

# EVA-625

## The World's Standard of Measurement . . . Elevator Ride Quality, Vibration & Sound

### ***Ride Quality Measurement & Analysis for the Elevator/Escalator Industry***

Physical Measurement Technologies' EVA-625 Elevator Vibration Analysis system and EVA Vibration Analysis Tools software has quickly become the global standard for the measurement of elevator and escalator ride quality, and vibration & sound. Designed to meet international standards for the recording and analysis of elevator and escalator vibration and sound, only the EVA system allows all elevators and escalators to be measured, analyzed, and documented absolutely, easily and at a **Very Low Cost**. Through continuous refinement & enhancement, the EVA system remains the product of choice for the measurement and analysis of elevator/escalator ride quality, and vibration & sound, while PMT has become the world's number 1 supplier of high accuracy instrumentation for the vertical transportation industry.

- **Quantify Elevator/Escalator ISO18738 Ride Quality**
- **Measure Acceleration/Deceleration, Speed, Jerk**
- **Identify & Locate Rail & Joint Misalignment**
- **Diagnose Bad Roller Guides**
- **Document Pre/Post Modernization Changes**
- **Evaluate Safety & Buffer Tests**
- **Troubleshoot Sheave, Ropes, Counterweight**
- **Assess Drive & Controller Function**
- **Document Elevator Performance Baseline**
- **Year to Year Elevator Operation Comparison**



### ***Elevator & Escalator System Quality Control, Diagnosis, & Inspection***

Elevator ride quality is a first indicator of quality design, installation, and service. The EVA system includes powerful tools to assist in quality improvement in all areas of the elevator mechanical and control system. The highly accurate response of the EVA system, and the analysis capabilities offered by the EVA Vibration Analysis Tools software allow technician to engineering level personnel to rapidly identify problem areas and perform corrective actions. Only the EVA system provides the ability to measure the vibration and sound that people feel and hear and analyze the broad-band vibration and sound that is the result of the function of all dynamic aspects of the elevator system. With a little practice, problems with roller guides, rail joints, motor control systems, and other dynamic elements can be identified in minutes and repairs targeted precisely. Quality of installation and service can be improved dramatically. Because of the simplicity of the EVA system and the information that is returned, the EVA-625 offers unmatched capabilities as an inspection and fast survey tool. The condition of the elevator can easily be compared year after year.

# PMT

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***The Absolute Measure of Elevators and Escalators***

# **EVA-625 Overview**

## ***Ride Quality Measurement & Analysis for the Elevator Industry, Inspection, QC***

The EVA system was created specifically to meet the needs of the elevator and escalator industry worldwide. Designed using the latest technology and continuously upgraded & improved, the EVA system is the first real standard for quantitative measurement of acceleration and sound level data, and the absolute determination of Ride Quality & diagnosis of elevator system problems. The broad response of the EVA-625 allows diagnosis of mechanical & control elements of elevator and escalator systems. Failing and worn assemblies can be identified before breakdowns occur and safety is compromised. **The EVA-625 should be a big part of your Total Quality System.**

**High Accuracy Acceleration and Sound Measurement, at Low Cost** - The EVA system is designed to be highly accurate in the short and long term. The EVA-625 is the first production instrument designed for the elevator industry that conforms to international standards for the measurement of elevator vibration and sound. The EVA system architecture (Division of Data Collection & Analysis) ensures against obsolescence and reduces costs. By separating the data analysis from the instrument, software upgrades keep the system current and on the leading edge of elevator/escalator analysis.

## **EVA System Highlights**

### **EVA-625**

- **Ride Quality Measurement & Diagnostic Tool for Elevator Service, Analysis, & Inspection**
- **Highly Accurate, Broad Band 3 Axis Acceleration With Frequency Response Down to 0 Hertz**
- **A -Weighted, Fast Response, Sound Level Recording**
- **Elevator, Escalator, Real Time Vibration & Tachometer Operation Modes**
- **Conforms to International Measurement Standards**
- **RSB Removable Tri-Axial Acceleration Sensor Block**
- **Extremely Easy to Use, Portable, Battery Operated, Rugged, Reliable, Small Size, Light Weight**
- **Low Cost – Includes EVA Software, Sensors, Battery Charger, Serial Cable, 1 Year Warranty**
- **Optional Tachometer For Elevator Door and Escalator Handrail/Step Speed Comparison**
- **Optional +/-10g Range Accelerometer for Safety & Buffer Tests**
- **Robust Hardware Design for Accurate Response to Vibration & Long Term Reliability**

### **EVA Vibration Analysis Tools Software**

- **Operations under Windows 3.x, Windows 95 and Windows NT**
- **ISO Human Response (ISO18738), Acceleration, Sound Level, Speed, Jerk, Distance Time Histories Display**
- **Spectral Analysis Capability, Software Selectable Filters & Sampling Rate**
- **ISO Human Response Analysis & User Selectable Digital Filtering**
- **User Defined Units of Measure & Graphical Scaling, Box Zoom & Scroll,**
- **Project Specification Analysis, Data Base Compilation**
- **Multiple Report Printing including Peak to Peak Vibration, Max/Average, Sound Max/Average**
- **Elevator Performance Measurements**

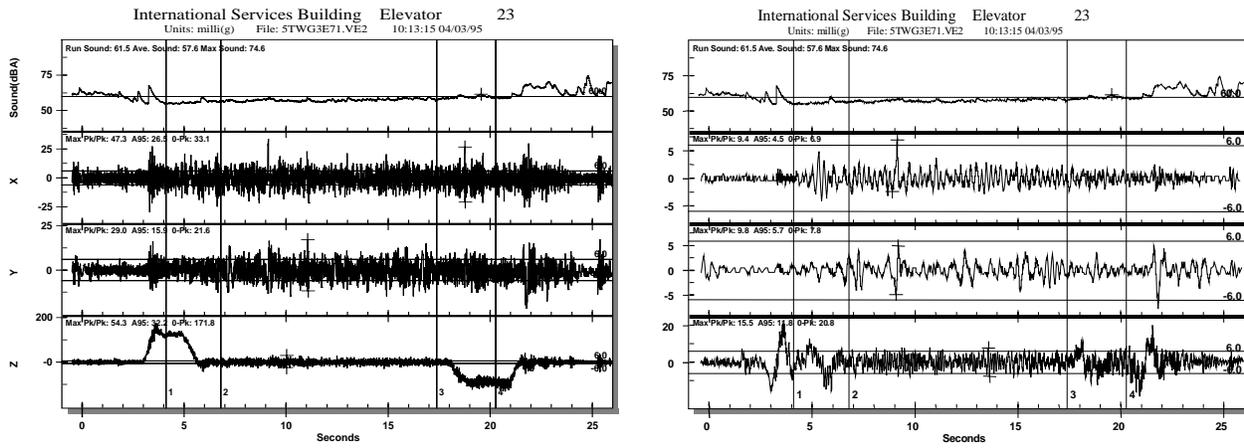
**Field Operations with a Field Tough Instrument** - The EVA system is particularly easy to operate, both in the field and in the office. About the size of a notebook computer, operation is simple and fast. The system can be configured for use on site, without having to carry a PC with you. Simply place the EVA-625 on the floor of the elevator, turn it on, press the record switch, and 'take a ride'. The data is automatically stored in non-volatile memory with room for over 700 seconds of data. An entire bank of elevators can be recorded in minutes. The EVA system is rugged enough so that it can go anywhere at anytime with few concerns. Shipping and field operations with a high accuracy instrument are no longer a worry.

**Removable 3-Axis Acceleration Sensor** - An important EVA-625 design innovation is the removable triaxial accelerometer package (RSB). It can be left within the EVA case for simple ride quality analysis, or the sensor can be removed for attachment to specific elevator mechanical elements. This allows isolated measurements of the vibration response of specific elevator structural members and components such as roller guides, motors, and gear boxes.

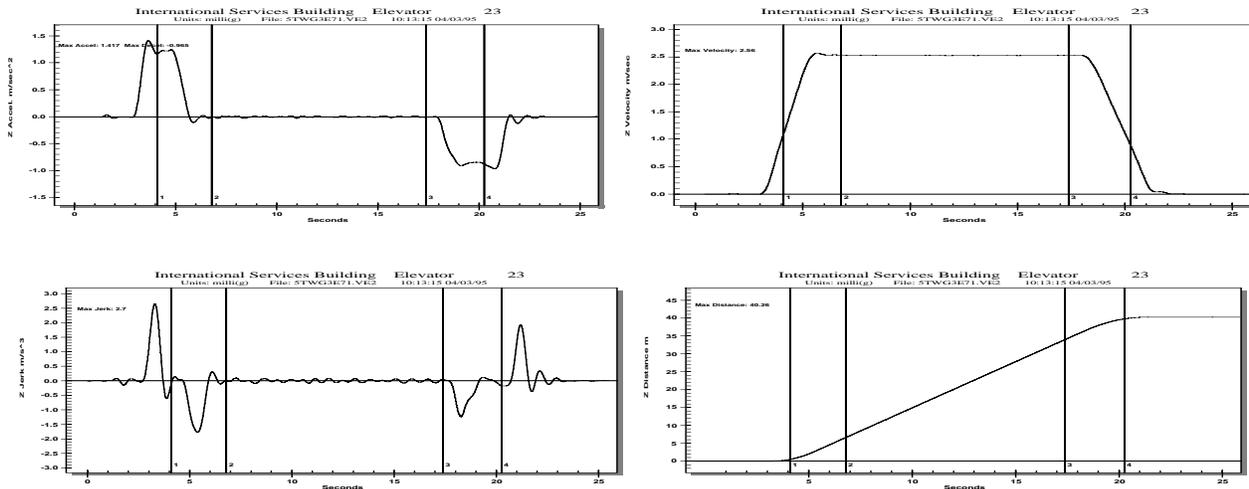
# EVA Vibration Analysis Tools - Science in the Software

## Elevator Tools

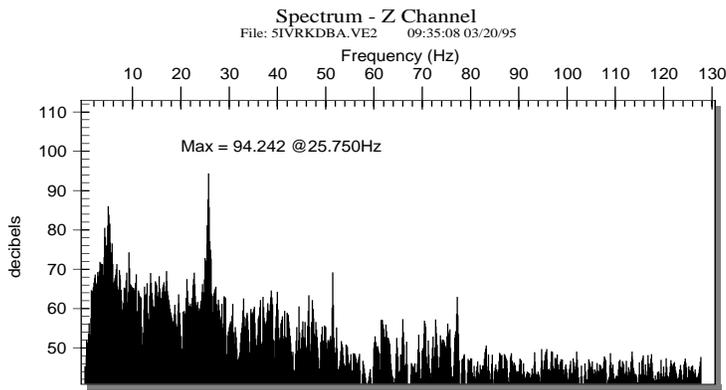
The included EVA Vibration Analysis Tools software is a powerful suite of analytical tools for elevators and escalators in a fully integrated **Windows™** based environment. It offers unmatched analysis of all elevator/escalator motion and sound levels, yet is easily used by the engineering or non-technical staff. Using PMT proprietary methods for automatically extracting information from the vibration recordings, ride quality levels, speed, elevator location, acceleration/deceleration, jerk, and sound levels can be evaluated in seconds. An extremely important feature of the software is the ISO Ride Quality Analysis. It must be remembered that ride quality is not measured by the vibration and sound that the instrument records, but rather by the vibration and sound that people feel and hear. PMT is the first and only company to apply ISO2631 based filtering of the vibration data to get a measure of the vibration that people feel. When diagnosing for ride quality purposes, it is important to improve the vibration that people feel. Analytical capabilities include time history zoom and expand with data measurement, elevator travel time measurement, comparison of data with respect to user imposed vibration limits, spectral analysis (FFT), and RMS vibration and sound level measurement (A-weighted, fast response). Of course, the EVA software also prints standard reports on your office printer.



The above graphical output (on left) is actual unfiltered data from an elevator. All measurements and analyses are derived from the unfiltered data. The graphs are divided into 4 windows; the top window is sound level as a function of time. The second window, is the x channel (front to back) vibration time history, the 3 window is the y axis (side to side) time history, and the bottom window is the z axis (vertical) vibration time history. The graphical output (on the right) is the ISO filtered data, the measure of ride quality.



Above are the acceleration time history (top left), jerk time history (bottom left), velocity time history (top right), and distance time history (bottom right). These are derived from the unfiltered vertical axis time history and are a measure of elevator performance. While in the EVA Vibration Analysis Tools software, the information can be expanded for study in great detail. Using the distance time history, 'bumps' as seen in the ISO data can be located in the hoistway with a high degree of accuracy.



Probably the most powerful tool for diagnosing problems is the Fourier transform. This allows the vibration to be analyzed with respect to frequency content. For example, 6 inch roller guides on a 2.5 m/s elevator will rotate about 5.3 times per second (5.3 Hz). If roller guides are creating a significant level of vibration, then this will show up in the spectrum (vibration level versus frequency) of the signal. This is an example that shows both a high vibration level at about 5 Hz (roller guides) and 26 Hz (gear mesh)

## Escalator Tools

The EVA-625 and EVA Vibration Analysis Tools are also optimized to evaluate escalator vibration on hand rails and steps, as well as to meet the special requirements of measuring sound levels at the landings, incline section, and machine. It also leads the operator in measurement of ambient sound level. An optional extension of the EVA-625 is the ETCH01 Tachometer module. This is used for the measurement of handrail & step speed so that differences can be evaluated and addressed. An important feature of the ETCH01 Tachometer and the optimized EVA software is the ability to quickly and accurately measure stopping distances. Contact PMT or your PMT representative for the **Escalator Measurement Tech Sheet**.

## Options

**ETCH01 Tachometer Module** – Although the EVA system accurately calculates elevator velocity and distance in elevator systems without the need of a tachometer, there are times when speed must be measured precisely in constantly moving systems such as escalators. To meet these needs, the ETCH01 tachometer is an extension to all EVA-625 systems. This provides the ability to measure & record, or display in real time, direct drive speed measurements for escalator handrails & steps, escalator stops, elevator doors, or any moving system.

**IMD-1 Escalator Step Skirt Index Measurement Device** – The EVA-625 can be used with the IMD-1 to record and analyze the newly defined escalator step/skirt index. The combination of EVA-625 and IMD-1 allows the measurement of loaded gap (step edge to skirt distance) and coefficient of friction of escalator skirt panels dynamically.

## Warranty & Support

The EVA system is provided with a full one year warranty. Software updates will be available to each registered user as new versions become available. PMT is also establishing a world-wide distributor network to provide quick & reliable local support for the EVA system. PMT will provide unlimited telephone, fax support to all EVA owners at no charge.

## EVA-625 Specifications

Microprocessor: 8XC52 Family Running @ 11 MHz  
 Display: 4 Line by 20 Column Liquid Crystal  
 Keyboard: 1 X 4 Sealed Membrane  
 Communications: Serial RS232, 57600 Baud  
 Clock: Integrated Battery Backed Real Time Clock  
 Battery: 12 V, Rechargeable Lead Acid Cel, 30 Hrs per Charge  
 Battery Charger: Universal Voltage  
 Sensors: 3 Accelerometers (x,y,z Triaxial arrangement)  
           1 Condenser Microphone  
 Accelerometer Technology: Piezoresistive, DC to 400 Hz

A/D Converter: 13 Bit Self Calibrating  
 Anti-Aliasing Filters: (Acceleration Channels)  
                           Software Selectable: 80 Hz or 160 Hz Cutoff  
 Sampling Rate: Software Selectable: 256 or 512 SPS/Channel  
 Frequency Response: Acceleration Selectable 0 to 80/ 0 to 160 Hz  
 Frequency Response: Mic. A-Weighted Fast Response 8 KHz  
                           Type 2S True RMS Sound Level Measurement  
 Range: Acceleration: +1.5g to -1.5g, Mic: 40 to 90db(A)  
 Resolution: Acceleration 600 micro(g), (.0006g), Mic: 1 dB  
 Data Storage: Over 700 Seconds of 4 Channel Data  
 PC Requirements: Windows 3.x, Windows 95, Windows NT

### Packaging:

Case: Structural Resin, Water Proof  
 Dimensions: 27.3L x 24.7W x 12.7D (cm)  
                   10.7L x 9.7W x 5.0D (in)

Weight: 4.3 (kg), 9.5 (lb)  
 Accelerometer Housing: Stainless Steel  
                                   (Removable Reorientation, Attachment to Structural Member)  
 Chassis, Microphone Housing: Anodized Aluminum

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Note: Specifications Subject to Change Due to Continuous Improvements