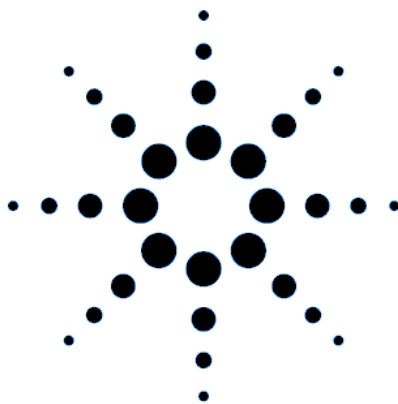


***ADDENDUM***  
to the  
**Agilent 6812B and 6813B**  
**User's Guide and Programming Guide**  
for the  
**Auxiliary Output Option 026**



**Agilent Technologies**

---

# Contents

<b>Contents</b>	<b>2</b>
<b>Auxiliary Output Capability</b>	<b>3</b>
<b>Rear Panel Connections</b>	<b>4</b>
<b>Installation</b>	<b>4</b>
<b>Front Panel Programming</b>	<b>4</b>
<b>Additional [Source] Commands</b>	<b>5</b>
<b>Additional Calibration Commands</b>	<b>5</b>
<b>Behavior Differences of Existing SCPI Commands</b>	<b>6</b>
<b>Auxiliary Output Specifications</b>	<b>7</b>
<b>Calibration for Option 026</b>	<b>7</b>

This document contains proprietary information protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated into another language without the prior consent of Agilent Technologies. The information contained in this document is subject to change without notice.

© Copyright 2000 Agilent Technologies, Inc.

## Auxiliary Output Capability

The Agilent Technologies Auxiliary Output Option 026 is available on the following ac sources:

Agilent 6812B AC Power Source (750VA)

Agilent 6813B AC Power Source (1750VA)

Option 026 consists of an auxiliary 26 Vrms output located on the rear panel of the ac source. This is a programmable output with a maximum output current of 100mA rms. The output frequency tracks the frequency of the main output of the ac source. Option 026 adds the following capabilities to the above listed ac source models:

- AC voltage and phase are programmable, in immediate mode only.
- Software calibration is available for both voltage and phase. Calibration is performed at a single frequency (400 Hz). Note that there is no compensation for frequency-dependent voltage variation or phase shift.
- The auxiliary output waveform and frequency are always the same as the main output.
- For a sine wave output, the maximum programmed rms voltage value is 26.02 V. For any waveform, the programmed rms voltage value may not result in a peak voltage of more than 36.8 V.
- Current limit is not programmable.
- DC voltage is not available.

## Front Panel Menus - Additions

The following menu commands have been added to let you program the Auxilliary Output. In most cases you will need to press the  Function key multiple times to access the menu item. Press the Entry key to access the parameter.

Voltage	<input type="button" value="▼"/>		<i>VOLT:AUX</i> <value>	Set auxiliary output voltage
Shift	Phase	<input type="button" value="▼"/>	<i>PHASE:AUX</i> <value>	Set auxiliary output phase

## SCPI Programming Commands - Additions

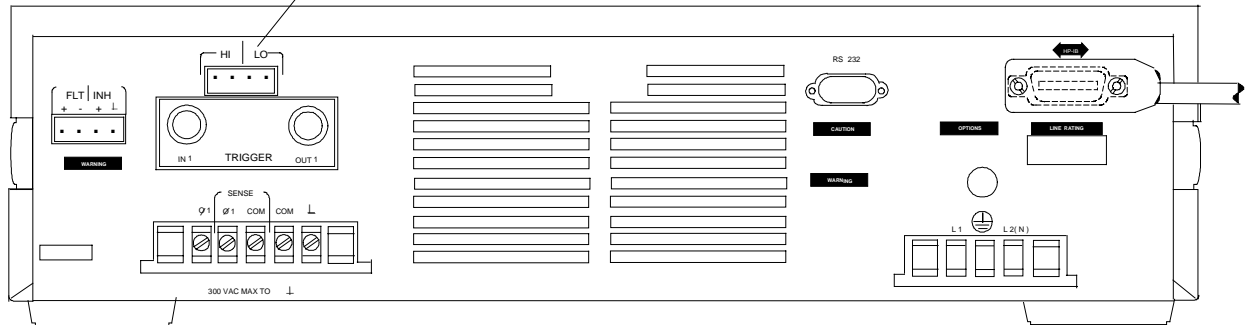
The following SCPI commands have been added to let you access the auxiliary output.

<b>CALibrate</b>	<b>[SOURce]</b>
:VOLTage	:VOLTage
:AUXiliary[:AC]	:AUXiliary <NRf+>
:PHase	:PHase
:AUXiliary	:AUXiliary <NRf+>
:DATA?	

---

## Rear Panel Connections

**Auxiliary Output.**  
Connector is removable.



Rear Panel, Overall View

---

## Installation

Turn the unit off before connecting any wires.

The Auxiliary Output has a HI and a LO connection. Two pins are designated HI and the other two pins are designated LO. The maximum isolation voltage to ground is 300 Vac ( $\pm 425$  Vdc).

---

**IMPORTANT:** You should always use both pins of the HI and the LO outputs. This promotes current sharing among the output pins.

---

---

## Front Panel Programming

### Setting the Auxiliary Output

To set the auxiliary output voltage and phase:

Action	Display
1. To set the auxiliary output voltage, press <b>Voltage</b> . Then scroll to the VOLT:AUX command. Use the numeric keypad to enter a voltage and press <b>Enter</b> .	VOLT:AUX 10
2. To set the auxiliary output phase, press <b>Shift</b> and <b>Phase</b> . Then scroll to the PHASE:AUX command. Use the numeric keypad to enter a phase and press <b>Enter</b> .	PHASE:AUX 25
3. To enable the auxiliary output, press <b>Output On</b> .	

---

## Additional [Source] Commands

The following additional source commands are provided with the Auxiliary Output Option 026.

### VOLTage:AUXiliary

This command programs the ac rms output voltage level of the auxiliary output. The auxiliary output waveform and frequency are always the same as the main output. The auxiliary output is enabled along with the main output.

The maximum peak voltage of the auxiliary output is 36.8 V peak. This includes any combination of voltage and function shape values. Therefore, the maximum value that can be programmed depends on the peak-to-rms ratio of the selected waveform. For a sinewave, the maximum voltage that can be programmed is 26.02 V rms.

<b>Command Syntax</b>	[SOURce:]VOLTage:AUXiliary[:LEVel][:IMMEDIATE][:AMPLitude] <NRf+>
<b>Parameters</b>	For sinewaves: 0 to 26.02   MAXimum   MINimum
<b>Unit</b>	V (rms voltage)
<b>*RST Value</b>	1
<b>Examples</b>	VOLT:AUX 12            VOLT:AUX:LEV 15
<b>Query Syntax</b>	[SOURce:]VOLTage:AUXiliary[:LEVel][:IMMEDIATE][:AMPLitude]?
<b>Returned Parameters</b>	<NR3>
<b>Related Commands</b>	PHASe:AUXiliary

### PHASe:AUXiliary

This command sets the phase of the auxiliary output voltage waveform relative to an internal reference. The phase angle is programmed in degrees. Positive phase angles are used to program the leading phase, and negative phase angles are used to program the lagging phase.

<b>Command Syntax</b>	[SOURce:]PHASe:AUXiliary[:ADJust[:IMMEDIATE] <NRf+>
<b>Parameters</b>	-360 through +360 (degrees)   MAXimum   MINimum
<b>*RST Value</b>	0 (degrees)
<b>Examples</b>	PHAS:AUX 90            PHAS:AUX MAX
<b>Query Syntax</b>	[SOURce:]PHASe:AUXiliary[:ADJust[:IMMEDIATE]?
<b>Returned Parameters</b>	<NR3>
<b>Related Commands</b>	VOLTage:AUXiliary

---

## Additional Calibration Commands

The following SCPI commands are used to calibrate the Auxiliary Output Option 026:

### CALibrate:VOLTage:AUXiliary

Initiates calibration of the auxiliary output voltage.

<b>Command Syntax</b>	CALibrate:VOLTage:AUXiliary[:AC]
<b>Parameters</b>	None
<b>Examples</b>	CAL:VOLT:AUX

## **CALibrate:PHASe:AUXiliary**

Initiates calibration of the auxiliary output phase.

<b>Command Syntax</b>	CALibrate:PHASe:AUXiliary
<b>Parameters</b>	None
<b>Examples</b>	CAL:PHAS:AUX

## **CALibrate:DATA?**

Lets you read the present value of the phase calibration. This command can only be used during the auxiliary phase calibration procedure. It will return an error if it is used at any other time.

<b>Query Syntax</b>	CALibrate:DATA?
<b>Parameters</b>	<NR3>
<b>Examples</b>	CAL:DATA?

---

## **Behavior Differences of Existing SCPI Commands**

This section documents the behavior differences of existing SCPI commands with the Auxiliary Output Option 026.

### **OUTput:STATe**

This command control the on/off state of both the main and auxiliary outputs.

### **\*SAV and \*RCL**

These commands include the auxiliary output voltage and phase.

### **\*RST**

Sets the auxiliary output voltage and phase to zero.

### **\*OPT?**

Returns 26.

### **\*IDN?**

Except for the firmware revision number, \*IDN? returns the same response as the standard 6812B/6813B.

In addition to the new calibration commands shown above, auxiliary voltage and phase calibration utilize the standard commands CALibrate:LEVel and CALibrate:DATA.

---

## Auxiliary Output Specifications

Table A-1 lists the specifications of the Agilent Auxiliary Output Option 026. Performance specifications are warranted over the ambient temperature range of 0 to 40 °C. Unless otherwise noted, specifications are for a sine wave with a resistive load at a frequency range of 400Hz.

**Table A-1. Option 026 Performance Specifications**

Parameter		Value
Maximum Output Ratings	rms Voltage:	0-26 V
	rms Current:	100 mA
	Frequency: <sup>1</sup>	400 Hz
Output Ripple and Noise	voltage p-p:	300 mV
Programming Accuracy		+/- 1 %

<sup>1</sup>The frequency of the auxiliary output tracks the main output.

**Table A-2. Option 026 Supplemental Characteristics**

Parameter		Value
Short Circuit Current (sustainable indefinitely)		>100 mA rms
Phase	offset relative to main output:	<= 1 degree
	phase control range:	+/- 360 degree
Programming Resolution	Output Voltage:	10 mV
	Output Phase:	0.1 degree

---

## Calibration for Option 026

This section includes calibration procedures for the Auxiliary Output Option 026. Add these procedures to those described in Appendix B of the AC Source User's Guide.

Because the output of the ac source must be enabled during calibration, proceed with caution, since voltages and currents will be active at both the auxiliary and the main output terminals.

---

**Important** Perform the verification procedures before calibrating your ac source. If the ac source passes the verification procedures, the unit is operating within its calibration limits and does not need to be re-calibrated.

---

---

**WARNING** ***LETHAL VOLTAGES.*** Ac sources can supply 424 V peak at their output. **DEATH** on contact may result if the output terminals or circuits connected to the output are touched when power is applied. These procedures must be performed by a qualified electronics technician or engineer trained on this equipment.

---

## Equipment Required

The equipment listed in the following table, or the equivalent to this equipment, is required for verification and calibration.

**Table B-1. Equipment Required**

Equipment	Characteristics	Recommended Model
<b>4-pin connector plug</b>	This connector is supplied with the ac source when ordered with Option 026.	1252-1488
<b>Digital Voltmeter</b>	Resolution: 10 nV @ 1 V Readout: 8.5 digits Accuracy: better than 20 ppm	Agilent 3458A
<b>Universal Counter</b>		Agilent 53132A or equivalent
<b>10:1 probes (2)</b>		
<b>GPIB Controller</b>	Full GPIB capabilities	HP Series 200/300 or equivalent

## Summary of Front Panel Calibration Menu

The Entry keypad is used for calibration functions.

Press this key to access the calibration menu.

Display	Command Function
CAL ON <value>	Turns calibration mode on when the correct password value is entered.
CAL OFF	Turns calibration mode off
CAL:LEV <char>	Advance to next step in sequence (P1, P2, P3, or P4).
CAL:DATA <value>	Input a calibration measurement.
SHUNT <value>	Enter a value for the external current shunt in ohms.
CAL:VOLT:OFFSET	Begin voltage offset calibration
CAL:VOLT:DC	Begin dc voltage calibration sequence
CAL:VOLT:AC	Begin ac voltage calibration sequence
CAL:VOLT:AUX	Begin auxiliary voltage calibration
CAL:VOLT:PROT	Begin voltage protection calibration
CAL:VOLT:EXT	Begin external voltage calibration sequence
CAL:CURR:AC	Begin ac current calibration sequence
CAL:CURR:MEAS	Begin current measurement calibration sequence
CAL:CURR:EXT	Begin external current calibration sequence
CAL:IMP	Begin output impedance calibration sequence
CAL:PHAS:AUX	Begin auxiliary phase calibration
CAL:SAVE	Saves the calibration constants in non-volatile memory.
CAL:PASS <value>	Set new calibration password.



## Enable Calibration Mode

Action	Display
1. Reset the unit by selecting <b>Shift, Output</b> , scrolling to *RST, and pressing <b>Enter</b> .	*RST
2. Press <b>Shift Calibration</b> , enter the calibration password from Entry keypad, and press <b>Enter</b> . If the password is correct, the <b>Cal</b> annunciator will come on. (If no password has been set, just press <b>Enter</b> .)	CAL ON 0.0
If the password is incorrect, an error occurs. If the active password is lost, the calibration function can be recovered by setting an internal switch that defeats password protection (see the Service Manual.)	OUT OF RANGE
If CAL DENIED appears, then an internal switch has been set to prevent the calibration from being changed (see the Service Manual.)	CAL DENIED

## Calibrating the Auxiliary Output Voltage

Action	Display
3. Disconnect all loads from the ac source. Connect the DVM across the output terminals of the auxiliary output using the 4-pin connector provided. Make sure the DVM is operating in AC volts mode.	
4. Press <b>Shift Calibration</b> , scroll to CAL VOLT AUX, and press <b>Enter</b> .	CAL:VOLT:AUX
5. Press <b>Shift Calibration</b> , scroll to CAL LEV P1 and press <b>Enter</b> .	CAL:LEV P1
6. Press <b>Shift Calibration</b> , scroll to CAL DATA, and use the Entry keypad to enter the ac voltage value displayed on the DVM. Then press <b>Enter</b>	CAL:DATA 0.00
7. Press <b>Shift Calibration</b> , scroll to CAL SAVE, and press <b>Enter</b> .	CAL:SAVE
8. Press <b>Shift Calibration</b> , select CAL OFF, and press <b>Enter</b> to exit Calibration mode. *RST and *RCL will also set the calibration state to OFF.	CAL OFF

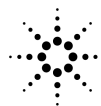
## Calibrating the Auxiliary Output Phase

Action	Display
1. Disconnect all loads from the ac source. Reset the ac source by selecting <b>Shift, Output</b> , scrolling to *RST, and pressing <b>Enter</b> . Make sure that the <b>Dis</b> annunciator on the front panel is on.	*RST
2. Use a clip lead and connect the LO terminal of the Auxiliary output to the ACC terminal of the Main output.	
3. Program the Main output of the ac source to 26Vrms @ 400 Hz. Program the Auxiliary output of the ac source to 26Vrms. Press <b>Output On</b> to enable the outputs.	
4. Set the 53132A controls as follows: Other Meas – Phase 1 to 2 Channel 1 & 2 Impedance: 1 Megohm Channel 1 & 2 Coupling: AC Channel 1 & 2 Attenuator: 10X	
5. Connect input 2 of the 53132A to the Auxiliary output with a 10:1 probe, positive lead to Hi out and negative lead to Low out (common to main output low).	
6. Connect input 1 of the 53132A to the Main output with a 10:1 probe, positive lead to AC out and negative lead to ACC out (common to auxiliary output low).	

**Note:** The 10:1 probes must be properly compensated for the 1 Megohm inputs to ensure that probes do not contribute a phase offset error. Compensation may be easily done by connecting both probes to the same AC source output and adjusting the compensation for one probe to produce a reading of 0.0 degrees on the 53132A counter.

7. Enable calibration mode as previously described.
8. Press **Shift Calibration**, scroll to CAL PHAS AUX, and press **Enter**. CAL:PHAS:AUX
9. Press **Shift Calibration**, scroll to CAL LEV P1 and press **Enter**. CAL:LEV P1
10. Using the universal counter (or equivalent instrument), monitor the phase of the auxiliary output with respect to the main output.
11. Press **Shift Calibration**, scroll to CAL DATA, but do **NOT** press the **Enter** key. CAL:DATA 0.00
12. Using the ENTRY arrow keys (**↑** and **↓**), adjust the calibration parameter until the *measured* phase difference is zero or as close to zero as possible. The actual phase at the instrument output changes immediately in response to the arrow keys. (This is the only time that the arrow keys operate in this “live” mode).
13. When the measured phase difference has been adjusted to zero, press **Enter**.
14. Press **Shift Calibration**, scroll to CAL SAVE, and press **Enter**. CAL:SAVE
15. Press **Shift Calibration**, select CAL OFF, and press **Enter** to exit Calibration mode. \*RST and \*RCL will also set the calibration state to OFF. CAL OFF

5964-8237



Agilent Technologies