



MODAL IMPACT HAMMERS



- Compatible with standard ICP[®] Signal Conditioners
- Variety of hammer tips provided so excitation content can be tailored to object under test
- Extender mass included with all models except with large hammers (086D20 & 086D50)
- Modal Tuning insures the hammer's structure does not influence the measurement
- TEDS models available - typically used in high channel count & roving hammer applications

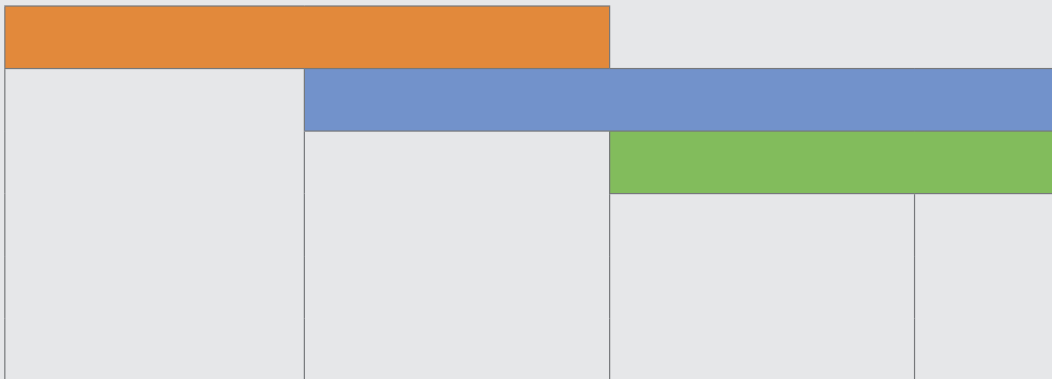
Each PCB[®] Modally Tuned[®], ICP[®] instrumented impact hammer features a rugged, force sensor that is integrated into the hammer's striking surface.

The force sensor provides a measurement of the amplitude and frequency content of the energy stimulus that is imparted to a test object. Accelerometers are used in conjunction with the hammer to provide a measurement of the object's structural response due to the hammer blow.

Using multi-channel data acquisition and analysis software, the test engineer is able to ascertain a variety of mechanical properties leading to an understanding of an object's structural behavioral characteristics. Items analyzed can include resonance detection, mode shapes, transfer characteristics, and structural health – such as crack and fatigue detection.

TYPICAL APPLICATIONS

- Circuit Boards, processors & memory modules
- Small Machined Components: impellers, lightly damped panels/frames
- Medium Structures: car frames, engines, & small electric motors
- Heavier Devices: pumps, compressors, weldments, impellers
- Heavy Devices: large weldments, propellers
- Building foundations



SPECIFICATIONS

| Model Number | 086E80 | | 086C01 | | 086C02 | | |
|--------------------------------|-------------------------|-----------|-------------------------------|------------------|-------------------------------|-----------|--|
| | English | SI | English | SI | English | SI | |
| Performance | | | | | | | |
| Sensitivity (±15%) | 100 mV/lbf | 22.5 mV/N | 50 mV/lbf | 11.2 mV/N | 50 mV/lbf | 11.2 mV/N | |
| Measurement Range | ±50 lbf pk | 222 N pk | ±100 lbf pk | ±444 N pk | ±100 lbf pk | ±444 N pk | |
| Resonant Frequency | ≥100 kHz | | ≥15 kHz | | ≥22 kHz | | |
| Non-Linearity | ≤1 % | | | | | | |
| Electrical | | | | | | | |
| Excitation Voltage | 20 to 30 VDC | | | | | | |
| Constant Current Excitation | 2 to 20 mA | | | | | | |
| Output Impedance | <100 Ohm | | | | | | |
| Output Bias Voltage | 8 to 14 VDC | | | | | | |
| Discharge Time Constant | ≥100 sec | | | ≥500 sec | | | |
| Physical | | | | | | | |
| Sensing Element | Quartz | | | | | | |
| Sealing | Epoxy | | | | | | |
| Hammer Mass | 0.17 oz | 4.8 gm | 0.23 lb | 0.10 kg | 0.34 lb | 0.16 kg | |
| Head Diameter | 0.25 in | 6.3 mm | 0.62 in | 1.57 cm | 0.62 in | 1.57 cm | |
| Tip Diameter | 0.10 in | 2.5 mm | 0.25 in | 0.63 cm | 0.25 in | 0.63 cm | |
| Hammer Length | 4.2 in | 107 mm | 8.5 in | 21.6 cm | 8.5 in | 21.6 cm | |
| Electrical Connection Position | Side | | | Bottom of Handle | | | |
| Extender Mass Weight | 0.044 oz | 1.25 gm | 0.9 oz | 25 gm | 2.6 oz | 75 gm | |
| Electrical Connector | 5-44 Coaxial | | | BNC Jack | | | |
| TEDS Model Available | | | | | | | |
| | N/A | | TLD086C01 | | TLD086C02 | | |
| Included Accessories | | | | | | | |
| | Calibration Certificate | | Calibration Certificate | | Calibration Certificate | | |
| | 018G10 Cable | | 081B05 10-32 Mounting Stud | | 081B05 10-32 Mounting Stud | | |
| | 080A109 Petro Wax | | 084A06 Extender Mass | | 084A08 Extender Mass | | |
| | 084A13 Extender mass | | 084B03 Hammer Tip, Hard SS | | 084B03 Hammer Tip, Hard SS | | |
| | 084A14 Handle, plastic | | 084B04 Hammer Tip, Medium | | 084B04 Hammer Tip, Medium | | |
| | 084A17 Handle, aluminum | | 084C05 Hammer Tip, Soft | | 084C05 Hammer Tip, Soft | | |
| | 084A28 Impact cap | | 084C11 Hammer Trip, Very soft | | 084C11 Hammer Trip, Very soft | | |
| | | | 085A10 Tip Cover | | 085A10 Tip Cover | | |

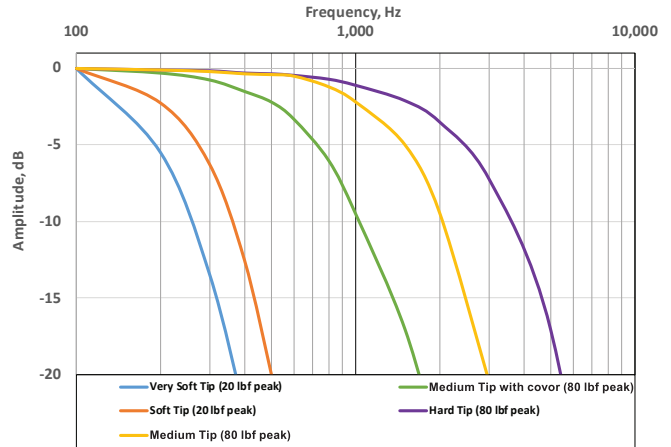
| 086C03 | | 086C04 | | 086D05 | | 086D20 | | 086D50 | |
|-------------------------------|-----------|-------------------------------|------------|------------------------------|--------------|---------------------------------|--------------|---------------------------------|--------------|
| English | SI | English | SI | English | SI | English | SI | English | SI |
| 10 mV/lbf | 11.2 mV/N | 5 mV/lbf | 1.1 mV/N | 1 mV/lbf | 0.23 mV/N | 1 mV/lbf | 0.23 mV/N | 1 mV/lbf | 0.23 mV/N |
| ±500 lbf pk | ±444 N pk | ±1000 lbf pk | ±4448 N pk | ±5000 lbf pk | ±22,240 N pk | ±5000 lbf pk | ±22,240 N pk | ±5000 lbf pk | ±22,240 N pk |
| ≥22 kHz | | | | | | ≥12 kHz | | ≥5 kHz | |
| ≤1 % | | | | | | | | | |
| 20 to 30 VDC | | | | | | | | | |
| 2 to 20 mA | | | | | | | | | |
| <100 Ohm | | | | | | | | | |
| 8 to 14 VDC | | | | | | | | | |
| ≥2000 sec | | | | | | ≥1400 sec | | ≥2000 sec | |
| Quartz | | | | | | | | | |
| Epoxy | | | | | | Hermetic | | | |
| 0.34 lb | 0.16 kg | 0.34 lb | 0.16 kg | 0.7 lb | 0.32 kg | 2.4 lb | 1.1 kg | 12.1 lb | 5.5 kg |
| 0.62 in | 1.57 cm | 0.62 in | 1.57 cm | 1.0 in | 2.50 cm | 2.0 in | 5.1 cm | 3.0 in | 7.6 cm |
| 0.25 in | 0.63 cm | 0.25 in | 0.63 cm | 0.25 in | 0.63 cm | 2.0 in | 5.1 cm | 3.0 in | 7.6 cm |
| 8.5 in | 21.6 cm | 8.5 in | 21.6 cm | 9.0 in | 22.7 cm | 14.5 in | 37 cm | 35 in | 89 cm |
| Bottom of Handle | | | | | | | | | |
| 2.6 oz | 75 gm | 2.6 oz | 75 gm | 7.0 oz | 200 gm | Not Available | | | |
| BNC Jack | | | | | | | | | |
| TLD086C03 | | TLD086C04 | | TLD086D05 | | TLD086D20 | | TLD086D50 | |
| Calibration Certificate | | Calibration Certificate | | Calibration Certificate | | Calibration Certificate | | Calibration Certificate | |
| 081B05 10-32 Mounting Stud | | 081B05 10-32 Mounting Stud | | 081B05 10-32 Mounting Stud | | 084A60 Hammer Tip, Very soft | | 084A31 Hammer Tip, Soft | |
| 084A08 Extender Mass | | 084A08 Extender Mass | | 084A09 Extender Mass | | 084A61 Hammer Tip, Soft | | 084A32 Hammer Tip, Hard plastic | |
| 084B03 Hammer Tip, Hard SS | | 084B03 Hammer Tip, Hard SS | | 084A50 Hammer Tip, Very soft | | 084A62 Hammer Tip, Medium | | | |
| 084B04 Hammer Tip, Medium | | 084B04 Hammer Tip, Medium | | 084A51 Tip Adaptor | | 084A63 Hammer Tip, Hard plastic | | | |
| 084C05 Hammer Tip, Soft | | 084C05 Hammer Tip, Soft | | 084B03 Hammer Tip, Hard SS | | | | | |
| 084C11 Hammer Trip, Very soft | | 084C11 Hammer Trip, Very soft | | 084B04 Hammer Tip, Medium | | | | | |
| 085A10 Tip Cover | | 085A10 Tip Cover | | 084C05 Hammer Tip, Soft | | | | | |
| | | | | 085A10 Tip Cover | | | | | |

PROPER IMPACT HAMMER USE:

Multiple hammer tips - allows tailoring of the impact pulse to frequencies of greatest interest. Increased durometer / hardness of tip provides for higher frequency content as shown in graphic to the right. Increasing the hammer speed (magnitude of impact) does not change excited frequencies and may cause adverse tip wear. Replacement tips are available but should not be required under normal use.

Single tap / double tap - Modal analysis benefits from the cleanest possible input, which is not as easy as it sounds. Practice swinging the hammer prior to data capture with the most direct impact possible and the least chance of secondary impacts (double tap). That will minimize the need for post-capture data filtering. Also note that items under test should be supported but not constrained - supports can provide damping.

During initial setup, confirm the measurement system is functioning properly. It is good practice to avoid the upper half of the measurement range to leave room for individual impulse variation. Impulse data with flat peaks can indicate saturation of measurement chain.



MODELS 333B30 / 333B40 / 333B50 MODAL ACCELEROMETERS

SINGLE AXIS CUBE WITH 10-32 COAXIAL CONNECTOR

- Low noise minimizes error in modal analysis
- Quartz sensing element
- Stud mounting for excellent mechanical coupling, UNF & metric studs included



MODEL 485B39 PORTABLE ICP® SIGNAL CONDITIONER

DUAL CHANNEL INTERFACE FOR ICP® SENSORS TO A POWERED USB PORT

- Makes high quality measurement more accessible
- Pocket-sized, ICP® sensors to USB signal converter
- Digitized data, 24-bit analog to digital converter



MODEL 482C24 FOUR CHANNEL, ICP® SIGNAL CONDITIONER

LINE POWERED FOR ICP® SENSORS AND IN-LINE ICP® CHARGE CONVERTERS

- Front panel keypad/display & RS-232 remote interface
- Adjustable gain with AC/DC coupling modes
- TEDS sensor support



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TM-FRQ-Impact-Hammers-0220



MTS Sensors, a division of MTS Systems Corporation (NASDAQ: MTSC), vastly expanded its range of products and solutions after MTS acquired PCB Piezotronics, Inc. in July, 2016. PCB Piezotronics, Inc. is a wholly owned subsidiary of MTS Systems Corp.; IMI Sensors and Larson Davis are divisions of PCB Piezotronics, Inc.; Accumetrics, Inc. and The Modal Shop, Inc. are subsidiaries of PCB Piezotronics, Inc.