

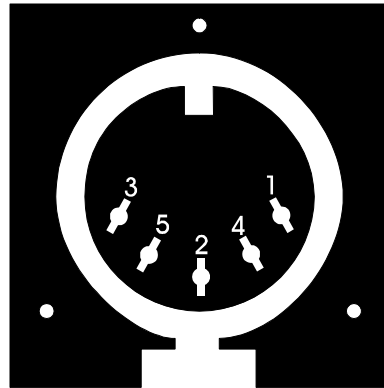
**RADIO INTERFACING**

Computer interfacing, covered in the previous chapter, is only half the interfacing task. The other half is connecting your MFJ-1278B to your radios.

**MFJ-1278B Radio Ports**

Interfacing the MFJ-1278B to your radios involves connecting the following signals at Radio Port 1 and Radio Port 2. The pin outs of Radio Port 1 and Radio Port 2 are shown in Fig. 3-1.

- Pin1 Microphone audio, from the MFJ-1278B to your transmitter.
- Pin 2 Ground, audio and PTT common.
- Pin3 Push-to-talk, to allow the MFJ-1278B to key your transmitter.
- Pin 4 Receive audio, from your receiver to the MFJ-1278B.
- Pin 5 Squelch input (optional) to allow the MFJ-1278B to detect activity on a shared-mode channel.



**Fig.3-1 Radio Port 1 and Radio Port 2 Connector**

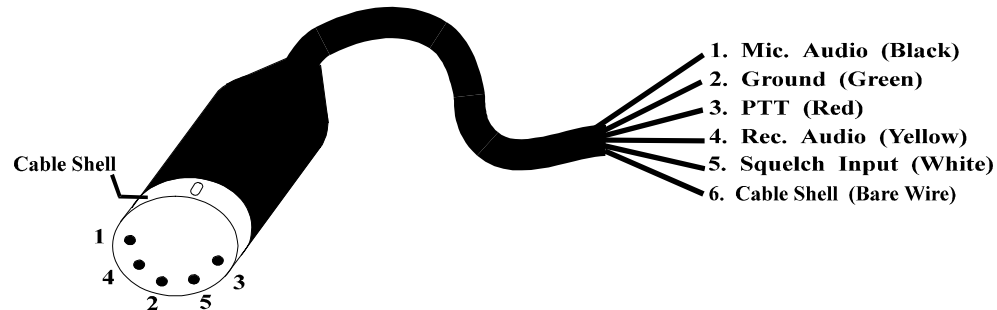
This chapter describes how to connect the MFJ-1278B to your radio and how to adjust the receive and transmit audio levels appropriately. The interconnection needs to be well thought out, to minimize pickup of stray audio and RF noise by the lines. If possible, you should set up your station with a monitor speaker and be able to operate on voice without disconnecting the MFJ-1278B.

**RADIO PORTS CONNECTION**

The MFJ-1278B gives the user two (2) radio ports. This allows for both FM and HF operation from either radio port. Since the radio ports are independent of each other, the user is not restricted to FM or HF operations. The radio ports on the MFJ-1278B allow an FM radio and an HF radio to be connected at all times. In fact you can have any combination of HF radios or VHF radios connected to the radio ports at any time. The pin designations for both radio ports are exactly the same. See Fig. 3-1 for the radio port pin designations. The radio ports on the MFJ-1278B are switched by using the **RADio** command. We will discuss radio port switching in the next chapter.

Once the user obtains the proper microphone connector (**not provided**), use Fig. 3-2 to wire the 5 pin DIN cable (provided) to the microphone connector. If two radios are to be used with the MFJ-1278B, you will need to wire two radio cables.

You may obtain the specific pin designations for your radio's microphone connector from your radio's manual. **Appendix A** at the end of this Instruction Manual lists pin assignments for some of the most popular radios. The accuracy of this information is not guaranteed. You should verify this information with your radio manual.



**Fig. 3-2 Radio Connector Pin Diagram**

Two 5-pin male DIN cables are provided with the MFJ-1278B. These cables have a 5-pin DIN connector on one end, with the other end of each cable being unterminated. The unterminated end of each cable is for wiring the appropriate microphone connector which matches your radio.

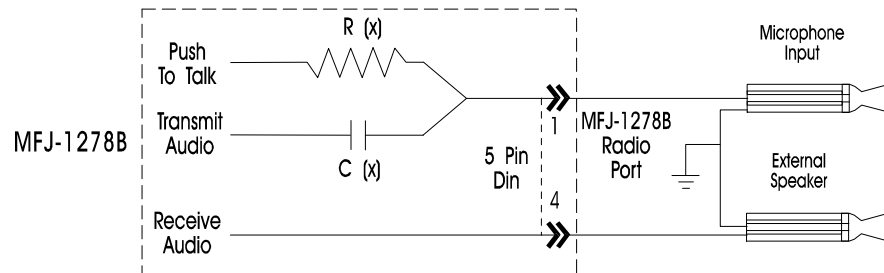
**CHECK THIS CABLE WITH AN OHM METER TO IDENTIFY EACH WIRE BEFORE WIRING IT TO THE MIC CONNECTOR THAT FITS YOUR RADIO.**

**HANDHELD RADIO CONNECTION**

Some HTs key the transmitter by drawing a small amount of current from the microphone input pin (see Fig. 3-3 below). Radios with this type of special keying circuit are ICOM-2AT (tm) and Yaesu FT-x09, FT-x3, FT-727 (tm) and others.

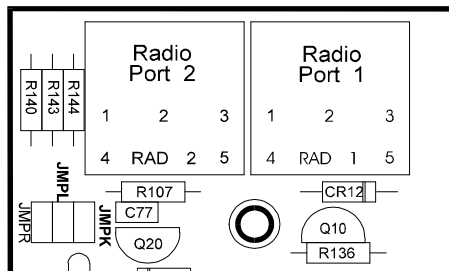
**Appendix A** at the end of this instruction manual provided pin designation for some of the radios. Also consult the instruction manual of your radio.

If your HT has this type of microphone circuit, you can wire the microphone like the one shown in Fig. 3-3 or you can remove the cover of the MFJ-1278B and install a shorting jumper at JMP L for Radio Port 1 or JMP K for Radio Port 2. Installing JMP K or JMP L will eliminate the need of soldering "Cx" and "Rx" to the microphone cable. "Cx" and "Rx" are installed on the MFJ-1278B mother board. Fig. 3-4 shows the location of JMP L and JMP K connectors. On the MFJ-1278B mother board, the "Rx" resistor for Radio Port 1 is R107 and the "Rx" resistor for Radio Port 2 is R140. If your radio still will not key properly after installing JMP L or JMP K, you may need to change R140 or R107 to a smaller value. Be sure to remove **JMP K** or **JMP L** when connecting the MFJ-1278B to another type of radio.



**FIG. 3-3 HT Special Keying Circuit**

Left Rear Corner of the MFJ-1278B

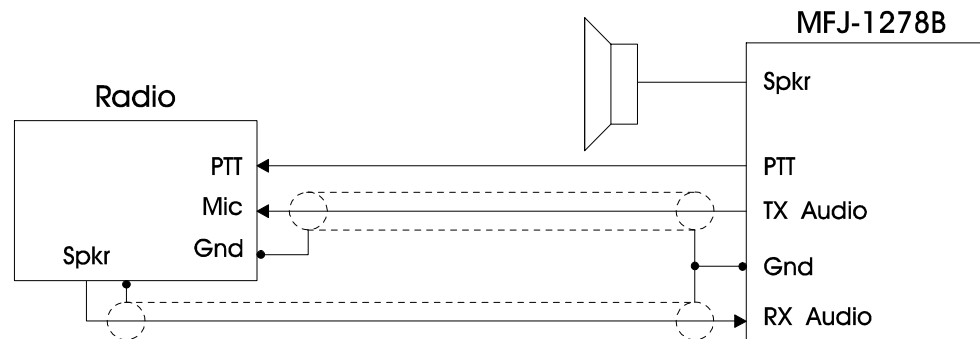


**RADIO INTERFACING METHODS**

The MFJ-1278B allows radio connection without any modifications to the radio or any signal balancing devices in the cables. There are two types interfacing methods presented in this chapter.

**Method 1: Direct Connection to Microphone and Speaker**

For Method 1, shown in Fig. 3-5, the MFJ-1278B's audio is fed directly into the microphone connector or similarly connected auxiliary jack. The output of the MFJ-1278B will be adjusted to give a proper modulation level. The receiver audio will be taken from an earphone plug or speaker jack and fed directly to the MFJ-1278B. The user can connect a monitor speaker to the SPEAKER jack of the MFJ-1278B. This allows you to monitor the transmit and receive audio on the channel.



**Fig. 3-5 Method One Interconnect.**

The transmit audio levels for both radio ports are factory preset at 250 mV p-p to be compatible with the mic input of most radios. However, if the transmit audio is too low or distorted, then adjust the appropriate output level control as stated in the section. Use the following procedure to calibrate:

**Transmit Audio Level Adjustment for Method I Interface**

1. Connect your MFJ-1278B and radio as shown in Fig. 3-5. Turn on the MFJ-1278B and computer and start your terminal program. Connect the radio to a dummy load and listen to the transmission with another nearby radio.
2. Enter the modem calibration procedure by typing

**CALIBRA**

followed by a carriage return. Press the **X** key on your keyboard to hear the transmission. Then

3. With the MFJ-1278B keying the transmitter and transmitting the higher of the two tones, adjust the transmit audio level as follows. With a small flat-tipped screwdriver, adjust trimpot located on the left side of them MFJ-1278B (R157 for radio 1 or R158 for radio 2) while you listen to the monitoring receiver. Adjusting the trimpot CW increases the output, while CCW decreases the output. Turn the adjustment on the trimpot clockwise (CW) until no increase in output level is heard at the monitoring receiver.
4. Rotate the adjustment on the trimpot counter-clockwise until the audio signal on the monitoring receiver decreases by half of the maximum level. This can be estimated by ear or accurately by measuring the output voltage at the transmit audio pin of the radio port with an oscilloscope or AC voltmeter.
5. Press the **K** key to return to receive mode and type **Q** to exit the calibration routine. Be sure to remove JMP4 if you placed it to defeat the watch-dog timer. You have now set your transmitter deviation to approximately the correct level.

If you notice a significant hum level in the monitored audio in Step 3, take measures to remove it. This may require shielded wire (recommended in any event) in your microphone audio circuit. The use of shielded cable is always necessary, in projects such as this. If your transmitter has an adjustable microphone gain control, try reducing the sensitivity of the transmitter microphone circuit and increasing the signal level from the MFJ-1278B to minimize hum or other noise problems.

#### Setting the Receiver Audio Input Level

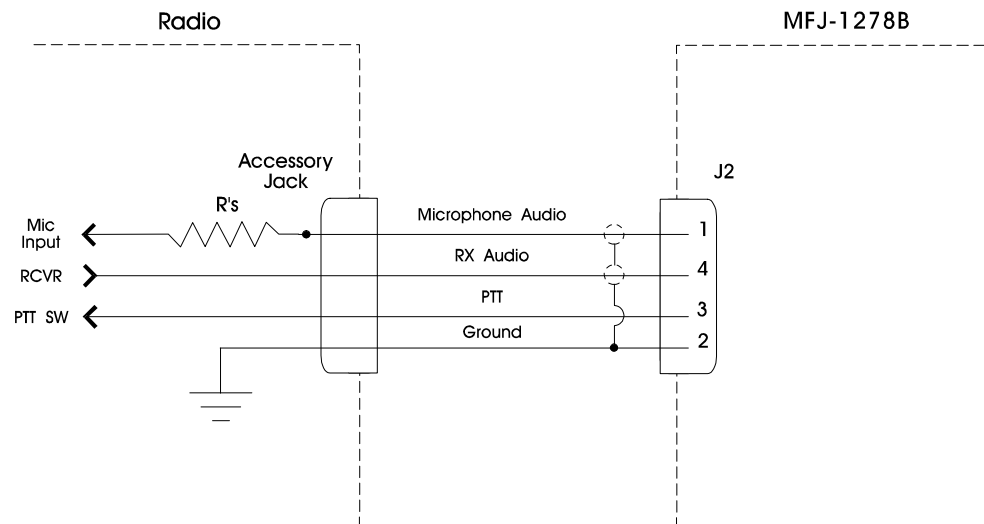
The modem in your MFJ-1278B implements an advanced phase coherence type data carrier detection (DCD). There is a threshold control and a sensitive tuning indicator. Together they set the correct receive audio level for the modem, also to optimize the DCD characteristics for the various methods of operation.

With your radio in the receive mode, open the squelch control so that a steady hiss is present on a speaker. Set the volume control to the minimum volume position. The tuning indicator on the MFJ-1278B should drift off to one side of the display and become stationary. It may drift enough to disappear off the end of the display. Slowly advance the audio output level with the volume control until the tuning indicator "springs to life" and dances around a point near the middle of the display. This is the absolute minimum audio level for marginal copy. Continue to advance the volume control until there is approximately twice as much audio present at the receiver output. This can be estimated by ear or measured with an oscilloscope or AC voltmeter. This will be near the correct amount of audio for NBFM operation. Levels higher than this will not degrade the modem performance as long as the receiver audio amplifier is capable of producing the chosen output level without distortion (clipping).

The bandwidth of the receiver audio will have an effect on modem sensitivity to false DCD. Some receivers produce wideband audio that will NOT produce any false DCD activity regardless of the threshold control setting. In this case, set the DCD threshold control to its maximum clockwise rotation. This will not effect modem performance.

### **Method 2: Accessory Jack or Interface Box Connection**

If your radio has an accessory jack with PTT, transmit audio, and receive audio signals, the interconnection can be done through this jack (shown in Fig. 3-6).



**Fig. 3-6 Accessory Jack Interface.**

If your radio does not have an accessory jack and you don't wish to add a connector to your radio, you may construct a separate external interface box. This box will permit simultaneous connection of your MFJ-1278B and a microphone. Figure 3-7 shows a schematic of an external interface box.

A microphone interface box similar to the one shown in Fig. 3-7 is available from MFJ Enterprises, Inc. or from any dealer of MFJ products. The Model No. of the microphone interface box is MFJ-1272B.

Regardless of whether you use an accessory jack or an external interface box, you should use shielded wire for all signal carrying leads. The connectors and fittings on your radio will be the deciding factor, as to what hardware you will need. The user may also want to refer to manuals of the equipment involved in the interconnections for some information.

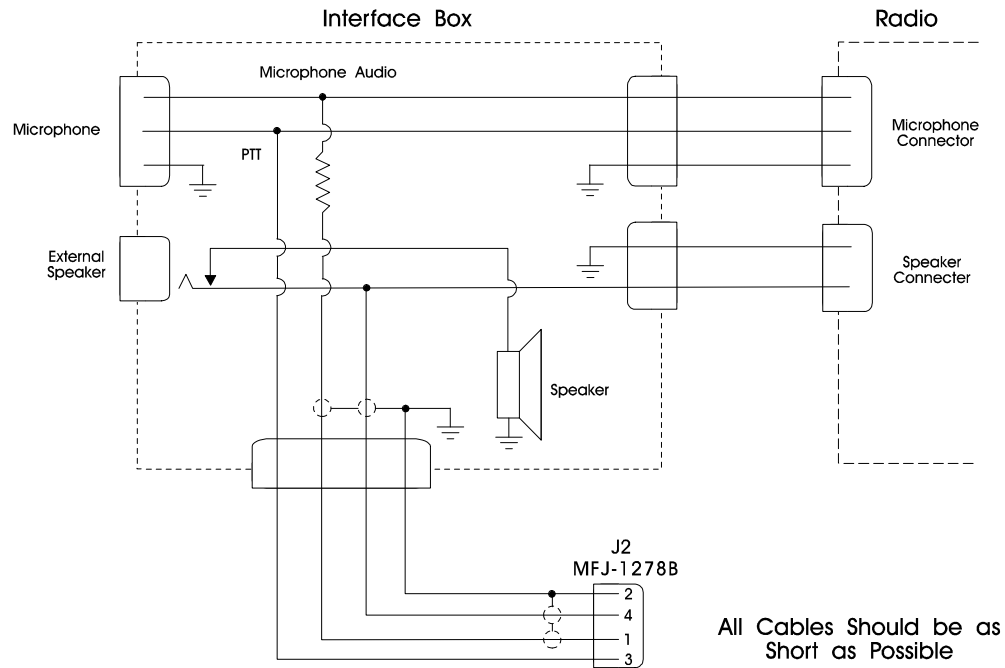


Fig. 3-7 External Interface Box

If you built the external interface box as in Fig.3-7, then follow this procedure to adjust R(s).

1. Install JMP J on the MFJ-1278B PC board.
2. Temporarily solder a variable resistor in place of R(s) Fig. 3-7. The maximum value of this resistor can be determined by experiment. However, a 500K resistor should be adequate most cases. Connect your MFJ-1278B to the radio. Connect the microphone to the radio, or to the interface box if one is being used. Connect the radio to a dummy load and listen to the transmission with another nearby radio. Adjust R(s) for proper modulation as the next sections describe.