NOTICE OF
CHANGE

NOT MEASUREMENT
SENSITIVE

MIL-STD-1821
NOTICE 3
XX Xxxxx 1998

DEPARTMENT OF DEFENSE
INTERFACE STANDARD FOR

STANDARD SIMULATOR DATA BASE (SSDB)
INTERCHANGE FORMAT (SIF)

TO ALL HOLDERS OF MIL-STD-1821

1. THE FOLLOWING PAGES OF MIL-STD-1821 HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
1	17 June 1993	-	REPRINTED WITHOUT CHANGE
2	XX XXXXX 1998	2	17 June 1993
5	XX XXXXX 1998	5	17 June 1993
6	17 June 1993	-	REPRINTED WITHOUT CHANGE
9	XX XXXXX 1998	9	17 June 1993
10	17 June 1993	-	REPRINTED WITHOUT CHANGE
17	17 June 1993	-	REPRINTED WITHOUT CHANGE
18	XX XXXXX 1998	18	17 June 1993
21	XX XXXXX 1998	21	17 April 1994
22	17 June 1993	-	REPRINTED WITHOUT CHANGE
25	XX XXXXX 1998	25	17 June 1993
26	17 June 1993	-	REPRINTED WITHOUT CHANGE
29	XX XXXXX 1998	29	17 April 1994
30	XX XXXXX 1998	30	17 June 1993
31	XX XXXXX 1998	31	17 June 1993
32	17 June 1993	-	REPRINTED WITHOUT CHANGE
35	17 June 1993	-	REPRINTED WITHOUT CHANGE
36	XX XXXXX 1998	36	17 April 1994
37	17 June 1993	-	REPRINTED WITHOUT CHANGE
38	XX XXXXX 1998	38	17 June 1993
41	XX XXXXX 1998	41	17 June 1993
42	17 June 1993	-	REPRINTED WITHOUT CHANGE
45	XX XXXXX 1998	45	17 June 1993
46	17 June 1993	-	REPRINTED WITHOUT CHANGE
47	XX XXXXX 1998	47	17 June 1993
48	17 June 1993	-	REPRINTED WITHOUT CHANGE
65	XX XXXXX 1998	65	17 June 1993
66	17 June 1993	-	REPRINTED WITHOUT CHANGE

AMSC: N/A

FSG: 69GP

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

1. CONTINUATION OF REVISED AND SUPERSEDED PAGES.

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
73	XX XXXXX 1998	73	17 June 1993
74	XX XXXXX 1998	74	17 April 1994
77	17 June 1993	-	REPRINTED WITHOUT CHANGE
78	XX XXXXX 1998	78	17 June 1993
79	17 June 1993	-	REPRINTED WITHOUT CHANGE
80	XX XXXXX 1998	80	17 June 1993
93	XX XXXXX 1998	93	17 June 1993
94	XX XXXXX 1998	94	17 June 1993
117	XX XXXXX 1998	117	17 June 1993
118	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-1	XX XXXXX 1998	A-1	17 June 1993
A-2	XX XXXXX 1998	A-2	17 June 1993
A-15	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-16	XX XXXXX 1998	A-16	17 June 1993
A-19	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-20	XX XXXXX 1998	A-20	17 June 1993
A-23	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-24	XX XXXXX 1998	A-24	17 April 1994
A-24a	XX XXXXX 1998	A-24a	17 April 1994
A-25	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-26	XX XXXXX 1998	A-26	17 June 1993
A-49	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-50	XX XXXXX 1998	A-50	17 April 1994
A-57	XX XXXXX 1998	A-57	17 June 1993
A-58	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-69	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-70	XX XXXXX 1998	A-70	17 June 1993
A-71	XX XXXXX 1998	A-71	17 April 1994
A-72	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-73	17 June 1993	-	REPRINTED WITHOUT CHANGE
A-74	XX XXXXX 1998	A-74	17 June 1993
B-1	XX XXXXX 1998	B-1	17 June 1993
B-2	XX XXXXX 1998	B-2	17 June 1993
B-5	17 June 1993	-	REPRINTED WITHOUT CHANGE
B-6	XX XXXXX 1998	B-6	17 June 1993
C-9	XX XXXXX 1998	C-9	17 June 1993
C-9a	XX XXXXX 1998	-	NEW PAGE
C-10	XX XXXXX 1998	C-10	17 June 1993
C-27	17 June 1993	-	REPRINTED WITHOUT CHANGE
C-28	XX XXXXX 1998	C-28	17 June 1993

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-1821 will verify that page changes indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or cancelled.

Custodians:
Air Force - 11

Preparing activity:
Air Force - 11

Project Nr. 69GP-0180

1.4 Tailoring of requirement descriptions. The detailed technical requirements of this format have been structured to permit tailoring to suit the particular database requirements of an individual program. Under normal circumstances, it should be sufficient for an acquisition agency to specify compliance with the SIF standard as a whole, with specific exceptions granted on a case-by-case basis with the concurrence of the SDBF. First-time users of the SIF standard should read Appendix C for general guidance on applying the standard to particular applications.

1.5 Method of reference. This standard should be invoked by requiring that a program utilize and/or deliver databases in accordance with MIL-STD-1821. Interface with the SDBF is implicit in any invocation of this standard.

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement hereto, cited in the solicition (see 6.2).

Military Standard

MIL-STD-1820	Generic Transformed Data Base Design Standard
MIL-STD-2408	Mapping, Charting, & Geodesy Glossary of Feature and Attribute Definitions, 21 April 1995

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those cited in the solicitation (see 6.2)

Distributed Processing (DP). One concept of SIF production, wherein alternate production centers are established at remote facilities, are equipped with SDBF-compatible DBGSs, and exchange SSDB files directly with the SDBF.

Edge. The line formed by the connection of two vertices.

Elevation Data. Digital information representing the variation in elevation of the Earth's surface, relative to mean sea level.

Face. A planar two- or three-dimensional structure formed by the closed connection of a series of segments.

Face-Based Texture. A technique for applying a texture map to a single polygon, wherein the texture pattern is of a fixed size, and replicated as often as is necessary to cover the entire polygon.

Feature Attribute Coding Standard (FACS). A Defense Mapping Agency developed system of alphanumeric codes, which are used to represent various properties of cultural features stored in a data base. FACS definitions are contained within MIL-STD-2408 dated 21 April 1995.

Feature Data. Same as Culture Data.

Feature Descriptor Code (FDC). An alphanumeric code used to identify the type of a cultural feature stored in a data base.

Generic Texture. A file containing a non-geospecific pattern, eligible for mapping repeatedly onto any polygon in the data base.

Generic Transformed Data Base (GTDB). A product of the SDBF, consisting of data which has been extracted from the SSDB and tailored to meet the specific characteristics of a particular training simulator image generator and/or constructive 2D M&S.

Global-Based Texture. A technique for applying texture to terrain, wherein an orthorectified image is mapped onto the terrain polygons at the corresponding geographic location.

Gridded Data. Digital information which is uniformly distributed in the form of a two-dimensional matrix, where a data value is provided for each (x,y) coordinate. Both terrain elevation and rasterized texture are considered types of gridded data files.

High Detail Input/Output (HDI). A concept of SIF production, wherein external producers use non-SDBF-compatible DBGSs to create SIF data sets for SDBF consumption; and conversely, the SDBF provides SIF data sets to external consumers for application on training simulators. The HDI term derives from the fact that the primary purpose of this interface is to facilitate the reuse of densely-populated data bases, which can be quite expensive to create.

Initial Graphics Exchange Standard (IGES). A format for the distribution of computer graphics files developed by the National Institute of Science and Technology. IGES is used as the basis of the SIF Constructive Solid Geometry (CSG) model format.

CDR	Critical Design Review
CSG	Constructive Solid Geometry
DBDD	Data Base Design Document
DBGS	Data Base Generation System
DFAD	Digital Feature Analysis Data
DIAM	Defense Intelligence Agency Manual
DID	Data Item Description
DLMS	Digital Landmass System
DMA	Defense Mapping Agency
DoD	Department of Defense
DP	Distributed Processing
DTED	Digital Terrain Elevation Data
EOF	End of File
EOT	End-of-tape Marker
FACS	Feature Attribute Coding Standard
FID	Feature Identifier
FDC	Feature Descriptor Code
FOM	Figure of Merit
GDS	Gridded Data Section
GFAD	Glossary of Feature and Attribute Definitions
GFE	Government-Furnished Equipment
GFP	Government-Furnished Property
GTDB	Generic Transformed Data Base
HCV	Hue-Chroma-Value
HDI	High Detail Input/Output
ICMGMS	Interactive Computer Modelling Geometric Modelling System
IGES	Initial Graphics Exchange Specification
JPEG	Joint Photographic Experts Group
JTCG-TSD	Joint Technical Coordinating Group - Training Systems and Devices
LOD	Level of Detail
LSB	Least Significant Bit
LUT	Look-Up Table
MSB	Most Significant Bit
MSL	Mean Sea Level
NIST	National Institute of Standards and Technology
NITF	National Imagery Transmission Format
PDR	Preliminary Design Review
RGB	Red-Green-Blue
SDBF	Simulator Data Base Facility
SIF	SSDB Interchange Format
SIF/DP	SIF for Distributed Processing
SIF/HDI	SIF for High-Detail Input/Output
SMC	Surface Material Category
SSDB	Standard Simulator Data Base
UTM	Universal Transverse Mercator
VMS	Virtual Memory System
VPF	Vector Product Format
WGS	World Geodetic System

5.1.1.2.3 General file and data formats. The file and data formats are detailed for the SIF/HDI Data Base Header File and each of the data sections in section 5.1.2 of this document.

5.1.1.2.3.1 Non-gridded data files. The SIF/HDI Data Base Header File and all files in the Model Data and Culture Data sections, except where explicitly noted otherwise, shall be in a compressed ASCII format with record keyword separators and ASCII null ('00') field separators. Within any of these files, when a field is initially all blanks, it shall be compressed to a null field of zero length; thus, two consecutive field separators shall occur at this point. There shall be one or more ASCII ~~CNTRL-Z~~ CNTRL-D characters at the end of each ASCII file.

5.1.1.2.3.2 Gridded data files. The Gridded Data section, containing both terrain elevation and rasterized texture data, shall have its files stored in the specified NITF format. All header files shall be stored in non-compressed ASCII, while the data files containing the actual grid data shall be in a binary format as specified by the NITF standard.

5.1.1.2.3.3 Non-ASCII files. Non-ASCII files shall be in a binary format where integer data are stored in two's-complement, with the high-order bit in the high-order byte representing the sign, as shown in Figure 2. Floating point data are stored in a single-precision format, as defined by ANSI/IEEE Std 754, Binary Floating Point Arithmetic. Appendix A shows the number of bytes used for each data field.

5.1.2 SIF/HDI file formats

5.1.2.1 SIF/HDI Data Base Header File Format. The SIF/HDI Data Base Header Format shall consist of a single file that contains general transmittal, identification, and directory information.

5.1.2.1.1 Header data encoding. A compressed form of ASCII shall be used in this file. The compression shall consist of stripping all leading zeros and blanks from numeric strings and all leading and trailing blanks from character strings. Every ASCII field shall be a variable-length field, separated by the ASCII null character ('00'). Since fields are variable-length, records shall also vary in length. Every record (except the file identifier record) begins with a 2-character keyword identifying its type. The record keyword for a comment record is identified as consecutive asterisks (**). Following the keyword is the standard ASCII null character ('00') as the field separator. The comment field will then continue until end of file (EOF) or the end of field separator ('00') is located in the SIF data file. Comment records shall not occur in the middle of any record in the file, but can be placed before or after any other record.

5.1.2.1.2 Header section structure. The Header section shall consist of a single SIF/HDI Data Base Header File.

5.1.2.1.3 Header file structure. This mandatory file shall contain general transmittal, identification, and directory information concerning the SIF/HDI data base to follow. It shall be the first file on the first tape volume. The order of data in the SIF/HDI Data Base Header File is as specified below. The order in which the file names appear in this file is the required order in which the files shall appear in the data base.

5.1.2.1.3.1 SIF File Identifier Record. The field structure of this record shall be as follows:

File Identifier Field (always 'SIF/HDI DATA BASE HEADER')

5.1.2.1.3.2 Transmittal Description Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'TD')
SIF Format Field
Originator Field
Recipient Field
Transmittal ID Field
Creation Date Field
Source Agency/Project Field
Database Name Field
Data On This Volume Flag Field
Security Classification Field
Control and Handling Field
Releasing Instructions Field
Classification Authority Field
Security Control Number Field
Security Downgrade Field
Downgrading Event Field
~~SIF Version Number Field (always ('00003')~~
SIF Version Number Field (always ('00004')

5.1.2.1.3.3 Data Directory Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'DD')
Number of 2D Static Models Field
Number of 3D Static Models Field
Number of 3D Dynamic Models Field
Number of Culture Tiles Field
Number of Terrain Tiles Field
Number of Generic Textures Field
Number of Stage 3 Specific Model Textures Field
Number of Stage 2 Specific Model Textures Field
Number of Stage 1 Specific Model Textures Field
Number of Stage 3 Specific Areal Textures Field
Number of Stage 2 Specific Areal Textures Field
Number of Stage 1 Specific Areal Textures Field
Number of SMC/FDC Textures Field
Merged or Layered Culture Field
Data Base SW Corner Field
Data Base NE Corner Field

5.1.2.1.3.4 Two-dimensional (2D) Static Model Library Header File Name Record. This record shall be included when the number of 2D Static Models Field in the Data Directory Record is non-zero. The field structure of this record shall be as follows:

Record Keyword Field (always '2L')
File Name Field

5.1.2.1.3.15 Generic Texture Entry Record. The number of these records shall correspond to the Number of Generic Textures Field in the Data Directory Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'GX')
Image Sub-Header File Name Field
Image Data File Name Field
Texture Library Field
Texture ID Field
Texture Type Field
Horizontal Resolution Field
Vertical Resolution Field
Number of Texels Per Row Field
Number of Texels Per Column Field
~~Image Creation Date and Time Field~~
Image Capture Date and Time Field
New Data Flag Field
Changed Data Flag Field
Security Classification Field
Control and Handling Field
Releasing Instructions Field
Classification Authority Field
Security Control Number Field
Security Downgrade Field
Downgrading Event Field

5.1.2.1.3.16 Stage 3 Specific Model Texture Entry Record. The number of these records shall correspond to the number of Stage 3 Specific Model Textures Field in the Data Directory Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'M3')
Image Sub-Header File Name Field
Image Data File Name Field
Texture Library Field
Texture ID Field
Texture Type Field
Horizontal Resolution Field
Vertical Resolution Field
Number of Texels Per Row Field
Number of Texels Per Column Field
Image Capture Date and Time Field
New Data Flag Field
Changed Data Flag Field
Security Classification Field
Control and Handling Field
Releasing Instructions Field
Classification Authority Field
Security Control Number Field
Security Downgrade Field
Downgrading Event Field

5.1.2.2 Model data

5.1.2.2.1 Model data encoding. A compressed form of ASCII shall be used. The compression shall take the form of stripping all leading zeros and blanks from numeric strings and all leading and trailing blanks from character strings. Every ASCII field shall be a variable-length field, separated by the ASCII null character ('00'). Since fields are variable-length, records shall also vary in length. Every record (except the SIF file identifier record) shall begin with a 2-character keyword identifying its type. The record keyword for a comment record shall be two consecutive asterisks (**). Following the keyword is the standard ASCII null character ('00') as the field separator. The comment field shall then continue until end of file (EOF) or the end of field separator ('00') is located in the SIF data file. Comment records shall not occur in the middle of any record in the file, but can be placed before or after any other record in the data file. Items in a field are separated by 'space' characters.

5.1.2.2.1.1 Model building standards. Models shall be constructed using a right-handed X-Y-Z Cartesian coordinate system. Models shall be built with the local X-axis identifying the direction of the front of the model, and the Z-axis pointing straight up into the air. For a static model, the front shall be defined as the side facing the nearest road feature. For a dynamic model, the X-axis shall point in the normal direction of motion; however, any dynamic model that launches vertically shall be modeled with its Z-axis pointing vertically. The origin of a static model shall be defined as a point where the model touches the earth. If the model is to appear floating over the earth, it shall have its origin at the point directly below it on the earth. The origin shall be at the center of the base of the model in the X-Y plane. For dynamic models, in the X-Y plane, the origin shall be the centroid of the model. The elevation of the origin shall be where the wheels, tracks, skids, or pontoons contact the ground if it is a surface vehicle, aircraft, or helicopter. All models are specified in units of meters. The traversal order of vertices within a polygon shall be in a clockwise direction relative to the "front" of the polygon.

5.1.2.2.2 Model section structure. Within a SIF data base, models shall be organized into three general classes: 2-D static models, 3-D static models, and 3-D dynamic models. Each type shall have a single library header file which shall in turn refer to separate Model Files containing the actual model representations. The SIF data base shall support storage of each model at up to nine levels of detail (LODs). LOD 0 shall have the least amount of detail, while LOD 8 has the most detail. A series of tables shall be used to refer to colors, face-based texture references, vertex-to-vertex texture references, model-based texture references, user-defined FACS, and the SIF-defined FACS. Each SIF model shall be described by a file made up of variable-length logical keyword records containing ASCII alphanumeric strings. This file shall consist of both geometry and attribute information. If polygonal geometry exists, then a binary vertex table file shall exist to describe polygon vertices. All models shall share the auxiliary data found in the table files. The IGES Version 4.0 file format shall be used to describe the constructive solid geometry of a model. The SIF/HDI format for models shall be entirely ASCII.

5.1.2.2.2.1 Field format. Data fields and records shall vary in length. They shall be stored in a compressed form of ASCII unless otherwise noted in this standard. (The Vertex Table File shall be stored in binary format.) All records (except the file identifier record and table entry records) shall begin with a 2-character keyword identifier. Items in a field are separated by 'space' characters.

5.1.2.2.2.2 Section format. The SIF/HDI model section format shall be as follows and as shown in Figure 3.

For each model library type
  Model Library Header File
  For each model
    Model Data File
    Vertex Table File [mandatory for polygonal format only]
    FACS Table File [optional]
Data Source Table File
~~FACS Table File [optional]~~
User-Defined FACS Table File [optional]
Color Table File [optional]
Face-Based Texture Reference Table File [optional]
Vertex-to-Vertex Texture Reference Table File [optional]
Model-Based Texture Reference Table File [optional]
Non-Mapped Texture Reference Table File [optional]

5.1.2.2.3 Model file structures

5.1.2.2.3.1 Model Library Header File. There shall be a separate Model Library Header File for each of the three library types. These files shall be named "MODEL2DS.LHD" for the 2D Static Model Library, "MODEL3DS.LHD" for the 3D Static Model Library, and "MODEL3DD.LHD" for the 3D Dynamic Model Library. The Model Library Header File format shall be as follows:

SIF File Identifier Record
Model Library Header Record

5.1.2.2.3.1.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI MODELS')
File Identifier Field (always 'MODEL LIBRARY HEADER')

5.1.2.2.3.1.2 Model Library Header Record. The field structure of this file shall be as follows:

Record Keyword Field (always 'ML')
Model Library Type Field
Security Level Field
Number of Models Field

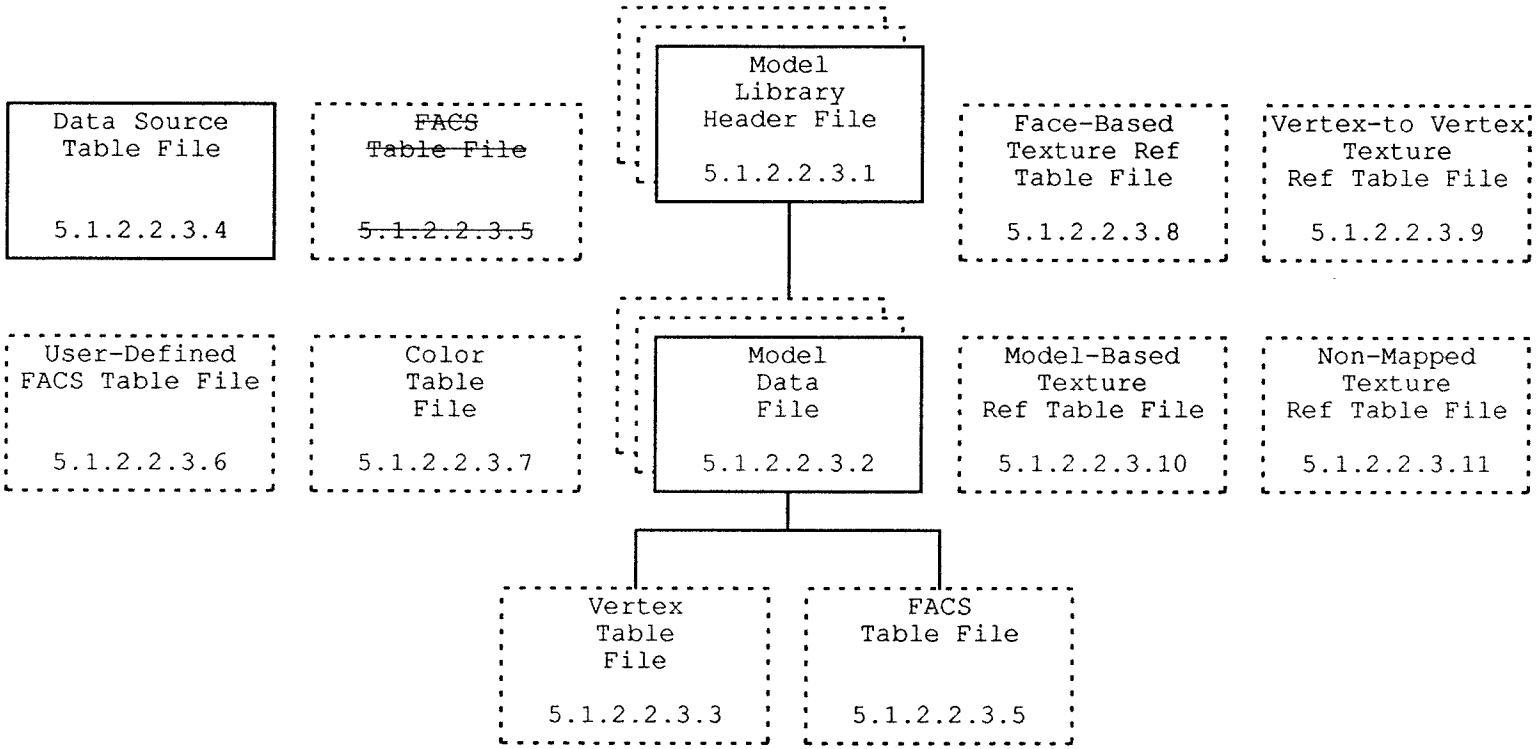

Figure 3. SIF/HDI Model Data File Relationships.

5.1.2.2.3.2.6 Subsidiary Model Reference Record. The number of these records for a given model shall correspond to the value contained in the Number of Subsidiary Model References field in the parent LOD Header record. The order of application for the placement information shall be first the translation, then the scale factor, then the rotation angles. The field structure of this record shall be as follows:

Record Keyword Field (always 'MR')
Referenced Model Library Type Field
Referenced Model Number Field
Referenced Model LOD Field
Translation Field
Scale Factor Field
Rotation Angles Field
Articulated Part Flag Field
FACS Table Index Field

5.1.2.2.3.2.7 Point Light String Record. The number of Point Light String records will correspond to the value in the Number of Point Light Strings field within the LOD Header record. The field structure of this record shall be as follows:

Record Keyword Field (always 'LS')
Length Field
~~Orientation Field~~
Orientation (Model) Field
Light String Shape Field
Width Field
~~Directionality Field~~
Directionality (Model) Field
Light Type Field
Source ID Number Field
Predominant Height Field
Surface Material Category Field
Color Table Index Field
Layer Number Field
Number of Lights Field
Point Light Positions Subrecord
FACS Table Index Field (defaults to 0 if no optional fields specified)

5.1.2.2.3.2.7.1 Point Light Positions Subrecord. The field structure shall be as follows:

for each light in the string
  Point Light Position Field

5.1.2.2.3.2.8 Collision Test Point Record. The number of these records shall correspond to the value in the Number of Collision Test Points field within the parent LOD Header record. The field structure of each record shall be as follows:

Record Keyword Field (always 'TP')
Vertex List Position Field

5.1.2.2.3.2.14 Model Microdescriptor Record. The number of these records corresponds to the Number of Microdescriptors field in the Component Header Record. These microdescriptors apply to all faces (polygons) in the component. The field structure of this record shall be as follows:

Record Keyword Field (always 'MI')
Microdescriptor Type Field
Microdescriptor Value Field

5.1.2.2.3.2.15 Component Texture Reference Pointer Record. The number of these records shall correspond to the value in the Number of Component Texture References field within the parent Component Header Record. The field structure of each record shall be as follows:

Record Keyword Field (always 'CR')
Texture Mapping Type Field
Texture Reference Table Index Field
Texture Mapping Set ID Field

5.1.2.2.3.2.16 Polygon Header Record. The number of these records for a given model shall correspond to the value contained in the Number of Polygons field in the parent LOD Header record. The number of these records for a given component shall correspond to the value contained in the Number of Polygons field in the parent Component Header record. The field structure of this record shall be as follows:

Record Keyword Field (always 'PO')
Polygon ID Field
Component ID Field
Cluster ID Field
Color Table Index Field
Convex Polygon Flag Field
Number of Microdescriptors Field
Number of Vertices Field
Number of Vertex Normals Field
Number of Vertex Colors Field
Number of Polygon Texture References Field
FACS Table Index Field (defaults to 0 if
no optional fields specified)

5.1.2.2.3.5 FACS Table File. The name of this file shall be of the form "Mtttxxxxx.FAC", where "ttt" is "2DS" for a 2D Static Model, "3DS" for a 3D Static Model, and "3DD" for a 3D Dynamic Model; and xxxxx is the model sequence number (not the SSDB model number). The FACS Table File format shall be as follows:

SIF File Identifier Record
FACS Table Header Record
for each FACS table entry
   FACS Table Entry Record

5.1.2.2.3.5.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI MODELS')
File Identifier Field (always 'FACS TABLE')

5.1.2.2.3.5.2 FACS Table Header Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'FT')
Number of FACS Table Entries Field

5.1.2.2.3.5.3 FACS Table Entry Record. The number of these records shall correspond to the count given in the header record. The field structure of this record shall be as follows:

Record Keyword Field (always 'FE')
FACS Table Index Field
Number of FACS Attributes for This Entry Field
for each FACS attribute
      FACS Attribute Subrecord

5.1.2.2.3.5.3.1 FACS Attribute Subrecord. The field structure of each record shall be as follows:

FACS Class Field
FACS Attribute Code Field
Synthetic Data Flag Field
Source ID Number Field
Sensors Supported Field
Attribute Value Field

5.1.2.2.3.9 Vertex-to-Vertex Texture Reference Table File. There shall be one texture pattern vertex defined for each polygon vertex. The first texture pattern vertex shall map to the first polygon vertex. The name of this file shall be "MODEL.VTR" The Vertex-to-Vertex Texture Reference Table File format shall be as follows:

SIF File Identifier Record
Vertex-to-Vertex Texture Reference Table Header Record
for each texture reference
  Vertex-to-Vertex Texture Reference Record

5.1.2.2.3.9.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI MODELS')
File Identifier Field (always 'VERTEX-TO-VERTEX TEXTURE REFERENCE TABLE')

5.1.2.2.3.9.2 Vertex-to-Vertex Texture Reference Table Header Record. The field structure of the record shall be as follows:

Record Keyword Field (always 'VX')
Number of Texture References Field

5.1.2.2.3.9.3 Vertex-to-Vertex Texture Reference Record. There shall be one texture pattern vertex defined for each polygon vertex. The first texture pattern vertex shall map to the first polygon vertex. The field structure of the record shall be as follows:

Record Keyword Field (always 'VB')
Texture Reference Table Index Field
Texture Library Field
Texture ID Field
Layer Number Field
Number of Texture Pattern Coordinates Field
Texture Pattern Coordinates Subrecord

5.1.2.2.3.9.3.1 Texture Pattern Coordinates Subrecord. The field structure of the subrecord shall be as follows:

for each texture pattern point
  ~~Texture Pattern Coordinates (X,Y) Field~~
  Texture Pattern Coordinates Field

5.1.2.2.3.10 Model-Based Texture Reference Table File. The name of this file shall be "MODEL.MTR". The Model-Based Texture Reference Table File format shall be as follows:

SIF File Identifier Record
Model-Based Texture Reference Table Header Record
for each texture reference
  Model-Based Texture Reference Record

5.1.2.2.3.11.3 Non-Mapped Texture Reference Record. The number of these records shall correspond to the count given in the Non-Mapped Texture Reference Table Header Record. The field structure of the record shall be as follows:

Record Keyword Field (always 'NM')
Texture Reference Table Index Field
Texture Library Field
Texture ID Field
Mirror Field
Wrap Field
Wrap Type Field

5.1.2.3 Culture Data. Producers of SIF/HDI culture shall transfer databases using either of two approaches to multiple levels of detail: layered or merged. The layered multi-LOD approach shall be used to represent multiple co-located culture tiles at different LODs. When layered culture data tiles are created, pointers (LOD Cross References) between related features in the lower resolution tiles and the higher resolution tiles shall be provided. The merged single-layer approach shall be used to represent a single layer of tiles throughout the gaming area. Each embedded patch of higher (or lower) resolution data shall be outlined and identified using island descriptor fields within the Data Resolution Identifier Record. Initially, the SDBF shall be responsible for segregating merged culture data into the SSDB layered LOD structure, and extracting requested SSDB data at the highest resolution available within the selected area of coverage and merging it into a single-layer culture database.

5.1.2.3.1 Culture Data Encoding. Comment fields or free text fields shall be embedded into a SIF ASCII data file as follows. The record keyword for a comment record shall be two consecutive asterisks (**). Following the keyword shall be the standard ASCII null character ('00') as a field separator. The comment field shall then continue until end of file (EOF) or the end of field separator is located in the SIF data file. Comment records shall not occur in the middle of any record in the file, but can be placed before or after any other record in the data file. Culture vertex data shall be encoded as binary values, but the headers and feature descriptors shall be encoded using a compressed form of ASCII. This compression shall take the form of stripping all leading zeros from numeric strings and all trailing blanks from character strings. Every ASCII field shall be separated from its neighbors by the ASCII null character ('00'). A SIF/HDI culture data set shall be comprised of six classes of features, defined as follows: Areal features are line segments which form a closed polygon around the area being described; linear (or lineal) features are line segments which typically do not form a closed polygon; point features consist of one or more discrete (non-connected) vertices; point light features consist of a single point which represents a light-emitting feature; point light string features are line segments consisting of two or more discrete (non-connected) vertices representing a light-emitting feature; and model references are a point location at which a model from the SIF/HDI model libraries may be inserted as a substitute for one or more culture features. For each of these classes of features there are certain rules which shall be followed, as defined below.

5.1.2.3.2.1.2 SIF/HDI Culture Database Header Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'DH')
Security Level Field
Culture Coordinate System Field ('GEODETIC' by convention)
Counter-Clockwise Areals Flag Field ('TRUE' by convention)
Explicit Closure of Areals Flag Field ('TRUE' by convention)
Number of LODs Field
~~Number of Tiles Field~~
Number of Culture Tiles Field
Number of Database Boundary Coordinates Field
for each boundary coordinate
    Latitude/Longitude Field
Number Of Data Sources Field

5.1.2.3.2.1.3 Data Source Table Record. The number of these records associated with the transmitted manuscripts shall correspond to the value in the Number of Data Sources Field in the parent SIF/HDI Culture Database Header Record. The field structure of the Data Source Table Record shall be as follows:

Record Keyword Field (always 'DS')
Number of Accuracy Regions Field
Source ID Number Field
Source Type Field
Source Name Field
Source Date Field
Source Agency/Project Field
Data Edition Number Field
Data Series Designator Field
Producer Code Field
Reliability of Data Field
Relative Vertical Accuracy Field
Absolute Vertical Accuracy Field
Relative Horizontal Accuracy Field
Absolute Horizontal Accuracy Field
Collection System Field
Compilation Date Field
Compilation Criteria Field
Security Classification Field
Codewords Field
Control and Handling Field
Releasing Instructions Field
Classification Authority Field
Security Control Number Field
Security Downgrade Field
Downgrading Event Field

5.1.2.3.2.10.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI CULTURE')
File Identifier Field (always 'NON-MAPPED TEXTURE REFERENCE TABLE')

5.1.2.3.2.10.2 Non-Mapped Texture Reference Table Header Record. The Non-Mapped Texture Reference Table Header shall be structured as follows:

Record Keyword Field (always 'NX')
Number of Texture References Field

5.1.2.3.2.10.3 Non-Mapped Texture Reference Record. The field structure shall be as follows:

Record Keyword Field (always 'NM')
Texture Reference Table Index Field
Texture Library Field
Texture ID Field
Mirror Field
Wrap Field
Wrap Type Field

5.1.2.3.2.11 Model Reference Table File. This table shall be included if there are any model references. The name of this file shall be "CULrxxxxx.MRF", where "r" is "M" for Merged Culture Data, "0" for LOD 0 Culture Data, "1" for LOD 1 Culture Data, "2" for LOD 2 Culture Data, "3" for LOD 3 Culture Data, "4" for LOD 4 Culture Data, and "5" for LOD 5 Culture Data; and "xxxxx"is the culture tile sequence number. The Model Reference Table File format shall be as follows:

SIF File Identifier Record
Model Reference Header Record
for each Model Reference Table Entry
  Model Reference Table Entry Record

5.1.2.3.2.11.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI CULTURE')
File Identifier Field (always 'MODEL REFERENCE TABLE')

5.1.2.3.2.11.2 Model Reference Header Record. The Model Reference Header shall be structured as follows:

Record Keyword Field (always 'MR')
Number of Model References Field

5.1.2.3.2.11.3 Model Reference Table Entry Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'ME')
Model Reference Table Index Field
~~Model Number Field~~
~~Model LOD Field~~
Referenced Model Number Field
Referenced Model LOD Field
Orientation Angle Field
Correlation Priority Field
Model Lat Long Field
Height Above Terrain Field
Scale Factor Field
Model Library Type Field
Number of Substituted Features Field
for each Substituted Feature
  Substituted Feature Number Field

5.1.2.3.2.12 Superfeature File. This file shall be included if there are any superfeatures defined within the culture tile. The name of this file shall be "CULrxxxxx.SFR", where "r" is "M" for Merged Culture Data, "0" for LOD 0 Culture Data, "1" for LOD 1 Culture Data, "2" for LOD 2 Culture Data, "3" for LOD 3 Culture Data, "4" for LOD 4 Culture Data, or "5" for LOD 5 Culture Data; and "xxxxx" is the culture tile sequence number. The Superfeature file format shall be as follows:

SIF File Identifier Record
for each Superfeature
  Superfeature Header Record

5.1.2.3.2.12.1 SIF File Identifier Record. The field structure of this record shall be as follows:

Section Identifier Field (always 'SIF/HDI CULTURE')
File Identifier Field (always 'SUPERFEATURE FILE')

5.1.2.3.2.12.2 Superfeature Header Record. There shall be a Superfeature header record for each superfeature defined within the culture tile. The field structure of this record shall be as follows:

Record Keyword Field (always 'SF')
Superfeature ID Field
Superfeature Description Field
Bounding Rectangle Coordinates Field
Number of Aggregate Features Field
Number of Child Features Field
Number of Child Superfeatures Field (currently 0 for P2851 SSDB data)
Number of Parent Superfeatures Field (currently 0 for P2851 SSDB data)
for each Aggregate Feature
  Feature Number Field
for each Child Feature
  Feature Number Field
for each Child Superfeature (currently none for P2851 SSDB data)
  Superfeature ID Field
for each Parent Superfeature (currently none for P2851 SSDB data)
  Superfeature ID Field

5.1.2.3.2.13.3.2 Linear Feature Record. The number of Linear Feature records shall correspond to the value in the Number of Linear Features field within the Manuscript Header Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'LF')
Feature Fragment Flag Field
Width Field
Bounding Rectangle Coordinates Field
Number of Texture References Field
Number of Culture Segments Field
Number of FACS List Pointers Field
Number of Microdescriptors Field
Number of Instances Field
Number of Feature Continuations Field
Feature Number Field
Feature Identification Code Field
Feature Descriptor Code Field
Synthetic Data Flag Field
Source ID Number Field
Correlation Priority Field
Predominant Height Field
Surface Material Category Field
Color Table Index Field
Layer Number Field
Terrain Feature Identifier Field
Number of Higher LOD Cross References Field
Number of Lower LOD Cross References Field

5.1.2.3.2.13.3.3 Point Feature Record. The number of Point Feature records shall correspond to the value in the Number of Point Features field within the Manuscript Header Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'PF')
Length Field
Orientation Field
Width Field
Bounding Rectangle Coordinates Field
Number of Texture References Field
Number of Culture Segments Field
Number of FACS List Pointers Field
Number of Microdescriptors Field
Number of Instances Field
Number of Feature Continuations Field
Feature Number Field
Feature Identification Code Field
Feature Descriptor Code Field
Synthetic Data Flag Field
Source ID Number Field
Correlation Priority Field
Predominant Height Field
Surface Material Category Field
Color Table Index Field
Layer Number Field
Terrain Feature Identifier Field
Number of Higher LOD Cross References Field
Number of Lower LOD Cross References Field

5.1.2.3.2.13.3.3 Point Light String Feature Record. The number of Point Light String Feature records shall correspond to the value in the Number of Point Light Strings field within the Manuscript Header Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'LS')
Feature Fragment Flag Field
Length Field
Orientation Field
Width Field
Directionality Field
Light Type Field
Light String Shape Field
Number of Lights Field
Point Light String Origin Field
Point Light String Delta Field
Bounding Rectangle Coordinates Field
Number of Culture Segments Field
Number of FACS List Pointers Field
Number of Microdescriptors Field
Number of Instances Field
Number of Feature Continuations Field
Feature Number Field
Feature Identification Code Field
Feature Descriptor Code Field
Synthetic Data Flag Field
Source ID Number Field
Correlation Priority Field
Predominant Height Field
Surface Material Category Field
Color Table Index Field
Layer Number Field
Terrain Feature Identifier Field
Number of Higher LOD Cross References Field
Number of Lower LOD Cross References Field

5.1.2.3.2.13.4 Culture Segment Pointer Record. The total number of segment list pointers associated with a feature shall correspond to the value in the Number of Culture Segments Field in the parent Feature Record. The field structure of this record shall be as follows:

Record Keyword Field (always 'SP')
Segment Direction Field
Correlation Priority Field
Segment ID Number Field

5.1.2.3.2.13.5 Model Reference Pointer Record. The total number of these records shall correspond to the value in the Number of Instances field within the parent feature header record. The field structure of this record shall be as follows:

Record Keyword Field (always 'MP')
Model Reference Table Index Field

5.1.2.4.3.4.1.6 Stage 3 Specific Model. Stage 3 Specific Model Texture (M3) shall consist of images whose contents have been changed through radiometric, cut/paste, and geometric operations. Such operations shall include noise removal, occlusion removal, shadow minimization, haze removal, color and contrast enhancements, image-to-image contrast enhancement, and orthorectification to include both 2D geometric corrections and 3D geometric corrections. These images shall be in the local cartesian coordinate system in units of meters.

5.1.2.4.3.4.1.7 Generic. Generic Texture (G) shall consist of non-geospecific images, for both geographic areas as well as models. Such texture shall be radiometrically and geometrically corrected. Generic texture shall be stored in units of meters.

5.1.2.4.3.4.1.8 SMC/FDC. SMC/FDC Texture (SF) shall consist of the DMA Surface Material Category (SMC) and Feature Descriptor Code (FDC) for that position. Such texture shall be geometrically corrected. These images shall be in the geodetic coordinate system with equal arc spacing. SMC/FDC texture shall be provided for geospecific areas only.

5.1.2.4.3.4.2 Field Structure. The field structure of this subrecord shall be as follows. For each texture type, a field shall be Required (R), Optional (O), Conditional (C), or Null (N), as specified herein.

Label	Field	A 123	M 123	G	S F
UDID	Data Base Sentinel (always "SIF/HDI")	RRR	RRR	R	R
GENERAL PROCESSING DATA:					
STEXLIB	Texture Library	RRR	RRR	R	R
TEXID	Texture ID (unique within a Texture Lib.)	RRR	RRR	R	R
STEXID	SSDB Texture ID (original SSDB Tex. ID)	RRR	RRR	R	R
TEXDES	Texture Description	RRR	RRR	R	R
~~HRES~~	~~Horizontal Resolution~~	~~RRR~~	~~RRR~~	~~R~~	~~R~~
~~VRES~~	~~Vertical Resolution~~	~~RRR~~	~~RRR~~	~~R~~	~~R~~
~~HSIZE~~	~~Horizontal Size~~	~~RRR~~	~~RRR~~	~~R~~	~~R~~
~~VSIZE~~	~~Vertical Size~~	~~RRR~~	~~RRR~~	~~R~~	~~R~~
MSTF	Modified Specific Texture Flag	RRR	RRR	N	O
NRF	Noise Removal Flag	RRR	RRR	N	O
ORF	Occlusion Removal Flag	RRR	RRR	N	O
HRF	Haze Removal Flag	RRR	RRR	N	N
SMF	Shadow Minimization Flag	RRR	RRR	N	N
IICEF	Inner Image Contrast Enhancement Flag	RRR	RRR	N	N
ITICEF	Image-to-Image Contrast Enhancement Flag	RRR	RRR	N	N
2GCF	2-D Geometric Correction Flag	RRR	RRR	N	R
3GCF	3-D Geometric Correction Flag	RRR	RRR	N	R
PRCOM	Processing Comments	OOO	OOO	O	O
IQC	Image Quality Comment	OOO	OOO	O	O
IQR	Image Quality Rating	OOO	OOO	O	O
ICAPDT	Image Capture Date & Time	RRR	RRR	O	R
IFCRDT	Image File Creation Date & Time	OOO	OOO	O	O
LMDT	Last Maintenance Date & Time	RRR	RRR	R	R
PAST	Positional Accuracy Standards	OOO	OOO	O	O
GEOLOC	Geographic Location Name	RRR	OOO	O	R
GTSNAME	Generic Texture Set Name	NNN	NNN	R	N

5.1.2.4.3.4.2 Field Structure - Continued.

Label	Field	A 123	M 123	G	S F
SOURCE DATA:					
NUMDS	Number of Data Sources for each data source	RRR	RRR	R	R
SOID	Source ID Number	RRR	RRR	R	R
SOTYPE	Source Type	RRR	RRR	R	R
SONAME	Source Name	RRR	RRR	R	R
SOAP	Source Agency/Project	RRR	RRR	R	R
SODATE	Source Date	RRR	RRR	R	R
SEID	Sensor ID	RRO	RRO	N	O
SETYPE	Sensor Type	RRO	RRO	N	O
SENAME	Sensor Name	RRO	RRO	N	O
REDA	Reliability of Data	RRR	RRR	R	R
PAST	Positional Accuracy Standards	OOO	OOO	O	O
COLSYS	Collection System	RRR	RRR	R	R
CODATE	Compilation Date	RRR	RRR	R	R
SYNDF	Synthetic Data Flag	RRR	RRR	R	R
COMCRI	Compilation Criteria	OOO	OOO	O	O
ICAPDT	Image Capture Date & Time	RRR	RRR	O	R
ENVIRONMENTAL CONDITIONS DATA:					
SPENVC	Special Environmental Conditions	OOO	OOO	N	O
PERCC	Percent of Cloud Cover	RRO	OOO	N	N
PERSC	Percent of Shadow Cover	RRO	OOO	N	N
TEXTURE FOOTPRINT DATA:					
PERTT	Percent of Texture in Tile	RRR	RRR	R	R
PERST	Percent of Specific Texture	RRR	RRR	O	R
NUMBOU	Number of Boundaries for each boundary	RRR	RRR	R	R
BOUNDID	Boundary ID	CCC	CCC	C	C
SOID	Source ID Number	CCC	CCC	C	C
MODVIEW	Model View Description (Stage 3)	CCC	CCC	C	C
HRES	Horizontal Resolution	RRR	RRR	R	R
VRES	Vertical Resolution	RRR	RRR	R	R
HSIZE	Horizontal Size	RRR	RRR	R	R
VSIZE	Vertical Size	RRR	RRR	R	R
NUMBP	Number of Boundary Points for each boundary point	CCC	CCC	C	C
BPID	Boundary Point ID	CCC	CCC	C	C
LATLON	Absolute Latitude/Longitude	CCC	NNN	N	C
RELCO	Relative Coordinates	NNN	CCC	N	N
ICO	Image Coordinates	CCC	CCC	C	C

6.4.1 Testing Facilities. When SIF is specified as a contract deliverable, the contracting officer may wish to arrange access to a Government-controlled facility for use in verification demonstrations and/or tests. The contracting officer may also with to arrange access to such a facility by the contractor to support developmental testing. These arrangements should also be made through the SDBF.

6.5 Data requirements. The following Data Item Descriptions (DIDs) must be listed, as applicable, on the Contract Data Requirements List (DD Form 1423) when this standard is applied on a contract, in order to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.4	DI-MCCR-80012	Software Design Document	Yes

The above DIDs were those cleared as of the date of this standard. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

6.6 Subject term (key word) listing.

Culture data
Constructive Solid Geometry
Database standards
Feature data
Photo texture
Models
Project 2851
Simulator databases
Terrain data
Texture
Training systems

6.7 Referenced documents. The following documents were used as references, in preparation of this standard.

~~DEFENSE MAPPING AGENCY~~

~~DMA Standard Supporting Mark 90, Section 100, Glossary of Feature/Attribute Definitions, Second Edition, June 1988, revised December 1988.~~

~~(Application for copies should be addressed to Defense Mapping Agency, 8613 Lee Highway, Fairfax VA 22031-2137.)~~

NATIONAL IMAGERY AND MAPPING AGENCY

MIL-STD-2408 Mapping, Charting & Geodesy
Glossary of Feature and Attribute Definitions
21 April 1995

(Application for copies should be addressed to Naval Publications and Forms Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

10. SCOPE

10.1 Scope. This Appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

10.2 Purpose. This Appendix provides definitions of the data fields to be used within SIF data bases.

20. APPLICABLE DOCUMENTS

20.1 Government documents

20.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks forma a part of this Appendix to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those lised in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement hereto, cited in the solicitation (see 6.2 of this Standard).

MIL-STD-1820	Generic Transformed Data Base Design Standard
MIL-STD-2408	Mapping, Charting & Geodesy Glossary of Feature and Attribute Definitions

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Form Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

20.2 Order of precedence. In the event of a conflict between the text of this appendix and the references cited herein, the text of this Appendix shall take precedence. Nothing in this Appendix, however, supercedes applicable laws and regulations unless a specific exemption has been obtained.

30 DEFINITIONS AND ACRONYMS

30.1 Definitions. The definitions provided in this Standard shall apply to this Appendix.

40 GENERAL REQUIREMENTS

40.1 This Appendix shall be a mandatory part of the standard. The information contained herein is intended for compliance.

40.2 Data Types. Data items shall be represented in the forms specified in Table A-1. Appendix C, para 60.1, explains Gridded Data Section (GDS) application and data item types of binary, integer, real, string, enumerated, and boolean.

40.2 GTDB Commonality. The definitions of some data items included within SIF data sets differ from the definitions contained within MIL-STD-1820, Generic Transformed Data Base Design Standard. Users of both SIF and GTDB need to exercise caution when using common software for both SIF and GTDB data sets.

50 **DETAILED REQUIREMENTS**

50.1 Data Items. All data items included in a SIF data set shall adhere to the definitions specified in Table A-2 of this standard.

60 **NOTES**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Referenced documents. The following documents were used as references, in preparation of this Appendix.

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI X3,27 — Information Systems - File Structure and Labeling of Magnetic Tapes for Information Interchange

ANSI/IEEE STD 754 — Binary Floating Point Arithmetic

(Application for copies should be addressed to Amreican National Standards Institute, 11 West 42nd Street, New York NY 10036.)

DEFENSE INTELLIGENCE AGENCY

DDM-2600-63220-90 — National Imgery Transmission Format (NITF), Version 1.1, 1 March 1989, sections 1 through 4.5

(Application for copies should be addressed to Defense Intelligence Agency, DIA/DM-1A, 3100 Clarendon Boulevard, Arlington, VA 22201-5317.)

~~DEFENSE MAPPING AGENCY~~

~~DMA Standard Supporting Mark 90, Section 100, Glossary of Feature/Attribute Definitions, Second Edition, June 1988, revised December 1988.~~

~~(Application for copies should be addressed to Defense Mapping Agency, 8613 Lee Highway, Fairfax VA 22031-2137.)~~

NATIONAL IMAGERY AND MAPPING AGENCY

MIL-STD-2408 Mapping, Charting & Geodesy
Glossary of Feature and Attribute Definitions
21 April 1995

(Application for copies should be addressed to Naval Publications and Forms Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

Field Name	Type	Length (CHARS)	Range	Description
.				
.				
.				
Directionality (Model)	REAL10	16	0.0..360.0	Angle from a model's x axis by which a point light is visible. A value of '360.0' indicates that the light is omnidirectional
.				
.				
.				

Field Name	Type	Length (CHARS)	Range	Description
~~Feature Descriptor Code~~	~~STR~~	~~5~~	~~--~~	~~Alphanumeric code asigned to classify culture and models within a set of hierarchical categories, based on the DMA FACS as extended by P2851~~
Feature Descriptor Code	STR	5	--	Alphanumeric code assigned to classify culture and models within a set of hierarchical categories, based on the extensions applied by P2851 to FACS codes defined in MIL-STD-2408

.
.
.

Field Name	Type	Length (CHARS)	Range	Description
~~Global Reference Point~~	~~INT2D~~	~~23~~	~~(-2147483648.. 2147483647; -2147483648.. 2147483647)~~	~~A point on 2D culture which corresponds to the origin of the texture being mapped~~
	~~INT3D~~	~~35~~	~~(-2147483648.. 2147483647; -2147483648.. 2147483647; -2147483648.. 2147483647)~~	~~A point on 3D culture which corresponds to the origin of the texture being mapped~~
Global Reference Point	REAL2D10	33	(-3.24e+09.. 3.24e+09; -6.48e+09.. 6.48e+09)	A point on 2D culture which corresponds to the origin of the texture being mapped (expressed in 1/10000 arc seconds)
	REAL3D10	50	(-3.24e+09.. 3.24e+09; -6.48e+09.. 6.48e+09; -12000000.0.. 100000.0)	A point on 3D culture which corresponds to the origin of the texture being mapped (expressed in 1/10000 arc seconds for latitude and longitude, and in millimeters for elevation)
Haze Removal Flag (GDS)	BOOLEAN	5	TRUE, FALSE	Flag indicating whether haze has been removed from an image
Height Above Terrain	INT	10	0..2147483647	The z value that is used for the placement point of a model, to identify the height above ground level, expressed in millimeters
Highest Feature Number	INT	10	1..2147483647	Identifier of the highest feature number contained within a culture tile
Highest Segment Number	INT	10	1..2147483647	Identifier of the highest segment number contained within a culture tile
Horizontal Captured Texel Size (GDS)	REAL10	16	0.0.. 1.393796575e+42	Approximate ground distance for a texel (expressed in meters) in the horizontal x-direction
Horizontal Resolution (BOTH)	REAL6	12	0.0..1.93428e+25	Horizontal length of a texel; units are arc-seconds/texel for Stage 3 Areal Texture and meters/texel for all others.

Field Name	Type	Length (CHARS)	Range	Description
~~Horizontal Size (GDS)~~	~~REAL6~~	~~12~~	~~0.0.. 1.93428e+25~~	~~The horizontal size of the entire image in meters, e.g., 1000.0 Meters~~
Horizontal Size (GDS)	REAL6	12	0.0.. 1.93428e+25	The horizontal size of the portion of the image specified by the texture footprint boundary. Note that when there is one footprint boundary that covers the entire image, this size value will yield the horizontal size of the entire image. This size value is to be expressed in meters, e.g., 1000.0 Meters
IGES Sequence Number for Component	INT	4	0..2000	Identifier for an IGES record that defines a component
Image Capture Date and Time (BOTH)	STR	12	YYMMDDHHMMSS	The date and time of day that a SIF image was captured, where YYMMDD = Year, Month and Day, and HHMMSS = Hours (0..24), Minutes and Seconds

Field Name	Type	Length (CHARS)	Range	Description
~~Image Coordinate System (GDS)~~	~~ENUM~~	~~1~~	~~G, O~~	~~Cordinate system of the image where G = geodetic, O = other. While NITF allows other values, P2851 has restricted the range of this field, for texture to be accepted into the active SSDB, the coordinate system must be geodetic~~
Image Coordinate System (GDS)	ENUM	1	G, O	Cordinate system of the image where G = geodetic, O = other. While NITF allows other values, the SDBF has restricted the range of this field

.
.
.

Field Name	Type	Length (CHARS)	Range	Description
.				
.				
.				
Orientation (Model)	REAL10	16	0.0..360.0	Orientation of a point light string's light object from the model's x axis, expressed in degrees.
.				
.				
.				

Field Name	Type	Length (CHARS)	Range	Description
~~Referenced Model LOD~~	~~ENUM~~	~~2~~	~~L0, L1, L2, L3, L4, L5, L6, L7, L8~~	~~The referenced level of detail of a referenced model~~
Referenced Model LOD	ENUM	2	L0, L1, L2, L3, L4, L5, L6, L7, L8, LA	The referenced level of detail of a referenced model. 'LA' is to be used when the referencing object does not need to point at a specific LOD of the model but rather just the model itself.

.
.
.

Field Name	Type	Length (CHARS)	Range	Description
~~Texture Library~~	~~ENUM~~	~~15~~	~~STAGE_1_AREAL_ TEXTURE, STAGE_2_AREAL_ TEXTURE, STAGE_3_AREAL_ TEXTURE, STAGE_1_MODEL_ TEXTURE, STAGE_2_MODEL _ TEXTURE, STAGE_3_MODEL _ TEXTURE, GENERIC_TEXTURE, SMC_FDC_TEXTURE~~	~~ID of one of the eight texture libraries~~
Texture Library	ENUM	21	STAGE_1_AREAL_ TEXTURE, STAGE_2_AREAL_ TEXTURE, STAGE_3_AREAL_ TEXTURE, STAGE_1_MODEL_ TEXTURE, STAGE_2_MODEL _ TEXTURE, STAGE_3_MODEL _ TEXTURE, GENERIC_TEXTURE, SMC_FDC_TEXTURE	ID of one of the eight texture libraries

.
.
.

Field Name	Type	Length (CHARS)	Range	Description
.				
.				
.				
~~Texture Pattern Coordinates~~	~~INT2D~~	~~11~~	~~(0..99999, 0..99999)~~	~~Positions within an image that are to be tied to the vertices of a model polygon when performing a vertex-to-vertex texture mapping~~
Texture Pattern Coordinates	REAL2D6	25	(0.0..1.0, 0.0..1.0)	Relative positions within an image that are to be tied to the vertices of a model polygon when performing a vertex-to-vertex texture mapping where (0,0) represents the upper left corner of the image and (1.0,1.0) represents the lower right corner of the image
.				
.				
.				

Field Name	Type	Length (CHARS)	Range	Description
.				
.				
.				
~~Vertical Size (GDS)~~	~~REAL6~~	~~12~~	~~0.0.. 1.93428e+25~~	~~The vertical size of the entire image in meters, e.g., 1000.0 Meters~~
Vertical Size (GDS)	REAL6	12	0.0.. 1.93428e+25	The vertical size of the portion of the image specified by the texture footprint boundary. Note that when there is one footprint boundary that covers the entire image, this size value will yield the vertical size of the entire image. This size value is to be expressed in meters, e.g., 1000.0 Meters
.				
.				
.				

SIF/HDI FACS CODES AND SIF SPECIFIC FEATURE DESCRIPTOR CODES

10. SCOPE

10.1 Scope. This Appendix is a mandatory part of the standard. The information contained herein is intended for compliance.

10.2 Purpose. The purpose of this Appendix is to define the SIF description of the SIF/HDI FACS Codes and SIF specific Feature Descriptor Codes (FDCs) that may be used during transmission of SIF databases.

20. APPLICABLE DOCUMENTS

20.1 Government documents

20.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks forma a part of this Appendix to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those lised in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement hereto, cited in the solicitation (see 6.2 of this Standard).

MIL-STD-1820	Generic Transformed Data Base Design Standard
MIL-STD-2408	Mapping, Charting & Geodesy Glossary of Feature and Attribute Definitions

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Form Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

20.2 Order of precedence. In the event of a conflict between the text of this appendix and the references cited herein, the text of this Appendix shall take precedence. Nothing in this Appendix, however, supercedes applicable laws and regulations unless a specific exemption has been obtained.

30 DEFINITIONS AND ACRONYMS

30.1 Definitions. The definitions provided in this Standard shall apply to this Appendix.

40 GENERAL REQUIREMENTS

40.1 This Appendix shall be a mandatory part of the standard. The information contained herein is intended for compliance.

~~40.1 FACS Commonality. The starting point for all FDCs and FACS codes within the SIF Military Standard shall be the Glossary of Feature/Attribute Definitions as published by the Defense Mapping Agency (DMA).~~

40.1 FACS Commonality. The starting point for all FDCs and FACS codes within the SIF Military Standard shall be MIL-STD-2408, Mapping, Charting & Geodesy Glossary of Feature and Attribute Definitions.

40.2 GTDB Commonality. The Feature Descriptor Codes (FDCs) defined in Appendix B of MIL-STD-1820 shall be used within SIF data sets. Additional SIF-specific FDCs shall conform to section 50 of this Appendix.

50 DETAILED REQUIREMENTS

50.1 FACS Codes. The specified FACS code shall be used for the entries in the FACS Table supplied with a model or a culture tile. Vaild ranges and types (integer, floating point, etc.) shall be as defined in the Project 2851 Data Base Design Documents and appendices. The exceptions to this are noted with an asterisk (*), and the acceptable ranges shall be as defined in ~~the DMA FACS Glossary~~ MIL-STD-2408 for these codes. To maintain compatability with the ~~DMA FACS Glossary~~ MIL-STD-2408, the SIF attributes that are represented via ~~the DMA FACS Glossary~~ MIL-STD-2408 codes shall use the same three character attribute identifier as used by ~~the DMA FACS Glossary~~ MIL-STD-2408. When a SIF user creates a user-defined FACS attribute, the first two characters of the FACS code shall be the originatory code for that user.

SIF Attribute Name	FACS Code	
Absorptivity	ABSORP	
Accuracy Category	ACCxxx	*
Aircraft Facility Type	AFTxxx	*
Amusement Park Structure	APSxxx	*
Angle of Orientation	AOO	*
Angle of Orientation, Derived	1AO	*
Angle of Radar Reflecotr, Derived	1AR	*
Area Coverage Attribute	ARA	*
ATS Use Attribute	AUAxxx	*
Bank Height Left 1	HL1xxx	*
Bank Height Right 1	HR1xxx	*
Base Polygon ID	BASEID	
Beacon Type Category	BEAxxx	*
Bottom Material Composition	BMCxxx	*
Bridge and/or Superstructure Category	BSCxxx	*
Bridge Reference Number	BRN	*
Brush/Undergrowth Density Code	BUDxxx	*
Building Function Category	BFCxxx	*
Bypass Condition Category	BCCxxx	*
Centroid (Deleted)	CENTRD	
Cluster ID	CLUSTR	
Color Table Index	CTINDX	
Component Name	CMNAME	
Conspicuous Object Category	COCxxx	*
Crane Attribute	CRAxxx	*
Culture Centroid	CCNTRD	
Current Type Category	CURxxx	*
Cycle Rate Off Time	LTOFF	
Cycle Rate On Time	LTON	
Dense Bank Vegetation Left	DVLxxx	*
Dense Bank Vegetation Right	DVRxxx	*
Density of Roof Cover, Derived	1DRxxx	*
Density of Structures, Derived	1DSxxx	*
Density of Tree Cover, Derived	1DTxxx	*
Density Measure, % of Roof Cover	DMRxxx	*
Density Measure, % of Tree/Canopy Cover	DMTxxx	*
Density Measure, Structure Count	DMS	*
Depth, Derived	1DE	*
Depth Below Surface	DEP	*
Depth of Water	DW1xxx	*
Diffuse Reflectance	DISREF	
Direction of Flow	DOF	*

50.2 SIF-Specific FDCs. The Feature Descriptor Codes (FDCs) identified in Appendix B of the GTDB Military Standard (MIL-STD-1820) shall be used for SIF. In addition, the following SIF-specific codes shall be used.

SIF FDC Code	Description
GRV02	Anti-Aircraft Artillery Vehicle
GRV01	Truck, General Purpose
HEL01	Helicopter
SML01	SAM Launcher
SMS01	SAM Site

60 **NOTES**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Referenced documents. The following documents were used as references, in preparation of this Appendix.

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI X3,27 Information Systems - File Structure and Labeling of Magnetic Tapes for Information Interchange

ANSI/IEEE STD 754 Binary Floating Point Arithmetic

(Application for copies should be addressed to Amreican National Standards Institute, 11 West 42nd Street, New York NY 10036.)

DEFENSE INTELLIGENCE AGENCY

DDM-2600-63220-90 National Imgery Transmission Format (NITF), Version 1.1, 1 March 1989, sections 1 through 4.5

(Application for copies should be addressed to Defense Intelligence Agency, DIA/DM-1A, 3100 Clarendon Boulevard, Arlington, VA 22201-5317.)

~~DEFENSE MAPPING AGENCY~~

~~DMA Standard Supporting Mark 90, Section 100, Glossary of Feature/Attribute Definitions, Second Edition, June 1988, revised December 1988.~~

~~(Application for copies should be addressed to Defense Mapping Agency, 8613 Lee Highway, Fairfax VA 22031-2137.)~~

NATIONAL IMAGERY AND MAPPING AGENCY

MIL-STD-2408 Mapping, Charting & Geodesy
Glossary of Feature and Attribute Definitions
21 April 1995

(Application for copies should be addressed to Naval Publications and Forms Center, ATTN: NPODS, 5801 Tabor Avenue, Philadelphia PA 19120-5099.)

i. For geo-specific photo texture, positioning accuracy of the pixels must meet the same standard as applied to DTED terrain posts, i.e., 130 meters, circular error, at the 90% confidence level, relative to WGS.

40.3.1 General Approach. SIF compliance will be assured in two ways: through the certification of the producer's data base generation system, and through the actual testing of individual data sets. Data set testing is expected to be used only during the initial certification of the process, and as occasional "spot checks" to ensure that the DBGS remains compliant during its production lifecycle. Particularly critical SIF data sets, such as those used for mission rehearsal applications, may be explicitly tested, also.

40.3.2 Process Certification. It is expected that many external SIF producers will, over the periods of performance of their individual contracts, end up generating a relatively large number of SIF data sets. Ostensibly, the quality review and approval of each of these could become a major effort on the part of the SDBF. Since the SDBF's resources will be quite limited, this is not seen as a viable approach. Threfore, instead of testing each individual data set, the producing software processes (i.e., the producer DBGSs) will be certified by the SDBF. The SDBF will assign a figure of merit (FOM) for each external data base generation system, certifying it for SIF production at some quality level. The FOM will fall within the range of zero through ~~nine~~ five, ~~nine~~ five being the highest level of certification attainable, and representing the best quality SIF data sets. The FOM provides a quantitative metric for the three categories of SIF compliance defined in this standard, namely format conformance, source correlation, and SDBF compatability. The acceptance of a given data set by the SDBF will be based upon this FOM, in conjunction with other factors, a discussed elsewhere in this appendix. Based upon an evaluation of the SIF data sets output by a given DBGS, the system will be assigned a FOM as follows:

0: Format does not conform to all mandatory requirements of the standard

1: Format conforms with all mandatory requirements of the standard, and may support a subset of its optional fields

2: Meets FOM-1, and supports all optional data fields

3: Meets FOM-1, and populates all mandatory fields with information correlated to its source data base

4: Meets FOM-3, and populates the subset of optional fields with source-correlated data

5: Meets FOM-2 and FOM-3, populates optional fields with source-correlated data when available, and remaining optional fields with default values

~~6: Meets FOM-3, and creates mandatory source data in accordance with SDBF production standards~~

~~7: Meets FOM-4 and FOM-6, and populates the subset of optional fields in accordance with SDBF production standards~~

Figure C-1 graphically portrays the relationships between the different FOMs. In cases where approved waivers have been granted, the producer's FOM will be flagged with a W after the numeric identifier (i.e., 1W).

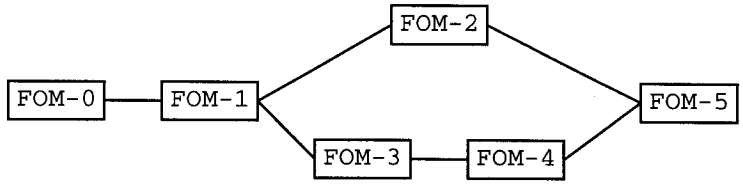

Figure C-1. FOM Relationships

~~8: Meets FOM-5 and FOM-7, and generates all fields in accordance with SDBF production standards~~

~~9: Meets FOM-8, and is fully compatable with all internal SDBF maintenance and quality control procedures~~

.
.
.

.
.
.

~~50.1.2.2.3.5 FACS Table File. This optional file serves two primary purposes: (1) to minimize space by eliminating redundant model and/or component attribute assignments and (2) to allow expandability of supported attributes. There shall be zero or one of these files in the SIF Model Section. A FACS Table Index pointing to the appropriate table entry can be found in several records.~~

50.1.2.2.3.5 FACS Table File. This optional file serves two primary purposes: (1) to minimize space by eliminating redundant component attribute assignments and (2) to allow expandability of supported attributes. There shall be zero or one of these files for each model in the SIF Model Section. A FACS Table Index pointing to the appropriate table entry can be found in several records.

.
.
.