

Photos by
Nan Wylie

Visual Information

Airman 1st Class Michael Valenzuela (foreground) and Tech. Sgt. Jerry Wheatley are both in the process of aligning oscilloscopes.



Masters of metrology

Travis PMEL, a measure of precision

By Michael T. Moseley
Daily Republic liaison

Metrology is an exact science, the science of weights and measurements to be exact. From the Greek *metrologia*, the theory of ratios, metrology has evolved into such a complicated system of making precision measurements that it can take a person years to master. It is just such mastery that the men and women of the Travis Precision Measurement Equipment Laboratory seek.

"The breadth of what we do amazes a lot of people," said Chief Master Sgt. Norman Bain, the Test, Measurement and Diagnostic Equipment flight chief. "We establish a traceability link with the National Institute of Standards and Technology."

What that means, according to Bain, is that Travis ensures that every measurement made here is in absolute agreement with the national standard of measurement set in Washington, D.C.

To ensure that 10 watts at Travis is the same as 10 watts in Washington requires meticulous attention to detail, said PMEL quality assurance NCO Master Sgt. Richard Horn. "We track things down to

parts per million to make sure that every piece of equipment we test is accurate."

PMEL's measurement accuracy can be illustrated using a granite slab kept in the physical dimensions section. To the naked eye the slab appears flat and smooth, but when subjected to scrutiny by PMEL technicians, a chart similar to a topographical map is laid out depicting the "mountain range" that is the true surface of the slab.

Why pay so much attention to the surface of a granite table top? It is the smoothness of this very rock that helps to calibrate the accuracy of an F-16's bore site alignment fixture, which allows the F-16 to hit what it aims at.

"This rock has to be smooth to within 200 micro-inches," said Master Sgt. Don Erden, PMEL physical dimensions supervisor.

That means that from any point on the surface of the slab to any other point on the surface of the slab, the difference in elevation can be no more than 200 micro-inches (a micro-inch being one one-millionth of an inch). Travis's granite slab is accurate to 85 micro-inches, way under the national standard.

"We have to be accurate in what we

do," Bain said. "The measurement accuracy for 250, plus, work centers in three different states depends on what we do here at Travis."

Travis's 40-person PMEL shop commonly contains 8,600 items in its inventory to be tested at any one time. Technicians must learn to effectively use 530 different measurement devices, gages or meters to calibrate everything from pressure, to physical dimensions to electrical output.

"Many people don't know that 10 pounds at Travis is not the same as 10 pounds at, say, Ramstein (Air Base, Germany)," Bain said. "The earth's gravitational pull is different all over the world."

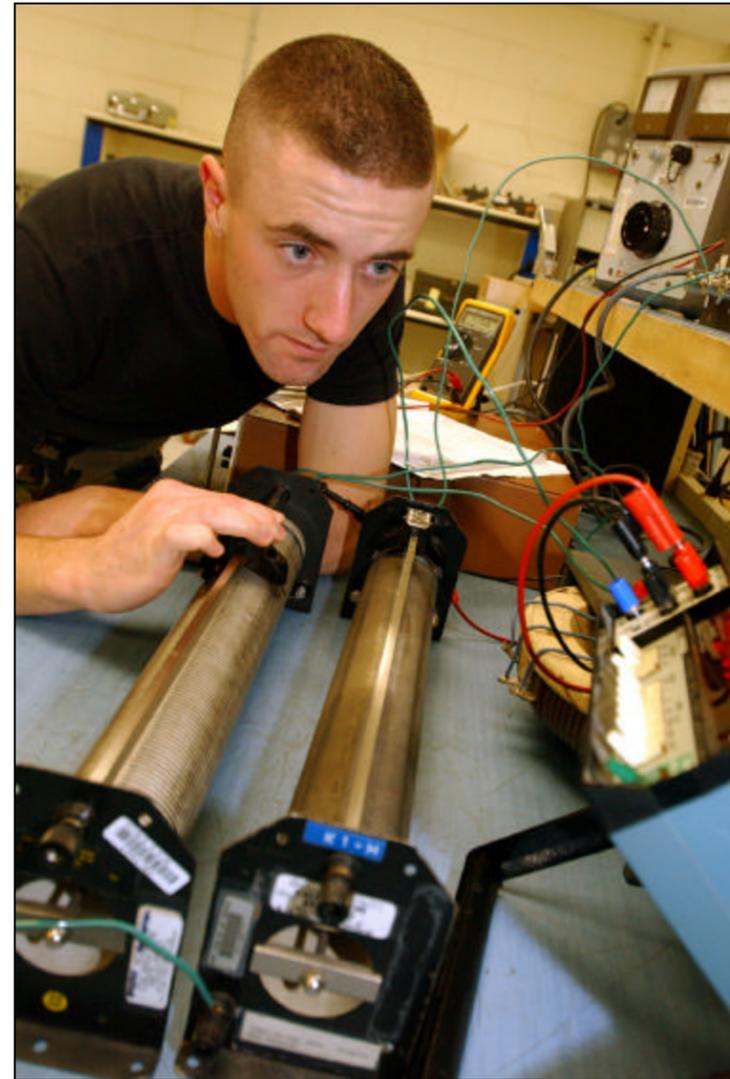
Knowing the difference in barometric pressure in those two locations is essential to the critical calibration of mechanisms that assist pilots in landing fighter aircraft for example, Erden explained.

If a piece of equipment is found to be "out of tolerance," as Bain puts it, meaning that the measurement levels fall outside of the accepted standard, it can most likely be repaired on station, Bain said.

Items that cannot be repaired or are deemed economically unfeasible to repair are condemned, and a new item ordered.



Staff Sgt. Dan Burke calibrates a primary pressure standard.



(Above), Airman 1st Class Nathaniel Christian calibrates a Direct Current voltage supply. (Below), Staff Sgt. Brian McBride helps train Airman 1st Class Emily Raines on a hydraulic pressure clock.



Airman 1st Class Jacob Snoddy certifies a weight scale used for the weight management program.



(Above), Airman 1st Class Timothy Walsh (foreground) and Tech. Sgt. Rick McKenzie perform maintenance on a missile test set. (Left), Tech. Sgt. Jeff Jarvis calibrates a digital multimeter. The test has to be done at many voltage levels.

