# Excitation Curves of Small Quadrupoles for TeV I Beam Line Use

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Fermilab

PBAR NOTE # 418

# Excitation Curves of Small Quadrupoles for TeV I Beam Line Use

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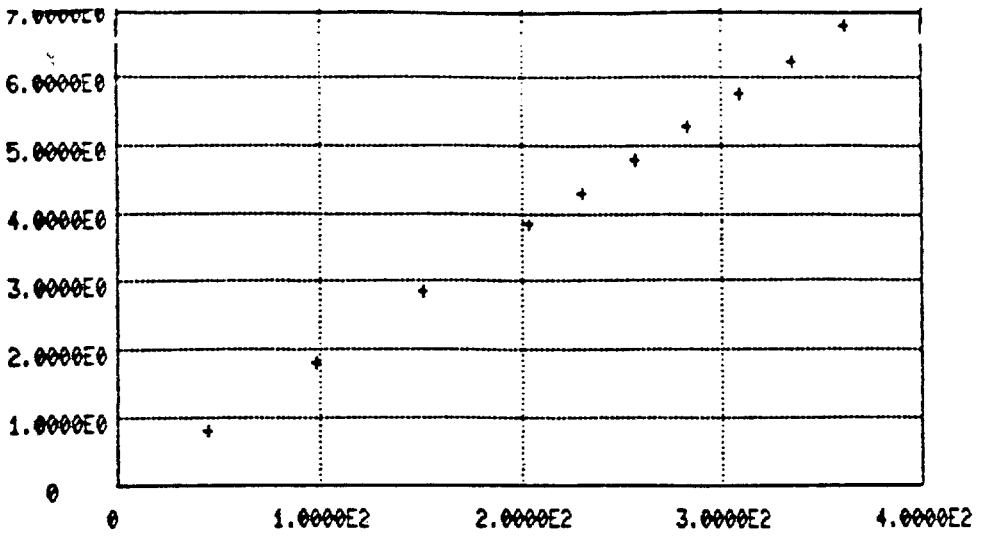
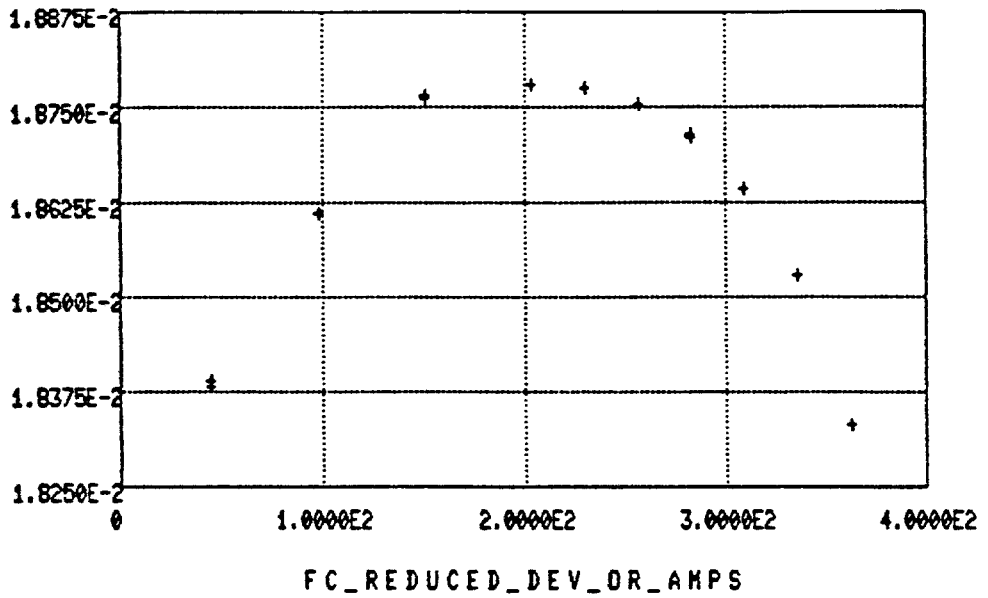
Excitation curves for at least one magnet of each length of TeV I Small Quadrupole have been measured utilizing the MTF-TeV I VAX standard measurement system. Since the standard measurement sequence does not include this sort of excitation curve, the standard reports issued on the magnet does not contain this data. Measurements were taken with the gradient probe SQ25 (probe ID #40) centered in the aperature and extending through the field length to integrate the strength of the magnet. The parameter BETA2 reported below is the probe calibration factor for this probe in meters**2. The gradient strength of the magnet in Tesla-meters/meter is obtained from the measured flux by dividing by BETA2.

The data were collected from MEAS BASE runs in which the measurement probe flux is recorded in a baseline measurement sequence. The hysteresis of the magnet is set by ramping to the specified maximum current then back to zero. The integrator is zeroed at zero current and the integrator voltage recored one or more times. The current is then ramped successively to the measurement current where the integrator volatge is recoreded, to full field and back to zero where the integrator voltage is again recoreded for each current at which data is desired. After correction for drift, amplifier gain and integrator RC, the data is recorded in the REDuced data files.

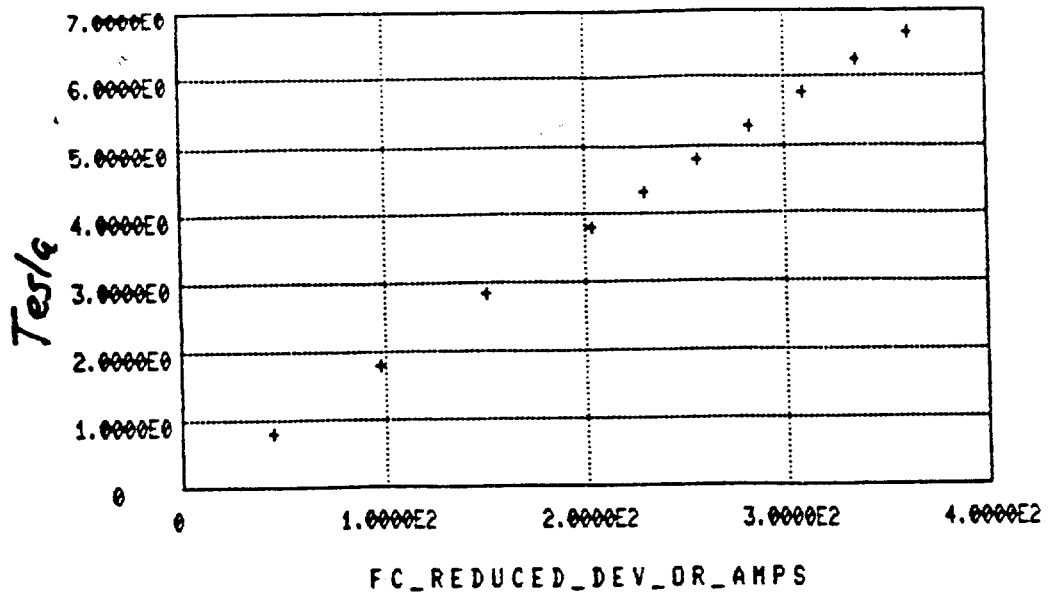
This report collects this data for measurements on several magnets. The data at non-zero currents are converted to Tesla and reported also in Tesla/Amp. In order to prepare the report entirely with the DATATRIEVE query language, the usual averaging of Probe Up and Probe Down measurments was not carried out. The reader is invited instead to look at both sets of data to observe that the error to be canceled is small. In addition, this report may not give the best final answers since the final probe calibration may differ from the one used here by a fraction of a per cent. The value used is shown to allow that correction to be made later if ever needed. The remanent field of the magnet is not measured by these procedures and no correction for its effect is made. The reported strengths are actually, therefore, the difference in strength between the magnet at measured current and its strength at zero current.

Attached, please find plots of typical data on excitation of Small Quads. Data for both Probe Up and Probe Down is given for SQA001. Data for each other length is then plotted. The DATATRIEVE procedured used to extract the data is given in case some aspect may be clarified by reference to it. This is followed by tables of data on the various magnets measured with this procedure. This data will be available in database files on the MDTF VAX for those interested in obtaining further details.

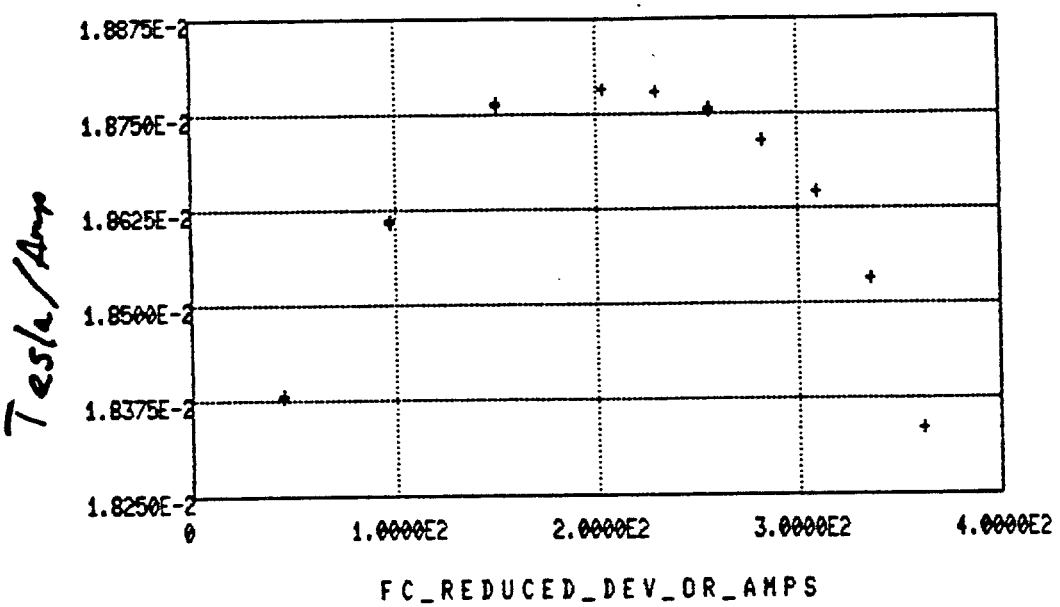


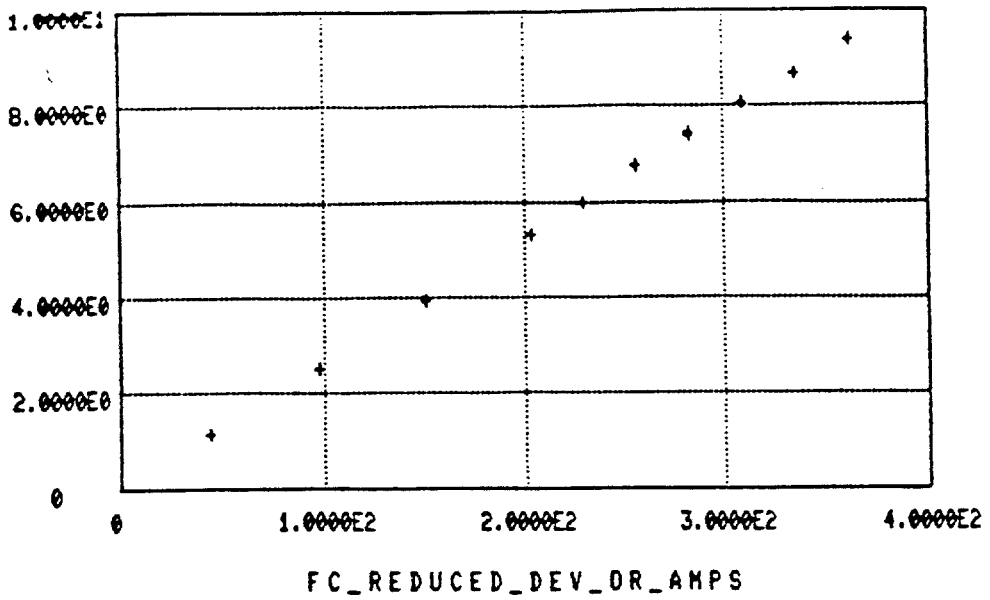




SQA001
Probe Up



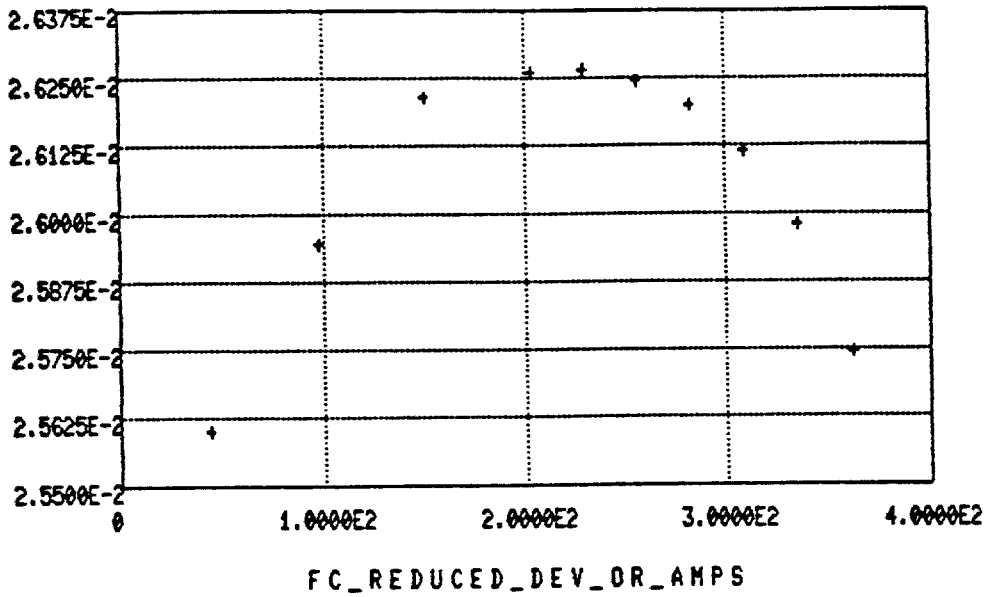

SQA001
Probe Down



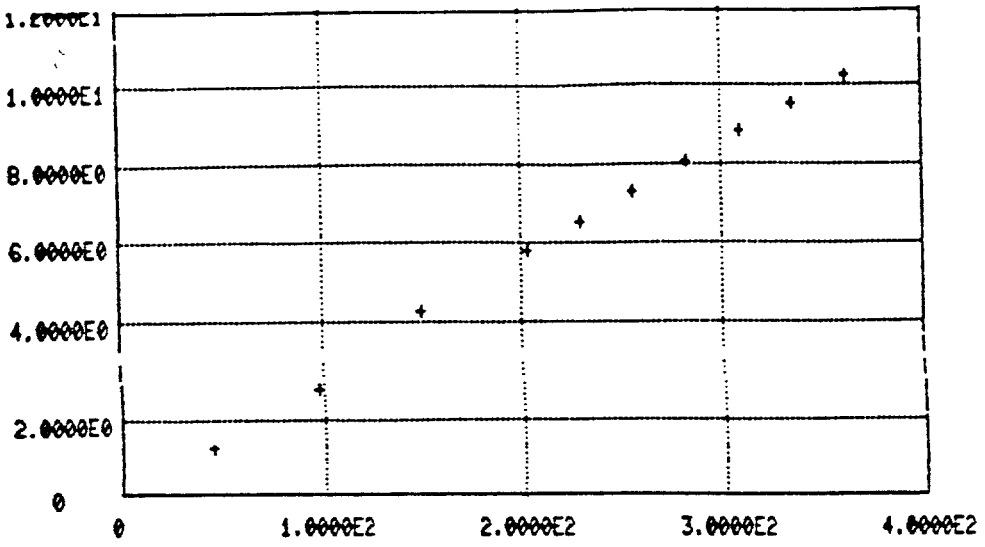


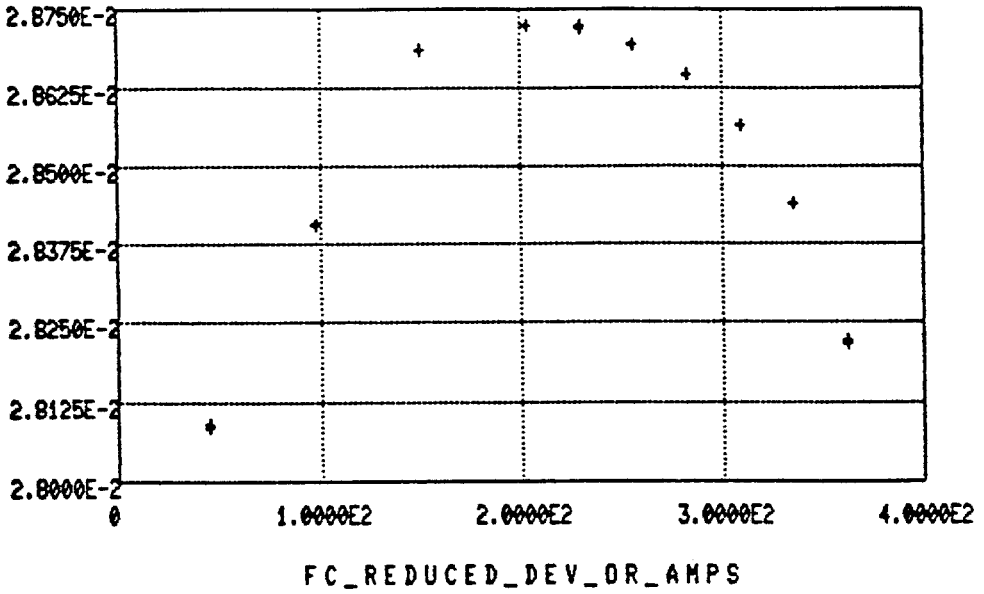

SQB016

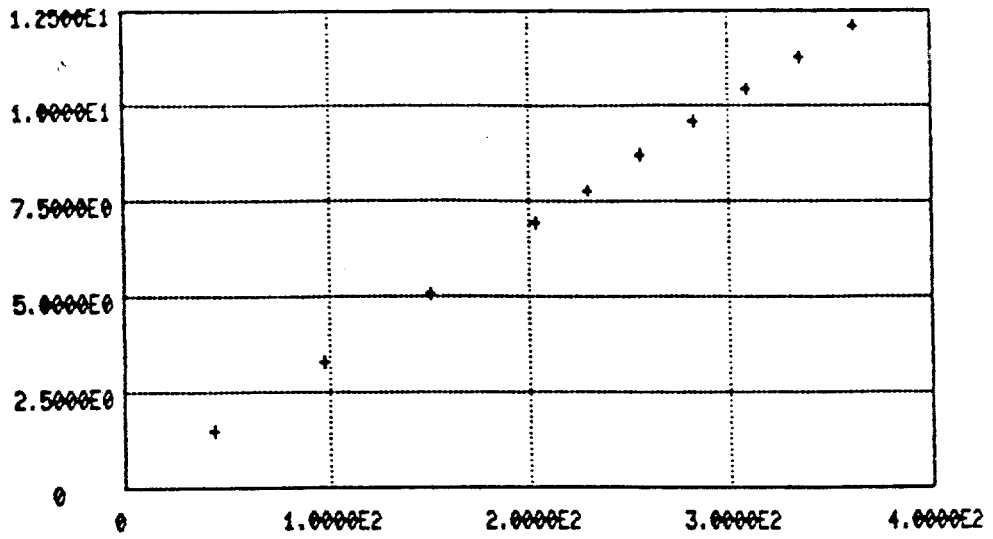
Probe Down



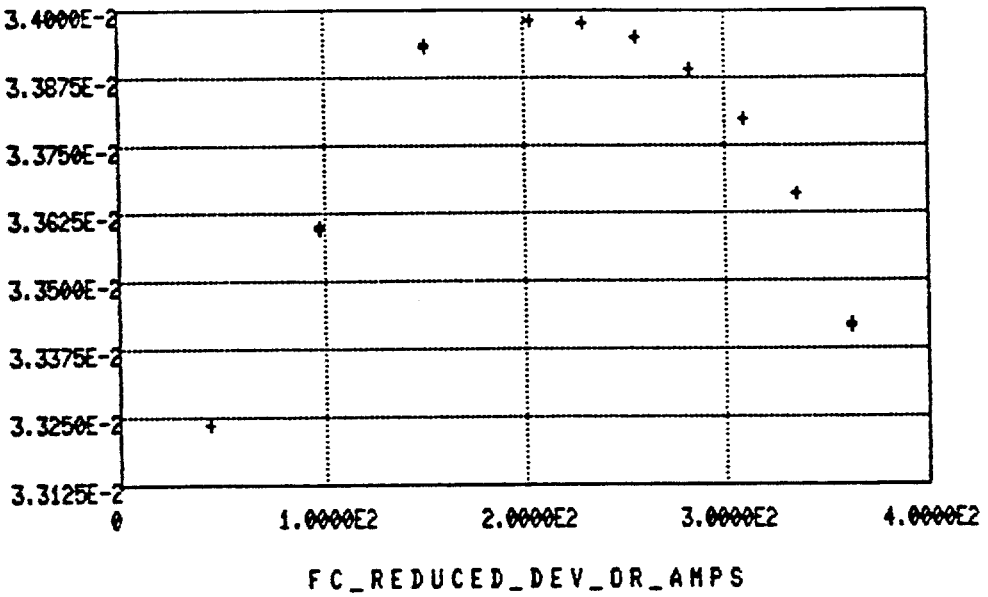
SQC101
ProbeDown

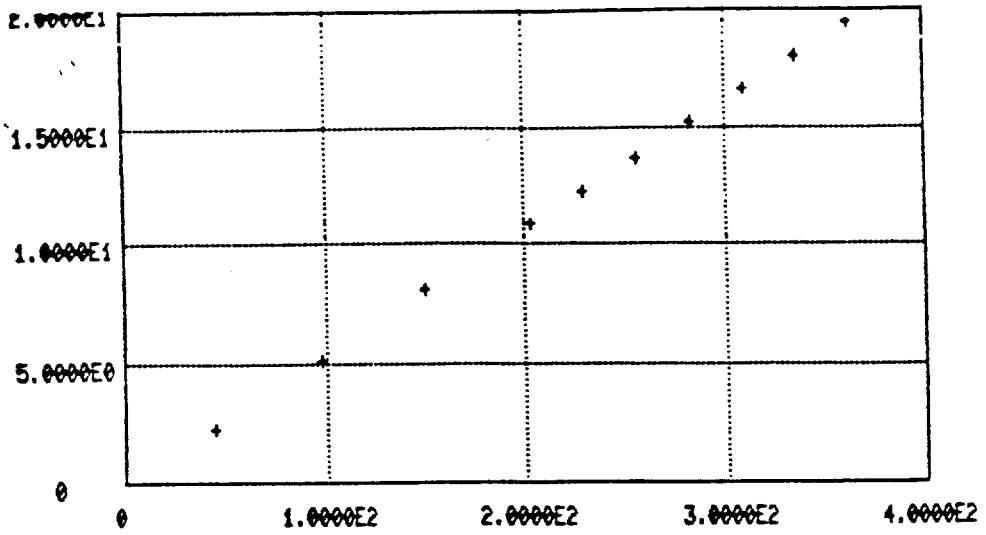


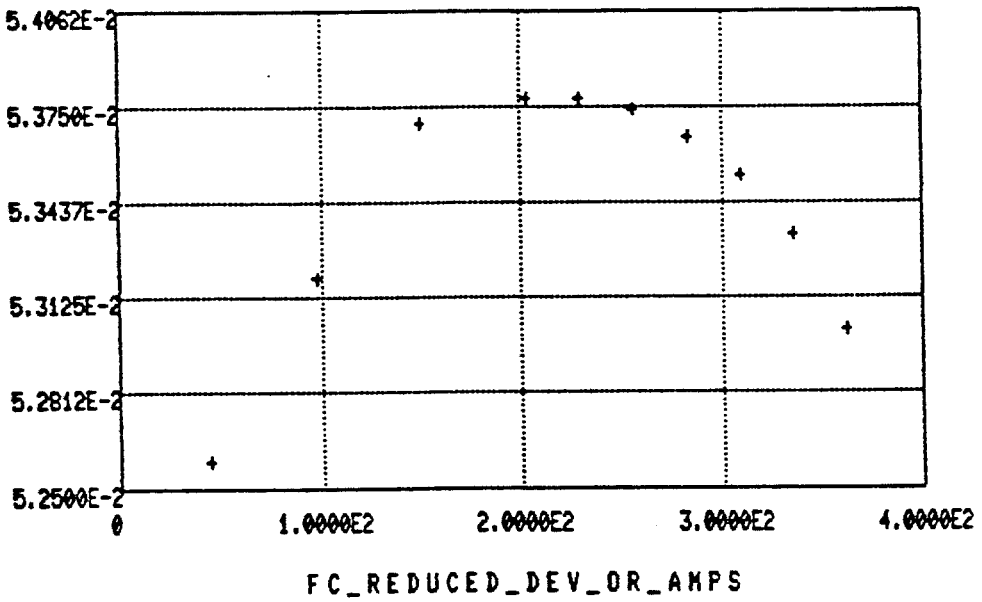






SQD001
Test Coil Down






SQE001
Probe Down

DATATRIEVE procedure which produced tables below. Additional editing of the file was required, however for display purposes.

```
DEFINE PROCEDURE SQ
!       PROCEDURE SQ    written by Bruce Brown, 20 Feb 1985
!       Designed to extract some results from excitation curves
!       Measured on Small Quadrupoles for TeV I Beam Line Use
!       DECLARE VARIABLES
DECLARE BETA2 PIC XXXXXXXXXXXXX.
!       FIND MEASUREMENT PROBE CALIBRATION
READY CDD$TOP.CDD$MSR.HDW.CALIBIDX
FIND SQ25 IN CALIBIDX WITH FNAL = "SQ25" AND INDEX = "FCBUCKMAG"
SELECT FIRST SQ25
BETA2 = CAL_B
PRINT BETA2
!       GET DATA ON ALL BASE RUNS WITH MANY POINTS
READY CDD$TOP.CDD$MSR.FC$DATA.FLATRED
FIND SQ IN FLATRED WITH
FC_MAGNET_ID CONT "SQ" AND
FC_PROBE_OPTION = "M" AND
FS_MOVEMENT_AXIS = "B" AND
FC_NUMBER_REDUCED_POINTS GT 6 AND
FC_TEST_COIL = 40
ON [-.DATAFILES]SQEXCITE.DAT FOR ALL SQ
        BEGIN
PRINT SKIP
PRINT "Excitation Run Results"
PRINT SKIP
PRINT FC_MAGNET_ID,FC_REFERENCE_MAGNET_ID,FC_PROBE_OPTION,
FC_TEST_COIL, BETA2, FC_REFERENCE_COIL
PRINT FC_TEST_COIL_UPDOWN,FC_RUN_DATE_TIME
FOR ALL A IN POINTS WITH FC_REDUCED_DEV_OR_AMPS GT 1
PRINT FC_REDUCED_DEV_OR_AMPS,FC_REDUCED_SIGNAL,FC_REDUCED_SIGNAL/BETA2,
 FC_REDUCED_SIGNAL/BETA2/FC_REDUCED_DEV_OR_AMPS
        END
END-PROCEDURE
```

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQA001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 13-Aug-1984 10:37:18.37 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3879E+01 | -1.2422E-02 | 0.806 | 1.8378E-02 |
| 4.3894E+01 | -1.2429E-02 | 0.807 | 1.8382E-02 |
| 9.6886E+01 | -2.7771E-02 | 1.803 | 1.8608E-02 |
| 9.6884E+01 | -2.7772E-02 | 1.803 | 1.8609E-02 |
| 1.4982E+02 | -4.3298E-02 | 2.811 | 1.8761E-02 |
| 1.4984E+02 | -4.3304E-02 | 2.811 | 1.8762E-02 |
| 2.0281E+02 | -5.8675E-02 | 3.809 | 1.8781E-02 |
| 2.0280E+02 | -5.8676E-02 | 3.809 | 1.8782E-02 |
| 2.2916E+02 | -6.6281E-02 | 4.303 | 1.8777E-02 |
| 2.2918E+02 | -6.6290E-02 | 4.303 | 1.8777E-02 |
| 2.5578E+02 | -7.3892E-02 | 4.797 | 1.8754E-02 |
| 2.5579E+02 | -7.3897E-02 | 4.797 | 1.8755E-02 |
| 2.8216E+02 | -8.1341E-02 | 5.280 | 1.8714E-02 |
| 2.8216E+02 | -8.1342E-02 | 5.281 | 1.8715E-02 |
| 3.0866E+02 | -8.8651E-02 | 5.755 | 1.8646E-02 |
| 3.0867E+02 | -8.8654E-02 | 5.755 | 1.8646E-02 |
| 3.3511E+02 | -9.5664E-02 | 6.210 | 1.8532E-02 |
| 3.3511E+02 | -9.5667E-02 | 6.211 | 1.8533E-02 |
| 3.6164E+02 | -1.0214E-01 | 6.631 | 1.8335E-02 |
| 3.6165E+02 | -1.0215E-01 | 6.631 | 1.8336E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQA001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 13-Aug-1984 09:23:20.53 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.4010E+01 | -1.2463E-02 | 0.809 | 1.8383E-02 |
| 4.4020E+01 | -1.2468E-02 | 0.809 | 1.8387E-02 |
| 9.7019E+01 | -2.7810E-02 | 1.805 | 1.8609E-02 |
| 9.7025E+01 | -2.7814E-02 | 1.806 | 1.8610E-02 |
| 1.4997E+02 | -4.3341E-02 | 2.814 | 1.8761E-02 |
| 1.4997E+02 | -4.3342E-02 | 2.814 | 1.8762E-02 |
| 2.0296E+02 | -5.8709E-02 | 3.811 | 1.8779E-02 |
| 2.0296E+02 | -5.8710E-02 | 3.811 | 1.8779E-02 |
| 2.2931E+02 | -6.6313E-02 | 4.305 | 1.8774E-02 |
| 2.2931E+02 | -6.6315E-02 | 4.305 | 1.8774E-02 |
| 2.5592E+02 | -7.3923E-02 | 4.799 | 1.8752E-02 |
| 2.5593E+02 | -7.3926E-02 | 4.799 | 1.8752E-02 |
| 2.8229E+02 | -8.1364E-02 | 5.282 | 1.8711E-02 |
| 2.8230E+02 | -8.1368E-02 | 5.282 | 1.8712E-02 |
| 3.0880E+02 | -8.8675E-02 | 5.757 | 1.8642E-02 |
| 3.0881E+02 | -8.8678E-02 | 5.757 | 1.8642E-02 |
| 3.3525E+02 | -9.5687E-02 | 6.212 | 1.8529E-02 |
| 3.3525E+02 | -9.5690E-02 | 6.212 | 1.8529E-02 |
| 3.6180E+02 | -1.0216E-01 | 6.632 | 1.8331E-02 |
| 3.6181E+02 | -1.0217E-01 | 6.632 | 1.8331E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQB001 | SQB002 | M | 40 | -1.5404E-2 | 38 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 6-Aug-1984 21:54:52.42 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3495E+01 | -1.7150E-02 | 1.113 | 2.5597E-02 |
| 4.3516E+01 | -1.7155E-02 | 1.114 | 2.5592E-02 |
| 6.9901E+01 | -2.7867E-02 | 1.809 | 2.5880E-02 |
| 6.9908E+01 | -2.7867E-02 | 1.809 | 2.5878E-02 |
| 9.6529E+01 | -3.8489E-02 | 2.499 | 2.5885E-02 |
| 9.6551E+01 | -3.8495E-02 | 2.499 | 2.5883E-02 |
| 1.2291E+02 | -4.9329E-02 | 3.202 | 2.6056E-02 |
| 1.2291E+02 | -4.9329E-02 | 3.202 | 2.6054E-02 |
| 1.4947E+02 | -6.0149E-02 | 3.905 | 2.6125E-02 |
| 1.4947E+02 | -6.0149E-02 | 3.905 | 2.6124E-02 |
| 1.7596E+02 | -7.0852E-02 | 4.600 | 2.6141E-02 |
| 1.7594E+02 | -7.0847E-02 | 4.599 | 2.6141E-02 |
| 2.0247E+02 | -8.1512E-02 | 5.292 | 2.6136E-02 |
| 2.0248E+02 | -8.1512E-02 | 5.292 | 2.6134E-02 |
| 2.2884E+02 | -9.2051E-02 | 5.976 | 2.6114E-02 |
| 2.2883E+02 | -9.2048E-02 | 5.976 | 2.6113E-02 |
| 2.5545E+02 | -1.0258E-01 | 6.660 | 2.6070E-02 |
| 2.5546E+02 | -1.0259E-01 | 6.660 | 2.6069E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQB001 | SQB002 | M | 40 | -1.5404E-2 | 38 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 6-Aug-1984 21:33:37.04 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3484E+01 | -1.7143E-02 | 1.113 | 2.5594E-02 |
| 4.3512E+01 | -1.7152E-02 | 1.113 | 2.5589E-02 |
| 6.9907E+01 | -2.7864E-02 | 1.809 | 2.5876E-02 |
| 6.9909E+01 | -2.7863E-02 | 1.809 | 2.5874E-02 |
| 9.6520E+01 | -3.8482E-02 | 2.498 | 2.5883E-02 |
| 9.6531E+01 | -3.8484E-02 | 2.498 | 2.5881E-02 |
| 1.2290E+02 | -4.9328E-02 | 3.202 | 2.6057E-02 |
| 1.2292E+02 | -4.9335E-02 | 3.203 | 2.6055E-02 |
| 1.4944E+02 | -6.0136E-02 | 3.904 | 2.6125E-02 |
| 1.4946E+02 | -6.0146E-02 | 3.905 | 2.6124E-02 |
| 1.7592E+02 | -7.0840E-02 | 4.599 | 2.6141E-02 |
| 1.7589E+02 | -7.0826E-02 | 4.598 | 2.6141E-02 |
| 2.0245E+02 | -8.1501E-02 | 5.291 | 2.6135E-02 |
| 2.0247E+02 | -8.1507E-02 | 5.291 | 2.6134E-02 |
| 2.2882E+02 | -9.2041E-02 | 5.975 | 2.6112E-02 |
| 2.2883E+02 | -9.2043E-02 | 5.975 | 2.6112E-02 |
| 2.5544E+02 | -1.0258E-01 | 6.659 | 2.6070E-02 |
| 2.5543E+02 | -1.0258E-01 | 6.659 | 2.6069E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQB016 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 10-Aug-1984 19:50:24.23 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3584E+01 | -1.7185E-02 | 1.116 | 2.5597E-02 |
| 4.3593E+01 | -1.7191E-02 | 1.116 | 2.5601E-02 |
| 9.6590E+01 | -3.8604E-02 | 2.506 | 2.5946E-02 |
| 9.6616E+01 | -3.8615E-02 | 2.507 | 2.5946E-02 |
| 1.4952E+02 | -6.0376E-02 | 3.920 | 2.6213E-02 |
| 1.4955E+02 | -6.0386E-02 | 3.920 | 2.6214E-02 |
| 2.0251E+02 | -8.1919E-02 | 5.318 | 2.6260E-02 |
| 2.0252E+02 | -8.1921E-02 | 5.318 | 2.6260E-02 |
| 2.2890E+02 | -9.2602E-02 | 6.012 | 2.6263E-02 |
| 2.2889E+02 | -9.2601E-02 | 6.011 | 2.6264E-02 |
| 2.5550E+02 | -1.0329E-01 | 6.705 | 2.6243E-02 |
| 2.5552E+02 | -1.0330E-01 | 6.706 | 2.6244E-02 |
| 2.8189E+02 | -1.1376E-01 | 7.385 | 2.6199E-02 |
| 2.8191E+02 | -1.1377E-01 | 7.386 | 2.6199E-02 |
| 3.0840E+02 | -1.2406E-01 | 8.054 | 2.6115E-02 |
| 3.0840E+02 | -1.2406E-01 | 8.054 | 2.6115E-02 |
| 3.3486E+02 | -1.3401E-01 | 8.700 | 2.5980E-02 |
| 3.3487E+02 | -1.3401E-01 | 8.700 | 2.5980E-02 |
| 3.6135E+02 | -1.4331E-01 | 9.303 | 2.5746E-02 |
| 3.6139E+02 | -1.4332E-01 | 9.304 | 2.5745E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQB016 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 10-Aug-1984 19:21:13.19 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3622E+01 | -1.7210E-02 | 1.117 | 2.5612E-02 |
| 4.3633E+01 | -1.7215E-02 | 1.118 | 2.5613E-02 |
| 9.6624E+01 | -3.8618E-02 | 2.507 | 2.5946E-02 |
| 9.6647E+01 | -3.8628E-02 | 2.508 | 2.5946E-02 |
| 1.4955E+02 | -6.0366E-02 | 3.919 | 2.6204E-02 |
| 1.4955E+02 | -6.0365E-02 | 3.919 | 2.6204E-02 |
| 2.0252E+02 | -8.1882E-02 | 5.316 | 2.6247E-02 |
| 2.0254E+02 | -8.1891E-02 | 5.316 | 2.6247E-02 |
| 2.2889E+02 | -9.2551E-02 | 6.008 | 2.6250E-02 |
| 2.2887E+02 | -9.2547E-02 | 6.008 | 2.6250E-02 |
| 2.5549E+02 | -1.0324E-01 | 6.702 | 2.6234E-02 |
| 2.5551E+02 | -1.0325E-01 | 6.703 | 2.6234E-02 |
| 2.8187E+02 | -1.1371E-01 | 7.382 | 2.6189E-02 |
| 2.8187E+02 | -1.1371E-01 | 7.382 | 2.6189E-02 |
| 3.0838E+02 | -1.2401E-01 | 8.050 | 2.6106E-02 |
| 3.0839E+02 | -1.2401E-01 | 8.051 | 2.6105E-02 |
| 3.3482E+02 | -1.3394E-01 | 8.695 | 2.5969E-02 |
| 3.3485E+02 | -1.3395E-01 | 8.695 | 2.5969E-02 |
| 3.6135E+02 | -1.4327E-01 | 9.301 | 2.5738E-02 |
| 3.6136E+02 | -1.4327E-01 | 9.301 | 2.5739E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQC002 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 15-Sep-1984 17:50:18.28 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 1.1890E+02 | -5.2192E-02 | 3.388 | 2.8497E-02 |
| 1.1906E+02 | -5.2277E-02 | 3.394 | 2.8505E-02 |
| 2.5831E+02 | -1.1396E-01 | 7.398 | 2.8641E-02 |
| 2.5867E+02 | -1.1413E-01 | 7.409 | 2.8643E-02 |
| 3.0806E+02 | -1.3538E-01 | 8.789 | 2.8529E-02 |
| 3.0853E+02 | -1.3559E-01 | 8.802 | 2.8530E-02 |
| 1.0620E+00 | -9.7673E-04 | 0.063 | 5.9707E-02 |
| 3.5816E+02 | -1.5560E-01 | 10.101 | 2.8204E-02 |
| 3.5872E+02 | -1.5583E-01 | 10.116 | 2.8200E-02 |
| 1.0110E+00 | -1.0912E-03 | 0.071 | 7.0067E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQC002 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 15-Sep-1984 17:40:21.06 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 1.1906E+02 | -5.2273E-02 | 3.393 | 2.8502E-02 |
| 1.1919E+02 | -5.2343E-02 | 3.398 | 2.8509E-02 |
| 2.5834E+02 | -1.1397E-01 | 7.399 | 2.8639E-02 |
| 2.5871E+02 | -1.1414E-01 | 7.410 | 2.8641E-02 |
| 3.0811E+02 | -1.3540E-01 | 8.790 | 2.8529E-02 |

| | |
|---|---|
| 3.0861E+02 -1.3562E-01 | 8.804 2.8529E-02 |
| 1.0837E+00 -9.7919E-04 | 0.064 5.8659E-02 |
| 3.5822E+02 -1.5563E-01 | 10.103 2.8204E-02 |
| 3.5879E+02 -1.5586E-01 | 10.118 2.8200E-02 |
| 1.0372E+00 -1.1013E-03 | 0.071 6.8927E-02 |

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQC101 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 11-Aug-1984 20:42:06.55 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3674E+01 | -1.8895E-02 | 1.227 | 2.8086E-02 |
| 4.3674E+01 | -1.8898E-02 | 1.227 | 2.8090E-02 |
| 9.6688E+01 | -4.2310E-02 | 2.747 | 2.8407E-02 |
| 9.6703E+01 | -4.2317E-02 | 2.747 | 2.8408E-02 |
| 1.4962E+02 | -6.6112E-02 | 4.292 | 2.8686E-02 |
| 1.4962E+02 | -6.6114E-02 | 4.292 | 2.8687E-02 |
| 2.0263E+02 | -8.9654E-02 | 5.820 | 2.8724E-02 |
| 2.0264E+02 | -8.9660E-02 | 5.821 | 2.8724E-02 |
| 2.2901E+02 | -1.0132E-01 | 6.577 | 2.8720E-02 |
| 2.2900E+02 | -1.0132E-01 | 6.577 | 2.8721E-02 |
| 2.5561E+02 | -1.1299E-01 | 7.335 | 2.8695E-02 |
| 2.5562E+02 | -1.1299E-01 | 7.335 | 2.8695E-02 |
| 2.8199E+02 | -1.2443E-01 | 8.078 | 2.8646E-02 |
| 2.8201E+02 | -1.2444E-01 | 8.078 | 2.8646E-02 |
| 3.0849E+02 | -1.3574E-01 | 8.812 | 2.8565E-02 |
| 3.0851E+02 | -1.3575E-01 | 8.813 | 2.8565E-02 |
| 3.3495E+02 | -1.4675E-01 | 9.527 | 2.8442E-02 |
| 3.3498E+02 | -1.4676E-01 | 9.527 | 2.8441E-02 |
| 3.6147E+02 | -1.5713E-01 | 10.201 | 2.8219E-02 |
| 3.6149E+02 | -1.5714E-01 | 10.201 | 2.8220E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQC101 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 11-Aug-1984 20:18:43.60 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3717E+01 | -1.8910E-02 | 1.228 | 2.8081E-02 |
| 4.3728E+01 | -1.8916E-02 | 1.228 | 2.8083E-02 |
| 9.6716E+01 | -4.2321E-02 | 2.747 | 2.8407E-02 |
| 9.6732E+01 | -4.2329E-02 | 2.748 | 2.8407E-02 |
| 1.4966E+02 | -6.6128E-02 | 4.293 | 2.8685E-02 |
| 1.4966E+02 | -6.6132E-02 | 4.293 | 2.8687E-02 |
| 2.0266E+02 | -8.9665E-02 | 5.821 | 2.8723E-02 |
| 2.0265E+02 | -8.9663E-02 | 5.821 | 2.8723E-02 |
| 2.2900E+02 | -1.0131E-01 | 6.577 | 2.8720E-02 |
| 2.2903E+02 | -1.0132E-01 | 6.578 | 2.8720E-02 |
| 2.5563E+02 | -1.1299E-01 | 7.335 | 2.8693E-02 |
| 2.5562E+02 | -1.1299E-01 | 7.335 | 2.8695E-02 |
| 2.8198E+02 | -1.2443E-01 | 8.077 | 2.8646E-02 |
| 2.8200E+02 | -1.2443E-01 | 8.078 | 2.8645E-02 |
| 3.0850E+02 | -1.3574E-01 | 8.812 | 2.8564E-02 |
| 3.0851E+02 | -1.3575E-01 | 8.812 | 2.8565E-02 |
| 3.3495E+02 | -1.4673E-01 | 9.525 | 2.8439E-02 |
| 3.3495E+02 | -1.4673E-01 | 9.526 | 2.8439E-02 |
| 3.6148E+02 | -1.5712E-01 | 10.200 | 2.8217E-02 |
| 3.6149E+02 | -1.5713E-01 | 10.200 | 2.8217E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQD001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 11-Aug-1984 16:16:13.58 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3612E+01 | -2.2325E-02 | 1.449 | 3.3232E-02 |
| 4.3612E+01 | -2.2328E-02 | 1.449 | 3.3235E-02 |
| 9.6597E+01 | -4.9988E-02 | 3.245 | 3.3595E-02 |
| 9.6604E+01 | -4.9996E-02 | 3.246 | 3.3597E-02 |
| 1.4952E+02 | -7.8151E-02 | 5.073 | 3.3931E-02 |
| 1.4952E+02 | -7.8155E-02 | 5.074 | 3.3932E-02 |
| 2.0248E+02 | -1.0598E-01 | 6.880 | 3.3978E-02 |
| 2.0248E+02 | -1.0598E-01 | 6.880 | 3.3978E-02 |
| 2.2885E+02 | -1.1977E-01 | 7.775 | 3.3976E-02 |
| 2.2886E+02 | -1.1978E-01 | 7.776 | 3.3976E-02 |
| 2.5546E+02 | -1.3359E-01 | 8.672 | 3.3947E-02 |
| 2.5546E+02 | -1.3359E-01 | 8.672 | 3.3947E-02 |
| 2.8184E+02 | -1.4713E-01 | 9.552 | 3.3891E-02 |
| 2.8184E+02 | -1.4714E-01 | 9.552 | 3.3891E-02 |
| 3.0834E+02 | -1.6053E-01 | 10.421 | 3.3798E-02 |
| 3.0834E+02 | -1.6053E-01 | 10.421 | 3.3799E-02 |
| 3.3480E+02 | -1.7359E-01 | 11.269 | 3.3659E-02 |
| 3.3482E+02 | -1.7359E-01 | 11.269 | 3.3658E-02 |
| 3.6136E+02 | -1.8601E-01 | 12.076 | 3.3417E-02 |
| 3.6144E+02 | -1.8604E-01 | 12.077 | 3.3415E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQD001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 11-Aug-1984 15:32:35.87 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 2.0252E+02 | -1.0582E-01 | 6.870 | 3.3921E-02 |
| 2.0253E+02 | -1.0583E-01 | 6.870 | 3.3921E-02 |
| 2.0255E+02 | -1.0589E-01 | 6.874 | 3.3939E-02 |
| 2.0256E+02 | -1.0590E-01 | 6.875 | 3.3939E-02 |
| 2.0254E+02 | -1.0595E-01 | 6.878 | 3.3958E-02 |
| 2.0256E+02 | -1.0595E-01 | 6.878 | 3.3958E-02 |
| 2.2889E+02 | -1.1974E-01 | 7.773 | 3.3960E-02 |
| 2.2892E+02 | -1.1975E-01 | 7.774 | 3.3960E-02 |
| 2.2893E+02 | -1.1981E-01 | 7.778 | 3.3976E-02 |
| 2.2891E+02 | -1.1981E-01 | 7.778 | 3.3977E-02 |
| 2.2890E+02 | -1.1986E-01 | 7.781 | 3.3994E-02 |
| 2.2891E+02 | -1.1987E-01 | 7.782 | 3.3994E-02 |
| 2.5550E+02 | -1.3367E-01 | 8.678 | 3.3964E-02 |
| 2.5550E+02 | -1.3367E-01 | 8.678 | 3.3964E-02 |
| 2.5549E+02 | -1.3372E-01 | 8.681 | 3.3979E-02 |
| 2.5549E+02 | -1.3373E-01 | 8.681 | 3.3979E-02 |
| 2.5548E+02 | -1.3378E-01 | 8.685 | 3.3994E-02 |
| 2.5550E+02 | -1.3379E-01 | 8.685 | 3.3994E-02 |
| 2.8186E+02 | -1.4733E-01 | 9.564 | 3.3934E-02 |
| 2.8186E+02 | -1.4734E-01 | 9.565 | 3.3935E-02 |
| 2.8185E+02 | -1.4739E-01 | 9.569 | 3.3949E-02 |
| 2.8186E+02 | -1.4740E-01 | 9.569 | 3.3950E-02 |
| 2.8184E+02 | -1.4745E-01 | 9.572 | 3.3964E-02 |
| 2.8186E+02 | -1.4746E-01 | 9.573 | 3.3964E-02 |
| 3.0834E+02 | -1.6086E-01 | 10.443 | 3.3867E-02 |
| 3.0836E+02 | -1.6087E-01 | 10.443 | 3.3867E-02 |
| 3.0834E+02 | -1.6092E-01 | 10.446 | 3.3880E-02 |
| 3.0835E+02 | -1.6093E-01 | 10.447 | 3.3880E-02 |
| 3.0833E+02 | -1.6099E-01 | 10.451 | 3.3896E-02 |
| 3.0835E+02 | -1.6100E-01 | 10.452 | 3.3896E-02 |
| 3.3480E+02 | -1.7406E-01 | 11.299 | 3.3750E-02 |
| 3.3483E+02 | -1.7407E-01 | 11.300 | 3.3750E-02 |
| 3.3481E+02 | -1.7413E-01 | 11.304 | 3.3762E-02 |
| 3.3482E+02 | -1.7413E-01 | 11.304 | 3.3763E-02 |
| 3.3479E+02 | -1.7419E-01 | 11.308 | 3.3776E-02 |
| 3.3482E+02 | -1.7420E-01 | 11.309 | 3.3776E-02 |
| 3.6135E+02 | -1.8663E-01 | 12.116 | 3.3529E-02 |
| 3.6143E+02 | -1.8666E-01 | 12.118 | 3.3527E-02 |
| 3.6136E+02 | -1.8669E-01 | 12.120 | 3.3539E-02 |

3.6139E+02 -1.8671E-01
3.6136E+02 -1.8674E-01
3.6139E+02 -1.8676E-01

12.121 3.3539E-02
12.123 3.3548E-02
12.124 3.3548E-02

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQD001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 11-Aug-1984 15:02:00.74 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3732E+01 | -2.2372E-02 | 1.452 | 3.3209E-02 |
| 4.3728E+01 | -2.2369E-02 | 1.452 | 3.3210E-02 |
| 4.3703E+01 | -2.2357E-02 | 1.451 | 3.3211E-02 |
| 4.3711E+01 | -2.2360E-02 | 1.452 | 3.3209E-02 |
| 4.3714E+01 | -2.2361E-02 | 1.452 | 3.3208E-02 |
| 4.3699E+01 | -2.2354E-02 | 1.451 | 3.3209E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQD002 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 19-Sep-1984 00:46:16.84 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL |
|---|---|
| 1.1985E+02 | -6.2397E-02 |
| 1.1986E+02 | -6.2456E-02 |
| 2.3994E+02 | -1.2651E-01 |
| 2.3994E+02 | -1.2656E-01 |
| 3.5996E+02 | -1.8739E-01 |
| 3.5998E+02 | -1.8745E-01 |
| 4.5492E+02 | -2.2282E-01 |
| 4.5492E+02 | -2.2287E-01 |

| TESLA | TESLA PER AMP |
|---|---|
| 4.051 | 3.3798E-02 |
| 4.055 | 3.3828E-02 |
| 8.213 | 3.4229E-02 |
| 8.216 | 3.4243E-02 |
| 12.165 | 3.3796E-02 |
| 12.169 | 3.3805E-02 |
| 14.465 | 3.1797E-02 |
| 14.468 | 3.1804E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQD002 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 19-Sep-1984 00:33:51.63 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL |
|---|---|
| 1.1981E+02 | -6.2414E-02 |
| 1.1981E+02 | -6.2464E-02 |
| 2.3990E+02 | -1.2651E-01 |
| 2.3992E+02 | -1.2657E-01 |
| 3.5993E+02 | -1.8739E-01 |
| 3.5991E+02 | -1.8744E-01 |
| 4.5486E+02 | -2.2282E-01 |
| 4.5487E+02 | -2.2287E-01 |

| TESLA | TESLA PER AMP |
|---|---|
| 4.052 | 3.3818E-02 |
| 4.055 | 3.3847E-02 |
| 8.213 | 3.4234E-02 |
| 8.217 | 3.4248E-02 |
| 12.165 | 3.3798E-02 |
| 12.168 | 3.3809E-02 |
| 14.465 | 3.1801E-02 |
| 14.468 | 3.1808E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 10-Aug-1984 23:21:07.15 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3732E+01 | -3.5425E-02 | 2.300 | 5.2587E-02 |
| 4.3762E+01 | -3.5448E-02 | 2.301 | 5.2585E-02 |
| 9.6693E+01 | -7.9212E-02 | 5.142 | 5.3182E-02 |
| 9.6697E+01 | -7.9217E-02 | 5.143 | 5.3183E-02 |
| 1.4957E+02 | -1.2371E-01 | 8.031 | 5.3695E-02 |
| 1.4957E+02 | -1.2371E-01 | 8.031 | 5.3696E-02 |
| 2.0252E+02 | -1.6777E-01 | 10.891 | 5.3778E-02 |
| 2.0254E+02 | -1.6778E-01 | 10.892 | 5.3778E-02 |
| 2.2887E+02 | -1.8958E-01 | 12.307 | 5.3774E-02 |
| 2.2889E+02 | -1.8960E-01 | 12.309 | 5.3775E-02 |
| 2.5546E+02 | -2.1146E-01 | 13.727 | 5.3737E-02 |
| 2.5548E+02 | -2.1147E-01 | 13.728 | 5.3736E-02 |
| 2.8184E+02 | -2.3293E-01 | 15.122 | 5.3653E-02 |
| 2.8187E+02 | -2.3296E-01 | 15.123 | 5.3652E-02 |
| 3.0839E+02 | -2.5425E-01 | 16.505 | 5.3522E-02 |
| 3.0841E+02 | -2.5427E-01 | 16.507 | 5.3521E-02 |
| 3.3493E+02 | -2.7514E-01 | 17.862 | 5.3331E-02 |
| 3.3495E+02 | -2.7516E-01 | 17.863 | 5.3330E-02 |
| 3.6156E+02 | -2.9526E-01 | 19.168 | 5.3014E-02 |
| 3.6158E+02 | -2.9528E-01 | 19.169 | 5.3014E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE001 | SQB001 | M | 40 | -1.5404E-2 | 29 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 10-Aug-1984 22:50:39.58 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 4.3696E+01 | -3.5373E-02 | 2.296 | 5.2553E-02 |
| 4.3705E+01 | -3.5382E-02 | 2.297 | 5.2556E-02 |
| 9.6642E+01 | -7.9117E-02 | 5.136 | 5.3146E-02 |
| 9.6658E+01 | -7.9130E-02 | 5.137 | 5.3146E-02 |
| 1.4953E+02 | -1.2358E-01 | 8.023 | 5.3652E-02 |
| 1.4954E+02 | -1.2359E-01 | 8.023 | 5.3652E-02 |
| 2.0249E+02 | -1.6760E-01 | 10.880 | 5.3733E-02 |
| 2.0249E+02 | -1.6760E-01 | 10.880 | 5.3733E-02 |
| 2.2884E+02 | -1.8938E-01 | 12.294 | 5.3725E-02 |
| 2.2884E+02 | -1.8939E-01 | 12.295 | 5.3726E-02 |
| 2.5543E+02 | -2.1123E-01 | 13.713 | 5.3685E-02 |
| 2.5544E+02 | -2.1124E-01 | 13.713 | 5.3685E-02 |
| 2.8180E+02 | -2.3269E-01 | 15.106 | 5.3605E-02 |
| 2.8183E+02 | -2.3271E-01 | 15.107 | 5.3604E-02 |
| 3.0831E+02 | -2.5395E-01 | 16.486 | 5.3471E-02 |
| 3.0832E+02 | -2.5396E-01 | 16.486 | 5.3471E-02 |
| 3.3479E+02 | -2.7478E-01 | 17.838 | 5.3283E-02 |
| 3.3479E+02 | -2.7478E-01 | 17.838 | 5.3282E-02 |
| 3.6134E+02 | -2.9483E-01 | 19.140 | 5.2969E-02 |
| 3.6136E+02 | -2.9484E-01 | 19.141 | 5.2968E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE003 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 18-Sep-1984 04:40:19.19 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 8.4909E+01 | -6.9558E-02 | 4.516 | 5.3182E-02 |
| 8.4921E+01 | -6.9579E-02 | 4.517 | 5.3190E-02 |
| 3.5978E+02 | -2.9393E-01 | 19.082 | 5.3037E-02 |
| 3.5979E+02 | -2.9395E-01 | 19.083 | 5.3038E-02 |
| 3.7984E+02 | -3.0840E-01 | 20.020 | 5.2707E-02 |
| 3.7987E+02 | -3.0842E-01 | 20.022 | 5.2708E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE003 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| D | 15-Sep-1984 20:51:16.33 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 8.4934E+01 | -6.9593E-02 | 4.518 | 5.3193E-02 |
| 8.4935E+01 | -6.9608E-02 | 4.519 | 5.3203E-02 |
| 3.5993E+02 | -2.9419E-01 | 19.099 | 5.3061E-02 |
| 3.5994E+02 | -2.9421E-01 | 19.099 | 5.3062E-02 |
| 3.7987E+02 | -3.0857E-01 | 20.032 | 5.2732E-02 |
| 3.7988E+02 | -3.0859E-01 | 20.033 | 5.2734E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE003 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 18-Sep-1984 04:29:54.66 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 8.4867E+01 | -6.9495E-02 | 4.511 | 5.3159E-02 |
| 8.4860E+01 | -6.9503E-02 | 4.512 | 5.3170E-02 |
| 3.5972E+02 | -2.9376E-01 | 19.070 | 5.3014E-02 |
| 3.5972E+02 | -2.9378E-01 | 19.071 | 5.3017E-02 |
| 3.7978E+02 | -3.0820E-01 | 20.008 | 5.2684E-02 |
| 3.7980E+02 | -3.0822E-01 | 20.009 | 5.2683E-02 |

Excitation Run Results

| FC MAGNET ID | FC REFERENCE MAGNET ID | FC PROBE OPTION | FC TEST COIL | BETA2 | FC REFERENCE COIL |
|---|---|---|---|---|---|
| SQE003 | SQC001 | M | 40 | -1.5404E-2 | 28 |

| FC TEST COIL UPDOWN | FC RUN DATE TIME |
|---|---|
| U | 15-Sep-1984 20:29:30.65 |

| FC REDUCED DEV OR AMPS | FC REDUCED SIGNAL | TESLA | TESLA PER AMP |
|---|---|---|---|
| 8.4957E+01 | -6.9621E-02 | 4.520 | 5.3199E-02 |
| 8.4969E+01 | -6.9642E-02 | 4.521 | 5.3209E-02 |
| 3.5998E+02 | -2.9412E-01 | 19.094 | 5.3040E-02 |
| 3.6003E+02 | -2.9415E-01 | 19.096 | 5.3039E-02 |
| 3.7991E+02 | -3.0847E-01 | 20.025 | 5.2710E-02 |
| 3.7994E+02 | -3.0850E-01 | 20.027 | 5.2711E-02 |