

# *Engineering Consulting Business*

*– 20 Years Experience to Share*

Darrell R. Word, PhD, PE

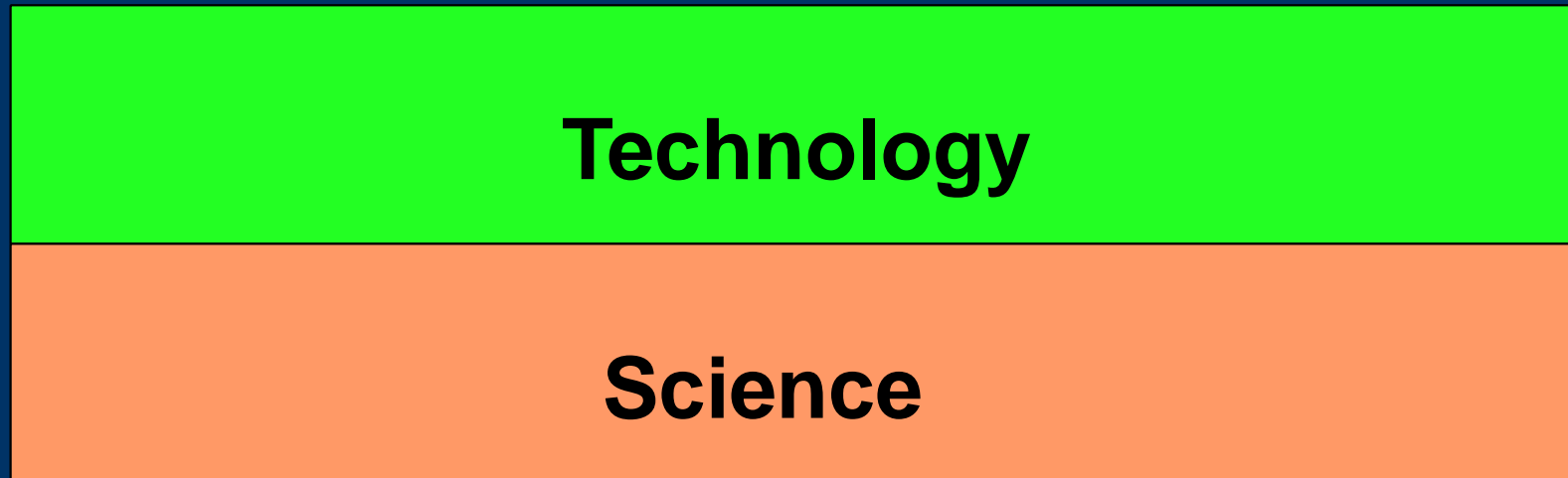
**DRW/ D. R. Word Associates**  
POB 786 // Leander, TX 78646-0786  
[d.r.word@ieee.org](mailto:d.r.word@ieee.org)

# *I. On Nature of Consulting Work*

- Layered Domain of Science and Technology, and the varied distribution of knowledge.
- Many problems legally require a P.E.
- Many companies have eliminated their development staff.
- Legal system needs experts for growing complexity of technical issues.
- Staff engineers are often equipped only for the ordinary.

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- Layered domain of Science and Technology



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## *II. Some Important Qualifications*

- Most basic: “Ability to offer a client usable solutions not otherwise readily available.”
- Competence and Experience in offered field.
- Self-confidence and studied view of start up risk.
- An accredited college degree in Engineering.
- One must be a Registered P.E. In Texas.

# *III. Consulting Practice*

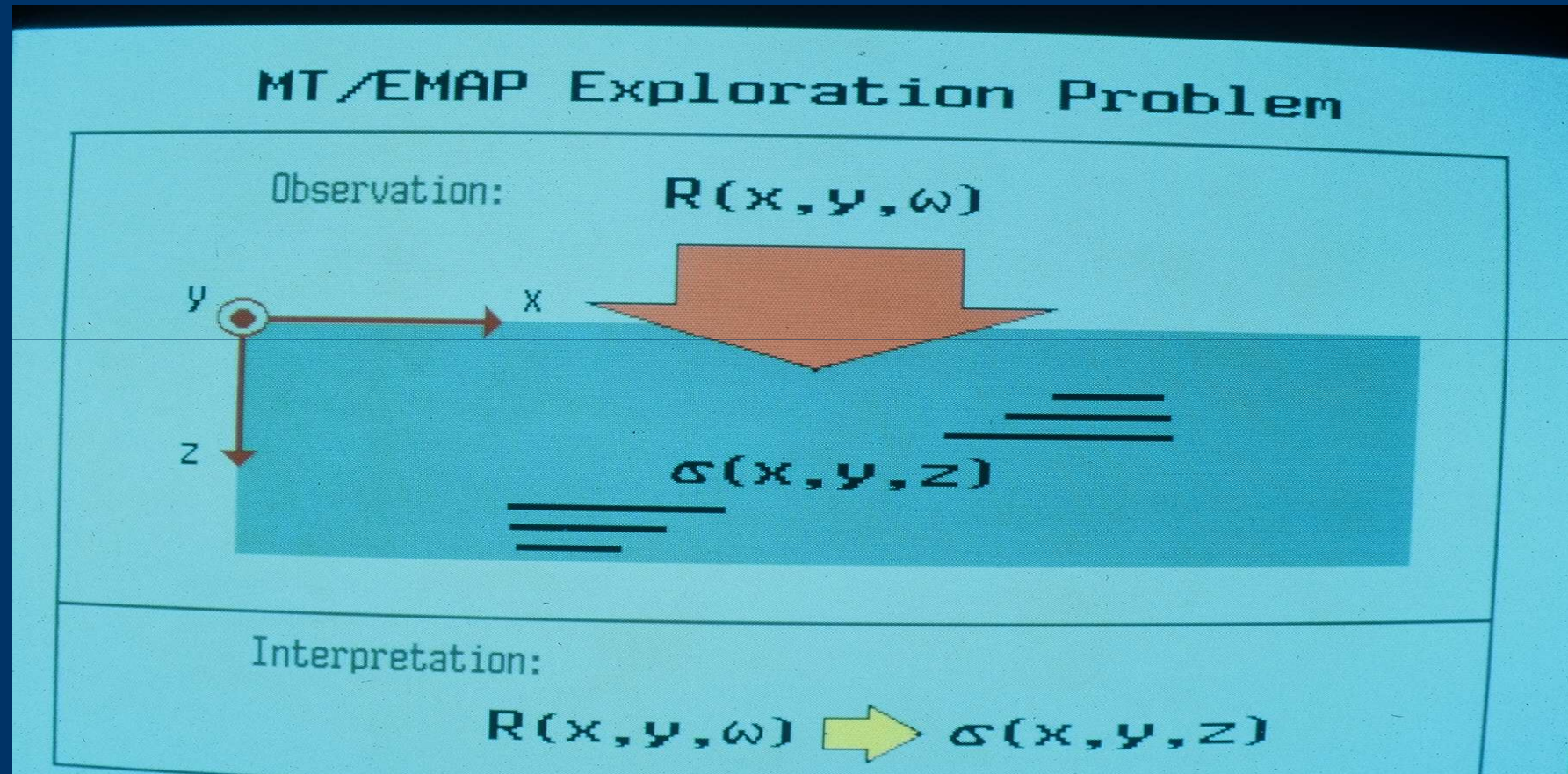
## *by D. R. Word*

- Background and Prep. -- (Science emphasis).
- Start up considerations.
- Modes of operation.
- Examples of work project types.
- Some observations.

# *III. Consulting Practice by D. R. Word*

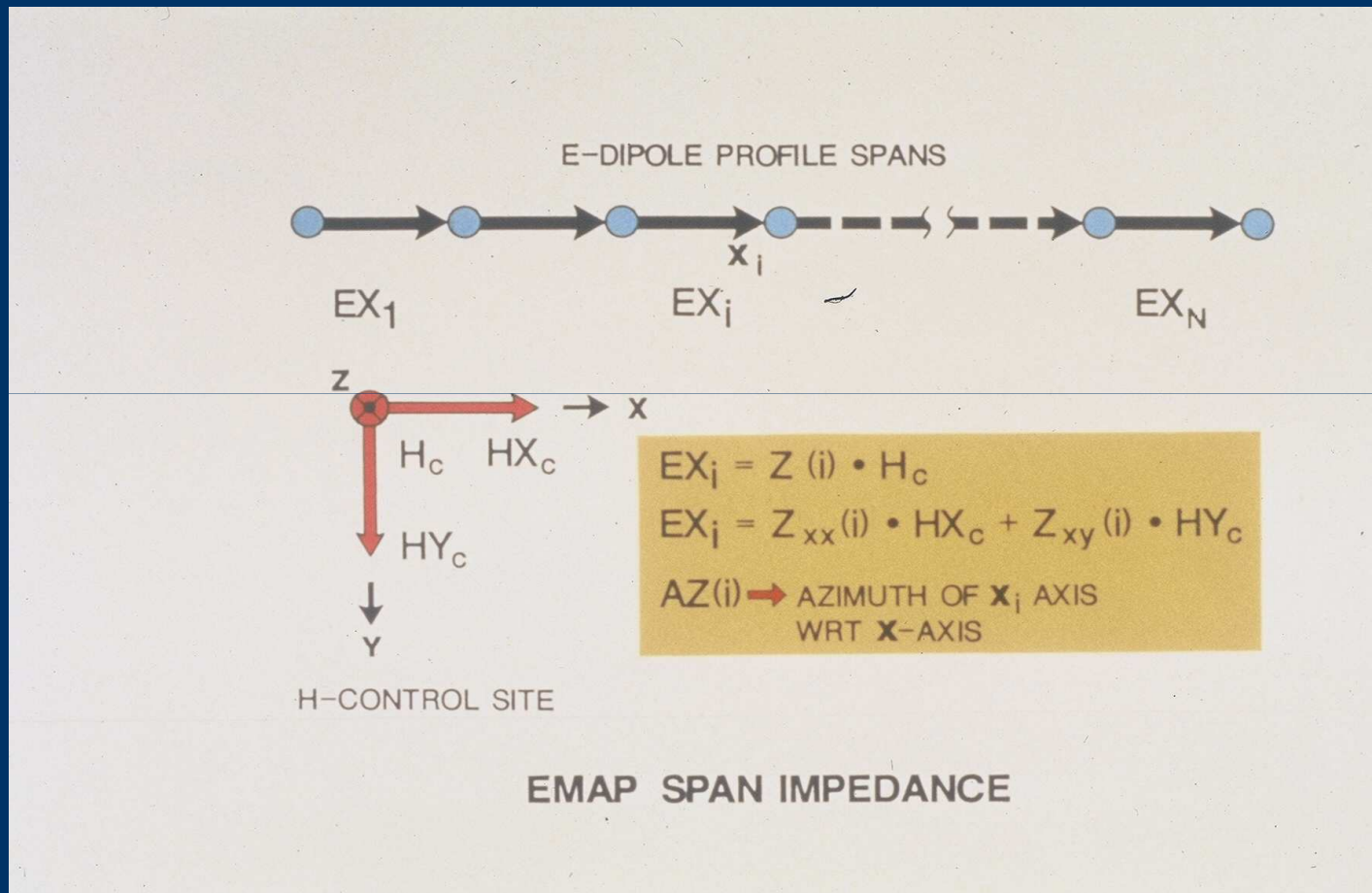
- Background and Prep. -- (Science emphasis). ///--
  - (1) Education with strong emphasis on EE Fundamentals, Theory, Math, Physics, EM Theory; with liberal cross-over between disciplines.
  - (2) Worked 10 yrs in UT-EERL / Balcones Research Center on Basic Research and R&D projects. Part time teaching on EE faculty.
  - (3) Co-founder (w/ UT colleague) of Geotronics Corp. - Austin; offering EM exploration services and instruments. Ran R&D for 20 years.

# MT/EMAP Scheme





# MT/EMAP Sensor Layout



# *Electrode for E-field Sensors*



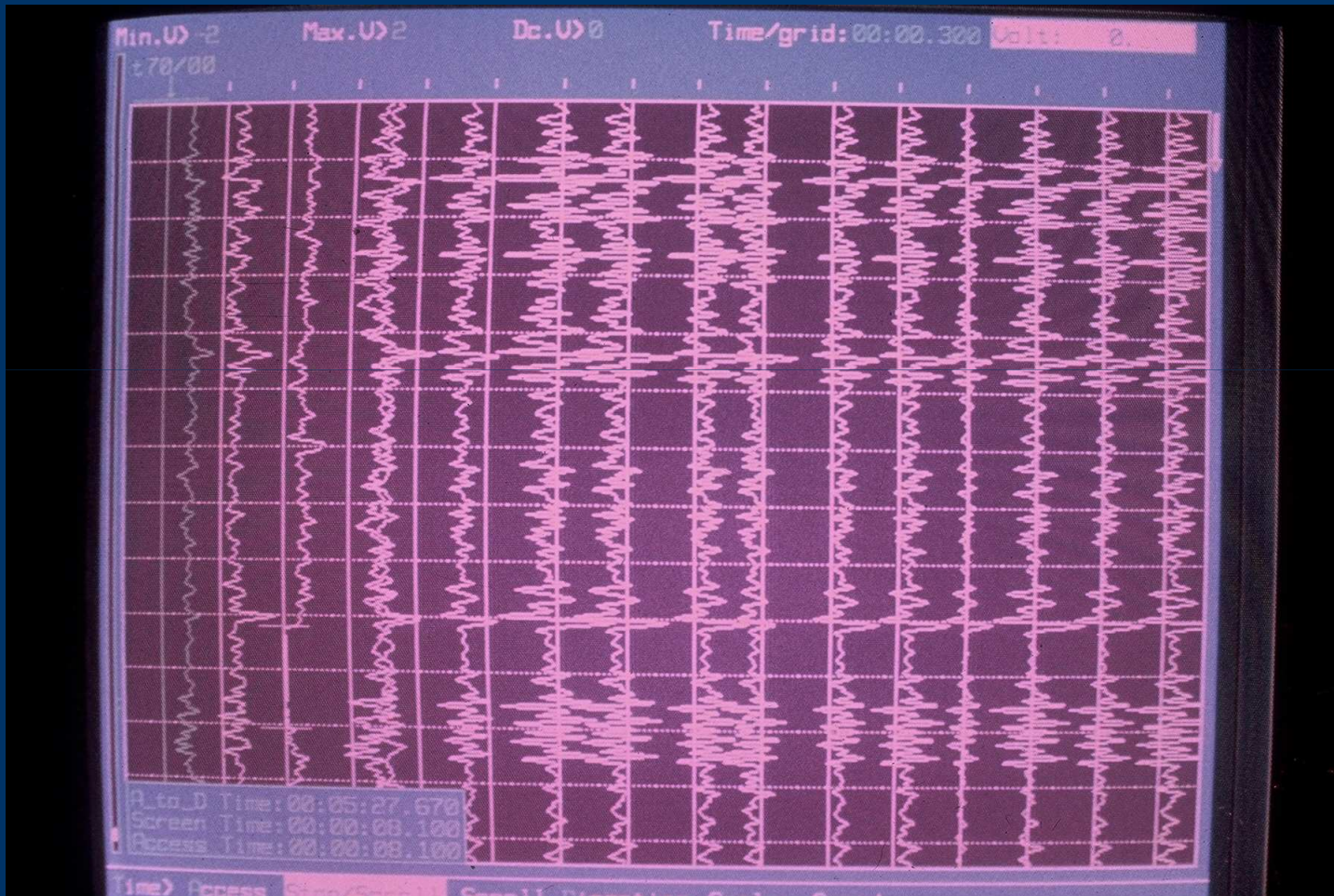
# *Induction Magnetometer for H-field*



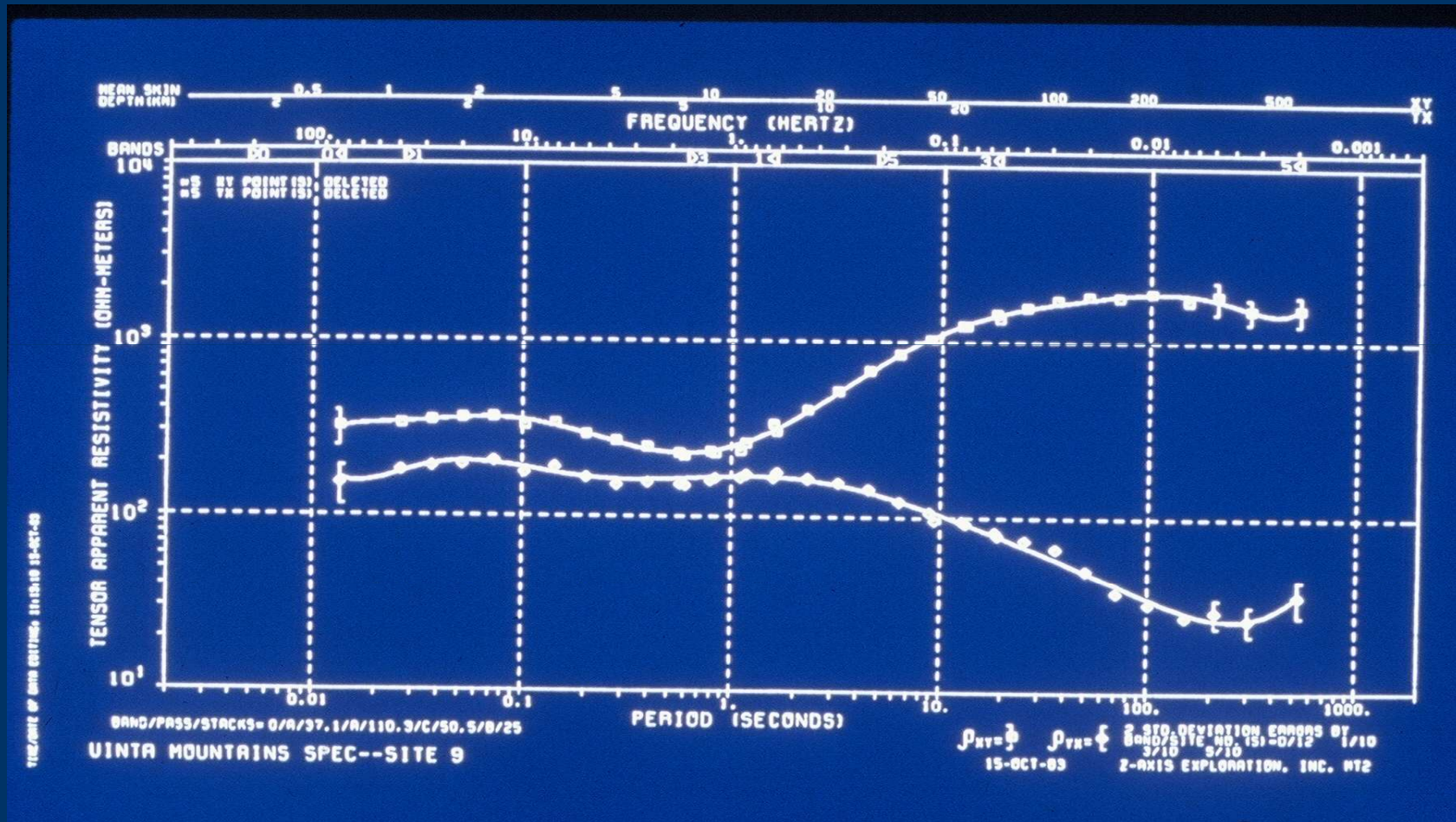
# *Cryogenic Magnetometer*



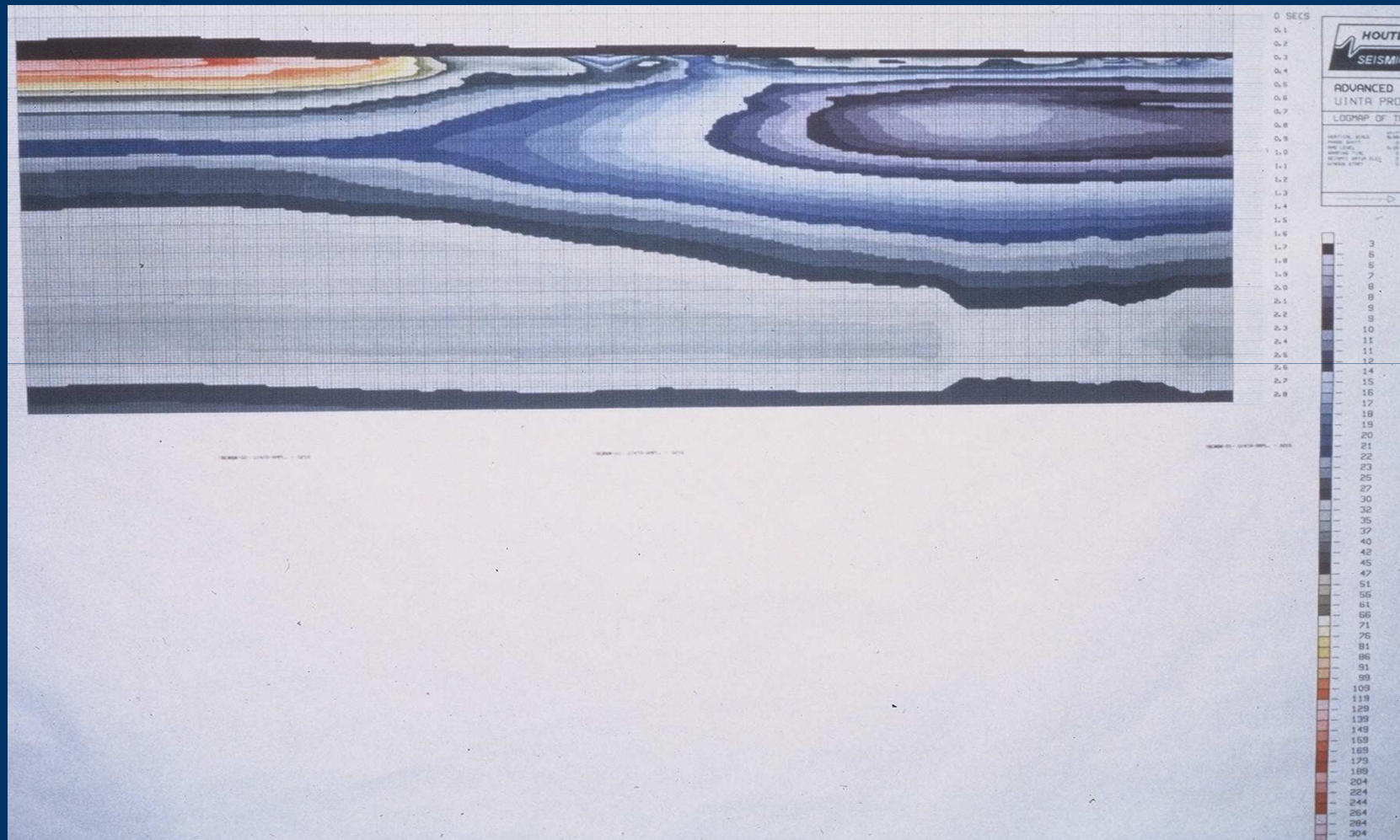
# Time-domain E- and H- signals



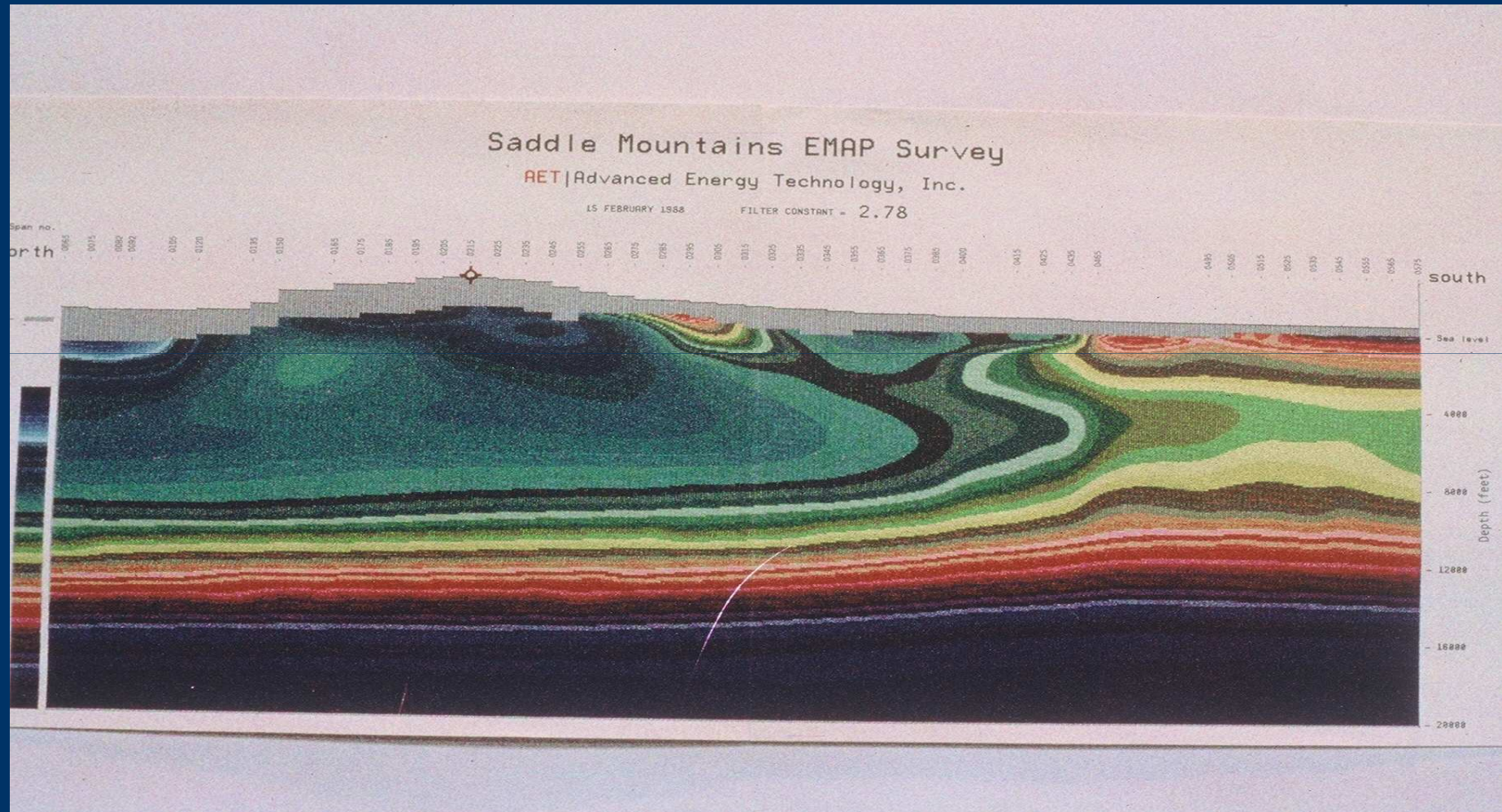
# Freq. -domain response – one site



# Interpreted Earth Conductivity Profile

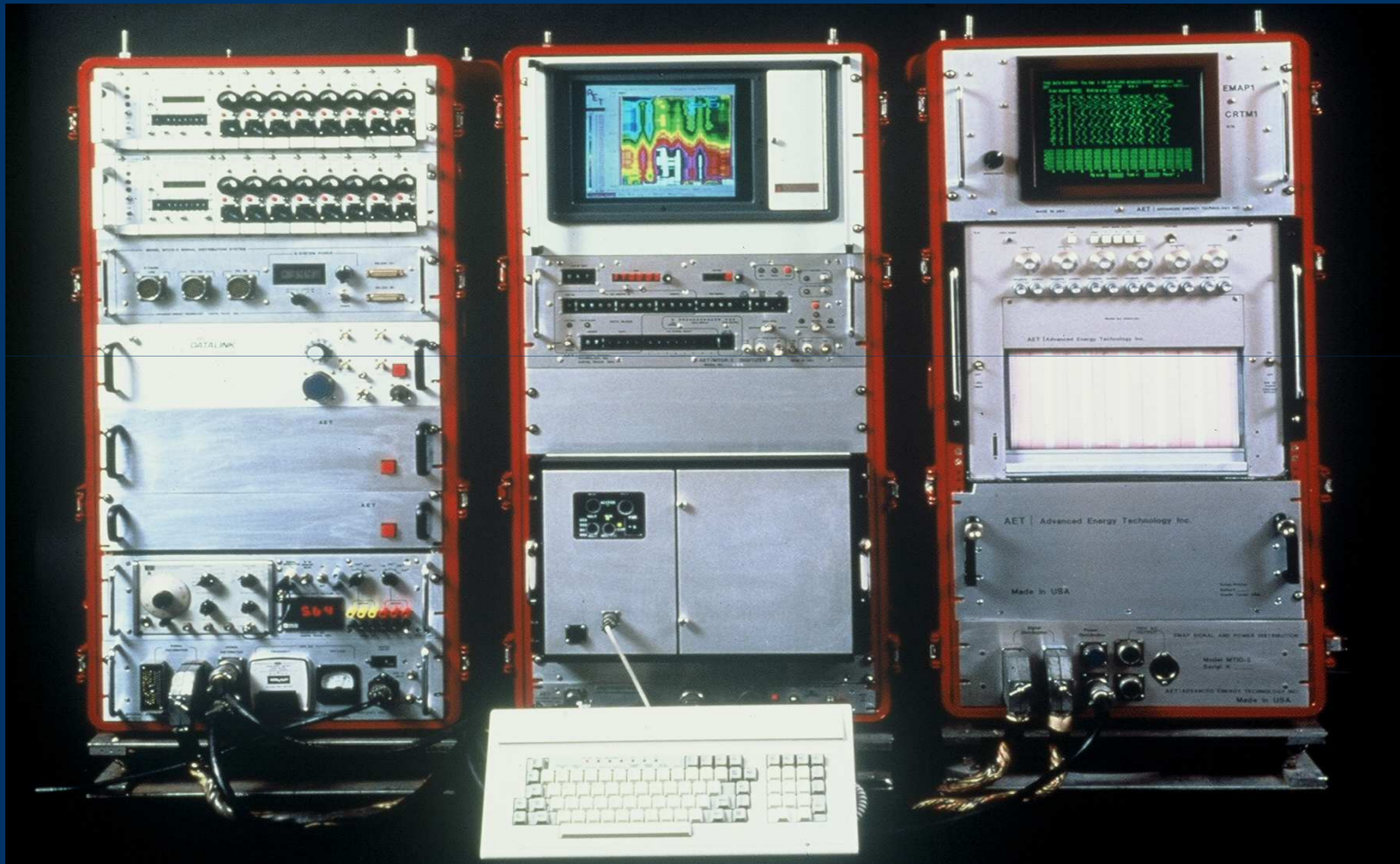


# Interp. Conductivity profile





# *Inst. For Data Acq. And Processing*



# *Instrument Truck*



# *Portable Instrument Hut*



# *Remote site sensor station.*



# *Remote sensor site*



# *III. Consulting Practice by D. R. Word*

- Modes of Operation.

(1) Sole Proprietor – Home office.

(2) Work mostly at home facility; some short duration travel to client.

(3) Used loosely coupled work associations with valued colleagues for specific jobs.

# *III. Consulting Practice by D. R. Word*

- Start up considerations.
  - (1) Sufficient funds to operate 3 or 4 months.
  - (2) Sought consulting work via referrals from from known professional contacts.
  - (3) Took occasional lessons from church mice.

# *III. Consulting Practice by D. R. Word*

- Examples of work project types.

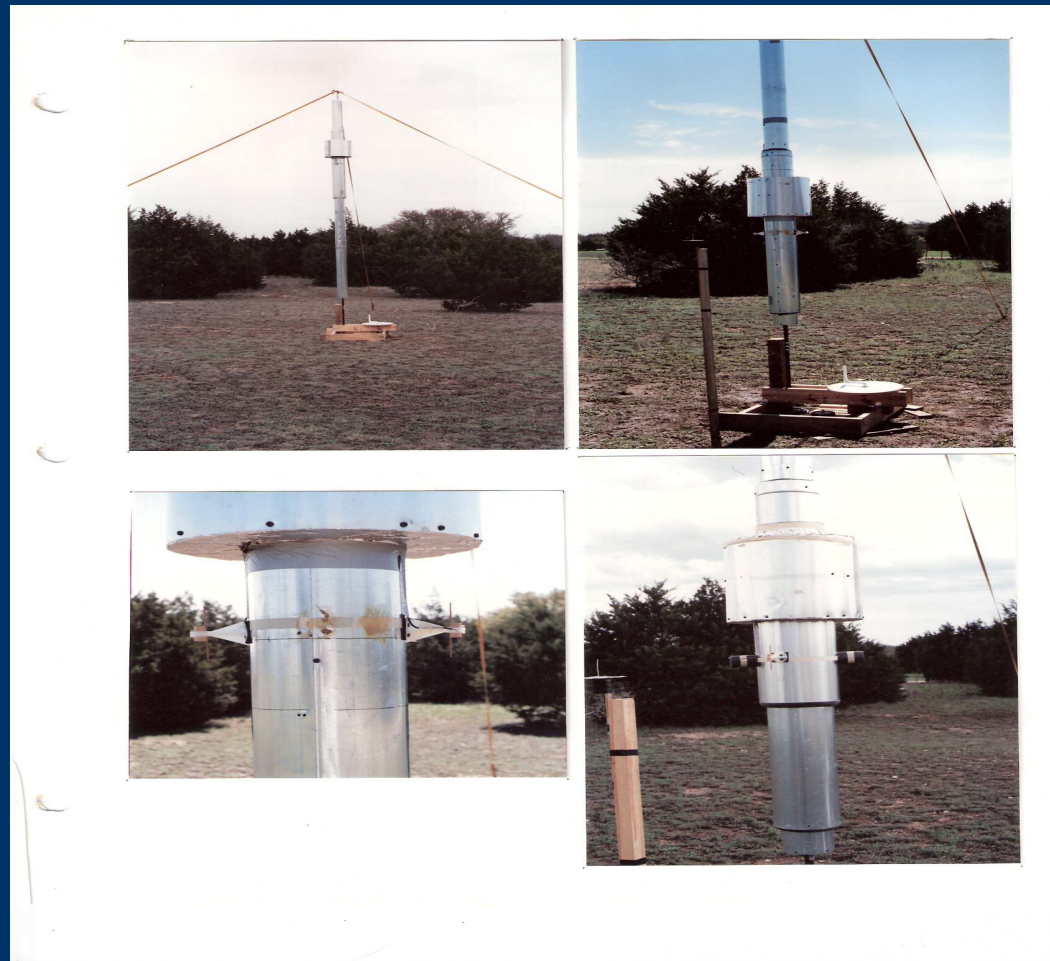
Typical work ranges widely within the field of EE and Electro-mechanics; including:

///--

Analog / digital systems; analog and digital signal processing; data acquisition; DSP (e.g., firmware for a single chip modems); control systems (hard drive head servo; plant control system, etc.); antenna design; RF and fiber-optic telemetry; RF systems (dev. of spread spectrum GPS type navigation receiver); low noise sensors and amplifiers; EM geophysical instrumentation; embedded MCU's; some AC power engineering problems; field emission modeling of power lines and substations; ion implanter beam optics and scanning uniformity improvement; nuclear research on deuterium fusion, and other.



# *Sim. Of 1.4 GHz antenna on Drill Stem*



# *Water Quality Sampling Instruments*



# *Small Dissolved Oxygen Logger*

**Midge™**

Temperature  
and  
dissolved  
oxygen  
logger



click for  
more info

# *Electrical Density Gage (EDG)*



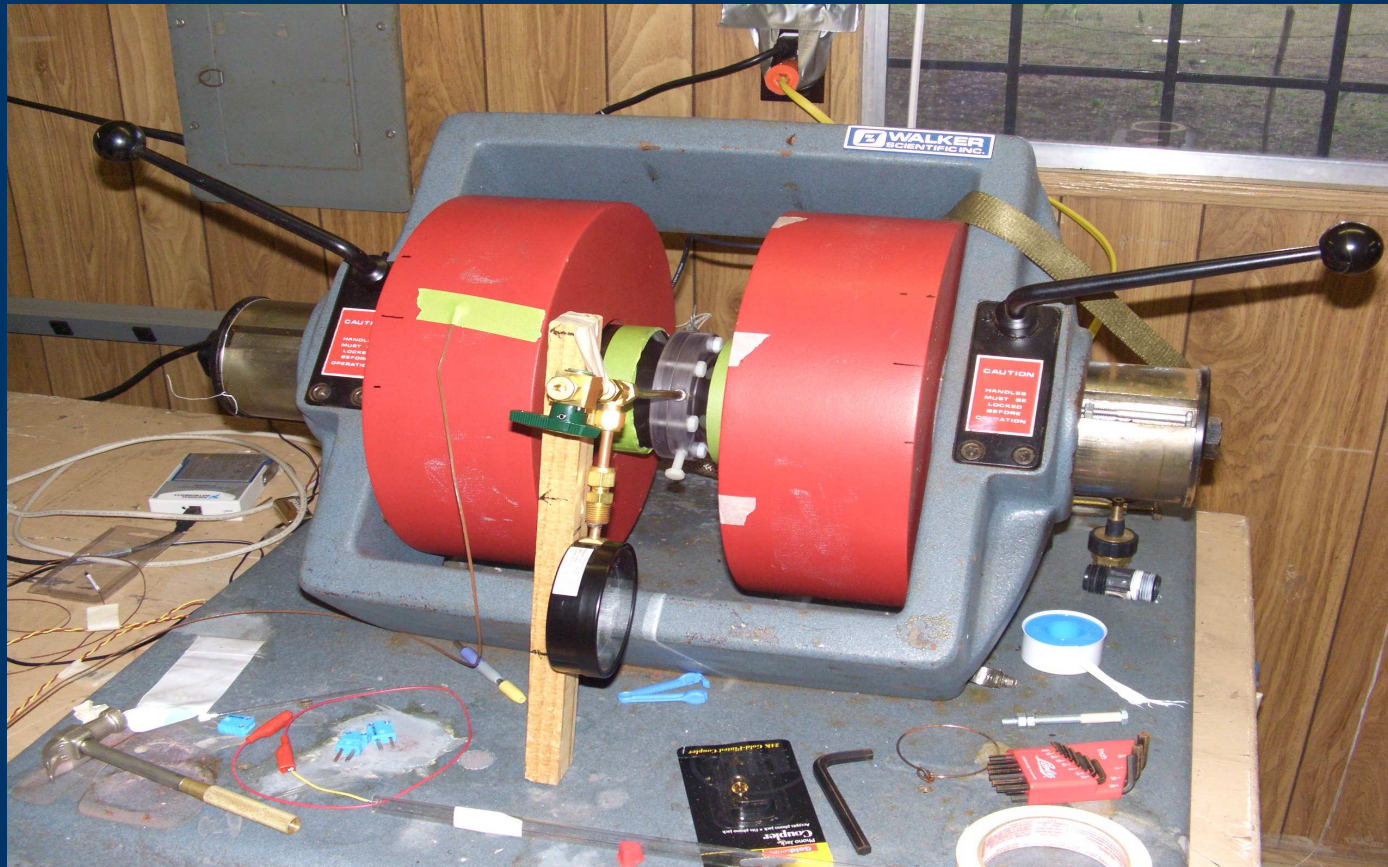
# *12.5 GHz Microwave TV testing*



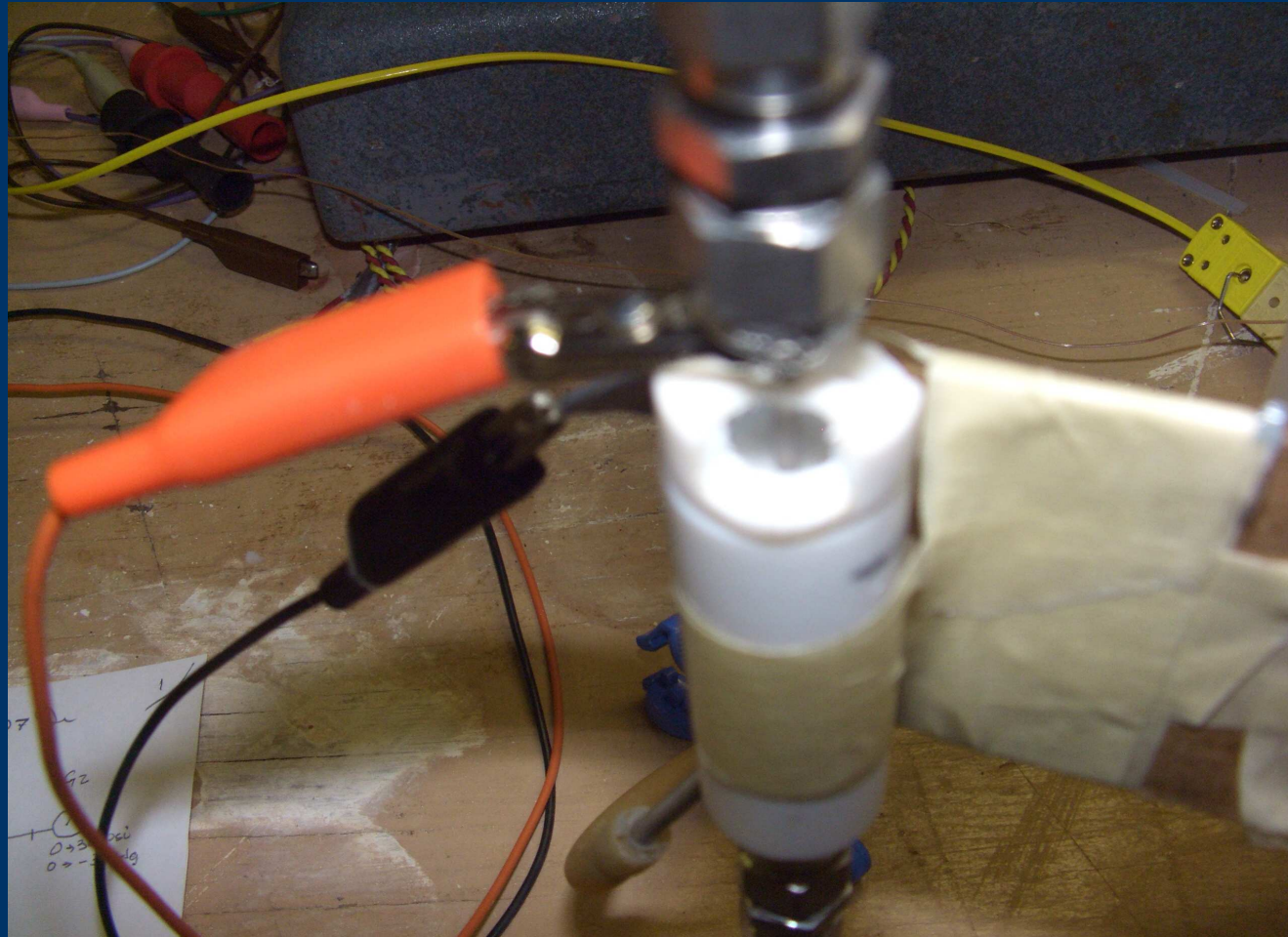
# *Instrument truck for microwave tests*



# *Experiment set up in Fusion Lab*

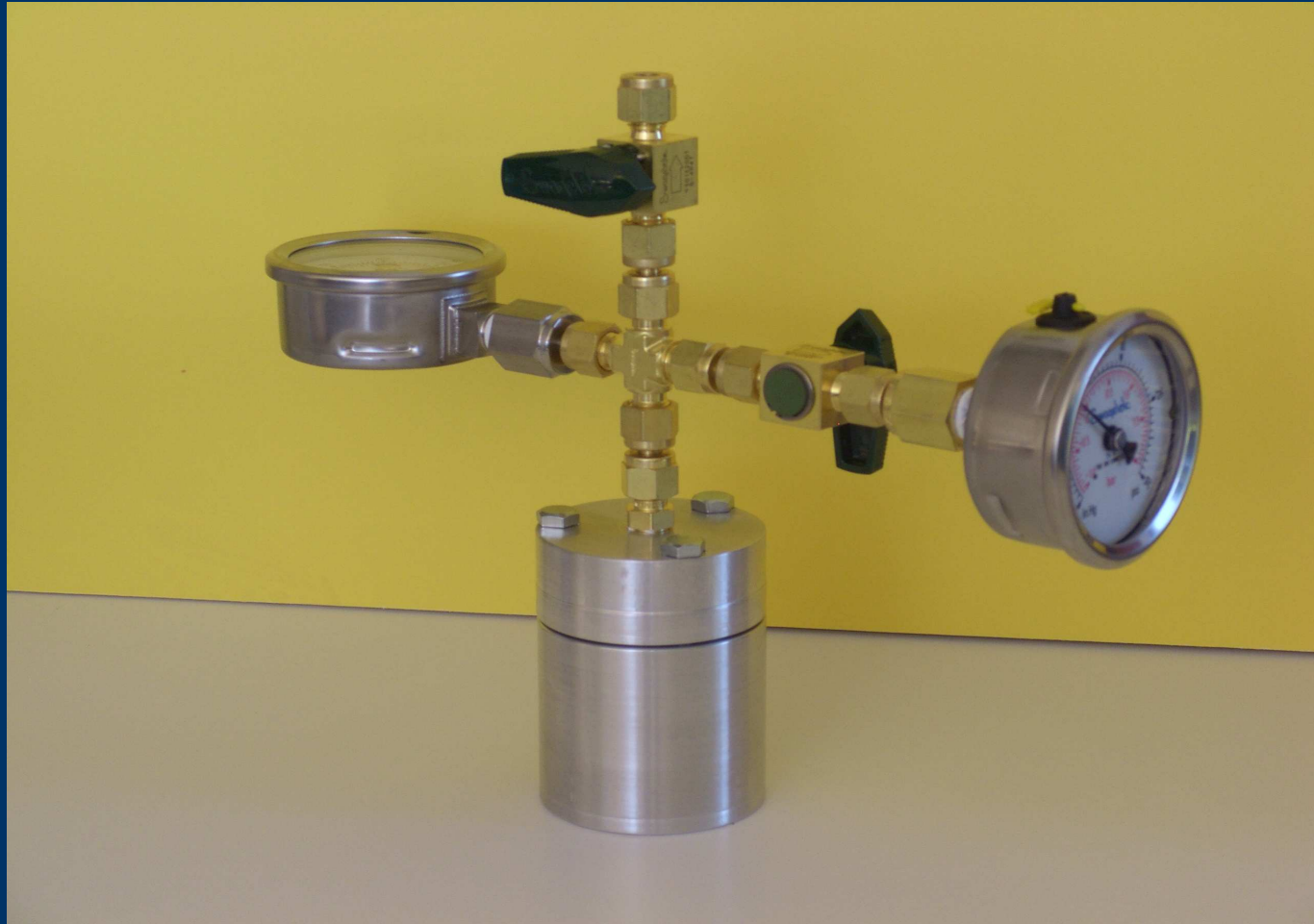


# *Small Electrolysis Deuterium Pump*





# *Test chamber for LT Fusion Experiment*



# *III. Consulting Practice by D. R. Word*

- Some Observations.
  - (1) More business education and orientation was needed.
  - (2) Sometime hard to manage and limit personal over-time.
  - (3) Easy to be drawn into ventures with delayed payoff.
  - (4) But I find that I am much happier than ever before.

## *IV. Some Important Peripheral Aspects*

- Ethics.
- Formal contract issues.
- Professional Liability Insurance.
- Marketing.