

**Table 15.19**  
**Digital Modulation Modes and Formats Used in Amateur Radio**

See the text of this chapter for definitions and abbreviations

**Lowest Permitted Frequency** is the lowest amateur frequency at which this emission may be used according to Part 97.307 limits on symbol rate and bandwidth

See also the supplemental PDF file "Digital Modes - Lowest Permitted Amateur Frequency" in the online supplemental material accompanying this book.

<i>Mode or Format Name</i>	<i>Developer</i>	<i>Principal Freq</i>	<i>Principal Application</i>	<i>Lowest Permitted Frequency</i>	<i>Data rate (bits/sec)</i>	<i>Bit rate (bits/sec)</i>	<i>Symbol rate (baud)</i>	<i>Modulation ("N-" means multi-carrier)</i>	<i>Error Handling</i>
ALE	MIL-STD-188-141, FED-STD-1045	HF	Data		<375	375	125	8FSK	FEC
AMTOR-A	G3PLX	HF	Data		53	114	114	FSK	ARQ
AMTOR-B	G3PLX	HF	Data		57	114	114	FSK	FEC
AOR AMBE	AOR Corp	HF	Voice, Data		2400	3600	50	36-QPSK	FEC
APCO P25	APCO	VHF	Voice	50 MHz	6800	9600	4,800	4FSK/QPSK	FEC
Chip64	IZ8BLY	HF	Keyboarding		21.1/37.5	300	300	DBPSK-DSSS	FEC
CLOVER-II	Hal Comm.	HF	Data		< 37.5-750	62.5-750	31.25	4-(2-16)DPSK/(2-4)DASK	FEC/FEC+ARQ
CLOVER-2000	Hal Comm.	HF	Data		108-1994	500-3000	62.5	8-(2-16)DPSK/(2-4)DASK	FEC/FEC+ARQ
DMR	Motorola	VHF	Voice	50 MHz		9600	4800	4FSK/QPSK/C4FM	FEC
Domino	ZL2AFP	HF	Keyboarding		31/44/62?	31/44/62	7.8/11/15.6	16FSK	None
DominoEX	ZL1BPU	HF	Keyboarding		(<15.63)-86.13	15.63-86.13	3.9-21.5	18FSK	None/FEC
D-Star (DV)	JARL	VHF	Voice & data	28 MHz	D:960 V:2400	4800	4800	0.5 GMSK/QPSK/4PSK	FEC
D-Star (DD)	JARL	UHF	Data	902 MHz	72k-124k	128000	128000	0.5 GMSK/QPSK/4PSK	FEC
Facsimile		HF	Image				120 lpm	FM, 1500-2300 Hz	None
FDMDV	G3PLX/HB9TLK	HF	Voice		1450	1450	50	15-QPSK	None
FSK441	K1JT	VHF	Meteor scatter	28 MHz	882	882	441	4FSK	None
G-TOR	Kantronics	HF	Data		35/75/115	80/160/240	100/200/300	FSK, 170/200 Hz shift	FEC + ARQ
Hellschreiber (Feld)	Rudolf Hell	HF	Keyboarding		2.5 char/s	122.5	122.5	ASK	None
JT6M	K1JT	50 MHz	Meteor scatter		77.9	116.8	21.53	44FSK	None
JT65	K1JT	V/UHF	Moonbounce		1.54	16.1	2.7	65FSK	FEC
MFSK16	ZL1BPU/IZ8BLY	HF	Keyboarding, Data		31.25	62.5	15.625	16FSK	FEC
MT63	SP9VRC	HF	Keyboarding		35/70/140	320/640/1280	5/10/20	64-DPSK	FEC
Olivia	SP9VRC	HF	Keyboarding		8.75/17.5	78.13/156.25	15.63/31.25	32-FSK	FEC
Packet (Bell202)		VHF	Data	28 MHz	<1200	1200	1200	FSK	ARQ
PACTOR-I	DL6MAA/DF4KV	HF	Data, Winlink email		51.2/128	100/200	100/200	FSK, 200 Hz shift	ARQ
PACTOR-II	Spec. Comm. Sys.	HF	Data, Winlink email		100-700	200-800	100	2-DBPSK/PI-4DQPSK/8,16DPSK	FEC + ARQ
PACTOR-III	Spec. Comm. Sys.	HF	Data, Winlink email		85-2722	200-3600	100	(2-18)-DBPSK/DQPSK	FEC + ARQ
PSK31	G3PLX	HF	Keyboarding		31.25	31.25	31.25	BPSK	None
QPSK31	G3PLX	HF	Keyboarding		31.25	62.5	31.25	QPSK	FEC
PSK63/125		HF	Keyboarding		62.5/125	62.5/125	62.5/125	BPSK	None
QPSK62/126		HF	Keyboarding		62.5/125	125/250	62.5/125	QPSK	FEC
Q15X25	SP9VRC	HF	Data		300/1200/2400	2500	83.33	15-QPSK	FEC + ARQ
RTTY (Baudot)		HF	Keyboarding, contests		30.3	45.45	45.45	FSK, 170 Hz shift	None
SSTV (traditional)	WØORX	HF	Image		8 s/frame		120-line B/W	FM, 1200-2300 Hz	None
SSTV Martin M1	Martin Emmerson	HF	Image		114 s/frame		240-line RGB	FM, 1200-2300 Hz	None
SSTV Scottie S1	Eddie Murphy	HF	Image		110 s/frame		240-line RGB	FM, 1200-2300 Hz	None
System Fusion	Yaesu	VHF	Voice, data	50 MHz		9600	4800	4FSK/QPSK/C4FM	FEC
Throb	G3PPT	HF	Keyboarding		10/20/40 wpm		1/2/4	9FSK/2-9FSK	None
WINMOR	KN6KB	HF	Winlink email			62.5-3750	31.25/62.5	(1-15)-QPSK/16QAM/4FSK	FEC + ARQ
WSPR (MEPT-JT)	K1JT	HF-VHF	Weak signal beacon		0.45	2.93	1.46	4FSK	FEC