

# Modular Signal Conditioners

## 440 SERIES MODULAR MULTI-CHANNEL SIGNAL CONDITIONERS

**Problem:** The Modal Shop Inc., a division of PCB Piezotronics, needed to develop a product that would make it easier for their customers to do large channel count signal conditioning for large modal tests.

The Modal Shop provides tools and equipment to perform large channel count test to determine the vibration characteristics of large structures. For example, aircraft manufactures will place thousands of accelerometers on a new aircraft to determine the vibration patterns of the aircrafts. Each of these accelerometers requires signal conditioning.

In the past, multi-channel signal conditioning was limited to only 8 channels per unit. This required a large number of units to handle the requirements of a large test. The Modal Shop contacted SDL to develop a high density signal conditioning unit.

SDL handled the complete project, from preliminary designs through initial production. SDL worked with TMS to turn informal descriptions of the desired product into written specification. From this specification, a flexible modular system architecture was defined. Two specific modules were then selected for the initial development, a 16-channel signal conditioning module, and an 8-channel multiplexing module.

Detailed specifications for each of these modules were developed. Signal conditioning specifications proved challenging. Broadband noise was required to be below 150  $\mu$ V RMS from 0.5 – 30kHz, and all hostile cross talk had to be less than 80 dB. The modules also had to be controllable from a central host computer. In addition, the central host computer had to be able to detect over-loads on channels and control multiplexing of the channels.



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SDL developed these two modules that meet all of the required specs, developed prototypes for validation of the design, obtained the required CE certifications and managed the initial production of final units.

**Solution:** The PCB 440 Series of modular signal conditioners is a flexible, compact solution for acceleration, sound pressure, and force sensor signal conditioning. The modular architecture allows great flexibility and scalability for users who may add or change testing capabilities in the future. The system adds or varies capability by the selection of signal conditioning modules that conform to the 440 series standard for form factor, power consumption, and digital communication. Chassis themselves can be linked together, further expanding the system's scalability.