Sapphire Instruments Co., Ltd.

Calibration Procedure of SI-9302

This procedure is for use by qualified service personnel to adjust SI-9302 properly. The equipments required are listed in Table 1.

No.	Item	Minimum Requirements
1	Power Supply	9VDC/5000mA mains adaptor or 9V battery
2	DMM	DC Accuracy < 0.5%
3	Function Generator	Maximum Frequency > 10MHz Sine-wave Distortion < 1%
4	Sine wave Signal Source	600Vpp, 60Hz sine wave 200Vpp, 20kHz sine wave
5	Oscilloscope	Bandwidth >= 20MHz Accuracy <= 2%

Table 1

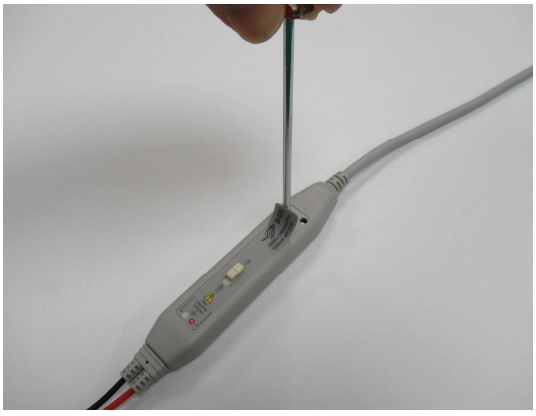
This procedure is divided into following steps;

A. Prepare the probe for adjustment.
B. Adjust input bias voltage: VR2.
C. Adjust output offset voltage: VR3 (1/20 ratio) & VR4 (1/200 ratio).
D. Adjust square-wave compensation for +input: VC1.
E. Adjust square-wave compensation for –input: VC2.
F. Adjust CMRR at 60 Hz: VR1.
G. Adjust CMRR at 20kHz: VC2.

A. Prepare the probe for adjustment.

A-1. Use a small flat screwdriver to peel the both panels off, referring to Fig. 1.

Fig. 1:



A-2. Loosen the four screws on the plastic cases as shown in Fig.2 .

A-3. Remove the plastic cases. Fig. 3a and Fig. 3b shows the location of adjustments on top side and bottom side respectively.

A-4. Use 9VDC /500 mA Mains adaptor and turn on all test equipments.

A-5. Allow the probe and test equipments to warm up 20 minutes at an ambient temperature of 18 degree Celsius to 28 degree Celsius.

A-6. In order to make following operation easier, use one plastic case to support the metal case and the input head as shown in Fig. 4.

Fig. 2:

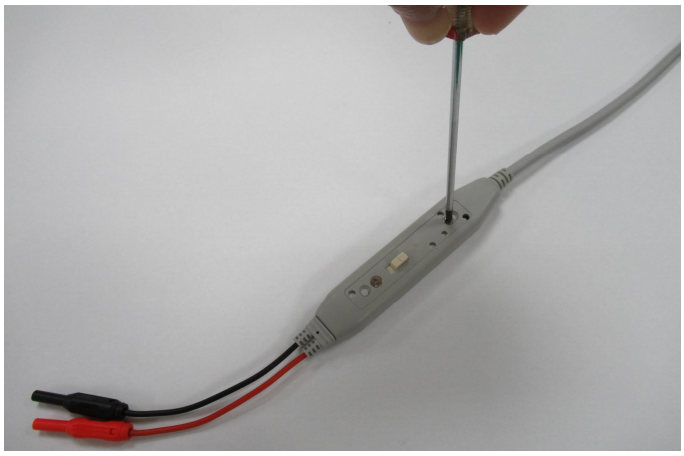


Fig. 3a: Top side

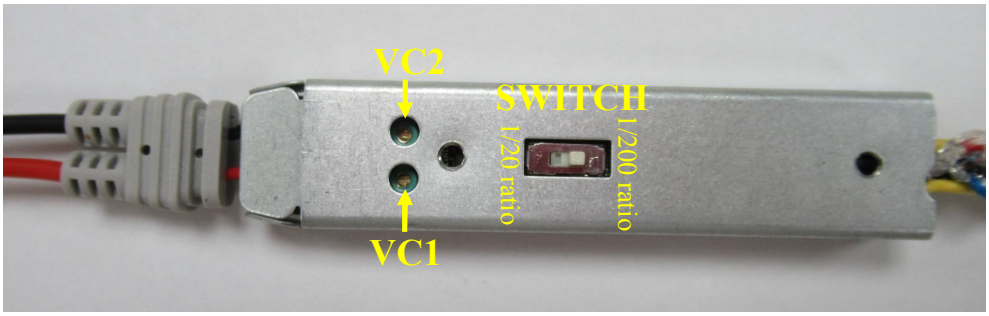
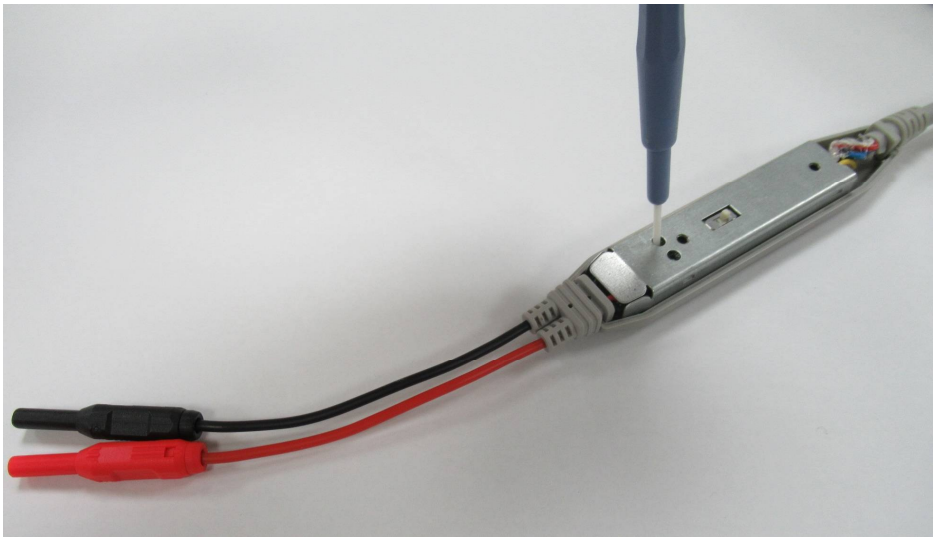


Fig. 3b: Bottom side

Fig. 4:



B. Adjust input bias voltage

B-1. Connect the probe as shown in Fig 5.

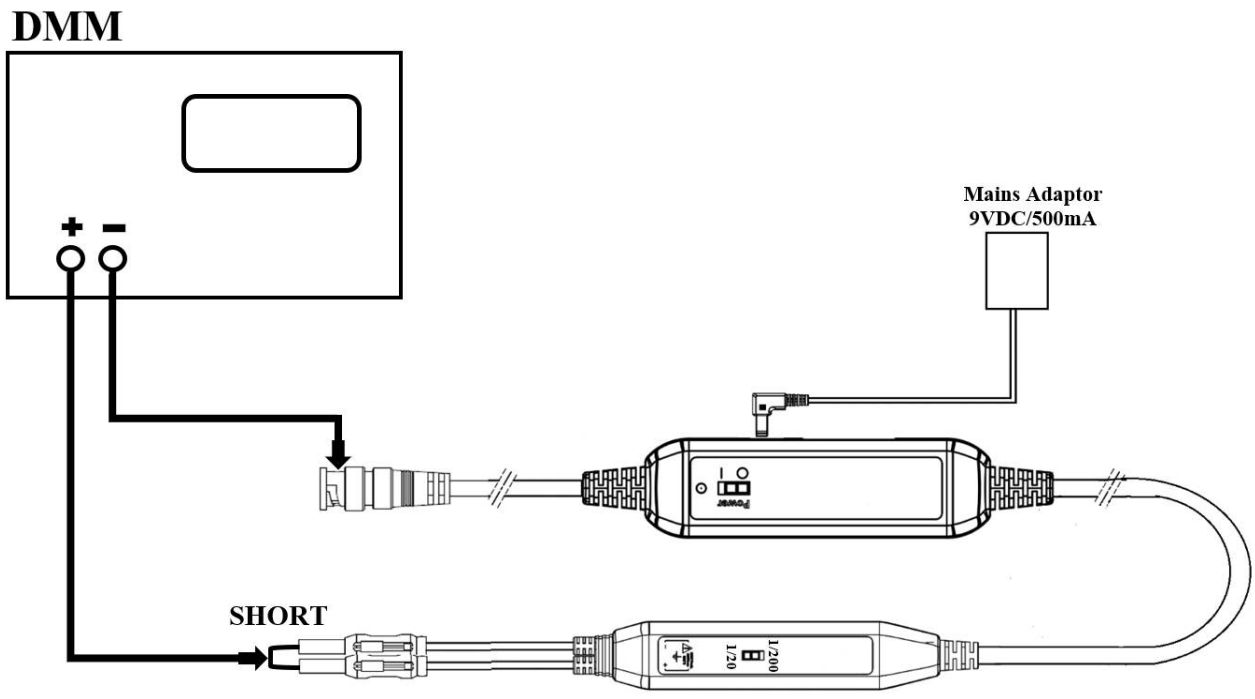
B-2. Switch the probe to 1/20 ratio.

B-3. The value of input bias voltage is displayed on the digital Multimeter.

B-4. Adjust VR2 to make the input bias voltage as small as possible.

B-5. The criterion is -3mV <= Vid<= +3mV.

Fig. 5: Adjusting the input bias voltage set-up



C. Adjust output offset voltage

C-1. Connect the probe as shown in Fig 6.

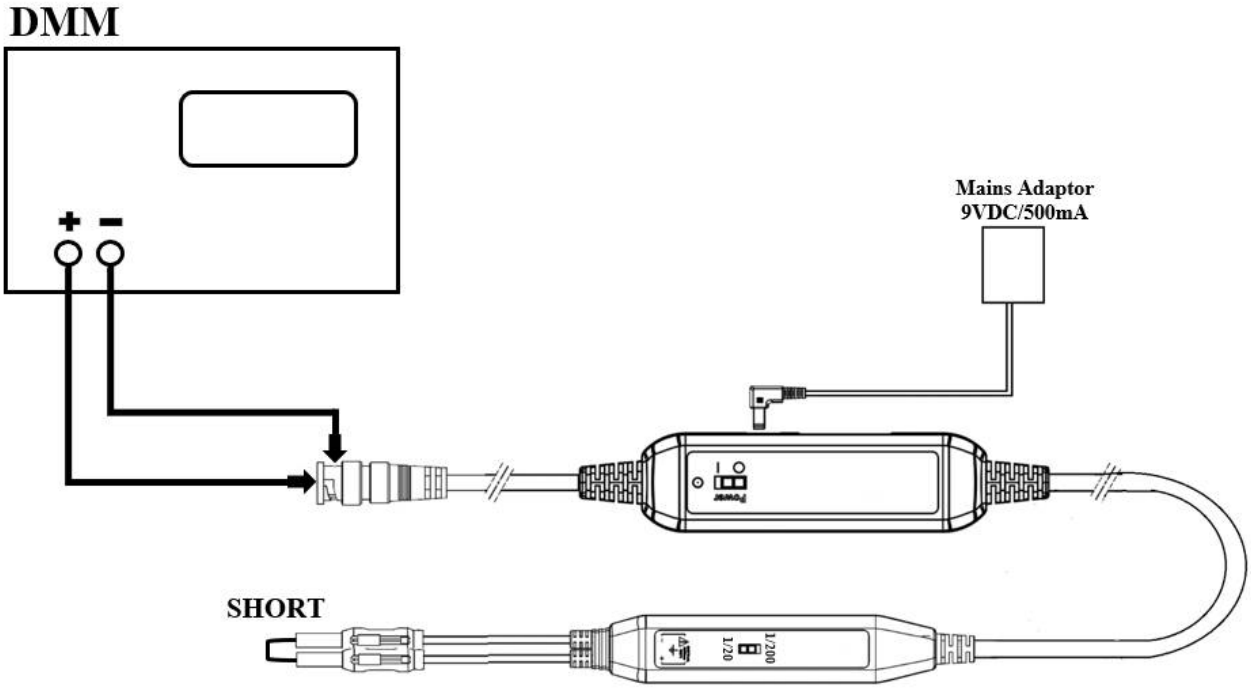
C-2. Switch the probe to 1/20 ratio then adjust VR3 for minimum output offset voltage.

C-3. Switch the probe to 1/200 ratio then adjust VR4 for minimum output offset voltage.

C-4. For easy tuning of output offset, tune both ratio (1/20 & 1/200) interchangeably until both ratios meet the criteria.

C-5. The criterion is -5 mV <= Vout <= +5 mV.

Fig. 6: Adjusting the output offset voltage set-up



D. Adjust square-wave compensation for +input.

D-1. Connect the probe as shown in Fig 7.

D-2. Set the output of the function generator to 20Vp-p, 1kHz square-wave.

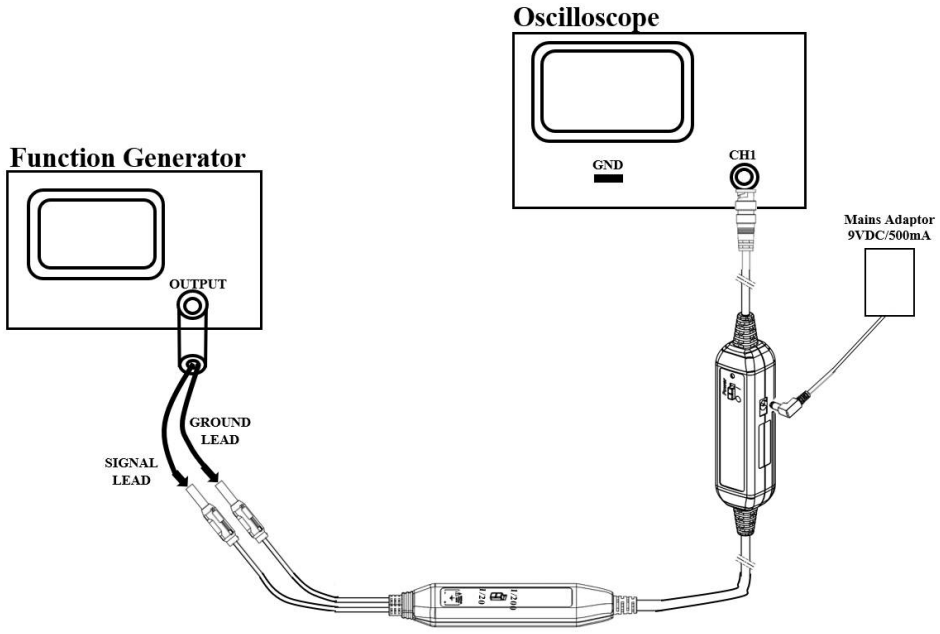
D-3. Set the input impedance of the oscilloscope to 50-ohm. If the oscilloscope doesn't provide the 50-ohm input impedance, add a feed through 50-ohm terminator to the input.

D-4. Set the VOLTS/DIV of the oscilloscope's panel to 500mV and the TIME/DIV to 50 uS.

D-5. Switch the probe to 1/20 ratio.

D-6. Adjust VC1 to make the front corner roll off or overshoot of the square-wave displayed on the oscilloscope less than 20 mV.

Fig. 7: Adjusting the square-waveform compensation for + input set-up



E. Adjust square-wave compensation for - input.

E-1. Connect the probe as shown in Fig 8.

E-2. Set the output of the function generator to 20Vp-p, 1kHz square-wave.

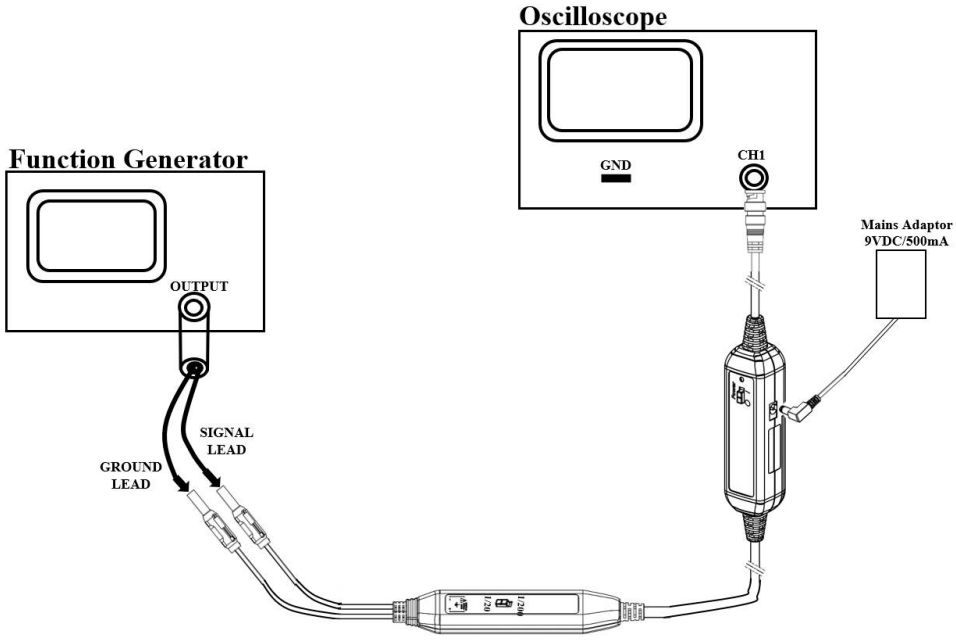
E-3. Set the input impedance of the oscilloscope to 50-ohm. If the oscilloscope doesn't provide the 50-ohm input impedance, add a feed through 50-ohm terminator to the input.

E-4. Set the VOLTS/DIV of the oscilloscope's panel to 500mV and the TIME/DIV to 50 uS.

E-5. Switch the probe to 1/20 ratio.

E-6. Adjust VC2 to make the front corner roll off or overshoot of the square-wave displayed on the oscilloscope less than 20 mV.

Fig. 8: Adjusting the square-waveform compensation for - input set-up



F. Adjust CMRR at 60 Hz

F-1. Connect the probe as shown in Fig 9.

F-2. Set the output of the function generator to 600Vp-p 60 Hz sine-wave

F-3. Set the input impedance of the oscilloscope to 50-ohm. If the oscilloscope doesn't provide the 50-ohm input impedance, add a feed through 50-ohm terminator to the input.

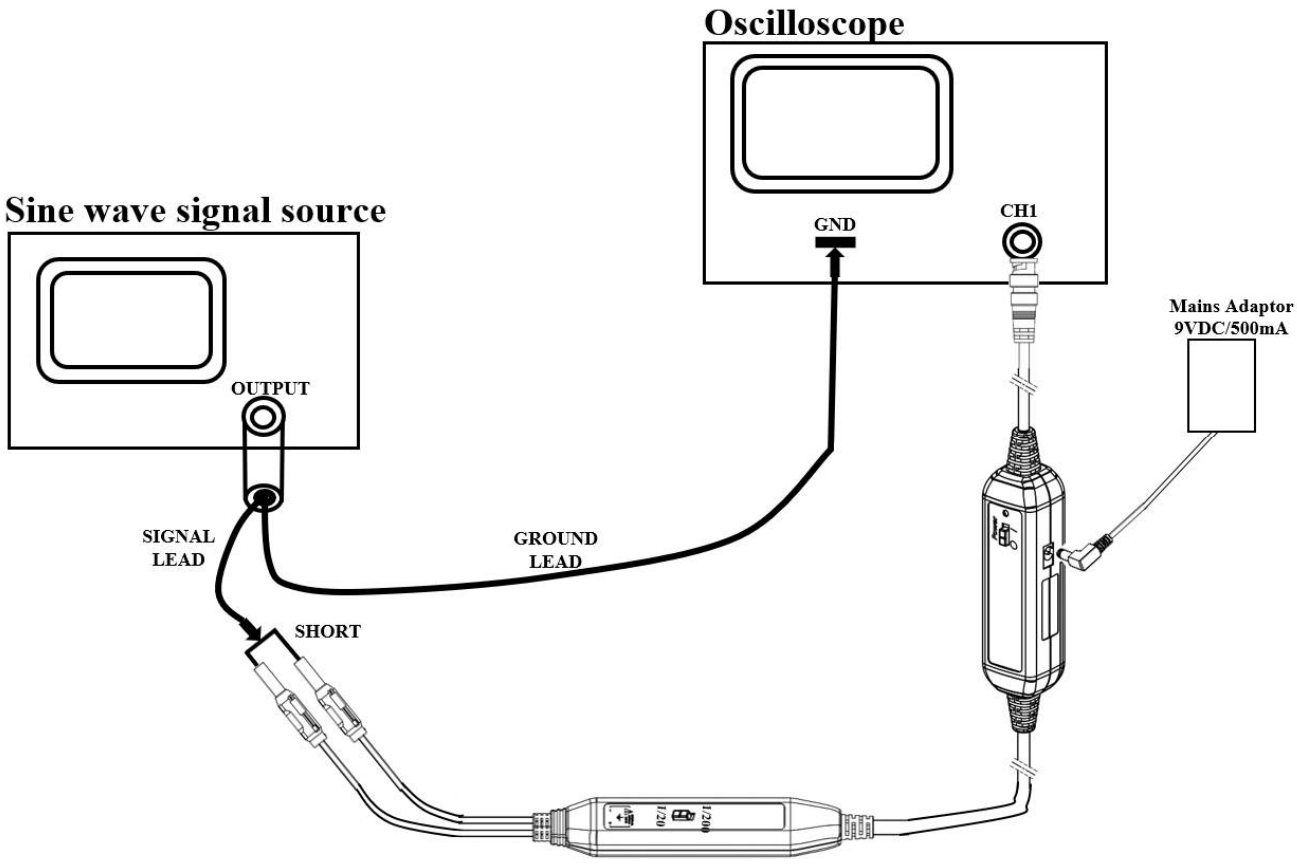
F-4. Set the VOLTS/DIV of the oscilloscope's panel to 1mV and the TIME/DIV to 2mS.

F-5. Switch the probe to 1/20 ratio.

F-3. Adjust VR1 for minimum Vout displayed on the oscilloscope.

F-4. The criterion is Vout <= 5mVp-p (after excluding noise).

Fig. 9: Adjusting the CMRR at 60Hz set-up



G. Adjust CMRR at 20KHz

F-1. Connect the probe as shown in Fig 10.

F-2. Set the output of the function generator to 200Vp-p 20 kHz sine-wave

F-3. Set the input impedance of the oscilloscope to 50-ohm. If the oscilloscope doesn't provide the 50-ohm input impedance, add a feed through 50-ohm terminator to the input.

F-4. Set the VOLTS/DIV of the oscilloscope's panel to 1mV and the TIME/DIV to 2mS.

F-5. Switch the probe to 1/20 ratio.

F-3. Adjust VR1 for minimum Vout displayed on the oscilloscope.

F-4. The criterion is Vout <= 10mVp-p (after excluding noise).

Fig. 10: Adjusting the CMRR at 20kHz set-up