



MICRO-MINIATURE TRI-AXIAL ACCELEROMETER UNIT

MICROTAU™

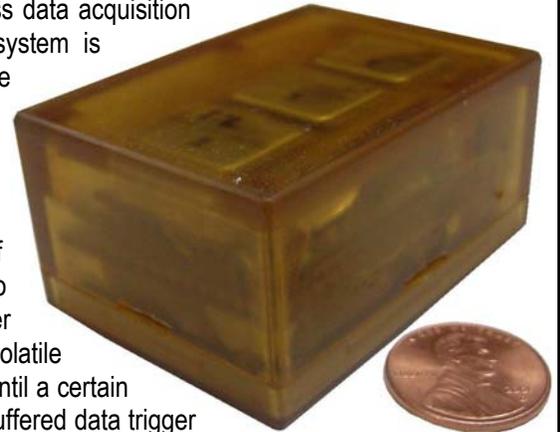
INVOCON, INC.

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The Complete *Wireless* Tri-Axial Accelerometer

The Micro-Miniature Tri-Axial Accelerometer Unit (MicroTAU) system is a wireless data acquisition network for dynamic acceleration sensing and recording applications. The system is composed of MicroTAU Remote Units, a MicroTAU Receiver Unit, and the Graphical User Interface (GUI).

The **MicroTAU Remote Unit** (pictured at right) is a small, battery-powered, autonomous, wireless device designed for trigger initiated acquisition and recording of acceleration data. The units have three internal accelerometers, each having a different axis of measurement (note the three accelerometers in the top of the pictured MicroTAU). Each unit can be wirelessly programmed for two consecutive acquisition events. The user selects the trigger threshold and trigger axis, and allocates to both events a portion of each channel's 9 minutes of non-volatile memory. Prior to acquisition, the units *sleep* in a low-power consumption mode until a certain time set by the user. Then, the MicroTAU Remote Unit will enter into a circular buffered data trigger mode sampling at 250 Hz. Upon completion of the first programmed event sequence, the unit will repeat the process with the second set of event parameters. Finally, the unit will re-enter the low-power consumption mode to wait for a wireless data download command from the user. Download and event setup commands are issued through the **MicroTAU GUI** running on a PC. The **MicroTAU Receiver Unit** connects to the PC via a standard RS-232 serial port.



The MicroTAU system has another feature that allows **synchronized acquisition** ($\pm 30\mu\text{s}$ @ 250Hz) between multiple units. The user can select one unit as the synchronization master and one or more others as slaves. When the master unit triggers, it begins to transmit synchronization pulses to the slave units. The slaves trigger like normal and adjust their sampling time to the pulses received from the master. Data downloaded from the various units is saved as synchronous data in the GUI.

The MicroTAU system was designed for NASA and successfully flown on the Shuttle flights starting in 2001 to detect vibrations of components during launch and landing. For the NASA application, the second acquisition event had a special feature that allowed the units to detect re-entry of the Shuttle. Internal to each MicroTAU unit is a **pressure sensor**. The user has the option of using this sensor to detect atmospheric pressure changes before entering the second event trigger stage.

Other applications where the triggered initiation capability may be appropriate are aircraft, engines, gearboxes, industrial equipment, and other components that experience random vibration events. The added pressure trigger feature could be useful in detecting vibrations on landing gears and other components that experience changes in pressure.

Specifications

DATA ACQUISITION RATE	250 Hz
SYNCHRONIZATION	$\pm 30\mu\text{s}$ @ 250Hz between units
SENSORS	3 internal accelerometers each sensing a different axis
INTERNAL TEMPERATURE	10-bit A/D with quarter degree C resolution
POWER	Battery powered, 2.8-4.0V input range
OPERATING TEMPERATURE RANGE	-35°C to +85°C (Reduce battery life by 50% when continuous operation at -35°C.)
BATTERY LIFE	80 cumulative hours of active data acquisition or trigger mode
MEMORY	9 cumulative minutes of data from each channel can be stored in non-volatile memory
PACKAGING	Snap enclosure (pictured) with replaceable internal battery—5.6cm x 4.1cm x 2.8cm Ruggedized housing in current development

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System specifications subject to change without notice.

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