FOREWORD

(This foreword is not part of this Standard)

This Standard was formulated under the cognizance of TIA Subcommittee TR-30.1 Modems. This Standard specifies a Frequency Shift Keyed (FSK) modem operating at a data signalling rates of 50 and 45.45 symbols/sec. The deaf and hard of hearing generally use this modem for real time 2-way text based communication over the public switched telephone network.

A FREQUENCY SHIFT KEYED MODEM FOR USE ON THE PUBLIC SWITCHED TELEPHONE NETWORK

1 SCOPE

This standard specifies a FSK modem which operates at a nominal data signalling rates of 50 or 45.45 symbols per second over the switched telephone network.

2 NORMATIVE REFERENCES

ANSI/TIA/EIA-232-F-1997 *Interface Between Data Terminal Equipment And Data Circuit Terminating Equipment Employing Serial Binary Data Exchange.*

ANSI/EIA/TIA-496-A-1989 *Interface between Data Circuit-Terminating Equipment (DCE) and the Public Switched Telephone Network (PSTN)*

ANSI/EIA/TIA-XXX .*5mm interface for digital cellular phones*

3 DEFINITIONS

3.1 Frequency Shift Keying (FSK)- a transmission method where a signal is applied to the line in response to the pressing of a key (or the electronic equivalent).

3.2 TTY - A term used by the deaf and hard of hearing for a device which incorporates a FSK modem such as described in this standard. This term originates with the electromagnetic Teletypewriters originally used for this communications.

4 Line Signal

4.1 Transmission Mode The transmission mode is character oriented Frequency Shift Keying (FSK) using two tones to represent the asynchronous serial data. A binary ONE is represented by 1400 Hz±1% tone and a binary ZERO is represented by 1800 Hz ±1%tone (see Annex B)

4.2 Bit duration A bit duration of 20 or 22.00 ± 0.40 ms providing nominal data signalling rates of 50 or 45.45 symbols/s respectively.

4.3 Character Set The character set conforms to the 5-bit Baudot set (see Annex A). Characters are preceded by a start bit (binary ZERO) and followed by a stop

bit (binary ONE). The start bit shall be one bit time in duration. It is desirable that the stop bit be 1.5 bit times in duration.(see Appendix B) Each key depression causes the transmission of a complete Baudot character including start and stop bits. A binary ONE hold tone (1400 Hz) follows the last key depression. This hold tone is transmitted for a period between 150ms to 300 ms after the end of the stop bit(s).

Note: The transmitter and receiver should normally start up in the LTRS mode. Additionally, to minimize error propagation, the DCE should re-send the most recent (i.e. last sent) mode character (i.e., LTRS or FIGS) every 72 characters.

4.4 Bit Ordering The bit ordering is LSB first with the first data bit corresponding to the Least Significant Bit (LSB) and the fifth data bit to the Most Significant Bit (MSB)

4.5 Transmit Levels When directly connected to the network (see section 5.2.1) the transmit levels shall be in conformity with FCC Part 68. When it is acoustically coupled to the telephone network the level is typically 108 $\pm$ 6 dBSPL.

4.6 Transmit capability The transmitter shall be capable of transmitting regardless of the state of the receiver.

5 Interfaces

5.1 DTE-DCE Interface The DTE-DCE interface shall support the following circuits (or their logical equivalent) as specified in *A*NSI/TIA/EIA-232-F-97:

Table 1 -Supported DTE-DCE Interface Circuits

ITU-T V.24 Number	Circuit	Description
103	BA	Transmit Data
104	BB	Received Data
135	CK	Received Energy Present

5.2 Line Interface

5.2.1 Direct Connection When the DCE is directly connected to the switched telephone network (land line) the DCE shall provide a jack in conformity with FCC Part 68. ANSI/EIA/TIA-496-A-89 should be consulted for guidance on the characteristics of this interface.

5.2.1 Acoustic Interface The DCE may be equipped with an Acoustic interface, the characteristics of this acoustic interface are beyond the scope of this standard.

5.2.2 Wireless Interface When the DCE is connected to a wireless phone the interface shall conform to ANSI/TIA/EIA-XXXX.

Annex A

(Informative)

Table 1A - Baudot Codes

DEC	HEX	BINARY	LETTER	FIGURE
0	00	00000	backspace	backspace
1	01	00001	E	3
2	02	00010	LF	LF
3	03	00011	A	-
4	04	00100	Space	Space
5	05	00101	S	
6	06	00110	I	8
7	07	00111	U	7
8	08	01000	CR	CR
9	09	01001	D	$
10	0A	01010	R	4
11	0B	01011	J	‘
12	0C	01100	N	,
13	0D	01101	F	!
14	0E	01110	C	:
15	0F	01111	K	(
16	10	10000	T	5
17	11	10001	Z	“
18	12	10010	L	)
19	13	10011	W	2
20	14	10100	H	=
21	15	10101	Y	6
22	16	10110	P	0
23	17	10111	Q	1
24	18	11000	O	9
25	19	11001	B	?
26	1A	11010	G	+
27	1B	11011	FIGS	FIGS
28	1C	11100	M	.
29	1D	11101	X	/
30	1E	11110	V	;
31	1F	11111	LTRS	LTRS

Note: CR and LF may be manually or automatically generated by the DTE. .If automatic generated, the sequence may contain an extra (non-printable) character to provide adequate time for older electromechanical TTYs to respond. CR & LF are inserted into the transmitted characters after a maximum of 72 characters to allow for the carriage return of older electromechanical TTYs.

Annex B

(Informative)

Receiver Frequency Tolerance

The Transmitter tolerances on existing devices in the field may vary as much as +/- 4% from the nominal values specified in Section 4.1, therefore receivers should be designed to accommodate these variations to ensure interworking with the broadest range of terminals.

Receiver Stop Bit Tolerance

As there is a wide variation of implementations in the field a receiver should be capable of decoding characters with stop bits of anywhere from 1.0 to 2.0 bit times in length.

Receiver Signal Level Tolerance

A receiver should be capable of correctly decoding the following message, or its equivalent, for at least 120 seconds, with receive levels from –5 dBm to –45 dBm and a signal to noise ratio of 13 dB.

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THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG
<FIGS> 123456789 <LTRS> TEST