2013 Second Meeting, ARRL Board of Directors
Report of the Ad Hoc Symbol Rate Rule Modernization Committee

The mandate the Ad Hoc Symbol Rate Rule Modernization Committee was established at minute 38 of the 2013 Annual Meeting:

Whereas, the symbol rate limitations found in the FCC's rules governing the Amateur Radio Service were codified in 1989, and

Whereas, advances in digital communications techniques have rendered these limitations obsolete, and

Whereas, the continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art is a fundamental purpose of the Amateur Radio Service;

Now therefore be it resolved, the ARRL Board of Directors establishes an Ad Hoc Symbol Rate Rule Modernization Committee (the Committee), and

Be it further resolved, that the Committee shall evaluate potential modifications to the Amateur Service rules to permit and facilitate the use and development of high symbol rate digital communications techniques, and

Be it further resolved, that the Committee shall recommend modifications to the ARRL Board of Directors for consideration at the Board's July 2013 meeting.

The Committee conducted its work via email reflector, and reached consensus to recommend removal of the symbol rate limitations contained in Section 97.307(f) of the Commission's Rules, while maintaining authorized bandwidth limitations.

The present rules restricting symbol rates were established in 1984, and reflected the state of the art at that time. The restrictions are summarized in the following table.

Band(s)	Maximum Symbol Rate	Authorized Bandwidth	Rule Reference
160-12 meters (excluding the 60 meter channels)	300 bauds	N/A	97.307(f)(3)
10 meters	1200 bauds	N/A	97.307(f)(4)
50 and 144 MHz	19.6 kilobauds	20 kHz	97.307(f)(5)
219 MHz	N/A	100 kHz	97.307(f)(13)
222 and 420 MHz	56 kilobauds	100 kHz	97.307(f)(6)
902 MHz and above	N/A	N/A	97.307(f)(7)

The state of the art in digital communications has advanced since the present rules were first written. Transmission protocols are available and in use in other services in which symbol rate exceeds the present limitations of Section 97.307(f) of the Commission's Rules, but the necessary bandwidth of the protocol is within the bandwidth of a typical HF single sideband channel (3 kHz), or the authorized bandwidths given in Section 97.307(f).

While an authorized bandwidth limitation is defensible in order to allow the equitable, efficient, and enjoyable sharing of the Amateur Radio spectrum, a symbol rate "speed limit" reflective of 1980s technology prohibits radio amateurs from utilizing state of the art technology, let alone contributing to the advancement of the radio art. In fact, the present rules for HF permit spectrum inefficiency, allowing data transmissions of unlimited bandwidth as long as the symbol rate is sufficiently slow.

Eliminating the symbol rate limitations for data emissions and substituting or retaining a maximum authorized bandwidth would permit the utilization of all HF data transmission protocols presently legal in the Amateur Radio Service, as well as state of the art protocols that fall within the authorized bandwidth. Such an approach would also standardize the criterion used to determine a permitted data transmission to be necessary bandwidth, eliminating symbol rate, and eliminating its confusion with baud rate. There is precedent for such an approach in the present Amateur Radio regulations: the 60 meter channels near 5.4 MHz have a maximum authorized bandwidth (2.8 kHz), and data may be transmitted on the channels, but there is no maximum symbol rate specified.

The Committee proposes no changes that would affect in any way the existing rules governing Morse telegraphy, phone, and image emissions. It is recommended to the Board of Directors that they seek changes to the Commission's Rules as described in an associated motion and reflected in the attached annex, and that the Committee be dissolved.

Respectfully submitted,

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Dennis Bodson, W4PWF
David Sumner, K1ZZ
Chris Imlay, W3KD
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ANNEX

PART 97: AMATEUR RADIO SERVICE

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Subpart D: Technical Standards

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97.305 - Authorized emission types.

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(c) A station may transmit the following emission types on the frequencies indicated, as authorized to the control operator, subject to the standards specified in § 97.307(f) of this part.

Wavelength band	Frequencies	Emission types authorized	Standards see ? 97.307(f), paragraph:
MF:			
160 m	Entire band	RTTY, data	(3).
160 m	Entire band	Phone, image	(1), (2).
HF:			
80 m	Entire band	RTTY, data	(3), (9).
75 m	Entire band	Phone, image	(1), (2).
40 m	7.000-7.100 MHz	RTTY, data	(3), (9)
40 m	7.075-7.100 MHz	Phone, image	(1), (2), (9), (11)
40 m	7.100-7.125 MHz	RTTY, data	(3), (9)
40 m	7.125-7.300 MHz	Phone, image	(1), (2)
30 m	Entire band	RTTY, data	(3).
20 m	14.00-14.15 MHz	RTTY, data	(3).
20 m	14.15-14.35 MHz	Phone, image	(1), (2).
17 m	18.068-18.110 MHz	RTTY, data	(3).
17 m	18.110-18.168 MHz	Phone, image	(1), (2).
15 m	21.0-21.2 MHz	RTTY, data	(3), (9).
15 m	21.20-21.45 MHz	Phone, image	(1), (2).
12 m	24.89-24.93 MHz	RTTY, data	(3).
12 m	24.93-24.99 MHz	Phone, image	(1), (2).

10 m	28.0-28.3 MHz	RTTY, data	(43).
10 m	28.3-28.5 MHz	Phone, image	(1), (2), (10).
10 m	28.5-29.0 MHz	Phone, image	(1), (2).
10 m	29.0-29.7 MHz	Phone, image	(2).
VHF:			
6 m	50.1-51.0 MHz	MCW, phone, image, RTTY, data	(2), (5).
Do	51.0-54.0 MHz	MCW, phone, image, RTTY, data, test	(2), (5), (8).
2 m	144.1-148.0 MHz	MCW, phone, image, RTTY, data, test	(2), (5), (8).
1.25 m	219-220 MHz	Data	(13)
Do	222-225 MHz	RTTY, data, test MCW, phone, SS, image	(2), (6), (8)
UHF:			
70 cm	Entire band	MCW, phone, image, RTTY, data, SS, test	(6), (8).
33 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
23 cm	Entire band	MCW, phone, image, RTTY, data, SS, test	(7), (8), and (12).
13 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
SHF:			
9 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
5 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
3 cm	Entire band	MCW, phone, image, RTTY, data, SS, test	(7), (8), and (12).
1.2 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
EHF:			
6 mm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
4 mm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
2.5 mm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
2 mm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
1mm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
	Above 275 GHz	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).

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97.307 - Emission standards.

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(f) The following standards and limitations apply to transmissions on the frequencies specified in § 97.305(c) of this part.

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(3) ~~Only a~~A RTTY or data emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in § 97.309(b) of this part also may be transmitted.~~The symbol rate must not exceed 300 bauds, or for frequency-shift keying, the frequency shift between mark and space must not exceed 1 kHz.~~ The authorized bandwidth is 2.8 kHz.

(4) ~~Only a RTTY or data emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. The symbol rate must not exceed 1200 bauds, or for frequency-shift keying, the frequency shift between mark and space must not exceed 1 kHz.~~ [Reserved.]

(5) A RTTY, data or multiplexed emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. ~~The symbol rate must not exceed 19.6 kilobauds.~~ A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in § 97.309(b) of this part also may be transmitted. The authorized bandwidth is 20 kHz.

(6) A RTTY, data or multiplexed emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. ~~The symbol rate must not exceed 56 kilobauds.~~ A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in § 97.309(b) of this part also may be transmitted. The authorized bandwidth is 100 kHz.

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