Manual Supplement

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This supplement contains information necessary to ensure the accuracy of the above manual. This manual is distributed as an electronic manual on the following CD-ROM:

CD Title:	9640A
CD Rev. & Date:	7/2008
CD PN:	2546628

FLUKE®
Calibration

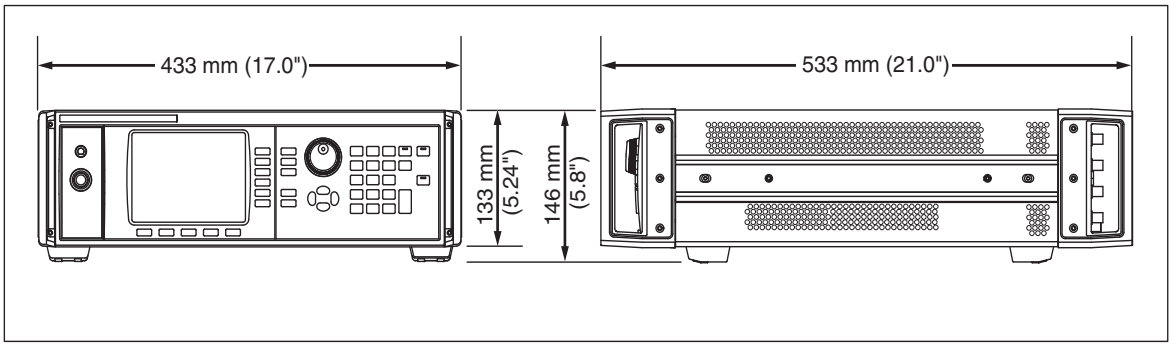
Change #1, 398

On pages 1-9 through 1-18, replace your ***Specifcations*** with:

Specifications

General Specifications

Performance	All specifications apply to a 1 year calibration interval at an ambient temperature of Tcal ±5 °C. Nominal factory Tcal calibration temperature 23 °C.
Standard Interfaces	IEEE488.2 (GPIB)
Warmup Time	60 minutes
Temperature	Operating: 0 °C to 50 °C Specified Operation: 5 °C to 40 °C Storage: -20 °C to +70 °C
Relative Humidity	Operating or Storage: Non-condensing, 5 °C to 30 °C <95 %, <40 °C <75 %, <50 °C <45 %
Altitude	Operating: ≤2,000 m Non-operating: ≤12,000 m
Safety	EN 61010-1:2001, CAN/CSA 22.2 No 61010-1:2004 and UL 61010-1:2004, indoor use only, pollution degree 2, installation category II.
EMC	EN 61326:2006 Class B.
Line Power	Rating: 115 V/ 230V nominal [1]
Power Consumption	≤250 VA
Dimensions	433 mm (17.0”) wide, 146 mm (5.8”) high and 533 mm (21.0”) deep. Mounts within industry-standard 19” (483 mm) rack-mount frames when fitted with Y9600 rack mounting kit.
Weight	18 kg (40 lbs)
[1] Type tested for operation and functionality 90 to 132 V rms and 180 to 264 V rms at 47 to 63 Hz.	



9640A Dimensions

Frequency Reference Input/Output Specifications

Frequency Reference Input	Rear panel Reference Frequency Input BNC connector
Frequency	9640A: 1 MHz to 20 MHz in 1 MHz steps ±30 ppm 9640A-LPN: 1 MHz to 20 MHz in 1 MHz steps ±1 ppm
Level	1 V pk nominal into 50 Ω, ±5 V pk max.

Frequency Reference Output	Rear panel Reference Frequency Output BNC connector
Frequency	1 MHz or 10 MHz, user selectable
Level	1.5 V pk-pk into 50 Ω, 3 V pk-pk into 1 kΩ, TTL compatible.
Accuracy [1]	0.04 ppm
Ageing Rate and Stability [1]	After 24hr warmup: $2x10^{-9}$/day. Continuous operation: ≤ $2x10^{-8}$/month, ≤ $4x10^{-8}$ over 1 year.
[1] Specifications apply only if Internal Frequency Reference operation selected. With External Frequency Reference operation selected the frequency of the Frequency Reference Output is locked to the signal applied to the Frequency Reference Input.	

Leveled Sine Specifications

Frequency	
Range	10 Hz to 4 GHz
Resolution	<100 MHz: 0.001 Hz , >100 MHz: 11 digits
Accuracy	Internal Frequency Reference: 0.04 ppm + 0.16 mHz External Frequency Reference: Ext Freq Ref Accuracy + 0.16 mHz

Amplitude	**50 Ω output**	**75 Ω output**
Output Connector	Precision 50 Ω N-Series male	Precision 75 Ω N-Series male
Range	-130 dBm to +24 dBm (0.2 uV to 10 V pk-pk) >125 MHz: +20 dBm >1.4 GHz: +14 dBm	-130 dBm to +18 dBm (0.13 uV to 6.3 V pk-pk) >125 MHz: +14 dBm >1.4 GHz: +8 dBm
Resolution	0.001dB	0.001dB
VSWR	≤500 MHz: ≤1.1 ≤1 GHz: ≤1.2 ≤3 GHz: ≤1.3 ≤4 GHz: ≤1.4	≤500 MHz: ≤1.1 ≤1 GHz: ≤1.2 ≤2 GHz: ≤1.3

Attenuation	**50 Ω output**	**75 Ω output**
Attenuation 100 kHz [1] to 128 MHz	Relative to +16 dBm output 0 - 33 dB ±0.035 dB 33 - 64 dB ±0.04 dB 64 - 100 dB ±0.1 dB 100 - 116 dB [1] ±0.2 dB	Relative to +10 dBm output 0 - 33 dB ±0.035 dB 33 - 64 dB ±0.05 dB 64 - 100 dB ±0.15 dB 100 - 110 dB [1] ±0.3 dB
Cumulative and Incremental Attenuation (Typical) To determine the attenuation specification between any two output levels, apply an RSS [2] summation of the dB values listed for each output level .	Relative to any level between +16dBm and -100 dBm, 100 kHz to 128 MHz +16 to -17 dBm ±0.035 dB -17 to -48 dBm ±0.04 dB -48 to -84 dBm ±0.1 dB -84 to -100 dBm ±0.2 dB	Relative to any level between +10dBm and -100 dBm, 100 kHz to 128 MHz +10 to -23 dBm ±0.035 dB -23 to -54 dBm ±0.05 dB -54 to -90 dBm ±0.15 dB -90 to -100 dBm ±0.3 dB

[1] Specifications are typical below 10 MHz at all attenuations, and typical for attenuation greater than 100 dB at all frequencies.

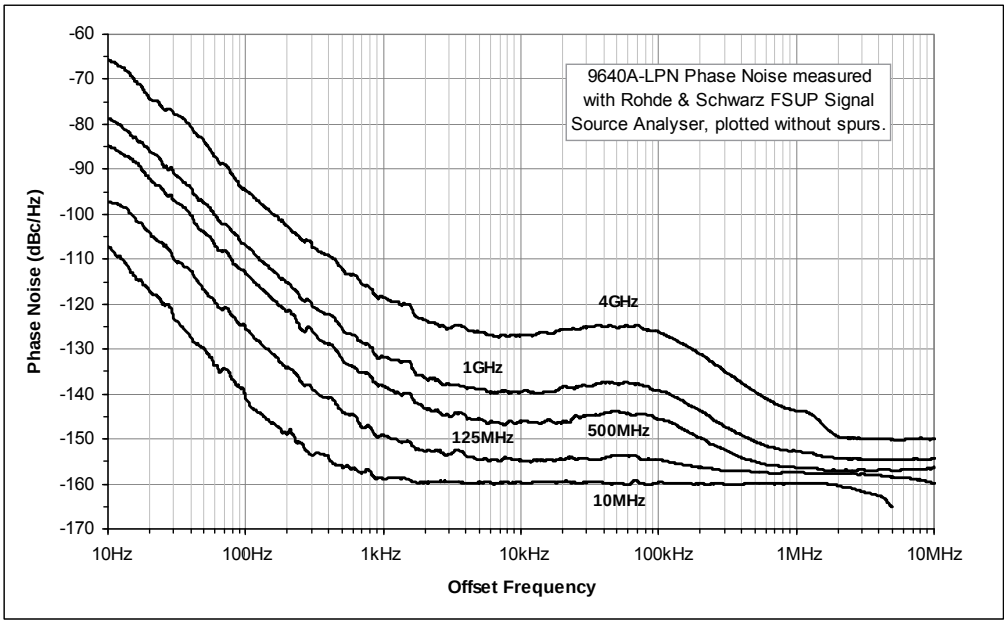
[2] Root Sum Square.

Absolute Amplitude Accuracy	**50 Ω Output**							
Amplitude								
dBm	10 Hz to 20 kHz	>20 kHz to <100 kHz	100 kHz to <10 MHz	10 MHz to 125 MHz	>125 MHz to 300 MHz	>300 MHz to 1.4 GHz	>1.4 GHz to 3 GHz	>3 GHz to 4 GHz
>+20 to +24	±0.05 dB	±0.05 dB	±0.05 dB	±0.05 dB	Output not available			
>+14 to +20	±0.05 dB	±0.05 dB	±0.05 dB	±0.05 dB	±0.1 dB	±0.25 dB		
-17 to +14	±0.05 dB	±0.05 dB	±0.05 dB	±0.05 dB	±0.1 dB	±0.25 dB	±0.3 dB	±0.5 dB
-48 to <-17	±0.05 dB	±0.05 dB	±0.05 dB	±0.05 dB	±0.1 dB	±0.5 dB	±0.5 dB	±0.5 dB
>-74 to <-48	Not Specified		±0.2 dB	±0.2 dB	±0.2 dB	±0.5 dB	±0.5 dB	±0.5 dB
>-84 to -74			±0.5 dB	±0.5 dB	±0.5 dB	±1.0 dB	±1.0 dB	±1.0 dB
>-94 to -84			±0.5 dB	±0.5 dB	±0.5 dB	±1.0 dB	±1.0 dB	Not Spec'd
-130 to -94				±1.5 dB	±1.5 dB	±1.5 dB	±1.5 dB	

Absolute Amplitude Accuracy	**75 Ω Output**							
Amplitude								
dBm	10 Hz to 20 kHz	>20 kHz to <100 kHz	100 kHz to <10 MHz	10 MHz to 125 MHz	>125 MHz to 300 MHz	>300 MHz to 1.4 GHz	>1.4 GHz [1] to 3 GHz	>3 GHz [1] to 4 GHz
>+14 to +18	±0.06 dB	±0.06 dB	±0.06 dB	±0.06 dB	Output not available			
>+8 to +14	±0.06 dB	±0.06 dB	±0.06 dB	±0.06 dB	±0.15 dB	±0.25 dB		
-23 to +8	±0.06 dB	±0.06 dB	±0.06 dB	±0.06 dB	±0.15 dB	±0.25 dB	±0.3 dB	±0.5 dB
-54 to <-23	±0.15 dB	±0.15 dB	±0.15 dB	±0.15 dB	±0.15 dB	±0.5 dB	±0.5 dB	±0.5 dB
>-80 to <-54	Not Specified		±0.2 dB	±0.2 dB	±0.2 dB	±0.5 dB	±0.5 dB	±0.5 dB
>-90 to -80			±0.7 dB	±0.7 dB	±0.7 dB	±1.0 dB	±1.0 dB	±1.0 dB
>-100 to -90			±0.7 dB	±0.7 dB	±0.7 dB	±1.0 dB	±1.0 dB	Not Spec'd
-120 to -100				±1.5 dB	±1.5 dB	±1.5 dB	±1.5 dB	
[1] Specifications are typical for frequencies >2 GHz								

Signal Purity	At maximum output level
Harmonics	≤ 1 GHz: < -60 dBc, >1 GHz: < -55 dBc
Spurious ≥3 kHz offset and Sub-harmonics	≤500 MHz: < -75 dBc, ≤1 GHz: < -70 dBc, ≤2 GHz: < -65 dBc, ≤4 GHz: < -60 dBc
SSB AM Noise	10 MHz to 1.4 GHz, <0.015 % RMS, in 50 Hz to 3 kHz Bandwidth, typical.
Residual FM	9640A: <0.5 Hz RMS at <125 MHz, in 50 Hz to 3 kHz Bandwidth, typical. 9640A-LPN: <0.4 Hz RMS at <125 MHz, in 50 Hz to 3 kHz Bandwidth, typical.

SSB Phase Noise	At maximum output level, Internal Freq Ref, (dBc/Hz)							
	Frequency	Offset from Carrier						
		10Hz Spec (Typ)	100Hz Spec (Typ)	1kHz Spec (Typ)	10kHz Spec (Typ)	100kHz Spec (Typ)	1MHz Spec (Typ)	10MHz Spec (Typ)
9640A	1GHz	Not Spec'd	Not Spec'd	-97 (-102)	-118 (-122)	-118 (-122)	-124 (-130)	-142 (-144)
9640A-LPN	10MHz	-102 (-106)	-129 (-139)	-148 (-155)	-151 (-155)	-153 (-157)	-155 (-157)	-155 (-160)
	125MHz	-90 (-93)	-117 (-124)	-140 (-145)	-144 (-149)	-147 (-152)	-153 (-154)	-153 (-156)
	250MHz	-84 (-88)	-112 (-118)	-135 (-140)	-141 (-146)	-142 (-149)	-152 (-155)	-153 (-155)
	500MHz	-78 (-83)	-107 (-112)	-130 (-136)	-138 (-143)	-139 (-144)	-151 (-154)	-151 (-152)
	1GHz	-72 (-76)	-101 (-106)	-125 (-130)	-134 (-138)	-134 (-138)	-148 (-152)	-149 (-151)
	2GHz	-66 (-69)	-95 (-100)	-119 (-126)	-129 (-133)	-128 (-133)	-145 (-149)	-148 (-150)
	4GHz	-60 (-66)	-89 (-96)	-114 (-120)	-124 (-128)	-122 (-128)	-141 (-146)	-147 (-149)



9640A-LPN SSB Phase Noise at +10dBm output level (measured).

External Leveling Input	Rear panel Modulation, Leveling and Frequency Pull BNC connector, 10 kΩ nominal input impedance.
For external power meter leveling	User adjustable full scale voltage, 1 V to 5 V, positive polarity.
Maximum Input	±5 V

External Frequency Control Input	Rear panel Modulation, Leveling and Frequency Pull BNC connector, 10 kΩ nominal input impedance.
Frequency Pull Range	±5 ppm
Frequency Pull Sensitivity	User adjustable between 0.0001 ppm/V to 1.0000 ppm/V, positive or negative polarity.
Maximum Input	±5 V

Modulation Specifications

Amplitude Modulation	**50 Ω output**	**75 Ω output**
Waveform	Sinusoidal, Triangle, or External signal	
Carrier Frequency	50 kHz to 4 GHz	
Carrier Level	<1.4 GHz: ≤+14 dBm >1.4 GHz: ≤+8 dBm	<1.4 GHz: ≤+8 dBm >1.4 GHz: ≤+2 dBm
Carrier Level Accuracy [1]	As Leveled Sine + 0.5 dB, typical	
Carrier Harmonics	≤ 50 dBc typical	
Rate	≤125.75 MHz, 1 Hz to 220 kHz, ≤ 1 % of Carrier Frequency. >127.75 MHz, 1 Hz to 100 kHz	
Rate Resolution	0.1 Hz, 5 digits	
Rate Accuracy	≥1 kHz: ±1 digit, <1 kHz: ±10 mHz	
Depth	0.1 % to 99 %	
Depth Resolution	0.1 %	
Carrier Frequency and Level Range for Specified Depth Accuracy and Distortion	≤1 GHz, -56 dBm to +14 dBm	≤1 GHz, -62 dBm to +8 dBm
AM Sine Depth Accuracy [2]	3 % of setting + 0.1 %, for >5 % depth. Typically 0.75 % of setting + 0.1 %, for 10 % to 90 % depth, ≤75 MHz carrier frequency.	
AM Sine Distortion [2] [3]	≤ -40 dBc,10 % to 80 % depth, for ≤ 20 kHz rate, or for > 20 kHz rate at ≤75 MHz carrier frequency. Typically ≤ -50 dBc, 10 % to 80 % depth, ≤75 MHz carrier frequency.	

[1] Signal content at carrier frequency only, excluding sidebands.

[2] Applies to demodulated signal content at rate fundamental frequency. Specifications are typical for modulation rates <20Hz.

[3] Includes harmonic distortion and noise up to 5 times rate frequency.

AM External	
Input	Rear panel Modulation, Leveling and Frequency Pull BNC connector, 10 kΩ nominal input impedance.
Bandwidth (-3 dB) [1]	DC coupled:[2] DC to 220 kHz typical. AC coupled: 10 Hz to 220 kHz typical.
Depth Sensitivity	User adjustable, 0.5 %/V to 400 %/V
Input Level	±2 V pk maximum operating, ±5 V pk absolute maximum
Carrier Level Accuracy	As AM Internal Sine + 20 mV x depth/V setting. Typical.
Depth Accuracy [3]	3 % of setting + 0.1 %, for >5 % depth, 1 Vpk input, DC or 200 Hz to 20 kHz.
Residual Distortion [4]	As AM Internal Sine, for 1 Vpk input, ≤100 kHz.

[1] Maximum input frequency 100 kHz for carrier frequency >125 MHz.

[2] DC coupled External Modulation permits DC control of carrier level or the offsetting of the modulation waveform. Note that at rates from 0.5 Hz to 10 Hz interaction with carrier leveling may occur, resulting in modulation distortion.

[3] Applies to demodulated signal content at rate fundamental frequency.

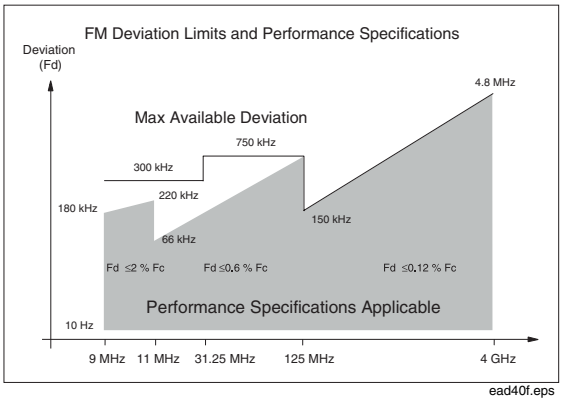
[4] Includes harmonic distortion and noise up to 5 times rate frequency.

Frequency and Phase [1] Modulation	
Waveform	FM: Sinusoidal, or External signal. PM: Sinusoidal only.
Carrier Frequency (Fc)	9 MHz to 4 GHz
Carrier Frequency Accuracy	Internal Frequency Reference: 0.04 ppm + 240 mHz External Frequency Reference: Ext Freq Ref Accuracy + 240 mHz
Rate (Fr)	1 Hz to 300 kHz
Rate Resolution	0.1 Hz, 5 digits
Rate Accuracy	≥1 kHz: ±1 digit, <1 kHz: ±10 mHz
Deviation (Fd) [2]	Fc 9 MHz to 31.25 MHz: FM: 10Hz to 300 kHz, PM: ≤1000rad Fc 31.25 MHz to 125 MHz: FM: 10 Hz to 750 kHz, PM: ≤1000rad Fc 125 MHz to 4 GHz: FM: 10 Hz to 0.12 % Fc, PM: ≤1000rad or 0.12 %Fc/Fr
Deviation Resolution	FM: 0.1 Hz, 5 digits. PM: 0.0001rad, 5 digits
FM/PM Sine Deviation Accuracy [2]	3 % of setting + 240 mHz. Typically 0.25 % of setting + 240 mHz, for ≤50 kHz rate.
FM/PM Sine Distortion [2] [3]	≤ -40 dBc (1 %) +20 dB/decade above 10 kHz (See chart). Typically ≤ -65 dBc +20 dB/decade above 1 kHz.

[1] Phase modulation is generated by applying sinusoidal frequency modulation with peak deviation derived from the phase deviation and rate settings (Fd = ϕd x Frate).

[2] See chart showing maximum available deviation, and maximum deviation for which deviation accuracy and distortion specifications apply. Applies to demodulated signal content at rate fundamental frequency. Specifications are typical for modulation rates <20Hz.

[3] Includes harmonic distortion and noise up to 5 times rate frequency.



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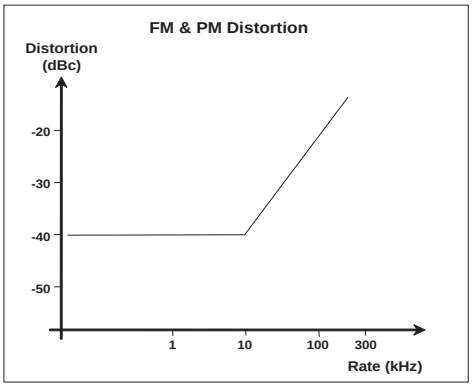

FM External	
Input	Rear panel Modulation Leveling and Frequency Pull BNC connector, 10 kΩ nominal input impedance.
Bandwidth (-3 dB)	DC coupled: DC to 300 kHz typical. AC coupled: 10 Hz to 300 kHz typical.
Deviation Sensitivity	User adjustable, 500 Hz/V to 19 MHz/V, carrier frequency dependent.
Input Level	±2 V pk maximum operating, ±5 V pk absolute maximum
Carrier Frequency Accuracy	As FM Internal Sine + 20 mV x deviation/V setting, typical.
Deviation Accuracy [1]	3 % of setting + 240 mHz, for 1 Vpk input, DC or 200 Hz to 20 kHz rate, deviation >0.01 %Fc.
Residual Distortion [1] [2]	As FM Internal Sine, for 1 Vpk input, deviation >0.01 % Fc. Typically ≤ -55 dBc +20 dB/decade above 10 kHz, for 1 Vpk input, deviation >0.01 % Fc.

[1] See chart showing maximum available deviation, and maximum deviation for which deviation accuracy and residual distortion specifications apply.

[2] Includes harmonic distortion and noise up to 5 times rate frequency.

Modulation Trigger Output	Rear panel Trigger I/O BNC connector
Level	TTL compatible logic output, selectable as rising or falling edge
Timing Alignment	±500 ns typical, from modulation waveform zero crossing for Sinusoidal or positive peak for Triangle.

Frequency Sweep Specifications

Sweep Frequency Range	10 Hz to 4 GHz Sweeps are generated as a sequence of discrete synthesized frequencies.
Sweep Modes	Stop - Start and Center - Span Linear or Logarithmic Repetitive, Single Shot, triggered and Manual Sweep Squelch or Non Squelch at frequency transitions
Frequency Resolution	<100 MHz: 0.1 Hz, >100 MHz: 11 digits
Frequency Steps	5 million maximum.
Step Size	0.1 Hz to 4 GHz
Step Dwell Time	20 ms to 10 s
Sweep Duration	100 hrs maximum, calculated from Step Dwell x Number of Steps
Squelch Duration [1]	20 ms, or 35 ms maximum during range transition
Trigger Input/Sync Output	Rear panel Trigger I/O BNC connector, selectable as sweep trigger input or sweep sync output.
Trigger Input	TTL compatible logic input, selectable as rising or falling trigger to start sweep. Typically ≤1 ms delay from trigger to sweep start.
Sync Output	TTL compatible logic output, selectable as rising or falling sync pulse coincident with sweep start. Typical pulse duration 250 µs. Typical time alignment +14 to +16 ms from sweep start (delay ensures settled signal at the trigger point).

[1] When selected, Squelch is active between all frequency transitions. When deselected, Squelch is active only at hardware range boundaries.

GPIB Command Emulation Mode Specifications

9640A	HP3335A
9640A-LPN 9640A-LPN + Option 8662/8663 GPIB	HP3335A HP3335A, HP8662A, HP8663A [1]

[1] Only one instrument emulation mode may be selected at any one time.