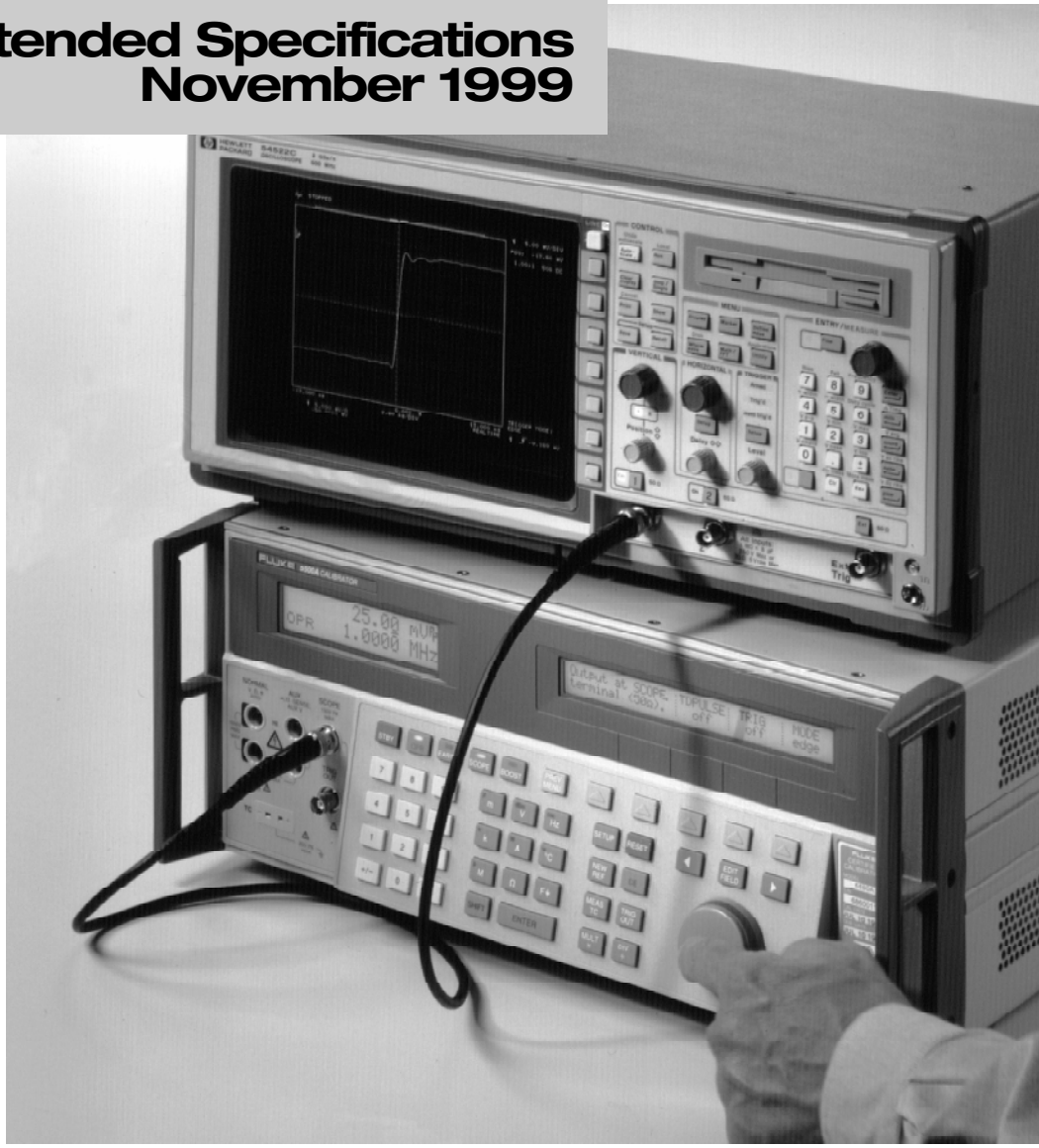
FLUKE®

Oscilloscope Calibration Options for Fluke 5500A/5520A Multi-Product Calibrators

Extended Specifications November 1999



General Specifications

These specifications apply to the 5520A-SC1100, 5500A-SC600 and 5500A-SC300 Oscilloscope Calibration Options. General specifications for the 5500A and 5520A can be found in the 5500A/5500A Extended Specifications (order publication number 1264848). The specifications are valid when the calibrator is operated under the conditions specified in the operator manual, and has completed a warm-up period of at least twice the length of time the calibrator was powered off, up to a maximum of 30 minutes.

The 5520A-SC1100 can only be installed in a 5520A calibrator. The 5500A-SC600 and SC300 can be installed in a 5520A or a 5500A calibrator.

Voltage Function Specifications

5520A-SC1100 and 5500A-SC600

Volt Function		DC Signal		Square Wave Signal[1]	
Load		**Into 50Ω**	**Into 1 MΩ**	**Into 50Ω**	**Into 1 MΩ**
Amplitude Characteristics					
Range		0V to ±6.6V	0V to ±130V	±1 mV to ±6.6V p-p	±1 mV to ±130V p-p
	Range	Resolution			
Resolution	1 mV to 24.999 mV 25 mV to 109.99 mV 110 mV to 2.1999V 2.2V to 10.999V 11V to 130V	1 µV 10 µV 100 µV 1 mV 10 mV			
Adjustment Range		Continuous			
1-Year Absolute Uncertainty, tcal ± 5°C		± (0.25% of output + 40 µV)	± (0.05% of output + 40 µV)	± (0.25% of output + 40 µV)	± (0.1% of output + 40 µV)[2]
Sequence		1-2-5 (e.g., 10 mV, 20 mV, 50 mV)			
Square Wave Frequency Characteristics					
Range		10Hz to 10 kHz			
1-Year Absolute Uncertainty, tcal ± 5°C		± (2.5 ppm of setting)			
Typical Abberation (from 50% of leading/trailing edge) 25 mV to 130V: within 4 µs 10 mV to 25 mV: within 8 µs 1 mV to 10 mV: within 14 µs		< (0.5% of output + 100 µV)			

[1] Positive or negative, zero referenced square wave.
[2] Above 1 kHz, ± (0.25% of output + 40 µV). Assumes connectors and cables are in good condition.

5500A-SC300

Volt Function	DC Signal		Square Wave Signal[1]	
Load	**Into 50Ω**	**Into 1 MΩ**	**Into 50Ω**	**Into 1 MΩ**
Amplitude Range	0V to ±2.2V	0V to ±33V	±1.8 mV to ±2.2V p-p	±1.8 mV to ±105V p-p
1-Year Absolute Uncertainty, tcal ± 5°C	± (0.25% of output + 100 µV)			
Sequence	1-2-5 (e.g., 10 mV, 20 mV, 50 mV)			
Frequency Range	10 Hz to 10 kHz			

[1] Positive or negative, zero referenced square wave.

Edge Function Specifications

5520A-SC1100 and 5500A-SC600

Edge Characteristics into 50Ω		1-Year Absolute Uncertainty, tcal ±5°C
Amplitude		
Rise Time	< 300 ps	+ 0/–100 ps
Range (p–p)	5.0 mV to 2.5V	± (2% of output + 200 µV)
Resolution	4 digits	
Adjustment Range	± 10% around each sequence value (indicated below)	
Sequence Values	5 mV, 10 mV, 25 mV, 50 mV, 60 mV, 80 mV, 100 mV, 200 mV, 250 mV, 300 mV, 500 mV, 600 mV, 1V, 2.5V	
Other Edge Characteristics		
Frequency Range	1 kHz to 10 MHz[1]	± (2.5 ppm of setting)
Frequency Range	≤ 300 ps[1]	(+ 0 ps/–100ps)
Typical Jitter, Edge to Trigger	< 5 ps [p–p]	
Leading Edge Abberations[2]	within 2 ns from 50% of rising edge]	< (3% of output + 2 mV)
	2 ns to 5 ns	< (2% of output + 2 mV)
	5 ns to 15 ns	< (1% of output + 2 mV)
	after 15 ns	< (0.5% of output + 2 mV)
Typical Duty Cycle	45% to 55%	
Tunnel Diode Pulse Drive	Square wave at 100 Hz to 100 kHz, with variable amplitude of 60V to 100V p–p	
Tunnel Diode Option	≤ 125 ps @ 250 mV p–p	

[1] Frequency range above 2 MHz has rise time specification ≤350 ps.

[2] Below 250 mV aberrations are typical.

5500A-SC300

Edge Characteristics into 50Ω		1-Year Absolute Uncertainty, tcal ±5°C
Amplitude Range (p–p)	4.5 mV to 2.75V	± (2% of output + 200 µV)
Frequency Range	1 kHz to 1 MHz	± (25 ppm of setting + 15 mHz)
Rise Time	≤1 ns	
Typical Jitter, Edge to Trigger	<5 ps (p–p)	
Leading Edge Aberrations	Within 10 ns	< (2% of output + 2 mV)
	10 to 30 ns	< (1% of output + 2 mV)
	After 30 ns	< (0.5% of output + 2 mV)
Typical Duty Cycle	45% to 55%	

Leveled Sinewave Function Specifications

5520A-SC1100 (> 600 MHz)

Characteristics into 50Ω	Frequency Range	
	50 kHz (reference)	600 MHz to 1.1 GHz
Amplitude Characteristics		
Range	5 mV to 3.5V	
Resolution	< 100 mV: 3 digits; ≥ 100 mV: 4 digits	
Adjustment Range	**Continuously Adjustable**	
1-Year Absolute Uncertainty, tcal ± 5°C	± (2% of output + 300 µV)	± (7% of output + 300 µV)
Flatness (relative to 50 MHz)[1]	not applicable	± (5% of output + 100 µV)
Short-Term Amplitude Stability	≤ 1 %[2]	
Frequency Characteristics		
Resolution	100 kHz	
1-Year Absolute Uncertainty, tcal ± 5°C	± 2.5 ppm	
Distortion Characteristics		
2nd Harmonic	≤ -33 dBc	
3rd and Higher Harmonic	≤ -38 dBc	

[1] As measured near oscilloscope bandwidth frequency.
[2] Within one hour after reference amplitude setting, provided temperature varies no more than ± 5°C.

5520A-SC1100 and 5500A-SC600

Leveled Sine Wave Characteristics into 50Ω	Frequency Range			
	50 kHz (Reference)	50 kHz to 100 MHz	100 MHz to 300 MHz	300 MHz to 600 MHz
Amplitude				
Range (p-p)		5 mV to 5.5V		
1-Year Absolute Uncertainty, tcal ±5°C	± (2% of output + 300 µV)	± (3.5% of output + 300 µV)	± (4% of output + 300 µV)	± (6% of output + 300 µV)
Flatness (relative to 50 kHz)[1]	Not applicable	± (1.5% of output + 100 µV)	± (2% of output + 100 µV)	± (4% of output + 100 µV)
Short-Term Amplitude Stability	≤1%[2]			
Frequency				
Resolution	10 kHz			
1-Year Absolute Uncertainty, tcal ±5°C	± 2.5 ppm			
Distortion				
2nd Harmonic	≤ -33 dBc			
3rd and Higher Harmonics	≤ -38 dBc			

[1] As measured near oscilloscope bandwidth frequency.
[2] Within one hour after reference amplitude setting, provided temperature varies no more than ±5°C.

5500A-SC300

Leveled Sine Wave Characteristics into 50Ω	Frequency Range		
	50 kHz (Reference)	50 kHz to 100 MHz	100 MHz to 300 MHz[1]
Amplitude			
Range (p-p)		5 mV to 5.5V[1]	
1-Year Absolute Uncertainty, tcal ±5°C	± (2% of output + 200 µV)	± (3.5% of output + 300 µV)	± (4% of output + 300 µV)
Flatness (relative to 50 kHz)[1]	Not applicable	± (1.5% of output + 100 µV)	± (2% of output + 100 µV)
Short-Term Amplitude Stability	≤1%[2]		
Frequency			
Resolution	10 kHz		
1-Year Absolute Uncertainty, tcal ±5°C	± 2.5 ppm		
Distortion			
2nd Harmonic	≤ -33 dBc		
3rd and Higher Harmonics	≤ -38 dBc		

[1] Extended frequency range to 350 MHz is provided, but flatness is not specified. Amplitude is limited to 3V for frequencies above 250 MHz.
[2] Within one hour after reference amplitude setting, provided temperature varies no more than ±5°C.

Time Marker Function Specifications

5520A-SC1100 and 5500A-SC600

Time Marker into 50Ω[1]	5s to 50 ms	20 ms to 100 ns	50 ns to 20 ns	10 ns	5 ns to 2 ns
1-Year Absolute Uncertainty, tcal ±5°C[2]	± (25 + t* X 1000) ppm	± 2.5 ppm	± 2.5 ppm	± 2.5 ppm	± 2.5 ppm
Wave Shape	Spike or square	Spike, square, 20%-pulse	Spike or square	Square or sine	Sine
Typical Jitter (p-p)	<10 ppm	<1 ppm	<1 ppm	<1 ppm	<1 ppm
Sequence	5-2-1 from 5s to 2 ns (e.g., 500 ms, 200 ms, 100 ms)				

[1] Output amplitude >1V pk.
[2] Time marker uncertainty is ± 50 ppm when measured off of cardinal points.
* t = time in seconds.

5500A-SC300

Time Marker into 50Ω [1]	5s to 100 µs	50 µs to 2 µs	1 µs to 20 ns	10 ns to 2 ns
1-Year Absolute Uncertainty, tcal ±5°C	± (25 + t* X 1000) pmm	± (25+ t* X 15000) pmm	± 25 ppm	± 25 ppm
Wave Shape	Pulsed Sawtooth	Pulsed Sawtooth	Pulsed Sawtooth	Sine
Sequence	5-2-1 from 5s to 2 ns (e.g., 500 ms, 200 ms, 100 ms)			

[1] Typical Amplitude > 1V
* t = time in seconds.

Trigger Functions 5520A-SC1100, 5500A-SC600 and 5500A-SC300

Available for edge and time marker functions (volt, pulse and video are available for 5520A-SC1100 and 5500A-SC600 only).

Wave Generator Function Specifications

5520A-SC1100, 5500A-SC600 and 5500A-SC300

Wave Generator Characteristics	Square Wave, Sine Wave, and Triangle Wave into 50Ω or 1 MΩ
Amplitude	
Range	Into 1 MΩ: 1.8 mV to 55V p-p Into 50Ω: 1.8 mV to 2.5V p-p (5520A-SC1100 and 5500A-SC600) Into 50Ω: 1.8 mV to 2.2V p-p (5500A-SC300)
1-Year Absolute Uncertainty, tcal ±5°C 10 Hz to 10 kHz	± (3% of p-p output + 100 μV)
Sequence	1-2-5 (eg., 10 mV, 20 mV, 50 mV,...)
Typical DC Offset Range	0 to ± (≥40% of p-p amplitude)[1]
Frequency	
Range	10 Hz to 100 kHz
Resolution	4 or 5 digits depending on frequency

[1] The DC offset plus the wave signal must not exceed 30V rms.

Pulse Generator Function Specifications

5520A-SC1100 and 5500A-SC600

The pulse generator is designed for oscilloscope capture function tests and trigger verification applications.

Pulse Generator Characteristics	Positive Pulse into 50Ω
Typical Rise/Fall Times	2 ns
Amplitude Available	Discrete steps: 2.5V, 1V, 250 mV, 100 mV, 25 mV, 10 mV
Pulse Width[1]	
Range	4 ns to 500 ns[1]
Uncertainty[2]	5% ± 2 ns
Pulse Period	
Range	20 ms to 200 ns (50 Hz to 6.6 MHz)
1-Year Absolute Uncertainty, tcal ± 5°C	± 2.5 ppm

[1] Pulse width not to exceed 40% of period.

[2] Pulse width uncertainty for periods less than 2 μs are not specified.

TV Trigger Specifications

5520A-SC1100 and 5500A-SC600. TV Trigger is provided at the Scope Output Terminal

Trigger Signal Type	Parameters
Frame Formats	Selectable NTSC, SECAM, PAL, PAL-M
Polarity	Selectable Inverted or Uninverted Video
Amplitude into 50Ω (p-p)	Adjustable 0 to 1.5V p-p into 50Ω load, (±7% accuracy)
Line Marker	Selectable Line Video Marker

Input Impedance Measurement Specifications

5520A-SC1100 and 5500A-SC600

	Range	Uncertainty
Resistance	40Ω to 60Ω	0.1%
	500 kΩ to 1.5 MΩ	0.1%
Capacitance	5 pF – 50 pF	± (5% of input + 0.5 pF)[1]

[1] Measurements made within 30 minutes of capacitance zero reference. Scope option must be selected for at least five minutes prior to capacitance measurement or zero.

Overload Measurement Specifications

5520A-SC1100 and 5500A-SC600. The overload test function applies dc or ac (1 kHz square wave) power into the 50Ω oscilloscope input and monitors the current. A time measurement counter indicates the time duration of the applied overload signal. When the oscillosope's input protection circuit reacts and opens up the 50Ω load, the calibrator indication is set to "off" on the right hand display. In order to prevent oscilloscope front end damage, a limited amount of energy is applied by a user settable time limit.

Source Voltage	Time Limit dc or 1 kHz ac
5V to 9V	Settable from 1 Sec to 60 Sec
Typical "On" Current Indication	**Typical "Off" Current Indication**
5V to 9V	Settable from 1 Sec to 60 Sec

External Frequency Reference Input (5520A only)

The External Reference Input selection allows the user to provide their own high stability 10 MHz reference clock for the 5500A-SC300, 5500A-SC600 and 5520A-SC1100 when fitted in a 5520A mainframe. All functions except Wave Generator and Marker greater than 50ms are then referenced to the external 10 MHz signal. The external reference input must be between 1V to 5V p-p.

Uncertainty of output = uncertainty of reference + 5 μHz.

Ordering Information

Ordering Information

5500A	Multi-Product Calibrator
5500A/3	Multi-Product Calibrator with 300 MHz Oscilloscope Calibration Option
5500A/6	Multi-Product Calibrator with 600 MHz Oscilloscope Calibration Option
5520A	High-Performance Multi-Product Calibrator
5520A/3	High Performance Multi-Product Calibrator with 300 MHz Oscilloscope Calibration Option
5520A/6	High Performance Multi-Product Calibrator with 600 MHz Oscilloscope Calibration Option
5520A/1 GHz	High Performance Multi-Product Calibrator with 1.1 GHz Oscilloscope Calibration Option

Options*

5500A-SC300	300 MHz/1 ns Oscilloscope Calibration Option
5500A-SC600	600 MHz/300 ps Oscilloscope Calibration Option
5520A-SC1100	1.1 GHz ps Oscilloscope Calibration Option (5520A only)

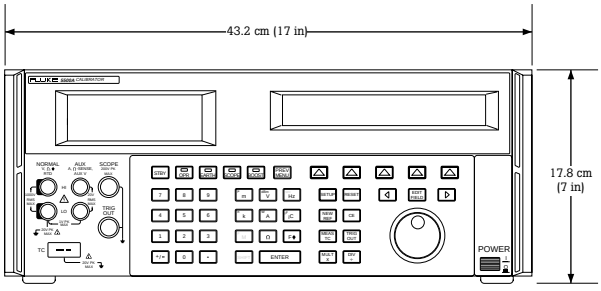
* SC options must be installed and calibrated at a Fluke Service Center and include report of calibration.

Accessories

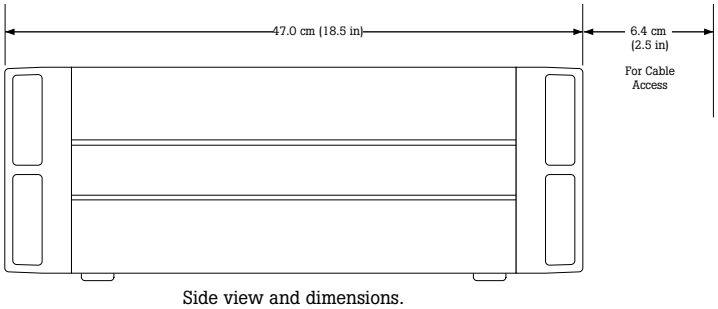
5500A/COIL	50-Turn Current Coil
5500A/CASE	Roll-Aboard Transit Case
5500A/LEADS	Comprehensive Test Lead Kit
5800A/TDP	125 ps Tunnel Diode Pulser
5520A/HPROBE	Humidity Measurement Probe
5500A/HNDL	Side Carry Handle
Y5537	Rack Mount Kit
TC100	Test Cart
5725A	Amplifier (5500A Only)
MET/CAL®	Calibration Software (IEEE and RS232)
5500/CAL	Calibration Software (RS232)
5800A-7004k	Oscilloscope Cal Cable and Accessory Kit

Pressure Modules (5520A only)

FLUKE-700PCK	Pressure Module Calibration Kit (required)
FLUKE-700P01	Pressure Module 0-10 IN. H_2O DIFF
FLUKE-700P02	Pressure Module 0-1 PSID
FLUKE-700P03	Pressure Module 0-5 PSID
FLUKE-700P04	Pressure Module 0-15 PSID
FLUKE-700P05	Pressure Module 0-30 PSIG
FLUKE-700P06	Pressure Module 0-100 PSIG
FLUKE-700P07	Pressure Module 0-500 PSIG
FLUKE-700P08	Pressure Module 0-1000 PSIG
FLUKE-700P09	Pressure Module 1500 PSIG
FLUKE-700P22	Pressure Module 0-1 PSID WET
FLUKE-700P23	Pressure Module 0-5 PSID WET
FLUKE-700P24	Pressure Module 0-15 PSID WET
FLUKE-700P29	Pressure Module 3000 PSIG WET
FLUKE-700P30	Pressure Module 5000 PSIG WET
FLUKE-700P31	Pressure Module 10000 PSIG WET
FLUKE-700PA3	Pressure Module 0-5 PSIA
FLUKE-700PA4	Pressure Module 0-15 PSIA
FLUKE-700PA5	Pressure Module 0-30 PSIA
FLUKE-700PA6	Pressure Module 0-100 PSIA
FLUKE-700PD2	Pressure Module ±1 PSID
FLUKE-700PD3	Pressure Module ±5 PSID
FLUKE-700PD4	Pressure Module ±15 PSID
FLUKE-700PD5	Pressure Module -15+30 PSIG
FLUKE-700PD6	Pressure Module -15+100 PSIG
FLUKE-700PD7	Pressure Module -15+200 PSIG
FLUKE-700PV3	Pressure Module -5 PSID
FLUKE-700PV4	Pressure Module -15 PSID
FLUKE-700PMP	Pressure Pump



Front view and dimensions.



Side view and dimensions.

Note: 5500A and 5520A dimensions are the same.

Product Compatability Chart

Model	5520A-SC1100	5500A-SC600	5500A-SC300
5520A	•	•	•
5500A		•	•
5800A/TDP	•	•	

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