



**Dr. Zap**

## Strategic and Economic Benefits of an ESD Program

*Written by: Ted Dangelmayer*

An effective ESD program is essential to maintaining quality and reliability, but it also provides both strategic and economic benefits to electronics manufacturers.

Looking to the future, the need for state-of-the-art ESD design and manufacturing practices will only intensify. This is because the rapid advance of technology and the associated design constraints are producing devices with ever-increasing sensitivity to ESD. A recent Sematech benchmarking study of integrated circuit (IC) suppliers indicated that ESD will be one of the top three reliability concerns within the next five years, and already is a major concern with certain products.

Factor One	An effective implementation plan
Factor Two	Management commitment
Factor Three	A long-term process owner
Factor Four	An active leadership team
Factor Five	Realistic requirements
Factor Six	Training for measurable goals
Factor Seven	Auditing using scientific measures
Factor Eight	ESD test facilities
Factor Nine	A communication program
Factor Ten	Systematic planning
Factor Eleven	Human factors engineering
Factor Twelve	Continuous improvement

**Table I. The 12 critical factors for successful ESD program management.**

Developing, implementing, and managing a successful electrostatic discharge (ESD) program to offset this trend requires a total system approach that extends from product design to customer acceptance. Industry standards such as ANSI/ESDA S20.20 are helping companies converge on one set of handling practices. The program will, however, still need to be well managed and woven into every aspect of the development and manufacturing processes in order to produce lasting success. In fact, a well-managed program can be far more effective than one well stocked with expensive supplies. Twelve critical factors (see Table I) form the basis of successful ESD program management.

Continued on Page 2



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## Product

### 41201 - Combo Tester



The ESD Systems.com 41201 Combo Tester incorporates a unique dual test circuit design which improves accuracy of testing and eliminates the need for separate wrist strap and foot grounder test units.

#### Features

- Positive rocker switch actuation eliminates faulty installation of banana jack and faulty readings
- Round test button will not deform or bend from pushing; will not stick
- LEDs display test results - simple operation with clear test result
- Red light and audible indicator mean circuit resistance is too high or low
- Low battery indicator provides early warning to replace battery
- Optional AC adapter available
- Wrist Strap Range: 750 kilohms - 10 megohms
- Footwear Range: 750 kilohms - 100 megohms
- Made in America

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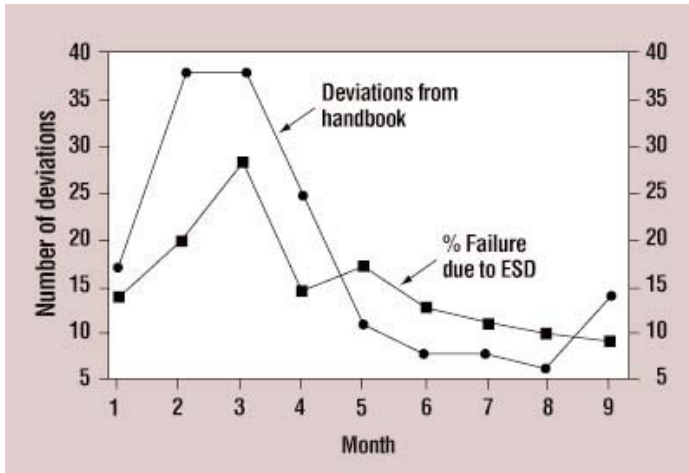
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Manufacturing Improvement	Result
Removed gloves	Savings of \$30,000/year
Reduced packaging	Savings of \$786,000/year
Identified production problem (e.g., EMI evens at surface mount, RF shield highly charged, black carrier and clear cover tape at 15,000 V)	50% yield improvement
Identified production problems at EMS site (benches not grounded)	Changed to a tier 1 EMS supplier, added frequency audits by major ESD suppliers

**Table II. Examples of manufacturing improvements and cost savings.**

The strategic and economic benefits of an ESD program far outweigh the associated implementation expenses. A way to measure these benefits has been elusive for many companies. On the other hand, Dangelmayer Associates has had considerable success in proving that a well-managed ESD program introduces dramatic strategic and economic benefits. Measurable financial indicators alone justify program expenses. However, after considering the intangible strategic benefits, the value of a sound ESD program becomes overwhelming and can range from \$100 million to \$500 million per year, per site in larger companies.



**Figure 1. Correlation of ESD practices and factory losses due to ESD.**

Figure 1 illustrates one measure of the effectiveness of sound program management with the results of a nine-month study. This study was conducted at a Lucent Technologies manufacturing location in which deviations from procedures were carefully tracked using prescribed auditing procedures. The results of this auditing were then compared with the relative removal rates of device failures attributable to ESD, as determined by failure mode analysis. Clearly there is a strong correlation between removal rates and deviations from specified handling procedures (see Table II).

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## Product

### 43102 - Bench Top Ionizer



The ESD Systems.com Item 43102 Bench Top Ionizer features a patented Faraday balance system that automatically maintains a balance ion output and also emits ions in a true laminar flow. This reduces ion recombination and emitter contamination.

#### Features

- AC ionizing system for superior performance in neutralizing static charges at greater distances
- Non-nuclear operation for added safety
- Gold plated emitters for longer life
- Fixed temperature heater that removes chill from air and enhances worker comfort and productivity
- Multiple installation options that provide flexibility
- Ground point for personnel grounding
- Made in America

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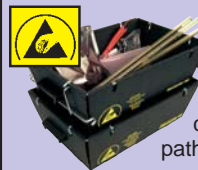
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## Product

### 37630 - Stackable/Nesting Tote



Protective Pak® item 37630 is used to transport or store ESD sensitive items. When operators carry the totes, conductive handles provide path to ground.

#### Features

- Added durability and strength provided by steel perimeter frame
- No assembly required
- Static dissipative surface of 10<sup>7</sup> - 10<sup>9</sup> ohms
- Made from 100% recycled material, and is 100% recyclable
- Reusable, ensuring best value
- 8 units per case, Sold individually
- Made in America

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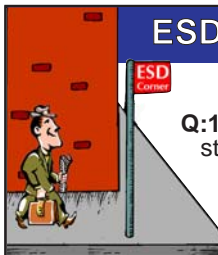
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**Q:1155** Does ANSI S20.20 state at what frequency testing for ESD floors should be done?

[see ANSWER 1155](#)

**Q:1088** We have bought one unit of data logger testing system, 41217. We tried installing the program but failed, what is wrong?

[see ANSWER 1088](#)

**Q:1154** What are the adverse effects of cell phones at workbenches?

[see ANSWER 1154](#)

**Q:1039** Are there general guidelines for packaging IC's that are moisture sensitive? Is a MVB bag with desiccant, humidity indicator card, and heat seal enough? Or, when do you need to add a vacuum seal and when do you need nitrogen purge?

[see ANSWER 1039](#)

**Q:1034** When transporting PCBs in the manufacturing process, is there a significant difference between using conductive bins versus dissipative bins?

[see ANSWER 1034](#)

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