

Preface

1969-1972 - During the height of the Vietnam War, with a Bachelor's and Master's in Mechanical Engineering, I was assigned to Tyndall AFB, Florida as an Air Force flight test engineer. I worked on developing instrumentation and analyzing data transmitted to our ground station from fighters flying over the Gulf Test Range.

1972-1974 - I was transferred to Wright-Patterson AFB, Ohio to work on the new F-15 and was part of the team that designed and tested the first advanced on-board monitoring system, the "On-Condition Maintenance System".



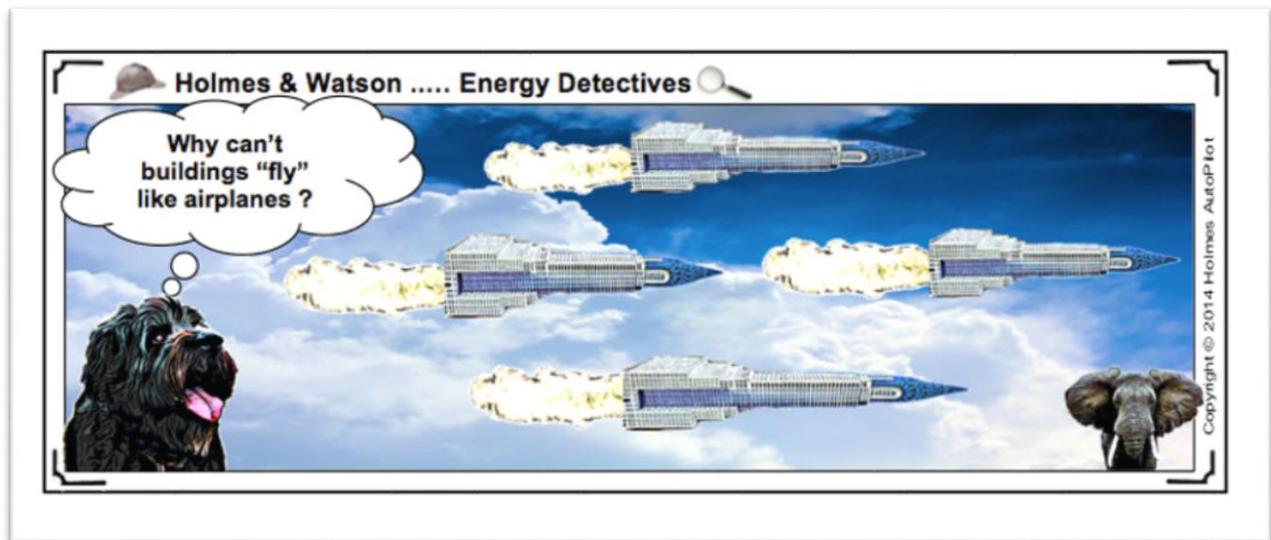
Lt. Holmes, Tyndall AFB 1969

1974-1979 – When I returned to civilian life, I started an Energy Conservation Department for a consulting engineering firm.

After five years of providing traditional consulting services including Energy Audits, Detailed Studies and designing Capital Improvements, **I was frustrated with the lack of actual results from traditional methods and determined to find a better way.**

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1979 - I started my own business with the hope of contracting to serve as energy manager for a number of facilities. **I wanted to work in the Real World with the Energy Systems, and actually save energy, not sit in an office only dealing with theories and possibilities.** From my consulting experience I knew that there was little, if any, data available on Energy Systems in buildings. From my Air Force experience, I knew that **accurate, Real-Time Data was required to operate any Energy System at peak efficiency under all conditions.**



I wondered what would happen if I applied what I had learned about monitoring complex Energy Systems in planes, to monitoring complex Energy Systems in buildings?

1979 - 1980 - I designed, built and installed my first Energy Monitoring System, at my expense, in my first project, a Mental Health Hospital. Along with an employee, we took an Apple II computer apart on my living room floor and remounted the components in a metal control panel. We soldered resistors and thermocouples to make our own temperature sensors and made our own cables using ribbon cable and clamp-on connectors.

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We mounted the panel in the mechanical room, installed all of the sensors and wiring and connected it to a 300 baud Hayes modem and dial-up telephone line so I could monitor the Energy Systems from my home office.

With the help of my 10 year old son, we wrote all of the software in “Basic” to read the data from the sensors using interface cards in the Apple, analyze and store it. As I was teaching Thermodynamics and other related courses for Purdue at the time, **the software included the Analytics required to continuously determine, display and store the efficiency of all of the Energy Systems.** This turned out to be the key to exposing the second biggest opportunity for energy savings, operating Energy Systems at peak efficiency under all conditions.

The results exceeded my wildest expectations. **We reduced the annual energy consumption, costs and emissions by 59%* with no-cost, low-cost changes in operation alone.** My only fees were a percentage of documented savings and I recovered my investment in the Energy Monitoring System within three months.

I Found the Better Way I was Looking For !

*The project was written up in the Journal of the Association of Energy Engineers (AEE) in 1983 and received an Energy Conservation Award from the Governor of Indiana.