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CALIBRATION PROCEDURE

SCXI™-1141/1142/1143

This document contains the information and instructions needed to calibrate the SCXI-1141/1142/1143 using Traditional NI-DAQ (Legacy).

Calibrate the SCXI-1141/1142/1143 at a regular interval as defined by the measurement accuracy requirements of your application. NI recommends performing a complete calibration at least once every year. Based on your measurement accuracy needs, you can shorten this interval to 90 days or six months.

Conventions

The following conventions apply to this document:

» The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a tip, which alerts you to advisory information.



This icon denotes a note, which alerts you to important information.



When this symbol is marked on a product, refer to the *Read Me First: Safety and Radio-Frequency Interference* for information about precautions to take.



When symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.



When symbol is marked on a product, it denotes a component that may be hot. Touching this component may result in bodily injury.

bold Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.

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italic	Italic text denotes variables, emphasis, a cross-reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.
`monospace`	Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

Software

Calibration requires the latest version of Traditional NI-DAQ (Legacy), which includes high-level function calls to simplify the task of writing software to calibrate devices. Traditional NI-DAQ (Legacy) supports many programming languages, including LabVIEW, LabWindows™/CVI™, Microsoft Visual C++, Microsoft Visual Basic, and Borland C++.

If the SCXI-1141/1142/1143 is revision F or later, this procedure requires using a calibration software library. The library contains a function that is needed to adjust calibration circuitry on the module. If you do not have the software library files, you can download them from `ni.com/info`, using info code `exgpxj`.

The calibration software library consists of these files:

- `SCXIdpCal.dll`
- `SCXIdpCal.h`



Note Determine the revision of the SCXI-1141/1142/1143 by checking the part number of the module, which is located on the outside of the module case. For example, part number 182628C-01 is revision C.

Documentation

The following documents are the primary references for writing your calibration utility:

- The *Traditional NI-DAQ Function Reference Help* includes information about the functions in Traditional NI-DAQ (Legacy).
- The *DAQ Getting Started Guide* provides instructions for installing and configuring NI-DAQ devices.
- The *SCXI Quick Start Guide* includes information for installing and configuring the SCXI chassis.
- The *Traditional NI-DAQ User Manual* includes information about creating applications that use Traditional NI-DAQ (Legacy).

You can add these help files when you install Traditional NI-DAQ (Legacy). After adding these help files, you can access them by selecting **Start»Programs»National Instruments NI-DAQ»Online-DAQ Support**. The documents provide instructions about installing and configuring DAQ devices. The documents also include detailed information about creating applications that use Traditional NI-DAQ (Legacy). For more information about the SCXI-1141/1142/1143, refer to the *SCXI-1141/1142/1143 User Manual*.

Test Equipment

NI recommends using the equipment in Table 1 to verify and calibrate the SCXI-1141/1142/1143. If these instruments are not available, use the accuracy requirements listed to select a suitable substitute.

Table 1. Test Equipment

Equipment	Recommended Model	Accuracy
Calibrator	Fluke 5700A	50 ppm
DMM	NI 4060	5 1/2 digit, 15 ppm
DAQ Device	NI 6030E	16-bit minimum
Terminal Block	SCXI-1304	N/A

Test Conditions

Follow these guidelines to optimize the connections and the environment during calibration:

- Keep connections to the SCXI terminal block and the rear connector of the SCXI module short. Long cables and wires act as antennae, picking up extra noise and thermal offsets that can affect measurements.
- Use shielded copper wire for all cable connections to the SCXI-1141/1142/1143. Use twisted-pair wire to reduce noise.
- Maintain the temperature between 18 and 28 °C.
- Keep relative humidity below 80%.
- Allow a warm-up time of at least 15 minutes for the SCXI module and 30 minutes for the DAQ device to ensure the measurement circuitry is at a stable operating temperature.

Calibration Procedure

This section provides step-by-step instructions for calling the appropriate calibration functions.

The steps used in the calibration procedure are as follows:

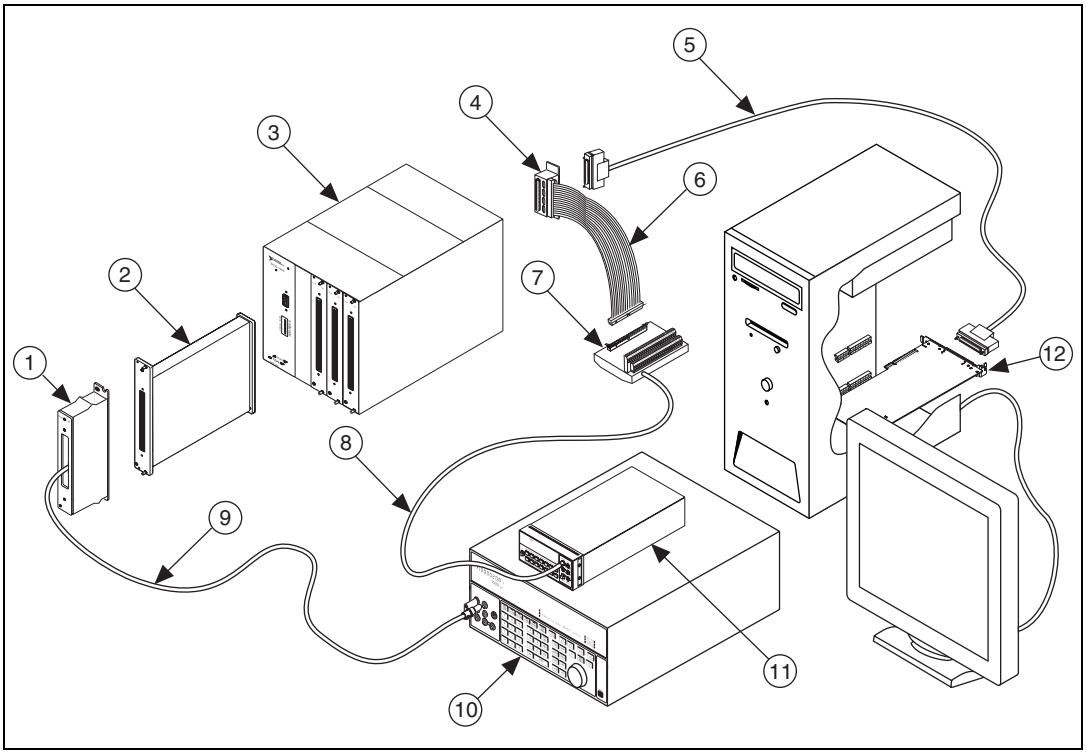
1. Setting up the SCXI-1141/1142/1143 for testing.
2. Verifying the existing operation of the SCXI-1141/1142/1143 to determine whether it is operating within its test limits.
3. Adjusting the offset and gain errors using a known external voltage source.
4. Verifying that the SCXI-1141/1142/1143 is operating within its test limits after adjustments.

Setting up the SCXI-1141/1142/1143 for Calibration

Complete the following steps, while referring to Figure 1 to set up the SCXI-1141/1142/1143 for calibration.

1. Make sure all components involved in the calibration procedure are powered-off.
2. Assemble the SCXI-1141/1142/1143, chassis, terminal block, and DAQ device as shown in Figure 1. The SCXI module you are calibrating must be connected directly to the DAQ device.
3. Power on the SCXI chassis and the external computer.
4. Make sure that all the appropriate driver and application software is installed.

5. You must configure the hardware properly with Measurement & Automation Explorer (MAX) under Traditional NI-DAQ (Legacy). Refer to the *SCXI Quick Start Guide* for details about configuring the SCXI chassis.



1	SCXI-1304 Terminal Block	7	TBX 50-Pin Terminal Block
2	SCXI-1141/1142/1143 Module	8	Cable to DMM
3	SCXI Chassis	9	Cable to Calibrator
4	SCXI-1349 Cable Adapter	10	Calibrator
5	Shielded 68-Pin Cable	11	DMM
6	NB1 Cable (50-Pin Ribbon Cable)	12	DAQ Device

Figure 1. Typical SCXI-1141/1142/1143 Setup for Calibration

Verifying the Operation of the SCXI-1141/1142/1143

The verification procedure determines how well the SCXI-1141/1142/1143 is meeting its specifications. You can use this information to select the appropriate calibration interval for your application.

Verifying Analog Input Measurements

Complete the following steps to verify the analog input offsets of the SCXI-1141/1142/1143:

1. Read the *Test Conditions* section in this document.
2. Refer to Table 9 for the specifications to test. Table 9 shows all acceptable settings for the module. NI recommends that you verify all ranges and gains. However, you can save time by checking only the ranges that your application uses.
3. Ensure that the E Series DAQ device is connected to the SCXI module.
4. Call `Calibrate_E_Series` to minimize any uncertainty associated with the E Series DAQ device. Set the following parameters:
   - **device**—The Traditional NI-DAQ (Legacy) device number assigned by MAX
   - **calOp**—`ND_SELF_CALIBRATE`
   - **setOfCalConst**—`ND_USER_EEPROM_AREA`
   - **calRefVolts**—0.0
5. Call `MIO_Config` to enable dithering on the E Series DAQ device measurements. Set the following parameters:
   - **DAQdeviceNumber**—The Traditional NI-DAQ (Legacy) device number assigned by MAX
   - **dither**—1
   - **useAMUX**—0
6. Call `SCXI_Single_Chan_Setup` to configure the module for single-channel measurements. Set the following parameters:
   - **SCXIchassisID**—The chassis ID value obtained from MAX
   - **moduleSlot**—1
   - **moduleChan**—0
   - **DAQdeviceNumber**—The cabled device number assigned by MAX to the E Series DAQ device
7. Call `SCXI_Set_Gain` to configure the module to the gain value you want to test. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—1
   - **moduleChan**—0
   - **gain**—The gain value from Table 9 that you want to test
8. Call `SCXI_Configure_Filter` to disable the filter.
   Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX

- **moduleSlot**—1
- **channel**—0
- **filterMode**—0
- **freq**—0 kHz
- **cutoffDivDown**—0
- **outClkDivDown**—2

9. Input the test voltage listed in Table 9 to channel 0 of the SCXI module.
10. Call `DAQ_Op`. Set the following parameters:
    - **DAQdeviceNumber**—The device number for the DAQ device
    - **channel**—0
    - **gain**—1 for a 16-bit E Series DAQ device
    - **count**—100
    - **sampleRate**—100
11. Call `SCXI_Scale` to convert the readings from binary to voltage. Set the following parameters:
    - **SCXIChassisID**—The device number assigned by MAX
    - **moduleSlot**—1
    - **channel**—0
    - **SCXIgain**—The gain you are testing
    - **TBgain**—1
    - **DAQboard**—The device number for the DAQ device
    - **DAQChannel**—0
    - **DAQgain**—1
    - **numPoints**—100
    - **binArray**—The array returned from `DAQ_Op`

    The result is a set of scaled voltages read from the SCXI module.
12. Average the results returned by `SCXI_Scale`. Compare the averaged result to the upper and lower limits listed in Table 9.
13. Repeat steps 6 through 12 for each remaining test point.
14. Repeat steps 6 through 13 for each remaining channel, changing the **moduleChan** variable to the channel number you are testing.

You have finished verifying the operation of the SCXI-1141/1142/1143.

Verifying Filter Parameters

Complete the following steps to set up the SCXI-1141/1142/1143 for this verification process:

1. Read the *Test Conditions* section in this document.
2. Ensure that the E Series DAQ device is connected to the SCXI-1141/1142/1143.
3. Call `SCXI_Configure_Filter` to enable the cutoff filter. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—1
   - **channel**—0
   - **filterMode**—1
   - **freq**—10 kHz
   - **cutoffDivDown**—0
   - **outClkDivDown**—2
4. Call `SCXI_Set_Gain` to configure the module to a gain of 1. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—1
   - **moduleChan**—0
   - **gain**—1
5. Connect the calibrator to analog input channel 0. Refer to Table 7 to determine which pins on the 96-pin front connector correspond to the positive and negative inputs of the specified channel. If you are using an SCXI-1304 connected to the SCXI-1141/1142/1143, connect the calibrator to the AI 0 + and AI 0 – inputs.
6. Connect the DMM to the output of channel 0. Refer to Table 8 to determine which pins on the 50-pin rear connector correspond to the positive and negative outputs for the specified channel. For example, the positive output for channel 0 is pin 3, which is AI 0 +. The negative output for channel 0 is pin 4, which is AI 0 –.

Verifying Stopband Attenuation

Verify the stopband attenuation by performing the following steps:

1. Set the calibrator to output a 10 kHz, 1 V_{rms} sine wave.
2. With a DMM, ensure that you read a 1 V_{rms} signal.
3. Increase the input signal frequency generated by the calibrator until the level read by the DMM is 10 mV_{rms}.

4. Verify that the frequency is within the limits shown in Table 2.

Table 2. Input Frequency

Module	Lower Limit (kHz)	Upper Limit (kHz)
SCXI-1141	12.5	13.5
SCXI-1142	31.0	33.0
SCXI-1143	17.5	19.0

Verifying Corner Frequency

Verify the corner frequency by performing the following steps:

1. Set the calibrator to output a 10 kHz, 1 V_{rms} sine wave.
2. Verify that the DMM output is within the values shown in Table 3.

Table 3. SCXI-1141/1142/1143 Output

Module	Lower Limit (V_{rms})	Upper Limit (V_{rms})
SCXI-1141	0.9825	1.0201
SCXI-1142	0.6837	0.7331
SCXI-1143	0.6916	0.7765

Verifying Passband

Verify the passband by performing the following steps:

1. Set the calibrator output to a 1 V_{rms} sine wave at the frequency specified in Tables 4, 5, or 6.
2. Verify that the DMM output is within the bounds specified by Tables 4, 5, or 6.
3. Repeat steps 1 and 2 until all test points are verified.

Table 4. Passband Test Points for the SCXI-1141

Frequency (kHz)	Lower Limit (V_{rms})	Upper Limit (V_{rms})
5.94	0.9803	1.0143
9.39	0.9803	1.0143

Table 5. Passband Test Points for the SCXI-1142

Frequency (kHz)	Lower Limit (V_{rms})	Upper Limit (V_{rms})
2.5	0.9596	0.9889
5.0	0.8909	0.9336

Table 6. Passband Test Point for the SCXI-1143

Frequency (kHz)	Lower Limit (V_{rms})	Per Limit (V_{rms})
5.0	0.9882	1.0119

Adjusting the SCXI-1141/1142/1143

This section contains three adjustment procedures: one for measuring gain error, one for adjusting calibration gain constants, and one for adjusting filter AC gain.

Measuring Gain Errors

Complete the following steps to measure the gain errors in the SCXI-1141/1142/1143:

1. Read the *Test Conditions* section in this document.
2. Refer to Table 9 for the specifications to be tested. Table 9 shows all acceptable settings for the module.
3. Ensure that the E Series DAQ device is connected to the SCXI-1141/1142/1143.
4. Call `SCXI_Single_Chan_Setup` to configure the module for single-channel measurements. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—1
   - **moduleChan**—0
   - **DAQdeviceNumber**—The device number assigned by MAX for the E Series DAQ device
5. Call `SCXI_Set_Gain` to configure the module to the gain value you want to adjust. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—1
   - **moduleChan**—0
   - **gain**—The gain value from Table 9 that you are currently testing

6. Connect the calibrator to the appropriate analog input channel, starting with channel 0. Refer to Table 7 to determine the pins on the 96-pin front connector that correspond to the positive and negative inputs of the specified channel. If you are using an SCXI-1304 connected to the SCXI-1141/1142/1143, connect the calibrator to the AI 0 + and AI 0 – inputs and verify that the SCXI-1304 is set to DC coupling.
7. Connect the DMM to the positive output on pin 3 (AI 0 +) and the negative output on pin 4 (AI 0 –) on the rear panel connector, illustrated in Table 8.

Tip For easy access to individual pins, use a TBX 50-pin connector block connected as shown in Figure 1.

8. Set the calibrator voltage to the positive test-point value in Table 9.
9. Read the voltage from the DMM. Record the DMM reading as *output1*, and the calibrator output voltage as volt1, for later use.
10. Set the calibrator to the negative test-point value for the same gain. Skip any input limits that are specified as 0.0 V. You need only upper and lower limits for adjustment.
11. Read the voltage from the DMM. Record the DMM reading as *output2*, and the calibrator output voltage as *volt2*. You now have two pairs of data points, (*volt1*, *output1*) and (*volt2*, *output2*), where *volt1* and *volt2* are calibrator readings, and *output1* and *output2* are DMM readings.
12. Convert the DMM voltage readings (*output1* and *output2*) to binary readings (*binary1* and *binary2*) using the following equation:

$$\textit{binary reading for 16-bit E Series products (binary)} = \left(\frac{output}{20}\right) \times 2^{16}$$

Note In both of the above equations, *output* is either *output1* or *output2*.

For example, using a 16-bit product such as a NI 6030E and obtaining a DMM reading of –9.90000 V, you get the following results:

$$binary = \left(\frac{-9.90000}{20}\right) \times 2^{16} = -32440.32$$

13. Record *binary1* with *volt1*, and *binary2* with *volt2*, for later use.
14. Repeat steps 5 through 13 for the remaining gain values you want to measure on this channel.
15. Repeat steps 4 through 14 for the remaining channels you want to measure.

You have finished measuring the gain on the SCXI-1141/1142/1143.

Adjusting Calibration Constants

Complete the following steps to adjust the calibration constants on the SCXI-1141/1142/1143 to compensate for the gain error measured in the *Measuring Gain Errors* section:

1. Reconnect the E Series DAQ device to the SCXI-1141/1142/1143.
2. Call `SCXI_Cal_Constants` to create and store the new calibration constants in the SCXI-1141/1142/1143 memory. Use the following parameters:
   - **SCXIchassisID**—The ID assigned by MAX
   - **moduleSlot**—1, unless you installed the module in a different slot
   - **channel**—The channel you want to adjust
   - **opCode**—2
   - **calibrationArea**—0
   - **rangeCode**—0 (not used for the SCXI-1141/1142/1143)
   - **SCXIgain**—The gain setting you want to adjust
   - **DAQboard**—The device number assigned by MAX
   - **DAQChan**—0
   - **DAQGain**—1 for 16-bit devices
   - **Tbgain**—1.0
   - **volt1** and **volt2**—The first and second voltage readings for the gain values that you are saving on the SCXI-1141/1142/1143
   - **binary1** and **binary2**—The first and second binary readings for the gain values that you are saving on the SCXI-1141/1142/1143
   - **calConst1** and **calConst2**—The return values
3. Repeat step 2, changing **calibrationArea** to 1.
4. Repeat step 2, changing **calibrationArea** to 3.
5. Repeat steps 2 through 4 for the next channel.
6. Repeat steps 2 through 5 for the next gain setting.

You have finished adjusting the calibration constants on the SCXI-1141/1142/1143.

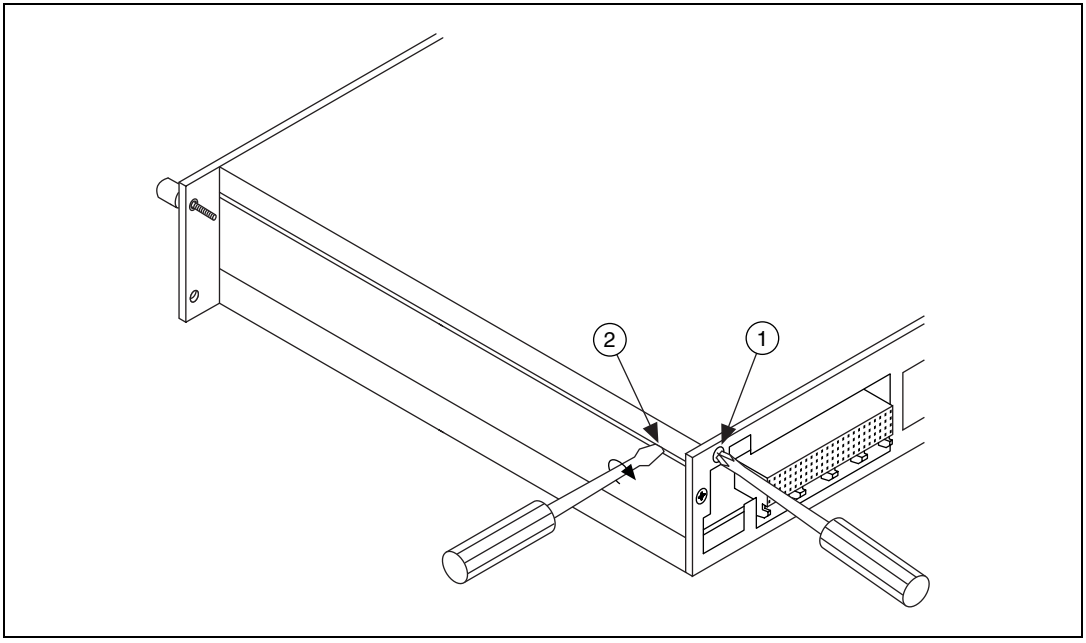
Adjusting Filter AC Gain

The AC gain of the filter is independent of the gain of the amplifier, so you can do this procedure with any amplifier gain. Ideally, you set the amplifier gain (G_s) and the amplitude of the sine wave (V_s) so that $V_s = 3.4\ V_{rms}/G_s$. You can set V_s to a lower amplitude, but not a higher one. To prevent errors due to ripple in the passband, the frequency of the sine wave must be lower than 1/50th of the cutoff frequency. For this procedure, in sections *SCXI-1141/1142/1143 Before Revision F* or *SCXI-1141/1142/1143 Revision F or Later* you will set the filters to a cutoff frequency of 25 kHz and use a sine wave of less than 500 Hz.

SCXI-1141/1142/1143 Before Revision F

Complete the following steps to set up the SCXI-1141/1142/1143 for adjustment and to adjust the AC gain filter, referring to Figures 2 and 3 as needed:

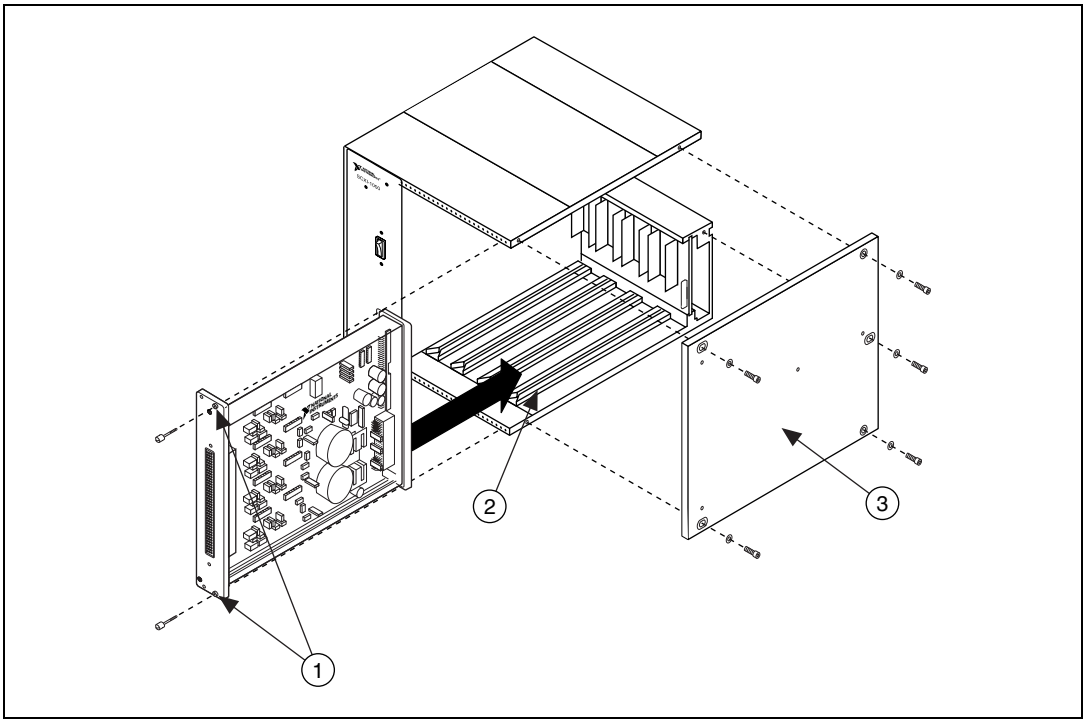
1. Remove the grounding screw from the module.
2. Remove the cover on the module to access the potentiometers.



1 Grounding Screw	2 Module Cover

Figure 2. Grounding Screw and Cover Removal

3. Remove the side plate of the SCXI chassis.
4. Install the module into slot 4 of the SCXI chassis.



1 Thumbscrews	2 Slot 4	3 Side Plate

Figure 3. Side Plate Removal and Module Installation

5. Read the *Test Conditions* section in this document.
6. Ensure that the E Series DAQ device is connected to the SCXI-1141/1142/1143.
7. Call `SCXI_Set_Gain` to configure the module to a gain value of 1. Set the following parameters:
   - **SCXIchassisID**—The device number assigned by MAX
   - **moduleSlot**—4
   - **moduleChan**—0
   - **gain**—1
8. Call `SCXI_Configure_Filter` to enable the filter bypass. Set the following parameters:
   - **SCXIchassisID**—The value configured in MAX
   - **moduleSlot**—40
   - **channel**—0

- **filterMode**—0
- **freq**—0 kHz
- **cutoffDivDown**—0
- **outClkDivDown**—0

9. Connect the calibrator to analog input channel 0. Refer to Table 7 to determine the pins on the 96-pin front connector that correspond to the positive and negative inputs of the specified channel. If you are using an SCXI-1304 connected to the SCXI-1141/1142/1143, connect the calibrator to the AI 0 + and AI 0 – inputs.
10. Connect the DMM to the output of channel 0. Refer to Table 8 to determine the pins on the 50-pin rear connector that correspond to the positive and negative outputs for the specified channel. For example, the positive output for channel 0 is pin 3, which is AI 0 +. The negative input for channel 0 is pin 4, which is AI 0 –.
11. Set the calibrator voltage to 3.4 V_{rms}, 400 Hz.
12. Measure and record the amplitude of the sine wave with the DMM.
13. Call `SCXI_Configure_Filter` to disable the filter bypass. Set the following parameters:
    - **SCXIchassisID**—The value configured in MAX
    - **moduleSlot**—4
    - **channel**—0
    - **filterMode**—1
    - **freq**—25 kHz
    - **cutoffDivDown**—0
    - **outClkDivDown**—2
14. Measure the amplitude of the sine wave at the output and adjust the potentiometer until the amplitude is at the same level as it was with the filter in bypass mode.
15. Repeat steps 8 through 14 for the remaining channels.

You have finished adjusting the filter AC gain of the SCXI-1141/1142/1143.

SCXI-1141/1142/1143 Revision F or Later

Complete the following steps to adjust the AC gain of the filter on an SCXI-1141/1142/1143 revision F or later:

1. Read the *Test Conditions* section in this document.
2. Ensure that the E Series DAQ device is connected to the SCXI-1141/1142/1143.

3. Call `SCXI_Set_Gain` to configure the module to a gain value of 1. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—4
   - **moduleChan**—0
   - **gain**—1
4. Call `SCXI_Configure_Filter` to enable the filter bypass. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—4
   - **channel**—0
   - **filterMode**—0
   - **freq**—0 kHz
   - **cutoffDivDown**—0
   - **outClkDivDown**—0
5. Connect the calibrator to analog input channel 0. Refer to Table 7 to determine the pins on the 96-pin front connector that correspond to the positive and negative inputs of the specified channel. If you are using an SCXI-1304 that is connected to the SCXI-1141/1142/1143, connect the calibrator to the AI 0 + and AI 0 – inputs.
6. Connect the DMM to the output of channel 0. Refer to Table 8 to determine the pins on the 50-pin rear connector that correspond to the positive and negative outputs for the specified channel. For example, the positive output for channel 0 is pin 3, which is AI 0 +. The negative input for channel 0 is pin 4, which is AI 0 –.
7. Set the calibrator voltage to 3.4 V_{rms}, 400 Hz.
8. Measure and record the amplitude of the sine wave with the DMM.
9. Call `SCXI_Configure_Filter` to enable the cutoff filter. Set the following parameters:
   - **SCXIchassisID**—The value obtained from MAX
   - **moduleSlot**—4
   - **channel**—0
   - **filterMode**—1
   - **freq**—25 kHz
   - **cutoffDivDown**—0
   - **outClkDivDown**—2

10. Call the `SCXI_SetDP` function in `SCXIdpCal.dll` to set the digital potentiometer to a neutral position, set the following short integer parameters:
    - **SCXIchassisID**—The value obtained from MAX
    - **moduleSlot**—4
    - **channel**—0
    - **value**—127
11. Measure the amplitude of the sine wave at the output of the module.
12. If the measured value is less than the value measured with the filter bypassed, increase the value to which the digital potentiometer is set. If it is greater, decrease the value. You can set the digital potentiometer from 0 to 255.
13. Call `SCXI_SetDP` to set the digital potentiometer to the new value:
    - **SCXIchassisID**—The value obtained from MAX
    - **moduleSlot**—4
    - **channel**—0
    - **value**—The new value decided upon in step 12
14. Repeat steps 11 through 13 until the measured amplitude is as close as possible to the level it was with the filter in bypass mode.
15. Repeat steps 4 through 14 for the remaining channels.

You have finished adjusting the filter AC gain of the SCXI-1141/1142/1143.

Verifying Adjusted Values

After you complete the adjustment procedure, it is important that you verify the accuracy of the adjusted values by repeating the procedure in the *Verifying the Operation of the SCXI-1141/1142/1143* section. Verifying the adjusted values ensures that the SCXI-1141/1142/1143 is operating within its specifications after adjustments.

Note If the module fails verification after adjustment, return it to NI for repair or replacement.

Front and Rear Panel Pin Assignments

Table 7 shows the pin assignments for the SCXI-1141/1142/1143 front panel connector.

Table 7. Front Signal Pin Assignments

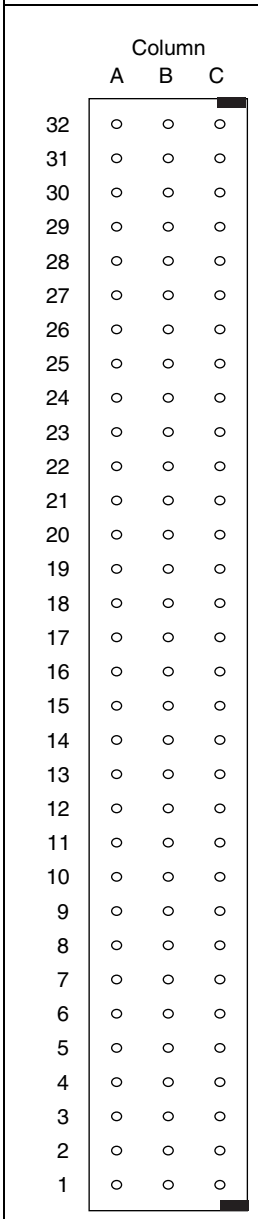
Front Connector Diagram	Pin Number	Column A	Column B	Column C
	32	AI 0 +	NC	AI 0 –
	31	NC	NC	NC
	30	AI 1 +	NC	AI 1 –
	29	NC	NC	NC
	28	A GND	NC	A GND
	27	NC	NC	NC
	26	AI 2 +	NC	AI 2 –
	25	NC	NC	NC
	24	AI 3 +	NC	AI 3 –
	23	NC	NC	NC
	22	A GND	NC	A GND
	21	NC	NC	NC
	20	AI 4 +	NC	AI 4 –
	19	NC	NC	NC
	18	AI 5 +	NC	AI 5 –
	17	NC	NC	NC
	16	A GND	NC	A GND
	15	NC	NC	NC
	14	AI 6 +	NC	AI 6 –
	13	NC	NC	NC
	12	AI 7 +	NC	AI 7 –
	11	NC	NC	NC
	10	NC	NC	NC
	9	NC	NC	NC
	8	RSVD	NC	RSVD
	7	NC	NC	NC
	6	RSVD	NC	RSVD
	5	NC	NC	NC
	4	RSVD	NC	EXT CLK
	3	NC	NC	NC
NC means no connection.	2	D GND	NC	OUT CLK
RSVD means reserved.	1	NC	NC	NC

Table 8 shows the pin assignments for the SCXI-1141/1142/1143 rear panel connector.

Table 8. Rear Signal Pin Assignments

Rear Connector Diagram	Signal Name	Pin Number	Pin Number	Signal Name
	NC	1	2	NC
	AI 0 +	3	4	AI 0 –
	AI 1 +	5	6	A GND
	AI 2 +	7	8	A GND
	AI 3 +	9	10	A GND
	AI 4 +	11	12	A GND
	AI 5 +	13	14	A GND
	AI 6 +	15	16	A GND
	AI 7 +	17	18	A GND
	NC	19	20	NC
	NC	21	22	NC
	NC	23	24	DIG GND
	SER DAT IN	25	26	SER DAT OUT
	DAQ D*/A	27	28	NC
	SLOT 0 SEL*	29	30	NC
	NC	31	32	NC
	DIG GND	33	34	NC
	NC	35	36	SCAN CLK
	SER CLK	37	38	NC
	NC	39	40	NC
	NC	41	42	NC
	RSVD	43	44	NC
	NC	45	46	NC
NC means no connection. RSVD means reserved.	NC	47	48	NC
	NC	49	50	NC

Specifications

Table 9 contains test specifications for the SCXI-1141/1142/1143. If the module has been calibrated within the last year, the *Test Point (V)* value should fall between the *Upper Limit (V)* and *Lower Limit (V)* values.

Table 9. SCXI-1141/1142/1143 Specifications

Test Point (V)	Gain	Upper Limit (V)	Lower Limit (V)
4.7500	1	4.771715	4.728285
0.0000	1	0.020480	–0.020480
–4.7500	1	–4.728285	–4.771715
2.3750	2	2.390948	2.359052
0.0000	2	0.015330	–0.015330
–2.3750	2	–2.359052	–2.390948
0.9500	5	0.962487	0.937513
0.0000	5	0.012240	–0.012240
–0.9500	5	–0.937513	–0.962487
0.4750	10	0.486334	0.463666
0.0000	10	0.011210	–0.011210
–0.4750	10	–0.463666	–0.486334
0.2375	20	0.248258	0.226742
0.0000	20	0.010696	–0.010696
–0.2375	20	–0.226742	–0.248258
0.0750	50	0.085408	0.064592
0.0000	50	0.010388	–0.010388
–0.0750	50	–0.064592	–0.085408
0.0375	100	0.047796	0.027204
0.0000	100	0.010286	–0.010286
–0.0375	100	–0.027204	–0.047796

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