

Multichannel Analyzer

World's Smallest

'Pocket MCA'

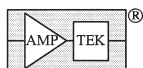


Size: 6.5" x 2.8" x 0.8"
(165mm x 71mm x 20mm)
Weight: <300 grams (including batteries)

The MCA8000A is a full featured, low power Multichannel Analyzer intended to be used with a wide variety of detector systems.

- 16k data channels
- Stores up to 128 spectra
- 24 hours of continuous data acquisition from two 1.5V AA batteries
- Conversion time $\leq 5 \mu\text{s}$ ($\geq 200,000$ cps)
- Two stage input analog pipeline
- Differential nonlinearity $< \pm 0.6\%$
Integral nonlinearity $< \pm 0.02\%$
- Sliding-scale linearization
- Two peak detection modes:
First peak after threshold (nuclear spectroscopy)
Absolute peak after the threshold (particle counter calibration in clean rooms)
- Two TTL compatible gates for coincidence & anticoincidence
- Stand-alone data acquisition
- Stored spectra protection via software security & serial ID number; date-time stamp
- 115.2 kbps serial interface

Free Windows & DOS software



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Ironically, he has things exactly backward. In government and university occupations, researchers who commit fraud are putting just what at risk, personally? Perhaps their reputation, if they are caught. Perhaps their job, if the sin is egregious. Susceptible to fashions, the government and university sectors have a strong incentive to protect researchers and their work and to overlook little flaws that may tend to advance common interests. And with little or no need to produce a commercial product, university and government researchers are subject to no mechanism for independent test of value, other than the so-called peer review of other soldiers in the same army. If and when somebody is exposed doctoring data, still nobody really loses. The researcher is "promoted sideways" (found another job in another lab or agency), a polite retraction is issued by the sponsors or department head, and the money keeps flowing. In last year's most newsworthy revelations of physics fraud, not one of the coauthors of the perpetrator's papers admitted even secondary responsibility ("I just assumed he was providing good data," they whined), let alone suffered the slightest financial or career setback. Except for one man, the fraud was free.

In industry, by contrast and as Laughlin correctly noticed, the stakes are much higher. Industrial research, far from being insulated from self-correcting (market) forces, experiences the strongest possible discipline daily. Consider where the high stakes of investment costs and the potential value of intellectual property really lead: not to fraud but to truth. Senior people in high-tech companies who pursue fraud do not just lose their reputations, they lose their homes, their fortunes, their livelihoods, and sometimes even their families under the stress.

Just as a successful discovery or development can make you rich, a false one can ruin you. Entrepreneurs bet everything they own on the value of their ideas, discoveries, developments, products. They have little time to waste on data or ideas they know to be false or worthless, because they literally cannot afford failure or wasted effort. They are paying for the work themselves. Naturally, ideas, discoveries, and developments result in intellectual property, sometimes of the very highest value. But the property has value only to the extent it is valued by others. Once a

private enterprise brings a new discovery or product to the market, consumers will test the work immediately and without pity. If it is without merit, or if its value is significantly less than the developers claimed, customers and competitors quickly crush the developers with rejection. That market scenario contains very little room for fraud and the greatest penalties when fraud is exposed. I would suggest that somebody enroll Laughlin in Economics 101.

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I could not disagree more with Robert Laughlin's analysis of recent fraud in experimental physics and the cure for what ails the profession. For science to be "relevant," it must produce something—which may be beauty or insight or patent royalties—that has real value to someone. Our best response to economic pressure is to create things with real value.

Laughlin claims that we scientists have an "obsession with fundamentals and truth" but that present economic "pressure can turn otherwise excellent and honest scientists into willing deceivers." Scientists as a group have moral frailties similar to other professional groups, but most of us understand two basic parameters. First, science is based on repeatable experiments and calculations, so it will not advance one's career to publish results that others will not repeat. And second, products and processes based on faulty parameters and theories do not work well. So truth is valuable in science because it enhances the value of intellectual property. A sane scientist would not assert a false answer to a question that has economic importance, but might be tempted to assert a self-serving falsehood that is "academic." Major hard-science frauds are generally committed by people who think that they know what the "right result" is and are frustrated in their attempts to get that result honestly.

To suppress fraud in physics, we can test our students for fraud in labs and assigned problems and punish where it is found. An instructor can set up a lab class to expect a fallacious result and then give a zero score to those who report it and praise those who report properly. Students often are given the correct answers before they begin to work assigned problems, especially those

in which issues of sign or factors of 2 are tricky. The instructor can check that the student obtained the correct sign or factor at the correct point, rather than changed it at some arbitrary step, and thus grade accordingly. Substantial partial credit should be given for a calculation presented honestly with the wrong sign or factor and a 0 for the correct answer presented dishonestly. In addition to teaching our students physics, it is also valuable to teach them to correct those misunderstandings about what is proven and what is speculated that arise from different personality types.

Laughlin asserts that the recent frauds at Bell Labs "are noteworthy only because of Bell's special stature in American science and its reputation, both partly attributable to Bell's having been shielded from [economic] pressures by the old AT&T monopoly." I assert that it is noteworthy that, despite its immediate economic stress, the present Bell Labs did the right thing. That benefits Bell's long-term economic interest.

The private companies that hire Oregon State University students report that OSU's most important lesson is ethics.

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The frightening trend of industrializing our universities is, I believe, the single greatest threat to the integrity of higher education in this country (and probably all countries). The topic was hotly debated 30 or 40 years ago, but as the money has flowed, the concern seems to have waned. To better tap industrial largess and to appease state legislatures, university administrations have turned to the business model, which, as Laughlin so eloquently wrote, "is such a terrible idea."

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So pervasive are the contradictions in Robert Laughlin's disingenuous view of research in industrial laboratories that it is not easy to know where to begin the counterargument.

Having spent many years as a researcher and manager in an industrial laboratory, I came to understand that companies investing in basic research do not think of it as "charity

or part of an advertising budget." For a century, corporation-funded basic research has been a prolific driver of the technical revolution on which the world's economy is increasingly built, human health improved, and national security enhanced. Without these impacts, it would be hard to justify the large investments, by both government and industry, in both basic and applied science. And contrary to Laughlin's assertion, basic research continues to flourish in corporate laboratories where it is embedded in a balanced

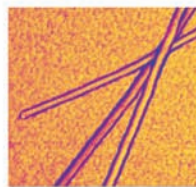
research portfolio and is highly valued by its corporate investor.

I discount Laughlin's assertion that "research linked to property has a built-in conflict of interest toward the truth" as being even less credible than it would be if "personal success and recognition" were substituted for "property." True, research is linked to property; something of economic value is created. However, it is patently false and contrary to experience that "intellectual property—knowledge that one can sell— . . . must be kept secret." Were it so, it

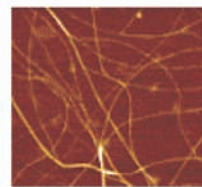
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300nm AFM phase
contrast image of
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