

- E2E01
- Wh
- ich type of modulation is common for
- data emissions below 30 MHz?
- FSK
- FSK is a digital method of transmission using Marks and spaces which are transmitted as one of two different
- frequencies
- of the transmitter carrier.
- FSK is
- true
- Frequency
- Shift Keying
- of the transmitter's carrier.
- This shift can be
- applied
- to
- any
- of the transmitter oscillators.
- Audio
- Frequency
- Shift Keying
- is
- generated
- by
- shifting the
- frequency
- of
- an
- audio oscillator
- that
- is fed into the
- transmitter's
- normal

- transmit audio input. Unlike FSK, AFSK can be used for FM modulation.
- E2E02
- What do the letters FEC mean as they relate to digital operation?
- Forward Error Correction
- Forward error
- correction (FEC) is a method of obtaining error control in data transmission in which the source
- (transmitter) sends redundant data and the destination (receiver) recognizes only the portion of the data that contains no
- apparent errors. Because FEC does not
- require
- handshaking
- between the source and the destination, it can be used for
- broadcasting of data to many destinations simultaneously from a single source.
- Simple FEC is one
- of two modes used by radio amateurs in a self
- -
- correcting digital mode called
- AMTOR
- Mode B (an
- abbreviation for amateur teleprinting over radio).
- E2E03
- How is Forward Error Correction implemented?
- By transmitting extra data that may be used to detect and correct transmission errors
- E2E04
- What is indicated when one of the ellipses in an FSK crossed
- -
- ellipse display suddenly disappears?
- Selective fading has occurred
- In any radio
- transmission, the channel spectral response is not flat. It has dips or fades in the response due to reflections
- causing cancellation of certain frequencies at the receiver. Reflections off near
- -
- by objects (e.g. ground, buildings, trees,

- etc.) can lead to
- multipath signals of similar signal power as the direct signal. This can result in deep nulls in the received
- signal power due to destructive interference. For narrow bandwidth transmissions if the null in the frequency response
- occurs at the transmission
- frequency then the entire signal can be lost.
- E2E05
- How does ARQ accomplish error correction?
- If errors are detected, a
- retransmission
- is requested
- E2E06
- What is the most common data rate used for HF packet communications?
- 300 baud
- E2E07
- Wha
- t is the typical bandwidth of a properly modulated MFSK16 signal?
- 316 Hz
- E2E08
- Which of the following HF digital modes can be used to transfer binary files?
- PACTOR
- E2E09
- Which of the following HF digital modes uses variable
- -
- length coding for bandwidth
- efficiency?
- PSK31
- Like Morse Code where a character or letter can be represented by variable length bit streams from one to 5 bits of data.
- E
- is a single dit, I is two dits, S is 3 dits and H is 4 dit
- s and the n
- umber 5 is represented by 5 dit
- s.
- E

- 2E1
- 0
- Which of these digital communications modes has the narrowest bandwidth?
- PSK31
- 2E11
- What is the difference between direct FSK and audio FSK?
- Direct FSK applies the data signal to the transmitter VFO
- E2E12
- Which type of digi
- t
- al
- communication does
- not support keyboard
- -
- to
- -
- keyboard operation?
- Winlink
- E2E01
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- E2E06
- What is the most c
- G1C09 (A) [97.305(c) and 97.307(f)(5)]
- What is the maximum symbol rate permitted for RTTY or data emission transmitted on the 1.25 meter and 70 centimeter bands
- **A. 56 kilobaud**

- B. 19.6 kilobaud
- C. 1200 baud
- D. 300 baud
- ~~
- G1C10 (C) [97.305(c) and 97.307(f)(4)]
- What is the maximum symbol rate permitted for RTTY or data emission transmissions on the 10 meter band?
- A. 56 kilobaud
- B. 19.6 kilobaud
- C. 1200 baud
- **D. 300 baud**
- ~~
- G1C11 (B) [97.305(c) and 97.307(f)(5)]
- What is the maximum symbol rate permitted for RTTY or data emission transmissions on the 2 meter band?
- A. 56 kilobaud
- B. 19.6 kilobaud
- **C. 1200 baud**
- D. 300 baud
- Digital operating: procedures, procedural signals, and common abbreviations
- In recent years, operating what's known as the "digital modes" has become popular.
- They are known by this name because you can't operate them without a computer.
- RTTY, PSK31, and MFSK are examples of digital modes.
- When operating the digital modes, amateurs connect the audio output of their transceivers into the input of a computer sound card and the output of the sound card to the audio input of the transceiver. The computer does all the heavy lifting, decoding the tones on the input and generating the tones to be transmitted.
- Amateurs have actually been operating RTTY for a long time. The abbreviation "RTTY" stands for radioteletype.
- . (G2E07) It's become a lot more popular in recent years, however, because now amateurs can operate this mode using a computer and not a mechanical teletype machine.

- RTTY signals shift between two frequencies. That's why this mode is called frequency shift keying. One frequency denotes a "1," while another denotes a "0." The difference between those two frequencies is called the frequency shift.
- 170 Hz
- is the most common
- frequency shift for RTTY emissions in the amateur HF bands. (G2E06)
- Using a computer sound card to generate audio tones that shift the frequency of a transmitted signal is called audio frequency shift keying (AFSK).
- LSB
- is the mode
- normally used when sending an RTTY signal via AFSK with an SSB transmitter. (G2E01)
- RTTY uses a code called the Baudot code to encode characters. Baudot code is
- a 5-bit
- code, with additional start and stop bits
- . (G2E05)
- When using some modes, the signal may shift between more than two frequencies. We call these modes MFSK. The abbreviation "MFSK" stand for
- Multi (or Multiple)
- Frequency Shift Keying
- . (G2E11) In an MFSK signal, a particular frequency will denote
- a particular combination of bits. A major advantage of MFSK16 compared to other
- digital modes is that
- it offers good performance in weak signal environments without
- error correction
- . (G2E10)
- Phase shift keying, or PSK, is another popular digital mode. When sending a PSK
- signal, the computer varies the phase of the signal rather than the frequency of the
- signal to send ones and zeroes. This makes it very efficient.
- 53
- "Digital modes," such as RTTY and PSK31, are now quite popular on the HF bands. The
- number 31 in the term PSK31 represents
- the approximate transmitted symbol rate
- .

- (G8B10). When operating digital modes, it is important to know the duty cycle of the data mode you are using when transmitting because
- some modes have high duty
- cycles which could exceed the transmitter's average power rating
- . (G8B08)
- Some digital modes allow you to send data at much higher data, or symbol, rates than
- PSK31. The tradeoff is that digital modes that transfer data at a high rate need more
- bandwidth than modes that send data at a slower rate. The relationship between
- transmitted symbol rate and bandwidth is that
- higher symbol rates require higher
- bandwidth
- . (G8B12)
- No matter what the data rate, noise can cause errors. One way to get around this is to
- use a technique called error correction.
- By transmitting redundant information with
- the data
- , forward error correction allows the receiver to correct errors in received data
- packets. (G8B11)
- 24
- Another way to minimize the effects of noise is to use filters to filter out the noise and to
- adjust your receiver's bandwidth so that it only passes the signal that you're interested
- in. It is good to match receiver bandwidth to the bandwidth of the operating mode
- because
- it results in the best signal to noise ratio
- . (G8B09)