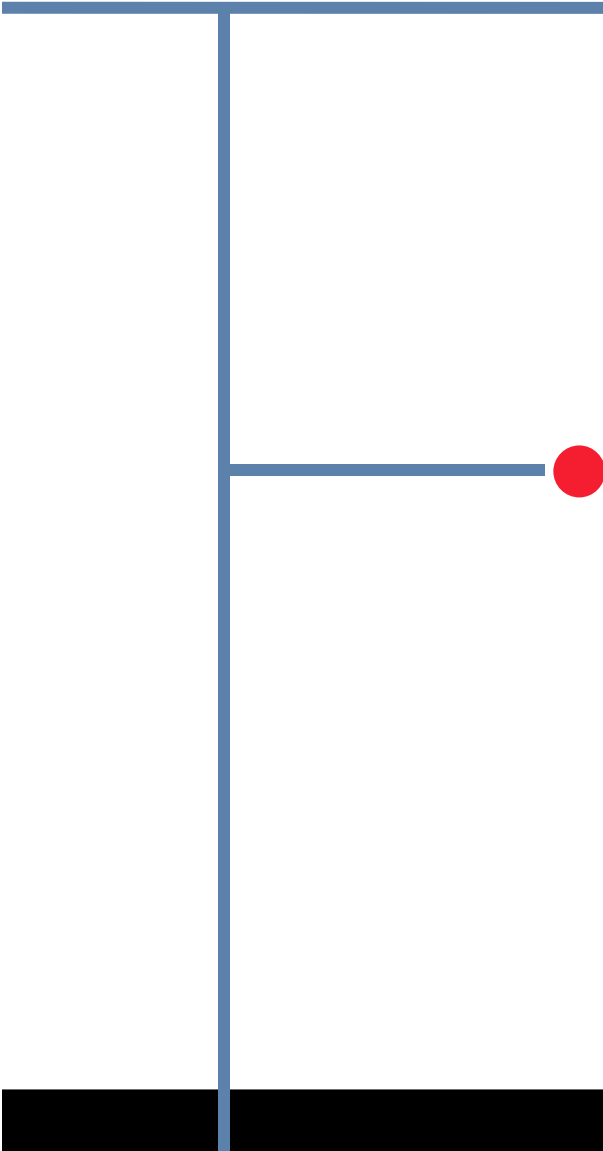




History of High Resolution Mass Spectrometry in Bremen

Helmut Muenster
Thermo Fisher Scientific (Bremen)

ATLAS Werke AG Bremen

- A former shipyard company
- **Dr. Ludolf Jenckel** (Physicist, Atlas Werke AG) together with one colleague developed in 1 year the first MS prototype in the cellar of a hospital
- After completion he persuades his company to set up a small division for MS:

1948 Atlas MAT was founded !

MAT = Mess und Analysen-Technik

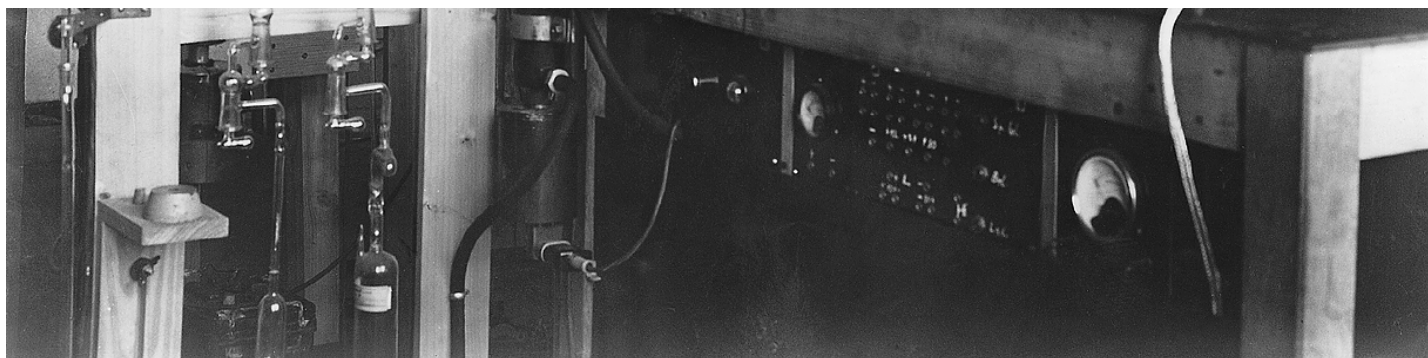
Magnet from his teacher Walcher, mounted on wooden frame
Companies in England and the US already sold commercial mass specs
The prototype could not compete with these instruments

CH1 (1948) – first prototype / birth of MAT



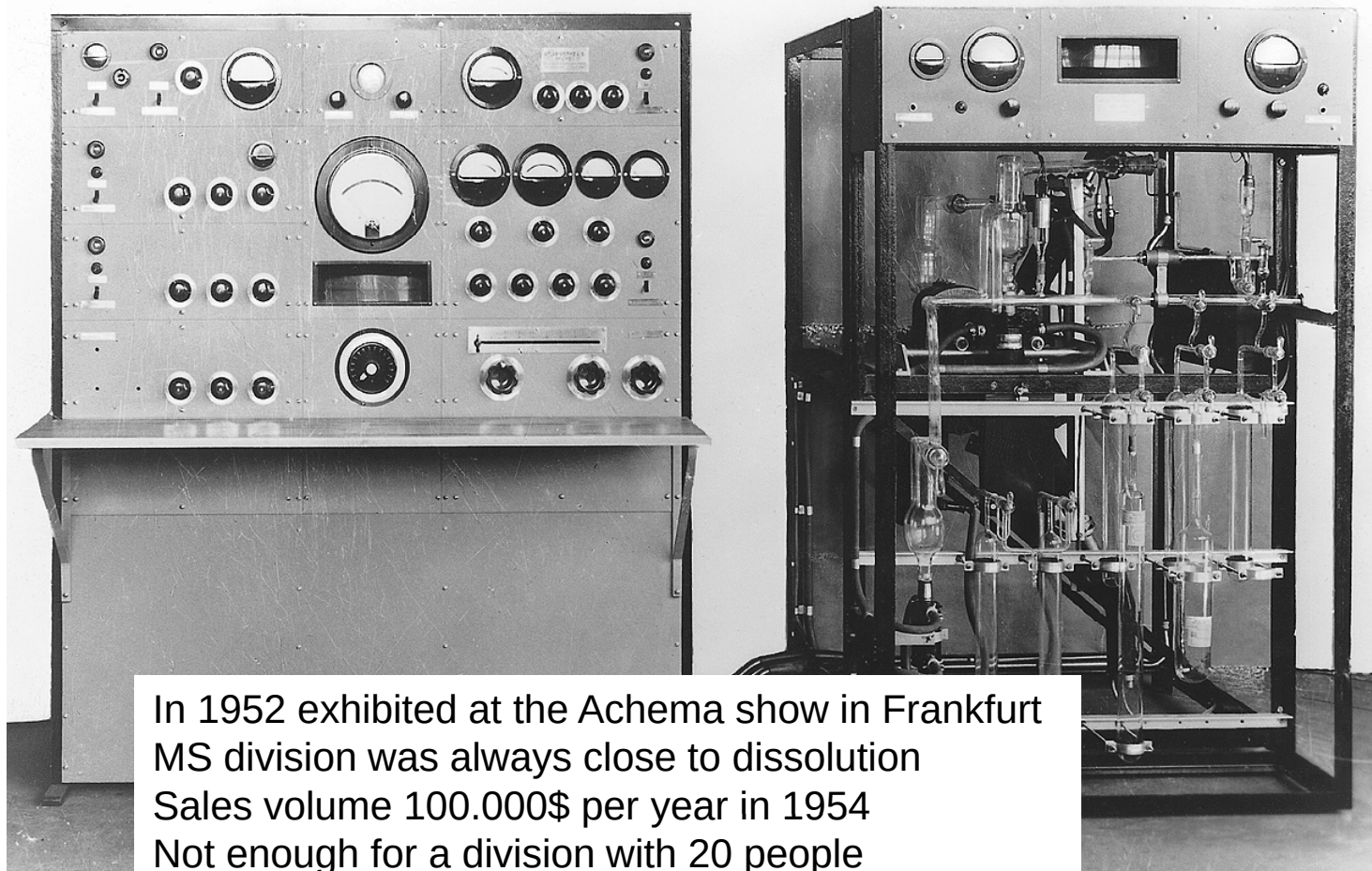
Definition of MS, from a user in USA:

„A machine that almost doesn't quite work

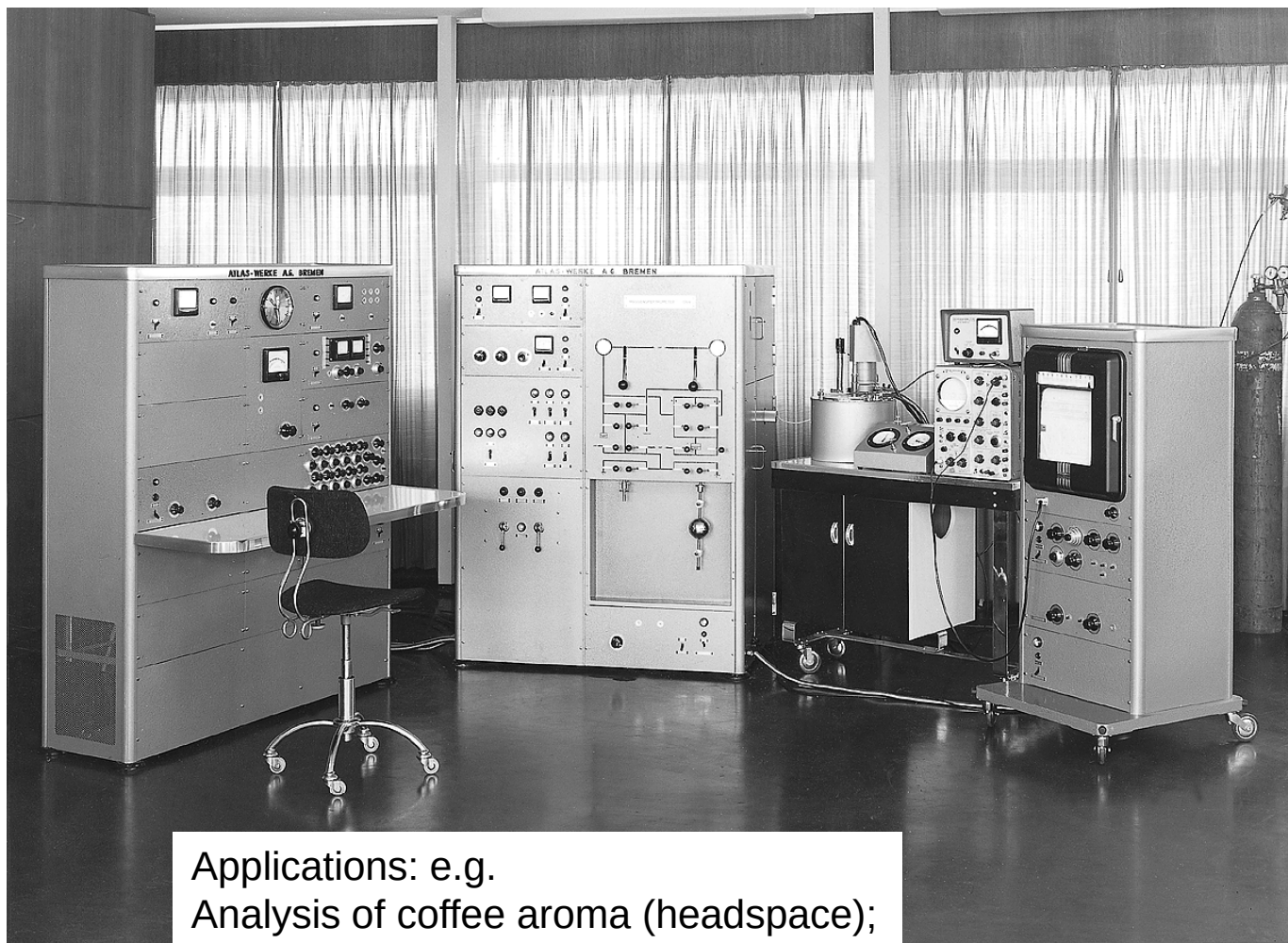


CH3 (1950) – (here: prototype)

Maximum Resolution ? **300**



CH4 (1958) – first success

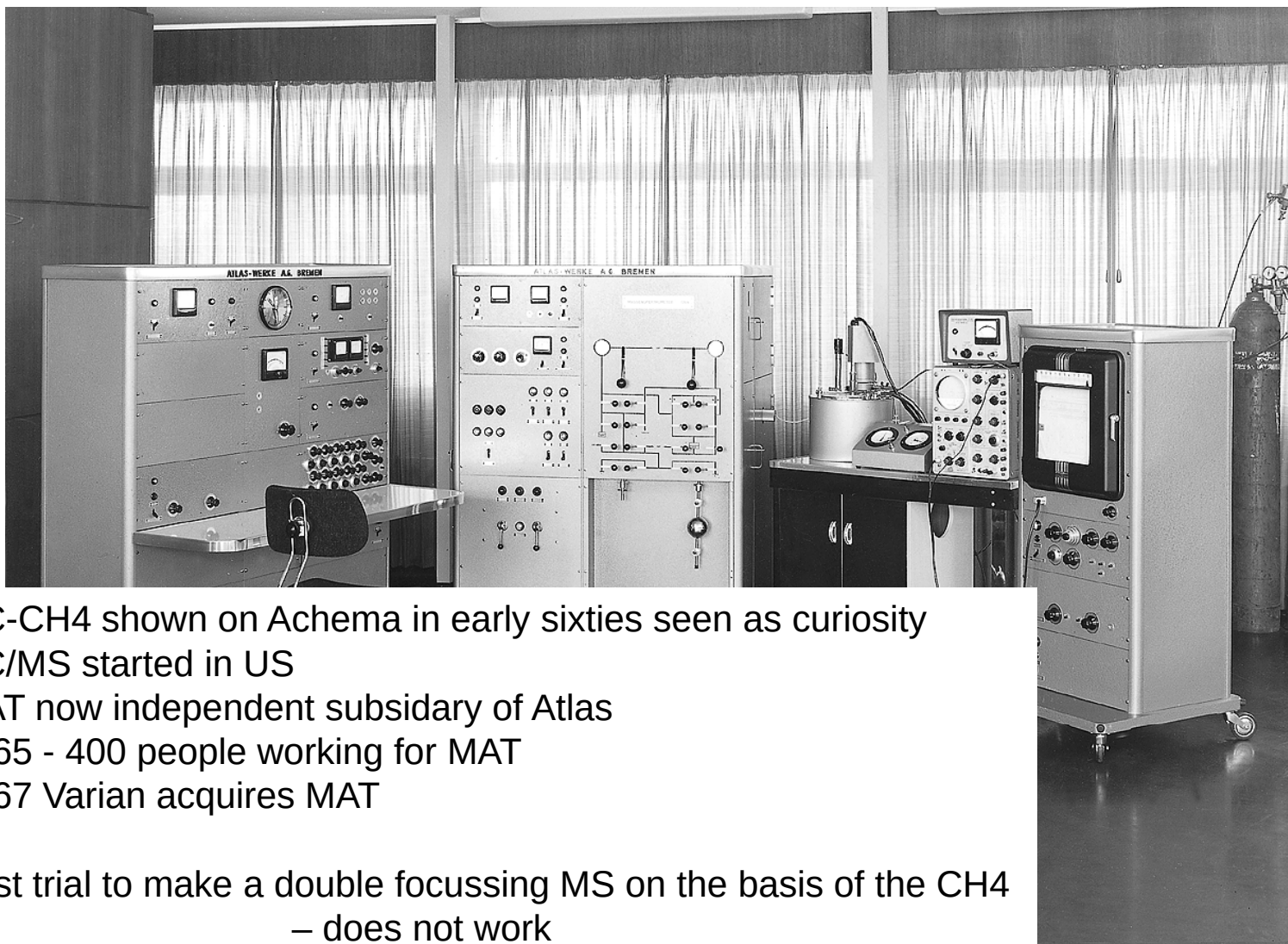


Applications: e.g.
Analysis of coffee aroma (headspace);
Perfume mixtures;
Cigarette smoke

- More than 400 installed by 1967

- MAT expanded

CH4 (1958) – first success



GC-CH4 shown on Achema in early sixties seen as curiosity

GC/MS started in US

MAT now independent subsidiary of Atlas

1965 - 400 people working for MAT

1967 Varian acquires MAT

First trial to make a double focussing MS on the basis of the CH4
– does not work

SM1 (1966) - Mattauch-Herzog Geometry

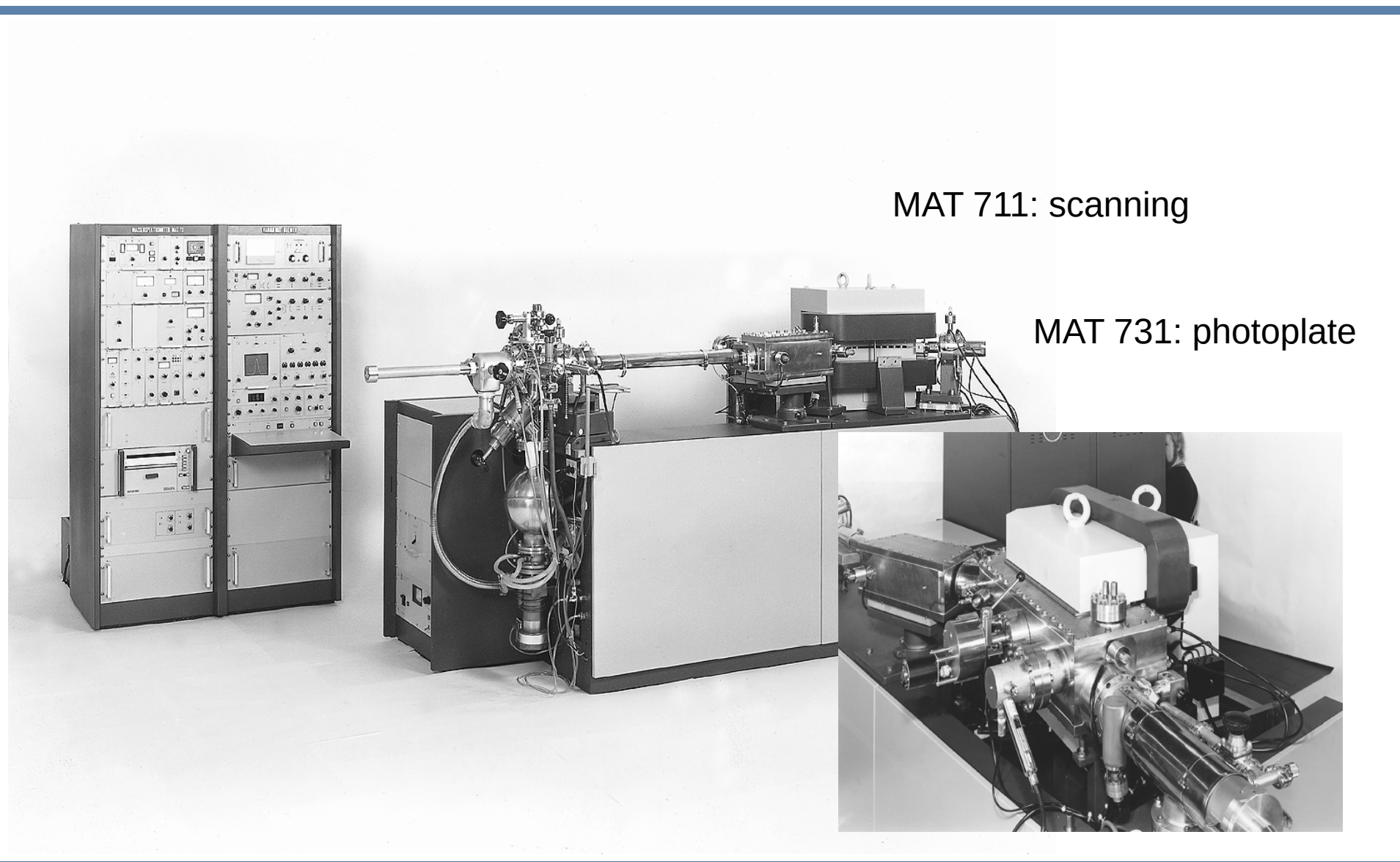


- High end MS
- **The first double focussing MS**

- Later:
MAT 731:
photoplate
MAT 711: scanning

But:
High production
cost
thus high priced
MS

MAT 711 / 731 Mattauch-Herzog Geometry



CH5 (1967)



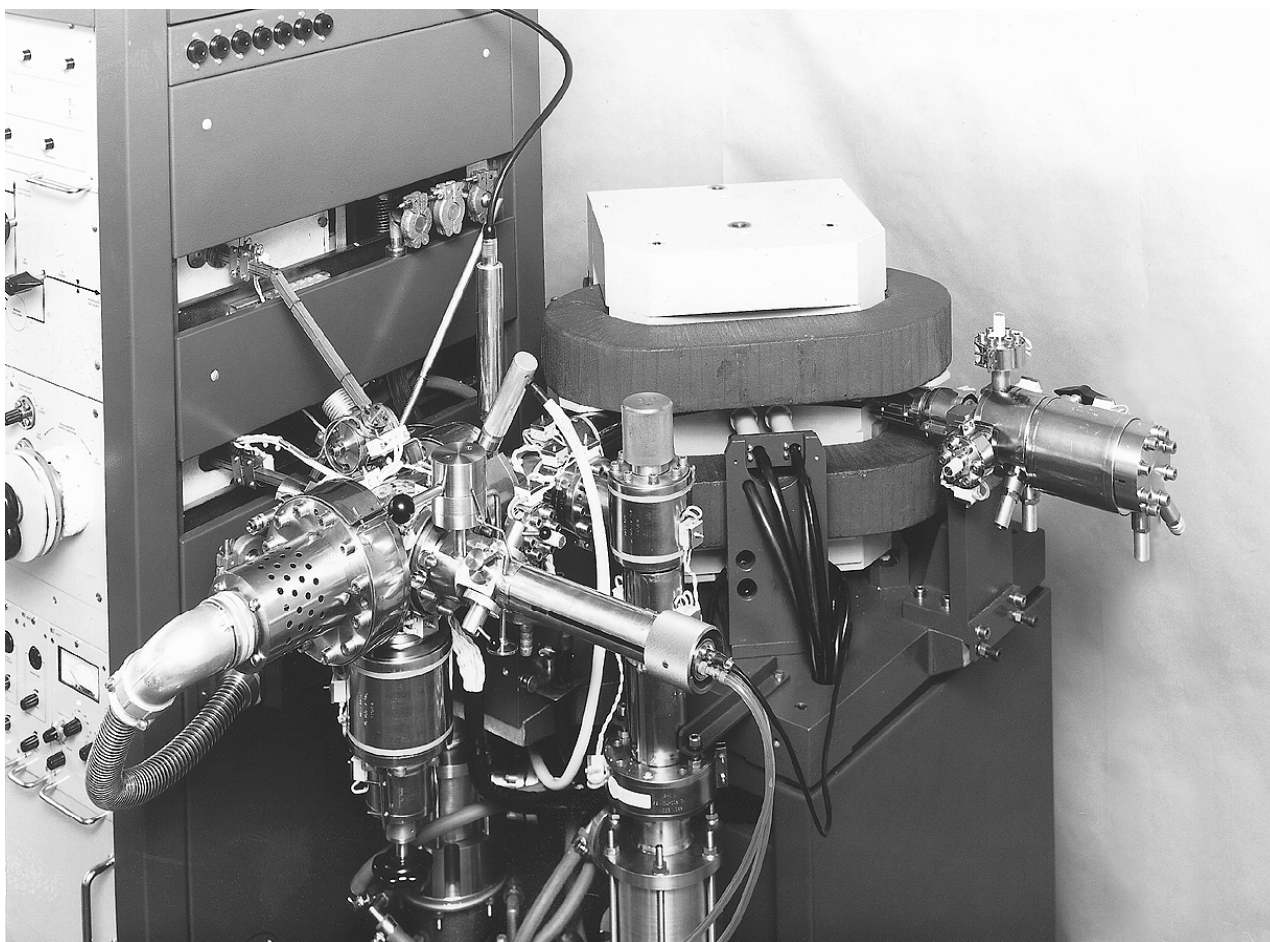
For routine analysis

Single focussing MS

- Maximum
Resolution ?

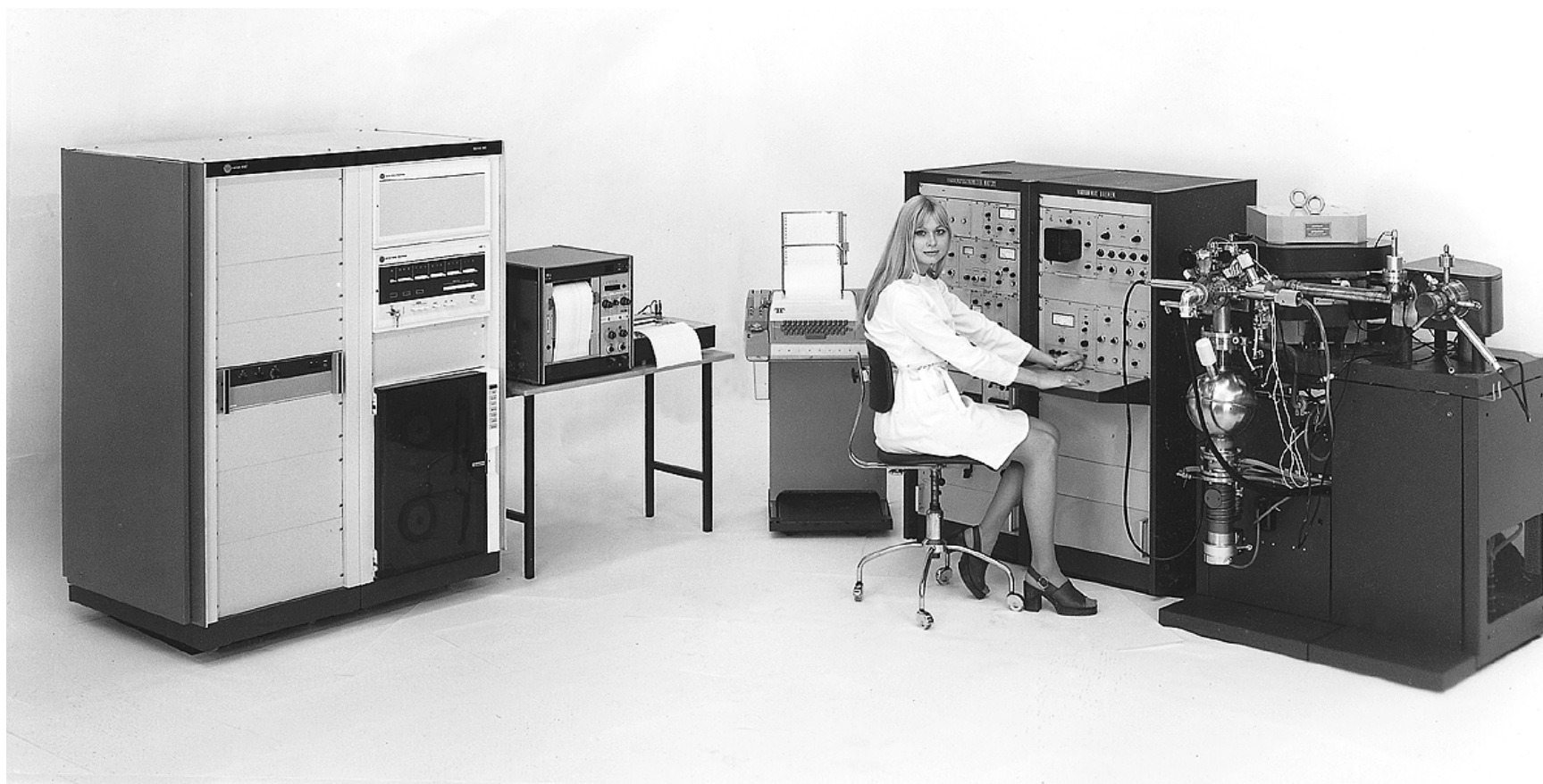
10,000

CH5: magnet, (CH5 was built until 1975)



- CH5-DF: (1971)
double focusing MS
(developed for
routine analysis)

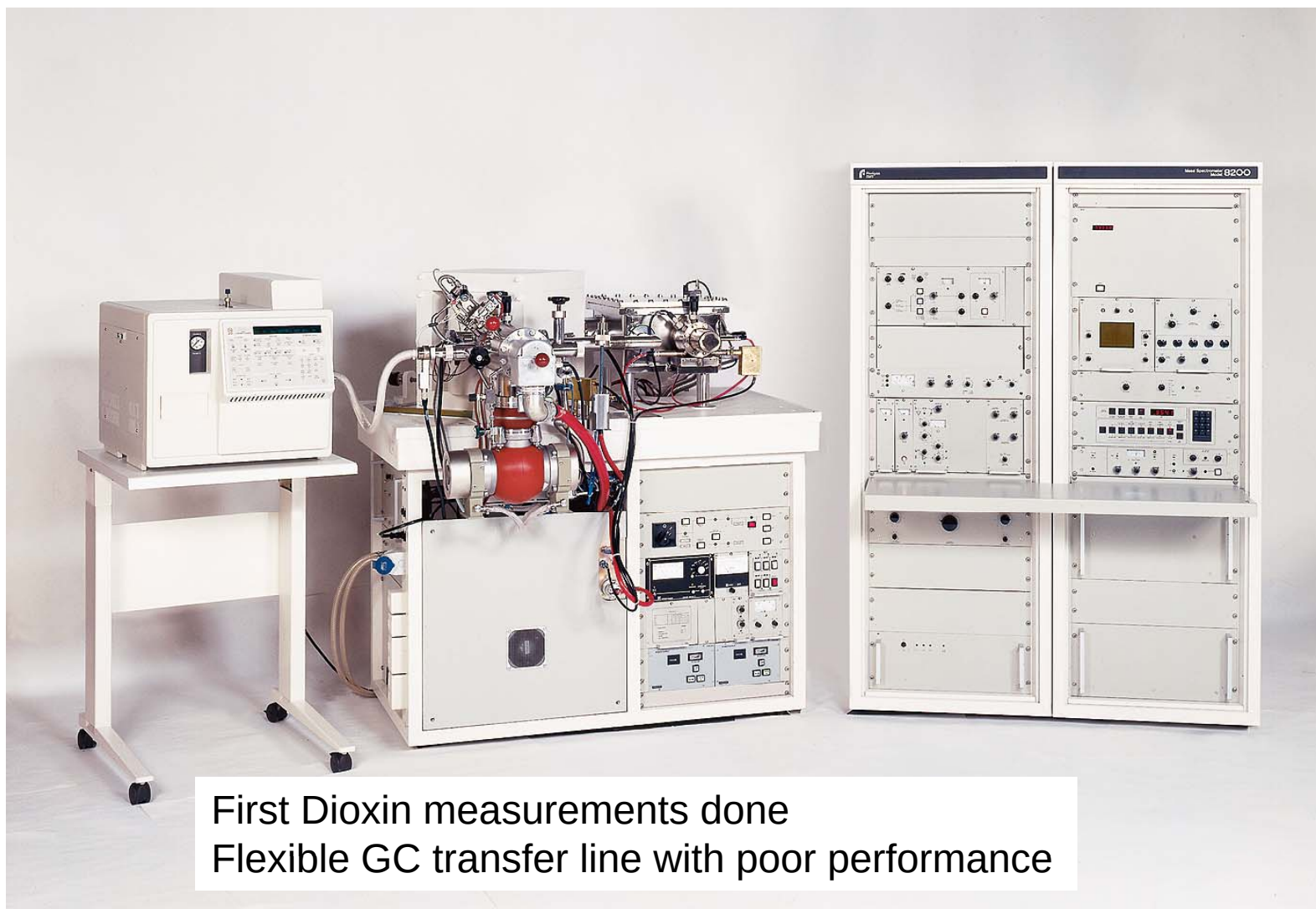
MAT 311 (1972, double focusing MS)



Maximum Resolution ? **20,000**

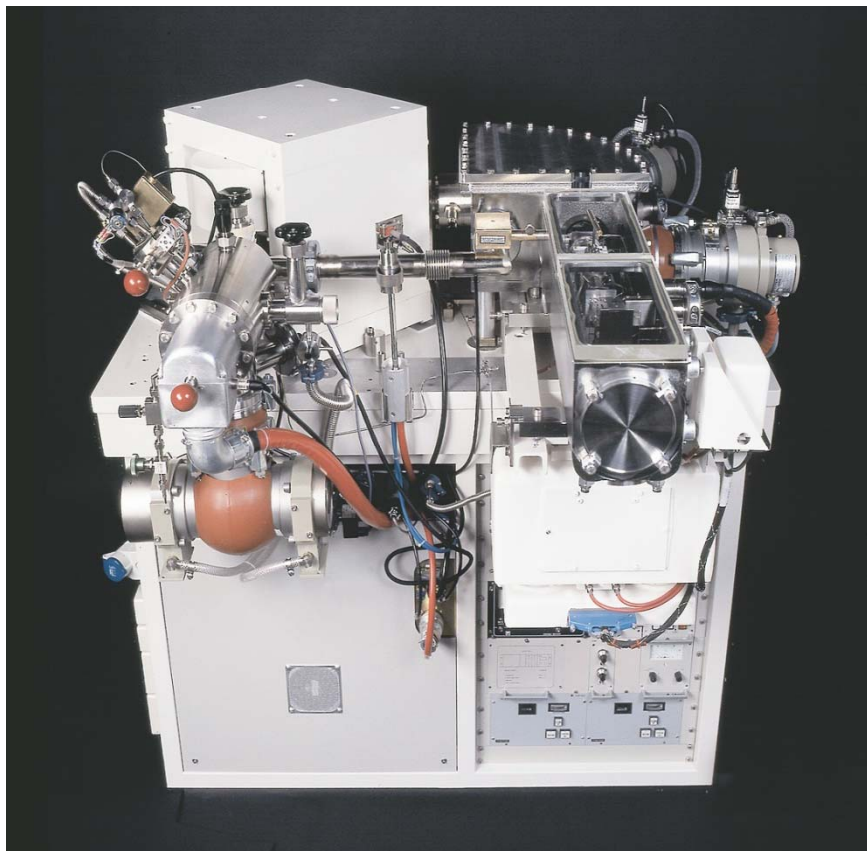
More than 1000 instruments sold by 1976 - MAT became one of the leading producers of MS in the

MAT 8200 (1982 – 1986)



First Dioxin measurements done
Flexible GC transfer line with poor performance

HSQ 30 (1985) – First Hybrid System



LTQ Orbitrap XL
Recent Hybrid MS

MAT 90 Series (1987)



- The MAT90: first completely computer controlled MS on the market

MAT 90 Series: Direct Predecessor of the DFS

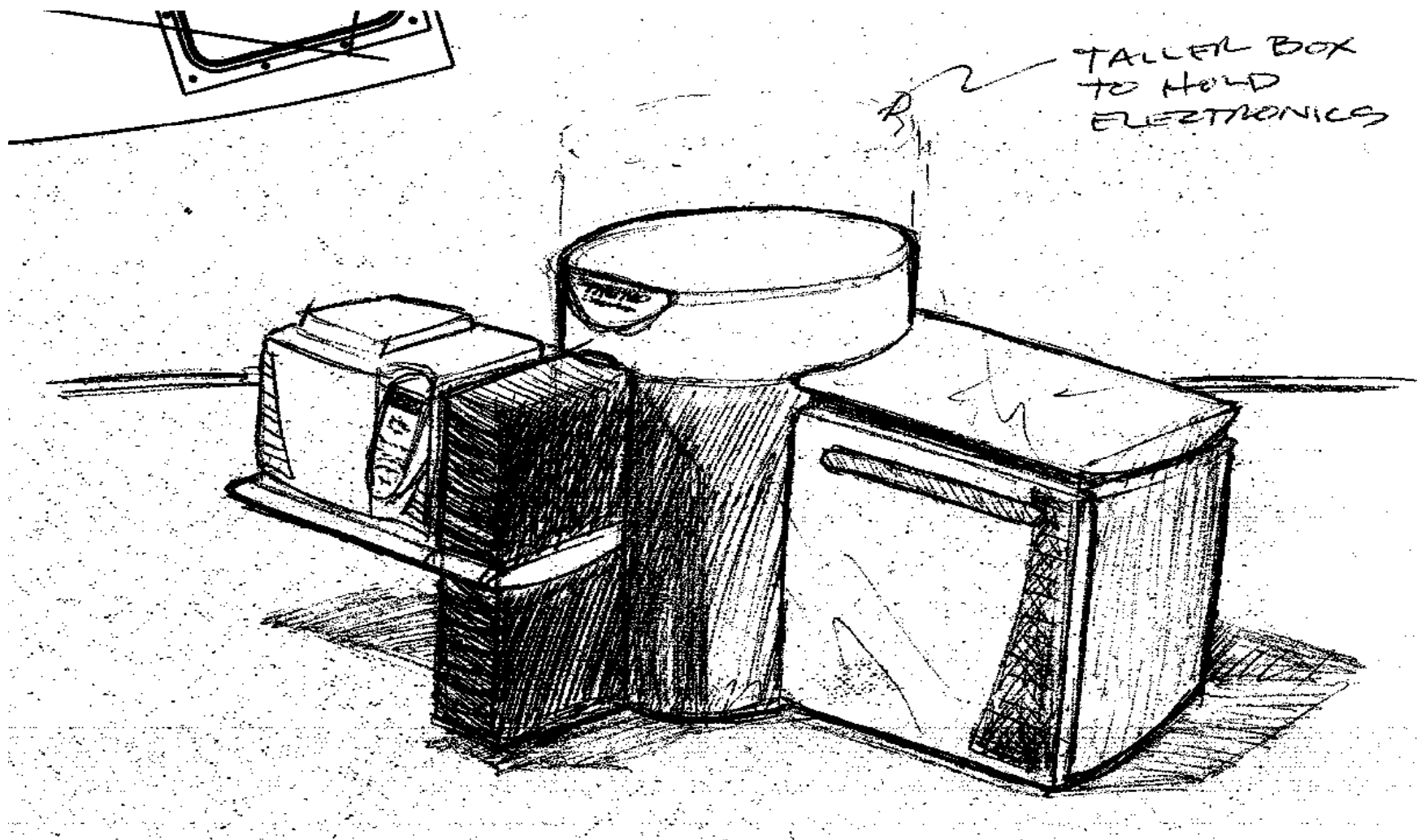
- **1987 - MAT 90**
- **1992 - MAT 95**
- **1995 - MAT 95 S**
- **1998 - MAT 95 XL**
- **2001 - MAT 95 XP**



2003

MAT95 XP Ion optics and electronics design dated back more than 15 years

DFS - Design Sketch



DFS High Resolution MS (2005)

**Introduced at
the 2005 Dioxin Conference
in Toronto**



**70 % used as Dual GC-MS instrument
Resolution up to 80,000
20 fg TCDD with S/N > 200:1
Designed for low power consumption and small footprint**

What's next ?

Thank you for your attention !