

Model 90

20 MHz Function Generator

- 1 mHz to 20 MHz Frequency Range
- 0.001% Synthesized Accuracy
- 15 V_{p-p} Output into 50 Ω
- Triggered, Gated, Burst, Sweep, AM, and FM Modes
- Balanced/Unbalanced Output Impedances
- Phaselock/Phase Offset Mode

Wavetek's Model 90 is a compact, highly versatile function generator that is equally at home on the bench or in ATE system environments. Its synthesized analog function generator features sine, triangle, square, and DC waveforms. With a broad feature set and excellent price/performance ratio, Model 90 is a clear choice for serious function generator users.

On the Bench. Model 90 is ideal for stand-alone applications. The front panel interface is sophisticated and intuitive. Controls are logically grouped by similar function, and a large, 16-character display gives clear visibility of each setting. Display intensity is adjustable for room lighting conditions.

Model 90 has an internal trigger generator that operates the unit in noncontinuous modes such as trigger, gate, and burst. The triggered frequency is selectable from the front panel; the unit can be manually triggered with one key if desired. This replaces a second instrument on your bench.

Manual numeric data entry or function selection are done using either the calculator-style keypad or the control knob. Simply choose the method that suits your personal style best. If you make a mistake, Model 90 prompts with error messages to guide you back within limits. There is even a parameter and machine reset function to instantly bring you

back to default conditions, if necessary. Critical parameters such as frequency, voltage, and offset can be calculated and displayed as frequency, period, V_{p-p}, V_p, V_{rms}, or dBm simply by rotating the control knob.

When done with your work, you can save up to 10 complete front panel set-ups in nonvolatile memory for use at a later date.

Nonvolatile memory and a convenient tilt bail handle make the Model 90 very easy to move for maximum utilization.

In the Rack. Model 90 excels in an ATE system. It comes with a GPIB interface as a standard feature. Virtually all front panel settings may be accessed over the bus. An optional rack-ear/handle kit allows easy access to the unit when installed, and cable routing holes access wire runs behind the unit.

Model 90 allows phaselock to an internal or external source. All signals within 2% of an external locking frequency allow the unit to remain locked. If the external frequency changes outside the 2% window, Model 90 automatically acquires and locks on the new frequency. And, like a frequency counter, the unit calculates and displays the new frequency.

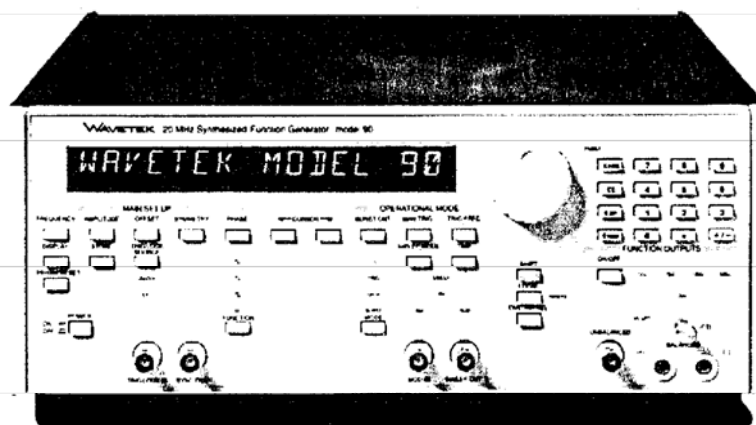
The GPIB address of Model 90 can be modified via the front panel, and an input buffer allows you to save the last 240 characters sent to the unit. You can also change the address of the Model 90 and monitor the commands being received over the bus by other units in the same system.

Other Features. Model 90 really shines when you look at all the features. The unit has a high 15 V_{p-p} output into 50 Ω with an amplitude-dependent ± 7.5 V offset. Non-continuous modes (triggered, gated, burst) are standard, and burst counts are selectable up to 1,000,000 cycles.

Modulation capability includes amplitude modulation (AM), frequency modulation (FM), and suppressed carrier modulation (SCM). Model 90 also performs sweep operations in continuous, triggered, or manual modes, with either a linear or logarithmic time base. Waveforms can be swept up or down as well.

Symmetry of any symmetrical waveform is adjustable between 5% and 95%. And, if locking to either an internal or external source, you may vary the phase offset in relation to that source by ± 180°.

The Model 90 features selectable output impedances of 50, 75, 135,



and 600 Ω . Both 135 and 600 Ω are available as balanced outputs using the front panel input jack. All impedances can be selected from the front panel or remotely. If you demand extremely high stability in your output, an optional TCXO gives you both a highly stable internal reference and the capability of using an external reference.

More Power to You. For those high power applications where 15 Vp-p are not enough, you can order Option 002, which delivers 40 Vp-p into 500 Ω .

Specifications

Waveforms

Programmable sine, triangle, square, ramp, and DC.
Sine Distortion: 10 Vp-p, 50 Ω , sine function.

To 20 Hz: -40 dB.

To 100 kHz: -46 dB.

To 2 MHz: -40 dB.

Square Wave Aberrations: < (5% + 20 mV) of peak-to-peak amplitude.

Square Wave Rise/Fall: < 9 ns, 10% to 90%, full output, 50 Ω .

Time Symmetry:

Range, Resolution: 5% to 95% in 1% increments.

Accuracy: $\pm(1\% + 5 \text{ ns})$ Improved to $\pm(0.2\% + 5 \text{ ns})$ when symmetry equals 50%.

Frequency Coverage: 5% to 95% to 2 MHz, linearly decreasing to 50% at 20 MHz.

Triangle Linearity: 10% to 90%.

To 100 kHz: $\pm 1\%$.

To 2 MHz: $\pm 2\%$.

Frequency

Range: 20 Hz to 20 MHz synthesized; 1 mHz to 20 MHz nonsynthesized; 1 mHz to 1 MHz 600 Ω or balanced.

Resolution: 4 digits.

Accuracy:

Synthesized: $\pm 10 \text{ ppm}$ at $20^\circ \pm 5^\circ \text{ C}$.

Nonsynthesized: $\pm 3\%$.

Stability:

Versus Time: $\pm 20 \text{ ppm/year}$, synthesized.

Versus Temperature: $\pm 2 \text{ ppm}/^\circ \text{ C}$ from 0° C to 50° C , synthesized.

Amplitude (50 Ω into 50 Ω)

Range: 1 mV to 15 Vp-p.

Resolution: 4 digits.

Accuracy:

To 100 mVp-p: $\pm(2\% + 1 \text{ mV})$.

To 1 Vp-p: $\pm(2\% + 2 \text{ mV})$.

To 15 Vp-p: $\pm(2\% + 10 \text{ mV})$.

Offset (50 Ω into 50 Ω)

Range: 1 mV to $\pm 7.5 \text{ V}$.

Resolution: 4 digits.

Modes

Continuous, triggered, gated, burst, AM, FM, SCM, sweep, and external phaselock.

Sweep:

Range: 3 decades.

Characteristic: Lin, log, up, down and up/down.

Modes: Continuous, triggered, and manual.

Time: 100 ms to 3600s.

Internal Trig Source: 1 mHz to 15 MHz.

External Phase Lock:

Range: 20 Hz to 20 MHz.

Phase Offset: $\pm 180^\circ$.

Phase Resolution: 1° .

Phase Accuracy: $\pm(4^\circ + 20 \text{ ns})$.

Outputs

Sync Out (50 Ω): TTL level pulse output at programmed frequency.

Sweep Out (600 Ω): Ramp output indicating sweep position, 0 to +5 V.

Ref Out (50 Ω): Optional. TTL level output at 10 MHz to use as a reference source for other units. Available with option 001. Located on rear panel.

Unbalanced Out: Function output programmable as 600 Ω to 1 MHz, or as 50 or 75 Ω to 20 MHz. Not concurrently available with balanced output.

Balanced Out: Dual banana-jack connectors provide differential output of selected function at either 135 Ω or 600 Ω to 1 MHz. Not concurrently available with unbalanced output.

Note: Unless otherwise stated, these specifications apply to the 50 Ω , unbalanced output after 20 minutes warm-up at the temperature of the last AutoCal, $\pm 10^\circ \text{ C}$.

Inputs

Ext Trig/Freq In (10 k Ω): Serves as input for either external trigger signal or phaselock signal.

Ref In (50 Ω): Optional. Input for external 10 MHz frequency reference. Available with Option 001. Located on rear panel.

Mod In (10 k Ω): Serves as input for external signals for AM, FM/VCG, and SCM.

General

Stored Settings: 10 complete front panel set-ups in nonvolatile memory. Last user set-up also retained at power down.

Dimensions: 13.3 cm (5.219 in) high, 35.5 cm (14 in) wide, 43.2 cm (17 in) deep.

Weight: 7.7 kg (17 lb) net; 11.8 kg (26 lb) shipping.

Grounding: 42 V floating signal common

Power: 90 - 108 V rms, 108 - 126 V rms, 138 - 231 V rms, 216 - 252 V rms; 48 - 466 Hz, 1 phase; < 100 VA.

Remote Operation: IEEE 488.1 interface provided as standard. GPIB address selectable via front panel.

Environment: Complies with MIL-T-2880C Class 5 environmental, safety, and EMI/EMC

Temperature Range: 0° to 50° C for operation, -40° to $+70^\circ \text{ C}$ for storage.

Humidity: 11° to $+30^\circ \text{ C}$ at 95% RH; 31° to $+40^\circ \text{ C}$ at 75% RH; 41° to $+50^\circ \text{ C}$ at 45% RH.

Vibration: Operates with a vibration level of 0.013 in from 5 to 55 Hz (2 g acceleration at 55 Hz).

Shock: Nonoperating 40 g, 9 ms half sine.

EMC: Complies with MIL-STD-461A Notice (EL). Emission and Susceptibility: Complies with CE02, CE04, CS02, CS06, RE02, RE02.1 & R303.

Options

Option 001: TCXO Reference. A TCXO crystal with a $\pm 1 \text{ ppm}$ stability over the operating temperature range (0° to 50° C). Aging rate is 1 ppm/year.

Option 002: High Voltage.

Option 003: Rack/Handle Kit. A set of handles and rack adapters with BNC feed-through holes on each side.

Option 004: Maintenance Kit. A set of two extender cards that raise the internal PCBs for easy maintenance.

Factory/FOB

San Diego, California