RECOMMENDATION 488-1*

EQUIVALENT POWERS OF DOUBLE-SIDEBAND AND SINGLE-SIDEBAND RADIOTELEPHONE EMISSIONS IN THE MARITIME MOBILE SERVICE

(1974-1990)

The CCIR,

CONSIDERING

(a) that according to provisions in force prior to 1 February 1992 of the International Convention for the Safety of Life at Sea, London, 1974, in the 2 MHz band using A3E emissions, it may be assumed that clearly perceptible signals will be obtained by day and under normal conditions and circumstances at 150 nautical miles by a power in the antenna of 15 W (unmodulated carrier) with an antenna efficiency of 27%;

(b) that clearly perceptible signals are assumed to be received when the r.m.s. value of the field strength produced at the receiver by the unmodulated carrier is at least 25 μV/m;

(c) that in normal operation the transmitter shall have a depth of modulation of at least 70% at peak intensity;

(d) that in the interest of more efficient spectrum utilization Resolution No. 306, Geneva, 1979, of the Radio Regulations requires the conversion by 1 January 1982, of all maritime emissions in the 2 MHz band to SSB except those on 2182 kHz, which may be A3E or H3E;

(e) that the Safety Convention requires that transmitters use the classes of emission assigned by the Radio Regulations;

(f) that to further improve efficient spectrum utilization all stations are constrained by the Radio Regulations to radiate no more than such power as is necessary to ensure a satisfactory service;

(g) that the International Maritime Organization Resolution A.610(15) requires that the transmitter should be capable of transmitting upper sideband signals, where appropriate, using class of emission J3E and H3E with a peak envelope power during normal modulation emission of at least 60 W;

(h) that SSB transmitters utilize R3E, H3E and J3E emissions;

(j) that there is consequently a need to specify for each of the types of SSB emission, the powers and field strengths equivalent to those in the DSB system at present employed;

(k) that cross-system operation between SSB and DSB equipments will at times be utilized,

UNANIMOUSLY RECOMMENDS

1. that the bases for the calculation of the field strengths of H3E, R3E and J3E emissions equivalent to a reference signal, which is an A3E emission for which the unmodulated carrier produces a field strength of 25 μV/m at the receiver, are as follows:

1.1 the signal-to-noise ratios at the output of the demodulator of all cases considered, including the reference case, are equal;

1.2 for single-tone modulation, the signal-to-noise ratio to be considered is only that of the fundamental component of the modulating tone at the output of the demodulator;

1.3 for class of emission A3E, the carrier is modulated by a single modulating tone to depths of 70% or 100%;

1.4 for class of emission H3E, the sideband amplitude for a single modulating tone is 70% or 100% of the carrier amplitude for equivalent 70% or 100% respectively, depths of modulation;

1.5 for class of emission R3E, the amplitude of the sideband signal corresponding to 70% and 100% modulations is the same as that for H3E in § 1.4 but the carrier level is reduced to 16 dB below peak envelope power corresponding to 100% modulation;

1.6 for class of emission J3E, the amplitude of the sideband signal corresponding to 70% and 100% modulations is the same as that for H3E in § 1.4, but the carrier level is reduced by at least 40 dB below peak power corresponding to 100% modulation;

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* This Recommendation terminates the study of Question 19/8, which has been deleted.

2. that under the above conditions the calculated equivalent r.m.s. field strengths for the various classes of emission and for different types of receiving systems, with the types of test signals indicated, are shown in Table I:

TABLE I

Class of emission	Type of receiver	Test signal	r.m.s. field strength (μV/m) equivalent to the reference signal (see § 1) with a modulation depth of:	
			70%	100%([2])
A3E	DSB	carrier only	25.0	25.0
A3E	SSB	carrier only	35.4	35.4
H3E	DSB	carrier only([1])	26.8	29.4
H3E	SSB	carrier only	17.7	17.7
R3E	SSB	carrier and sideband	12.8	18.0
J3E	SSB	sideband only	12.4	17.7

([1]) Envelope detection of the H3E emission is assumed and this requires the reference field strength of 25 μV/m to be increased by 7% and 18% at 70% and 100% modulation, respectively, to compensate for the reduction in the amplitude of the fundamental component due to harmonic distortion in the detection process.

([2]) The calculations for 100% modulation are based upon the reference carrier (unmodulated) field strength of 25 μV/m.

3. that the calculated equivalent peak envelope powers into the antenna to achieve the field strengths given in § 2 are as listed in Table II; these powers are in all cases based upon a modulated signal:

TABLE II

Class of emission	Type of receiver	Peak envelope power (W) equivalent to the reference signal (see § 1) with a modulation depth of:	
		70%	100%
A3E	DSB	43.4	60
A3E	SSB	86.7	120
H3E	DSB	49.7	83.2
H3E	SSB	21.7	30.0
R3E	SSB	5.9	10.6
J3E	SSB	3.7	7.5

Note – The values given in this Table are valid irrespective of the type of modulating signal (i.e. single-tone, two-tone, smoothly-read text, etc.), provided the same modulation is used for all classes of emission.

Note – The Director, CCIR, is requested to bring this Recommendation to the attention of IMO.