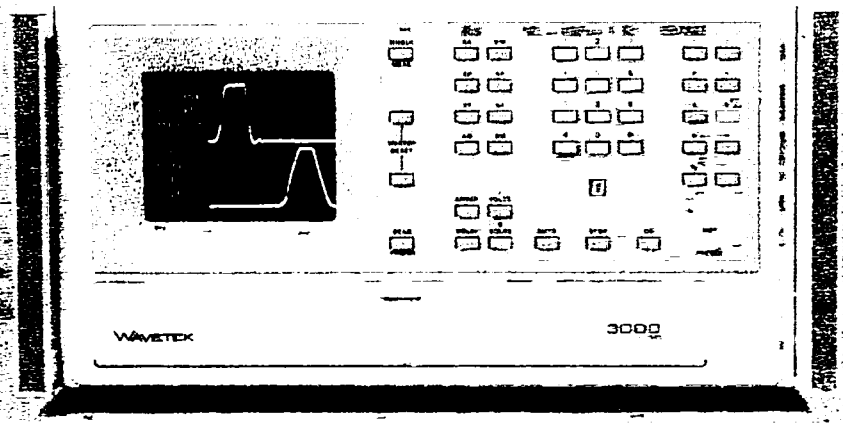
MODEL 3000



1 GHz Programmable Waveform Analyzer

- **100 Measurement Points with Full 1 GHz Bandwidth**
- **1000 Dots Digital Waveform Storage on Both Inputs (Waveform Recording)**
- **Autoscan™: Automatic Search for the Signal of Interest**
- **IEEE-488 Interface Standard**
- **Microprocessor-Controlled Waveform Analyzer**

For applications calling for the automated test and characterization of multi-pin, high speed semiconductor devices or assemblies, Wavetek recommends the Model 3000 Waveform Analyzer. When configured with Model 3020 Probe Multiplexers, Model 3000 can form up to a 100 channel, 1 GHz bandwidth, digital readout sampling oscilloscope, which is unrivalled in its ability to meet the test requirements of the latest generation of high speed devices and assemblies. The innovative design of the Waveform Analyzer, Probes and Multiplexers allows a unique combination of measurement speed, resolution and accuracy, to give unequalled system throughput, repeatability and dependability. Flexible control of this performance—both on the bench and via the IEEE-488 interface — allows automated determination of parameters such as transition times, propagation delays, pulse widths, overshoot, undershoot and other pulse aberrations, as well as voltage levels. Furthermore, the modularity of design and construction enables easy expansion and upgrade as and when future test requirements dictate.

The features which make Model 3000 ideal for fast, automated measurements on high frequency waveforms derive from the method of sampling used — Sequential Equivalent Time Sampling. Of the different sampling methods available, only the Sequential Equivalent Time technique offers a cost effective, high accuracy, fast, multi-channel solution for repetitive signals in a typical automated test environment. Alternative techniques, Real Time and Random Repetitive sampling, rely on much higher sampling rates so the entire measurement system — including all cabling and signal switching — must possess a high bandwidth. Furthermore, at these sampling rates, even state-of-the-art analog-to-digital converters are unable to provide more than eight or nine bits of resolution, limiting the levels of accuracy achievable.

To overcome these drawbacks, Sequential Equivalent Time Sampling was chosen for Model 3000. Very fast measurements, up to 40 per second, with high repeatability, using this technique, provide high speed and accuracy, enhancing both measurement confidence and system throughput while simplifying software generation.

The timebase accuracy of ±1.2% of full scale, even at the highest sweep rates, is made possible by the exceptionally low trigger to sample jitter introduced by Model 3000, making the unit particularly suitable for measurements on

fast pulse trains, such as those encountered when testing the latest generations of devices and assemblies.

For voltage level measurements, a combination of the remote sampling probes and the sampling technique used allows measurements to be made with 12-bit digital resolution. Stability of voltage measurements is better than ±2mV per day, and noise is less than 1mVp-p for the duration of a sweep. Absolute voltage measurements may be made in the reference mode, whereby a reference voltage is injected into the analog to digital converter for only the first 10 samples (i.e. 1%) of the measurement cycle. Subsequent voltage measurements may be made relative to these ten samples, with the knowledge that the high stability of the measuring circuitry has introduced no significant drift during that time period. Model 3000 allows the user to specify the start and stop points for time domain measurements as a percentage of a transition, an absolute voltage level, or a combination of both, on any combination of the two input channels.

In practical applications, pulse distortions such as glitches, overshoot and undershoot may adversely affect measurements. Model 3000 has the ability to eliminate these aberrations from the measurement, enhancing the quality of the test. However, these distortions may be of interest to the user since they could seriously impair the operation of the circuit in its final application. Model 3000 offers the ability to examine the waveform specifically for these properties, either in the time or voltage domain. The measurement method does not depend on the accurate positioning of markers or cursors, so that the results from one test cycle to the next will be repeatable, even if the horizontal and vertical positions of the waveform are not constant, a situation which will be encountered in many test applications.

Model 3000 is able to synchronize to an unattended trigger in the range DC to 225 MHz. This means that if the frequency is changed, it is not necessary to adjust stability controls.

Other programmable features include the averaging of ten measurements, the Autoscan facility to automatically find a waveform and the short sweep mode, which allows the instrument to stop taking samples once the sweep has reached the point where the particular measurement required has been completed, increasing system throughput still further.

The user has access to 10 stored setups (16 over the IEEE-488 interface), each of which may be recalled, edited and stored — either by a series of front panel keystrokes or from a remote controller.

Table 1. Probe Input Characteristics

Probe	Capacitance	Resistance	Dynamic Range	Overload
Without Attenuator	1.5pF	>10MΩ	±1.0V	±3.0V
With X1 Attenuator Tip	2.5pF	100kΩ	±1.0V	±3.0V
With X5 Attenuator Tip	2.5pF	1MΩ	±5.0V	±15.0V
With X10 Attenuator Tip	2.5pF	1MΩ	±10.0V	±30.0V
With X100 Attenuator Tip	2.5pF	1MΩ	±100V	±200V

WAVEFORM ANALYZER

TIMEBASE

Ranges: 200ps per division to 100 ms per division, (Full scale = 10 div) in a 1-2-5 sequence. (Real time sampling in effect at >0.5 ms/div).
Resolution: 1/1000 of full scale (2ps at 200ps/div).
Delay Programming[1]**:** 0% to >99% of full scale in 1% increments.
Measurement Accuracy: ±1.2% of full scale.
Sampling Rate: 50 Hz to 80 kHz.

VOLTAGE

Ranges: 2mV/div. to 10V/div., in a 1-2-5 sequence. (>100mV/div. requires use of probe tip attenuators.)
Resolution: 12 bits (1 in 4096) with full scale signal. (Full scale = 10 div.)
Offset Programming: ±0% to ±90% of full scale in 10% increments.
Measurement Accuracy: ±2% of full scale (relative measurements). ±2% of full scale ±10mV (absolute, reference mode).

TRIGGERING

Unattended Trigger Rate: DC to 225 MHz, >2 ns pulse width.
Trigger Jitter: Typically 5ps with optimum trigger level and slew rate >1V/ns.[2] <20ps to 20 MHz, <50ps to 225 MHz.
Input Impedance: 50Ω nominal.
Threshold Level: To ±2.5V manually set, preset to ±0.5V.
Maximum Level: ±5.0V.

GENERAL

Environment: 0° to +45°C operation, −40° to +70°C storage.
Power: 100V/117V ±10% 60Hz. 200V/217V/234V ±10% 50 Hz.
Power Consumption: 250W.
Dimensions: 222mm (8.75 in.) high, 483mm (19.0 in.) wide, 635mm (25.0 in.) deep.
Weight: 24.52 kg (54 lb) net, 31.34 kg (69 lb) shipping.

1 GHz SAMPLING PROBE (MODEL 3010)

Input Characteristics: See Table 1.
Bandwidth: DC to >1 GHz, at −3dB (risetime <350ps).
Error in Transient Response: <3%.
Coincidence[3]**:** <±50ps.
DC Stability: 2mV per day, after 30 min warm-up.
Noise: <200μV tangential (1mVp-p).

OPTIONS

693-41521: X1 Probe Tip Attenuator
693-31857: X5 Probe Tip Attenuator
693-41522: X10 Probe Tip Attenuator
693-41523: X100 Probe Tip Attenuator

ACCESSORIES

350-31273: Rack Mount Slides
350-31092: Rack Mount Ears

NOTES

[1] *Only available in Equivalent Time Mode*
[2] *Typical figure, only applicable at minimum delay and fastest sweep settings.*
[3] *Defined as the maximum error between two probes directly connected to the Model 3000 Waveform Analyzer*

FACTORY/FOB
San Diego, CA