

S P T - 1

SPECTRA-TUNE

Tuning Indicator  
for  
Radio Data Communications

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## SPECTRA-TUNE SPT-1

### INTRODUCTION:

The SPT-1 Spectra-Tune is a tuning indicator that may be used with any RTTY or Morse code radio system. The frequency spectra of the received signal is displayed in a calibrated linear 40-segment bar graph. The 1000 Hz frequency scale may be centered to favor reception of various radio data modes including RTTY-HT, FAX/SSTV, RTTY-LT, and CW. Separate input connections are provided for receiver audio and for calibration audio tones. The SPT-1 may be powered from any external 12-15 VDC source. The Spectra-Tune is a particularly convenient accessory for the HAL PCI-2000 and PCI-EXT; the SPT-1 cables mate directly with special connectors on the PCI-EXT.

## CONNECTIONS:

Connection of the SPT-1 is very simple. Only two or three wires are required. These connections are:

1. DC Power - coaxial power connector  
+V on center pin  
-V on outside ring  
12-15 VDC, filtered @ 90 ma
2. RCVE AUDIO - gray or black phono plug  
8 to 600 ohms  
-60 to +10 dBm  
(0.8mV to 2.5V rms)
3. CAL AUDIO - red phono plug  
8 to 600 ohms  
-60 to +10 dBm  
(0.8mV to 2.5V rms)

The DC power source need not be regulated but should be well filtered to avoid hum and noise problems. When the SPT-1 is connected to the PCI-EXT Cable Extender Box, the power is supplied by the computer. For other applications, any 12VDC power source capable of supplying 90 ma. will serve. A low-cost wall-mounted DC power pack is ideal. Be sure that the external power supply is isolated from the power line and that by-passing is used to prevent RFI problems when transmitting.

The RCVE AUDIO input may be connected directly to the receiver speaker or 500 ohm audio output line; hi-impedance "recorder" outputs may not produce sufficient audio voltage for the SPT-1. The SPT-1 will have a greater dynamic range for display of weak signals if a 500 ohm audio output is used. When connected to the PCI-EXT, the

SPT-1 audio input is obtained directly from the same audio line that drives the PCI-2000 demodulators, eliminating the need for a separate connection to the receiver.

The CAL AUDIO input may be connected to any known-frequency calibration source. When connected to the PCI-EXT AUDIO OUTPUT connector, the PCI-2000's internal AFSK oscillator is used to give precise calibration frequencies. This arrangement assures transceive tuning calibration between the receive and transmit tones. When the SPT-1 is used with other modulator/demodulator systems (such as the CT2200 or ST6000), the CAL INPUT may be conveniently obtained from the TX AUDIO or AUDIO OUTPUT terminals, in parallel with the cable to the transmitter microphone audio input. The CAL AUDIO input is optional and is not required unless very accurate calibration of the frequency scale is desired.

No other connections are required for proper operation of the SPT-1. Typical connections of the SPT-1 to the PCI-EXT are shown in Figure 1. Connections to the CT2200 or other RTTY/CW devices are shown in Figure 2.

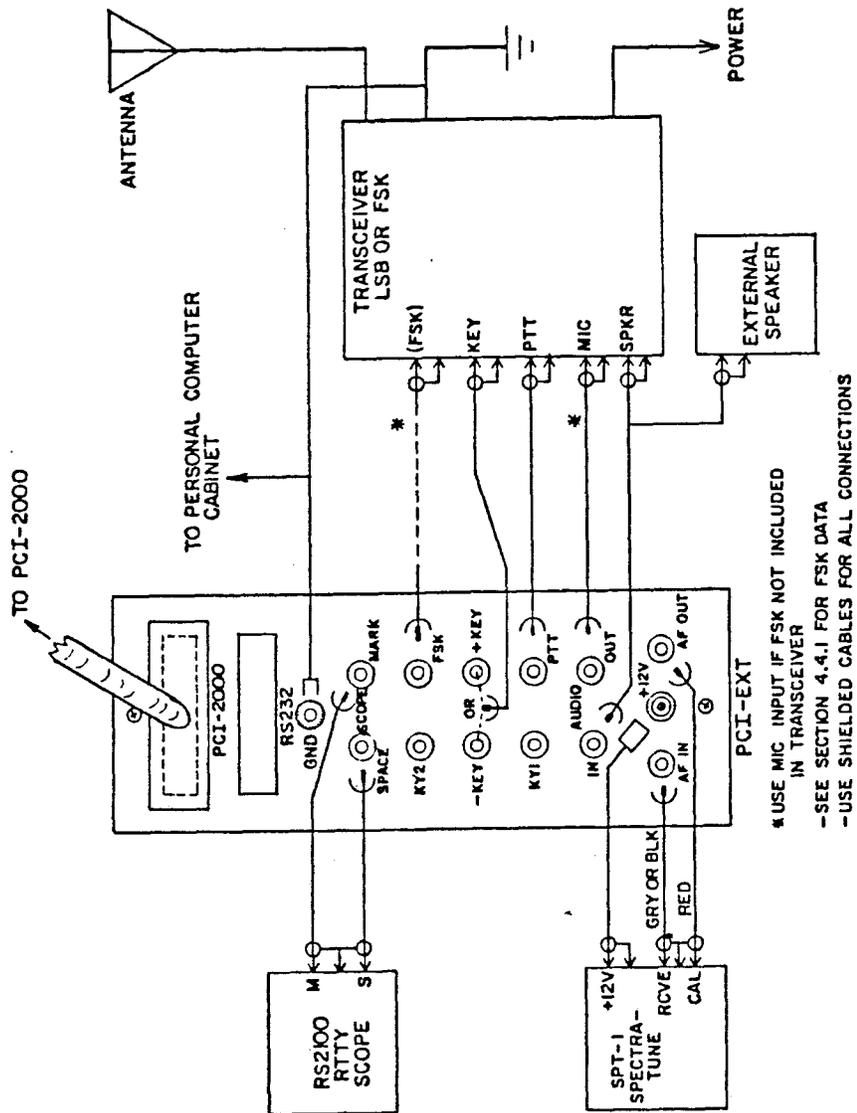


FIGURE 1. SPT-1 CONNECTIONS TO PCI-EXT

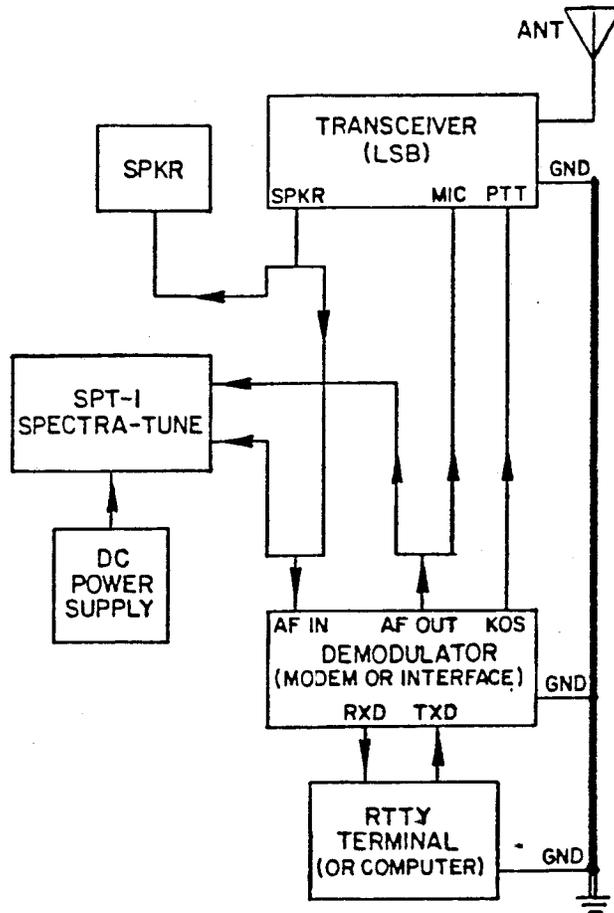


FIGURE 2. GENERAL SPT-1 CONNECTIONS

## OPERATION:

Operation of the SPT-1 is very simple and normally requires no more than setting the calibration control to the desired frequency range and then tuning the receiver. The following procedure is recommended when used with the PCI-EXT and PCI-2000:

1. With all connections made to the PCI-EXT, SPT-1, receiver and transmitter, turn on the computer and select the desired mode of operation. Temporarily disconnect the PTT cable to the transmitter.
2. Preset the SPT-1 Calibration control to the desired frequency range (CW, RTTY, etc). Use RTTY-HT for RTTY unless you have an export version of the PCI-2000; use RTTY-LT for export models. CW is the same for either version.
3. Select "CAL" on the SPT-1 power switch.
  - a. For RTTY, carefully adjust the SPT-1 calibration control so that the bright LED segment is directly below "M" on the frequency scale. Type a few characters and send them using ALT-F10. The illuminated segments will flash between "M" and "S" corresponding to the selected shift.
  - b. For CW, be sure that the CW TX sidetone is enabled (normal default condition), type some text, and send it (ALT-F10). Adjust the SPT-1 calibration control so that the flashing segment is directly above "CW" on the frequency scale.

4. Set the SPT-1 power switch to "ON" and tune RTTY or CW signals. Correct tuning will appear on the SPT-1 just like the CAL tests in step 3a or 3b. Reconnect the PTT cable to the PCI-EXT before transmitting.
5. You may re-check calibration at any time you are transmitting by changing the SPT-1 power switch from "ON" to "CAL" (return to "ON" for receiving).

A similar adjustment procedure is used for any other RTTY/CW system. Be sure to defeat the transmitter PTT line while doing the initial SPT-1 calibration to prevent transmission of the test characters. The SPT-1 will maintain calibration for long periods, but it is recommended that you check the calibration periodically to prevent errors that will be caused if the SPT-1 calibration control is accidentally changed while operating.

The SPT-1 gives a very accurate and dependable tuning indication for most RTTY and CW signals. The frequency scale of the display allows you to "see" the desired signal long before correct tuning has been reached and tells you which way to turn the receiver dial for correct tuning. The Spectra-Tune is equally effective for RTTY, FAX/SSTV, or CW receiver tuning.

The SPT-1 gives a very readable display for most signal conditions. However, under conditions of low signal-to-noise ratio, the LED display will tend to be "smeared" by the noise. In this case, a separate RTTY X-Y Scope (such as the RS2100) is a useful addition to the receiving equipment. The combination of both the SPT-1 and RS2100 gives good RTTY tuning indications under all signal conditions.

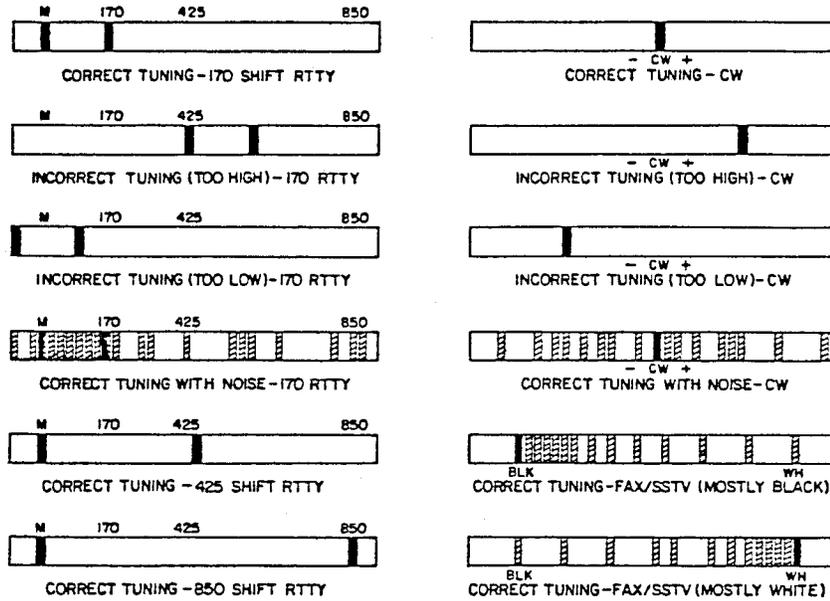


FIGURE 3. TYPICAL TUNING INDICATIONS

Typical tuning indications for RTTY, CW, and FAX/SSTV modes are shown above in Figure 3. Notice that, when noise is present, the desired signal will usually show "brighter" than noise or interference.

The frequency scale of the SPT-1 can be very useful for analyzing the received signal. The top label is for RTTY reception and the three standard shifts (170, 425, and 850 Hz) are shown in their proper positions. The bottom labels are for CW and FAX/SSTV tuning. Each LED segment of the display represents 25 Hz. In addi-

tion, there are two rows of small dots, one above the display and one below. The dots in each row are spaced 100 Hz (4 LED segments) apart; the bottom row is displaced from the top row by 50 Hz (2 LED segments). These dots can be used in conjunction with the known RTTY and CW calibration marks to measure any frequency within the selected 1000 Hz scale. The approximate scale calibrations for each mode are:

RTTY-HT: M = 2125 Hz; 2050 < scale < 3025 Hz  
FAX/SSTV: BLK = 1500 Hz; 1400 < scale < 2375 Hz  
RTTY-LT: M = 1275 Hz; 1200 < scale < 2175 Hz  
CW: CW = 800 Hz; 300 < scale < 1275 Hz

The SPT-1 is also very useful when setting the Pass-band Tuning (PBT) of the receiver. To do this, set the SPT-1 calibration for the desired mode (RTTY-HT, for example), tune the receiver so that NO signals are heard (only noise), and adjust the PBT control until the noise "band" of flashing LED segments is centered about the desired frequency range ("M" to "170" for 170-shift RTTY). This feature is particularly useful for proper adjustment of PBT when a narrow receiver filter is selected.

## TECHNICAL DATA

The SPT-1 is constructed on two closely spaced circuit boards that are mounted to the front panel. The schematic diagrams of these boards are shown in Figures 4 and 5.

The SPT-1 uses a high-gain limiter stage to remove amplitude variations in the received signal. The limited signal drives a frequency-to-voltage converter to produce a DC voltage that is linearly proportional to the frequency of the input signal. This voltage then drives a 40 segment linear voltmeter display. The front panel calibration control allows selection of which 1000 Hz range from 300 to 3000 Hz is to be displayed.

The SPT-1 is designed to give you years of trouble-free performance and should not require internal recalibration. If it should fail or require recalibration, please contact HAL Communications and we will be glad to repair the unit for you. Be sure to contact us in advance for return authorization so that we can allocate repair time for your unit. ALSO, INCLUDE A NOTE IN THE BOX THAT GIVES YOUR NAME, ADDRESS, AND BRIEF DESCRIPTION OF THE PROBLEM.

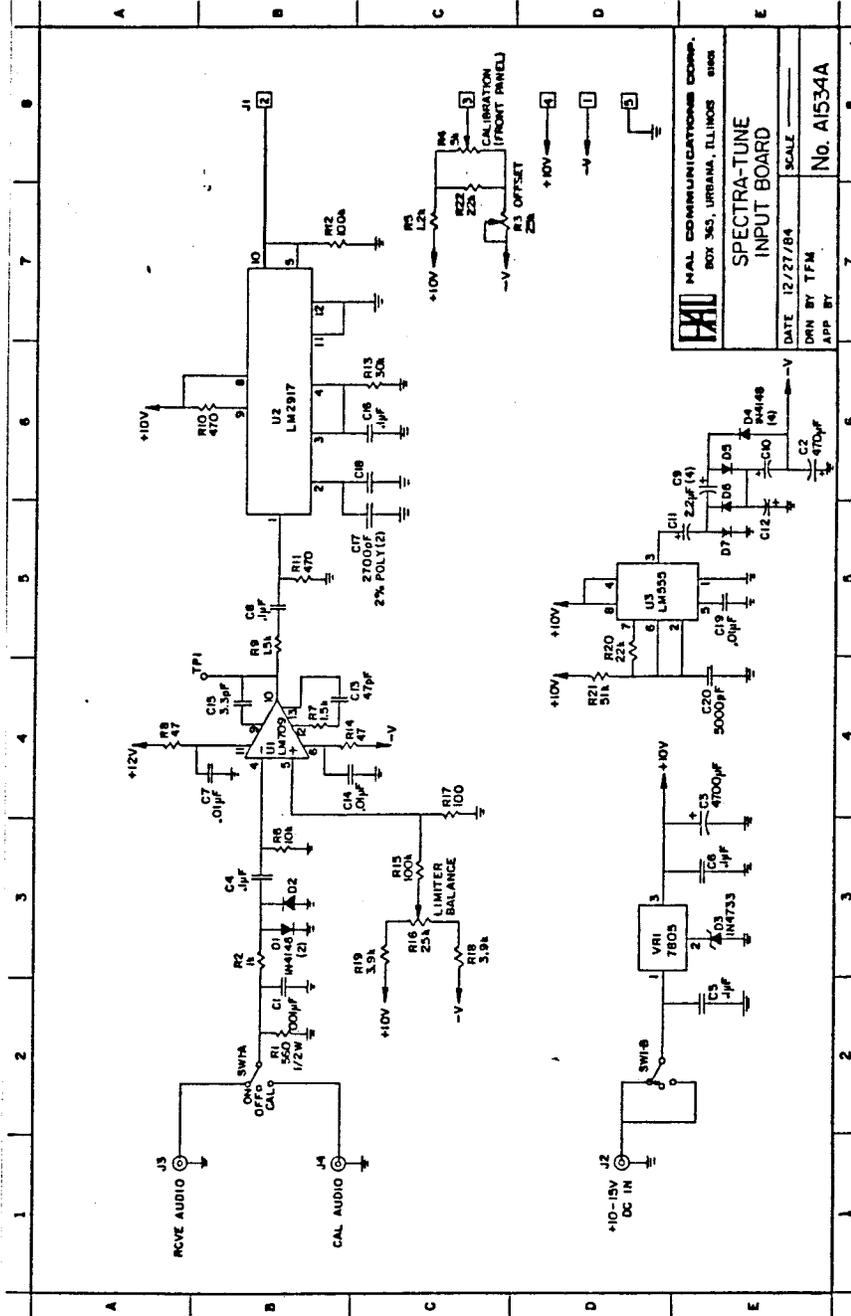


FIGURE 4. SPECTRA-TUNE INPUT BOARD

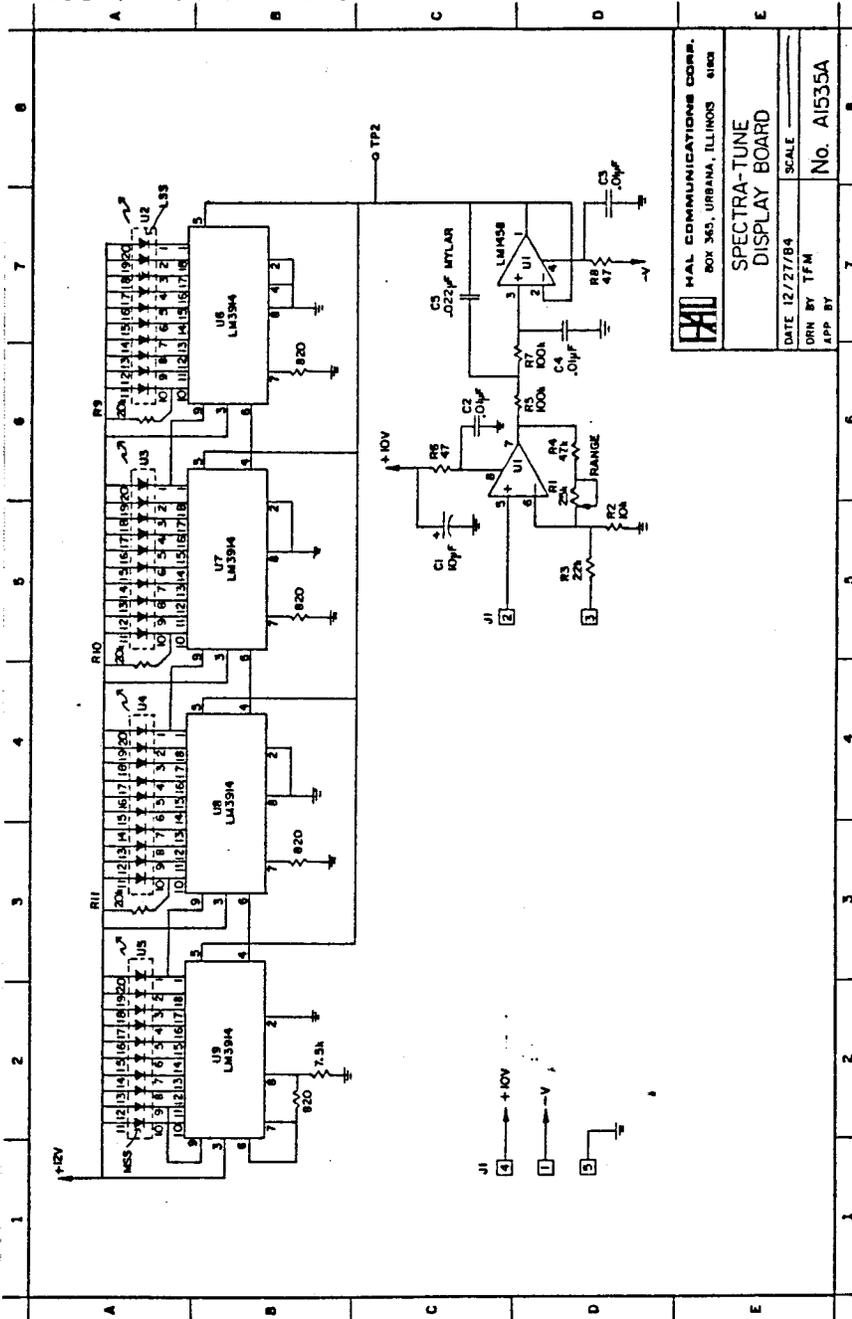


FIGURE 5. SPECTRA-TUNE DISPLAY BOARD

 <b>HAI</b> MAL COMMUNICATIONS CORP. BOX 365, URBANA, ILLINOIS 61802	
<b>SPECTRA-TUNE          DISPLAY BOARD</b>	
DATE 12/27/84	SCALE
DRN BY TFM	APP BY
No. AI535A	

HAL COMMUNICATIONS CORP  
P.O. BOX 365  
URBANA, IL 61801

LIMITED WARRANTY

HAL Communications Corp of Urbana, Illinois, hereby warrants to the original purchaser only that any new equipment manufactured by HAL Communications Corp shall be free from defects in materials and workmanship for a period of one year from the date of original purchase. In the case of parts kits, this warranty applies only to materials and not to workmanship in kit assembly.

In the event of a defect in materials or workmanship during the warranty period, HAL Communications Corp will, at its own expense, repair the defective unit and replace any defective parts. Costs of shipping the unit to HAL Communications Corp shall be paid by the purchaser, as well as costs of removal and reinstallation of the unit. HAL Communications Corp will bear the shipping costs incurred in returning the unit to the purchaser.

To obtain service under this warranty, the original purchaser should do the following:

1. Notify, as soon as possible, the Customer Service Department at HAL Communications Corp, Urbana, Illinois, either in writing or by telephone, of the existence of a possible defect;
2. At the time of notification, identify the model or serial number, the approximate date of purchase, the place of purchase, and the possible defect;
3. Hold the unit until a written return authorization is received.
4. Return the unit, freight prepaid, upon the receipt of the written return authorization.

Correct installation, use, maintenance, and repair are essential for proper performance of this product. The purchaser should carefully read the technical manual.

This warranty does not apply to any defect which HAL Communications Corp determines is due to any of the following:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts;
2. Misuse, abuse, neglect, improper installation, or improper operation (including operation without a proper safety ground connection);
3. Accidental or intentional damage.

All implied warranties, if any, are limited in duration to a period of one year from the date of original purchase. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

HAL Communications Corp disclaims any liability for incidental or consequential damages arising out of the use of, or inability to use, this product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.