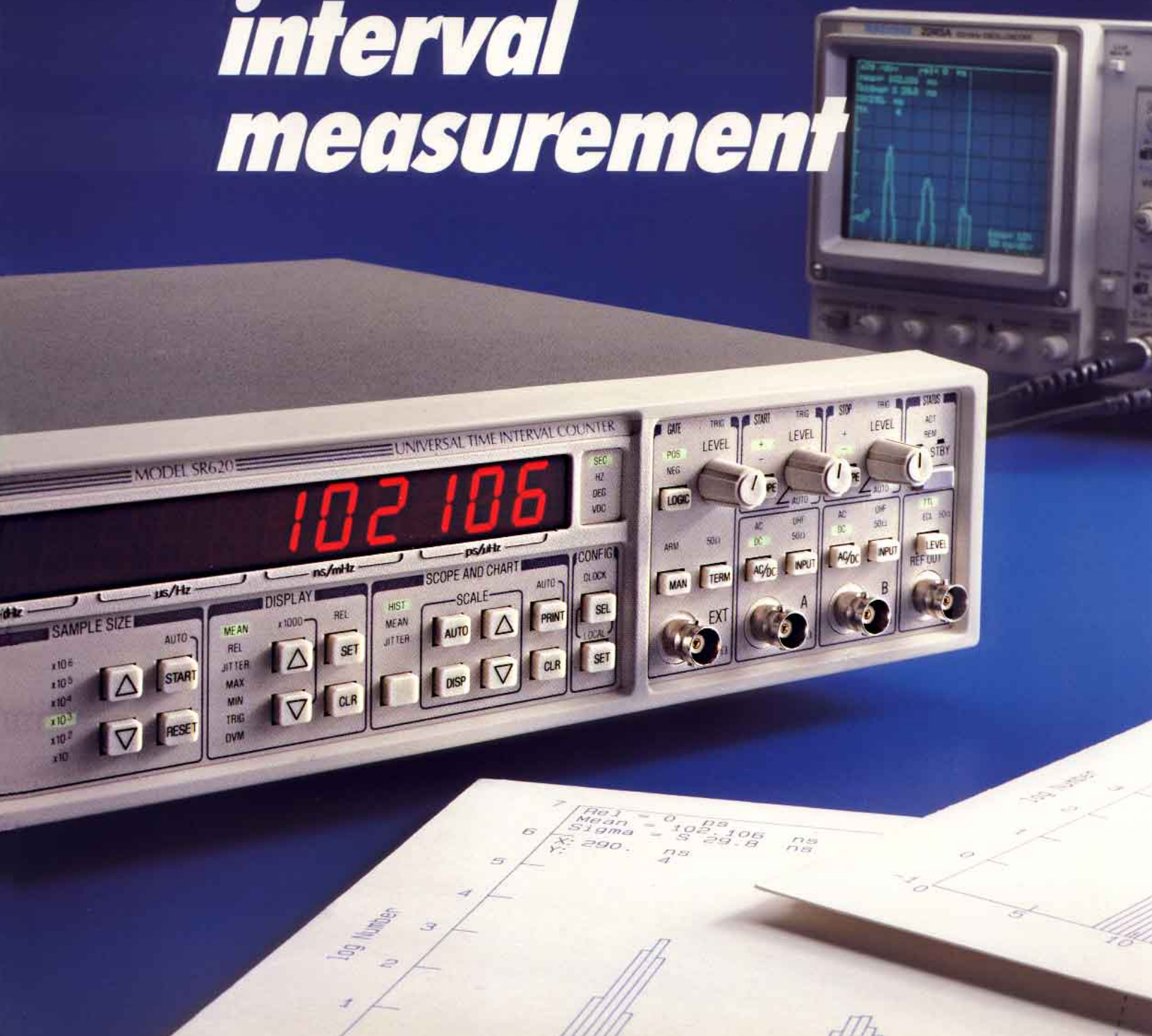
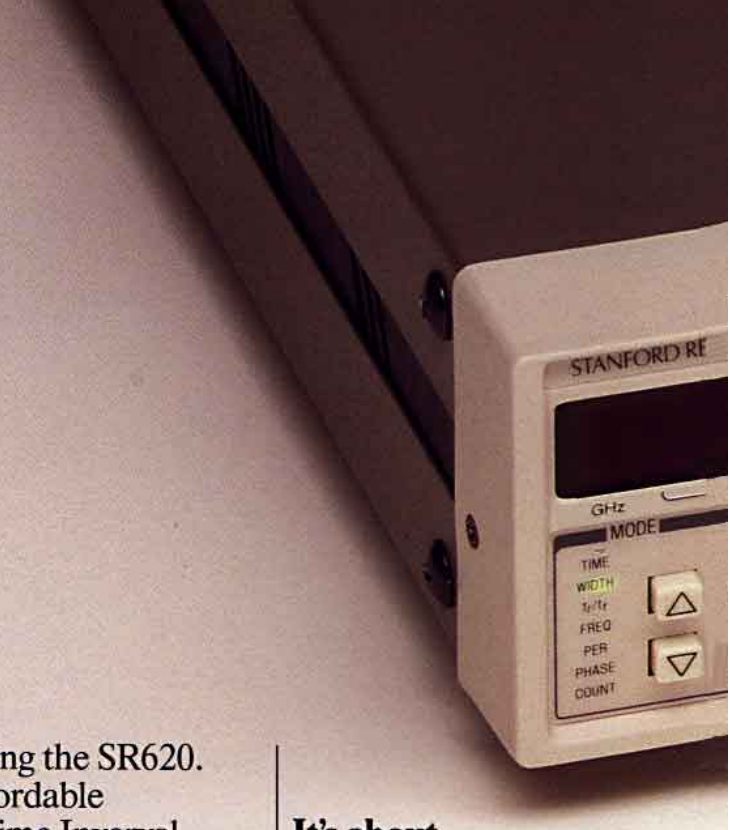
STANFORD RESEARCH SYSTEMS

Time interval measurement



SR620 universal time interval counter.

$4950 *(U.S. list)*



- 4 ps single-shot least significant digit
- 25 ps rms single-shot resolution
- 1.3 GHz maximum frequency
- 10^{-9} Hz frequency resolution
- 0.001° phase resolution
- Statistical analysis: mean, min, max, std dev and Allan variance
- Sample sizes from 1 to 1 million
- Graphic histogram and time variation plots on X-Y oscilloscope
- Hardcopy to printers and plotters
- GPIB and RS-232 interfaces
- Optional oven timebase

Introducing the SR620. The affordable Universal Time Inverval Counter from SRS.

It's about time.

The SR620 measures time interval, frequency, period, pulse width, phase, as well as rise and fall times. Built-in statistical functions are provided in all modes—including mean, max, min, standard deviation, and Allan variance. And an easy-to-read 16 digit LED display shows any of these parameters on sample sizes from 1 to 1 million.

It's about accuracy.

The SR620 is a reciprocal interpolating counter. The standard timebase is a 10.000 MHz temperature compensated oscillator with $3x10^{-9}$ aging per day. An optional oven oscillator provides even greater accuracy with $5x10^{-10}$ per day aging. For more demanding applications, a rear panel input makes it easy for you to supply your own 5 or 10 MHz timebase.

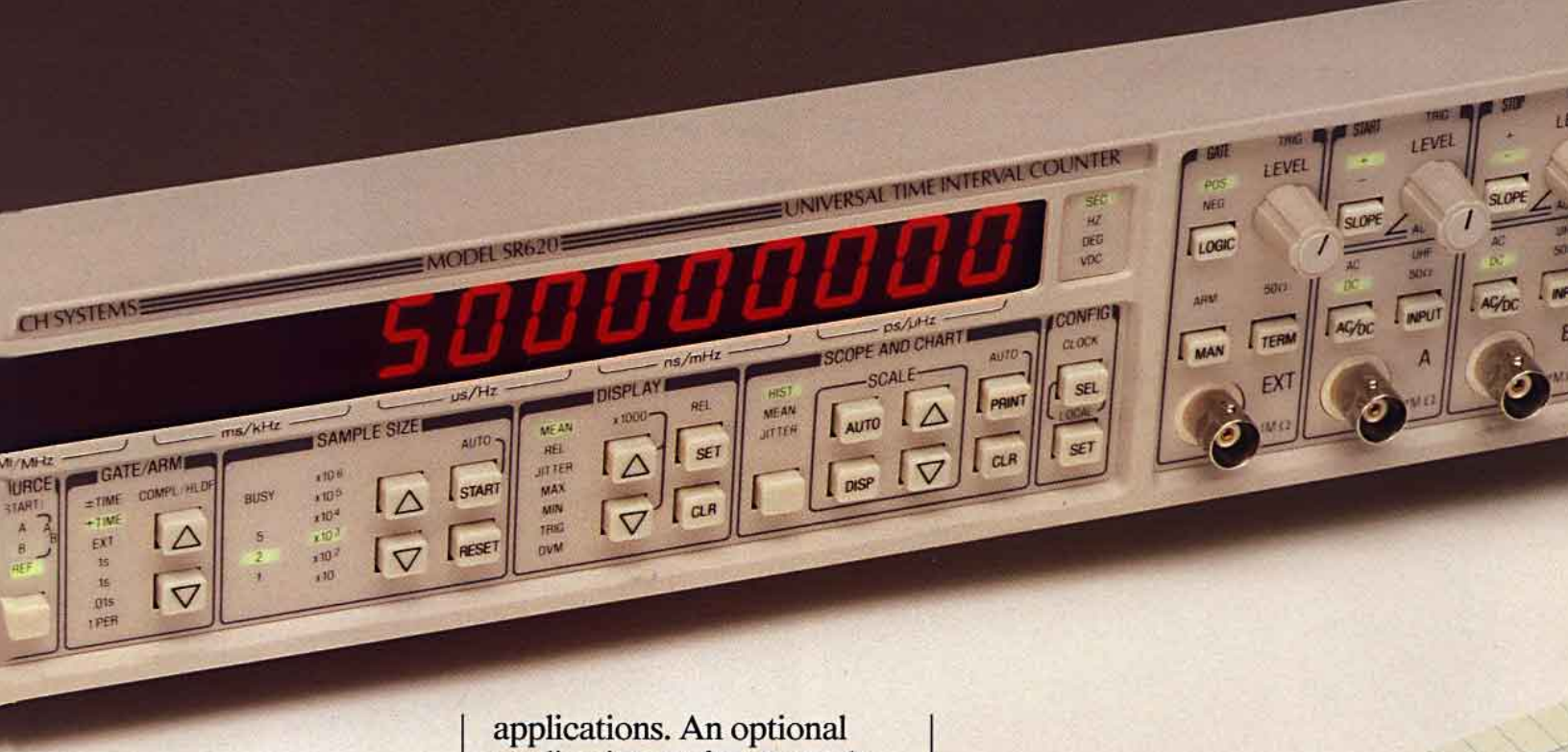
It's about versatility.

Measure virtually any signal with a variety of arming and gating modes.

The SR620 measures intervals up to 1000 seconds in ±TIME, +TIME, or EXTernal (with or without holdoff) arming modes.

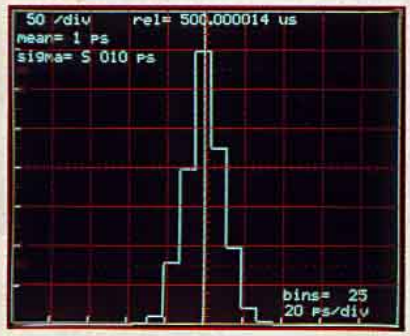
It measures frequency over 12 orders of magnitude. The frequency range extends from 0.001 Hz to 1.3 GHz. Preprogrammed frequency measurement gates include 1 PERIOD, 0.01, 0.1, and 1.0 second, or EXTernal. With an external trigger, you can program your own gates from 1μsec to 10 msec.

START/STOP inputs range from −5 to +5 Volts and may be terminated in 1MΩ or 50Ω. Regardless of signal shape, duty cycle, or amplitude, the SR620's AUTO-threshold feature lets you set up measurements fast



Draw your own conclusions.

The SR620 adds graphics to any measurement by displaying histograms and time variation plots on any X-Y oscilloscope. Complete with front panel Autoscale, Zoom, and Cursor functions.



When you have the graph you need, attach any HP-GL plotter. And plot it. Or print it out on a dot matrix printer.

All without a computer.

When you need a computer...

The SR620 provides GPIB and RS-232 interfaces (both standard) for ATE and other applications. An optional applications software package is available for IBM PCs and compatibles.

The counter you can do more than count on.

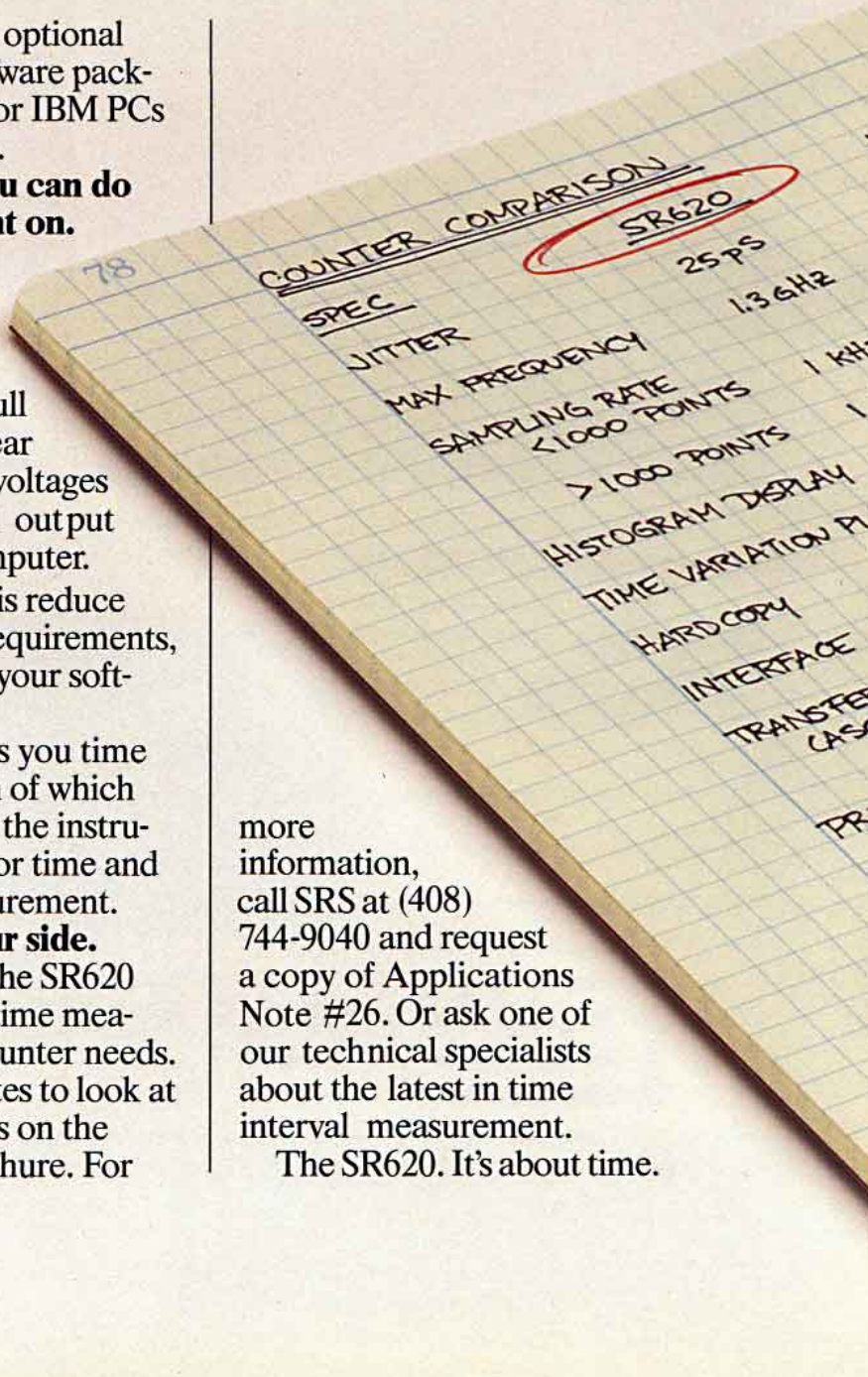
Two DVM inputs (±2V or ±20V full scale) and two D/A outputs (±10V full scale) on the rear panel allow DC voltages to be input and output by your host computer. Not only does this reduce your hardware requirements, it also simplifies your software needs.

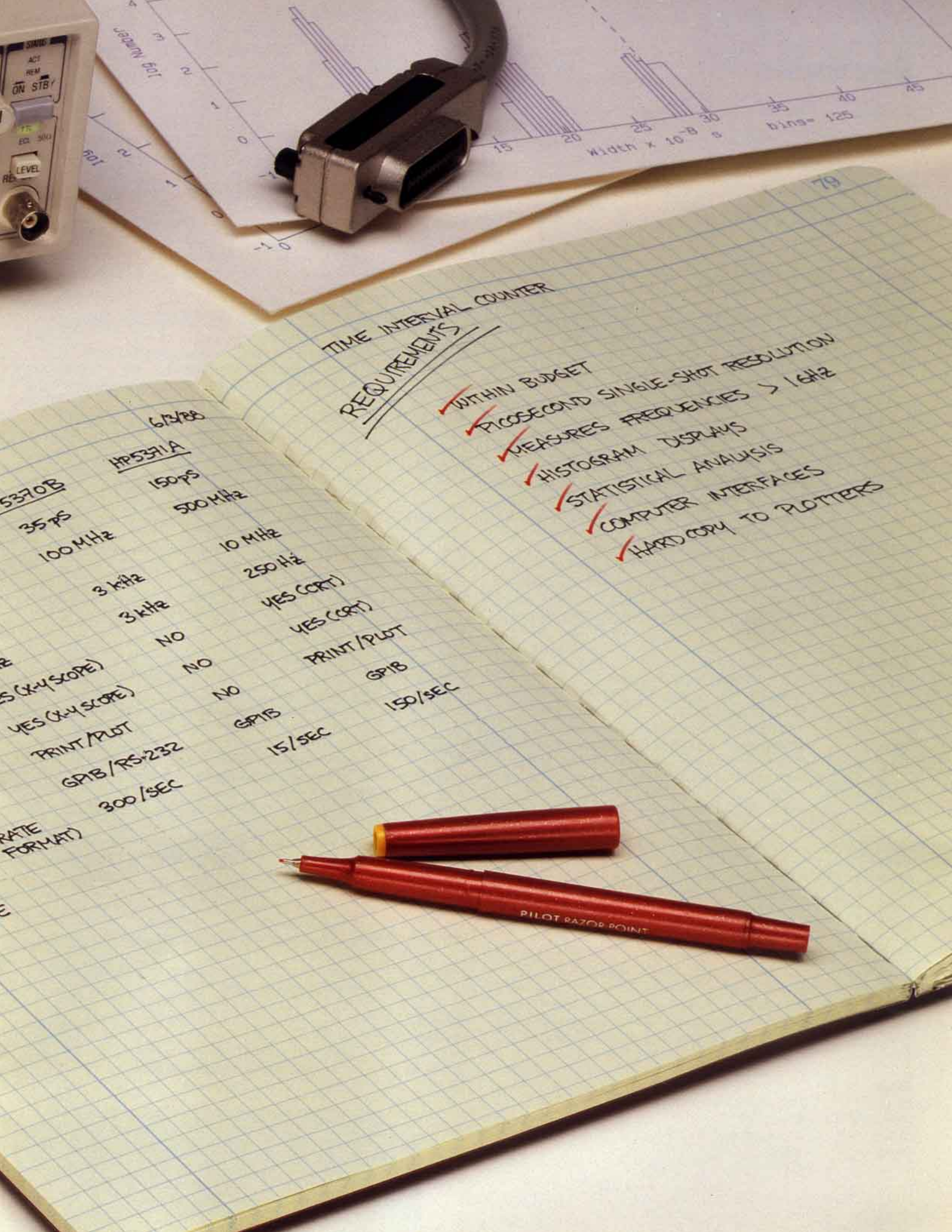
And that saves you time and money. Both of which make the SR620 the instrument of choice for time and frequency measurement.

Put time on your side.

Find out how the SR620 can satisfy your time measurement and counter needs. Take a few minutes to look at the specifications on the back of this brochure. For more information, call SRS at (408) 744-9040 and request a copy of Applications Note #26. Or ask one of our technical specialists about the latest in time interval measurement.

The SR620. It's about time.




TIME INTERVAL COUNTER
REQUIREMENTS
WITHIN BUDGET
PICOSECOND SINGLE-SHOT RESOLUTION
MEASURES FREQUENCIES > 1 GHz
HISTOGRAM DISPLAYS
STATISTICAL ANALYSIS
COMPUTER INTERFACES
HARD COPY TO PLOTTERS
6/1/88
HP5371A
150 ps
500 MHz
10 MHz
250 Hz
YES (CRT)
YES (CRT)
PRINT/PLOT
GPIB
150/SEC
5370B
35 ps
100 MHz
3 kHz
3 kHz
NO
NO
NO
GPIB
15/SEC
YES (X-Y SCOPE)
YES (X-Y SCOPE)
PRINT/PLOT
GPIB/RS-232
300/SEC
PILOT RAZOR POINT

Specifications

Functions

Time Interval, Pulse Width, Rise and Fall Times, Frequency, Period, Phase, and Event Counting. Measurement statistics (mean, min, max, standard deviation or Allan variance) and graphics are available in all modes of operation.

Time Interval

(Time, Width, Rise and Fall Times)

Range	-1000 to +1000 s in +/- TIME mode; -1 ns to +1000 s in all other modes
Trigger Rate	0 to 100 MHz
Least Significant Digit Resolution	4 ps single sample, 1 ps with averaging $(((25\text{ ps typ [50 ps max]})^2 + (0.2\text{ ppb x Interval})^2)/N)^{1/2}$ rms $(((25\text{ ps typ [50 ps max]})^2 + (0.05\text{ ppb x Interval})^2)/N)^{1/2}$ rms (Opt 01) where N=sample size.
Error	< ±(500ps typ[1 ns max] + Timebase Error x Interval) < ±(50 ps typ[100ps max] + Timebase Error x Interval) (REL)
Arming Modes	+TIME — Stop is armed by Start +TIME EXT — Ext arms Start +TIME EXT HOFF — Leading EXT edge arms Start, trailing EXT edge arms Stop. ±TIME — Armed by Start/Stop pair ±TIME CMPL — Armed by Stop/Start pair ±TIME EXT — Armed by EXT input edge EXT arming may be internally delayed or scanned with respect to the EXT input in variable steps. The step size may be set in a 1,2,5 sequence from 1 µs to 10 ms. The maximum delay is 50,000 steps.
Display	16 digit fixed point with 1 ps LSD
Sample Rate	For a sample size of N, the total sample time is N x(800 µs + measured time interval) + Calculation time. The calculation time occurs only after N measurements are completed and varies from 0 µs (N=1, no graphics, binary responses) to 5 ms (N=1, no graphics) to 10 ms (display mean or std dev) to 60 ms (display histogram).

Frequency

Range	0.001 Hz to 300 MHz via comparator inputs. 40 MHz to 1.3 GHz via internal UHF prescalers. RATIO A/B range: 10^{-9} to 10^{3}
Error	< ± ((100 ps typ[350 ps max])/Gate + Timebase Error) x Frequency
Gates	External, 1 period, 1µs to 500 sec, in 1,2,5 sequence .Gates may be externally triggered with no delay. Internal gates from 1 µs to 10 ms may be externally triggered. The delay from trigger may be set from 1 to 50,000 gate widths.
Display	16 digit fixed point with LSD = Freq x 4ps/Gate . 1 µHz max. resolution (1 nHz with x1000 for frequencies ≤ 1 MHz)

Period

Range	0 to 1000 seconds. RATIO A/B range: 10^{-9} to 10^{3}
Error	< ±((100 ps typ[350ps max])/Gate + Timebase Error) x Period
Gates	Same as frequency
Display	16 digit fixed point with LSD = 1 ps (1 fs with x1000 for periods ≤ 1 s)

Phase

	Phase = 360 x (Tb - Ta) / Period A
Range	-180 to +180 degrees (0 to 100 MHz frequency)
Resolution	(25 ps x Frequency x 360 + 0.001) degree
Gate	0.01 seconds (1 period min.) for period measurement and 1 sample for time interval measurement. Period may also be measured using externally triggered internal gates as in frequency mode.
Error	< ±(1ns x Frequency x 360 + 0.001) degree

Events

Range	10^{12}. RATIO A/B range: 10^{-9} to 10^{3}
Count Rate	0 to 300 MHz
Gates	Same as frequency
Display	12 digits

Timebase

	Standard	Option/01
Frequency	10.000 MHz	10.000 MHz
Type	TCVCXO	Ovenized VCXO
Aging	$1x10^{-6}$/yr	$5x10^{-10}$/day
Allan Variance	$2x10^{-10}$/s	$5x10^{-11}$/s
Stability 0-50° C	1 ppm	0.005 ppm
Settability	0.01 ppm	0.001 ppm
External	User may supply 5 or 10 MHz timebase. 1 Volt nominal.	

Inputs

	A, B, and EXTernal
Threshold	-5.00 to +5.00 VDC with 10 mV resolution
Sensitivity	40 mV rms @50MHz to 300mV rms @300MHz
Autolevel (A&B)	Threshold set between peak input excursions (f>10Hz,duty cycle>10^{-6})
Slope	Rising or falling edge
Impedance	(1 M Ohm + 30 pf) or 50 Ohms
Coupling	AC or DC. Ext is always DC coupled.
Bandwidth	300 MHz BW provides 1.2 ns risetime
Prescaler (A&B)	10 mV rms @100 MHz to 400mV rms @1.3 GHz
Protection	100 V. 50 Ohm terminator is released if input exceeds ±5 Vpeak.

REF Output

	Calibration and Trigger source
Frequency	1.00 KHz (Accuracy same as timebase)
Rise/Fall	2 ns
Amplitude	TTL: 0 to 4 VDC (2 VDC into 50 Ohms) ECL: -1.8 to -0.8 VDC into 50 Ohms

DVM Inputs

	Two rear panel DVM inputs
Full Scale	±1.999 or ±19.99 VDC
Type	Sample & hold with successive approximation converter
Impedance	1 M Ohm
Accuracy	0.3% of full scale
Speed	Formatted response in approximately 5 ms.

D/A Outputs

	Two rear panel outputs
Full Scale	±10.00 VDC
Resolution	5 mV
Impedance	< 1 Ohm
Accuracy	.03% of full scale
Default	Voltage proportional to Mean & Deviation

Graphics

Scope	Two rear panel outputs to drive x-y scope
Displays	Histograms and strip charts of mean & deviation
X-axis	-5 to +5 V for 10 division deflection
Y-axis	-4 to +4 V for 8 division deflection
Resolution	250 (H) x 200 (V) pixels
Hardcopy	Via Centronics port to Epson graphics compatible dot matrix printers. RS-232, IEEE-488 to HP-GL compatible Digital Plotters.

Interfaces

RS-232C	300 to 19.2 KBaud. All instrument functions may be controlled. PC compatible serial cable.
GPIB	IEEE-488 compatible interface. All instrument functions may be controlled.
Speed	Approximately 150 ASCII formatted responses per second. 1400 binary responses per second.

General

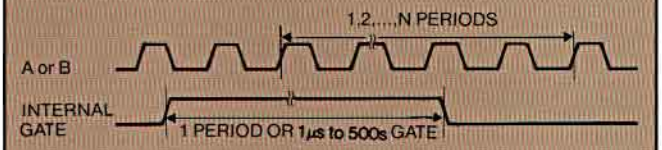
Operating	0 to 50° C
Power	100, 120, 220 or 240 VAC +5% -10%. 70 Watts.
Dimensions	14" x 14" x 3.5". Rack mounting hardware included.
Weight	11 lbs

Timing is everything.

The SR620 measures time interval and frequency/period in a number of different modes. *Time interval* modes include +Time and ±Time. The measurement is armed by the START or STOP input. *External arming* allows measurements to be synchronized with an external trigger (with adjustable holdoff or delay). *Frequency/period* measurements can be internally gated. *Internal gates* may be triggered externally (with adjustable delay). *External gates* may also be used.

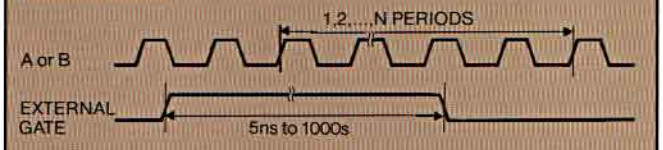
Frequency and period modes

Internal Gates



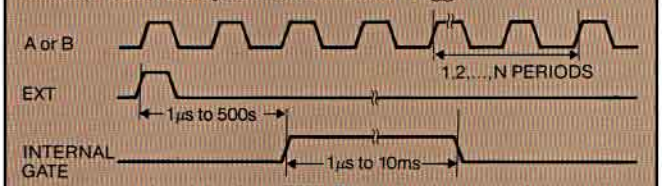
Frequency measured for 1 period or during gate.

External Gates



Frequency measured during external gate. A minimum of 1 period is always measured.

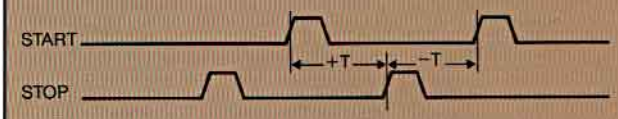
Internal Gates Delayed From External Trigger



Internal gate after delay from EXT. Delay may be scanned.

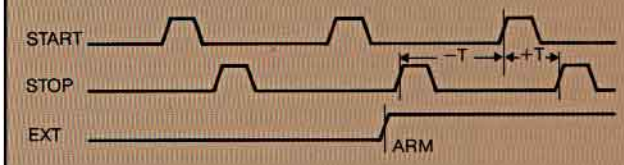
Time interval modes

+Time and ±Time



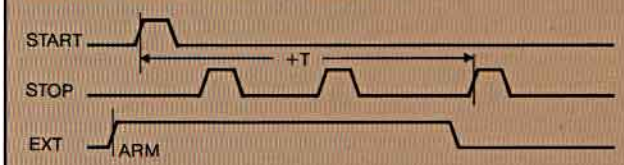
+Time: Arm on STOP, next START-STOP pair measured.
−Time: Arm on START, next STOP-START pair measured.

External Arming (+Time or ±Time)



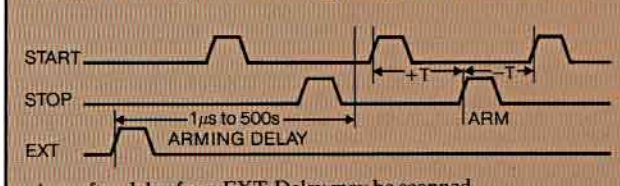
Arm on EXT input with both +Time and ±Time modes.

External Arming with STOP Holdoff



Arm on EXT. Time from next START to 1st STOP after holdoff.

External Arming with Scanning Delay (+Time or ±Time)



Arm after delay from EXT. Delay may be scanned.

Ordering Information

SR620	**Universal Time Interval Counter** with Time Interval, Frequency, Period, Phase, Pulse Width, Rise and Fall Time, and Event Counting modes. GPIB and RS-232 interfaces, 1 ppm standard timebase, scope display and printer /plotter interface included.	**$4950**
Option/01	**High stability oven timebase**	**$950**

Price subject to change without notice.

SRS

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