

# Concilium Technologies

*Real Alliances Real Solutions*

## The Consequence of Not Calibrating

### Customer Information Brochure

There is much talk about the risks associated with inadequate calibration, but many people have asked whether the risks are real or just theoretical.



"Looks like someone forgot to calibrate the 'Instrument Landing System', captain."

Here are a few real-life incidents to start you worrying....

### Getting Overheated ?

A manufacturing process used an oven with a "calibrated" temperature controller. After three months the controller was found to be mis-calibrated meaning that the actual temperature was substantially higher than specified. The quality and reliability of products made during the whole period were now in question and a costly product recall seemed necessary. Although it finally transpired that the error didn't adversely affect manufactured product, it took a month's work to prove it.



## Anything Good on TV Tonight ?



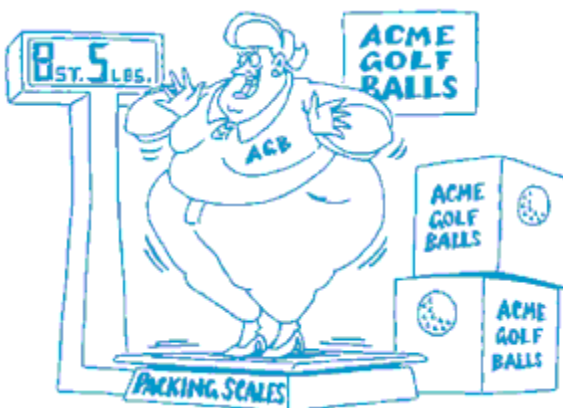
A TV station's studio-transmitter-link microwave carrier frequency was incorrectly tuned such that the receiver captured the signal from a competing broadcaster. Suddenly, the station was transmitting pictures from the other channel's studio. It transpired that although the frequency counter had been checked, its reference oscillator (timebase) hadn't been adjusted back to nominal.

## Over-stated

A manufacturer of FM Stereo Tuners claimed 50dB stereo separation. However, a hi-fi enthusiasts' magazine published an independent evaluation indicating it to be only 30dB for a sample unit. Obviously, this wasn't exactly the kind of publicity the manufacturer had hoped for since sales might be adversely affected. It turned out they were using a "poorly" calibrated FM stereo generator for final adjustment on the production line -- L-R gain and pilot phase were out of tolerance. The calibration error was then corrected, but the damage to the company's reputation had been done.

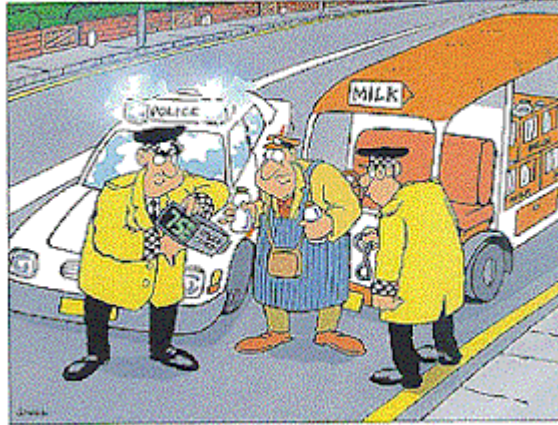


## Misleading Scales



A major manufacturer of premium golf balls didn't have their weighing scales checked because they were used "for shipping purposes only". They shipped out large containers of balls based on total weight. After a program of periodic calibration was finally implemented, they discovered that each bin contained 300 more balls than had been stated which was equivalent to a \$500 loss per bin.

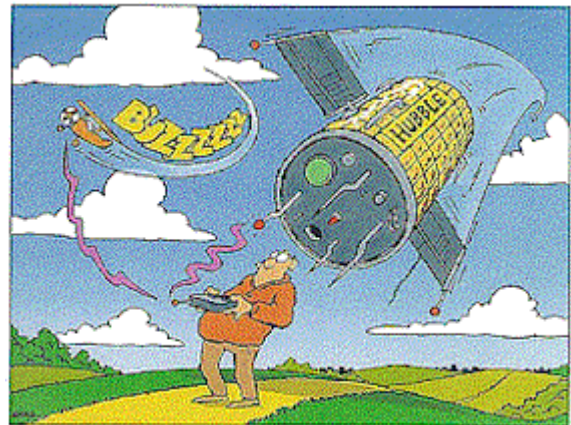
A city police department's radar speed violation tickets were legally invalidated in court after somebody proved the calibration process for the radar guns wasn't traceable to national standards.



"Honestly officer, battery-powered milk floats can't do 75 miles per hour.... even downhill."

### Sounds Bad, Man

Because of erroneous measurements made by a broadcast consultant, an American FM radio station's composite modulation depth was wrongly set such that the modulation peaks were  $\pm 150\text{kHz}$ . This was "200% modulation" as defined by the US Federal Communications Commission -- twice the legal limit and likely to attract a large fine because of co-channel interference. Investigators discovered that the consultant had "self-calibrated" his modulation meter.



Transmitters can be tricky to set-up so that they don't attract the wrong kind of attention !

### The Importance of Thorough Calibration

There is considerable debate as to whether the extent and quality of testing carried out during an instrument calibration makes a difference to the bottom-line of the company that owns the instrument. It is quite difficult to find case studies in which it can be conclusively shown that a less thorough testing routine has a direct impact on the quality of the products being tested. The following examples help to illustrate that inadequate testing during calibration can lead to erroneous decisions in the production test area. Coincidentally, they both took place in the same week, in the same Agilent Service Center.

## Case Study 1

*Company A* is the leading manufacturer of electronic countermeasures equipment and other secure communications products. Their usual calibration provider is a large, low-cost Third Party Maintainer (TPM).

Suspecting a problem with the marker counter readout accuracy, they sent their 8594E Portable Spectrum Analyzer to the TPM advising of their suspicions. The equipment was returned to them having been "fully" calibrated, with no fault found (the instrument was reported to be entirely within specification). Still suspecting the problem they sent it back, and again it was calibrated and reported to be in-spec.

The Analyzer was then sent to an Agilent Service Center, with the same fault suspected. It was put into the calibration process and the error was clearly identified. It was corrected with appropriate adjustments to the log/lin amplifier and returned to the customer within specification. Obviously the TPM had not tested that part of the instrument -- particularly unsatisfactory considering they were told of a suspected problem in that area. The customer is now confident that his instrument is giving trustworthy information... but now has doubts about the other equipment he has calibrated by the TPM.

## Case Study 2

*Company B* is a global electronics company serving Aerospace, Defense, and Information Technology markets worldwide. The company uses a major (different) TPM for calibration.

They sent a 11683A Power-meter Range Calibrator to the TPM for routine calibration. The device was found to be outside specification on two ranges and a "Conditional" calibration certificate was issued. The customer knew his equipment well and was in total disbelief that it was out-of-tolerance.

He sent it to an Agilent Service Center for a second opinion. It was tested manually while cold and after being warmed-up. On both occasions the measured values were found to be in the middle of the specification on all ranges. The conclusion is that the TPM may have been using an intermittent cable or some other poor technique that produced erroneous test results on some ranges. The customer has his confidence restored in his Range Calibrator... but not in his TPM calibration provider.

## Conclusions

The two situations were opposite: one instrument was faulty but reported to be good and the other was good but reported to be faulty. In both cases the customer could have incurred significant costs had he not chosen to ask an Agilent Service Center for a second opinion. Agilent's Service Center's high quality, thorough calibration procedures correctly established the performance characteristics of the equipment and restored confidence to the customer. Proof beyond doubt that all calibration is not equal !

## Other Customer Information Brochures

Selecting a Calibration Vendor  
Defining your calibration requirements  
Calibration Myths

## About Concilium's Services

Concilium is the only Authorised HP/Agilent Service Center in Africa. We boast over 23 years experience in the Repair and Calibration of HP/Agilent Equipment. Our SANAS Accredited Laboratory is the most comprehensive facility, allowing us to calibrate all makes of Equipment from Digital Multimeters to specialised RF Test Equipment.

**Concilium is a ISO9001:2000 company with a ISO/IEC17025 SANAS accredited Calibration Laboratory.**

We invite you to contact us should you require:

- More information on our Capabilities
- Quotation on Equipment for Calibration
- Assessment of your Calibration Requirements
- A Visit to our Laboratory
- General Information

## Contact us

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