

Vertical Beam Size at J19 vs. Time in Cycle

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U.S. Department of Energy

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

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

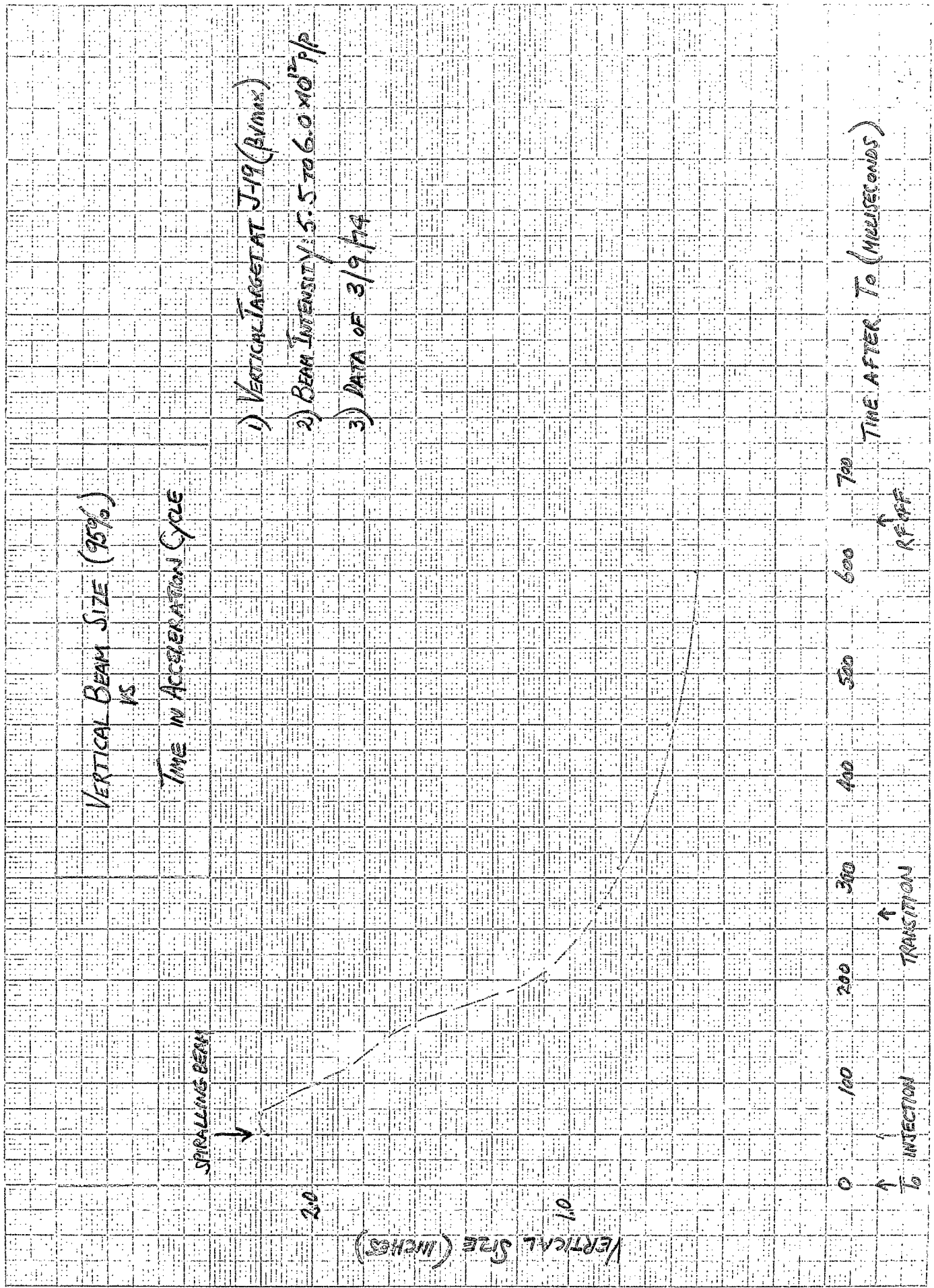
Conditions

- 1) Vertical Targets at β -19 (β max)
- 2) Beam Intensity 5.5 to 6.0×10^{14} p/p
- 3) Average ring vacuum - 3×10^{-7} Torr.

Results

- 1) Initial measurements shown in 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^{14} 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).

J. M. ...
3/11/74



VERTICAL BEAM SIZE (95%)
VS

TIME IN ACCELERATION CYCLE

- 1) VERTICAL TARGET AT J-19 (B.V.M.M.)
- 2) BEAM INTENSITY: 5.5 TO 6.0 x 10¹⁷ P/P
- 3) DATA OF 3/9/74

VERTICAL SIZE (INCHES)

TIME AFTER T₀ (MICROSECONDS)

SPALLING BEAM

INJECTION

TRANSITION

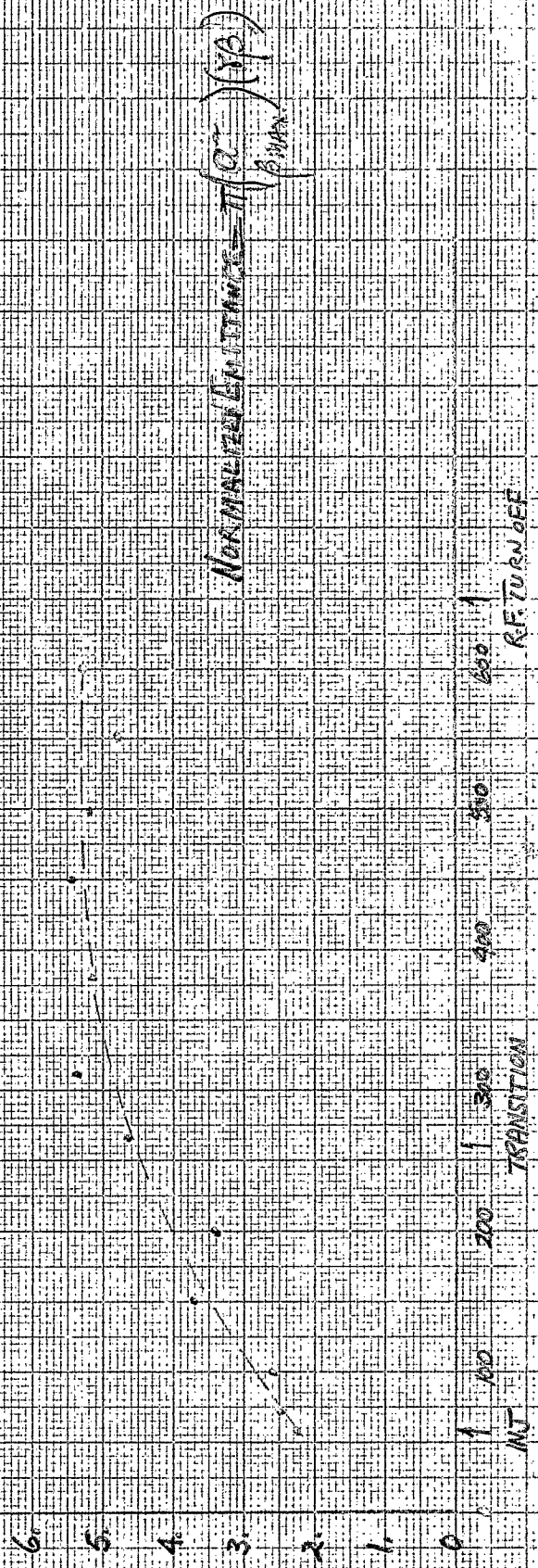
REOFF

no. 26

NORMALIZED VERTICAL BEAM ENTRANCE VS TIME IN ACCELERATION CYCLE

NORMALIZED VERTICAL ENTRANCE - (TRAMP)

- 1) BEAM SIZE (95%) AT J-19 (β_{MAX})
- 2) (80) CALCULATED FROM BEAM FREQUENCY AND INTEGRATED $\dot{\beta}$
- 3) BEAM INTENSITY $\sim 5.5 \times 10^6 \times 10^6 P/P$
- 4) DATA OF 3/9/74



NORMALIZED ENTRANCE - $\pi(\alpha_{\beta_{MAX}})$ (1/2)

TIME AFTER T_0 IN MILLISECONDS

BEAM MOMENTUM
VS
TIME

30

20

10

BEAM MOMENTUM - GEV/E

0

100

200

300

400

500

600

700

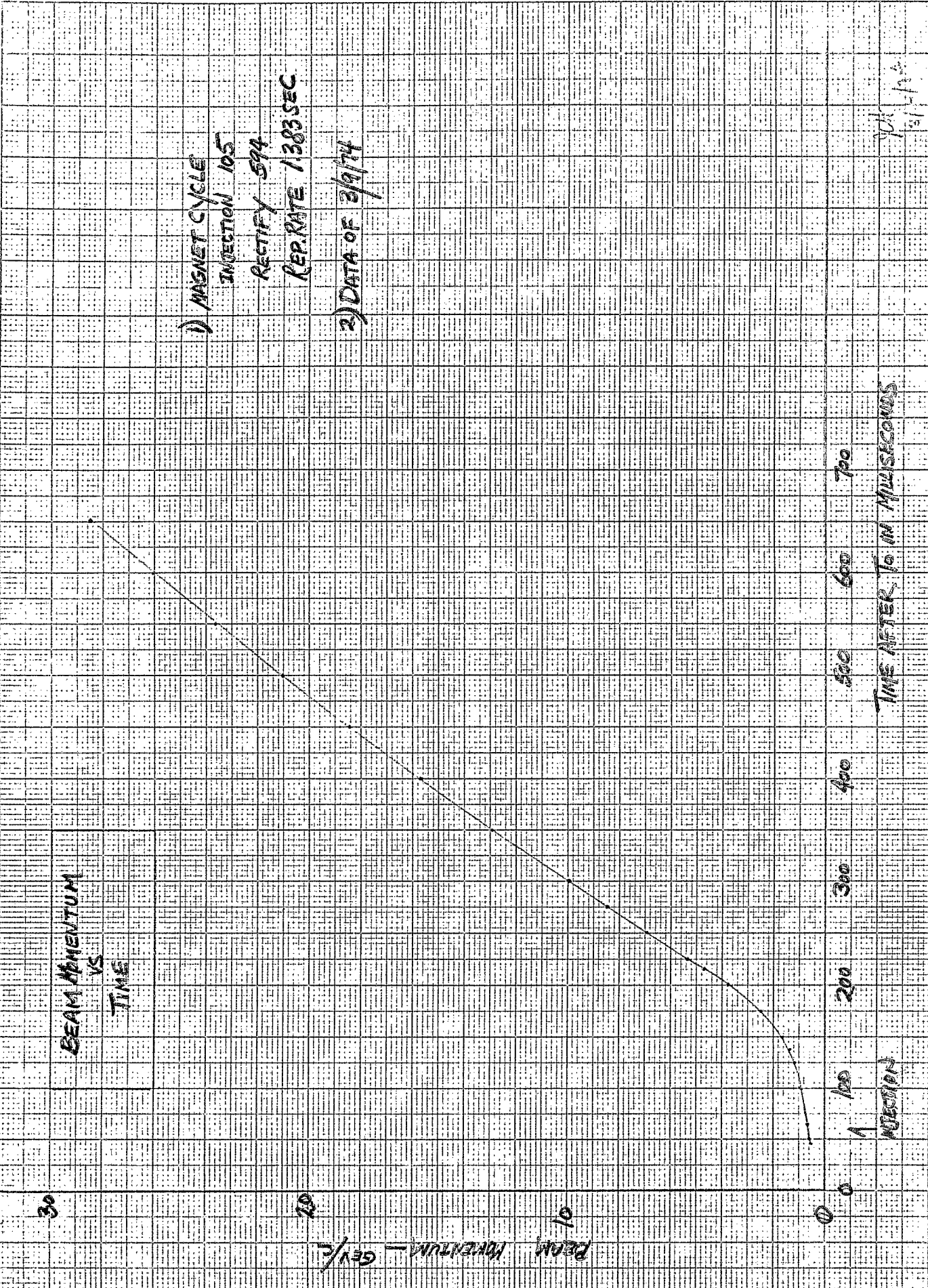
INJECTION

TIME AFTER TO IN MILLISECONDS

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

2) DATA OF 3/9/74

PH
10/1/74



10 X 10 TO THE CENTIMETER 42 234 33

GRAPHIC CALCULATOR COMPANY, CHICAGO, ILL. 60606

(BET) OF PROTON
VS
ACCELERATION TIME

DATE OF 3/9/74

30

20

10

(BET) - BETA TIMES GAMMA OF PROTON

0

100

200

300

400

500

600

700

800

900

1000

1100

1200

1300

1400

1500

1600

1700

1800

1900

2000

TRANSITION

TIME AFTER T₀ IN MILLISECONDS

11/15/74

11/15/74

11/15/74

11/15/74

11/15/74

11/15/74

11/15/74

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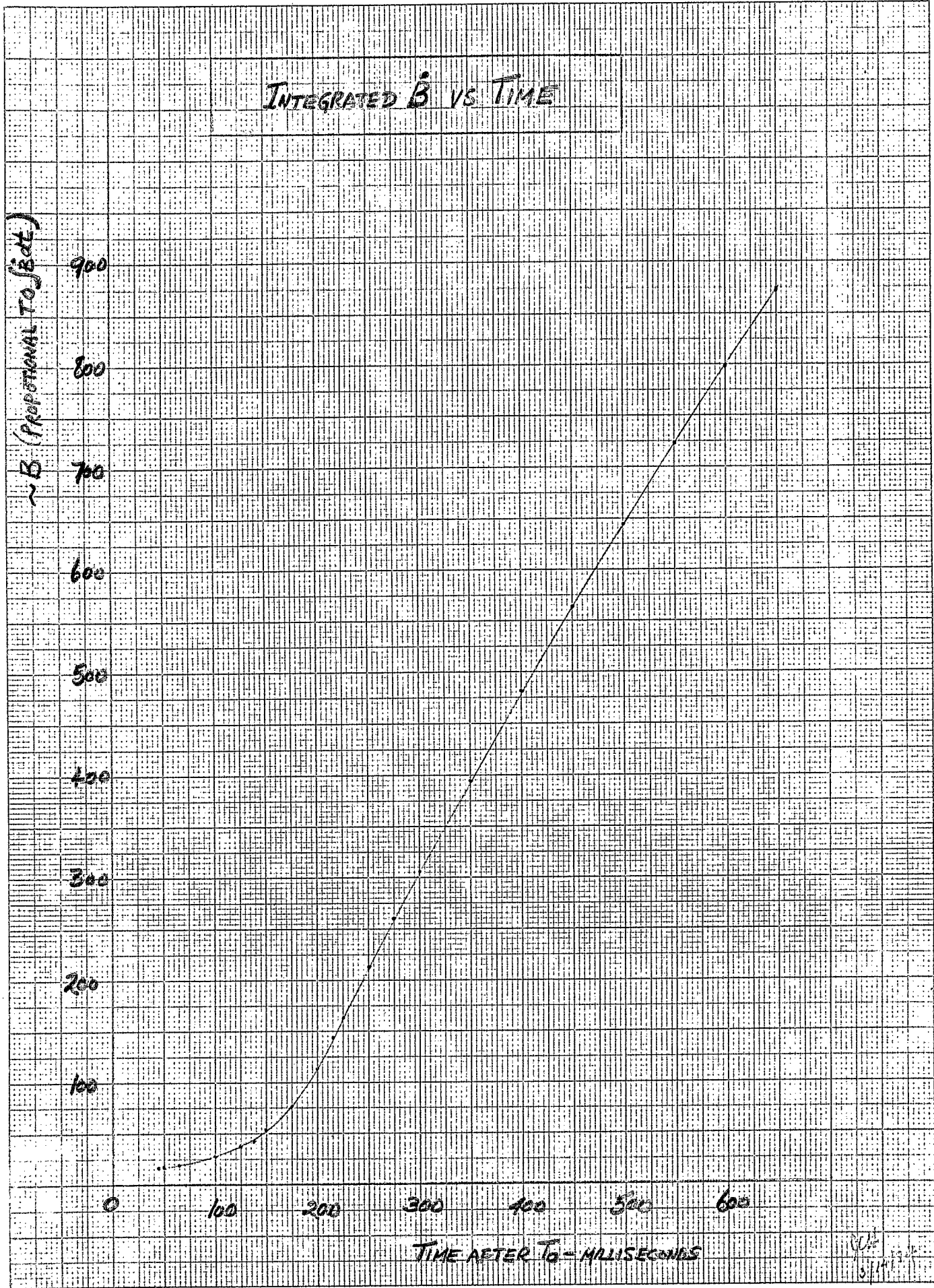
INTEGRATED \dot{B} VS TIME

$\sim B$ (PROPORTIONAL TO $\int \dot{B} dt$)

900
800
700
600
500
400
300
200
100
0

100 200 300 400 500 600

TIME AFTER T_0 - MICROSECONDS



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1) RING MAGNET D3

2) MAGNET CYCLE -
INJECTION - 105

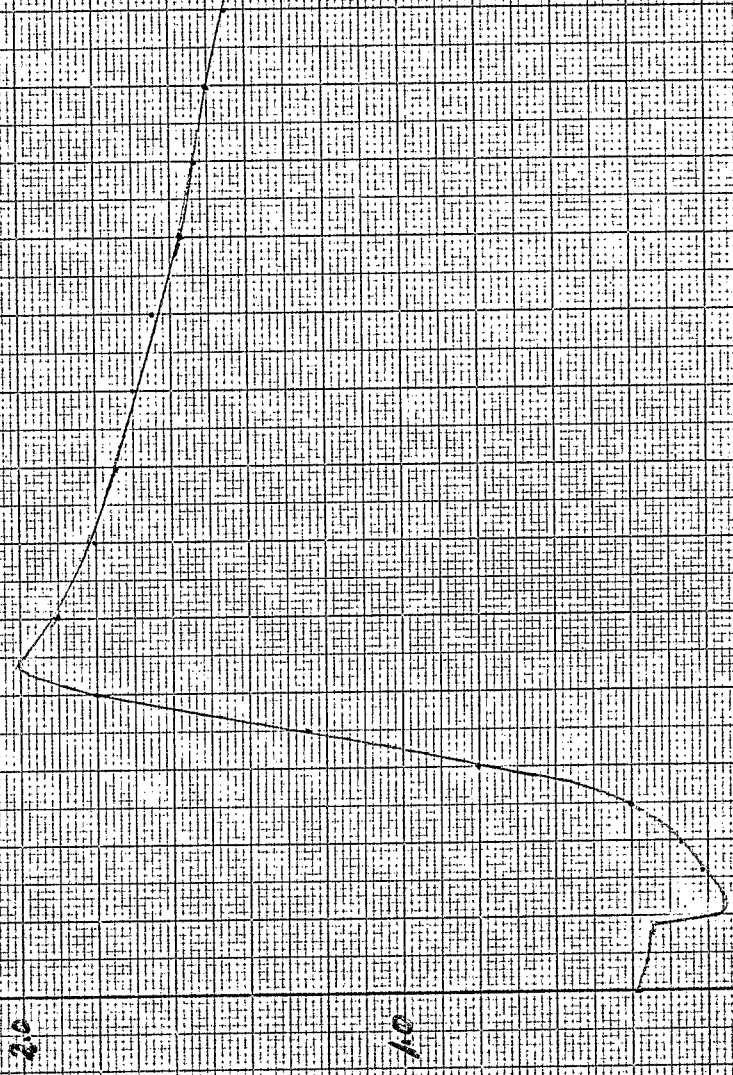
RECTIFY - 594

REP. RATE - 1/383 SEC

3) DATA OF 3/19/74

B VS. TIME

VOLTS INDUCED IN BRUSHES - VOLTS



TIME FROM T0 (MILLISECONDS)

TRANSITION

3/19/74