International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R M.824-4

(02/2013)

Technical parameters of radar beacons

M Series

Mobile, radiodetermination, amateur and related satellite services

International Telecommunication Union

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Annex 1 of Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from http://www.itu.int/ITU-R/go/patents/en where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

Series of ITU-R Recommendations

(Also available online at http://www.itu.int/publ/R-REC/en)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	**Mobile, radiodetermination, amateur and related satellite services**
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

Electronic Publication
Geneva, 2013

RECOMMENDATION ITU-R M.824-4*

Technical parameters of radar beacons

(1992-1994-1995-2007-2013)

Scope

Radar beacons (racons) are in common use in the maritime radionavigation service and in limited use in the aeronautical radionavigation service. This Recommendation sets out the technical parameters for:

– maritime racons – 2 900-3 100 MHz and 9 200-9 500 MHz;

– aeronautical fixed-frequency racons – 9 300-9 500 MHz.

The ITU Radiocommunication Assembly,

considering

a) that maritime radars in the maritime radionavigation service operate in the frequency bands 2 900-3 100 MHz and 9 200-9 500 MHz;

b) that aeronautical mobile radars operate in the frequency band 9 300-9 500 MHz;

c) that maritime radar beacons (maritime racons) operate in the frequency bands 2 900-3 100 MHz and 9 200-9 500 MHz;

d) that the use of fixed-frequency racons is not permitted in the frequency band 9 320-9 500 MHz;

e) that the use of the frequency band 9 300-9 500 MHz by the aeronautical radionavigation service is limited to airborne weather radars and ground-based radars. In addition, ground-based fixed-frequency racons in the aeronautical radionavigation service are permitted in the frequency band 9 300-9 320 MHz on condition that harmful interference is not caused to the maritime radionavigation service. In the frequency band 9 300-9 500 MHz, ground-based radars used for meteorological purposes have priority over other radiolocation devices,

recommends

1 that the technical parameters for maritime racons, and ground based aeronautical fixed-frequency racons should be in accordance with Annexes 1 and 2, respectively.

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* This Recommendation should be brought to the attention of the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the World Meteorological Organization (WMO), the International Association of Lighthouse Authorities (IALA) and the International Electrotechnical Commission (IEC).

Annex 1

Technical parameters for a maritime racon

Item	Parameters	Specifications
1. Antenna	Polarization	In the 3 GHz band, suitable for responding to radars using horizontal polarization and to radars using vertical polarization. In the 9 GHz band, suitable for responding to radars using horizontal polarization.
2. Receiver	Frequency band Recovery period Primary radar pulse length gating	2 900-3 100 MHz and/or 9 200 to 9 500 MHz ≤ 100 μs after end of response ≥ 0.05 μs ≤ 2 μs
3. Transmitter	Frequency	Transmission should occur: – either on the frequency of the interrogating signal with a frequency matching accuracy of ± 3.5 MHz for interrogating pulses with a duration of less than 200 ns, or, with a frequency matching accuracy of ± 1.5 MHz for pulses with a duration equal to or more than 200 ns; – or by a series of sweeps covering the entire frequency band of the receiver in which the signal was received. Where the transmission consists of a series of sweeps, the form of the sweep shall be sawtooth and should have a slew rate of between 60 s and 120 s per 200 MHz.
4. Response	Delay after receipt of interrogation Form of identification Duration	Normally not more than 0.7 μs Identification coding should normally be in the form of a Morse letter. The identification coding used should be as described in appropriate navigational publications. The identification coding should comprise the full length of the radar beacon response and, where a Morse letter is used, the response should be divided with a ratio of one dash equal to three dots and one dot equal to one space. The coding should normally commence with a dash. The duration of the response should be approximately 20% of the maximum range requirement of the particular radar beacon, or should not exceed five miles, whichever is the lower value. In certain cases, the duration of the response may be adjusted to suit the operational requirements for the particular radar beacon (see Note 1).

NOTE 1 – Characteristics for antenna gain, receiver sensitivity, transmitter power, racon response duration, frequency agile racon on/off time, and side-lobe suppression should be determined by administrations.

Annex 2

Technical parameters for a ground-based aeronautical fixed-frequency racon

Characteristics	Value
Transmitter	
Frequency (MHz)	9 310
Necessary bandwidth (allowing for frequency tolerance of ± 3 MHz)	12
Power (measured at antenna terminals) (W)	50
Form of identification	15 digital codes
Overall length of transmission (μs)	15.5
Receiver	
Passband (MHz)	9 370 to 9 380
Sensitivity (dBm)	–55
Maximum blocking period (μs)	25
Pulse length discrimination (μs)	2.35 ± 0.3
Fixed delay in response (μs)	4.7 ± 0.1
Antenna	
Gain (dBi)	0, minimum
Beamwidth (degrees)	Azimuth: 360° Elevation: 30°
Polarization	Horizontal