



CM-P00050776

EHT-87-54

IX EHF - Workshop

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5. - 9. 10. 87

" Start of Experiments for
the RFA-Injector-System

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Problems to be treated:

Coupling of two RFB's
operating at different
frequencies (50, 200 MHz)

Alignment

Phase- and Amplitude - control

Particle pulse format
(1 or 2 out of 4)

Equipments:

New p - Source (K. Langbein),
90% H^+ , meets space charge
limit of RFA

New 200 MHz transmitter
(up to 100 kW)

50 MHz Split-Coaxial-RFA
(4 rod)

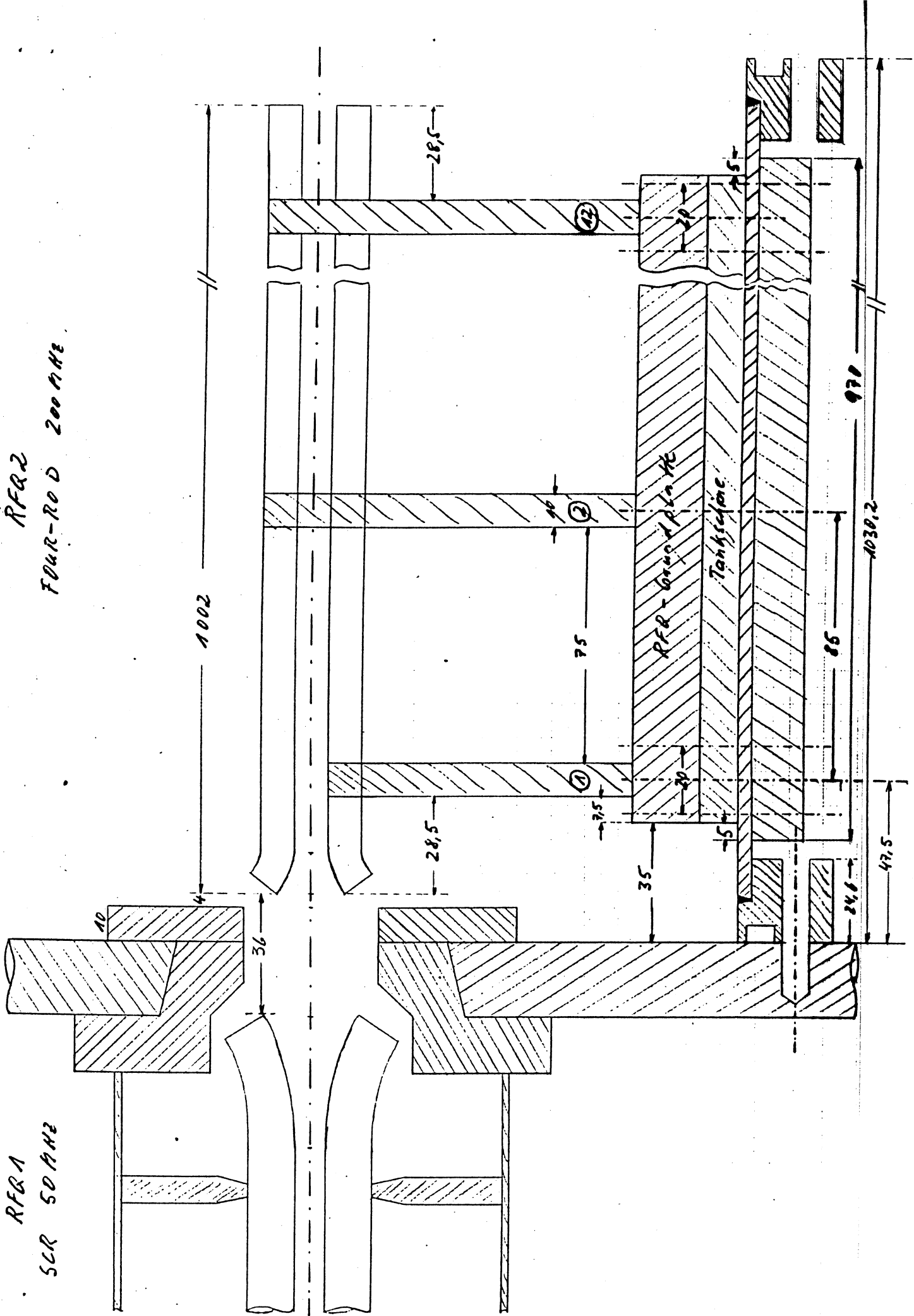
200 MHz Linear-4 rod-RFA
(like 4 rod RFA built
for Hera)

Diagnostic (GHz-range)

Special multiparticle
code

RFR1
SCR 50 AHE

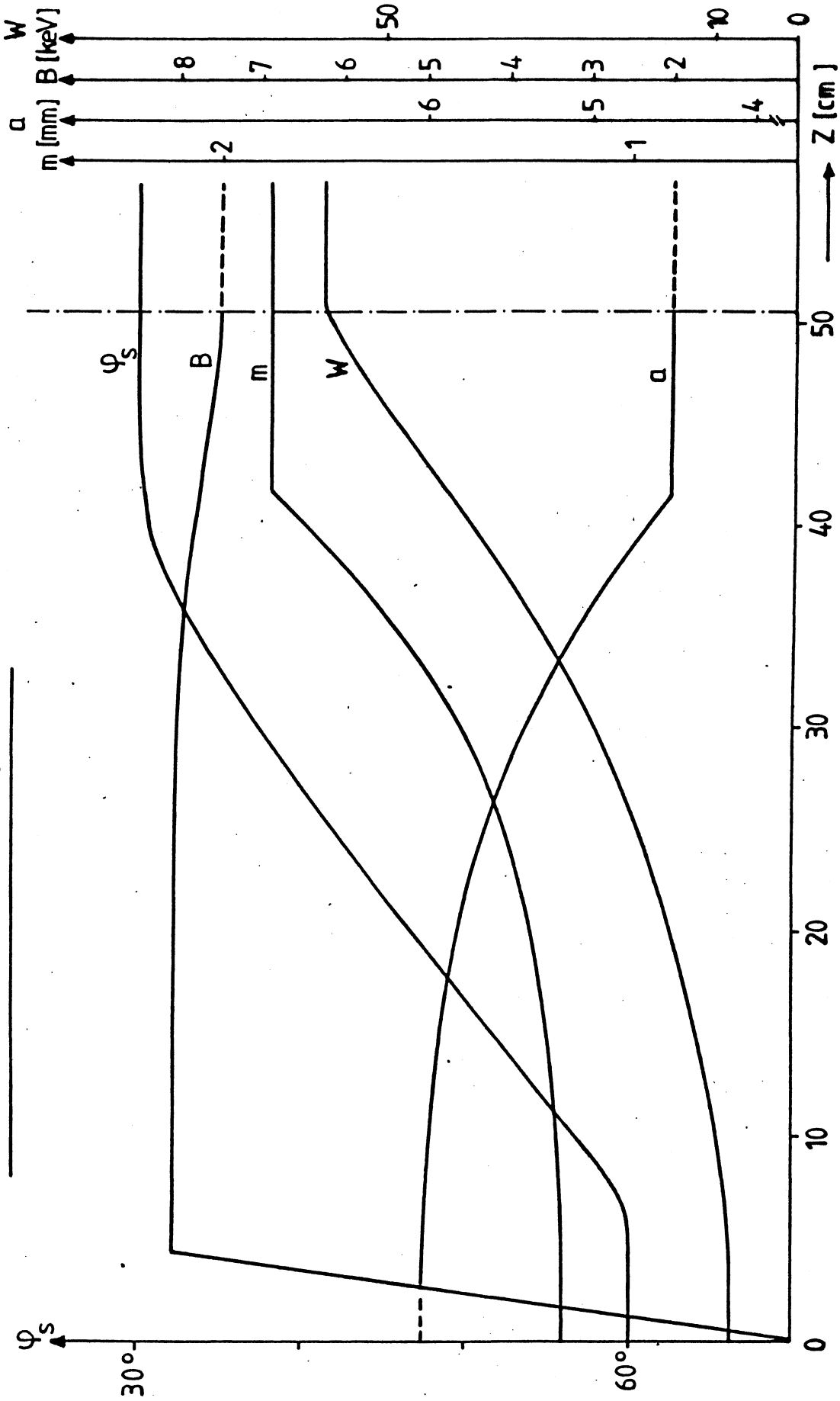
RFR2
FOR-RO D 200 AHE



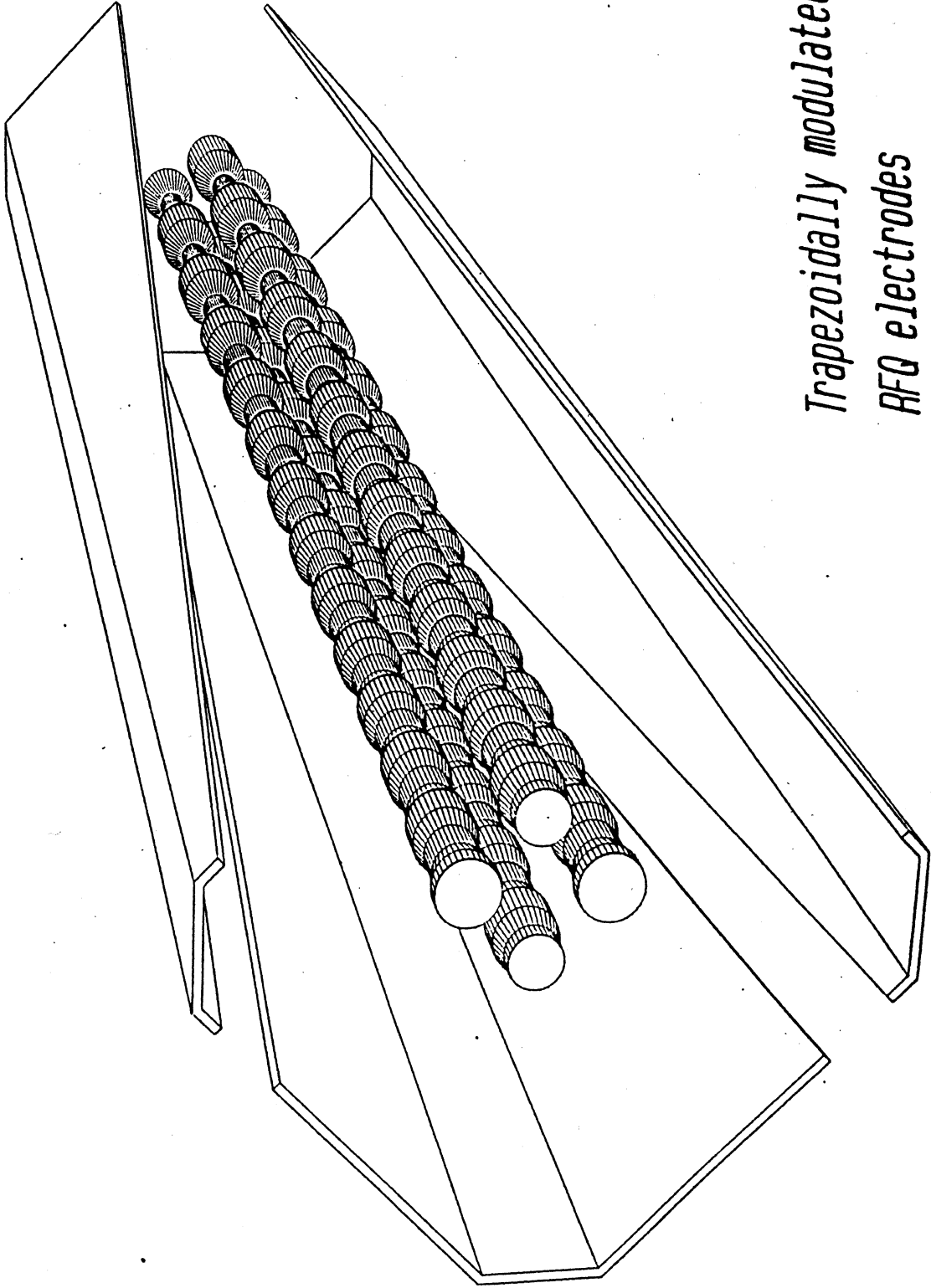
PARAMETERS OF THE SCR - RFQ

ION	$H^+ (H_2^+)$
RF FREQUENCY	50 MHz
ENERGY	6.4 - 48.8 KeV / N
APERTURE RADIUS	6 - 4.5 mm
MODULATION	1.16 - 1.88
RF VOLTAGE	8.65 KV / N
SYNCHRONOUS PHASE φ_s	$60^\circ - 30^\circ$
σ_{ot}	45.5°
CURRENT LIMIT ($I_L = I_T$)	5 mA (100%)
LENGTH	0.5 m
NUMBER OF CELLS	36
MATCHING - IN	$4B\lambda / 2$
MATCHING - OUT	$2B\lambda / 2$
R_p - VALUE	180 K Ω

SCR - RFQ PARAMETERS



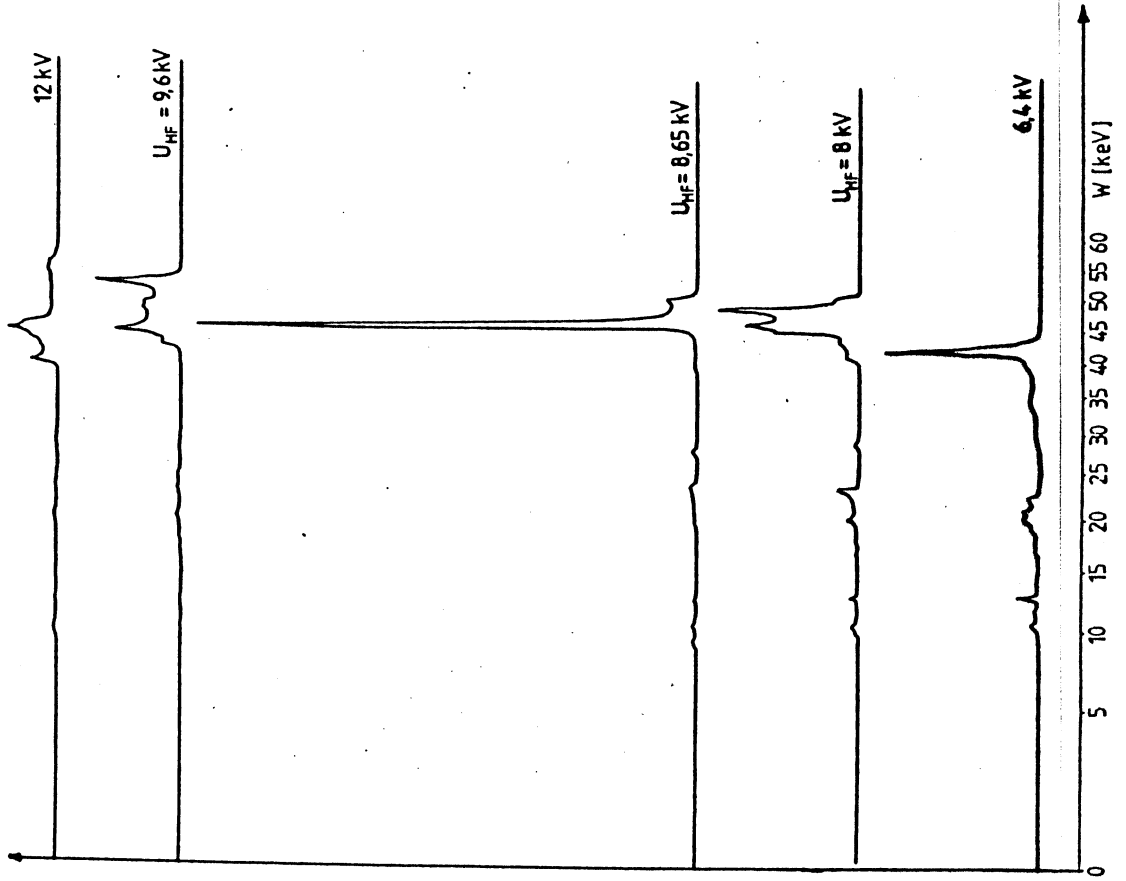
RM → BUNCHER → ACCELERATOR → RM →



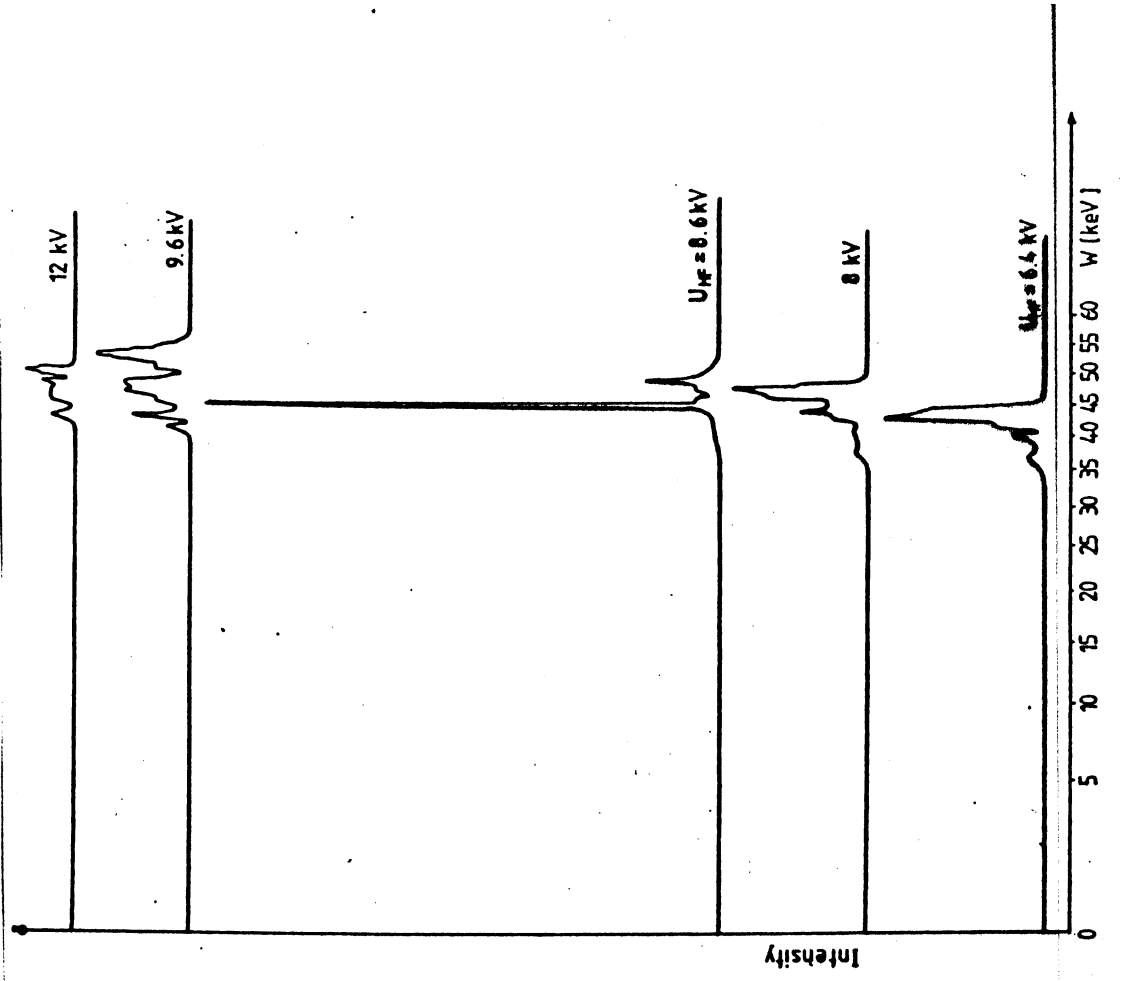
*Trapezoidally modulated SCA-
AFQ electrodes*

H⁺ - ENERGY SPECTRA AT DIFFERENT RF - VOLTAGES.
DESIGN-VOLTAGE: 8.65 KV, DESIGN-ENERGY: 46.8 KeV

MEASURED



CALCULATED

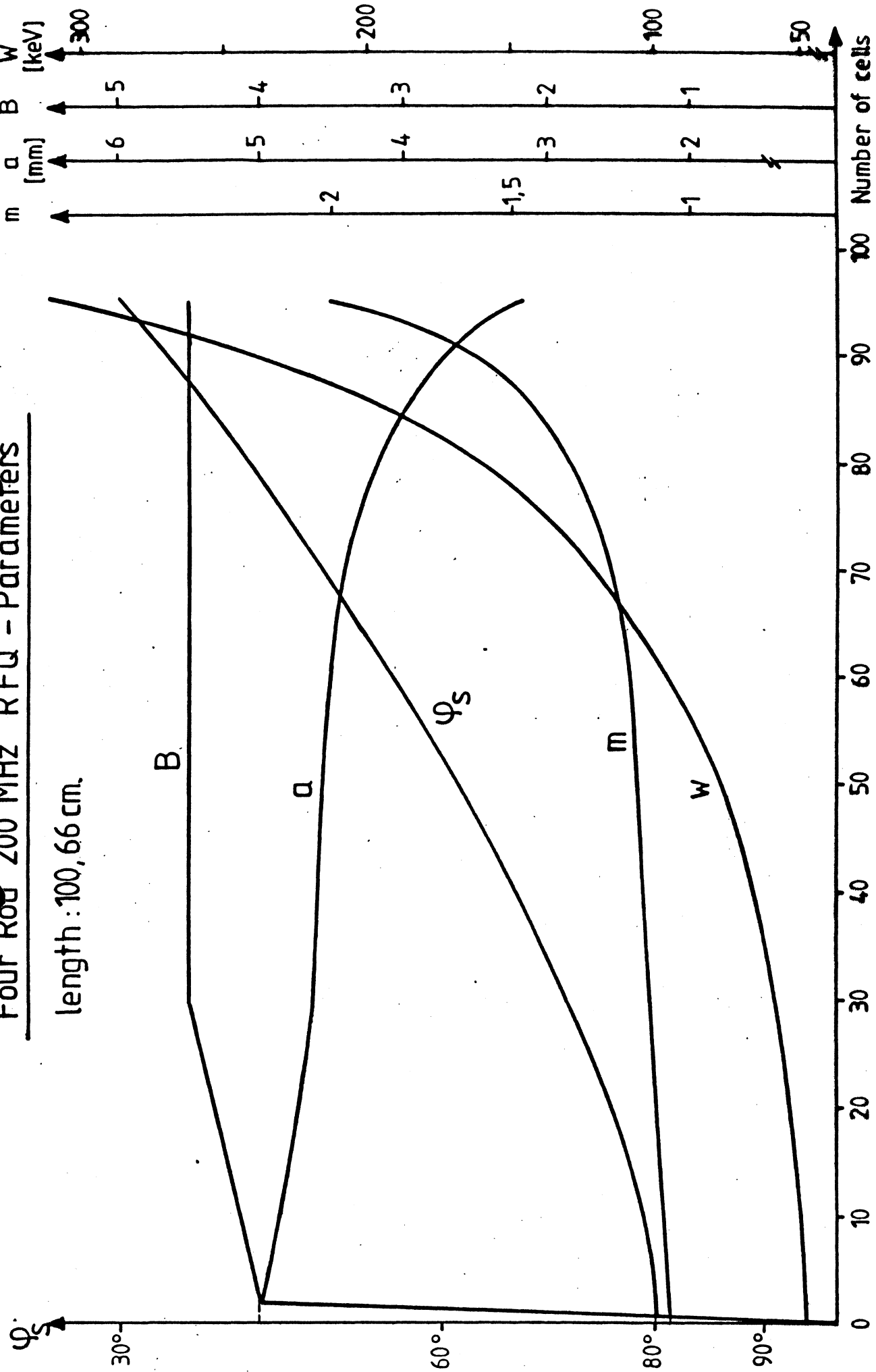


PARAMETERS OF THE FOUR ROD - RFQ

ION	H^+
RF FREQUENCY	200 MHz
ENERGY	48.8 - 315.8 KeV / N
APERTURE RADIUS	5 - 3.2 mm
MODULATION	1.060 - 2.012
RF VOLTAGE	45 KV / N
SYNCHRONOUS PHASE φ_s	$80^\circ - 30^\circ$
σ_{ot}	23°
CURRENT LIMIT (I_L, I_T)	70 mA, 40 mA (100%)
LENGTH	1 m
NUMBER OF CELLS	93
MATCHING - IN	$2 B\lambda / 2$
R_p - VALUE	70 K Ω
RF - POWER	28 KW
FOCUSSING PARAMETER B	4.06 - 4.50
A_{10}	0.0244 - 0.5441

Four Rod 200 MHz RFQ - Parameters

length : 100,66 cm.



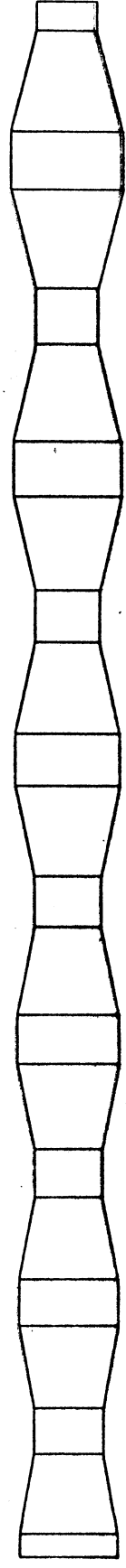
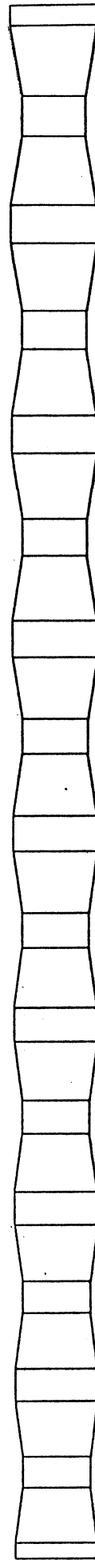
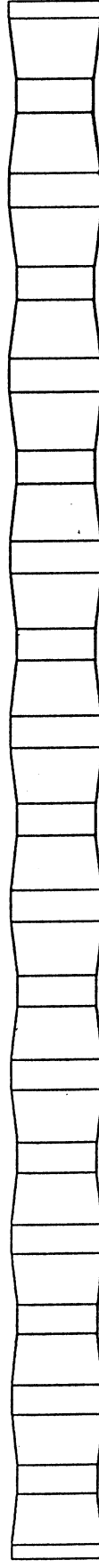
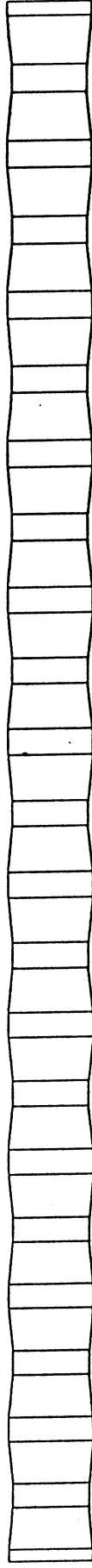
SHAPER

BUNCHER

**SCHEME OF THE TRAPEZOIDALY MODULATED ELECTRODES OF THE 200 MHz
FOUR ROD - RFQ**

NUMBER OF CELLS : 93

LENGTH : 100.66 cm



"1 out of 4" concept

ENERGIE-PHASEN-HISTOGRAMM

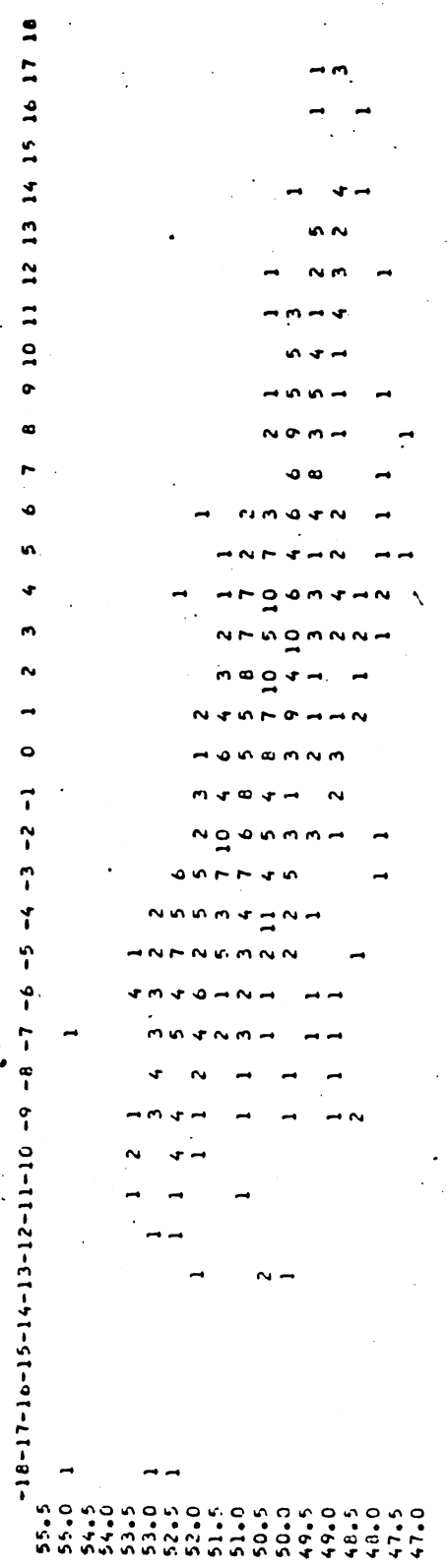
200AHe - RFR

Longitudinal

Input-Distribution
ΔW

1. Bucket

Iinj = 2,56 mA



0 0.0000
2 0.0230
0 0.0000
0 0.0000
0 0.0000
0 0.1034
19 0.2184
39 0.4483
36 0.4136
49 0.5632
72 0.8276
85 0.9770
87 1.0000
51 0.5862
40 0.4598
11 0.1264
10 0.1149
2 0.0230
0 0.0000

3 0 0 0 4 2 3 7 14 9 21 23 25 33 35 31 22 28 31 27 32 35 19 15 16 13 10 9 7 7 6 0 2 4 0
09.00.00.00.00.11.06.09.20.40.26.60.66.71.94.89.63.80.89.77.91.88.54.54.43.46.37.29.26.20.20.17.00.06.11.00

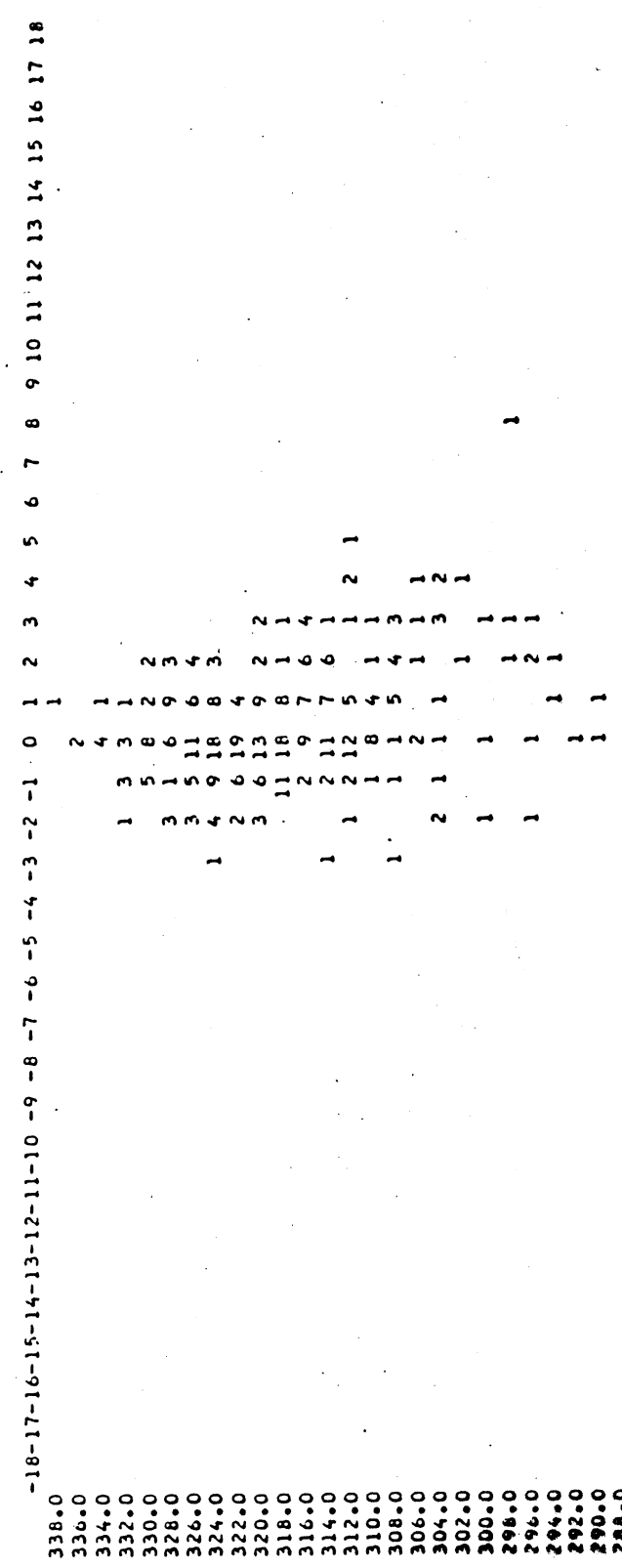
ENERGIE-PHASEN-HISTOGRAMM

Δy/ΔW - Distribution
at the end of RFR

JT = 1,88 mA
= 73%

Δy = 60°

ΔW = ± 22 keV



1 0.0233
2 0.0465
5 0.1163
8 0.1860
17 0.3953
22 0.5116
29 0.6744
43 1.0000
31 0.7209
35 0.8140
39 0.9070
28 0.4512
24 0.5981
15 0.3488
15 0.3488
5 0.1163
10 0.2326
2 0.0465
3 0.0930
3 0.0930
5 0.1163
4 0.0930
2 0.0465
0 0.0000
0 0.0000
0 0.0000
0 0.0000

