PS/LP Note 95-21(Min.)
24. 3. 1995

# *Summary on the CLIC/PS Meeting 24/03/1995*

## Progress reports on the design and preparation of CTF2

### 1. Upgrading the CTF modulators to a peak output power of 45 MW — by P. Pearce

The talk is written-up in CLIC Note N° 268.

Some points: The two klystrons feeding the HCS sections will likely be run at 2998.5 ± 7.9 MHz. The peak input power to the tube should not exceed that of the amplifier which will be purchased (it may require tuning of the tube).

It would be advantageous if the VALVO combiner could be used at the TH - tube outlet as well.

The command charging will permit to pulse KLY03 and 97 up to 50 Hz and this is acceptable. See Appendix 1 for a summary of the modifications which will have to be made to the present modulators.

### 2. The low power rf for the klystrons — by R. Bossart

Yesterday ( ! ), two 3 GHz, 300 W max. amplifiers were tested. These amplifiers were specified by P. Pearce. Manufacturer: MILMEGA Ltd, UK. The output pulse is flat and variable by 10 dB. After 1 $10^{-6}$ sec the phase changes by 2° over 5 $10^{-6}$ sec. With a pre-pulse this is improved to 1° but this complication does not seem to be necessary. Bandwidth : ± 10 MHz.

Thus, this amplifier may do the job. A somewhat simplified specification will now be made.

Two programmable phase change systems - to drive LIPS - are put into production.

### 3. BPM's for the 3 GHz drive beam — by H. Braun and L. Thorndahl.

The design of the detector is derived from the one for the 30 GHz line. Aperture : 40 mm while in the 30 GHz part it is 12 mm, L = 67 mm. There will be one bakeable version - behind the gun - and three more in the line. A total of six detectors will be made. A Kaman feedthrough was chosen. The signal processing is still under review.

## 4. Design of the 30 GHz lines

by I. Wilson, W. Wuensch, C. Achard, W. Coosemans, R. Pittin

Guidelines, keypoints were given by I. Wilson. See Appendix 2.

The layout - top view - is shown on fig. 1 and 2.

Note: - the module length is 1410 mm
- the distance between beams is 550 mm

The axis of the CTS is 160 mm above that of the CAS, Fig. 3. This implies that the drive beam has to become 160 mm higher than the probe beam.

The equipment will be mounted as if a solid girder is present, as will be the case in CLIC.

Many details will now be worked out (vacuum and water headers ?).

And, how difficult is it to have the drive and probe beam so close ?

The alignment system requires 21 motors and 13 sensors per module. More data are needed on the radiation dose these elements are likely to receive.

A controls system is under study.

There is no space left in the CTF gallery for the equipment to serve the 30 GHz lines. The gallery can be extended by about 35 $m^2$.

Cost : 60 - 100 kCHF. A prolongation of the CTF tunnel will not be made in 96/97 and therefore we should launch the extension of the gallery for January 1996.

## COMMUNICATION BY K. HüBNER

The Directorate of CERN decided that the linear collider studies and the R&D in superconducting rf is part of the new medium and long-term plan under the heading new initiatives. The situation will be reviewed in 1998.

A Design Report on CTF2 should now be written.

**Summary**

The following modifications will have to be made to the present CTF 35MW pulsed klystron - modulators for them to operate at a maximum output power of 45MW.

a) Install new 45MW klystrons from Thomson and Valvo-Philips.

b) Change the high voltage pulse transformer in the klystron tank.

c) Configure the two arm klystron output waveguide circuit for the machine.

d) Re-build the PFN with 32nf/50kV pulse capacitors and modified tuning coils.

e) Modify the End-Of-Line diode circuit for the higher fault currents.

f) Construct the new Tail clipper protection circuit assembly.

g) Increase the power supply storage capacitor to 8μf.

h) Test and install the command charging SCR and its trigger system.

I) Modification and adjustment of D'qing electronic controls.

j) Review of the incoming 3-phase power distribution and fusing levels at each modulator.

The development and test programme concerning these modifications will be made using the MDK29 test modulator. It is intended to be able to fully transpose tested assemblies for 45MW operation from this installation to the CTF modulator MDK98 during January to April 1996.

**References**

i. M. Akemoto and S. Takeda, "Pulse Modulator for 85MW klystron in ATF Linac" 17th International Linac Conference, (LINAC 94), Tsukuba, Japan, August 1994.

ii. R. Ness et al,"Command resonant charging system for a 350kW average power line type modulator", 21st Power Modulator Symposium, Costa Mesa, CA, USA, June 1994.

iii. R. Cassel, "Command charging for the SLAC klystron-modulators", PS Klystron-Modulator workshop proceedings, NotePS/LP 92-06, CERN, Geneva, October 1992.

iv. B. Godenzi, "Private communication", PS/PO group, CERN, Geneva, 1995.

## CTF2

(TWO-BEAM 30 GHz END)

(a) Trying to make CTF2 layout as representative of CLIC layout as possible (CA, WW)

(b) Alignment by stretched-wire system ($\pm 5\mu m$) (WC, RP)

(c) One BPM/quad.
BPM outputs will probably NOT be used for beam-based active alignment – beam jitter too large!
For cost reasons – BPM outputs might be multi-plexed.
Available in control room for setting-up & diagnostics.
(JS, WW, LT)

(d) Can probably use CLIC main linac design quads. in both lines.
Giesch design 75 T/m – 5 T/m is being checked.
L = 55 mm
$L_0 \doteq$ 105 mm
Estimated cost < 5000 SF

(e) Power supplies
Drive linac – all Fs & all Ds in series (2 supplies)
Probe linac – 7 supplies
(5 matching quads individually powered
+ 2 main sectors at beginning & end of line)

(f) Vacuum system (CA, J-C G)

(g) Overall control system (Ivan Dehoose, HB, JS, WC, RP,)

I. Wilson

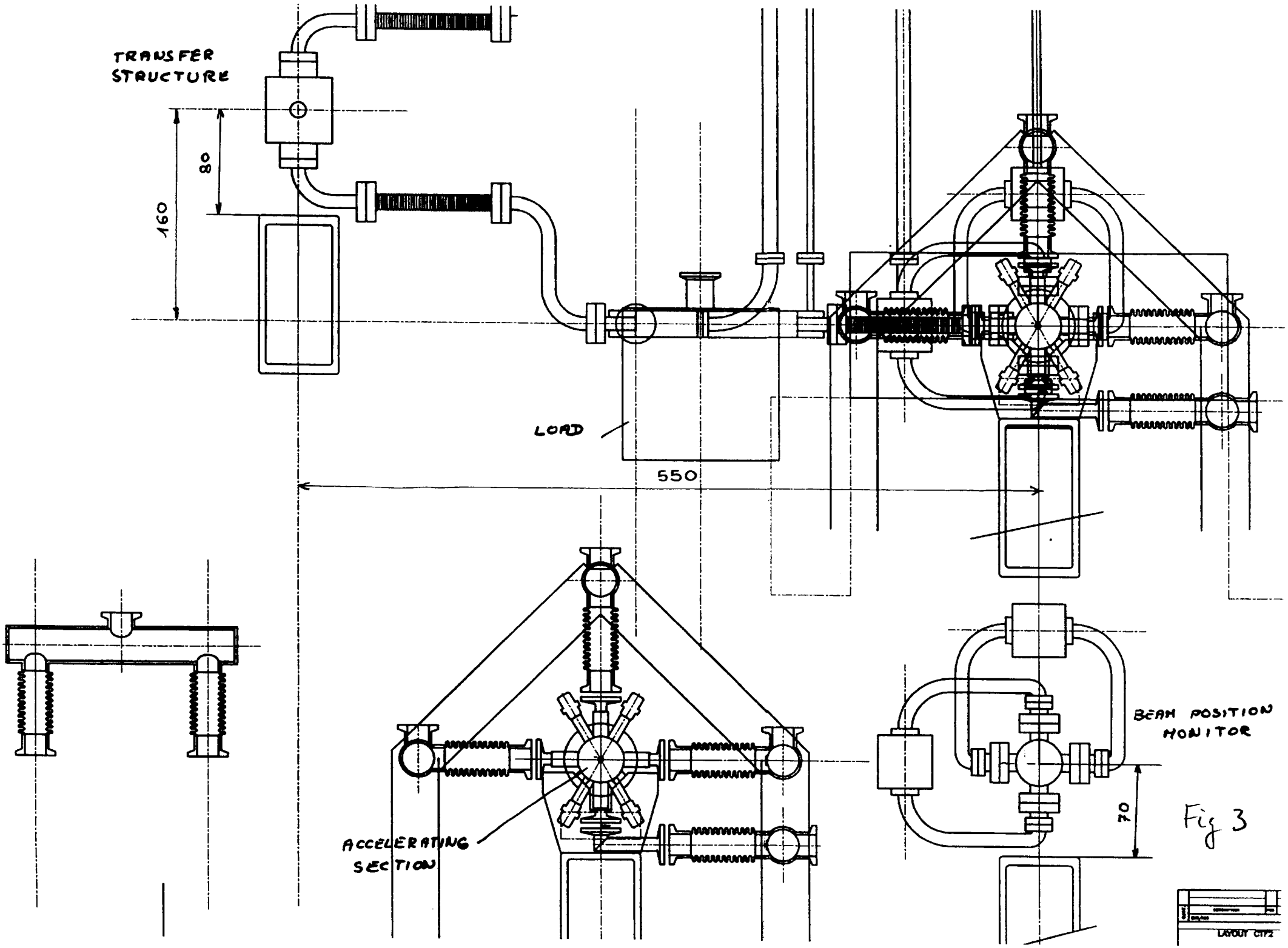
TRANSFER
STRUCTURE
80
160
LOAD
550
ACCELERATING
SECTION
BEAM POSITION
MONITOR
20

Fig 3

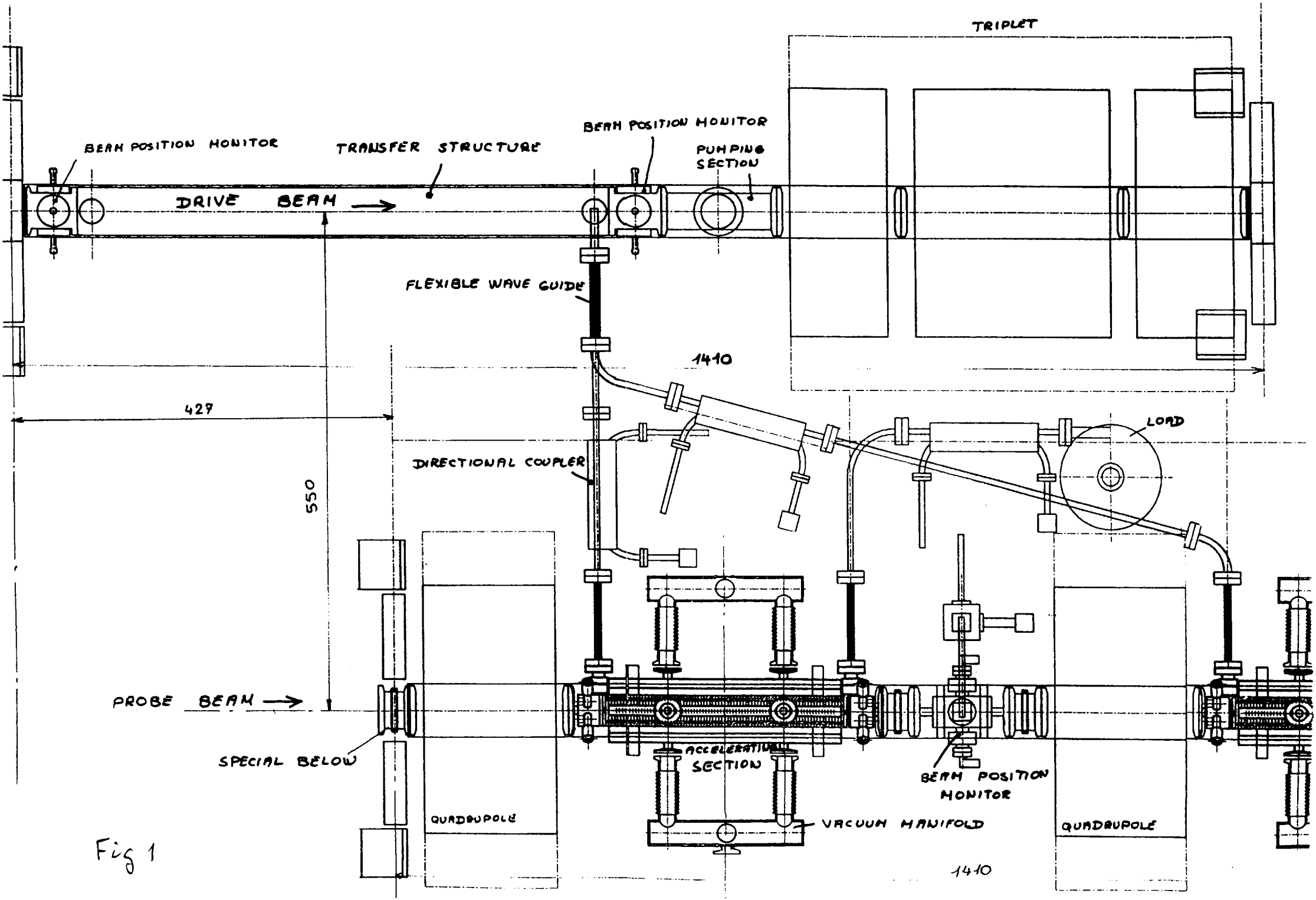
TRIPLET
BEAM POSITION MONITOR
TRANSFER STRUCTURE
BEAM POSITION MONITOR
PUMPING SECTION
DRIVE BEAM
FLEXIBLE WAVE GUIDE
1410
427
550
DIRECTIONAL COUPLER
LOAD
PROBE BEAM
SPECIAL BELOW
ACCELERATING SECTION
BEAM POSITION MONITOR
QUADRUPOLE
VACUUM MANIFOLD
QUADRUPOLE
1410

Fig 1

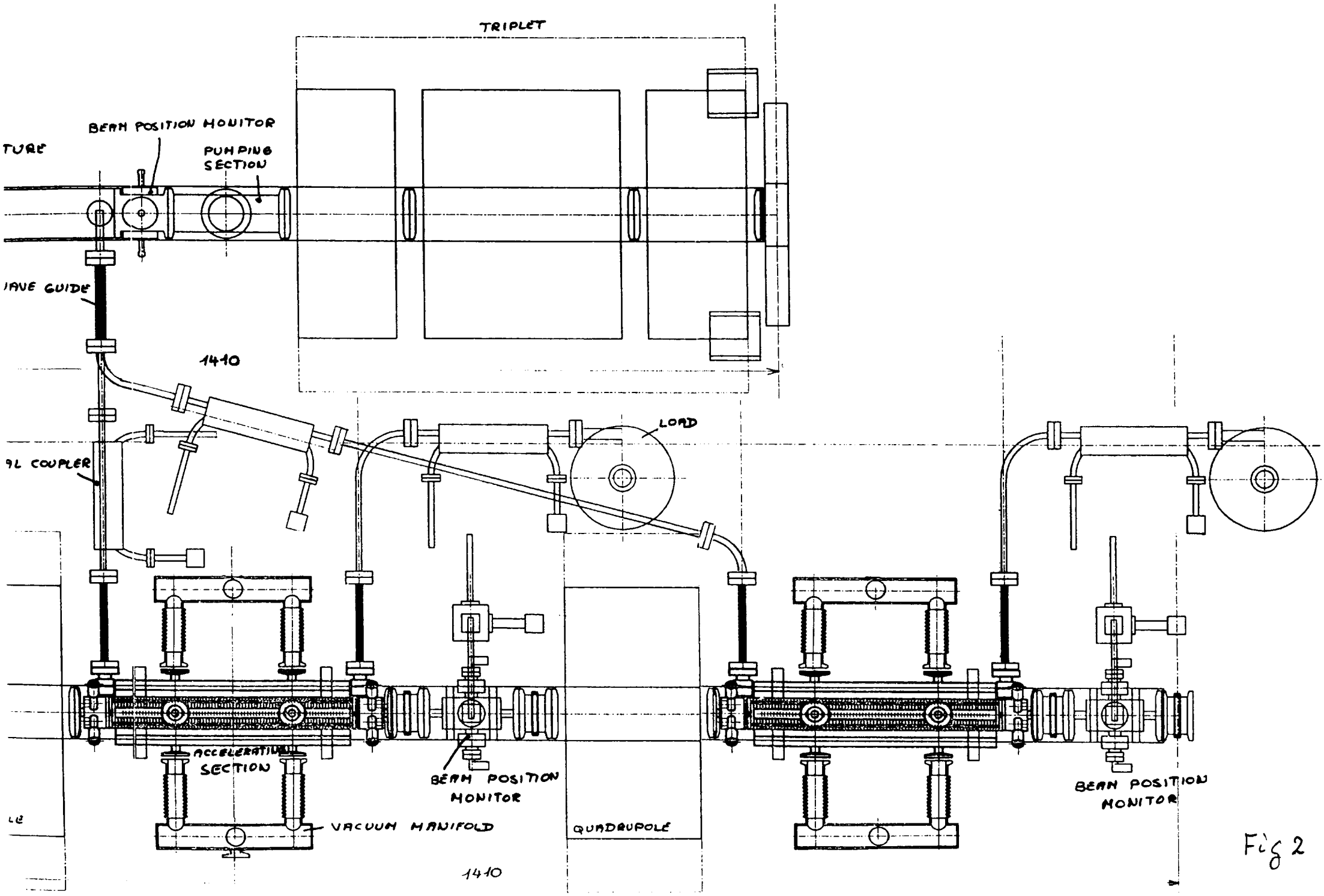
TRIPLET
BEAM POSITION MONITOR
PUMPING SECTION
TURE
IAVE GUIDE
1410
LOAD
9L COUPLER
ACCELERATING SECTION
BEAM POSITION MONITOR
VACUUM MANIFOLD
QUADRUPOLE
BEAM POSITION MONITOR
LE
1410

Fig 2

Distribution:

| | |
|---|---|
| Achard, C. | MT |
| Autin B. | PS |
| Bossart R. | PS |
| Braun H. | PS |
| Brouet M. | AT |
| Chautard F. | PS |
| Chevallay E. | PS |
| Clendenin, J. | PS |
| Comunian M. | PS |
| Corsini Roberto | PS |
| Coosemans W. | AT |
| Dehler M. | PS |
| Delahaye J.-P. | PS |
| Fischer Claude | SL |
| Garoby, R. | PS |
| Godot J.-Cl. | PS |
| Guignard G. | SL |
| Hübner K. | DG |
| Hutchins S. | PS |
| Jensen E. | PS |
| Johnson C. D. | PS |
| Kamber I. | PS |
| Koziol, H. | PS |
| Kugler H. | PS |
| Madsen J.H.B. | PS |
| Metral G. | PS |
| Mourier J. | PS |
| Pearce P. | PS |
| Pittin R. | PS |
| Potier J.-P. | PS |
| Riche A.J. | PS |
| Riege Hans | AT |
| Rinolfi L. | PS |
| Rossat G. | PS |
| Schnell W. | Bât. 584 |
| Suberlucq G. | PS |
| Thomi J.C. | PS |
| Thorndahl L. | PS |
| Warner D.J. | PS |
| Wilson I. | SL |
| Wuensch W. | SL |