APx1701 Transducer Test Interface User Guide

Contents

APx1701 Transducer Test Interface

Specifications

- **Product Name:** APx1701 Transducer Test Interface
- **Manufacturer:** Audio Precision
- **Model:** APx1701
- **Release Date**: November, 2023
- **Audio Technology:** MPEG-4 AAC-LC licensed by Fraunhofer IIS
- **Trademarks:** HDMI, Qualcomm, aptX
- **Contact Information:** Audio Precision, 9290SW Nimbus Ave Beaverton, Oregon 97008, Phone: 503-627-0832, 800-231-7350, Website: ap.com

Installation Instructions

This booklet contains safety information, installation instructions, and full specifications for the Audio Precision APx1701 Transducer Test Interface.

Documentation and Support

- Detailed information on the operation of the APx1701 Transducer Test Interface is available from the embedded Help installed with the APx500 measurement software, in the APx500 User's Manual PDF on the APx500 Application USB, and on the Web at ap.com. Printed copies can be ordered from Audio Precision or your local distributor.
- Visit the Audio Precision Web site at ap.com for APx support information. You can also contact our Technical Support staff at techsupport@ap.com, or by telephoning 503-627-0832 ext. 4, or 800-231-7350 ext. 4 (toll-free in the USA).

Product Usage Instructions

Introduction

The APx1701 Transducer Test Interface is designed for testing transducers with precision and accuracy.

Using the APx1701

To use the APx1701 effectively, follow the steps outlined below:

Setting Up the Hardware

1. Ensure that the equipment is properly qualified before servicing or repairing.
2. Set up the hardware according to the installation instructions provided in the manual.

FAQs

- **Can I service or repair the equipment myself?**
  No, it is recommended that servicing should be performed only by a qualified technician or an authorized Audio Precision distributor.
- **What should I do to ensure safety while using the equipment?**
  Do not defeat the safety ground connection. This equipment is designed to operate only with an approved three-conductor power cord and safety grounding to prevent electrical shock hazards.

Copyright Claim

- Audio Precision
- 9290SW Nimbus Ave
- Beaverton, Oregon 97008
- **503-627-0832**
- **800-231-7350**
- **ap.com**

Documentation and Support

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APx1701 Transducer Test Interface.

The APx500 User's Manual

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ap.com
Visit the Audio Precision Web site at **ap.com** for APx support information. APx resources are available at **ap.com**. You can also contact our Technical Support staff at **techsupport@ap.com**, or by telephoning **503-627-0832** ext. 4, or **800-231-7350** ext. 4 (toll free in the U.S.A.).

Safety Information

- Do NOT service or repair this equipment unless properly qualified. Servicing should be performed only by a qualified technician or an authorized Audio Precision distributor.
- Do NOT defeat the safety ground connection. This equipment is designed to operate only with an approved three-conductor power cord and safety grounding. Loss of the protective grounding connection can result in electrical shock hazard from the accessible conductive surfaces of this equipment.
- Do NOT exceed mains voltage ratings. This equipment is designed to operate only from a 50–60 Hz ac mains power source at 100–240 Vac nominal voltage. The mains supply voltage is not to exceed ±10 % of nominal (90–264 Vac).
- For continued fire hazard protection, fuses should be replaced ONLY with the exact value and type indicated on the rear panel of the instrument and discussed on page 20 of this booklet.
- The input measurement terminals are intended to be used for the measurement of audio signals only.
- Do NOT substitute parts or make any modifications without the written approval of Audio Precision. Doing so may create safety hazards. Using this product in a manner not specified by Audio Precision can result in a safety hazard.
- This product is for indoor use—Installation Category II, Measurement Category I, pollution degree 2.
- To clean the enclosure of this product, use a soft cloth or brush to remove accumulated dust. A mild detergent may be used to remove remaining dirt or stains. Do not use strong or abrasive cleaners. Wipe all surfaces with a damp cloth.
- This unit is designed for rack mounting, but is also supplied with four feet that can be attached to the bottom surface for desktop use.

Safety Symbols

The following symbols may be marked on the panels or covers of equipment or modules, and are used in this manual:

- **WARNING!—**This symbol alerts you to a potentially hazardous condition, such as the presence of dangerous voltage that could pose a risk of electrical shock. Refer to the accompanying Warning Label or Tag, and exercise extreme caution.

- **ATTENTION!—**This symbol alerts you to important operating considerations or a potential operating condition that could damage equipment. If you see this marked on equipment, refer to the Operator's Manual or User's Manual for precautionary instructions.

- **FUNCTIONAL EARTH TERMINAL—**A terminal marked with this symbol is electrically connected to a reference point of a measuring circuit or output and is intended to be earthed (grounded) for any functional purpose other than safety.

- **PROTECTIVE EARTH TERMINAL—**A terminal marked with this symbol is bonded to conductive parts of the instrument and is intended to be connected to an external protective earthing (grounding) system.

- **WARNING! HOT SURFACE**—This symbol is marked on a surface that may become too hot to touch during operation.

Disclaimer

Audio Precision cautions against using their products in a manner not specified by the manufacturer. To do otherwise may void any warranties, damage equipment, or pose a safety risk to personnel.

Installation

Introduction

- The APx1701 is an accessory device that must be used in conjunction with both an Audio Precision APx analyzer instrument (sold separately) and a connected personal computer (PC). The APx1701 will not operate without a USB connection to the PC running the APx measurement software, as part of an APx analyzer system.
- Installation and safety information for the APx analyzer instrument, the required APx500 measurement software (version 4.3 or later) and PC system requirements can be found in the Installation and Specifications booklet

pro-vided with the APx analyzer.

Using the APx1701

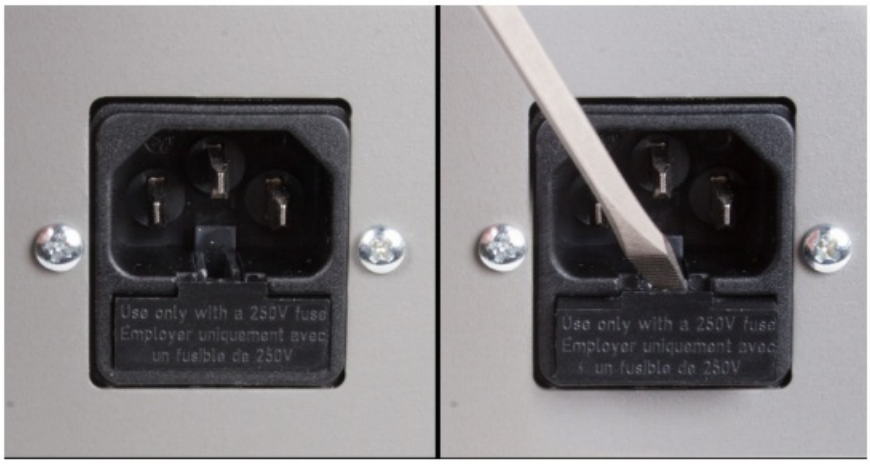
- To use the APx1701, first connect the APx analyzer instrument to the PC and launch the APx500 measurement software. Software installation instructions and hardware connection information are provided in the documentation included with the analyzer instrument.
- The manual APx500 User's Manual is available as a PDF on the APx500 Application Disc and online at ap.com.

Setting Up the Hardware

Connecting your APx1701 to the electrical mains supply
The APx1701 Transducer Test Interface must be connected to a 50–60 Hz alternating current (ac) electrical mains supply. The minimum voltage is 100 Vac; maximum voltage is 240 Vac. The instrument is fitted with a universal power supply that does not require voltage configuration or change of fuse type to accept mains voltages within the specified range.

Removing and installing mains fuses

- For all rated voltages, use two mains fuses of type 4A T/SB (5×20 mm) 250 V.
- To remove the mains fuse carrier module, refer to the figures below and proceed as follows:



Power entry module removal Fuse carrier

- Remove the mains power supply cord from the connector-or on the power entry module, located on the APx1701 rear panel. The mains fuse carrier module is part of the power entry module, below the power cord connector.
- Insert a small screwdriver into the power cord connector area, reaching into the slot on the mains fuse carrier module. Pry the module out slightly, until you can grasp the module firmly with your fingers. Pull the fuse carrier module out of the power entry module. The two mains
- fuses are loosely mounted within the fuse carrier module; take care not to let them fall.
- Replace the fuses if necessary, using fuses as described above. Carefully reinsert the fuse carrier module into the power entry module, and press it firmly into place.
- Connect the power cord from a mains power outlet to the power cord connector on the APx1701 rear panel.

USB connection

- The APx500 measurement software communicates with the APx1701 using a USB 2.0 interconnection. Once the software is successfully installed, connect the APx1701 PC INTERFACE to an available USB connector on the measurement PC. Connect the mains power cord to the APx1701 and to a source of ac mains power. Turn the APx1701 front panel power switch ON.
- For more information about making measurements with the APx1701, refer to the User's Guide beginning on page 33 of this document, and the APx500 User's Manual.

Abbreviations, Terms and Symbols

- **ADC or A/D** Analog to Digital converter or conversion.
- **BW** Bandwidth or Measurement Bandwidth, nominally at –3 dB; a single number indicates only the upper limit.
- **DAC or D/A** Digital to Analog converter or conversion.
- **DSP** Digital Signal Processing or Digital Signal Processor.
- **DUT** Device Under Test, the device to which the generator or analyzer is connected.
- **EMC** ElectroMagnetic Compatibility, usually refers to both emissions (radiated and conducted via AC mains) and susceptibility.
- **ENBW** Equivalent Noise Bandwidth, the frequency of an ideal filter having the same rms response to white noise.
- **FFT** Fast Fourier Transform, a mathematical process converting a signal in the time domain to the frequency domain.
- **IMD** InterModulation Distortion, a measure of nonlinearity using a test signal with two or more components.
- **RMS or rms** Root Mean Square, an equivalentpower expression of signal amplitude.
- **SR** Sample Rate, usually as it applies to the conversion rate of A/D and D/A converters or digital audio formats.
- **THD** Total Harmonic Distortion, rms summation of d2 to d9 (may be bandwidth limited), usually derived from an FFT.
- **THD+N** Rms measurement of ALL harmonics, spurious signals, and noise within a specified bandwidth.
- **Typical or Typ** A characteristic that is not guaranteed, usually due to a practical limitation in testing or metrology.
- **UI** Unit Interval, a measure of time as it applies to digital audio formats. 1 UI=1/(128 • SR)
- **[ ]** Indicates a specification in an equivalent unit, for example: 0.030 dB [0.35%] or 10.61 Vrms [30.00 Vpp].
- ≈ Indicates an approximate or nominal value, or range of values; not guaranteed.

APx1701 Transducer Test Interface Specifications

Characteristic	Specifications	Supplemental Information
POWER AMPLIFIER		
Configuration	2 independent channels	*Intended for driving electro-acoustic transducers up to 110 kHz maximum. Do NOT use with higher frequencies.*
Input Impedance		*≈3.32 kΩ || 575 pF, unbalanced*
Output Impedance		*≈0.13 Ω (0.10 Ω current sense resistor in series with the –Output Terminal)*
Voltage Gain, 1 kHz	+20.000 dB [x10.00], non-inverting; R_{SOURCE} must be 50 Ω ±2%	*Defined as the ratio of the +Output voltage (unloaded) to the open circuit source voltage*
Voltage Gain Accuracy, 1 kHz		
+15°C to +30°C	±0.05 dB [±0.58%]	
0°C to +40°C	±0.09 dB [±1.04%]	
Input Sensitivity, 1 kHz		
For 100 watts into 8 Ω		*≈2.874 Vrms [4.065 Vpk]*
For 60 watts into 4 Ω		*≈1.600 Vrms [2.262 Vpk]*
For clipping (unloaded)		*<4.5 Vpk (9 Vpp)*
Maximum Output Ratings		
R_{LOAD} ≥16 Ω, both channels	30.0 Vrms	*Typically >30.5 Vrms*
R_{LOAD} = 8 Ω, one channel only	100 W, 10 Hz to 50 kHz; 95 W, 50 kHz to 100 kHz	*Typically >107 W at 1 kHz*
R_{LOAD} = 4 Ω, one channel only	60 W, 10 Hz to 50 kHz; 55 W, 50 kHz to 100 kHz	*Typically >64 W at 1 kHz*
Frequency Response[1]		
10 Hz to 20 kHz	±0.08 dB (DC coupled)	
20 kHz to 50 kHz	±0.30 dB	
50 kHz to 100 kHz	±0.80 dB	
Residual Noise[2]		
A-Weighted	≤6.0 µVrms [–102.2 dBu]	*SNR ≈134 dB (ref 30 Vrms output)*
22 kHz BW	≤7.5 µVrms [–100.3 dBu]	
80 kHz BW	≤13 µVrms [–95.5 dBu]	
500 kHz BW	≤30 µVrms [–88.2 dBu]	
Residual THD+N[1,2,3]		
10 Hz to 20 kHz	≤(–100 dB + 13 µVrms)	*80 kHz measurement bandwidth*
20 kHz to 100 kHz	≤(–80 dB + 30 µVrms)	*500 kHz measurement bandwidth*
Slew Rate		*Typically >40 V/µs*
Output DC Offset	±5 mV with input terminated	
Output Crosstalk		*Typically <–70 dB with R_{LOAD}=4 Ω*
MICROPHONE INPUTS		
Number and Types of Inputs		
Balanced	2 each, female XLR	*Switchable +48 V phantom power*
Unbalanced	2 each, grounded bnc	*Switchable 4 mA (+24 V CCP) with TEDS reading capability*
Maximum Rated Input		
Balanced	10 Vpk (20 Vpp), differentially	
Unbalanced	5 Vpk (10 Vpp)	

Input Impedance[4]		
Balanced, each side to ground		*≈5 kΩ || 240 pF–300 pF*
Unbalanced		*≈20 kΩ || 240 pF–300 pF*
Input AC Coupling		*time constant ≈0.20 s; –3 dB is ≈0.8 Hz*
Switching Configuration		
Microphone Output (Pass Thru) 1		*Switchable from among microphone balanced inputs 1 and 2, or microphone unbalanced inputs 1 and 2. Also switchable to read the DC output of either unbalanced microphone input.*
Microphone Output (pass Thru) 2		*Switchable from among microphone balanced input 2 or microphone unbalanced input 2 only.*
Residual Noise		*Determined by the audio analyzer; the inputs are passively switched.*
Input Crosstalk (R_S ≤600Ω)	≤(–78 dB + 1 µV) to 20 kHz	
OUTPUT CURRENT SENSE (MONITOR)		
Sensitivity	0.100 V per Amp, ±0.50%	*0.10 Ω current sense resistor is in series with the – (minus) Output terminal of each amplifier.*
Switching Configuration		*Power amplifier output 1 or 2. Current sense resistor remains in circuit at all times even when not selected.*
GENERAL/ENVIRONMENTAL		
Power Requirements	100 to 240 Vac ±10% (90–264 Vac), 50–60 Hz, with safety ground via approved power cord, 360 VA max.	*No range switching or fuse changes required over the full operating range of 90–264 Vac.*
Temperature	0°C to +40°C operating, –40°C to +75°C storage.	
Humidity	10% to 80%, non-condensing	
Operating Altitude	2,000 m [6,560 feet]	
Stabilization Time	20 minutes	*Allow up to 1 hour per 10°C if unit has been exposed to a significant change in temperature. Allow 24–48 hours to recover if condensation has occurred.*
EMC	Complies with Directive 2014/30/EC, IEC 61326-1, Ed. 2.0, EN 61326-1:2013. Radiated and conducted emissions are within Class B limits of CISPR 11.	*Emissions and immunity levels are influenced by the quality of interface and signal cables attached to the unit. Compliance was demonstrated using Audio Precision cables.*
Safety	Complies with Directive 2014/35/EC, IEC 61010-1:2010 Ed. 3.0, EN 61010-1:2010, CAN/CSA-C22.2 No. 61010-1-12, UL Std. No. 61010-1 (3rd Ed.).	*This product is for indoor use— Installation Category II, Measurement Category I, pollution degree 2.*
Dimensions (W x H x D)	483 x 88 x 372 mm [19.00 x 3.44 x 14.66 in]	*Primarily intended for rack mounting. Adding feet for bench-top use adds ≈0.5 in to overall height.*
Weight	5.5 kg [12.1 lbs]	

Notes to Specifications

1. RLOAD must be ≥4 Ω.
2. For specified noise and distortion performance, a ground bonding wire ≤10″ [25 cm] must be connected between the source and APx1701 chassis.
3. Measured with the APx555 only. Other audio analyzers will display higher readings due to their higher internal residual performance.
4. Total effective impedance when selected, including the shunting effects of the analyzer input and interconnection cable.

Introduction

The APx1701 Transducer Test Interface is an APx accessory device with both input and output functions. The APx1701 is primarily designed to drive loudspeakers and headphones in acoustic testing, to measure loudspeaker

impedance curves, and to accommodate and power both measurement microphones and microphones under test.

Output Functions

For output measurement functions, the APx1701 provides an audio power amplifier that stands between a driven transducer (typically a loudspeaker system, driver or headphones) and the APx analyzer analog outputs. Additionally, sense resistors are provided for driver impedance measurements.

Input Functions

For input measurement functions, the APx1701 is connected between transducer outputs (typically microphones) and the APx analyzer analog inputs. The APx1701 can provide CCP or phantom powering to attached microphones. TEDS data can be read and passed from a TEDS microphone to APx500.

APx500 measurement software

Control of the APx1701 requires Audio Precision's APx500 measurement software running on the measurement system PC. See the APx500 User's Manual and the embedded Help within the APx500 software for information about addressing the APx1701 from the software.

Mounting and ventilation

- The APx1701 is designed to mount in a standard 19-inch relay rack, and is fitted with integral rack ears. The APx1701 is two rack units (2 U) in height.
- For proper ventilation to prevent overheating and failure, we recommend that the APx1701 be mounted with at least 1 U of space above and below, and that there be at least 3 inches of space to the rear of the unit.
- Never mount an APx1701 in a tightly enclosed rack.

Safety Features

- The APx1701 monitors internal conditions to protect itself and the device under test from damage.
- If an amplifier channel trips its current limit and causes the amplifier to voltage clip, an alert will be issued.
- If the amplifier draw should exceed the capability of the internal power supplies, the power supplies will momentarily shut down and the amplifier inputs will be disconnected by relays. The input relays can be reset from the APx500 software.
- If thermal limits at key locations within the APx1701 are exceeded, the amplifier inputs will be disconnected by relays. The input relays can be reset from the APx500 software.

LED indicators

- There are two LED indicators on the APx1701 front panel. The Power LED, to the right, is illuminated when AC mains power is applied and the APx1701 is switched ON.
- The USB LED, to the left, indicates a number of APx1701 conditions, detailed in the following table.

USB LED	*Condition*
• OFF	• Power is Off, USB is not connected.
• ON	• Power is On, USB is connected.
• Slow	• Power is OFF, USB is connected
• Fast	• A clip fault, a power fault, or a temperature fault

PC control and data interconnections

- The APx1701 must be connected by USB 2.0 to a personal computer running APx500 measurement software (version 4.3 or later) to operate.
- If multiple APx1701 interfaces are detected, only the first one encountered will be activated by the software.

APx audio interconnections

- Typically, the APx instrument generator unbalanced audio outputs are connected to the APx1701 amplifier inputs, and the APx1701 microphone outputs (pass thru) are connected to the analyzer balanced inputs. See System Connections on page 37.
- If impedance curves are to be measured, the Sense Resistor output is connected to an analyzer balanced input.

Ground connection

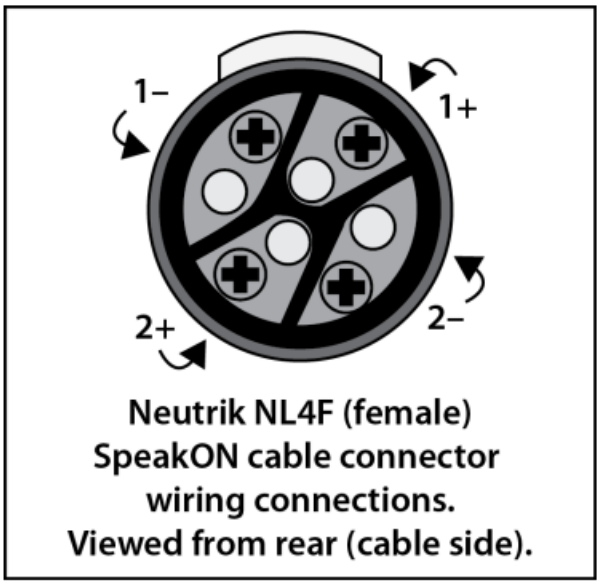
For best noise performance, the APx1701 and the APx analyzer should have their ground lugs connected with a low-resistance cable, such as the ground strap provided with the interface.

DUT connections (amplifier outputs)

- Each channel of the two-channel audio power amplifier in the APx1701 has an output source resistance of approximately 0.13 Ω, including the 0.10 Ω current sense resistor.
- When one channel is in use, the amplifier is rated at 100 W into 8 Ω, or 60 W into 4 Ω. The amplifier can drive lower impedances, but is limited to an output current of about 6 A.
- When two channels are in use, the amplifier is rated at 30.0 V rms into loads above 15 Ω.

Loudspeaker connections

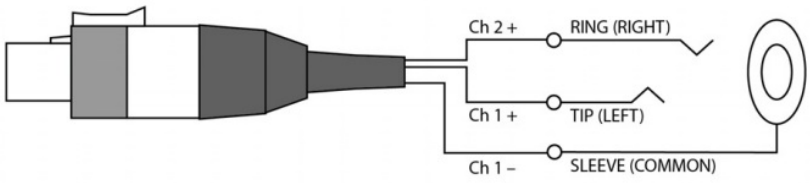
- The APx1701 amplifier outputs appear on the 4 pins of the Neutrik NLT4M SpeakON connector. The diagram here shows the pin arrangement for the mating NL4F or NLT4F cable connector, shown from the rear (cable conection) point of view. Use large gauge, high quality speaker cable of short length for best results.
- The amplifier output signals appear on a four-connector SpeakON connector, wired conventionally according to the following diagram.
  Note that rotating and disconnecting a SpeakON connector while under load can result in arcing, which will damage the surface of the contacts and increase parasitic resistance. Do not disconnect while under load.



Neutrik NL4F (female)
SpeakON cable connector
wiring connections.
Viewed from rear (cable side).

Headphone connections

- When connecting to headphones that are fitted with a 1/4-inch or 3.5 mm tip-ring-sleeve (TRS) plug, a SpeakON to TRS jack adapter must be used.



SpeakON to TRS wiring for headphone testing

- Use only the Ch 1– connection as a return for both channels, as shown. This avoids the unintended paralleling of the sense resistors.

DUT connections (microphone inputs)

- The APx1701 is designed to easily interface with common measurement microphones, and with common professional recording and sound reinforcement microphones.

Unbalanced Microphone Inputs

- Most measurement microphones have an unbalanced audio output, typically provided on a BNC connector.
- The BNC Unbalanced Microphone Inputs are designed to connect to such microphones.
- Pre-polarized measurement microphones typically use the +24 V CCP (constant current power) system, which can be provided by the APx1701. See Microphone Powering on page 42.
- TEDS data can be read from TEDS-enabled microphones connected to an APx1701 unbalanced microphone input. See TEDS data on page 43.
- If the microphone requires a proprietary power supply (typical of measurement microphones that require a polarizing voltage) connect the audio output from the power supply to an unbalanced microphone input, using

high-quality shielded microphone cable.

Balanced Microphone Inputs

- Most professional recording and sound reinforcement microphones have a balanced audio output, typically provided on an XLR connector. The XLR Balanced Microphone Inputs are designed to interface directly with professional recording or sound reinforcement microphones.
- Solidstate condenser microphones typically use the +48 V phantom power system, which can be provided by the APx1701. See Microphone Powering on page 42.
- Unpowered professional microphones, such as dynamic or ribbon microphones, can be connected to the balanced inputs and operated with the phantom power off.
- If the microphone requires a proprietary power supply (typical of tube/valve microphones) connect the audio output from the power supply to a balanced microphone input, using high-quality shielded balanced microphone cable.

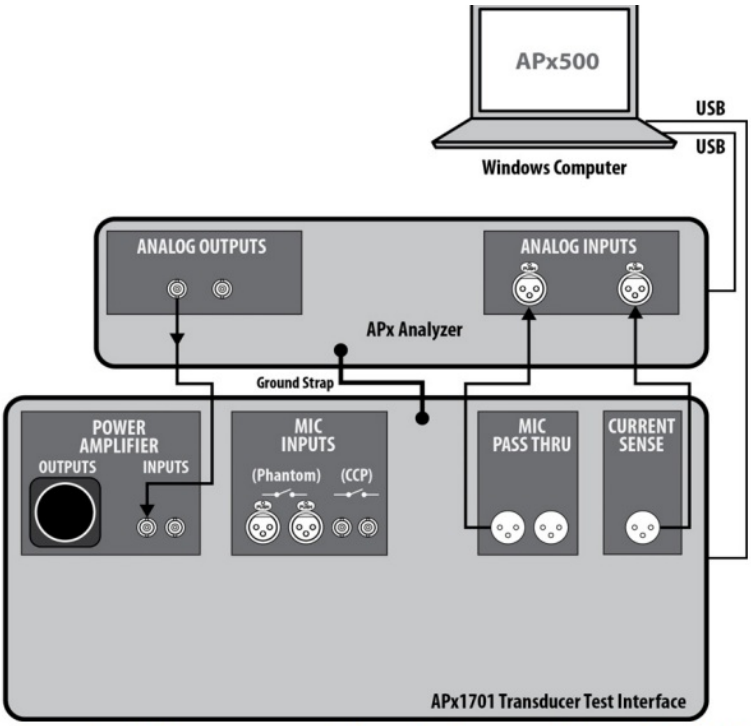
Testing with the APx1701

The APx1701 Transducer Test Interface is intended for use with an APx500 Series analyzer and APx500 measurement software. We will look at some typical test cases, beginning on page 38.

System connections

- In all cases shown, the APx1701 must be connected to the APx500 analysis system, including the PC running the measurement software and the analyzer instrument hardware.
- The connection to the PC is accomplished by a USB 2.0 connection between the PC and the APx1701.
- The audio connections between the analyzer and the APx1701 are accomplished using one or two unbalanced shielded BNC-to-BNC cables, and one, two or three balanced shielded XLR-to-XLR cables. Typically, one or two analyzer unbalanced analog outputs are connected to the APx1701 amplifier inputs, and one or two of the APx1701 microphone outputs (pass thru) are connected to the analyzer balanced analog inputs. For impedance tests, the
- APx1701 current sense output must also be connected to an analyzer balanced input.
- Additionally, a low-resistance ground strap should be connected between the chassis grounds of the APx analyzer and the APx1701.

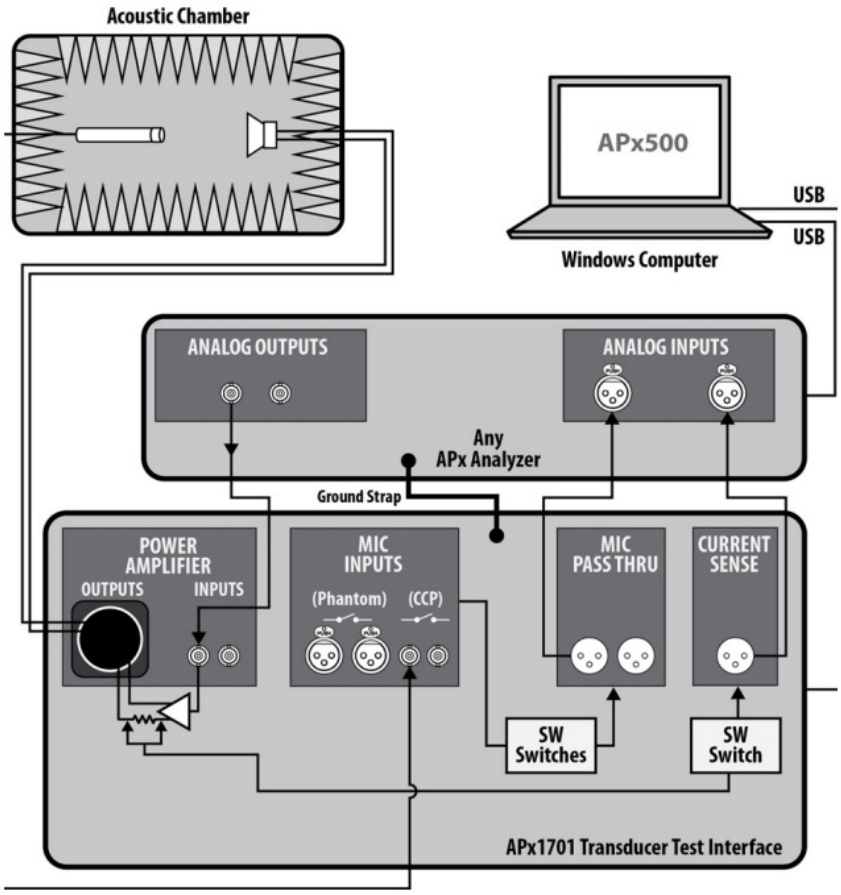
APx1701/APx analyzer system interconnections



Typical interconnection between the APx1701 and an APx analyzer, using one amplifier channel, one microphone channel and current sense.

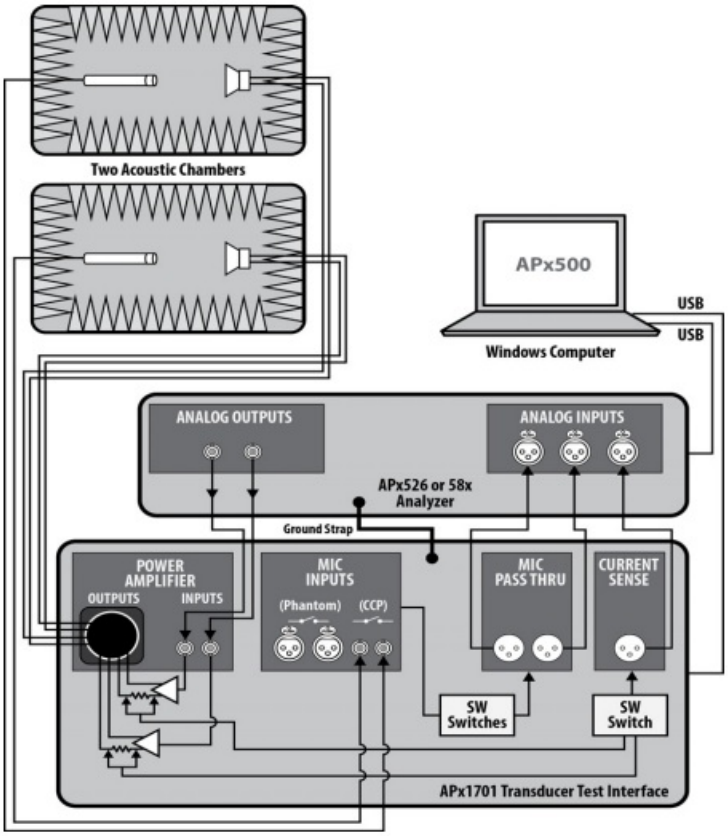
Testing a loudspeaker driver

- Mount the loudspeaker driver, and connect it to the APx1701 amplifier output channel 1 (pins 1+ and 1– on the SpeakON connector). See Amplifier Output Connection below. Mount the measurement microphone on a microphone stand, and connect it to the APx1701. See Microphone Connections on page 36.
- In many cases you may want to place the driver and the microphone in an acoustic chamber with a specified distance between them; for demonstration purposes, you can place them in close proximity in an ordinary, quiet room.
- In the APx500 software, set the Signal Path I/O to Transducer Interface, and run the Acoustic Response measurement. You will see a number of results, including frequency response, group delay and rub-and-buzz.
- Impedance/Thiele-Small measurements are optional, and require the Current Sense connection shown in the diagrams.



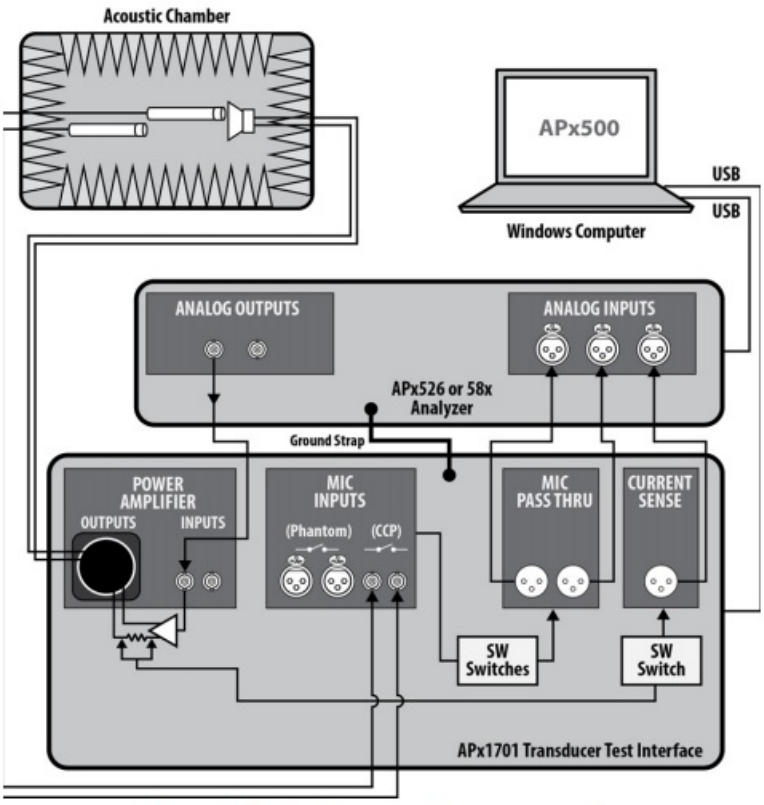
Simplified diagram for acoustic testing and impedance measurement of a loudspeaker driver.

Testing two loudspeakers simultaneously



Simplified diagram for acoustic testing and impedance measurement of two loudspeaker drivers.

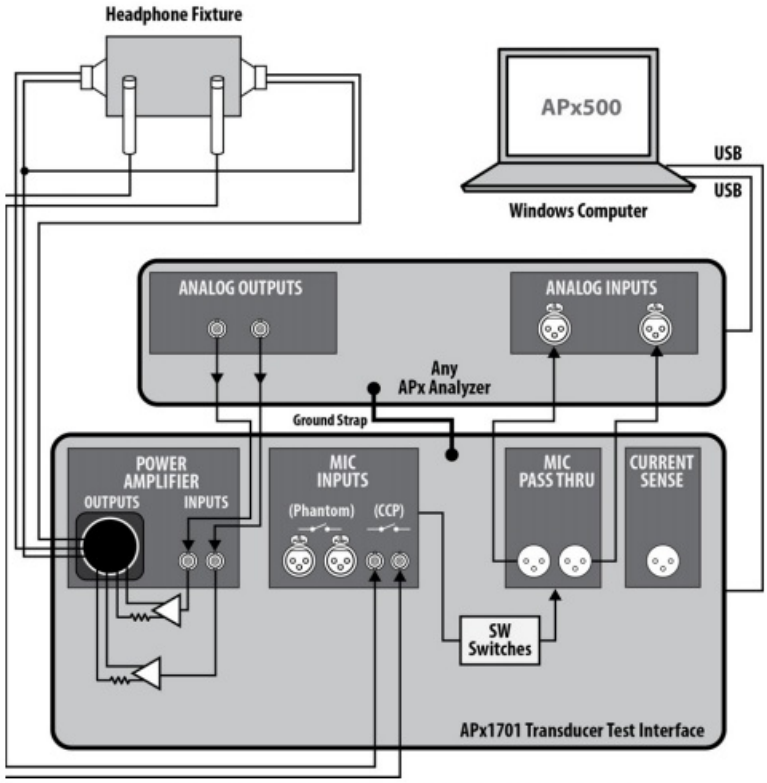
Testing a loudspeaker (near field/far field)



Simplified diagram for acoustic testing and impedance measurement of a loudspeaker driver using near- and far-field microphones.

Testing headphones

- Mount the headphones to a fixture, and connect the APx1701 amplifier output channels to the headphones.
- Typically, headphones use a TRS (tip-ring-sleeve) plug, and you should make an adapter cable to accommodate this. See the illustration on page 36. Mount the measurement microphones in the fixture, and connect them to the APx1701. See Microphone Connections on page 36.
- In the APx500 software, set the Signal Path I/O to Trans-ducer Interface, and run the Acoustic Response measurement. You will see a number of results, including frequency response, group delay and rub-and-buzz.
- Headphones often have impedance curves that do not relate well to Thiele-Small models, and do not provide conventional impedance results. However, in production quality assurance, the impedance test can reveal TRS jack fatigue or failure, often a problem in a busy production environment.
- The higher impedance of headphones can result in noisy impedance curves. You can smooth such curves using the Smooth Derived Result in APx500.

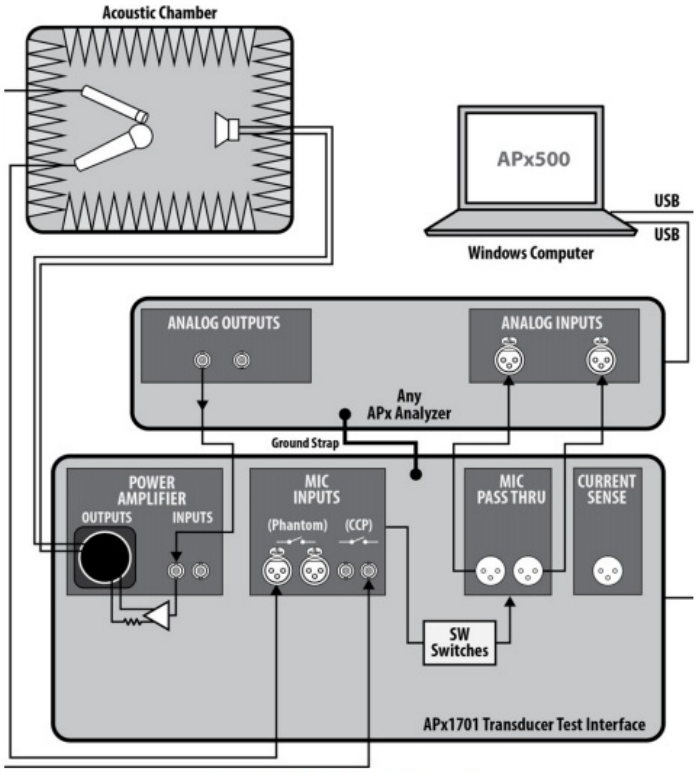


Simplified diagram for acoustic testing of stereo headphones using a headphone fixture.

Comparing two microphones

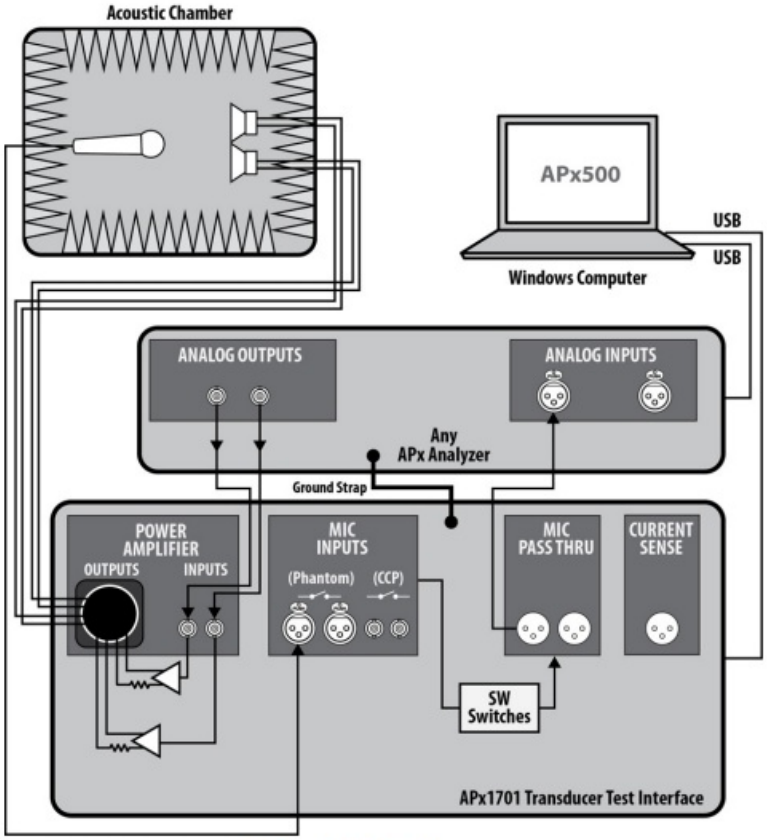
- Conveniently mount a full-range loudspeaker, and connect it to the APx1701 amplifier output channel 1 (pins 1+ and 1– on the SpeakON connector). See Amplifier Output Connections on page 35. Mount the microphone to be tested (DUT) on a microphone stand, and connect it to the APx1701. See Microphone Connections on page 36.
- In the APx500 software, set the Signal Path I/O to Trans-ducer Interface, and run the Acoustic Response measurement.
- Alternatively, you can mount both the DUT mic and a measurement mic in close proximity, using two input channels and comparing the microphone results.

- A further technique to evaluate microphone distortion is to use two loudspeakers, feeding each a different tone, and performing an IMD test on the microphone output, as shown in the following illustration. This will provide a microphone distortion result, with a minimal contribution of distortion from the loudspeaker.



Simplified diagram for testing a professional microphone in comparison to a measurement microphone.

- Testing a microphone with split IMD signals



Simplified diagram for testing a professional microphone using the 2-channel IMD method.

Microphone Powering and the APx1701

Condenser microphones (also called capacitor micro-phones) use a capacitor as the transducer element. All condenser microphones require powering of some sort. Some designs need a polarizing voltage for the transducer element, and all designs need power for the small amplifier and associated circuitry attached to the transducer.

Measurement microphone CCP powering

- Measurement microphones that are prepolarized (using an electret condenser for the transducer element) are typically powered by a constant current supply (CCP) power system. The APx1701 can provide +24 Vdc CCP power at 4 mA to such microphones when connected to the unbalanced microphone inputs.
- Measurement microphones that require a polarization voltage for the transducer element are typically fitted with a multipin connector and are provided with a proprietary power supply from the manufacturer. The APx1701 can use such microphones, but cannot power them. You must provide a power supply.

Studio microphone phantom powering

- Condenser microphones designed for recording and sound reinforcement applications are typically balanced devices, and use a powering system called phantom power.
- A phantom powered microphone may be prepolarized, or may develop the polarization voltage internally from the phantom power. The APx1701 can provide +48 Vdc phantom power to such microphones when connected to the balanced microphone inputs.

TEDS data

- Some measurement microphones and other transducers store Transducer Electronic Data Sheet (TEDS) information that can be read by connected devices. The Audio Precision APx1701 Transducer Test Interface can read data from TEDS 0.9 and TEDS 1.0 microphones connected to either of the unbalanced microphone inputs. This data is passed to the APx500 software via the USB connection for display, reporting, and entry into calibration dialogs.
- For R&D testing, these data are used as datasheet values in calibration reports. For production testing in controlled production setups and environments, the TEDS data can be used in lieu of actual calibration values. For best accuracy, it is recommended that microphone sensitivity be measured using an external acoustic source such as a pistonphone.
- TEDS is described in detail in the IEEE 1451 family of standards.

APx1701 Self-Test

- Audio Precision offers a diagnostic software program called SelfTest.exe, which interrogates the attached hardware and guides the user through a series of procedures to verify the performance of many of the analyzer functions and circuits.
- Go to the Audio Precision Web site and download the APx500 Series Self-Test from the Software: Utilities, Projects & Macros section at **ap.com**.
- When used with an APx analyzer, it is possible to run SelfTest.exe to verify the performance of the APx1701. However, since the APx1701 power amplifier must be measured with a load, the SLFT-1701 Self-Test Fixture is required.
- The SLFT-1701-KIT can be ordered from your sales representative.
- The SLFT-1701-KIT provides the required SpeakON, BNC and XLR cables and two 8 Ω load resistors mounted in a small enclosure, the SLFT-1701 Self-Test Fixture.

The SLFT-1701 Self-Test Fixture

The SLFT-1701 should only be used with an APx-1701 and APx analyzer, using the dedicated Audio Precision self-test program, SelfTest.exe. The SLFT-1701 should only be used with this dedicated test.

WARNING! DO NOT TOUCH

- The surface of the SLFT-1701 will get hot during normal use.
- MONITOR THIS ACCESSORY WHILE IN USE.

DO NOT EXCEED THIS RATING

- Maximum power dissipation is 5 watts per channel.
- Use of this accessory beyond maximum power rating will result in hazardous surface temperatures and create a risk of burn injuries or fire.
- Do not place on combustible surface while in use.
- This accessory should only be used by qualified and trained professionals familiar with power amplifiers, high voltage and the potential for elevated temperatures in this equipment.

Documents / Resources

	AP APx1701 Transducer Test Interface [pdf] User Guide APx1701, APx1701 Transducer Test Interface, APx1701, Transducer Test Interface, Test Interface, Interface

References

- Audio Analyzers & Testing: Audio Precision | The Global Leader
- Audio und Medientechnologien
- User Manual