

INTRODUCING TEKTRONIX/ENVIRONMENTAL LABORATORIES





Our expert staff is dedicated to providing unchallengeable testing, understandable results and professional advice on how to correct failures.

Experience is the hallmark of the engineers and technicians of a staff that includes internationally recognized experts known throughout the industry for their understanding of environmental testing disciplines. Their professionalism assures you straightforward answers to your testing questions.

Professionals plan, execute and document results for you. Tests are performed in accordance with U.L., CSA, FCC, IEC, ASTM, VDE and most military standards. In addition, we will design tests to your specifications.

Complete integrity of test equipment is maintained through a rigorous schedule of maintenance and submission to qualified calibration laboratories. The calibration of the instrumentation and equipment used in the labs is traceable to the National Bureau of Standards.

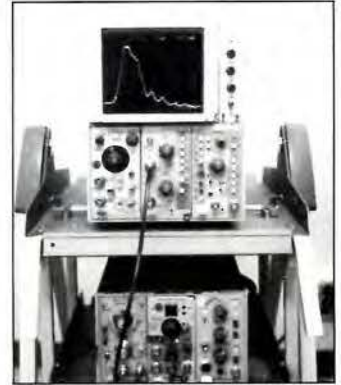
The Environmental Labs are part of a standard-setting organization. The world renowned quality of Tektronix oscilloscopes has been tested in these labs for over 40 years. As part of Technology and Operations in the Instruments Group at Tektronix you can be sure that we can test equipment on the leading edge of technology.



The labs are organized into four areas of concentration: **Electromagnetic Lab** examines radiated and conducted emissions and susceptibility and also provides electrostatic evaluations. Site evaluations and open field measurements are also performed.

Atmospherics Lab has facilities to simulate several atmospheric environments of concern to the electronics industry including temperature, humidity and altitude.

Dynamics Lab performs vibration, shock and transportation induced dynamics testing as well as miscellaneous mechanical life cycle tests, component bending test, force measurements, product safety and U.L. tests.



Reliability Lab takes time into account with long-term studies performed on products exposed to hot, humid, dry heat and vibration environments. Mean time between failures, mean time to fail and failure prediction values are generated.

No other environmental laboratory in the western U.S.A. has the capability, expertise and commitment to excellence you will find here at Tektronix. These labs, the guardians of quality at Tektronix, are now available to you.

Take a "walk" through the following pages. You'll see the people, the equipment and the pride of each of the environmental labs.

Then, come visit us in person.



ELECTROMAGNETIC

Our E.M.C. Staff tests for emission, susceptibility and even provides on-site testing.

The Electromagnetic Compatibility Lab:

- Radiated Emissions
- Conducted Emissions
- Radiated Susceptibility
- Conducted Susceptibility
- Automated Testing
- Anechoic Chamber
- Shielded Room
- X-Ray Emissions
- Field Site Surveys

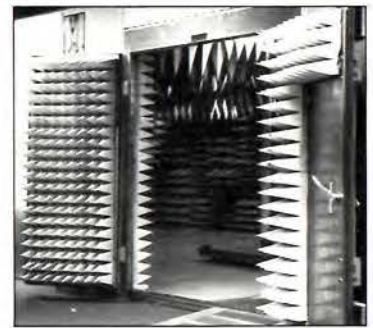
ELECTROMAGNETIC EMISSIONS



Electromagnetic emission testing for instruments or systems is conducted in our large anechoic chamber or open field site.

Capabilities include:

- Anechoic Chamber
- Automated Testing
- Radiated Emissions
- Conducted Emissions
- FCC & VDE Testing
- Mil. Std. Testing
- Field Site Evaluations



ELECTROMAGNETIC SUSCEPTIBILITY

Susceptibility Testing is conducted in a shielded room via remote control. Video cameras are used to monitor the item under test.



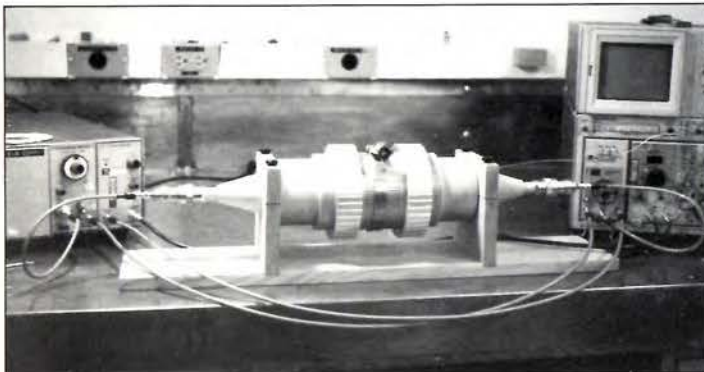
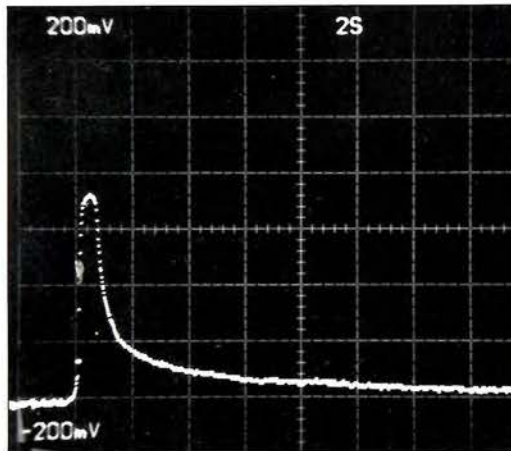
ELECTROSTATIC EVALUATION



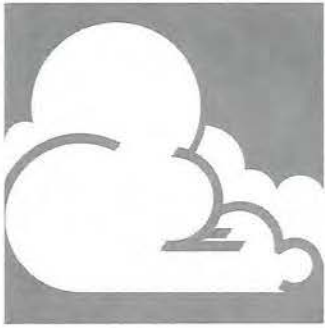
Surface resistance, static generation and static dissipation tests are performed on a wide range of materials and products.

We perform:

- Static Generation Tests
- Static Dissipation Tests
- Surface Resistance Tests
- Anti-Static Product Evaluation
- Site Evaluation



HUMIDITY



ATMOSPHERIC

The Atmospheric Lab has the facilities to accurately simulate atmospheric environments.

Tests conducted include:

- Programmed Humidity
- Programmed Temperature
- Humidity/Sulfide
- Temperature/Altitude
- Humidity/Corrosion
- Salt Fog
- Ultraviolet Rays
- U.L. Flammability Tests
- Burning Oil Test
- Contact Resistance
- Insulation Resistance



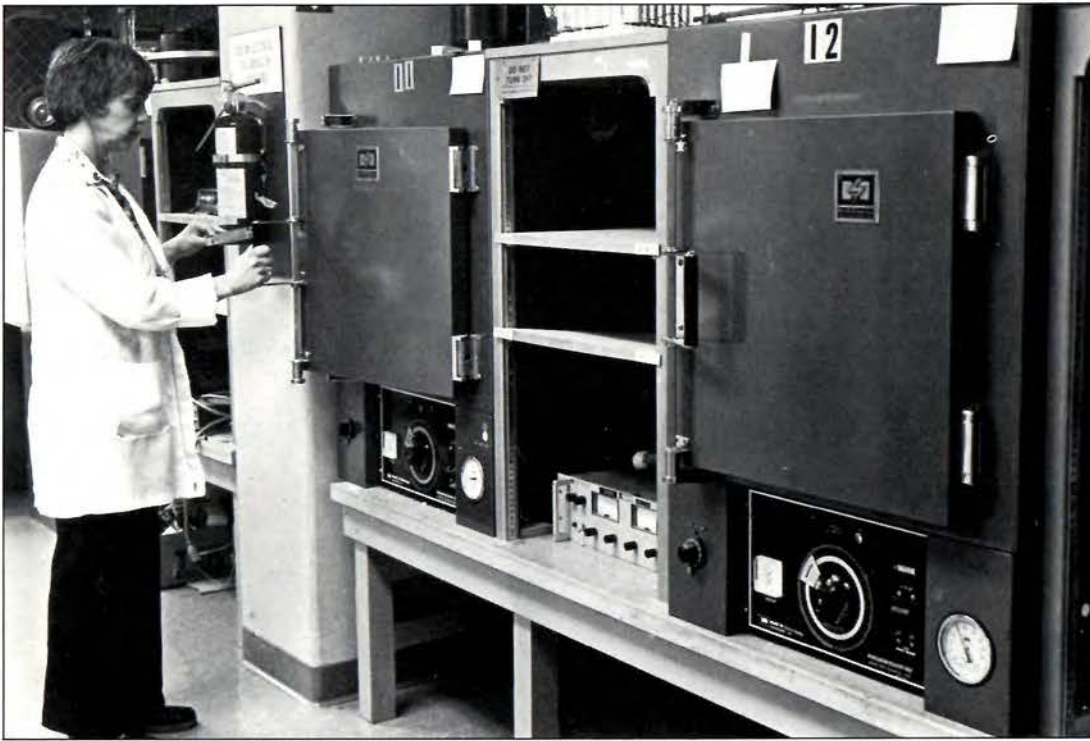
Programmable humidity chambers are capable of covering a wide range of temperature and humidity combinations.

Custom humidity profile plans are written for your individual needs.

Tests conducted include:

- Programmed Humidity
- 45 to 98% R.H.
- Component Storage
- Humidity/Corrosion
- Humidity/Sulfide
- Mil. Std. Testing

TEMPERATURE



A wide range of programmable temperature chambers are available to accommodate your requirements.

The Temperature Lab regularly tests for:

- Temperature Cycling
- Long-Term Storage
- Temperature/Altitude
- Mil. Std. Testing



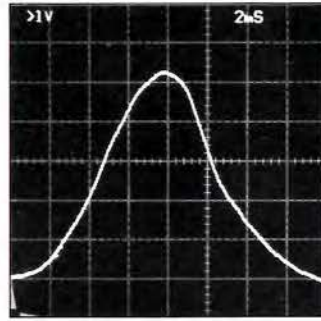
DYNAMICS

Equipment capable of monitoring and capturing a wide range of vibration, shock and mechanical measurement data is provided in the Dynamics Lab facility.

Tests conducted include:

- Sine Vibration
- Random Vibration
- Cargo Bounce
- Package Drop
- Mechanical Shock

MECHANICAL SHOCK



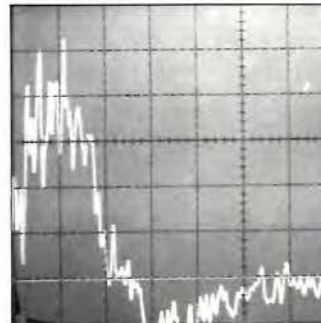
Mechanical Shock testing at Tek Environmental Labs includes:

- Instruments up to 150 g, 11 msec.
- Components up to 3000 g, .5 msec.
- Response Acceleration Monitoring
- Digital Storage of Shock Waveforms
- Military Transit Drop Test
- Mil. Std. Testing



Two free fall shock machines are capable of testing a wide range of instrument sizes and weights. Accelerometers are available for monitoring shock response on the test item. Waveforms are stored in a digital oscilloscope.

PACKAGE EVALUATION



Cargo bounce and package drop tests simulate the vibration and rough handling that must be endured by products in the course of normal shipping.



Tests performed include:

- Cargo Bounce
- Package Drop Test
- Acceleration Monitoring
- Displacement Measurements of Item in Package

VIBRATION



Random Vibration Table Capable of:

- Sine Vibration
- Random Vibration
- 6000 Force Lbs.
- 5 to 2000 Hz.
- 1 in. Max. Displacement
- 36 in. Diameter Table
- Digital Control
- Response Acceleration
- Synchronized Strobe

High Frequency Vibration System Capabilities are:

- Sine Vibration
- Random Vibration
- 250 Force Lbs.
- 10 to 5000 Hz.
- 1 in. Max. Displacement
- 6 in. Square Table
- Max. Load 20 Lbs.
- 4 Programmable Channels
- Portable Strobe
- Response Acceleration

Mechanical Vibration Table features:

- Sine Vibration
- 3 Single Axes
- 10 to 100 Hz.
- 36 in. Square Table
- Max. Load 200 Lbs.
- 10 G Max Limit
- 0.1 in. Max. Displacement
- Synchronized Strobe



MECHANICAL LIFE CYCLING



Tensile strength, force measurement and drop tests as well as others are performed in the mechanical life cycle section of the Dynamics Lab.

We evaluate:

- Mech. Life Cycling
- Product Safety
- U.L. Mechanical
- Force Measurement



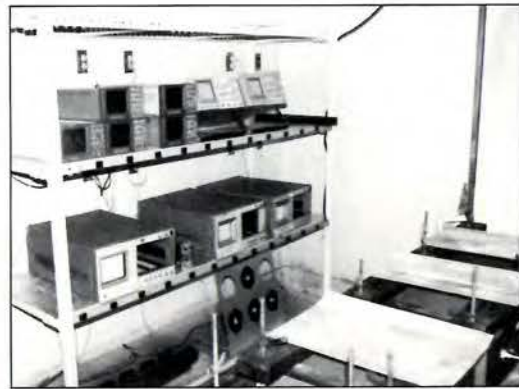
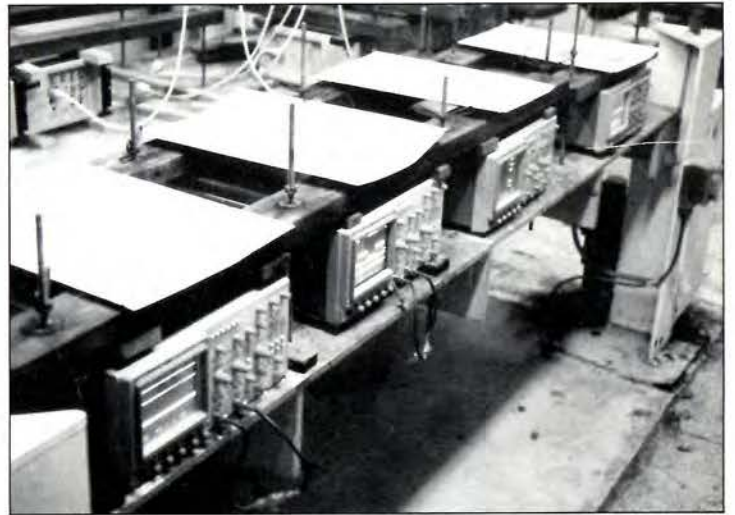


RELIABILITY

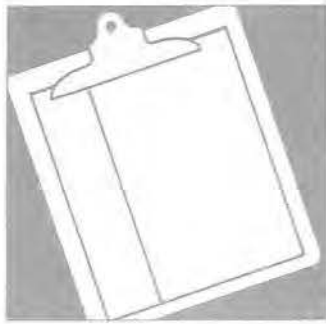
The Reliability Lab generates mean time to fail and failure prediction values and stores that information in an easily accessible data base.

We regularly perform:

- A.G.R.E.E. Testing
- Part Stress Analysis Prediction
- Parts Count Reliability Prediction
- Component and Instrument Testing



Testing facilities include an elevated temperature and humidity room and an elevated temperature room. Both have vibration machines and instrument power cycling equipment.



SPECIAL

We tailor Special Services to meet your specialized testing needs.

The Hughes Probeye Series 4000 Infra-red Thermal Video System provides real time temperature maps of objects displayed in up to 16 colors with each color assigned to a different temperature range. The system features an isotherm windowing display, freeze action, zoom capability, emissivity adjustment, cross hair cursors with temperature readout, and automatic range controls.

This system is a very useful tool for developing new product introduction graphics as well as troubleshooting hot spots in existing products. The system has a temperature measurement range from -20 to +1500 degrees centigrade, with temperature resolution as fine as 0.1 degree.

The high-speed color video system is capable of recording at 200 fields per second and plays back at 100 fields per second. The system includes a camera on a tripod, portable recording system, and lighting equipment. Playback can be in standard speed, variable slow motion, and still frames. This system is very useful in troubleshooting machine failures.

The Bruel and Kjaer integrating sound level meter system is capable of measuring and recording sound pressure levels in octave, and 1/3 octave bands over the audible range (20 to 20 kHz.). The system also measures sound power levels, maximum peak, sound exposure levels, and performs hearing loss risk or noise annoyance determinations. The system is very useful in measuring machine and instrument noise.

ENVIRONMENTAL LABORATORIES SUMMARY OF CAPABILITIES

Climatic Environments:

Programmed Temp.	-75 to +250 Deg. C.
Programmed Humidity	45 to 98% R.H.
Humidity/Sulfide	3 to 10 p.p.m. Sulfide.
Altitude/Temperature	Ambient to 50,000 ft. at Ambient to +55 Deg. C.
Salt Fog	1 to 20% NaCl Solution
Corrosion and Outclassing of Materials	In Hot Humid Conditions
Ultraviolet Rays MIL. STD., U.L. & C.S.A. Tests	Approximates ASTM-D1501

Dynamic Environments:

Vibration Sine or Random	6000 Force Lbs.
Transportation	50 to 2 kHz.
	1 in. p-p @ 5 Hz.
Vibration Shock Halfsine	Max. 3000 G's, .5 msec.
Military Transit Drop	Max. 32 in. Drop Ht.
Package Drop Test	Max. 48 in. Drop Ht.
Component/Materials Mech. Eval. Tests MIL. STD., Product Safety, and U.L. Tests	

Electromagnetic Interference:

Radiated & Conducted Emissions Testing	Per Military Standards
	Per F.C.C. & V.D.E. Standards
Radiated & Conducted Susceptibility Tests	Per MIL., & F.D.A. Stds.
X-Ray Emission Measurements	Per ANSI/EIA Stds.
Site Surveys	Interference Measurements, Shielding effectiveness Per MIL. STD. 285
Electrostatic Discharge test on products and Systems Electrostatic Evaluation of Materials	Static Generation Meas. Static dissipation Surface Resistivity

Reliability Demonstration:

A.G.R.E.E. Tests	Per MIL. STD-781B
Part Stress Analysis Predictions	Per MIL-HDBK-217D
Parts Count Reliability Prediction	Per MIL-HDBK-217D
Component and Instrument Testing	Per MIL-HDBK-217D Goals

Special Services:

Sound Level Measurements	2 to 70 kHz. Freq. Range
High-Speed Color	200 Fields Per. Sec.
Infra-Red Thermal Video Scanning	-20 to +1500 Deg. C.

To find out more or schedule a visit to the Tektronix Environmental Labs, contact:

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For further information, contact:

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