

TECHNICAL CONDITIONS FOR A SATELLITE EMERGENCY POSITION-INDICATING RADIO BEACON

(Article 7 paragraph 18 and paragraph 21, Article 14 paragraph 3, Article 45.2 paragraph 5, paragraph 2 item 5, paragraph 3 item 4 of the Ordinance Regulating Radio Equipment)

September 18, 1990

Ministry of Posts and Telecommunications Notification No. 572

Finally amended in No. 745 on December 13, 2001

The technical conditions for a satellite emergency position-indicating radio beacon shall be stipulated as follows based on the provisions of Article 7 paragraph 16 and paragraph 19, Article 14 paragraph 3, Article 45.3.3 paragraph 1 item 5, paragraph 2 item 4, paragraph 3 item 4 of the Ordinance Regulating Radio Equipment (Radio Regulatory Commission Regulations No. 18 of 1950).

- 1 The satellite emergency position-indicating radio beacon shall comply with the following conditions.
 - (1) The satellite emergency position-indicating radio beacon shall have a means for protecting the polarity of power supply from accidental reversal.
 - (2) The equipment that automatically detaches itself from the hull shall start operation before it reaches the depth of 4 meters, and shall be capable of carrying out a function test independently.
 - (3) The dedicated equipment for sending a distress alarm manually shall operate by two or more independent operations.
 - (4) The manufacturer's name, type name, manufacturing number, identification signal (maritime identification numerals and ship station identification), and the expiry date of the battery shall be indicated on the outside of the beacon so that they can be clearly read at its ordinary installation position.
- 2 The satellite emergency position-indicating radio beacon prescribed in Article 45.2 paragraph 1 of the Ordinance Regulating Radio Equipment shall comply with the following conditions in addition to the conditions stated in the preceding paragraph.
 - (1) The beacon shall use G1B emissions of a frequency of 406.025 MHz or 406.028 MHz for a signal intended for artificial satellites and A3X emissions of a frequency of 121.5 MHz for a signal used by aircraft for homing.
 - (2) The equipment intended for artificial satellites which uses G1B emissions shall comply with the following conditions.
 - a The equipment shall not break down even if the antenna terminal is short-circuited or opened.
 - b When emission radiation is continuously performed because of a failure in the equipment, the radiation shall be automatically stopped before the radiation continues for 45 seconds.
 - c The frequency variations (which refer to the value of inclination of linear regression per minute in a variation for 15 minutes) shall be $1/10^9$ or less.
 - d The antenna power shall be 5 W (with a tolerance of ± 2 dB).
 - e The permissible values for the intensity of spurious emissions of each frequency from 406 MHz to 406.1 MHz shall be the value of the curve shown in Fig. 1.
 - f The transmission signal shall comply with the following conditions.

- (a) The composition shall be as shown in Fig. 1.
- (b) The transmission time of a signal which is transmitted in the self-diagnosis mode shall be 440 ms at maximum, and the number of transmissions shall be one.
- (c) The error detecting code shall be the BCH code, and the polynomial expression that generates it shall be as follows.

$$G1(X) = 1 + X^3 + X^7$$

$$G3(X) = G1(X) \cdot (1 + X + X^2 + X^3 + X^7)$$

$$G5(X) = G3(X) \cdot (1 + X^2 + X^3 + X^4 + X^7)$$

- (d) The transmission rate shall be 400 bits/s (with a tolerance of 1%).

- (3) The equipment intended for aircraft which uses A3X emissions shall comply with the following conditions.

- a The signal used by aircraft for homing shall be continuously transmitted by the said equipment. However, after the transmission of a signal used by the said aircraft for homing is suspended for two seconds at maximum by the transmission of a signal intended for an artificial satellite by the equipment stated in the preceding item, the frequency shift of the carrier of a signal to be re-transmitted shall be within ± 30 Hz.
- b The peak-envelope effective radiated power (which refers to the value of the product of the peak envelope power supplied from a transmitter to an antenna and the relative gain of the antenna in the direction given) shall be 50 mW (with a tolerance of ± 3 dB).
- c The permissible values for the intensity of spurious emissions of each frequency from 121.4 MHz to 121.6 MHz shall be the value of the curve shown in Fig. 1.

- 3 The satellite emergency position-indicating radio beacon prescribed in Article 45.2 paragraph 2 of the Ordinance Regulating Radio Equipment shall comply with the conditions defined in each item of paragraph 1 (except item 2) and each item of paragraph 2.

- 4 The satellite emergency position-indicating radio beacon prescribed in Article 45 of the Ordinance Regulating Radio Equipment shall comply with the following conditions in addition to the conditions defined in paragraph 1.

- (1) The transmission frequency shall not be easily changed from outside.
- (2) The antenna power shall be 1 W (with a tolerance of -3 dB to $+1$ dB).
- (3) The permissible values for the mean power of spurious emissions of each frequency supplied to the feeder shall be lower than the mean power of the fundamental frequency by 40 dB.

- (4) The time interval for transmission shall be as shown in Fig. 2.

- (5) The transmission signal shall comply with the following conditions.

- a The composition shall be as shown in Table 2 and Fig. 3.
- b The error detecting code shall be the BCH code, and the polynomial expression that generates it shall be as follows.

$$G(X) = 1 + X^4 + X^8 + X^{10} + X^{11} + X^{13} + X^{15} + X^{16} + X^{17} + X^{20} + X^{22} + X^{23} + X^{24} + X^{26} + X^{27} + X^{28} + X^{29} + X^{30} + X^{32} + X^{33} + X^{36} + X^{37} + X^{40}$$

- c When the frequency deviation shows a positive number, "1" shall be given, and when it shows a negative number, "0" shall be given.

- (6) The axial ratio of the antenna shall be 5 dB or lower in the range of an elevation angle from 0° to 90° .

Supplementary Provisions (November 5, 1996

Ministry of Posts and Telecommunications Notification No. 571)

- 1 The Notification shall come into force as of the day of promulgation.
- 2 Notwithstanding the provisions of the Notification after amendment, the technical conditions for the satellite emergency position-indicating radio beacon which was installed on a ship before November 22, 1996 shall continue to conform to the prior Regulations if the beacon remains installed on the said ship.
- 3 The type of satellite emergency position-indicating radio beacon which has validity having passed the type authorization in accordance with the Radio Equipment Type Authorization Regulations (Ministry of Posts and Telecommunications Ordinance No. 40 of 1961) as of the enforcement date of this Notification shall lose its validity on November 23, 1996. However, the beacon which had been installed on a ship before November 22, 1996 shall be deemed to have passed the type authorization if it remains installed on the said ship.

Table 1 Composition of signals

Unmodulated wave 160 ms	Synchronizati on code (24) Note 1	Classification of message types (1) Note 2	Kinds of identification indications (1)	Identification indications (59) Note 3	Error detecting code (21)	Message	
						(6) Note 4	(32) Note 5

Numerals in () represent the number of bits.

Note 1 The synchronization code shall consist of a bit synchronization signal “11111111111111” and a frame synchronization signal “000101111.” However, the frame synchronization signal which is transmitted in the self-diagnosis mode shall be “011010000.”

Note 2 When the message type classification is “1”, the 32 bits stated in Note 5 shall be added to the message.

Note 3 The identification indications shall be as follows.

(1) When the identification indication type is “0”

Contents	Positions of Bits
MID	1 to 10
Numerals of six digits (*1) in identification of ship stations except MID	11 to 30
Latitude (degree)	31 to 37
Latitude (minute)	38 to 43
North latitude: 0, south latitude: 1	44
Longitude (degree)	45 to 52
Longitude (minute)	53 to 58
East longitude: 0, west longitude: 1	59

*1 The said numerals shall be maritime identification numerals (MID) and ship identification prescribed in Appendix No. 43 of the Associated Regulations.

(2) When the identification indication type is “1”

Contents		Positions of Bits
MID		1 to 10
Kind of data		11 to 13
Data (*2)		14 to 57
Kind of induction equipment	No induction equipment	: 00
	That which has a transmitter of 121.5 MHz	: 01
	That which has a radar transponder in the 9 GHz band	: 10
	That which has other induction equipment	: 11
		58 to 59

*2 a When the kind of data is “0101”

- (a) Bits 14 to 49 represent a call sign. However, the numeral combination in which all the digits are numerals shall be construed to be the lower-order six digits of MID.
- (b) Bits 50 to 55 shall be used for the numerals which identify a satellite emergency position-indicating radio beacon of the same ship (hereinafter referred to as “EPIRB”).
- (c) For bits 56 and 57, “00” shall be entered.
- (d) Characters and numerals shall be converted to a code of six bits according to the following conversion table.

Character	Code	Character	Code
A	111000	U	111100
B	110011	V	101111
C	101110	W	111001
D	110010	X	110111
E	110000	Y	110101
F	110110	Z	110001
G	101011	Blank	100100
H	100101	-	011000
I	101100	/	010111
J	111010	1	011101
K	111110	2	011001
L	101001	3	010000
M	100111	4	001010
N	100110	5	000001
O	100011	6	010101
P	101101	7	011100
Q	111101	8	001100
R	101010	9	000011
S	110100	0	001101
T	100001		

The code indicated in the left-hand column shall be MSB (the highest rank bit) and the code indicated in the right-hand column shall be LSB (the lowest rank bit).

- b When the kind of data is "011"
- (a) Bits 14 to 17 shall represent the kind of EPIRB according to the following codes.
- 0100: used in the sea
1000: used in a life boat
- (b) Bits 18 to 37 shall be used for serial numbers.

Note 4 The bits of the message shall be used as follows.

Position of Bit	Contents	
1	0: bits 3 to 6 to be used for purposes other than those stated below 1: bits 3 to 6 to be used for purposes other than those stated above	
2	0: shows that EPIRB is of a manually starting type. 1: shows that EPIRB is of a manually and automatically starting type.	
3 to 6	Kind of distress (when the 1st bit is "1")	0001: fire or explosion 0010: inundation 0010: collision 0100: stranding 0101: inclination and danger of overturning 0110: sinking 0111: other distress 1000: abandon ship 1111: test

Note 5 The 32 bits of the message shall be used as follows.

(1) When the identification indication type is “0”

Position of Bit	Contents
1 to 9	Steerage (degree)
10 to 14	Speed (knot)
15 to 17	Day of the week (example: 000 = Sunday)
18 to 22	Time (24 hours indication)
23 to 27	Minute (every two minutes)
28 to 32	Additional functions

(2) When the identification indication type is “1”

Position of bit	Contents
1 to 2	“00”
3 to 9	Latitude (degree)
10 to 15	Latitude (minute)
16	North latitude: 0, south latitude: 1
17 to 24	Longitude (degree)
25 to 30	Longitude (minute)
31	East longitude: 0, west longitude: 1
32	Even-numbered parity of bits 1 to 31

Table 2 Composition of transmission signals

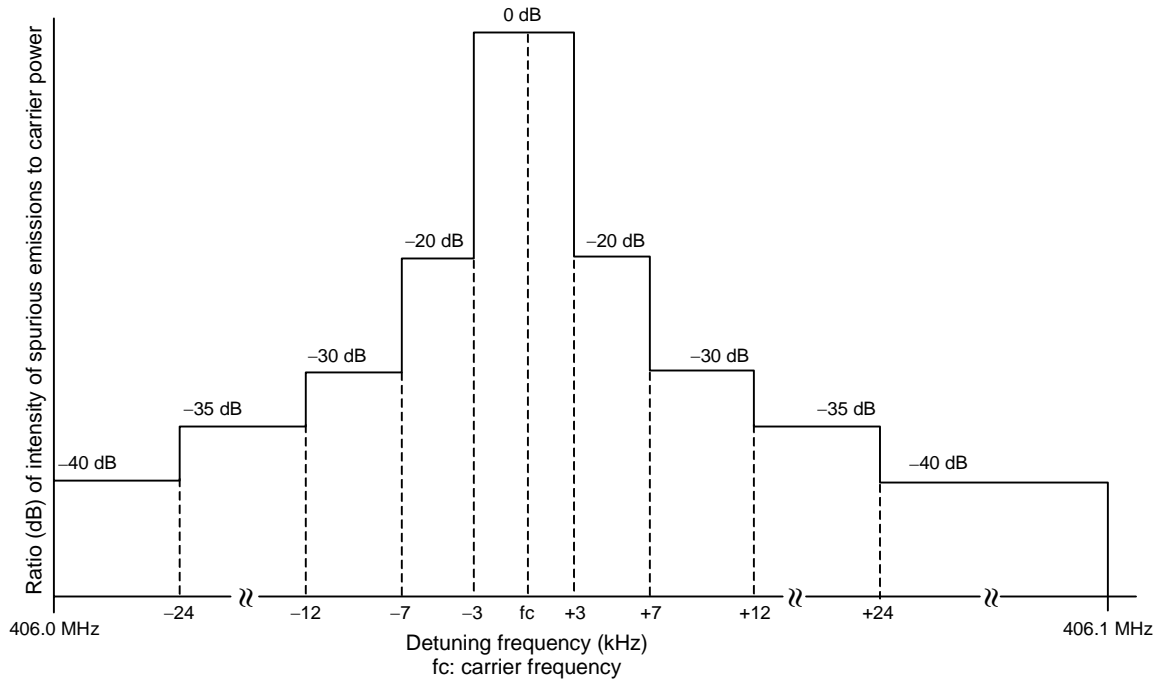
Synchronization Signal	20 Bits	“1110 1101 1110 0000”
An identification indication of the station where the beacon is installed	30 bits	Ship identification Range: 0 to 999999999
Locations of distress	1 bit	Indication of longitude (east longitude, west longitude) 0: east 1: west
	1 bit	Indication of latitude (north latitude, south latitude) 0: north 1: south
	8 bits	Longitude (degree) Range: 0 to 180
	6 bits	Longitude (minute) Range: 0 to 60
	7 bits	Latitude (degree) Range: 0 to 90
	6 bits	Latitude (minute) Range: 0 to 60
Message	9 bits	Steerage (degree) Range: 0 to 360
	5 bits	Position change time (hour (coordinated universal time)) Range: 0 to 24
	6 bits	Position change time (minute) Range: 0 to 60
	5 bits	Starting time (hour (coordinated universal time)) Range: 0 to 24
	6 bits	Starting time (minute) Range: 0 to 60
	6 bits	Speed (knot) Range: 0 to 63
Kind of distress	4 bits	Situation of distress (Note)
Error detecting code	40 bits	

Note: Situation of distress

Binary Code	Situation of Distress
0001	Fire or explosion
0010	Inundation
0011	Collision
0100	Stranding
0101	Inclination and danger of overturning
0110	Sinking
0111	Drifting due to ship inoperability
0000	Other distress
1000	Abandon ship
1111	Test

Fig. 1 Permissible values for the intensity of spurious emissions

1 A signal intended for an artificial satellite using G1B emissions



2 A homing signal intended for aircraft using A3X emissions

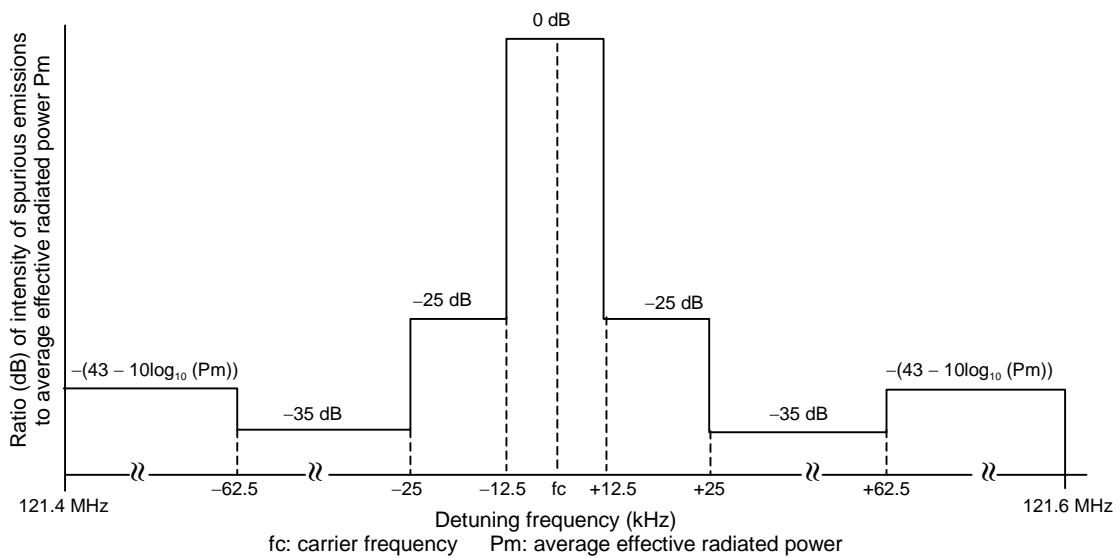
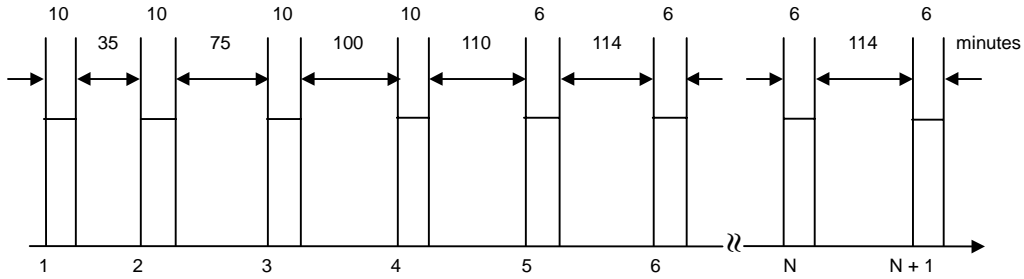
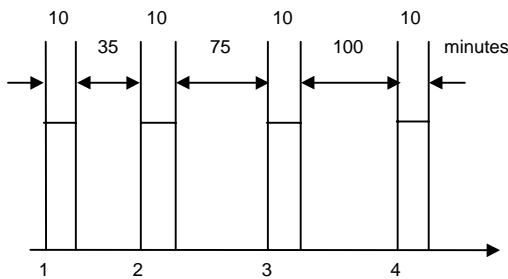


Fig. 2 Time interval for transmission

1 When the beacon has a function for updating and transmitting the location information after it operates



2 In cases other than 1 above



Note: xxxx emissions of a frequency in the bands from 1,644.3 MHz to 1644.5 MHz and xxxx emissions of a frequency in the bands from 1,645.6 MHz to 1,645.8 MHz shall be automatically switched and transmitted.

Fig. 3 An example of the composition of a transmission signal

11101101111000100000	010010101110011011000010100001	1	0	01110111	010011	0100111	001000
Synchronization code (20 bits)	Ship station identification (30 bits) *314159265*			Degree (8 bits)	Minute (6 bits)	Degree (7 bits)	Minute (8 bits)
	Indication of hemisphere (east/west) Indication of hemisphere (north/south)			Longitude 119° 19°		Latitude 39° 00°	

100000100	01010	101100	0100	010100	010000	0110	1 (FEC) 0
Steerage (9 bits)	Hour (5 bits)	Minute (6 bits)	Hour (5 bits)	Minute (6 bits)	Speed (knot) (6 bits)	Situation of navigation (4 bits)	Error detecting code (40 bits)
30.0°	Position change time 10 hours 44 minutes		Starting time 12 hours 20 minutes		16 knots	Sinking	

Note: Article 45.3 was brought forward to Article 45.2 according to MPT Ordinance No. 57 of 1991.