


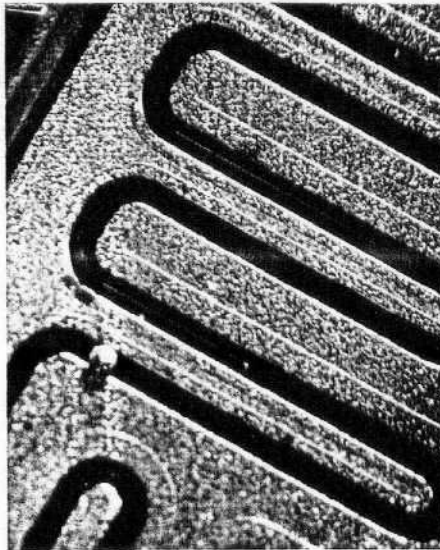
PARTICLE IMPACT NOISE DETECTION
Sound Technology for Electronics Reliability Testing




PIND TESTERS, INC.

*F*or over twenty years, PIND TESTERS, INC.'s products have given users a simple, reliable and inexpensive method of Particle Impact Noise Detection (PIND) testing of electronic components.

Our non-destructive acoustic emission test monitors for loose particles inside high-reliability electronic components such as transistors, hybrids, integrated circuits, switches and relays—particles that have the potential of causing short circuits and serious malfunctions in systems operations.



Particles like this 4 mil ball inside a TO5 chip can cause serious malfunctions in electronic components.

The PTI Test System

ADVANCED TECHNOLOGY THAT'S EASY TO USE

Our PTI Model 4501A, featured on the cover, is the most advanced system available today. Combining sensors that monitor and display the shaker motion with feedback control to correct for any changes in test conditions, the PTI test system generates accurate and repeatable test conditions. Its ultrasensitive, ultrasonic (155 kHz) sensor can detect particles as small as 1 mil impacting the package cavity.

You'll be amazed at how quick and easy it is to program and reprogram the 4501A to your own internal specifications—or to meet rigorous military standards.

The microprocessor technology allows the user to program up to 29 steps within the allowable g level to simulate the whole range of testing requirements.

The operator simply enters the desired g level of shock and specifies either vibration frequency or cavity height. The PTI system then calculates the appropriate frequency and generates the proper shaker motion—automatically.

In fact, our system is so easy to use, your operator will be comfortable with the system within the first hour—and quite competent in just a few hours.

UNIQUE FEATURES OFFER CONVENIENCE AND FLEXIBILITY

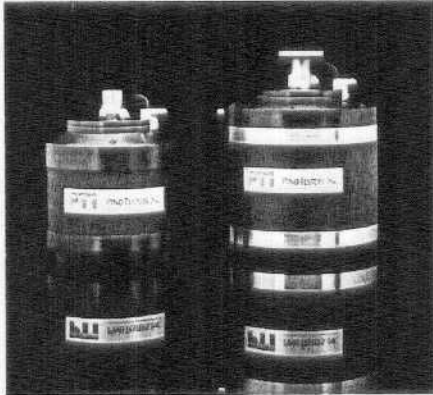
Whether you're testing electronic components for cardiac pacemakers, manned spacecraft or undersea telephone cables, you'll enjoy the convenience and flexibility of the special features which set our system apart:

- The PTI Model 4501A is the only system that meets or exceeds military standards (U.S. MIL-STD-883C Method 2020.6 and MIL-STD-750C Method 2052).
- The PTI system is consistent and accurate—an imbedded accelerometer monitors testing and feedback control circuits correct the shaker motion.
- The PTI Model 4501A feedback control circuits ensure repeatable and consistent shock levels by controlling the velocity of the shaker head prior to impact.
- The PTI system is fully programmable—allowing the user to enter different g levels as well as vibrations at different frequencies.
- The PTI 4501A shaker automatically steps through programmed sequences with the touch of a button—or optional foot pedal.
- Total test sequence time is user programmable to your own company specifications or as required by MIL standards.

PROGRAMMABLE SOFTWARE FOR MORE VERSATILITY

The PTI system can be tailored to your specific test requirements through the versatility of our specially-designed and thoroughly-tested software—PROMs (Programmable Read Only Memories). With our pre-programmed software (MPP), you can store up to nine pre-programmed shock sequences which the system can deliver on demand.

The low-frequency PROMs (LFP) allow testing at frequencies as low as 25 Hz, at reduced g level, as well as an assortment of relay, hybrid and discreet component testing. And if additional tests are required, we can alter the software to meet your specifications.



Our larger Model 4501-M200 shaker is designed for heavier payloads.

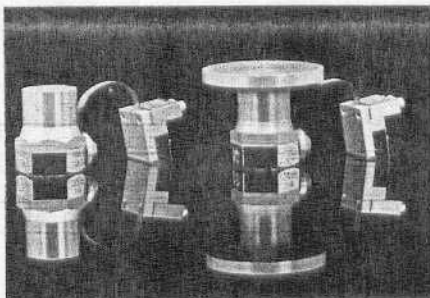
Service and Replacement Parts

ENHANCEMENT PRODUCTS FOR GREATER TESTING OPTIONS

Our basic PTI Model 4501A system can also be upgraded with a number of special enhancement products designed to give you greater testing options:

- **MODEL 4501X** - If you'll need to test heavier payloads than the 55 gram maximum allowable test specimen for our basic unit, our Model 4501X system offers a larger shaker which can handle components up to 175 grams.
- **MODEL 4501L** - For testing the larger flat packages, our Model 4501L system offers the larger shaker with a larger sensor which can accommodate a package up to 50mm x 100mm.

In addition, we can supply you with two different coupling options: precut double-sided dots or high-viscosity acoustic couplant.



Two different sensors to accommodate electronic components of all shapes and sizes.

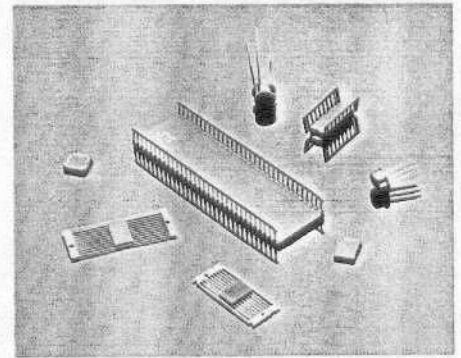
PREVENTATIVE MAINTENANCE SAVES TIME AND MONEY

To ensure that your PIND system is always performing at its peak, PIND TESTERS, INC. has developed a comprehensive preventative maintenance program. Our program offers complete system diagnostics, repairs and exchanges. All with the accuracy provided by complete calibration and certification for all system components traceable to the National Bureau of Standards.

Military standards (U.S. MIL-STD-45662A) require that each system - including sensors, amplifiers, thresholds and display monitors - is calibrated annually. However, PIND TESTERS, INC. recommends that your system is serviced once every six months as a consistent routine maintenance program can reduce costs over the long haul.

The PTI preventative maintenance program includes all calibration and repairs including cable and circuit checks for minute defects as well as complete disassembly, cleaning and precision alignment of the shaker.

We then issue a 30-day warranty - or extended warranty if you prefer. And we offer priority five-day service when your PIND system is something you just can't do without.

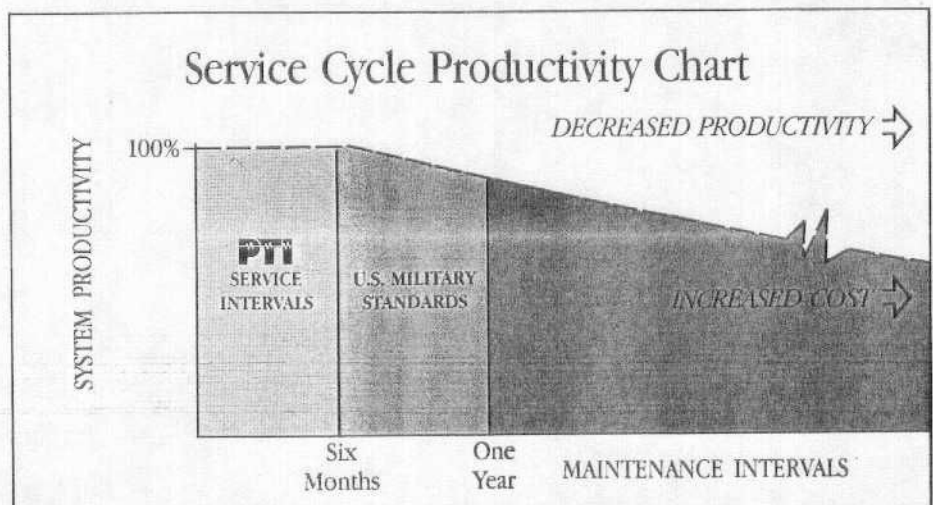


PIND TESTERS products can test the entire range of electronics packages.

TRAINING TAILORED TO YOUR SPECIALIZED NEEDS

PIND TESTERS, INC. also provides a complete training program for users at all levels of experience. Our comprehensive, two-day training seminars explain the intricacies of systems operations, testing methods, particle behavior, calibration procedures, failure analysis, repair and maintenance procedures, and the latest military specifications.

These seminars, consisting of lectures by experts and hands-on laboratory sessions, are conducted at PTI headquarters in Irvine, California. Or, if you prefer, we will provide an on-site training program at your location - tailor-made according to the specialized needs of your company.



Timely preventative maintenance ensures system reliability and productivity over the long haul - and keeps maintenance costs down.

Quality, Reliability and Service

PIND TESTERS, INC. has been the largest and most respected developer of PIND testing systems since our first system was delivered in 1969. And its no wonder. Customers at electronics installations around the world depend on PTI products every day.

That's because PIND TESTERS, INC. is committed to the highest quality and highest cost performance. In fact, design improvements in direct response to user feedback have kept PTI at the leading edge of PIND technology for more than two decades.

SPECIFICATIONS

PRE-SHOCK AND CO-SHOCK

Amplitude	200 to 2,000 g
Program Resolution	100 g
Pulse Width	Less than 100 μ sec

VIBRATION

Time	0.1 to 25.5 sec
Time Program Resolution	0.1 sec
Amplitude	0.1 to 20.0 g
Amplitude Program Resolution	0.1 g
Frequency	40 to 250 Hz
With Low Frequency Option	25 to 250 Hz
Frequency Program Resolution	1.0 Hz

MAXIMUM ALLOWABLE TEST

SPECIMEN LOAD	55 grams (With heavy duty shaker, 175 grams)
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IMPACT SENSOR ACTIVITY	-77.5 \pm 3 dB re 1 volt per μ bar at 155 kHz
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ACCELEROMETER SENSITIVITY	2.10 pc/g \pm 10% at 100 Hz
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STU SENSOR SENSITIVITY	-77.5 \pm 3 dB re 1 volt per μ bar at 155 kHz
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THRESHOLD DETECTOR	Factory-preset (Specify either MIL-STD-883 or MIL-STD-750)
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NOISE LEVEL	Less than 10 mV, peak
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OUTPUTS

Oscilloscope	10 V, peak
Audio	Integral speaker
Impact Indicators	Light-emitting diodes
Monitor Output	10 V, peak

EXTERNAL STU PULSER OUTPUT	250 μ V \pm 20%
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POWER REQUIREMENTS	Selectable: 100, 120, 200, 220 or 240 VAC \pm 10% at 50 to 60 Hz
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POWER CONSUMPTION	175 watts
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DIMENSIONS

Control Unit:	5.25" high x 17.0" wide x 18.5" deep (13cm x 43cm x 47cm)
Standard Shaker:	6" dia. x 6" high (14cm x 14cm)
Heavy Duty Shaker:	7" dia. x 7" high (17.78cm x 17.78cm)
Oscilloscope:	5.25" high x 8.5" wide x 18" deep (13cm x 22cm x 46cm)
	(Rack mount available for scope and control unit.)

WEIGHT

Control Unit	30lb. (11 kg)
Standard Shaker	15lb. (7 kg)
Heavy Duty Shaker	30lb. (14 kg)
Oscilloscope	17.5lb. (8 kg)
S140 C/A Sensor/Accelerometer	65 grams
S140 C/AL Sensor/Accelerometer	100 grams

ORDERING INFORMATION

YOUR MODEL 4501A WILL COME COMPLETE WITH:

- Model 4501-100068 Microprocessor-Based Controller (*Control Unit*)
- Model 4501-M100 Shaker
(For Maximum Test Specimen Load of 55 grams)
- Model E090-4501 Oscilloscope
- Model 100-S140C/A Impact Sensor/Accelerometer
- Model 110-SCM4 Cables (3) (Y, B & R)
- CH02-AC-LPD Acoustic Couplant (5 oz)
- Model 100-S140BM STU Sensor
- Model 4501-500065-A External STU Pulser
- E990-0010 Shaker Dust Cover
- W080-0330 AC Power Cable
(For Controller)
- W080-0610 Interconnect Cable
(Controller to Oscilloscope)
- W080-0210 Shaker Drive Cable
(Connector to Shaker)
- LT-4501 Operation and Maintenance Manual

OPTIONS

- Model S900-0119 Remote Foot Switch
- Model 4501-R-118 Rack Frame for Display Oscilloscope and mounting hardware for 4501 Controller
- Model 4501-M200 Heavy Duty Shaker
(For Maximum Test Specimen Load of 175 grams)
- Model 4501-CALKIT Calibration Kit
Special-purpose PROMs
(Programmable Read-Only Memories) such as these:
 - LFP Low Frequency PROM set for relay testing
 - MPP Multiple-Program PROM preprogrammed with your most commonly used test programs
 - DDP 25, 50 or 75 detection delay PROM for delay of time to start of detection

Because of our commitment to continued product development, PTI reserves the right to modify these specifications without notice

MODEL 4501A PIND TEST SYSTEM

VIBRATION SPECIFICATIONS:

Frequency Range	40 to 250 Hz, Sinusoidal
Optional Low Frequency Program	Maximum Amplitude Protection varies with Frequency, 25Hz
Frequency Resolution	1 Hz
Time	0.1 to 25.5 Second per Program
Time Program Resolution	0.1 Second
Amplitude	0.1 to 20.0 'G' Peak
Amplitude Program Resolution	0.1 'G'
Repeatability	0.5 'G' Peak, with Feedback Control
D.U.T. Weight	Maximum 150 Grams over the entire range Maximum 175 Grams at 60 Hz

SHOCK SPECIFICATIONS:

Method	Feedback Control of Shaker Armature Adapts Shock to D.U.T. Weight
Amplitude	Programmable 200 to 2000 'G'
Program Resolution	100 'G'
Repeatability	Within 50 'G'
Pulse Width	<100 Microsecond at 50% Amplitude 100-180 Microsecond at 10% Amplitude
Shock Delay	Settling time after Shock Programmable from 25 to 250 Msec
D.U.T. Weight	Amplitude falls slightly with load Maximum Capacity 150 Grams with 1000 g Amplitude (May require Programmed value to be increased)

MAXIMUM WEIGHT SPECIFICATION:

Shaker Limitation	300 Grams
Vibration Limitation	150 Grams w/ Sensor
Shock Limitation	150 Grams may require increasing Program Value

ELECTRICAL SPECIFICATIONS:

Power requirements	Selectable 100,120,220,240 VAC +/-10% at 50 or 60 Hz
Power Consumption	Maximum 300 Watts
Power Amplifier Rating	Maximum Dynamic Load 80 Watts RMS
Acoustic Detection Circuitry	60 dB Gain +/- 2 dB
100-200 kHz Band pass	
Threshold	Two Levels Switch Selectable, Factory Preset
Outputs:	
Acceleration Display	16 Digit LED
Frequency Display	16 Digit LED
Threshold Crossing Indicator	A Detect LED lights on Impact A Fail LED Lights and stays lit on failure
Shock Level Display	16 Digit LED
Oscilloscope	10 V, Peak
Audio	4 Watt Internal Speaker
Monitor Output	10 V, Peak

IMPACT SENSOR SPECIFICATIONS:

Sensitivity	-77.5 dB +/- 3 dB re 1V per Microbar at 155 kHz Measured using ANSI 2.1-1988, Underwater Reciprocity
Cable	Integral Three Conductors fully shielded Flex Cable
EMI Protection	Full Faraday Shield including all cabling

MODEL 4501A PIND TEST SYSTEM

100-S140C/A.

Number of Crystals

One in center with 0.75 inch detection circle

Diameter

22 mm (0.875 in)

Weight

60 Grams

ACCELEROMETER SPECIFICATIONS:

Sensitivity

2.1 pc/G +/- 10% at 100 Hz

Physical

Located Inside Impact Sensor

STU SENSOR SENSITIVITY

-77.5 dB +/- 3 dB ref 1V per Microbar at 155 kHz

Measured using ANSI 2.1-1988, Underwater Reciprocity

EXTERNAL STU PULSER OUTPUT 250 microvolts +/- 20%

PHYSICAL SPECIFICATIONS:

Control Unit

13cmX43cmX47cm(5.25X17.0X18.5in)

Display Scope

13cmX22cmX46cm (5.25X8.5X18in)

M120 Shaker

14cm High X 14cm Dia (6 X 6 in)

SYSTEM INCLUDES:

4501-100068

Main Chassis with Microprocessor Programmable Control
Power Amplifier, and Display

4501-M120

15 Force-Pound PIND Vibration and Shock Shaker

4501-820171

Software including

Vibration Amplitude Automatic Adjustments

Adjustable Shock Delay Timing 25-250 Millisecond

Dual Switchable Adjustable Thresholds

High Resolution X-Y Monitor Oscilloscopes

22 mm diameter surface Impact Sensor/Accelerometer

with One (1) Detection crystal, 0.75 in detection circle in center

Low Noise BNC-Microdot Cables

Sensitivity Test Unit (STU)

External STU Pulsar Box

Associated Cables

Operation/Maintenance Manual

#UPDATE3-4501

E090-4501

100-S140C/A

(3) 110-SCM4

100-S140BM

4501-500065A

7080-0210, 0330,0610

T-4501