

Modifications for the Yaesu FT-920

Expanded Digital Mode Operating Instructions

Application Note

Yaesu U.S.A - Amateur Products Division - Technical Support

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Model: FT-920 **Serial No. Range:** All

Expanded Digital Mode Operating Instructions

This document provides expanded operating instructions for the FT-920 when operating on RTTY, HF Packet, and/or other Digital modes.

Digital Mode Operation

While setting up your equipment for digital operation, however, it is important that you understand the differences between the two keying methods provided on the FT-920 for digital mode operation, so that the controls and switches may be set correctly.

- Most operation is accomplished using *Audio Frequency-Shifted Keying* (AFSK), whereby the Terminal Node Controller (TNC) generates audio tones to be transmitted as data by the FT-920. To activate this mode of operation, the front panel Mode selection must be set to DATA-USB (even though "USB" may not be the actual sideband utilized in operation), and the rear panel [AFSK-FSK] switch must be set to **AFSK**.
- The FT-920 can also accept input from a TNC or Terminal Unit (TU) operating in the FSK (*Frequency-Shifted Keying*) mode, whereby a *closure to ground* of the FSK keying line causes the transmitted carrier to be shifted in frequency; no audio tones are produced by the TNC or TU.

AFSK RTTY or Packet Operation

The AFSK configuration environment may be the easiest for you to use, as the TNC then has total control of the tone frequencies, Mark/Space relationship (normal/inverted), and other aspects of digital operation which are critical to successful operation.

1. Connect your TNC to the FT-920's **Data** jack per the instructions on page 16. Pin 1 of the **Data** jack should be connected to the TNC's "Mic Audio" or "Tx Audio" line. Be sure to set the [AFSK-FSK] switch to **AFSK**.
2. For AFSK RTTY (Baudot) or 300 bps HF Packet operation, press the [Data] mode key until [Data] and

[**USB**] appear on the display. Now enter the Menu system, and select Menu #U-46; set this Menu Item for the frequency appropriate for your operating mode:

- For typical RTTY operation, select **2125-L**; this sets the carrier injection up for an offset of 2.125 kHz in a pseudo-LSB mode, so that the transceiver actually is operating in the "LSB" mode (even though the display still indicates **Data-USB**).
 - For Packet operation, you may leave Menu #U-46 in its default **2125-U** (pseudo-USB mode), or set it to **1700-U** or some other value as required by the configuration of your TNC. See the documentation provided with your TNC's communication software for details regarding defining the transmitted tones.
3. The packet frequency display (offset) may also be modified via Menu #U-45, allowing you to have the radio's display indicate either Mark or Space frequency, or the center frequency of the two tones.
 4. At this point, you are ready to utilize your TNC's software to begin operation. After loading the software, tune in an RTTY station so that it is properly decoded on your computer screen. When solid copy is obtained, you may press the appropriate key on your computer's keyboard to activate the transmitter, and begin typing. See your TNC's instruction manual for further details regarding actual operation.
 5. The DSP High- and Low-Cut filters are particularly beneficial in reducing interference in RTTY pile-up situations. A typical setting of the **High Cut** control is at approximately 1 o'clock, while the **Low Cut** control may be set approximately to 11 o'clock.
 6. The "CW" Narrow filter may also be used for AFSK operation. Just press the **Narrow** key, then rotate the **IF Shift** control to peak the signal in the narrowed IF passband.
 7. Via Menu #U-10, the Enhanced Tuning Scale may be engaged so as to allow a visual representation of precise tuning pursuant to the tone frequency selected via Menu #U-46. However, since your TNC may also have such a facility, and because the TNC is ultimately in control of the tone generation and decoding, you may wish to rely on the TNC's tuning indicator, and use the Enhanced Tuning Scale of your FT-920 for other purposes.
 8. For 1200 bps FM packet, press the [**Data**] key until **Data** and **FM** appear on the display.

FSK RTTY Operation

This mode utilizes the tone generator in the FT-920 for production of the required Mark and Space tones used for RTTY operation.

1. Follow the interconnection guidelines on page 17 for details on how to hook up your terminal equipment to the transceiver. Be certain to set the [**AFSK-FSK**] switch on the rear panel of the transceiver to **FSK**. In this mode of operation, closing Pin 1 of the **Data** jack to ground causes the carrier to shift; the *magnitude* of the shift (170/425/850 Hz) is set via Menu #U-43, while the carrier's offset from zero beat and its sideband USB/LSB) can be set via Menu #U-42. Do not connect Pin 1 of the **Data** jack to any TNC/TU line which carries "Mic Audio" or "Tx Audio" as these lines are used for **AFSK** operation (see previous section).

2. Press the front panel **Data** switch to select the [**Data**] [**LSB**] mode, which corresponds to "FSK" operation (remember, "**Data USB**" is used for "AFSK" operation).
3. At this point, you are ready to utilize your TNC/TU's software to begin operation. After loading the software, tune in an RTTY station so that it is properly decoded on your computer screen or TU display. When solid copy is obtained, you may press the appropriate key on your computer's keyboard to activate the transmitter, and begin typing. See your TNC/TU instruction manual for further details regarding actual operation.
4. As with AFSK operation, the "CW" filter may be engaged in the FSK mode by pressing the [**Narrow**] key, and the DSP filters may also be used to reduce interference in crowded digital operating situations.

Operating Tips

- If you are hearing and decoding stations successfully in an AFSK environment, but stations cannot understand you, check to be certain that your TNC's software has not set a shift other than 170 Hz, and be sure that the tones have not been "inverted" in the software configuration.
- If you are getting no shift (only a steady carrier) in RTTY FSK operation, be sure that you have not connected Pin 1 of the **Data** jack to an AFSK output line from your TNC (use only the "FSK" line provided by your TNC). If the FSK line has been properly connected, check to be sure that you have the "FSK" mode properly enabled on your TNC, if the software requires you to do so.
- If you are having trouble decoding HF packet stations, be sure that you have set Menu #U-46 to one of the settings which ends with "**U**" (instead of "**L**"), and that you have chosen a tone frequency compatible with the tones for which your TNC is configured.

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