NO. 56 [redacted]

Vertical Beam Size Measurements (data of 3/9/74)

Measurement of vertical beam size were made by intercepting 5% of the beam with vertically flipped aluminum targets.

Conditions

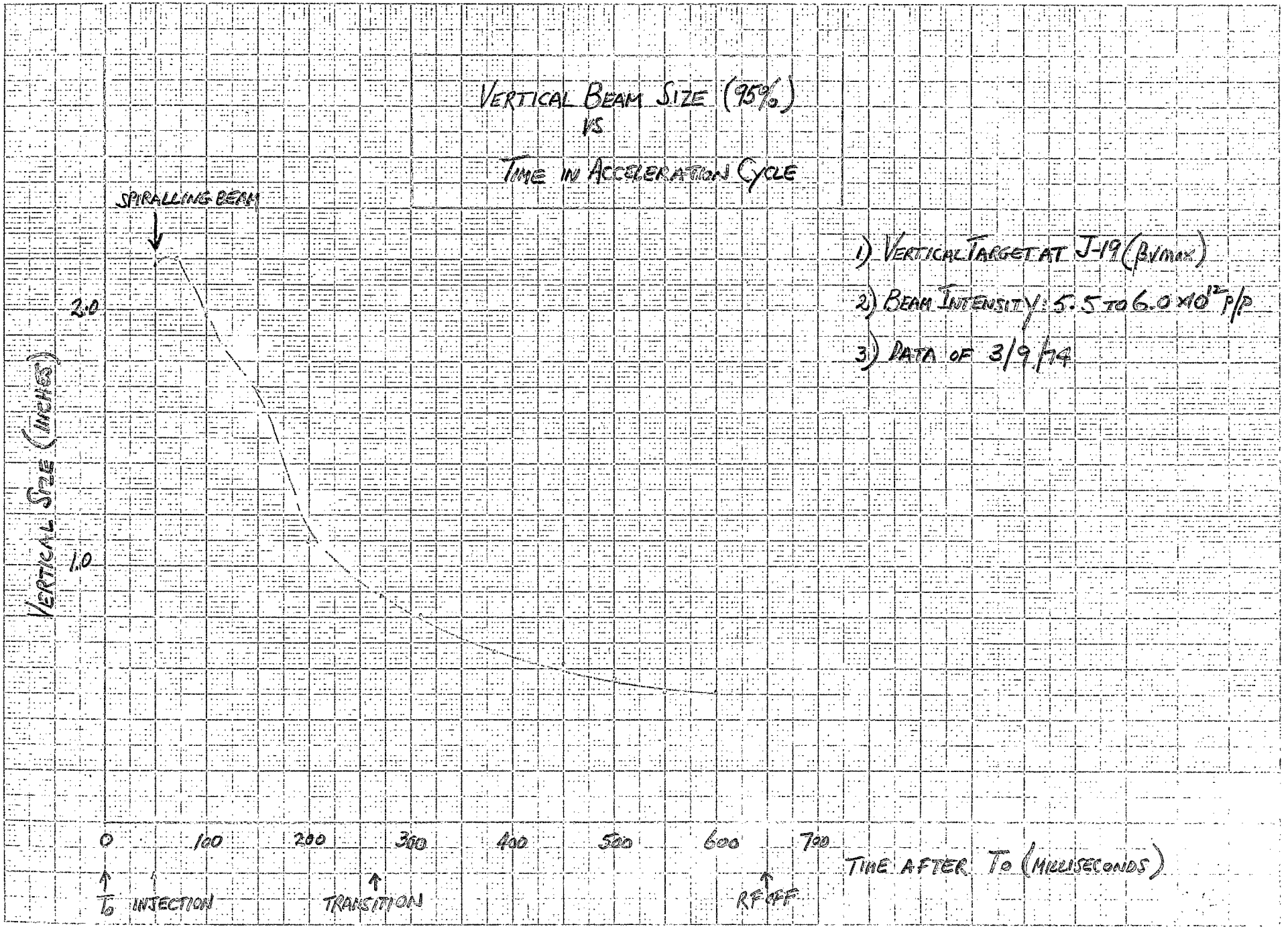
1) Vertical Targets at S-19 (βv max)
2) Beam Intensity 5.5 to 6.0×10^{12} p/p
3) Average ring vacuum — 3×10^{-7} Torr.

Results

1). Initial measurements shown on accompanying graph.
2) H.E. beam is approx 0.5" (~1.2 cm) at β max.
3) L.E. beam is approx 2.2" (~5.5 cm) at β max.
4) Ratio (damping) is approx 4.5/1, while square root of momentum ratio is 7/1. This compares with the horizontal damping (see data of 5/10/73) of 5/1, and is larger than previously observed vertical damping (see data of 4/27/73) of about 3/1.
5) Previous (4/27/73 measurements at 4.0 to 5×10^{12} p/p) gave a beam size at injection of about (1.25" x 1.4), 1.78 inches (β max).
6) At H.E. previous measurements (4/27/73) gave a beam size of about 1.4 cm (at β max).

[signature]
3/11/74

SQUARE 10 X 10 TO THE CENTIMETER AS 9014 00



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NORMALIZED VERTICAL BEAM EMITTANCE VS TIME IN ACCELERATION CYCLE

1) BEAM SIZE (95%) AT J-19 ($B_{Y MAX}$)

2) ($B\delta$) CALCULATED FROM BEAM FREQUENCY AND INTEGRATED $\dot{B}$

3) BEAM INTENSITY ~ 5.5 TO 6.0 X 10^{12} P/P

4) DATA OF 3/9/74

NORMALIZED EMITTANCE = $\pi\left(\frac{a}{B_{MAX}}\right)(\gamma\beta)$

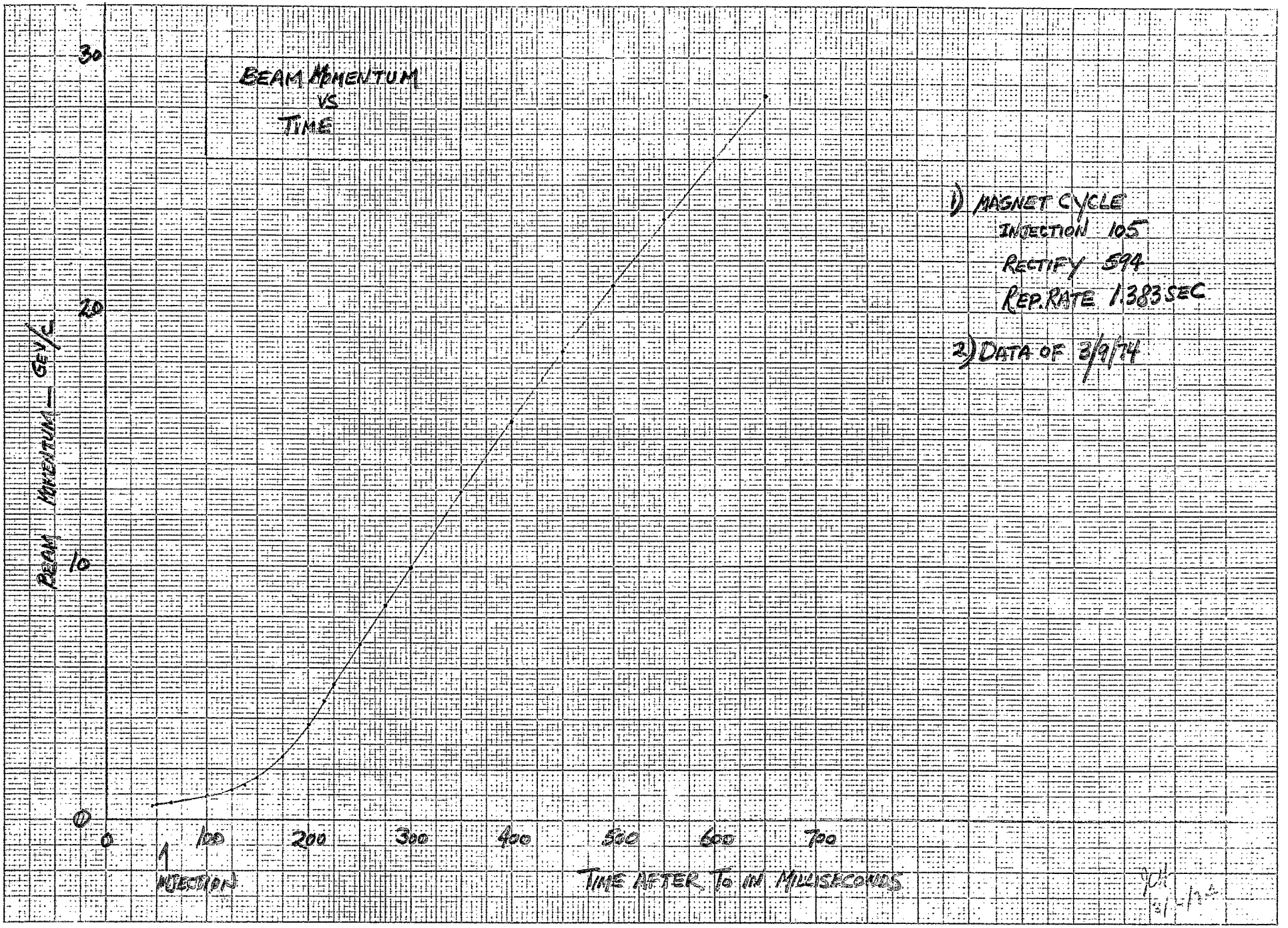
NORMALIZED VERTICAL EMITTANCE - (π x MRAD)

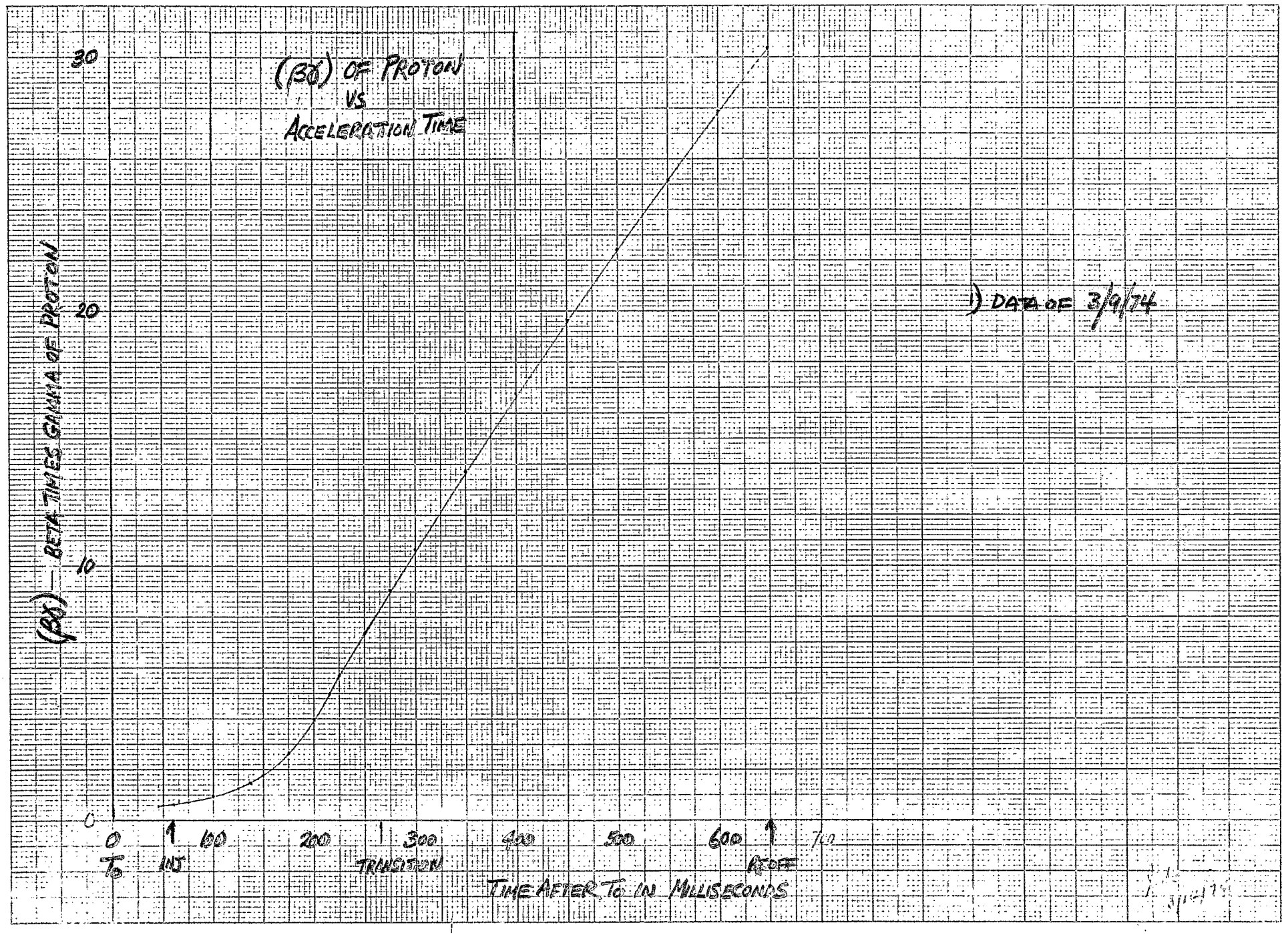
6.
5.
4.
3.
2.
1.
0

1 INJ 100 200 1 TRANSITION 300 400 500 600 1 R.F. TURN OFF

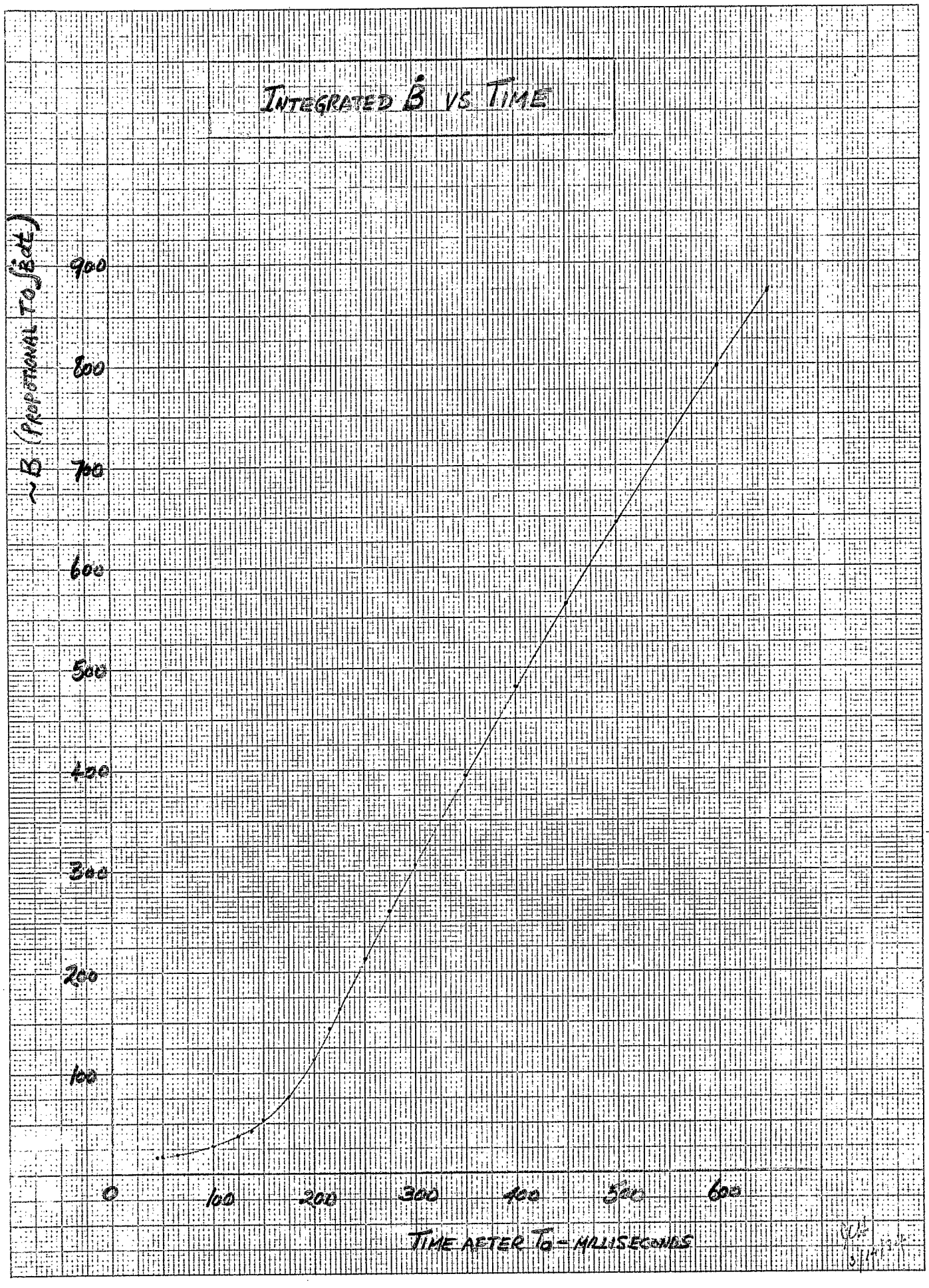
TIME AFTER T_0 IN MILLISECONDS

SQUARE 10 X 10 TO THE CENTIMETER AS 8014-5




(Bx) OF PROTON
VS
ACCELERATION TIME
) DATA OF 3/9/74
(Bx) — BETA TIMES GAMMA OF PROTON
30
20
10
0
0
To
100
INJ
200
300
TRANSITION
400
500
600
RF OFF
700
TIME AFTER To IN MILLISECONDS

No. 56



SQUARE 10 X 10 TO THE CENTIMETER AS-6014-60

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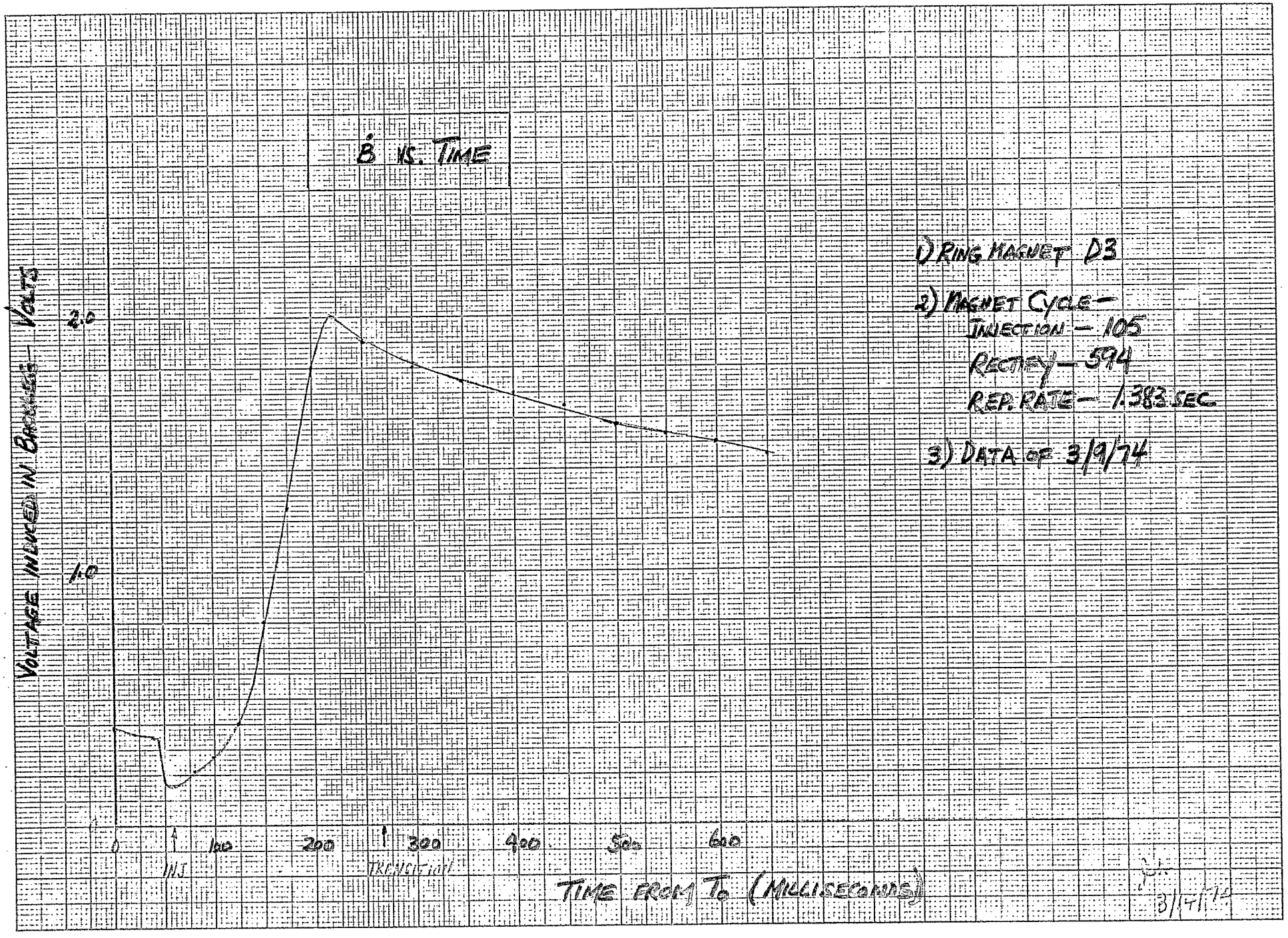
SQUARE 10 X 10 TO THE CENTIMETER AS-8014-CD

$\dot{B}$ VS. TIME



1) RING MAGNET D3

2) MAGNET CYCLE –
INJECTION – 105
RECTIFY – 594
REP. RATE – 1.383 SEC.

3) DATA OF 3/9/74

3/14/74