

Model 5185

Wideband Preamplifier

Instruction Manual

190118-A-MNL-D

FCC Notice

This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with this manual, may cause interference to radio communications. As temporarily permitted by regulation, operation of this equipment in a residential area is likely to cause interference, in which case the user at his own facility will be required to take whatever measures may be required to correct the interference.

Company Names

SIGNAL RECOVERY is part of Advanced Measurement Technology, Inc, a division of AMETEK, Inc. It includes the businesses formerly trading as EG&G Princeton Applied Research, EG&G Instruments (Signal Recovery), EG&G Signal Recovery and PerkinElmer Instruments (Signal Recovery)

Declaration of Conformity

This product conforms to EC Directives 89/336/EEC Electromagnetic Compatibility Directive, amended by 92/31/EEC and 93/68/EEC, and Low Voltage Directive 73/23/EEC amended by 93/68/EEC.

This product has been designed in conformance with the following IEC/EN standards:

EMC: BS EN55011 (1991) Group 1, Class A (CSPIR 11:1990)
 BS EN50082-1 (1992):
 IEC 801-2:1991
 IEC 801-3:1994
 IEC 801-4:1988

Safety: BS EN61010-1: 1993 (IEC 1010-1:1990+A1:1992)

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1.1 Model 5185

The Model 5185 Wideband Preamplifier is a DC to 200 MHz preamplifier featuring switchable gain ($\times 10$ and $\times 100$) and input impedance ($50\ \Omega$ and $1\ \text{M}\Omega // 20\ \text{pF}$), together with a DC offset capability.

The $50\ \Omega$ input frequency response exceeds 200 MHz with an equivalent input noise of $10\ \text{nV}/\sqrt{\text{Hz}}$ at 10 kHz. The $1\ \text{M}\Omega$ input frequency response exceeds 100 MHz, has switch selected AC or DC coupling and has an equivalent input noise of $30\ \text{nV}/\sqrt{\text{Hz}}$ at 10 kHz.

A ground switch is provided to isolate the input signal from the output and a DC offset facility enables the DC offset on an input signal to be subtracted before it reaches the amplifier output. An overload detector is also provided.

The 5185 is powered using an external power supply (model PS0108 or user provided) connected via the 5-pin DIN connector on the rear panel. Signal connections are made via $50\ \Omega$ BNC cables to the front panel of the instrument.

1.2 Options

The model 5185 is supplied complete with a model PS0108 Remote Line Power Supply for powering the unit. The following optional extra is available.

Model K0304 Rack Mounting Kit

This allows 1 or 2 model 5185 preamplifiers to be mounted in a standard 19 " rack.

2.1 Introduction

The following procedure is provided to facilitate initial performance checking of the Model 5185. In general, the procedure should be performed after inspecting the instrument for shipping damage (any noted to be reported to the carrier and to **SIGNAL RECOVERY**), but before using it experimentally. Should any difficulty be encountered in carrying out these checks, contact the factory or one of its representatives.

2.1.01 Equipment Required

- 1) General purpose laboratory oscilloscope.
- 2) Signal generator capable of providing 10 mV and 100 mV pk-pk sinewave at a frequency of 1 MHz, 50 Ω output impedance.
- 3) 50 Ω BNC terminators (2 off) and appropriate 50 Ω BNC coaxial leads.

2.2 Procedure

- 1) Make sure that the voltage selector switch on the external power supply is in the position indicating the line voltage to be used (110 V AC or 230 V AC).
- 2) Plug the external power supply output lead into the preamplifier's power input socket, plug the line cord into the external power supply and switch on the line power.
- 3) Set the 5185 **POWER** switch to the **ON** position (down) and verify that the **POWER** LED illuminates.
- 4) Set the 5185 **GAIN** to $\times 10$ (push-button released), select the 50 Ω **INPUT** (50 Ω push-button depressed) and connect the signal source to the **INPUT** connector. Ensure that the **GND** and the **DC OFFSET** push-buttons are in the released position, (i.e. both **GND** and **DC OFFSET** are off).
- 5) Connect the oscilloscope to the 5185 **OUTPUT** connector and terminate with one of the 50 Ω terminators at the oscilloscope input.
- 6) Set the signal generator to 1 MHz, 100 mV pk-pk sinewave and connect it to the 5185 **INPUT**. Use the oscilloscope to monitor the signal generator amplitude settings so as to obtain consistency between input settings and output readings.
- 7) Monitor the output of the 5185 on the oscilloscope; the level should be 1 V pk-pk.

- 8) Set the signal generator to 1 MHz, 10 mV pk-pk sinewave. Set the 5185 gain to $\times 100$ (**GAIN** push-button depressed) and monitor the output of the 5185 on the oscilloscope; the level should be 1 V pk-pk.
- 9) Set the 5185 input to 1 M Ω DC (**DC** push-button depressed) and terminate the signal source in 50 Ω at the 5185 **INPUT** connector.
- 10) Repeat steps 6, 7 and 8.
- 11) Set the 5185 input to 1 M Ω AC (**AC** push-button depressed) and repeat steps 6, 7 and 8.
- 12) Set the 5185 **GND** switch to on (**GND** push-button depressed) and verify that the sinewave displayed on the oscilloscope reduces to zero.
- 13) Set the 5185 **GND** switch to off (**GND** push-button released) and set the DC **OFFSET** switch to on (**DC OFFSET** push-button depressed). Adjust the DC **OFFSET** control screw and verify that the DC level of the output waveform can be adjusted. Note that the overload indicator will light as the DC offset on the output waveform is increased.
- 14) Return the **DC OFFSET** switch and the **POWER** switch to the **OFF** position (**DC OFFSET** push-button released and the **POWER** switch to the up position).

This completes the initial checks. If the instrument performed as indicated, one can be reasonably sure that it has arrived in good working order and is functioning properly.

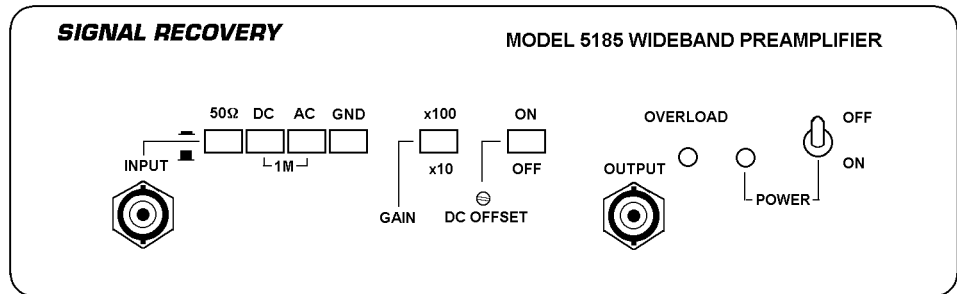


Figure 3-1, Model 5185 Front Panel

3.1 Introduction

The Model 5185 Preamplifier can be powered from the model PS0108 external power source, supplied with the instrument, or from user-provided ± 15 V DC power supplies. In operation, the signal to be measured is connected to the **INPUT** connector. The output signal is given by the expression (Input Signal \times Amplifier Gain) when the output is terminated in 50 Ω . All selections are made by means of push-buttons.

3.2 Power Switch and Indicators

The 5185 is switched ON by setting the **POWER** switch to the down position. A red LED to the left of the power switch lights to indicate that power is being applied. A second red LED labeled **OVERLOAD** lights when the input signal applied to the amplifier (plus any additional DC offset) has caused the output level to exceed approximately 1 V pk-pk (when loaded with 50 Ω).

3.3 Input

There is one single-ended input provided via a BNC connector. This input can be selected to be 50 Ω or 1 M Ω // 20 pF input impedance by means of the push-button switch bank. The 1 M Ω input can be selected to be AC or DC coupled. A ground switch allows the signal path to be grounded causing the output of the amplifier to remain at zero volts. A DC offset can be applied to the input signal by pressing the **DC OFFSET** key and adjusting the small screw via the access hole on the front panel. When using the 50 Ω input, the signal source should normally have an output impedance of 50 Ω and be connected to the 5185 input with low loss 50 Ω coax. Any deviation from this is likely to degrade the high frequency performance of the preamplifier.

3.4 Output

The 5185 output is provided at the **OUTPUT** BNC connector. The output impedance is 50 Ω and it is intended that the amplifier output is terminated in a 50 Ω load. The

output should be connected to the load with low loss 50 Ω coax. Any deviation from this is likely to degrade the high frequency performance of the preamplifier. The $\times 10$ and $\times 100$ gains are only valid when the 5185 is terminated in 50 Ω .

3.5 External Supply

External power is provided by means of the stand-alone external power supply, model PS0108, which is supplied with the unit and provides ± 18 V DC, or by means of user-provided ± 15 V DC supplies. Connection to the preamplifier is by a 5-way DIN socket on the rear panel of the 5185 (see figure 3-2).

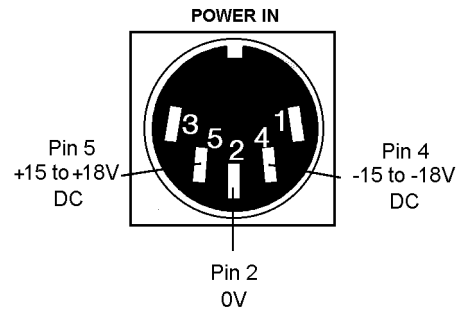


Figure 3-2, External Power Input Connector

Specifications

Input

Configuration	Single-ended
Connector	BNC
Input Impedance	50 Ω or 1 M Ω // 25 pF
Coupling:	
50 Ω Input	DC only
1 M Ω Input	DC or AC
Frequency Response:	
50 Ω Input	DC to 200 MHz (± 1 dB) DC to 250 MHz (+1 to -3 dB)
1 M Ω Input DC	DC to 100 MHz (± 1 dB) DC to 125 MHz (+1 to -3 dB)
1 M Ω Input AC	5 Hz to 100 MHz (± 1 dB) 5 Hz to 125 MHz (+1 to -3 dB)
Equivalent Input Noise, rms	
50 Ω Input	10 nV/ $\sqrt{\text{Hz}}$ at 10 kHz
1 M Ω Input	30 nV/ $\sqrt{\text{Hz}}$ at 10 kHz
Rise and Fall Time:	
50 Ω Input	≤ 2 ns
1 M Ω Input	≤ 2.6 ns
Maximum Input Voltage:	
$\times 10$ gain	100 mV pk-pk
$\times 100$ gain	10 mV pk-pk
Gain	$\times 10$ (20 dB) or $\times 100$ (40 dB), switch selectable
Gain Accuracy	± 3 % at 10 kHz
Gain Stability	± 250 ppm/ $^{\circ}\text{C}$

Output

Connector	BNC
Polarity	Non-inverting
Voltage Swing	> 1 V peak to peak
Slew Rate	> 2000 V/ μs (unloaded)
Impedance	50 Ω
DC Stability	100 $\mu\text{V}/^{\circ}\text{C}$ (referred to input)
DC Offset Adjustment Range	± 10 mV (referred to input)

Power Requirements

Voltage	± 15 V or ± 18 V DC
Current	300 mA max.
External Power	External power for the model 5185 can be provided by: <ol style="list-style-type: none">1) The model PS0108, a stand-alone external power supply, which is supplied with the unit and provides ± 18 V DC. Supply input is switchable between 110 V AC and 230 V AC, 50-60 Hz.2) User-provided DC supplies (± 15 V) connected to rear-panel 5-pin 180° DIN power input connector.

General

Dimensions	
Width	21.0 cm (8.25 ")
Depth	27.9 cm (11 ")
Height	8.9 cm (3.5 ")
Weight	2.9 kg (6.4 lb)

External Power Supply

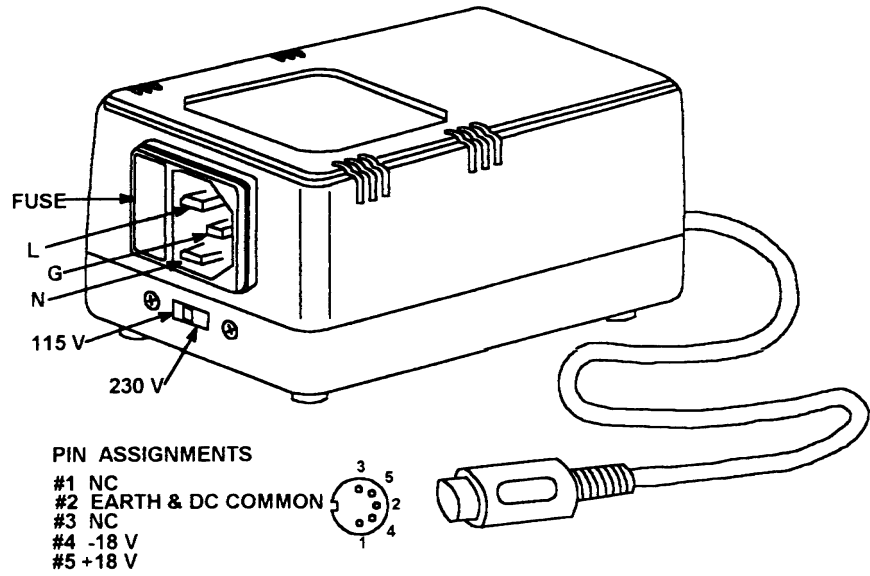


Figure B-1, External Power Supply, model PS0108

Fuse Rating	
115 V operation	200 mA
230 V operation	100 mA
Fuse Type	5 mm × 20 mm, 250 V, Slow Blow

WARRANTY

AMETEK SIGNAL RECOVERY, a part of AMETEK Advanced Measurement Technology, Inc, warrants each instrument of its own manufacture to be free of defects in material and workmanship for a period of ONE year from the date of delivery to the original purchaser. Obligations under this Warranty shall be limited to replacing, repairing or giving credit for the purchase, at our option, of any instruments returned, shipment prepaid, to our Service Department for that purpose, provided prior authorization for such return has been given by an authorized representative of AMETEK Advanced Measurement Technology, Inc.

This Warranty shall not apply to any instrument, which our inspection shall disclose to our satisfaction, to have become defective or unusable due to abuse, mishandling, misuse, accident, alteration, negligence, improper installation, or other causes beyond our control. This Warranty shall not apply to any instrument or component not manufactured by AMETEK Advanced Measurement Technology, Inc. When products manufactured by others are included AMETEK Advanced Measurement Technology, Inc equipment, the original manufacturers Warranty is extended to AMETEK Advanced Measurement Technology, Inc customers. AMETEK Advanced Measurement Technology, Inc reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

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SHOULD YOUR EQUIPMENT REQUIRE SERVICE

- A. Contact your local AMETEK SIGNAL RECOVERY office, agent, representative or distributor to discuss the problem. In many cases it may be possible to expedite servicing by localizing the problem to a particular unit or cable.
- B. We will need the following information, a copy of which should also be attached to any equipment which is returned for service.
- | | |
|---|---|
| 1. Model number and serial number of instrument | 6. Symptoms (in detail, including control settings) |
| 2. Your name (instrument user) | 7. Your purchase order number for repair charges (does not apply to repairs in warranty) |
| 3. Your address | 8. Shipping instructions (if you wish to authorize shipment by any method other than normal surface transportation) |
| 4. Address to which the instrument should be returned | |
| 5. Your telephone number and extension | |
- C. If you experience any difficulties in obtaining service please contact:

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