

## **Frequently Asked Questions About TMS TEDS**

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**Is TEDS an approved standard?**

Yes, TEDS is IEEE standard 1451.4, 2004.

You can find out more information from the following website:

<http://standards.ieee.org/regauth/1451/FAQs.html>

**What is the “state of the union” for TEDS?**

TEDS sensors have been shipping from PCB and in use within select transducers since 1999. The pre-ballot version of the standard was known as P1451.4, and utilized only the RAM portion of the TEDS memory. Now that the standard has been balloted and approved, PCB, The Modal Shop and other manufacturers are moving towards supporting the use of the ROM portion of the TEDS memory.

**What is The Modal Shop’s progress on new TEDS?**

The Modal Shop expects to release updated library and end-user (PC only) forms of TEDS support software in Q1 of 2006. This capability will include both pre-ballot and approved versions of the standard, and include support for the private LMS Geometry formats.

**What is the rest of the industry doing on new TEDS?**

All major piezoelectric sensor manufacturers are progressing towards support of balloted 1451 versions. Many data acquisition system manufacturers are also supporting the 1451.4 standard. It is primarily customer driven, and proceeding at various rates within the individual companies.

**What is the road map for progress to "completion" of TEDS?**

The Modal Shop plans to release a support library and PC software version 1451 and P1451 compliant capability in Q1 2006.

**Can I keep my P version TEDS?**

Yes, there is no reason, if you have a functional system, to migrate from the P version. Make sure that when you order new transducers you specify in which format you wish your TEDS to be written – P1451, LMS, or 1451. Our primary importance is to understand that it is NOT ABSOLUTELY NECESSARY to move to the “balloted” version format. What is important is to maintain compatibility with your DAQ software, and your calibration software. It does NO GOOD to purchase sensors with new formats, or upgrade transducer formats if your DAQ software will not read these formats.

**Is there anything like version compatibility?**

This is up to the DAQ supplier software, but The Modal Shop and other sensor suppliers are encouraging backwards compatibility, for example, that DAQ software recognizes when the ROM is being used.

**What about the software for my PCB power supply that reads TEDS?**

The Modal Shop’s 440 software (supporting the PCB 440 series signal conditioning hardware platform) will be updated to support IEEE format sometime in Q1 2006.

**What about my DAQ system's software to read TEDS?**

Consult your DAQ system supplier as to which formats they support, and version compatibility.

**If I want to use Write once space (ROM) what are my options? (in-field options)**

The Modal Shop's 400B76 TEDS interface software kit (expected release in Q1 2006) is anticipated to permit you to read from a sensor's current format, and rewrite them using ROM space. Otherwise, return your sensor to the factory or The Modal Shop's calibration facility, and specify that you wish to have the TEDS format upgraded to IEEE1451.

**If I want to use Write once space (ROM) what are my options? (at-factory options)**

Specify to the PCB factory which format you wish to have written.

Note that at this time LMS' private version DOES NOT use the ROM.

**What products are available to help me?**

The Modal Shop currently offers the 400A76 that supports P and LMS versions. The 400B76, expected release in Q1 2006, will support P, LMS and IEEE 1451. This TEDS sensor support kit is designed to provide full TEDS sensor read/write capability from a PC interface, and includes software and dongle hardware. Additionally, the 400A89 and 400A88 TEDS support products are also available from either PCB or The Modal Shop.

**Who should I contact if I have questions on TEDS?**

You can find out more information from the following website:

<http://standards.ieee.org/regauth/1451/FAQs.html>,

or contact an application engineer at The Modal Shop.

**Roughly how many people are using TEDS?**

From 1999 through 2005, PCB has shipped an estimated 20,000 sensor channels supporting TEDS, mainly accelerometers and microphones, to hundreds of customers. TEDS has also been included with force sensors, impedance heads, impact hammers and pressure transducers. Many major data acquisition vendors support TEDS sensors within their hardware and software, including National Instruments, Larson Davis, LMS, B&K, VXI Technologies, LDS-Dactron and Data Physics.

The current sensor manufacturer ID list is at:

[http://standards.ieee.org/regauth/1451/manufacturerID/Public\\_Listing.html](http://standards.ieee.org/regauth/1451/manufacturerID/Public_Listing.html)

**Are there any compelling examples of where TEDS is being successful?**

An excellent example in the automotive industry is the NVH laboratory at the Daimler Chrysler Germany facility. They use thousands of TEDS equipped and retro-fitted transducers to minimize equipment setup and cabling time.

A good example in the aerospace industry is ATA in southern California. The former SDRC research and consulting group outside of San Diego, ATA is recognized as a leader in large channel, modal/GVT and experimental testing, and has published several application notes and conference papers on the implementation of TEDS in large multi-channel test systems.

**Are there any mistaken applications of TEDS?**

The best example of "mistaken" but useful application of TEDS is "TEDS in a tube" where PCB offers an in-line "TEDS tube" model 070A70 and 070A71 to retro-fit legacy ICP sensors. As long as the sensor and the 070A7x stay mated, there is no problem, and it is a highly useful and inexpensive solution. Strictly speaking, this is an example of misuse of the TEDS standard and intent given the capacity to separate the digital

memory from the analog sensor it identifies, opening greater potential for human error in sensor bookkeeping.

**Sensor vendors are onboard, but is it a standard with all DAQ manufacturers?**

See the list above for known DAQ manufacturers. Understand that this list is certainly incomplete, and please contact the DAQ manufacturer of interest regarding specific TEDS support capability.

**How do I configure the contents of TEDS? -- at the sensor manufacturer?**

Specify to the sensor manufacturer what format TEDS you want at the time of order, typically IEEE1451, P1451, or LMS format.

**How do I configure the contents of TEDS? -- with my DAQ system?**

DAQ system manufacturers have typically implemented support to read TEDS sensors. Many have not implemented write capability within the DAQ system hardware and software. It is recommended to contact the DAQ manufacturer directly regarding this capability. If the DAQ system provider does not support write capability, products exist, like the 400A76 from The Modal Shop, that allow in-field configuration of TEDS content.

**How do I configure the contents of TEDS? --on my own w/custom capability?**

Specify to your sensor manufacturer that you want the TEDS "blank", and use your own tools. If you want a starting point, we suggest visiting the Dallas/Maxim 1-wire website for tools. Be sure that if you are writing something other than a "standard" TEDS, that you set the "private" format bit. The Modal Shop offers software libraries (model KTEDS005) available to support your custom TEDS support capability.

**What can I write in my TEDS? -- What are the formats / their use / benefits?**

You can find out more information from the following website:  
<http://standards.ieee.org/regauth/1451/FAQs.html>

**What can I write in my TEDS? -- What are the specific contents of each format?**

You can find out more information from the following website:  
<http://standards.ieee.org/regauth/1451/FAQs.html>

**How will I benefit from TEDS? -- overall reasons for creation of TEDS**

TEDS was created with a vision of "plug and play" for sensors. There are several compelling reasons, but the two most significant are:

- 1.) Rather than depending upon printed calibration certificates, TEDS allows for sensitivity data to be read directly from the sensor.
- 2.) With large multi-channel test system, TEDS automates channel bookkeeping, eliminates cable tracing, simplifies troubleshooting and greatly reduces the potential for errors or confusion accordingly.

**What is the front-running application for TEDS?**

High channel count modal is currently the most obvious and direct benefactor of TEDS. Customers who have TEDS spend much less time tracing sensor cables and entering sensitivity data and geometry information stored directly on-board the transducer. Depending upon the format chosen and its implementation within the DAQ system, TEDS sensors can be programmed with sensitivity, measurement location, and/or geometry information, then, at data acquisition time, the application software can query

the sensor, and determine what measurement location is actually connected to what channel of the DAQ.

**Can I change the contents of TEDS?      RAM**

Yes. The 400A76 (and the 400B76, expected release in Q1 2006) allows full read/write capability of the P and LMS formats. The 400A75, now obsolete, only allowed write capability of the “user” portion of the TEDS memory. Calibration systems may rewrite the calibration section.

**Can I change the contents of TEDS?      ROM**

No, once it has been written, it is permanent.

**Can I change the formats of TEDS?      RAM**

Yes, but only if it is a P1451 or LMS private version format to begin with. Once the ROM has been written using 1451, the format of TEDS is fixed and frozen.

**Can I change the formats of TEDS?      ROM**

No, once it has been written, it is permanent.

**Is there any databasing ability w/ TEDS?**

Not explicitly defined by IEEE1451. This is a function of external DAQ or user software.

**Is there any capability for a customer to create a sensor database?**

This is specific to the DAQ application software. The Modal Shop’s 440 series and 400A76 software can export to CSV format or text format files, compatible with database software. Some data format conversion may be necessary.

**Is there a database of all template formats?**

You can find out more information from the following website:  
<http://standards.ieee.org/regauth/1451/FAQs.html>

**What about the NI virtual TEDS database?**

Refer to the National Instruments website for further information.

**How long does TEDS take? - read RAM-write RAM-read ROM-write ROM**

The basic node of a TEDS part consists of 256 bits, communicated at 10-100k bits per second, so much less than 25ms per sensor. The communication speed is actually DAQ system dependent, but up to 100k bits per second is normal. Some DAQ systems require ½ second “settling” time when switching between ICP® and TEDS modes.

**How long does TEDS take? - practical read time on multi-channel systems**

This is a complicated question, and depends on the degree of “parallelism” in the multi-channel system hardware, and it’s communication interface to the host PC. The PCB 440 series multi-channel ICP signal conditioning system consists of 16 channel modules, up to 8 modules per rack. The 440 software reads the TEDS information in channel pairs in parallel across all modules in the rack. Therefore, this system reads 16, 32, up to 128, with the same speed, less than 1 minute per rack.