EB/db

MPS/Int. ML/69-3
20. 3. 1969

REPORT ON PROJECT "EJECTION 16"

I. Project Specification

The mechanical construction for the project must allow the ejection to function with both the "small magnets 1969" (Mr. Bertolotto) and the "large magnets 1970" (Mr. Keizer).

The geometry of the magnet arrangement for the small magnets is given in the memorandum MPS/SR/Memo/68-35 by R. Bertolotto, for the large magnets by F. Schäff as shown in fig. 1.

The movements of the magnet support are :

translation in horizontal plane,
rotation in horizontal plane,
translation in vertical plane,
rotation around the longitudinal axis of the first magnet.

The first three movements are remotely controlled, the last one locally. The range of movements and precision are given in the Notes of Meeting of 10th February, 1969. (E. Boltezar).

A screen for measuring the position of the proton beam must be placed in front of the first magnet inside the vacuum tank; possibly a beam monitoring device has to be added. (M. van Rooy).

The connection box for the electrical power supply is placed on the concrete in the middle of the straight section. The dimensions of the box are 900 mm x 650 mm, height 175 mm. (H. Reitz)

For cooling there will be needed : 150 l/min demineralized water, 25 kp/cm^2 pressure and 2 x 20 l/min raw water (D. Bloess - K. Braun).

II. Project conception

The magnet support is mechanically separated from the vacuum tank, the only connection between them being a pair of metallic bellows. Thus, the vacuum tank with its base frames (fig. 2) can be dimensioned just against stress failure, whereas the magnet support (fig. 3) is a rigid structure with well defined loads.

For rapid dismounting, the magnets and the support are one mechanical unit which can be rolled out of the vacuum tank and transported via crane and trolley out of the PS tunnel. A new set of magnets with a new support already tested and aligned can be rolled back into the tank without doing any additional alignment in the tunnel. The support rests on its fixed base frame and is located into exact position by dowel pins. To roll it out of the tank it will be lifted on movable rails which are mounted on the base frame.

The vacuum tank is provided with four ion pumps 300 l/sec (Varian) grouped in two pairs so that the center of the straight section is left free for the magnet support. The turbo-molecular pump unit is connected to the upstream service manifold (reserved for a target) and placed on the yoke side of magnet 15. For mounting purposes the ion pumps can be rolled into position on rails. The connection of these pumps to the tank includes a valve and a metallic bellows. All seals are metallic.

The screen to measure the position of the beam will be mounted on the upstream end of the first magnet. It will be operated by a wire passing through the stem of the magnet carrier. The device to pull the wire is mounted on the magnet support. The electrical cable for the beam monitor will pass through the tank cover.

For each set of magnets (small aperture and large aperture) there will be a different magnet carrier (fig. 1) with the same outside dimensions but different brackets for magnet fixing and different connections for power and water supplies.

III. Construction details

The vacuum tank is a stainless-steel box with a flange for an aluminium wire joint. It is provided with three wheels and with two bellows welded on each side wall.

The tank cover is made of stainless-steel. It is provided with a bellows (bolted on the cover) for a flexible vacuum connection. When the vacuum tank is open, the cover rests on the magnet support, loosely fixed to it. When closing the tank, the cover is automatically guided into its correct position by conical pins.

The magnet carrier is a hollow beam of rectangular cross section with a welded-on tubular stem. The magnets hang on brackets bolted to the beam. The relative alignment of the magnets is done by shimming the brackets.

The movable magnet support consists ofan L-shaped body resting on three slider plates to provide three movements : rotation around the horizontal axis of the first magnet, rotation in the horizontal plane and translation in the horizontal plane. The movements are provided in this order starting from the top to the bottom plate. The translation in the vertical plane is provided by a plate fixed to the carrier stem and sliding on the vertical wall of the L-shaped body. All movements are produced by lead screws driven by electric motors working against a spring force to avoid back-lash. The exception is the vertical movement where there is no spring, and the rotation around the horizontal axis of the magnet which is not driven by an electric motor. Each horizontal plate slides on three bronze pads; they are guided by keys. The main elements of the support are constructed in mild steel.

The base frame for the support, a structure in mild steel, embedded in concrete at three points, is constructed so that is does not interfere with the connection box and the rather heavy strip line for the magnet power supply. The frame is provided with movable rails as mentioned above.

The base frames for the vacuum tank support the tank and the ion pumps. Both the tank and the pumps are fixed on their rails with special clamps. The two base frames are of a different shape; the upstream one is simple, the downstream one more complicated to avoid interference with the magnet support arms which provide the pivot point for the rotation in the horizontal plane. Both base frames are made of mild steel.

IV. Mounting and dismounting

To dismount the magnet support for transport out of the ring, one must go through the following procedure :

- disconnect the main power supply (4 bolts)
- disconnect other electrical supply cables (about 6 plugs)
- disconnect water supply (rapid connections)
- unscrew bolts to open the tank (12 x M24 bolts)
- raise the rails to enable support system to be rolled out
- roll the support out of the vacuum tank
- lift complete assembly by CPS 2 ton crane and carry it over the CPS magnet to the transport trolley.

The estimated time for this procedure, done by two trained mechanics, is about 20 minutes.

E. Boltezar

Distribution :

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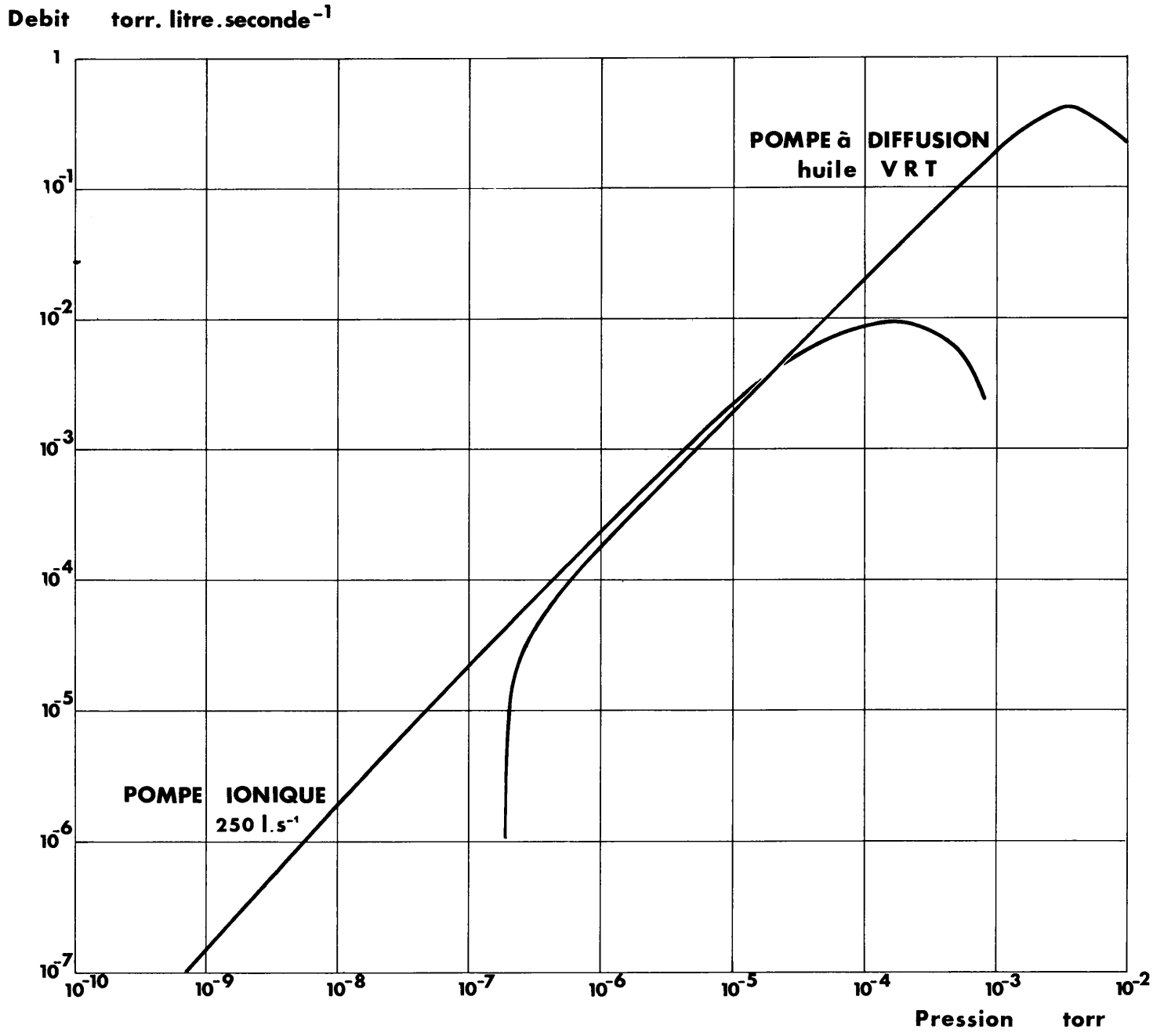
R. Keizer
F. Rohner
F. Schäff
P.H. Standley
P. Strolin
M. van Rooy
H. Reitz


Debit torr. litre.seconde^{-1}
1
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
POMPE à DIFFUSION
huile V R T
POMPE IONIQUE
250 l.s^{-1}
10^{-10}
10^{-9}
10^{-8}
10^{-7}
10^{-6}
10^{-5}
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10^{-3}
10^{-2}
Pression torr

FIG. 1

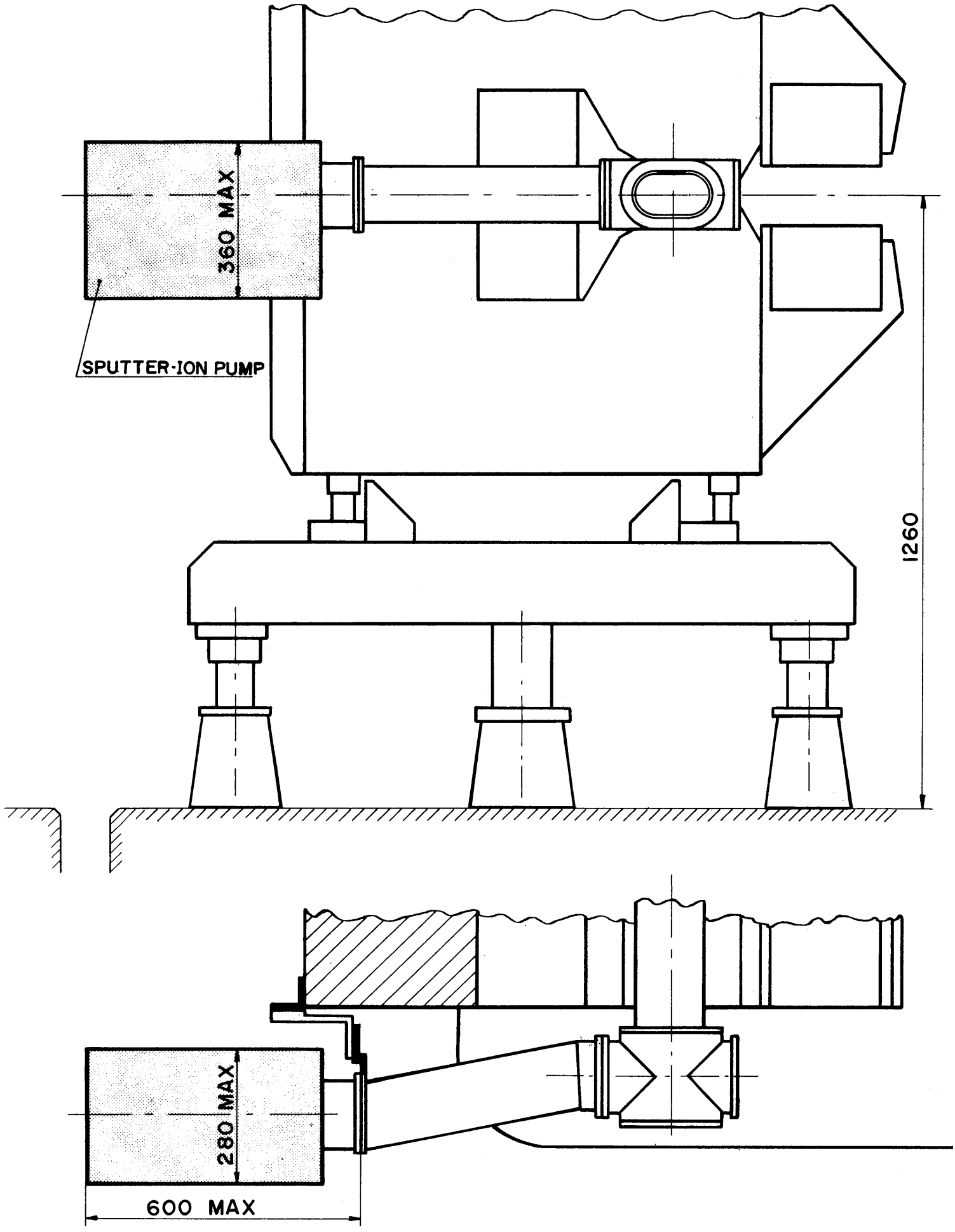
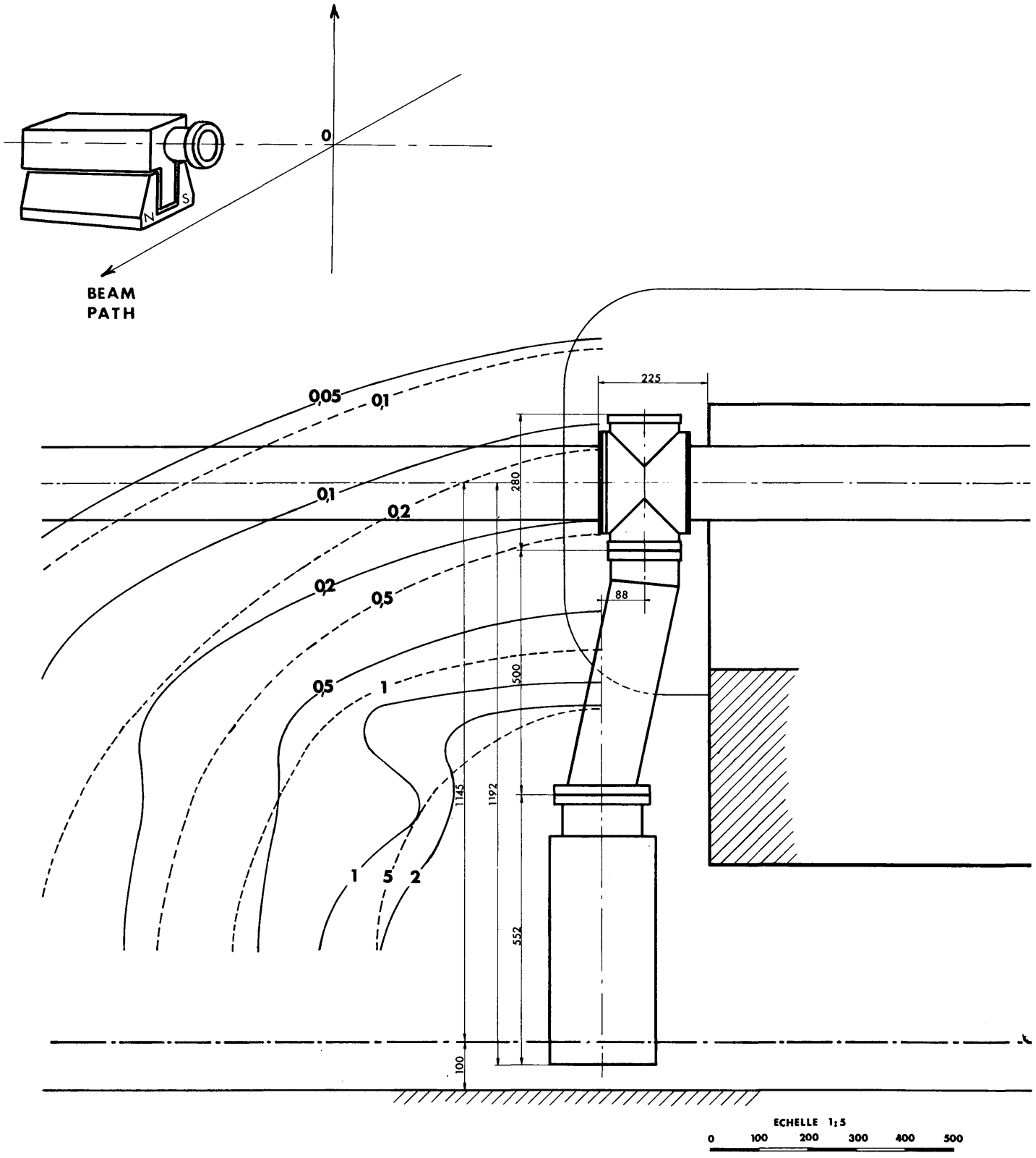


FIG. 2



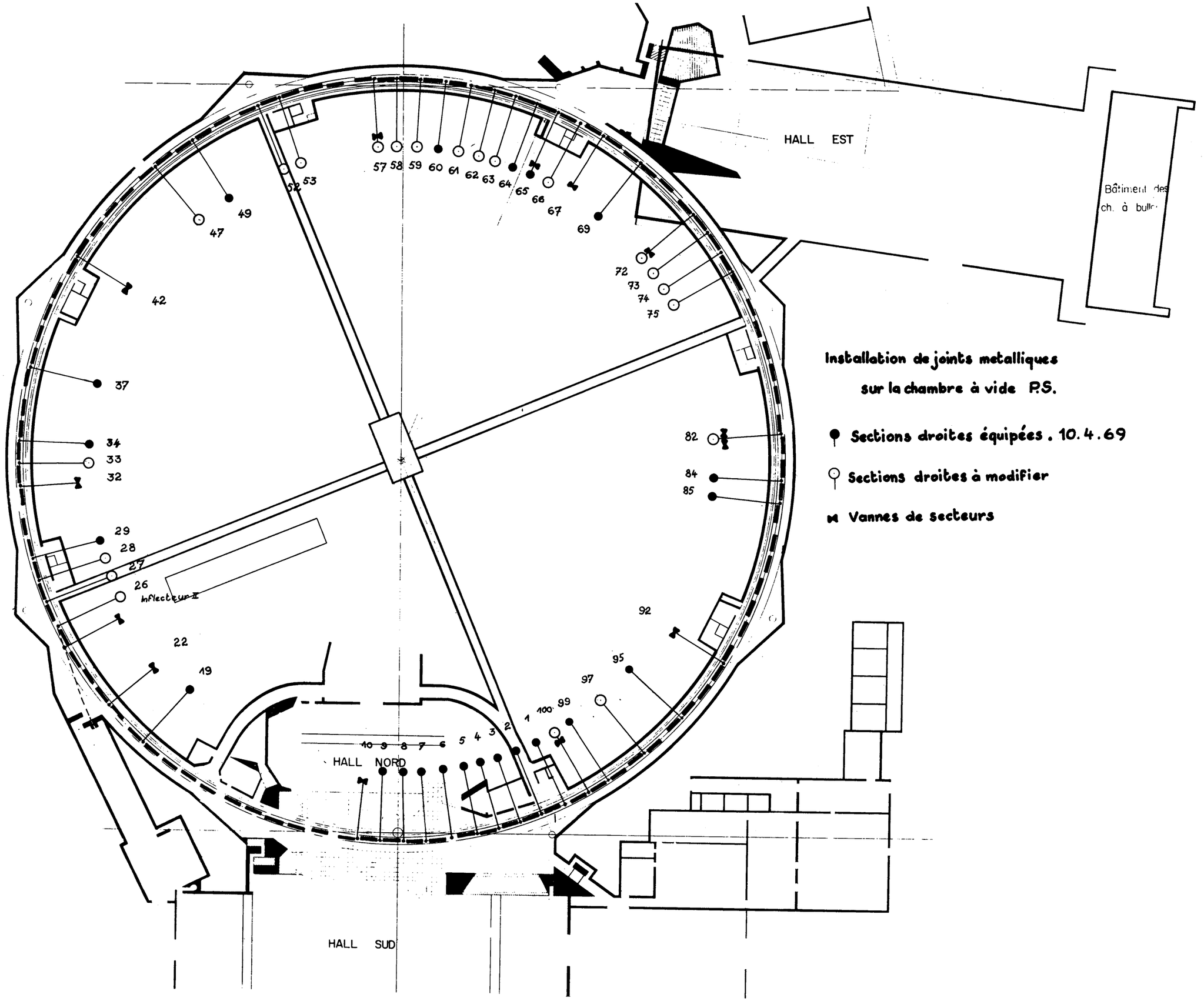
CHAMP DE FUITE D'UNE POMPE IONIQUE 250 l.s^{-1}

Valeurs en Gauss dans le plan horizontal de la chambre a vide

—— **avec**

- - - - **sans** **blindage magnetique**

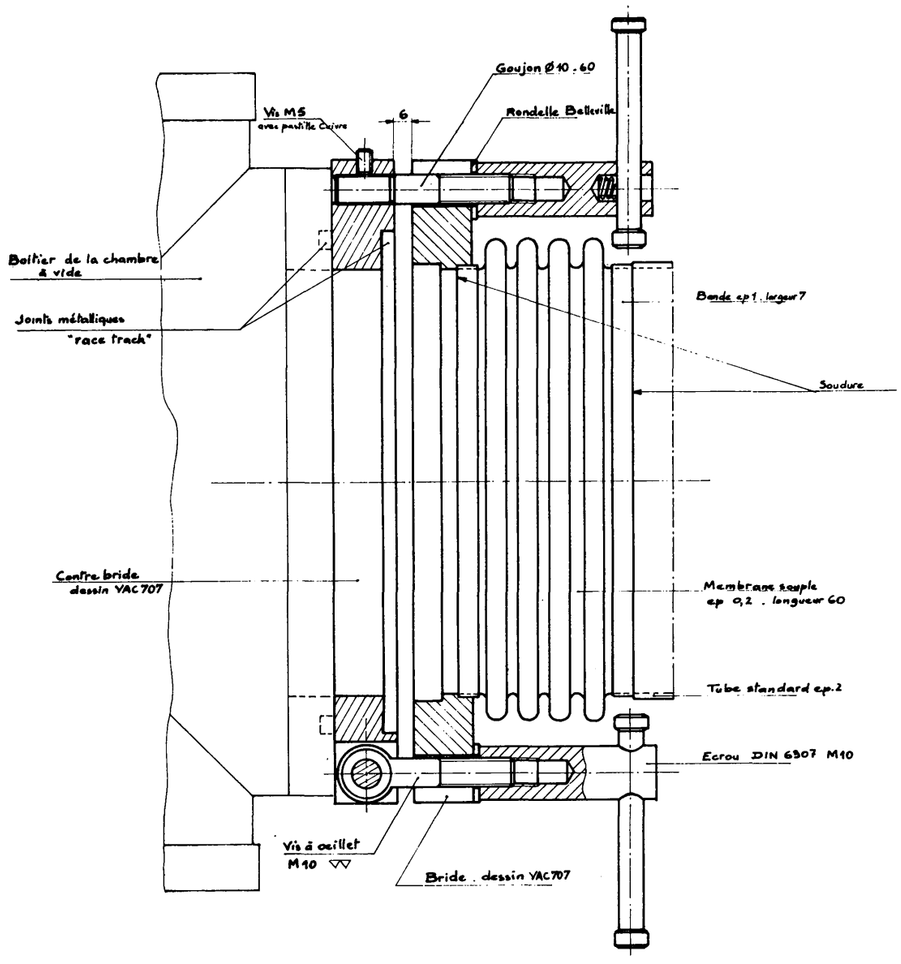
FIG. 3

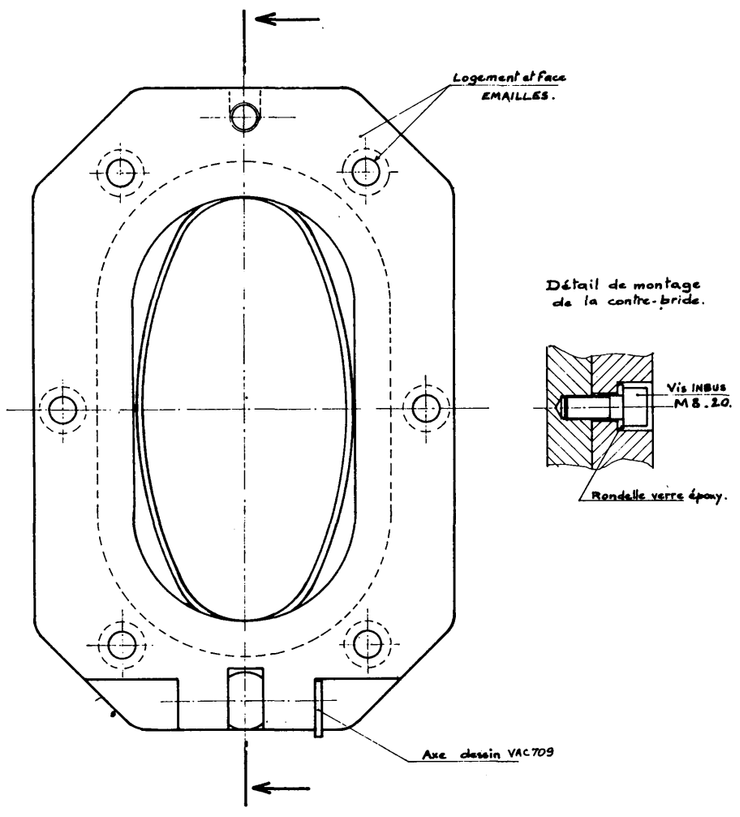


Installation de joints metalliques sur la chambre à vide P.S.

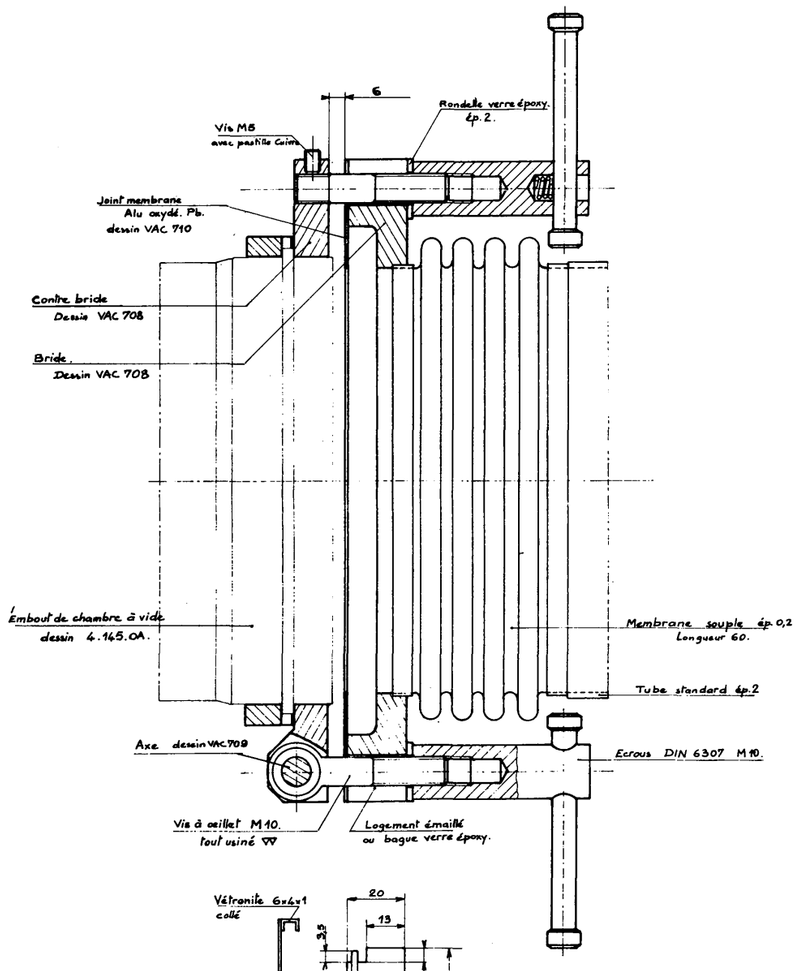
- Sections droites équipées . 10.4.69
- Sections droites à modifier
- Vannes de secteurs

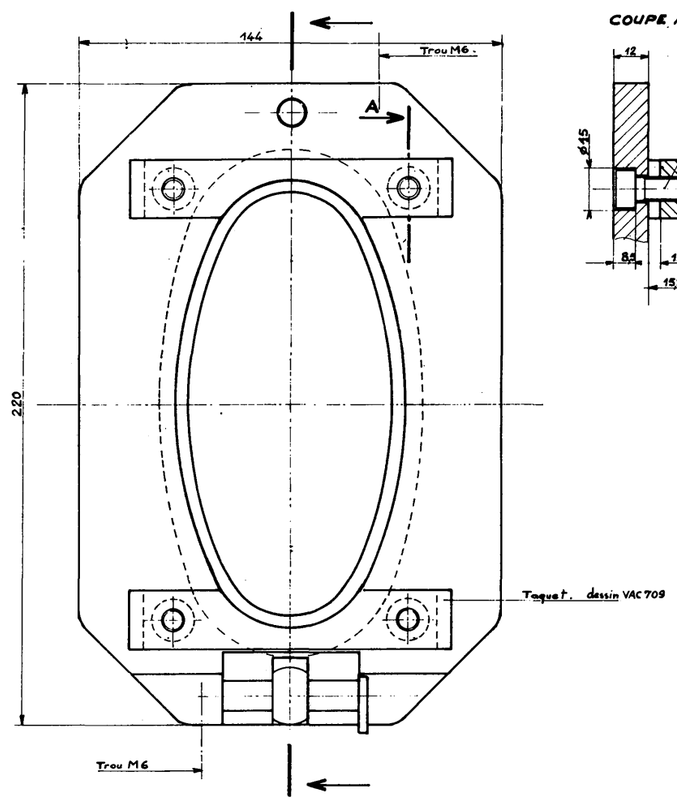
FIG. 4

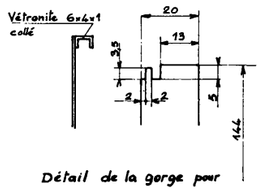




RACCORDEMENT AMONT







Détail de la gorge pour support du joint plat.

RACCORDEMENT AVAL

FIG. 5

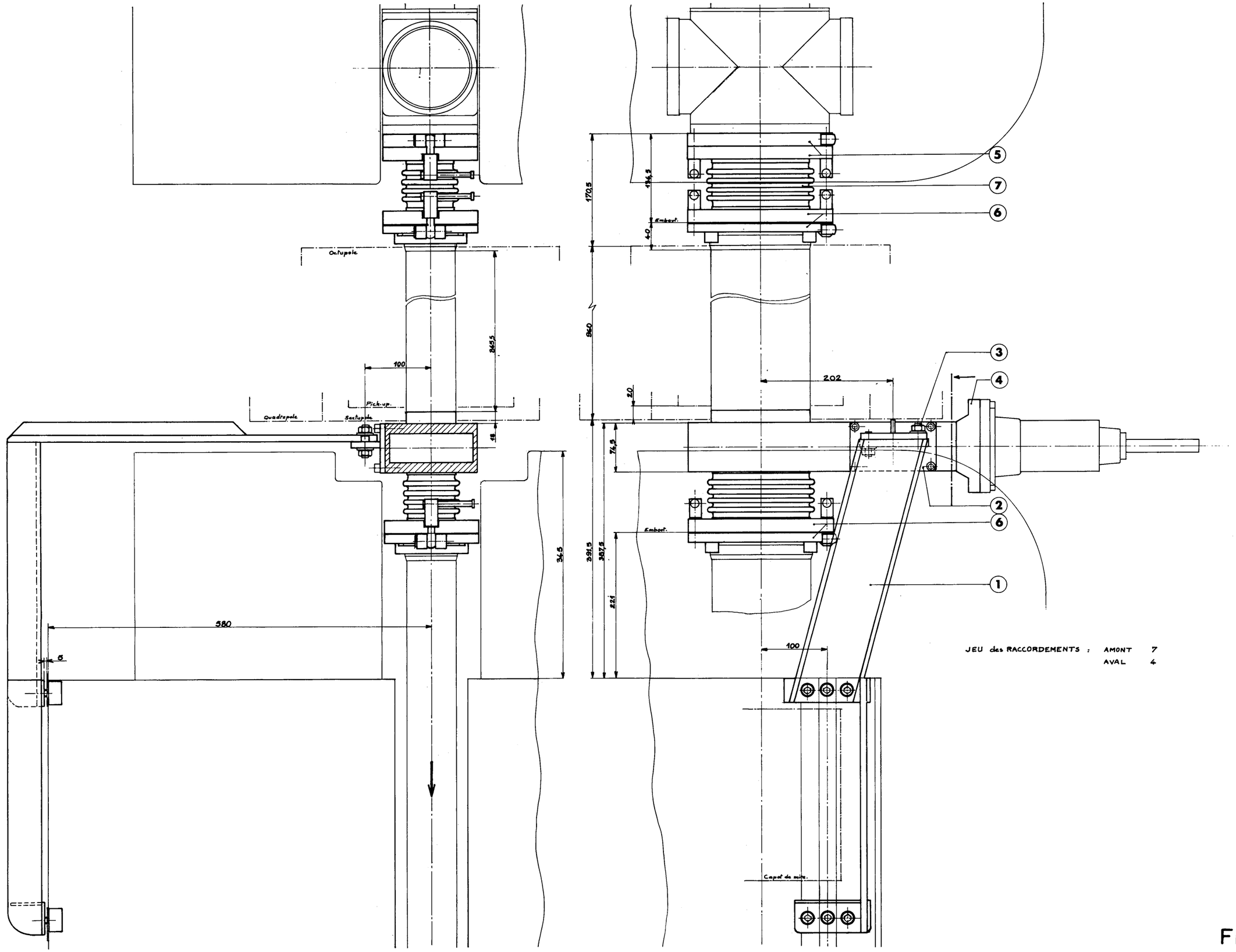

Octupole
Quadrupole
Sextupole
Pick-up
100
345.5
18
34.5
580
6
170.5
146.5
Emboit.
40
860
20
74.5
391.5
357.5
221
202
100
5
7
6
3
4
2
6
1
Emboit.
Capot de mise.
JEU des RACCORDEMENTS : AMONT 7
AVAL 4

FIG. 6

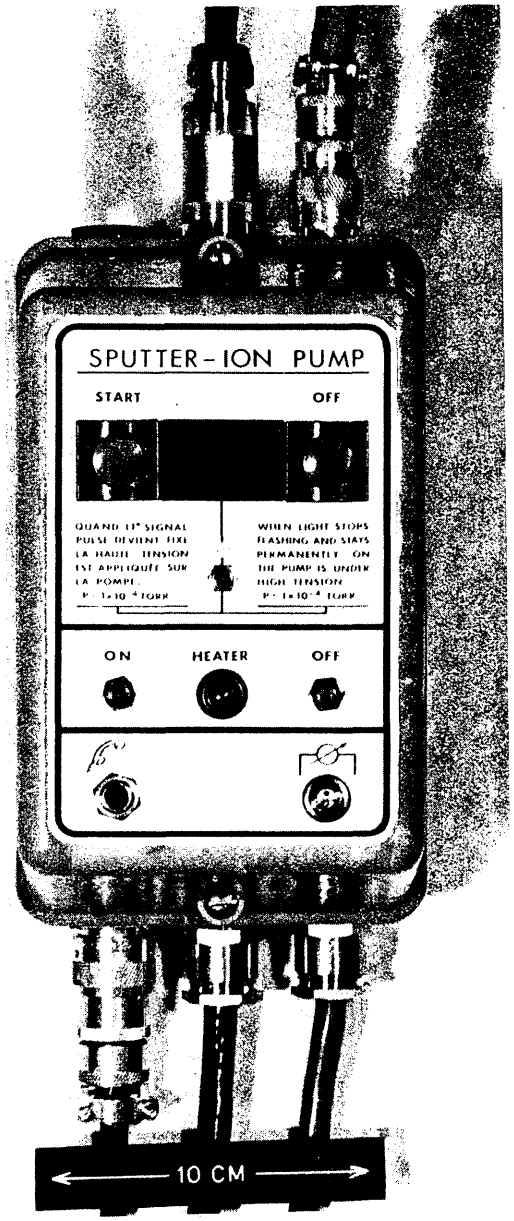


fig. 8

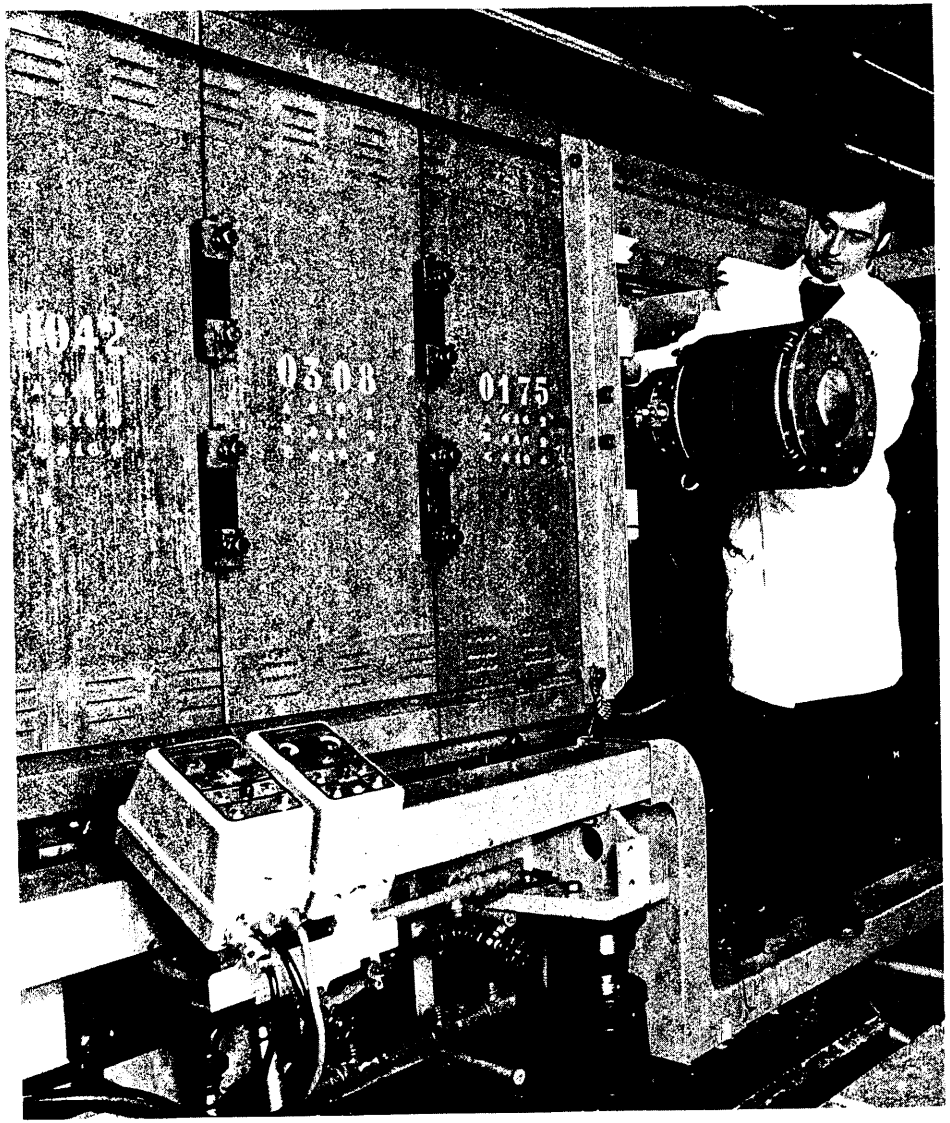


fig. 7

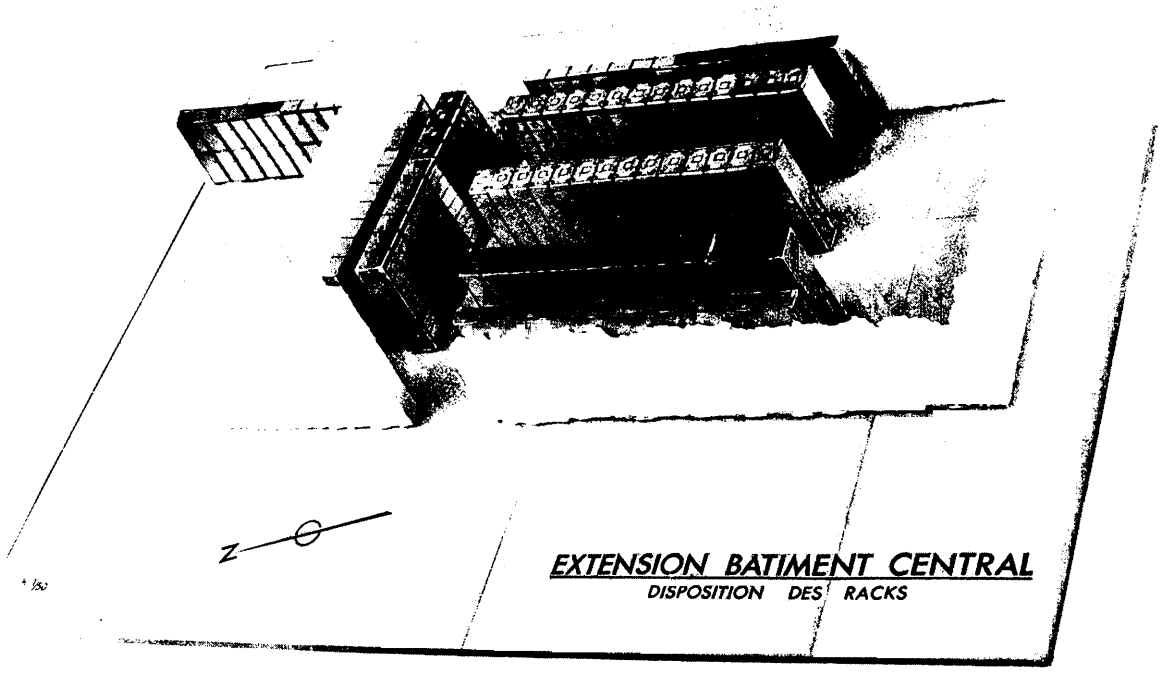


fig. 9

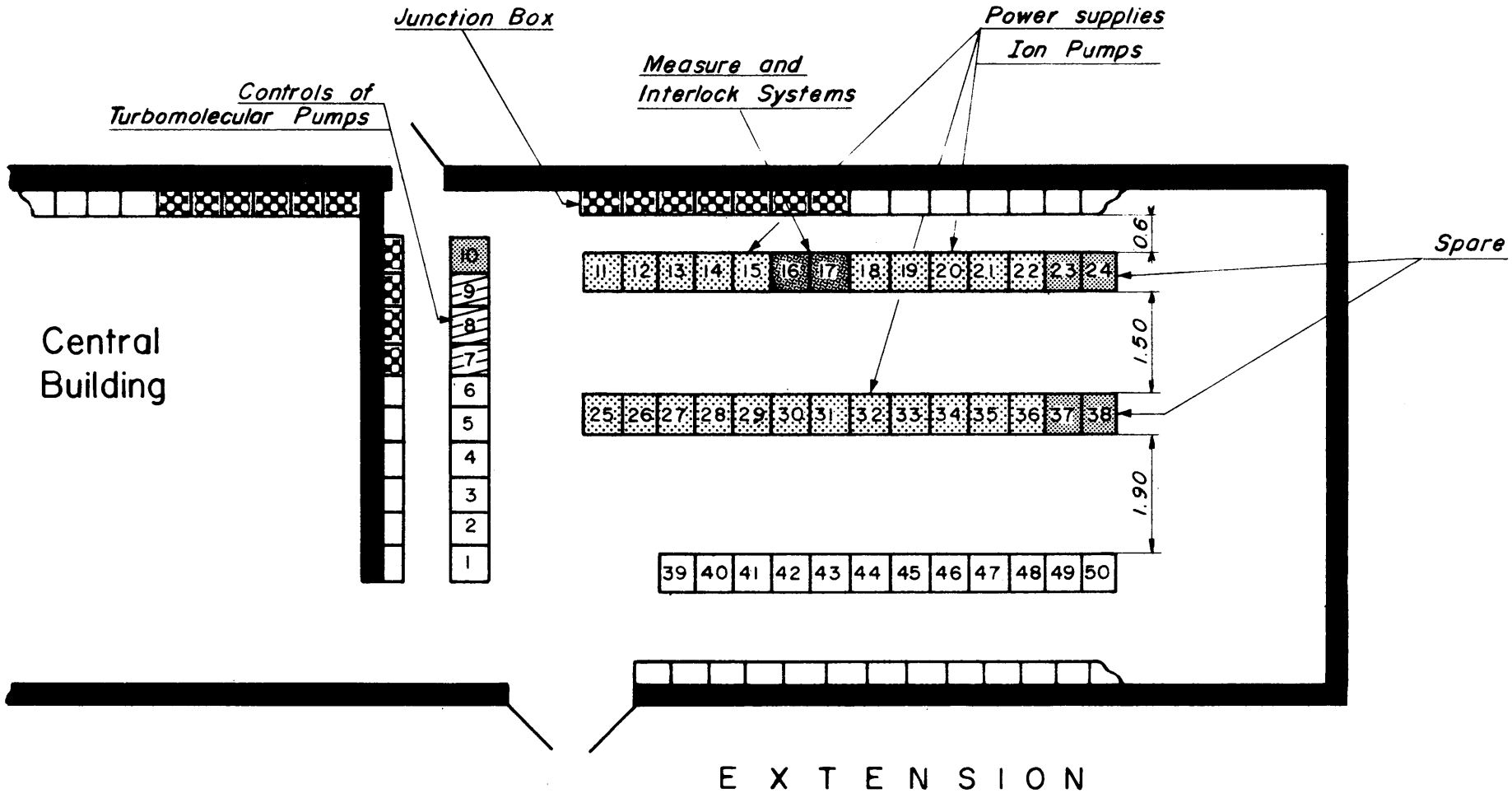


FIG. 9bis

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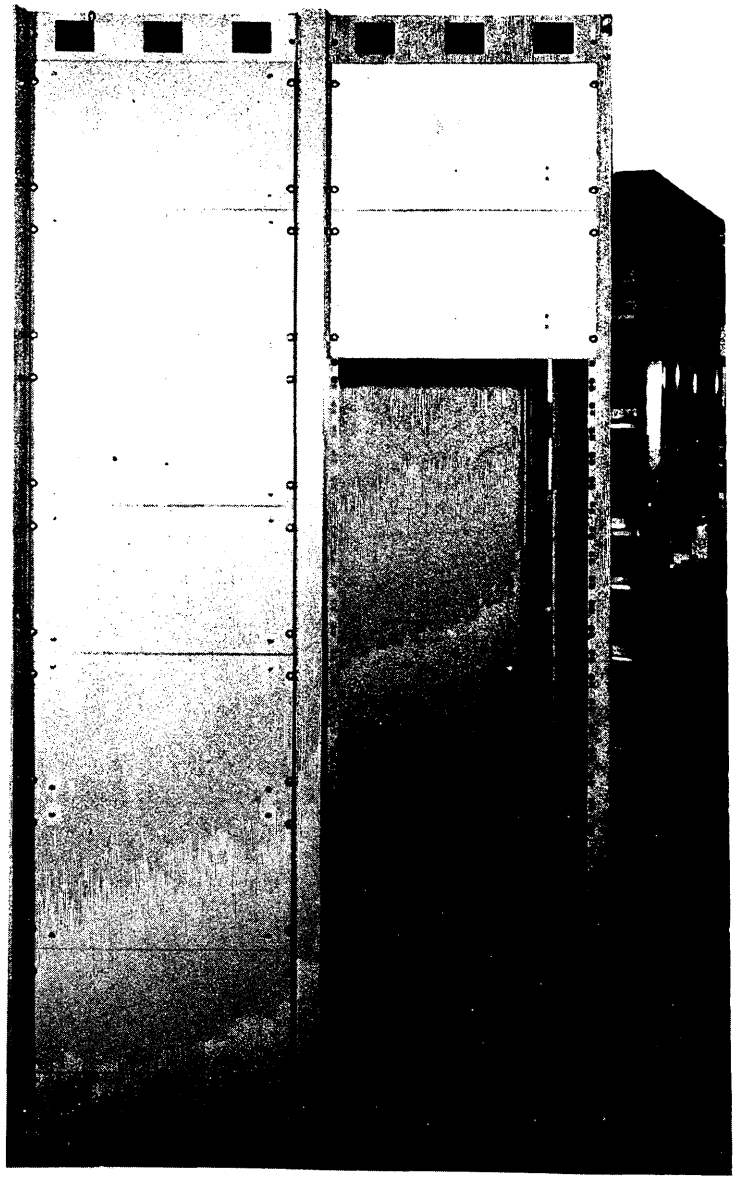

fig.10

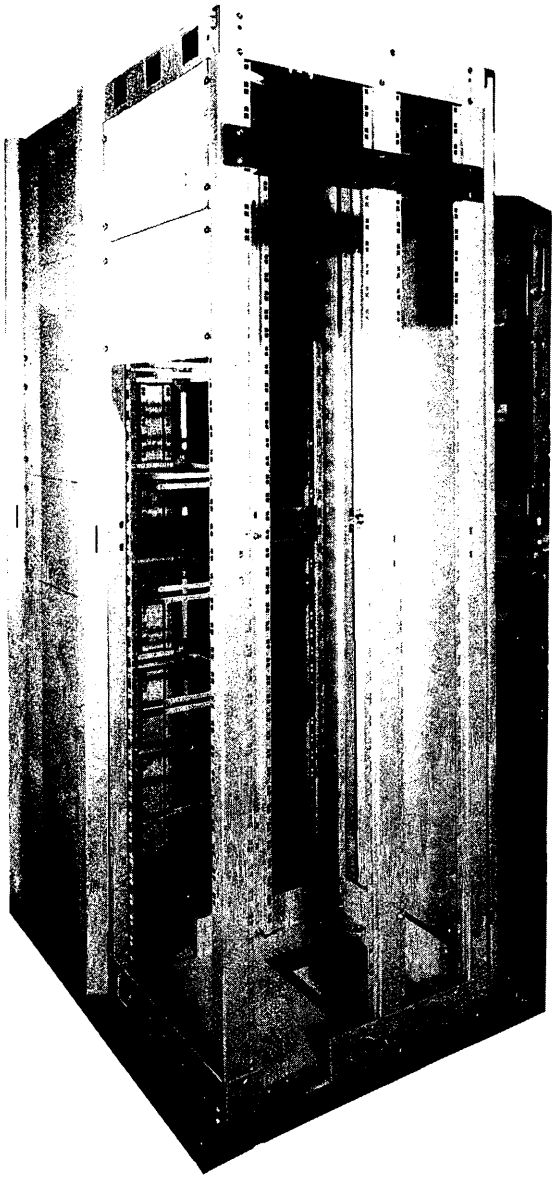

fig.11

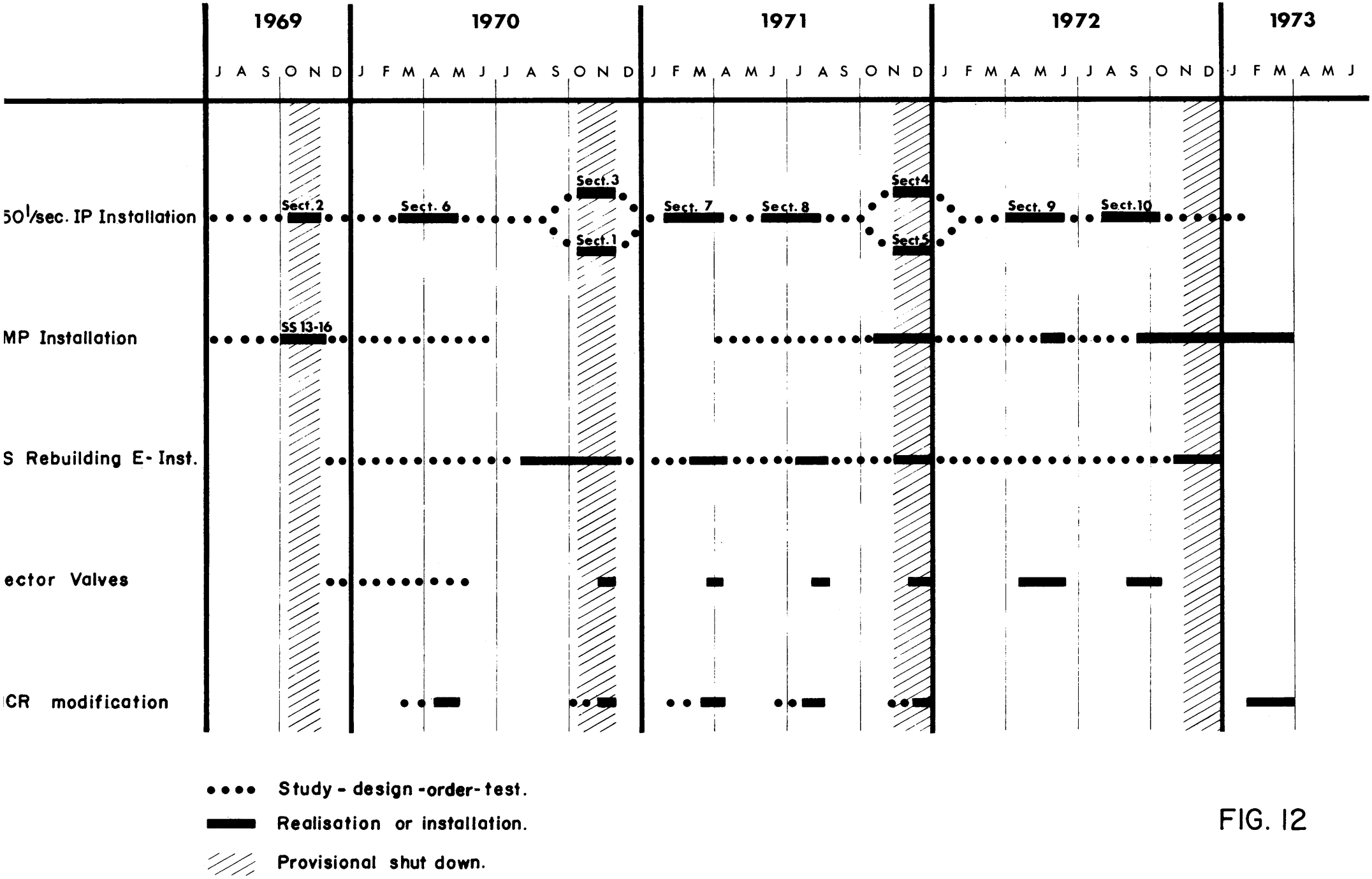
1969
1970
1971
1972
1973
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J
50 l/sec. IP Installation
Sect. 2
Sect. 6
Sect. 3
Sect. 1
Sect. 7
Sect. 8
Sect 4
Sect 5
Sect. 9
Sect. 10
MP Installation
SS 13-16
S Rebuilding E- Inst.
ector Valves
CR modification
Study - design -order- test.
Realisation or installation.
Provisional shut down.

FIG. 12