

220 or 240V ac  $\pm 10$  percent, 50 to 400 Hz, 30W. The input voltage is selectable by positioning a pcb in the power receptacle to display the desired voltage in the viewing port.

## 1-10. SPECIFICATIONS

1-11. The specifications for the Model 1953A are listed in Table 1-2. Physical dimensions of the unit are shown in Figure 1-1. Option specifications are given in Table 1-3.

Table 1-1. Available Options

OPTION	NAME	INSTALLATION	
		FACTORY	FIELD (SERVICE CENTER)
-02	Data Output Unit (DOU)	Yes	Yes
-04	Temperature Compensated Crystal Oscillator (TCXO)	Yes	No
-05	External Time Base Multiplier	Yes	No
-07	520 MHz Prescaler	Yes	No
-10	Oven-Stabilized Time Base	Yes	No
-11	Basic Remote Control Unit (RCU)	Yes	No
-12	Full Remote Control Unit (RCU)	Yes	No
-13	1000 MHz Prescaler	Yes	No
-14	1250 MHz Prescaler	Yes	No
-15	IEEE-488 Standard Interface	Yes	No
-16	Rear Panel Inputs	Yes	No
-20	Superior Oven-Stabilized Time Base	Yes	No

Table 1-2. 1953A Specifications

<b>FREQUENCY MEASUREMENTS</b>	
Range . . . . .	0 to 125 MHz (dc coupled) 5 Hz to 125 MHz (ac coupled). Optional prescalers to 1250 MHz (see Options -07, -13, -14).
Gate Time . . . . .	0.1 ms to 10s in 6 decade steps (prescaled input increases gate time by a factor of 4 or 8).
Resolution . . . . .	0.1 Hz at 10s gate time to 10 kHz at 0.1 ms gate time.
Accuracy . . . . .	Time Base accuracy $\pm 1$ count.
Readout . . . . .	kHz or MHz automatically displayed with decimal point.
<b>RATIO MEASUREMENTS</b>	
Displays . . . . .	$f_1/f_2$ , where $f_1$ and $f_2$ are applied at the two input channels, A and B, respectively.
Range . . . . .	$f_1$ : 0 to 120 MHz (dc coupled). 5 Hz to 120 MHz (ac coupled). $f_2$ : 0 to 25 MHz (dc coupled). 5 Hz to 25 MHz (ac coupled).
Accuracy . . . . .	$\pm 1$ count of signal on input A + trigger error of signal on input B*.
Readout . . . . .	Decimal point without unit annunciation.

Table 1-2. 1953A Specifications (cont)

**PERIOD MEASUREMENTS**

Range . . . . .	0 to 25 MHz (dc coupled). 5 Hz to 25 MHz (ac coupled).
Periods Averaged . . . . .	1 period to $10^5$ periods.
Frequency Counted . . . . .	10 MHz.
Resolution . . . . .	1 ps at $10^5$ periods to 0.1 $\mu$ s at 1 period.
Accuracy . . . . .	Time Base accuracy $\pm 1$ count + trigger error of signal on input A*.
Readout . . . . .	ms or $\mu$ s automatically displayed with decimal point.

**TIME INTERVAL MEASUREMENT**

Range . . . . .	0.1 $\mu$ s to $10^7$ s.
Input . . . . .	Channels A and B; common or separate.
Resolution . . . . .	0.1 $\mu$ s to 10 ms in 6 decade steps.
Accuracy . . . . .	$\pm 1$ count + time base accuracy + trigger error**.
Readout . . . . .	ms or s automatically displayed with decimal point.

**TOTALIZE MEASUREMENT**

Totalizing . . . . .	A gated by B.
Range . . . . .	0-125 MHz (dc coupled). 5 Hz-125 MHz (ac coupled).

**SENSITIVITY****Channel A**

Sinewave . . . . .	30 mV rms from dc to 75 MHz increasing to 50 mV at 125 MHz.
Pulse . . . . .	100 mV pulse amplitude with minimum pulse width of 10 ns.

**Channel B**

Sinewave . . . . .	30 mV rms from dc to 25 MHz.
Pulse . . . . .	100 mV, with minimum pulse width of 50 ns.

**Channel C**

(Prescaled) . . . . .	15 mV from 50 MHz to 520 MHz (AGC) (Option -07). 15 mV from 50 MHz to 1000 MHz (Options -13 or -14), increasing to 30 mV at 1250 MHz (Option -14 only).
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**INPUT IMPEDANCE**

Channel A or B . . . . .	1 $m\Omega$ in parallel with 30 pf maximum.
Channel C (Prescaled) . . . . .	50 $\Omega$ nominal, VSWR 2:1 max when not limiting.
Dynamic Range without Limiting . . . . .	-3.5 to +3.5V (Channel A and B) 1V rms (Channel C).
Impedance in Limiting Condition . . . . .	120 $k\Omega$ in parallel with 75 pf (Channel A and B). VSWR less than 3:1 (Channel C).

**ATTENUATOR**

Channel A and B only . . . . .	Sensitivity is decreased by a factor of approximately 10 in the X10 position.
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Table 1-2. 1953A Specifications (cont)

**SLOPE**

Channel A and B only . . . . . Front panel slide switch selects positive or negative slope triggering.

**TRIGGER LEVEL**

Channel A and B only . . . . . Front panel control has  $\pm 1V$  range when attenuator is in X1 position, and  $\pm 10V$  in the X10 position. Preset position is fully counterclockwise.

**TIME BASE**

	STANDARD	-04 OPTION	-10 OPTION	-20 OPTION
Frequency	10.00 MHz	10.00 MHz	10.00 MHz	10.00 MHz
Aging Rate (constant temp)	$< \pm 3 \times 10^{-7} / \text{mo}$	$< \pm 3 \times 10^{-7} / \text{mo}$	$< \pm 1 \times 10^{-7} / \text{mo}$	$< \pm 1.5 \times 10^{-8} / \text{mo}$
Temperature Stability 0°C-50°C 20°C-30°C	$< \pm 2 \times 10^{-8}$ $\pm 5 \times 10^{-7} \text{ typ}$	$< \pm 5 \times 10^{-7}$ $\pm 2 \times 10^{-7} \text{ typ}$	$< \pm 1 \times 10^{-8}$ $\pm 3 \times 10^{-9} \text{ typ}$	$< \pm 2 \times 10^{-10} / ^\circ\text{C}$ $\pm 5 \times 10^{-10} / \text{day}$
Line Voltage ( $\pm 10\%$ Change)	$< \pm 1 \times 10^{-7}$	$< \pm 5 \times 10^{-8}$	$< \pm 3 \times 10^{-9}$	$< \pm 1 \times 10^{-9}$
Warm-up Time (to $1 \times 10^{-8}$ )	—	—	20 min.	20 min.

\* Trigger error of channel A or B is less than  $\pm 0.3\%$  (fA/fB) for signals with better than 40 dB signal to noise ratio and 100 mV rms amplitude.

\*\* Trigger error in time interval mode is less than  $\pm 0.0025 / \text{signal slope (V/}\mu\text{s)}$  in  $\mu\text{s}$  with trigger levels set to 0V dc.

**EXTERNAL TIME BASE INPUT**

Frequency Required . . . . . 10 MHz.      Impedance . . . . . 1 M $\Omega$ , 20 pF.  
Sensitivity . . . . . 250 mV rms.      Dynamic Range without Limiting . . . . . 5V peak-to-peak.  
Input Impedance during Limiting . . . . . 470 $\Omega$  in parallel with 30 pF.

DISPLAY . . . . . 9-digit LED display incorporating large 7-segment character. Full leading zero suppression.

CYCLE RATE. . . . . When in the "CONT" mode, the time interval between successive measurements can be varied by means of a cycle rate control between approximately 0.2 and 2.0 s. "Reset" button clears display and activates a new measurement

RESET . . . . . In TRIG (trigger) mode, the readings may be updated by pushing the RESET button or by shorting the external reset pin on the remote control connector to ground. With external reset the display is not cleared.

SELF-CHECK . . . . . A time base-derived 10 MHz signal is internally connected to the counter input.

GATE TIME . . . . . High true-TTL level output.

TIME INTERVAL MARKER . . . . . Low true-TTL level output.

OPERATING TEMPERATURE . . . . . 0°C to +50°C.

STORAGE TEMPERATURE . . . . . -40°C to +75°C.

POWER REQUIREMENTS . . . . . 50-400 Hz; 120/240V  $\pm 10\%$  (100V operation available), 30W nominal.

**DIMENSIONS (See Figure 1-1)**

Width . . . . . 36.2 cm (14.25 in.)      Depth . . . . . 34.29 cm (13.5 in.)  
Height . . . . . 8.76 cm (3.45 in.)      Weight . . . . . 4.32 kg (9.5 lbs.)

Table 1-3. Option Specifications

**-02 DATA OUTPUT UNIT (PARALLEL)**

Provides BCD TTL outputs for each digit, plus overflow, unit annunciation, decimal point and print command.

**-04 TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR (TCXO)**

See time base specifications.

**-05 EXTERNAL TIME BASE MULTIPLIER**

Allows use of external 1, 5 or 10 MHz reference clock (standard unit accepts 10 MHz). This option also permits burst measurements to be made when a "level" signal is available.

**-07 520 MHz PRESCALER**

Covers frequency range of 50 to 520 MHz, using a scaling ratio of 4. Sensitivity is 15 mV rms (AGC). Maximum allowable input is 5V rms (fuse protected). VSWR less than 2:1 into 50 $\Omega$  for levels less than 1V rms.

**-10 OVEN-STABILIZED TIME BASE**

Oven is activated whenever instrument is connected to the AC line (see time base specifications).

**-11 BASIC REMOTE CONTROL UNIT**

Allows single-line programming (TTL or contact closure) of range, mode, slope and reset functions. Allows analog programming of trigger levels, and provides power sense, overflow status, and system ready outputs. Front panel lockout is provided.

**-12 FULL REMOTE CONTROL UNIT**

Includes all the features of Option -11, plus programming of ac/dc coupling, attenuation, separate/common, and digital trigger level. Trigger level of channels A and B is programmable over a +1V to -1V range (2 BCD digits plus sign), giving a resolution of 1% and an accuracy of 5% plus 2 mV. Temperature stability is better than 200  $\mu\text{V}/^\circ\text{C}$ . Two analog input/output lines are provided for either checking the D/A performance, or programming via analog levels. Option -12 increases input capacitance to 37 pF maximum.

**-13 1000 MHz PRESCALER**

Covers 50 to 1000 MHz using a scaling ratio of 8. Sensitivity is 15 mV rms, and maximum allowable input is 5V rms (fuse protected). VSWR less than 2.5:1 (50 $\Omega$ ) for levels less than 1V rms.

**-14 1250 MHz PRESCALER**

Covers 50 to 1250 MHz using a scaling ratio of 8. Sensitivity is 15 mV to 1000 MHz, increasing to 30 mV rms at 1250 MHz. Maximum input 5V rms (fuse protected), and VSWR less than 2.5:1 for levels less than 1V rms.

**-15 IEEE STD-488 INTERFACE (SERIAL)**

Full remote programming of function, range, and all signal conditioning controls including trigger levels. Directly compatible with IEEE Interface Standard. Data output includes 9-digits of display information, decimal point and exponent for time or frequency units. Front panel lockout is provided. Write for application bulletin covering this option.

**-16 REAR PANEL INPUTS**

Two rear inputs in parallel with A and B front inputs (capacity 85 pF), plus one rear input for channel C.

**-20 SUPERIOR OVEN-STABILIZED TIME BASE**

Oven is activated whenever instrument is connected to the AC line if the rear panel power switch is set to on. (See time base specifications).

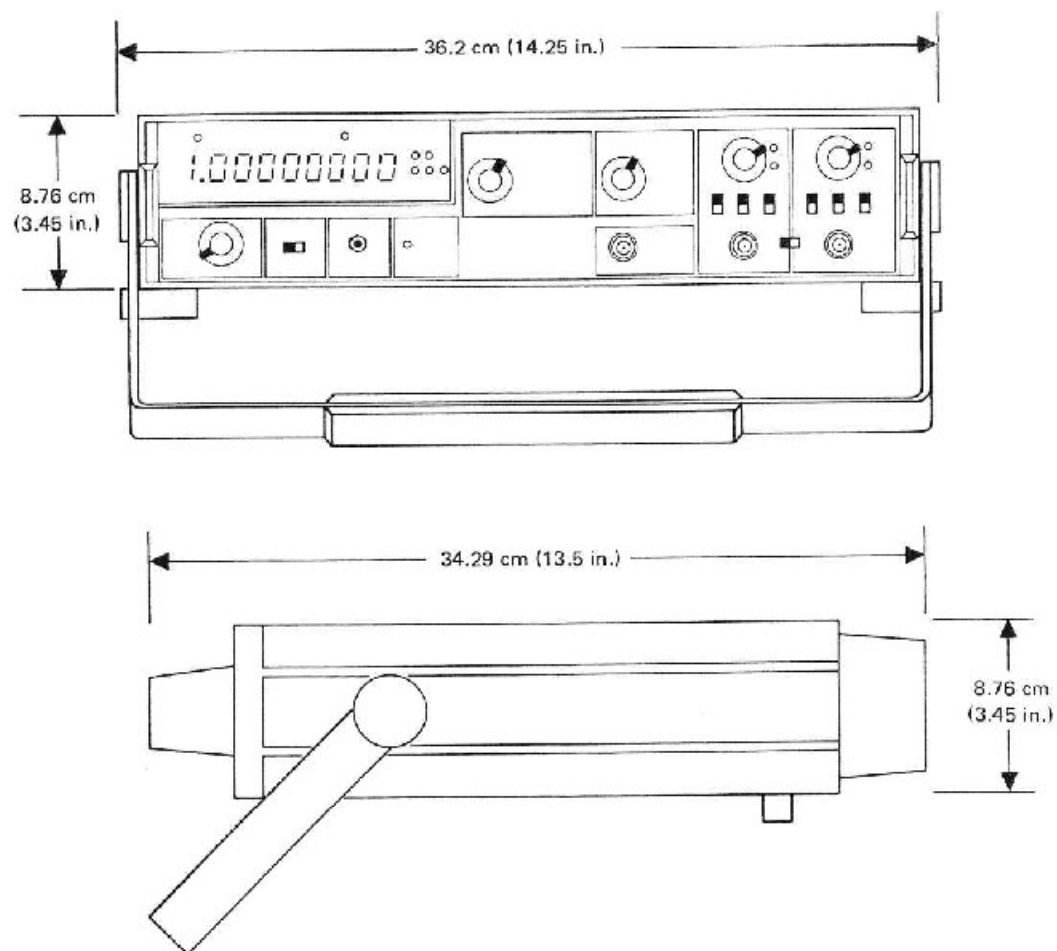


Figure 1-1. Model 1953A Dimensions