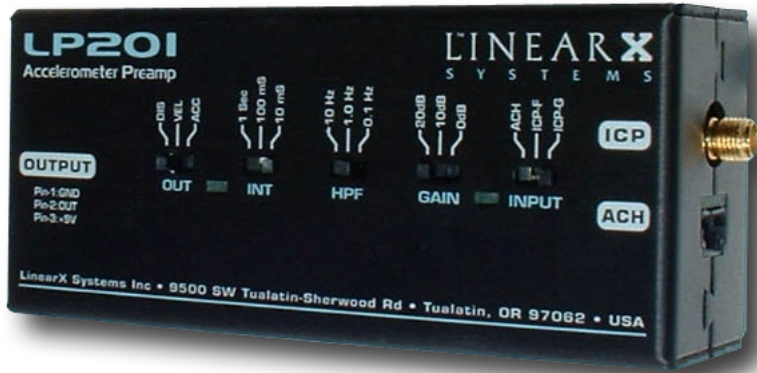


LP201™

Accelerometer Preamp



Features & Capabilities

- Precision Acceleration, Velocity, Displacement
- Dual Inputs for ACH or ICP
- Double Integrators: 10mS, 100mS, 1 Sec
- Selectable Highpass Filters: 10Hz, 1Hz, 0.1Hz,
- Selectable Gain Settings : 0dB, 10dB, 20dB
- Low Output Impedance of 150 Ohm
- Wide frequency range 0.1Hz - 100kHz
- Large dynamic range > 130dB
- Simple 9VDC/30mA LVP interface
- Small in-line preamp chassis

Dual ACH/ICP Input Accelerometer Preamp

The LP201 is a precision accelerometer preamp designed to provide three different types of data: Acceleration, Velocity, and Displacement (Excursion). It provides dual ICP/ACH inputs which permit operation with a wide variety of standard precision and low cost accelerometers. Measurements of cabinet/panel vibrations and loudspeaker excursion can be easily obtained.

The LP201 features dual precision integrators with selectable time constants, selectable gain, and selectable highpass filtering. It provides signal output via a male XLR connector utilizing the same LVP interface format as is standard on all of our analyzer mic inputs. Power can also be provided by any general means capable of supplying 9VDC at 30mA through an appropriate adapter cable.

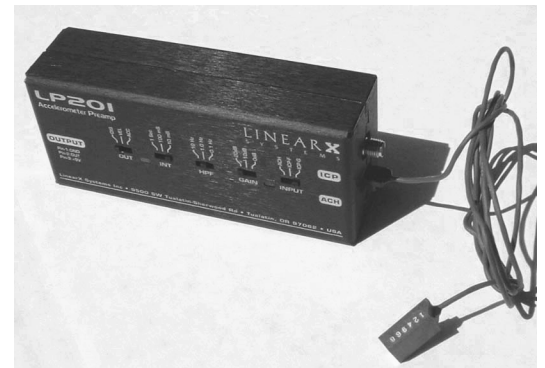
ACH Input

The ACH input is designed specifically to utilize the very low cost MSI ACH-01-03 accelerometer. A matching connector is provided which allows the ACH-01-03 to be directly inserted. The LP201 provides all of the input biasing circuitry required for the ACH allowing maximum performance to be obtained. This accelerometer is very low cost (approx \$30) and is useable for general purpose mounting on flat surfaces. The size of the accelerometer is about 1/2 Inch square, and it has 8 grams of mass. Maximum acceleration is 150g. Very useful for measuring vibrations on panels and enclosure walls where there is ample surface area for attachment. Hot melt glue works very well for this or perhaps double sided tape.

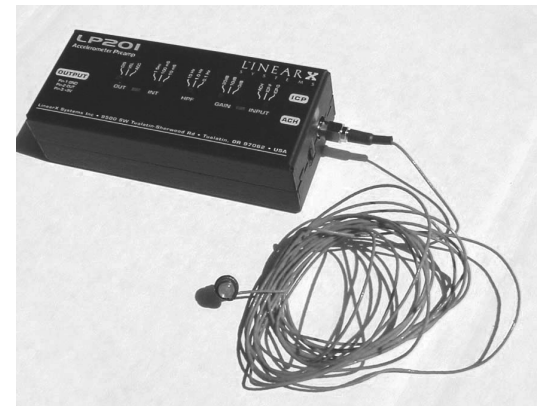
ICP Input

The ICP input is an industry standard used with many accelerometers. A wide variety of accelerometers using this format are commonly available. A low cost SMA connector is provided for this input.

Note: Many ICP type acclerometers utilize a Microdot 10-32 type connector. These connectors are extremely expensive and relatively difficult to obtain. For this reason the LP201 uses a common SMA connector which is much lower cost and readily available everywhere. Adapters can be obtained from 10-23 to BNC, and BNC to SMA, or modified cables.



LP201 with ACH-01-03 connected



LP201 with PCB 352B10 connected

Low Output Impedance

The output impedance of the LP201 is 150 Ohms which enables long cable runs to be driven without signal loss. Because accelerometers typically operate down to very low frequencies, the power source connected to the LP201 through the XLR must have very low noise and ripple at low frequencies. The output of the LP201 is provided on a male 3-Pin XLR connector. This connector also supplies power to the LP201 using the LinearX LVP interface. This interface uses a dedicated 9VDC supply at about 30mA and can be easily powered directly from the LMS analyzer or by other external power supplies or via battery.

LP201 Selectable Parameters

■ Gain: 0dB / 10dB / 20dB

The input gain can be set for 0dB (x1), 10dB (x3.16), or 20dB(x10). For maximum dynamic range the 0dB setting is commonly used. However if your signal level is relatively low, the +10 or +20 settings can be used to increase the signal to noise ratio with the analyzer input. However using gain will reduce the maximum clipping level. Gain structure through the entire unit is also dependent on the Integrator settings and source spectrum when using the Velocity or Displacement outputs.

■ HPF: 0.1Hz / 1.0Hz / 10Hz

The LP201 has several fixed 0.075Hz Highpass filters throughout the circuitry. However the HPF switch enables you to roll-off more of the low frequency response as needed by selecting either 0.1, 1.0, or 10Hz. When accelerometers are integrated to produce Velocity or Displacement, the low frequency gain can become very high. This can result in drift of the output. By using the Highpass filter this can be controlled or reduced as necessary.

■ INT: 1 Sec / 100mSec / 10mSec

The time constant of the dual integrators can be selected to optimize the gain structure for various signal spectrums and applications. The smaller the time constant, the higher the gain. The gain increases as frequency decreases. For most loudspeaker applications the 10mSec value is appropriate. If less gain is desired, the 100mSec or 1 Sec values can be used.

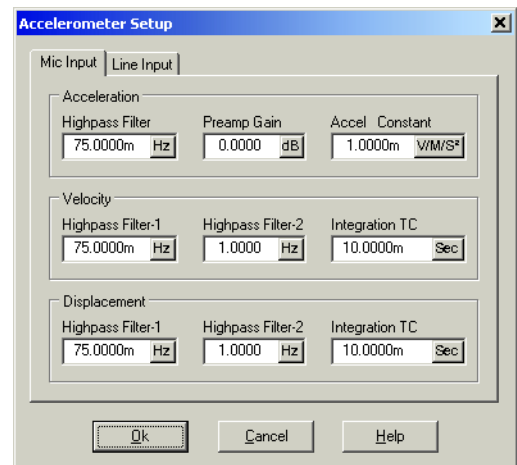
■ OUT: Acc / Vel / Dis

This switch selects the type of output signal. Either Acceleration, Velocity, or Displacement can be chosen. All output signals maintain positive polarity relative to either input.

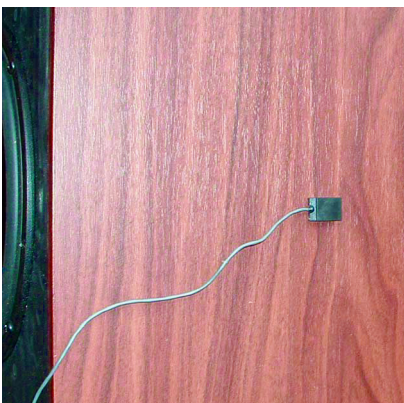
LMS-4.6 Accelerometer Setup & Configuration

Beginning in LMS version 4.6, a new setup dialog is provided which enables LMS to be used with the LP201 to easily obtain calibrated data for Acceleration, Velocity, and Displacement (Excursion).

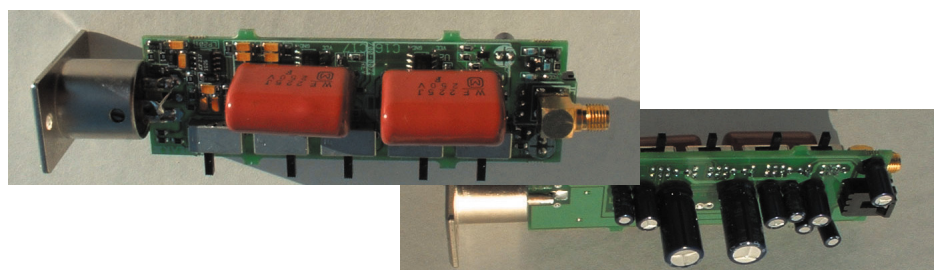
Each accelerometer typically comes with a calibration constant spec which relates the output voltage vs. acceleration. This *Acceleration Constant* can be entered here in the dialog, along with the other parameter settings of the LP201. The LP201 is simply connected to the LMS Mic Input and is then powered directly by LMS.



The type of data is selected in the Analyzer Parameters dialog for either Acceleration, Velocity, or Excursion. The curves are then drawn in actual units as dictated by the type of data selected.



ACH-01-03 mounted on cabinet wall



Loudspeaker Measurements

This series of examples demonstrate how the LP201 can be used to obtain complete acceleration, velocity, and excursion data on a woofer.

For these tests a PCB 352B10 accelerometer was mounted to a 6.5" (165mm) woofer in a ported enclosure. A drop of hot melt glue was used to attach the accelerometer to the seam between the cone and dust cap as shown below.

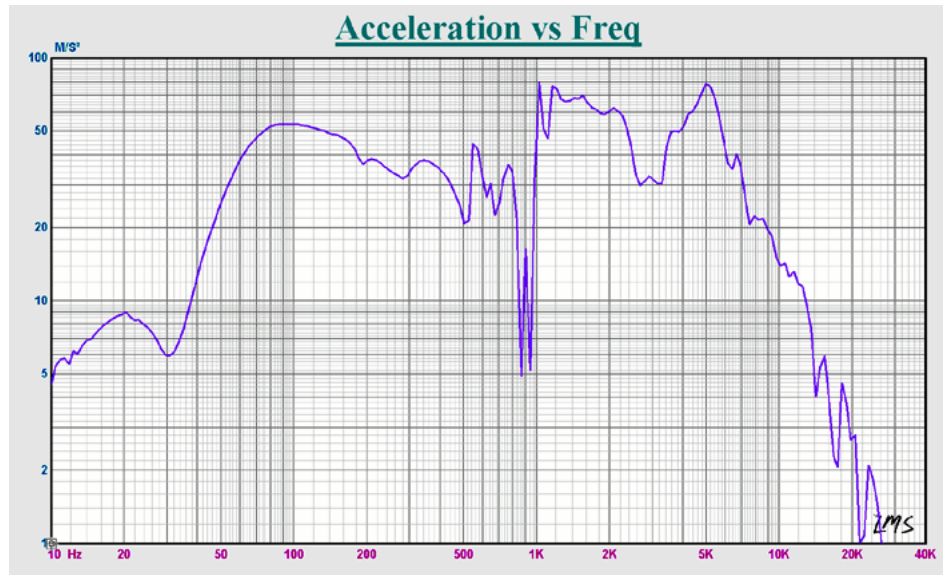


Because of the very small size and low mass (0.7g) of the 352B10, the overall change in the effective moving mass of the driver is relatively small. This driver had a cone mass of 28g, so adding the 352B10 only changes the mass by approximately 2-3%. Most typical production variations in drivers can be easily more than this from unit to unit.

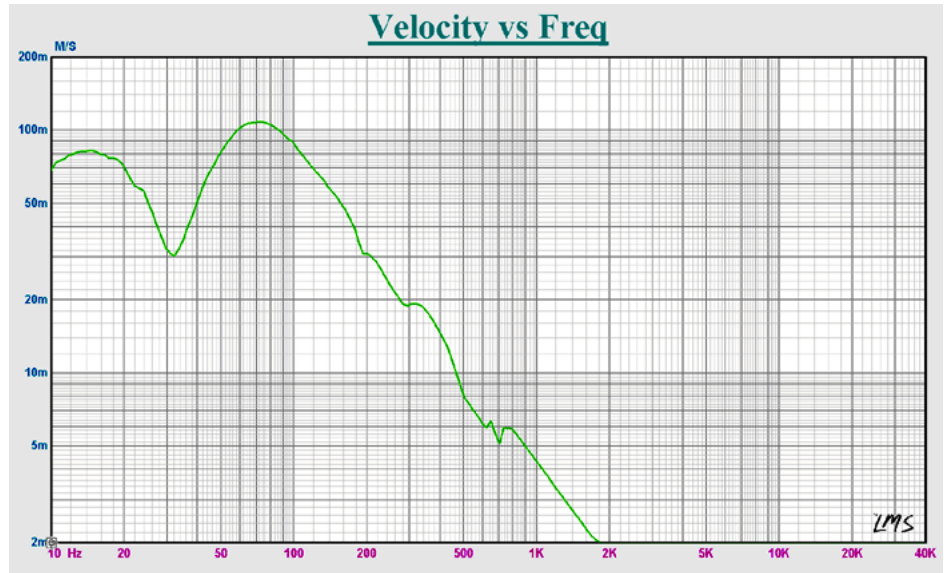
The enclosure was driven at about 1W (2.8V) and the graphs at the right were produced for acceleration, velocity, and excursion using the LP201.

The graphs shown here demonstrate some typical results for measuring the motional behavior of a driven cone loudspeaker. The shape of the excursion curve will show much more of the low frequency behavior, and far less of the mid/high frequency behavior.

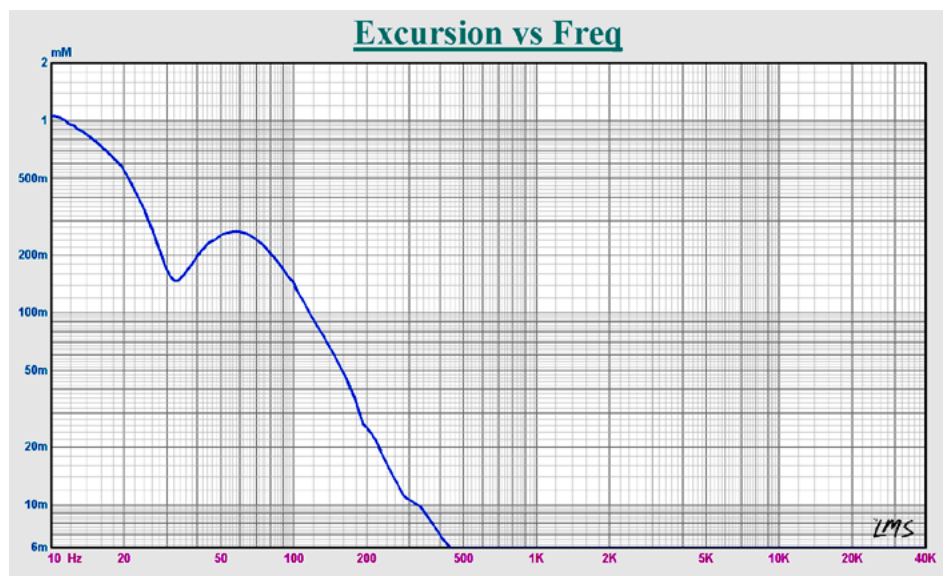
The port resonance is reducing the driver excursion at about 32Hz. The units here are millimeters. The excursion at 10Hz reaches about 1mm. The depth of the null at the port resonance is largely a function of the losses in the port and/or enclosure. Lower port losses will produce a deeper null.



Acceleration of Woofer Cone, Ported Enclosure



Velocity of Woofer Cone, Ported Enclosure



Excursion of Woofer Cone, Ported Enclosure

Specifications

■ Functions

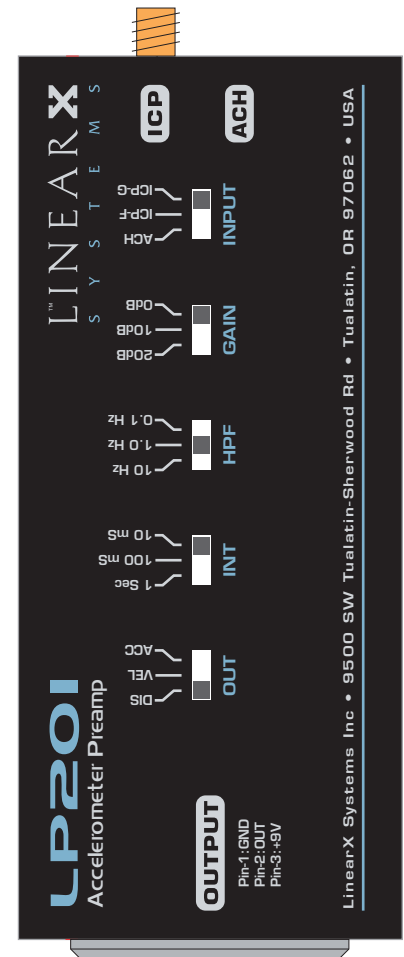
Inputs	ICP & ACH interfaces
Output	LVP Interface (9VDC/30mA)
Double Integrators	1.0 Sec, 0.1 Sec, 0.01 Sec
Highpass Filters	0.1Hz, 1.0Hz, 10Hz
Gain	0dB, 10dB, 20dB

■ Electrical

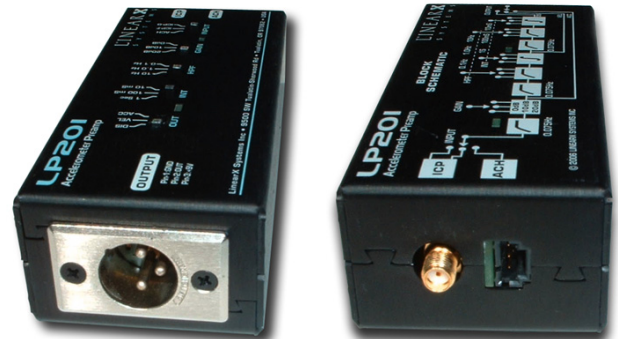
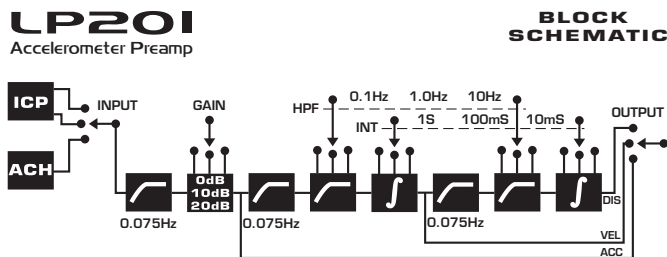
ICP Input Impedance	400K Ohm
ICP Current Source	3mA
ACH Input Impedance	30M Ohm
ACH Current Source	20uAmp
Equiv Input Noise	8nV/RtHz (0.8ug/RtHz based on 10mV/g)
Output Impedance	150 Ohms
Max Output Level	+20dBm (7.75Vrms)
Frequency Response	0.1Hz - 100kHz
LVP Supply Voltage	9VDC ±10%
LVP Supply Current	30mA Typical

■ Mechanical

ICP Connector	SMA Female Recptacle
ACH Connector	AMP 3-Pin Male Header
Output Connector	3-Pin Male XLR
Length	4 Inches (100mm)
Width	2 Inches (50mm)
Height	1.3 Inches (38mm)
Weight	5.3oz (150g)
Material	Aluminum
Finish	Black Anodized



Block Schematic



Visit our web site or contact the factory for a list of International Dealers.

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