

alternate procedure may be used provided prior Commission approval is obtained.

[60 FR 37264, July 19, 1995, as amended at 61 FR 4235, Feb. 5, 1996; 61 FR 6155, Feb. 16, 1996; 61 FR 18986, Apr. 30, 1996; 62 FR 41214, July 31, 1997; 62 FR 52044, Oct. 6, 1997; 64 FR 66409, Nov. 26, 1999; 67 FR 63288, Oct. 11, 2002; 68 FR 38639, June 30, 2003; 69 FR 46443, Aug. 3, 2004; 69 FR 67838, Nov. 22, 2004; 70 FR 28466, May 18, 2005; 70 FR 61061, Oct. 20, 2005; 72 FR 35195, June 27, 2007]

§90.212 Provisions relating to the use of scrambling devices and digital voice modulation.

(a) Analog scrambling techniques may be employed at any station authorized the use of A3E, F3E, or G3E emission, subject to the provision of paragraph (d) of this section.

(b) The use of digital scrambling techniques or digital voice modulation requires the specific authorization of F1E or G1E emission, and these emissions will only be authorized subject to the provisions of paragraph (d) of this section.

(c) The transmission of any non-voice information or data under the authorization of F1E or G1E emission is prohibited. However, stations authorized the use of F1E or G1E emission may also be authorized F1D, F2D, G1D or G2D emission for non-voice communication purposes, pursuant to §90.207(1).

(d) Station identification shall be transmitted in the unscrambled analog mode (clear voice) or Morse code in accordance with the provisions of §90.425. All digital encoding and digital modulation shall be disabled during station identification.

[43 FR 54791, Nov. 22, 1978, as amended at 47 FR 15340, Apr. 9, 1982; 49 FR 48711, Dec. 14, 1984; 72 FR 35195, June 27, 2007]

§90.213 Frequency stability.

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	^{1,2,3} 100	100	200
25-50	20	20	50
72-76	5	50
150-174	^{5,11,5}	⁶ 5	^{4,6} 50
216-220	1.0	1.0
220-222 ¹²	0.1	1.5	1.5
421-512	^{7,11,14} 2.5	⁸ 5	⁸ 5
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	¹⁴ 0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928 ¹³	2.5	2.5	2.5
929-930	1.5
935-940	0.1	1.5	1.5
1427-1435	⁹ 300	300	300
Above 2450 ¹⁰

¹ Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.

² For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.

³ Travelers information station transmitters operating from 530-1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.

⁴ Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.

⁵ In the 150-174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

⁶ In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.

⁷ In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

⁸ In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

⁹ Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 kHz must operate with a frequency stability of 100 ppm. Fixed stations with output powers less than 120 watts and using time-division multiplex, must operate with a frequency stability of 500 ppm.

¹⁰ Except for DSRCS equipment in the 5850-5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850-5925 MHz band is specified in subpart M of this part.

¹¹ Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150-174 MHz band and 2.5 ppm in the 421-512 MHz band.

¹² Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.

¹³ Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.

¹⁴ Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

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(b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

[60 FR 37266, July 19, 1995, as amended at 61 FR 4235, Feb. 5, 1996; 61 FR 18986, Apr. 30, 1996; 61 FR 38403, July 24, 1996; 62 FR 2040, Jan. 15, 1997; 62 FR 18927, Apr. 17, 1997; 67 FR 41860, June 20, 2002; 69 FR 46443, Aug. 3, 2004; 69 FR 67838, Nov. 22, 2004]

§ 90.214 Transient frequency behavior.

Transmitters designed to operate in the 150–174 MHz and 421–512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals ^{1,2}	Maximum frequency difference ³	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t ₁ ⁴	±25.0 kHz	5.0 ms	10.0 ms

[62 FR 2040, Jan. 15, 1997]

§ 90.215 Transmitter measurements.

(a) The licensee of each station shall employ a suitable procedure to determine that the carrier frequency of each transmitter authorized to operate with an output power in excess of two watts is maintained within the tolerance prescribed in § 90.213. This determination shall be made, and the results entered in the station records in accordance with the following:

- (1) When the transmitter is initially installed;
- (2) When any change is made in the transmitter which may affect the carrier frequency or its stability.

(b) The licensee of each station shall employ a suitable procedure to determine that each transmitter authorized to operate with an output power in excess of two watts does not exceed the maximum figure specified on the current station authorization. On authorizations stating only the input power to the final radiofrequency stage, the maximum permissible output power is 75 percent for frequencies below 25 MHz

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Time intervals ^{1,2}	Maximum frequency difference ³	All equipment	
		150 to 174 MHz	421 to 512 MHz
t ₂	±12.5 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t ₁ ⁴	±12.5 kHz	5.0 ms	10.0 ms
t ₂	±6.25 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t ₁ ⁴	±6.25 kHz	5.0 ms	10.0 ms
t ₂	±3.125 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±6.25 kHz	5.0 ms	10.0 ms

¹ t_{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.
² t₁ is the time period immediately following t_{on}.
³ t₂ is the time period immediately following t₁.
⁴ t₃ is the time period from the instant when the transmitter is turned off until t_{off}.
⁵ t_{off} is the instant when the 1 kHz test signal starts to rise.
⁶ During the time from the end of t₂ to the beginning of t₃, the frequency difference must not exceed the limits specified in § 90.213.
⁷ Difference between the actual transmitter frequency and the assigned transmitter frequency.
⁸ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

and 60 percent of the input power for frequencies above 25 MHz. If a non-DC final radiofrequency stage is utilized, then the output power shall not exceed 75 percent of the input power. This determination shall be made, and the results thereof entered into the station records, in accordance with the following:

- (1) When the transmitter is initially installed;
- (2) When any change is made in the transmitter which may increase the transmitter power input.

(c) The licensee of each station shall employ a suitable procedure to determine that the modulation of each transmitter, which is authorized to operate with an output power in excess of two watts, does not exceed the limits specified in this part. This determination shall be made and the following results entered in the station records, in accordance with the following:

- (1) When the transmitter is initially installed;