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From the CEO:

Greetings to the Global Ectron Sales Team. We have had a great summer; how about you? We have two stunning announcements to make concerning our 1140 series Thermocouple Simulator-Calibrators.

First and foremost, we won THE CONTRACT with the U.S. Air Force to supply our Model 1140 as the standard thermocouple simulator-calibrator for use in all Air Force calibration labs around the world! We won over all competitive simulators because "Ectron has the best Thermocouple Simulator-Calibrator available". Because they insisted on a dual battery-operated/ac model we are currently modifying the Model 1140A to become the new Model 1140B.

But when we ship the first model at the end of the month, it will be the Air Force's standard for both thermocouple and dc operation. This \$500,000 contract was big news and will help us achieve standardization with another branch of our U.S. Armed Forces. We will advise when the Model 1140B will be ready for the rest of the world which will be soon.

Also, in June the U.S. Navy awarded us a National Stock Number for the Model 1140A. It is 7Z 6625-01-573-6135. Naval Inventory Control Point (N35) is source of supply for this item. Please inform all your MIL, DOD, aerospace, and other subcontractors of this easy way to buy the 1140A.

So my advice to you is call on Cal Labs, the many companies producing thermocouple instrumentation, and anyone you know in the Metrology business to get on the bandwagon and get the best Thermocouple Simulator-Calibrator in the industry, bar none. We have become the de facto standard in the industry for this class of product. Happy selling men!

Sincerely,



E. Earl Cunningham, President and CEO

## Model 1140A Wins Again



We all know about the superior features of the Model 1140A as a thermocouple simulator but we haven't made a point of showing how this instrument is also a superior dc source and dc digital voltmeter.

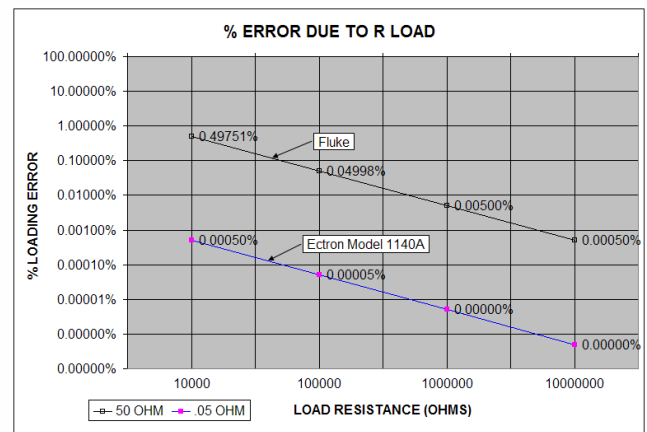
First of all the one-year accuracy specification of the 1140A is 30 ppm (of the voltage) + 2.5  $\mu$ V. If we have the 1140A output a 100 mV signal it will be accurate to 5.5  $\mu$ V for one year. Because it has a resolution of 7 digits we can change the output in 0.1  $\mu$ V increments when producing 100 mV. With these specs alone we

have few competitors in the dc source arena. But the 1140A has one more important feature that really sets it apart.

What if you needed to connect a precise 100 mV voltage to a 1,000  $\Omega$  load? Try using a big and very expensive (\$40,000) Fluke Model 5720A calibrator, a superb do-all calibrator with the best possible accuracy, 9 ppm + 0.5  $\mu$ V (voltages less than 220 mV). You dial up 100 mV and connect to the load and OOPS, the voltage at the output terminals of the 5720A is only 95.24 millivolts! What can be wrong? You check everything and finally, as a last resort you check the manual. Lo and behold, the 5720A has a 50  $\Omega$  output impedance.

What does a 50  $\Omega$  output impedance do for our test? Well, instead of 100.0000 mV at the output terminals the voltage is almost 5% off. A check with Ohm's law confirms the problem. So rather than the quoted accuracy of 9 ppm + 0.5  $\mu$ V for the 220 mV range, we have a gross error. In fact, to equal the quoted accuracy for 100 mV, the load must exceed 5 M $\Omega$  and even with this load we double the inaccuracy of the instrument.

Let's now try the 1140A. With an output impedance of only 0.05  $\Omega$  the voltage is now 99.9950 mV, a loading error of only 5  $\mu$ V or 0.005% of the 100 mV. In other words, when we want to produce a voltage below 220 mV into loads below 1 M $\Omega$  we should use the Ectron Model 1140A instead of the Fluke 5720A. Other dc sources with the same problem include the Xitron 2000. See [Ectron Application Note 111](#) for a chart of error for various load resistances vs. voltage.



## *The Flying 560H*

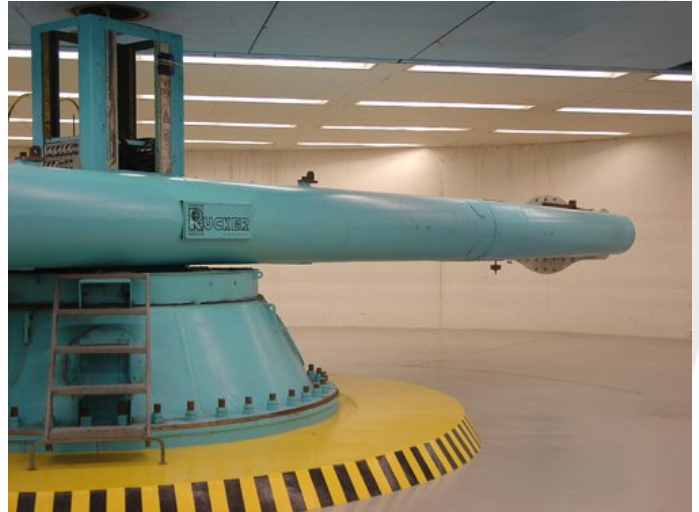
### *A Unique Application for The Model 560H Instrumentation Amplifier*

The Model 560H is a versatile, differential dc amplifier with excellent accuracy (0.1%), stability ( $1 \mu\text{V}/^\circ\text{C}$ ), frequency response (dc to 200 kHz), and reliability. Its characteristics enable it to be used as a general-purpose amplifier but its performance allows it to be popular as a dedicated, high-accuracy data collection amplifier.

One application of this product is unique. This Ectron amplifier was chosen as the data collection amplifier that rides at the hub of many of the world's largest centrifuges. The Ectron amplifier was selected because of its accuracy, dc stability, and overall precision even under vibration conditions. It receives data from accelerometers, strain gages, and other sensors used with these huge machines. Up to 90 Model 560H amplifiers are used on each centrifuge.

Of particular importance is the ability of the Ectron Model 560H amplifier to reject EMI signals that emanate from the huge drive motors as well as some of the on-board electronics.

To complete the 500 Series amplifier products, we also offer the Model 563H. This model adds an excitation supply and bridge completion components to the same amplifier, allowing the 563H to provide full support for bridge-type sensors such as strain gages, load cells, and similar transducers.



### **Other Applications**

1. Used in large data-logging systems. These compact conditioner-amplifiers (16 channels in a 3 U enclosure) allow high channel count in a small volume yet provide high-accuracy, low-noise data.
2. Most data loggers have 1% to 5% accuracy because of poor input amplification. The Models 560H and 563H are frequently used preceding data-logging instrumentation when low-level or high-accuracy signals are involved.
3. Used as a general-purpose lab amplifier. Cal labs as well as many colleges and universities use these amplifiers because of their versatility: excellent low-level performance, excellent linearity, wide bandwidth.
4. Because these amplifiers have excellent reliability and stability with changing temperatures they are used on board larger aircraft. However, Ectron's rugged 400 series conditioner-amplifiers are frequently better choices here.
5. Railway testing systems use the Model 563HL conditioner-amplifiers on board rail test cars as well as rail car wheel test systems. Again, the stability and accuracy of the 500 Series amplifiers were key factors in their selection.

## *Tech Tips: Did You Know...?*

**Thermocouple** – a temperature transducer comprising a closed circuit made of two different metals. If the two junctions are at different temperatures, an electromotive force is developed that is proportional to the temperature difference between the junctions. This is called the Seebeck effect.

**Cold-Junction Compensation** – Also called reference-junction compensation. When measuring temperature using thermocouples, the reference terminal may not be held at  $0^\circ\text{C}$ , but at the surrounding temperature of  $T1^\circ\text{C}$  instead. Without any compensation, the thermocouple output will be reduced by  $T1^\circ\text{C}$ . This is compensated by adding potential difference to the internal amplifier corresponding to  $T1^\circ\text{C}$ .



## *Personnel Announcements*

### Ectron Employment Anniversaries

Jonathan Jacob – Engineering, 24 years

Mike Lascu – Test, 1 year

Howie Clark – Operations, 35 years

Michael Fontes – Sales, 3 years

Amy Cunningham – Administration, 3 years

### Births

Micah Howard, 5/27/09

Earl's second great-grandchild

## *Sales Representative Awards, Fiscal Year 2008–2009*

### U.S. Rep of the Year

Aztec Enterprises, Inc. – Western US  
Paul Spatz (Arizona)

### International Rep of the Year

Pyrodynamics – India  
Raviprakash Suryanarain



Ectron proudly announces its new sales representative in Mexico, Ingeniería e Instrumentación Internacional. Shown above, Francisco Esquivel (VP of Sales) and Miguel Esquivel (CEO), with Ectron's Michael Fontes (center).



Mr. Raviprakash Suryanarain (center), President of Pyrodynamics in India, receiving his award. Michael Fontes (left) and Earl Cunningham (right).

## *Ectron Product Application*

Cooper-Atkins in Connecticut manufactures specialty thermometric devices used in the food service industry, such as meat thermometers. They use Ectron's Model 1140A to calibrate their thermocouples.



Michael Fontes (left). Phil Goulis (right), senior design engineer at Cooper-Atkins.

