

## Specifications

Frequency Range 1MHz - 2.8GHz  
 Input Impedance: 50 Ohm  
 Input Coupling: AC  
 Max Input +15dBm (50mW)  
 Time Base  
 Frequency: 10MHz  
 Initial Accuracy:  $\pm 1$  PPM

**Frequency Display Resolution**  
 (Least significant digit displayed (LSD) as a function of Gate Time and Range.)

Range	Gate Select	Gate Time	LSD	Sample Display
250MHz	.01	.01 Sec	100Hz	250.0000
	1	.1 Sec	10Hz	250.00000
	1.0	1.0 Sec	1Hz	250.000000
	10	10 Sec	0.1Hz	250.0000000
2.8GHz	.01	.64 Sec	100Hz	2800.0000
	1.0	6.4 Sec	10Hz	2800.00000



## Specifications

**Maximized Sensitivity Concept** The Model 3300 has the maximum amount of broad band gain possible without driving the front end circuitry into hard self oscillation. The purpose of this concept is to permit the maximum possible pick up distance from radio transmitters. There is no gain or sensitivity adjustment possible in the circuit. Specific sensitivities at particular frequencies are difficult to predict with precision in production units. The input sensitivity specifications below are intended to a rough indication as to what may be expected. Defective components such as blown amplifiers, broken or unsoldered chip resistors, caps and inductors will cause a drastic reduction in performance. These typical sensitivity specifications should not be relied upon for the purposes of incoming inspection or evaluation. Contact the factory if the results obtained are significantly different than those below. Performance on an antenna does not always relate exactly to input sensitivity as measured on a signal generator. The purpose is however to provide the best possible antenna performance regardless of sensitivity.

### Input Sensitivity (Typical)

10MHz	<15mV	800MHz	<3mV
27MHz	<300uV	1GHz	<3mV
150MHz	<300uV	2GHz	<25mV
450MHz	<350uV	2.4GHz	<40mV

## Specifications

**Display:** 10 digit .175" character height Liquid Crystal.  
**Annunciators:** Frequency, MHz, Low Batt, Prescale, A, 0.01, 0.1, 1.0, 10. Decimal point at the MHz position.  
**Battery:** Internal 4 cell AA, 600 mA-Hour, shrink wrapped pack, flying leads terminated with two conductor female plug.  
**Battery Discharge Time:** 6 Hours from a full charge. 10-12 hours recharge time from AC90 wall plug adapter supplied.  
**Low Battery Indicator:** "Low Batt" displayed when battery pack is no longer usable and must be recharged.  
**Power:** 9-11 VDC at 150 mA from model AC90 wall plug adapter. Max input voltage 11 VDC.  
**Power Input Jack:** Female coax 2.1mm center positive.  
**Size:** 3.7"H x 2.75"W x 1.2"D  
**Weight:** 7.5 oz  
**Cabinet:** Stamped Aluminum with Black Textured Power Coat Finish.



## How to Operate the 3300

Before operating the counter it is recommended that the 3300 be charged for a minimum of 12 hours after it is received. Charging is accomplished by powering the unit from a source of external power such as the AC90 wall plug adapter supplied with the counter.

### Connecting the 3300 to the AC90 Wall Plug Adapter for Charging and Operation

Plug the AC90 Adapter into a 110VAC household receptacle. Connect the coax plug from the AC90 adapter to the power input jack on the top end panel of the 3300. Do not plug other adapters into the AC90 unless they are rated for at least 200 mA at 9VDC and have center positive polarity on their coax plug. Incorrect polarity or incorrect voltage may damage the 3300. The 3300 may be operated while the battery is being charged.

### Turning the Counter ON

The power switch is labeled (1) in Figure 1. Slide the switch up to the ON position. Make sure that the Hold Switch labeled (3) is in the down (OFF) position. You should see the LCD display become active and the Red LED above the display should flash in time with the Gate measurement period.

#### In case of difficulty check:

1. Low batteries - charge as above
2. No output from plug transformer - plug into different 110V outlet.
3. Hold Switch (3) is on (up position) - move switch to down (off) position.

### Turning the Counter OFF

Slide the power switch (1) to the down position. All LCD display and Red LED activity should stop. NiCad Battery charging will occur when the power switch in either the ON or OFF position.

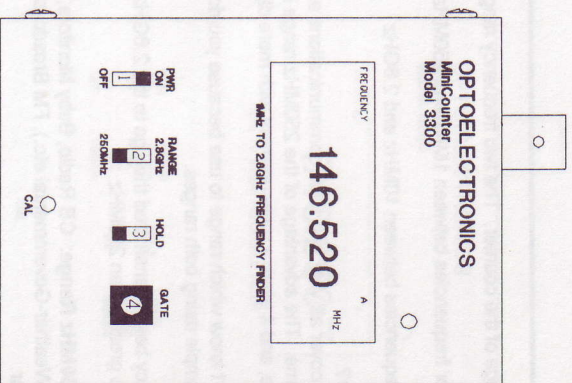


Figure 1

## How to Operate the 3300

### Select A Range

Switch (2) selects the frequency range of the counter. The two frequency ranges are as follows:

**250MHz** (switch down) for frequencies between 1MHz and 250MHz

**2.8GHz** (switch up) for frequencies between 10MHz and 2.8GHz

### Which Range do I select and why?

The 2.8GHz range does completely cover all VHF and UHF communications and so it is fine to leave the 3300 in this range all the time. The advantage of the 250MHz range is that it is much faster to respond, it is more sensitive, and it gives a measurement with more digits of resolution.

If you are frequency finding and don't know which range to use because you don't know what the frequency will be then it is best to sample using both ranges.

If you know the approximate frequency being transmitted then go to the 2.8GHz range only when you know that the frequency of interest is greater than 250MHz.

**Frequencies You Can Find on the 250MHz Range:** CB Radio, Baby Monitors, Cordless Phones, VHF (Business- Marine/ Weather-Governmental etc.), FM Broadcast, Wireless Microphones, 2, 6 and 10 meter Amateur.

**Frequencies You can Find on the 2.8GHz Range:** UHF (Business, Governmental etc.), Cellular Radio, 800MHz Business and Governmental, 1296 Amateur.

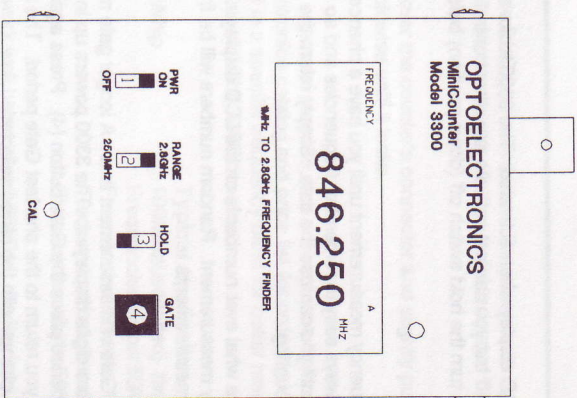


Figure 2



## How to Operate the 3300

### Using the Hold Switch

The Hold Switch (3) freezes the LCD display when activated. The 3300 locks up and stops counting. You can turn the power off but you can not activate any other controls or functions while the hold switch is up. Always turn the hold switch off (down position) before turning power on.

### When Do I Use the Hold Switch?

When ever you want to store a frequency measurement until you have a chance to write it down or tune a receiver. It is not always easy to remember frequencies and so it may be easier to activate the Hold feature until you can use the data. Simply return the Hold switch to the off (down) position to resume counting.

Activating the Hold switch will freeze what ever number is on the LCD display. The number may or may not be a valid frequency measurement. Random numbers will be frozen on the display as easily as real frequency measurements.

### Selecting A Gate Time

Push Button Switch (4) selects the Gate or measurement time. A longer gate means counting for a longer period and results in more digits displayed. The 3300 powers up in the shortest gate period. To lengthen the Gate period press the Gate button (4). Press again to go to the next longer gate. Press again until you return to the shortest Gate period. The available gate times are shown on page 3 and will change with the range selected.

### What Gate do I use?

For finding a frequency to tune a radio use the fastest gate available. For making a more accurate measurement use a longer gate.

### Connecting an Antenna

The counter has a standard female BNC type connector. To use an antenna it must have a male type BNC connector. (In a pinch however you can stick an unfolded paper clip into the center of the connector.)

To connect the antenna, place it over the counter's connector and slightly push down on the antenna's connector. Turn it clock wise until it locks.

### Selecting an Antenna

The TA100S telescoping whip is a general purpose, low cost antenna that can be used for most applications. Check the Optoelectronics catalog and price list for ordering information. You can also use an antenna that is tuned to a specific frequency band for better results. The following antennas are recommended for use with the 3300 counter:

#### Antenna

TA100S Telescoping Whip  
RD27 Rubber Duck  
RD100 Rubber Duck  
RD440 Rubber Duck  
RD800 Rubber Duck

#### Typical Application

100MHz(extended) through 500MHz(collapsed)  
Frequencies below 50MHz  
Frequencies between 100 and 250MHz  
Frequencies between 150 and 500MHz  
Frequencies above 500MHz

None of the above antennas will work well below about 20MHz. As the frequency decreases they look more and more like a short circuit on the 50 Ohm input. Use a long wire antenna or an active antenna in order to pick up HF. An effective low cost active antenna is made by MFJ and others. Always use an antenna when working with radio transmitters. Never touch the antenna of the counter to the radio's antenna or damage to the counter may result.



## How to Operate the 3300

### Connecting An Optional Cable

You wish to measure frequencies from a signal generator it is best to use a coax cable with a male BNC connector on one end to connect to the counter and the appropriate connector on the other end for the signal generator. This cable will need to be purchased from a source of test accessories (possibly mail order) or made up. Radio Shack stores are one possible source.

The coaxial cable should be 50 Ohm. If the signal generator is not a 50 Ohm source then a 50 Ohm feed through termination should be used.

### Using a Probe

An oscilloscope probe may be used to directly connect to circuitry test points. Make sure you are not using a 10X probe designed for a high impedance input or very little signal will make it through to the counter.

Never connect the 3300 to 110VAC house current outlets. Doing so will damage the counter and may cause electrical shock.

## What the Counter Will Not Count

### Garage Door, Car Alarm, and Some RC Transmitters

Many of these Devices use OOK Modulation (On-Off- Keying). The transmitted frequency is not present during the entire gate measurement period of the counter. If you can't modify the transmitter to stay on long enough (several seconds would be nice) then you can't count it with the 3300 or any other counter that we know of.

### Single Side Band Transmissions

Suppressed Carrier modulation does not have a carrier to count. You can whistle into the microphone to get an approximate frequency measurement but it will not be very accurate. Switch to the Tune position on the transmitter if possible. The only Single Side Band Counter we know of is the Optoelectronics' Model SSB220.

### Audio Frequencies or 60Hz

The 3300 is an RF Counter and is not rated to count below 1MHz or 1 Million cycles per second.

### Radio Shack Wireless Microphone

Output power is too low even for the very sensitive 3300. You may even have a tough time tuning your receiver to it.

### Signals From Transmitter Towers

Today many commercial towers have more than one transmitter. In order to count the counter must have one dominant signal that is clearly stronger than any other. Sorry, this is physics and not any shortcoming on the part of the 3300. One solution is to use an APS104 Preslector or filter of some type. Check the Optoelectronics catalog for a full line of accessories.