

# **Vectornics VC-300D**

## **DIGITAL BARGRAPH ANTENNA TUNER**

### **FEATURES**

The Vectornics VC-300D Antenna Tuner optimizes the performance of your antenna and transmitter, receiver, or transceiver by providing adjustable impedance matching. The tuner also measures the Power and Standing Wave Ratio (SWR), allowing you to adjust for the lowest possible ratio for the selected transmit frequency. It utilizes a precision frequency compensated lighted dual movement SWR/Power meter which can show either peak or average readings. Also included is a built-in dummy load for tuning purposes which is easily switched in and out of the circuit. The tuner features a revolutionary new digital bargraph display that enables you to see real peak SSB power relative to full CW power. Levels and delay are front panel adjustable.

### **SPECIFICATIONS**

#### **FRONT PANEL INDICATORS**

- Meter ..... Dual movement D'Arsonval lighted cross needle Power and SWR meter.  
Bargraph Display ..... 20 segment LED display

#### **FRONT PANEL CONTROLS**

- TRANSMITTER Tuning ..... Continuous rotation capacitor  
ANTENNA Tuning ..... Continuous rotation capacitor  
INDUCTANCE ..... 12 position switched Inductor  
OUTPUT SELECT ..... Eight position: DIRECT coax 1, coax 2, bypass and dummy load; TUNED coax 1, coax 2, wire and dummy load  
LEVEL ..... Adjust display to 100% of CW power  
DELAY ..... Adjust the rate at which the display returns to zero  
RANGE ..... 2 position switch: 30W/300W

#### **REAR PANEL CONNECTORS**

- COAX 1 ..... SO-239 connector  
COAX 2 ..... SO-239 connector  
BYPASS ..... SO-239 connector

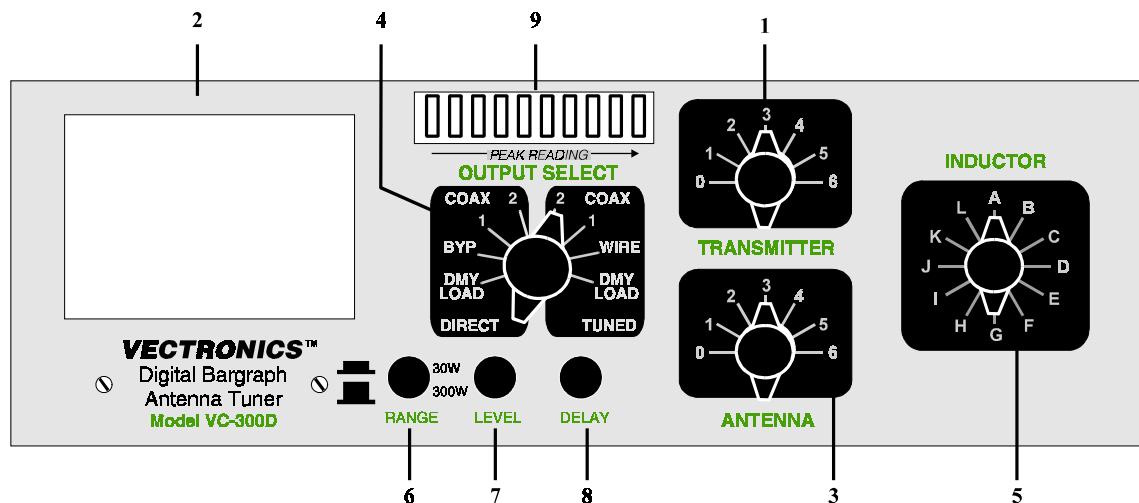
TRANSMITTER IN ..... SO-239 connector  
 BALANCE LINE ..... Dual Banana jack  
 WIRE ..... Banana jack

## OTHER

Frequency Coverage ..... 1.8-30 MHz  
 Power Maximum ..... 150 Watts Continuous; 300 Watts PEP  
 Dimensions ..... 3.5" H x 10.2" W x 9.4" D  
 Weight ..... 3.7 lbs.

## CONTROLS / CONNECTORS

### FRONT PANEL FUNCTIONS



### 1. TRANSMITTER

Continuously adjustable input capacitor

### 2. POWER / SWR METER

Dual needle meter displays FORWARD and REFLECTED Power in Watts.  
 The SWR is measured where the two needles intersect on the red scale.

### 3. ANTENNA

Continuously adjustable output capacitor.

### 4. OUTPUT SELECT

Eight-position rotary switch an output coaxial connector.

**DIRECT MODE:**

- DMY LOAD selects the internal dummy load, bypassing the impedance matching circuit but providing normal meter readings.
- BYP selects the BYPASS connector on the rear panel, bypassing the impedance matching circuit but providing normal meter readings.
- COAX 1 selects the COAX 1 connector, bypassing the impedance matching circuit but providing normal meter readings.
- COAX 2 selects the COAX 2 connector, bypassing the impedance matching circuit but providing normal meter readings.

**TUNED MODE:**

- COAX 2 selects the COAX 2 connector through the impedance matching circuit.
- COAX 1 selects the COAX 1 connector through the impedance matching circuit.
- WIRE selects the WIRE connector through the impedance matching circuit.
- DMY LOAD selects the internal dummy load through the impedance matching circuit.

**5. INDUCTOR**

12-position rotary switch to vary inductance.

**6. RANGE**

Two-position push button switch selects the range of FORWARD and REFLECTED Power displayed on the power meter.

When the RANGE switch is OUT, the FORWARD meter scale reads 300 watts full scale and the REFLECTED meter scale reads 60 watts full scale. When the switch is IN, the FORWARD meter scale reads 30 watts full scale and the REFLECTED meter scale reads 6 watts full scale.

**7. LEVEL**

When the level control is adjusted to light the red LED at 100% CW power, the digital bargraph will indicate relative peak on SSB. When this control is turned fully anticlockwise, the switched position turns off the meter lamps and the digital bargraph.

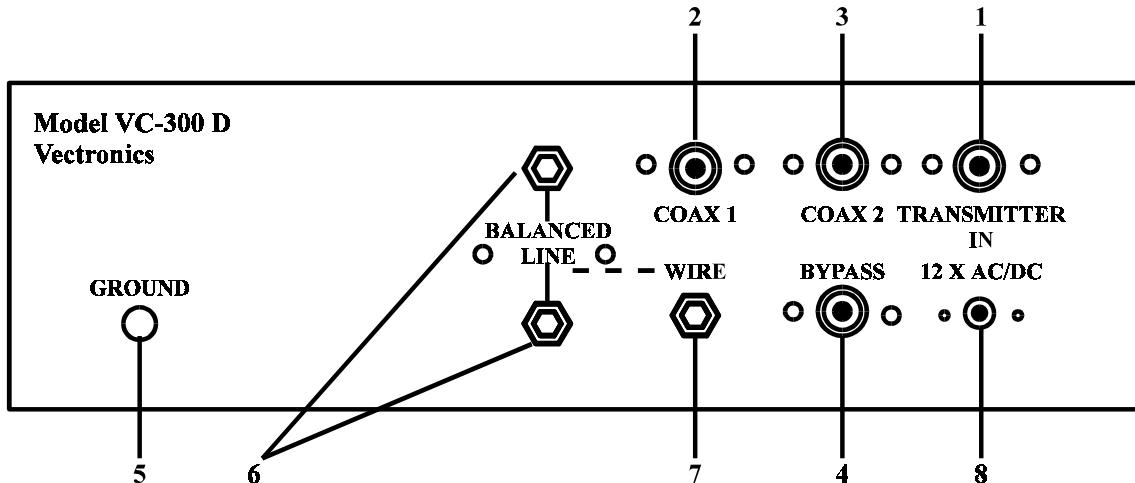
**8. DELAY**

The delay control adjust the rate at which the digital bargraph returns to zero. This control is set according to the operators discretion.

**9. DIGITAL BARGRAPH**

20 segment LED bargraph which displays peak power. The right-hand LED is red, indicating 100% power.

## REAR PANEL CONNECTORS



## 1. TRANSMITTER IN

Coaxial connector for input from SWL receiver or transmitter.

## 2. COAX 1

Coaxial connector for output to Antenna One.

## 3. COAX 2

Coaxial connector for output to Antenna Two.

## 4. BYPASS

Coaxial connector for third coax output. Bypasses tuner, but meter circuits remain active.

## 5. GROUND

Post/Wing-nut type ground connector.

## 6. BALANCED OUTPUT

Two banana jack connectors for output to RF balanced twin-lead antennas. (Note that jumper must be used as shown by the dotted line.)

## 7. END FED WIRE

Banana jack for output to a single-wire antenna. (Do not use jumper.)

## 8. 20V DC

Barrel connector for 15-20 VDC input, this voltage is internally regulated to 12 Volts providing power to the digital bargraph and meter lamp. The center pin is positive (+).

## INSTALLATION

Carefully unpack your VC-300D from the packing carton and inspect it for signs of damage. If any damage is apparent, notify the transportation carrier or dealer immediately. We recommend keeping the packing carton for moving, storage, or reshipping the tuner.

Select a location for the VC-300D that allows the connectors to be free of any possible contact during operation.

**WARNING: SOME BALANCED OR END-FED ANTENNAS WILL PRODUCE HIGH RF VOLTAGES AT THE BANANA CONNECTORS. RF BURNS MAY RESULT IF TOUCHED DURING TRANSMISSION.**

### INSTALLATION PROCEDURES

1. Connect a coax cable from your transmitter or receiver to the TRANSMITTER connector on the rear panel. Keep the cable as short as possible. If you use a linear amplifier, connect your transmitter to the linear amplifier output to the VC-300D. **Do not use more than 200 watts through the tuner.**
2. Connect coax cable(s) from your antenna to COAX 1 or COAX 2 connectors on the rear panel. These connectors are either direct from the transmitter or through the tuned circuit depending on the setting of the OUTPUT SELECTOR switch.
3. If you are using a balanced feed antenna, connect a balanced line to the BALANCED OUTPUT connectors and jumper banana jack (8) with lower jack (7) as shown by dotted line.
4. If using a single wire antenna, connect it to jack (7) without installing jumper.
5. Connect any antenna that does not require the use of a tuner to the BYPASS (4) connector using a coax cable. This lets you select this antenna from the OUTPUT SELECTOR switch.
6. To avoid possible damage to the VC-300D, set TRANSMITTER, ANTENNA, and RANGE switches as outlined in the next section before applying transmitter power.
7. Begin tuning with your transmitter set at a low power setting (**10 to 20 W**)

**WARNING: DO NOT OPERATE THE VC-300D WITH THE COVER OFF! DO NOT CHANGE THE INDUCTOR SWITCH WITH MORE THAN 20 WATTS OF APPLIED POWER!**

## TUNING

1. Select the band and frequency of desired operation.
2. Set TRANSMITTER, ANTENNA, and INDUCTOR controls to the suggested settings before applying transmitter power. Actual settings may vary from antenna to antenna.

<b>BAND/ FREQUENCY</b>	<b>TRANSMITTER</b>		<b>ANTENNA</b>		<b>INDUCTANCE</b>	
	Sug.	Actual	Sug.	Actual	Sug.	Actual
160 M / 1.8 MHz	5		5		L	
75 M / 3.75 MHz	3		3		H	
40 M / 7.15 MHz	3		3		E	
30 M / 10.125 MHz	3		3		C	
20 M / 14.175 MHz	2		2		B	
17 M / 10.118 MHz	3		3		A	
15 M / 21.225 MHz	4		4		A	
12 M / 24.940 MHz	5		5		A	
10 M / 28.850 MHz	4		4		A	

3. Set up your transmitter to a low power output. If your transmitter has a TUNE position, select that position.
4. If you use a linear amplifier, set it to STANDBY. Do not use the linear amplifier until the VC-300D is tuned.

**WARNING: DO NOT EXCEED 150 WATTS ON ANY BAND WHERE THE SWR ON THE ANTENNA IS GREATER THAN 4 TO 1.**

5. Set RANGE switch to 30W (button IN).
6. Set OUTPUT SELECTOR switch to the proper selection on the TUNED side of the switch. Selecting any of the DIRECT positions bypasses the tuning circuitry all together.
7. Rotate the TRANSMITTER, ANTENNA, and INDUCTOR controls for maximum noise or signal as heard on your receiver.
8. Key your transmitter and adjust the power level for a reading of 10 watts on the FORWARD scale. Adjust the TRANSMITTER, ANTENNA, and INDUCTOR controls for a minimum REFLECTED reading while maintaining a FORWARD reading of 10 watts using your transmitter power control.

9. Read the SWR on the red scale at the point where the two needles intersect. Repeat step 8 until the lowest SWR reading is obtained. The SWR should be 2:1 or lower.

**Note:** This procedure takes patience the first time. The transmitter and antenna controls vary the capacitors and provide fine adjustments. The inductor control provides coarse adjustment.

If the SWR cannot be reduced to the lowest reading try increasing or decreasing the reading of the transmitter control. Then try to null the antenna control for the lowest reading. You may want to try reversing this procedure by increasing or decreasing the antenna control and nulling the transmitter control. Always perform these adjustments at low power.

10. When you have tuned your antenna to the best SWR, record the settings of the TRANSMITTER, ANTENNA, and INDUCTANCE controls on the previous chart for future reference. When you retune, use these settings as your starting point.

## NOTES

1. An SWR or 1:1 is best, but an SWR as high as 2:1 may be acceptable. Check your transmitter manual for details.
2. If you cannot get an acceptable SWR, lengthen or shorten your antenna and/or feedlines and retune.
3. If you get low SWR readings at more than one setting, use the setting that:
  - Gives the highest FORWARD power reading.
  - Gives the lowest REFLECTED power reading.
  - Uses the largest capacitance (highest number) on the TRANSMITTER and ANTENNA controls.
4. Any time a new or different antenna is connected, it is necessary to repeat the tuning procedure for each antenna.

## USING THE BARGRAPH

1. Plug in the AC adapter provided with your tuner into jack located on the back panel.
2. In the Tuning Section, after completing the tune-up sequence, key your transmitter through the tuner into the dummy load. Adjust for a meter reading of 100 Watts Forward (at this time the SWR will have been adjusted for minimum value as outlined in the Tuning Section).
3. Rotating the LEVEL control activates the bargraph and the segments will illuminate progressively as the LEVEL control is increased. If your cross-needle meter is reading 100 Watts as indicated in (2) rotate LEVEL control so that the last LED (red) illuminates. **This signifies that the 100 Watt average single tone reading on the**

**cross-needle meter display is identical to the power reading of 100 Watts single tone on the digital display.** Without any further adjustment of the level control, switch your transmitter to SSB and speak normally into the microphone and you will notice that the cross-needle meter will read approximately 30-40 Watts and the digital display will show an output of 100 Watts PEP when red LED ignites while you are speaking. This will confirm that the cross-needle meter reads 30-40 Watts average assuming you started with the 100 Watts single-tone as described above and the digital display will read voice peaks of 100 Watts or to say more correctly **100 Watts PEP**.

**Note:** All cross-needle meters read average power when you are using the transmitter in the SSB mode. Some cross-needle meter displays are capable of peak-reading but will read 20% low because of directional coupler driver impedance problems.

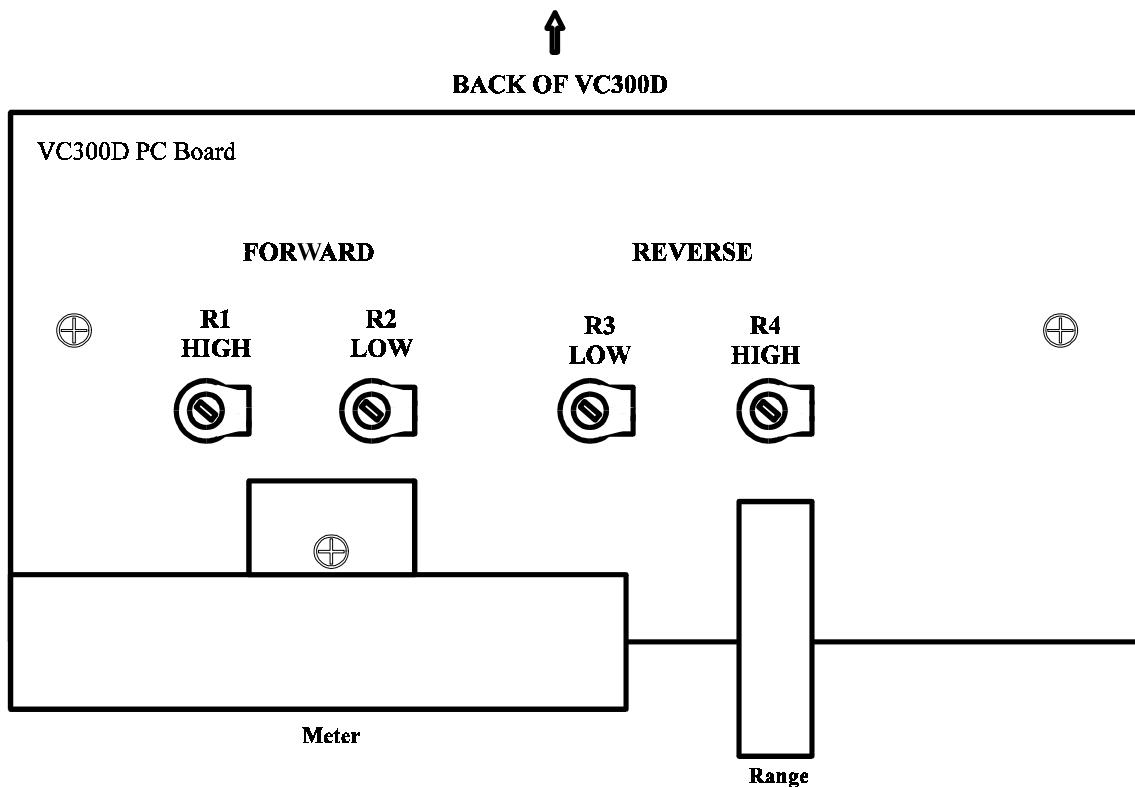
4. After you are satisfied you are getting the right results in (3), while you are speaking into the microphone with the DELAY control fully counter-clockwise, the forward peak indication on the meter will be as quick in response as the delay. If this is not a desirable condition, rotate the DELAY control counter-clockwise until the desired amount of DELAY is introduced in the display. The forward fast attack time is not affected by the DELAY control.

## TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by reading the manual you may call VECTRONICS at 601-323-5800. You will be best helped if you have your unit, manual and all information on your station handy so you can answer any questions the technicians may ask.

You can also send questions by mail to VECTRONICS, 1007 HWY 25 South, Starkville, MS 39759 or by Fax to 601-323-6551. Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.

## METER CALIBRATION



### METER CALIBRATION PEOCEDURE

- Connect transceiver to TRANSMITTER IN connector.
- Connect external 50Ω load to COAX 2 connector.
- Set the OUTPUT SELECT switch to the COAX 2 DIRECT position.
- Set the RANGE button to 300 W and the PEAK/AVG button to AVG.
- Apply 100W of RF at 14.0 MHz.
- Adjust R1 (see Figure 1) so that 100W of FORWARD power is read on the meter.
- Reduce the RF power to 10W and set the RANGE to 30W
- Adjust R2 so that 10W of FORWARD power is read on the meter.
- Reverse the transceiver and load connectors on the rear panel
- Set the RANGE to 300W.
- Apply 10W of RF power and adjust R4 to read 10W of REFLECTED power.
- Set the RANGE to 30W.
- Apply 2W of RF power and adjust R3 to read 2W of REFLECTED power.

## SCHEMATIC DIAGRAM

### MODEL VC-300D

