FERMILAB-UPC-165

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Data Base Organization for Physical and Electrical Measurements on Energy Saver dipole magnets

A. Wehmann

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The MTF department has underway a project of entering physical and electrical data for the Energy Saver magnets into Fermilab's Cyber 175 system. This report describes the data for the dipoles, its means of entry, and its organization in the Cyber 175 system. The method of accessing this data is also described.

The data entered into the computer is exhibited in table 1 . Most of this data is recorded manually in the magnet assembly traveller, which is the document that "travels" with the magnet during the assembly steps executed in Industrial Building 1. The traveller outlines all assembly steps that combine together a collared coil, a cryostat, and two steel half yokes. It also accompanies the magnet through leak checking, magnetic measurements, and final inspection. After final inspection the traveller is separated from the magnet and is used to help prepare a data

summary (see Appendix 1) for evaluation by the Saver Calculations group (e.g. Leo Michelotti). The traveller and its summary are then used as a source of data for entry into the Cyber 175 computer system.

The data are entered by an on-line, interactive program named "POST" (Ref. 1). This program facilitates entry of specific data and minimizes mistakes. A separate file is created for each magnet.

The separate files for each magnet must be combined for easy, rapid access to the data. The "RIM" data base system has been chosen to do this (Ref. 2). The organization chosen for the RIM data base is shown in table 2. RIM allows easy access to each subset of magnet data (known as a "relation"). Examples of relation names are "intro", "hipot", "offsets", etc. The relation "commnts" contains all the comments that POST allows one to insert (after any item in the list shown in table 1). RIM has many useful manipulative commands to view and manipulate the "attributes" in the relations. Table 3 shows the data base organization for each relation. Each attribute is explicitly listed by name--together with its type and number of entries. The relations correspond almost one-to-one with the sections in table 1. Obvious contractions have been made, such as combining sections 28 and 29 into the relation

"cldlift". Further explanation is given in the table caption.

The hi-pot data in the relation 'hipot' is taken at room temperature during final inspection. It is taken after the magnet has been removed from the magnet measurement test stand and should not be confused with the hipot data taken while the magnet is on the test stand.

An example of accessing the data by use of a FORTRAN 5 program (named "CZOP") is given in Fig. 1. This program provides us with histograms of the crossover pipe offsets measured during final inspection (by using the package "HBOOK"--Ref. 3).

Similar treatment of the corresponding Energy Saver quadrupole data has been initiated.

References

1. "POST" was written by E. ("Jay") Schmidt.

2. Jeanne Ingebretsen, "User's Guide and Reference to RIM", March, 1982, Fermilab Computer Department.

3. HBOOK writeup, Fermilab Computer Department, December, 1979

Table Captions

1. Table 1 is four pages listing the data file for magnet TC1025. The manual entry data is inserted into columns 51-60 of a pre-existing file. The data are grouped into sections 0 to 29. Each section has internal item numbers. For example, section 3 has 18 items. Columns 2 & 3 have the section number; columns 4 & 5 have the item number. Item 0 of each section gives the descriptive title for the section. Columns 6-50 have descriptive information used to facilitate both data entry and later corrections. Column 1 has either a blank character or a choice of special characters that indicate a special action to be taken by the program "POST". Of these, "C" indicates a value computed by a subroutine triggered by a "T" in an earlier item. The character "@" in column 1 marks an undefined value and "*" marks a comment (none are seen in this file). Columns 61-80 contain limits that can be used by "POST" to issue warnings, if desired.

   In this particular file the cold lifts in sections 28 and 29 were not entered. This file should not make it into the data base until after the cold lifts are inserted.

2. Table 2 shows the relations in the RIM data base "SARA" on the Cyber disk (user number 90609). There are 467 magnets in this data base as of Sept.

19. No read password is necessary to read this data base. This table is generated by the RIM command "LIST".

3. Table 3 shows each relation and its attributes. It gives their names, their type, their length, and tells if they are "keyed". Type "INT" is a number with no decimal point; type "REAL" is a number with a decimal point present. Attributes in common to a number of relaions are "NUMBER" and "NUMB1". These are both the magnet number. "NUMBER" has been "keyed" for faster access to a given row.

The attribute names have a close correspondence to the descriptive listing in Table 1. Appendix 3 has further information. This table is generated by the RIM command "LIST ALL".

Figure Captions

1. Figure 1 is a listing of a program that accesses the data base "SARA" and makes two-dimensional scatter plots of the crossover pipe offsets that are in relation "OFFSETS". Line 31 has been blacked out because it had the "owner" password for the data base. Lines 7, 14, 29, 31, 32 & 35 show usage of the FORTRAN interface to RIM. Not shown is the library call in the job control record that makes this interface accessible. Lines 50, 51, 57, 66-75 have been turned off.

A 0 1MAGNET NAME				TC1025		
D 0 2DATA TRANSCRIPTION DATE				820910		
A 0 3COMPLETED BY (INITIALS)				SG		
A 0 4CRYOSTAT TYPE (A, B, OR C)				C		
T 0 5CHECKING CRYOSTAT TYPE						
100HIPOT IN MICROAMPS (FLUSH WITH N2 BEFORE HIPOT)						
1 1DATE DATA TAKEN (YYMMDD)				820816	790000	840000
1 2L&R HEATER TO GROUND	AT	3.0	KV.	15	0.0	5.0
1 3L&R HEATER TO COIL	AT	5.0	KV.	40	0.0	5.0
1 4BUS TO COIL	AT	5.0	KV.	20	0.0	5.0
1 5BUS TO GROUND	AT	5.0	KV.	10	0.0	5.0
1 6COIL TO GROUND	AT	5.0	KV.	10	0.0	5.0
200RESISTANCE DC IN OHMS						
2 1DATE DATA TAKEN (YYMMDD)				820816	790000	840000
2 2COIL & BUS RESISTANCE				4.774	4.6	4.9
2 3COIL & BUS TEMPERATURE (DEG)				77		
T 204CALCULATE CORRECTED RES.						
C 205COIL & BUS RESISTANCE	AT	75.0	DEG	4.7559		
2 6LEFT HEATER (H-B)				27.	27.65	30.65
2 7RIGHT HEATER (C-D)				29.	27.65	30.65
2 8E-DNST COIL LEAD				.37	0.62	0.95
300MAGNET TEST BOX MEASUREMENTS (AT 1 KHZ, COIL FLOATING)						
3 1DATE DATA TAKEN (YYMMDD)				820816	790000	840000
3 3V2				2.321		
3 4V3				3.580		
3 5V4				2.300		
3 6V5				3.588		
3 7V6				.1572		
3 8V7				.1715		
3 9V8				.0182		
T 310CALCULATE DERIVED QUANTITIES						
C 311L (UNGRD) IN MILLIHENRY				22.40	22.11	22.61
C 312L (GRD) IN MILLIHENRY				22.60		
C 313Q				2.23	2.13	2.27
C 314R (UNGRD) IN OHMS				63.08	62.66	65.26
C 315R (GRD) IN OHMS				64.61		
C 316COIL/CRYO CAPACITANCE (NF)				49.42	46.1	53.7
C 317COIL/BUS CAPACITANCE (NF)				5.17	4.5	5.7
C 318BUS/CRYO CAPACITANCE (NF)				.62	0.45	0.69
400VACUUM (MIN DET LEAK, ATM CC/SEC), ACCEPT LESS THAN 50E-10						
4 1DATE DATA TAKEN (YYMMDD)				820810	790000	840000
4 21 PHASE	AT	30.	PSI	5.63E-10	0.0	50.0E-10
4 32 PHASE	AT	30.	PSI	5.63E-10	0.0	50.0E-10
4 4NITROGEN 2	AT	30.	PSI	5.63E-10	0.0	50.0E-10
4 5VAC SHELL	AT	1.0	ATM	5.63E-10	0.0	50.0E-10
500PHYSICAL DIMENSIONS OF IRON						
5 1DATE DATA TAKEN (YYMMDD)				820816	790000	840000
5 2YOKING DATE (YYMMDD)				820806	790000	840000
5 3FLATNESS-POINT 1 (INCHES)				.020		
5 4FLATNESS-POINT 2				-.005		
5 5FLATNESS-POINT 3				-.005		
5 6FLATNESS-POINT 4				-.005		
5 7FLATNESS-POINT 5				.000		
5 8FLATNESS-POINT 6				-.005		
5 9FLATNESS-POINT 7				.002		
510FLATNESS-POINT 8				.000		
511FLATNESS-POINT 9				.000		
512FLATNESS-POINT 10				.010		
513FLATNESS GAGE READING				.391		
514RADIAL-POINT 1 (INCHES)				-.015		
515RADIAL-POINT 2				.000		

TABLE 1

	516RADIAL-POINT 3	.004		
	517RADIAL-POINT 4	.000		
	518RADIAL-POINT 5	.006		
	519RADIAL-POINT 6	.000		
	520RADIAL-POINT 7	.002		
.	521CALCULATE MAXIMUMS			
C	522FLATNESS, MAX VERTICAL	.023		
C	523RADIAL, MAX EXCURSION	.015		
	600CROSSOVER PIPE OFFSETS			
	6 1DATE DATA TAKEN (YYMMDD)	820816	790000	840000
	6 2N2 UPSTREAM HORIZ. (X)	.000		
	6 3BORE UPSTREAM HORIZ. (X)	.047		
	6 42 PHASE UPSTREAM HORIZ. (X)	.078		
	6 5N2 UPSTREAM VERT. (Y)	.016		
	6 6BORE UPSTREAM VERT. (Y)	.016		
	6 72 PHASE UPSTREAM VERT. (Y)	.000		
	6 8N2 DOWNSTREAM HORIZ. (X)	.047		
	6 9BORE DOWNSTREAM HORIZ. (X)	.063		
	6102 PHASE DOWNSTREAM HORIZ. (X)	.109		
	611N2 DOWNSTREAM VERT. (Y)	.000		
	612BORE DOWNSTREAM VERT. (Y)	-.016		
	6132 PHASE DOWNSTREAM VERT. (Y)	.000		
A	614ADDITIONAL REMARKS	N		
	700MTF LUG SETTING INFORMATION			
	7 1DATE DATA TAKEN (YYMMDD)	820813	790000	840000
	7 2VERTICAL PLANE ANGLE (MR)	-1.7883		
	7 3INITIAL US LUG ANGLE, D1	.5260		
	7 4INITIAL DS LUG ANGLE, F1	.4985		
	7 5FIXTURE CALIBRATION, MO	.4985		
T	706CALCULATE TWIST			
	707TWIST BETWEEN LUG PAIRS (MR)	2.75		
	800QUALITY CONTROL CHECK OF LUG SETTINGS			
	8 1DATE DATA TAKEN (YYMMDD)	820813	790000	840000
	8 2Q.C. D1	.5164		
	8 3Q.C. C1	.4811		
	8 4Q.C. F1	.5164		
	8 5Q.C. E1	.4816		
	8 6US LUG HEIGHT, H2	.0919		
	8 7US LUG HEIGHT, G2	.1060		
	8 8DS LUG HEIGHT, K2	.1115		
	8 9DS LUG HEIGHT, J2	.0846		
	810MICROMETER CALIBRATION, L	.1000		
	900OTHER CHECKS			
	9 1DATE DATA TAKEN (YYMMDD)	820816	790000	840000
A	9 2BELLOWS OR S.S. DAMAGE	N		
A	9 3LEADS/INSULATION SHORT	N		
A	9 4LUGS SET CORRECTLY	Y		
A	9 5COIL TRAVELLER LOCATED	N		
	21 0CRYOSTAT WARM DIAMETER DATA FOR QUADRANTS I & III			
@	21 1DATE DATA TAKEN (YYMMDD)	@	790000	840000
	21 2DIAMETER, STATION 1 (INCHES)	7.4293	7.0000	8.0000
	21 3DIAMETER, STATION 2	7.4311	7.0000	8.0000
	21 4DIAMETER, STATION 3	7.4319	7.0000	8.0000
	21 5DIAMETER, STATION 4	7.4295	7.0000	8.0000
	21 6DIAMETER, STATION 5	7.4289	7.0000	8.0000
	21 7DIAMETER, STATION 6	7.4302	7.0000	8.0000
	21 8DIAMETER, STATION 7	7.4319	7.0000	8.0000
	21 9DIAMETER, STATION 8	7.4317	7.0000	8.0000
	2110DIAMETER, STATION 9	7.4332	7.0000	8.0000
	2111ANCHOR CORRECTION FACTOR	.000		
	22 0CRYOSTAT WARM DIAMETER DATA FOR QUADRANTS II & IV			
@	22 1DATE DATA TAKEN (YYMMDD)	@	790000	840000

TABLE 1

22 2DIAMETER, STATION 1 (INCHES)		7.4376	7.0000	8.000
22 3DIAMETER, STATION 2		7.4375	7.0000	8.000
22 4DIAMETER, STATION 3		7.4279	7.0000	8.000
22 5DIAMETER, STATION 4		7.4265	7.0000	8.000
22 6DIAMETER, STATION 5		7.4214	7.0000	8.00
22 7DIAMETER, STATION 6		7.4295	7.0000	8.0
22 8DIAMETER, STATION 7		7.4319	7.0000	8.000
22 9DIAMETER, STATION 8		7.4334	7.0000	8.000
2210DIAMETER, STATION 9		7.4273	7.0000	8.000
2211ANCHOR CORRECTION FACTOR		.000		
23 0YOKE RADIUS DATA SHEET, QUADRANT III				
23 1DATE DATA TAKEN (YYMMDD)		820809	790000	840000
23 2RADIUS, STATION 1 (INCHES)		3.826	3.5000	4.000
23 3RADIUS, STATION 2		3.806	3.5000	4.000
23 4RADIUS, STATION 3		3.819	3.5000	4.000
23 5RADIUS, STATION 4		3.822	3.5000	4.000
23 6RADIUS, STATION 5		3.832	3.5000	4.0000
23 7RADIUS, STATION 6		3.819	3.5000	4.000
23 8RADIUS, STATION 7		3.821	3.5000	4.000
23 9RADIUS, STATION 8		3.8155	3.5000	4.000
2310RADIUS, STATION 9		3.7785	3.5000	4.000
24 0ROOM TEMPERATURE SHIM DATA (IN MILS) FOR QUAD III				
24 1DATE DATA TAKEN (YYMMDD)		820730	790000	840000
24 2QUAD III DESIRED		14.0	-200.	+200.
24 3QUAD III USED		14.	-200.	+200.
T24 4COMPUTING SOME CHECK VALUES FOR QUAD III				
C24 5MAX POS SHIM (X ANCHOR)		.021		
C24 6MAX POS SHIM FOR ANCHOR		.029		
C24 7MAX NEG SHIM (X ANCHOR)		-.045		
C24 8MAX NEG SHIM FOR ANCHOR		-.043		
25 0YOKE RADIUS DATA SHEET, QUADRANT IV				
25 1DATE DATA TAKEN (YYMMDD)		820809	790000	840
25 2RADIUS, STATION 1 (INCHES)		3.813	3.5000	4.0000
25 3RADIUS, STATION 2		3.8225	3.5000	4.0000
25 4RADIUS, STATION 3		3.821	3.5000	4.0000
25 5RADIUS, STATION 4		3.822	3.5000	4.0000
25 6RADIUS, STATION 5		3.833	3.5000	4.0000
25 7RADIUS, STATION 6		3.8815	3.5000	4.0000
25 8RADIUS, STATION 7		3.817	3.5000	4.0000
25 9RADIUS, STATION 8		3.835	3.5000	4.0000
2510RADIUS, STATION 9		3.8185	3.5000	4.0000
26 0ROOM TEMPERATURE SHIM DATA (IN MILS) FOR QUAD IV				
26 1DATE DATA TAKEN (YYMMDD)		820730	790000	840000
26 2QUAD IV DESIRED		26.0	-200.	+200.
26 3QUAD IV USED		19.	-200.	+200.
T26 4COMPUTING SOME CHECK VALUES FOR QUAD IV				
C26 5MAX POS SHIM (X ANCHOR)		.019		
C26 6MAX POS SHIM FOR ANCHOR		.032		
C26 7MAX NEG SHIM (X ANCHOR)		-.043		
C26 8MAX NEG SHIM FOR ANCHOR		-.046		
27 0COLD RESHIM DATA (IN MILS)				
@27 1DATE DATA TAKEN (YYMMDD)		@	790000	840000
27 2QUAD III DESIRED		-6.8	-200.	+200.
27 3QUAD III USED		-7.	-200.	+200.
27 4QUAD IV DESIRED		-21.8	-200.	+200.
27 5QUAD IV USED		-22.	-200.	+200.
28 0COLD LIFT AFTER RESHIMMING FOR QUADRANT I				
28 2STATION 1 (INCHES)			1.500	1.
28 3STATION 2			1.500	1.750
28 4STATION 3			1.500	1.750
28 5STATION 4			1.500	1.750
28 6STATION 5				

TABLE 1

3 7	STATION 6	1.500	1.750
3 8	STATION 7	1.500	1.750
28 9	STATION 8	1.500	1.750
2810	STATION 9	1.500	1.750
29 0	COLD LIFT AFTER RESHIMMING FOR QUADRANT II		
29 2	STATION 1 (INCHES)	1.500	1.750
29 3	STATION 2	1.500	1.750
29 4	STATION 3	1.500	1.750
29 5	STATION 4	1.500	1.750
29 6	STATION 5		
29 7	STATION 6	1.500	1.750
29 8	STATION 7	1.500	1.750
29 9	STATION 8	1.500	1.750
2910	STATION 9	1.500	1.750

TABLE 1

EXISTING RELATIONS AS OF 82/10/04 13.39.58

RELATION NAME	RPW	MPW	MODIFY DATE	NO. ATTRIBUTES	NO. ROWS
INTRO	NONE	YES	82/09/19	7	467
HIPOT	NONE	YES	82/09/19	4	467
ELEC	NONE	YES	82/09/19	9	467
BLBOX	NONE	YES	82/09/19	12	467
LKCK	NONE	YES	82/09/19	7	467
IRON	NONE	YES	82/09/19	24	467
OFFSETS	NONE	YES	82/09/19	18	467
INSTALL	NONE	YES	82/09/19	8	467
CCCK	NONE	YES	82/09/19	12	467
OTHOKS	NONE	YES	82/09/19	7	467
CYDIA	NONE	YES	82/09/19	7	467
YOKERAD	NONE	YES	82/09/19	5	467
WHSHIM	NONE	YES	82/09/19	17	467
RESHIM	NONE	YES	82/09/19	7	467
CLDLIFT	NONE	YES	82/09/19	21	467
COMMNTS	NONE	YES	82/09/19	5	339

TABLE 2

RELATION INTRO

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
NAME	TEXT	6 CHARACTERS	
DADATE	INT	1	
CRDATE	INT	1	
MODDATE	INT	1	
INITIAL	TEXT	3 CHARACTERS	
CRYTYPE	TEXT	1 CHARACTERS	

CURRENT NUMBER OF ROWS = 467

RELATION : HIPOT

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADH	INT	1	
HDATE	INT	1	
CURRENT	REAL	5	

CURRENT NUMBER OF ROWS = 467

RELATION : ELEC

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADE	INT	1	
EDATE	INT	1	
RES7X	REAL	1	
TEMP	REAL	1	
RES75	REAL	1	
LHRES	REAL	1	
RHRES	REAL	1	
ETOCOIL	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : BLBOX

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADB	INT	1	
BDATE	INT	1	
RAWVOLT	REAL	7	
LUNGD	REAL	1	
LGD	REAL	1	
Q	REAL	1	
RUNGD	REAL	1	
RGD	REAL	1	
COILCRYO	REAL	1	
COILBUS	REAL	1	
BUSCRYO	REAL	1	

CURRENT NUMBER OF ROWS = 467

TABLE 3

RELATION : LKCK

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADL	INT	1	
LDATE	INT	1	
PH1	REAL	1	
PH2	REAL	1	
LN2	REAL	1	
INSVAC	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : IRON

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADI	INT	1	
IDATE	INT	1	
YDATE	INT	1	
FLAT1	REAL	1	
FLAT2	REAL	1	
FLAT3	REAL	1	
FLAT4	REAL	1	
FLAT5	REAL	1	
FLAT6	REAL	1	
FLAT7	REAL	1	
FLAT8	REAL	1	
FLAT9	REAL	1	
FLAT10	REAL	1	
GAGE	REAL	1	
SAG1	REAL	1	
SAG2	REAL	1	
SAG3	REAL	1	
SAG4	REAL	1	
SAG5	REAL	1	
SAG6	REAL	1	
SAG7	REAL	1	
FLATMX	REAL	1	
SAGMAX	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : OFFSETS

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADO	INT	1	
ODATE	INT	1	
USLNX	REAL	1	
USBTX	REAL	1	
US2PX	REAL	1	
USLNY	REAL	1	
USBTY	REAL	1	
US2PY	REAL	1	
DSLNX	REAL	1	
DSBTX	REAL	1	
DS2PX	REAL	1	
DSLNY	REAL	1	
DSBTY	REAL	1	
DS2PY	REAL	1	
USRSBNT	TEXT	3 CHARACTERS	
DSN2BNT	TEXT	3 CHARACTERS	
REMARK	TEXT	10 CHARACTERS	

CURRENT NUMBER OF ROWS = 467

TABLE 3 (cont.)

RELATION : INSTALL

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADIN	INT	1	
INDATE	INT	1	
ANG	REAL	1	
USD1	REAL	1	
DSF1	REAL	1	
MO	REAL	1	
TWIST	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : QCCK

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADQ	INT	1	
INDATE	INT	1	
ANGLE1	REAL	1	
ANGLE2	REAL	1	
ANGLE3	REAL	1	
ANGLE4	REAL	1	
HEIGHT1	REAL	1	
HEIGHT2	REAL	1	
HEIGHT3	REAL	1	
HEIGHT4	REAL	1	
L	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : OTHCKS

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADOT	INT	1	
OTDATE	INT	1	
DELDAM	TEXT	10 CHARACTERS	
LEDSHT	TEXT	10 CHARACTERS	
LUGSOK	TEXT	10 CHARACTERS	
COILTRAV	TEXT	10 CHARACTERS	

CURRENT NUMBER OF ROWS = 467

RELATION : CYDIA

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADC	INT	1	
DIDAT	INT	1	
D13	REAL	9	
ANCRF13	REAL	1	
D24	REAL	9	
ANCRF24	REAL	1	

CURRENT NUMBER OF ROWS = 467

TABLE 3 (cont.)

RELATION : YOKERAD

LAST MOD : 82/09/19 — READ PASSWORD : NONE
SCHEMA : SARA — MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADY	INT	1	
YRDAT	INT	1	
RAD3	REAL	9	
RAD4	REAL	9	

CURRENT NUMBER OF ROWS = 467

RELATION : WMSHIM

LAST MOD : 82/09/19 — READ PASSWORD : NONE
SCHEMA : SARA — MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADW	INT	1	
WSHDAT	INT	1	
DES3	REAL	1	
USD3	REAL	1	
DES4	REAL	1	
USD4	REAL	1	
LIM3A	REAL	1	
LIM3B	REAL	1	
LIM3C	REAL	1	
LIM3D	REAL	1	
LIM4A	REAL	1	
LIM4B	REAL	1	
LIM4C	REAL	1	
LIM4D	REAL	1	
SHAGREE1	TEXT	10 CHARACTERS	
SHAGREE2	TEXT	10 CHARACTERS	

CURRENT NUMBER OF ROWS = 467

RELATION : RESHIM

LAST MOD : 82/09/19 — READ PASSWORD : NONE
SCHEMA : SARA — MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADR	INT	1	
RSHDAT	INT	1	
RDES3	REAL	1	
RUSD3	REAL	1	
RDES4	REAL	1	
RUSD4	REAL	1	

CURRENT NUMBER OF ROWS = 467

TABLE 3 (cont.)

RELATION : CLDLIFT

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMB1	INT	1	
DADCO	INT	1	
RSHDAT	INT	1	
CLA1	REAL	1	
CLA2	REAL	1	
CLA3	REAL	1	
CLA4	REAL	1	
CLA5	REAL	1	
CLA6	REAL	1	
CLA7	REAL	1	
CLA8	REAL	1	
CLA9	REAL	1	
CLB1	REAL	1	
CLB2	REAL	1	
CLB3	REAL	1	
CLB4	REAL	1	
CLB5	REAL	1	
CLB6	REAL	1	
CLB7	REAL	1	
CLB8	REAL	1	
CLB9	REAL	1	

CURRENT NUMBER OF ROWS = 467

RELATION : COMMNTS

LAST MOD : 82/09/19 READ PASSWORD : NONE
SCHEMA : SARA MODIFY PASSWORD : YES

NAME	TYPE	LENGTH	KEY
NUMBER	INT	1	YES
DADCM	INT	1	
ISEC	INT	1	
ITEM	INT	1	
COMS	TEXT	80 CHARACTERS	

CURRENT NUMBER OF ROWS = 339

TABLE 3 (cont.)

```
 1        PROGRAM CZOP(OUTPUT,TAPE6=OUTPUT)
 2 C
 3 C   PROGRAM TO GET DATA FROM A 'RIM' DATA BASE WITH
 4 C      DIPOLE TRAVELER INFORMATION AND MAKE SCATTER
 5 C      PLOTS OF THE DIPOLE CROSSOVER PIPE OFFSETS
 6 C
 7        INTEGER RMSTAT
 8        DIMENSION OFFSET(25),US(6),DS(6),TIT(6),GENTIT(5)
 9       +  ,WMSHIM(15),KSHIM(15),IOFF(24)
10        EQUIVALENCE (OFFSET(4),US(1) ),(OFFSET(10),DS(1) )
11       + ,(OFFSET(1),WMSHIM(1),KSHIM(1),IOFF(1) ),
12       + (OFFSET(22),REM)
13        CHARACTER A*80
14        COMMON //HIEMOR(2000),/RIMCOM/RMSTAT
15        DATA TIT/7HUS LN2$,8HUS BORE$,7HUS 2PH$,
16       + 7HDS LN2$,8HDS BORE$,7HDS 2PH$/
17        DATA GENTIT/10HDIPOLE CRO,10HSSOVER PIP,10HE OFFSETS ,
18       + 10H           ,0./
19 C
20   108  FORMAT (1X,4A10)
21        CALL HOUTPU(6)
22        CALL HTITLE (GENTIT)
23 C

24        DO 10 I=1,6
25        CALL HBOOK2(I,TIT(I),40,-.20,.20,40,-.20,.20,31.)
26 C   NOTE THAT LAST ARGUMENT WANTS A DECIMAL POINT
27   10   CONTINUE
28 C
29        CALL RMOPEN(4HSARA)
30 C      WRITE (6,105) RMSTAT
31        CALL RMUSER(5H[redacted]
32        CALL RMFIND(0,7HOFFSETS)
33 C   LOOP & GET OFFSETS
34        DO 400 J=1,1000
35        CALL RMGET(0,OFFSET)
36        IF (RMSTAT.EQ.-1) GO TO 800
37           IF (RMSTAT.NE.0) THEN
38 C         WRITE (6,105) RMSTAT
39   105     FORMAT (' RMSTAT=',I6)
40           STOP 1
41           ENDIF
42 C      WRITE (6,101) (IOFF(I),I=1,3),(OFFSET(K),K=4,15)
43 C101   FORMAT (I5,2I8,12F7.3)
44 C      WRITE (6,102) (OFFSET(K),K=16,25)
45 C102   FORMAT (1X,10A11)
46 C

47        DO 300 I=1,3
48        X=US(I)
49        Y=US(I+3)
50 C      WRITE (6,103) IOFF(1),I,X,Y
51 C103   FORMAT (1X,2I5,2F10.3)
52   300  CALL HFILL(I,X,Y,1)
53 C
54        DO 350 I=4,6
55        X=DS(I-3)
56        Y=DS(I)
57 C      WRITE (6,103) IOFF(1),I,X,Y
58        CALL HFILL(I,X,Y,1)
```

Figure 1

```
 350  CONTINUE
 400  CONTINUE
C  END OF LOOP
C
      STOP 2
 800  CONTINUE
      CALL HISTDO
C     WRITE (6,106) J
C106  FORMAT (' NUMBER OF ENTRIES IN SCATTER PLOTS=',I6)
C  CHECK ON WMSHIM VALUES, EXP. -4.000-4 SEEN IN RIM OUTPUT
C     CALL RMFIND(1,6HWMSHIM)

C     DO 600 I=1,5
C     CALL RMGET(1,WMSHIM)
C     WRITE (6,105)RMSTAT
C     WRITE (6,107) (KSHIM(J),J=1,3),(WMSHIM(J),J=4,15)
C107  FORMAT (I5,2I8,4E10.3/4E10.3,5X,4E10.3)
C600  CONTINUE
      STOP
      END
```

APPENDIX I

SAMPLE

DIPOLE

SUMMARY

(INSPECTION PART ONLY)

Form Revised 2-17-82

AFTER MTF

DIPOLE

MAGNET NO. TC-1025

DATE 8-20-82

Date of last rework, if any: None

I. Electrical Measurements Date of Meas 8-16-82

A. HiPot (flush with N_2 before HiPot) Accept < 5 μA

L & R Heater to Ground	.15	μA (3 kV)
L & R Heater to Coil	.40	μA (5 kV)
Bus to Coil	.20	μA (5 kV)
Bus to Ground	.10	μA (5 kV)
Coil to Ground	.10	μA (5 kV)

B. DC Resistances

		Accept
Coil & Bus	4.8 ohms at 75 °F	4.6 - 4.9
Left Heater (H-B)	27. ohms	26 - 32
Right Heater (C-D)	29. ohms	26 - 32
E-Dnst coil lead	.37 ohms	

C. MAGNET TEST BOX MEASUREMENTS (at 1 Khz, coil floating)

2.321	3.550	2.300	3.588	.1572	.1715	.0182
(V2)	(V3)	(V4)	(V5)	(V6)	(V7)	(V8)

L = 22.40 / 22.11-22.61 mH Q = 2.23 / 2.13-2.27 R = 63.08 / 62.66-65.26 ohms

Capacitances:

coil/cryos = 49.4 / 46.1-53.7 nF coil/bus = 5.2 / 4.5-5.7 nf bus/cryost = .62 / .45-.69 nF

MAGNET NO. TC°-1025

DIPOLE DATE 8-20-82

II. Vacuum Integrity Date of Meas 8-10-82

Insulating Vac.	Pressure	Min Det Leak (atm cc/sec) accept $<50\times10^{-10}$
10	30 psia	5.63×10^{-10}
20	30 psia	5.63×10^{-10}
N_2	30 psia	5.63×10^{-10}

III. Physical Dimensions of Yoke Date of Meas 8-16-82

A. Flatness (y_i)

D.S. 1	2	3	4	5	6	7	8	9	10 U.S.
+.020	-.005	-.005	-.005	.000	-.005	+.002	.000	.000	+.010

Reading on calibration gage .391

Max $| y_i - (y_3 + y_8) \div 2 |$ = +.015 Accept <.040

B. Radial (x_i)

D.S. 1	2	3	4	5	6	7 U.S.
-.015	000	+.004	.000	+.006	.000	+.002

Max $| x_i |$ = -.015 Accept <.040

C. Twist

Angular twist of magnet between lug pairs +2.6240 Accept < ± 2 mr

MAGNET NO. TC-1025

DIPOLE DATE 8-20-82

IV. Crossover Pipe Offsets Date of Meas 8-16-82

	Upstream		Downstream		Accept
x-N_2	0		+7/64	+3/64	- 1/16≤ x ≤ 1/16
x-Bore	+3/64		+2/32		- 1/64≤ x ≤ 5/64
x-20	+5/64		+7/64		- 1/16≤ x ≤ 3/32
y-N_2	+1/64		0	0	- 1/16≤ y ≤ 1/16
y-Bore	+1/64		-1/64		- 3/64≤ y ≤ 3/64
y-20	0 (after bending)		0	(after bending)	- 1/16≤ y ≤ 1/16

Remarks:

Sealing surface or bellows damage: None

Lug setting: ok

Condition of leads & Insulation: ok

Other:

Holds over-ridden

Description	Person over-riding

Coil traveller located for above? Yes ____ No ✓

MAGNET NO. TC-1025

DIPOLE DATE 8-20-82

This page principally for internal MTF use

Coil & bus resistance before temperature correction 4.774

Coil & bus temperature 77

Yoking date 8-6-82

Cryostat Type: A

MTF Lug Setting Information Date of Meas 8-13-82

Vertical Plane Angle (mr) -1.7883

Initial US Lug Angle, outer side, D1 .5260

Initial DS Lug Angle, outer side, F1 .4985

Fixture Calibration M_0 .4985

QC Check of Lugs

Lug Angles

		outer			
U.S.	M .5164		P .5164		D.S.
	L .4811		N .4816		
		inner			

Lug Heights

		outer			
U.S.	H .0919		K .1115		D.S.
	G .1060		J .0846		
		inner			

Micrometer Calibration: .1000

Initials of Preparer of Summary Sheet ~~JLS~~

Appendix 2

RIM Pitfalls

In this appendix I note some problems I had as a neophyte user of RIM. One set of problems occurred when I tried to prepare input data for RIM without use of the FORTRAN interface. I prepared rows of data for direct entry into a RIM data base and then used the "INPUT" command to read in the file I had prepared. My experience was that the error messages RIM supplies when there is trouble were really meant for row-by-row interactive entry of data; when loading from a file the error message gives no information about which row of data was the offender. I found it necessary to use the FORTRAN interface in order to get more useful error information.

A second set of problems occurred because of my misunderstanding of the "vector-like" attributes. An example would be an attribute declared as "name real 6". This corresponds to six numbers referred to by one name. If it happens that this attribute is undefined for a particular magnet, all six numbers are regarded as undefined and the RIM convention is to mark the attribute as null with a single entry of "-0-". Just as it is impossible to mark the second number of the six as undefined by itself, it is impossible to perform comparison tests on the second number of the six by itself (using the "WHERE" clause). I found it necessary to change the RIM "schema" and use six names instead of one. The RIM "unload" feature seemed the obvious way to change such attributes, but the pitfall in that case was that the six values were unloaded inside a pair of parentheses. It was impossible to reload after changing from "name real 6" to "naml real", "nam2 real", etc. without removing the parentheses. Again the style of the RIM error messages made difficult the process of discovering exactly what was the trouble during the unload, change, & reload sequence.

Appendix 3

I. Built-in Changes

The structure of the data base "SARA" has been arranged to anticipate a few changes to the input magnet files. In the relation "OFFSETS", attributes "USN2BNT" and "DSN2BNT" are currently undefined. Section 6 in table 1 is to be modified to supply a "yes" or "no" answer to the question of whether or not the nitrogen pipe had to be bend to correct its offset to an acceptable value. In the relation "WMSHIM", attributes "SHAGREE1" and "SHAGREE2" are currently undefined. Sections 24 and 26 in table 1 are to be modified at item #4 so as to ask whether or not the computed shim values for each of the nine stations along the magnet agree well with the values recorded in the magnet traveller (currently it is to be assumed that they did, since the traveller is set aside for review if they don't).

II. Note on dates

In the relation "INTRO" the attribute "DADATE" is the date that the program "POST" automatically enters as item 2, section 0 when it gets past item 1, section 0. Attribute "CRDATE" is the creation date of the magnet data file and "MODDATE" is the date of its most recent modification before its placemment in the RIM data base. Both "CRDATE" and "MODDATE" comme from the dates given by the Cyber commmand "CATLIST".

In all the relations except "IRON" and "INTRO" there are two dates. The first is a replica of "DADATE" and is meant to be modified if that row of the relation is changed. The second is the date that the data was recorded on the traveller data sheet. "IRON" contains an additional date which is the date of yoking the magnet.

It will be noted in Table 1 that each section has a date. This provides more possibilities for recording a date than dates exist in the traveller, so often the date is entered in the magnet data

file as unknown. As an example, the final electrical inspection data are taken at one time--yet end up in sections 1,2, & 3. Undefined dates are entered into the "SARA" data base as replicas of "DADATE", preceded by a minus sign.