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Report on SNS Magnet Database

S. Sathe

April 2000

Collider Accelerator Department

Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

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BNL/SNS TECHNICAL NOTE

NO. 074

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COLLIDER-ACCELERATOR DEPARTMENT
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973

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1.Introduction

Magnet Database for SNS is modeled after the work done on the LHC project which is a multi lab collaboration (CERN, FNAL, BNL, KEK). Jie Wei presented the LHC Magnet database model at the Application-Database workshop held at ORNL in Oct 99. It was agreed at this workshop that SNS Magnet Database would be designed based on this system.

2. Magnet Database Functionality

The Magnet and Survey Database of the Spallation Neutron Source (SNS) Ring is designed for production-magnet quality assurance, field and alignment error impact analysis, multi-element assembly assistance, and ring installation assistance. The database consists of tables designed to store magnet field property and field quality measurement data, alignment measurements data, quality assurance checklists, and installation information. As part of the controls system, this database will be integrated with EPICS database to play an essential role in future machine commissioning and operations. The database structure can be extended to include magnet data from Linac, HEBT and RTBT. Magnet Database has been designed based on the requirements from Magnet Measurement group, physicists responsible for the Ring, RTBT and HEBT and Survey group.

3. Magnet Database Design and Usage

Magnet and Survey database has been designed using Oracle Designer tool and to be implemented in the Oracle Server. The database usage procedure has been described using Oracle Designer Process diagram. Using Designer tool, the Entity Relationship Diagram (ERD) representing the conceptual design has been drawn. The diagrammatic representation of the physical design is then generated based on this ERD. The physical design is used to create the table definitions, constraint definitions etc.

The magnet group receives the magnets from the companies that make the magnets. After receiving the magnets magnet group members record the magnet information in the database. Magnet group assembles the magnets if required and then makes measurements on them. This data is also recorded in the database.

A physicist is responsible for a set of magnets used in the Ring, Linac or Transfer lines. They provide the installation instructions to the magnet installers. Physicists record these instructions in this database. They are also responsible for making sure that various aspects of the magnets such as electrical, cog engineering, survey etc. are performed and are OK. After various tests are over, the physicists fill in the "check off" list for the respective magnets or for an assembly. These check off list tables are provided in the Magnet database. Physicists record the comments for each of the magnets or an assembly at various times in the process of testing. Survey group is responsible for surveying the magnets and recording the fiducial positions from the optical survey. This magnet survey data is recorded in this Magnet database.

4. Process Diagram

The process diagram (refer to the process diagram) helps in understanding who is responsible for what processes. It also describes which process saves information in the database. The process diagram in general gives the highest-level overview of the magnet database usage.

5. Entity Relationship Diagram (ERD)

ERD (refer to the ERD diagram) is drawn to conceptualize the database design of the Magnet Database. Main entities taking part in the design are identified and their attributes are well defined and documented. The relationship between the entities is also identified and drawn. Following is the ERD for Magnet database.

6. Entity and Attribute Description

A report describing each of the entities in the ERD diagram (Refer to the System Glossary Report) and the attributes for each of the entities (Refer to the 'Entities and Attributes' Report) is generated. The Table definitions for the Database (Refer to Table Definition Report) are also created.

7. Status

SNS Magnet database design is now ready for implementation. As part of the implementation stage, we will start creating tables in the database. Most of the data entry is expected to be in a bulk format, however some software to provide form interface will have to be implemented. Various data reporting mechanisms will have to be implemented as needed.

Fig. 1: Process Diagram:

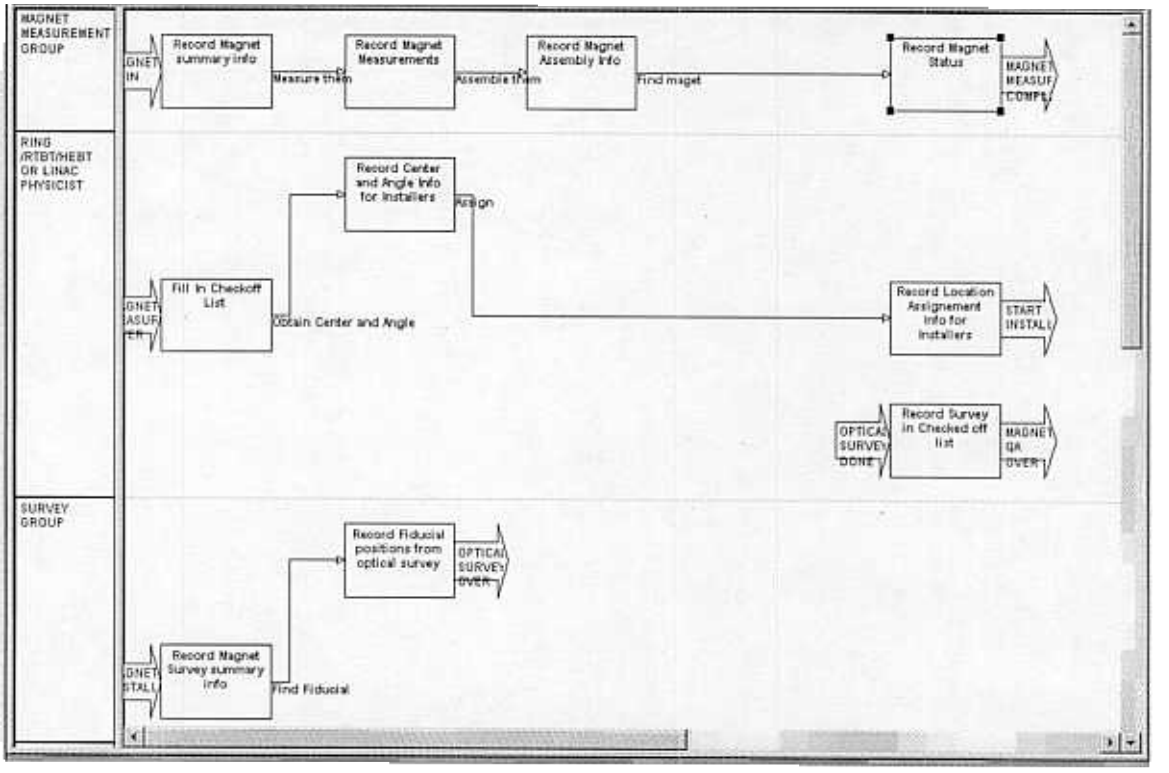
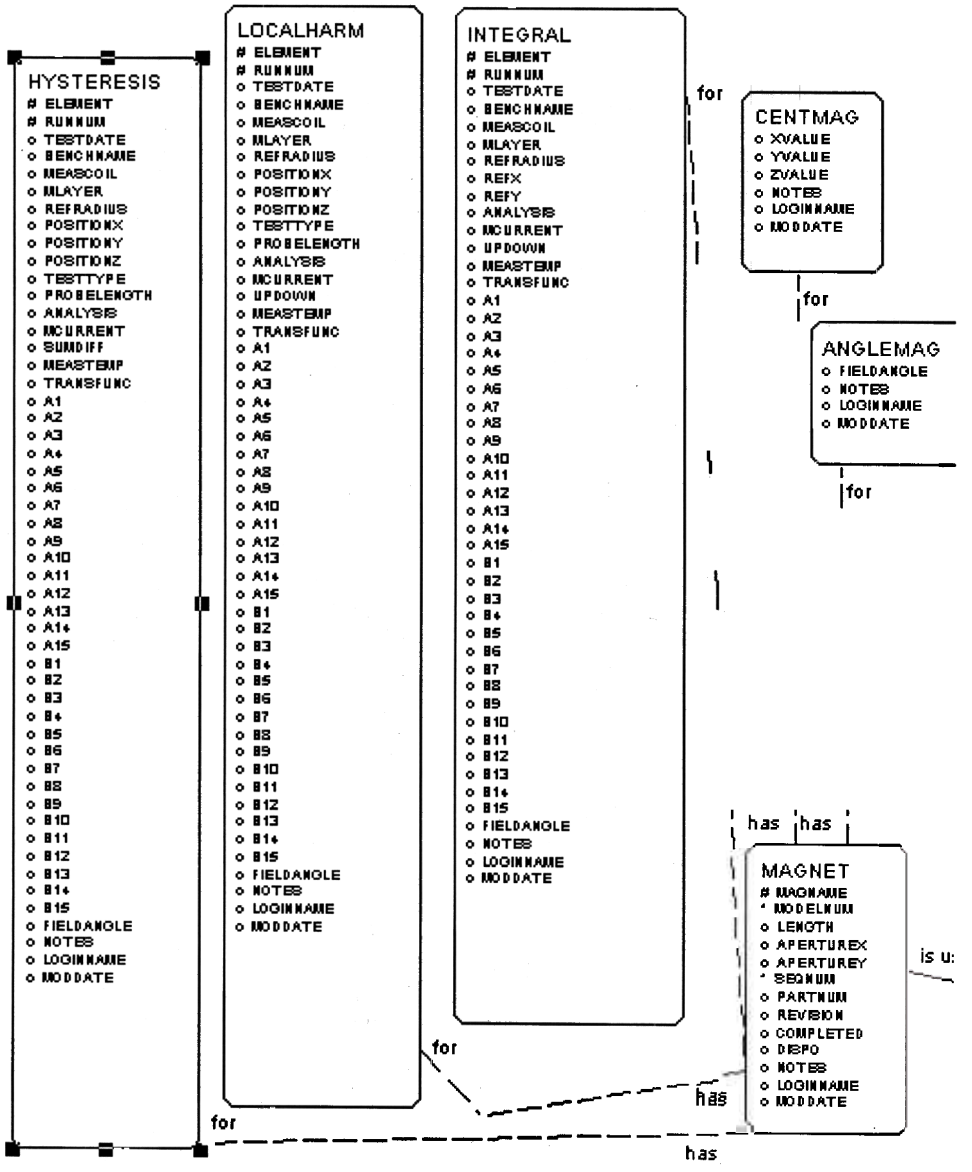
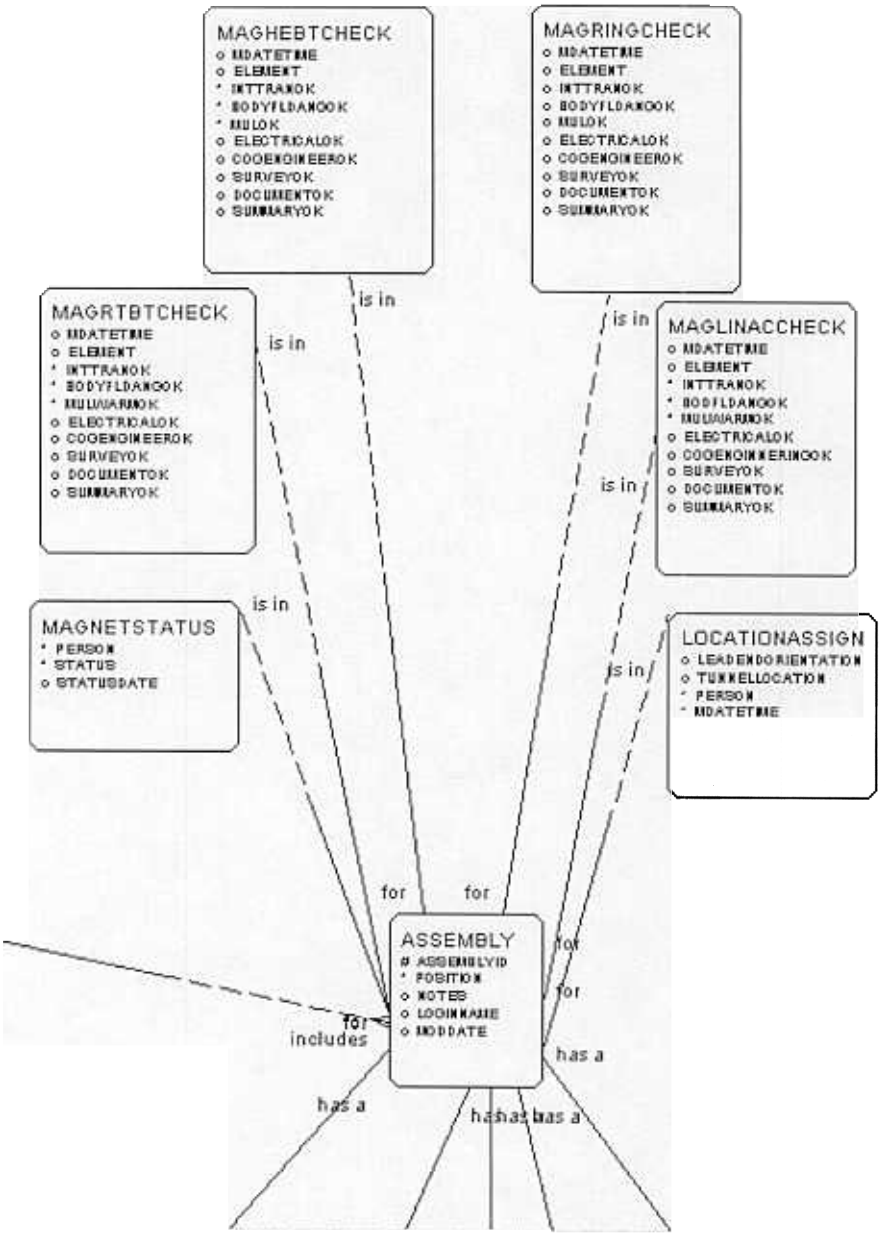


Fig. 2 : Entity Relationship Diagram




MAGHEBTCHECK
MAGRINGCHECK
MAGRTBTCHECK
MAGLINACCHECK
MAGNETSTATUS
LOCATIONASSIGN
ASSEMBLY
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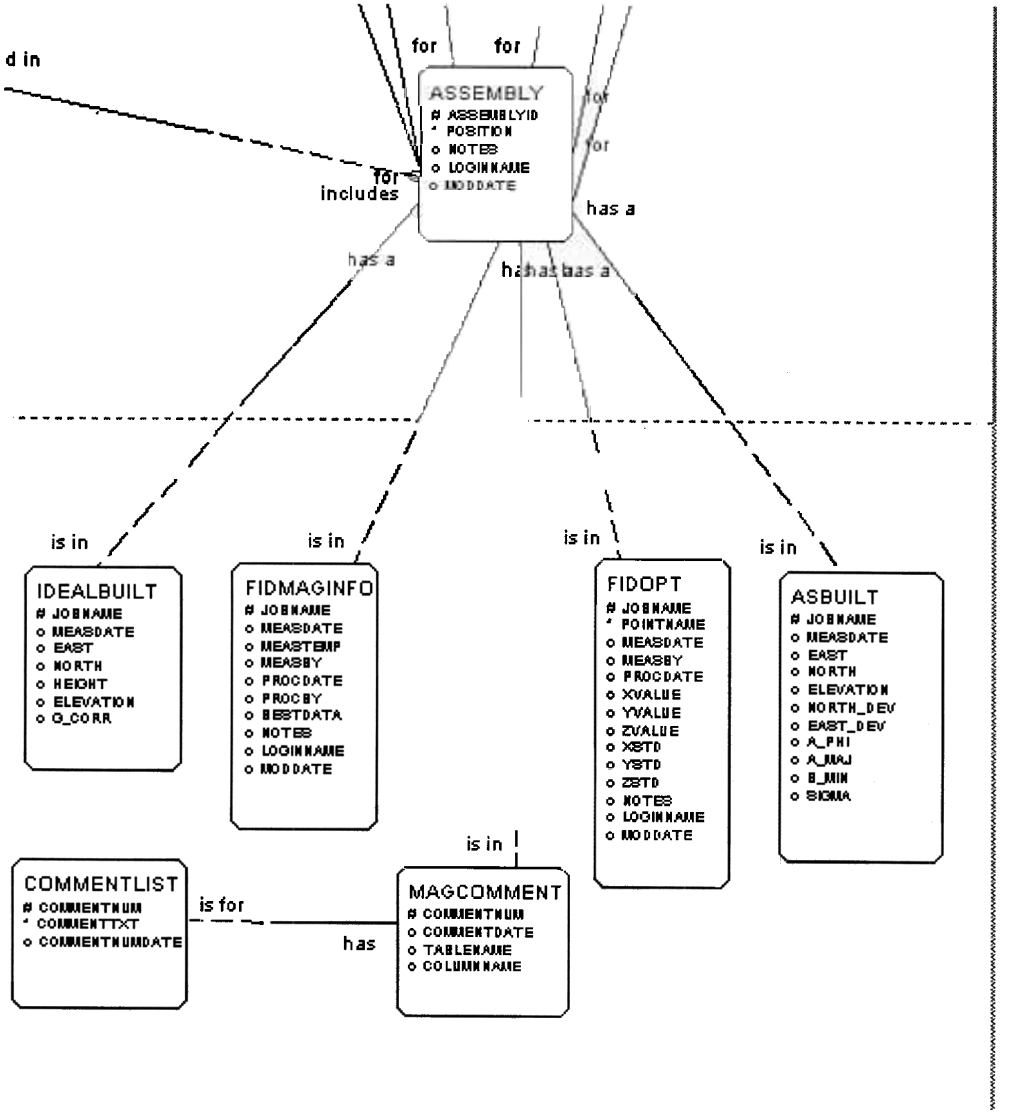
for
includes
has a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o MEASDATE
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o NORTH
o HEIGHT
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o G_CORR
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JOBNAME
o MEASDATE
o MEASTEMP
o MEASBY
o PROCDATE
o PROCBY
o BESTDATA
o NOTES
o LOGINNAME
o MODDATE
FIDOPT
JOBNAME
* POINTNAME
o MEASDATE
o MEASBY
o PROCDATE
o XVALUE
o YVALUE
o ZVALUE
o XSTD
o YSTD
o ZSTD
o NOTES
o LOGINNAME
o MODDATE
ASBUILT
JOBNAME
o MEASDATE
o EAST
o NORTH
o ELEVATION
o NORTH_DEV
o EAST_DEV
o A_PHI
o A_MAJ
o B_MIN
o SIGMA
is in
COMMENTLIST
COMMENTNUM
* COMMENTTXT
o COMMENTNUMDATE
is for
has
MAGCOMMENT
COMMENTNUM
o COMMENTDATE
o TABLENAME
o COLUMNNAME

Designer/2000

Report : SYSTEM GLOSSARY

Filename D:\designReports\MagSys2.pdf

Run by DES

Report Date : 07-APR-00 10:26am

Total Pages 3

Parameter Values

Application System : MAGNET
Version : 1
Include Short Names ? Yes
Inlcude Terms ? : Yes

Entities/terms Created

On/After :
On/Before : 07-APR-00

and

Entities/terms Changed

On/After :
On/Before : 07-APR-00

Type	Name	Description
Entity	ANGLEMAG (ANG)	Magnet field angle relative to external reference. Physicist fills out this table to give instructions to the installer
	ASBUILT (ASBUILT)	actual surveyed magnet fiducial position in global coordinates
	ASSEMBLY (ASS)	Combined element assembly information. Magnet measurement group fills out this table.
	ASSMAG (ASSMAG)	Contains the Assemblies or Magnets
	CENTMAG (CEN)	Magnet center relative to external reference. Physicist fills out this table to give instructions to the installer
	COMMENTLIST (COM)	Contents of the comments
	FIDMAGINFO (FID)	Summary of magnet survey data; flaging best data. Survey group fills out this table.
	FIDOPT (FID1	Fiducial positions from optical survey Survey group fills out this table.
	HYSTERESIS (HYS)	magnetization multipoles. Magnet measurement group fills out this table.
	IDEALBUILT (IBUILT)	Ideal magnet fiducial position in global coordinates
	INTEGRAL (INT)	Integral field strength and geometric multipoles. Magnet measurement group fills out this table.
	LOCALHARM (LOC)	Multipoles measured at one position. Magnet measurement group fills out this table.
	LOCATIONASS (LOCASS)	Name Location of assigned Magnet/Assembly
	MAGCOMMENT (MAG1)	comments for magnets
	MAGHEBTCHECK (MAG2)	check-off list for HEBT magnets
	MAGLINACCHECK (MAGLIN)	Check off list for Linac Magnets
	MAGNET (MAG)	Summary of magnet name and main parameters. Magnet measurement group fills out this table.
	MAGNETSTATUS (MAG4)	Magnet status and history. This is filled in by the physicist
	MAGRINGCHECK (MAGRING)	Check off list for ring magnets
	MAGRTBTCHECK (MAG6)	Check-off list for RTBT magnets

Designer/2000

SYSTEM GLOSSARY

End of Report

Report : ENTITIES AND THEIR ATTRIBUTES

Filename : D:\designReports\MagAttr2.pdf

Run by : DES

Report Date : 07-APR-00 10:33am

Total Pages : 18

Parameter values

Application System : MAGNET
Version : 1
Entity Name : %
Diagram :

Entities Created

On/After :
On/Before : 07-APR-00

and

Entities Changed

On/After :
On/Before : 07-APR-00

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
GLEMAG	FIELDANGLE	80	Y	NUMBER	6	2	Field angle	
	NOTES	90	Y	VARCHAR2	255		Comments	
	LOGINNAME	100	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	110	Y	DATE			Date & time row of data was last modified	
BUILT	JOBNAME	10	Y	VARCHAR2	8		Unique Survey filename	
	MEASDATE	20	Y	DATE			Date when measurement is done	
	EAST	30	Y	NUMBER	8	4	East-west position in global coordinates	
	NORTH	40	Y	NUMBER	8	4	North-south position in global coordinates	
	ELEVATION	50	Y	NUMBER	8	4	Vertical elevation in global coordinates	
	NORTH_DEV	60	Y	NUMBER	8	4	standard deviation in measured north-south coodinates	
	EAST_DEV	70	Y	NUMBER	8	4	standard deviation in measured east-west coordinates	
	A_PHI	80	Y	NUMBER	8	4	direction of error ellipse	
	A_MAJ	90	Y	NUMBER	8	4	major axis length of error ellipse	
	B_MIN	100	Y	NUMBER	8	4	minor axis length of erro ellipse	
	SIGMA	110	Y	INTEGER			1 or 2 of sigma	

Entity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
SEMBLY	ASSEMBLYID	10	N	VARCHAR2	10		Assembly magnet serial number	
	POSITION	30	N	VARCHAR2	1		Position of element in assembly	
	NOTES	40	Y	VARCHAR2	255		Comments	
	LOGINNAME	50	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	60	Y	DATE			Date & time row of data was last modified	
SMAG	ID	10	N	VARCHAR2	10		Magnet or Assembly serial name	
	OBJTYPE	20	N	VARCHAR2	10		Magnet or Assembly	
NTMAG	XVALUE	70	Y	NUMBER	8	4	x coordinate relative to specified fiducial	
	YVALUE	80	Y	NUMBER	8	4	y coordinate relative to specified fiducial	
	ZVALUE	90	Y	NUMBER	8	4	z coordinate relative to specified fiducial	
	NOTES	100	Y	VARCHAR2	255		Comments	
	LOGINNAME	110	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	120	Y	DATE			Date & time row of data was modified	
MMENTLIST	COMMENTTXT	20	N	CHAR	255		Comment text	
	COMMENTNUMDATE	30	Y	DATE			Date when comment has been modified	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
DMAGINFO	JOBNAME	20	N	VARCHAR2	8		Unique survey filename	
	MEASDATE	30	Y	DATE			date of measurement	
	MEASTEMP	40	Y	NUMBER	5	2	Magnet temperature during survey	
	MEASBY	50	Y	VARCHAR2			Measured by FNAL, BNL, CERN	
	PROCDATE	60	Y	DATE			Date when data is processed	
	PROCBY	70	Y	VARCHAR2	15		Data processed by	
	BESTDATA	80	Y	VARCHAR2	1		Best data flag (T or F)	
	NOTES	90	Y	VARCHAR2	255		comments	
	LOGINNAME	100	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	110	Y	DATE			Date & time row of data was last modified	

Entity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
DOPT	JOBNAME	25	N	VARCHAR2	8		Unique survey filename	
	POINTNAME	30	N	VARCHAR2	10		Measurement point name	
	MEASDATE	50	Y	DATE			Measured date	
	MEASBY	60	Y	VARCHAR2			Measured by which lab/group	
	PROCDATE	70	Y	DATE			Data processed date	
	XVALUE	80	Y	NUMBER	8	4	Radial coordinate (cm)	
	YVALUE	90	Y	NUMBER	8	4	Longitudinal coordinate (cm)	
	ZVALUE	100	Y	NUMBER	8	4	Vertical coordinate (cm)	
	XSTD	110	Y	NUMBER	5		Radial standard deviation	
	YSTD	120	Y	NUMBER	5		Longitudinal standard deviation	
	ZSTD	130	Y	NUMBER	5		Vertical standard deviation	
	NOTES	140	Y	VARCHAR2	255		Comments	
	LOGINNAME	150	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	160	Y	DATE			Date & time row of data was last modified	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
TERESIS	ELEMENT	20	N	VARCHAR2	10		Element ID being tested	
	RUNNUM	30	N	NUMBER	4		Run # for this magnet	
	TESTDATE	40	Y	DATE			Date tested	
	BENCHNAME	50	Y	VARCHAR2	20		Test station (proto-type or production, test bldg.)	
	MEASCOIL	60	Y	VARCHAR2	10		Serial number of measurement coil used	
	REFRADIUS	80	Y	NUMBER	4	0	Reference radius	
	POSITIONX	90	Y	NUMBER	10	3	Measurement coil horizontal position	
	POSITIONY	100	Y	NUMBER	10	3	Measurement coil vertical position	
	POSITIONZ	110	Y	NUMBER	10	3	Measurement coil longitudinal position	
	TESTTYPE	120	Y	VARCHAR2	10		Type of the measurement	
	PROBELENGTH	130	Y	NUMBER	4	2	Length of measurement probe	
	ANALYSIS	140	Y	VARCHAR2	8		History number generated by field program	
	MCURRENT	150	Y	NUMBER	8	2	Current at which measurements were made	
	SUMDIFF	160	Y	VARCHAR2	1		+ for (Up + Down)/2; - for (Up - Down)/2	
	MEASTEMP	170	Y	NUMBER	5	2	Temperature	
	TRANSFUNC	180	Y	NUMBER	9	5	Integral transfer function at reference radius	
	A1	190	Y	NUMBER	10	3	Skew dipole	
	A2	200	Y	NUMBER	10	3	Skew quadrupole	
	A3	210	Y	NUMBER	10	3	Skew sextupole	
	A4	220	Y	NUMBER	10	3	Skew octupole	
	A5	230	Y	NUMBER	10	3	Skew decapole	

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				NUMBER			-p	
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		De:				kattbl		

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
STERESIS	B14	470	Y	NUMBER	10	3	Normal 28-pole	
	B15	480	Y	NUMBER	10	3	Normal 30-pole	
	FIELDANGLE	490	Y	NUMBER	6	2	Integral field angle	
	NOTES	500	Y	VARCHAR2	255		Comments	
	LOGINNAME	510	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	520	Y	DATE			Date & time row of data was last modified	
EALBUILT	JOBNAME	10	Y	VARCHAR2	8		Name of survey fiducial	
	MEASDATE	20	Y	DATE			Date when entered/modified	
	EAST	30	Y	NUMBER	8	4	East-West position in global coordinates	
	NORTH	40	Y	NUMBER	8	4	North-south position in global coordinates	
	HEIGHT	50	Y	NUMBER	8	4	Height in global coordinates(physics)	
	ELEVATION	60	Y	NUMBER	8	4	Vertical elevation in global coordinates(alignment)	
	G_CORR	70	Y	NUMBER	8	4	Garvity correction	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
TEGRAL	ELEMENT	20	N	VARCHAR2	10		Element ID being tested	
	RUNNUM	30	N	NUMBER	4		Run # for this magnet	
	TESTDATE	40	Y	DATE			Date tested	
	BENCHNAME	50	Y	VARCHAR2	20		Test station (proto-type or production, test bldg.)	
	MEASCOIL	60	Y	VARCHAR2	10		Serial number of measurement coil used	
	REFRADIUS	80	Y	NUMBER	4		Reference radius	
	REFX	90	Y	NUMBER	4	0	Horizontal position of origin for harmonics	
	REFY	100	Y	NUMBER	4	0	Vertical position of origin for harmonics	
	ANALYSIS	110	Y	VARCHAR2	8		History number generated by field program	
	MCURRENT	120	Y	NUMBER	8	2	Current at which measurements were made	
	UPDOWN	130	Y	INTEGER			Current at which measurements were made	
	MEASTEMP	140	Y	NUMBER	5	2	Temperature	
	TRANSFUNC	150	Y	NUMBER	9	5	Integral transfer function at reference radius	
	A1	160	Y	NUMBER	10	3	Skew dipole	
	A2	170	Y	NUMBER	10	3	Skew quadrupole	
	A3	180	Y	NUMBER	10	3	Skew sextupole	
	A4	190	Y	NUMBER	10	3	Skew octupole	
	A5	200	Y	NUMBER	10	3	Skew decapole	
	A6	210	Y	NUMBER	10	3	Skew dodecapole	
	A7	220	Y	NUMBER	10	3	Skew 14-pole	
	A8	230	Y	NUMBER	10	3	Skew 16-pole	
	A9	240	Y	NUMBER	10	3	Skew 18-pole	

:y	Attribute Name	Seq	Opt	Forma	Length	Dec Pl	Attribute Description	tri	Note
TEGRAL	A1								
	A1								
	A1			NUMBER					
				NUMBER					
							drup		
							drup		
				NUMBER					
	B4			NUMBER			Norma		
				NUMBER			Norma		
				NUMBER			ecapo		
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y Name	tribute Name	Seq	Opt	Forma	Length	Dec Pl	Attribute Description	Attribut	Not
TEGRAL	MODDATE								

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
:ALHARM	ELEMENT	20	N	VARCHAR2	10		Element ID being tested	
	RUNNUM	30	N	NUMBER	4		Run # for this magnet	
	TESTDATE	40	Y	DATE			Date tested	
	BENCHNAME	50	Y	VARCHAR2	20		Test station (proto-type or production, test bldg.)	
	MEASCOIL	60	Y	VARCHAR2	10		Serial number of measurement coil used	
	REFRADIUS	80	Y	NUMBER	4	0	Reference radius	
	POSITIONX	90	Y	NUMBER	10	3	Measurement coil horizontal position	
	POSITIONY	100	Y	NUMBER	10	3	Measurement coil vertical position	
	POSITIONZ	110	Y	NUMBER	10	3	Measurement coil longitudinal position	
	TESTTYPE	120	Y	VARCHAR2	10		Type of the measurement	
	PROBELENGTH	130	Y	NUMBER	4	2	Length of measurement probe	
	ANALYSIS	140	Y	VARCHAR2	8		History number generated by field program	
	MCURRENT	150	Y	NUMBER	8	2	Current at which measurements were made	
	UPDOWN	160	Y	INTEGER			Up (+1) or down (-1) ramp measurements	
	MEASTEMP	170	Y	NUMBER	5	2	Temperature	
	TRANSFUNC	180	Y	NUMBER	9	5	Integral transfer function at reference radius	
	A1	190	Y	NUMBER	10	3	Skew dipole	
	A2	200	Y	NUMBER	10	3	Skew quadrupole	
	A3	210	Y	NUMBER	10	3	Skew sextupole	
	A4	220	Y	NUMBER	10	3	Skew octupole	
	A5	230	Y	NUMBER	10	3	Skew decapole	

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ty	Attribute Name	Seq.	Opt	orma	Length	Dec Pl	Attribut	Description	tribut	Not
				NUMBER				lod		
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								di		
								quadrupo		
				NUMBER						
				NUMBER						
				NUMBER						
				NUMBER				do ecap		
				NUMBER						
B8				NUMBER						
				NUMBER						
				NUMBER						
				NUMBER						
				NUMBER						

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
CALHARM	B15	480	Y	NUMBER	10	3	Normal 30-pole	
	FIELDANGLE	490	Y	NUMBER	6	2	Integral field angle	
	NOTES	500	Y	VARCHAR2	255		Comments	
	LOGINNAME	510	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	520	Y	DATE			Date & time row of data was last modified	
CATIONASS	LEADORIENTATION	10	Y	VARCHAR2	30		magnet lead end orientation from left to right or right to left	
	TUNNELLOCATION	20	Y	VARCHAR2	20		location in the tunnel where this Magnet or Assembly is installed	
	PERSON	30	Y	VARCHAR2	15		Login name of the person	
	MDATETIME	40	Y	DATE			date and time when this row was last modified	
GCOMMENT	COMMENTNUM	10	N	VARCHAR2	4		Comment number	
	COMMENTDATE	30	Y	DATE			Date when comment was added/modified	
	TABLENAME	40	Y	VARCHAR2	15		magnet table name for which this comment belongs	
	COLUMNNAME	50	Y	VARCHAR2	20		column in that table	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
3HEBTCHECK	MDATETIME	20	Y	DATE			ok date and time of entry	
	ELEMENT	25	Y	VARCHAR2	10		Element" element ID	
	INTTRANOK	30	N	VARCHAR2	2		ok integral transfer function	
	BODYFLDANGOK	50	N	VARCHAR2	2		FldAngOK null field angle quality approval	
	MULOK	60	N	VARCHAR2	2		MulOK field multipole quality approval	
	ELECTRICALOK	120	Y	VARCHAR2	2		ok electrical quality approval	
	COGENGINEEROK	130	Y	VARCHAR2	2		ok cog engineering quality approval	
	SURVEYOK	140	Y	VARCHAR2	2		ok survey/alignment quality approval	
	DOCUMENTOK	150	Y	VARCHAR2	2		ok documentation completness approval	
	SUMMARYOK	160	Y	VARCHAR2	2		ok overall quality approval	
3LINACCHECK	MDATETIME	20	Y	DATE			ok date and time of entry	
	ELEMENT	30	Y	VARCHAR2	10		"Element" element ID	
	INTTRANOK	40	N	VARCHAR2	2		ok integral transfer function	
	BODFLDANGOK	50	N	VARCHAR2	2		FldAngOK null field angle quality approval	
	MULWARMOK	60	N	VARCHAR2	2		MulOK field multipole quality approval	
	ELECTRICALOK	70	Y	VARCHAR2	2		ok electrical quality approval	
	COGENGINNERINGOK	80	Y	VARCHAR2	2		ok cog engineering quality approval	
	SURVEYOK	90	Y	VARCHAR2	2		ok survey/alignment quality approval	
	DOCUMENTOK	100	Y	VARCHAR2	2		ok documentation completness approval	
	SUMMARYOK	110	Y	VARCHAR2	2		ok overall quality approval	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
GNET	MAGNAME	10	N	VARCHAR2	10		Magnet serial name	
	MODELNUM	20	N	VARCHAR2	3		Magnet model number	
	LENGTH	30	Y	NUMBER	4	2	Magnet length at room temper	
	APERTUREX	35	Y	NUMBER	4		Magnet H aperture (width or inscribed diameter)	
	APERTUREY	40	Y	NUMBER	4	0	Magnet H aperture (height or inscribed diameter)	
	SEQNUM	70	N	NUMBER	3	0	Vendor's construction sequennce number	
	PARTNUM	80	Y	VARCHAR2	12		Part number of the magnet	
	REVISION	90	Y	VARCHAR2	2		Revision to which the magnet waas built	
	COMPLETED	100	Y	DATE			Date completed	
	DISPO	110	Y	VARCHAR2			Disposition: Accepted, Rejected, rework	
	NOTES	120	Y	VARCHAR2	255		Comments	
	LOGINNAME	130	Y	VARCHAR2	15		Login name of person entering or modifying data	
	MODDATE	140	Y	DATE			Date & time row of data was last modified	
GNETSTATUS	PERSON	20	N	VARCHAR2	15		person who entered the status	
	STATUS	30	N	VARCHAR2	20		Retrofitted from column STATUS of table MAGNETSTATUS	
	STATUSDATE	40	Y	DATE			Retrofitted from column STATUSDATE of table MAGNETSTATUS	

tity Name	Attribute Name	Seq.	Opt.	Format	Length	Dec Pl	Attribute Description	Attribute Notes
GRINGCHECK	MDATETIME	20	Y	DATE			ok date and time of entry	
	ELEMENT	30	Y	VARCHAR2	2		"Element" element ID	
	INTTRANOK	40	Y	VARCHAR2	2		ok integral transfer function	
	BODYFLDANGOK	50	Y	VARCHAR2	2		FldAngOK null field angle quality	
	MULOK	60	Y	VARCHAR2	2		MulOK field multipole quality approval	
	ELECTRICALOK	70	Y	VARCHAR2	2		ok electrical quality approval	
	COGENGINEEROK	80	Y	VARCHAR2	2		ok cog engineering quality approval	
	SURVEYOK	90	Y	VARCHAR2	2		ok survey/alignment quality approval	
	DOCUMENTOK	100	Y	VARCHAR2	2		ok documentation completness approval	
	SUMMARYOK	110	Y	VARCHAR2	2		ok overall quality approval	
GRTBTCHECK	MDATETIME	20	Y	VARCHAR2			ok date and time of entry	
	ELEMENT	25	Y	VARCHAR2	10			
	INTTRANOK	30	N	VARCHAR2	2		ok integral transfer function	
	BODYFLDANGOK	50	N	VARCHAR2	2		FldAngOK null field angle quality	
	MULWARMOK	70	N	VARCHAR2	2		MulOK field multipole quality approval	
	ELECTRICALOK	100	Y	VARCHAR2	2		ok electrical quality approval	
	COGENGINEEROK	110	Y	VARCHAR2	2		ok cog engineering quality approval	
	SURVEYOK	120	Y	VARCHAR2	2		ok survey/alignment quality approval	
	DOCUMENTOK	130	Y	VARCHAR2	2		ok documentation completness approval	
	SUMMARYOK	140	Y	VARCHAR2	2		ok overall quality approval	

De:

ENTITIES AND THE "TTRIBUTES

Magnet Database Tables

The MAGNET table contains all the magnets. The ASSEMBLIES table contains all the Magnet Assembly entries. ASSMAGS table contains all the Magnet ids and Assembly Ids.

```
PROMPT Creating Table 'INTEGRALS'
CREATE TABLE INTEGRALS
 (MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,ELEMENT VARCHAR2(10) NOT NULL
 ,RUNNUM NUMBER(4) NOT NULL
 ,TESTDATE DATE
 ,BENCHNAME VARCHAR2(20)
 ,MEASCOIL VARCHAR2(10)
 ,REFRADIUS NUMBER(4,0)
 ,REFX NUMBER(4,0)
 ,REFY NUMBER(4,0)
 ,ANALYSIS VARCHAR2(8)
 ,MCURRENT NUMBER(8,2)
 ,UPDOWN NUMBER(38)
 ,MEASTEMP NUMBER(5,2)
 ,TRANSFUNC NUMBER(9,5)
 ,A1 NUMBER(10,3)
 ,A2 NUMBER(10,3)
 ,A3 NUMBER(10,3)
 ,A4 NUMBER(10,3)
 ,A5 NUMBER(10,3)
 ,A6 NUMBER(10,3)
 ,A7 NUMBER(10,3)
 ,A8 NUMBER(10,3)
 ,A9 NUMBER(10,3)
 ,A10 NUMBER(10,3)
 ,A11 NUMBER(10,3)
 ,A12 NUMBER(10,3)
 ,A13 NUMBER(10,3)
 ,A14 NUMBER(10,3)
 ,A15 NUMBER(10,3)
 ,B1 NUMBER(10,3)
 ,B2 NUMBER(10,3)
 ,B3 NUMBER(10,3)
 ,B4 NUMBER(10,3)
 ,B5 NUMBER(10,3)
 ,B6 NUMBER(10,3)
 ,B7 NUMBER(10,3)
 ,B8 NUMBER(10,3)
 ,B9 NUMBER(10,3)
 ,B10 NUMBER(10,3)
 ,B11 NUMBER(10,3)
 ,B12 NUMBER(10,3)
 ,B13 NUMBER(10,3)
 ,B14 NUMBER(10,3)
 ,B15 NUMBER(10,3)
 ,FIELDANGLE NUMBER(6,2)
 ,NOTES VARCHAR2(255)
```

```
 ,LOGINNAME VARCHAR2(15)
 ,MODDATE DATE
 )


PROMPT Creating Table 'IDEALBUILT'
CREATE TABLE IDEALBUILT
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,JOBNAME VARCHAR2(8) NOT NULL
 ,MEASDATE DATE
 ,EAST NUMBER(8,4)
 ,NORTH NUMBER(8,4)
 ,HEIGHT NUMBER(8,4)
 ,ELEVATION NUMBER(8,4)
 ,G_CORR NUMBER(8,4)


PROMPT Creating Table 'LOCATIONASS'
CREATE TABLE LOCATIONASS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,LEADORIENTATION VARCHAR2(30)
 ,TUNNELLOCATION VARCHAR2(20)
 ,PERSON VARCHAR2(15)
 ,MDATETIME DATE
 )


PROMPT Creating Table 'MAGNETSTATUSES'
CREATE TABLE MAGNETSTATUSES
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,PERSON VARCHAR2(15) NOT NULL
 ,STATUS VARCHAR2(20) NOT NULL
 ,STATUSDATE DATE
 )


PROMPT Creating Table 'COMMENTLISTS'
CREATE TABLE COMMENTLISTS
 (MAG1_COMMENTNUM VARCHAR2(4) NOT NULL
 ,COMMENTTXT VARCHAR2(255) NOT NULL
 ,COMMENTNUMDATE DATE
 )


PROMPT Creating Table 'CENTMAGS'
CREATE TABLE CENTMAGS
 (MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,XVALUE NUMBER(8,4)
 ,YVALUE NUMBER(8,4)
 ,ZVALUE NUMBER(8,4)
```

```
,NOTES VARCHAR2(255)
,LOGINNAME VARCHAR2(15)
,MODDATE DATE
)


PROMPT Creating Table 'ANGLEMAGS'
CREATE TABLE ANGLEMAGS
 (MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,FIELDANGLE NUMBER(6,2)
 ,NOTES VARCHAR2(255)
 ,LOGINNAME VARCHAR2(15)
 ,MODDATE DATE
 )

PROMPT Creating Table 'MAGCOMMENTS'
CREATE TABLE MAGCOMMENTS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,COMMENTNUM VARCHAR2(4) NOT NULL
 ,COMMENTDATE DATE
 ,TABLENAME VARCHAR2(15)
 ,COLUMNNAME VARCHAR2(20)


PROMPT Creating Table 'ASBUILT'
CREATE TABLE ASBUILT
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,JOBNAME VARCHAR2(8) NOT NULL
 ,MEASDATE DATE
 ,EAST NUMBER(8,4)
 ,NORTH NUMBER(8,4)
 ,ELEVATION NUMBER(8,4)
 ,NORTH_DEV NUMBER(8,4)
 ,EAST_DEV NUMBER(8,4)
 ,A_PHI NUMBER(8,4)
 ,A_MAJ NUMBER(8,4)
 ,B_MIN NUMBER(8,4)
 ,SIGMA NUMBER(38)
 )

PROMPT Creating Table 'HYSTERESES'
CREATE TABLE HYSTERESES
 (MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,ELEMENT VARCHAR2(10) NOT NULL
 ,RUNNUM NUMBER(4) NOT NULL
 ,TESTDATE DATE
 ,BENCHNAME VARCHAR2(20)
```

```
,MEASCOIL VARCHAR2(10)
,REFRADIUS NUMBER(4,0)
,POSITIONX NUMBER(10,3)
,POSITIONY NUMBER(10,3)
,POSITIONZ NUMBER(10,3)
,TESTTYPE VARCHAR2(10)
,PROBELENGTH NUMBER(4,2)
,ANALYSIS VARCHAR2(8)
,MCURRENT NUMBER(8,2)
,SUMDIFF VARCHAR2(1)
,MEASTEMP NUMBER(5,2)
,TRANSFUNC NUMBER(9,5)
,A1 NUMBER(10,3)
,A2 NUMBER(10,3)
,A3 NUMBER(10,3)
,A4 NUMBER(10,3)
,A5 NUMBER(10,3)
,A6 NUMBER(10,3)
,A7 NUMBER(10,3)
,A8 NUMBER(10,3)
,A9 NUMBER(10,3)
,A10 NUMBER(10,3)
,A11 NUMBER(10,3)
,A12 NUMBER(10,3)
,A13 NUMBER(10,3)
,A14 NUMBER(10,3)
,A15 NUMBER(10,3)
,B1 NUMBER(10,3)
,B2 NUMBER(10,3)
,B3 NUMBER(10,3)
,B4 NUMBER(10,3)
,B5 NUMBER(10,3)
,B6 NUMBER(10,3)
,B7 NUMBER(10,3)
,B8 NUMBER(10,3)
,B9 NUMBER(10,3)
,B10 NUMBER(10,3)
,B11 NUMBER(10,3)
,B12 NUMBER(10,3)
,B13 NUMBER(10,3)
,B14 NUMBER(10,3)
,B15 NUMBER(10,3)
,FIELDANGLE NUMBER(6,2)
,NOTES VARCHAR2(255)
,LOGINNAME VARCHAR2(15)
,MODDATE DATE


PROMPT Creating Table 'FIDOPTS'
CREATE TABLE FIDOPTS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,JOBNAME VARCHAR2(8) NOT NULL
```

```
,POINTNAME VARCHAR2(10) NOT NULL
,MEASDATE DATE
,MEASBY VARCHAR2(240)
,PROCDATE DATE
,XVALUE NUMBER(8,4)
,YVALUE NUMBER(8,4)
,ZVALUE NUMBER(8,4)
,XSTD NUMBER(5,4)
,YSTD NUMBER(5,4)
,ZSTD NUMBER(5,4)
,NOTES VARCHAR2(255)
,LOGINNAME VARCHAR2(15)
,MODDATE DATE
)


PROMPT Creating Table 'MAGNET'
CREATE TABLE MAGNET
 (MAGNAME VARCHAR2(10) NOT NULL
 ,MODELNUM VARCHAR2(3) NOT NULL
 ,LENGTH NUMBER(4,2)
 ,APERTUREX NUMBER(4)
 ,APERTUREY NUMBER(4,0)
 ,SEQNUM NUMBER(3,0) NOT NULL
 ,PARTNUM VARCHAR2(12)
 ,REVISION VARCHAR2(2)
 ,COMPLETED DATE
 ,DISPO VARCHAR2(240)
 ,NOTES VARCHAR2(255)
 ,LOGINNAME VARCHAR2(15)
 ,MODDATE DATE


PROMPT Creating Table 'ASSMAGS'
CREATE TABLE ASSMAGS
 (ID VARCHAR2(10) NOT NULL
 ,OBJTYPE VARCHAR2(10) NOT NULL
 )
/

PROMPT Creating Table 'ASSEMBLIES'
CREATE TABLE ASSEMBLIES
 (ASSEMBLYID VARCHAR2(10) NOT NULL
 ,MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,POSITION VARCHAR2(1) NOT NULL
 ,NOTES VARCHAR2(255)
 ,LOGINNAME VARCHAR2(15)
 ,MODDATE DATE
 )


PROMPT Creating Table 'MAGRTBTCHECKS'
CREATE TABLE MAGRTBTCHECKS
```

```
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,MDATETIME VARCHAR2(240)
 ,ELEMENT VARCHAR2(10)
 ,INTTRANOK VARCHAR2(2) NOT NULL
 ,BODYFLDANGOK VARCHAR2(2) NOT NULL
 ,MULWARMOK VARCHAR2(2) NOT NULL
 ,ELECTRICALOK VARCHAR2(2)
 ,COGENGINEEROK VARCHAR2(2)
 ,SURVEYOK VARCHAR2(2)
 ,DOCUMENTOK VARCHAR2(2)
 ,SUMMARYOK VARCHAR2(2)
 )

PROMPT Creating Table 'MAGRINGCHECKS'
CREATE TABLE MAGRINGCHECKS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,MDATETIME DATE
 ,ELEMENT VARCHAR2(2)
 ,INTTRANOK VARCHAR2(2)
 ,BODYFLDANGOK VARCHAR2(2)
 ,MULOK VARCHAR2(2)
 ,ELECTRICALOK VARCHAR2(2)
 ,COGENGINEEROK VARCHAR2(2)
 ,SURVEYOK VARCHAR2(2)
 ,DOCUMENTOK VARCHAR2(2)
 ,SUMMARYOK VARCHAR2(2)



PROMPT Creating Table 'MAGLINACCHECKS'
CREATE TABLE MAGLINACCHECKS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,MDATETIME DATE
 ,ELEMENT VARCHAR2(10)
 ,INTTRANOK VARCHAR2(2) NOT NULL
 ,BODFLDANGOK VARCHAR2(2) NOT NULL
 ,MULWARMOK VARCHAR2(2) NOT NULL
 ,ELECTRICALOK VARCHAR2(2)
 ,COGENGINNERINGOK VARCHAR2(2)
 ,SURVEYOK VARCHAR2(2)
 ,DOCUMENTOK VARCHAR2(2)
 ,SUMMARYOK VARCHAR2(2)

/

COMMENT ON COLUMN MAGLINACCHECKS.ELEMENT IS 'Element Id'
/

PROMPT Creating Table 'MAGHEBTCHECKS'
CREATE TABLE MAGHEBTCHECKS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
```

```
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,MDATETIME DATE
 ,ELEMENT VARCHAR2(10)
 ,INTTRANOK VARCHAR2(2) NOT NULL
 ,BODYFLDANGOK VARCHAR2(2) NOT NULL
 ,MULOK VARCHAR2(2) NOT NULL
 ,ELECTRICALOK VARCHAR2(2)
 ,COGENGINEEROK VARCHAR2(2)
 ,SURVEYOK VARCHAR2(2)
 ,DOCUMENTOK VARCHAR2(2)
 ,SUMMARYOK VARCHAR2(2)
 )


PROMPT Creating Table 'FIDMAGINFOS'
CREATE TABLE FIDMAGINFOS
 (ASSMAG_ID VARCHAR2(10) NOT NULL
 ,ASSMAG_OBJTYPE VARCHAR2(10) NOT NULL
 ,JOBNAME VARCHAR2(8) NOT NULL
 ,MEASDATE DATE
 ,MEASTEMP NUMBER(5,2)
 ,MEASBY VARCHAR2(240)
 ,PROCDATE DATE
 ,PROCBY VARCHAR2(15)
 ,BESTDATA VARCHAR2(1)
 ,NOTES VARCHAR2(255)
 ,LOGINNAME VARCHAR2(15)
 ,MODDATE DATE
 )


PROMPT Creating Table 'LOCALHARMS'
CREATE TABLE LOCALHARMS
 (MAG_MAGNAME VARCHAR2(10) NOT NULL
 ,ELEMENT VARCHAR2(10) NOT NULL
 ,RUNNUM NUMBER(4) NOT NULL
 ,TESTDATE DATE
 ,BENCHNAME VARCHAR2(20)
 ,MEASCOIL VARCHAR2(10)
 ,REFRADIUS NUMBER(4,0)
 ,POSITIONY NUMBER(10,3)
 ,POSITIONZ NUMBER(10,3)
 ,TESTTYPE VARCHAR2(10)
 ,PROBELENGTH NUMBER(4,2)
 ,ANALYSIS VARCHAR2(8)
 ,MCURRENT NUMBER(8,2)
 ,UPDOWN NUMBER(38)
 ,MEASTEMP NUMBER(5,2)
 ,TRANSFUNC NUMBER(9,5)
 ,A1 NUMBER(10,3)
 ,A2 NUMBER(10,3)
 ,A3 NUMBER(10,3)
```

```
,A4 NUMBER(10,3)
,A5 NUMBER(10,3)
,A6 NUMBER(10,3)
,A7 NUMBER(10,3)
,A8 NUMBER(10,3)
,A9 NUMBER(10,3)
,A10 NUMBER(10,3)
,A11 NUMBER(10,3)
,A12 NUMBER(10,3)
,POSITIONX NUMBER(10,3)
,A13 NUMBER(10,3)
,A14 NUMBER(10,3)
,A15 NUMBER(10,3)
,B1 NUMBER(10,3)
,B2 NUMBER(10,3)
,B3 NUMBER(10,3)
,B4 NUMBER(10,3)
,B5 NUMBER(10,3)
,B6 NUMBER(10,3)
,B7 NUMBER(10,3)
,B8 NUMBER(10,3)
,B9 NUMBER(10,3)
,B10 NUMBER(10,3)
,B11 NUMBER(10,3)
,B12 NUMBER(10,3)
,B13 NUMBER(10,3)
,B14 NUMBER(10,3)
,B15 NUMBER(10,3)
,FIELDANGLE NUMBER(6,2)
,NOTES VARCHAR2(255)
,LOGINNAME VARCHAR2(15)
,MODDATE DATE
```