TECHNICAL CONDITIONS FOR EMERGENCY LOCATOR TRANSMITTERS

(Article 14 paragraph (3) and Article 45-12-2 paragraph (1) item i) j) and item ii) b)-3of the Ordinance Regulating Radio Equipment)

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Ministry of Public Management, Home Affairs, Posts and Telecommunications Announcement No. 153

Subject to provisions in the Ordinance Regulating Radio Equipment (Radio Regulatory Commission Regulations No. 18 of 1950), Article 14 paragraph (3) and Article 45-12-2 paragraph (1) item i) j) and item ii) b)-3, the MPHPT announces that it has defined technical conditions for emergency locator transmitters as follows.

The MPHPT abrogates the 1979 Ministry of Posts and Telecommunications Announcement No. 430 (with regard to emergency locator transmitters and their technical conditions to which provisions in the Ordinance Regulating Radio Equipment, Article 45-12-2 are not applied) and the 1997 MPT Announcement No.267 (with regard to technical conditions for emergency locator transmitters).

1. The function that senses falling aircraft acceleration shall be able to activate emergency locator transmitters based on requirements specified in Annex Figure 1.

2. Requirements for transmitting facilities:

    (1) A transmitting device that uses a radio wave with a frequency of 121.5 or 243 MHz shall have the following allowable antenna power deviation: 50% above the upper limit and 20% below the lower limit.

    (2) A transmitting device that uses radio waves with frequencies from 406 to 406.1 MHz shall meet the following requirements:

        i) When continuous emission of radio waves occurs due to a failure, the transmitting device shall be able to terminate such within 45 seconds from its inception.

        ii) The antenna power shall be 5 watts and its allowable deviation shall be within ± 2 dB.

        iii) Permissible values for the intensity of spurious emissions from the transmitting device shall be those on the curve shown in Annex Figure 2.

        iv) The transmit signal structure shall be in compliance with that shown in Annex

Tables.

v) The transmit signal error test code shall be the BCH code and its generation polynomial shall be as follows:

a) For 21 bits from 86th to 106th

$$G1(X)= 1+X^3+X^7$$
$$G3(X)=G1(X) \quad (1+X+X^2+X^3+X^7)$$
$$G5(X)=G3(X) \quad (1+X^2+X^3+X^4+X^7)$$

b) For 12 bits from 133rd to 144th

$$G(X)=(1+X+X^6)(1+X+X^2+X^4+X^6)$$
$$=(1+X^3+X^4+X^5+X^8+X^{10}+X^{12})$$

vi) The transmit signal transmission speed shall be 400 bit/sec (the allowable deviation shall be 0.01 above or below it).

Supplementary Provision

The technical requirements for emergency locator transmitters that were installed on aircraft prior to the enforcement date of this Notice may, notwithstanding the provisions herein, be subject to the former provisions hitherto in force until December 31, 2004.

Annex Table: Signal structure

Section 1. If the identification type bit is "1."

Unmodulated wave: 160 milliseconds	Synchronization code (24) See Note 1	Notification format classification (1) See Note 2	Object identification code					Error test code (21)	Notification	
			Identification type (1)	Nationality code (10) See Note 3	Data type (3) See Note 4	Data (44) See Note 5	Guidance system type (2) See Note 6		(6) See Note 7	(33) See Note 8
Bit position	1–24	25	26	27–36	37–39	40–83	84–85	86–106	107–112	107–144

A number enclosed in parentheses indicates the number of bits.

Note 1: A synchronization code shall consist of a bit synchronization signal "111111111111111" and a frame synchronization signal "000101111."
Note 2: If the notification format classification bit is "0," Note 8 shall apply, otherwise Note 9 shall apply.
Note 3: These bits shall represent the nationality of the aircraft on which the emergency locator transmitter is installed, using the same number as the maritime identification defined in the Radio Regulations.
Note 4: These bits shall be either "001" or "011."
Note 5: The content of this data shall be as follows:
(1) If the 37th to 39th bits of the data type are "001," the 40th to 81st bits shall

represent the nationality and registration symbols that are defined in the Aviation Law and specified for the aircraft on which this emergency locator transmitter is installed, and the 82nd and 83rd bits shall be "00."

The following conversion table shall be used to convert an alphanumeric character to a 6-bit code:

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 leftmost and rightmost bits of a code shall be the MSB (Most Significant Bit) and the LSB (Least Significant Bit), respectively.

(2) If the 37th to 39th bits of the data type are "011," the 40th to 42nd bits shall be one of "000," "001," and "011" and represent the following information. The 43rd bit shall be "1" and the 74th to 83rd bits shall represent the COSPAS-SARSAT type approval number for this emergency locator transmitter.

  i) For "000"
      (A) The 44th to 63rd bits shall indicate the manufacturer's serial number for this emergency locator transmitter.
      (B) Each of the 64th to 73rd bits shall be "0."

  ii) For "001"
      (A) The 44th to 61st bits shall represent what is derived by using the

conversion table given in (1) to convert an ICAO 3-letter code (aircraft operating agency 3-letter shortened symbol) defined in Doc8585 by ICAO (International Civil Aviation Organization).

    (B) The 62nd to 73rd bits shall indicate the serial number of the aircraft operating agency.

  iii) For "011"

    (A) The 44th to 67th bits shall represent a 24-bit address specified for an aircraft according to provisions in ICAO Annex 10.

    (B) The 68th to 73rd bits shall be used to identify the emergency locator transmitter installed on the aircraft.

Note 6: The guidance system type shall be as follows:

    (1) Without a VHF guidance system: 00

    (2) With a transmitter of 121.5 MHz: 01

    (3) With any other guidance system: 11

Note 7: The notification bits shall be used as follows:

Bit position	Description
107	0: Indicates that the 109th to 112th bits do not mean the emergency code.
	1: Indicates that the 109th to 112th bits mean the emergency code.
108	0: Indicates that this emergency locator transmitter is a manual start type.
	1: Indicates that this emergency locator transmitter is both a manual and automatic start type.
109	0: Indicates that a fire does not occur.
	1: Indicates that a fire occurs.
110	0: Indicates that medical assistance is not required.
	1: Indicates that medical assistance is required.
111	0: Indicates the status of being movable.
	1: Indicates the status of being immovable.
112	Shall be "0."

Note 8: The notification bits shall be used as follows:

Bit position	Description
107	0: Indicates that positioning data is provided by an external navigation device.
	1: Indicates that positioning data is provided by an internal navigation device.
108	0: Indicates a north latitude.
	1: Indicates a south latitude.
109–115	Indicates the number of degrees (0 to 90 degrees) in one-degree increments.
116–119	Indicates the number of minutes (0 to 56 minutes) in four-minute increments.
120	0: Indicates an east longitude.
	1: Indicates a west longitude.
121–128	Indicates the number of degrees (0 to 180 degrees) in one-degree increments.
129–132	Indicates the number of minutes (0 to 56 minutes) in four-minute increments.

| 133–144 | Indicates error test code 2 (BCH code). |

Section 2.   If the identification type bit is "0."

Unmodulated wave: 160 milliseconds	Synchronization code (24) See Note 1	Notification format classification (1) See Note 2	Object identification code					Error test code (21)	Supplementary data (6) See Note 6
			Identification type (1)	Nationality code (10) See Note 3	Protocol code (4) See Note 4	Identification data, etc. (24) See Note 4	Positioning information (21) See Note 5		
Bit position	1–24	25	26	27–36	37–40	41–64	65–85	86–106	107–112

A number enclosed in parentheses indicates the number of bits.

Note 1: A synchronization code shall consist of a bit synchronization signal "111111111111111" and a frame synchronization signal "000101111."

Note 2: If the notification format classification is "1," the following information shall be added by using the 113th and following bits:

	Positioning information (latitude and longitude in 4-second increments) (20)	Error test code (12)
Bit position	113–132	133–144

A number enclosed in parentheses indicates the number of bits.

Note 3: These bits shall represent the nationality of the aircraft on which the emergency locator transmitter is installed, using the same number as the maritime identification defined in the Radio Regulations.

Note 4: The 37th to 40th bits (protocol code) shall use one of "0100," "0101," and "0011" to represent the following information:

(1) For "0100"
   i)   The 41st to 50th bits shall represent the COSPAS-SARSAT type approval number.
   ii) The 51st to 64th bits shall indicate the manufacturer's serial number for this emergency locator transmitter.

(2) For "0101"
   i)   The 41st to 55th bits shall be a set of three 5-bit codes that are derived from converting an ICAO 3-letter code (aircraft operating agency 3-letter shortened symbol) defined in Doc8585 by ICAO (International Civil Aviation Organization) by using the conversion table provided in Section 1. Note 6 (1) hereof, and removing the top bit of each of the converted letters.
   ii) The 56th to 64th bits shall indicate the serial number of the aircraft operating agency.

(3) For "0011"
   The 41st to 64th bits shall represent a 24-bit address specified for an aircraft according to provisions in ICAO Annex 10.

Note 5: The positioning information shall be latitude and longitude data in 15-minute increments.

Note 6: The supplementary data shall be as follows:

Bit position	Description
107–110	Shall be "1101."
111	0: Indicates that positioning data is provided by an external navigation device.
	1: Indicates that positioning data is provided by an internal navigation device.
112	0: Indicates that this guidance system has no VHF guidance system.
	1: Indicates that this guidance system has a 121.5 MHz transmitter.

Annex Figure 1: Requirements for the falling aircraft acceleration sensing function

Notes

1. ΔV: Velocity change (ft/s)

2. Curve's relational expression: $\Delta V = 32.174\,GT_p$

3. The minimum of velocity changes shall be 3.5±0.5 ft/s immediately before the falling acceleration sensing function becomes operational.

4. The falling acceleration sensing function shall not respond to impacts of 1.7 G or less.

Annex Figure 2: Permissible values for the intensity of spurious emissions in frequency bands from 406 to 406.1 MHz.