# Manual Supplement

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|---|---|---|---|
| Manual Title: | 5520A Service | Supplement Issue: | **8** |
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This supplement contains information necessary to ensure the accuracy of the above manual. Enter the corrections in the manual if either one of the following conditions exist:

1. The revision letter stamped on the indicated PCA is equal to or higher than that given with each change.
2. No revision letter is indicated at the beginning of the change.

# Change #1

Replace page 1-9, ***1-11. DC Current Specifications***, with the following:

## *1-11. DC Current Specifications*

| Range | Absolute Uncertainty, tcal ± 5 °C ± (ppm of output + µA) | | Resolution | Max Compliance Voltage V | Max Inductive Load mH |
|---|---|---|---|---|---|
| | 90 days | 1 year | | | |
| 0 to 329.999 mA | 120 + 0.02 | 150 + 0.02 | 1 nA | 10 | |
| 0 to 3.29999 mA | 80 + 0.05 | 100 + 0.05 | 0.01 µA | 10 | |
| 0 to 32.9999 mA | 80 + 0.25 | 100 + 0.25 | 0.1 µA | 7 | |
| 0 to 329.999 mA | 80 + 2.5 | 100 + 2.5 | 1 µA | 7 | 400 |
| 0 to 1.09999 A | 160 + 40 | 200 + 40 | 10 µA | 6 | |
| 1.1 to 2.99999 A | 300 + 40 | 380 + 40 | 10 µA | 6 | |
| 0 to 10.9999 A (20 A Range) | 380 + 500 | 500 + 500 | 100 µA | 4 | |
| 11 to 20.5 A [1] | 800 + 750 [2] | 1000 + 750 [2] | 100 µA | 4 | |

[1] Duty Cycle: Currents < 11 A may be provided continuously. For currents > 11 A, see Figure 1-4. The current may be provided 60-T-I minutes any 60 minute period where T is the temperature in °C (room temperature is about 23°C) and I is the output current in Amps. For example, 17 A, at 23 °C could be provided for 60-17-23 = 20 minutes each hour. When the 5520A is outputting currents between 5 and 11 amps for long periods, the internal self-heating reduces the duty cycle. Under those conditions, the allowable "on" time indicated by the formula and Figure 1-4 is achieved only after the 5520A is outputting currents < 5A for the "off" period first.

[2] Specifications apply within two minutes of selecting operate.

| Range | Noise | |
|---|---|---|
| | Bandwidth 0.1 Hz to 10 Hz p-p | Bandwidth 10 Hz to 10 kHz rms |
| 0 to 329.999 µA | 2 nA | 20 nA |
| 0 to 3.29999 mA | 20 nA | 200 nA |
| 0 to 32.9999 mA | 200 nA | 2.0 µA |
| 0 to 329.999 mA | 2000 nA | 20 µA |
| 0 to 2.99999 A | 20 µA | 1 mA |
| 0 to 20.5 A | 200 µA | 10 mA |

Replace page 1-14, ***1-14. AC Current (Sine Wave) Specifications*** with the following:

## *1-14. AC Current (Sine Wave) Specifications*

| LCOMP off | | | | | | |
|---|---|---|---|---|---|---|
| **Range** | **Frequency** | **Absolute Uncertainty, tcal ± 5 °C ± (% of output + μA)** | | **Compliance adder ± (μA/V)** | **Max Distortion & Noise 10 Hz to 100 kHz BW ± (% output + floor)** | **Max Inductive Load μH** |
| | | **90 days** | **1 year** | | | |
| 29.00 μA to 329.99 μA | 10 Hz to 20 Hz | 0.16 + 0.1 | 0.2 + 0.1 | 0.05 | 0.15 + 0.5 μA | 200 |
| | 20 Hz to 45 Hz | 0.12 + 0.1 | 0.15 + 0.1 | 0.05 | 0.1 + 0.5 μA | |
| | 45 Hz to 1 kHz | 0.1 + 0.1 | 0.125 + 0.1 | 0.05 | 0.05 + 0.5 μA | |
| | 1 kHz to 5 kHz | 0.25 + 0.15 | 0.3 + 0.15 | 1.5 | 0.5 + 0.5 μA | |
| | 5 kHz to 10 kHz | 0.6 + 0.2 | 0.8 + 0.2 | 1.5 | 1.0 + 0.5 μA | |
| | 10 kHz to 30 kHz | 1.2 + 0.4 | 1.6 + 0.4 | 10 | 1.2 + 0.5 μA | |
| 0.33 mA to 3.2999 mA | 10 Hz to 20 Hz | 0.16 + 0.15 | 0.2 + 0.15 | 0.05 | 0.15 + 1.5 μA | 200 |
| | 20 Hz to 45 Hz | 0.1 + 0.15 | 0.125 + 0.15 | 0.05 | 0.06 + 1.5 μA | |
| | 45 Hz to 1 kHz | 0.08 + 0.15 | 0.1+ 0.15 | 0.05 | 0.02 + 1.5 μA | |
| | 1 kHz to 5 kHz | 0.16 + 0.2 | 0.2 + 0.2 | 1.5 | 0.5 + 1.5 μA | |
| | 5 kHz to 10 kHz | 0.4 + 0.3 | 0.5 + 0.3 | 1.5 | 1.0 + 1.5 μA | |
| | 10 kHz to 30 kHz | 0.8 + 0.6 | 1.0 + 0.6 | 10 | 1.2 + 0.5 μA | |
| 3.3 mA to 32.999 mA | 10 Hz to 20 Hz | 0.15 + 2 | 0.18 + 2 | 0.05 | 0.15 + 5 μA | 50 |
| | 20 Hz to 45 Hz | 0.075 + 2 | 0.09 + 2 | 0.05 | 0.05 + 5 μA | |
| | 45 Hz to 1 kHz | 0.035 + 2 | 0.04 + 2 | 0.05 | 0.07 + 5 μA | |
| | 1 kHz to 5 kHz | 0.065 + 2 | 0.08 + 2 | 1.5 | 0.3 + 5 μA | |
| | 5 kHz to 10 kHz | 0.16 + 3 | 0.2 + 3 | 1.5 | 0.7 + 5 μA | |
| | 10 kHz to 30 kHz | 0.32 + 4 | 0.4 + 4 | 10 | 1.0 + 0.5 μA | |
| 33 mA to 329.99 mA | 10 Hz to 20 Hz | 0.15 +20 | 0.18 + 20 | 0.05 | 0.15 + 50 μA | 50 |
| | 20 Hz to 45 Hz | 0.075 + 20 | 0.09 + 20 | 0.05 | 0.05 + 50 μA | |
| | 45 Hz to 1 kHz | 0.035 + 20 | 0.04 + 20 | 0.05 | 0.02 + 50 μA | |
| | 1 kHz to 5 kHz | 0.08 + 50 | 0.10 + 50 | 1.5 | 0.03 + 50 μA | |
| | 5 kHz to 10 kHz | 0.16 + 100 | 0.2 + 100 | 1.5 | 0.1 + 50 μA | |
| | 10 kHz to 30 kHz | 0.32 + 200 | 0.4 + 200 | 10 | 0.6 + 50 μA | |
| 0.33 A to 1.09999 A | 10 Hz to 45 Hz | 0.15 + 100 | 0.18 + 100 | | 0.2 + 500 μA | 2.5 |
| | 45 Hz to 1 kHz | 0.036 + 100 | 0.05 + 100 | | 0.07 + 500 μA | |
| | 1 kHz to 5 kHz | 0.5 + 1000 | 0.6 + 1000 | [2] | 1 + 500 μA | |
| | 5 kHz to 10 kHz | 2.0 + 5000 | 2.5 + 5000 | [3] | 2 + 500 μA | |
| 1.1 A to 2.99999 A | 10 Hz to 45 Hz | 0.15 + 100 | 0.18 + 100 | | 0.2 + 500 μA | 2.5 |
| | 45 Hz to 1 kHz | 0.05 + 100 | 0.06 + 100 | | 0.07 + 500 μA | |
| | 1 kHz to 5 kHz | 0.5 + 1000 | 0.6 + 1000 | [2] | 1 + 500 μA | |
| | 5 kHz to 10 kHz | 2.0 + 5000 | 2.5 + 5000 | [3] | 2 + 500 μA | |
| 3 A to 10.9999 A | 45 Hz to 100 Hz | 0.05 + 2000 | 0.06 + 2000 | | 0.2 + 3 mA | 1 |
| | 100 Hz to 1 kHz | 0.08 + 2000 | 0.10 + 2000 | | 0.1 + 3 mA | |
| | 1 kHz to 5 kHz | 2.5 + 2000 | 3.0 + 2000 | | 0.8 + 3 mA | |
| 11A to 20.5 A [1] | 45 Hz to 100 Hz | 0.1 + 5000 | 0.12 + 5000 | | 0.2 + 3 mA | 1 |
| | 100 Hz to 1 kHz | 0.13 + 5000 | 0.15 + 5000 | | 0.1 + 3 mA | |
| | 1 kHz to 5 kHz | 2.5 + 5000 | 3.0 + 5000 | | 0.8 + 3 mA | |

[1] Duty Cycle: Currents < 11 A may be provided continuously. For currents > 11 A, see Figure 1-4. The current may be provided 60-T-I minutes any 60 minute period where T is the temperature in °C (room temperature is about 23°C) and I is the output current in Amps. For example, 17 A, at 23°C could be provided for 60-17-23 = 20 minutes each hour. When the 5520A is outputting currents between 5 and 11 amps for long periods, the internal self-heating reduces the duty cycle. Under those conditions, the allowable "on" time indicated by the formula and Figure 1-4 is achieved only after the 5520A is outputting currents < 5A for the "off" period first.

[2] For compliance voltages greater than 1 V, add 1 mA/V to the floor specification from 1 kHz to 5 kHz.

[3] For compliance voltages greater than 1 V, add 5 mA/V to the floor specification from 5 kHz to 10 kHz.

Replace page 1-15, ***1-14. AC Current (Sine Wave) Specifications***, with the following:

## *AC Current (Sine Wave) Specifications (cont)*

| LCOMP on | | | | | |
|---|---|---|---|---|---|
| **Range** | **Frequency** | **Absolute Uncertainty, tcal ± 5 °C ± (% of output + μA)** | | **Max Distortion & Noise, 10 Hz to 100 kHz BW ± (% output + μA)** | **Max Inductive Load μH** |
| | | **90 days** | **1 year** | | |
| 29.00 μA to 329.99 μA | 10 Hz to 100 Hz | 0.2 + 0.2 | 0.25 + 0.2 | 0.1 + 1.0 | 400 |
| | 100 Hz to 1 kHz | 0.5 + 0.5 | 0.6 + 0.5 | 0.05 + 1.0 | |
| 0.33 mA to 3.2999 mA | 10 Hz to 100 Hz | 0.2 + 0.3 | 0.25 + 0.3 | 0.15 + 1.5 | |
| | 100 Hz to 1 kHz | 0.5 + 0.8 | 0.6 + 0.8 | 0.06 + 1.5 | |
| 3.3 mA to 32.999 mA | 10 Hz to 100 Hz | 0.07 + 4 | 0.08 + 4 | 0.15 + 5 | |
| | 100 Hz to 1 kHz | 0.18 + 10 | 0.2 + 10 | 0.05 + 5 | |
| 33 mA to 329.99 mA | 10 Hz to 100 Hz | 0.07 + 40 | 0.08 + 40 | 0.15 + 50 | |
| | 100 Hz to 1 kHz | 0.18 + 100 | 0.2 + 100 | 0.05 + 50 | |
| 0.33 A to 2.99999 A | 10 Hz to 100 Hz | 0.1 + 200 | 0.12 + 200 | 0.2 + 500 | |
| | 100 to 440 Hz | 0.25 + 1000 | 0.3 + 1000 | 0.25 + 500 | |
| 3 A to 20.5 A [1] | 10 Hz to 100 Hz | 0.1 + 2000 [2] | 0.12 + 2000 [2] | 0.1 + 0 | 400 [4] |
| | 100 Hz to 1 kHz | 0.8 + 5000 [3] | 1.0 + 5000 [3] | 0.5 + 0 | |

[1] Duty Cycle: Currents < 11 A may be provided continuously. For currents > 11 A, see Figure 1-4. The current may be provided 60-T-I minutes any 60 minute period where T is the temperature in °C (room temperature is about 23°C) and I is the output current in Amps. For example, 17 A, at 23°C could be provided for 60-17-23 = 20 minutes each hour. When the 5520A is outputting currents between 5 and 11 amps for long periods, the internal self-heating reduces the duty cycle. Under those conditions, the allowable "on" time indicated by the formula and Figure 1-4 is achieved only after the 5520A is outputting currents < 5A for the "off" period first.

[2] For currents >11 A, Floor specification is 4000 μA within 30 seconds of selecting operate. For operating times >30 seconds, the floor specification is 2000 μA.

[3] For currents >11 A, Floor specification is 1000 μA within 30 seconds of selecting operate. For operating times >30 seconds, the floor specification is 5000 μA.

[4] Subject to compliance voltages limits.

| **Range** | **Resolution μA** | **Max Compliance Voltage V rms [1]** |
|---|---|---|
| 0.029 mA to 0.32999 mA | 0.01 | 7 |
| 0.33 mA to 3.29999 mA | 0.01 | 7 |
| 3.3 mA to 32.9999 mA | 0.1 | 5 |
| 33 mA to 329.999 mA | 1 | 5 |
| 0.33 A to 2.99999 A | 10 | 4 |
| 3 A to 20.5 A | 100 | 3 |

[1] Subject to specification adder for compliance voltages greater than 1 V rms.

# Change #2

On page 4-7, under ***Testing the Front Panel***, replace the description of the DISPLAY self test with:

- DISPLAY – Checks all segments of the two displays.

  When testing the output display (DISPLAY MEAS), three choices are available that write test patterns to the output display: ALL ON, ALL OFF, and CURSOR TEST. To exit the self test, press RESET. In V3.6 Main software, pressing PREV MENU, STBY or OPR will also cause reset.

# Change #3

On page 5-4, Table 5, replace the Fluke stock number for A1, A3, A6, A8, and A12 with the following:

| | | | |
|---|---|---|---|
| A1 | *PCB, KEYBOARD | 761049 | 1 |
| A3 | *PCA, SUB-ASSY, MOTHERBOARD | 626884 | 1 |
| A6 | *PCA, DDS | 1577331 | 1 |
| A8 | *PCA, SUB-ASSY, VOLTAGE | 626926 | 1 |
| A12 | *PCA, SUB-ASSY, FILTER | 626942 | 1 |

# Change #4

On page 3-27, Table 3-18, delete the entire section following: **Entry points for CAL_START FACTORY Modifier.**

# Change #5, 39294

On page 1-18, under ***Temperature Calibration (RTD) Specifications***, under **RTD Type**,

Change: Pt 395 100 Ω

To: Pt 385 100 Ω

# Change #6

On page 6-29, section 6-46 delete the last paragraph and add step 4.

4. Compare result to tolerance columns.

On page 6-31, replace Table 6-20 with the following:

**Table 6-20. DC Voltage Verification at 50 Ω**

| Calibrator Mainframe output | Agilent 3458A Reading | Tolerance (V DC) | |
|---|---|---|---|
| | | MIN | MAX |
| 0 mV | | -0.040 mV | 0.040 mV |
| 2.49 mV | | 2.4438 mV | 2.5362 mV |
| -2.49 mV | | -2.5362 mV | -2.4438 mV |
| 9.9 mV | | 9.835 mV | 9.965 mV |
| -9.9 mV | | -9.965 mV | -9.835 mV |
| 24.9 mV | | 24.798 mV | 25.002 mV |
| -24.9 mV | | -25.002 mV | -24.798 mV |
| 109.9 mV | | 109.585 mV | 110.215 mV |
| -109.9 mV | | -110.215 mV | -109.585 mV |
| 499 mV | | 497.71 mV | 500.29 mV |
| -499 mV | | -500.29 mV | -497.71 mV |
| 2.19 V | | 2.1845 V | 2.1955 V |
| -2.19 V | | -2.1955 V | -2.1845 V |
| 6.599 V | | 6.5825 V | 6.6155 V |
| -6.599 V | | -6.6155 V | -6.5825 V |

# Change #7

On page 6-53, Table 6-37, replace the **Tolerance** section with the following:

| Tolerance |
|---|
| 2.2 ηS |
| 4.25 ηS |
| 4.25 ηS |
| 27.0 ηS |

# Change #8

On page 6-97, Table 6-53, change the last line in the first column:

From: 500 MHz

To: 300 MHz

# Change #9

On page 3-55, add section 3-35,

## *3-35. Thermocouple Measurement Accuracy*

The Thermocouple Measurement Accuracy test checks the internal temperature reference. To perform this test, measure a lag bath temperature within ± 2 °C of the 5520A. Set the 5520A to Internal Reference, J thermocouple type. Make connections with J-type thermocouple wire as shown in Figure 3-5. Table 3-35 shows the test points.

**Table 3-35. Thermocouple Measurement Accuracy Test**

| Nominal Value (°C) | 5500A Reads (°C) | Deviation °C | 90-Day Spec. (°C) |
|---|---|---|---|
| Lag bath temperature | | | 0.1 |

# Change #10

On page 5-7, **Table 5-2**, change the following:

| | | | |
|---|---|---|---|
| MP1 | FRONT PANEL, MODIFIED | 1593149 | 1 |

# Change #11

On page 6-47, Table 6-33, in the bottom row, replace E with:

E Compute and enter Error relative to 10 MHz (%): 100 * (sqrt(Column C entry) - sqrt(Column D entry)) / sqrt(Column D entry).