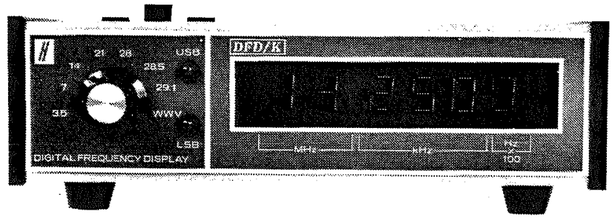
INSTRUCTION MANUAL DIGITAL FREQUENCY DISPLAY



INTRODUCTION

Description

The Tempo DFD/K Digital Frequency Display is designed to operate in conjunction with Kenwood Transceiver models TS-520 and TS-511S. The DFD/K provides a six digit display of both transmitted and receive frequency. In addition the unit also indicates the true receive frequency when the receive incremental tuning (RIT) control is in use.

The displayed frequency is indicated in MHz, kHz, and hundreds of Hz, providing rapid interpretation by the operator. The display is updated approximately 17 times per second, thus permitting instantaneous readout while tuning across the band.

Specifications

Frequency display range	1.5 to 30 MHz
Input frequency range	4.9 to 5.5 MHz
Frequency display	6 digits
Accuracy	Within 100 Hz ± count
Counting time	10 milliseconds
Clock frequency	8 MHz
Semiconductor complement	21 IC's, 1 transistor, 49 diodes
Power source	105 to 125V, 50/60 Hz
Dimensions	8½"w x 6"d x 3"h (not including knobs and connectors)
Weight	3 lbs

NOTE :
The Tempo DFD/K has the capability of displaying the transceiver's frequency for reception in the 27.0 to 27.5 MHz range. To display these frequencies, simply turn the DFD/K band switch to the first position beyond WWV.

INSTALLATION AND OPERATION

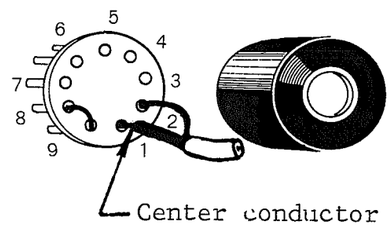
General

The DFD/K Digital Frequency Display should be located where an unobstructed flow of cool air may be obtained around the unit. If the unit is situated on top of the transceiver, use a sheet of cork or asbestos under the digital display as a heat buffer.

Connection to the Kenwood TS-511S or TS-520

The DFD/K is supplied with a gray interconnecting cable to supply the VFO RF voltage from the transceiver to the digital display.

Connect the stripped end of this cable to the 9 pin VFO shorting plug located on the rear panel of the transceiver. Solder the cable to pins 1 and 2 as shown in the pictorial below.



After installation of cable reassemble the plug and reinstall in the "VFO" socket on the rear panel of the transceiver. Connect the other end of the cable to the input receptacle of the DFD/K. Connect a ground strap between the DFD/K and the ground stud on the transceiver.

Operation

General - Your DFD/K has been factory calibrated to a secondary frequency standard referenced to WWV. The overall accuracy of the digital frequency readout however will depend on the tolerance of the transceiver's heterodyne crystals in the first local oscillator circuit. These are normally close enough that any error will be minimal between bands. If a significant error is noted when checked against WWV, you may recalibrate the DFD/K to your transceiver as described in the MAINTENANCE section.

You may notice some non-linearity between the readout on the DFD/K and the "analog dial" of your transceiver as you tune across the band. In this case the DFD/K is providing a correct frequency readout; the non-linearity is in the mechanical "tracking" of the transceiver's VFO/dial drive.

Operating Procedure - Operation of the DFD/K is automatic once the Band and MODE switches have been set to match those of the transceiver. Once the analog dial of the transceiver has been calibrated at a 100 kHz marker the digital readout of the DFD/K will be the same except for possible non-linearity in mechanical tracking of the VFO previously discussed.

Note: The 100 Hz digit will exhibit an ambiguity of ±1. This is normal, however, if it is distracting release the Hz x 100 switch to extinguish the last digit.

Controls and Indicators - The various controls and indicators are shown in Figure 1. The function of each is as follows:

1. POWER Switch - This switch applies power to the DFD/K when pressed.

2. MODE Switch - This switch shifts the DFD/K local oscillator frequency to correct the readout for USB or LSB, also illuminates the appropriate indicator.

NOTE: The MODE Switch must be set to the same position as the MODE Switch in the transceiver. For CW or AM, however, use the USB position.

3. Hz x 100 Switch - This switch illuminates the 100 Hz readout when pressed.

4. Band Switch - This switch selects the desired band (or 500 kHz segment of the band) to be displayed and also programs the counter. This switch must also be set to the same position as the Band Switch in the transceiver for proper readout.

5. USB Indicator - Illuminated when USB mode is selected.

6. LSB Indicator - Illuminated when LSB mode is selected.

7. First Digit Display - Readout for MHz x 10 (this digit is not illuminated when the Band Switch is in the 160, 80, or 40 meter position)

8. Second Digit Display - Readout for MHz x 1.

9. Third Digit Display - Readout for kHz x 100.

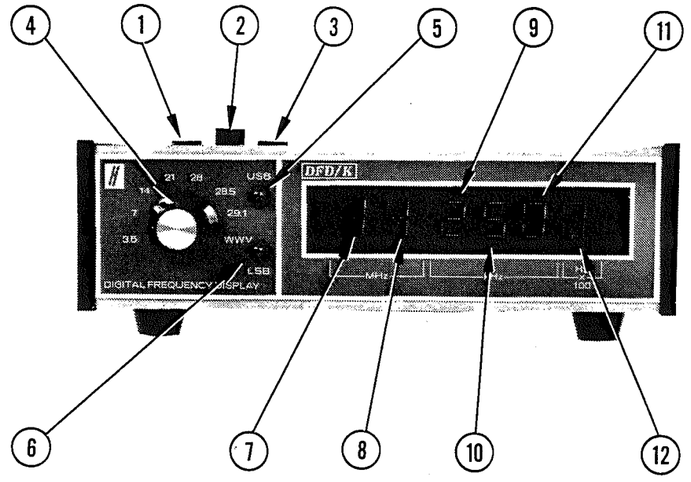


Figure 1. Controls and Indicators

10. Fourth Digit Display - Readout for kHz x 10.

11. Fifth Digit Display - Readout for kHz x 1.

12. Sixth Digit Display - Readout for Hz x 100 (this digit is not illuminated unless the Hz x 100 switch is pressed).

MAINTENANCE

General

Your DFD/K Digital Display has been carefully calibrated and tested prior to shipment from the factory. The reliability of the solid-state devices employed in the DFD/K should provide years of trouble free service is the unit is not abused.

CAUTION: DO NOT APPLY ANY VOLTAGE, OR SIGNAL, OTHER THAN THE TRANSCEIVER VFO OUTPUT AT THE DFD/K INPUT RECEPTACLE. FAILURE TO OBSERVE THIS PRECAUTION WILL RESULT IN SEVERE DAMAGE.

Routine Maintenance

Routine maintenance should be limited to keeping the unit clean, and periodic calibration checks.

Cleaning

When the DFD/K is used in dusty or sandy areas the interior should be periodically cleaned. A vacuum cleaner, or low pressure air source should be used, while accumulated dirt may be removed with a soft brush and alcohol. Check that the interior is thoroughly dry before replacing the cover and/or operating the equipment. Wipe the exterior with a damp cloth whenever required.

Calibration

Periodically check the accuracy of the digital readout against the internal calibrator in the transceiver. If the calibration error exceeds ±100 Hz the unit may be recalibrated as follows:

1. Remove the two screws that retain the top cover of the DFD/K. These will be found at the top rear of the case. Slide the top cover back and remove.

2. Apply power to the DFD/K and transceiver. Allow at least 30 minutes warm-up.
3. Set band and MODE switches on the DFD/K and the transceiver to agree on any desired band. Place the transceiver RIT switch to the "OFF" position. Press the Hz x 100 switch to illuminate the last digit in the DFD/K.
4. Turn on the transceiver internal calibrator and carefully adjust the main tuning knob for a "zero" beat. The DFD/K should display the resultant frequency within ±100 Hz.
5. If the DFD/K exceeds this tolerance, adjust trimmer capacitor TC-1 until the correct reading is obtained. See pictorial for location of TC-1.

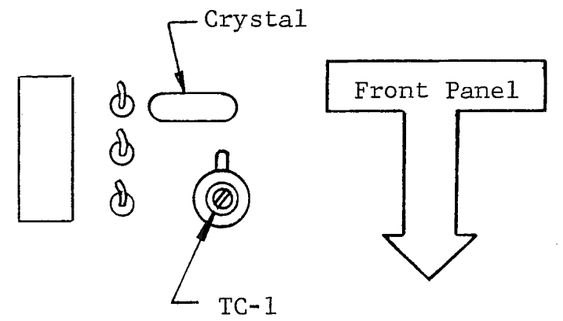


Figure 2. Trimmer location

Note: The last digit of the display will normally read ±100 Hz of the actual frequency. For example: A frequency on the 20 meter band of 14.30000 may be displayed as 14.2999 or 14.3001. This is caused by normal ambiguity of the least significant number in digital circuits.

Troubleshooting and Repair

The digital circuitry employed in the DFD/K requires specialized test equipment for troubleshooting not normally available to the average amateur. Therefore, it is recommended that the unit be returned to the factory for any required repairs.

In most cases a problem encountered with operation of the DFD/K may be traced to a loose interconnecting cable between the unit and the transceiver.

Fuse Replacement

The DFD/K is protected in the 115 VAC primary circuit with a 3AG·1 ampere fuse. If the fuse blows it may be replaced as follows:

1. Disconnect the unit from the 115 VAC power source.
2. Remove the two screws at the top rear of the case; slide the top cover back and remove.
3. Replace the fuse and reassemble the unit.