Transmitter Operation

4. Press the `C` (TON) key to activate the CTCSS tone encoder, which provides a sub-audible repeater access tone. One press of the `C` (TON) key will activate the CTCSS tone encoder. In this situation, you will observe the "🔳" indicator on the display. If you press the `C` (TON) key repeatedly, you will observe "🔳🆂🆀" (CTCSS Encode/Decode), followed by "**DCS**" (Digital Coded Squelch, Encode/Decode). One additional press will disable all repeater-access tone systems. See the next section for a discussion of DCS operation.

5. If the default repeater access tone are not appropriate for your area, it also may be set independently for each band. To change the repeater access tone:
   ① Press and hold the `C` (TON) key for one second. This instantly recalls Menu #48 (TONE FREQ).
   ② Rotate the `DIAL` knob to select the desired CTCSS frequency.
   ③ When done, press and hold the `F` key for one second so save the new setting and exit to normal operation.

6. Set the transceiver's receiver to the repeater output (downlink) frequency.

7. Close the **PTT** switch and speak into the microphone. You will observe that the transmitted frequency has shifted according to the setting of the `A` (RPT) key.

8. Release the **PTT** switch to return to the Receive mode.

9. With repeater shift activated, you can temporarily reverse the transmit and receive frequencies by pressing the `B` (REV) key. The "🔳" icon will blink while "Reverse" shift is activated. Press the `B` (REV) key again to revert to the "Normal" shift direction.

10. When you are finished with repeater operation, you may wish to set the repeater shift to simplex by pressing the `A` (RPT) key, and disable the CTCSS or DCS tone by pressing the `C` (TON) key.

11. On many transceiver versions, the Automatic Repeater Shift (ARS) feature is enabled at the factory. This feature automatically activates the appropriate repeater shift when you are operating inside the designated 144 MHz or 430 MHz FM repeater sub-bands in your country. If you wish to change the settings for the ARS, use Menu #01 (144 ARS) or Menu #02 (430 ARS) (see page 58).

If your local repeaters need a 1750-Hz burst tone for access (typically in Europe), press and hold in the front panel's `HOME` *key to transmit the burst tone.*

Tone Search Scanning

In operating situations where you don't know the CTCSS tone being used by another station, you can command the radio to listen to the incoming signal and scan in search of the tone being used.

To scan for the CTCSS tone in use:

1. Press the `F` key momentarily, then rotate the `SEL` knob, as needed, until Operating Function Row 12 [TCH, DCH] appears on the display.
2. Press the `A` (TCH) key to activate CTCSS Encoder/Decoder; (the "**T SQ**" icon will appear on the display) and start scanning for the incoming CTCSS tone.
3. When the radio detects the correct tone, it will halt on that tone, and audio will be allowed to pass.
4. Press and hold in the `A` (TCH) key for one second; the CTCSS tone detected will be stored as the "current" tone, so it may be used for memory storage purposes, and you may now exit to normal operation.

Transmitter Operation

DCS Operation

Another form of tone access control is Digital Code Squelch, or DCS. It is a newer, more advanced tone system that is less susceptible to false triggering than CTCSS. A DCS Encoder/Decoder is built into your transceiver, and operation is very similar to that described above for CTCSS.

1. Set the desired DCS code via Menu #23 (DCS CODE).
2. Press the **F** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row 4 [RPT, REV, TON] appears on the display.
3. Press the **C** (TON) key three times to activate the DCS Encoder/Decoder (the "**DCS**" icon will appear on the display). The receiver will remain muted until a matching DCS code is received on an incoming signal.
4. Press the **C** (TON) key once to cancel DCS operation (the "**DCS**" icon will disappear).

DSC Search Scanning

In operating situations where you don't know the DCS code being used by another station, you can command the radio to listen to the incoming signal and scan in search of the code being used.

To scan for the DCS code in use:

1. Press the **F** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row 12 [TCH, DCH] appears on the display.
2. Press the **B** (DCH) key to activate DCS Encoder/Decoder; (the "**DCS**" icon will appear on the display) and start scanning for the incoming DCS code.
3. When the radio detects the correct code, it will halt on that code, and audio will be allowed to pass.
4. Press and hold in the **B** (DCH) key for one second; the DCS code detected will be stored as the "current" code, so it may be used for memory storage purposes, and you may now exit to normal operation.

ARTS™ (Auto Range Transpond System) Operation

The ARTS™ system uses DCS signaling to inform you when you and another ARTS™-equipped station are within communications range. This can be especially valuable during search-and-rescue operations, as a base station can quickly use ARTS™ to alert a field unit that it is out of range; the field unit can then move to a better location to re-establish communications.

1. Press the **F** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row 6 [SSM, SCH, ART] appears on the display.
2. Press the **C** (ART) key to activate ARTS™ operation.
3. Your display will change to "out range" to indicate the beginning of ARTS™ operation. Every 25 seconds, your radio will transmit a "polling" call to the other station. When that station responds with its return ARTS™ polling signal, your display will change to "in range" to confirm reception of the response.
4. To cancel ARTS operation, press the **C** (ART) key again (the "out range" or "in range" indication will disappear from the LCD).

The ARTS™ feature offers a choice of beep options to alert you to the current status of ARTS™ operation. Use MENU #09 (ARTS BEEP) on page 59 to select the beep option that is best for your operating needs.

CW Identifier Setup

The ARTS™ feature includes a CW identifier. When it is activated, the radio will send "**DE** (*your callsign*) **K**" in Morse code every ten minutes during ARTS™ operation.

To program the CW IDer, use Menu #31 (ID), as described on page 62. And to activate the CW IDer, use Menu #18 (CW ID).

Transmitter Operation

DIGITAL MODE OPERATION (SSB-BASED AFSK)

The **FT-818** provides extensive capability for digital mode operation on the HF, VHF, and UHF bands. The use of AFSK (Audio Frequency-Shifted Keying) configurations allows a wide variety of different communication modes to be utilized. The Menu provides for specific digital mode selections, which include custom BFO offsets to optimize the receive and transmit passbands for the mode selected.

Before beginning Digital operation, you need to define which Digital mode will be utilized. To do this, use Menu #26 as follows (in this example, we will set up RTTY as the Digital mode):

1. Press and hold in the **F** key for one second to enter the Menu mode.
2. Rotate the **SEL** knob to select Menu #26 (DIG MODE).
3. Rotate the **DIAL** knob to select "RTTY."
4. Press and hold in the **F** key for one second to save the new setting and exit.

Use this technique to set up any digital mode.

RTTY (Radio TeleType) Operation

The "RTTY" mode on the **FT-818** is based on LSB-side carrier injection, in accordance with long-standing amateur practice. If you need USB-side injection for your application, see the "User" mode discussion below.

1. Connect your TNC (Terminal Node Controller) or terminal modem to the **FT-818**'s rear-panel **DATA** jack, per the illustration.
2. Press the **MODE(◄)** / **MODE(►)** key, as needed, to select the DIG mode (the "DIG" icon will appear on the display). Be certain to use the "TX Audio" line from your TNC, not an "FSK Key" line, for the transmit-data connection.
3. Press the **MODE(◄)** / **MODE(►)** key, as needed, to select the DIG mode (the "DIG" icon will appear on the display). You should now be able to tune around the band, and any RTTY signals heard should be capable of being decoded.
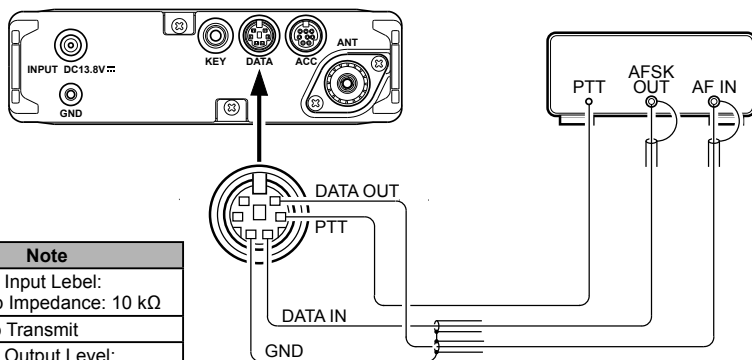
Pin Label	Note
DATA IN	Maximum Input Lebel: 1.0 V pp Impedance: 10 kΩ
PTT	Ground to Transmit
DATA OUT	Maximum Output Level: 300 mVpp Impedance: 10kΩ

4. If the optional **YF-122C** 500 Hz filter has been installed, it may be used for RTTY work. Recall Operating Function Row 7 [IPO, ATT, NAR] then press the ⬜C⬜ (NAR) key to engage the narrow filter.

5. To set up the transmit side, be sure that the Meter is set to monitor ALC voltage. If not, press the ⬜F⬜ key momentarily, then rotate the ⬜SEL⬜ knob to select to select Operating Function Row 9 [PWR, MTR], then press the ⬜B⬜ (MTR) key so as to select metering of ALC.

6. Press and hold in the ⬜F⬜ key for 1/2 second to enter the MENU mode, then rotate the ⬜SEL⬜ knob to select Menu #25 (DIG MIC).

7. Following the instructions for your TNC's software, activate the transmitter from the computer keyboard; this should cause the AFSK output from the TNC to be sent to the radio. While transmitting, view the ALC meter; a few "dots" of ALC indication should be observed. If not, rotate the ⬜DIAL⬜ knob to adjust the AFSK level. Press and hold in the ⬜F⬜ key for one second to save the new AFSK level setting and return to normal operation. You are now ready for RTTY operation.

Because RTTY is a continuous-duty transmission mode, try to keep your transmission short when running on battery power, so as to minimize current drain.

PSK31 Operation

Two dedicated PSK31 modes are available, one each for USB-side and LSB-side injection. For BPSK work, the injection does not matter, but for QPSK the two working stations must use the same sideband.

Connect the **FT-818** to your computer's sound card or interface.

Setup for PSK31 operation is basically identical to that previously described for RTTY operation. As before, use the "DIG" mode. However, in Menu #26, select "PSK31-L" (for LSB injection) or "PSK31-U" (for USB injection). As with RTTY, Menu #25 may be used to set the drive to the transmitter. And the **YF-122C** 500 Hz filter may also be utilized, as described previously.

Transmitter Operation

"USER" Defined Digital Modes

Also provided in the **FT-818** are two convenient "USER" Digital modes, one each providing USB- and LSB-side injection, which may be used for SSTV, Fax, Pactor, and other digital operating modes.

Here is an example involving the configuration of the USER mode for RTTY with USB-side injection (as opposed to LSB injection, used in the default "RTTY" mode):

1. Use Menu #26 to set the Digital mode to "USER-U."
2. Press the **MODE(◄)** / **MODE(►)** key, as needed, to select the DIG mode (the "DIG" icon will appear on the display).
3. Now use Menu #27 to configure the transceiver's passband response. Once in the Menu mode, rotate the **SEL** knob to select Menu #27 (DIG SHIFT), and rotate the **DIAL** knob to set the desired BFO offset (depending on how your TNC's tones are set up). For typical high-frequency tone use, a setting of about "+2100" will be a good starting point.
4. Finally, depending on how you wish the display to respond, you may program in a corresponding display shift, using Menu #24 (DIG DISP). Remember to press and hold in the **F** key for one second when exiting the Menu mode.
5. The setup of the AFSK drive level is identical to that described previously for RTTY operation.

The USER-L and USER-U Digital modes should allow you to operate on any SSB-based AFSK Digital mode. Note that the "PSK31" configurations will also work well for many Digital operating situations.
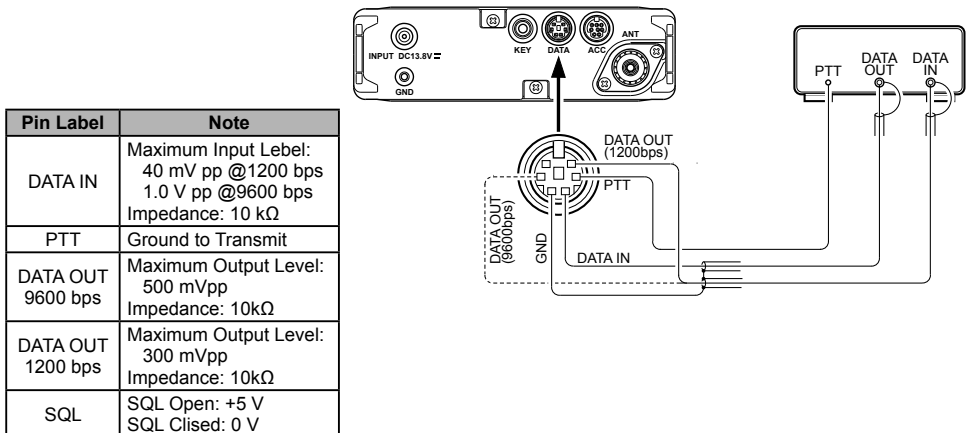
Packet (1200/9600 bps FM) Operation

The **FT-818** is designed for operation on either 1200 bps or 9600 bps packet, and setup is similar to that described previously for SSB-based modes. A separate Data input adjustment is provided, allowing you to optimize the deviation on the FM Packet modes separately from the SSB-based Digital modes. The RX-Data output lines are fixed-level outputs, not affected by the setting of the AF Gain control.

1. Connect your TNC to the **FT-818**'s rear-panel **DATA** jack, per the illustration. Note that different connections are used for 1200 bps and 9600 bps Packet.
2. Use Menu #40 (PKT RATE) to select the desired Packet mode. Once you have entered the Menu and have selected Menu #40, rotate the **DIAL** knob to select either "1200" or "9600" (bps) as the Packet rate.
3. Press the **MODE(◀)** / **MODE(▶)** key, as needed, to select the PKT mode (the "PKT" icon will appear on the display).
4. You are now set up for reception on Packet. If you are operating on 1200 bps, try now to connect to another station or node; you may well find that the drive level needs no further adjustment.
5. If you are having trouble connecting due to insufficient or excessive drive from the TNC to the **FT-818**, use Menu #39 (PKT MIC) to set the drive. Use your terminal software's "test" protocol to send out test tones, and adjust the deviation by rotating the **DIAL** knob, which will vary the data input level to the **FT-818**'s modulator. Remember to press and hold in the **F** key for one second when adjustments are completed, so as to save the new setting for Menu #39.

The 9600 bps Packet deviation setting is very critical to successful operation, and it can only be accomplished using a calibrated deviation meter; the optimum setting is usually ±2.75 kHz (±0.25 kHz). For 1200 bps, the optimum level is much less critical, with the optimum deviation being between ±2.5 kHz and ±3.5 kHz.

Pin Label	Note
DATA IN	Maximum Input Lebel: 40 mV pp @1200 bps 1.0 V pp @9600 bps Impedance: 10 kΩ
PTT	Ground to Transmit
DATA OUT 9600 bps	Maximum Output Level: 500 mVpp Impedance: 10kΩ
DATA OUT 1200 bps	Maximum Output Level: 300 mVpp Impedance: 10kΩ
SQL	SQL Open: +5 V SQL Clised: 0 V

Transmitter Operation

AM TRANSMISSION

The **FT-818** utilizes low-level amplitude modulation of an early stage for transmission purposes. This capability is primarily provided for emergency use only, as low-power operation typically utilizes more efficient transmission/reception modes.

The AM carrier level is preset to 1.5 Watts during alignment at the factory, and should not require further adjustment. It is important to remember that AM transmission requires that power must be distributed among the carrier and voice sidebands; therefore, if excessive carrier power is used, there will be insufficient power available for the information-carrying voice sidebands.

The AM microphone gain is preset at the factory to a value which typically provides good audio. If you need to modify the microphone gain in the AM mode, use Menu #05 (AM MIC). See page 58 for details.

SPLIT FREQUENCY OPERATION

This transceiver provides convenient split-frequency operation, using the VFO-A and VFO-B, for DX working and other operating situations requiring unique split frequency pairs.

The example below will describe a typical split-frequency DX situation on the 20-meter band, with a DX station transmitting on 14.025 MHz, listening 10 kHz higher in the band.

1. Set VFO-A to 14.035.00 MHz CW (DX station's listening frequency).
2. Press the [F] key momentarily, then rotate the (SEL) knob, as needed, until Operating Function Row [A/B, A=B, SPL].
3. Press the [A] (A/B) key momentarily to select VFO-B.
4. Tune the VFO-B frequency to 14.025.00 MHz (DX station's transmitting frequency).
5. Press the [C] (SPL) key momentarily. The transceiver will now transmit using the VFO-A frequency, and will receive using the VFO-B frequency. The "**S**" icon will appear on the display.
6. To listen to the pile-up calling the DX station (so as to align your frequency more closely to that of the station being worked by the DX), press the [A] (A/B) key to reverse the VFOs. You will now be tuning in the vicinity of 14.035 MHz, and you can zero in on the DX station's listening frequency by tuning in on the station in QSO with the DX. Press the [A] (A/B) key again to return to reception on the DX station's frequency.
7. Press the [C] (SPL) key once more to cancel split operation; the "**S**" icon will disappear from the display.