions.

The frequency drift shall be measured by placing the equipment in a climatic chamber and measuring its emission.

The frequency of the carrier wave (or the centre of the band emitted) shall be measured when the temperature and supply voltage are being varied simultaneously as specified. The maximum deviation of the carrier wave frequency shall be added to the frequency difference noted from the test site measurements, to obtain the total bandwidth used.

3. PEAK ENVELOPE POWER (E.I.R.P.)

3.1. Definition

For the purpose of these specifications, the peak envelope power (e.i.r.p.) is the power radiated in the direction of maximum field intensity under the specified environmental conditions.

3.2. Method of measurement

The transmitter being tested shall be placed in a test site as specified in paragraph 1.1.

The transmitter shall be used with its normal emission.

The test receiver shall be tuned to the working frequency of the transmitter.

The transmitter antenna and the test antenna shall be oriented to obtain maximum response.

The "transmitter/transmitter antenna" assembly shall be replaced by the substitution antenna defined in paragraph 1.3., and the level of the input signal for the substitution antenna shall be adjusted to obtain in the measuring receiver the same level as previously or a level deviating by a known value.

The peak envelope power (e.i.r.p.) is the power delivered to the antenna, plus a value allowing for the gain of the substitution antenna relative to the isotropic antenna.

4. SPURIOUS EMISSIONS FROM THE TRANSMITTER

4.1. Definition

Spurious emissions are emissions on any frequency other than those of the carrier and sideband components resulting from the normal modulation process, radiated by the antenna and the equipment structures.

4.2. Method of measurement

The method of measurement is similar to that described in paragraph 3.2. It shall be repeated for any frequency on which spurious emissions have been found.

5. SPURIOUS EMISSIONS FROM THE RECEIVER

5.1. Definition

Receiver spurious emissions come from emissions transmitted by the antenna and by the receiver structures.

5.2. Method of measurement

The method of measurement is similar to that described in paragraph 3.2., replacing the transmitter by the receiver.

6. ACCURACY OF MEASUREMENT

The tolerances for the measurement of the following parameters shall be as given below:

1. DC voltage	± 3 %
2. AC voltage	± 3 %
3. Radio frequency	± 10 kHz
4. Radio-frequency voltage	± 2 dB
5. Radio-frequency field strength	± 3 dB
6. Radio-frequency carrier power	± 10 %
7. Impedance of coupling devices, cables, plugs, attenuators, etc.	± 5 %
8. Internal impedance of generators and input impedance of measuring receivers	± 10 %
9. Attenuation of attenuators	± 1 dB
10. Temperature	± 1 ° C

Annex IV

INFORMATION TO BE PROVIDED BY AN APPLICANT FOR THE TYPE APPROVAL OF LOW-POWER RADIOLOCATION EQUIPMENT FOR DETECTING MOVEMENT AND FOR ALERT

General

Applicant: name, address, telephone number and telex.
Action officer for the applicant: name and telephone number.
Manufacturer: name and address.
Type designation and trade name (if shown on the equipment).
Countries in which the appliance or equipment from which it derives has already been submitted for type approval and results obtained.
Type of equipment: transmitter, receiver, transmitter/receiver.
Options for use fixed, mobile, portable.
Connections and/or additional devices.
Power source: integral or external; using batteries, accumulators, mains.
Antennas: type;
 isotropic gain.
Class of emission; type of modulation.
Band of operating frequencies for the system.
List of carrier wave frequencies available to the equipment during tests.

Transmitter

Nominal value of the equivalent isotropically radiated peak envelope power.
Nominal value of the total bandwidth used (see paragraphs 2. in Annex II and 2.1. in Annex III).

Receiver

Type of demodulation system.

Test conditions

Lower extreme temperature.
Higher extreme temperature.
Nominal supply voltage(s).

Left blank

Appendix to Recommendation T/R 60-01

This Appendix contains additional information concerning national derogations and options available for the implementation of Recommendation T/R 60-01. It has been produced by the "Radiocommunications" Working Group T/WG 3 and circulated by the CEPT liaison office. Since the information has come from Administrations, its content is not subject to approval by the "Telecommunications" Commission.

T/R 60-01

Appendix to Annex I (adopted at Malaga-Torremolinos 1975)

Paragraph	Administration	Description of variation and choice	Reason
General	Greece Ireland Norway Spain Switzerland United Kingdom	Under examination Recommendation not in force Recommendation not in force (choices are indicated) Recommendation not in force Recommendation not in force Recommendation not in force	

T/R 60-01

Appendix to Annex II (adopted at Malaga-Torremolinos 1975)

Paragraph	Administration	Description of variation and choice	Reason
1. and 8.	Germany (Fed. Rep. of)	Depends on revision of Annexes II and III	
1.1.	Finland France	Frequencies used: 9.830 MHz and 9.950 MHz Frequencies used: 2.450 MHz, 9.900 MHz and 24.125 MHz, possibly 10.590 MHz, 8.875 MHz for road radars only The total occupied band, according to the circumstances, shall be between 2.430 MHz and 2.470 MHz (and bandwidth less than 10 MHz) 8.865 MHz and 8.885 MHz 9.880 MHz and 9.920 MHz 24.075 MHz and 24.175 MHz	Choice possible
	Netherlands	9.300 - 9.500 MHz (telecommand and alert equipment) 13.4 - 14 GHz (alert) 24.05 - 24.25 GHz (alert)	Choice possible
	Norway	(Current specification) 10.56 GHz ± MHz	
	Sweden	Frequency bands: 10.25 - 10.28 GHz Frequency bands: 10.35 - 10.38 GHz Frequency bands: 10.51 - 10.55 GHz Frequency bands: 10.55 - 10.58 GHz Frequency bands: 24.00 - 24.25 GHz	
2.	Austria Belgium Denmark Finland	Extreme temperatures: -20° C and +55° C Extreme temperatures: -10° C and +55° C Extreme temperatures: + 5° C and +40° C Extreme temperatures: -20° C and +55° C (Equipment for use indoors will be tested only at normal temperatures)	Choice possible Choice possible Choice possible
	France	Extreme temperatures: -10° C and +55° C (on request: - 20° C and +25° C	Choice possible
	Germany (Fed. Rep. of) Netherlands Norway Sweden	Extreme temperatures: -10° C and +55° C The equipment is not tested under extreme conditions (Current specification) -20° C and +55° C Extreme temperatures: -25° C and +55° C (except for equipment used only in temperature-controlled premises: +5° C and +40° C) Bandwidth at - 30 dB in most cases: 30 MHz (only for 10 GHz equipment)	Choice possible Choice possible
4.	Switzerland France (United Kingdom)	Extreme temperatures: - 10° C and +55° C Maximum peak envelope power (e.i.r.p.): 500 mW (at 2.450 MHz, 9.990 MHz and 24.125 MHz) 20 mW (10.590 MHz) 100 mW (8.975 MHz)	Choice possible
	Sweden	E.i.r.p.: 5 W if the antenna gain is more than 20 dB relative to the isotrope	
5.	Germany (Fed. Rep. of)	Additional limits in the range below 1.000 MHz: 2 µW Furthermore, in the frequency range from 10 kHz to 30 MHz, limits are imposed: 1. by the magnetic component of the interference field radiated by the equipment or by its leads 2. as the case may be, for the voltage created by conduction in the mains supply leads (particularly important for base stations)	The substitution method for frequencies below 30 MHz raises problems
	Norway Sweden	(Current specifications): Spurious emission limited to 50 µW E.i.r.p.: 10 µW/MHz outside a ± 20 MHz band centred on the frequency allocated for 10 GHz equipment and outside 24.00 to 24.25 GHz for 24 GHz equipment	

T/R 60-01

Appendix to Annex III (adopted at Malaga-Torremolinos 1975)

Paragraph	Administration	Description of variation and choice	Reason
2.2.	Denmark Sweden	Measurements are taken only at the usual temperatures Resolution bandwidth: 1 MHz Measurement range: 5-33 GHz (no 3 rd harmonic), equipment 01-10-83 Measurement range: 2-40 GHz for 24 GHz equipment (01-07-82)	