# suggestions for low and high current magnetic field monitoring

Achim Franz, BNL

after asking around I could not find any usable probes, so I suggest we use the old PHENIX Hall probes we used for the original field mapping in 1999 and another test in 2003.

Plus a single 3D probe, LakeView, with separate GPIB readout, but it does have a very short cable, 6', we ordered the wrong replacement length.
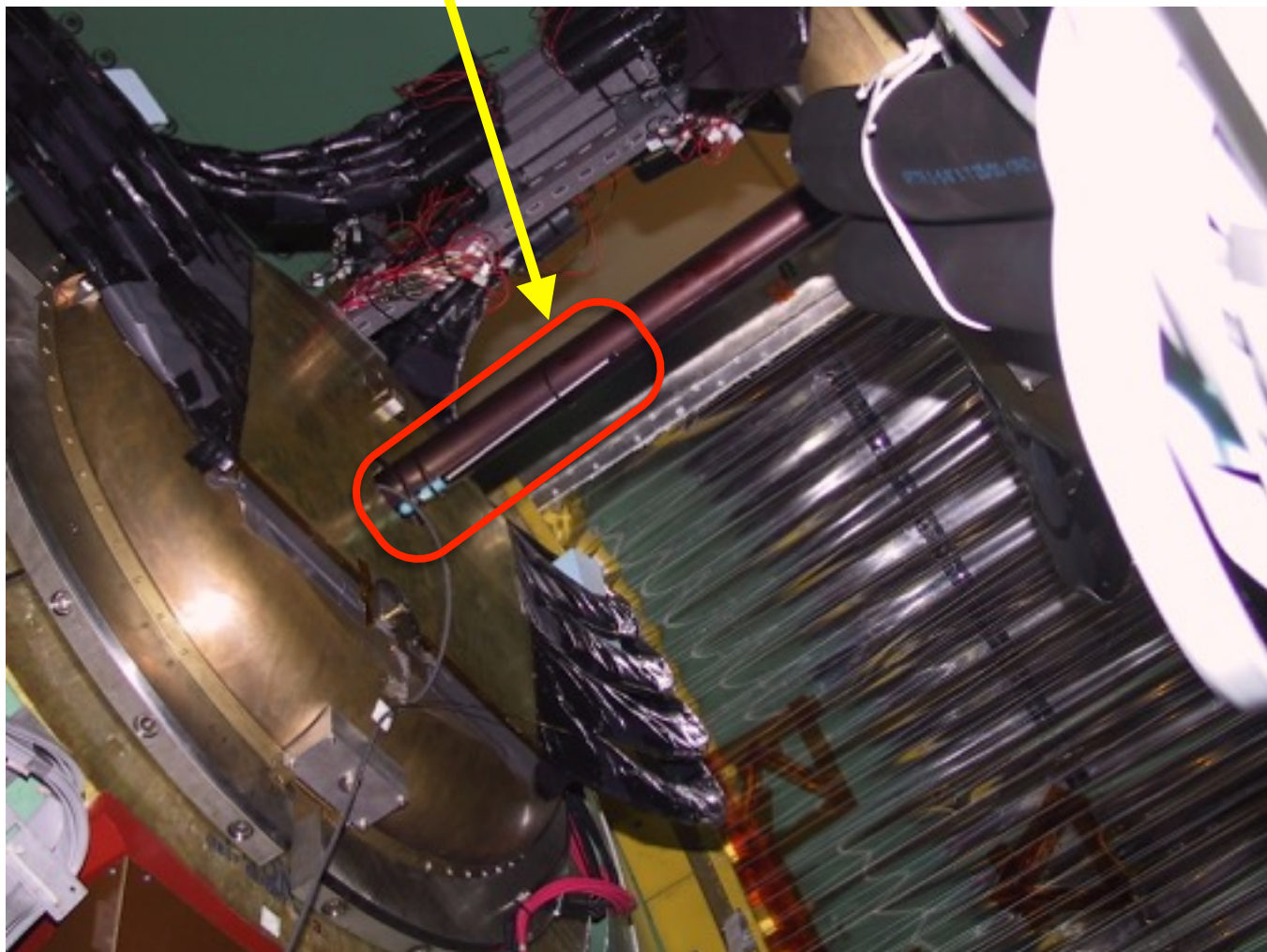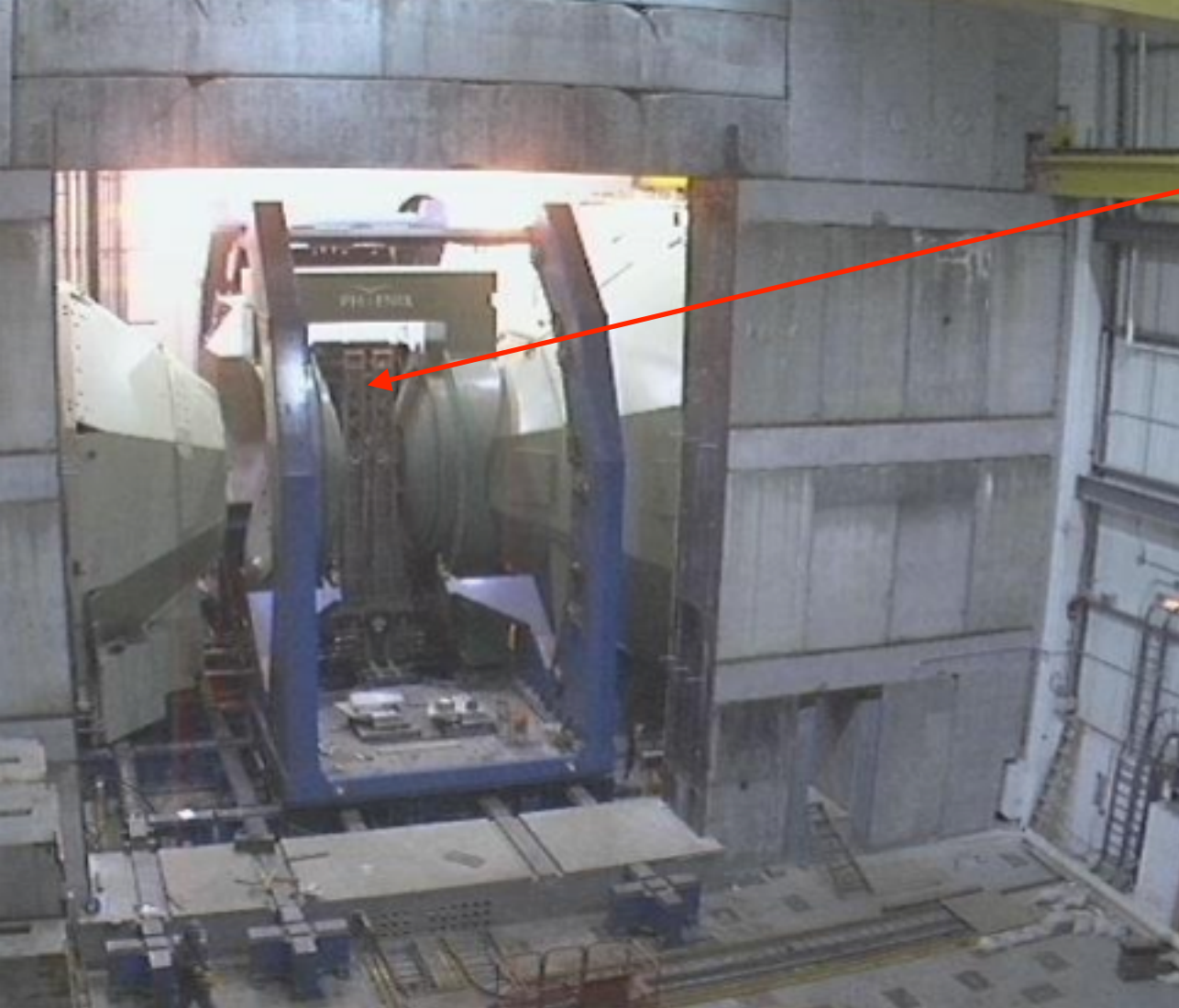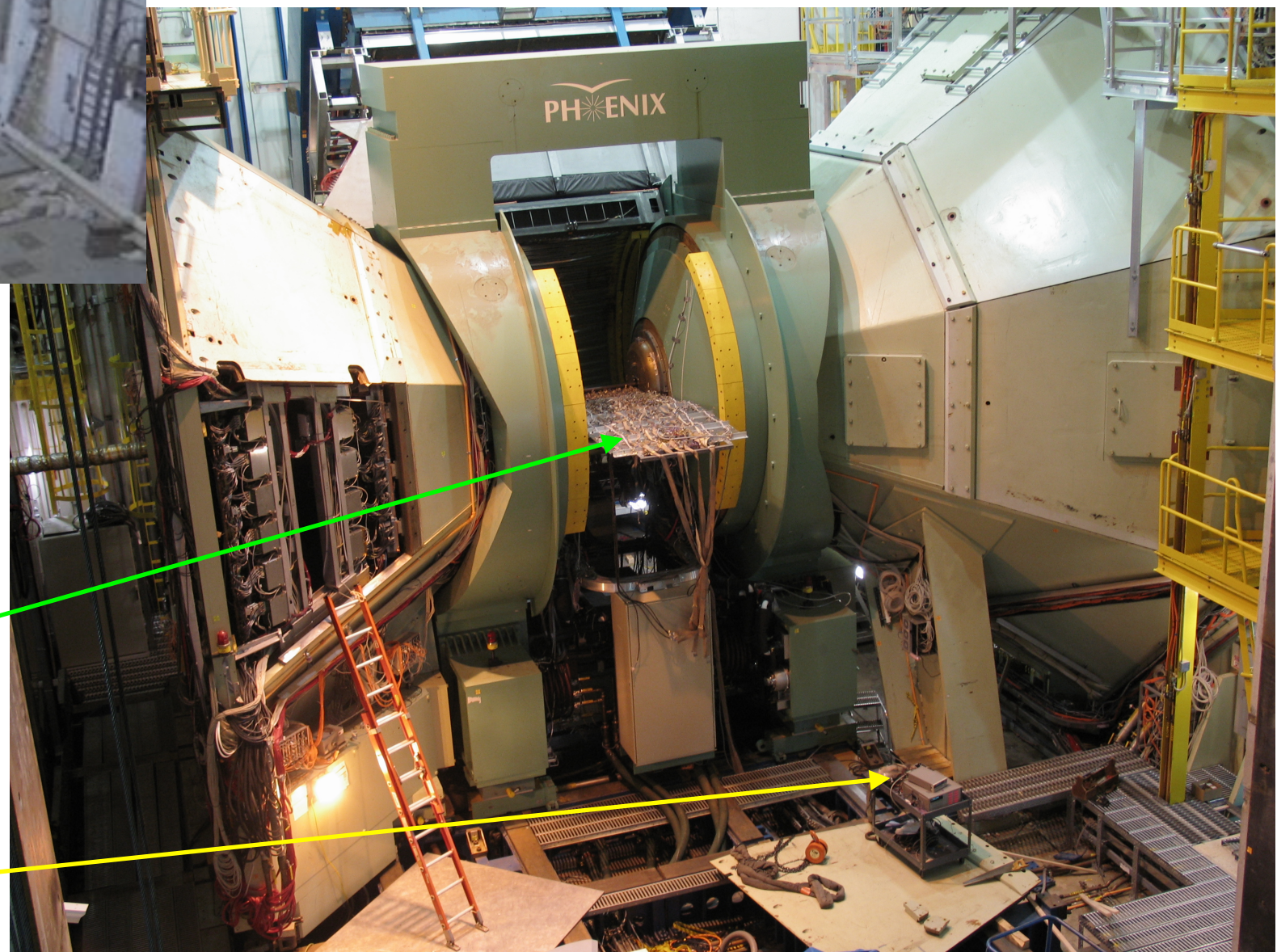
mapping fixture 1999

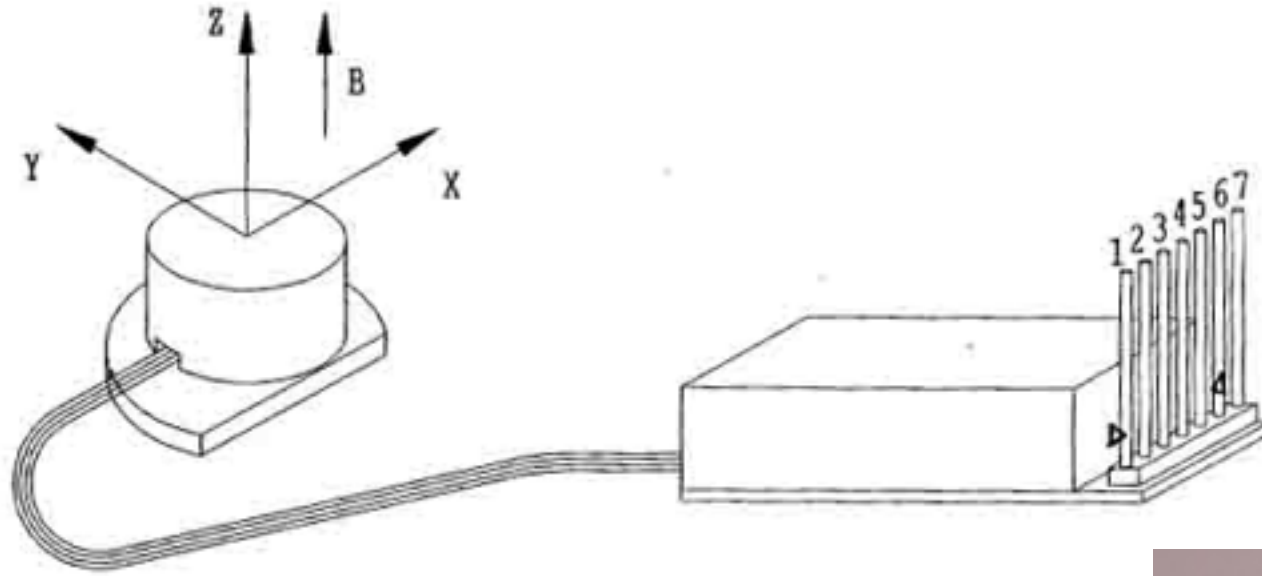test in 2003, trying to get this running again

plate with probes

Keithley 2000 DMM and 7002 switch

# 3. Hall Probe with Amplifier Board HT1D-AB



~ 400 Probes build and tested by Russian colleagues, booklet with constants available.

1. Control current "-"
2. Control current "+"
3. GND _black_
4. -15V _Blue_
5. +15V _Red_
6. GND
7. Output voltage "+"

Note: The positive voltage appears at the lead 7, when the magnetic field vector is directed as shown and control current enters in to the lead 2.

Accuracy of calibration:

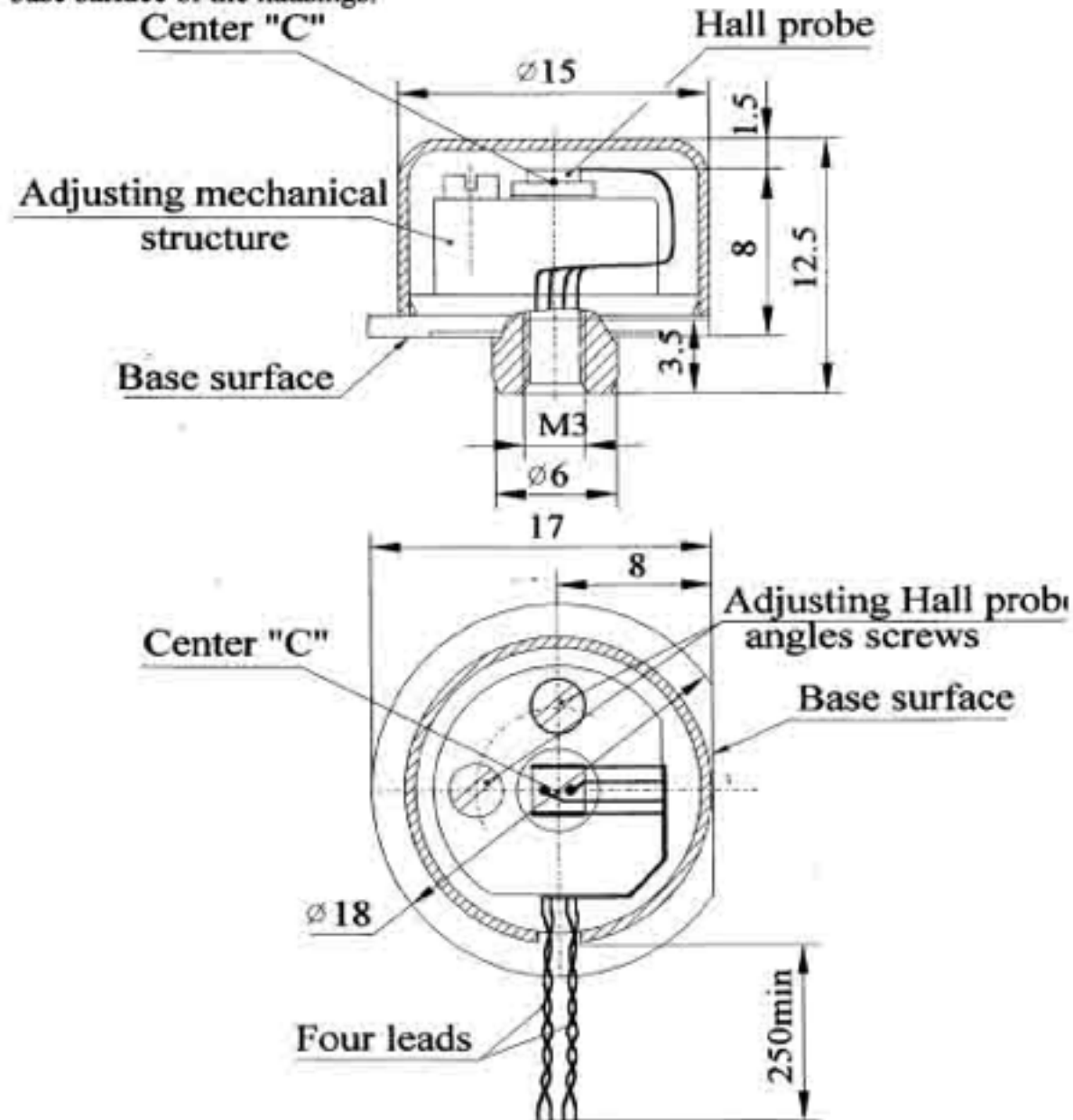| | |
|---|---|
| Magnetic sensitivity | ±5.0E−4 |
| Offset voltage | ±0.7 mV |
| Output voltage temperature coefficient | ±5.0E-3 %/°C |
| Offset voltage temperature coefficient | ±0,02 mV/°C |
| "Planar" Hall coefficient | ±10 mV/T² |

Achim Franz, BNL, achim@bnl.gov
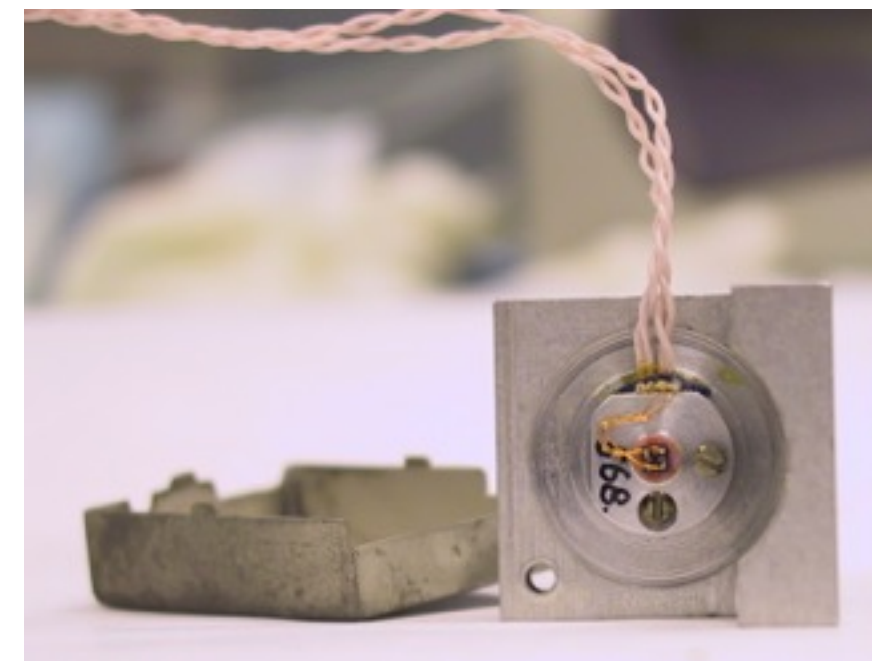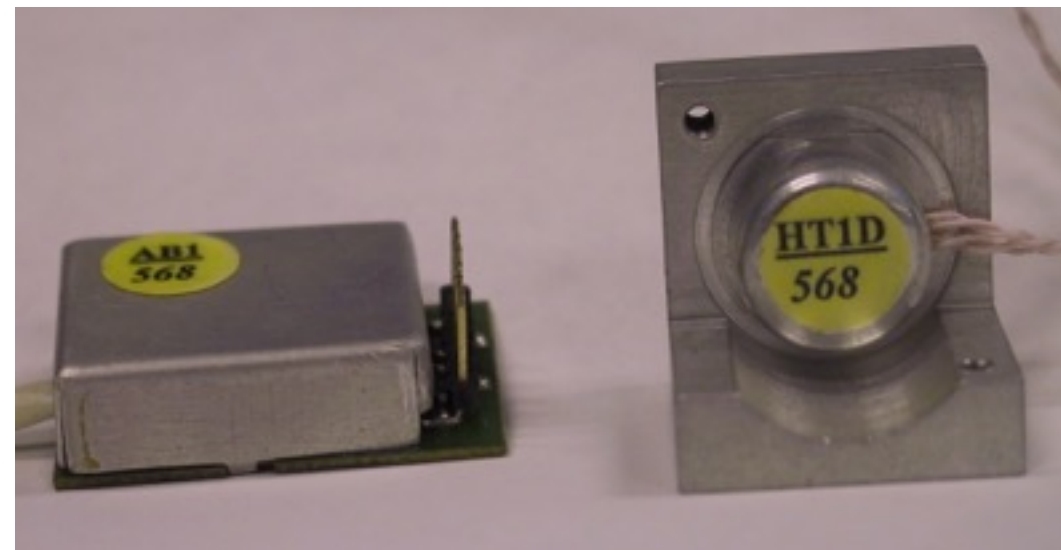
# General Specifications
## Hall Probe with Amplifier Board, Model HT1D-AB.

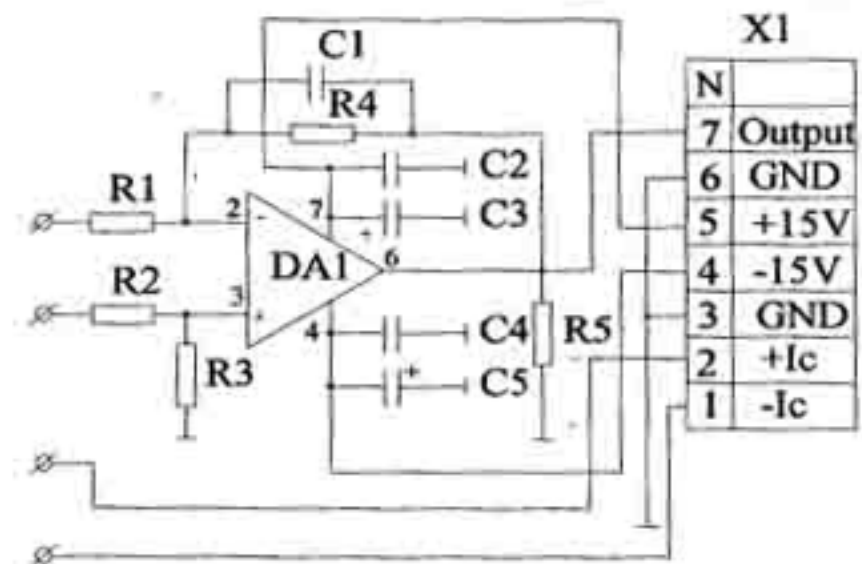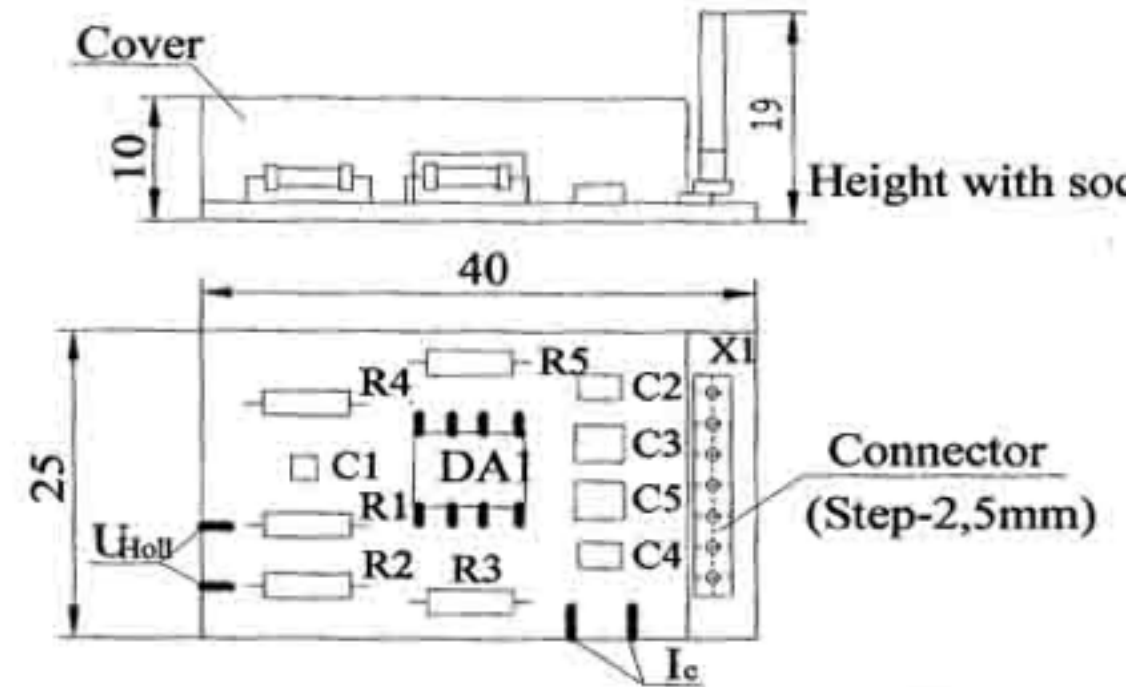## 1. Hall Probe HT1D

All Hall probes are mounted in the hausings with accuracy ±0,25 mm in any direction relatively the poind "C" and adjusted up to 0.06 degree (1millirad) in two independent directions relatively the bottom base surface of the hausings.



Center "C"
Hall probe
∅15
1.5
Adjusting mechanical structure
8
12.5
Base surface
3.5
M3
∅6
17
8
Center "C"
Adjusting Hall probe angles screws
Base surface
∅18
∅18
Four leads
250min

Note: all dimensions are in mm.

## 2. Amplifier Board AB



Cover
10
19
Height with soc
40
25
R4  R5  X1
C2
C1  DA1  C3
C5
R1
$U_{Holl}$
R2  R3  C4
$I_c$
Connector (Step-2,5mm)

C1
R4
R1
C2
C3
DA1
R2
R5
C4
R3
C5

| N | |
|---|---|
| 7 | Output |
| 6 | GND |
| 5 | +15V |
| 4 | -15V |
| 3 | GND |
| 2 | +Ic |
| 1 | -Ic |

X1

Note: all dimensions are in mm.

| Resistors C2-29B | | Chip Capacitors | |
|---|---|---|---|
| Element | Nominal | Element | Nominal |
| R1, R2 | 1k | C1 | 10nF |
| R3, R4 | 100k | C2,C4 | 100nF |
| R5 | 10k | C3,C5 | 10μF(16VDC) |

Achim Franz, BNL, achim@bnl.gov

5

# readout cables,
# 2 may work,
# 18 probes each
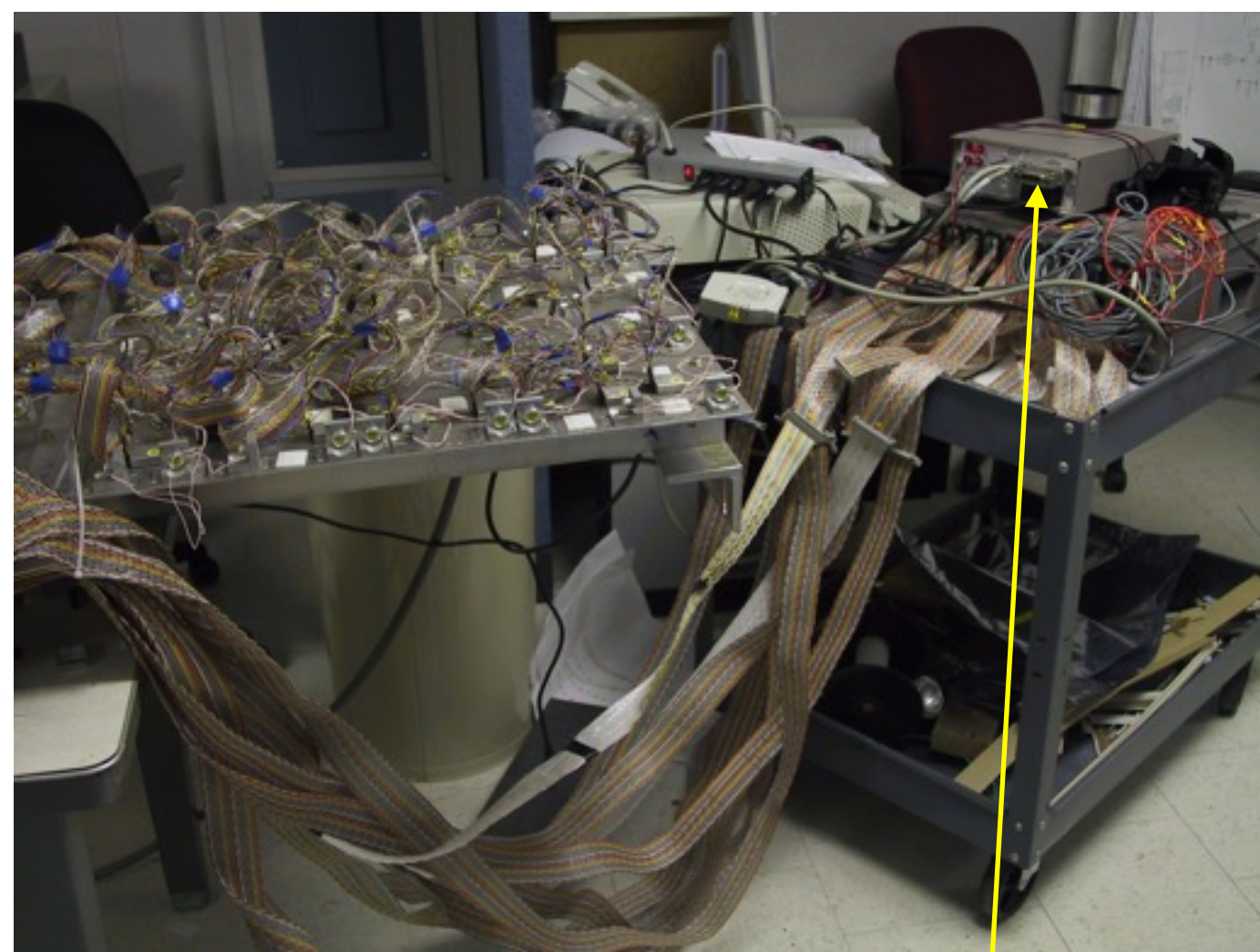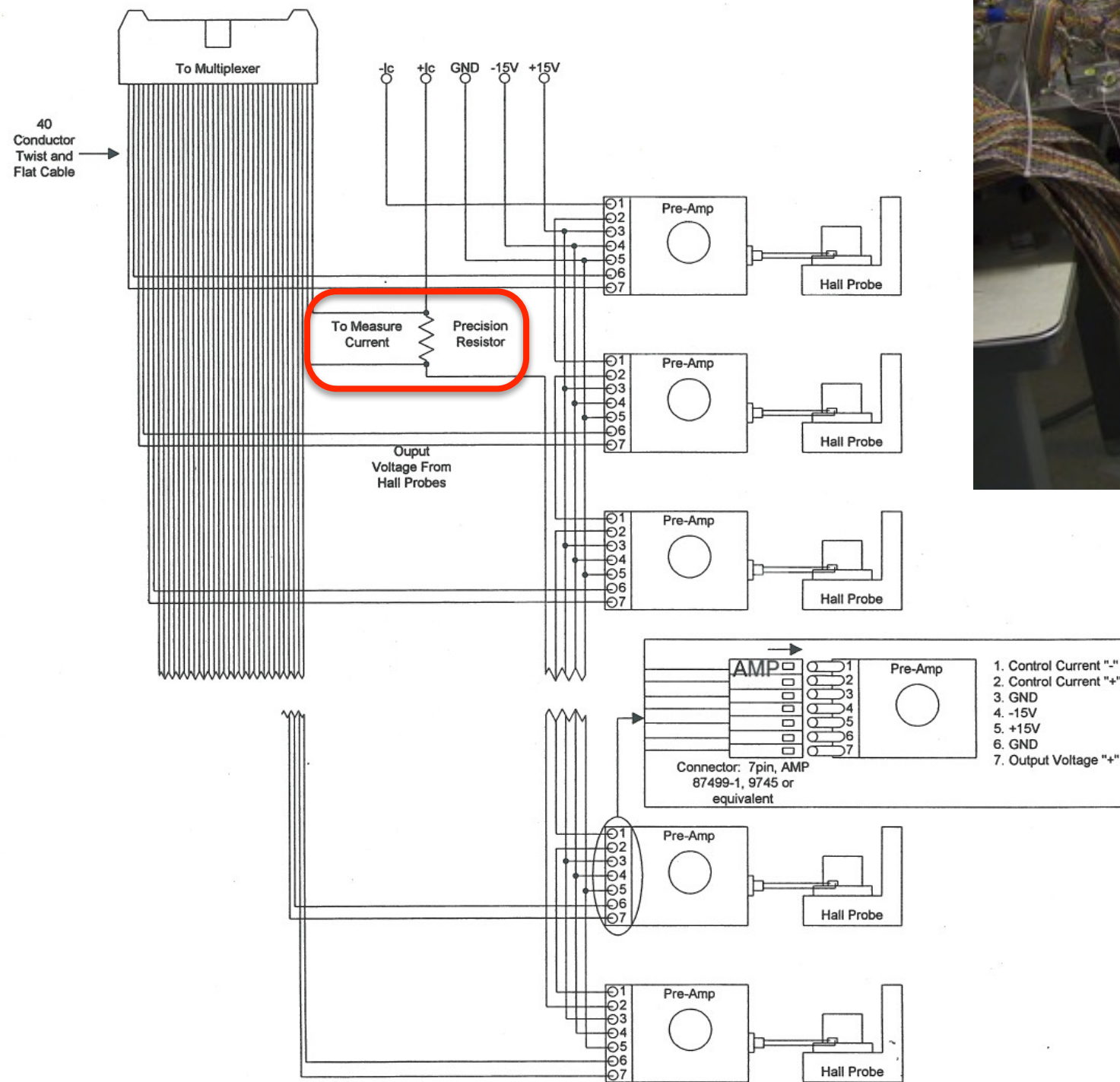


## Keithley 2000 DMM
## and 7002 switch

this is a set of monitoring probes for the MuonMagnetSouth
create something similar on a Al unistrut base
placed on the cryostat floor
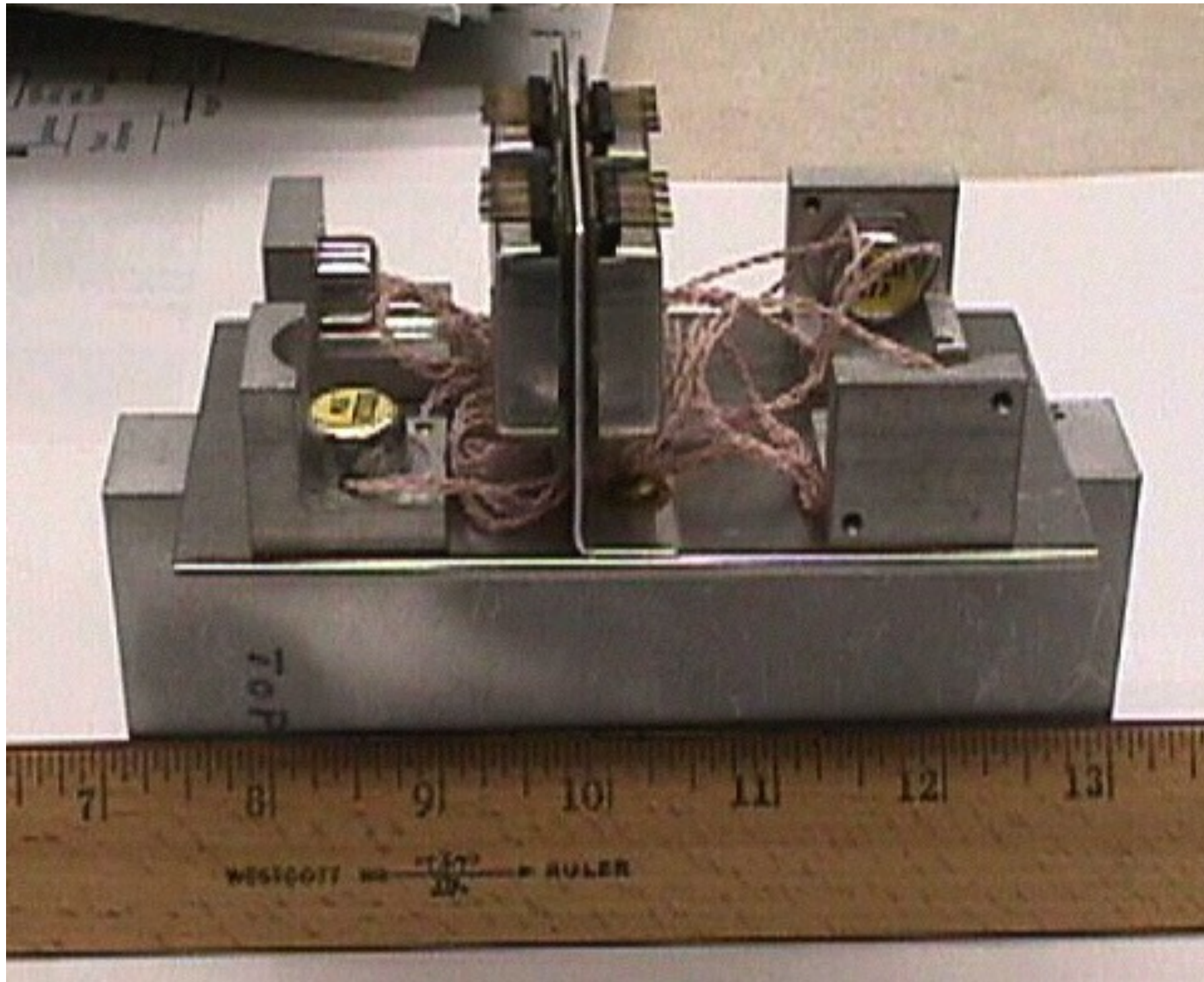
# testing readout with an old Mac and PyVisa



PyVISA is a Python package that enables you to control all kinds of measurement devices independently of the interface (e.g. GPIB, RS232, USB, Ethernet). As an example, reading self-identification from a Keithley Multimeter with GPIB number 12 is as easy as three lines of Python code:

```
>>> import visa
>>> rm = visa.ResourceManager()
>>> rm.list_resources()
('ASRL1::INSTR', 'ASRL2::INSTR', 'GPIB0::12::INSTR')
>>> inst = rm.open_resource('GPIB0::12::INSTR')
>>> print(inst.query("*IDN?"))
```

(That's the whole program; really!) It works on Windows, Linux and Mac; with arbitrary adapters (e.g. National Instruments, Agilent, Tektronix, Stanford Research Systems).

https://pyvisa.readthedocs.org/en/stable/