MICROSOFT OFFICE EXCEL 97-2007

BINARY FILE FORMAT SPECIFICATION

[*.xls (97-2007) format]

Microsoft Office Excel 97-2007 Binary File Format (.xls) Specification

NOTICE

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Introduction

The Binary Interchange File Format (BIFF) is the file format Microsoft Office Excel workbooks are saved to (aka *.xls). Microsoft Excel versions 5.0 and later use compound files (explained later in this document); this is the OLE implementation of the Structured Storage Model. For more information on this standard, see http://download.microsoft.com/download/0/B/E/0BE8BDD7-E5E8-422A-ABFD-4342ED7AD886/WindowsCompoundBinaryFileFormatSpecification.pdf.

File Format Versions

This document covers the implementation of BIFF versions 5, 7, and 8 for versions of Microsoft Excel released since version 5.0 and as noted in the following table:

BIFF version	Microsoft Office Excel version
BIFF5	Microsoft Excel version 5.0 (XL5)
BIFF7	Microsoft Excel 95 (XL7) (also called Microsoft Excel version 7)
BIFF8	Microsoft Excel 97 (XL8), Microsoft Excel 2000 (XL9), Microsoft Excel 2002 (XL10), Microsoft Office Excel 2003 (XL11), Microsoft Office Excel 2007 (XL12)

You can identify the BIFF version used in an XLS file from the Beginning Of File (BOF) record present in all BIFF version 5, 7, and 8 files. In BIFF4 and earlier versions, various records (other than the BOF record) have version information specified in the high-order byte of their record numbers. This was a redundant methodology, so for versions of BIFF after BIFF4, Excel obtains the BIFF version by reading the BOF record.

The record descriptions in this document apply to BIFF versions 5, 7, and 8. If records have differences between the various BIFF versions, they are noted in the record descriptions within this document.

The following tables describe the new and changed records in BIFF8 as compared to BIFF7. For more information on these records, see the record description listed later in this document.

Note: unless otherwise noted, the use of the word Excel without a reference to a specific version or release implies the generic function or ability of Excel for releases 5.0 through 2007. Also, a form of shorthand notation is used throughout this document to indicate release levels of Excel. For example, XL9 = Microsoft Excel 2000, XL10 = Microsoft Excel 2002, XL11 = Microsoft Office Excel 2003, XL12 = Microsoft Office Excel 2007 and so on.

New Records in BIFF8 for Microsoft Excel 97

Number	Record
1B1h	CF
1BAh	CODENAME
1B0h	CONDFMT
1B5h	DCONBIN
161h	DSF
1BEh	DV
1B2h	DVAL
1C0h	EXCEL9FILE
FFh	EXTSST

Number	Record
1B8h	HLINK
FDh	LABELSST
E5h	MERGECELLS
ECh	MSODRAWING
EBh	MSODRAWINGGROUP
EDh	MSODRAWINGSELECTION
DCh	PARAMQRY
1Afh	PROT4REV
1BCh	PROT4REVPASS
1ADh	QSI
1C1h	RECALCID
1B7h	REFRESHALL
FCh	SST
1AEh	SUPBOOK
C6h	SXDB
122h	SXDBEX
F1h	SXEX
1BBh	SXFDBTYPE
F2h	SXFILT
F9h	SXFMLA
FBh	SXFORMAT
103h	SXFORMULA
F6h	SXNAME
F8h	SXPAIR
F0h	SXRULE
F7h	SXSELECT
100h	SXVDEX
1B6h	TXO
1A9h	USERBVIEW
1AAh	USERSVIEWBEGIN
1ABh	USERSVIEWEND
160h	USESELFS
162h	XL5MODIFY

Changed Records in BIFF8 for Microsoft Excel 97

Number	Record
09h	BOF
85h	BOUNDSHEET
200h	DIMENSIONS
0Bh	INDEX
1Ch	NOTE
5Dh	OBJ
DCh	SXEXT
1Ah	VERTICALPAGEBREAKS
23Eh	WINDOW2
5Ch	WRITEACCESS
59h	XCT
E0h	XF

The User Names and Revision Log streams support the shared workbooks features that were added in Excel 95. The BIFF record data in shared list records (records that begin with RR), and the binary format of the User Names and Revision Log streams are documented.

The DocumentSummaryInformation and SummaryInformation streams support the document properties available in Excel 95 and 97, which are standardized across Microsoft Office applications. SummaryInformation and DocumentSummaryInformation are widely understood and additional information can be found at:

- http://msdn2.microsoft.com/en-us/library/aa380376(VS.85).aspx
- http://poi.apache.org/apidocs/org/apache/poi/hpsf/SummaryInformation.html
- http://poi.apache.org/apidocs/org/apache/poi/hpsf/DocumentSummaryInformation.html

FRT Record Description

Excel 97 and later versions support Future Record Types (FRTs). These records are used to roundtrip information that was not supported in that version. Basically, data in an FRT is ignored by versions of Excel that do not recognize the command name or data format. This allows data to be retained by Excel from a file read to a file save, but ultimately the data is ignored and not acted upon by the version of Excel that encounters the data. While Excel 97 may not support a new command, record, or data format, it does save the unsupported command, record, or data in a defined manner and write these elements back to the record stream when the file is saved. For example, this allows an Excel 2000 or later version of Excel to load back new records without loss of data.

When Excel 97 or later encounters unrecognized FRT records, it writes them to the record stream at the end of the current record block.

Note: FRT records longer than the maximum allowable record length use the CONTINUEFRT record instead of the CONTINUE record for additional information.

The FRT header definition is:

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt that appears in the first two bytes of the record
6	grbitFrt	2	FRT flags; see following table
8	REF	8	REF structure; this is only present when the bitfFrtRef flag is set in grbitFrt; otherwise the actual record data starts in this position

The grbitFrt field has the following option flags.

Bits	Mask	Flag Name	Contents
0	0001h	bitfFrtRef	1= a REF structure is present in the FRT header
1	0002h	bitfFrtVolatile	1= Excel should give an alert when saving if that version doesn't recognize the FRT

15-2 FFFCh (Reserved) Reserved; must be zero

The REF structure has the following fields.

Offset	Field Name	Size	Contents
8	rwFirst	2	The first row of the range associated with the record
10	rwLast	2	The last row of the range associated with the record
12	colFirst	2	The first column of the range associated with the record
14	colLast	2	The last column of the range associated with the record

New FRT Records in Excel 2000

Number	Record
812h	CONTINUEFRT
803h	DBQUERYEXT
804h	EXTSTRING
800h	HLINKTOOLTIP
80Ah	OLEDBCONN
807h	QSIF
806h	QSIR
802h	QSISXTAG
80Eh	SXPIEX
80Dh	SXTH
80Fh	SXVDTEX
80Ch	SXVIEWEX
810h	SXVIEWEX9
80Bh	WOPT

New FRT Records in Excel 2002

Number	Record
863h	BOOKEXT
865h	CRASHRECERR
86Ah	DATALABEXT
86Bh	DATALABEXTCONTENTS
86Ch	CELLWATCH
866h	HFPicture
813h	REALTIMEDATA
862h	SHEETEXT
864h	SXADDL
868h	FEAT
867h	FEATHEADR
86dh	FEATINFO

New FRT Records in Excel 2003

Number	Record
875h	CONTINUEFRT11
874h	DROPDOWNOBJIDS
872h	FEAT11
871h	FEATHEADR11
873h	FEATINFO11

New FRT Records in Mac Excel 11

Number	Record
8c9h	LNEXT
8cah	MKREXT
8cbh	CRTCOOPT
8c0h	AUTOWEBPUB
8c1h	LISTOBJ
8c2h	LISTFIELD
8c3h	LISTDV
8c4h	LISTCONDFMT
8c5h	LISTCF
8c6h	FMQRY
8c7h	FMSQRY
8c8h	PLV

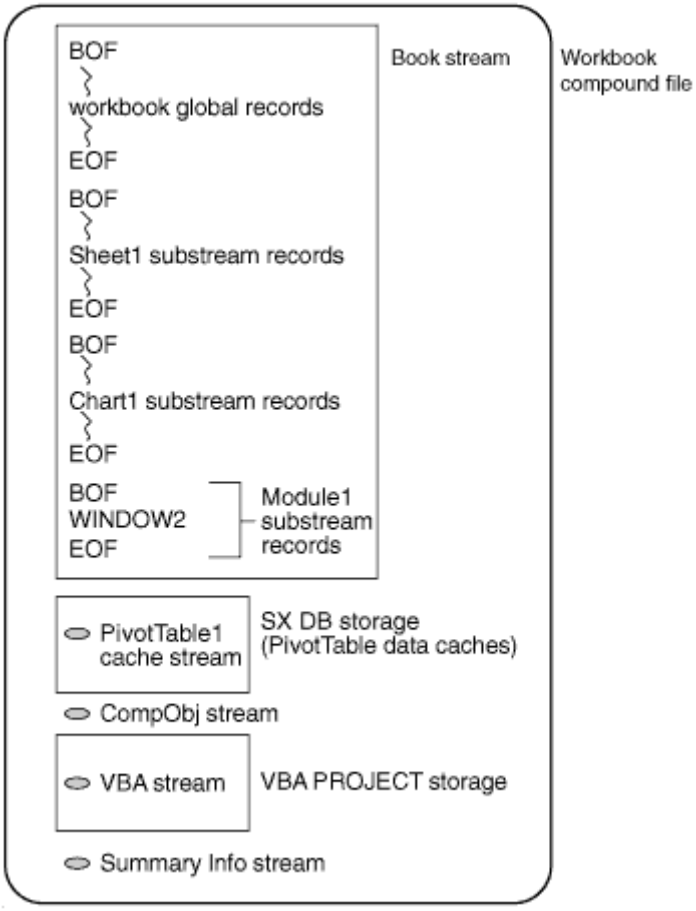
New FRT Records in Excel 2007

Number	Record
876h	DCONN
877h	LIST12
878h	FEAT12
879h	CONDFMT12
87Ah	CF12
87Bh	CFEX
87Ch	XFCRC
87Dh	XFEXT
87Eh	EZFILTER12
87Fh	CONTINUEFRT12
881h	SXADDL12
884h	MDTINFO
885h	MDXSTR
886h	MDXTUPLE
887h	MDXSET
888h	MDXPROP
889h	MDXKPI
88Ah	MDTB
88Bh	PLV
88Ch	COMPAT12
88Dh	DXF
88Eh	TABLESTYLES
88Fh	TABLESTYLE
890h	TABLESTYLEELEMENT
892h	STYLEEXT
893h	NAMEPUBLISH
894h	NAMECMT
895h	SORTDATA12
896h	THEME
897h	GUIDTYPELIB
898h	FNGRP12
899h	NAMEFNGRP12
89Ah	MTRSETTINGS

89Bh COMPRESSPICTURES
89Ch HEADERFOOTER
8A3h FORCEFULLCALCULATION

The Workbook Compound File

An OLE 2 compound file is essentially "a file system within a file." The compound file contains a hierarchical system of storages and streams. A storage is analogous to a directory, and a stream is analogous to a file in a directory. Each Excel workbook is stored in a compound file, an example is shown in the following illustration. This file is a workbook that contains three sheets: a worksheet (Book stream – Sheet1 substream records) with a PivotTable (SX DB storage), a Visual Basic module (VBA PROJECT storage), and a chart (Book stream - Chart1 substream records).



If a workbook contains embedded objects, then the file will also contain storages written by the applications that created the objects. The PivotTable data cache storage and VBA PROJECT storage are not covered in this document. The CompObj stream contains OLE 2 component object data, and the Summary Info stream contains the standardized file summary information such as title, subject, author, and so on.

The Book stream begins with a BOF record, and is followed by workbook global records up to the first EOF. The workbook global section contains one BOUNDSHEET record for each sheet in the workbook. You can use the dt field

(document type), the lbPlyPos field (stream position of the BOF record for the sheet), and the cch/rgch fields (sheet name as a byte-counted string) to quickly read selected sheets in the workbook.

Each sheet in the workbook is stored after the workbook global section, beginning with BOF and ending with EOF. If you read the file in a continuous stream (instead of using the BOUNDSHEET records), you can test the dt field of each BOF record to determine the sheet type.

Simple Save (new for BIFF7 and later)

Excel 95 and 97 use a simple save method from OLE 2, developed to increase performance. Excel uses the simple save method if a workbook has no:

Visual Basic modules

PivotTables

embedded objects on worksheets

When Excel saves a workbook using simple save, the streams in the file must be at least 4k bytes long. The OLE 2 code adds padding bytes to the streams to ensure they are at least 4k bytes long. If you use a low-level binary viewer (instead of the BiffView utility) to examine the resulting file, the padding bytes appear as "garbage" at the end of the streams.

To find the actual end of the Book stream, increment a counter each time a BOF record is read and then decrement it every time an EOF record is read. When the counter reaches zero, the last EOF in the Book stream was read.

Double Stream File

For improved backward compatibility, Excel 97 has a save file type option: **Microsoft Excel 97 & 5.0/95 Workbook**. When a workbook is saved using this file type, Excel writes two complete book streams. The first stream in the file is the **Microsoft Excel 5.0/95** format (BIFF5/BIFF7), and the second one is the **Microsoft Excel 97** format (BIFF8). The DSF record, which only appears in the BIFF8 stream, indicates the file is a double stream file.

To distinguish the two streams, the BIFF5/BIFF7 stream is called Book, and the BIFF8 stream is called Workbook.

Unicode Strings in BIFF8

Excel 97 and later versions use unicode strings. In BIFF8, strings are stored in a compressed format. Each string contains the following fields:

Offset	Field Name	Size	Contents
0	cch	2	Count of characters in the string (**Note**: this is the number of characters, NOT the number of bytes)
2	grbit	1	Option flags (see grbit field definition table below)
3	rgb	var	Array of string characters and formatting runs

Unicode strings usually require 2 bytes of storage per character. Because most strings in USA/English Excel have all of the high bytes of unicode characters set to 00h, the strings can be saved using a compressed unicode format. The grbit field specifies the compression encoding as shown in the following table.

grbit field definition:

Bits	Mask	Flag Name	Contents
0	01h	fHighByte	=0 if all the characters in the string have a high byte of 00h and only the low bytes are saved in the file (compressed) =1 if at least one character in the string has a nonzero high byte and therefore all characters in the string are saved as double-byte characters (not compressed)
1	02h	(Reserved)	Reserved; must be 0 (zero)
2	04h	fExtSt	Extended string follows (East Asian versions, see text)
3	08h	fRichSt	Rich string follows
7–4	F0h	(Reserved)	Reserved; must be 0 (zero)

An unformatted string with all high bytes set to 00h has grbit=00h. This implies there are no formatting runs (crun), which means the crun runs count field does not exist.

An unformatted string that has at least one character with a nonzero high byte has grbit=01h.

A formatted string with all high bytes set to 00h has grbit=08h if the string has several different character formats applied.

The easiest way to understand the contents of BIFF8 strings is to look at an example. Suppose the string **this is red ink** is in a cell, and is formatted so the word **red** is red. The rgb field of the SST record appears as follows (text characters in bold):

```
0F 00 08 02 00 74 68 69 73 20 69 73 20 72 65 64 20 69 6E 6B
08 00 06 00 0B 00 05 00
```

Swapping bytes and reorganizing:

```
000F  08  0002 74 68 69 73 20 69 73 20 72 65 64 20 69 6E 6B
0008  0006  000B  0005
```

This rgb field of the SST record parses as follows:

Data	Description
000F	String is 15 characters long.
08	The grbit is set to 08h, which indicates a rich string.
0002	Count of formatting runs (runs follow the string and are not included in the character count; if there are no formatting runs, this field does not exist).
74 68 69 73 20 69 73 20 72 65 64 20 69 6E 6B	The string characters; **Note**: in this case, each character is one byte.
0008 0006	Run number 1: index to FONT record 6 (ifnt, 0-based) for characters beginning with character number 8 (0-based).

Data	Description
000B 0005	Run number 2: index to FONT record 5 (ifnt, 0-based) for characters beginning with character number B (0-based).

Extended Strings in East Asian Versions

In East Asian versions (for example, Japanese Microsoft Excel), extended strings may appear in the SST record (fExtSt is set in the grbit field). These strings store additional fields with phonetic, language ID, or keyboard ID information. The first two fields of extended strings (cch and grbit) are identical to the nonextended strings described in the preceding text.

Extended strings contain the following fields.

Extended strings (not rich: fRichSt is not set)

Offset	Field Name	Size	Contents
0	cch	2	Count of characters in the string data (**Note**: this is the number of characters, NOT the number of bytes)
2	grbit	1	Option flags (see grbit field definition table above)
3	cchExtRst	4	Length of ExtRst data
7	rgb	var	String data
var	ExtRst	var	ExtRst data (not documented; length of this field is given by cchExtRst)

Extended strings (rich: fRichSt is set)

Offset	Field Name	Size	Contents
0	cch	2	Count of characters in the string data (**Note**: this is the number of characters, NOT the number of bytes)
2	grbit	1	Option flags (see grbit field definition table above)
3	crun	2	Count of formatting runs
5	cchExtRst	4	Length of ExtRst data
9	rgb	var	String data
var	rgSTRUN	var	Array of formatting run structures; length is equal to (crun x 4) bytes
var	ExtRst	var	ExtRst data (not documented; length of this field is given by cchExtRst)

Other Microsoft Excel File Formats

Excel creates several other files, some of which are documented in this material. The workspace file (.XLW extension in Microsoft Windows) and the toolbar file (.XLB extension in Microsoft Windows) are not covered in this document. The files are used to configure Excel's UI and do not contain user data.

This document contains BIFF documentation for Excel version 5.0, Excel 95, Excel 97, Excel 2000, Excel 2002, Office Excel 2003 and Office Excel 2007 only

BIFF Record Information

Although different BIFF record types contain different information, every record has the same basic format. All BIFF records consist of the following three sections:

Record Number

This 16-bit word identifies the record. The hexadecimal value of the record number is included in parentheses in the heading of the record description. For example, the EOF record's heading appears in this article as "EOF: End of File (0Ah)."

Record Data Length

This 16-bit word equals the length of the following record data, in bytes. The record length depends on the type of data in the record. For example, the EOF record is always the same length, while a FORMULA record varies in length depending on the length of the formula itself.

Record Data

This is the portion of the record containing the actual data that describes the formula, window, object, and so on.

The format for all BIFF records is:

Offset	Length (bytes)	Contents
0	2	Record number
2	2	Record data length
4	variable	Record data

In BIFF8, a BIFF record has a length limit of 8,228 bytes, including the record type and record length fields. Therefore, the record data field must be no longer than 8,224 bytes.

In BIFF7 and earlier, a BIFF record has a length limit of 2,084 bytes, including the record type and record length fields. Therefore, the record data field must be no longer than 2,080 bytes.

In all BIFF versions, if the record exceeds the maximum length, then one or more CONTINUE records must follow the parent record. For example, embedded bitmap graphic objects often use a parent IMDATA record and several CONTINUE records.

If a field (or a bit in a field) is marked "Reserved," then your application should treat the field or bit as a "don't-care" when you read or write the BIFF file. If a field (or bit in a field) is marked "Reserved; must be zero," then you must write zeros to the field or bit when you write a BIFF file.

Byte Swapping

Excel BIFF files are transportable across the MS-DOS/Windows and Apple Macintosh operating systems, among others. To support transportability, Excel writes BIFF files where the low-order byte of the word appears first in the file, followed by the high-order byte.

Whenever Excel for the Macintosh reads or writes a BIFF file, it calls a function that swaps the high- and low-order bytes of every 16-bit word in every record in the file. For 32-bit longs, the bytes in each 16-bit word are swapped first, and then the two 16-bit words are swapped. Be sure to include a byte-swap function in any custom BIFF utility written for the Macintosh.

Indexing in BIFF Records

In BIFF files, rows and columns are always stored 0-based, rather than with an offset of 1 as they appear in a sheet. For example, cell A1 is stored as row 0 (rw=00h), column 0 (col=00h); cell B3 is row 2 (rw=02h), column 1 (col=01h), and so on.

In most cases, you can use the variable-naming conventions in this document to determine if a variable is 0-based. Variable names beginning with the letter **i** are usually indexes, which are 0-based. For example, the variable ixfe occurs in every cell record; it is a 0-based index into the table of XF records. Variable names beginning with the letter c are usually counts, which are 1-based. For example, many records contain a cch, which is a count of characters in the following string.

Undefined Cells in the Sheet

To reduce file size, cells without values or formulas and are not referenced by formulas in any other cell are considered to be "undefined" cells. Such undefined cells do not appear in the BIFF file.

For example, if a worksheet has a value in cell A3, and the formula =A3+A4 in cell B10, then the only defined cells on the worksheet are A3, A4, and B10. No other cells need to exist.

Using this technique, entire rows can be undefined if they have no defined cells in them. In the preceding example, only rows 3, 4, and 10 are defined, so the file contains only three ROW records.

Cell Records

The term "cell records" refers to the BIFF record types with actual cell data. Cell records that appear in BIFF5/BIFF7/BIFF8 files are shown in the following table.

Record	Contents
ARRAY	An array-entered formula
BLANK	An empty cell
BOOLERR	A Boolean or error value
FORMULA	A cell formula, stored as parse tokens
LABEL	A string constant
LABELSST	String constant that uses BIFF8 shared string table (new to BIFF8)
NUMBER	An IEEE floating-point number
MULBLANK	Multiple empty cells (new to BIFF5)
MULRK	Multiple RK numbers (new to BIFF5)
RK	An RK number
RSTRING	Cell with character formatting
SHRFMLA	A shared formula (new to BIFF5)
STRING	A string that represents the result of a formula

Excel stores cell records in blocks with no more than 32 rows. Each row that contains cell records has a corresponding ROW record in the block, and each block contains a DBCELL record at the end of the block. For more information about row blocks and optimizing code when searching for cell records, see "Finding Cell Records in BIFF Files".

BIFF Record Order

BIFF record order has changed as the file format has evolved. The simplest way to determine BIFF record order is to create a workbook in Excel and then use the BiffView utility to examine the record order.

BIFF Records: Alphabetical Order

Record	Number
1904: 1904 Date System	22h
ADDIN: Workbook Is an Add-in Macro	87h
ADDMENU: Menu Addition	C2h
ARRAY: Array-Entered Formula	221h
AUTOFILTER: AutoFilter Data	9Eh
AUTOFILTER12: AutoFilter Data Introduced in Excel 2007	87Eh
AUTOFILTERINFO: Drop-Down Arrow Count	9Dh
BACKUP: Save Backup Version of the File	40h
BLANK: Cell Value, Blank Cell	201h
BOF: Beginning of File	809h
BOOKBOOL: Workbook Option Flag	DAh
BOOKEXT: Extra Book Info	863h
BOOLERR: Cell Value, Boolean or Error	205h
BOTTOMMARGIN: Bottom Margin Measurement	29h
BOUNDSHEET: Sheet Information	85h
CALCCOUNT: Iteration Count	0Ch
CALCMODE: Calculation Mode	0Dh
CELLWATCH: Cell Watch	86Ch
CF: Conditional Formatting Conditions	1B1h
CF12: Conditional Formatting Condition 12	87Ah
CFEX: Conditional Formatting Extension	87Bh
CODENAME: VBE Object Name	42h
CODEPAGE: Default Code Page	42h
COLINFO: Column Formatting Information	7Dh
COMPAT12: Compatibility Checker 12	88Ch
COMPRESSPICTURES: Automatic Picture Compression Mode	89Bh
CONDFMT: Conditional Formatting Range Information	1B0h
CONDFMT12: Conditional Formatting Range Information 12	879h
CONTINUE: Continues Long Records	3Ch
CONTINUEFRT: Continued FRT	812h
CONTINUEFRT11: Continue FRT 11	875h
CONTINUEFRT12: Continued FRT 12	87Fh
COORDLIST: Polygon Object Vertex Coordinates	A9h
COUNTRY: Default Country and WIN.INI Country	8Ch
CRASHRECERR: Crash Recovery Error	865h
CRN: Nonresident Operands	5Ah
CRTCOOPT: Color options for Chart series in Mac Office 11	8cbh

Record	Number
DATALABEXT: Chart Data Label Extension	86Ah
DATALABEXTCONTENTS: Chart Data Label Extension Contents	86Bh
DBCELL: Stream Offsets	D7h
DBQUERYEXT: Database Query Extensions	803h
DCON: Data Consolidation Information	50h
DCONBIN: Data Consolidation Information	1B5h
DCONN: Data Connection	876h
DCONNAME: Data Consolidation Named References	52h
DCONREF: Data Consolidation References	51h
DEFAULTROWHEIGHT: Default Row Height	225h
DEFCOLWIDTH: Default Width for Columns	55h
DELMENU: Menu Deletion	C3h
DELTA: Iteration Increment	10h
DIMENSIONS: Cell Table Size	200h
DOCROUTE: Routing Slip Information	B8h
DROPDOWNOBJIDS: Drop Down Object	874h
DSF: Double Stream File	161h
DV: Data Validation Criteria	1BEh
DVAL: Data Validation Information	1B2h
DXF: Differential XF	88Dh
EDG: Edition Globals	88h
EOF: End of File	0Ah
EXCEL9FILE: Excel 9 File	1C0h
EXTERNCOUNT: Number of External References	16h
EXTERNNAME: Externally Referenced Name	223h
EXTERNSHEET: External Reference	17h
EXTSST: Extended Shared String Table	FFh
EXTSTRING: FRT String	804h
FEAT: Shared Feature Record	868h
FEAT11: Shared Feature 11 Record	872h
FEAT12: Shared Feature 12 Record	878h
FEATHEADR: Shared Feature Header	867h
FEATHEADR11: Shared Feature Header 11	871h
FEATINFO: Shared Feature Info Record	86dh
FEATINFO11: Shared Feature Info 11 Record	873h
FILEPASS: File Is Password-Protected	2Fh
FILESHARING: File-Sharing Information	5Bh
FILESHARING2: File-Sharing Information for Shared Lists	1A5h
FILTERMODE: Sheet Contains Filtered List	9Bh
FMQRY: Filemaker queries	8c6h
FMSQRY: File maker queries	8c7h

Record	Number
FNGROUP12: Function Group	898h
FNGROUPCOUNT: Built-in Function Group Count	9Ch
FNGROUPNAME: Function Group Name	9Ah
FONT: Font Description	231h
FOOTER: Print Footer on Each Page	15h
FORCEFULLCALCULATION: Force Full Calculation Mode	8A3h
FORMAT: Number Format	41Eh
FORMULA: Cell Formula	406h
GCW: Global Column-Width Flags	ABh
GRIDSET: State Change of Gridlines Option	82h
GUIDTYPELIB: VB Project Typelib GUID	897h
GUTS: Size of Row and Column Gutters	80h
HCENTER: Center Between Horizontal Margins	83h
HEADER: Print Header on Each Page	14h
HEADERFOOTER: Header Footer	89Ch
HFPicture: Header / Footer Picture	866h
HIDEOBJ: Object Display Options	8Dh
HLINK: Hyperlink	1B8h
HLINKTOOLTIP: Hyperlink Tooltip	800h
HORIZONTALPAGEBREAKS: Explicit Row Page Breaks	1Bh
IMDATA: Image Data	7Fh
INDEX: Index Record	20Bh
INTERFACEEND: End of User Interface Records	E2h
INTERFACEHDR: Beginning of User Interface Records	E1h
ITERATION: Iteration Mode	11h
LABEL: Cell Value, String Constant	204h
LABELSST: Cell Value, String Constant/SST	FDh
LEFTMARGIN: Left Margin Measurement	26h
LHNGRAPH: Named Graph Information	95h
LHRECORD: .WK? File Conversion Information	94h
LIST12: Extra Table Data Introduced in Excel 2007	877h
LISTCF: List Cell Formatting	8c5h
LISTCONDFMT: List Conditional Formatting	8c4h
LISTDV: List Data Validation	8c3h
LISTFIELD: List Field	8c2h
LISTOBJ: List Object	8c1h
LNEXT: Extension information for borders in Mac Office 11	8c9h
LPR: Sheet Was Printed Using LINE.PRINT()	98h
MDTB: Block of Metadata Records	88Ah
MDTINFO: Information about a Metadata Type	884h
MDXPROP:Member Property MDX Metadata	888h
MDXKPI:Key Performance Indicator MDX Metadata	889h

Record	Number
MDXSET:Set MDX Metadata	887h
MDXSTR: MDX Metadata String	885h
MDXTUPLE: Tuple MDX Metadata	886h
MERGECELLS: Merged Cells	E5h
MKREXT: Extension information for markers in Mac Office 11	8cah
MMS: ADDMENU/DELMENU Record Group Count	C1h
MSODRAWING: Microsoft Office Drawing	ECh
MSODRAWINGGROUP: Microsoft Office Drawing Group	EBh
MSODRAWINGSELECTION: Microsoft Office Drawing Selection	EDh
MTRSETTINGS: Multi-Threaded Calculation Settings	89Ah
MULBLANK: Multiple Blank Cells	BEh
MULRK: Multiple RK Cells	BDh
NAME: Defined Name	218h
NAMECMT: Name Comment	894h
NAMEFNGRP12: Extra Function Group	899h
NAMEPUBLISH: Publish to Excel Server Data for Name	893h
NOTE: Comment Associated with a Cell	1Ch
NUMBER: Cell Value, Floating-Point Number	203h
OBJ: Describes a Graphic Object	5Dh
OBJPROTECT: Objects Are Protected	63h
OBPROJ: Visual Basic Project	D3h
OLEDBCONN: OLE Database Connection	80Ah
OLESIZE: Size of OLE Object	DEh
PALETTE: Color Palette Definition	92h
PANE: Number of Panes and Their Position	41h
PARAMQRY: Query Parameters	DCh
PASSWORD: Protection Password	13h
PLS: Environment-Specific Print Record	4Dh
PLV: Page Layout View in Mac Excel 11	8c8h
PLV: Page Layout View Settings in Excel 2007	88Bh
PRECISION: Precision	0Eh
PRINTGRIDLINES: Print Gridlines Flag	2Bh
PRINTHEADERS: Print Row/Column Labels	2Ah
PROTECT: Protection Flag	12h
PROT4REV: Shared Workbook Protection Flag	1AFh
PROT4REVPASS: Shared Workbook Protection Password	1BCh
PUB: Publisher	89h
QSI: External Data Range	1ADh
QSIF: Query Table Field Formatting	807h
QSIR: Query Table Formatting	806h
QSISXTAG: PivotTable and Query Table Extensions	802h
REALTIMEDATA: Real-Time Data (RTD)	813h

Record	Number
RECALCID: Recalc Information	1C1h
RECIPNAME: Recipient Name	B9h
REFMODE: Reference Mode	0Fh
REFRESHALL: Refresh Flag	1B7h
RIGHTMARGIN: Right Margin Measurement	27h
RK: Cell Value, RK Number	7Eh
ROW: Describes a Row	208h
RSTRING: Cell with Character Formatting	D6h
SAVERECALC: Recalculate Before Save	5Fh
SCENARIO: Scenario Data	AFh
SCENMAN: Scenario Output Data	AEh
SCENPROTECT: Scenario Protection	DDh
SCL: Window Zoom Magnification	A0h
SELECTION: Current Selection	1Dh
SETUP: Page Setup	A1h
SHEETEXT: Extra Sheet Info	862h
SHRFMLA: Shared Formula	BCh
SORT: Sorting Options	90h
SORTDATA12: Sort Data 12	895h
SOUND: Sound Note	96h
SST: Shared String Table	FCh
STANDARDWIDTH: Standard Column Width	99h
STRING: String Value of a Formula	207h
STYLE: Style Information	293h
STYLEEXT: Named Cell Style Extension	892h
SUB: Subscriber	91h
SUPBOOK: Supporting Workbook	1AEh
SXADDL: Pivot Table Additional Info	864h
SXADDL12: Additional Workbook Connections Information	881h
SXDB: PivotTable Cache Data	C6h
SXDBEX: PivotTable Cache Data	122h
SXDI: Data Item	C5h
SXDXF: Pivot Table Formatting	F4h
SXEX: PivotTable View Extended Information	F1h
SXEXT: External Source Information	DCh
SXFDBTYPE: SQL Datatype Identifier	1BBh
SXFILT: PivotTable Rule Filter	F2h
SXFMLA: Pivot Table Parsed Expression	F9h
SXFORMAT: PivotTable Format Record	FBh
SXFORMULA: PivotTable Formula Record	103h
SXIDSTM: Stream ID	D5h
SXITM: Pivot Table Item Indexes	F5h

Record	Number
SXIVD: Row/Column Field IDs	B4h
SXLI: Line Item Array	B5h
SXNAME: PivotTable Name	F6h
SXPAIR: PivotTable Name Pair	F8h
SXPI: Page Item	B6h
SXPIEX: OLAP Page Item Extensions	80Eh
SXRULE: PivotTable Rule Data	F0h
SXSELECT: PivotTable Selection Information	F7h
SXSTRING: String	CDh
SXTBL: Multiple Consolidation Source Info	D0h
SXTBPG: Page Item Indexes	D2h
SXTBRGIITM: Page Item Name Count	D1h
SXTH: PivotTable OLAP Hierarchy	80Dh
SXVD: View Fields	B1h
SXVDEX: Extended PivotTable View Fields	100h
SXVDTEX: View Dimension OLAP Extensions	80Fh
SXVI: View Item	B2h
SXVIEW: View Definition	B0h
SXVIEWEX: Pivot Table OLAP Extensions	80Ch
SXVIEWEX9: Pivot Table Extensions	810h
SXVS: View Source	E3h
TABID: Sheet Tab Index Array	13Dh
TABIDCONF: Sheet Tab ID of Conflict History	EAh
TABLE: Data Table	236h
TABLESTYLE: Table Style	88Fh
TABLESTYLEELEMENT: Table Style Element	890h
TABLESTYLES: Table Styles	88Eh
TEMPLATE: Workbook Is a Template	60h
THEME: Theme	896h
TOPMARGIN: Top Margin Measurement	28h
TXO: Text Object	1B6h
TXTQUERY: Text Query Information	805h
UDDESC: Description String for Chart Autoformat	DFh
UNCALCED: Recalculation Status	5Eh
USERBVIEW: Workbook Custom View Settings	1A9h
USERSVIEWBEGIN: Custom View Settings	1AAh
USERSVIEWEND: End of Custom View Records	1ABh
USESELFS: Natural Language Formulas Flag	160h
VCENTER: Center Between Vertical Margins	84h
VERTICALPAGEBREAKS: Explicit Column Page Breaks	1Ah
WEBPUB: Web Publish Item	801h
WINDOW1: Window Information	3Dh

Record	Number
WINDOW2: Sheet Window Information	23Eh
WINDOWPROTECT: Windows Are Protected	19h
WOPT: Web Options	80Bh
WRITEACCESS: Write Access User Name	5Ch
WRITEPROT: Workbook Is Write-Protected	86h
WSBOOL: Additional Workspace Information	81h
XCT: CRN Record Count	59h
XF: Extended Format	E0h
XFCRC: XF Extensions Checksum	87Ch
XFEXT: XF Extension	87Dh
XL5MODIFY: Flag for DSF	162h

BIFF Records: Record Number Order

Number	Record
0Ah	EOF: End of File
0Ch	CALCCOUNT: Iteration Count
0Dh	CALCMODE: Calculation Mode
0Eh	PRECISION: Precision
0Fh	REFMODE: Reference Mode
10h	DELTA: Iteration Increment
11h	ITERATION: Iteration Mode
12h	PROTECT: Protection Flag
13h	PASSWORD: Protection Password
14h	HEADER: Print Header on Each Page
15h	FOOTER: Print Footer on Each Page
16h	EXTERNCOUNT: Number of External References
17h	EXTERNSHEET: External Reference
19h	WINDOWPROTECT: Windows Are Protected
1Ah	VERTICALPAGEBREAKS: Explicit Column Page Breaks
1Bh	HORIZONTALPAGEBREAKS: Explicit Row Page Breaks
1Ch	NOTE: Comment Associated with a Cell
1Dh	SELECTION: Current Selection
22h	1904: 1904 Date System
26h	LEFTMARGIN: Left Margin Measurement
27h	RIGHTMARGIN: Right Margin Measurement
28h	TOPMARGIN: Top Margin Measurement
29h	BOTTOMMARGIN: Bottom Margin Measurement
2Ah	PRINTHEADERS: Print Row/Column Labels
2Bh	PRINTGRIDLINES: Print Gridlines Flag
2Fh	FILEPASS: File Is Password-Protected
3Ch	CONTINUE: Continues Long Records
3Dh	WINDOW1: Window Information
40h	BACKUP: Save Backup Version of the File
41h	PANE: Number of Panes and Their Position
42h	CODENAME: VBE Object Name

Number	Record
42h	CODEPAGE: Default Code Page
4Dh	PLS: Environment-Specific Print Record
50h	DCON: Data Consolidation Information
51h	DCONREF: Data Consolidation References
52h	DCONNAME: Data Consolidation Named References
55h	DEFCOLWIDTH: Default Width for Columns
59h	XCT: CRN Record Count
5Ah	CRN: Nonresident Operands
5Bh	FILESHARING: File-Sharing Information
5Ch	WRITEACCESS: Write Access User Name
5Dh	OBJ: Describes a Graphic Object
5Eh	UNCALCED: Recalculation Status
5Fh	SAVERECALC: Recalculate Before Save
60h	TEMPLATE: Workbook Is a Template
63h	OBJPROTECT: Objects Are Protected
7Dh	COLINFO: Column Formatting Information
7Eh	RK: Cell Value, RK Number
7Fh	IMDATA: Image Data
80h	GUTS: Size of Row and Column Gutters
81h	WSBOOL: Additional Workspace Information
82h	GRIDSET: State Change of Gridlines Option
83h	HCENTER: Center Between Horizontal Margins
84h	VCENTER: Center Between Vertical Margins
85h	BOUNDSHEET: Sheet Information
86h	WRITEPROT: Workbook Is Write-Protected
87h	ADDIN: Workbook Is an Add-in Macro
88h	EDG: Edition Globals
89h	PUB: Publisher
8Ch	COUNTRY: Default Country and WIN.INI Country
8Dh	HIDEOBJ: Object Display Options
90h	SORT: Sorting Options
91h	SUB: Subscriber
92h	PALETTE: Color Palette Definition
94h	LHRECORD: .WK? File Conversion Information
95h	LHNGRAPH: Named Graph Information
96h	SOUND: Sound Note
98h	LPR: Sheet Was Printed Using LINE.PRINT(
99h	STANDARDWIDTH: Standard Column Width
9Ah	FNGROUPNAME: Function Group Name
9Bh	FILTERMODE: Sheet Contains Filtered List
9Ch	FNGROUPCOUNT: Built-in Function Group Count
9Dh	AUTOFILTERINFO: Drop-Down Arrow Count
9Eh	AUTOFILTER: AutoFilter Data
A0h	SCL: Window Zoom Magnification
A1h	SETUP: Page Setup

Number	Record
A9h	COORDLIST: Polygon Object Vertex Coordinates
ABh	GCW: Global Column-Width Flags
AEh	SCENMAN: Scenario Output Data
AFh	SCENARIO: Scenario Data
B0h	SXVIEW: View Definition
B1h	SXVD: View Fields
B2h	SXVI: View Item
B4h	SXIVD: Row/Column Field IDs
B5h	SXLI: Line Item Array
B6h	SXPI: Page Item
B8h	DOCROUTE: Routing Slip Information
B9h	RECIPNAME: Recipient Name
BCh	SHRFMLA: Shared Formula
BDh	MULRK: Multiple RK Cells
BEh	MULBLANK: Multiple Blank Cells
C1h	MMS: ADDMENU/DELMENU Record Group Count
C2h	ADDMENU: Menu Addition
C3h	DELMENU: Menu Deletion
C5h	SXDI: Data Item
C6h	SXDB: PivotTable Cache Data
CDh	SXSTRING: String
D0h	SXTBL: Multiple Consolidation Source Info
D1h	SXTBRGIITM: Page Item Name Count
D2h	SXTBPG: Page Item Indexes
D3h	OBPROJ: Visual Basic Project
D5h	SXIDSTM: Stream ID
D6h	RSTRING: Cell with Character Formatting
D7h	DBCELL: Stream Offsets
DAh	BOOKBOOL: Workbook Option Flag
DCh	PARAMQRY: Query Parameters
DCh	SXEXT: External Source Information
DDh	SCENPROTECT: Scenario Protection
DEh	OLESIZE: Size of OLE Object
DFh	UDDESC: Description String for Chart Autoformat
E0h	XF: Extended Format
E1h	INTERFACEHDR: Beginning of User Interface Records
E2h	INTERFACEEND: End of User Interface Records
E3h	SXVS: View Source
E5h	MERGECELLS: Merged Cells
EAh	TABIDCONF: Sheet Tab ID of Conflict History
EBh	MSODRAWINGGROUP: Microsoft Office Drawing Group
ECh	MSODRAWING: Microsoft Office Drawing
EDh	MSODRAWINGSELECTION: Microsoft Office Drawing Selection
F0h	SXRULE: PivotTable Rule Data
F1h	SXEX: PivotTable View Extended Information

Number	Record
F2h	SXFILT: PivotTable Rule Filter
F4h	SXDXF: Pivot Table Formatting
F5h	SXITM: Pivot Table Item Indexes
F6h	SXNAME: PivotTable Name
F7h	SXSELECT: PivotTable Selection Information
F8h	SXPAIR: PivotTable Name Pair
F9h	SXFMLA: Pivot Table Parsed Expression
FBh	SXFORMAT: PivotTable Format Record
FCh	SST: Shared String Table
FDh	LABELSST: Cell Value, String Constant/SST
FFh	EXTSST: Extended Shared String Table
100h	SXVDEX: Extended PivotTable View Fields
103h	SXFORMULA: PivotTable Formula Record
122h	SXDBEX: PivotTable Cache Data
13Dh	TABID: Sheet Tab Index Array
160h	USESELFS: Natural Language Formulas Flag
161h	DSF: Double Stream File
162h	XL5MODIFY: Flag for DSF
1A5h	FILESHARING2: File-Sharing Information for Shared Lists
1A9h	USERBVIEW: Workbook Custom View Settings
1AAh	USERSVIEWBEGIN: Custom View Settings
1ABh	USERSVIEWEND: End of Custom View Records
1ADh	QSI: External Data Range
1AEh	SUPBOOK: Supporting Workbook
1AFh	PROT4REV: Shared Workbook Protection Flag
1B0h	CONDFMT: Conditional Formatting Range Information
1B1h	CF: Conditional Formatting Conditions
1B2h	DVAL: Data Validation Information
1B5h	DCONBIN: Data Consolidation Information
1B6h	TXO: Text Object
1B7h	REFRESHALL: Refresh Flag
1B8h	HLINK: Hyperlink
1BBh	SXFDBTYPE: SQL Datatype Identifier
1BCh	PROT4REVPASS: Shared Workbook Protection Password
1BEh	DV: Data Validation Criteria
1C0h	EXCEL9FILE: Excel 9 File
1C1h	RECALCID: Recalc Information
200h	DIMENSIONS: Cell Table Size
201h	BLANK: Cell Value, Blank Cell
203h	NUMBER: Cell Value, Floating-Point Number
204h	LABEL: Cell Value, String Constant
205h	BOOLERR: Cell Value, Boolean or Error
207h	STRING: String Value of a Formula
208h	ROW: Describes a Row
20Bh	INDEX: Index Record

Number	Record
218h	NAME: Defined Name
221h	ARRAY: Array-Entered Formula
223h	EXTERNNAME: Externally Referenced Name
225h	DEFAULTROWHEIGHT: Default Row Height
231h	FONT: Font Description
236h	TABLE: Data Table
23Eh	WINDOW2: Sheet Window Information
293h	STYLE: Style Information
406h	FORMULA: Cell Formula
41Eh	FORMAT: Number Format
800h	HLINKTOOLTIP: Hyperlink Tooltip
801h	WEBPUB: Web Publish Item
802h	QSISXTAG: PivotTable and Query Table Extensions
803h	DBQUERYEXT: Database Query Extensions
804h	EXTSTRING: FRT String
805h	TXTQUERY: Text Query Information
806h	QSIR: Query Table Formatting
807h	QSIF: Query Table Field Formatting
809h	BOF: Beginning of File
80Ah	OLEDBCONN: OLE Database Connection
80Bh	WOPT: Web Options
80Ch	SXVIEWEX: Pivot Table OLAP Extensions
80Dh	SXTH: PivotTable OLAP Hierarchy
80Eh	SXPIEX: OLAP Page Item Extensions
80Fh	SXVDTEX: View Dimension OLAP Extensions
810h	SXVIEWEX9: Pivot Table Extensions
812h	CONTINUEFRT: Continued FRT
813h	REALTIMEDATA: Real-Time Data (RTD)
862h	SHEETEXT: Extra Sheet Info
863h	BOOKEXT: Extra Book Info
864h	SXADDL: Pivot Table Additional Info
865h	CRASHRECERR: Crash Recovery Error
866h	HFPicture: Header / Footer Picture
867h	FEATHEADR: Shared Feature Header
868h	FEAT: Shared Feature Record
86Ah	DATALABEXT: Chart Data Label Extension
86Bh	DATALABEXTCONTENTS: Chart Data Label Extension Contents
86Ch	CELLWATCH: Cell Watch
86dh	FEATINFO: Shared Feature Info Record
871h	FEATHEADR11: Shared Feature Header 11
872h	FEAT11: Shared Feature 11 Record
873h	FEATINFO11: Shared Feature Info 11 Record
874h	DROPDOWNOBJIDS: Drop Down Object
875h	CONTINUEFRT11: Continue FRT 11
876h	DCONN: Data Connection

Number	Record
877h	LIST12: Extra Table Data Introduced in Excel 2007
878h	FEAT12: Shared Feature 12 Record
879h	CONDFMT12: Conditional Formatting Range Information 12
87Ah	CF12: Conditional Formatting Condition 12
87Bh	CFEX: Conditional Formatting Extension
87Ch	XFCRC: XF Extensions Checksum
87Dh	XFEXT: XF Extension
87Eh	EZFILTER12: AutoFilter Data Introduced in Excel 2007
87Fh	CONTINUEFRT12: Continue FRT 12
881h	SXADDL12: Additional Workbook Connections Information
884h	MDTINFO: Information about a Metadata Type
885h	MDXSTR: MDX Metadata String
886h	MDXTUPLE: Tuple MDX Metadata
887h	MDXSET: Set MDX Metadata
888h	MDXPROP: Member Property MDX Metadata
889h	MDXKPI: Key Performance Indicator MDX Metadata
88Ah	MDTB: Block of Metadata Records
88Bh	PLV: Page Layout View Settings in Excel 2007
88Ch	COMPAT12: Compatibility Checker 12
88Dh	DXF: Differential XF
88Eh	TABLESTYLES: Table Styles
88Fh	TABLESTYLE: Table Style
890h	TABLESTYLEELEMENT: Table Style Element
892h	STYLEEXT: Named Cell Style Extension
893h	NAMEPUBLISH: Publish To Excel Server Data for Name
894h	NAMECMT: Name Comment
895h	SORTDATA12: Sort Data 12
896h	THEME: Theme
897h	GUIDTYPELIB: VB Project Typelib GUID
898h	FNGRP12: Function Group
899h	NAMEFNGRP12: Extra Function Group
89Ah	MTRSETTINGS: Multi-Threaded Calculation Settings
89Bh	COMPRESSPICTURES: Automatic Picture Compression Mode
89Ch	HEADERFOOTER: Header Footer
8A3h	FORCEFULLCALCULATION: Force Full Calculation Settings
8c1h	LISTOBJ: List Object
8c2h	LISTFIELD: List Field
8c3h	LISTDV: List Data Validation
8c4h	LISTCONDFMT: List Conditional Formatting
8c5h	LISTCF: List Cell Formatting
8c6h	FMQRY: Filemaker queries
8c7h	FMSQRY: File maker queries
8c8h	PLV: Page Layout View in Mac Excel 11
8c9h	LNEXT: Extension information for borders in Mac Office 11
8cah	MKREXT: Extension information for markers in Mac Office 11

Number	Record
8cbh	CRTCOOPT: Color options for Chart series in Mac Office 11

Record Descriptions

The first two fields in every BIFF record are record number and record length. Because these fields have the same offset and size in every BIFF record, they are not documented in the following descriptions. For more information about the record number and record length fields, see "BIFF Record Information".

1904: 1904 Date System (22h)

The 1904 record stores the date system used by Excel.

Record Data

Offset	Field Name	Size	Contents
4	f1904	2	=1 if the 1904 date system is used

ADDIN: Workbook Is an Add-in Macro (87h)

This record has no record data field. If the ADDIN record is present in the BIFF file, it signifies that the macro is an add-in macro. The ADDIN record, if present, must immediately follow the first BOF record in the Book stream.

ADDMENU: Menu Addition (C2h)

The ADDMENU record stores a menu addition. When a menu object (a menu bar, a menu, a menu item, or a submenu item) is added to the user interface, Excel writes a group of ADDMENU records for each object. The first record stores the menu bar, the second stores the menu, the third stores the menu item, and the fourth stores the submenu item (**Note**: this is identical to the menu hierarchy in the user interface). The number of records in the group depends on the level of the menu structure at which the addition occurs. For example, adding a menu to a menu bar causes two ADDMENU records to be written. Adding a submenu item to a menu item causes four records to be written.

If fInsert is true (equal to 01h), the menu object is added at this level of the hierarchy. For example, if fInsert is true in the second ADDMENU record of the group, Excel adds a new menu to an existing menu bar. If fInsert is false (equal to 00h), the record is a placeholder, and one of the following ADDMENU records in the group defines the menu addition.

For menu items and submenu items, the icetab field stores the index to the added command, if the item is attached to a built-in command. The icetabBefore field stores the index to the existing command prior to where the new command was insertd in the list. If either of these indexes equals FFFFh, the corresponding string from the rgch field is used instead of a built-in command.

The caitm field is equal to the number of following ADDMENU records to insert at this level of the menu hierarchy.

Record Data

Offset	Field Name	Size	Contents
4	icetabItem	2	icetab of the command

Offset	Field Name	Size	Contents
6	icetabBefore	2	icetab of the existing command prior to where the new command was inserted
8	caitm	1	Number of ADDMENU records at the next level of the menu hierarchy
9	fInsert	1	=1, insert this menu object =0, this is a placeholder record
10	rgch	var	stItem, stBefore, stMacro, stStatus, stHelp strings (see text)

The rgch field stores five concatenated strings, as described in the following table. Null strings appear in the rgch field as a single byte (00h).

String	Contents
stItem	Text of the menu object
stBefore	Text of the item this item was added ahead of
stMacro	Macro name, encoded using a technique similar to the encoded file names in the EXTERNSHEET record
stStatus	Status bar text (for add-ins)
stHelp	Help file name and context ID (for add-ins)

ARRAY: Array-Entered Formula (221h)

An ARRAY record describes a formula that was array-entered into a range of cells. The range of cells in which the array is entered is defined by the rwFirst, rwLast, colFirst, and colLast fields.

The ARRAY record occurs directly after the FORMULA record for the cell in the upper-left corner of the array — that is, the cell defined by the rwFirst and colFirst fields.

The parsed expression is the array formula, stored in the Excel internal format. For an explanation of the parsed format, see "Microsoft Excel Formulas".

Record Data

Offset	Field Name	Size	Contents
4	rwFirst	2	First row of the array
6	rwLast	2	Last row of the array
8	colFirst	1	First column of the array
9	colLast	1	Last column of the array
10	grbit	2	Option flags
12	chn	4	(See text)
16	cce	2	Length of the parsed expression
18	rgce	var	Parsed formula expression

Ignore the chn field when reading the BIFF file. If a BIFF file is written, the chn field must be 00000000h.

The grbit field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	fAlwaysCalc	Always calculate the formula.
	1	02h	fCalcOnLoad	Calculate the formula when the file is opened.
	7–2	FCh	(unused)	
1	7–0	FFh	(unused)	

AUTOFILTER: AutoFilter Data (9Eh)

This record stores data for an active AutoFilter.

Record Data — BIFF7 and Later

Offset	Name	Size	Contents
4	iEntry	2	Index of the active AutoFilter
6	grbit	2	Option flags
8	doper1	10	DOPER structure for the first filter condition
18	doper2	10	DOPER structure for the second filter condition
28	rgch	var	String storage for vtString DOPER

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	1 – 0	0003h	wJoin	=1 if the custom filter conditions are ANDed =0 if the custom filter conditions are ORed
	2	0004h	fSimple1	=1 if the first condition is a simple equality (for optimization)
	3	0008h	fSimple2	=1 if the second condition is a simple equality (for optimization)
	4	0010h	fTop10	=1 if the condition is a Top 10 AutoFilter
	5	0020h	fTop	=1 if the Top 10 AutoFilter shows the top items; =0 if it shows the bottom items
	6	0040h	fPercent	=1 if the Top 10 AutoFilter shows percentage; =0 if it shows items
	15 – 7	FF80h	wTop10	The number of items to show (from 1 to 500 decimal, expressed as a binary number)

Record Data — BIFF5

Offset	Field Name	Size	Contents
4	iEntry	2	Index of the active AutoFilter
6	grbit	2	Option flags
8	doper1	10	DOPER structure for first filter condition
18	doper2	10	DOPER structure for the second filter condition
28	rgch	var	String storage for vtString DOPER

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	1 – 0	03h	wJoin	=1 if the custom filter conditions are ANDed =0 if the custom filter conditions are ORed

	2	04h	fSimple1	=1 if the first condition is a simple equality (for optimization)
	3	08h	fSimple2	=1 if the second condition is a simple equality (for optimization)
	7 – 4	F0h	(Reserved)	
1	7 – 0	FFh	(Reserved)	

DOPER Structures

The database oper structures (DOPERs) are 10-byte parsed definitions of the filter conditions that appear in the **Custom AutoFilter** dialog box. The DOPER structures are defined in the following sections.

DOPER Structure for RK Numbers (vt=02h)

Offset	Field Name	Size	Contents
0	vt	1	Data type
1	grbitSgn	1	Comparison code
2	rk	4	RK number
6	(Reserved)	4	

DOPER Structure for IEEE Floating-Point Numbers (vt=04h)

Offset	Field Name	Size	Contents
0	vt	1	Data type
1	grbitSgn	1	Comparison code
2	num	8	IEEE floating-point number

DOPER Structure for Strings (vt=06h)

Offset	Field Name	Size	Contents
0	vt	1	Data type
1	grbitSgn	1	Comparison code
2	(Reserved)	4	
6	cch	1	Length of the string (the string is stored in the rgch field that follows the DOPER structures)
7	(Reserved)	3	

DOPER Structure for Boolean and Error Values (vt=08h)

Offset	Name	Size	Contents
0	vt	1	Data type
1	grbitSgn	1	Comparison code
2	fError	1	Boolean/error flag
3	bBoolErr	1	Boolean value or error value
4	(Reserved)	6	

The bBoolErr field contains the Boolean or error value, as determined by the fError field. If the fError field contains a 0 (zero), the bBoolErr field contains a Boolean value; if the fError field contains a 1, the bBoolErr field contains an error value.

Boolean values are 1 for true and 0 for false.

Error values are listed in the following table.

Error value	Value (hex)	Value (dec.)
#NULL!	00h	0
#DIV/0!	07h	7
#VALUE!	0Fh	15
#REF!	17h	23
#NAME?	1Dh	29
#NUM!	24h	36
#N/A	2Ah	42

The vt field contains the data type of the DOPER, as shown in the following table. For the DOPER types 00h, 0Ch, and 0Eh, the remaining 9 bytes of the DOPER are ignored.

vt	DOPER type
00h	Filter condition not used
02h	RK number
04h	IEEE number
06h	String
08h	Boolean or error value
0Ch	Match all blanks
0Eh	Match all non-blanks

The grbitSgn field corresponds to the following comparison operators:

grbitSgn	Operator
01	<
02	=
03	<=
04	>
05	<>
06	>=

AUTOFILTER12: Auto-filter Data Introduced in Excel 2007 (87Eh)

This record stores data for Excel 2007 new auto-filter types.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Eh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	iEntry	2	The number of the column to which this filter applies, 0-based; stored as 2-byte integer number

18	fHideArrow	4	=1 if dropdown arrow is hidden
22	ft	4	Filter type (see below for details)
26	cft	4	Custom filter type (see below for details)
30	ccriteria	4	Number of criteria
34	cdategroupings	4	Number of date groupings
38	grbit	2	Auto-filter flags (see below for details)
40	wTop10Num	4	Top 10 filter type (see below for details). Only defined when fTop10 in grbit is =1
44	idList	4	Table unique ID, =0xFFFFFFFF if this is worksheet auto-filter; stored as unsigned 4-byte integer number
48	guidSview	16	GUID of the associated custom view, if any; a 16-byte (128-bit) number
64	rgb	var	DXF data or cell icon (see below for details)

The ft field contains one of the following values:

ft	Filter type
00h	Value
01h	Cell color
02h	Font color
03h	Cell icon

The cft field contains one of the following values:

cft	Custom filter type
00h	Nothing
01h	Above average
02h	Below average
03h	Top 10
04h	Equal to date
05h	Before date
06h	After date
07h	Between dates
08h	Tomorrow
09h	Today
0Ah	Yesterday
0Bh	Next week
0Ch	This week
0Dh	Last week
0Eh	Next month
0Fh	This month
10h	Last month
11h	Next quarter
12h	This quarter
13h	Last quarter

14h	Next year
15h	This year
16h	Last year
17h	Year-to-date
18h	1st quarter
19h	2nd quarter
1Ah	3rd quarter
1Bh	4th quarter
1Ch	1st month
1Dh	2nd month
1Eh	3rd month
1Fh	4th month
20h	5th month
21h	6th month
22h	7th month
23h	8th month
24h	9th month
25h	10th month
26h	11th month
27h	12th month
28h	Not equal to date
29h	Before or equal to date
2Ah	After or equal to date
2Bh	Not between dates

The grbit field contains the following flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fTop10	=1 if this is Top 10 criterion
	1	0002h	fTop	=1 if top, =0 if bottom
	2	0004h	fPercent	=1 if percent, =0 if items
	3	0008h	fWorksheetAutoFilter	=1 if this is worksheet AutoFilter
	4-15	FFF0h	(Reserved)	Currently not used, and set to 0

The wTop10Num field contains one of the following values:

wTop10Num	Top 10 filter type
00h	Unknown
01h	Count
02h	Percent
03h	Sum

If ft field contains 00h (value), then there is no data stored in rgb block. All criteria and date groupings data is stored in CONTINUEFRT12 (87Fh) records that follow EZFILTER12 (87Eh) record as described below.

First stored are ccriteria CONTINUEFRT12 records of the following form:

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Fh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	ref	8	Area reference (range) to which the AutoFilter is applied
16	doper	10	DOPER structure (described in AUTOFILTER (9Eh) record)
26	rgch	var	String storage for vtString DOPER

Criteria records are followed by cdategroupings CONTINUEFRT12 records of the following form:

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Fh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	ref	8	Area reference (range) to which the AutoFilter is applied
16	yr	2	Year, 4-digit
18	mon	2	Month, 1-12
20	dom	4	Day of the month, 1-31
24	hour	2	Hour, 0-23
26	min	2	Minute, 0-59
28	sec	2	Second, 0-59
30	wdy	2	Day of the week, 1-7
32	fracsec	2	Fractions of a second
34	wRound	2	Rounding parameter: 00h. Round to seconds 01h. Round to 10th of seconds 02h. Round to 100th of seconds 03h. Round to 1000th of seconds
36	dnt	4	Date node type. Specifies which part of the date (Year/Month/Day/Hour/Minute/Second) is being used in the filter: 00h. Year 01h. Month 02h. Day 03h. Hour 04h. Minute 05h. Second

If ft field contains 01h or 02h (cell color or font respectively), then the following data is stored in rgb block:

Offset	Name	Size	Contents
0	dxf	var	Cell or font color DXF

If ft field contains 03h (cell icon), then the following data is stored in rgb block:

Offset	Name	Size	Contents
0	iiconset	4	Icon set number
4	iicon	4	Icon number within the specified set

AUTOFILTERINFO: Drop-Down Arrow Count (9Dh)

This record stores the count of AutoFilter drop-down arrows. Each drop-down arrow has a corresponding OBJ record. If at least one AutoFilter is active (in other words, the range was filtered at least once), there is a corresponding FILTERMODE record in the file. There is also one AUTOFILTER record for each active filter.

Record Data

Offset	Field Name	Size	Contents
4	cEntries	2	Number of AutoFilter drop-down arrows on the sheet

AUTOWEBPUB: Auto web publish storage (8c0h)

This is a Mac Excel FRT record. It stores the information for auto web publishing.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c0h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description
16	tws	1	Type of web source
17	grbitFlags	2	Flags
19	id	2	Unused
21	ref	8	REF structure; ref if twsREf
29	cchPath	2	Where to save
31	cchShTitle	2	Sheet title; 0 if twsWorkbook
33	cchObjToPub	2	Object name, if applicable
35	rgach	var	Path, sheet then object

The grbitFlags field contains the following option flags

Bits	Mask	Flag Name	Contents
0	0001h	fScheduled	1=
1	0002h	fWarn	1=
2	0004h	fMustRegister	1=

15-3 FFF8h (Reserved) Reserved; must be zero

BACKUP: Save Backup Version of the File (40h)

The BACKUP record specifies whether Excel should save backup versions of a file.

Record Data

Offset	Field Name	Size	Contents
4	fBackupFile	2	=1 if Excel should save a backup version of the file

BLANK: Cell Value, Blank Cell (201h)

A BLANK record describes an empty cell. The rw field contains the 0-based row number. The col field contains the 0-based column number.

Record Data

Offset	Name	Size	Contents
4	rw	2	Row
6	col	2	Column
8	ixfe	2	Index to the XF record

BOF: Beginning of File (809h)

The BOF record marks the beginning of the Book stream in the BIFF file. It also marks the beginning of record groups (or "substreams" of the Book stream) for sheets in the workbook. For BIFF2 through BIFF4, the BIFF version is found from the high-order byte of the record number field, as shown in the following table. For BIFF5/BIFF7, and BIFF8 use the vers field at offset 4 to determine the BIFF version.

BOF Record Number Field

Offset	Field Name	Size	Contents
0	vers	1	version: =00 BIFF2 =02 BIFF3 =04 BIFF4 =08 BIFF5/BIFF7/BIFF8
1	bof	1	09h

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	vers	2	Version number: =0600 for BIFF8
6	dt	2	Substream type: 0005h = Workbook globals 0006h = Visual Basic module 0010h = Worksheet or dialog sheet 0020h = Chart 0040h = Excel 4.0 macro sheet 0100h = Workspace file
8	rupBuild	2	Build identifier (=0DBBh for Excel 97)
10	rupYear	2	Build year (=07CCh for Excel 97)

12	bfh	4	File history flags
16	sfo	4	Lowest BIFF version (see text)

The rupBuild and rupYear fields contain numbers that identify the version (build) of Excel that wrote the file. If you write a BIFF file, you can use the BiffView utility to determine the current values of these fields by examining a BOF record in a workbook file.

The sfo field contains the earliest version (vers field) of Excel that can read all records in this file.

The bfh field contains the following flag bits:

Bits	Mask	Flag Name	Contents
0	00000001h	fWin	=1 if the file was last edited by Excel for Windows
1	00000002h	fRisc	=1 if the file was last edited by Excel on a RISC platform
2	00000004h	fBeta	=1 if the file was last edited by a beta version of Excel
3	00000008h	fWinAny	=1 if the file has ever been edited by Excel for Windows
4	00000010h	fMacAny	=1 if the file has ever been edited by Excel for the Macintosh
5	00000020h	fBetaAny	=1 if the file has ever been edited by a beta version of Excel
7–6	000000C0h	(Reserved)	Reserved; must be 0 (zero)
8	00000100h	fRiscAny	=1 if the file has ever been edited by Excel on a RISC platform
31 – 9	FFFFFE00	(Reserved)	Reserved; must be 0 (zero)

Record Data — BIFF5 and BIFF7

Offset	Field Name	Size	Contents
4	vers	2	Version number (0500 for BIFF5 and BIFF7)
6	dt	2	Substream type: 0005h = Workbook globals 0006h = Visual Basic module 0010h = Worksheet or dialog sheet 0020h = Chart 0040h = Excel 4.0 macro sheet 0100h = Workspace file
8	rupBuild	2	Build identifier (internal use only)
10	rupYear	2	Build year (internal use only)

BOOKBOOL: Workbook Option Flag (DAh)

This record saves a workbook option flag.

Record Data

Offset	Record Name	Size	Contents
4	grbit	2	See table below

The grbit field contains the following flags:

Bits	Mask	Flag Name	Contents
0	0001h	fNoSaveSupp	=1 if the **Save External Link Values** option is turned off (**Options** dialog box, **Calculation** tab)
1	0002h	(Reserved)	
2	0004h	fHasEnvelope	xl9: =1 if book has envelope (**File** | **Send To** | **Mail Recipient**)
3	0008h	fEnvelopeVisible	xl9: =1 if envelope is visible
4	0010h	fEnvelopeInitDone	xl10: =1 if envelope has been initialized
6-5	0060h	grbitUpdateLinks	xl10: Update external links: 0= prompt user to update 1= do not prompt, do not update 2= do not prompt, do update
7	0080h	(Reserved)	
8	0100h	fHideBorderUnsels	xl11: 1= hide borders of unselected Tables
15-9	FE00h	(Reserved)	

BOOKEXT: Extra Book Info (863h)

Introduced in Excel 10 (2002) this record is an FRT record. This record contains workbook-specific information new to Excel 10 (2002) and Excel 11 (2003). The rgf and rgf2 fields contain several bit flags and other fields, as described in the tables below.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0863h
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Must be zero
16	cb	4	Record size minus 4 (excludes rt and cb in record header) =014h in Excel 10, =015h in Excel 11, may be larger in future releases
20	grbit	4	Flags and other fields; see description below
24	grbit2	var	In Excel 11 this indicates there are more flags if it is set to 1. In Excel 10 this is 0. This field may be larger in the future.

The grbit field contains the following flags and fields:

Bits	Mask	Flag or Field Name	Contents
0	00000001h	fDontAutoRecover	=1 if Auto Recover is disabled for this workbook; =0 otherwise.
1	00000002h	fHidePivotTableFList	=1 if pivot table field list should be hidden for this workbook; =0 if it should be shown.
2	00000004h	fFilterPrivacy	=1 if personal information should be removed from File / Properties on save; =0 otherwise.
3	00000008h	fEmbedSmartTags	=1 if smart tags should be embedded in this workbook on save; =0 otherwise.
5-4	00000030h	mdSmartTagsDisplay	Corresponding to a control in the Tools/AutoCorrect Options…./Smart Tags dialog tab: =0 mdSmartTagsDisplayAll, if both button and indicator should be shown for each smart tag; =1 mdSmartTagsDisplayNone, if smart tags should not be shown at all; =2 mdSmartTagsDisplayNoIndicator, if only the button (but no indicator) should be shown for each smart tag.
6	00000040h	fSavedDuringRecovery	=1 if the workbook was saved during auto recovery; =0 otherwise
7	00000080h	fCreatedViaMinimalSave	=1 if the workbook was created by means of minimal save; =0 otherwise
8	00000100h	fOpenedViaDataRecovery	=1 if this workbook was opened by means of data recovery; =0 otherwise
9	00000200h	fOpenedViaSafeLoad	=1 if the workbook has been opened in safe load mode; =0 otherwise
31-10	FFFFFC00h	(unused)	Reserved; must be zero

The grbit2 field contains the following flags:

Bits	Mask	Flag Name	Contents
0	01h	fBuggedUserAboutSolution	In Excel 11: =1 if the user doesn't want to be prompted to load smart doc components; =0 otherwise
1	02h	fShowInkAnnotation	In Excel 11: =1 if inking annotations should be displayed in this workbook; =0 otherwise
7-2	FCh	(unused)	Unused

BOOLERR: Cell Value, Boolean or Error (205h)

A BOOLERR record describes a cell that contains a constant Boolean or error value. The rw field contains the 0-based row number. The col field contains the 0-based column number.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row
6	col	2	Column
8	ixfe	2	Index to the XF record
10	bBoolErr	1	Boolean value or error value
11	fError	1	Boolean/error flag

The bBoolErr field contains the Boolean or error value, as determined by the fError field. If the fError field contains a 0 (zero), the bBoolErr field contains a Boolean value; if the fError field contains a 1, the bBoolErr field contains an error value.

Boolean values are 1 for true and 0 for false.

Error values are listed in the following table.

Error value	Value (hex)	Value (dec.)
#NULL!	00h	0
#DIV/0!	07h	7
#VALUE!	0Fh	15
#REF!	17h	23
#NAME?	1Dh	29
#NUM!	24h	36
#N/A	2Ah	42

BOTTOMMARGIN: Bottom Margin Measurement (29h)

The BOTTOMMARGIN record specifies the bottom margin in inches when a sheet is printed. The num field is in 8-byte IEEE floating-point format.

Record Data

Offset	Field Name	Size	Contents
4	num	8	Bottom margin

BOUNDSHEET: Sheet Information (85h)

This record stores the sheet name, sheet type, and stream position.

BIFF8 Record Data

Offset	Field Name	Size	Contents
4	lbPlyPos	4	Stream position of the start of the BOF record for the sheet
8	grbit	2	Option flags
10	cch	1	Length of the sheet name (in characters)
11	rgch	var	Sheet name (grbit/rgb fields of Unicode String)

BIFF7 Record Data

Offset	FieldName	Size	Contents
4	lbPlyPos	4	Stream position of the start of the BOF record for the sheet
8	grbit	2	Option flags
10	cch	1	Length of the sheet name
11	rgch	var	Sheet name

The grbit field contains the following options:

Bits	Mask	Option Name	Contents
1–0	0003h	hsState	Hidden state: 00h = visible 01h = hidden 02h = very hidden (see text)
7 – 2	00FCh	(Reserved)	
15 – 8	FF00h	dt	Sheet type: 00h = worksheet or dialog sheet 01h = Excel 4.0 macro sheet 02h = chart 06h = Visual Basic module

A Visual Basic procedure can set the **Visible** property of a sheet to create a very hidden sheet. A very hidden sheet can be made visible again by a Visual Basic procedure, but there is no way to make the sheet visible through the user interface of Excel.

CALCCOUNT: Iteration Count (0Ch)

The CALCCOUNT record stores the **Maximum Iterations** option from the **Options** dialog box, **Calculation** tab.

Record Data

Offset	Field Name	Size	Contents
4	cIter	2	Iteration count

CALCMODE: Calculation Mode (0Dh)

The CALCMODE record stores options from the **Options** dialog box, **Calculation** tab.

Record Data

Offset	Flag Name	Size	Contents
4	fAutoRecalc	2	Calculation mode: =0 for manual =1 for automatic =−1 for automatic, except tables

CELLWATCH: Cell Watch (86Ch)

Introduced in Excel 10 (2002) this BIFF record is an FRT record. Each CELLWATCH record stores the fact that a cell is being watched in the Watch Window toolbar.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =086Ch
6	grbitFrt	2	FRT flags; =1 (bitfFrtRef); FRT header includes a REF structure
8	refFrt	8	REF structure of cell being watched
16	cb	4	Size of variable length rgb; =0 for Excel 10 and Excel 11, but is set up for extension and preservation of more data
20	rgb	var	Extended info goes here. This is empty for Excel 10 and Excel 11, but is set up for extension and preservation of more data

CF: Conditional Formatting Conditions (1B1h)

This record stores a conditional formatting condition.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	ct	1	Conditional Formatting type 1 = "Cell Value Is" 2 = "Formula Is"
5	cp	1	Conditional Formatting operator (applicable when ct=1) 1 = "between" 2 = "not between" 3 = "equal" 4 = "not equal" 5 = "greater than" 6 = "less than" 7 = "greater than or equal" 8 = "less than or equal"
6	cce1	2	Count of bytes in rgce1
8	cce2	2	Count of bytes in rgce2
10	rgbdxf	var	Conditional format to apply, stored as a DXF
var	rgce1	var	First formula for this condition

var	rgce2	var	Second formula for this condition

CF12: Conditional Formatting Condition 12 (87Ah)

This record stores a conditional formatting condition with content that is new for Office Excel 2007.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Ah
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	ct	1	Conditional Formatting type 1 = "Cell Value Is" 2 = "Formula Is" 3 = "Gradient" 4 = "Databar" 5 = "Filter" 6 = "Multistate (KPI)"
17	cp	1	Conditional Formatting operator (when ct=1) 1 = "between" 2 = "not between" 3 = "equal" 4 = "not equal" 5 = "greater than" 6 = "less than" 7 = "greater than or equal" 8 = "less than or equal"
18	cce1	2	Count of bytes in rgce1
20	cce2	2	Count of bytes in rgce2
22	rgbdxf	var	Conditional format to apply, stored as a DXF
var	rgce1	var	First formula for this condition
var	rgce2	var	Second formula for this condition
var	cce3	2	Count of bytes in rgce3
var	rgce3	var	Third formula if needed
var	grbitCF12	1	see text below
var	ipriority	2	condition priority
var	icfTemplate	2	template index
var	cbTemplateParm	1	count of template bytes to follow (<=16)
var	rgbTemplateParm	var	template parameter bytes
var	rgbCT	var	type specific content follows; see text

The grbitCF12 field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fActive	if =1 cfvo evaluation failed so we don't want to draw this rule.
1	02h	fStopIfTrue	if =1 stop evaluating conditions after this rule if result is true.
2	04h	(Reserved)	Reserved; must be 0 (zero)
3	08h	(Reserved)	Reserved; must be 0 (zero)
4	10h	fListCol	if =1 rule applies to list column
5-7	80h	(Reserved)	Reserved; unused

rgbCT – This structure contains conditional format type specific information, it is not present for ct=1 or ct=2 types. Other types are listed below:

rgbCT when ct=3 (Gradient)

Offset	Name	Size	Contents
0	cbGradient	2	number of bytes to follow
2	bZero	1	must be zero
3	cInterpCurve	1	count of structures in rgInterp array
4	cGradientCurve	1	count of structures in rgCurve array
5	grbitGradient	1	see text below
6	rgInterp	var	array of interpolation formula structures
var	rgCurve	var	array of gradient color curve structures

The grbitGradient field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fClamp	Currently always =1
1	02h	fBackground	Currently always =1
2..7	FCh	(Reserved)	Reserved; must be 0 (zero)

The rgInterp array interpolation formula structures are defined as follows:

Offset	Name	Size	Contents
0	cfvoInterp	var	conditional format value object
var	numDomain	8	three point linear interpolation domain. (Interpolation is used to take domain endpoints to range endpoints.)

A conditional format value object (**cfvo**) has the following structure:

Offset	Name	Size	Contents
0	cfvotype	1	conditional format value type 1 = number 2 = min 3 = max 4 = percent 5 = percentile 6 = stddev 7 = formula
1	cceFmla	2	count of bytes for formula
3	rgceFmla	var	formula bytes
var	numParmValue	8	only present if cceFmla = 0

The rgCurve array gradient color structures are defined as follows:

Offset	Name	Size	Contents
0	numGRange	8	gradient range
8	xclrType	4	color type
12	xclrValue	8	color value – value based on color type
30	numTint	8	tint and shade value

rgbCT when ct = 4 (Databar)

Offset	Name	Size	Contents
0	cbDataBar	2	number of bytes to follow
2	bZero	1	must be zero
3	grbitDatabar	1	see text below
4	iPercentMin	1	min length of data bar as % of cell width
5	iPercentMax	1	max length of data bar as % of cell width
6	xclrType	4	color type
10	xclrValue	8	color value – value based on color type
18	numTint	8	tint and shade value
26	cfvoDB1	var	cfvo – formula 1
var	cfvoDB2	var	cfvo – formula 2

The grbitDatabar field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fRightToLeft	direction of bar in cell
1	02h	fShowValue	if =1 show values in cell
2..7	FCh	(Reserved)	Reserved; must be 0 (zero)

rgbCT when ct =5 (Filter)

Offset	Name	Size	Contents
0	cbFilter	2	number of bytes to follow

2	bZero	1	must be zero
3	grbitFilter	1	see text below
4	iParam	2	top/bottom parameter range

The grbitFilter field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fTop	if =1 filter top results
1	02h	fPercent	if =1 format values that are in the given % of the selected range
2..7	FCh	(Reserved)	Reserved; must be 0 (zero)

rgbCT when ct = 6 (Multistate/KPI)

Offset	Name	Size	Contents
0	cbMulti	2	number of bytes to follow
2	bZero	1	must be zero
3	csStates	1	count of structures in rgStates array
4	iIconSet	1	index of icon set to use 0 = 3 Arrows 1 = 3 Arrows Gray 2 = 3 Flags 3 = 3 Traffic Lights 1 4 = 3 Traffic Lights 2 5 = 3 Signs 6 = 3 Symbols 7 = 3 Symbols 2 8 = 4 Arrows 9 = 4 Arrows Gray 10 = 4 Red To Black 11 = 4 Rating 12 = 4 Traffic Lights 13 = 5 Arrows 14 = 5 Arrows Gray 15 = 5 Rating 16 = 5 Quarters
5	grbitMulti	1	see text below
6	rgStates	var	array of state structures

The grbitMulti field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fIconOnly	if =1 show icon only in cell
1	02h	(Reserved)	must be 0
2	04h	fReverse	if =1 reverse icon order

Bits	Mask	Name	Contents
3..7	F8h	(Reserved)	reserved; must be 0 (zero)

The rgStates array contains structures with the following format:

Offset	Name	Size	Contents
0	cfvo	var	conditional format value object
var	fEqual	1	if =1 then use icon if ">="
var	(Reserved)	4	Not used

CFEX: Conditional Formatting Extension (87Bh)

This FRT record saves conditional format condition information that is new for Office Excel 2007. This information is used on load to round trip conditional formatting that was not supported in previous versions.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Bh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	fIsCF12	4	if non-zero this is an Office Excel 2007-specific CF
20	nID	2	Unique ID of parent CONDFMT
22	rgbExt	var	only present if fIsCF12 = 0

rgbExt – For conditions that have been already written out as CF records, this structure will contain the information needed to restore new for Office Excel 2007 capabilities.

Offset	Name	Size	Contents
0	icfNon12	2	index of this condition out of all the non-Office-Excel-2007-specific conditions of the parent conditional format
2	cp	1	Conditional formatting operator
3	icfTemplate	1	template index
4	ipriority	2	condition priority
6	grbitCFEX	1	see text below
7	fHasDxf	1	=1 if dxf structure follows
8	rgbdxf	var	only present if fHasDxf=1
var	cbTemplateParm	1	count of template bytes (<=16)
var	rgbTemplateParm	var	template parameter bytes

The grbitCFEX field is defined as follow:

Bits	Mask	Name	Contents
0	0001h	fActive	if =1 cfvo evaluation failed so we don't want to draw this rule.

Bits	Mask	Name	Contents
1	0002h	fStopIfTrue	if =1 stop evaluating conditions after this rule if result is true.
2	0004h	(Reserved)	Reserved; must be 0 (zero)
3	0008h	fListCol	if =1 rule applies to list column

Note: if the parent conditional format is a filter type format (ct=5) then rgbTemplateParm contains the following content:

Offset	Name	Size	Contents
0	grbitFilter	1	see text
1	iParam	2	filter parameter value
3	(Reserved)	13	Reserved; must be 0 (zero)

The grbitFilter field is defined as follow:

Bits	Mask	Name	Contents
0	01h	fTop	if =1 filter top results
1	02h	fPercent	if =1 format values that are in the given % of the selected range
3..7	FCh	(Reserved)	Reserved; must be 0 (zero)

CODENAME: VBE Object Name (42h)

The CODENAME record stores the name for a worksheet object. It is not necessarily the same name seen in the workbook sheet tab. It is the name seen in the VBE project window for the worksheet.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	stCodeName	var	The name as a Unicode String.

CODEPAGE: Default Code Page (42h)

The CODEPAGE record stores the default code page (character set) used when the workbook was saved.

Record Data

Offset	Field Name	Size	Contents
4	cv	2	Code page the file is saved in: 01B5h (437 dec.) = IBM PC (Multiplan) 8000h (32768 dec.) = Apple Macintosh 04E4h (1252 dec.) = ANSI (Microsoft Windows)

COLINFO: Column Formatting Information (7Dh)

The COLINFO record describes the column formatting for a range of columns.

Record Data

Offset	Field Name	Size	Contents
4	colFirst	2	First formatted column (0-based)
6	colLast	2	Last formatted column (0-based)
8	coldx	2	Column width, in 1/256s of a character width
10	ixfe	2	Index to XF record that contains the default format for the column.
12	grbit	2	Options
14	(Reserved)	2	Reserved; must be 0 (zero)

The grbit field contains the following options:

Offset	Bits	Mask	Option Name	Contents
0	0	01h	fHidden	=1 if the column range is hidden
	7–1	FEh	(unused)	
1	2–0	07h	iOutLevel	Outline level of column range
	3	08h	(Reserved)	Reserved; must be 0 (zero)
	4	10h	fCollapsed	=1 if the column range is collapsed in outlining
	7–5	E0h	(Reserved)	Reserved; must be 0 (zero)

COMPAT12: Compatibility Checker 12 (88Ch)

This record is saved by Office Excel 2007 and later versions to remember whether or not the compatibility checker should be called when saving to BIFF8.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Ch
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	fNoCompatChk	4	If non-zero don’t call compatibility checker on BIFF8 save

COMPRESSPICTURES: Automatic Picture Compression Mode (89Bh)

This record stores the status of the automatic picture compression mode for the current workbook.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =089Bh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0

16	fAutoCompressPictures	4	=1 if pictures must be compressed for the current workbook. Stored as 4-byte integer value

CONDFMT: Conditional Formatting Range Information (1B0h)

This record stores conditional formatting range information.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	ccf	2	Number of conditional formats
6	grbit	2	Option flags
8	rwFirst	2	First row to conditionally format (0-based)
10	rwLast	2	Last row to conditionally format (0-based)
12	colFirst	2	First column to conditionally format (0-based)
14	colLast	2	Last column to conditionally format (0-based)
16	rgbSqref	var	Array of sqref structures

The grbit field contains the following options:

Bits	Mask	Flag Name	Contents
0	01h	fToughRecalc	=1 if the appearance of the cell requires significant processing
15–1	FFFEh	nID	an integer ID which links a CONDFMT record to corresponding records of type CONDFMT12 and CFEX, which have the same nID value

The sqref structure stores a union of multiple areas on a worksheet. The sqref structure is:

Offset	Var Name	Size	Contents
0	irefMac	2	Number of areas that follow
2	reref	var	Array of ref structures

The ref structure is:

Offset	Field Name	Size	Contents
0	rwFirst	2	First row in the reference
2	rwLast	2	Last row in the reference
4	colFirst	2	First column in the reference
6	colLast	2	Last column in the reference

CONDFMT12: Conditional Formatting Range Information 12 (879h)

Office Excel 2007 introduced new kinds of condition types and formatting for conditional formats. When saving a conditional format to BIFF8, Excel will determine if any of the format's conditions can be supported by previous versions. If the conditional format refers to cells completely outside the Office Excel 2003 grid it will not be saved. If the format uses conditions or formatting that are only supported in

Office Excel 2007 then a CONDFMT12 record will be used to persist the format followed by one or more CF12 records (both will be ignored by previous versions.) If the format contains conditions and formatting that can be supported in previous versions then a CONDFMT record (truncating to the smaller grid as needed) will be saved. The CONDFMT record will be followed by CF (1B1h) records for the non-Office Excel 2007 specific conditions and then CFEX (87Bh) records for conditions only supported by Office Excel 2007 or later.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0879h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	ccf	2	Number of CF12 records to follow
18	grbitCF	2	Option flags
20	rwFirst	2	First row to conditionally format (0-based)
22	rwLast	2	Last row to conditionally format (0-based)
24	colFirst	2	First column to conditionally format (0-based)
26	colLast	2	Last column to conditionally format (0-based)
28	rgbSqref	var	Array of sqref structures

The grbitCF field is defined as follow:

Bits	Mask	Name	Contents
0	0001h	fToughRecalc	=1 if the appearance of the cell requires significant processing
1..15	FFFEh	nID	unique ID of this conditional format

CONTINUE: Continues Long Records (3Ch)

Records longer than 8,228 bytes (2,084 bytes in BIFF7 and earlier) must be split into several records. The first section appears in the base record; subsequent sections appear in CONTINUE records.

In BIFF8, the TXO record is always followed by CONTINUE records that store the string data and formatting runs.

Record Data

Offset	Name	Size	Contents
4		var	Continuation of record data

If the continued data is a string, the CONTINUE record also has a field to indicate whether the string is compressed or uncompressed unicode.

Record Data

Offset	Field Name	Size	Contents
4	grbit	1	0= Compressed unicode string 1= Uncompressed unicode string
5		var	Continuation of record data

CONTINUEFRT: Continued FRT (812h)

Introduced in Excel 9 (2000) this is a FRT record. It is used to extend a FRT record that is larger than the maximum record size.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0812h
6	grbitFrt	2	FRT flags; must be zero
8	rgb	var	Continued data

CONTINUEFRT11: Continue FRT 11 (875h)

Introduced in Office Excel 2003 this is a FRT record. It is used to extend a FRT record that is larger than the maximum record size. This record differs from the CONTINUEFRT with an additional ref range. This is because the limitation of Excel 2000 on FRT causing the CONTINUEFRT to be lost, round-tripping only the parent FRT record.

Hence, for all new features starting from Office Excel 2003, this CONTINUEFRT11 must be used to write a large feat record instead of CONTINUEFRT. This ensures a continued record will round-trip with its FRT record through Excel 2000 and Excel 2002.

Special note: to ensure the record will round-trip through Excel 2000 correctly, the grbit field of the CONTINUEFRT11 must be zero or the Ref.colLast must not be equal to 0xFFFF (the limitation of Excel 2000 FRT handling). Office Excel 2003 sets this grbit to be 0, and the ref to be NULL.

Record Data

Offset	Field Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0875h
6	grbitFrt	2	FRT flags;
8	Ref	8	The rectangle range (see table below for bits definition)
16	Rgb	var	Continued data

The grbitFrt field contains the following option flags.

Bits	Mask	Flag Name	Contents
0	0001h	bitfFrtRef	1= a REF structure is present in the FRT header
1	0002h	bitfFrtVolatile	1= Excel should give an alert when saving if that version doesn't recognize the FRT
15-2	FFFCh	(Reserved)	Reserved; must be zero

The REF structure has the following fields.

Offset	Field Name	Size	Contents
0	rwFirst	2	The first row of the range associated with the record
2	rwLast	2	The last row of the range associated with the record

4	colFirst	2	The first column of the range associated with the record
6	colLast	2	The last column of the range associated with the record

CONTINUEFRT12: Continued FRT 12 (87Fh)

This is a FRT record. It is used to extend a FRT record that is larger than the maximum record size. This record is used for FRT types that are new to Office Excel 2007, in particular: DCONN (876h), EZFILTER12 (87Eh), MDTINFO (884h), MDXSTR (885h), MDXTUPLE (886h), MDXSET (887h), SORTDATA12 (895h), THEME (896h), SHAPEPROPS (8A0h) (chart record), TEXTPROPS (8A1h) (chart record), RICHTEXT (8A2h) (chart record), SHAPEPROPSSTREAM (8A4h) (chart record), TEXTPROPSSTREAM (8A5h) (chart record), and RICHTEXTSTREAM (8A6h) (chart record).

The structure of CONTINUEFRT12 (87Fh) is the same as of CONTINUEFRT (812h) record described elsewhere in this document.

COORDLIST: Polygon Object Vertex Coordinates (A9h)

This record stores the coordinates of the vertices in a polygon object.

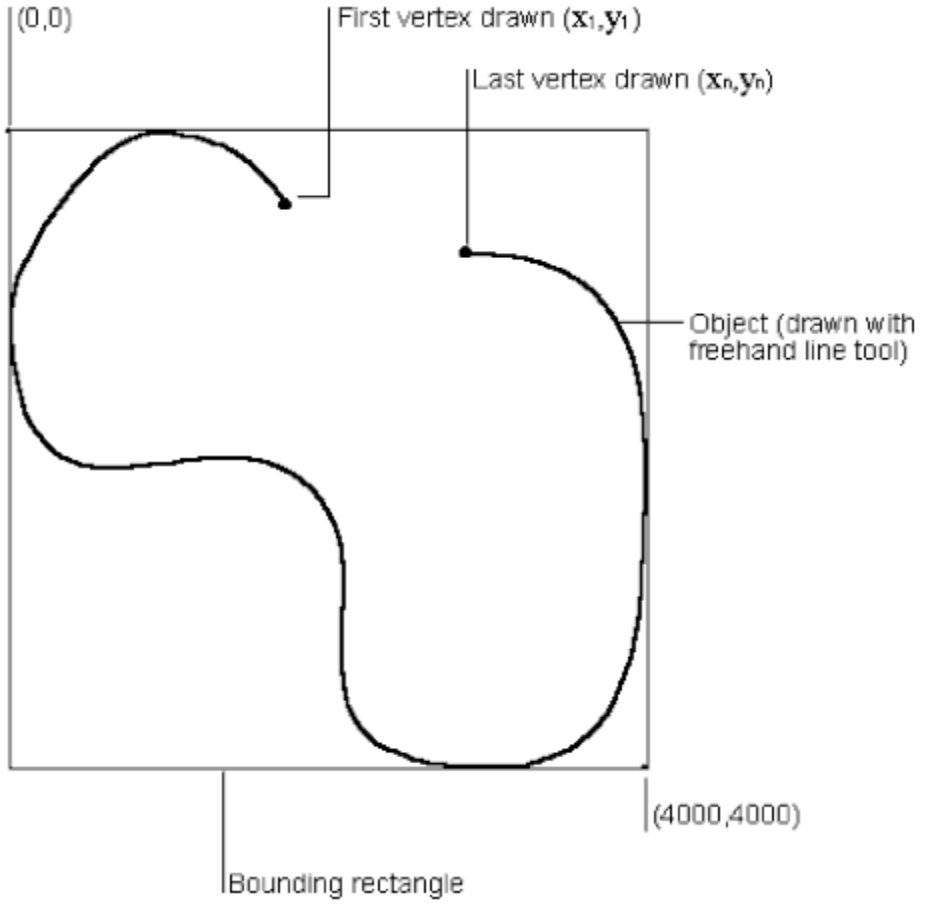
Record Data

Offset	Field Name	Size	Contents
4	rgVTX	var	Array of vertex coordinates

The VTX structure is:

```
typedef struct _vtx
{
     unsigned short int x;
     unsigned short int y;
}
VTX;
```

The upper-left corner of a polygon’s bounding rectangle is (x = 0h, y = 0h), and the lower-right corner is (x = 4000h, y = 4000h), as shown in the following illustration.



After the polygon is drawn, Excel normalizes the coordinates in rgVTX to the bounding rectangle. The actual size of the polygon can be derived from the size of the bounding rectangle in the common object fields section of the OBJ record.

COUNTRY: Default Country and WIN.INI Country (8Ch)

This record contains localization information.

Record Data

Offset	Field Name	Size	Contents
4	iCountryDef	2	Default country index
6	iCountryWinIni	2	Country index from the Win.ini file

The default country index, iCountryDef, is determined by the localized version of Excel that created the BIFF file. For example, all BIFF files created by the U.S. version of Excel have iCountryDef=1. If Microsoft Excel for Windows created the BIFF file, iCountryWinIni is equal to the index that corresponds to the country setting in the Win.ini file. Country indexes are defined in the following table.

Index	Country
1	United States
2	Canada
3	Latin America, except Brazil
7	Russia
20	Egypt

Index	Country
30	Greece
31	Netherlands
32	Belgium
33	France
34	Spain
36	Hungary
39	Italy
41	Switzerland
43	Austria
44	United Kingdom
45	Denmark
46	Sweden
47	Norway
48	Poland
49	Germany
52	Mexico
55	Brazil
61	Australia
64	New Zealand
66	Thailand
81	Japan
82	South Korea
84	Viet Nam
86	Mainland China
90	Turkey
213	Algeria
216	Morocco
218	Libya
351	Portugal
354	Iceland
358	Finland
420	Czech Republic
886	Republic of China
961	Lebanon
962	Jordan
963	Syria
964	Iraq
965	Kuwait
966	Saudi Arabia
971	United Arab Emirates
972	Israel
974	Qatar
981	Iran

CRASHRECERR: Crash Recovery Error (865h)

Introducted in Excel 10 (2002) this record is an FRT record. This BIFF record is used by Excel's crash recovery mechanism to report to the user errors detected during crash recovery of the workbook (BIFF file). The meaningful info in this record is the error message text contained in the cch and rgch fields, with possible CONTINUE record(s) following, if the error message text spans more than one BIFF record.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0865h
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Must be zero
16	cb	4	Fixed size of this record minus 4 bytes for BIFF header (rt and cb), plus only 1 byte from rgch. =13h
20	cch	2	Length of the string containing error message(s); number of actual characters.
22	rgch	var	String containing localized text of one or more line(s) of crash recovery error message(s). (See section titled Unicode Strings in Biff8 for more information about Unicode encodings.)

CRN: Nonresident Operands (5Ah)

The CRN record describes nonresident operands in a formula. For example, if you have a worksheet with the formula =EXT.XLS!A1*A3, where EXT.XLS is not the active workbook, the nonresident operand EXT.XLS!A1 generates a CRN record describing cell A1. If the nonresident operand contains more than one row, there is one CRN record for each row. For example, if the formula =EXT.XLS!A1:A4*4 is an array-entered on a worksheet, there will be four CRN records.

If a worksheet contains two different formulas and each formula has multiple nonresident operands, Excel may create one or more CRN records, depending on how the nonresident cells are arranged. For example, suppose a worksheet contains two formulas (in different cells), =EXT.XLS!A1*2 and =EXT.XLS!B1*2. Because the nonresident operands are in a row and are not separated by an empty cell, Excel creates only one CRN record containing information about cells A1 and B1.

If, however, the formulas are =EXT.XLS!A1*2 and =EXT.XLS!C1*2, Excel creates two CRN records because an empty cell (B1) separates the two operands, A1 and C1.

Record Data

Offset	Field Name	Size	Contents
4	colLast	1	Last column of the nonresident operand
5	colFirst	1	First column of the nonresident operand
6	rw	2	Row of the nonresident operand
8	OPER	var	OPER structure; see the following description

The OPER structure repeats for each cell in the nonresident operand. For example, the formula =SUM(EXT.XLS!A1:A3) produces one CRN record with three OPER structures.

OPER Structure If the Cell Contains a Number

Offset	Field Name	Size	Contents
0	grbit	1	=01h for a cell that contains a number
1	num	8	IEEE floating-point number

OPER Structure If the Cell Contains a String

Offset	Field Name	Size	Contents
0	grbit	1	=02h for a cell that contains a string
1	cch	1	Number of characters in the string
2	rgch	var	String

OPER Structure If the Cell Contains a Boolean Value

Offset	Field Name	Size	Contents
0	grbit	1	=04h for a cell that contains a Boolean value
1	f	2	=1 if TRUE =0 if FALSE
3	(unused)	6	

OPER Structure If the Cell Contains an Error Value

Offset	Field Name	Size	Contents
0	grbit	1	=10h for a cell that contains an error value
1	err	2	Error value
3	(unused)	6	

CRTCOOPT: Color options for Chart series in Mac Office 11 (8cbh)

This is a Chart FRT record. It stores the series color options.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c9h
6	grbitFrt	2	FRT flags; must be zero
8	padding	8	Reserved; must be zero
16	iScheme	4	Color Scheme
20	grbit	2	Format flags

The grbit field contains the following option flags.

Bits	Mask	Flag Name	Contents
0	0001h	fShaded	1= Vary by shade
1	0002h	fGrayscale	1= Grayscale shade
15-2	FFFCh	(Reserved)	Reserved; must be zero

DATALABEXT: Chart Data Label Extension (86Ah)

Introduced in Excel 10 (2002) this BIFF record is an FRT record for Charts.

This record is the parent of DATALABEXTCONTENTS, but contains no other information.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =086Ah
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Reserved; must be zero

DATALABEXTCONTENTS: Chart Data Label Extension Contents (86Bh)

Introduced in Excel 10 (2002) this BIFF record is an FRT record for Charts. This record holds Chart Data Label extensions which are new for Excel 10. Specifically, it indicates which chart information is contained in the data labels, and the separator string used between parts of the data label.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =086Bh
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Reserved; must be zero
16	grbit	2	Option flags for chart data labels (see description below)
18	cchSep	2	Count of characters in the separator string
20	rgchSep	var	Separator string for use in chart data labels. (See section titled 'Unicode Strings in Biff8' for more information about Unicode encodings.)

The grbit field contains the following data label option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fSeriesName	=1 if the data labels contain the series name =0 otherwise
1	0002h	fCategoryName	=1 if the data labels contain the category name (x-value) =0 otherwise
2	0004h	fValue	=1 if the data labels contain the y-value =0 otherwise
3	0008h	fPercent	=1 if the data labels contain a percentage =0 otherwise
4	0010h	fBubbleSizes	=1 if the data labels contain bubble size =0 otherwise
15-5	FFE0h	(unused)	Reserved; must be zero

DBCELL: Stream Offsets (D7h)

The DBCELL record stores stream offsets for the BIFF file. There is one DBCELL record for each block of ROW records and associated cell records. Each block can contain data for up to 32 rows. For more information about the DBCELL record, see "Finding Cell Records in BIFF Files".

Record Data

Offset	Field Name	Size	Contents
4	dbRtrw	4	Offset from the start of the DBCELL record to the start of the first ROW record in the block; this is an offset to an earlier position in the stream.
8	rgdb	var	Array of stream offsets (2 bytes each).

DBQUERYEXT: Database Query Extensions (803h)

Introduced in Excel 9 (2000) this is a FRT record. It contains extensions to the DBQUERY record.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0803h
6	grbitFrt	2	FRT flags; must be zero
8	dbt	2	The database type; this overrides the value of dbt in the SXEXT record 1= ODBC data source 2= DAO recordset 4= Web Query XL9: 5= OLE database XL9: 6= Text query XL9: 7= ADO query XL10: 8= (reserved) XL11: 9= Data retrieval service
10	grbitDbquery	4	DB Query options; see following table
14	grbitExt	2	Extended options; see following table
16	bVerDbqueryEdit	1	The last version of Excel that edited the query 0= Excel 2000 1= Excel XP 2= Office Excel 2003 3=Office Excel 2007
17	bVerdbqueryRefreshed	1	The last version of Excel that refreshed the query (see bVerDbqueryEdit for values)

Offset	Field Name	Size	Contents
18	bVerDbqueryRefreshableMin	1	The oldest version of Excel that is enabled to refresh the query (see bVerDbqueryEdit for values)
19	(Reserved)	3	Reserved; must be zero
22	coledb	2	Count of OLE DB connection strings; each is saved as an OLEDBCONN record immediately following the DBQUERYEXT record
24	cstFuture	2	Count of strings from future versions of Excel; each is saved as an EXTSTRING record immediately following the OLEDBCONN records
26	wRefreshInterval	2	0= Timed refresh is off for this query; any other value is the time between refreshes measured in minutes
28	wHtmlFormat	2	HTML formatting to apply to the imported data for a Web Query; 1= None 2= Rich Text Formatting 3= Full HTML formatting
30	cwParamFlags	2	Count of pbt flag sets in rgpbt; these override the flags from the PARAMQRY record
32	rgpbt	var	Array of pbt flags; each is 2 bytes; see following table
var	rgbFuture	var	Information from future versions of Excel

The grbitDbquery field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	fMaintain	1= Maintain connection to data source
	1	02h	(Reserved)	
	2	04h	fImportXMLSource	XL10: 1= the query source is XML
	3	08h	fListSrc	XL11: 1= the query source is a SharePoint list
	4	10h	fListReinitCache	XL11: 1= if reinitializing rather than refreshing
	6-5	60h	ExcelOption	XL11: ExcelOption from List App: 0= None 1= Print 2= Chart 3= PivotTable
	7	80h	fSrcIsXML	XL11: 1= if the source is XML or XSD

Offset	Bits	Mask	Flag Name	Contents
	7-4	F0h	(Reserved)	
1	7-0	FFh	(Reserved)	
2	7-0	FFh	grbitVar	Query type-specific bitflags for OLEDB queries and Web queries; see following table
3	7-0	FFh	grbitVar2	Query type-specific bitflags; see text below

If the query is an OLEDB query, the grbitVar field has the following option flags:

Bits	Mask	Flag Name	Contents
2-0	07h	dbost	OLEDB Command Type; this specifies the context for the strings in the SXEXT record 1= OLAP command; the string is a Cube name 2= SQL string; use the SQL guid 3= the string is a Table name 4= CommandText string; use the default guid; this command is executed by the OLEDB provider XL11: 5= the string is an XML fragment specifying a SharePoint list and view
3	08h	fLocalConn	0= Refresh from source 1= Use the local connection when refreshing
4	10h	fNoRefreshCube	0= Refresh cube in an OLAP PivotTable 1= Refresh from the local cube in an OLAP PivotTable; Excel 2000 always writes 0
5	20h	fUseOfficeLcid	1=Send user's UI locale to Analysis Services server on connection. Used for AS member translation feature (OLAP only)
6	40h	fSrvFmtNum	1=Apply server number formatting (OLAP only)
7	80h	fSrvFmtBack	1=Apply server background color (OLAP only)

If the query is a Web query, the grbitVar field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	01h	fParsePreFormatted	0= each row of text enclosed in <PRE> tags will be imported to a single cell 1= text enclosed in <PRE> tags will be parsed as tables
1	02h	fConsecDelim	Must be zero if fParsePreFormatted is 0 0= treat each consecutive delimiter as a separate delimiter 1= treat all consecutive delimiters as one

Bits	Mask	Flag Name	Contents
2	04h	fSameSettings	Must be zero if fParsePreFormatted is 0 0= parse each table inside <PRE> tags separately 1= parse all tables inside a <PRE> block with the same width settings as the first row
3	08h	fXL97	0= Excel 2000 or later web query 1= Excel 97 web query
4	10h	fNoDateRecog	0= import dates as date data type 1= import dates as text
5	20h	fRefreshedInXl9	1= This query was refreshed in Excel 2000
7-6	C0h	(Reserved)	Reserved; must be zero

For OLAP connections, the grbitVar2 field has the following option flags:

Bits	Mask	Flag Name	Contents
0	01h	fSrvFmtFore	1=Apply server foreground color
1	02h	fSrvFmtFlags	1= Apply server font formatting
2	04h	fSupportsLangCellProp	1=Server supports querying for language property so that cells can be formatted using currency number format sent by the server.
7-3	F8h	(Reserved)	Reserved; must be zero

For non-OLAP connections, the grbitVar2 field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	01h	fAdoRefreshable	Must be zero if query type is not ADO 1= the ADO query can be refreshed
7-1	FEh	(Reserved)	

The grbitExt field contains the option flags listed in the following table.

Bits	Mask	Flag Name	Contents
0	0001h	fTextWiz	1= this is a refreshable text query
1	0002h	fTableNames	This is always 0 for any non-Web query 1= The tables to import are specified by name in the string contained in the ExtString record following the DBQUERYEXT record
15-2	FFFCh	(Reserved)	Reserved; must be zero

The rgpbt fields each contain the following option flags:

Bits	Mask	Flag Name	Contents
2-0	0007h	pbt	0= prompt for parameter on refresh of query 1= use stored value for the parameter 2= use the value from a cell
3	0008h	fAutoRefresh	0= do not refresh automatically when the cell value changes 1= refresh the query when the cell value changes. Must be 0 if pbt is not =2
15-4	FFF0h	(Reserved)	Reserved; must be zero

DCON: Data Consolidation Information (50h)

The DCON record stores options from the **Consolidate** dialog box (**Data** menu).

Record Data

Offset	Field Name	Size	Contents
4	iiftab	2	Index to the data consolidation function (see the following table)
6	fLeftCat	2	=1 if the Left Column option is turned on
8	fTopCat	2	=1 if the Top Row option is turned on
10	fLinkConsol	2	=1 if the **Create Links To Source Data** option is turned on

The iiftab field, described in the following table, corresponds to the **Function** option in the **Consolidate** dialog box (**Data** menu).

Function	Iiftab
Average	0
Count Nums	1
Count	2
Max	3
Min	4
Product	5
StdDev	6
StdDevp	7
Sum	8
Var	9
Varp	10

DCONBIN: Data Consolidation Information (1B5h)

The DCONBIN record stores a data consolidation reference. DCONBIN is identical to DCONNAME, except that DCONBIN is used when the data consolidation reference refers to a built-in name (as described by a NAME record). The stFile field contains an encoded workbook name. For more information about this field, see "EXTERNSHEET".

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	cchName	1	Length of the named range of the source area
5	stName	var	Named range of the source area for consolidation
var	cchFile	1	Length of the workbook name
var	stFile	var	Workbook name

DCONN: Data Connection (876h)

This record is used by Office Excel 2007 and later to store information for data connection.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0876h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	Dbt	2	Database source types (see below for details)
10	Grbit	2	Connection flags (see below for details)
12	Cparams	2	The number of parameters for parameterized queries
14	(Reserved)	2	Currently not used, and set to 0
16	grbitDbquery	2	Query flags (see below for details)
18	grbitDbt	2	Query flags specific to the dbt (see below for details)
20	bVerDbqueryEdit	1	The Excel query version that was last used to edit the query. One of the following version numbers: =0 Excel 9 (2000) and earlier =1 Excel 10 (XP) =2 Excel 11 (2003) =3 Excel 12 (2007)
21	bVerDbqueryRefreshed	1	The Excel query version that last refreshed the query. One of the following version numbers: =0 Excel 9 (2000) and earlier =1 Excel 10 (XP) =2 Excel 11 (2003) =3 Excel 12 (2007)
22	bVerDbqueryRefreshableMin	1	Minimum Excel query version required to refresh the query. One of the following version numbers: =0 Excel 9 (2000) and earlier =1 Excel 10 (XP) =2 Excel 11 (2003) =3 Excel 12 (2007)

23	wRefreshInterval	2	How many minutes to wait between automatic refreshes of the query
25	wHTMLFmt	2	How to handle formatting from the HTML source (see below for details)
27	Rcc	4	Reconnection method: =0 As required - On refresh use the existing connection information and if it ends up being invalid then get updated connection information, if available =1 Always - On every refresh get updated connection information, if available, and use that instead of the existing connection information =2 Never - Never get updated reconnection information even if it is available and even if the existing connection information is invalid
31	credMethod	1	Reconnection method (see below for details)
32	(Reserved)	1	Currently not used, and set to 0

Note: from the following variable length field onward the stream of fields will be broken apart and continued by CONTINUEFRT12 (87Fh) BIFF8 records as required by the maximum BIFF8 record size limit.

33	rgchSourceDataFile	var	Database file to try and reconnect to if use of existing OLE DB connection fails (see below for details on these variable length strings)
var	rgchSourceConnectionFile	var	Connection (ODC) file to try and re-read if use of existing connection fails (see below for details on these variable length strings)
var	rgchConnectionName	var	Name of the workbook connection (see below for details on these variable length strings)
var	rgchConnectionDesc	var	User description for the workbook connection (see below for details on these variable length strings)
var	rgchSSOApplicationID	var	Single Sign On ID string (see below for details on these variable length strings)
var	rgchTableNames	var	Comma-separated list of table names. Only present when fTableNames flag in grbit field (see below) is =1 (see below for details on these variable length strings)
var	rgbParameter	var	Only present when cparams is not zero and fStandAlone is one. rgbParameter will occur cparams times and each describes a parameter for a parameterized query (see below for details)
var	rgbConnection	var	Connection data specific to the dbt (see below for details)

var	rgbSQL	var	Sequence of strings representing a SQL statement for an ODBC-based source (see below for details on these sequence of strings)
var	rgbSQLSav	var	Sequence of strings representing the original (non-parameterized) SQL statement for an ODBC-based source for a PivotTable using server-based page fields (see below for details on these sequence of strings)
var	rgbEditWebPage	var	Sequence of strings representing the URL for the web query edit query dialog (see below for details on these sequence of strings)
var	rgbID	var	ID of the Excel object that the connection is associated with (see below for details)

The dbt field contains one of the following values:

dbt	Database source type
00h	No type specified
01h	ODBC-based source
02h	DAO-based source
03h	Access generated this source
04h	Web query
05h	OLEDB-based source
06h	Text-based source created via the Text Import Wizard
07h	ADO record set
08h	Reserved
09h	DSP

The grbit field contains the following connection flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fSavePwd	=1 if password is cached/saved for this connection
	1	0002h	fTablesOnlyHTML	=1 if web queries should only work on HTML tables
	2	0004h	fTableNames	=1 if there are any tables to use
	3	0008h	fDeleted	=1 if the associated workbook connection has been deleted
	4	0010h	fStandAlone	=1 if the connection is not currently in use by any Excel feature
	5	0020h	fAlwaysUseConnectionFile	=1 indicates whether when the connection is refreshed we should always and only use the connection information in the connection file. Applies only to OLE DB and ODBC

	6	0040h	fBackgroundQuery	=1 if the connection should be refreshed in the background (asynchronously)
	7	0080h	fRefreshOnLoad	=1 if the connection should be refreshed at the end of file load
	8	0100h	fSaveData	=1 if the supporting data/records for the connection get saved
	9-15	FE00h	(Reserved)	Currently not used, and set to 0

The grbitDbquery field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fMaintain	=1 if the connection with the database should be kept open once established
	1	0002h	fNewQuery	=1 if the connection has not been refreshed for the first time
	2	0004h	fImportXMLSource	=1 if import underlying XML Source
	3	0008h	fSPListSrc	=1 if and only if the query is using the SharePoint List Provider
	4	0010h	fSPListReinitCache	=1 if reinitializing rather than refreshing
	5-6	0060h	ExcelOption	ExcelOption from List App: 0=None 1=Print 2=Chart 3=PivotTable
	7	0080h	fSrcIsXML	=1 if and only if the source is XML or XSD
	8-15	FF00h	(Reserved)	Currently not used, and set to 0

grbitDbt Variant: dbt = 04h (web query) contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fParsePreFormatted	=1 if text enclosed in <PRE> tags will be parsed as tables =0 if each row of text enclosed in <PRE> tags will be imported as a single cell

1	0002h	fConsecDelim	Must be zero if fParsePreFormatted is 0 =1 if consecutive delimiters should be treated as just one delimiter =0 if each consecutive delimiters should be treated as a separate delimiter
2	0004h	fSameSettings	Must be zero if fParsePreFormatted is 0 =1 if all tables inside a <PRE> block should be parsed with the same width settings as the first row =0 if each table inside a <PRE> block should be parsed separately
3	0008h	fXL97Format	=1 if the query was created by Excel 97 =0 if the query was created by Excel 2000 or later
4	0010h	fNoDateRecog	=1 if dates should be imported as text =0 if dates should be imported as date data type
5	0020h	fRefreshedInXl9	=1 if the query was refreshed in Excel 2000
6-15	FFC0h	(Reserved)	Currently not used, and set to 0

grbitDbt Variant: dbt = 05h (OLEDB-based source) contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0-2	0007h	dbost	OLEDB Command Type: 0=Has not been defined yet 1=OLAP command; a cube name 2=SQL string; the SQL guid 3=Table name 4=CommandText string; the default guid 5=SharePoint List Query; an XML fragment specifying a SharePoint list and view
	3	0008h	fLocalConn	=1 if use the local connection when refreshing. Only valid for OLAP =0 if refresh from the source
	4	0010h	fNoRefreshCube	=1 if refresh from the local cube. =0 if refresh cube. Only valid for OLAP

5	0020h	fUseOfficeLcid	=1 if Excel needs to set the Microsoft Office UI locale on the connection. Only valid for OLAP
6	0040h	fSrvFmtNum	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the number format from the OLAP source
7	0080h	fSrvFmtBack	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the background color from the OLAP source
8	0100h	fSrvFmtFore	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the font color from the OLAP source
9	0200h	fSrvFmtFlags	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the font style from the OLAP source
10	0400h	fSupportsLangCellProp	=1 if Excel should send the Microsoft Office UI locale to the OLAP provider to support AS member localization
11-15	F800h	(Reserved)	Currently not used, and set to 0

grbitDbt Variant: dbt = 07h (ADO record set) contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0-7	00FFh	(Reserved)	Currently not used, and set to 0
	8	0100h	fAdoRefreshable	=1 if the ADO query can be refreshed
	9-15	FE00h	(Reserved)	Currently not used, and set to 0

The wHTMLFmt field determines the HTML formatting to apply to the imported data for a Web Query:

wHTMLFmt	Preserved formatting
01h	None
02h	Rich text formatting only
03h	Full HTML formatting

The credMethod is one of the following values:

credMethod	Reconnection method
00h	Integrated authentication
01h	Use no credentials at all
02h	Use stored credentials

03h Prompt for credentials

Note: DCONN (876h) record and possible succeeding CONTINUEFRT12 (87Fh) records might be followed up by one or more SXADDL12 (881h) records that are created by Excel 14 or newer. The content of these records is not currently defined.

The rgbParameter is organized as follows:

Offset	Name	Size	Contents
0	rgchName	var	Name of the parameter (see below for details on these variable length strings)
var	wParamFlags	2	Option flags (see below for details)
var	wTypeSql	2	Used for ODBC queries; the parameter SQL type
var	wParamFlags2	2	Option flags (see below for details)
var	rgbBinding	var	Parameter "value" specific to the pbt (see below for details)

The wParamFlags (query parameter flags) is as follows:

Offset	Bits	Mask	Name	Contents
0	0-2	0007h	pbt	Parameter type: =0 Prompt =1 Value
	3-15	FFF8h	(Reserved)	Currently not used, and set to 0

The wParamFlags2 (query parameter flags) is as follows:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fDefaultName	=1 if a default name has been assigned to the parameter =0 if the user has specified a name for the parameter
	2-15	FFFEh	(Reserved)	Currently not used, and set to 0

rgbBinding Variant: pbt = 00h (prompt) is organized as follows:

Offset	Name	Size	Contents
0	rgchPrompt	var	Prompt string for the parameter value (see below for details on these variable length strings)

rgbBinding Variant: pbt = 01h (value) is organized as follows:

Offset	Name	Size	Contents
0	wBindingValueType	2	Data type of the binding value: =01h Number =02h String =04h Boolean =0800h Integer
2	rgbBindingValue	var	Parameter value data specific to the wBindingValueType (see below for details)

rgbBindingValue Variant: wBindingValueType = 01h (number) is organized as follows:

Offset	Name	Size	Contents
0	numVal	8	The binding numeric value.

rgbBindingValue Variant: wBindingValueType = 02h (string) is organized as follows:

Offset	Name	Size	Contents
0	rgchVal	var	The binding string value (see below for details on these variable length strings)

rgbBindingValue Variant: wBindingValueType = 04h (Boolean) is organized as follows:

Offset	Name	Size	Contents
0	fVal	1	The binding Boolean value.
1	(Reserved)	7	Currently not used, and set to 0

rgbBindingValue Variant: wBindingValueType = 0800h (integer) is organized as follows:

Offset	Name	Size	Contents
0	lVal	4	The binding integer value.
4	(Reserved)	4	Currently not used, and set to 0

rgbConnection Variant: dbt = 01h (ODBC-based source) is organized as follows:

Offset	Name	Size	Contents
0	rgchConnection	var	The connection string (see below for details on these variable length strings)

rgbConnection Variant: dbt = 04h (web query) is organized as follows:

Offset	Name	Size	Contents
0	rgbURL	var	Sequence of strings representing the URL for a web query (see below for details on these sequence of strings)

var	rgbWebPost	var	Sequence of strings representing the post method for a web query (see below for details on these sequence of strings)

rgbConnection Variant: dbt = 05h (OLEDB-based source) is organized as follows:

Offset	Name	Size	Contents
0	nDrillthroughRows	4	An unsigned int representing the number of drillthrough rows
4	coledb	2	Can only be non-zero if fStandAlone = 1. An unsigned int representing the number of connection strings associated with the OLEDB connection. Valid range is 0 to 4 inclusive.
6	rgioledb	var	An array of unsigned ints (2 bytes) of count coledb where each element holds the index of the connection string in the uncompacted array.
var	rgConn	var	An array of strings of count coledb where each element holds a string (see below for details on these variable length strings)

rgbConnection Variant: dbt = 06h (Text-based source created via the Text Import Wizard) is organized as follows:

Offset	Name	Size	Contents
0	rt	2	Record type; =0805h
2	grbitFrt	2	FRT flags; must be zero
4	grbit	2	Options; see following table
6	rowStartAt	4	Row in source file where the query information starts
10	delimFlags	4	Delimiter flags; see following table
14	itwf	4	Fields in each row of data
15	chDecimal	1	ANSI character; which character is used for the decimal separator
16	chThousSep	1	ANSI character, which character is used for the thousands separator
17	rgtxtwf	var	Array of itwf TXTWF structures (see below)
var	rgchFile	var	Name of the text file that is the source for the query

The grbit field contains following option flags.

Bits	Mask	Name	Contents
0	0001h	(Reserved)	Reserved; must be one
1	0002h	fDelimited	0= The data fields are of fixed size 1= The data is delimited

3-2	000Ch	iCpid	File Origin; 1= Macintosh 2= Windows (ANSI) 3= MS-DOS (PC-8)
4	0010h	fPromptForFile	0= Refresh data from saved file location 1= Browse for a file to open when refreshing
14-5	7FE0h	iCpidNew	XL10: File's original codepage
15	8000h	fUseNewiCpid	XL10: 1= use iCpidNew (iCpid set to 2)

The delimFlags field contains following option flags.

Offset	Bits	Mask	Name	Contents
0	0	01h	fTab	1= Treat the tab character as a field delimiter
	1	02h	fSpace	1= Treat the space character as a field delimiter
	2	04h	fComma	1= Treat the comma character as a field delimiter
	3	08h	fSemiColon	1= Treat the semicolon character as a field delimiter
	4	10h	fCustom	1= Use the custom delimiter character specified in the chCustom field
	5	20h	fConsective	0= Consecutive delimiters are all treated as separate delimiters 1= Consecutive delimiters are treated as one delimiter
	7-6	C0h	iTextDelm	Text delimiter; 0= Quotation mark 1= Apostrophe 2-3= No text delimiter
2-1	15-0	FFFFh	chCustom	Custom text delimiter character
3	7-0	FFh	(Reserved)	Reserved; must be zero

The TXTWF structure is shown in the following table.

Offset	Name	Size	Contents
0	fieldType	4	Field data type: =00h, Automatic =01h, Text =02h, Date in the order month, day then year =03h, Date in the order day, month then year =04h, Date in the order year, month then day =05h, Date in the order month, year then day =06h, Date in the order day, year then month =07h, Date in the order year, day then month =08h, Skip importing this field

4	fieldStart	4	The character position (zero-based) this field starts at if delimiters are not being used to determine where fields start and end

The rgbID is organized as follows:

Offset	Name	Size	Contents
0	btype	1	ID type: =0 No associated object =1 Index (or numeric ID) of associated object =2 Name of associated object
1	rgbIDValue	2	Value of the ID specific to the btype (see below for details)

rgbIDValue Variant: btype = 0 (no associated object) is organized as follows:

Offset	Name	Size	Contents
0	(Empty)	0	

rgbIDValue Variant: btype = 1 (index of associated object) is organized as follows:

Offset	Name	Size	Contents
0	wID	2	An unsigned int representing the ID or index of the associated object

rgbIDValue Variant: btype = 2 (name of associated object) is organized as follows:

Offset	Name	Size	Contents
0	rgchID	var	Name of the associated object (see below for details on these variable length strings)

The sequence of strings (used for rgbSQL, rgbSQLSav, etc.) are organized as follows:

Offset	Name	Size	Contents
0	cst	2	An unsigned int representing the number of complete strings that are saved
2	rgst	var	An array of strings of count cst where each element holds a string (see below for details on these variable length strings)

The variable length strings (used for rgchSourceDataFile, rgchSource-ConnectionFile, etc.) are organized as follows:

Offset	Name	Size	Contents
0	cchTotal	4	An unsigned int representing the length of the saved string in characters
4	cchPartial	2	An unsigned int representing the length of the immediately following string segment
6	rgbPartial	var	The string segment using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	rgbRemainder	var	Repeated cchPartial-rgbPartial pairs sufficient times to save the entire string

DCONNAME: Data Consolidation Named References (52h)

The DCONNAME record contains the complete description of a named range of cells for the **Consolidate** command (**Data** menu). The stFile field contains an encoded workbook name. For more information about this field, see "EXTERNSHEET".

Record Data

Offset	Field Name	Size	Contents
4	cchName	1	Length of the named range of the source area
5	stName	var	Named range of the source area for consolidation
var	cchFile	1	Length of the workbook name
var	stFile	var	Workbook name

DCONREF: Data Consolidation References (51h)

The DCONREF record contains the complete description of a range of cells for the **Consolidate** command (**Data** menu). The rgch field contains an encoded workbook name. For more information about this field, see "EXTERNSHEET".

Record Data

Offset	Field Name	Size	Contents
4	rwFirst	2	First row of the source area for consolidation
6	rwLast	2	Last row of the source area for consolidation
8	colFirst	1	First column of the source area for consolidation
9	colLast	1	Last column of the source area for consolidation
10	cch	1	Length of the workbook name
11	rgch	1	Workbook name

DEFAULTROWHEIGHT: Default Row Height (225h)

The DEFAULTROWHEIGHT record specifies the height of all undefined rows on the sheet. The miyRw field contains the row height in units of 1/20th of a point. This record does not affect the row height of any rows that are explicitly defined.

Record Data

Offset	Field Name	Size	Contents
4	grbit	2	Option flags (see the following table)
6	miyRw	2	Default row height

The grbit field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	fUnsynced	=1 if all undefined rows have incompatible font height and row height
	1	02h	fDyZero	=1 if all undefined rows have 0 (zero) height
	2	04h	fExAsc	=1 if all undefined rows have an extra space above
	3	08h	fExDsc	=1 if all undefined rows have an extra space below
	7–4	F0h	(Unused)	
1	7–0	FFh	(Unused)	

DEFCOLWIDTH: Default Width for Columns (55h)

The DEFCOLWIDTH record specifies the width, measured in characters, for columns not explicitly sized in the COLWIDTH record.

Record Data

Offset	Field Name	Size	Contents
4	cchdefColWidth	2	Default width of the columns

DELMENU: Menu Deletion (C3h)

The DELMENU record stores a menu deletion and is very similar to the ADDMENU record. For more information about menu system modification, see "ADDMENU".

If fDelete is true (equal to 01h), the menu object is deleted at this level of the hierarchy. For example, if fDelete is true in the second DELMENU record of the group, Excel deletes the specified menu from a menu bar. If fDelete is false (equal to 00h), the record is a placeholder, and one of the following DELMENU records in the group will define the menu deletion.

For menu items and submenu items, the icetabItem field stores the index to the deleted command if the item is attached to a built-in command. If icetabItem equals FFFFh, the stItem string from the rgch field is used instead.

Record Data

Offset	Field Name	Size	Contents
4	icetabItem	2	icetab of the command
6	cditm	1	Number of DELMENU records at the next level of the menu hierarchy
7	fDelete	1	=1, delete this menu object =0, this is a placeholder record
8	fMultiple	1	=1 if this item has subitems
9	rgch	var	stItem (see text)

The first byte of the stItem string is the byte count, and the last byte is reserved.

DELTA: Iteration Increment (10h)

The DELTA record stores the **Maximum Change** value from the **Options** dialog box, **Calculation** tab. The number is in 8-byte IEEE floating-point format.

Record Data

Offset	Field Name	Size	Contents
4	numDelta	8	Maximum iteration change

DIMENSIONS: Cell Table Size (200h)

The DIMENSIONS record contains the minimum and maximum bounds of the sheet. It provides a concise indication of the sheet size.

Note: both the rwMac and colMac fields are greater by 1 than the actual last row and column. For example, a worksheet that exists between cells B3 and D6 would have the following dimensions in the dimensions record (rows and columns are 0-based in BIFF files in which row 1 and column A are both coded as 0):

rwMic=2	indicates that 3 is the first row
colMic=1	indicates that B is the first column
rwMac=6	indicates that 6 is the last row
colMac=4	indicates that D is the last column

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rwMic	4	First defined row on the sheet
8	rwMac	4	Last defined row on the sheet, plus 1
12	colMic	2	First defined column on the sheet
14	colMac	2	Last defined column on the sheet, plus 1
16	(Reserved)	2	Reserved; must be 0 (zero)

Record Data — BIFF7 and earlier

Offset	Field Name	Size	Contents
4	rwMic	2	First defined row on the sheet
6	rwMac	2	Last defined row on the sheet, plus 1
8	colMic	2	First defined column on the sheet
10	colMac	2	Last defined column on the sheet, plus 1
12	(Reserved)	2	Reserved; must be 0 (zero)

DOCROUTE: Routing Slip Information (B8h)

This record stores originator information for a routing slip and other information for document routing. The rgch field contains the concatenation of seven null-terminated strings: Subject, Message, Route ID, Custom Message Type, Book Title, Originator's Friendly Name, and Originator's System-Specific Address. The lengths of the strings are contained in the seven fields, cchSubject through ulEIDSize.

Record Data

Offset	Field Name	Size	Contents
4	iStage	2	Routing stage
6	cRecip	2	Number of recipients
8	delOption	2	Delivery option: =0, one at a time =1, all at once

10	wFlags	2	Option flags
12	cchSubject	2	Length of the Subject string
14	cchMessage	2	Length of the Message string
16	cchRouteID	2	Length of the Route ID string
18	cchCustType	2	Length of the Custom Message Type string
20	cchBookTitle	2	Length of the Book Title string
22	cchOrg	2	Length of the Originator's Friendly Name string
24	ulEIDSize	4	Length of the Originator's System-Specific Address string
28	rgch	var	(See text)

The wFlags field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	fRouted	=1 if the document has been routed
	1	02h	fReturnOrig	=1 if the document should be returned to its originator
	2	04h	fTrackStatus	=1 if the status message should be sent
	3	08h	fCustomType	=1 if the status message is a custom message type
	6–4	70h	(Reserved)	
	7	80h	fSaveRouteInfo	=1 if the routing slip information should be saved
1	7–0	FFh	(Reserved)	

DROPDOWNOBJIDS: Drop Down Object IDs Record (874h)

Introduced in Excel 11 (2003) the DROPDOWNOBJIDS record stores the drop down drawing object ids used for the AutoFilter etc. in a workbook. These ids are persisted so the next time the book is loaded, these ids can be re-used.

This record is created to help ease the issue of limited drawing object ids so the limit would not be reached so easily with a huge Table or a Table with many columns.

In Excel 2003, at the end of the AutoFilter drop down object ids, if there is a total row used on any Table(s), its drop down object id is also saved as the last item of the array of drop down object ids.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0874h
6	grbitFrt	2	FRT cell reference flag =0 bitFrtNone

8	(Reserved)	8	Currently not used, set to 0.
16	cidObj	2	Count of Object ids
18	rgidObj	var	Array of cidObj many object ids, 2 bytes each

DSF: Double Stream File (161h)

The DSF record stores a flag that indicates if the workbook is a double stream file.

Record Data — BIFF8

Offset	Flag Name	Size	Contents
4	fDSF	2	=1 if the workbook is a double stream file

DV: Data Validation Criteria (1BEh)

This record stores data validation criteria for a range of cells.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	dwDvFlags	4	Option flags; see following table
8	rgb	var	Array of data validation criteria (see text) followed by Title, Prompt, and Error sts, Min and Max rgces, and cref REFs

The dwDvFlags field contains the following option flags:

Bits	Mask	Flag Name	Contents
3–0	0000000Fh	ValType	Validation type
6-4	00000070h	ErrStyle	Error alert style
7	00000080h	fStrLookup	=1 if this is list-type validation with an explicitly expressed list of valid inputs
8	00000100h	fAllowBlank	=1 suppress an error when any cell referenced by the validation formula is blank
9	00000200h	fSuppressCombo	=1 if this is list-type validation, with no drop-down to be displayed in the cell when selected
17–10	0003FC00h	mdImeMode	The IME mode to be used for this cell (East Asian versions only)
18	00040000h	fShowInputMsg	=1 show input message box
19	00080000h	fShowErrorMsg	=1 show error message box
23–20	00F00000h	typOperator	Operator type
3 –24	FF000000h	(Reserved)	Reserved; must be 0 (zero)

DVAL: Data Validation Information (1B2h)

This record stores data validation information.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	wDviFlags	2	Option flags; see following table
6	xLeft	4	The x coordinate of the input window
10	yTop	4	The y coordinate of the input window
14	idObj	4	For a Table with in-cell drop-down, the object id of drop-down OBJ record
18	idvMac	4	Number of DV records that follow

The wDviFlags field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fWnClosed	=1 the input window has been closed
1	0002h	fWnPinned	=1 the input window is pinned in place
2	0004h	fCached	=1 if information about a cell's data validation has been cached
15–3	FFF8h	(Reserved)	Reserved; must be 0 (zero)

DXF: Differential XF (88Dh)

The DXF record is used to describe formatting properties that are used by various features to modify cell formatting. BIFF8 records such as CF and SXDXF still persist DXF information inline (possibly followed by an xfexts structure to round trip post BIFF8 formatting). However new feature records (e.g. TABLESTYLEELEMENT) refer to DXFs with a dxfID which is the index of this corresponding DXF record as saved on disk.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Dh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitDxf	2	see table below
18	xfProps	var	Array of formatting properties; see table below

The grbitDxf field contains the flags listed in the following table.

Bits	Mask	Name	Contents
0	0001h	fUIFill	=1 default (if 0 forecolor/backcolor swapped)
1	0002h	fNewBorder	=1 default (if 1 left,right,top,bottom borders refer to outline of range instead of per cell)
2..15	FFFCh	(Reserved)	Reserved; must be 0 (zero)

xfProps – this structure is used by DXF and STYLEEXT records to represent a set of XF formatting properties. This header is followed by cprops number of property definitions each starting with an xfpropheader.

Offset	Name	Size	Contents
0	version	2	xfprops version – currently 0.
2	cprops	2	count of xfprop entries that follow

xfpropheader - The data for each XF format property starts with a common header:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.

This header is followed by a variable amount of data as determined by the XF property type (xfpropType). Unknown property types are skipped on load. BIFF12 defines the following XF property types. The Data kind describes the actual structure used to represent the property type's information. If present each property entry will modify the corresponding XF property (see XF records definition.)

xfpropType	Value	Data kind
Fill pattern (Fls)	0	xfpropByte
ForeColor	1	xfpropColor
BackColor	2	xfpropColor
Gradient	3	xfpropGradient
GradientStop	4	xfpropGradientStop
TextColor	5	xfpropColor
BorderTop	6	xfpropBorder
BorderBottom	7	xfpropBorder
BorderLeft	8	xfpropBorder
BorderRight	9	xfpropBorder
BorderDiag	10	xfpropBorder
BorderVertical	11	xfpropBorder
BorderHorizontal	12	xfpropBorder
BorderDiagUp	13	xfpropBorder
BorderDiagDown	14	xfpropBorder
HorizontalAlign	15	xfpropByte
VerticalAlign	16	xfpropByte
TextRotation	17	xfpropByte
TextIndent	18	xfpropWord
ReadingOrder	19	xfpropByte
WrapText	20	xfpropByte
JustifyText	21	xfpropByte

ShrinkToFit	22	xfpropByte
MergeCell	23	xfpropByte
TextName	24	xfpropString
Bold	25	xfpropWord
Underline	26	xfpropWord
SuperSubscript	27	xfpropWord
Italic	28	xfpropByte
StrikeThru	29	xfpropByte
Outline	30	xfpropByte
Shadow	31	xfpropByte
Condense	32	xfpropByte
Extend	33	xfpropByte
CharSet	34	xfpropByte
FontFamily	35	xfpropByte
TextSize	36	xfpropDWord
FontScheme	37	xfpropByte
NumFormat	38	xfpropString
(reserved)	39	xfpropDWord
(reserved)	40	xfpropDWord
NumFormatIndex	41	xfpropWord
TextRelativeIndent	42	xfpropWord
Locked	43	xfpropByte
Hidden	44	xfpropByte

xfpropByte –Used for properties defined by a single byte of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	data	1	Single byte of data

xfpropWord –Used for properties defined by a single word of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	data	2	Single word (2 bytes) of data

xfpropDWord –Used for properties defined by a single double word of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	data	4	Single double word (4 bytes) of data

xfpropColor – Used for properties that represent a single color of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	grbit	1	Bit 0: fValidRGBA Bits 1..7: xclrType
5	xclrIndex	1	Color index if indexed or theme color
6	nTintShade	2	Tint and shade to apply. Signed short that is used to represent how the color should be tinted or shaded. This value is mapped to the range (-1.0 to 1.0). Positive values make the color value lighter, negative values make the color value darker. A 0.0 value means do not tint/shade the color.
8	dwRgba	4	RGB color

xclrType – Excel supports the following color types.

Color type	Value	Comments
xclrAuto	0	Automatic foreground/background colors
xclrIndexed	1	xclrIndex = BIFF8 indexed palette color (icv)
xclrRGB	2	dwRgba = RGB color
xclrThemed	3	xclrIndex = Theme color index

xfpropBorder – Used for properties that represent a single cell border of data (extends xfpropColor with single word describing border line type dg):

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	grbit	1	Bit 0: fValidRGBA Bits 1..7: xclrType
5	xclrIndex	1	Color index if indexed or theme color
6	nTintShade	2	Tint and shade to apply
8	dwRgba	4	RGB color
12	dgBorder	2	Border line style

dgBorder – The border line style corresponds to the options in the **Format Cells** dialog box, **Border** tab, as shown in the following table.

dgBorder Value	Border line style
0	None
1	Thin
2	Medium
3	Dashed
4	Dotted
5	Thick
6	Double
7	Hairline
8	Medium dashed
9	Dash-dot
10	Medium dash-dot
11	Dash-dot-dot
12	Medium dash-dot-dot
13	Slanted dash-dot

xfpropString – Used for properties that can be represented with a single character string of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	cchName	2	Length of string in 2 byte characters
6	rgchName	var	The actual string characters

xfpropGradient – Used for properties to represent a gradient fill definition.

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	type	4	Gradient type. Two gradient types are currently supported – linear (0) and rectangular (1)
8	numDegree	8	Gradient angle. Used for linear gradients to determine the angle at which the gradient strokes will be drawn (vertical, horizontal, or diagonal)
16	numFillToLeft	8	Left coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge

24	numFillToRight	8	Right coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge
32	numFillToTop	8	Top coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge.
40	numFillToBottom	8	Bottom coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge

xfpropGradientStop –Used to define the gradient stops of the preceding xfpropGradient.

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Length of this property in bytes with header.
4	(Reserved)	2	Gradient stop index – not used on load.
8	numPosition	8	Gradient stop position. Position within the gradient range where this gradient stop's color should begin.
16	grbit	1	Bit 0: fValidRGBA Bits 1..7: xclrType (same as described for xfpropColor).
17	xclrIndex	1	Color index if indexed or theme color (same as described for xfpropColor).
18	nTintShade	2	Tint and shade to apply (same as described for xfpropColor).
20	dwRgba	4	RGB color (same as described for xfpropColor).

EDG: Edition Globals (88h)

The EDG record contains information about the publisher/subscriber feature. This record can be created only by Excel for the Macintosh. However, if any other platform version of Excel encounters the EDG record in a BIFF file, it leaves the record in the file, unchanged, when the file is saved.

Record Data

Offset	Field Name	Size	Contents
4	lcsec	4	Count of all section records ever created in this document, plus 1 (includes published embedded charts)
8	crtpub	2	Count of all PUB records in the file (includes published embedded charts)

10	(Reserved)	2	Reserved; must be 0 (zero)

EOF: End of File (0Ah)

The EOF record marks the end of the workbook stream or the end of one of the substreams in the workbook stream. It has no record data field and is 0A000000h.

EXCEL9FILE: Excel 9 File (1C0h)

The EXCEL9FILE record indicates the file was written by Excel 2000. It has no record data field and is C0010000h. Any application other than Excel 2000 that edits the file should not write out this record.

EXTERNCOUNT: Number of External References (16h)

The EXTERNCOUNT record specifies the number of externally referenced workbooks, DDE references, and OLE references contained in an Excel workbook.

For example, a worksheet contains the following formulas in cells A1:A3:

```
=SALES.XLS!Profits
=Signal|System!Formats
=Signal|StockInfo!MSFT
```

This worksheet would have a value of 3 in the cxals field of the EXTERNCOUNT record, corresponding to the three external references SALES.XLS, Signal|System, and Signal|StockInfo.

Record Data

Offset	Field Name	Size	Contents
4	cxals	2	Number of external references

EXTERNNAME: Externally Referenced Name (223h)

The EXTERNNAME record stores an externally referenced name, DDE link, or OLE link. All EXTERNNAME records associated with a supporting workbook must directly follow the EXTERNSHEET record for the workbook. The order of EXTERNNAME records in a BIFF file should not be changed.

External Name

When the EXTERNNAME record stores an external name, fOle and fOleLink are both equal to zero (FALSE), and the record has the form shown in the following table.

Offset	Field Name	Size	Contents
4	grbit	2	Option flags
6	(Reserved)	4	Reserved; must be 0 (zero)
10	cch	1	Length of the external name
11	rgch	var	External name
var	cce	2	Length of the name definition
var	rgce	var	Name definition, in parsed expression format; for more information, see "Microsoft Excel Formulas".

The grbit field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fBuiltin	=1 if the name is a built-in name
1	0002h	fWantAdvise	N/A for External Names (must be 0 (zero))
2	0004h	fWantPict	N/A for External Names (must be 0 (zero))
3	0008h	fOle	N/A for External Names (must be 0 (zero))
4	0010h	fOleLink	N/A for External Names (must be 0 (zero))
15-5	FFE0h	(Reserved)	Reserved; must be 0 (zero)

DDE Link

When the EXTERNNAME record stores a DDE link, the record has the form:

Offset	Field Name	Size	Contents
4	grbit	2	Option flags
6	(Reserved)	4	Reserved; must be 0 (zero)
10	cch	1	Length of the external name
11	rgch	var	External name
var	rgoper	var	Array of OPERs storing the current value of the name

The grbit field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fBuiltin	N/A for DDE links (must be 0 (zero))
1	0002h	fWantAdvise	=0 for manual DDE links =1 for automatic DDE links
2	0004h	fWantPict	=1 if Excel wants a cfPict clipboard format representation of the data; OBJ and IMDATA records store the image
3	0008h	fOle	=1 if this record stores the OLE StdDocumentName identifier (no rgoper follows rgch)
4	0010h	fOleLink	=0 for DDE links
14–5	7FE0h	cf	The clipboard format for which the DDE Advise succeeded; this is used to reduce the time required for future Advise cycles
15	8000h	(Reserved)	Reserved; must be 0 (zero)

OLE Link

When the EXTERNNAME record stores an OLE link, fWantAdvise and fOleLink are equal to 1 (TRUE), and the record has the following form:

Offset	Name	Size	Contents
4	grbit	2	Option flags
6	lStgName	4	OLE 2 storage identifier
10	cch	1	Length of the link name
11	rgch	var	Link name

The grbit field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fBuiltin	N/A for OLE links (must be 0 (zero))
1	0002h	fWantAdvise	=0 for manual OLE links =1 for automatic OLE links
2	0004h	fWantPict	=1 if Excel wants a cfPict clipboard format representation of the data; OBJ and IMDATA records store the image
3	0008h	fOle	N/A for OLE links (must be 0 (zero))
4	0010h	fOleLink	=1 for OLE links
15–5	FFE0h	(Reserved)	Reserved; must be 0 (zero)

EXTERNSHEET: External Reference (17h)

The EXTERNSHEET record specifies externally referenced workbooks. In BIFF7 and earlier, multiple EXTERNSHEET records form a table in the file. The cxals field of the EXTERNCOUNT record specifies the number of EXTERNSHEET records. You should not change the order of EXTERNSHEET records.

In BIFF8, the SUPBOOK record stores the encoded pathname and file name. There is one SUPBOOK record for each externally referenced workbook. The EXTERNSHEET record contains a table (rgXTI) that points to the SUPBOOK records. Several ptgs in a BIFF8 formula contain an ixti field; this is the 0-based index to the rgXTI table in the EXTERNSHEET record.

An externally referenced workbook is called a source workbook. The workbook that refers to it is called a dependent workbook.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	cXTI	2	Number of XTI structures that follow
6	rgXTI	var	Array of XTI structures

Each 6-byte XTI structure contains the following data.

Offset	Field Name	Size	Contents
0	iSUPBOOK	2	Index (0-based) to table of SUPBOOK redcords
2	itabFirst	2	Index (0-based) to first sheet tab in the reference
4	itabLast	2	Index (0-based) to last sheet tab in the reference

Record Data — BIFF7 and earlier

Offset	Field Name	Size	Contents
4	cch	1	Length of the file name
5	rgch	var	File name

The cch field contains the length of the source workbook file name. The rgch field contains the source workbook file name.

File name Encoding

Whenever possible, file names are encoded to make BIFF files transportable across file systems. Encoded file names are identified by the first character of the rgch

field. The first character of the rgch field may be any one of the values listed in the following table.

Name	Value	Meaning
chEmpty	00	Reference to an empty workbook name (see text)
chEncode	01	File name has been encoded (see the following table)
chSelf	02	Self-referential external reference (see text)

chEmpty indicates the file name is an external reference to an empty workbook name, as in the formula =Sheet1!$A$1.

chSelf indicates the file name is an external reference in which the dependent and source workbooks are the same. An example of this is the workbook SALES.XLS, which contains the formula =SALES.XLS!$A$1.

A chDDE key (03h) can occur in the rgch field; it is not necessarily the first character in the field, as are chEmpty, chEncode, and chSelf. This key indicates that the external reference is a DDE or OLE link. In a DDE link, the chDDE key replaces the | (pipe) character that separates the DDE application and topic. In an OLE link, chDDE separates the classname and file name.

A chEncode at the beginning of rgch indicates the file name of the source workbook was encoded to a less system-dependent file name. The special keys listed in the following table are recognized in the rgch field.

Key Name	Value	PC file systems
chVolume	01	Represents an MS-DOS drive letter. It is followed by the drive letter. For example, the formula ='D:\SALES.XLS'!A1 generates the chVolume key when the dependent workbook is not on the D drive. UNC file names, such as \\server\share\myfile.xls, generate an @ character after the chVolume key; this replaces the initial double backslash (\\).
chSameVolume	02	Indicates the source workbook is on the same drive as the dependent workbook (the drive letter is omitted). For example, the formula ='\SALES.XLS'!A1 generates the chSameVolume key when the dependent workbook is not in the root directory.
ChDownDir	03	Indicates the source workbook is in a subdirectory of the current directory. For example, the formula ='XL\SALES.XLS'!A1 generates the chDownDir key. The subdirectory name precedes the chDownDir key, and the file name follows it.
chUpDir	04	Indicates the source workbook is in the parent directory of the current directory. For example, the formula ='..\SALES.XLS'!A1 generates the chUpDir key.
chLongVolume	05	(Not used)
chStartupDir	06	Indicates the source workbook is in the startup directory (the Xlstart subdirectory of the directory that contains Excel.exe).
chAltStartupDir	07	Indicates the source workbook is in the alternate startup directory.

Key Name	Value	PC file systems
chLibDir	08	Indicates the source workbook is in the Library directory.

EXTSST: Extended Shared String Table (FFh)

The EXTSST record contains a hash table that optimizes external copy operations.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	Dsst	2	Number of strings in each bucket
6	Rgisstinf	var	Array of ISSTINF structures

Each ISSTINF contains the following:

Offset	Field Name	Size	Contents
0	ib	4	The stream position where the strings begin (stream pointer into the SST record)
4	cb	2	Offset into the SST record that points to where the bucket begins
6	(Reserved)	2	Reserved; must be 0 (zero)

When writing a BIFF file, do not write out SST and LABELSST records without including the EXTSST record, because this will cause Excel to crash when it performs an external copy.

Although an EXTSST record must be written, do not fill out the entire record. Only the fields with nonempty buckets have to be calculated; the rest of the bytes of the EXTSST can be garbage. If a BIFF8 file is examined, a few bytes of the EXTSST display valid data (assuming the file is a small one with only a few strings).

EXTSTRING: FRT String (804h)

Introduced in Excel 9 (2000) this is a FRT record. It contains a string.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0804h
6	grbitFrt	2	FRT flags; must be zero
8	cch	2	Count of characters in the string
10	rgach	var	string (grbit/rgb fields as defined in "Unicode Strings in BIFF8".)

FEAT: Shared Feature Record (868h)

Introduced in Excel 10 (2002) the Shared Feature (FEAT) record describes specific Shared Feature Data such as a Protection setting, or a SmartTag setting (more information on SmartTags is available at http://www.microsoft.com/downloads/details.aspx?familyid=c6189658-d915-4140-908a-9a0114953721&displaylang=en).

Though currently Excel has many different Shared Features such as Formula Error Checking, Protection, SmartTag etc only 2 types of Shared Feature (FEAT) may be created in Excel 2000: Protection and SmartTag.

Special note: in Excel 2000, the ref field within the structure of FRTHEADER, which is documented in the FRT record description, is used to store the ref range of the FEAT data so that round-tripping the BIFF file through an earlier version would not damage the FEAT data so easily. But this ref in FRTHEADER is no longer used, and is set to NULL for all FEAT data in Excel 2003 and later.

Special note: In Excel 2003 and later, this FEAT is not used anymore for new shared features, such as Tables, since a new record of FEAT11 was introduced for better feature data round-tripping scenarios through earlier versions of Excel.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0868h
6	grbitFrt	2	FRT cell reference flag (see table below)
8	Ref	8	Range reference to a worksheet cell region if grbitFrt=1 (bitFrtRef). Otherwise blank.
16	isf	2	Shared feature type index (see table below for possible values). =2 for Enhanced Protection =4 for SmartTag
18	fHdr	1	=0 since this is for feat not feat header
19	(Reserved)	4	Reserved for future use =0 for Enhanced Protection or SmartTag
23	cref	2	Count of ref ranges this feature is on
25	cbFeatData	4	Count of byte for the current feature data
29	(Reserved)	2	=0, currently not used
31	REFs	8*cref	REFs are written if cref!=0.
var	rgbFeat	Var	Variable length byte of feature specific data (see section below for detail FEAT structures of each shared feature type)

Where the grbitFrt flag has the following bits

Bits	Mask	Bit Name	Description
0	0001h	bitFrtRef	The Ref bits have value
1	0002h	bitFrtVolatile	Alert when saving in earlier versions of Excel
15-2	FFFCh	bitFrtError	There are errors associated with this record

Since each Shared Feature type has its own specific data structure, each FEAT record has a different data structure layout in rgbFeat field according to the Shared Feature type (i.e., according to each isf field value).

The detailed data structure of rgbFeat for the 2 different FEAT types are as follows:

The rgbFeat structure If the feature type is a Protection (isf=2)

Offset	Field Name	Size	Contents
0	grbit	4	=1 if this record has SDRel, the Relative Security Descriptor data. =0 if has no SDRel data
4	wPassword	4	The encrypted password
8	cbTitle	2	Count of bytes of rgbTitle
10	rgbTitle	var	Title string
var	cbSD	4 –if grbit>0 0 –otherwise	Count of byte of the Security Descriptor data
var	SD	var -if grbit>0 0 -otherwise	The Security Descriptor data block

The rgbFeat Structure If the feature type is a SmartTag (isf=4)

Offset	Field Name	Size	Contents
0	wHash	4	The hash value of the SmartTag Tag or cell string
4	cSmartTags	1	number of SmartTags in this cell
5	rgSmartTags	var	Array of cSmartTags of SmartTag data stuctures

The rgFactoid has the following data structure for each of its elements:

Offset	Field Name	Size	Contents
0	grbit	1	Flags indicating whether the SmartTag is deleted or is XML-based (i.e., no indicator is necessary)
1	pBagId	2	The property bag Id
3	cProp	2	Count of properties
5	cbUnknown	2	Count of byte of Unknown data
7	rgProperty	var	Array of cProp of properties (see table below for property data structure)

The rgProperty has the following data structure for each of its elements:

Offset	Field Name	Size	Contents
0	wKeyIndex	4	The property steKey index
1	wValueIndex	4	The property steValue index

Note: One or more CONTINUEFRT record(s) may be used if rgbFeat is larger than the maximum record size which is 8,228 bytes.

FEAT11: Shared Feature 11 Record (872h)

Introduced in Excel 11 (2003) the Shared Feature 11 (FEAT11) record describes a specific Shared Feature Data such as Tables.

Since the FEAT record in Excel 2002 does not have as much extensibility for round-tripping future data structures through earlier versions of Excel, this new record type is introduced in Excel 2003 which is similar to FEAT record but has more extensibility built in for better round-tripping stories through earlier versions of Excel.

Hence, starting from Excel 2003, the FEAT record, introduced in Excel 2002, is no-longer used for new feature data structures. Instead, FEAT11 is used for saving the data structure for new features such as Tables.

Still, Excel has many different Shared Features such as Formula Error Checking, Protection, SmartTag etc., and Tables, only 3 types of Shared Feature may be created in Excel 2003: Protection, SmartTag, and Tables using either FEAT or FEAT11 records.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0872h
6	grbitFrt	2	FRT cell reference flag (see table below for details)
8	Ref	8	Range reference to a worksheet cell region if grbitFrt=1 (bitFrtRef). Otherwise blank.
16	isf	2	Shared feature type index =5 for Table
18	fHdr	1	=0 since this is for feat not feat header
19	(Reserved)	4	Reserved for future use =0 for Table
23	cref	2	Count of ref ranges this feature is on
25	cbFeatData	4	Count of byte for the current feature data.
29	(Reserved)	2	=0 currently not used
31	rgbFeat	var	Variable length byte of feature specific data (see section below for detail FEAT structures of each shared feature type)

Where the grbitFrt flags has the following bits

Bits	Mask	Flag Name	Description
0	0001h	bitFrtRef	The Ref bits have value
1	0002h	bitFrtVolatile	Alert when saving in earlier versions of Excel
15-2	FFFCh	bitFrtError	There are error with this record

However, since each Shared Feature type has its own specific data structure, this FEAT record has a different data structure layout in the rgbFeat field according to the Shared Feature type (the isf field flags have different Shared Feature types). This is because the detailed data structure of rgbFeat for the Protection and Factoid are listed in FEAT already. Here, only the Table type is listed, and saved in FEAT11.

The rgbFeat structure for Excel 11 (2003) - If the feature type is a Table (isf=5)

Offset	Field Name	Size	Contents
0	lt	4	Table data source type: =0 for Excel Worksheet Table =1 for read-write SharePoint linked List =2 for XML mapper Table =3 for Query Table
4	idList	4	The ID of the Table (unique per worksheet)
8	crwHeader	4	How many header/title rows the Table has at the top
12	crwTotals	4	How many total rows the Table has at the bottom
16	idFieldNext	4	Next id to try when assigning a unique id to a new field
20	cbFSData	4	The size of the Fixed Data portion of the Table data structure.
24	rupBuild	2	the rupBuild that generated the record
26	unusedShort	2	UNUSED short that can be used later. The value is reserved during round-tripping.
28	listFlags	4	Collection of bit flags: (see listFlags' bit setting table below for detail.)
32	lPosStmCache	4	Table data stream position of cached data
36	cbStmCache	4	Count of bytes of cached data
40	cchStmCache	4	Count of characters of uncompressed cached data in the stream
44	lem	4	Table edit mode (see List (Table) Editing Mode (lem) setting table below for details.)
48	rgbHashParam	16	Hash value for SharePoint Table
64	cchName	2	Count of characters in the Table name string rgbName
66	rgbName	var	Table name string using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	cFieldData	2	Number of column fields in the Table

Offset	Field Name	Size	Contents
Var	cchCSPName	2 –if listFlags.fLoadCSPName is TRUE 0 -otherwise	Count of characters in the Cryptographic Service Provider Name string
var	rgbCSPName	Var	Name of the Cryptographic Service Provider used to generate rgbHashParam, of length cbCSPName. String saved using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	cchEntryId	2 –if listFlags.fLoadEntryId is TRUE 0 -otherwise	Count of characters in the Map Entry Id rgbEntryId
var	rgbEntryId	var –if listFlags.fLoadEntryId is TRUE 0 -otherwise	Map entry ID for XDT's using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	rgFieldData	var	Array of cFieldData many field data (see Field Data table for rgFieldData below for detail bits layout)
var	cIdDeleted	2 –if listFlags.fLoadPldwIdDeleted is TRUE 0 –otherwise	Count of rgIdDeleted, may be non-zero only for a SharePoint linked Table
var	rgIdDeleted	var –if listFlags.cIdDelete>0 0 –otherwise	Array of cIdDeleted many, 4-byte IDs of rows that were deleted in a SharePoint Table.
var	cIdChanged	2 –if fLoadPldwIdChange is TRUE 0 –otherwise	Count of rgIdChanged, may be non-zero only for a SharePoint linked Table
var	rgIdChanged	var –if cIdChanged>0 0 –otherwise	Array of cIdChanged many 4-byte IDs of rows in a SharePoint Table changed since the last refresh operation.

Offset	Field Name	Size	Contents
var	cCellInvalid	2 –of listFlags.fLoadPlstclInvalid is TRUE 0 -otherwise	Count of rgCellInvalid, may be non-zero only for a SharePoint Table
var	rgCellInvalid	var –if listFlags.cCellInvalid>0 0 –otherwise	Array of cCellInvalid many 8-byte Cells that contain invalid data that wasn't caught by normal error checking. Each has: 4 bytes for row index 4 bytes for field index in a List

Where the listFlags' bit setting table is:

Bits	Mask	Flag Name	Contents
0	00000001h	fActive	=1 if the Table is Active
1	00000002h	fAutoFilter	=1 if an autofilter is applied to the Table
2	00000004h	fPersistAutoFilter	=1 if the autofilter was cached when Table is deactivated
3	00000008h	fShowInsertRow	=1 if the insert row is visible
4	00000010h	fInsertRowInsCells	=1 if cells were inserted to show the insert-row
5	00000020h	fLoadPldwIdDeleted	=1 if need to load the deleted row IDs
6	00000040h	fShownTotalRow	=1 if the Table's total row has been shown before. The total row may not be showing on the Table currently though.
7	00000080h	fInsNewRwInFilter	=1 if should insert a new row when in filter mode
8	00000100h	fNeedsCommit	=1 if there are changes made to the Table that haven't been committed
9	00000200h	fSingleCell	=1 if the Table is limited to a single cell
10	00000400h	fInDeletion	=1 if the Table is in Deletion state
11	00000800h	fDoNotApplyFilter	=1 if should not filter out the records in the Table by AutoFiter
12	00001000h	fForceInsertToBeVisible	=1 if the Table has no data rows and the insert row is forced to be visible
13	00002000h	fCompressedXml	=1 if Table XML data was compressed on save
14	00004000h	fLoadCSPName	=1 if the pstCSPName field exists
15	00008000h	fLoadPldwIdCached	=1 if need to load the changed row IDs

Bits	Mask	Flag Name	Contents
19-16	000F0000h	verXL	the verXLCur generated this LSTD =11 for Office Excel 2003 =12 for Office Excel 2007
20	00100000h	fLoadEntryId	=1 if the Table has Entry ID
21	00200000h	fLoadPllstcInvalid	=1 if we need to load the array of invalid Table cells
22	00400000h	fGoodRupBld	=1 if rupBld has been initialized correctly
23	00800000h	fDefaultListBdr	=1 if the Table border is the default border, in other words, it has not been modified
24	01000000h	fPublished	=1 if the Table is published
31-25	FE000000h	(Reserved)	Reserved; Must be zero.

The List (Table) Editing Mode (lem) may take the following values to indicate various editing modes:

Value	Edit Mode	Description
0	lemNormal	The Table can be edited as normal
1	lemRefreshCopy	The Table must be refreshed before editing is allowed because the user copied a Query Table type of Table
2	lemRefreshCache	The Table must be refreshed before editing is allowed because caching a user change failed
3	lemRefreshCacheUndo	The Table must be refreshed before editing is allowed because undoing a cached user change failed
4	lemRefreshLoaded	The Table must be refreshed before editing is allowed because on load we could not re-connect to the Table source
5	lemRefreshTemplate	The Table must be refreshed before editing is allowed because on load we didn't have a cache to load since the Query Table was saved without it is cell data
6	lemRefreshRefresh	The Table must be refreshed before editing is allowed because a previous refresh failed
7	lemNoInsRowsSPRequired	Rows can't be inserted into this SharePoint Table because there are hidden required columns
8	lemNoInsRowsSPDocLib	Rows can't be inserted into this SharePoint Table because it is a

Value	Edit Mode	Description
		document library
9	lemRefreshLoadDiscarded	The Table must be refreshed before editing is allowed because on load the user wanted to discard cached changes
10	lemRefreshLoadHashValidation	The Table must be refreshed before editing is allowed because on load the validation of the Table's data area failed
11	lemNoEditSPModView	Can't allow the user to edit this Table due to the type of moderated view it is
12	(Reserved)	Reserved
13	(Reserved)	Reserved
14	(Reserved)	Reserved

And the array rgFiledData of column data following this data structure for each of its items:

Offst	Field Name	Size	Contents
0	idField	4	The ID of the Field
4	lfdt	4	data type of List field (see lfdt table below for value definition)
8	lfxidt	4	The Mso Xml Instance Data Type (see lfxidt table below for the value to data type map)
12	ilta	4	Aggregate type of the List field (see table below for value map).
16	cbFmtAgg	4	Number of bytes for rgbFmtAgg
20	istnAgg	4	What style to apply to the field's aggregate cell.
24	colFlags	4	Collection of bit flags: (see colFlags bit setting table below)
28	cbFmtInsertRow	4	Number of bytes rgbFmtInsertRow
32	istnInsertRow	4	Style for this InsertRow column
36	cchFieldName	2	Count of characters in the Field name rgbFieldName

Offst	Field Name	Size	Contents
36	rgbFieldName	var	field name string using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	cchCaption	2 –if colFlags.fSingleCell is FALSE 0 -otherwise	Count of characters in the Field Caption string rgbCaption
var	rgbCaption	var -if colFlags.fSingleCell is FALSE 0 –if colFlags.fSingleCell is TRUE	Column caption string using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	rgbFmtAgg	var	Array of formats applied to aggregation cells, length of cbFmtAgg
var	rgbFmtInsertRow	var	Array of formats applied to insert row cells, length of cbFmtInsertRow
var	cbAutoFilter	4 –if colFlags.fAutoFilter is TRUE 0 -otherwise	The AutoFitler data for this column (See Feat AutoFilter section in FEATHEADER record).
var	idObj	2 –if colFlags.fAutoFilter is TRUE 0 -otherwise	The AutoFilter dropdown object ID
var	AutoFilter	var –if colFlags.fAutoFilter is TRUE 0 -otherwise	The AutoFilter record of size cbAutoFilter (see AUTOFILTER record for detail bits definition)
var	iXmapMac	2 –if colFlags.fLoadXmapi is TRUE 0 -otherwise	The count of XMap data in rgXMap
var	rgXmap	var –if colFlags.fLoadXmapi is TRUE 0 -otherwise	Array of iXmpMac of XMapData structures (see XMapData table below for detail structure of each XMap data)
var	cceFmla	2 -if colFlags.fLoadFmla is TRUE 0-otherwise	Count of bytes in the calculated column's formula.

Offst	Field Name	Size	Contents
var	rgbFmla	var -if colFlags.fLoadFmla is TRUE 0 -otherwise	The calculated column formula string of length cceFmla (see how formulas are generally persisted for detail).
var	cceFmlaTotal	2 –if colFlags.fLoadTotalFmla is TRUE 0 -otherwise	Count of bytes in the total row cell's formula.
var	rgbFmlaTotal	var –if colFlags.fLoadTotalFmla is TRUE 0- otherwise	The total row cell formula string of length cceFmlaTotal (see how formulas are generally persisted for detail).
var	cchTotal	2 –if colFlags.fLoadTotalStr is TRUE 0 -otherwise	Count of characters in the total row cell string rgbTotal
var	rgbTotal	var -if colFlags.fLoadTotalStr is TRUE 0 –if colFlags.fLoadTotalStr is FALSE	Column caption string using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	LCID	4 –if the rgbFeat.lt=1 0 –otherwise	The LCID of the currency symbol to use
var	cDec	4 –if rgbFeat.lt=1 0 –otherwise	The number of decimal places for a numeric colum when fDecSet is 1 (TRUE)
var	FmtSettings	4 –if rgbFeat.lt=1 0 -otherwise	Collection of misc. format settings (see FmtSettings table below for details..)
var	DVSettings	4 –if rgbFeat.lt=1 0 -otherwise	Collection of misc. validation settings (see table below)
var	rgbDV	var –if DVSettings.fDefaultSet is TRUE 0 -otherwise	The data validation string, whose size depends on the lfdt data type (see lftd vs. rgbDV size table below)
var	cchFormula	2 –if DVSettings.fLoadFormula is TRUE 0-otherwise	Count of characters in the validation formula string rgbFormula

Offst	Field Name	Size	Contents
var	rgbFormula	var -if DVSettings.fLoadFormula is TRUE 0 -otherwise	Validation formula string using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)
var	cbRtdv	4 –if rgbFeat.lt=1 0 –otherwise	Count of bytes of dv data – only used for Excel 2003 Beta1

Where Ilta has value map:

Value	Name	Aggregation Function
0		No formula
1	Average	Average
2	Count	Count
3	CountNum	Count Numbers
4	Max	Max
5	Min	Min
6	Sum	Sum
7	StdDev	Standard Deviation
8	Var	Variance
9	Custom	Any formula

And the lfxidt of Mso Xml Instance Data Type has the following value map:

Value	Name	Data Type String
0	msoxidtInvalid	NULL
1	msoxidtUnknown	NULL
0x2400	msoxidtComplexContent	NULL
0x2101	msoxidtAnyType	anyType
0x2102	msoxidtAnyUri	anyURI
0x2103	msoxidtBase64Binary	base64Binary
0x2104	msoxidtBoolean	boolean
0x2105	msoxidtByte	byte
0x2106	msoxidtDate	date
0x2107	msoxidtDateTime	dateTime
0x2108	msoxidtDay	gDay
0x2109	msoxidtDecimal	decimal
0x210A	msoxidtDouble	double
0x210B	msoxidtDuration	duration
0x210C	msoxidtEntities	ENTITIES
0x210D	msoxidtEntity	ENTITY
0x210E	msoxidtFloat	float
0x210F	msoxidtHexBinary	hexBinary

Value	Name	Data Type String
0x2110	msoxidtId	ID
0x2111	msoxidtIdRef	IDREF
0x2112	msoxidtIdRefs	IDREFS
0x2113	msoxidtInt	int
0x2114	msoxidtInteger	integer
0x2115	msoxidtLanguage	language
0x2116	msoxidtLong	long
0x2117	msoxidtMonth	gMonth
0x2118	msoxidtMonthDay	gMonthDay
0x2119	msoxidtName	Name
0x211A	msoxidtNCName	NCName
0x211B	msoxidtNegativeInteger	negativeInteger
0x211C	msoxidtNmToken	NMTOKEN
0x211D	msoxidtNmTokens	NMTOKENS
0x211E	msoxidtNonNegativeInteger	nonNegativeInteger
0x211F	msoxidtNonPositiveInteger	nonPositiveInteger
0x2120	msoxidtNormalizedString	normalizedString
0x2121	msoxidtNotation	NOTATION
0x2122	msoxidtPositiveInteger	positiveInteger
0x2123	msoxidtQName	QName
0x2124	msoxidtShort	short
0x2125	msoxidtString	string
0x2126	msoxidtTime	time
0x2127	msoxidtToken	token
0x2128	msoxidtUnsignedByte	unsignedByte
0x2129	msoxidtUnsignedInt	unsignedInt
0x212A	msoxidtUnsignedLong	unsignedLong
0x212B	msoxidtUnsignedShort	unsignedShort
0x212C	msoxidtYear	gYear
0x212D	msoxidtYearMonth	gYearMonth

And the colFlags' bit setting table is:

Bits	Mask	Bit Name	Contents
0	00000001h	fAutoFilter	=1 if has an AutoFilter
1	00000002h	fAutoFilterHidden	=1 if the Autofilter is hidden
2	00000004h	fLoadXmapi	=1 if the data source is XML Maper
3	00000008h	fLoadCalcColFmla	=1 if has calculated column formula
4	00000010h	(Reserved)	calculated column refers more than rows for Excel 2003 Beta1, not used for Excel 2003
5	00000020h	fCalcColRefersTo	=1 if calculated column depend on this field
6	00000040h	fLoadCalcColArray	=1 if need to load a calculated column array formula

Bits	Mask	Bit Name	Contents
7	00000080h	fLoadTotalFmla	=1 if need to load total row cell formula
8	00000100h	fLoadTotalArray	=1 if the total row cell formula is an array formula
9	00000200h	fSaveStyleName	=1 if need to load header row cell style name
10	00000400h	fLoadTotalStr	=1 if need to load total row cell string constant
11	00008000h	fAutoCreateCalcCol	=1 if calculated column should be automatically created on load
31-12	FFFFF000h	(Reserved)	Reserved; Must be zero.

The FmtSettings bits are:

Bits	Mask	Bit Name	Contents
0	00000001h	fPercent	Whether the numeric values in the column are percentages
1	00000002h	fDecSet	Whether the number of decimal places for a numeric column is set
2	00000004h	fDateOnly	If only the date is displayed for a datetime column
4-3	00000018h	iReadingOrder	Text column direction: context, ltr, rtl
5	00000020h	fRichText	Whether this column contains rich text strings
6	00000040h	fUnkRTFormatting	Whether there was rich text formatting that we didn't recognize
7	00000080h	fAlertUnkRTFormatting	Whether we need to alert the user about rich text formatting that we didn't recognize
31-8	FFFFFF00h	(unused)	Currently not used.

The DVSettings bits are:

Bits	Mask	Bit Name	Contents
0	00000001h	fReadOnly	Whether the column is read only
1	00000002h	fRequired	Whether entries in the column are required
2	00000004h	fMinSet	Whether the minimum value for a numeric column is set
3	00000008h	fMaxSet	Whether the maximum value for a numeric column is set
4	00000010h	fDefaultSet	Whether there is a default value for the column
5	00000020h	fDefaultDateToday	Whether the default value for the column is today's date
6	00000040h	fLoadFormula	TRUE if pstFormula!=NULL on load/save
7	00000080h	fAllowFillIn	TRUE if the choice field allows custom user entries
31-8	FFFFFF00h	(unused)	Currently not used.

And the array of rgXMap has the following data structure for each of its element:

Offset	Name	Size	Contents
0	grbit	4	Collection of bit flags. (see grbit setting table below for possible values).
4	dwMapID	4 –if grbit. fLoadXMap = TRUE 0 -otherwise	The XML map item ID
8	cbXPath	2 – if grbit.fLoadXMap = TRUE 0 -otherwise	Count of bytes of XPath string rgbXPath
8	rgbXPath	var	The XPath, of length cbXPath

Where the grbit has the following possible values:

Bits	Mask	Flag Name	Size	Contents
0	00000001h	fFilled	1 bit	for data was filled down due to flattening
1	00000002h	fLoadXMap	1 bit	for pstXMap is non-null
2	00000004h	fCanBeSingle	1 bit	for it can be a single cell
3	00000008h	fDefaultSet	1 bit	for default value is set for XDT
4	FFFFFFF0h	(unused)	28 bits	for currently not used bits

And the value match for the data type lfdt and the corresponding rgbDV size table:

lfdt	Data Type	rgbDV Size
1	Short text	Length-pre-fixed wide character string
2	Number	8
3	Yes/No	4
4	Data time	8 -if DVSettings.fDefaultDateToday = FALSE 0 –otherwise
5	Multi-line text	0
6	Currency	8
7	Lookup	0
8	Choice	Length-prefixed wide character string
9	Hyperlink	0
10	Counter	0
11	Multi-choice	Length-prefixed wide character string

Note: One or more CONTINUEFRT11 record(s) maybe used if the rgbFeat is larger than the maximum record size which is 8,228 bytes.

FEAT12: Shared Feature 12 Record (878h)

Introduced in Office Excel 2007 the Shared Feature 12 (FEAT12) record has the same data layout as the FEAT11 (Shared Feature 11) record with the benefit that Office Excel 2003 doesn't understand the contents of a FEAT12 record. For instance this is used to save a Table when Office Excel 2007 features make the Table unrecognizable and/or unusable in Office Excel 2003.

See the description of the FEAT11: Shared Feature 11 Record (872h) for a description of the record data.

FEATHEADR: Shared Feature Header (867h)

Introduced in Excel 10 (2002) the FEATHEADR record describes the common information (header) for shared features such as Protection and SmartTag. For example, if you have a worksheet that contains Protection, a Shared Feature Header (FEATHEADER) record is created for all Protections which may include Sheet Protection or Book Protection. Though Sheet Protection and Book Protection may have specific data that are different and are saved in the Feature Data (see FEAT record for detail) portion, their common settings are stored in this header block record.

A worksheet may contain one or more different types of Shared Feature and each type of Shared Feature has its own Shared Feature Header (FEATHEADER) record to store common information across all Shared Feature of the same type. This FEATHEADER record will have different data structure layout according to the Shared Feature type (the isf field flags differentiate Shared Feature types). For example, if a Workbook has both Protection and SmartTag, there is one Shared Feature Header (FEATHEADER) created for Protection, and another Shared Feature Header (FEATHEADER) created for SmartTag. Therefore, the data block of the Shared Feature Header (FEATHEADER) may have a different data structure depending on which Shared Feature Type the record is for.

Though Excel currently has many different Shared Features such as Formula Error Checking, Protection, SmartTag etc., only 2 types of Shared Feature are persisted in Excel 2002: Protection and SmartTag.

Special note: In Excel 2003, this FEATHEADER is not used for new shared features, such as Tables, since a new record of FEATFEADER11 was introduced for better feature data round-tripping stories through earlier versions of Excel.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0867h
6	grbitFrt	2	FRT cell reference flag =0 currently
8	(Reserved)	8	Currently not used and set to 0.
16	isf	2	Shared feature type index =2 for Enhanced Protection =4 for SmatTag
18	fHdr	1	=1 since this is a feat header

Offset	Field Name	Size	Contents
19	cbHdrData	4	Size of rgbHdrSData =4 for simple feature headers =0 there is no rgbHdrData =-1 for complex feature headers, the size of rgbHdrData depends on the isf type. (prior to Excel 2003, all features saved using FEATHEAER use complex features.)
23	rgbHdrData	var	Byte array of extra info, including from future versions of Excel

The rgbHdrData block for Enhanced Protection

Offset	Field Name	Size	Contents
0	grbit	4	Bit flag for protection rules setting (see table below for detail bit settings)

The bit settings for protection rules settings in the grbit:

Bits	Mask	Bit Name	Description
0	00000001h	iprotObject	Edit object
1	00000002h	iprotScenario	Edit scenario
2	00000004h	iprotFormatCells	Format cells
3	00000008h	iprotFormatColumns	Format columns
4	00000010h	iprotFormatrows	Format rows
5	00000020h	iprotInsertColumns	Insert columns
6	00000040h	iprotInsertRows	Insert rows
7	00000080h	iprotInsertHyperlinks	Insert hyperlinks
8	00000100h	iprotDeleteColumns	Delete columns
9	00000200h	iprotDeleteRows	Delete rows
10	00000400h	iprotSelLockedCells	Select locked cells
11	00000800h	iprotSort	Sort
12	00001000h	iprotAutoFilter	Use Autofilter
13	00002000h	iprotPivotTables	Use PivotTable reports
14	00004000h	iprotSelUnlockedCells	Select unlocked cells

The rgbHdrData block for SmartTag

Offset	Field Name	Size	Contents
0	cSmartTag	4	Count of SmartTags
4	rgbSmartTag	var	Array of SmartTag header data (see table below).
var	cbPropBagData	2	Count of bytes in Property Bag store plus unknown data, i.e., rest of the data size including this count bit
var	sVersion	2	Version number
var	(Reserved)	4	Currently not used.
var	Cste	4	String table entry

Offset	Field Name	Size	Contents
var	cbUnknown	2	Count of bytes of unknown data
var	pvUnknoan	var	The Unknown data

Where the rgbSmartTag, the array of SmartTag header data block, has the fields:

Offset	Field Name	Size	Contents
0	cbSmartTag	4	Count of Byte of the SmartTag data
4	id	4	Id of this SmartTag
8	cbUri	2	Count of bytes of rgbUri
10	rgbUri	var	Character string of URI (Universal Resource Identifier) which is the name space portion of the SmartTag, of length cbUri e.g., urn:schemas-microsoft-com:office:smarttags
var	cbTag	2	Count of bytes of the SmartTag tag name rgbTag
var	rgbTag	var	Character string of the SmartTag tag name, of length cbTag e.g., Stockticker
var	cbDownLoadURL	2	Count of bytes of Download URL address string: rgbDownLoadURL
var	rgbDownLoadURL	var	Character string of downloading URL
Var	pvUnknown	var	Additional data in pvUnknown, of length cbSmartTag – cbUri – cbTag – cbDownLoadURL – 10

In Excel 2003, only book level SmartTags' headers are saved. Sheet level SmatTag headers are not persisted.

FEATHEADR11: Shared Feature Header 11 (871h)

Introduced in Excel 11 (2003) the FEATHEADR11 record describes common information (header) for shared features such as Tables. For example, if you have a worksheet that contains Table(s), a Shared Feature Header (FEATHEADER11) record is created for all Tables. Though Tables from the same or different sheets may have specific data that are different which are saved in the Feature Data 11 (see FEAT11 record for detail) portion, their common settings are stored in this header block record.

A worksheet may contain one or more different types of Shared Feature and each type of Shared Feature has its own Shared Feature Header (FEATHEADER11) record to store common information across all Shared Feature of the same type. For example, if a Workbook has both Table and some future shared feature, there is one Shared Feature Header (FEATHEADER11) created for Table, and another Shared Feature Header (FEATHEADER11) created for the future feature. Therefore, the data block of the Shared Feature Header (FEATHEADER11) may have a different data structure depending on which Shared Feature Type the record is for. Hence, the FEATHEADER11 record will have a different data structure layout according to the Shared Feature type (the isf field flags differentiate Shared Feature types).

Though Excel currently has many different Shared Features such as Formula Error Checking, Protection, Factoid (SmartTag etc.), only 3 types of Shared Feature are persisted in Excel 2003: Protection, Factoid (SmartTag), and Table.

In Excel 2003, Table uses the FEATHEADER11 structure, even though the FEATHEADER is still used for existing Excel 10 (2002) features such as Protection and Factoid (SmartTag) etc. This new record of FEATHEADER11, though it has exactly the same structure as FEATHEADER, was introduced to persist header records in combination with FEAT11 (introduced to address bugs in round-tripping scenario of FEAT) through earlier versions. Therefore, if a shared feature is saved using FEAT11, it should be using FEATHEADER11 instead of FEATHEADER.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0871h
6	grbitFrt	2	FRT cell reference flag =0 bitFrtNone
8	(Reserved)	8	Currently not used, and set to 0
16	isf	2	Shared feature type index =5 for Table
18	fHdr	1	=1 since this is a feat header
19	cbHdrData	4	Size of rgbHdrSData =4 for simple feature headers =0 there is no rgbHdrData =-1 for complex feature headers and the size of rgbHdrData depends on the isf type. (in Excel 2003, all features saved using FEATHEAER11 are complex features.)
23	rgbHdrData	var	Byte array of extra info, including from future versions of Excel; length depends on isf feature type.

The rgbHdrData block for Table (isf = 5)

Offset	Field Name	Size	Contents
0	idObjTotal	4	The id of the dropdown object for the total row
4	idListNext	4	Next id to use when assigning a unique id to a new Table
8	cFilterData	2	Count of Feat Autofilters
10	rgFilterData	var	Array of cFilterData many AutoFilter data structures (see table below).
var	refFilter	8 –if cFilterData>0 0 -otherwise	The ref (rwFirst, rwLast, colFirst, colLast) of the Feat Autofilter range.

Where the structure for each item in the rgFilterData array has the following layout for each filter data item:

Offset	Field Name	Size	Contents
0	cbAutoFilter	4	Count of Bytes of the AutoFilter record
4	idObj	2	Id of the AutoFilter drop down object

6	AutoFilter	var	The AutoFilter data of length cbAutoFilter (see the AutoFilter record section for detailed description of AutoFitler data)

FEATINFO: Shared Feature Info Record (86dh)

Introduced in Excel 10 (2002) the FEATINFO record describes shared feature definitions and options or handling instructions for various shared features, such as Protection, Factoid etc.

There should be one FEATINFO record for each shared feature type that exists in a workbook. That means, this block of data describes the common handling instructions of a shared feature of the same type regardless of whether the features are on the same or different sheets of a workbook.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =086dh
6	grbitFrt	2	FRT cell reference flag =0 currently
8	(Reserved)	8	Currently not used, and set to 0.
16	Isf	4	The shared feature type =2 for Enhanced Protection =4 for SmartTag
20	grbitFlags	4	Bit flags of handling instructions

Currently, grbitFlags only has the following first 13 bits of handling instructions defined:

Bits	Mask	Bit Name	Contents
0	00000001h	bitFFeatHover	Support hover operation
1	00000002h	bitFFeatSelect	Support select operation
2	00000004h	bitFFeatScroll	This feature does not support scrolling
3	00000008h	bitFFeatNoUndo	This feature does not support undo
4	00000010h	bitFFeatNoCopy	Copy will not preserve the feature data
5	00000020h	bitFFeatMerge	Support merge operation
6	00000040h	bitFFeatComplexData	The feature has complex structure instead of default simple structure
7	00000080h	bitFFeatIdle	Has Idle operation to perform
8	00000100h	bitFFeatSimpleHdr	The feature has simple default data structure
9	00000200h	bitFFeatOneCell	The feature’s data array will be sorted
10	00000400h	bitFFeatOverlapRefs	This feature can have overlapping ranges

Bits	Mask	Bit Name	Contents
11	00000800h	bitFFeatNotifyClear	Send notification upon clearing all settings for the given feature reference range
12	00001000h	bitFFeatNoMergeSqref	Disable merge of feature reference ranges
13	00002000h	bitFFeatSort	Adjusted on Sort. Only valid with bitFFeatOneCell

FEATINFO11: Shared Feature Info 11 Record (873h)

Introduced in Excel 11 (2003) the FEATINFO11 record describes shared feature definitions and options or handling instructions for various shared features in Excel 2003 such as Protection, Factoid (SmartTag) and Table.

This record is similar to FEATINFO in Excel 2002, but has a better built in mechanism for round-tripping through earlier versions of Excel. Hence, starting from Excel 2003, FEATINFO is no longer used for saving Shared Features handling instructions. Instead, this FEATINFO11 should be used in its place.

Likewise, there should be one FEATINFO11 record for each shared feature that exists in a workbook. This means, this block of data describes the common handling instructions of a shared feature of the same type regardless of whether or not the features are on the same or different sheets of a workbook.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0873h
6	grbitFrt	2	FRT cell reference flag =0 currently
8	(Reserved)	8	Currently not used, and set to 0.
16	Isf	4	The shared feature type =5 for Table
20	grbitFlags	4	Bit flags of handling instructions (see table below).

Currently, grbitFlags only has the following bits of handling instructions defined:

Bits	Mask	Bit Name	Contents
0	00000001h	bitFFeatHover	Support hover operation
1	00000002h	bitFFeatSelect	Support select operation
2	00000004h	bitFFeatScroll	This feature doesn’t support scrolling
3	00000008h	bitFFeatNoUndo	This feature doesn’t support undo
4	00000010h	bitFFeatNoCopy	Copy will not preserve the feature data
5	00000020h	bitFFeatMerge	Support merge operation

Bits	Mask	Bit Name	Contents
6	00000040h	bitFFeatComplexData	The feature has complex structure instead of default simple structure
7	00000080h	bitFFeatIdle	Has Idle operation to perform
8	00000100h	bitFFeatSimpleHdr	The feature has simple default data structure
9	00000200h	bitFFeatOneCell	The feature's data array will be sorted
10	00000400h	bitFFeatOverlapRefs	This feature can have overlapping ranges
11	00000800h	bitFFeatNotifyClear	Send notification upon clearing all settings for the given feature reference range
12	00001000h	bitFFeatNoMergeSqref	Disable merge of feature reference ranges
13	00002000h	bitFFeatSort	Adjusted on Sort. Only valid with bitFFeatOneCell
14	00004000h	bitFFeatOneBlock	Feat reference should only be one contiguous block of cells
15	00008000h	bitFFeatDontSplit	1. Feat reference should not be split into multiple references during reference adjust. 2. Also does shrink the Feat when a cut-paste is done on an entire edge of the Feat.
16	00010000h	bitFFeatNotifyChange	Notify the feature proc when a data or formatting change occurs
17	00020000h	bitFFeatNoEdgeExtend	1. Feat reference should not be extended/adjusted when an insert operation is done immediately adjacent to but outside the FEAT reference. 2. Also prevents the bottom/right edge of the FEAT reference from being "permanently anchored" to row 65,536 and/or column IV of the worksheet.
18	00040000h	bitFFeatImportantUdr	supports specific type of important Undo records
27-19	07F80000h	(Reserved)	Currently not used.
28	08000000h	bitFFeat11	Feat load/save through rtFeat11 etc, is FRT to Excel 2002 and earlier
31-29	E0000000h	(Reserved)	Currently not used.

FILEPASS: File Is Password-Protected (2Fh)

If you type a protection password (**File** menu, **Save As** command, **Options** dialog box), the FILEPASS record appears in the BIFF file. The wProtPass field contains the encrypted password. All records after FILEPASS are encrypted (see the Office Open XML specification (Ecma Internation Standard 376) for further details).

http://www.ecma-international.org/publications/standards/ECMA-376.htm

Note: this record specifies a file protection password, as opposed to the PASSWORD record (type 13h), which specifies a sheet-level or workbook-level protection password.

Record Data

Offset	Field Name	Size	Contents
4	wProtPass	4	Encrypted password

FILESHARING: File-Sharing Information (5Bh)

This record stores file-sharing options selected in the **Options** dialog box, accessed by using the **Save As** command (**File** menu). The write reservation password entered in the dialog box is encrypted to an integer, wResPass. This record also contains the user name of the file's creator, stUNWriteRes.

Changes for BIFF7

There are minor changes to the behavior of this record in BIFF7. For Excel 7.0 workbooks without shared lists, this record behaves as it does in BIFF5.

For Excel 7.0 workbooks with shared lists, there are both FILESHARING and FILESHARING2 records in the Book stream. In this case, FILESHARING always contains a dummy password. FILESHARING2 contains either a dummy password if the workbook is not write-protected or a valid password if the workbook is write-protected.

Record Data

Offset	Field Name	Size	Contents
4	fReadOnlyRec	2	=1 if the **Read Only Recommended** option is selected in the **Options** dialog box
6	wResPass	2	Encrypted password (if this field is 0 (zero), there is no write reservation password)
8	cch	1	Length of the user name
9	stUNWriteRes	var	User name

FILESHARING2: File-Sharing Information for Shared Lists (1A5h)

In Excel 7.0 workbooks with shared lists, FILESHARING2 contains either a dummy password if the workbook is not write-protected or a valid password if the workbook is write-protected. If the workbook does not contain shared lists, this record does not appear in the file.

This record does not appear in BIFF5 files.

Record Data

Offset	Field Name	Size	Contents
4	fReadOnlyRec	2	=1 if the **Read Only Recommended** option is selected in the **Options** dialog box
6	wResPass	2	Encrypted password (if this field is 0 (zero), there is no write reservation password)
8	cch	1	Length of the user name
9	stUNWriteRes	var	User name

FILTERMODE: Sheet Contains Filtered List (9Bh)

If the sheet contains a filtered list, the file will contain a FILTERMODE record. This record has no record data field.

FMQRY: Filemaker queries (8c6h)

This is a Mac Excel FRT record. It stores the information for Filemaker queries.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c5h
6	grbitFrt	2	FRT flags; must be zero
8	grbit	4	Flags
12	cchName	2	
14	rgchName	var	

The grbit field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	0001h	fPrompt	1=
0	15-1	FFFEh	(Reserved)	Reserved; must be zero
1	15-0	FFFFh	(Reserved)	Reserved; must be zero

FMSQRY: Filemaker queries (8c7h)

This is a Mac Excel FRT record. Same as FMQRY, it stores the information for Filemaker Server queries.

FNGRP12: Function Group (898h)

This record stores a name of a current function group.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0898h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	astFnGrp	var	Function group name; ASCII string

FNGROUPCOUNT: Built-in Function Group Count (9Ch)

This record stores the number of built-in function groups (Financial, Math & Trig, Date & Time, and so on) in the current version of Excel.

Record Data

Offset	Field Name	Size	Contents
4	cFnGroup	2	Number of built-in function groups

FNGROUPNAME: Function Group Name (9Ah)

This record stores the name of a custom function category.

Record Data

Offset	Field Name	Size	Contents
4	cch	1	Size of the function category name
5	rgch	var	Function category name

FONT: Font Description (231h)

The workbook font table contains at least five FONT records. FONT records are numbered as follows: ifnt=00h (the first FONT record in the table), ifnt=01h, ifnt=02h, ifnt=03h, ifnt=05h (minimum table), and then ifnt=06h, ifnt=07h, and so on. **Note**: ifnt=04h never appears in a BIFF file. This is for backward-compatibility with previous versions of Excel. If you read FONT records, remember to index the table correctly, skipping ifnt=04h.

Record Data

Offset	Name	Size	Contents
4	dyHeight	2	Height of the font (in units of 1/20th of a point).
6	grbit	2	Font attributes (see the following table).
8	icv	2	Index to the color palette.
10	bls	2	Bold style; a number from 100dec to 1000dec (64h to 3E8h) that indicates the character weight (“boldness”). The default values are 190h for normal text and 2BCh for bold text.
12	sss	2	Superscript/subscript: 00h= None 01h= Superscript 02h= Subscript
14	uls	1	Underline style: 00h= None 01h= Single 02h= Double 21h= Single Accounting 22h= Double Accounting
15	bFamily	1	Font family, as defined by the Windows API LOGFONT structure.
16	bCharSet	1	Character set, as defined by the Windows API LOGFONT structure.

17	(Reserved)	1	Reserved; must be 0 (zero).
18	cch	1	Length of the font name.
19	rgch	var	Font name.

The grbit field contains the following font attributes:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	(Reserved)	Reserved; must be 0 (zero)
	1	02h	fItalic	=1 if the font is italic
	2	04h	(Reserved)	Reserved; must be 0 (zero)
0	3	08h	fStrikeout	=1 if the font is struck out
	4	10h	fOutline	=1 if the font is outline style (Macintosh only)
	5	20h	fShadow	=1 if the font is shadow style (Macintosh only)
	7 – 6	C0h	(Reserved)	Reserved; must be 0 (zero)
1	7 – 0	FFh	(unused)	

FOOTER: Print Footer on Each Page (15h)

The FOOTER record stores a print footer string for a sheet. This string appears at the bottom of every page when the sheet is printed.

Record Data

Offset	Field Name	Size	Contents
4	cch	1	Length of the footer string (bytes)
5	rgch	var	Footer string

FORCEFULLCALCULATION: Force Full Calculation Mode (8A3h)

This record stores the status of the forced calculation mode for the current workbook.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08A3h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	fNoDeps	4	=1 if the workbook is in the forced calculation mode, in which case dependencies are ignored, and all worksheets are marked to calculate fully every time the calculation is triggered. Stored as 4-byte integer value

FORMAT: Number Format (41Eh)

The FORMAT record describes a number format in the workbook.

All the FORMAT records should appear together in a BIFF file. The order of FORMAT records in an existing BIFF file should not be changed. It is possible to write custom number formats in a file, but they should be added at the end of the existing FORMAT records.

Record Data

Offset	Field Name	Size	Contents
4	ifmt	2	Format index code (for internal use only)
6	cch	2	Length of the string
7	grbit	1	Option Flags (described in Unicode Strings in BIFF8 section)
8	rgb	var	Array of string characters

Excel uses the ifmt field to identify built-in formats when it reads a file that was created by a different localized version. For more information about built-in formats, see "XF".

FORMULA: Cell Formula (6h)

A FORMULA record describes a cell that contains a formula.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row
6	col	2	Column
8	ixfe	2	Index to XF record
10	num	8	Current value of the formula (see text)
18	grbit	2	Option flags
20	chn	4	(See text)
24	cce	2	Length of the parsed expression
26	rgce	var	Parsed expression

The chn field should be ignored when you read the BIFF file. If you write a BIFF file, the chn field must be 00000000h.

The grbit field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fAlwaysCalc	Always calculate the formula.
1	0002h	fCalcOnLoad	Calculate the formula when the file is opened.
2	0004h	(Reserved)	
3	0008h	fShrFmla	=1 if the formula is part of shared formula group.
15–4	FFF0h	(Reserved)	

For more information about shared formulas, see "SHRFMLA".

The rw field contains the 0-based row number. The col field contains the 0-based column number.

If the formula evaluates to a number, the num field contains the current calculated value of the formula in 8-byte IEEE format. If the formula evaluates to a string, a Boolean value, or an error value, the most significant 2 bytes of the num field are FFFFh.

A Boolean value is stored in the num field, as shown in the following table. For more information about Boolean values, see "BOOLERR".

Offset	Field Name	Size	Contents
0	otBool	1	=1 always
1	(Reserved)	1	Reserved; must be 0 (zero)
2	f	1	Boolean value
3	(Reserved)	3	Reserved; must be 0 (zero)
6	fExprO	2	=FFFFh

An error value is stored in the num field, as shown in the following table. For more information about error values, see "BOOLERR".

Offset	Field Name	Size	Contents
0	otErr	1	=2 always
1	(Reserved)	1	Reserved; must be 0 (zero)
2	err	1	Error value
3	(Reserved)	3	Reserved; must be 0 (zero)
6	fExprO	2	=FFFFh

If the formula evaluates to a string, the num field has the structure shown in the following table.

Offset	Field Name	Size	Contents
0	otString	1	=0 always
1	(Reserved)	5	Reserved; must be 0 (zero)
6	fExprO	2	=FFFFh

The string value is not stored in the num field; instead, it is stored in a STRING record that immediately follows the FORMULA record.

The cce field contains the length of the formula. The rgce field contains the formula in its parsed format. For more information, see "Microsoft Excel Formulas".

GCW: Global Column-Width Flags (ABh)

This record contains an array of 256 flag bits, where each bit represents a column on the sheet. If a bit is true, it means the corresponding column has the **Use Standard Width** option turned on. If a bit is false, it means that the column has the **Use Standard Width** option turned off. If the Standard Width measurement was changed (that is, if it is no longer the default), Excel writes a STANDARDWIDTH record.

Record Data

Offset	Field Name	Size	Contents
4	cb	2	Number of bytes in the global column-width flags
6	grbitGCW	2	Global column-width flags for columns A through P
8	grbitGCW	2	Global column-width flags for columns Q through AF
...	...	...	...
4+cb	grbitGCW	2	Global column-width flags for columns IG through IV

The grbitGCW field contains the following option flags:

Bits	Mask	Flag Name	Contents
0 (LSB)	0001h	fGCWcol1	Flag for column 1 (for example, column A)

1	0002h	fGCWcol2	Flag for column 2 (for example, column B)
2	0004h	fGCWcol3	Flag for column 3 (for example, column C)
...	...	...	...
15	8000h	fGCWcol16	Flag for column 16 (for example, column P)

GRIDSET: State Change of Gridlines Option (82h)

This record indicates the user changed the state of the **Gridlines** option in the **Page Setup** dialog box, **Sheet** tab.

Record Data

Offset	Flag Name	Size	Contents
4	fGridSet	2	=1 if the user has ever changed the setting of the **Gridlines** option

GUIDTYPELIB: VB Project TypeLib GUID (897h)

This record stores TypeLib GUID corresponding to the compiled version of VB project.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0897h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	guid	16	TypeLib GUID corresponding to the compiled version of VB project. Stored as 16-byte (128-bit) number

GUTS: Size of Row and Column Gutters (80h)

This record contains the size of the row and column gutters, measured in screen units. The row and column gutters are the spaces that contain outline symbols. They are located above column headings and to the left of row headings.

Record Data

Offset	Field Name	Size	Contents
4	dxRwGut	2	Size of the row gutter that appears to the left of the rows
6	dyColGut	2	Size of the column gutter that appears above the columns
8	iLevelRwMac	2	Maximum outline level (for the row gutter)
10	iLevelColMac	2	Maximum outline level (for the column gutter)

HCENTER: Center Between Horizontal Margins (83h)

If the **Horizontally** option is selected on the **Margins** tab in the **Page Setup** dialog box, fHCenter=1.

Record Data

Offset	Field Name	Size	Contents
4	fHCenter	2	=1 if the sheet is to be centered between horizontal margins when printed

HEADER: Print Header on Each Page (14h)

The HEADER record specifies a print header string for a sheet. This string appears at the top of every page when the sheet is printed.

Record Data

Offset	Field Name	Size	Contents
4	cch	1	Length of the header string (bytes)
5	rgch	var	Header string

HEADERFOOTER: Header Footer (89Ch)

The HEADERFOOTER record stores information added in Office Excel 2007 for headers/footers.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =089Ch
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	guidSview	16	If this header FRT belongs to a specific sheet view (sview), the sheet view's GUID will be saved here.
32	grbitFlags	2	see text
34	cchHeaderEven	2	length of even header text
36	cchFooterEven	2	length of even footer text
38	cchHeaderFirst	2	length of first page header text
40	cchFooterFirst	2	length of first page footer text
42	rgchHeaderEven	var	even header text if non-zero length
var	rgchFooterEven	var	even footer text if non-zero length
var	rgchHeaderFirst	var	first page header text if non-zero length
var	rgchFooterFirst	var	first page footer text if non-zero length

The grbitFlags field contains the fields listed in the following table.

Bits	Mask	Name	Contents
0	0001h	fHFDiffOddEven	=1 if different odd/even pages
1	0002h	fHFDiffFirst	=1 if different first page
2	0004h	fHFScaleWithDoc	=1 scales header/footer with document
3	0008h	fHFAlignMargins	=1 align header/footer with page margins

Bits	Mask	Name	Contents
4..15	FFF0h	(Reserved)	Reserved; must be 0 (zero)

HFPicture: Header / Footer Picture (866h)

Introducted in Excel 10 (2002) this BIFF record is an FRT record. It includes an embedded encoding of the contents of the picture, which may be in MSODRAWING or MSODRAWINGGROUP record format. Pictures contain large amounts of data and may be continued across multiple HFPICTURE records (see fContinue flag).

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0866h
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Must be zero
16	rgf	1	Bit flags, see description below.
15	rgb	var	An embedded encoding of the contents of the picture; May be in MSODRAWING or MSODRAWINGGROUP record format as indicated in rgf flags listed below.

The rgf field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	01h	fIsDrawing	0= if the rgb portion of this record does not use MSODRAWING record format 1= if this record uses MSODRAWING record format
1	02h	fIsDrawingGroup	0= if this record does not use MSODRAWINGGROUP record format 1= if this record uses MSODRAWINGGROUP record format
2	04h	fContinue	0= if this record is the last or only record containing HFPicture data for this picture. 1= if more of the HFPicture data is contained in additional HFPicture records following this record.
3-7	FCh	(unused)	Reserverd; must be zero

HIDEOBJ: Object Display Options (8Dh)

The HIDEOBJ record stores options selected in the **Options** dialog box, **View** tab.

Record Data

Offset	Flag Name	Size	Contents
4	fHideObj	2	=2 if the **Hide All** option is turned on =1 if the **Show Placeholders** option is turned on =0 if the **Show All** option is turned on

HLINK: Hyperlink (1B8h)

The HLINK record stores a hyperlink.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rwFirst	2	First row of the hyperlink
6	rwLast	2	Last row of the hyperlink
8	colFirst	2	First column of the hyperlink
10	colLast	2	Last column of the hyperlink
12	rgbHlink	var	Hyperlink stream (from the Microsoft Office DLL; this stream is not documented)

HLINKTOOLTIP: Hyperlink Tooltip (800h)

Introduced in Excel 9 (2000) this is a FRT record. It contains the tooltip that appears when the mouse hovers over the hyperlink at the workbook location pointed to by the REF structure. **Note**: grbitFrt is omitted.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0800h
8	REF	8	REF structure; see FRT Record Information
16	rgb	var	The hyperlink tooltip; a null-terminated unicode string

HORIZONTALPAGEBREAKS: Explicit Row Page Breaks (1Bh)

The HORIZONTALPAGEBREAKS record contains a list of explicit row page breaks.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	cbrk	2	Number of page breaks
6	rgbrk	var	Array of brk structures

The cbrk field contains the number of page breaks. Each element of the rgbrk structure contains three 2-byte integers: the first specifies the row of the break, the second specifies the starting column, and the third specifies the ending column for the break. All row and column numbers are 1-based, and the breaks occur after the row or column. This array is sorted by row, and then by the starting/ending column. No two page breaks may overlap.

Record Data — BIFF7 and earlier

Offset	Field Name	Size	Contents
4	cbrk	2	Number of page breaks
6	rgrw	var	Array of rows

The cbrk field contains the number of page breaks. The rgrw field is an array of 2-byte integers that specifies rows. Excel sets a page break before each row contained in the list of rows in the rgrw field. The rows must be sorted in ascending order.

IMDATA: Image Data (7Fh)

The IMDATA record contains the complete description of a bitmapped graphic object, such as a drawing created by a graphics tool.

Record Data

Offset	Field Name	Size	Contents
4	cf	2	Image format: =02h, Windows metafile or Macintosh PICT format =09h, Windows bitmap format =0Eh, Native format (see text)
6	env	2	Environment from which the file was written: =1, Microsoft Windows =2, Apple Macintosh
8	lcb	4	Length of the image data
12	data	var	Image data

For more information about the Apple Macintosh PICT file format, see http://developer.apple.com/documentation/mac/QuickDraw/QuickDraw-2.html.

If the image is in Microsoft Windows bitmap format (cf=09h), the data field consists of a BITMAPCOREINFO data structure followed by the actual bitmap. The BITMAPCOREINFO data structure consists of a BITMAPCOREHEADER structure, followed by an array of RGBTRIPLE structures that define the color table. For more information about these structures, see the documentation for the Microsoft Windows Software Development Kit.

Native format (cf=0Eh) stores an embedded object from another application. The image data is in the foreign application's format and cannot be directly processed by Excel.

INDEX: Index Record (20Bh)

Excel writes an INDEX record immediately after the BOF record for each worksheet substream in a BIFF file. For more information about the INDEX record, see "Finding Cell Records in BIFF Files".

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	(Reserved)	4	Reserved; must be 0 (zero)
8	rwMic	4	First row that exists on the sheet
12	rwMac	4	Last row that exists on the sheet, plus 1
16	(Reserved)	4	Reserved; must be 0 (zero)
20	rgibRw	var	Array of file offsets to the DBCELL records for each block of ROW records. A block contains ROW records for up to 32 rows. For more information, see "Finding Cell Records in BIFF Files".

Record Data — BIFF7 and earlier

Offset	Field Name	Size	Contents
4	(Reserved)	4	Reserved; must be 0 (zero)
8	rwMic	2	First row that exists on the sheet
10	rwMac	2	Last row that exists on the sheet, plus 1
12	(Reserved)	4	Reserved; must be 0 (zero)
16	rgibRw	var	Array of file offsets to the DBCELL records for each block of ROW records. A block contains ROW records for up to 32 rows. For more information, see "Finding Cell Records in BIFF Files".

The rwMic field contains the number of the first row in the sheet that contains a value or a formula that is referenced by a cell in some other row. Because rows (and columns) are always stored 0-based rather than 1-based (as they appear on the screen), cell A1 is stored as row 0, cell A2 is row 1, and so on. The rwMac field contains the 0-based number of the last row in the sheet, plus 1.

INTERFACEEND: End of User Interface Records (E2h)

This record marks the end of the user interface section of the Book stream. It has no record data field.

INTERFACEHDR: Beginning of User Interface Records (E1h)

This record marks the beginning of the user interface section of the Book (Workbook) stream. In BIFF7 and earlier, it has no record data field. In BIFF8 and later, the INTERFACEHDR record data field contains a 2-byte word that is the code page. This is exactly the same as the cv field of the the CODEPAGE record.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	Cv	2	Code page the file is saved in: 01B5h (437 dec.) = IBM PC (Multiplan) 8000h (32768 dec.) = Apple Macintosh 04E4h (1252 dec.) = ANSI (Microsoft Windows)

ITERATION: Iteration Mode (11h)

The ITERATION record stores the **Iteration** option from the **Options** dialog box, **Calculation** tab.

Record Data

Offset	Field Name	Size	Contents
4	fIter	2	=1 if the **Iteration** option is on

LABEL: Cell Value, String Constant (18h)

A LABEL record describes a cell that contains a pre-BIFF8 string constant. **Note**: this was replaced in BIFF8 by LABELSST.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row (0-based)

6	col	2	Column (0-based)
8	ixfe	2	Index to the XF record
10	cch	2	Length of the string (must be <= 255)
12	grbit	1	Option flags
13	rgb	var	Array of string characters

LABELSST: Cell Value, String Constant/SST (FDh)

A LABELSST record describes a cell that contains a string constant from the shared string table, which is new to BIFF8.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rw	2	Row (0-based)
6	col	2	Column (0-based)
8	ixfe	2	Index to the XF record
10	isst	4	Index into the SST record where actual string is stored

LEFTMARGIN: Left Margin Measurement (26h)

The LEFTMARGIN record specifies the width of the left margin, in inches. The num field is in 8-byte IEEE floating-point format.

Record Data

Offset	Field Name	Size	Contents
4	num	8	Left margin

LHNGRAPH: Named Graph Information (95h)

Record Data

This record is similar to the .WKS NGRAPH record, except that the first 13 references are not written. Instead, there are 13 integers indicating whether the references X, A–F, and Data Label A–F are defined.

LHRECORD: .WK? File Conversion Information (94h)

This record contains information that Excel uses when it converts an .XLS file to a .WKS, .WK1, or .WK3 file, or vice versa.

Record Data

LHRECORD contains subrecords that resemble BIFF records. Each subrecord consists of the three fields described in the following table.

Offset (within subrecord)	Length (bytes)	Contents
0	2	Subrecord type (rtlh)
2	2	Length of the subrecord data
4	var	Subrecord data

The following table describes the subrecords.

rtlh	Subrecord name	Contents
01h	(Reserved)	Reserved for future use.
02h	lhrtHpstGrHeader	Header string for the /Graph Save Print help command.
03h	lhrtHpstGrFooter	Footer string for the /Graph Save Print help command.
04h	lhrtNumGrLftMgn	Left margin for the /Graph Save Print help command (IEEE number).
05h	lhrtNumGrRgtMgn	Right margin for the /Graph Save Print help command (IEEE number).
06h	lhrtNumGrTopMgn	Top margin for the /Graph Save Print help command (IEEE number).
07h	lhrtNumGrBotMgn	Bottom margin for the /Graph Save Print help command (IEEE number).
08h	lhrtGrlh	Current /Graph View data. Structure similar to the .WKS GRAPH record except that the first 13 references are not written. Instead, there are 13 integers that indicate whether the references X, A–F, and Data Label A–F are defined.
09h	lhrtcchGlColWidth	Current global column width (integer).
0Ah	(Reserved)	Reserved for future use.
0Bh	lhrttblType	Current table type: =0, none (default) =1, table1 =2, table2
0Ch	(Reserved)	Reserved for future use.

LIST12: Extra Table Data Introduced in Excel 2007 (877h)

This record stores additional information about a specified Table.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0877h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	lsd	2	Type of Table data contained in this record (see below for details)
18	idList	4	Table unique ID
22	rgb	var	Data of the record (see below for details)

The lsd field contains one of the following values:

lsd	Table data type
00h	Block-level formatting
01h	Table style client information

02h Display name

If lsd field contains 00h (block-level formatting), then the following data is stored in rgb block:

Offset	Name	Size	Contents
0	cbdxfHeader	4	Count of bytes in the Table header cells' DXF, =0 if no DXFis recorded in dxfHeader below; stored as 4-byte integer
4	istnHeader	4	The Table header cells' style number, =-1 if no style name is recorded in stHeader below; stored as 4-byte integer
8	cbdxfData	4	Count of bytes in the Table data cells' DXF, =0 if no DXFis recorded in dxfData below; stored as 4-byte integer
12	istnData	4	The Table data cells' style number, =-1 if no style name is recorded in stData below; stored as 4-byte integer
16	cbdxfAgg	4	Count of bytes in the Table aggregate cells' DXF, =0 if no DXFis recorded in dxfAgg below; stored as 4-byte integer
20	istnAgg	4	The Table aggregate cells' style number, =-1 if no style name is recorded in stAgg below; stored as 4-byte integer
24	cbdxfBorder	4	Count of bytes in the Table data cells border's DXF, =0 if no DXFis recorded in dxfBorder below; stored as 4-byte integer
28	cbdxfHeaderBorder	4	Count of bytes in the Table header cells border's DXF, =0 if no DXFis recorded in dxfHeaderBorder below; stored as 4-byte integer
32	cbdxfAggBorder	4	Count of bytes in the Table aggregate cells border's DXF, =0 if no DXFis recorded in dxfAggBorder below; stored as 4-byte integer
36	dxfHeader	var	The Table header cells' DXF
var	dxfData	var	The Table data cells' DXF
var	dxfAgg	var	The Table aggregated cells' DXF
var	dxfBorder	var	The Table data cells border's DXF
var	dxfHeaderBorder	var	The Table header cells border's DXF
var	dxfAggBorder	var	The Table aggregate cells border's DXF
var	stHeader	var	The Table header cells' style; string
var	stData	var	The Table data cells' style; string

var	stAgg	var	The Table aggregate cells' style; string

If lsd field contains 01h (Table style information), then the following data is stored in rgb block:

Offset	Name	Size	Contents
0	grbitListStyleClient	2	The Table style client flags (see below for details)
2	stListStyleName	var	The Table style name; string

The grbitListStyleClient field contains the following flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fFirstColumn	=1 if the first column style is enabled
	1	0002h	fLastColumn	=1 if the last column style is enabled
	2	0004h	fRowStripes	=1 if the row banding is enabled
	3	0008h	fColumnStripes	=1 if the column banding is enabled
	4	0010h	fRowHeaders	=1 if the row header style is enabled
	5	0020h	fColumnHeaders	=1 if the column header style is enabled
	6	0040h	fDefaultStyle	=1 if this is the default Table style
	7-15	FF80h	(Reserved)	Currently not used, and set to 0

If lsd field contains 02h (display name), then the following data is stored in rgb block:

Offset	Name	Size	Contents
0	stListName	var	The Table name
var	stListComment	var	The Table comment

LISTCF: List Cell Formatting (8c5h)

This is a Mac Excel FRT record. Same as a CF but wrapped in an FRT header. This describes the cell formatting for the preceding listfield, if present.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c5h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description.
16	rtcf	var	CF structure;

LISTCONDFMT: List Conditional Formatting (8c4h)

This is a Mac Excel FRT record. Same as a CONDFMT but wrapped in an FRT header. This describes the conditional formatting for the preceding listfield, if present.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c4h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description.
16	rtcondfmt	var	CONDFMT structure;

LISTDV: List Data Validation (8c3h)

This is a Mac Excel FRT record. Same as a DV but wrapped in an FRT header. This describes the data validation for the preceding listfield, if present.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c3h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description.
16	rtdv	var	DV structure;

LISTFIELD: List Field (8c2h)

This is a Mac Excel FRT record. It stores one record for each field in the parent list object.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c2h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description. Contains a REF that can be adjusted by a non-list-aware version of Excel
16	wFileFlags	2	Flags
18	ref	8	REF structure; location of field on sheet as known by list-aware version of Excel
26	rwCount	4	Rw to calc against (offset from frtheader.ref.ewFirst) or max count
30	wFieldFlags	2	
32	cchName	2	
38	cchFmla	2	

40	Rgb	var	Name, fmla, xfmtr

The wFileFlags field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fHasDval	1=
1	0002h	fHasCondFmt	1=
15-2	FFFCh	(Reserved)	Reserved; must be zero

LISTOBJ: List Object (8c1h)

This is a Mac Excel FRT record. It stores the information for list object.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c1h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description. Contains a REF that can be adjusted by a non-list-aware version of Excel
16	cFields	2	
18	cRecords	2	
20	ref	8	REF structure; location of field on sheet as known by a list-aware version of Excel
28	wListFlags1	2	
30	wListFlags2	2	
32	Rgsortflags	6	
38	cchName	2	Size of rgbName
40	rgbName	var	The name of the list.

LNEXT: Extension information for borders in Mac Office 11 (8c9h)

This is a Chart FRT record. It stores the extended properties for a line or border.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c9h
6	grbitFrt	2	FRT flags; must be zero
8	padding	8	Reserved; must be zero
16	cvRGB	4	Line color in RGB format
20	lOpacity	4	Line opacity (from 0 to 65,536)

24	lnw	4	Line width

LPR: Sheet Was Printed Using LINE.PRINT() (98h)

If this record appears in a file, it indicates that the sheet was printed using the LINE.PRINT() macro function. The LPR record stores options associated with this function.

Record Data

Offset	Field Name	Size	Contents
4	grbit	2	Option flags
6	cchMargLeft	2	Left margin, expressed as a count of characters
8	cchMargRight	2	Right margin, expressed as a count of characters
10	cliMargTop	2	Top margin, expressed as a count of lines
12	cliMargBot	2	Bottom margin, expressed as a count of lines
14	cliPg	2	Number of lines per page
16	cch	1	Length of the printer setup string
17	rgch	var	Printer setup string

The grbit field contains the following option flags:

Offset	Bits	Mask	Flag Name	Contents
0	0	01h	fWait	=1, alert the user after each sheet is printed
	1	02h	fFormatted	=1, print headers and footers
	2	04h	fAutoLF	=1, write only the carriage return (CR) character (no line feed) at the end of the line
	7–3	F8h	(unused)	
1	7–0	FFh	(unused)	

MDTB: Block of Metadata Records (88Ah)

This record stores a block of metadata records.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Ah
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	rgmdir	var	Block of metadata records

The rgmdir field contains an array of 8-byte long metadata records of the following structure:

Offset	Name	Size	Contents
0	imdt	4	Index of metadata record type amongst MDTINFO records; 1-based index stored as a 4-byte integer value

4	mdd	4	Index of metadata record value in the storage corresponding to record type

MDTINFO: Information about a Metadata Type (884h)

This record stores information about a single metadata type.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0884h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbit	4	Metadata type flags
20	stName	var	Metadata type name; string

The grbit field contains the following metadata type flags:

Offset	Bits	Mask	Name	Contents
0	0	00000001h	ghostRow	=1 if metadata is copied to/from a ghost row
	1	00000002h	ghostCol	=1 if metadata is copied to/from a ghost column
	2	00000004h	edit	=1 if metadata survives editing of a cell value
	3	00000008h	delete	=1 if metadata survives deletion of a cell value
	4	00000010h	copy	=1 if metadata is copied with a cell
	5	00000020h	pasteAll	=1 if metadata is populated by "Paste Special: All"
	6	00000040h	pasteFormulas	=1 if metadata is populated by "Paste Special: Formulas"
	7	00000080h	pasteValues	=1 if metadata is populated by "Paste Special: Values"
	8	00000100h	pasteFormats	=1 if metadata is populated by "Paste Special: Formats"
	9	00000200h	pasteComments	=1 if metadata is populated by "Paste Special: Comments"
	10	00000400h	pasteDataValidation	=1 if metadata is populated by "Paste Special: Validation"
	11	00000800h	pasteBorders	=1 if metadata is populated with borders
	12	00001000h	pasteColWidths	=1 if metadata is populated by "Paste Special: Column widths"

13	00002000h	pasteNumberFormats	=1 if metadata is populated with number formats
14	00004000h	merge	=1 if metadata survives cell merge
15	00008000h	splitFirst	=1 if when a merged cell is split its metadata is copied to the first resulting cell
16	00010000h	splitAll	=1 if when a merged cell is split its metadata is copied to all of the resulting cells
17	00020000h	rowColShift	=1 if metadata survives shifting due to row/column insertion/deletion
18	00040000h	clearAll	=1 if metadata survives "Clear: All"
19	00080000h	clearFormats	=1 if metadata survives "Clear: Formats"
20	00100000h	clearContents	=1 if metadata survives "Clear: Contents"
21	00200000h	clearComments	=1 if metadata survives "Clear: Comments"
22	00400000h	assign	=1 if metadata is propagated by formula assignment operation
23-27	0F800000h	(Reserved)	Currently not used, and set to 0
28	10000000h	coerce	=1 if value metadata is safe to strip away on coercion
29	20000000h	adjust	=1 if metadata is location-aware: needs adjustment, cannot be shared
30	40000000h	cellMeta	=1 if cell metadata type; =0 if value metadata type
31	80000000h	(Reserved)	Currently not used, and set to 0

MDXKPI: Key Performance Indicator Mdx Metadata (889h)

This record stores key performance indicator mdx metadata.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0889h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0

16	istrConnName	4	Index of connection name in string store
20	tfnSrc	1	Tag of the Cube function producing mdx metadata
21	kpiprop	1	Key performance indicator property
22	istrKPIName	4	Index of member unique name in string store
26	istrMbrKPI	4	Index of key performance indicator name in string store

The tfnSrc field contains one of the following values:

tfnSrc	Cube function
07h	CUBEKPIMEMBER

The kpiprop field contains one of the following values:

kpiprop	Key performance indicator property
01h	Value
02h	Goal
03h	Status
04h	Trend
05h	Weight
06h	Current time member

MDXPROP: Member Property Mdx Metadata (888h)

This record stores member property mdx metadata.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0888h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	istrConnName	4	Index of connection name in string store
20	tfnSrc	1	Tag of the Cube function producing mdx metadata
21	istrMbr	4	Index of member unique name in string store
25	istrProp	4	Index of property name in string store

The tfnSrc field contains one of the following values:

tfnSrc	Cube function
06h	CUBEMEMBERPROPERTY

MDXSET: Set Mdx Metadata (887h)

This record stores set mdx metadata.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0887h

6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	istrConnName	4	Index of connection name in string store
20	tfnSrc	1	Tag of the Cube function producing mdx metadata
21	sso	1	Set sort order
22	istrSetDef	4	Index of mdx set definition in string store
26	cistr	4	Number of member indices
30	rgistr	var	Indices of member unique names in string store, an array of 4 byte integer values of the length cistr

The tfnSrc field contains one of the following values:

tfnSrc	Cube function
03h	CUBESET
04h	CUBESETCOUNT

The sso field contains one of the following values:

sso	Cube function
00h	Unsorted
01h	Ascending
02h	Descending
03h	Alpha ascending
04h	Alpha descending
05h	Natural ascending
06h	Natural descending

MDXSTR: MDX metadata string (885h)

This record stores mdx metadata string.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0885h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	St	var	Mdx metadata string; string

MDXTUPLE: Tuple Mdx Metadata (886h)

This record stores tuple mdx metadata.

Record Data — BIFF8 only

Offset	Name	Size	Contents
4	Rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0886h
6	grbitFrt	2	FRT cell reference flag; =0 currently

8	(Reserved)	8	Currently not used, and set to 0
16	istrConnName	4	Index of connection name in string store
20	tfnSrc	1	Tag of the Cube function producing mdx metadata
21	cistr	4	Number of member indices
25	rgistr	var	Indices of member unique names in string store, an array of 4 byte integer values of the length cistr

The tfnSrc field contains one of the following values:

tfnSrc	Cube function
01h	CUBEMEMBER
02h	CUBEVALUE
05h	CUBERANKEDMEMBER

MERGECELLS: Merged Cells (E5h)

This record stores all merged cells.

Record Data

Offset	Field Name	Size	Contents
4	cmcs	2	Count of REF structures
6	rgRef	var	Array of REF structures

MKREXT: Extension information for markers in Mac Office 11 (8cah)

This is a Chart FRT record. It stores the extended properties for markers.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08CAh
6	grbitFrt	2	FRT flags; must be zero
8	padding	8	Reserved; must be zero
16	cvRGBFore	4	Marker foreground color in RGB format
20	cvRGBBack	4	Marker background color in RGB format
24	lOpacity	4	Marker opacity (from 0 to 65,536)

MMS: ADDMENU/DELMENU Record Group Count (C1h)

This record stores the number of ADDMENU groups and DELMENU groups in the Book stream.

Record Data

Offset	Field Name	Size	Contents
4	caitm	1	Number of ADDMENU record groups
5	cditm	1	Number of DELMENU record groups

MSODRAWING: Microsoft Office Drawing (ECh)

This record contains a drawing object provided by the Microsoft Office Drawing tool. For more information on this file format, see Microsoft Office Drawing Binary File Format specification.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rgMSODrawing	var	Microsoft Office Drawing data

MSODRAWINGGROUP: Microsoft Office Drawing Group (EBh)

This record contains a group drawing object provided by the Microsoft Office Drawing tool. For more information on this file format, see Microsoft Office Drawing Binary File Format specification.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rgMSODrawiGr	var	Microsoft Office Drawing group data

MSODRAWINGSELECTION: Microsoft Office Drawing Selection (EDh)

This record contains a selection of drawing objects. The objects are provided by the Microsoft Office Drawing tool. For more information on this file format, see Microsoft Office Drawing Binary File Format specification.

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rgMSODrSelr	var	Microsoft Office Drawing selection data

MTRSETTINGS: Multi-threaded Calculation Settings (89Ah)

This record stores multi-threaded calculation settings.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =089Ah
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	fMTREnabled	4	=1 if multi-threaded calculation is enabled; stored as 4-byte integer value
20	fUserSetThreadCount	4	=1 if the thread count was manually specified by the user; stored as 4-byte integer value
24	cUserThreadCount	4	The count of calc threads as specified by the user; stored as 4-byte integer value

MULBLANK: Multiple Blank Cells (BEh)

The MULBLANK record stores up to the equivalent of 256 BLANK records; the MULBLANK record is a file size optimization. The number of ixfe fields can be

determined from the ColLast field and is equal to (colLast-colFirst+1). The maximum length of the MULBLANK record is (256x2+10)=522 bytes, because Excel can have at most 256 columns. **Note**: storing 256 blank cells in the MULBLANK record takes 522 bytes as compared with 2,560 bytes for 256 BLANK records.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row number (0-based)
6	colFirst	2	Column number (0-based) of the first column of the multiple RK record
8	rgixfe	var	Array of indexes to XF records
10	colLast	2	Last column containing the BLANKREC structure

MULRK: Multiple RK Cells (BDh)

The MULRK record stores up to the equivalent of 256 RK records; the MULRK record is a file size optimization. The number of 6-byte RKREC structures can be determined from the ColLast field and is equal to (colLast-colFirst+1). The maximum length of the MULRK record is (256x6+10)=1546 bytes, because Excel has at most 256 columns. **Note**: storing 256 RK numbers in the MULRK record takes 1,546 bytes as compared with 3,584 bytes for 256 RK records.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row number (0-based)
6	colFirst	2	Column number (0-based) of the first column of the multiple RK record
8	rgrkrec	var	Array of 6-byte RKREC structures
var	colLast	2	Last column containing the RKREC structure

The RKREC structure is defined as follows:

```
typedef struct rkrec
{
     SHORT ixfe;     /* index to XF record */
     long RK;        /* RK number */
}
RKREC;
```

NAME: Defined Name (218h)

The NAME record describes a defined name in the workbook.

Record Data

Offset	Field Name	Size	Contents
4	grbit	2	Option flags
6	chKey	1	Keyboard shortcut
7	cch	1	Length of the name text (in characters)
8	cce	2	Length of the name definition

Offset	Field Name	Size	Contents
10	ixals	2	Index to the sheet that contains this name, if the name is a local name (see text)
12	itab	2	1-based index into the sheets in the current book, where the list is arranged by the visible order of the tabs.
14	cchCustMenu	1	Length of the custom menu text
15	cchDescription	1	Length of the description text
16	cchHelptopic	1	Length of the help topic text
17	cchStatustext	1	Length of the status bar text
18	rgch	var	Name text (grbit/rgb fields as defined in "Unicode Strings in BIFF8".)
var	rgce	var	Name definition (see text)
var	rgchCustMenu	var	Custom menu text
var	rgchDescr	var	Description text
var	rgchHelptopic	var	Help topic text
var	rgchStatustext	var	Status bar text

The grbit field contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fHidden	=1 if the name is hidden
1	0002h	fFunc	=1 if the name is a function
2	0004h	fOB	=1 if the name is a Visual Basic procedure
3	0008h	fProc	=1 if the name is a function or command name on a macro sheet
4	0010h	fCalcExp	=1 if the name contains a complex function
5	0020h	fBuiltin	=1 if the name is a built-in name
11–6	0FC0h	fgrp	Function group index
12	1000h	fBig	=1 if the name refers to binary data (see text)
15–13	C000h	(Reserved)	

If the fBig bit in the grbit field is equal to 1, the NAME record contains a name attached to binary data. These names can be created only by calling the xlDefineBinaryName function from the Microsoft Excel C API. The first byte is the length of the name, which is followed by the name string. Following the name string is the data to which the name refers. The data can be up to 2^{32} bytes long and can span multiple CONTINUE records.

The fCalcExp bit is set if the name definition contains a function that returns an array (for example, TREND, MINVERSE), contains a ROW or COLUMN function, or contains a user-defined function.

The chKey byte is significant only when the fProc bit is set in the grbit field. chKey is the keyboard shortcut for a command macro name. If the name is not a command macro name or has no keyboard shortcut, chKey is meaningless.

The cch field contains the length of the name text, and the rgch field contains the text itself. The cce field contains the length of the name definition, and the rgce field contains the definition itself. The location of rgce within the record depends on the length of the name text (rgch) field.

The name definition (rgce) is stored in the Excel parsed format. For more information, see "Microsoft Excel Formulas".

The NAME record stores two types of names: global names and local names. A global name is defined for an entire workbook, and a local name is defined on a single sheet. For example, MyName is a global name, whereas Sheet1!MyName is a local name. The ixals field in the NAME record is nonzero for local names and will index the list of EXTERNSHEET records for the sheets in the workbook.

All NAME records should appear together in a BIFF file. The order of NAME records in an existing BIFF file should not be changed. You can add new names to a file, but you should add them at the end of the NAME list (block of NAME records). Excel saves the names to the BIFF file in alphabetic order, but this is not a requirement; Excel will sort the name list, if necessary, when it loads a BIFF file.

Built-in Names

Excel contains several built-in names — such as Criteria, Database, Auto_Open, and so on — for which the NAME records do not contain the actual name. Instead, cch always equals 1, and a single byte is used to identify the name as shown in the following table.

Built-in name	rgch
Consolidate_Area	00
Auto_Open	01
Auto_Close	02
Extract	03
Database	04
Criteria	05
Print_Area	06
Print_Titles	07
Recorder	08
Data_Form	09
Auto_Activate	0A
Auto_Deactivate	0B
Sheet_Title	0C

NAMECMT: Name Comment (894h)

This record stores a comment associated with a specified name.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0894h

6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	cachName	2	Number of characters in the name; 2-byte unsigned integer value
18	cachComment	2	Number of characters in the comment; 2-byte unsigned integer value
20	rgach	var	ASCII name string of length cachName immediately followed by ASCII comment string of length cachComment

NAMEFNGRP12: Extra Function Group (899h)

This record stores a name of a function group, which is beyond 32 groups supported by Excel 2003 and earlier.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0899h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	cachName	2	Number of characters in the name; 2-byte unsigned integer value
18	fgrp	2	Number of the function group; 2-byte unsigned integer value
20	rgach	var	ASCII name string of length cachName

NAMEPUBLISH: Publish to Excel Server Data for Name (893h)

This record stores data concerning a name published to Excel Server.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0893h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitPublishFlags	2	Publish data flags (see below for details)
18	cachName	2	Number of characters in the name
20	rgach	var	ASCII name string of length cachName

The grbitPublishFlags field contains the following flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fPublished	=1 if the name is published to Excel Server
	1	0002h	fWorkbookParam	=1 if the name is a workbook parameter on Excel Server
	2-15	FFC0h	(Reserved)	Currently not used, and set to 0

NOTE: Comment Associated with a Cell (1Ch)

The NOTE record specifies a comment associated with a particular cell. In Excel 95 (BIFF7) and earlier versions, this record stores a note (cell note). This feature was significantly enhanced in Excel 97, so the name was changed to "comment".

Record Data — BIFF8

Offset	Field Name	Size	Contents
4	rw	2	Row of the comment
6	col	2	Column of the comment
8	grbit	2	Options flag (see table below)
10	idObj	2	Object id for OBJ record that contains the comment
12	stAuthor	var	Name of the original comment author (as Unicode string)

The grbit field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	(Reserved)	Reserved; must be 0 (zero)
1	0002h	fShow	=0 if the comment does not show when a mouse is not hovering over the cell (default)
15 – 2	FFFCh	(Reserved)	Reserved; must be 0 (zero)

The rw and col fields specify the cell that contains the comment. The rw field contains the 0-based row number; the col field contains the 0-based column number.

The idObj field denotes the id of the graphic object (OBJ record) that contains the comment. Each comment has a corresponding OBJ record in which the ot field specifies the object type as a Comment Shape. The text of the comment (as well as the formatting information) is in the corresponding OBJ record and its supporting records.

The stAuthor field contains the name of the original author of the comment, as a byte-counted string; the count is an unsigned short (2-bytes) that precedes the string. The string itself is padded with NULL bytes until it is word-aligned. The NULLs appear after the count and before the string data.

Record Data — BIFF7 and earlier

Offset	Field Name	Size	Contents
4	rw	2	Row of the note
6	col	2	Column of the note
8	cch	2	Length of the note (bytes)
10	rgch	var	Text of the note

The cell is denoted by the rw and col fields. The rw field contains the 0-based row number. The col field contains the 0-based column number.

The cch field contains the length of the note in bytes. The rgch field contains the text of the note in ASCII format.

Notes longer than 2,048 characters (bytes) must be divided into several NOTE records, with each record containing no more than 2,048 characters. In this case, the first NOTE record contains the fields listed in the following table.

Offset	Field Name	Size	Contents
4	rw	2	Row of the note
6	col	2	Column of the note
8	cch	2	Total length of the note
10	rgch	2048	First 2,048 characters of the note

Each successive NOTE record contains the following fields:

Offset	Field Name	Size	Contents
4	rw	2	=–1 always (FFFFh)
6	(Reserved)	2	Reserved; must be 0 (zero)
8	cch	2	Length of this section of the note
10	rgch	var	This section of the note

NUMBER: Cell Value, Floating-Point Number (203h)

A NUMBER record describes a cell containing a constant floating-point number. The rw field contains the 0-based row number. The col field contains the 0-based column number. The number is contained in the num field in 8-byte IEEE floating-point format.

Record Data

Offset	Field Name	Size	Contents
4	rw	2	Row
6	col	2	Column
8	ixfe	2	Index to the XF record
10	num	8	Floating-point number value

OBJ: Describes a Graphic Object (5Dh)

BIFF files may contain several different variations of the OBJ record. They correspond to the graphic objects and dialog box controls available in Excel: line object, rectangle object, check box object, and so on.

Record Data-BIFF8

In BIFF8, the OBJ record contains a partial description of a drawing object, and the MSODRAWING, MSODRAWINGGROUP, and MSODRAWINGSELECTION records contain the remaining drawing object data.

To store an OBJ record in BIFF8, Excel writes a collection of subrecords. The structure of a subrecord is identical to the structure of a BIFF record. Each subrecord begins with a 2-byte id number, ft (see the following table). Next a 2-byte length field, cb, specifies the length of the subrecord data field. The subrecord data field follows the length field.

The first subrecord is always ftCmo (common object data), and the last subrecord is always ftEnd.

Subrecord	Number	Description
ftEnd	00h	End of OBJ record
(Reserved)	01h	
(Reserved)	02h	

Subrecord	Number	Description
(Reserved)	03h	
ftMacro	04h	Fmla-style macro
ftButton	05h	Command button
ftGmo	06h	Group marker
ftCf	07h	Clipboard format
ftPioGrbit	08h	Picture option flags
ftPictFmla	09h	Picture fmla-style macro
ftCbls	0Ah	Check box link
ftRbo	0Bh	Radio button
ftSbs	0Ch	Scroll bar
ftNts	0Dh	Note structure
ftSbsFmla	0Eh	Scroll bar fmla-style macro
ftGboData	0Fh	Group box data
ftEdoData	10h	Edit control data
ftRboData	11h	Radio button data
ftCblsData	12h	Check box data
ftLbsData	13h	List box data
ftCblsFmla	14h	Check box link fmla-style macro
ftCmo	15h	Common object data

ftCmo (15h)

Offset	Field Name	Size	Contents
0	ft	2	=ftCmo (15h)
2	cb	2	Length of ftCmo data
4	ot	2	Object type (see following table)
6	id	2	Object ID number
8	grbit	2	Option flags (see following table)
14	(Reserved)	12	Reserved; must be 0 (zero)

The grbit field at byte 8 contains the following flag bits:

Bits	Mask	Flag Name	Contents
0	0001h	fLocked	=1 if the object is locked when the sheet is protected
3 – 1	000Eh	(Reserved)	Reserved; must be 0 (zero)
4	0010h	fPrint	=1 if the object is printable
12–5	1FE0h	(Reserved)	Reserved; must be 0 (zero)
13	2000h	fAutoFill	=1 if the object uses automatic fill style
14	4000h	fAutoLine	=1 if the object uses automatic line style
15	8000h	(Reserved)	Reserved; must be 0 (zero)

The ot field contains the object type.

ot	Object type
00	Group

01	Line
02	Rectangle
03	Oval
04	Arc
05	Chart
06	Text
07	Button
08	Picture
09	Polygon
0A	(Reserved)
0B	Check box
0C	Option button
0D	Edit box
0E	Label
0F	Dialog box
10	Spinner
11	Scroll bar
12	List box
13	Group box
14	Combo box
15	(Reserved)
16	(Reserved)
17	(Reserved)
18	(Reserved)
19	Comment
1A	(Reserved)
1B	(Reserved)
1C	(Reserved)
1D	(Reserved)
1E	Microsoft Office drawing

ftEnd (00h)

The ftEnd file type marks the end of an OBJ record.

Offset	Name	Size	Contents
0	ft	2	=ftEnd (00h)
2	cb	2	Length of ftEnd (=00h)

ftMacro (04h)

Offset	Name	Size	Contents
0	ft	2	=ftMacro (04h)
2	cb	2	Length of ftMacro
4	(Reserved)	var	

ftButton (05h)

Offset	Name	Size	Contents
0	ft	2	=ftButton (05h)
2	cb	2	Length of ftButton
4	(Reserved)	var	

ftGmo (06h)

Offset	Name	Size	Contents
0	ft	2	=ftGmo (06h)
2	cb	2	Length of ftGmo
4	(Reserved)	var	

ftCf (07h)

Offset	Name	Size	Contents
0	ft	2	=ftCf (07h)
2	cb	2	Length of ftCf
4	(Reserved)	var	Reserved

ftPioGrbit (08h)

Offset	Name	Size	Contents
0	ft	2	=ftPioGrbit (08h)
2	cb	2	Length of ftPioGrbit
4	(Reserved)	var	Reserved

ftPictFmla (09h)

Offset	Name	Size	Contents
0	ft	2	=ftPictFmla (09h)
2	cb	2	Length of ftPictFmla
4	(Reserved)	var	Reserved

ftCbls (0Ah)

Offset	Name	Size	Contents
0	ft	2	=ftCbls (0Ah)
2	cb	2	Length of ftCbls
4	(Reserved)	var	Reserved

ftRbo (0Bh)

Offset	Name	Size	Contents
0	ft	2	=ftRbo (0Bh)
2	cb	2	Length of ftRbo
4	(Reserved)	var	Reserved

ftSbs (0Ch)

Offset	Name	Size	Contents
0	ft	2	=ftSbs (0Ch)
2	cb	2	Length of ftSbs
4	(Reserved)	var	Reserved

ftNts (0Dh)

Offset	Name	Size	Contents
0	ft	2	=ftNts (0Dh)
2	cb	2	Length of ftNts
4	(Reserved)	var	Reserved

ftSbsFmla (0Eh)

Offset	Name	Size	Contents
0	ft	2	=ftSbsFmla (0Eh)
2	cb	2	Length of ftSbsFmla
4	(Reserved)	var	Reserved

ftGboData (0Fh)

The ftGboData file type contains group box object data.

Offset	Name	Size	Contents
0	ft	2	=ftGboData (0Fh)
2	cb	2	Length of ftGboData
4	(Reserved)	var	Reserved

ftEdoData (10h)

Offset	Name	Size	Contents
0	ft	2	=ftEdoData (10h)
2	cb	2	Length of ftEdoData
4	(Reserved)	var	Reserved

ftRboData (11h)

Offset	Name	Size	Contents
0	ft	2	=ftRboData (11h)
2	cb	2	Length of ftRboData
4	(Reserved)	var	Reserved

ftCblsData (12h)

Offset	Name	Size	Contents
0	ft	2	=ftCblsData (12h)
2	cb	2	Length of ftCblsData

4	(Reserved)	var	Reserved

ftLbsData (13h)

Offset	Name	Size	Contents
0	ft	2	=ftLbsData (13h)
2	cb	2	Length of ftLbsData
4	(Reserved)	var	Reserved

ftCblsFmla (14h)

Offset	Name	Size	Contents
0	ft	2	=ftCblsFmla (14h)
2	cb	2	Length of ftCblsFmla
4	(Reserved)	var	Reserved

Record Data—BIFF5 and BIFF7

The first 36 bytes of every OBJ record are fields that are common to all object types. The remaining fields are object-specific and are described in separate sections following the common object fields.

Common Object Fields

Offset	Name	Size	Contents
4	cObj	4	Count (1-based) of the objects in the file
8	OT	2	Object type - Group object: OT = 00h Line object: OT = 01h Rectangle object: OT = 02h Oval object: OT = 03h Arc object: OT = 04h Chart object: OT = 05h Text object: OT = 06h Button object: OT = 07h Picture object: OT = 08h Polygon object: OT = 09h Check box object: OT = 0Bh Option button object: OT = 0Ch Edit box object: OT = 0Dh Label object: OT = 0Eh Dialog frame object: OT = 0Fh Spinner object: OT = 10h Scroll bar object: OT = 11h List box object: OT = 12h Group box object: OT = 13h Drop-down object: OT = 14h
10	id	2	Object identification number
12	grbit	2	Option flags (see the following table)
14	colL	2	Column containing the upper-left corner of the object's bounding rectangle

Offset	Name	Size	Contents
16	dxL	2	X (horizontal) position of the upper-left corner of the object's bounding rectangle, relative to the left side of the underlying cell, expressed as 1/1024th of the cell's width
18	rwT	2	Row containing the upper-left corner of the object's bounding rectangle
20	dyT	2	Y (vertical) position of the upper-left corner of the object's bounding rectangle, relative to the top of the underlying cell, expressed as 1/1024th of the cell's height
22	colR	2	Column containing the lower-right corner of the object's bounding rectangle.
24	dxR	2	X (horizontal) position of the lower-right corner of the object's bounding rectangle, relative to the left side of the underlying cell, expressed as 1/1024th of the cell's width.
26	rwB	2	Row containing the lower-right corner of the object's bounding rectangle.
28	dyB	2	Y (vertical) position of the lower-right corner of the object's bounding rectangle, relative to the top of the underlying cell, expressed as 1/1024th of the cell's height.
30	cbMacro	2	Length of the FMLA structure that stores the definition of the attached macro; see FMLA Structure. Some objects may store the length of the FMLA structure in a cbFmla that immediately preceded the FMLA; in these objects, cbMacro is ignored.
32	(Reserved)	6	Reserved; must be 0 (zero).

The grbit field at byte 12 contains the following flag bits:

Offset	Bits	Mask	Name	Contents
0	0	01h	fSel	=1 if the object is selected
	1	02h	fAutoSize	=1 if the object moves and sizes with the cells
	2	04h	fMove	=1 if the object moves with the cells (**Format Object** dialog box, **Properties** tab)
	3	08h	(Reserved)	Reserved; must be 0 (zero)
	4	10h	fLocked	=1 if the object is locked when the sheet is protected
	5	20h	(Reserved)	Reserved; must be 0 (zero)
	6	40h	(Reserved)	Reserved; must be 0 (zero)
	7	80h	fGrouped	=1 if the object is part of a group of objects
1	0	01h	fHidden	=1 if the object is hidden (this can be done only from a macro)

1	02h	fVisible	=1 if the object is visible
2	04h	fPrint	=1 if the object is printable
7 – 3	F8h	(Reserved)	Reserved; must be 0 (zero)

Line Object Fields

Offset	Name	Size	Contents
38	icv	1	Index to the color palette for line color.
39	lns	1	Line style - Solid: lns = 0 Dash: lns = 1 Dot: lns = 2 Dash-dot: lns = 3 Dash-dot-dot: lns = 4 Null (unused): lns = 5 Dark gray: lns = 6 Medium gray: lns = 7 Light gray: lns = 8
40	lnw	1	Line weight - Hairline: lnw = 0 Single: lnw = 1 Double: lnw = 2 Thick: lnw = 3
41	fAuto	1	Bit 0 = 1 if **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	es	2	End style structure (see the following table).
44	iqu	1	Quadrant index (direction of line): Starts upper left, ends lower right: iqu = 0 Starts upper right, ends lower left: iqu = 1 Starts lower right, ends upper left: iqu = 2 Starts lower left, ends upper right: iqu = 3
45	(Reserved)	1	Reserved; must be 0 (zero).
46	cchName	1	Length of the name (null if no name).
47	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see the following section).

The end style structure (es) describes the arrowheads on the end point of the line. The structure contains four 4-bit fields, as described in the following table.

Offset	Bits	Mask	Name	Contents
0	3–0	0Fh	sest	Arrowhead style - None: sest = 0 Open: sest = 1 Filled: sest = 2 Double-ended open: sest = 3 Double-ended filled: sest = 4

	7–4	F0h	sesw	Arrowhead width - Narrow: sesw = 0 Medium: sesw = 1 Wide: sesw = 2
1	3–0	0Fh	sesl	Arrowhead length - Short: sesl = 0 Medium: sesl = 1 Long: sesl = 2
	7–4	F0h	(unused)	

FMLA Structure

The FMLA structure stores a parsed expression for the macro attached to the object. For more information about parsed expressions, see "Microsoft Excel Formulas". The FMLA structure is null if the object does not have a macro attached.

In some object types, the FMLA structure length is given by cbMacro in the common object fields. In other object types, the FMLA structure length is given by a cbFmla that immediately precedes the FMLA. In these object types, ignore cbMacro. There may be an optional padding byte at the end of the FMLA to force it to end on a word boundary. The FMLA structure has the following form:

Offset	Name	Size	Contents
0	cce	2	Length of the parsed expression.
2	(Reserved)	4	
6	rgce	var	Parsed expression (may contain a padding byte to force word-boundary alignment).

Rectangle Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see the following table).
48	cchName	1	Length of the name (null if no name).
49	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").

The frame style structure (frs) contains 16 bits. Because dxyCorner overlaps the byte boundary, the structure is defined as a single 16-bit field instead of two 8-bit fields.

Offset	Bits	Mask	Name	Contents
0	0	0001h	frt	=1 if the rectangle has rounded corners (**Format Object** dialog box, **Patterns** tab)
	1	0002h	fShadow	= 1 if the rectangle has a shadow border (**Format Object** dialog box, **Patterns** tab)
	9 – 2	03FCh	dxyCorner	Diameter of the oval (actually a circle) that defines the rounded corners (if frt=1)
	15–10	FC00h	(unused)	

Oval Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see the following table).
48	cchName	1	Length of the name (null if no name).
49	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").

The frame style structure (frs) contains 16 bits. dxyCorner is not used for oval objects.

Offset	Bits	Mask	Name	Contents
0	0	0001h	frt	(Not used for oval objects)
	1	0002h	fShadow	=1 if the oval has a shadow border (**Format Object** dialog box, **Patterns** tab)
	2–9	03FCh	dxyCorner	(Not used for oval objects)
	10–15	FC00h	(unused)	

Arc Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	iqu	1	Quadrant index (section of an oval describing the arc) - Upper-right quadrant of the oval: iqu = 0 Upper-left quadrant of the oval: iqu = 1 Lower-left quadrant of the oval: iqu = 2 Lower-right quadrant of the oval: iqu = 3
47	(Reserved)	1	Reserved; must be 0 (zero).
48	cchName	1	Length of the name (null if no name).
49	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").

Chart Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see "Rectangle Object Fields").

48	grbit	2	Option flags (shown LSB to MSB): fLinked:1 =1 if linked to a chart sheet Reserved:15 Reserved; must be 0 (zero)
50	(Reserved)	16	Reserved; must be 0 (zero).
66	cchName	1	Length of the name (null if no name).
67	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").

An embedded chart BIFF substream immediately follows the chart object record. This embedded chart file begins with a BOF record and ends with an EOF record. For more information on this file format, see Excel Chart Records section.

Text Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see the preceding section "Rectangle Object Fields").
48	cbText	2	Length of the object text.
50	(Reserved)	2	Reserved; must be 0 (zero).
52	cbRuns	2	Total length of all TXORUNS structures in the record.
54	ifntEmpty	2	If cbRuns=0, the text object is empty, and these 2 bytes contain the index to the FONT record for the object. If the object contains text, cbRuns>0, and these 2 bytes are reserved.
56	(Reserved)	2	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).

Offset	Name	Size	Contents
60	rot	2	Orientation of text within the object boundary (**Format Object** dialog box, **Alignment** tab): =0, no rotation (text appears left to right) =1, text appears top to bottom; letters are upright =2, text is rotated 90 degrees counterclockwise =3, text is rotated 90 degrees clockwise
62	(Reserved)	12	Reserved; must be 0 (zero).
74	cchName	1	Length of the name (null if no name).
75	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	TXORUNS	8	TXORUNS structure (see "TXORUNS").
var	TXORUNS	8	TXORUNS structure (see "TXORUNS").

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	(Reserved)	Reserved; must be 0 (zero)
	3–1	0Eh	alcH	Horizontal text alignment: 1 = left-aligned 2 = centered 3 = right-aligned 4 = justified
	6–4	70h	alcV	Vertical text alignment: 1 = left-aligned 2 = centered 3 = right-aligned 4 = justified
	7	80h	fAutoTextSize	=1 if the **Automatic Size** option is turned on (**Format Object** dialog box, **Alignment** tab)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is turned on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
	7 – 3	F8h	(Reserved)	Reserved; must be 0 (zero)

TXORUNS

The TXORUNS structure contains formatting information about the object text string. A TXORUNS structure occurs every time the text formatting changes. The TXORUNS structure is described in the following table.

Offset	Name	Size	Contents
0	ichFirst	2	Index to the first character to which the formatting applies
2	ifnt	2	Index to the FONT record
4	(Reserved)	4	

There are always at least two TXORUNS structures in the text object record, even if the entire text string is normal font (ifnt=0). The last TXORUNS structure, which ends the formatting information for the string, always has ichFirst=cbText, and ifnt=0.

Button Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for buttons).
39	icvFore	1	Index to the color palette for foreground color (fixed for buttons).
40	fls	1	Fill pattern (fixed for buttons).
41	grbit	1	Option flags (fixed for buttons).
42	icv	1	Index to the color palette for line color (fixed for buttons).
43	lns	1	Line style (fixed for buttons).
44	lnw	1	Line weight (fixed for buttons).
45	fAuto	1	Bit 0 = 1 (fixed for buttons).
46	frs	2	Frame style structure (ignored for buttons).
48	cbText	2	Length of the object text.
50	(Reserved)	2	Reserved; must be 0 (zero).
52	cbRuns	2	Total length of all TXORUNS structures in record.
54	ifntEmpty	2	If cbRuns=0, the button object is empty, and these 2 bytes contain the index to the FONT record for the object. If the object contains text, cbRuns>0, and these 2 bytes are reserved.
56	(Reserved)	2	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).

Offset	Name	Size	Contents
60	rot	2	Orientation of text within the object boundary (**Format Object** dialog box, **Alignment** tab): =0, no rotation (text appears left to right) =1, text appears top to bottom; letters are upright =2, text is rotated 90 degrees counterclockwise =3, text is rotated 90 degrees clockwise
62	(Reserved)	6	Reserved; must be 0 (zero).
68	grbit	2	Option flags (shown LSB to MSB): fDefault:1 = 1 if this is the default button fHelp:1 = 1 if this is the Help button fCancel:1 = 1 if this is the cancel button fDismiss:1 = 1 if this is the dismiss button Reserved:12 Reserved; must be 0 (zero)
70	accel	2	Accelerator key character.
72	accel2	2	Accelerator key character (East Asian versions only).
74	cchName	1	Length of the name (null if no name).
75	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	TXORUNS	8	TXORUNS structure (see "TXORUNS").
var	TXORUNS	8	TXORUNS structure (see "TXORUNS").

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	(Reserved)	Reserved; must be 0 (zero)
	3–1	0Eh	alcH	Horizontal text alignment: 1 = left-aligned 2 = centered 3 = right-aligned 4 = justified
	6–4	70h	alcV	Vertical text alignment: 1 = left-aligned 2 = centered 3 = right-aligned 4 = justified
	7	80h	fAutoTextSize	=1 if the **Automatic Size** option is turned on (**Format Object** dialog box, **Alignment** tab)
1	0	01h	(unused)	

1	02h	fLockText	=1 if the **Lock Text** option is turned on (**Format Object** dialog box, **Protection** tab)
2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
7–3	F8h	(Reserved)	Reserved; must be 0 (zero)

Picture Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see "Line Object Fields").
44	lnw	1	Line weight (see "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see the preceding section "Rectangle Object Fields").
48	cf	2	Image format: =00h Text format =01h Null format (no image data) =02h Windows metafile or Macintosh PICT format =09h Windows bitmap format
50	(Reserved)	4	Reserved; must be 0 (zero).
54	cbPictFmla	2	Length of the picture FMLA structure (the FMLA that contains the link to the picture).
56	(Reserved)	2	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	4	Reserved; must be 0 (zero).
64	cchName	1	Length of the name (null if no name).
65	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	Attached macro FMLA structure (see "FMLA Structure").
var	PictFmla	var	Picture FMLA structure (see "FMLA Structure").
var	(Reserved)	4	Reserved; must be 0 (zero).

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	fAutoPict	=0 if the user manually sizes picture by dragging a handle
	1	02h	fDde	=1 if the reference in the FMLA structure is a DDE reference
	2	04h	fIcon	=1 if the picture is from a DDE link, and the only available representation of the picture is an icon
	7–3	F8h	(unused)	
1	7–0	FFh	(unused)	

Sheet Background in Microsoft Excel for Windows 95

The sheet background bitmap for worksheets and charts is stored as a hidden picture object that has the name __BkgndObj (the stName field at byte 65). An IMDATA record will also appear in the file to store the image description.

Group Object Fields

Offset	Name	Size	Contents
34	(Reserved)	4	Reserved; must be 0 (zero).
38	idNext	2	Object ID number (id) of the object that follows the last object in this group. If there are no objects following the group, idNext=0.
40	(Reserved)	16	Reserved; must be 0 (zero).

A Group OBJ record precedes the OBJ records for the group members.

Polygon Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color.
39	icvFore	1	Index to the color palette for foreground color.
40	fls	1	Fill pattern.
41	fAuto	1	Bit 0 = 1 if the **Automatic Fill** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
42	icv	1	Index to the color palette for line color.
43	lns	1	Line style (see the preceding section "Line Object Fields").
44	lnw	1	Line weight (see preceding section "Line Object Fields").
45	fAuto	1	Bit 0 = 1 if the **Automatic Border** option is turned on (**Format Object** dialog box, **Patterns** tab). All other bits in fAuto are don't-care.
46	frs	2	Frame style structure (see the preceding section "Rectangle Object Fields").
48	wstate	2	If bit 0 = 1, the polygon is closed. All other bits are don't-care.

50	(Reserved)	10	
60	iMacSav	2	Number of vertices in the polygon (1-based).
62	(Reserved)	8	
70	cchName	1	Length of the name (null if no name).
71	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").

For polygon objects, a COORDLIST record follows the OBJ record.

Check Box Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for check box objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for check box objects).
40	fls	1	Fill pattern (ignored for check box objects).
41	fAuto	1	(Ignored for check box objects).
42	icv	1	Index to the color palette for line color (fixed for check box objects).
43	lns	1	Line style (ignored for check box objects).
44	lnw	1	Line weight (ignored for check box objects).
45	fAuto	1	(Ignored for check box objects).
46	frs	2	Frame style structure (ignored for check box objects).
48	(Reserved)	10	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	20	Reserved; must be 0 (zero).
80	cchName	1	Length of the name (null if no name).
81	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbFmla2	2	Length of the FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see "FMLA Structure").
var	cbText	2	Length of the object text (never null).
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).

Offset	Name	Size	Contents
var	fChecked	2	=0 if the check box is not checked =1 if the check box is checked =2 if the check box is gray (mixed)
var	accel	2	Accelerator key character.
var	accel2	2	Accelerator key character (East Asian versions only).
var	grbit	2	Option flags (shown LSB to MSB): fNo3d:1 = 1 if 3-D shading is turned off fBoxOnly:1 = 1 if only the box is drawn Reserved:14 Reserved; must be 0 (zero)

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7 – 0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is turned on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
	7 – 3	F8h	(Reserved)	Reserved; must be 0 (zero)

Dialog Frame Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for dialog frame objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for dialog frame objects).
40	fls	1	Fill pattern (ignored for dialog frame objects).
41	grbit	1	Option flags (ignored for dialog frame objects).
42	icv	1	Index to the color palette for line color (fixed for dialog frame objects).
43	lns	1	Line style (ignored for dialog frame objects).
44	lnw	1	Line weight (ignored for dialog frame objects).
45	fAuto	1	Bit 0 = 1 for dialog frame objects.
46	frs	2	Frame style structure (ignored for dialog frame objects).
48	cbText	2	Length of the object text.
50	(Reserved)	8	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	14	Reserved; must be 0 (zero).
74	cchName	1	Length of the name (null if no name).

75	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	TXORUNS	8	TXORUNS structure (see text).
var	TXORUNS	8	TXORUNS structure (see text).

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7 – 0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(Unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is turned on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if an object is selected (the broken border is displayed)
	7 – 3	F8h	(Reserved)	Reserved; must be 0 (zero)

The TXORUNS structure contains formatting information about the object text string, which is the dialog box caption. There are two TXORUNS structures in the dialog frame object record. The first has ichFirst=00h, and it has ifnt pointing to the FONT record for the text. The second has ichFirst=cbText, and it contains no other useful information. The TXORUNS structure is shown in the following table.

Offset	Name	Size	Contents
0	ichFirst	2	Index to the first character to which the formatting applies
2	ifnt	2	Index to the FONT record
4	(Reserved)	4	

Drop-Down Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for drop-down objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for drop-down objects).
40	fls	1	Fill pattern (ignored for drop-down objects).
41	grbit	1	Option flags (ignored for drop-down objects).
42	icv	1	Index to the color palette for line color (fixed for drop-down objects).
43	lns	1	Line style (ignored for drop-down objects).
44	lnw	1	Line weight (ignored for drop-down objects).
45	fAuto	1	Bit 0 = 1 for drop-down objects.

Offset	Name	Size	Contents
46	frs	2	Frame style structure (ignored for drop-down objects).
48	(Reserved)	4	Reserved; must be 0 (zero).
52	iVal	2	Scroll bar position.
54	iMin	2	Scroll bar minimum value.
56	iMax	2	Scroll bar maximum value.
58	dInc	2	Amount to scroll when an arrow is clicked.
60	dPage	2	Amount to scroll when the scroll bar is clicked.
62	fHoriz	2	=1 if the scroll bar is horizontal.
64	dxScroll	2	Width of the scroll bar.
66	grbit	2	Option flags (shown LSB to MSB): (Reserved):3 Reserved; must be 0 (zero) fNo3d:1 = 1 if 3-D shading is turned off (Reserved):12 Reserved; must be 0 (zero)
68	(Reserved)	18	Reserved; must be 0 (zero).
86	ifnt	2	Index to the FONT record for list box.
88	(Reserved)	14	Reserved; must be 0 (zero).
102	xLeft	2	X (horizontal) position of the upper-left corner of the drop-down object's bounding rectangle.
104	yTop	2	Y (vertical) position of the upper-left corner of the drop-down object's bounding rectangle.
106	xRight	2	X (horizontal) position of the lower-right corner of the drop-down object's bounding rectangle.
108	yBot	2	Y (vertical) position of the lower-right corner of the drop-down object's bounding rectangle.
110	(Reserved)	4	Reserved; must be 0 (zero).
114	cchName	1	Length of the name (null if no name).
115	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbFmla2	2	Length of the FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see "FMLA Structure").
var	cbFmla3	2	Length of the FMLA structure for the input range (never null).
var	fmla3	var	FMLA structure for the input range (see "FMLA Structure").

Offset	Name	Size	Contents
var	cLines	2	Number of elements in the list box (1-based).
var	iSel	2	Index of the selected item (1-based).
var	grbit	2	Option flags (shown LSB to MSB): (Reserved):2 Reserved; must be 0 (zero) fValidIds:1 = 1 if idEdit is valid fNo3d:1 = 1 if 3-D shading is turned off (Reserved):12 Reserved; must be 0 (zero)
var	(Reserved)	2	Reserved; must be 0 (zero).
var	grbit	2	Option flags (shown LSB to MSB): wStyle:2 Drop-down style: 0 = combo, 1 = combo edit, 2 = simple 3 = max (Reserved):14 Reserved; must be 0 (zero)
var	cLine	2	Maximum number of lines the drop-down list box contains before a scroll bar is added.
var	dxMin	2	Minimum allowable width of the drop-down list box.
var	(Reserved)	2	Reserved; must be 0 (zero).

Edit Box Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for edit box objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for edit box objects).
40	fls	1	Fill pattern (ignored for edit box objects).
41	grbit	1	Option flags (ignored for edit box objects).
42	icv	1	Index to the color palette for line color (fixed for edit box objects).
43	lns	1	Line style (ignored for edit box objects).
44	lnw	1	Line weight (ignored for edit box objects).
45	fAuto	1	Bit 0 = 1 for edit box objects.
46	frs	2	Frame style structure (ignored for edit box objects).
48	(Reserved)	10	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	14	Reserved; must be 0 (zero).
74	cchName	1	Length of the name (null if no name).
75	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).

Offset	Name	Size	Contents
var	cbFmla	2	Length of the FMLA structure for the attached macro (never null).
var	fmla	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbText	2	Length of the object text (never null).
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	ivtEdit	2	Edit validation: =000, Text =001, Integer =010, Number =011, Reference =100, Formula
var	fMultiLine	2	=1 if the edit is a multiline edit.
var	fVScroll	2	=1 if the edit box has a vertical scroll bar.
var	idList	2	Object ID of the linked list box or linked drop-down, if the edit box is part of a combination list-edit box or combination drop-down edit box. If idList=0, this is a simple edit box.

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7 – 0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is turned on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
	7 – 3	F8h	(Reserved)	Reserved; must be 0 (zero)

Group Box Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for group box objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for group box objects).
40	fls	1	Fill pattern (ignored for group box objects).
41	grbit	1	Option flags (ignored for group box objects).
42	icv	1	Index to the color palette for line color (fixed for group box objects).
43	lns	1	Line style (ignored for group box objects).

Offset	Name	Size	Contents
44	lnw	1	Line weight (ignored for group box objects).
45	fAuto	1	Bit 0 = 1 for group box objects.
46	frs	2	Frame style structure (ignored for group box objects).
48	(Reserved)	10	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	26	Reserved; must be 0 (zero).
86	cchName	1	Length of the name (null if no name).
87	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla	2	Length of the FMLA structure (never null).
var	fmla	var	FMLA structure (see "FMLA Structure").
var	cbText	2	Length of object text (never null).
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	accel	2	Accelerator key character.
var	accel2	2	Accelerator key character (East Asian versions only).
var	grbit	2	Option flags (shown LSB to MSB) - fNo3d:1 = 1 if 3-D shading is off (Reserved):15 Reserved; must be 0 (zero)

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7–0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
	7–3	F8h	(Reserved)	Reserved; must be 0 (zero)

Label Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for label objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for label objects).
40	fls	1	Fill pattern (ignored for label objects).
41	grbit	1	Option flags (ignored for label objects).

Offset	Name	Size	Contents
42	icv	1	Index to the color palette for line color (fixed for label objects).
43	lns	1	Line style (ignored for label objects).
44	lnw	1	Line weight (ignored for label objects).
45	fAuto	1	Bit 0 = 1 for label objects.
46	frs	2	Frame style structure (ignored for label objects).
48	cbText	2	Length of object text.
50	(Reserved)	8	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	14	Reserved; must be 0 (zero).
74	cchName	1	Length of the name (null if no name).
75	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	fmla	var	FMLA structure (see "FMLA Structure").
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	TXORUNS	8	TXORUNS structure (see text).
var	TXORUNS	8	TXORUNS structure (see text).

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7–0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if object is selected (the broken border is displayed)
	7–3	F8h	(Reserved)	Reserved; must be 0 (zero)

The TXORUNS structure contains formatting information about the object text string, which is the label string. There are two TXORUNS structures in the label object record. The first has ichFirst=00h and has ifnt pointing to the FONT record for the label. The second has ichFirst=cbText and contains no other useful information. The TXORUNS structure is shown in the following table.

Offset	Name	Size	Contents
0	ichFirst	2	Index to the first character to which the formatting applies
2	ifnt	2	Index to the FONT record
4	(Reserved)	4	

List Box Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for list box objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for list box objects).
40	fls	1	Fill pattern (ignored for list box objects).
41	grbit	1	Option flags (ignored for list box objects).
42	icv	1	Index to the color palette for line color (fixed for list box objects).
43	lns	1	Line style (ignored for list box objects).
44	lnw	1	Line weight (ignored for list box objects).
45	fAuto	1	Bit 0 = 1 for list box objects.
46	frs	2	Frame style structure (ignored for list box objects).
48	(Reserved)	4	Reserved; must be 0 (zero).
52	iVal	2	Scroll bar position.
54	iMin	2	Scroll bar minimum value.
56	iMax	2	Scroll bar maximum value.
58	dInc	2	Amount to scroll when the arrow is clicked.
60	dPage	2	Amount to scroll when the scroll bar is clicked.
62	fHoriz	2	=1 if the scroll bar is horizontal.
64	dxScroll	2	Width of the scroll bar.
66	grbit	2	Option flags (shown LSB to MSB): (Reserved):3 Reserved; must be 0 (zero). fNo3d:1 = 1 if 3-D shading is off. (Reserved):12 Reserved; must be 0 (zero).
68	(Reserved)	18	Reserved; must be 0 (zero).
86	ifnt	2	Index to the FONT record for the list box.
88	(Reserved)	4	Reserved; must be 0 (zero).
92	cchName	1	Length of the name (null if no name).
93	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see “FMLA Structure”).
var	cbFmla2	2	Length of the FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see “FMLA Structure”).
var	cbFmla3	2	Length of the FMLA structure for input range (never null).

Offset	Name	Size	Contents
var	fmla3	var	FMLA structure for input range (see "FMLA Structure").
var	cLines	2	Number of elements in the list box (1-based).
var	iSel	2	Index of the selected item (1-based).
var	grbit	2	Option flags (shown LSB to MSB) - (Reserved): 2 -Reserved; must be 0 (zero). fValidIds:1 =1 -if idEdit is valid. fNo3d:1 =1 -if 3-D shading is off. WListSelType:2 -List box selection type: 0 = standard. 1 = multiselect. 2 = extended-select (Reserved):10 Reserved; must be 0 (zero).
var	idEdit	2	Object ID of the linked edit box, if the list box is part of a combination list-edit box. If idList=0, this is a simple list box.
var	rgbSel	var	Array of bytes, indicating which items are selected in a multiselect or extended-select list box. The number of elements in the array is equal to cLines. If an item is selected in the list box, the corresponding element in the array =1.

Option Button Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for option button objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for option button objects).
40	fls	1	Fill pattern (ignored for option button objects).
41	fAuto	1	(Ignored for option button objects).
42	icv	1	Index to the color palette for line color (fixed for option button objects).
43	lns	1	Line style (ignored for option button objects).
44	lnw	1	Line weight (ignored for option button objects).
45	fAuto	1	(Ignored for option button objects).
46	frs	2	Frame style structure (ignored for option button objects).
48	(Reserved)	10	Reserved; must be 0 (zero).
58	grbit	2	Option flags (see the following table).
60	(Reserved)	32	Reserved; must be 0 (zero).
92	cchName	1	Length of the name (null if no name).
93	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).

Offset	Name	Size	Contents
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbFmla2	2	Length of FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see "FMLA Structure").
var	cbText	2	Length of the object text (never null).
var	rgch	var	Object text; may contain a single padding byte at the end of the text for word-boundary alignment (cbText does not count this padding byte).
var	fChecked	2	=0 if the option button is not checked. =1 if the option button is checked.
var	accel	2	Accelerator key character.
var	accel2	2	Accelerator key character (East Asian versions only).
var	grbit	2	Option flags (shown LSB to MSB): fNo3d:1 =1 if 3-D shading is off. fBoxOnly:1 =1 if only the box is drawn. (Reserved):14 -Reserved; must be 0 (zero).
var	idRadNext	2	Object ID of the next option button in the group.
var	fFirstBtn	2	=1 if this option button is the first in the group.

The grbit field at byte 58 contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	7–0	FFh	(Reserved)	Reserved; must be 0 (zero)
1	0	01h	(unused)	
	1	02h	fLockText	=1 if the **Lock Text** option is on (**Format Object** dialog box, **Protection** tab)
	2	04h	fFuzzy	=1 if the object is selected (the broken border is displayed)
	7–3	F8h	(Reserved)	Reserved; must be 0 (zero)

Scroll Bar Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for scroll bar objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for scroll bar objects).
40	fls	1	Fill pattern (ignored for scroll bar objects).
41	grbit	1	Option flags (ignored for scroll bar objects).
42	icv	1	Index to the color palette for line color (fixed for scroll bar objects).

Offset	Name	Size	Contents
43	lns	1	Line style (ignored for scroll bar objects).
44	lnw	1	Line weight (ignored for scroll bar objects).
45	fAuto	1	Bit 0 = 1 for scroll bar objects.
46	frs	2	Frame style structure (ignored for scroll bar objects).
48	(Reserved)	4	Reserved; must be 0 (zero).
52	iVal	2	Scroll bar position.
54	iMin	2	Scroll bar minimum value.
56	iMax	2	Scroll bar maximum value.
58	dInc	2	Amount to scroll when the arrow is clicked.
60	dPage	2	Amount to scroll when the scroll bar is clicked.
62	fHoriz	2	=1 if the scroll bar is horizontal.
64	dxScroll	2	Width of the scroll bar.
66	grbit	2	Option flags (shown LSB to MSB): (Reserved):3 -Reserved; must be 0 (zero). fNo3d:1 =1 if 3-D shading is off. (Reserved):12 -Reserved; must be 0 (zero).
68	cchName	1	Length of the name (null if no name).
69	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbFmla2	2	Length of the FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see "FMLA Structure").

Spinner Object Fields

Offset	Name	Size	Contents
38	icvBack	1	Index to the color palette for background color (fixed for spinner objects).
39	icvFore	1	Index to the color palette for foreground color (fixed for spinner objects).
40	fls	1	Fill pattern (ignored for spinner objects).
41	grbit	1	Option flags (ignored for spinner objects).
42	icv	1	Index to the color palette for line color (fixed for spinner objects).
43	lns	1	Line style (ignored for spinner objects).
44	lnw	1	Line weight (ignored for spinner objects).
45	fAuto	1	Bit 0 = 1 for spinner objects.

Offset	Name	Size	Contents
46	frs	2	Frame style structure (ignored for spinner objects).
48	(Reserved)	4	Reserved; must be 0 (zero).
52	iVal	2	Spinner position.
54	iMin	2	Spinner minimum value.
56	iMax	2	Spinner maximum value.
58	dInc	2	Amount to scroll when the spinner is clicked.
60	(Reserved)	2	Reserved; must be 0 (zero).
62	fHoriz	2	=1 if the spinner is horizontal.
64	dxScroll	2	Width of the spinner.
66	grbit	2	Option flags (shown LSB to MSB): (Reserved):3 -Reserved; must be 0 (zero). fNo3d:1 =1 if 3-D shading is off. (Reserved):12 -Reserved; must be 0 (zero).
68	cchName	1	Length of the name (null if no name).
69	stName	var	Name (null if no name; may contain a padding byte to force word-boundary alignment).
var	cbFmla1	2	Length of the FMLA structure for the attached macro (never null).
var	fmla1	var	FMLA structure for the attached macro (see "FMLA Structure").
var	cbFmla2	2	Length of the FMLA structure for the cell link (never null).
var	fmla2	var	FMLA structure for the cell link (see "FMLA Structure").

OBJPROTECT: Objects Are Protected (63h)

The OBJPROTECT record stores an option from the Protection command.

Record Data

Offset	Name	Size	Contents
4	fLockObj	2	=1 if objects are protected

OBPROJ: Visual Basic Project (D3h)

The contents of this record are reserved.

Record Data

Offset	Name	Size	Contents
4	(Reserved)	var	

OLEDBCONN: OLE Database Connection (80Ah)

Introduced in Excel 9 (2000) this is a FRT record. It contains the connection information for an OLE database connection.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Ah
6	grbitFrt	2	FRT flags; must be zero
8	grbitConn	2	Connection flags; see following table
10	cst	2	Count of following ExtString records; these records will be concatenated together to make the connection string
12	(Reserved)	4	Reserved; must be zero
16	rgbFuture	var	Information from future versions of Excel

The grbitConn field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fPasswd	0= The connection password has been stripped 1= The password for the connection is present
1	0002h	fLocal	1= This is a local connection string
15-2	FFFCh	(Reserved)	Reserved; must be zero

OLESIZE: Size of OLE Object (DEh)

This record stores the size of an embedded OLE object (when Excel is a server).

Record Data

Offset	Name	Size	Contents
4	(Reserved)	2	
6	rwFirst	2	First row
8	rwLast	2	Last row
10	colFirst	1	First column
11	colLast	1	Last column

PALETTE: Color Palette Definition (92h)

The PALETTE record describes the colors selected in the **Options** dialog box, **Color** tab. Each rgch field contains 4 bytes: rgbRed, rgbGreen, rgbBlue, and an unused byte. The 3 color bytes correspond to the Red, Green, and Blue values in the **Color Picker** dialog box, and the unused byte is don't-care. The **Color Picker** dialog box appears when you click the **Modify** button on the **Color** tab. If the worksheet uses the default palette, the BIFF file does not contain the PALETTE record.

Record Data

Offset	Name	Size	Contents
4	ccv	2	Count of color values that follow
6	rgch	4	Color value of the first color in the palette
10	rgch	4	Color value of the second color in the palette
14	rgch	4	Color value of the third color in the palette

Offset	Name	Size	Contents
...	...	...	...
var	rgch	4	Color value of the last color (=ccv) in the palette

PANE: Number of Panes and Their Position (41h)

The PANE record describes the number and position of unfrozen panes in a window.

Record Data

Offset	Name	Size	Contents
4	x	2	Horizontal position of the split; 0 (zero) if none
6	y	2	Vertical position of the split; 0 (zero) if none
8	rwTop	2	Top row visible in the bottom pane
10	colLeft	2	Leftmost column visible in the right pane
12	pnnAct	2	Pane number of the active pane

The x and y fields contain the position of the vertical and horizontal splits, respectively, in units of 1/20th of a point. Either of these fields can be 0 (zero), indicating that the window is not split in the corresponding direction.

For a window with a horizontal split, the rwTop field is the topmost row visible in the bottom pane or panes. For a window with a vertical split, the colLeft field contains the leftmost column visible in the right pane or panes.

The pnnAct field indicates which pane is the active pane. The pnnAct field contains one of the following values:

0 = lower right
1 = upper right
2 = lower left
3 = upper left

If the window has frozen panes, as specified in the WINDOW2 record, x and y have special meaning. If there is a vertical split, x contains the number of columns visible in the top pane. If there is a horizontal split, y contains the number of rows visible in the left pane. Both types of splits can be present in a window, as in unfrozen panes.

PARAMQRY: Query Parameters (DCh)

This record contains query data.

Note: PARAMQRY has the same record number as SXEXT. This has no adverse ramifications in a BIFF file because PARAMQRY always occurs in conjunction with an SXEXT record.

Record Data — BIFF8

Offset	Name	Size	Contents
4	wTypeSql	2	Used for ODBC queries; the parameter SQL type
6	flags	2	Option flags; see following table

Offset	Name	Size	Contents
8	grbit	2	If pbt=1 then this value indicates what type of value is in rgb: 0001h = an IEEE number 0002h = a variable-length Unicode string 0004h = a Boolean but the value is stored in fVal rather than rgb 0800h = an integer
10	fVal	2	A true/false value if pbt=2 and the parameter is a Boolean
12	rgb	var	if pbt=0, prompt string as a Unicode string if pbt=1, refer to grbit if pbt=2, reference as parsed expression

The flags field contains the following option flags:

Bits	Mask	Name	Contents
1–0	0003h	pbt	Parameter binding type: =0 Prompt type (example, "Please enter a date") =1 Fixed value type (example, 10, "MSFT", 01/06/97, and so on) =2 Reference type (example, "=Sheet2!$A$5")
2	0004h	fAuto	=1 for automatic parameters
3	0008h	fNonDefaultName	=0 then program prompts for the name
15–4	FFF0h	(Reserved)	Reserved; must be 0 (zero)

PASSWORD: Protection Password (13h)

The PASSWORD record contains the encrypted password for a protected sheet or workbook (see Office Open XML specification (Ecma Internation Standard 376) for further details). **Note**: this record specifies a sheet-level or workbook-level protection password, as opposed to the FILEPASS record, which specifies a file password.

Record Data

Offset	Name	Size	Contents
4	wPassword	2	Encrypted password

PLS: Environment-Specific Print Record (4Dh)

The PLS record saves printer settings and printer driver information.

Record Data, Macintosh

Offset	Name	Size	Contents
4	wEnv	2	Operating environment: 0= Microsoft Windows 1= Apple Macintosh
6	rgb	var	TPrint structure (for more information about this structure, see *Inside Macintosh, Volume II,* page 149).

Record Data, Windows

Offset	Name	Size	Contents
4	wEnv	2	Operating environment: 0= Microsoft Windows 1= Apple Macintosh
6	rgb	var	DEVMODE structure (for more information about this structure, see the documentation for the Microsoft Windows Software Development Kit).

PLV: Page Layout View in Mac Excel 11 (8c8h)

This is a Mac Excel FRT record. It stores the information for Page Layout View in MacExcel 11.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =08c5h
6	grbitFrt	2	FRT flags; must be zero
8	grbitFlags	1	Flags
9	wscale	4	

The grbitFlags field contains the following option flags:

Bits	Mask	Name	Contents[i]
0	01h	fPLVMove	1=
1	02h	fOnePage	1=
2	03h	fRuler	1=
3	04h	fPrintScaleNotSheetScale	1=
7-4	F0h	(reserved)	Reserved; must be zero

PLV: Page Layout View Settings in Excel 2007 (88Bh)

This record stores data associated with the preceding worksheet's page layout view.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Bh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	wScalePLV	2	Zoom scale for the worksheet, =100 if zoom is 100%; 2-byte unsigned integer value
18	grbit	2	Page layout view flags (see below for details)

The grbit field contains the following page layout view flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fPageLayoutView	=1 if the worksheet is in the page layout view

1	0002h	fRulerVisible	=1 if the ruler is visible
2	0004h	fWhitespaceHidden	=1 if margins between pages are hidden in the page layout view
3-15	FFF8h	(Reserved)	Currently not used, and set to 0

PRECISION: Precision (0Eh)

The PRECISION record stores the **Precision As Displayed** option from the **Options** dialog box, **Calculation** tab.

Record Data

Offset	Name	Size	Contents
4	fFullPrec	2	=0 if **Precision As Displayed** option is selected

PRINTGRIDLINES: Print Gridlines Flag (2Bh)

This record stores the **Gridlines** option from the **Page Setup** dialog box, **Sheet** tab.

Record Data

Offset	Name	Size	Contents
4	fPrintGrid	2	=1 to print gridlines

PRINTHEADERS: Print Row/Column Labels (2Ah)

The PRINT HEADERS record stores the **Row And Column Headings** option from the **Page Setup** dialog box, **Sheet** tab.

Record Data

Offset	Name	Size	Contents
4	fPrintRwCol	2	=1 to print row and column headings

PROTECT: Protection Flag (12h)

The PROTECT record stores the protection state for a sheet or workbook.

Record Data

Offset	Name	Size	Contents
4	fLock	2	=1 if the sheet or workbook is protected

PROT4REV: Shared Workbook Protection Flag (1AFh)

The PROT4REV record stores a shared-workbook protection flag.

Record Data — BIFF8

Offset	Name	Size	Contents
4	fRevLock	2	=1 if the **Sharing with Track Changes** option is on (**Protect Shared Workbook** dialog box)

PROT4REVPASS: Shared Workbook Protection Password (1BCh)

The PROT4REV record stores an encrypted password for shared-workbook protection.

Record Data — BIFF8

Offset	Name	Size	Contents
4	wRevPass	2	Encrypted password (if this field is 0 (zero), there is no Shared Workbook Protection Password; the password is entered in the **Protect Shared Workbook** dialog box)

PUB: Publisher (89h)

The PUB record contains information about the publisher/subscriber feature. This record can be created only by Microsoft Excel for the Macintosh. However, if Excel for any other operating environment encounters the PUB record in a BIFF file, it leaves the record in the file, unchanged, when the file is saved.

Record Data

Offset	Name	Size	Contents
4	grbit	2	Option flags
6	ref	6	Reference structure describing the published area on the worksheet
12	sec	36	Section record associated with the published area
48	rgbAlias	var	Contents of the alias pointed to by the section record

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	fAprPrinted	=1 if the published appearance is shown when printed
	1	02h	fSizPrinted	=1 if the published size is shown when printed
	7–2	FCh	(unused)	
1	7–0	FFh	(unused)	

QSI: External Data Range (1ADh)

This record stores an external data range.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit	2	Option flags; see following table.
6	itblAutoFmt	2	Index to autoformat table.
8	grbitAtrAutoFmt	2	Low-order 6 bits contain autoformat attribute flag bits; the high-order 10 bits are reserved.
10	(Reserved)	4	Reserved; must be 0 (zero).
14	cchName	1	Length of name.

15	rgchName	var	Name string.

The grbit field contains the option flags listed in the following table.

Bits	Mask	Name	Contents
0	0001h	fTitles	=1 if the range contains titles
1	0002h	fRowNums	=1 if the range uses row numbers
2	0004h	fDisableRefresh	=1 if refresh is disabled
3	0008h	fAsync	=1 if the records are to be retrieved in the background
4	0010h	fNewAsync	=1 if this is the first query of a new external data range and the records are to be retrieved in the background
5	0020h	fRefreshOnLoad	=1 if this range should be refreshed every time the file is loaded
6	0040h	fGrowShrink	=1 if cells are inserted and deleted as the number of rows and columns grows and shrinks during external data range refresh
7	0080h	fFill	=1 if the range has a fill applied
8	0100h	fAutoFormat	=1 if the range has an autoformat applied
9	0200h	fSaveData	=0 if the range's cell data is saved as blank cells =1 if the range's cell data is saved
10	0400h	fDisableEdit	=1 if the cells are locked for editing
12-11	1800h	(Reserved)	Reserved; must be 0 (zero)
13	2000h	fOverwrite	=1 if cells are overwritten and cleared as the number of rows and columns grows and shrinks during external data range refresh
15–14	C000h	(Reserved)	Reserved; must be 0 (zero)

QSIF: Query Table Field Formatting (807h)

Introduced in Excel 9 (2000) this is a FRT record. It stores the information for formatting the individual fields of a Query Table. A set of QSIF records immediately follows the QSIR record.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0807h
6	grbitFrt	2	FRT flags; must be zero
8	grbit	4	Union of flags; see table
12	idField	4	ID number of the query table field; this is a unique identification tag

16	rgbEx	var	Bytes reserved for extra information to be written by future versions of Excel; the size of this field is determined by cbQsifSaved in the parent QSIR record
var	rgbTitle	var	Unicode string; this is the name of the field

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fUserIns	1= This column was inserted into the Query Table and is not in the query
	1	0002h	fFillDown	1= The formula in this column should be filled down/deleted up on a refresh
	2	0004h	fSortDes	1= If sorted on this field, this field should be sorted in descending order
	10-3	07F8h	iSortKey	Sort order 0= Not sorted on this field 1= This field is the first sort key 2= This field is the second sort key 3= This field is the third sort key
	11	0800h	fRowNums	1= This column contains the row numbers for the returned records
	12	1000h	(Reserved)	Reserved; must be zero
	13	2000h	fSorted	1= This column is included in the sort range
	15-14	C000h	(Reserved)	Reserved; must be zero
2	0	0001h	fClipped	1= This column falls outside the worksheet range
	15-1	FFFEh	(Reserved)	Reserved; must be zero

QSIR: Query Table Formatting (806h)

Introduced in Excel 9 (2000) this is a FRT record. It stores the formatting information for a Query Table. This record is followed immediately by a set of QSIF records.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0806h
6	grbitFrt	2	FRT flags; bitfFrtRef must be set to 1; see FRT Record Description
8	REF	8	REF structure; see FRT Record Description
16	cbQsirSaved	2	Number of bytes in the QSIR structure as saved (starting with the grbit field and ending with the rgbEx field, inclusive)

Offset	Name	Size	Contents
18	cbQsifSaved	2	Number of bytes in each QSIF structure as saved (starting with the grbit field and ending with the rgbEx field, inclusive)
20	grbit	4	Query table flags; see table
24	iSortCustom	4	ID of custom sort order applied
28	cQsif	4	Count of QSIF structures; these records immediately follow the QSIR record
32	cpstDeleted	4	Count of strings; these are the columns that are in the database query but have been removed from the query table; stored in the rgbTitle array, below
36	idFieldNext	4	First ID number available for assignment to a newly-created QSIF structure
40	ccolExtraLeft	2	Columns to the left of the Query Table that are to be sorted with the Query Table
42	ccolExtraRight	2	Columns to the right of the Query Table that are to be sorted with the Query Table
44	idList	4	XL11: Table ID if linked to a Table
48	rgbEx	var	Bytes reserved for extra information to be written by future versions of Excel; the size of this field is determined by cbQsirSaved
var	rgbTitle	var	Unicode strings; these are the names of the database fields that have been removed from the Query Table

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fPersist	0= Restore original field order and formatting on refresh 1= Keep user's formatting and field order changes when refreshing
	1	0002h	fPersistSort	0= Restore data to original order on refresh 1= Apply sort to data on refresh
	2	0004h	fPersistAutofilter	0= Unapply autofilter on refresh 1= Keep autofilter on refresh
	15-3	FFF8h	(Reserved)	Reserved; must be zero
2	3-0	000Fh	(Reserved)	Reserved; must be zero
	4	0010h	fSorted	1= A sort has been applied to the Query Table
	5	0020h	fCaseSensSort	1= Sort is case-sensitive

Offset	Bits	Mask	Name	Contents
	6	0040h	fHdrRowSort	1= Query Table sort accounted for a header row
	7	0080h	fidWrapped	1= id numbers of Qsif structures has wrapped around the upper bound; Excel will have to check for duplicate ids
	8	0100h	(Reserved)	Reserved; must be zero
	9	0200h	fTitlesOld	1= The Query Table had titles last time it was refreshed
	14-10	7C00h	wVersionBeforeRefreshAlert	Used as a 5-bit integer to indicate the latest version of Excel that needs to give a warning alert on refresh
	15	8000h	(Reserved)	Reserved; must be zero

Note the flags fPersist, fPersistSort, fPersistAutofilter, and fMapFields must have the same value.

QSISXTAG: Pivot Table and Query Table Extensions (802h)

Introduced in Excel 9 (2000) this is a FRT record. It stores extra information for Query Tables and Pivot Tables.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0802h
6	grbitFrt	2	FRT flags; must be zero
8	fSx	2	=0 if the record is for a Query Table =1 if the record is for a Pivot Table
10	grbit	2	General options; see following table
12	dwQsiFuture	4	Feature-specific options; see following table
16	VerSxLastUpdated	1	Version of Excel that last refreshed the Pivot Table – only used in the Pivot Table case otherwise must be zero; =0 if Excel 2000 =1 if Excel XP =2 if Excel 2003 =3 if Office Excel 2007
17	VerSxUpdateableMin	1	Version of Excel that last refreshed the Pivot Table (see values for VerSxLastUpdated) – only used in the Pivot Table case otherwise must be zero
18	obCchName	1	Offset in bytes from beginning of FRT to beginning of cchName

19	bVerRtqsisxtag	1	Version of Excel that first created the PivotTable or Query Table
20	stName	var	name of the Pivot Table or Query Table (full Unicode string)

The grbit field contains the following general option flags:

Bits	Mask	Name	Contents
0	0001h	fEnableRefresh	0= the table can be refreshed if the setting in the SXDB record or in the QSI record is enabled 1= the table can be refreshed, regardless of the setting in the SXDB or QSI record
1	0002h	fInvalid	This overrides the setting in the SXDB record (which should be 0 when QSISXTAG exists) 1= PivotTable cache is invalid
2	0004h	fTensorEx	XL9: 1= This is an OLAP PivotTable report; expect a SXVIEWEX record to follow
15-3	FFF8h	(Reserved)	Reserved; must be zero

If the record is for a Query Table, the dwQsiFuture field contains the following feature-specific option flags:

Bits	Mask	Name	Contents
0	0001h	fPreserveFormat	1= Keep formatting that has been applied by the user
1	0002h	fAutoFit	1= Auto Fit the columns after refresh
15-2	FFFCh	(Reserved)	Reserved; must be zero

If the record is for a Pivot Table, the dwQsiFuture field contains the following feature-specific option flags:

Bits	Mask	Name	Contents
0	0001h	fNoStencil	1= Do not draw large drop zones for PivotTable report if it has no data fields
1	0002h	fHideTotAnnotation	XL9: 1= Suppress the asterisk for the total in an OLAP PivotTable
2	0004h	(Reserved)	
3	0008h	fIncludeEmptyRw	XL10: 1= Retrieve and show empty rows from the OLAP data source in the Pivot Table view
4	0010h	fIncludeEmptyCol	XL11: 1= Retrieve and show empty columns from the OLAP data source in the Pivot Table view
15-5	FFFCh	(Reserved)	

REALTIMEDATA: Real-Time Data (RTD) (813h)

Introduced in Excel 10 (2002) this BIFF record is an FRT record. There is one REALTIMEDATA record for each RTD (real-time data) topic in the workbook. Each REALTIMEDATA record contains topic name, variant RTD data (RTDOPER), and an array of RTDE structures describing the set of cells associated with it. If necessary, this record may continue with one or more CONTINUEFRT records following it.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0813h
6	grbitFrt	2	FRT flags; must be zero
8	ichSamePrefix	4	Number of leading characters in common with the previous Topic string (implicitly understood, and not to be repeated in this record); basically the length of any common prefix between the Topic of this record and the Topic of the previous REALTIMEDATA record. Zero if there is no prefix in common, or if this is the first REALTIMEDATA record.
12	cchTopic	4	Count of characters in the Topic string, not including the implicit prefix if ichSamePrefix is greater than zero.
16	rgchTopic	var	Topic string, not including the implicit prefix, if any. May be encoded as a compressed or uncompressed Unicode string. (See section titled 'Unicode Strings in Biff8' for more information about these encodings.)
var	RTDOPER	var	RTDOPER contains variant type and data of RTD data (similar to but not identical to OPER structure used elsewhere)
var	rgRTDE	var	Variable-length array of RTDE structures, describing the set of cells associated with the RTD topic. Each RTDE contains row, column, and sheet tab index. Length of array determined by record size of this record and any CONTINUEFRT records.

The RTDOPER structure can be one of the following formats:

RTDOPER Structure Which Contains a Number

Offset	Name	Size	Contents
0	grbit	2	=0001h for variant RTD data which contains a number
2	num	8	IEEE floating-point number

RTDOPER Structure Which Contains a String

Offset	Name	Size	Contents
0	grbit	2	=0002h or 1000h for variant RTD data which contains a string
2	cch	4	Number of characters in the string rgch

6	rgch	var	String (See section titled Unicode Strings in Biff8)

RTDOPER Structure Which Contains a Boolean Value

Offset	Name	Size	Contents
0	grbit	2	=0004h for variant RTD data which contains a Boolean value
2	f	4	=1 if TRUE =0 if FALSE

RTDOPER Structure Which Contains an Error Value

Offset	Name	Size	Contents
0	grbit	2	=0010h for variant RTD data which contains an error value
2	err	4	Error value

RTDOPER Structure Which Contains an Integer

Offset	Name	Size	Contents
0	grbit	2	=0800h for variant RTD data which contains an integer
2	w	4	32-bit signed integer

RTDE Structure

Offset	Name	Size	Contents
0	rw	2	Row
2	col	2	Column
4	Itab	2	Sheet tab index

RECALCID: Recalc Information (1C1h)

This record stores the recalc ID of the version of Excel that last recalculated the file. Any application other than Excel that edits the file should not write out this record.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type repeated; 1C1h
6	(Reserved)	2	Reserved; must be zero
8	dwBuild	4	Recalc engine ID

RECIPNAME: Recipient Name (B9h)

This record stores recipient information about a routing slip.

Record Data

Offset	Name	Size	Contents
4	cchRecip	2	Length of the recipient's friendly name string
6	ulEIDSize	4	Length of recipient's system-specific address string
10	rgchFriendly	var	recipient's friendly name (null-terminated)
var	rgchSSAddr	var	recipient's system-specific address (null-terminated)

REFMODE: Reference Mode (0Fh)

The REFMODE record stores the **Reference Style** option from the **Options** dialog box, **General** tab.

Record Data

Offset	Name	Size	Contents
4	fRefA1	2	Reference mode: =1 for A1 mode =0 for R1C1 mode

REFRESHALL: Refresh Flag (1B7h)

This record stores an option flag.

Record Data — BIFF8

Offset	Name	Size	Contents
4	fRefreshAll	2	=1 then Refresh All should be done on all external data ranges and PivotTables when loading the workbook (the default is =0)

RIGHTMARGIN: Right Margin Measurement (27h)

The RIGHTMARGIN record specifies the right margin in inches. The num field is in 8-byte IEEE floating-point format.

Record Data

Offset	Name	Size	Contents
4	num	8	Right margin

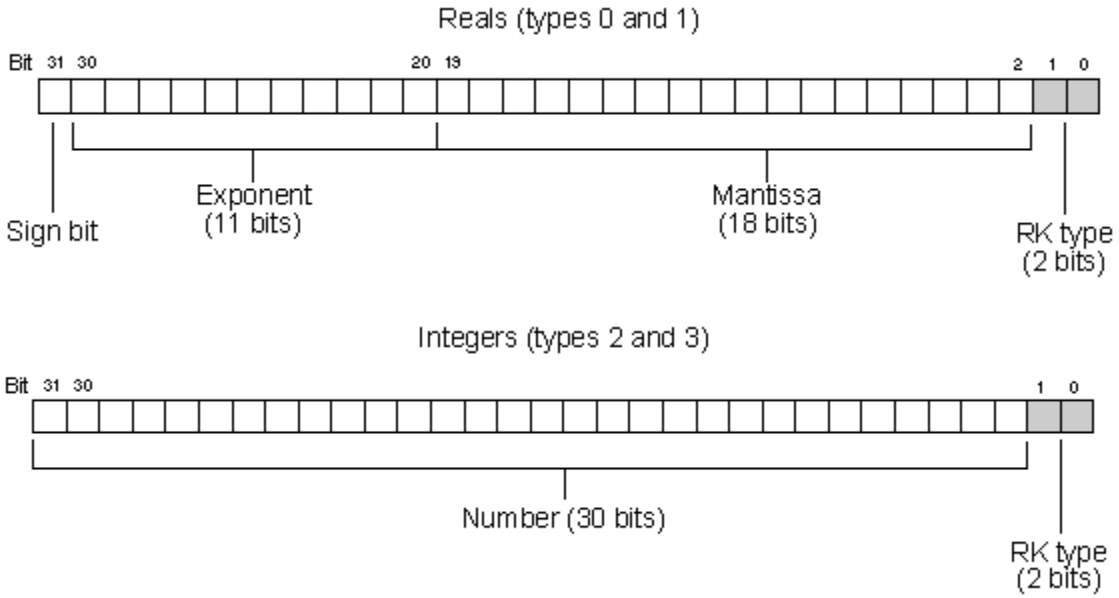
RK: Cell Value, RK Number (7Eh)

Excel uses an internal number type, called an RK number, to save memory and disk space.

Record Data

Offset	Name	Size	Contents
4	rw	2	Row number
6	col	2	Column number
8	ixfe	2	Index to the XF record that contains the cell format
10	rk	4	RK number (see the following description)

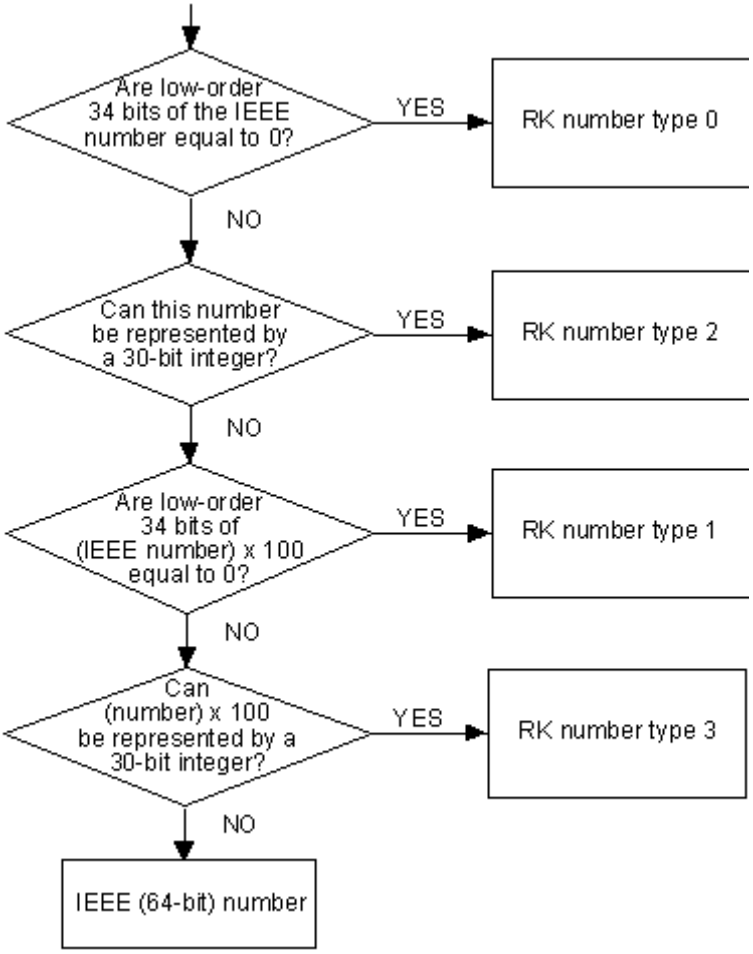
An RK number is either a 30-bit integer or the most significant 30 bits of an IEEE number. The two LSBs of the 32-bit rk field are always reserved for RK type encoding; this is why the RK numbers are 30 bits, not the full 32. See the following diagram.



There are four different RK number types, as described in the following table.

RK type	Encode priority	Number (decimal)	RK number (hex)	Description of 30-bit encoding
0	1	1	3F F0 00 00	IEEE number
1	3	1.23	40 5E C0 01	IEEE number x 100
2	2	12345678	02 F1 85 3A	Integer
3	4	123456.78	02 F1 85 3B	Integer x 100

Excel always attempts to store a number as an RK number instead of an IEEE number. There is also a specific priority of RK number encoding that the program uses. The following flowchart is a simplified version of the encoding algorithm. The algorithm always begins with an IEEE (full 64-bit) number.



You can use the following C code to demonstrate how to decode RK numbers:

```
double NumFromRk(long rk)
      {
      double num;
      if(rk & 0x02)
            {
            // int
            num = (double) (rk >> 2);
            }
      else
            {
            // hi words of IEEE num
            *((long *)&num+1) = rk & 0xfffffffc;
            *((long *)&num) = 0;
            }
      if(rk & 0x01)
            // divide by 100
            num /= 100;
      return num;
      }
main()
      {
```

```
    printf("%f\n", NumFromRk (0x02f1853b));
    }
```

If you write a NUMBER record to a BIFF file, Excel may convert the number to an RK number when it reads the file.

ROW: Describes a Row (208h)

A ROW record describes a single row on an Excel sheet. ROW records and their associated cell records occur in blocks of up to 32 rows. Each block ends with a DBCELL record. For more information about row blocks and about optimizing your code when searching for cell records, see "Finding Cell Records in BIFF Files".

Record Data

Offset	Name	Size	Contents
4	rw	2	Row number.
6	colMic	2	First defined column in the row.
8	colMac	2	Last defined column in the row, plus 1.
10	miyRw	2	Row height.
12	irwMac	2	Used by Excel to optimize loading the file; if you are creating a BIFF file, set irwMac to 0.
14	(Reserved)	2	
16	grbit	2	Option flags.
18	ixfe	2	If fGhostDirty=1 (see grbit field), this is the index to the XF record for the row. Otherwise, this field is undefined. **Note**: ixfe uses only the low-order 12 bits of the field (bits 11–0). Bit 12 is fExAsc, bit 13 is fExDsc, and bits 14 and 15 are reserved. fExAsc and fExDsc are set to true if the row has a thick border on top or on bottom, respectively.

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	2–0	07h	iOutLevel	Outline level of the row
	3	08h	(Reserved)	
	4	10h	fCollapsed	=1 if the row is collapsed in outlining
	5	20h	fDyZero	=1 if the row height is set to 0 (zero)
0	6	40h	fUnsynced	=1 if the font height and row height are not compatible
	7	80h	fGhostDirty	=1 if the row has been formatted, even if it contains all blank cells
1	7–0	FFh	(Reserved)	

The rw field contains the 0-based row number. The colMic and colMac fields give the range of defined columns in the row.

The miyRw field contains the row height, in units of 1/20th of a point. The miyRw field may have the 8000h (2^{15}) bit set, indicating that the row is standard height. The low-order 15 bits must still contain the row height. If you hide the row — either by setting row height to 0 (zero) or by using the **Hide** command — miyRw still contains the original row height. This allows Excel to restore the original row height when you click the **Unhide** button.

Each row can have default cell attributes that control the format of all undefined cells in the row. By specifying default cell attributes for a particular row, you are effectively formatting all the undefined cells in the row without using memory for those cells. Default cell attributes do not affect the formats of cells that are explicitly defined.

For example, if you want all of row 3 to be left-aligned, you could define all 256 cells in the row and specify that each individual cell be left-aligned. This would require storage for each of the 256 cells. An easy alternative would be to set the default cell for row 3 to be left-aligned and not define any individual cells in row 3.

RSTRING: Cell with Character Formatting (D6h)

When part of a string in a cell has character formatting, an RSTRING record is written instead of the LABEL record. The RSTRING record is obsolete in BIFF8, replaced by the LABELSST and SST records.

Record Data

Offset	Name	Size	Contents
4	rw	2	Row
6	col	2	Column
8	ixfe	2	Index to the XF record
10	cch	2	Length of the string
12	rgch	var	String
var	cruns	1	Count of STRUN structures
var	rgstrun	var	Array of STRUN structures

The STRUN structure contains formatting information about the string. A STRUN structure occurs every time the text formatting changes. The STRUN structure is described in the following table.

Offset	Name	Size	Contents
0	ich	1	Index to the first character to which the formatting applies
1	ifnt	1	Index to the FONT record

SAVERECALC: Recalculate Before Save (5Fh)

If the **Recalculate Before Save** option is selected in the **Options** dialog box, **Calculation** tab, then fSaveRecalc=1.

Record Data

Offset	Name	Size	Contents
4	fSaveRecalc	2	=1 to recalculate before saving

SCENARIO: Scenario Data (AFh)

This record stores information about an individual scenario.

Record Data

Offset	Name	Size	Contents
4	cref	2	Number of changing cells
6	fLocked	1	=1 if the scenario is locked for changes
7	fHidden	1	=1 if the scenario is hidden
8	cchName	1	Length of the name
9	cchComment	1	Length of the comment
10	cchNameUser	1	Length of the user name
11	rgchName	var	scenario name string (grbit/rgb fields only of unicode string)
	rgchNameUser	var	user name full unicode string
	rgchComment	var	comment full unicode string
var	rgRef	var	Array of cref cell references that contains changing cells (see text)
var	rgst	var	Array of cref byte-counted strings that contains changing cell values (see text)
var	rgIfmt	var	Array of cref ifmt integers (see text)

The changing cells for the scenario are stored in the three arrays at the end of the record. The rgRef array contains the cell addresses, as shown in the following table.

Offset	Name	Size	Contents
0	rw	2	Row number (0-based)
2	col	2	Column number (0-based)

In BIFF8, the cell values are always stored as an array of unicode strings.

In BIFF7, the cell values are always stored as an array of byte-counted strings, as shown in the following table.

Offset	Name	Size	Contents
0	cch	1	Length of the string
1	rgch	var	String

Finally, the cell number format indexes (ifmt) are stored as an array of 2-byte integers, following the array of cell value strings. These are stored only when the scenario contains cells with date/time number formats. If the cells contain any other number format, the rgIfmt contains 0's (zeros).

SCENMAN: Scenario Output Data (AEh)

This record stores the general information about the set of scenarios on a worksheet.

Record Data

Offset	Name	Size	Contents
4	csct	2	Number of scenarios
6	isctCur	2	Index of the current scenario

8	isctShown	2	Index of the last displayed scenario
10	irefRslt	2	Number of reference areas in the following scenario result array
12	rgref	var	Scenario result array (see the following table)

Each reference area in the scenario result array contains the fields listed in the following table.

Offset	Name	Size	Contents
0	rwFirst	2	First row
2	rwLast	2	Last row
4	colFirst	1	First column
5	colLast	1	Last column

SCENPROTECT: Scenario Protection (DDh)

This record stores the scenario protection flag.

Record Data

Offset	Name	Size	Contents
4	fScenProtect	2	=1 if scenarios are protected

SCL: Window Zoom Magnification (A0h)

This record stores the window zoom magnification.

Record Data

Offset	Name	Size	Contents
4	nscl	2	Numerator of a reduced fraction
6	dscl	2	Denominator of a reduced fraction

The magnification is stored as a reduced fraction. For example, if the magnification is 75 percent, nscl=03h and dscl=04h (3/4 = 0.75 = 75%). If the magnification is 11 percent, nscl=0Bh (11 decimal) and dscl=64h (100 decimal). If the BIFF file does not contain the SCL record, the magnification is 100 percent.

SELECTION: Current Selection (1Dh)

The SELECTION record stores the selection.

Record Data

Offset	Name	Size	Contents
4	pnn	1	Number of the pane described
5	rwAct	2	Row number of the active cell
7	colAct	2	Column number of the active cell
9	irefAct	2	ref number of the active cell
11	cref	2	Number of refs in the selection
13	rgref	var	Array of refs

The pnn field indicates which pane is described. It contains one of the following values:

0 = lower right
1 = upper right
2 = lower left
3 = upper left

For a window that has no splits, the pnn field =3.

The rwAct and colAct fields specify the active cell.

The irefAct field is a 0-based index into the array of ref structures (refs), specifying which ref contains the active cell. The rgref is an array because it is possible to create a multiple selection. In the case of a multiple selection, each selection is described by a ref, including the active cell (even if it is included in one of the other selections).

The selection (of cells) is described by the rgref array. The number of refs in the rgref field is equal to cref. Each ref in the array is 6 bytes long and contains the fields listed in the following table.

Offset	Name	Size	Contents
0	rwFirst	2	First row in the reference
2	rwLast	2	Last row in the reference
4	colFirst	1	First column in the reference
5	colLast	1	Last column in the reference

If a selection is so large that it exceeds the maximum BIFF record size, it is parsed into multiple consecutive SELECTION records. Each record contains a portion of the larger selection. Only the cref and rgref fields vary in the multiple records; the pnn, rwAct, colAct, and irefAct fields are the same across all records in the group.

SETUP: Page Setup (A1h)

The SETUP record stores options and measurements from the **Page Setup** dialog box.

Record Data

Offset	Name	Size	Contents
4	iPaperSize	2	Paper size (see fNoPls in the following table)
6	iScale	2	Scaling factor (see fNoPls in the following table)
8	iPageStart	2	Starting page number
10	iFitWidth	2	Fit to width; number of pages
12	iFitHeight	2	Fit to height; number of pages
14	grbit	2	Option flags (see the following table)
16	iRes	2	Print resolution (see fNoPls in the following table)
18	iVRes	2	Vertical print resolution (see fNoPls in the following table)
20	numHdr	8	Header margin (IEEE number)
28	numFtr	8	Footer margin (IEEE number)
36	iCopies	2	Number of copies (see fNoPls in the following table)

The grbit field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fLeftToRight	Print over, and then down.
1	0002h	fLandscape	=0, Landscape mode =1, Portrait mode (see fNoPls below).
2	0004h	fNoPls	=1, then the iPaperSize, iScale, iRes, iVRes, iCopies, and fLandscape data were not obtained from the printer, so they are not valid.
3	0008h	fNoColor	=1, print black and white.
4	0010h	fDraft	=1, print draft quality.
5	0020h	fNotes	=1, print notes.
6	0040h	fNoOrient	=1, orientation not set.
7	0080h	fUsePage	=1, use custom starting page number instead of Auto.
8	0100h	(Reserved)	
9	0200h	fEndNotes	XL9: =1, print cell notes at end of document (if fNotes=1)
11-10	0C00h	iErrors	XL10: =0, display errors as on sheet =1, display errors as blank =0, display errors as --- (dashes) =0, display errors as #N/A
15–12	F000h	(unused)	

SHEETEXT: Extra Sheet Info (862h)

Introduced in Excel 10 (2002) this record is an FRT record. This record is for worksheet-specific data that is new for Excel 10 (2002), and is currently only used to store colored sheet tab information, if any.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0862h
6	grbitFrt	2	FRT flags; must be zero
8	(unused)	8	Reserved; must be zero
16	cb	4	=14h (Record size minus 4); may be larger in the future
20	rgbShxData	4	Colored tab info and reserved bits; may be larger in future; see the following description

The rgbShxData field contains the following option flags:

Bits	Mask	Name	Contents
6-0	0000007Fh	icv	Index to the color palette for the colored sheet tab for this worksheet.
31-7	FFFFFF80h	(Reserved)	Reserved; must be zero

SHRFMLA: Shared Formula (BCh)

The SHRFMLA record is a file size optimization. It is used with the FORMULA record to compress the amount of storage required for the parsed expression (rgce). In earlier versions of Excel, if you read a FORMULA record in which the rgce field contained a ptgExp parse token, the FORMULA record contained an array formula. In Excel 5.0 and later, this could indicate either an array formula or a shared formula.

If the record following the FORMULA is an ARRAY record, the FORMULA record contains an array formula. If the record following the FORMULA is a SHRFMLA record, the FORMULA record contains a shared formula. You can also test the fShrFmla bit in the FORMULA record's grbit field to determine this.

When reading a file, you must convert the FORMULA and SHRFMLA records to an equivalent FORMULA record if you plan to use the parsed expression. To do this, take all of the FORMULA record up to (but not including) the cce field, and then append to that the SHRFMLA record from its cce field to the end. You must then convert some ptgs; this is explained later in this article.

Following the SHRFMLA record are one or more FORMULA records containing ptgExp tokens that have the same rwFirst and colFirst fields as those in the ptgExp in the first FORMULA. There is only one SHRFMLA record for each shared-formula record group.

To convert the ptgs, search the rgce field from the SHRFMLA record for any ptgRefN, ptgRefNV, ptgRefNA, ptgAreaN, ptgAreaNV, or ptgAreaNA tokens. Add the corresponding FORMULA record's rw and col fields to the rwFirst and colFirst fields in the ptgs from the SHRFMLA. Finally, convert the ptgs as shown in the following table.

Convert this ptg	To this ptg
ptgRefN	ptgRef
ptgRefNV	ptgRefV
ptgRefNA	ptgRefA
ptgAreaN	ptgArea
ptgAreaNV	ptgAreaV
ptgAreaNA	ptgAreaA

For more information about ptgs and parsed expressions, see "Microsoft Excel Formulas".

Remember that STRING records can appear after FORMULA records if the formula evaluates to a string.

If your code writes a BIFF file, always write standard FORMULA records; do not attempt to use the SHRFMLA optimization.

Record Data

Offset	Name	Size	Contents
4	rwFirst	2	First row
6	rwLast	2	Last row
8	colFirst	1	First column
9	colLast	1	Last column
10	(Reserved)	2	
12	cce	2	Length of the parsed expression
14	rgce	var	Parsed expression

SORT: Sorting Options (90h)

This record stores options from the **Sort** and **Sort Options** dialog boxes.

Record Data

Offset	Name	Size	Contents
4	grbit	2	Option flags
6	cchKey1	1	Length of the string for sort key 1
7	cchKey2	1	Length of the string for sort key 2
8	cchKey3	1	Length of the string for sort key 3
9	rgchKey1	var	String for sort key 1
var	rgchKey2	var	String for sort key 2
var	rgchKey3	var	String for sort key 3

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fCol	=1 if the **Sort Left To Right** option is on.
	1	0002h	fKey1Dsc	=1 if key 1 sorts in descending order.
	2	0004h	fKey2Dsc	=1 if key 2 sorts in descending order.
	3	0008h	fKey3Dsc	=1 if key 3 sorts in descending order.
	4	0010h	fCaseSensitive	=1 if the sort is case-sensitive.
	9 – 5	03E0h	iOrder	Index to the table in the **First Key Sort Order** option. The Normal sort order corresponds to iOrder=0.
	10	0400h	fAltMethod	Used only in East Asian versions of Excel.
	15–11	F800h	(Reserved)	

SORTDATA12: Sort Data 12 (895h)

The SORTDATA12 record stores sort related information added in Office Excel 2007.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0895h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitSort	2	see text
18	rwFirst	4	First row of cell range to sort
22	rwLast	4	Last row of cell range to sort
26	colFirst	4	First column of cell range to sort
30	colLast	4	Last column of cell range to sort
34	cconditions	4	count of sort conditions
38	idParent	8	the parent's ID if the sort field parent is a list object or a query table.

The grbitSort field contains information about the sort data's parent object type and sort options. This information is described in the following table:

Bits	Mask	Name	Contents
0	0001h	fCol	=0 sort by columns; =1 sort by rows
1	0002h	fCaseSensitive	=1 use case sensitive sort
2	0004h	fAltMethod	=1 don't use phonetic info when sorting (available in East Asian versions)
3..6	0038h	sfp	sort fields parent type; see table below
7..15	FFC0h	(Reserved)	

sfp values:

sfp	Value	Comments
sfpWorksheet	0	Sort data is used for a worksheet sort
sfpListObject	1	Sort data is used for a Table sort
sfpAutoFilter	2	Sort data is used for AutoFilter sort
sfpQueryTable	3	Sort data is used for QueryTable sort

The SORTDATA12 record will be followed by one CONTINUEFRT12 record for each sort condition. The continue record has the following format:

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087fh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitSortCondition	2	see text below

18	rwFirst	4	first row of condition's sort range
22	rwLast	4	last row of condition's sort range
26	colFirst	4	first column of condition's sort range
30	colLast	4	last column of condition's sort range
34	dwCondData	8	see text
42	cchSslist	4	length of custom sort list string
46	rgchSslist	var	custom sort list string

The grbitSortCondition field contains information about the sort data's parent object type and sort options. This information is described in the following table:

Bits	Mask	Name	Contents
0	0001h	fSortDesc	=1 for descending sort
1..4	001Eh	sortOnType	kind of sort to perform
5..15	FFE0h	(Reserved)	Reserved; must be 0 (zero)

Office Excel 2007 supports sorting information in the following kinds of ways:

sortOnType	Value	Comments
sortonValue	0	Sort data by its value
sortonCellColor	1	Sort data by cell fill color
sortonFontColor	2	Sort data by cell text color
sortonFlag	3	Sort data by icon

The dwCondData field varies in content based on the sortOnType.If the data is sorted by value this field should be 0. If the data is sorted by cell fill color (sortonCellColor) or font color (sortonFontColor) this field will contain the index (dxfid) of a DXF record describing the formatting. If the data is sorted by icon (sortonFlag) the dwCondData field contains the following information:

Bits	Mask	Name	Contents
0..31	0000FFFFh	iIconSet	index of icon set
32..63	FFFF0000h	iIcon	index of icon in the set

SOUND: Sound Note (96h)

The SOUND record contains the complete description of a sound note.

Record Data

Offset	Name	Size	Contents
4	cf	2	Clipboard format; 4257h (16,983 decimal) for sound notes
6	env	2	Environment from which the file was written: =1, Microsoft Windows =2, Apple Macintosh
8	lcb	4	Length of the sound data
12	data	var	Sound data

SST: Shared String Table (FCh)

The SST record contains string constants.

Record Data — BIFF8

Offset	Name	Size	Contents
4	cstTotal	4	Total number of strings in the shared string table and extended string table (EXTSST record)
8	cstUnique	4	Number of unique strings in the shared string table
12	rgb	var	Array of unique unicode strings.

STANDARDWIDTH: Standard Column Width (99h)

The STANDARDWIDTH record records the measurement from the **Standard Width** dialog box.

Record Data

Offset	Name	Size	Contents
4	DxGCol	2	Standard column width, in increments of 1/256th of a character width

STRING: String Value of a Formula (207h)

When a formula evaluates to a string, a STRING record occurs after the FORMULA record. If the formula is part of an array, the STRING record occurs after the ARRAY record.

Record Data

Offset	Name	Size	Contents
4	cch	2	Length of the string
6	grbit	1	0= Compressed unicode string 1= Uncompressed unicode string
7	rgch	var	String

STYLE: Style Information (293h)

Each style in an Excel workbook, whether built-in or user-defined, requires a style record in the BIFF file. When Excel saves the workbook, it writes the STYLE records in alphabetical order, which is the order in which the styles appear in the drop-down list box.

Record Data — Built-in Styles

Offset	Name	Size	Contents
4	ixfe	2	Index to the style XF record. **Note:** ixfe uses only the low-order 12 bits of the field (bits 11–0). Bits 12, 13, and 14 are unused, and bit 15 (fBuiltIn) is 1 for built-in styles.

Offset	Name	Size	Contents
6	istyBuiltIn	1	Built-in style numbers: =00h Normal =01h RowLevel_n =02h ColLevel_n =03h Comma =04h Currency =05h Percent =06h Comma[0] =07h Currency[0]
7	iLevel	1	Level of the outline style RowLevel_n or ColLevel_n (see text).

Record Data — User-Defined Styles

Offset	Name	Size	Contents
4	ixfe	2	Index to the style XF record. **Note:** ixfe uses only the low-order 12 bits of the field (bits 11–0). Bits 12, 13, and 14 are unused, and bit 15 (fBuiltIn) is 0 for user-defined styles.
6	cch	1	Length of the style name.
7	rgch	var	Style name.

The automatic outline styles — RowLevel_1 through RowLevel_7, and ColLevel_1 through ColLevel_7 — are stored by setting istyBuiltIn to 01h or 02h and then setting iLevel to the style level minus 1. If the style is not an automatic outline style, ignore this field.

STYLEEXT: Named Cell Style Extension (892h)

This record is used for new Office Excel 2007 formatting properties associated with named cell styles. As noted previously XFEXT records are only able to handle round-trip formatting when the document was last saved by Office Excel 2007 or later and the formatting has not been changed. This constraint exists because BIFF8 does not have a mechanism for uniquely identifying XFs once they are loaded if document formatting changes. For named cell styles however new formatting properties can be associated with the style XF by name and the style's formatting can be updated on load (Office Excel 2007 or later).

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0892h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitFlags	1	see below
17	iCategory	1	style category
18	istyBuiltIn	1	style built in ID

19	iLevel	1	Level of the outline style RowLevel_n or ColLevel_n. The automatic outline styles — RowLevel_1 through RowLevel_7, and ColLevel_1 through ColLevel_7 — are stored by setting istyBuiltIn to 01h or 02h and then setting iLevel to the style level minus 1. If the style is not an automatic outline style, ignore this field
20	cchName	2	Length of style name (in 2 byte characters)
22	rgchName	var	Name of style to extend (2 byte characters). If style does not exist then this record is ignored.
var	xfProps	var	Array of formatting properties. This structure is used to reprsent a set of formatting properties. It is described in greater detail in the DXF record description

The grbitFlags field contains the flags listed in the following table.

Bits	Mask	Name	Contents
0	01h	fBuiltIn	=1 if style should be noted as a builtin
1	02h	fHidden	=1 if style should not be displayed in the UI (used to mark "deleted" builtins)
2	04h	fCustom	=1 if builtin style has a custom (non default) definition.
3..7	F8h	(Reserved)	Reserved; must be 0 (zero)

iCategory – identifies which category in the UI should contain this style. The following categories are currently defined:

Category	Value	Comments
catCustom	0	Custom styles category
catGoodBad	1	Good, bad, neutral styles category
catDataModel	2	Data model styles category
catTitleHeading	3	Title & heading styles category
catAccent	4	Themed cell styles category
catNumberFormat	5	Number format styles category

istyBuiltIn –ID that uniquely identifies this builtin cell style. The following table expands on the original BIFF8 istyBuiltIn IDs:

ID	Built in style
0	Normal
1	RowLevel_n
2	ColLevel_n
3	Comma

ID	Built in style
27	Bad
28	Neutral
29	Accent1
30	20% - Accent1

4	Currency
5	Percent
6	Comman[0]
7	Currency[0]
8	Hyperlink
9	Followed Hyperlink
10	Note
11	Warning Text
12	Emphasis 1 (obsolete)
13	Emphasis 2 (obsolete)
14	Emphasis 3 (obsolete)
15	Title
16	Heading 1
17	Heading 2
18	Heading 3
19	Heading 4
20	Input
21	Output
22	Calculation
23	Check Cell
24	Linked Cell
25	Total
26	Good

31	40% - Accent 1
32	60% - Accent1
33	Accent2
34	20% - Accent2
35	40% - Accent2
36	60% - Accent2
37	Accent3
38	20% - Accent3
39	40% - Accent3
40	60% - Accent3
41	Accent4
42	20% - Accent4
43	40% - Accent4
44	60% - Accent4
45	Accent5
46	20% - Accent5
47	40% - Accent5
48	60% - Accent5
49	Accent6
50	20% - Accent6
51	40% - Accent6
52	60% - Accent6
53	Explanatory Text

SUB: Subscriber (91h)

The SUB record contains information about the publisher/subscriber feature. This record can be created only by Excel for the Macintosh. However, if Excel for any other platform encounters the SUB record in a BIFF file, it leaves the record in the file unchanged, when the file is saved.

Record Data

Offset	Name	Size	Contents
4	ref	6	Reference structure describing the subscribed area on the worksheet.
10	drwReal	2	Actual number of rows in the subscribed area.
12	dcolReal	2	Actual number of columns in the subscribed area.
14	grbit	2	Option flags.
16	cbAlias	2	Size of rgbAlias.

18	sec	36	Section record associated with the subscribed area.
54	rgbAlias	var	Contents of the alias pointed to by the section record.
var	stz	var	Null-terminated string containing the path of publisher. The first byte is a length byte, which does not count the terminating null byte.

The grbit field contains the option flags listed in the following table.

Offset	Bits	Mask	Name	Contents
0	0	01h	(Reserved)	
	1	02h	fObj	=1 if subscribed in the object layer
	7–2	FCh	(Reserved)	
1	7–0	FFh	(Reserved)	

SUPBOOK: Supporting Workbook (1AEh)

This record stores data about a supporting external workbook.

Record Data — BIFF8

Offset	Name	Size	Contents
4	ctab	2	Number of tabs in the workbook
6	stVirtPath	var	Encoded file name of the workbook as a unicode string (see text for file name encoding characters)
var	rgst	var	Array of ctab sheet tab names as unicode strings.

File name Encoding

Whenever possible, file names are encoded to make BIFF files transportable across file systems. Encoded file names are identified by the first character of the rgch field. The first character of the rgch field may be any one of the values listed in the following table.

Name	Value	Meaning
chEmpty	00	Reference to an empty workbook name (see text)
chEncode	01	File name has been encoded (see the following table)
chSelf	02	Self-referential external reference (see text)

chEmpty indicates the file name is an external reference to an empty workbook name, as in the formula =Sheet1!$A$1.

chSelf indicates the file name is an external reference in which the dependent and source workbooks are the same. An example of this is the workbook SALES.XLS, which contains the formula =SALES.XLS!$A$1.

A chDDE key (03h) can occur in the rgch field; it is not necessarily the first character in the field, as are chEmpty, chEncode, and chSelf. This key indicates that the external reference is a DDE or OLE link. In a DDE link, the chDDE key replaces the | (pipe) character that separates the DDE application and topic. In an OLE link, chDDE separates the classname and file name.

A chEncode at the beginning of rgch indicates the file name of the source workbook was encoded to a less system-dependent file name. The special keys listed in the following table are recognized in the rgch field.

Name	Value	PC file systems	Macintosh file system
chVolume	01	Represents an MS-DOS drive letter. It is followed by the drive letter. For example, the formula ='D:\SALES.XLS'!A1 generates the chVolume key when the dependent workbook is not on the D drive. UNC file names, such as \\server\share\myfile.xls, generate an @ character after the chVolume key; this replaces the initial double backslash (\\).	Represents a single-character volume name. Because single-character volume names are uncommon on the Macintosh, the chLongVolume key is used to represent volume names that are longer than a single character.
chSameVolume	02	Indicates the source workbook is on the same drive as the dependent workbook (the drive letter is omitted). For example, the formula ='\SALES.XLS'!A1 generates the chSameVolume key when the dependent workbook is not in the root directory.	Indicates the source workbook is in the same volume as the dependent workbook (the volume name is omitted).
ChDownDir	03	Indicates the source workbook is in a subdirectory of the current directory. For example, the formula ='XL\SALES.XLS'!A1 generates the chDownDir key. The subdirectory name precedes the chDownDir key, and the file name follows it.	Indicates the source workbook is in a folder in the current folder. For example, the formula =':XL:Sales1992'!A1 generates the chDownDir key. The folder name precedes the chDownDir key, and the file name follows it.
chUpDir	04	Indicates the source workbook is in the parent directory of the current directory. For example, the formula ='..\SALES.XLS'!A1 generates the chUpDir key.	Indicates the source workbook is in the parent folder of the current folder. For example, the formula =':Sales1992'!A1 generates the chUpDir key.

Name	Value	PC file systems	Macintosh file system
chLongVolume	05	(unused)	The chLongVolume key is followed by the length of the name (1 byte) and then by the volume name string.
chStartupDir	06	Indicates the source workbook is in the startup directory (the Xlstart subdirectory of the directory that contains Excel.exe).	Indicates the source workbook is in the Excel Startup Folder (5), which is in the System Folder.
chAltStartupDir	07	Indicates the source workbook is in the alternate startup directory.	Indicates the source workbook is in the alternate startup folder.
chLibDir	08	Indicates the source workbook is in the Library directory.	Indicates the source workbook is in the Macro Library folder.

SXADDL: Pivot Table Additional Info (864h)

Introduced in Excel 10 (2002) this record is an FRT record. SXADDL is used for storing additional information about Pivot Tables and Query Tables, specifically extensions that are new for Excel 10 and beyond.

This record has a large combination of possible uses and kinds of data, hence all the sxcs and sxds described below. Each class (sxc) may have multiple data types (sxd), and a sequence of SXADDL records for a particular class begins with the sxdId variant of an SXADDL record and ends with the sxdEnd variant of an SXADDL record. Also, classes can be nested – proper class nesting is important and required.

Record Data: Generic SXADDL Template (see specific variants below)

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0864h
6	grbitFrt	2	FRT flags; must be zero
8	sxc	1	PivotTable, PivotCache or Query Table class of information contained in this record (View, Field, etc.); see description of sxc values below.
9	sxd	1	PivotTable, PivotCache or Query Table data type contained in this record (Id, End, etc.); see description of sxd values below.
10	dwUserData	4	Extra piece of data for this record. Usage is dependant on the sxc and sxd.
14	(Reserved)	2	Reserved; Must be zero.
16	rgbSxAddlData	var	Data for this record. Usage is dependant on the sxc and sxd.

Here is a description of the different sxc values that can go into the SXADDL record.

sxc PivotTable, PivotCache or Query Table Class	Value	Description / Purpose
sxcView	00h	PivotTable view properties (related to rtSxview) Parent classes: None when used with sxdId. sxcView when used with sxdCalcMemString, sxdVer10Info and sxdEnd.
sxcField	01h	PivotTable field properties (related to rtSxvd) Parent classes: sxcView when used with sxdId. sxcField when used with sxdVer10Info and sxdEnd.
sxcHierarchy	02h	OLAB cube hierarchy properties (related to rtSxth) Parent classes: sxcView when used with sxdId. sxcHierarchy when used with sxdProperty, sxdFilterMember, sxdVerUpdInv and sxdEnd.
sxcCache	03h	PivotTable cache properties (related to rtSxDb) Parent classes: None when used with sxdId. sxcCache when used with sxdVer10Info and sxdEnd.
sxcCacheField	04h	PivotTable cache field properties (related to rtSxFdb) Parent classes: sxcCache when used with sxdId. sxdCacheField when used with sxdEnd.
sxcQsi	05h	Query Table properties (related to rtQsi) Parent classes: None when used with sxdId. sxcQsi when used with sxdEnd.
sxcQuery	06h	Database query properties (related to rtDbquery) Parent classes: sxcQsi or sxcCache depending on whether the information is for a Query Table source or a PivotTable source.
sxcGrpLevel	07h	Properties of an OLAP cube level when two or more OLAP cube members were grouped within this OLAP cube hierarchy. **Note**: this particular level may not be directly involved in the grouping operation. Parent classes: sxcHierarchy when used with sxdId. sxcGrpLevel when used with sxdGrpLevelInfo and sxdEnd.
sxcGroup	08h	Definition of a group of OLAP cube members in an OLAP cube group level. Parent classes: sxcGrpLevel when used with sxdId. sxcGroup when used with sxdGroupInfo, sxdMember and sxdEnd.
(Reserved)	FCh	Reserved
(Reserved)	FEh	Reserved
(Reserved)	FFh	Reserved

Here is a description of the different sxd values that can go into the SXADDL record.

sxd PivotTable, PivotCache or Query Table Data Type	Value	Description / Purpose
sxdId	00h	An identifier that uniquely refers to the exact instance of an object (view, field, etc.) a class refers to. Since all following records up to a corresponding sxdEnd record will be associated with the instance referred to by this ID this record should be emitted first for a new set of class records.
sxdVerUpdInv	01h	If the PivotTable is updated by PivotTable code of this version or lower then the rest of the records for this class instance should be considered invalid when reloaded into Excel 10 or later.
sxdVer10Info	02h	Additional version 10 properties (usually represented as flags). Dependant on the sxc being used.
sxdCalcMember	03h	Defintion of a user-defined calculated member or a set in an OLAP cube.
sxdXMLSource	04h	URL to use when editing the source of a Web-based Query Table.
sxdSrcDataFile	05h	Name of source data file (such as an MDB file), if any, that the PivotTable or Query Table originally retrieved data from.
sxdSrcConnFile	06h	Name of file, if any, where we got the original connection and query information to the data source.
sxdReconnCond	07h	How to handle the case when a refresh operation can't reconnect to the data source.
sxdProperty	05h	Describes an OLAP cube member property being shown on the PivotTable view.
sxdGrpLevelInfo	06h	Properties of an OLAP cube group level. The level was constructed due to a user operation that grouped two or more OLAP cube members.
sxdGrpInfo	07h	Properties of a group of OLAP cube members in an OLAP cube group level.
sxdMember	08h	The name of an OLAP cube member that belong to a group.
sxdFilterMember	09h	The names of the OLAP cube members selected for a hierarchy in the page area of the PivotTable view.
sxdCalcMemString	0Ah	MDX of a calculated member formula in an OLAP cube when the formula length is greater than 255 characters.
(Reserved)	FCh	Reserved
(Reserved)	FDh	Reserved
(Reserved)	FEh	Reserved

sxd PivotTable, PivotCache or Query Table Data Type	Value	Description / Purpose
sxdEnd	FFh	No data but indicates there are no more records for the current class instance.

Note: The specific SXADDL Variants only show the BIFF record fields starting at offset 8 or greater; the FRT header is the same for all of them.

Record Data: SXADDL Variant: sxdId (identifier). Used by multiple sxc classes as the initial record of the set for the given class instance. If the string ID is greater than 255 characters then the string is parsed into 255 character (at the most) segments with each segment saved in its own SXADDL record.

Offset	Name	Size	Contents
8	sxc	1	One of the following: =sxcView=00h (PivotTable view) =sxcField=01h (PivotTable field) =sxcHierarcy=02h (OLAP cube Hierarchy) =sxcQsi=05h (Query Table) =sxcQuery=06h (Database query) =sxcGrpLevel=07h (OLAP cube group level) =sxcGroup=08h (OLAP cube member group)
9	sxd	1	=sxdId=00h (ID)
10	cchNameTotal (dwUserData)	4	For the first record for this ID this will be the length in characters of the ID string (stName). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stName (rgbSxAddlData)	var	Name (ID) string, identifying class instance, etc.; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdId (identifier) for sxcCache

Offset	Name	Size	Contents
8	sxc	1	=sxcCache=03h (PivotTable cache)
9	Sxd	1	=sxdId=00h (ID)
10	idCache (dwUserData)	4	The internally assigned PivotTable cache ID (a DWORD).
14	(Reserved)	2	Reserved; Must be zero.
16	rgbSxAddlData	var	(empty)

Record Data: SXADDL Variant: sxdEnd (end of class). Used by multiple sxc classes as the final record of the set for the given class instance.

Offset	Name	Size	Contents
8	sxc	1	One of the following: =sxcView=00h (PivotTable view) =sxcField=01h (PivotTable field) =sxcHierarcy=02h (OLAP cube hierarchy) =sxcCache=03h (PivotTable cache) =sxcQsi=05h (Query Table) =sxcQuery=06h (Database query) =sxcGrpLevel=07h (OLAP cube group level) =sxcGroup=08h (OLAP cube member group)
9	sxd	1	=sxdEnd=FFh (End)
10	dwUserData	4	=0
14	(Reserved)	2	Reserved; Must be zero.
16	rgbSxAddlData	var	(empty)

Record Data: SXADDL Variant: sxdVerUpdInv (the properties are invalid when the PivotTable view is updated by the indicated PivotTable version or earlier). Used by multiple sxc classes.

Offset	Name	Size	Contents
8	sxc	1	One of the following: =sxcView=00h (PivotTable view) =sxcField=01h (PivotTable field) =sxcHierarcy=02h (OLAP cube Hierarchy) =sxcCache=03h (PivotTable cache) =sxcQsi=05h (Query Table) =sxcQuery=06h (Database Query) =sxcGrpLevel=07h (OLAP cube group level) =sxcGroup=08h (OLAP cube member group)
9	sxd	1	=sxdVerUpdInv=01h (properties invalid when PivotTable view updated by certain PivotTable version or earlier)
10	dwVersionInvalidates (dwUserData)	4	One of the following version numbers: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007) If the PivotTable was updated by this version or earlier, then subsequent records for this class instance are considered invalid.
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	Var	(empty)

Record Data: SXADDL Variant: sxdVer10Info (Excel version 10 properties) for sxcCache.

Offset	Name	Size	Contents
8	sxc	1	=sxcCache=03h (PivotTable cache)
9	sxd	1	=sxdVer10Info=02h (Excel 10 properties)
10	(dwUserData)	4	Reserved; Must be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	sxdbsave10 (rgbSxAddlData)	14	Structure of Excel 10 properties (described below)

The sxdbsave10 structure looks like this:

Offset	Name	Size	Contents
0	citmGhostMax	4	Maximum number of PivotItems that no longer appear in any records retained during PivotTable refresh.
4	bVerCacheLastRefresh	1	The PivotTable version which last refreshed this cache. One of the following version numbers: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3=Excel 12 (2007)
5	bVerCacheRefreshableMin	1	The minimum PivotTable version needed to refresh this cache. One of the following version numbers: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
6	numDateCopy	8	Redundant date of when the PivotTable cache was last refreshed.

Record Data: SXADDL Variant: sxdVer10Info (Excel 10 properties) for sxcView.

Offset	Name	Size	Contents
8	sxc	1	=sxcView=00h (PivotTable view)
9	sxd	1	=sxdVer10Info=02h (Excel 10 properties)
10	dwViewFlagsVer10 (dwUserData)	4	PivotTable view Excel 10 flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	0	(empty)

The dwViewFlagsVer10 looks like this:

Bits	Mask	Name	Contents
7-0	000000FFh	bVerSxMacro	Default property settings for the PivotTable view were initialized based on this PivotTable version. One of the following version numbers: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
8	00000100h	fDisplayImmediateItems	=1 if PivotItems are displayed in the PivotTable view even when there is no field in the data area =0 otherwise
9	00000200h	fEnableDataEd	=1 if the user is allowed to change the values in the data area of the PivotTable view =0 otherwise
10	00000400h	fDisableFList	=1 if the PivotTable field list control/window is not displayed when the user's selection is in a PivotTable cell =0 otherwise
11	00000800h	fReenterOnLoadOnce	=1 if the PivotTable view is automatically re-entered onto the worksheet on the next load =0 otherwise
12	00001000h	fNotViewCalculatedMembers	=1 if OLAP cube calculated members should be hidden in the PivotTable view =0 otherwise
13	00002000h	fNotVisualTotals	=1 if grand totals and subtotals in a PivotTable based on an OLAP source include values of hidden members rather than just the values of the members currently shown in the PivotTable view. =0 otherwise

Bits	Mask	Name	Contents
14	00004000h	fPageMultipleItemLabel	=1 if when a field, from a PivotTable that is not based on an OLAP source, has one or more hidden items and is being shown in the page area the PivotItem cell shows the text "(Multiple Items)" instead of "(All)" =0 othewise
15	00008000h	fTensorFillCv	=1 if for a PivotTable based on an OLAP source the data/aggregate cells in the PivotTable view use the background color, if available, from the OLAP server. =0 otherwise
16	00010000h	fHideDDData	=1 if the dropdown control for the "Data" PivotField should be hidden. =0 otherwise
31-17	FFFE0000h	(Reserved)	Reserved; Must be zero

Record Data: SXADDL Variant: sxdVer10Info (Excel 10 properties) for sxcField.

Offset	Name	Size	Contents
8	sxc	1	=sxcField=01h (PivotTable field)
9	sxd	1	=sxdVer10Info=02h (Excel 10 properties)
10	dwFieldFlagsVer10 (dwUserData)	4	PivotTable field Excel 10 flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	0	(empty)

The dwFieldFlagsVer10 looks like this:

Bits	Mask	Name	Contents
0	00000001h	fHideDD	=1 if the dropdown control for this PivotField should be hidden. =0 otherwise
31-1	FFFFFFFEh	(Reserved)	Reserved; Must be zero.

Record Data: SXADDL Variant: sxdXMLSource (URL for editing the source of a web-based Query Table). If the URL is greater than 255 characters then the string is broken up into 255 character (at the most) segments with each segment saved in its own SXADDL record.

Offset	Name	Size	Contents
8	sxc	1	=sxcQuery=06h (Database query)

9	sxd	1	=sxdXMLSource=04h (URL for editing the source of a web-based Query Table)
10	cchXMLSource (dwUserData)	4	For the first record for this URL this is the length in characters of the URL string (stXMLSource). For subsequent/continuation records it is zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stXMLSource (rgbSxAddlData)	Var	XML Source string, continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdSrcDataFile (source data file). If the filename is greater than 255 characters then the string is broken up into 255 character (at the most) segments with each segment saved in its own SXADDL record.

Offset	Name	Size	Contents
8	sxc	1	=sxcQuery=06h (Database query)
9	sxd	1	=sxdSrcDataFile=05h (Source data file)
10	cchSrcDataFile (dwUserData)	4	For the first record for this filename this is the length in characters of the filename string (stSrcDataFile). For subsequent/continuation records it is zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stSrcDataFile (rgbSxAddlData)	Var	Source data file string, continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdSrcConnFile (source connection file). If the filename is greater than 255 characters then the string is broken up into 255 character (at the most) segments with each segment saved in its own SXADDL record.

Offset	Name	Size	Contents
8	sxc	1	=sxcQuery=06h (Database query)
9	sxd	1	=sxdSrcConnFile=06h (Source connection file)
10	cchSrcConnFile (dwUserData)	4	For the first record for this filename this is the length in characters of the filename string (stSrcConnFile). For subsequent/continuation records it is zero.
14	(Reserved)	2	Reserved; Must be zero.

Offset	Name	Size	Contents
16	stSrcConnFile (rgbSxAddlData)	Var	Source connecting file string, continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdReconnCond (reconnect handling condition)

Offset	Name	Size	Contents
8	sxc	1	=sxcQuery=06h (Database query)
9	sxd	1	=sxdSrcDataFile=07h (Reconnect handling condition)
10	rccDBQuery (dwUserData)	4	One of the following reconnection handling condition values: 0= Prompt the user to determine if the extra connection and source data information available should be used. 1= Always use the extra connection and source data information available without prompting the user about what to do. 2= Never make use of the extra connection and source data information. Indicates how to handle the case when a refresh operation can't reconnect to the data source. The extra connection information is the source connection file and the extra source data information is the source data file.
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	Var	(empty)

Record Data: SXADDL Variant: sxdGrpLevelInfo (OLAP cube group level information).

Offset	Name	Size	Contents
8	sxc	1	=sxcGrpLevel=07h (OLAP cube group level)
9	sxd	1	=sxdGrpLevelInfo=06h (OLAP cube group level information)
10	dwFlagsSxtgl (dwUserData)	4	OLAP cube group level flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	stLevelName (rgbSxAddlData)	Var	String containing the caption (display name) of this OLAP cube level.

The dwFlagsSxtgl (OLAP cube group level flags) are as follows:

Bits	Mask	Name	Contents
0	00000001h	fGroupLevel	=1 if this is a custom OLAP cube group level rather than an OLAP cube level that came from the cube data source =0 otherwise
31–1	FFFFFFFCh	(Reserved)	Reserved; must be zero

Record Data: SXADDL Variant: sxdGrpInfo (OLAP cube member group information)

Offset	Name	Size	Contents
8	sxc	1	=sxcGroup=08h (OLAP cube member group)
9	sxd	1	=sxdGrpInfo=07h (OLAP cube member group information)
10	dwFlagsSxtgs (dwUserData)	4	OLAP cube member group flags (see description below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData starts here) stUniqueName	var	String containing the unique name of this OLAP cube member group.
var	stCaption	var	String containing the caption (display name) of this OLAP cube member group.
var	(optional) stParentUniqueName	var	If this group has a parent OLAP cube level then this is a string containing the unique name of that parent level, otherwise the string is missing.
var	iGroupNum	4	An ID uniquely identifies this group within the OLAP cube level.

The dwFlagsSxtgs (OLAP cube member group flags) are as follows:

Bits	Mask	Name	Contents
3-0	0000000fh	(Reserved)	Reserved; must be zero
4	00000010h	fHasNoParent	=1 if this group does not have a parent OLAP cube level =0 otherwise
31-5	FFFFFFE0h	(Reserved)	Reserved; must be zero

Record Data: SXADDL Variant: sxdMember (OLAP cube group member)

Offset	Name	Size	Contents
8	sxc	1	=sxcGroup=08h (OLAP cube member group)
9	sxd	1	=sxdMember=08h (OLAP cube group member)
10	dwFlagsSxtgmem (dwUserData)	4	OLAP cube group member flags (see description below)
14	(Reserved)	2	Reserved; Must be zero.

Offset	Name	Size	Contents
16	stUnique (rgbSxAddlData)	Var	String containing the unique name of an OLAP cube member that is part of the current group

The dwFlagsSxtgmem (OLAP cube group member flags) are as follows:

Bits	Mask	Name	Contents
0	00000001h	(Reserved)	Reserved; must be zero
1	00000002h	fGroup	=1 if this is a custom OLAP cube group member rather than an OLAP cube member that came from the cube data source =0 otherwise
2	00000004h	fDead	=1 if this OLAP cube member doesn't exist anymore in the cube data source =0 otherwise
31-3	FFFFFFF8h	(Reserved)	Reserved; must be zero

Record Data: SXADDL Variant: sxdProperty (OLAP cube member property)

Offset	Name	Size	Contents
8	sxc	1	=sxcHierarchy=02h (OLAP cube hierarchy)
9	sxd	1	=sxdProperty=05h (OLAP cube member property)
10	dwFlagsSxtdmp (dwUserData)	4	OLAP cube member property flags (see description below)
14	(reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData starts here) stProperty	Var	String containing the unique name of the OLAP cube member property
var	sxtdmpp	8	Structure of OLAP cube member property properties (see description below)

The dwFlagsSxtdmp (OLAP cube member property flags) are as follows:

Bits	Mask	Name	Contents
0	00000001h	fDisplayInReport	=1 if the OLAP cube member property should be displayed in the PivotTable view =0 otherwise
1	00000002h	fDisplayInTip	=1 if the OLAP cube member property should be displayed as a tip. In Excel 10 the member property is still displayed in the PivotTable view, there will be no tip. This is persisted to provide a better file roundtrip experience from the Microsoft Office Web Components Pivot control to Office Excel and back to the Pivot control. =0 otherwise
31-2	FFFFFFFCh	(Reserved)	Reserved; must be zero

The SXTDMPP structure is organized as follows:

Offset	Name	Size	Contents
0	cchLevelUnq	2	(unsigned) Count of characters in stProperty, starting with the first character that represents the unique name of the OLAP cube level that the OLAP cube member property belongs to.
2	ichPropName	2	(unsigned) Zero-based character offset into stProperty indicating where the OLAP cube member property name begins.
4	cchPropName	2	(unsigned) Count of characters in stProperty, starting with character ichPropName that represents the OLAP cube member property name.
6	isxtl	2	(signed) Index of the OLAP cube level the OLAP cube member property belongs to. -1 (0xFFFF) indicates the member property applies to all levels in this OLAP cube hierarchy.

Record Data: SXADDL Variant: sxdFilterMember (OLAP cube filtered members). This record variant can appear multiple times, back to back, with different cStPageItems and grStPageItems settings if the combined length of all the OLAP cube member unique name strings plus the FRT header is bigger than can fit into one BIFF record.

Offset	Name	Size	Contents
8	sxc	1	=sxcHierarchy=02h (OLAP cube hierarchy)
9	sxd	1	=sxdFilterMember=09h (OLAP cube filtered members)
10	dwSxFilterMemFlags (dwUserData)	4	OLAP cube filtered members flags (see description below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData starts here) cStPageItems	2	Count of strings in the list of OLAP cube member unique names that immediately follow this field
18	grStPageItems	var	List of OLAP cube member unique name strings, one right after another, indicating which members are selected when this OLAP cube hierarchy is in the page of the PivotTable view.

The dwSxFilterMemFlags (OLAP cube filtered members flags) are as follows:

Bits	Mask	Name	Contents
0	00000001h	fEnableMultiplePageItems	=1 if the user is allowed to select two or more OLAP cube members in the OLAP cube hierarchy when the hierarchy is in the page area of the PivotTable view. =0 otherwise Must be 1.
1	00000002h	fExpectMultiplePageItems	=1 if Excel should be ready to handle loading multiple OLAP cube member strings. =0 otherwise Must be 1.
31-2	FFFFFFFCh	(Reserved)	Reserved; must be zero

Record Data: SXADDL Variant: sxdCalcMember (OLAP cube calculated member or set)

Offset	Name	Size	Contents
8	sxc	1	=sxcView=00h (PivotTable view)
9	sxd	1	=sxdCalcMember=03h (OLAP cube calculated member or set)
10	dwSxcalcmemflags (dwUserData)	4	OLAP cube calculated member or set flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData starts here) stCalcMemName	var	String containing the OLAP cube calculated member or set unique name.
var	stMDXFormula	var	String containing the MDX representation of the formula for the OLAP cube calculated member if fLongFormula=0; otherwise the string is missing and an SXADDL record of type sxdCalcMemString is written that contains the formula
var	stMemberCaption	var	String containing the caption (display name) of the custom OLAP cube calculated member (not used for sets) if fMemberCaption=1; otherwise the string is missing
var	stSourceHierarchy	var	String containing the OLAP cube hierarchy unique name of the hierarchy the OLAP cube calculated member (not used for sets) is associated with if fSourceHierarchy=1; otherwise the string is missing

Offset	Name	Size	Contents
var	stParentUnique	var	String containing the OLAP cube member unique name of the parent member of the OLAP cube calculated member (not used for sets) if fParentUnique=1; otherwise the string is missing
var	wSolveOrder	4	When there are two or more OLAP cube calculated members, the order they are calculated in can affect the result of this number (wSolveOrder) and is used to determine where in the sequence of calculations this calculated member is computed and applied. A value of zero means it is undetermined (it is up to the OLAP provider) as to where in the calculation sequence the calculated member will be computed.

The dwSxcalcmemflags (OLAP cube calculated member flags) are as follows:

Bits	Mask	Name	Contents
0	00000001h	fParentUnique	=1 if the string stParentUnique is included in rgbSxAddlData =0 otherwise
1	00000002h	fMemberCaption	=1 if the string stMemberCaption is included in rgbSxAddlData =0 otherwise
2	00000004h	fSourceHierarchy	=1 if the string stSourceHierarchy is included in rgbSxAddlData =0 otherwise
3	00000008h	fLongFormula	=1 if the length of the MDX representation of the formula is greater than 255 characters. In this case the formula string is written to an SXADDL record of type sxdCalcMemString; =0 if the string stMDXFormula is included in rgbSxAddlData
7–4	000000F0h	(Reserved)	Reserved; Must be zero.
8	00000100h	fSet	=1 if the calculation is for an OLAP cube set =0 if the calculate is for an OLAP cube calculated member
31-9	FFFFFE00h	(Reserved)	Reserved; Must be zero.

Record Data: SXADDL Variant: sxdCalcMemString (OLAP cube calculated member formula MDX)

Offset	Name	Size	Contents
8	sxc	1	=sxcView=00h (PivotTable view)
9	sxd	1	=sxdCalcMemString=0Ah (OLAP cube calculated member formula MDX)
10	cchMDXFormula (dwUserData)	4	For the first record for this MDX string this is the length in characters of the MDX string (stMDXFormula). For subsequent/continuation records it is zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stMDXFormula (rgbSxAddlData)	var	MDX formula string, continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdSxcondfmt (Office Excel 2007 – PivotTable conditional format).

Offset	Name	Size	Contents
8	sxc	1	=sxcSxcondfmt=03h (PivotTable conditional formatting)
9	sxd	1	=sxdSxcondfmt=35h (PivotTable conditional format)
10	(dwUserData)	4	Reserved; Must be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	rtsxcondfmt (rgbSxAddlData)	16	Structure of PivotTable conditional formatting properties (described below)

The RTSXCONDFMT structure is organized as follows:

Offset	Name	Size	Contents
0	sxcondfmtScope	4	Area of the PivotTable to which the conditional formatting applies. One of the following: 0= Cells in user selection. 1= Cells in the selected data/value fields. 2= Cells in the selected PivotTable field intersections.

Offset	Name	Size	Contents
4	sxcondfmtType	4	Specifies the PivotTable conditional formatting top N evaluation type. One of the following: 0= No top N evaluation. 1= Top N is evaluated across the entire scope range. 2= Top N is evaluated for each row. 3= Top N is evaluated for each column.
8	ipriority	4	Priority of the PivotTable conditional formatting rule.
12	csxrule	4	Count of PivotTable rule records that follow (see sxdSxrule).

Record Data: SXADDL Variant: sxdSxpiIvmb (Office Excel 2007 – PivotTable page/report field – cell value metadata mapping).

Offset	Name	Size	Contents
8	sxc	1	=sxcView=00h (PivotTable view)
9	sxd	1	=sxdSxpiIvmb=36h (PivotTable page/report field – cell value metadata mapping)
10	(dwUserData)	4	Reserved; Must be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	rtsxpiivmb (rgbSxAddlData)	8	Structure of PivotTable page/report field – cell value metadata mapping (described below)

The RTSXPIIVMB structure is organized as follows:

Offset	Name	Size	Contents
0	isxpi	4	Index of PivotTable page/report field.
4	ivmb	4	Index of cell value metadata.

Record Data: SXADDL Variant: sxdAutoShow (Office Excel 2007 – legacy AutoShow item count).

Offset	Name	Size	Contents
8	sxc	1	=sxcField12=17h (PivotTable field)
9	sxd	1	=sxdAutoShow=37h (legacy AutoShow item count)
10	citmAutoShow (dwUserData)	4	Number of items to show for legacy AutoShow.

14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	var	(empty)

Record Data: SXADDL Variant: sxdSxfilter (Office Excel 2007 – PivotTable advanced filter properties).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdSxfilter=38h (PivotTable advanced filter properties)
10	(dwUserData)	4	Reserved; Must be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	rtsxfilter12 (rgbSxAddlData)	24	Structure of PivotTable advanced filter properties (described below)

The RTSXFILTER12 structure is organized as follows:

Offset	Name	Size	Contents
0	isxvd	4	Index of the PivotTable field that this PivotTable filter belongs to.
4	isxvdMProp	4	Index of the PivotTable field representing the OLAP cube member property field that this PivotTable filter is defined on.
8	sxft	4	Specifies the type of the PivotTable advanced: One of the following: 0= Unknown 1= count 2= percent 3= sum 4= caption equal 5= caption not equal 6= caption begins with 7= caption does not begin with 8= caption ends with 9= caption does not end with

Offset	Name	Size	Contents
			10= caption contains
			11= caption does not contain
			12 = caption is greater than
			13= caption is greater than or equal to
			14= caption is less than
			15= caption is less than or equal to
			16= caption is between
			17= caption is not between
			18= value equal
			19= value not equal
			20= value greater than
			21= value greater than or equal to
			22= value less than
			23= value less than or equal to
			24= value between
			25= value not between
			26= date equals
			27= date older than
			28= date newer than
			29= date between
			30= tomorrow
			31= today
			32= yesterday
			33= date of next week
			34= date of this week
			35= date of last week
			36= date of next month
			37= date of this month
			38=date of last month
			39= date of next quarter

Offset	Name	Size	Contents
			40= date of this quarter 41= date of last quarter 42= date of next year 43= date of this year 44= date of last year 45= year to date 46= dates in first quarter 47= dates in second quarter 48= dates in third quarter 49= dates in fourth quarter 50= dates in Jan. 51= dates in Feb. 52= dates in Mar. 53= dates in April. 54= dates in May. 55= dates in June. 56= dates in July. 57= dates in Aug. 58= dates in Sep. 59= dates in Oct. 60= dates in Nov. 61= dates in Dec. 62= date not equal 63= date older than or equal 64= date newer than or equal 65= date not between
12	iEvalOrder	4	Evaluation order of the PivotTable filter and it starts with zero.
16	isxdiMeasure	4	Index of the PivotTable measure field - used only by filters in relational pivots - and specifies on which measure a value filter should apply.
20	isxthMeasure	4	Index of the OLAP cube measure field specifying on which measure a value filter should apply.

Record Data: SXADDL Variant: sxdSxfilterDesc (Office Excel 2007 – PivotTable advanced filter description string).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdSxfilterDesc=39h (PivotTable advanced filter description string)
10	cchDesc (dwUserData)	4	For the first record for the description this will be the length in characters of the description string (stDesc). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stDesc (rgbSxAddlData)	var	Description string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdSxfilterValue1 (Office Excel 2007 – PivotTable advanced filter value 1).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdSxfilterValue1=3Ah (PivotTable advanced filter value 1)
10	cchValue (dwUserData)	4	For the first record for the value this will be the length in characters of the value string (stValue). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stValue (rgbSxAddlData)	var	Value string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdSxfilterValue2 (Office Excel 2007 – PivotTable advanced filter value 2).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdSxfilterValue2=3Bh (PivotTable advanced filter value 2)

10	cchValue (dwUserData)	4	For the first record for the value this will be the length in characters of the value string (stValue). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stValue (rgbSxAddlData)	var	Value string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdXlsfilter (Office Excel 2007 – PivotTable dynamic filter properties).

Offset	Name	Size	Contents
8	sxc	1	=sxcSxfilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdXlsfilter=3Ch (PivotTable dynamic filter properties)
10	(dwUserData)	4	Reserved; Must be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	rtxlsfilter (rgbSxAddlData)	44	Structure of PivotTable dynamic filter properties (described below)

The RTXLSFILTER structure is organized as follows:

Offset	Name	Size	Contents
0	cft	4	Dynamic filter type. One of the following: 0= Filter type not available 1= Shows values that are above average. 2= Shows values that are below average. 3= Shows values in the top 10. 4= Shows values for a specific date. 5= Shows values before a specific date. 6= Shows values after a specific date. 7= Shows values between two dates, inclusive. 8= Shows tomorrow’s dates. 9= Shows today's dates.

Offset	Name	Size	Contents
			10= Shows yesterday's dates. 11= Shows next week's dates. 12= Shows this week's dates. 13= Shows last week's dates. 14= Shows next month's dates. 15= Shows this month's dates. 16= Shows last month's dates. 17= Shows next quarter's dates. 18= Shows this quarter's dates. 19= Shows last quarter's dates. 20= Shows next year's dates. 21= Shows this year's dates. 22= Shows last year's dates. 23= Shows the dates between the beginning of the year and today, inclusive. 24= Shows the dates that are in the 1st quarter, regardless of year. 25= Shows the dates that are in the 2nd quarter, regardless of year. 26= Shows the dates that are in the 3rd quarter, regardless of year. 27= Shows the dates that are in the 4th quarter, regardless of year. 28= Shows the dates that are in January, regardless of year. 29= Shows the dates that are in February, regardless of year.

Offset	Name	Size	Contents
			30= Shows the dates that are in March, regardless of year. 31= Shows the dates that are in April, regardless of year. 32= Shows the dates that are in May, regardless of year. 33= Shows the dates that are in June, regardless of year. 34= Shows the dates that are in July, regardless of year. 35= Shows the dates that are in August, regardless of year. 36= Shows the dates that are in September, regardless of year. 37= Shows the dates that are in October, regardless of year. 38= Shows the dates that are in November, regardless of year. 39= Shows the dates that are in December, regardless of year. 40= Shows the values for dates that aren't a specific date. 41= Shows the values before or equal to a specific date. 42= Shows the values equal to or after a specific date. 43= Shows the values that are not between two dates.
4	ccriteria	4	Count of criteria values/operands (see ezdoper1 and ezdoper2)
8	(Variable)	36	Contents are dependent on the value of cft (dynamic filter type), see the variants described below.

The rest of the RTXLSFILTER structure, when cft = 3, is organized as follows:

Offset	Name	Size	Contents
8	top10ft	4	Top 10 filter definition. One of the following: 0= Unknown top 10 type. 1= Show the top 10 based on the count of items. 2= Show the top 10 percent. 3= Show the top 10 based on the item values.
12	fTop	2	=1 to show the top 10 =0 to show the bottom 10
14	numTopN	8	Top or bottom value.
22	(Reserved)	14	Reserved; Must be zero.

The rest of the RTXLSFILTER structure, when cft <> 3, is organized as follows:

Offset	Name	Size	Contents
8	ezdoper1	10	First operand/criteria for the filter. Structure of PivotTable database operand (described below as RTSXEZDOPER).
18	ezdoper2	10	Second operand/criteria for the filter. Structure of PivotTable database operand (described below as RTSXEZDOPER).
28	djoin1	4	Specifies the relationship between the two operands/criteria. One of the following: 0= Unknown relationship between the criteria. 1= An “and” relationship between the criteria. 2= An “or” relationship between the criteria.
32	djoin2	4	Specifies the relationship between the two operands/criteria. One of the following: 0= Unknown relationship between the criteria. 1= An “and” relationship between the criteria. 2= An “or” relationship between the criteria.

The RTSXEZDOPER structure is organized as follows:

Offset	Name	Size	Contents
0	vts	1	Value type of the operand/criteria. One of the following: 0= Value not specified. 4= Value is a real number. 6= Value is a string. 8= Value is a boolean or error. 10= No match for value. 12= Blank value. 14= Non-blank value.
1	grbitSgn	1	Filter operator. One of the following: 1= Show results which are less than criteria. 2= Show results which are equal to criteria. 3= Show results which are less than or equal to criteria. 4= Show results which are greater than criteria. 5= Show results which are not equal to criteria. 6= Show results which are greater than or equal to criteria.
2	(Variable)	8	Contents are dependent on the value of vts (value type), see the variants described below.

The rest of the RTSXEZDOPER structure, when vts = 0, vts = 10, vts = 12 and vts = 14, is organized as follows:

Offset	Name	Size	Contents
2	(Reserved)	8	Reserved; Must be zero.

The rest of the RTSXEZDOPER structure, when vts = 4, is organized as follows:

Offset	Name	Size	Contents
2	num	8	A real number.

The rest of the RTSXEZDOPER structure, when vts = 6, is organized as follows:

Offset	Name	Size	Contents
2	fCompare	1	=1 if the string is really simple so that an optimized string comparison routine can be used. =0 if the string is complex or if you're not sure whether the string is considered simple or complex.
3	fAutoWild	1	=1 if the string is treated as a prefix that can match any string that starts with the same characters.
4	(Reserved)	4	Reserved; Must be zero.

The rest of the RTSXEZDOPER structure, when vts = 8, is organized as follows:

Offset	Name	Size	Contents

2	bBoolErr	1	A Boolean or error value.
			When fError = 0 then one of the following Boolean values:
			0= FALSE
			1= TRUE
			When fError =1 then one of the following Excel error values:
			0= #NULL!= a null range reference.
			7= #DIV0!= divide by zero.
			15= #VALUE!= an invalid value.
			23= #REF!= an invalid cell reference.
			29= #NAME?= an unrecognized name/label.
			36= #NUM!= an invalid number.
			42= #N/A= no value available.

3	fError	1	=1 if bBoolErr contains an Excel error value. =0 if bBoolErr contains a Boolean value.
4	(Reserved)	4	Reserved; Must be zero.

Record Data: SXADDL Variant: sxdXlsfilterValue1 (Office Excel 2007 – PivotTable dynamic filter value 1).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdXlsfilterValue1=3Dh (PivotTable dynamic filter value 1)

10	cchValue (dwUserData)	4	For the first record for the value this will be the length in characters of the value string (stValue). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stValue (rgbSxAddlData)	var	Value string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdXlsfilterValue2 (Office Excel 2007 – PivotTable dynamic filter value 2).

Offset	Name	Size	Contents
8	sxc	1	=sxcFilter12=1Dh (PivotTable advanced filter)
9	sxd	1	=sxdXlsfilterValue2=3Eh (PivotTable dynamic filter value 2)
10	cchValue (dwUserData)	4	For the first record for the value this will be the length in characters of the value string (stValue). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stValue (rgbSxAddlData)	var	Value string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdFilterMember12 (Office Excel 2007 – filtered OLAP cube member names).

Offset	Name	Size	Contents
8	sxc	1	=sxcHierarchy=02h (OLAP cube hierarchy)
9	sxd	1	=sxdFilterMember12=3Fh (filtered OLAP cube member names)
10	isxtl (dwUserData)	4	Index of OLAP cube level.
14	(Reserved)	2	Reserved; Must be zero.
16	rgstMember (rgbSxAddlData)	var	Sequence of member name strings using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdPropName (Office Excel 2007 – OLAP member property name).

Offset	Name	Size	Contents
8	sxc	1	=sxcCacheField=04h (PivotCache field)
9	sxd	1	=sxdProName=40h (OLAP member property name)
10	cchName (dwUserData)	4	For the first record for the name this will be the length in characters of the name string (stName). For subsequent/continuation records it will be zero.
14	(Reserved)	2	Reserved; Must be zero.
16	stName (rgbSxAddlData)	var	Value string; continued across multiple SXADDL records if necessary, using Unicode encoding. (See section titled Unicode Strings in Biff8 for more information about these encodings.)

Record Data: SXADDL Variant: sxdInfo12 (Office Excel 2007 – additional version 12 properties) for sxcHierarchy.

Offset	Name	Size	Contents
8	sxc	1	=sxcHierarchy=02h (OLAP cube hierarchy)
9	sxd	1	=sxdInfo12=41h (additional version 12 properties)
10	dwHierarchyFlags (dwUserData)	4	OLAP cube hierarchy flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	var	(empty)

The dwHierarchyFlags look like this:

Bits	Mask	Name	Contents
0	00000001h	fUnbalancedRealKnown	=1 if it has been determined whether the OLAP cube hierarchy is unbalanced.
1	00000002h	fUnbalancedReal	=1 if the OLAP cube hierarchy is unbalanced. =0 if fUnbalancedRealKnown is 0 or if the OLAP cube hierarchy is not unbalanced.

Bits	Mask	Name	Contents
2	00000004h	fUnbalancedGroupKnown	=1 if it has been determined whether the OLAP cube grouped hierarchy is unbalanced.
3	00000008h	fUnbalancedGroup	=1 if the OLAP cube grouped hierarchy is unbalanced. =0 if fUnbalancedRealKnown is 0 or if the OLAP cube grouped hierarchy is not unbalanced.
4	00000010h	fHidden	
31-5	FFFFFFE0h	(Reserved)	Reserved; Must be zero.

Record Data: SXADDL Variant: sxdInfo12 (Office Excel 2007 – additional version 12 properties) for sxcCache.

Offset	Name	Size	Contents
8	sxc	1	=sxcCache=03h (PivotCache)
9	sxd	1	=sxdInfo12=41h (additional version 12 properties)
10	dwCacheFlags (dwUserData)	4	PivotCache flags (described below)
14	(Reserved)	2	Reserved; Must be zero.
16	(rgbSxAddlData)	var	(empty)

The dwCacheFlags look like this:

Bits	Mask	Name	Contents
0	00000001h	fSheetData	=1 if the PivotCache supports sheet data formulas.
1	00000002h	fSrvSupportAttribDrill	=1 if the PivotCache's data source supports attribute drill.
2	00000004h	fSrvSupportSubQuery	=1 if the PivotCache's data source supports sub queries.
31-3	FFFFFFF8h	(Reserved)	Reserved; Must be zero.

Any SXADDL variants not listed above are read by Office Excel as is and are retained within the appropriate context in which they were encountered. These records are saved into BIFF if the user saves in BIFF format.

SXADDL12: Additional Workbook Connections Information (881h)

This record stores additional data associated with DCONN (876h) record, and created by Excel 14 or newer. This record is structured the same way as SXADDL (864h) record, and has sxc field set to sxcWBConn (19h).

SXDB: PivotTable Cache Data (C6h)

The SXDB is stored on a separate stream that maintains information about each PivotTable cache. The SXDB record is followed by a single SXDBEX record and several FDB records, one for each field in the PivotTable, given by cfdbTot.

Record Data — BIFF8

Offset	Name	Size	Contents
4	crdbdb	4	Number of records in database
8	idstm	2	Identifies the stream
10	grbit	2	=01h, fSaveData — data is saved with table layout. =02h, fInvalid — the PivotTable must be refreshed before the next update. =04h, fRefreshOnLoad — the PivotTable will be refreshed on load. =08h, fOptimizeCache — the cache is optimized to use the least amount of memory. =10h, fBackgroundQuery — results of the query are obtained in the background. =20h, fEnableRefresh — refresh is enabled.
12	crdbDbb	2	Number of records for each database block.
14	cfdbdb	2	Number of base fields in databases.
16	cfdbTot	2	Number of base fields, grouped fields, and calculated fields.
18	crdbUsed	2	This value is not used and can be set to zero.
20	vsType	2	Data source is one of: =1, Excel worksheet =2, External Data =4, Consolidation =8, Scenario PivotTable
22	cchWho	2	Number of characters in the string containing the name of the user who last refreshed the PivotTable.
24	rgb	var	String, represents the number of the user who last refreshed the PivotTable. Length is in cchWho.

SXDBEX: PivotTable Cache Data (122h)

The SXDBEX record is an extension of the SXDB record. Both records contain PivotTable cache data.

Record Data — BIFF8

Offset	Name	Size	Contents
4	numDate	8	Date the PivotTable cache was created or was last refreshed. The date is stored as an 8-byte IEEE floating-point number.
12	cSxFormula	4	Count of SXFORMULA records for this cache.

SXDI: Data Item (C5h)

This record contains information about the PivotTable data item.

Record Data

Offset	Name	Size	Contents
4	isxvdData	2	Field that this data item is based on.
6	iiftab	2	Index to the aggregation function: =00h, Sum =01h, Count =02h, Average =03h, Max =04h, Min =05h, Product =06h, Count Nums =07h, StdDev =08h, StdDevp =09h, Var =0Ah, Varp
8	df	2	Data display format: =00h, Normal =01h, Difference from =02h, Percentage of =03h, Percentage difference from =04h, Running total in =05h, Percentage of row =06h, Percentage of column =07h, Percentage of total =08h, Index
10	isxvd	2	Index to the SXVD record used by the data display format.
12	isxvi	2	Index to the SXVI record used by the data display format.
14	ifmt	2	Index to the format table for this item.
16	cchName	2	Length of the name; if the name =FFFFh, rgch is null and the name in the PivotTable cache storage is used.
18	rgch	var	Name.

SXDXF: PivotTable Formatting (F4h)

This record stores formatting to apply to a PivotTable area

Record Data — BIFF8			
Offset	**Name**	**Size**	**Contents**
4	rgbdxf	var	PivotTable formatting to apply (refer to DXF documentation at the end of the XF record)

SXEX: PivotTable View Extended Information (F1h)

This record follows the SXVIEW record and contains information about additional features added to PivotTables in Excel 97.

Record Data — BIFF8			
Offset	**Name**	**Size**	**Contents**
4	csxformat	2	Number of SXFORMAT records to follow
6	cchErrorString	2	Number of characters for DisplayErrorString string
8	cchNullString	2	Number of characters for DisplayNullString string
10	cchTag	2	Number of characters in Tag string
12	csxselect	2	Number of RTSXSELECT records to follow
14	crwPage	2	Number of page field per row
16	ccolPage	2	Number of page field per column
18	grbit1	2	=0001h, fAcrossPageLay =01FEh, cWrapPage =0200h, fPreserveFormattingNow =0400h, fManualUpdate
20	grbit2	2	=0001h, fEnableWizard =0002h, fEnableDrilldown =0004h, fEnableFieldDialog =0008h, fPreserveFormatting =0010h, fMergeLabels =0020h, fDisplayErrorString =0040h, fDisplayNullString =0080h, fSubtotalHiddenPageItems =0100h, (unused) =0200h, FEnableDataEd =0400h, fDisableFList
22	cchPageFieldStyle	2	Number of characters in page field style string
24	cchTableStyle	2	Number of characters for table style string
26	cchVacateStyle	2	Number of characters for vacate style string
28	rgb	var	Array of characters for ErrorString, NullString, Tag, PageFieldStyle, TableStyle, VacateStyle

SXEXT: External Source Information (DCh)

This record stores information about the SQL query string that retrieves external data for a PivotTable. The record is followed by SXSTRING records that contain the

SQL strings and then by a SXSTRING record that contains the SQL server connection string.

Note: PARAMQRY has the same record number as SXEXT. This has no adverse ramifications in a BIFF file because PARAMQRY always occurs in conjunction with an SXEXT record.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit	2	Options flags; see following table
6	cparams	2	Number of parameter strings
8	cstQuery	2	Number of strings for SQL statement or URL
10	cstWebPost	2	Number of strings for post method of Web query
12	cstSQLSav	2	Number of strings for SQL statement for server-based page fields
14	cstOdbcConn	2	Number of strings for ODBC connection string

The grbit field contains the following flags.

Bits	Mask	Name	Contents
2–0	0007h	dbt	=1 ODBC data source =2 DAO recordset (no actual information about the recordset is saved) =3 reserved =4 Web (WWW) query XL9: 5= OLE database XL9: 6= Text query XL9: 7= ADO query
3	0008h	fOdbcConn	=1 for ODBC connection
4	0010h	fSql	=1 for ODBC connection
5	0020h	fSqlSav	=1 for server-based page fields
6	0040h	fWeb	=1 for a Web (WWW) query
7	0080h	fSavePwd	=1 if the **Save Password** option is on
8	0100h	fTablesOnlyHTML	=1 if the **Save Tables in HTML Only** option is on
15–9	FE00h	(Reserved)	

The following records occur after a SXEXT record:

Record name	Contents
SXSTRING SXSTRING . . .	Collection of cstQuery SXSTRING records to concatenate to give the URL (Web query), SQL string (ODBC query) or parameterized SQL string (for server-based page field)
SXSTRING SXSTRING . . .	Collection of cstOdbcConn SXSTRING records to concatenate to give the ODBC connection string (ODBC queries only)

SXSTRING SXSTRING . . .	Collection of cstWebPost SXSTRING records to concatenate to give the post method data (Web query only, optional)
PARAMQRY PARAMQRY . . .	Collection of cparams PARAMQRY parameter definition records
SXSTRING SXSTRING . . .	Collection of cstSQLSav SXSTRING records to concatenate to give the original SQL string for an ODBC query with server-based page fields

Record Data — BIFF7 and earlier

Offset	Name	Size	Contents
4	id	2	Connection ID of the SQL server
6	fError	2	=1 if an error occurred during the last attempt to communicate with the server
8	cstSQL	2	Number of SXSTRING records that follow

SXFDBTYPE: SQL Datatype Identifier (1BBh)

This record contains a SQL datatype identifier.

Record Data — BIFF8

Offset	Name	Size	Contents
4	wTypeSql	2	The SQL datatype of the field described in the immediately preceding SXFDB record. These are the same values as found in the ODBC SDK. See the SQL datatypes in SQL.H

SXFILT: PivotTable Rule Filter (F2h)

This record stores PivotTable Rule Filter options.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit1	2	=0001h, fRwField, field is in row area. =0002h, fColumnField, field is in column area. =0004h, fPageField, field is in page area. =0008h, fDataField, field is in data area. =0030h, (reserved) =FFC0h, iDim.
8	grbit2	2	=03FFh, isxvd. =FC00h, (reserved)

10	grbitSbt	2	=0001h, Data =0002h, Default =0004h, SUM =0008h, COUNTA =0010h, COUNT =0020h, AVERAGE =0040h, MAX =0080h, MIN =0100h, PRODUCT =0200h, STDEV =0400h, STDEVP =0800h, VAR =1000h, VARP =2000h, Grand Total XL9: =4000h, blank line
12	cisxvi	2	Number of SXVI records.

SXFMLA: PivotTable Parsed Expression (F9h)

This record stores a PivotTable parsed expression.

Record Data — BIFF8

Offset	Name	Size	Contents
4	cce	2	Size of rgce
6	csxname	2	Number of RTSXNAME records to follow this record
8	rgce		Parsed expressed whose size is given by cce

SXFORMAT: PivotTable Format Record (FBh)

This record stores formatting data.

Record Data — BIFF8

Offset	Name	Size	Contents
4	rlType	2	=0h, clear =1h, format applied
6	cbData	2	Length of formatting data in the SXDXF record that follows this record

Note: an SXRULE and related records immediately follow the SXFORMAT record; these are followed by an SXDXF record.

SXFORMULA: PivotTable Formula Record (103h)

This record stores a PivotTable formula.

Record Data — BIFF8

Offset	Name	Size	Contents
4	(Reserved)	2	Reserved. Should be set to zero.
6	ifdb	2	–1 if the calculated item formula applies to all fields, or, if positive, the field that this calculated item formula applies to.

SXIDSTM: Stream ID (D5h)

This record is a header record for a group of SXVS, SXEXT, and SXSTRING records that describe the PivotTable streams in the SX DB storage (the PivotTable cache storage). The idstm field identifies the stream.

Record Data

Offset	Name	Size	Contents
4	idstm	2	Stream ID

SXITM: PivotTable Item Indexes (F5h)

The SXITM record stores an array of PivotTable item indexes, which describes the item layout for one line of a row or column in the PivotTable view.

Record Data

Offset	Name	Size	Contents
4	rgisxvi	var	Array of PivotTable item indexes

The SXITM record has variable length. The PivotTable item index structure is shown in the following table.

Offset	Name	Size	Contents
0	isxvi	2	PivotTable item index

SXIVD: Row/Column Field IDs (B4h)

This record stores an array of field ID numbers (2-byte integers) for the row fields and column fields in a PivotTable. Two SXIVD records appear in the file: the first contains the array of row field IDs, and the second contains the array of column field IDs.

Record Data

Offset	Name	Size	Contents
4	rgisxvd	var	Array of 2-byte integers; contains either row field IDs or column field IDs

SXLI: Line Item Array (B5h)

The SXLI record stores an array of variable-length SXLI structures, which describe the row and column items in a PivotTable. There are two SXLI records for each PivotTable: the first stores row items, and the second stores column items.

Record Data

Offset	Name	Size	Contents
4	rgsxli	var	Array of SXLI structures

The SXLI structure has variable length but always is at least 10 bytes long, with one element in the rgisxvi array (the index to the SXVI record for the item). The SXLI structure is shown in the following table.

Offset	Name	Size	Contents
0	cSic	2	Count of items identical to the previous element in rgsxvi; for 0<=i<cSic, rgisxvi[i] is the same as the previous line.

Offset	Name	Size	Contents
2	itmtype	2	Item type: =00h, Data =01h, Default =02h, SUM =03h, COUNTA =04h, COUNT =05h, AVERAGE =06h, MAX =07h, MIN =08h, PRODUCT =09h, STDEV =0Ah, STDEVP =0Bh, VAR =0Ch, VARP =0Dh, Grand total XL9: =0Eh, blank line
4	isxviMac	2	Maximum index to the rgisxvi[i] array.
6	grbit	2	Option flags; see the following table.
8	rgisxvi	2	Array of indexes to SXVI records; the number of elements in the array is (isxviMac+1).

The grbit field contains the following flags:

Bits	Mask	Name	Contents
0	0001h	fMultiDataName	=1, use the data field name for the subtotal (instead of using "Total").
8–1	01F7h	iData	For a multidata subtotal, iData is the index to the data field.
9	0200h	fSbt	=1, this item is a subtotal.
10	0400h	fBlock	=1, this item is a block total.
11	0800h	fGrand	=1, this item is a grand total.
12	1000h	fMultiDataOnAxis	=1, this axis contains multi-data.
15–13	E000h	(Reserved)	Reserved; must be 0 (zero).

SXNAME: PivotTable Name (F6h)

This record stores a PivotTable name.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit	2	=02h, fErrName, the name is invalid and should be displayed and evaluated as **#NAME**.
6	ifdb	2	Field to aggregate in calculated field formulas.

Offset	Name	Size	Contents
8	ifn	2	Function to use for aggregation in calculated field formulas. =01h, SUM =02h, COUNTA =03h, AVERAGE =04h, MAX =05h, MIN =06h, PRODUCT =07h, COUNT =08h, STDEV =09h, STDEVP =0Ah, VAR =0Bh, VARP
10	csxpair	2	Number of SXPAIR records to follow this record.

SXPAIR: PivotTable Name Pair (F8h)

This record stores a PivotTable name pair.

Record Data — BIFF8

Offset	Name	Size	Contents
4	isxvd	2	Field.
6	iCache	2	Index of item in field.
8	(Reserved)	2	Reserved, should be set to zero.
10	grbit	2	=01h, fCalculatedItem. =06h, reserved. =08h, fPhysical, item is referred to by position (physical) rather than by name (logical) =10h, fRelative, if fPhysical is true, then item is referred to using relative references rather than absolute references.

SXPI: Page Item (B6h)

This record contains information about the PivotTable page item.

Record Data

Offset	Name	Size	Contents
4	isxvi	2	Index to the SXVI record for the page item
6	isxvd	2	Index to the SXVD record for the page item
8	idObj	2	Object ID for the page item drop-down arrow

These three fields are repeated for each field that is showing the PivotTable view page area. **Note**: it is possible this could make the record larger than the limit for a single BIFF record, so one or more CONTINUE records may be needed.

SXPIEX: OLAP Page Item Extensions (80Eh)

Introduced in Excel 9 (2000) this is a FRT record. It stores OLAP extensions to PivotTable Page Items.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Eh
6	grbitFrt	2	FRT flags; must be zero
8	isxth	4	The index of the SXTH record which gives the hierarchy that is in this page field orientation
12	stUnique	var	Unicode string; the unique name of the Page Item
var	stDisplay	var	Unicode string; the display name of the Page Item

SXRULE: PivotTable Rule Data (F0h)

This record stores PivotTable rule data.

Record Data — BIFF8

Offset	Name	Size	Contents
4	iDim	1	Position of current field in axis.
5	isxvd	1	Current field.
6	grbit	2	see table below
8	(Reserved)	2	
10	csxfilt	2	Number of SXFILT records following this record.
12	irwFirst	1	When grbit.fPart=1, relative zero-based first/last row/column offsets from the first cell in the area to the first cell in the partial area.
13	irwLast	1	
14	icolFirst	1	
15	icolLast	1	

The grbit field contains the PivotTable rule properties and flags as follows:

Bits	Mask	Name	Contents
3-0	000Fh	sxaxis	PivotTable area that the current field is in =1h, row area =2h, column area =4h, page area =8h, data area
7-4	00F0h	sxrtype	Rule area type =1h, data values or item labels area =3h, entire PivotTable =4h, PivotTable empty origin (top-left) cell(s) =5h, field header cell =6h, PivotTable empty top-right cell(s)
8	0100h	fPart	=1 if only a portion of the area is included
9	0200h	fNoLabels	=1 if the labels are not part of the area
10	0400h	fNoData	=1 if the data cells are not part of the area

Bits	Mask	Name	Contents
11	0800h	fGrandRw	=1 if the row grand total is part of the area
12	1000h	fGrandCol	=1 if the column grand total is part of the area
13	2000h	fGrandRwSav	Redundant value of fGrandRw
14	4000h	fCacheBased	=1 if the SXFILT item indexes refer to PivotTable cache items rather than view items
15	8000h	fGrandColSav	Redundant value of fGrandCol

SXSELECT: PivotTable Selection Information (F7h)

This record stores PivotTable selection information.

Record Data — BIFF8

Offset	Name	Size	Contents
4	iwnx	2	0-based index of the window of the sheet
6	pnn	2	0-based index of the pane of the window
8	sxaxisAct	2	The PivotTable area the selection is on =0h, no PivotTable area =1h, row area =2h, column area =4h, page area =8h, data area
10	iDimAct	2	Which field (zero-based index) within the PivotTable area the selection operation started on
12	iLiStart	2	0-based index of the PivotTable line where the selection operation started
14	iLiAct	2	0-based index of the PivotTable line that was most recently included in the selection
16	iLiMin	2	0-based index of the first possible PivotTable line that could be included into the current selection
18	iLiMax	2	0-based index of the last possible PivotTable line that could be included into the current selection
20	rwClick	2	0-based row/column coordinates of the cell where the user last clicked the PivotTable selection
22	colClick	2	
24	rwClickPrev	2	0-based row/column coordinates of the cell where the user previous clicked the PivotTable selection
26	colClickPrev	2	
28	grbit	2	PivotTable selection properties and flags

The grbit field contains the PivotTable selection properties and flags listed in the following table.

Bits	Mask	Name	Contents
4-0	001Fh	cClick	Number of clicks the user did to refine the current selection

5	0020h	fNoData	=1 if the data cells are not part of the area
6	0040h	fNoLabels	=1 if the labels are not part of the area
7	0080h	fToggleDataHeader	=1 if the header cell for the selected items can be included or excluded from the selection
8	0100h	fAreaClickRefines	=1 if a click in a selection area can refine the selection rather than an additional click on the same cell that the selection started with
9	0200h	fExtendable	=1 if the current selection can be extended to include other PivotTable lines
15-10	FC00h	(Reserved)	Reserved; must be zero

SXSTRING: String (CDh)

This record contains an SQL query string, an SQL server connection string, or a page item name from a multiple-consolidation PivotTable.

Record Data

Offset	Name	Size	Contents
4	cch	2	Length of the string
6	rgch	var	String

SXTBL: Multiple Consolidation Source Info (D0h)

This record stores information about multiple-consolidation PivotTable source data.

Record Data

Offset	Name	Size	Contents
4	cdref	2	Count (1-based) of DCONREF or DCONNAME records that follow the SXTBL record
6	csxtbpg	2	Count (1-based) of SXTBPG records that follow the DCONREF or DCONNAME records
8	grbitPages	2	(See the following table)

The grbitPages field contains an encoded count of page fields, as shown in the following table.

Offset	Bits	Mask	Name	Contents
0	14–0	7FFFh	cPages	Count (1-based) of page fields
	15	8000h	fAutoPage	=1 if the user selected the **Create A Single Page Field For Me** option in the **PivotTable Wizard** dialog box

SXTBPG: Page Item Indexes (D2h)

This record stores an array of page item indexes that represent the table references for a multiple-consolidation PivotTable.

Record Data

Offset	Name	Size	Contents
4	rgiitem	var	Array of 2-byte indexes to page items (iitem)

SXTBRGIITM: Page Item Name Count (D1h)

This record stores the number of page item names in a multiple-consolidation PivotTable. The names are stored in SXSTRING records that follow the SXTBRGIITM.

Record Data

Offset	Name	Size	Contents
4	cItems	2	Number of page item names (number of SXTBRGIITM records that follow)

SXTH: Pivot Table OLAP Hierarchy (80Dh)

Introduced in Excel 9 (2000) this is a FRT record. It contains OLAP Pivot Table hierarchy information.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Dh
6	grbitFrt	2	FRT flags; must be zero
8	dwFlags	4	OLAP options; see following table
12	sxaxis	4	The ID of the axis element; 1= sxaxisRw; the row header region of the PivotTable 2= sxaxisCol; the column header region of the PivotTable 4= sxaxisPage; the page field dropdown of the PivotTable 8= sxaxisData; the body of the PivotTable
16	isxvd	4	Index into array of dimensions; these are loaded in the SXVD records; only applicable if the sxaxis is sxaxisPage or sxaxisData
20	csxvdXl	4	Count of fields fetched from the OLAP database
24	sxDragTh	2	Field drag flags; see following table
26	stUnique	var	Unicode string; Unique name for the hierarchy
var	stDisplay	var	Unicode string; Display name for the hierarchy
var	stDefaultUnique	var	Unicode string; Unique name of the default member
var	stAllUnique	var	Unicode string; Unique name of the All member
var	stDimensionUnique	var	Unicode string; Unique name of the dimension

Offset	Name	Size	Contents
var	cisxvd	4	Count of isxvd items in the rgb field; this has the same value as csxvdXl
var	rgisxvd	var	Set of isxvd items; each is a 4-byte identifier that points to a specific SXVD record
var	rgb	var	Set of strings describing which members have been hidden; see text below

The dwFlags field contains the following option flags.

Bits	Mask	Name	Contents
0	0001h	fMeasure	1= This hierarchy is a measure; it can only be moved to the data area
1	0002h	(Reserved)	
2	0004h	fOutlineMode	XL10: 1= When new levels are added to the PivotTable view for this hierarchy default to showing them in outline layout
3	0008h	fEnableMultiplePageItems	XL10: 1= Allow the user to select two or more OLAP cube members in this hierarchy when the hierarchy is in the page area
4	0010h	fSubtotalAtTop	XL10: 1= When new levels are added to the PivotTable view for this hierarchy default to showing subtotals at the top of the item list
5	0020h	fSet	XL10: 1= This hierarchy is a custom set
6	0040h	fDontShowInFldList	XL10: 1= This hierarchy should not be shown in the field list control/window
31-7		(Reserved)	

The sxDragTh field contains the following option flags.

Bits	Mask	Name	Contents
0	0001h	fDragToRow	1= This field can be dragged to a row field
1	0002h	fDragToColumn	1= This field can be dragged to a column field
2	0004h	fDragToPage	1= This field can be dragged to a page field
3	0008h	fDragToData	1= This field can be dragged to a data field
4	0010h	fDragToHide	1= This field can be hidden
15-5	FFE0h	(Reserved)	Reserved; must be zero

The rgb field contains a structured list of elements hidden in the PivotTable. First is a count of the number of sets. The sets follow. Each set contains a count of the number of strings in that set, followed by the strings in that set. **Note**: this can easily make the record larger than the limit for a single BIFF record, so one or more CONTINUEFRT records may be needed.

SXVD: View Fields (B1h)

This record contains PivotTable view fields and other information.

Record Data

Offset	Name	Size	Contents
4	sxaxis	2	Axis: =0, no axis =1, row =2, column =4, page =8, data
6	cSub	2	Number of subtotals attached.
8	grbitSub	2	Item subtotal type (see the following table).
10	cItm	2	Number of items.
12	cchName	2	Length of the name; if the name =FFFFh, rgch is null and the name in the cache is used.
14	rgch	var	Name.

The subtotal type (grbitSub) bits are defined as shown in the following table.

Name	Contents
bitFNone	0000h
bitFDefault	0001h
bitFSum	0002h
bitFCounta	0004h
bitFAverage	0008h
bitFMax	0010h
bitFMin	0020h
bitFProduct	0040h
bitFCount	0080h
bitFStdev	0100h
bitFStdevp	0200h
bitFVar	0400h
bitFVarp	0800h

SXVDEX: Extended PivotTable View Fields (100h)

This record contains extended PivotTable view fields information.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit1	4	=0001h, fShowAllItems — show all items for this field. =0002h, fDragToRow — user can drag field to row area. =0004h, fDragToColumn — user can drag field to column area. =0008h, fDragToPage — user can drag field to page area. =0010h, fDragToHide — user can remove field from view. =0060h, reserved. =0080h, fServerBased — this field is a server-based field in the page area. =0100h, reserved. =0200h, fAutoSort — autosort is enabled. =0400h, fAscendSort — autosort ascending. =0800h, fAutoShow — autoshow is enabled. =1000h, fAscendShow — show top values. =2000h, fCalculatedField — calculated field. XL9: =4000h, fPageBreaksBetweenItems – a page break is put between item changes in the Pivot Table view XL9: =8000h, fHideNewItems – new items that come in during a Pivot Table refresh are not shown in the view by default
8	grbit2	1	=1Fh, reserved. XL9: =20h, fOutline – layout this field in outline form on the Pivot Table view XL9: =40h, fInsertBlankRow – a blank line is put between item changes in the Pivot Table view XL9: =80h, fSubtotalAtTop –- when fOutline=1 then display subtotals at the top of the list of items instead of at the bottom
9	citmShow	1	Number of items to show for AutoShow, default is 10.
10	isxdiSort	2	0-based index of data field that AutoSort is based on or –1 for current field.
12	isxdiShow	2	0-based index of data field that AutoShow is based on.
14	ifmt	2	Number format of field or 0 if none.
16	cchSubName	2	XL9: Length of unicode string in stSubName. FFh means no custom subtotal name was specified
18	(Reserved)	4	XL9:
22	(Reserved)	4	XL9:
26	stSubName	var	XL9: Custom subtotal name represented in unicode

SXVDTEX: View Dimension OLAP Extensions (80Fh)

Introduced in Excel 9 (2000) this is a FRT record. It stores OLAP extensions to the SXVD record.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Fh
6	grbitFrt	2	FRT flags; must be zero
8	wTensorFlags	2	OLAP options; see following table
10	isxth	2	Which OLAP hierarchy
12	isxtl	4	OLAP level
16	csxvi	4	Count of 2-byte items in rgsxvi
20	rgsxvi	var	Sets of PivotTable item flags; see following table for flags

The wTensorFlags field contains the following option flags.

Bits	Mask	Name	Contents
0	0001h	fTensorSort	1= The results are returned in the same order as they are arranged on the server
1	0002h	fDrilledLevel	1= The user drilled to this level; this is always 1 for the first level in the OLAP hierarchy
15-2	FFFCh	(Reserved)	Reserved; must be zero

The rgsxvi fields contain the following option flags.

Bits	Mask	Name	Contents
0	0001h	fDrilledMember	0= This element's children are hidden 1= This element's child nodes are expanded
1	0002h	fChildrenKnown	0= Excel does not know if this node has child nodes 1= Excel knows whether this node has child nodes
2	0004h	fHasChildren	Must be zero if fChildrenKnown is zero 0= This node has no child nodes 1= This node has child nodes
15-3	FFF8h	(Reserved)	Reserved; must be zero

SXVI: View Item (B2h)

This record contains information about a PivotTable item.

Record Data

Offset	Name	Size	Contents
4	itmtype	2	Item type: =FEh, Page =FFh, Null =00h, Data =01h, Default =02h, SUM =03h, COUNTA =04h, COUNT =05h, AVERAGE =06h, MAX =07h, MIN =08h, PRODUCT =09h, STDEV =0Ah, STDEVP =0Bh, VAR =0Ch, VARP =0Dh, Grand total XL9: =0Eh, blank
6	grbit	2	Option flags.
8	iCache	2	Index to the PivotTable cache.
10	cchName	2	Length of the name; if the name =FFFFh, rgch is null and the name in the cache is used.
12	rgch	var	Name.

The grbit field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fHidden	=1 if the item is hidden.
1	0002h	fHideDetail	=1 if detail is hidden.
2	0004h	(Reserved)	
3	0008h	fFormula	=1 if item is a calculated item.
4	0010h	fMissing	=2 if item does not exist in any records.
15–5	FFE0h	(Reserved)	

SXVIEW: View Definition (B0h)

This record contains top-level PivotTable information.

Record Data

Offset	Name	Size	Contents
4	rwFirst	2	First row of the PivotTable
6	rwLast	2	Last row of the PivotTable
8	colFirst	2	First column of the PivotTable
10	colLast	2	Last column of the PivotTable
12	rwFirstHead	2	First row containing PivotTable headings

Offset	Name	Size	Contents
14	rwFirstData	2	First row containing PivotTable data
16	colFirstData	2	First column containing PivotTable data
18	iCache	2	Index to the cache
20	(Reserved)	2	Reserved; must be 0 (zero)
22	sxaxis4Data	2	Default axis for a data field
24	ipos4Data	2	Default position for a data field
26	cDim	2	Number of fields
28	cDimRw	2	Number of row fields
30	cDimCol	2	Number of column fields
32	cDimPg	2	Number of page fields
34	cDimData	2	Number of data fields
36	cRw	2	Number of data rows
38	cCol	2	Number of data columns
40	grbit	2	Option flags
42	itblAutoFmt	2	Index to the PivotTable autoformat
44	cchName	2	Length of the PivotTable name
46	cchData	2	Length of the data field name
48	rgch	var	PivotTable name, followed by the name of a data field

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	0001h	fRwGrand	=1 if the PivotTable contains grand totals for rows
	1	0002h	fColGrand	=1 if the PivotTable contains grand totals for columns
	2	0004h	(Reserved)	Reserved; must be 0 (zero)
	3	0008h	fAutoFormat	=1 if the PivotTable has an autoformat applied
	4	0010h	fWH	=1 if the width/height autoformat is applied
	5	0020h	fFont	=1 if the font autoformat is applied
	6	0040h	fAlign	=1 if the alignment autoformat is applied
	7	0080h	fBorder	=1 if the border autoformat is applied
	8	0100h	fPattern	=1 if the pattern autoformat is applied
	9	0200h	fNumber	=1 if the number autoformat is applied
	15–10	FC00h	(Reserved)	Reserved; must be 0 (zero)

SXVIEWEX: Pivot Table OLAP Extensions (80Ch)

Introduced in Excel 9 (2000) this is a FRT record. It stores counts of the records for OLAP extensions to PivotTables. The SXTH records immediately follow the SXVIEWEX record, followed by the SXPIEX records and the SXVDTEX records. The count of each of these is specified in the SXVIEWEX record.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Ch
6	grbitFrt	2	FRT flags; must be zero
8	csxth	4	Count of SXTH records
12	csxpi	4	Count of SXPIEX records
16	csvdtex	4	Count of SXVDTEX records
20	cbFuture	4	Count of bytes from future versions of Excel
24	rgbFuture	var	Information from future versions of Excel

SXVIEWEX9: Pivot Table Extensions (810h)

Introduced in Excel 9 (2000) this is a FRT record. It contains extensions to Pivot Tables new to XL2000.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0810h
6	grbitFrt	2	FRT flags; must be zero
8	(Reserved)	4	Reserved; must be zero
12	grbit	4	Options; see following table
16	itblAutoFmt	2	Index to the PivotTable autoformat
18	chGrand	var	Unicode string; the Grand Total name

The grbit field contains following option flags.

Offset	Bits	Mask	Name	Contents
0	0	0001h	(Reserved)	Reserved; must be zero
	1	0002h	fPrintTitles	1= Set Print Titles
	2	0004h	fLineMode	1= One or more of the child records has the fOutline bit set
	4-3	0018h	(Reserved)	Reserved; must be zero
	5	0020h	fRepeatItemsOnEachPrintedPage	1= Print the item label on each page when the PivotTable is printed
	15-6	FFC0h	(Reserved)	Reserved; must be zero

Offset	Bits	Mask	Name	Contents
2	15-0	FFFFh	(Reserved)	Reserved; must be zero

SXVS: View Source (E3h)

This record contains an integer that defines the data source for a PivotTable.

Record Data

Offset	Name	Size	Contents
4	vs	2	Data source: =01h, Excel list or database =02h, External data source (Microsoft Query) =04h, Multiple consolidation ranges =10h, A Scenario Manager summary report

TABID: Sheet Tab Index Array (13Dh)

This record contains an array of sheet tab index numbers. The record is used by the Shared Lists feature.

The sheet tab indexes have type `short int` (2 bytes each). The index numbers are 0-based and are assigned when a sheet is created; the sheets retain their index numbers throughout their lifetime in a workbook. If you rearrange the sheets in a workbook, the rgiTab array will change to reflect the new sheet arrangement.

This record does not appear in BIFF5 files.

Record Data

Offset	Name	Size	Contents
4	rgiTab	var	Array of tab indexes

TABIDCONF: Sheet Tab ID of Conflict History (EAh)

This record contains the sheet tab index for the Conflict History worksheet. The record is used by the Shared Lists feature.

This record does not appear in BIFF5 files.

Record Data

Offset	Name	Size	Contents
4	itabConf	2	Sheet tab index for the Conflict History worksheet. If =FFFFh, the user has stopped sharing the workbook.

TABLE: Data Table (236h)

A TABLE record describes a data table created with the **Table** command (**Data** menu).

Record Data

Offset	Name	Size	Contents
4	rwFirst	2	First row of the table
6	rwLast	2	Last row of the table
8	colFirst	1	First column of the table
9	colLast	1	Last column of the table

Offset	Name	Size	Contents
10	grbit	2	Option flags
12	rwInpRw	2	Row of the row input cell
14	colInpRw	2	Column of the row input cell
16	rwInpCol	2	Row of the column input cell
18	colInpCol	2	Column of the column input cell

The grbit field contains the option flags listed in the following table.

Offset	Bits	Mask	Name	Contents
0	0	01h	fAlwaysCalc	Always calculate the formula.
	1	02h	fCalcOnLoad	Calculate the formula when the file is opened.
	2	04h	fRw	=1 input cell is a row input cell. =0 input cell is a column input cell.
	3	08h	fTbl2	=1 if two-input data table. =0 if one-input data table.
	7–4	F0h	(unused)	
1	7–0	FFh	(unused)	

The area (range of cells) in which the table is entered is defined by the rwFirst, rwLast, colFirst, and colLast fields. This area is the interior of the table and does not include the outer row or column (these contain the table formulas and/or input values).

In cases where the input cell is a deleted reference (the cell displays **#REF!**), the rwInp field is –1. The colInp field is not used in this case.

TABLESTYLE: Table Style (88Fh)

This record is used for each custom Table style in use in the document.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Fh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	grbitTS	2	see below
18	ctse	4	Count of TABLESTYLEELEMENT records to follow.
22	cchName	2	Length of Table style name in 2 byte characters.
24	rgchName	var	Table style name in 2 byte characters

The grbitTS field contains the flags listed in the following table.

Bits	Mask	Name	Contents
0	0001h	fIsBuiltIn	Should always be 0.
1	0002h	fIsPivot	=1 if Table style can be applied to PivotTables

Bits	Mask	Name	Contents
2	0004h	fIsTable	=1 if Table style can be applied to Tables
3..15	FFF8h	(Reserved)	Reserved; must be 0 (zero)

TABLESTYLEELEMENT: Table Style Element (890h)

This record represents each custom table style in use in the document.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0890h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	tseType	4	Type of table style element
20	size	4	Number of items in each band for row or column stripped elements.
24	dxfid	4	Index of DXF record with formatting for this table style element.

Excel supports the following table style element types:

tseType	Value	Comments
tseWholeTable	0	Applies to whole table
tseHeaderRow	1	Header row formatting
tseTotalRow	2	Total row formatting
tseFirstColumn	3	First column formatting
tseLastColumn	4	Last column formatting
tseRowStripe1	5	First row stripe formatting
tseRowStripe2	6	Second row stripe formatting
tseColumnStripe1	7	First column stripe formatting
tseColumnStripe2	8	Second column stripe formatting
tseFirstHeaderCell	9	First cell of header row formatting
tseLastHeaderCell	10	Last cell of header row formatting
tseFirstTotalCell	11	First cell of total row formatting
tseLastTotalCell	12	Last cell of total row formatting
tseSubtotalColumn1	13	Top level subtotals column formatting
tseSubtotalColumn2	14	Alternating even column subtotals formatting
tseSubtotalColumn3	15	Alternating odd column subtotals formatting
tseSubtotalRow1	16	Top level subtotals row formatting

tseSubtotalRow2	17	Alternating even subtotals row formatting
tseSubtotalRow3	18	Alternating odd subtotals row formatting
tseBlankRow	19	Blank row formatting
tseColumnSubheading1	20	Top level column subheading formatting
tseColumnSubheading2	21	Alternating even column subheading formatting
tseColumnSubheading3	22	Alternating odd column subheading formatting
tseRowSubheading1	23	Top level row subheading formatting
tseRowSubheading2	24	Alternating even row subheading formatting
tseRowSubheading3	25	Alternating odd row subheading formatting
tsePageFieldLabels	26	Page field label formatting
tsePageFieldValues	27	Page field values formatting

TABLESTYLES: Table Styles (88Eh)

This record supports custom Table styles that are in use in the document and persists the current default Table and PivotTable styles.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =088Eh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	cts	4	count of TABLESTYLE records to follow
20	cchDefListStyle	2	Length of default list table style name in 2 byte characters
22	cchDefPivotStyle	2	Length of default pivot table style name in 2 byte characters.
24	rgchDefListStyle	var	default list table style name
var	rgchDefPivotStyle	var	default pivot table style name

TEMPLATE: Workbook Is a Template (60h)

This record has no record data field. If the TEMPLATE record is present in the Book stream, it signifies that the workbook is a template. The TEMPLATE record, if present, must immediately follow the BOF record.

THEME: Theme (896h)

The THEME record stores information about the current theme in use in the document. The record contains a default theme version value that if non-zero indicates which default theme to use. If the theme version is 0 then the document uses a custom theme which will be serialized to a byte stream containing the zip

package with the theme contents (see Office Open XML specification (Ecma Internation Standard 376) for further details). This byte stream is be appended on to the THEME record and as many CONTINUEFRT12 records as needed to hold its contents.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0896h
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	dwThemeVersion	8	default theme version; =0 if custom theme
24	rgb	var	beginning of serialized package bytes

TOPMARGIN: Top Margin Measurement (28h)

The TOPMARGIN record specifies the top margin in inches when a sheet is printed. The num field is in 8-byte IEEE floating-point format.

Record Data

Offset	Name	Size	Contents
4	num	8	Top margin

TXO: Text Object (1B6h)

This record stores a text object. The TXO record is followed by two CONTINUE records. The first CONTINUE contains the text data, and the second CONTINUE contains the formatting runs. If the text box contains no text, then these CONTINUE records are not written to the file.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit	2	Option flags; see following table
6	rot	2	Orientation of text within the object boundary: =0, no rotation (text appears left to right) =1, text appears top to bottom; letters are upright =2, text is rotated 90 degrees counterclockwise =3, text is rotated 90 degrees clockwise
8	(Reserved)	6	Reserved; must be 0 (zero)
14	cchText	2	Length (in characters) of text (in first CONTINUE record)
16	cbRuns	2	Length of formatting runs (in second CONTINUE record)
14	(Reserved)	4	Reserved; must be 0 (zero)

The grbit field contains the following option flags.

Bits	Mask	Name	Contents
0	0001h	(Reserved)	

3–1	000Eh	alcH	Horizontal text alignment: 1= left-aligned 2= centered 3= right-aligned 4= justified
6–4	0070h	alcV	Vertical text alignment: 1= top 2= center 3= bottom 4= justify
8–7	0180h	(Reserved)	
9	0200h	fLockText	=1 if the **Lock Text** option is on (**Format Text Box** dialog box, **Protection** tab)
15–10	FC00h	(Reserved)	

The first CONTINUE record contains the text (grbit/rgb fields as defined for unicode strings) the length (in characters) is given by cchText.

The second CONTINUE record contains an array of formatting runs structures (TXORUNS). A TXORUNS structure contains formatting information about the object text string. A TXORUNS structure occurs every time the text formatting changes. The TXORUNS structure is described in the following table.

Offset	Name	Size	Contents
0	ichFirst	2	Index to the first character where formatting applies
2	ifnt	2	Index to the FONT record
4	(Reserved)	4	

There are always at least two TXORUNS structures in the second CONTINUE record, even if the entire text string is normal font (ifnt=0). The last TXORUNS structure, which ends the formatting information for the string, always has ichFirst=cchText.

TXTQUERY: Text Query Information (805h)

This is a FRT record. It contains the information for a Text Query.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0805h
6	grbitFrt	2	FRT flags; must be zero
8	grbit	2	Options; see following table
10	rowStartAt	4	Row in source file where where the query information starts
14	delimFlags	4	Delimiter flags; see following table
18	itwf	4	Fields in each row of data
22	chDecimal	1	ANSI character; which character is used for the decimal separator

23	chThousSep	1	ANSI character, which character is used for the thousands separator
24	rgtxtwf	var	Array of itwf TXTWF structures (see below)
var	rgchFile	var	Name of the text file that is the source for the query

The grbit field contains following option flags.

Bits	Mask	Name	Contents
0	0001h	(Reserved)	Reserved; must be one
1	0002h	fDelimited	0= The data fields are of fixed size 1= The data is delimited
3-2	000Ch	iCpid	File Origin; 1= Macintosh 2= Windows (ANSI) 3= MS-DOS (PC-8)
4	0010h	fPromptForFile	0= Refresh data from saved file location 1= Browse for a file to open when refreshing
14-5	7FE0h	iCpidNew	XL10: File's original codepage
15	8000h	fUseNewiCpid	XL10: 1= use iCpidNew (iCpid set to 2)

The delimFlags field contains following option flags.

Offset	Bits	Mask	Name	Contents
0	0	01h	fTab	1= Treat the tab character as a field delimiter
	1	02h	fSpace	1= Treat the space character as a field delimiter
	2	04h	fComma	1= Treat the comma character as a field delimiter
	3	08h	fSemiColon	1= Treat the semicolon character as a field delimiter
	4	10h	fCustom	1= Use the custom delimiter character specified in the chCustom field
	5	20h	fConsective	0= Consecutive delimiters are all treated as separate delimiters 1= Consecutive delimiters are treated as one delimiter
	7-6	C0h	iTextDelm	Text delimiter; 0= Quotation mark 1= Apostrophe 2-3= No text delimiter
2-1	15-0	FFFFh	chCustom	Custom text delimiter character
3	7-0	FFh	(Reserved)	Reserved; must be zero

The TXTWF structure is shown in the following table.

Offset	Name	Size	Contents
0	fieldType	4	Field data type: =00h, Automatic =01h, Text =02h, Date in the order month, day then year =03h, Date in the order day, month then year =04h, Date in the order year, month then day =05h, Date in the order month, year then day =06h, Date in the order day, year then month =07h, Date in the order year, day then month =08h, Skip importing this field
4	fieldStart	4	The character position (zero-based) this field starts at if delimiters are not being used to determine where fields start and end

UDDESC: Description String for Chart Autoformat (DFh)

This record stores the description string for a custom chart autoformat. The record is written only in the chart autoformat file (XL8GALRY.XLS in Microsoft Excel for Windows).

Record Data

Offset	Name	Size	Contents
4	cch	1	Length of the description string
5	rgch	var	Description string

UNCALCED: Recalculation Status (5Eh)

If the UNCALCED record is present in the Book stream, it indicates the Calculate message was in the status bar when Excel saved the file. This occurs if the sheet changed, the **Manual calculation** option was on, and the **Recalculate Before Save** option was off (**Options** dialog box, **Calculation** tab).

Record Data

Offset	Name	Size	Contents
4	(Reserved)	2	Reserved; must be 0 (zero)

USERBVIEW: Workbook Custom View Settings (1A9h)

The USERBVIEW record stores settings for a custom view in the workbook.

Record Data — BIFF8

Offset	Name	Size	Contents
4	iViewId	4	ID for the custom view.
8	iTabid	4	Tab index for the active sheet (1-based).
12	guid	16	Globally unique identifier for the custom view.
28	x	4	Horizontal position of window.
32	y	4	Vertical position of window.
36	dx	4	Width of window.
40	dy	4	Height of window.

44	wTabRatio	2	Ratio of the width of the workbook tabs to the width of the horizontal scroll bar; to obtain the ratio, convert to decimal and then divide by 1000.
46	grbit1	2	Option flags.
48	grbit2	2	Option flags.
50	wMergeInterval	2	Time interval between automatic merges of shared workbook in minutes.
52	st	var	Name of custom view as a unicode string.

The grbit1 field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fDspFmlaBar	=1 if the formula bar is displayed
1	0002h	fDspStatus	=1 if the status bar is displayed
3-2	000Ch	mdNoteDisp	=0 if the comment indicator is off =1 if the comment indicator is on =2 if the comment indicator is on and a comment is displayed
4	0010h	fDspHScroll	=1 if the horizontal scroll bar is displayed
5	0020h	fDspVScroll	=1 if the vertical scroll bar is displayed
6	0040h	fBotAdornment	=1 if the workbook tabs are displayed
7	0080h	fZoom	=1 if the workbook window is maximized
9 – 8	0300h	fHideObj	=0 if the **Show All** option is turned on =1 if the **Show Placeholders** option is turned on =2 if the **Hide All** option is turned on
10	0400h	fPrintIncl	=1 if include print settings
11	0800h	fRowColIncl	=1 if include row/column settings
12	1000h	fInvalidTabId	=1 if sheet was deleted or hidden
13	2000h	fTimedUpdate	=1 if timed update mode
14	4000h	fAllMemChanges	=1 if Shared Workbook local session changes only
15	8000h	fOnlySync	=1 if Shared Workbook conflict mode

The grbit2 field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fPersonalView	=1 if using timed update mode flags
1	0002h	fIconic	=1 if icon maximized in view
15–2	FFFCh	(Reserved)	Reserved; must be 0 (zero)

USERSVIEWBEGIN: Custom View Settings (1AAh)

The USERSVIEWBEGIN record specifies settings for a custom view associated with the sheet. This record also marks the start of custom view records, which save custom view settings. Records between USERSVIEWBEGIN and USERSVIEWEND contain settings for the custom view, not settings for the sheet itself.

Record Data — BIFF8

Offset	Name	Size	Contents
4	guid	16	Globally unique identifier for the custom view
20	iTabid	4	Tab index for the sheet (1-based)
24	wScale	4	Window zoom magnification
28	icv	4	Index to color value
32	pnnSel	4	Pane number of the active pane
36	grbit	4	Option flags
40	refTopLeft	8	Reference structure describing the visible area of the top-left pane (see text)
48	operNum	16	Array of 2 IEEE floating-point numbers that specify the vertical and horizontal positions of the pane split
64	colRPane	2	The first visible column of the right pane (=−1 implies no vertical split)
66	rwBPane	2	The first visible of the bottom pane (=−1 implies no horizontal split)

The grbit field contains the following option flags:

Bits	Mask	Name	Contents
0	00000001h	fShowBrks	=1 if page breaks are displayed
1	00000002h	fDspFmlaSv	=1 if the window should display formulas =0 if the window should display value
2	00000004h	fDspGridSv	=1 if the window should display gridlines
3	00000008h	fDspRwColSv	=1 if the window should display row and column headings
4	00000010h	fDspGutsSv	=1 if outline symbols are displayed
5	00000020h	fDspZerosSv	=1 if the window should display 0 (zero) values =0 if the window should suppress display of 0 (zero) values
6	00000040h	fHorizontal	=1 if the sheet is to be centered between the horizontal margins when printed
7	00000080h	fVertical	=1 if the sheet is to be centered between the vertical margins when printed
8	00000100h	fPrintRwCol	=1 to print row and column headings
9	00000200h	fPrintGrid	=1 to print gridlines
10	00000400h	fFitToPage	=1 if the **Fit To** option is on (**Page Setup** dialog box, **Page** tab)
11	00000800h	fPrintArea	=1 if there is at least one print area on the sheet

12	00001000h	fOnePrintArea	=1 if there is only one print area on the sheet
13	00002000h	fFilterMode	=1 if the list is filtered
14	00004000h	fEzFilter	=1 if AutoFilter is active (the drop-down arrows are displayed)
16–15	00018000h	(Reserved)	
17	00020000h	fSplitV	=1 if the window is split vertically
18	00040000h	fSplitH	=1 if the window is split horizontally
20–19	00180000h	fHiddenRw	2 bits true => hidden rws are defined as name
21	00200000h	fHiddenCol	=1 if there is at least one hidden column on the sheet
23–22	00C00000h	(Reserved)	
24	01000000h	fSizeWithWn	=1 if the chart is sized with window (chart sheet only)
25	02000000h	fFilterUnique	=1 if the view contains a filtered list
26	04000000h	fSheetLayoutView	=1 if the sheet is in page break preview
31–27	F8000000h	(Reserved)	

The sheet view settings are saved using standard BIFF records that occur between the USERSVIEWBEGIN record and the USERSVIEWEND record.

The guid is a unique identifier for a particular custom view for the entire workbook. The same guid can be found on USERSVIEWBEGIN records for other sheets and also in the USERBVIEW record for the workbook.

USERSVIEWEND: End of Custom View Records (1ABh)

The USERSVIEWEND record marks the end of the settings for a custom view associated with the sheet.

Record Data — BIFF8

Offset	Name	Size	Contents
4	fValid	2	=1 if the view settings saved are valid

The fValid field is 1 if all records from USERSVIEWBEGIN to USERSVIEWEND record are valid. Otherwise it is 0.

USESELFS: Natural Language Formulas Flag (160h)

This record stores a flag bit.

Record Data — BIFF8

Offset	Name	Size	Contents
4	fUsesElfs	2	=1 if this file was written by a version of Excel that can use natural-language formula input

VCENTER: Center Between Vertical Margins (84h)

If the **Center On Page Vertically** option is on in the **Page Setup** dialog box, **Margins** tab, then fVCenter=1.

Record Data

Offset	Name	Size	Contents
4	fVCenter	2	=1 if the sheet is to be centered between the vertical margins when printed

VERTICALPAGEBREAKS: Explicit Column Page Breaks (1Ah)

The VERTICALPAGEBREAKS record contains a list of explicit column page breaks.

Record Data — BIFF8

Offset	Name	Size	Contents
4	cbrk	2	Number of page breaks
6	rgbrk	var	Array of brk structures

The cbrk field contains the number of page breaks. Each element of the rgbrk structure contains three 2-byte integers: the first specifies the column of the break, the second specifies the starting row, and the third specifies the ending row for the break. All row and column numbers are 1-based, and the breaks occur after the row or column. This array is sorted by column, and then by starting/ending row. No two page breaks may overlap.

Record Data — BIFF7 and earlier

Offset	Name	Size	Contents
4	cbrk	2	Number of page breaks
6	rgcol	var	Array of columns

The cbrk field contains the number of page breaks. The rgcol field is an array of 2-byte integers that specifies columns. Excel sets a page break before each column contained in the list of columns in the rgcol field. The columns must be sorted in ascending order.

WEBPUB: Web Publish Item (801h)

This is a FRT record. It stores the information for a single published web page. It appears in the sheet stream for the sheet from which this item was published.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; = 0801h
6	grbitFrt	2	FRT flags; see FRT Records for more information
8	ref	var	Range reference; see FRT Records for more information

Offset	Name	Size	Contents
var	tws	1	Type of Web Source: 1= twsSheet; Entire Sheet was published 2= twsPrintArea; the Print Area was published 3= twsAutoFilter; an AutoFilter was published 4= twsRef; a range of cells was published 5= twsChart; a Chart was published 6= twsPivotTable; a PivotTable was published 7= twsQuery; a Query Table was published 8= twsLabel; a named range was published
var	twd	1	Type of Web Page created: 0= twdHtmlPlain; non-interactive page 1= twdHtmlCalc; page uses Spreadsheet functionality 2= twdHtmlList; page uses PivotTable functionality 3= twdHtmlChart; page uses Chart functionality
var	grfOptions	2	Common options; see following table
var	(Reserved)	2	Reserved; must be zero
var	nStyled	4	Style number (usually the same as the number inside stDivId)
var	cb	4	Size of information that follows
var	stSrcName	var	Source data name (does not exist if tws is twsRef); zero length string if tws is a type that has no name (ie the item is the entire sheet or the AutoFilter)
var	stFileDest	var	Unicode string; name of the file that is written out; should never be zero length
var	stDivId	var	Unicode string identifier used for the DIV tag ID attribute; should never be zero length
var	stTitle	var	Unicode string; title for published data in the HTML file; can be zero length
var	idCrtShape	var	XL10: if tws=twsChart, this is a 4-byte chart shape id; otherwise this is zero length
var	rgb	var	Future information

The grfOptions field contains the following option flags:

Bits	Mask	Name	Contents
0	0001h	fNew	1= this item is not yet published
1	0002h	fAutoRepublish	1= auto-republish is on
2	0004h	(Reserved)	
3	0008h	fMhtml	1= publish in MHTML
15-4	FFF0h	(unused)	

WINDOW1: Window Information (3Dh)

The WINDOW1 record contains workbook-level window attributes. The xWn and yWn fields contain the location of the window in units of 1/20th of a point, relative to the

upper-left corner of the Excel window client area. The dxWn and dyWn fields contain the window size, also in units of 1/20th of a point.

Record Data

Offset	Name	Size	Contents
4	xWn	2	Horizontal position of the window.
6	yWn	2	Vertical position of the window.
8	dxWn	2	Width of the window.
10	dyWn	2	Height of the window.
12	grbit	2	Option flags.
14	itabCur	2	Index of the selected workbook tab (0-based).
16	itabFirst	2	Index of the first displayed workbook tab (0-based).
18	ctabSel	2	Number of workbook tabs that are selected.
20	wTabRatio	2	Ratio of the width of the workbook tabs to the width of the horizontal scroll bar; to obtain the ratio, convert to decimal and then divide by 1000.

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	fHidden	=1 if the window is hidden
	1	02h	fIconic	=1 if the window is currently displayed as an icon
	2	04h	(Reserved)	
	3	08h	fDspHScroll	=1 if the horizontal scroll bar is displayed
	4	10h	fDspVScroll	=1 if the vertical scroll bar is displayed
	5	20h	fBotAdornment	=1 if the workbook tabs are displayed
	6	40h	fNoAFDateGroup	=1 if the AutoFilter should not group dates (Excel 11 (2003) behavior) (New for Office Excel 2007)
	7	80h	(Reserved)	
1	7–0	FFh	(Reserved)	

WINDOW2: Sheet Window Information (23Eh)

The WINDOW2 record contains window attributes for a sheet in a workbook.

Record Data — BIFF8

Offset	Name	Size	Contents
4	grbit	2	Option flags
6	rwTop	2	Top row visible in the window
8	colLeft	2	Leftmost column visible in the window
10	icvHdr	4	Index to color value for row/column headings and gridlines

14	wScaleSLV	2	Zoom magnification in page break preview
16	wScaleNormal	2	Zoom magnification in normal view
18	(Reserved)	4	

The grbit field contains the option flags shown in the following table.

Offset	Bits	Mask	Name	Contents
0	0	01h	fDspFmla	=1 if the window should display formulas =0 if the window should display value
	1	02h	fDspGrid	=1 if the window should display gridlines
	2	04h	fDspRwCol	=1 if the window should display row and column headings
	3	08h	fFrozen	=1 if the panes in the window should be frozen
	4	10h	fDspZeros	=1 if the window should display 0 (zero) values =0 if the window should suppress display of 0 (zero) values
	5	20h	fDefaultHdr	=1 (see the following explanation) =0 use rgbHdr color
	6	40h	fRightToLeft	=1 if text is right-to-left
	7	80h	fDspGuts	=1 if outline symbols are displayed
1	0	01h	fFrozenNoSplit	=1 if the panes in the window are frozen but there is no split
	1	02h	fSelected	=1 if the sheet tab is selected
	2	04h	fPaged	=1 if the sheet is currently being displayed in the workbook window
	3	08h	fSLV	=1 if the sheet was saved while in page break preview
	7–4	F0h	(Reserved)	

fDefaultHdr is 1 if the window's row and column headings and gridlines should be drawn in the window's default foreground color. If this field is 0, the color index in the icvHdr field is used instead.

Record Data — BIFF7 and earlier

Offset	Name	Size	Contents
4	grbit	2	Option flags
6	rwTop	2	Top row visible in the window
8	colLeft	2	Leftmost column visible in the window
10	rgbHdr	4	Row/column heading and gridline color

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	fDspFmla	=1 if the window should display formulas =0 if the window should display value

	1	02h	fDspGrid	=1 if the window should display gridlines
	2	04h	fDspRwCol	=1 if the window should display row and column headings
	3	08h	fFrozen	=1 if the panes in the window should be frozen
	4	10h	fDspZeros	=1 if the window should display 0 (zero) values =0 if the window should suppress display of 0 (zero) values
	5	20h	fDefaultHdr	=1 (see the following explanation) =0 use rgbHdr color
	6	40h	fArabic	=1 for the Arabic version of Excel
	7	80h	fDspGuts	=1 if outline symbols are displayed
1	0	01h	fFrozenNoSplit	=1 if the panes in the window are frozen but there is no split
	1	02h	fSelected	=1 if the sheet tab is selected
	2	04h	fPaged	=1 if the sheet is currently being displayed in the workbook window
	7–3	F8h	(Reserved)	

fDefaultHdr is 1 if the window's row and column headings and gridlines should be drawn in the window's default foreground color. If this field is 0, the RGB color in the rgbHdr field is used instead.

WINDOWPROTECT: Windows Are Protected (19h)

The WINDOWPROTECT record stores an option from the **Protect Workbook** dialog box.

Record Data

Offset	Name	Size	Contents
4	fLockWn	2	=1 if the workbook windows are protected

WOPT: Web Options (80Bh)

Introduced in Excel 9 (2000) this is a FRT record. It stores the information from the **Web Options** dialog.

Record Data

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =080Bh
6	grbitFrt	2	FRT flags; must be zero
8	grbit	2	Options; see following table

10	bScreenSize	1	Target monitor screen size 0= 544x376 1= 640x480 2= 720x512 3= 800x600 4= 1024x768 5= 1152x882 6= 1152x900 7= 1280x1024 8= 1600x1200 9= 1800x1440 10= 1920x1200
11	dwPixelsPerInch	4	Target monitor pixels per inch
15	uiCodePage	4	Code page index value
19	cchLocationOfComponents	2	length of the string in rgbLocationOfComponents
21	rgbLocationOfComponents	var	Unicode string; the path to the location for download of the Microsoft Office Web Components
var	rgbFuture	var	Space reserved for bytes from future versions of Excel

The grbit field contains following option flags.

Bits	Mask	Name	Contents
0	0001h	fRelyOnCSS	1= Do not write HTML information that is already written in CSS
1	0002h	fOrganizeInFolder	0= Write HTML files all to the same location 1= Create a folder for the supporting files for files saved as HTML
2	0004h	fUseLongFileNames	1= Use Long filenames when writing HTML files
3	0008h	fDownloadComponents	1= Download Microsoft Office Web Components
4	0010h	fRelyOnVML	0= Write out image files for objects
5	0020h	fAllowPNG	1= Use PNG format for images
15-6	FFC0h	(Reserved)	Reserved; must be zero

WRITEACCESS: Write Access User Name (5Ch)

This record contains the user name, which is the name entered when installing Excel.

Record Data — BIFF8

Offset	Name	Size	Contents
4	stName	112	User name as an unformatted unicode string. The name is always padded with spaces so the size of the stName field is exactly 112 bytes.

Record Data — BIFF7 and earlier

Offset	Name	Size	Contents
4	cch	1	Length of the user name
5	stName	31	User name, padded with spaces (20h) so the size of the stName field is exactly 31 bytes

WRITEPROT: Workbook Is Write-Protected (86h)

This record is 4 bytes long, and it has no record data field. If the WRITEPROT record is present in the Book stream, it signifies the worksheet has a Write Reservation password (**File** menu, **Save As** command, **Options** dialog box). For information about the password (wResPass), see "FILESHARING".

WSBOOL: Additional Workspace Information (81h)

This record stores information about workspace settings.

Record Data

Offset	Name	Size	Contents
4	grbit	2	Option flags

The grbit field contains the following option flags:

Offset	Bits	Mask	Name	Contents
0	0	01h	fShowAutoBreaks	=1 if automatic page breaks are visible
	3–1	E0h	(unused)	
	4	10h	fDialog	=1 if the sheet is a dialog sheet
	5	20h	fApplyStyles	=0 if automatic styles are applied to an outline
	6	40h	fRwSumsBelow	=1 if summary rows appear below detail in an outline
	7	80h	fColSumsRight	=1 if summary columns appear to the right of detail in an outline
1	0	01h	fFitToPage	=1 if the **Fit** option is on (**Page Setup** dialog box, **Page** tab)
	1	02h	(Reserved)	
	3–2	06h	fDspGuts	=1 if outline symbols are displayed
	5–4		(Reserved)	
	6		fAee	=1 if the **Alternate Expression Evaluation** option is on (**Options** dialog box, **Calculation** tab)
	7		fAfe	=1 if the **Alternate Formula Entry** option is on (**Options** dialog box, **Calculation** tab)

XCT: CRN Record Count (59h)

For BIFF8, an XCT record precedes a CRN record. The XCT and CRN records are grouped with their associated SUPBOOK record.

For BIFF7 and earlier, the XCT record stores the number of CRN records (type 5Ah) in the file. The CRN records immediately follow the XCT record.

Record Data — BIFF8

Offset	Name	Size	Contents
4	ccrn	2	Count of CRN records that follow
6	itab	2	Index (0-based) to sheet tab associated with the CRN record(s)

Record Data — BIFF7 and earlier

Offset	Name	Size	Contents
4	ccrn	2	Count of CRN records that follow

XF: Extended Format (E0h)

The XF record stores formatting properties. There are two different XF records, one for cell records and another for style records. The fStyle bit is true if the XF is a style XF. The ixfe of a cell record (BLANK, LABEL, NUMBER, RK, and so on) points to a *cell* XF record, and the ixfe of a STYLE record points to a *style* XF record. **Note**: in previous BIFF versions, the record number for the XF record was 43h.

Prior to BIFF5, all number format information was included in FORMAT records in the BIFF file. Beginning with BIFF5, many of the built-in number formats were moved to an internal table and are no longer saved with the file as FORMAT records. Use the ifmt to associate the built-in number formats with an XF record. However, the internal number formats are no longer visible in the BIFF file.

The following table lists all the number formats that are now maintained internally. **Note**: 17h through 24h are reserved for international versions and are undocumented at this time.

Index to internal format (ifmt)	Format string
00h	General
01h	0
02h	0.00
03h	#,##0
04h	#,##0.00
05h	($#,##0_);($#,##0)
06h	($#,##0_);[Red]($#,##0)
07h	($#,##0.00_);($#,##0.00)
08h	($#,##0.00_);[Red]($#,##0.00)
09h	0%
0ah	0.00%
0bh	0.00E+00
0ch	# ?/?
0dh	# ??/??

Index to internal format (ifmt)	Format string
0eh	m/d/yy
0fh	d-mmm-yy
10h	d-mmm
11h	mmm-yy
12h	h:mm AM/PM
13h	h:mm:ss AM/PM
14h	h:mm
15h	h:mm:ss
16h	m/d/yy h:mm
25h	(#,##0_);(#,##0)
26h	(#,##0_);[Red](#,##0)
27h	(#,##0.00_);(#,##0.00)
28h	(#,##0.00_);[Red](#,##0.00)
29h	_(* #,##0_);_(* (#,##0);_(* "-"_);_(@_)
2ah	_($* #,##0_);_($* (#,##0);_($* "-"_);_(@_)
2bh	_(* #,##0.00_);_(* (#,##0.00);_(* "-"??_);_(@_)
2ch	_($* #,##0.00_);_($* (#,##0.00);_($* "-"??_);_(@_)
2dh	mm:ss
2eh	[h]:mm:ss
2fh	mm:ss.0
30h	##0.0E+0
31h	@

A BIFF file can contain as many XF records as are necessary to describe the different cell formats and styles in a workbook. The XF records are written in a table in the workbook (Book) stream, and the index to the XF record table is a 0-based number called ixfe.

The workbook stream must contain a minimum XF table consisting of 15 style XF records and one cell XF record (ixfe=0 through ixfe=15). The first XF record (ixfe=0) is the XF record for the Normal style. The next 14 records (ixfe=1 through ixfe=14) are XF records that correspond to outline styles RowLevel_1, ColLevel_1, RowLevel_2, ColLevel_2, and so on. The last record (ixfe=15) is the default cell XF for the workbook.

Following these XF records are five additional style XF records (not strictly required) that correspond to the Comma, Comma [0], Currency, Currency [0], and Percent styles.

Cell XF Record—BIFF8

Record Data

Offset	Bits	Mask	Name	Contents
4	15–0	FFFFh	ifnt	Index to the FONT record.
6	15–0	FFFFh	ifmt	Index to the FORMAT record.
8	0	0001h	fLocked	=1 if the cell is locked.

Offset	Bits	Mask	Name	Contents
	1	0002h	fHidden	=1 if the cell is hidden.
	2	0004h	fStyle	=0 for cell XF. =1 for style XF.
	3	0008h	f123Prefix	If the **Transition Navigation Keys** option is *off* (**Options** dialog box, **Transition** tab), f123Prefix=1 indicates that a leading apostrophe (single quotation mark) is being used to coerce the cell's contents to a simple string. If the **Transition Navigation Keys** option is *on*, f123Prefix=1 indicates that the cell formula begins with one of the four Lotus 1-2-3 alignment prefix characters: ' left " right ^ centered \ fill This bit is always 0 if fStyle=1.
	15–4	FFF0h	ixfParent	Index to the XF record of the parent style. Every cell XF must have a parent style XF, which is usually ixfeNormal=0. This field is always FFFh if fStyle=1.
10	2–0	0007h	alc	Alignment: 0= general 1= left 2= center 3= right 4= fill 5= justify 6= center across selection
	3	0008h	fWrap	=1 wrap text in cell.
	6–4	0070h	alcV	Vertical alignment: 0= top 1= center 2= bottom 3= justify
	7	0080h	fJustLast	(Used only in East Asian versions of Excel).
	15–8	FF00h	trot	Rotation, in degrees; 0–90dec is up 0–90 deg., 91–180dec is down 1–90 deg, and 255dec is vertical.
12	3–0	000Fh	cIndent	Indent value (**Format Cells** dialog box, **Alignment** tab).

Offset	Bits	Mask	Name	Contents
	4	0010h	fShrinkToFit	=1 if **Shrink To Fit** option is on (**Format Cells** dialog box, **Alignment** tab).
	5	0020h	fMergeCell	=1 if **Merge Cells** option is on (**Format Cells** dialog box, **Alignment** tab).
	7–6	00C0h	iReadOrder	Reading direction (East Asian versions only): 0= Context 1= Left-to-right 2= Right-to-left
	9–8	0300h	(Reserved)	
	10	0400h	fAtrNum	=1 if the ifmt is not equal to the ifmt of the parent style XF. This bit is N/A if fStyle=1.
	11	0800h	fAtrFnt	=1 if the ifnt is not equal to the ifnt of the parent style XF. This bit is N/A if fStyle=1.
	12	1000h	fAtrAlc	=1 if either the alc or the fWrap field is not equal to the corresponding field of the parent style XF. This bit is N/A if fStyle=1.
	13	2000h	fAtrBdr	=1 if any border line field (dgTop, and so on) is not equal to the corresponding field of the parent style XF. This bit is N/A if fStyle=1.
	14	4000h	fAtrPat	=1 if any pattern field (fls, icvFore, icvBack) is not equal to the corresponding field of the parent style XF. This bit is N/A if fStyle=1.
	15	8000h	fAtrProt	=1 if either the fLocked field or the fHidden field is not equal to the corresponding field of the parent style XF. This bit is N/A if fStyle=1.
14	3–0	000Fh	dgLeft	Border line style (see the following table).
	7–4	00F0h	dgRight	Border line style (see the following table).
	11–8	0F00h	dgTop	Border line style (see the following table).
	15–12	F000h	dgBottom	Border line style (see the following table).

Offset	Bits	Mask	Name	Contents
16	6–0	007Fh	icvLeft	Index to the color palette for the left border color.
	13–7	3F80h	icvRight	Index to the color palette for the right border color.
	15–14	C000h	grbitDiag	1=diag down, 2=diag up, 3=both.
18	6–0	0000007Fh	icvTop	Index to the color palette for the top border color.
	13–7	00003F80h	icvBottom	Index to the color palette for the bottom border color.
	20–14	001FC000h	icvDiag	for diagonal borders.
	24–21	01E00000h	dgDiag	Border line style (see the following table).
	25	02000000h	fHasXFExt	=1 when a subsequent XFEXT record may modify the properties of this XF. New for Office Excel 2007
	31–26	FC000000h	fls	Fill pattern.
22	6–0	007Fh	icvFore	Index to the color palette for the foreground color of the fill pattern.
	13–7	3F80h	icvBack	Index to the color palette for the background color of the fill pattern.
	14	4000h	fSxButton	=1 if the XF record is attached to a PivotTable button. This bit is always 0 if fStyle=1.
	15	8000h	(Reserved)	

Style XF Record—BIFF8

The style XF record is identical in structure to the cell XF record, with the differences in meaning summarized as follows:

Offset	Bits	Mask	Name	Contents
8	2	0004h	fStyle	=1 for style XF.
	3	0008h	f123Prefix	=0 for style XF.
	15–4	FFF0h	ixfParent	=FFFh for style XF.
12	10	0400h	fAtrNum	doesn't matter for style XF.
	11	0800h	fAtrFnt	doesn't matter for style XF.
	12	1000h	fAtrAlc	doesn't matter for style XF.
	13	2000h	fAtrBdr	doesn't matter for style XF.
	14	4000h	fAtrPat	doesn't matter for style XF.
	15	8000h	fAtrProt	doesn't matter for style XF.
22	14	4000h	fSxButton	=0 for style XF.

Line Styles

The border line style fields — dgTop, dgLeft, and so on — correspond to the options in the **Format Cells** dialog box, **Border** tab, as shown in the following table.

dg* value	Border line style
0	None
1	Thin
2	Medium
3	Dashed
4	Dotted
5	Thick
6	Double
7	Hair

The following are in **BIFF8** only:

8	Medium dashed
9	Dash-dot
10	Medium dash-dot
11	Dash-dot-dot
12	Medium dash-dot-dot
13	Slanted dash-dot

Cell XF Record — BIFF7 and earlier

Record Data

Offset	Bits	Mask	Name	Contents
4	15–0	FFFFh	ifnt	Index to the FONT record.
6	15–0	FFFFh	ifmt	Index to the FORMAT record.
8	0	0001h	fLocked	=1 if the cell is locked.
	1	0002h	fHidden	=1 if the cell is hidden.
	2	0004h	fStyle	=0 for cell XF. =1 for style XF.
	3	0008h	f123Prefix	If the **Transition Navigation Keys** option is *off* (**Options** dialog box, **Transition** tab), f123Prefix=1 indicates that a leading apostrophe (single quotation mark) is being used to coerce the cell's contents to a simple string. If the **Transition Navigation Keys** option is *on*, f123Prefix=1 indicates that the cell formula begins with one of the four Lotus 1-2-3 alignment prefix characters: ' left " right ^ centered \ fill
	15–4	FFF0h	ixfParent	Index to the XF record of the parent style. Every cell XF must have a parent style XF, which is usually ixfeNormal=0.

Offset	Bits	Mask	Name	Contents
10	2–0	0007h	alc	Alignment: 0= general 1= left 2= center 3= right 4= fill 5= justify 6= center across selection
	3	0008h	fWrap	= 1 wrap text in cell.
	6–4	0070h	alcV	Vertical alignment: 0= top 1= center 2= bottom 3= justify
	7	0080h	fJustLast	(Used only in East Asian versions of Excel.)
	9–8	0300h	ori	Orientation of text in cell: =0 no rotation. =1 text appears top-to-bottom; letters are upright. =2 text is rotated 90 degrees counterclockwise. =3 text is rotated 90 degrees clockwise.
	10	0400h	fAtrNum	=1 if the ifmt is not equal to the ifmt of the parent style XF.
	11	0800h	fAtrFnt	=1 if the ifnt is not equal to the ifnt of the parent style XF.
	12	1000h	fAtrAlc	=1 if either the alc or the fWrap field is not equal to the corresponding field of the parent style XF.
	13	2000h	fAtrBdr	=1 if any border line field (dgTop, and so on) is not equal to the corresponding field of the parent style XF.
	14	4000h	fAtrPat	=1 if any pattern field (fls, icvFore, icvBack) is not equal to the corresponding field of the parent style XF.
	15	8000h	fAtrProt	=1 if either the fLocked field or the fHidden field is not equal to the corresponding field of the parent style XF.
12	6–0	007Fh	icvFore	Index to the color palette for the foreground color of the fill pattern.
	12–7	1F80h	icvBack	Index to the color palette for the background color of the fill pattern.
	13	2000h	fSxButton	=1 if the XF record is attached to a PivotTable button.

Offset	Bits	Mask	Name	Contents
	15–14	C000h	(Reserved)	
14	5–0	003Fh	fls	Fill pattern.
	8–6	01C0h	dgBottom	bottom Border line style (see previous table)
	15–9	FE00h	icvBottom	Index to the color palette for the bottom border color.
16	2–0	0007h	dgTop	top Border line style (see previous table).
	5–3	0038h	dgLeft	left Border line style (see previous table).
	8–6	01C0h	dgRight	right Border line style (see previous table).
	15–9	FE00h	icvTop	Index to the color palette for the top border color.
18	6–0	007Fh	icvLeft	Index to the color palette for the left border color.
	13–7	3F80h	icvRight	Index to the color palette for the right border color.
	15–14	C000h	(Reserved)	

Style XF Record—BIFF7 and earlier

The BIFF7 style XF record is identical in structure to the BIFF7 cell XF record, with the differences in meaning summarized as follows:

Offset	Bits	Mask	Name	Contents
8	2	0004h	fStyle	=1 for style XF.
	3	0008h	f123Prefix	=0 for style XF.
	15–4	FFF0h	ixfParent	=FFFh for style XF.
10	10	0400h	fAtrNum	=0 if the style includes Number (**Style** dialog box).
	11	0800h	fAtrFnt	=0 if the style includes Font (**Style** dialog box).
	12	1000h	fAtrAlc	=0 if the style includes Alignment (**Style** dialog box).
	13	2000h	fAtrBdr	=0 if the style includes Border (**Style** dialog box).
	14	4000h	fAtrPat	=0 if the style includes Patterns (shading) (**Style** dialog box).
	15	8000h	fAtrProt	=0 if the style includes Protection (cell protection) (**Style** dialog box).
12	13	2000h	fSxButton	=0 for style XF.

DXF records

Related to the XF record is the DXF record used by CF, SXDXF, EZFILTER12 and LIST12. The DXF record is a way to partially modify or define a format.

Offset	Name	Size	Contents
4	(Reserved)	2	
6	grbit	2	Option flags
8	grbit2	2	Option flags

The grbit field contains the following flags:

Bits	Mask	Name	Contents
8-0	01FFh	(Reserved)	
9	0200h	fAtrNum	1= a DXFNUM record follows
10	0400h	fAtrFnt	1= a DXFFNT record follows
11	0800h	fAtrAlc	1= a DXFALC record follows
12	1000h	fAtrBdr	1= a DXFBDR record follows
13	2000h	fAtrPat	1= a DXFPAT record follows
14	4000h	fAtrProt	1= a DXFPROT record follows
15	8000h	(Reserved)	

The grbit2 field contains the following flags:

Bits	Mask	Name	Contents
0	0001h	fIfmtUser	1= DXFNUM is user-defined format
15-1	FFFEh	(Reserved)	

DXFNUM (2 bytes)

Offset	Name	Size	Contents
4	(Reserved)	2	

DXFFNT (2 bytes)

Offset	Name	Size	Contents
4	(Reserved)	2	

DXFALC (alignment - 8 bytes)

Size	Bits	Mask	Name	Contents
2	2-0	0007h	alc	alignment (see XF's alc)
	15-3	FFF8h	(unused)	
2	3–0	000Fh	cIndent	indent value (see XF's cIndent)
	5–4	0030h	(unused)	
	7-6	00C0h	iReadOrder	reading direction (see XF's iReadOrder)
	15-8	FF00h	(unused)	
4			iIndent	relative indent value

DXFBDR (borders - 8 bytes)

Size	Bits	Mask	Name	Contents
2	3–0	000Fh	dgLeft	left border line style
	7–4	00F0h	dgRight	right Border line style
	11-8	0F00h	dgTop	top Border line style
	15-12	F000h	dgBottom	bottom Border line style
2	6–0	007Fh	icvLeft	left border color palette index
	13-7	3F80h	icvRight	right border color palette index
	15-14	C000h	grbitDiag	1=diag down, 2=diag up, 3=both.
4	6–0	0000007Fh	icvTop	top border color palette index
	13-7	00003F80h	icvBottom	bottom border color palette index
	20-14	001FC000h	icvDiag	diagonal line color palette index
	24-21	01E00000h	dgDiag	diagonal line style
	31-25	FE000000h	(unused)	

DXFPAT (fill pattern – 4 bytes)

Size	Bits	Mask	Name	Contents
2	9-0	03FFh	(unused)	
	15-10	FC00h	fls	Fill pattern.
2	6–0	007Fh	icvFore	foreground color palette index.
	13–7	3F80h	icvBack	background color palette index.
	15-14	C000h	(unused)	

DXFPROT (protection – 2 bytes)

Size	Bits	Mask	Name	Contents
2	0	0001h	fLocked	=1 if locked
	1	0002h	fHidden	=1 if hidden
	15-2	FFFCh	(unused)	

XFCRC: XF Extensions Checksum (87Ch)

This record is used in determining whether XFEXT (87Dh) records should be applied when loading a document. This record if present should come after all XF records. It contains the number of XF records that were written and a checksum of the data in those records. If the number of records and the checksum match and the document was last saved with version 12 or later then XFEXT records will be applied.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Ch
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	version	2	Record version; =0 currently
18	cxfs	2	Number of XF records written to disk

20	crc	2	Checksum of the written XF records.

XFEXT: XF Extension (87Dh)

When writing XF records to BIFF8 format from Office Excel 2007 or later, if the XF record uses new formatting properties then a BIFF8 compatible XF record will be written followed by an XFEXT record that references that XF and contains additional information that can be used to restore the new properties when the document is opened again in Office Excel 2007 or later.

Offset	Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =087Dh
6	grbitFrt	2	FRT cell reference flag; =0 currently
8	(Reserved)	8	Currently not used, and set to 0
16	version	2	Record version; =0 currently – Office Excel 2007 will ignore this record on load if not 0.
18	ixfe	2	Index of to XF record this extension modifies
20	(Reserved)	2	Currently not used, and set to 0
22	cexts	2	Number of extension properties that follow
24	rgb	var	Array of extension properties.

The data for each extension property starts with a common header:

Offset	Name	Size	Contents
0	extType	2	Indicates extension property type
2	cb	2	Length of this extension in bytes including header.

This header is followed by a variable amount of data specified by the extension property type. Unknown extension types are skipped on load. BIFF12 defines the following extension property types:

Extension type	Value	Comments
xfextRGBForeColor	0	Sets cell interior forecolor to RGB
xfextRGBBackColor	1	Sets cell interior backcolor to RGB
reserved	2	Reserved; not used
reserved	3	Reserved; not used
xfextForeColor	4	Sets cell interior forecolor
xfextBackColor	5	Sets cell interior backcolor
xfextGradientTint	6	Sets cell interior to a specified gradient
xfextBorderColorTop	7	Sets specified cell border color
xfextBorderColorBottom	8	Sets specified cell border color
xfextBorderColorLeft	9	Sets specified cell border color
xfextBorderColorRight	10	Sets specified cell border color

xfextBorderColorDiag	11	Sets specified cell border color
reserved	12	Reserved; not used
xfextTextColor	13	Sets cell text color
xfextFontScheme	14	Set cell font to use specified font scheme
xfextIndent	15	Set cell indentation level (indents > 15)

RGB color extensions (xfextRGBForeColor, xfextRGBBackColor) data format:

Offset	Name	Size	Contents
4	rgbColor	4	rgb color (alpha is ignored)

Full color extensions (xfextForeColor, xfextBackColor, xfextBorderColor*, xfextTextColor):

Offset	Name	Size	Contents
4	xclrType	2	Color type
6	nTintShade	2	signed tint and shade value
8	xclrValue	4	Color value – value based on color type
10	(Reserved)	8	Reserved; not used

xclrType – Excel supports the following color types, xclrValue varies by type as noted in the comments.

Color type	Value	Comments
xclrAuto	0	Automatic foreground/background colors
xclrIndexed	1	xclrValue = BIFF8 indexed palette color (icv)
xclrRGB	2	xclrValue = RGB color
xclrThemed	3	xclrValue = Theme color index

nTintShade – signed short that is used to represent how the color should be tinted or shaded. This value is mapped to the range (-1.0 to 1.0). Positive values make the color value lighter, negative values make the color value darker. A 0.0 value means do not tint/shade the color.

Font scheme extension (xfextFontScheme) data format:

Offset	Name	Size	Contents
4	fontScheme	1	font scheme (1 = Major, 2 = Minor)

Indentation level extension (xfextIndent) data format:

Offset	Name	Size	Contents
4	cIndent	2	indent level (0..250) { Biff8 XF max was 15 }

Gradient fill extension (xfextGradientTint):

Offset	Name	Size	Contents
4	type	4	Gradient type. Two gradient types are currently supported – linear (0) and rectangular (1)
8	numDegree	8	Gradient angle. Used for linear gradients to determine the angle at which the gradient strokes will be drawn (vertical, horizontal, or diagonal)
16	numFillToLeft	8	Left coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge
24	numFillToRight	8	Right coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge
32	numFillToTop	8	Top coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge
40	numFillToBottom	8	Bottom coordinate. Used for rectangular gradients to determine the coordinates of the rectangle where the gradient should converge
48	cGradStops	4	The number of gradient stop definitions to follow. A valid gradient must have at least one gradient stop and no more than 256
52	rgGradStops	var	Array of gradient stops

Each rgGradStops entry has the following data format:

Offset	Name	Size	Contents
0	xclrType	2	Color type. See previous definition for Excel color types/values
2	xclrValue	4	Color value. See previous definition for Excel color types/values
6	numPosition	8	Position within the gradient range where this gradient stop’s color should begin

14	numTint	8	Tint and shade value. Same as nTintShade but expressed as double. This value is used to represent how the color should be tinted or shaded. This value is ranges from (-1.0 to 1.0). Positive values make the color value lighter, negative values make the color value darker. A 0.0 value means do not tint/shade the color.

XL5MODIFY: Flag for DSF (162h)

This is a new record in BIFF8. In a double stream file, the XL5MODIFY record appears in the BIFF5/BIFF7 stream (the stream named Book). This record is used internally and contains no record data field.

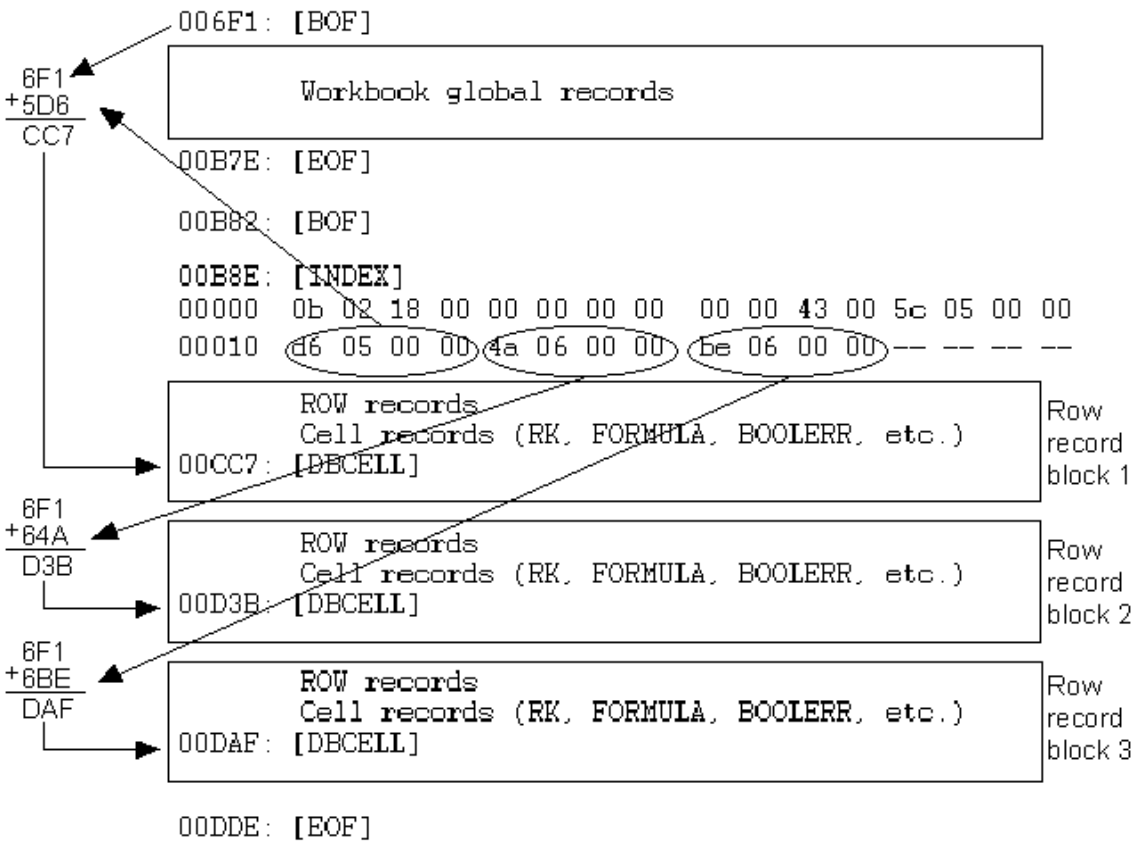
Finding Cell Records in BIFF Files

Excel uses the INDEX and DBCELL records to optimize the lookup of cell records (RK, FORMULA, and so on). You can use these records to optimize your code when reading a BIFF file, or you can just read the entire workbook (Book) stream to find the cell values you want. The unoptimized method may be slower, depending on the size, structure, and complexity of the file.

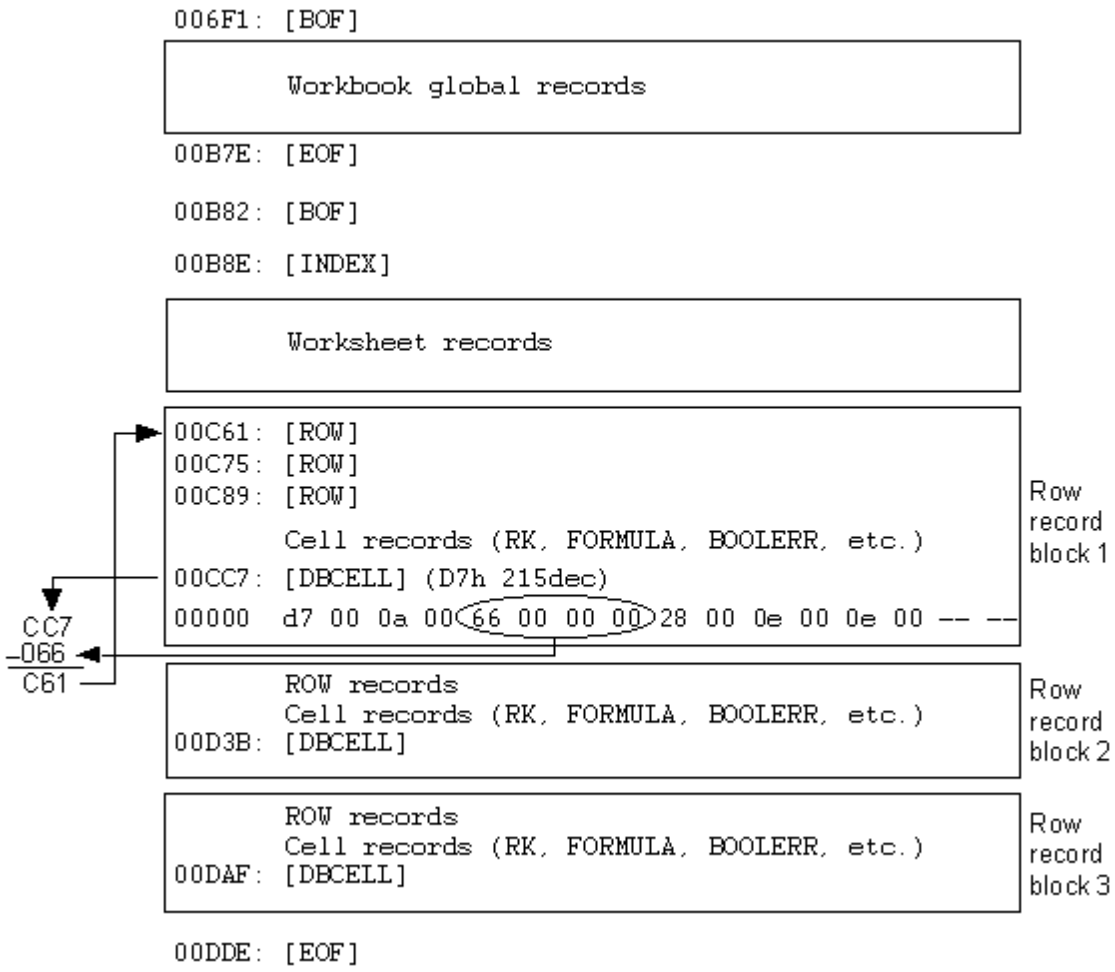
If your code writes a BIFF file, you must include the INDEX and DBCELL records with correct values in the record fields. If this is not done, Excel cannot optimize lookup, and the program's performance will suffer; especially when the user tries to copy data out of the file that your application has written.

Excel stores cell records in blocks with no more than 32 rows. Each row that contains cell records has a corresponding ROW record in the block, and each block contains a DBCELL record at the end of the block.

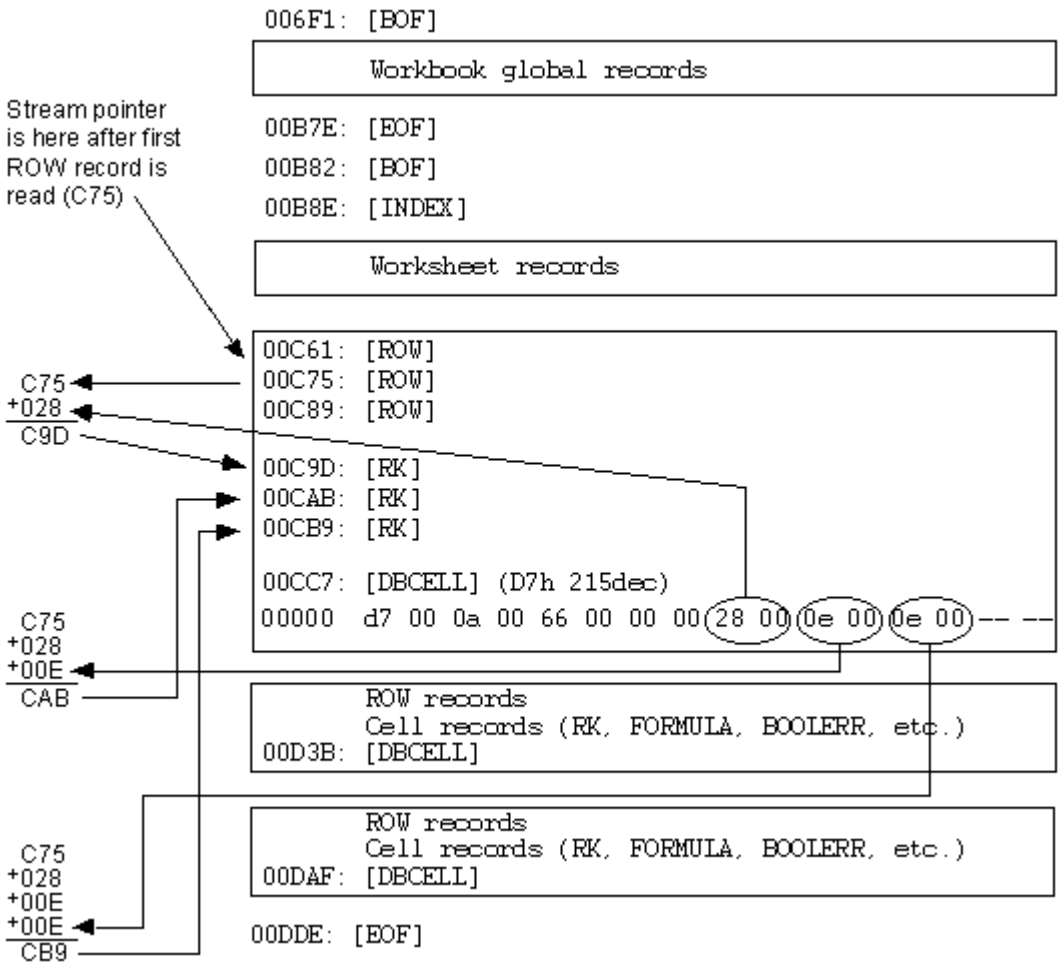
The following illustration shows how to use the INDEX record to locate the DBCELL records at the end of the record blocks. **Note**: the stream position at the start of the first BOF record in the workbook stream is 6F1h. To find the start of each DBCELL record, add this number to each member of the rgibRw array in the INDEX record.



After your code has computed the location of the DBCELL records, use the dbRtrw field to find the location of the start of the first ROW record for each block. This field is stored as a positive long integer, although the offset is really a "negative" offset to an earlier position in the file. See the following illustration for details.



Finally, your code can compute the start of each cell record in the block by using the members in the rgdb array in the DBCELL record. The offsets in this array use the start of the second ROW record in the block as the initial offset. This is because the code has to read the first ROW record to know what the row number is (and then to make a decision based on the row number), and the stream pointer is at the start of the second ROW record after this. See the following illustration for details.



Microsoft Excel Formulas

This section describes how Excel stores formulas. Formulas most commonly appear in rgce fields in FORMULA, ARRAY, and NAME records. In this section, *formula* is a synonym for *parsed expression,* which is the internal tokenized representation of an Excel formula.

There are no changes to the tokenized representation of an Excel formula from BIFF5 to BIFF7; therefore this information applies to both versions.

Parsed Expressions and Tokens

Excel uses a modified reverse-Polish notation technique to store parsed expressions. A parsed expression contains a sequence of parse tokens, each of which is either an operand, an operator token, or a control token. Operand tokens push operands onto the stack. Operator tokens perform arithmetic operations on operands. Control tokens assist in formula evaluation by describing properties of the formula.

A token consists of two parts: a token type and a token value. A token type is called a *ptg* (parse thing) in Excel. A ptg is 1 byte long and has a value from 01h to 7Fh. The ptgs above 7Fh are reserved.

The ptg specifies only what kind of information a token contains. The information itself is stored in the token value, which immediately follows the ptg. Some tokens consist of only a ptg, without an accompanying token value. For example, to specify

an addition operation, only the token type ptgAdd is required. But to specify an integer operand, specify both the ptgInt and the token value, which is an integer.

For example, assume the formula =5+6 is in cell A1. The parsed expression for this formula consists of three tokens: two integer operand tokens (<token 1> and <token 2>) and an operator token (<token 3>), as shown in the following table.

<token 1>	<token 2>	<token 3>
ptgInt 0005h	ptgInt 0006h	ptgAdd

Note: each ptgInt is immediately followed by the integer token value.

If this formula is entered in cell A1 and then examined in the FORMULA record (using the BiffView utility), the following is seen:

```
00000  06 00 1d 00 00 00 00 00 0f 00 00 00 00 00 00 00
00010  26 40 00 00 00 00 e0 fc 07 00 1e 05 00 1e 06 00
00020  03 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
```

The first 26 bytes of the hex dump contain the record number, record length, rw, col, ixfe, num, grbit, chn, and cce fields. The remaining 7 bytes contain the two ptgInt (1Eh) tokens — which contain the token values that represent the integers 5 and 6 (0005h and 0006h) — and the ptgAdd (03h) token. If the formula were changed to =5*6, the third token would be ptgMul (05h). For more information about the FORMULA record, see "FORMULA".

In many cases, the token value consists of a structure of two or more fields. In these cases, offset-0 (zero) is assumed to be the first byte of the token value — that is, the first byte immediately following the token type.

Microsoft Excel ptgs

The following table contains all ptgs that appear in BIFF files. All other ptgs are reserved.

The ptgSheet and ptgEndSheet tokens are no longer used. The external sheet references are contained in the ptgNameX, ptgRef3d, and ptgArea3d tokens.

Name	Ptg	Type
ptgExp	01h	control
ptgTbl	02h	control
ptgAdd	03h	operator
ptgSub	04h	operator
ptgMul	05h	operator
ptgDiv	06h	operator
ptgPower	07h	operator
ptgConcat	08h	operator
ptgLT	09h	operator
ptgLE	0Ah	operator
ptgEQ	0Bh	operator
ptgGE	0Ch	operator
ptgGT	0Dh	operator
ptgNE	0Eh	operator

Name	Ptg	Type
ptgIsect	0Fh	operator
ptgUnion	10h	operator
ptgRange	11h	operator
ptgUplus	12h	operator
ptgUminus	13h	operator
ptgPercent	14h	operator
ptgParen	15h	control
ptgMissArg	16h	operand
ptgStr	17h	operand
ptgAttr	19h	control
ptgSheet	1Ah	(ptg DELETED)
ptgEndSheet	1Bh	(ptg DELETED)
ptgErr	1Ch	operand
ptgBool	1Dh	operand
ptgInt	1Eh	operand
ptgNum	1Fh	operand
ptgArray	20h	operand, reference class
ptgFunc	21h	operator
ptgFuncVar	22h	operator
ptgName	23h	operand, reference class
ptgRef	24h	operand, reference class
ptgArea	25h	operand, reference class
ptgMemArea	26h	operand, reference class
ptgMemErr	27h	operand, reference class
ptgMemNoMem	28h	control
ptgMemFunc	29h	control
ptgRefErr	2Ah	operand, reference class
ptgAreaErr	2Bh	operand, reference class
ptgRefN	2Ch	operand, reference class
ptgAreaN	2Dh	operand, reference class
ptgMemAreaN	2Eh	control
ptgMemNoMemN	2Fh	control
ptgNameX	39h	operand, reference class
ptgRef3d	3Ah	operand, reference class
ptgArea3d	3Bh	operand, reference class
ptgRefErr3d	3Ch	operand, reference class
ptgAreaErr3d	3Dh	operand, reference class
ptgArrayV	40h	operand, value class
ptgFuncV	41h	operator
ptgFuncVarV	42h	operator
ptgNameV	43h	operand, value class
ptgRefV	44h	operand, value class

Name	Ptg	Type
ptgAreaV	45h	operand, value class
ptgMemAreaV	46h	operand, value class
ptgMemErrV	47h	operand, value class
ptgMemNoMemV	48h	control
ptgMemFuncV	49h	control
ptgRefErrV	4Ah	operand, value class
ptgAreaErrV	4Bh	operand, value class
ptgRefNV	4Ch	operand, value class
ptgAreaNV	4Dh	operand, value class
ptgMemAreaNV	4Eh	control
ptgMemNoMemNV	4Fh	control
ptgFuncCEV	58h	operator
ptgNameXV	59h	operand, value class
ptgRef3dV	5Ah	operand, value class
ptgArea3dV	5Bh	operand, value class
ptgRefErr3dV	5Ch	operand, value class
ptgAreaErr3dV	5Dh	operand, value class
ptgArrayA	60h	operand, array class
ptgFuncA	61h	operator
ptgFuncVarA	62h	operator
ptgNameA	63h	operand, array class
ptgRefA	64h	operand, array class
ptgAreaA	65h	operand, array class
ptgMemAreaA	66h	operand, array class
ptgMemErrA	67h	operand, array class
ptgMemNoMemA	68h	control
ptgMemFuncA	69h	control
ptgRefErrA	6Ah	operand, array class
ptgAreaErrA	6Bh	operand, array class
ptgRefNA	6Ch	operand, array class
ptgAreaNA	6Dh	operand, array class
ptgMemAreaNA	6Eh	control
ptgMemNoMemNA	6Fh	control
ptgFuncCEA	78h	operator
ptgNameXA	79h	operand, array class (NEW ptg)
ptgRef3dA	7Ah	operand, array class (NEW ptg)
ptgArea3dA	7Bh	operand, array class (NEW ptg)
ptgRefErr3dA	7Ch	operand, array class (NEW ptg)
ptgAreaErr3dA	7Dh	operand, array class (NEW ptg)

Extended ptgs in BIFF8

In BIFF8, expended ptgs are used to store natural-language formulas. These ptgs contain a ptgExtend (ptg=18h), followed by a 1-byte extended ptg type, called an eptg, and then followed by extended data if applicable. Extended ptgs are listed in the following table.

eptg	eptg Type	Size	Extended info?	Operand Type
0h	(Reserved)			
1h	eptgElfLel	4	No	Error
2h	eptgElfRw	4	No	Reference
3h	eptgElfCol	4	No	Reference
4h–5h	(Reserved)			
6h	eptgElfRwV	4	No	Value
7h	eptgElfColV	4	No	Value
8h–9h	(Reserved)			
Ah	eptgElfRadical	13	No	Reference
Bh	eptgElfRadicalS	13	Yes	Reference
Ch	eptgElfRwS	4	Yes	Reference
Dh	eptgElfColS	4	Yes	Reference
Eh	eptgElfRwSV	4	Yes	Value
Fh	eptgElfColSV	4	Yes	Value
10h	eptgElfRadicalLel	4	No	Error
11h–18h	(Reserved)			
19h–1Ah	Invalid values			
1Bh	(Reserved)			
1Ch	(Reserved)			
1Dh	eptgSxName	4	No	Value
1Eh	(Reserved)			

The data contained in eptgs is not documented.

For eptgs that have extended info, the extra information is appended to the saved parsed expression, immediately following the last token. The format of the extra information is:

First 4 bytes: the lowest 30 bits of these bytes is the count (cLoc) of 4-byte structures following these 4 bytes.

The next 4*cLoc bytes are reserved.

As with array constants, if a formula contains more than one eptg with extended information, the token values for the eptgs are appended to the saved parsed expression in order: first the values for the first eptg, then the values for the second eptg, and so on.

Likewise, an expression containing both eptgs and array constants appends the eptg and array constant data in the order that they occur in the parsed expression.

Expression Evaluation

Calculation of Excel formulas is a straightforward process. A last-in, first-out (LIFO) stack, the operand stack, is maintained during calculation. When an operand is encountered, it is pushed onto the stack. When an operator is encountered, it operates on the topmost operand or operands. Operator precedence is irrelevant at evaluation time; operators are handled as soon as they are encountered.

There are three kinds of operators: unary, binary, and function. Unary operators, such as the minus sign that negates a number, operate only on the top operand. Binary operators, such as the addition operator, operate on the top two operands. Function operators, which implement Excel functions, operate on a variable number of operands, depending on how many arguments the function accepts.

All operators work by popping the required operands from the stack, performing calculations, and then pushing the result back onto the operand stack.

Scanning a Parsed Expression

One fairly common operation you can perform on parsed expressions is to scan them, taking appropriate actions at each ptg. You can do this with a loop by using a pointer variable that points to the next ptg to scan. However, you must increment this pointer carefully, because different ptgs may have token values of different lengths.

One approach is to maintain an array with one element per ptg. Each element contains the size of the token value. To increment the pointer, add the array element corresponding to the current ptg to the pointer. One way of reducing the array size is to limit the array indexes to the range 0–3Fh and then index it using the reference-class ptg (the base ptg) instead of the value-class or array-class ptg. This is possible because the token value is the same for all classes of a particular ptg. For more information about operand classes, see "ptg Values for Operand Tokens".

There are two tokens, ptgStr and ptgAttr (when bitFAttrChoose is true), that have variable length and are therefore exceptions to the preceding description. The first token, ptgStr, is followed by a variable-length string. The token value specifies the length of the string, so the pointer can be incremented by reading the string length (cch) and then adding the string length to the pointer.

The other token is ptgAttr when bitFAttrChoose is true. In this case, the token value contains an optimized CHOOSE function, which contains a variable-length sequence of word offsets in the cases (value1, value2, … arguments) for the CHOOSE function. For these, use the wCases field to calculate the pointer increment.

Unary Operator Tokens

The unary operator tokens for Excel are described in the following paragraphs. These operators pop the top argument from the operand stack, perform a calculation, and then push the result back onto the operand stack.

ptgUplus: Unary Plus (ptg=12h)

Has no effect on the operand.

ptgUminus: Unary Minus (ptg=13h)

Negates the operand on the top of the stack.

ptgPercent: Percent Sign (ptg=14h)

Divides the top operand by 100.

Binary Operator Tokens

There are several binary operator ptgs. All binary operator ptgs pop the top two arguments from the operand stack, perform the associated calculation, and then push the result back onto the operand stack.

ptgAdd: Addition (ptg=03h)

Adds the top two operands.

ptgSub: Subtraction (ptg=04h)

Subtracts the top operand from the second-to-top operand.

ptgMul: Multiplication (ptg=05h)

Multiplies the top two operands.

ptgDiv: Division (ptg=06h)

Divides the top operand by the second-to-top operand.

ptgPower: Exponentiation (ptg=07h)

Raises the second-to-top operand to the power of the top operand.

ptgConcat: Concatenation (ptg=08h)

Appends the top operand to the second-to-top operand.

ptgLT: Less Than (ptg=09h)

Evaluates to TRUE if the second-to-top operand is less than the top operand; evaluates to FALSE otherwise.

ptgLE: Less Than or Equal (ptg=0Ah)

Evaluates to TRUE if the second-to-top operand is less than or equal to the top operand; evaluates to FALSE otherwise.

ptgEQ: Equal (ptg=0Bh)

Evaluates to TRUE if the top two operands are equal; evaluates to FALSE otherwise.

ptgGE: Greater Than or Equal (ptg=0Ch)

Evaluates to TRUE if the second-to-top operand is greater than or equal to the top operand; evaluates to FALSE otherwise.

ptgGT: Greater Than (ptg=0Dh)

Evaluates to TRUE if the second-to-top operand is greater than the top operand; evaluates to FALSE otherwise.

ptgNE: Not Equal (ptg=0Eh)

Evaluates to TRUE if the top two operands are not equal; evaluates to FALSE otherwise.

ptgIsect: Intersection (ptg=0Fh)

Computes the intersection of the top two operands. This is the Excel space operator.

ptgUnion: Union (ptg=10h)

Computes the union of the top two operands. This is the Excel comma operator.

ptgRange: Range (ptg=11h)

Computes the minimal bounding rectangle of the top two operands. This is the Excel colon operator.

Operand Tokens: Constant

These operand tokens push a single constant operand onto the operand stack.

ptgMissArg: Missing Argument (Operand, ptg=16h)

Indicates a missing argument to an Excel function. For example, the second (missing) argument to the function `DCOUNT(Database,,Criteria)` would be stored as a `ptgMissArg`.

ptgStr: String Constant (Operand, ptg=17h)

Indicates a string constant `ptg` followed by a string length field (00 to FFh) and the actual string.

Offset	Name	Size	Contents
0	`cch`	1	The length of the string
1	`rgch`	var	The string

`ptgStr` requires special handling when parsed expressions are scanned. For more information, see "Scanning a Parsed Expression".

In BIFF8, the `rgch` contains a unicode string. For more information, see "Unicode Strings in BIFF8".

ptgErr: Error Value (Operand, ptg=1Ch)

This `ptg` is followed by the 1-byte error value (`err`). For a list of error values, see "BOOLERR".

Offset	Name	Size	Contents
0	`err`	1	An error value

ptgBool: Boolean (Operand, ptg=1Dh)

This `ptg` is followed by a byte that represents TRUE or FALSE.

Offset	Name	Size	Contents
0	`f`	1	=1 for TRUE =0 for FALSE

ptgInt: Integer (Operand, ptg=1Eh)

This `ptg` is followed by a word that contains an unsigned integer.

Offset	Name	Size	Contents
0	`w`	2	An unsigned integer value

ptgNum: Number (Operand, ptg=1Fh)

This ptg is followed by an 8-byte IEEE floating-point number.

Offset	Name	Size	Contents
0	num	8	An IEEE floating-point number

Operand Tokens

Operand tokens push operand values onto the operand stack. These values fall into one of three classes — reference class, value class, or array class — depending on what type of value the formula expects from the operand. The type of value is determined by the context of the operand when the formula is parsed by Excel.

Reference Class

Some operands are required by context to evaluate to references. In this case, the term *reference* is a general term meaning one or more areas on an Excel worksheet.

When the Excel expression evaluator encounters a reference class operand, it pushes only the reference itself onto the operand stack; it does not de-reference it to return the underlying value or values. For example, because we have a ptgRef, a reference (to the cell B5) is pushed onto the stack. This function returns the column width of cell B5; therefore, only the reference to B5 is required, and there's no need to de-reference to the value stored in cell B5.

Value Class

This is the most common type of operand. Value class operands push a single de-referenced value onto the operand stack. Using the formula =A1+1 as an example, because we have a ptgRefV, the value (of cell A1, for example: 5) is pushed onto the stack.

Array Class

This operand pushes an array of values onto the operand stack. You can specify the values in an array constant or in a reference to cells. Using the formula =SUM({1,2,3;4,5,6}) as an example, because we have a ptgArrayA, the whole array ({1,2,3;4,5,6}) is pushed onto the stack.

ptg Values for Operand Tokens

The three classes of operand tokens are divided numerically, as shown in the following table.

Operand class	Ptg values
Reference	20h–3Fh
Value	40h–5Fh
Array	60h–7Fh

The arithmetic difference between ptg classes is 20h. This is the basis for forming the class variants of ptgs. Class variants of ptgs are formed from the reference class ptg, also known as the base ptg. To form the value class ptg from the base ptg, add 20h to the ptg and append V (for "value") to the ptg name. To form the array class ptg from the base ptg, add 40h to the ptg and append A (for "array") to the ptg name. These rules are summarized in the following table for a sample base ptg, ptgRef.

Class	Name	Ptg
Reference	ptgRef	24h
Value	ptgRefV	44h
Array	ptgRefA	64h

The following example is a suggested method for calculating the base ptg from any class variant.

```
if (ptg & 40h)
{
     /* Value class ptg. Set the 20h bit to
        make it Reference class, then strip
        off the high-order bits. */
     ptgBase = (ptg | 20h) & 3Fh;
}
else
{
     /* Reference or Array class ptg. The 20h bit
        is already set, so just have to strip off
        the high-order bits. */
     ptgBase = ptg & 3Fh;
}
```

A more efficient implementation would define a macro that computes the base ptg, as in the following example.

```
#define PtgBase(ptg) (((ptg & 0x40) ? (ptg | 0x20): ptg) & 0x3F)
```

Operand Tokens: Base

This section describes the operand tokens in their base form (also known as reference class operand tokens).

ptgArray: Array Constant (Operand, ptg=20h)

Array constant followed by 7 reserved bytes.

The token value for ptgArray consists of the array dimensions and the array values. ptgArray differs from most other operand tokens in that the token value doesn't follow the token type. Instead, the token value is appended to the saved parsed expression, immediately following the last token. The format of the token value is shown in the following table.

Offset	Name	Size	Contents
0	ccol	1	The number of columns in the array constant
1	crw	2	The number of rows in the array constant
3	rgval	var	The array values

An array with 256 columns is stored with a ccol=0, because a single byte cannot store the integer 256. This is unambiguous, because a 0-column array constant is meaningless.

The number of values in the array constant is equal to the product of the array dimensions, crw*ccol. Each value is either an 8-byte IEEE floating-point number or a string. The two formats for these values are shown in the following tables.

IEEE Floating-Point Number

Offset	Name	Size	Contents
0	grbit	1	=01h
1	num	8	IEEE floating-point number

String

Offset	Name	Size	Contents
0	grbit	1	=02h
1	cch	1	The length of the string
2	rgch	var	The string

If a formula contains more than one array constant, the token values for the array constants are appended to the saved parsed expression in order: first the values for the first array constant, then the values for the second array constant, and so on.

If a formula contains very long array constants, the FORMULA, ARRAY, or NAME record containing the parsed expression may overflow into CONTINUE records (to accommodate all of the array values). In such cases, an individual array value is never split between records, but record boundaries are established between adjacent array values.

The reference class ptgArray never appears in an Excel formula; only the ptgArrayV and ptgArrayA classes are used.

ptgName: Name (Operand, ptg=23h)—BIFF8

This ptg stores the index to a name. The ilbl field is a 1-based index to the table of NAME records in the workbook.

Offset	Name	Size	Contents
0	ilbl	2	Index to the NAME table
2	(Reserved)	2	Reserved; must be 0 (zero)

ptgName: Name (Operand, ptg=23h)—BIFF7 and earlier

This ptg stores the index to a name. The ilbl field is a 1-based index to the table of NAME records in the workbook.

Offset	Name	Size	Contents
0	ilbl	2	Index to the NAME table
2	(Reserved)	12	Reserved; must be 0 (zero)

ptgRef: Cell Reference (Operand, ptg=24h)—BIFF8

This ptg specifies a reference to a single cell. It is followed by references for the row and column that contain the cell. The column number is encoded.

Offset	Name	Size	Contents
0	rw	2	The column of the reference
2	grbitCol	2	(See the following table)

Only the low-order 14 bits of the grbitCol field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitCol field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	col	The column number or column offset (0-based)

For example, cell C5 is row number 4, column number 2 (Excel stores 0-based cell references). Therefore, the absolute reference $C$5 is stored in a ptgRef, as shown in the following file fragment.

```
24 04 00 02 00
```

In this case, rw=0004h and grbitCol=0002h. **Note**: bits 14 and 15 of grbitCol are both 0 (zero).

The relative reference C5 is stored in a ptgRef, as shown in the following file fragment.

```
24 04 00 02 C0
```

In this case, where grbitCol=C004h and col=02h, bits 14 and 15 of grbitCol are both 1.

Mixed references are stored in the same way, with appropriate coding in grbitCol.

ptgRef: Cell Reference (Operand, ptg=24h)—BIFF7 and earlier

This ptg specifies a reference to a single cell. It is followed by references for the row and column that contain the cell. The row number is encoded.

Offset	Name	Size	Contents
0	grbitRw	2	(See the following table)
2	col	1	The column of the reference

Only the low-order 14 bits of the grbitRw field store the row number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitRw field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

For example, cell C5 is row number 4, column number 2 (Excel stores 0-based cell references). Therefore, the absolute reference $C$5 is stored in a ptgRef, as shown in the following file fragment.

```
24 04 00 02
```

In this case, grbitRw=0004h and col=02h. **Note**: bits 14 and 15 of grbitRw are both 0 (zero).

The relative reference C5 is stored in a ptgRef, as shown in the following file fragment.

```
24 04 C0 02
```

In this case, where grbitRw=C004h and col=02h, bits 14 and 15 of grbitRw are both 1.

Mixed references are stored in the same way, with appropriate coding in grbitRw.

ptgArea: Area Reference (Operand, ptg=25h)—BIFF8

This ptg specifies a reference to a rectangle (range) of cells. ptgArea is followed by 8 bytes that define the first row, last row, first column, and last column of the rectangle. The numbers of the first and last columns are encoded.

Offset	Name	Size	Contents
0	rwFirst	2	The first row of the reference
2	rwLast	2	The last row of the reference
4	grbitColFirst	2	(See the following table)
6	grbitColLast	2	(See the following table)

Only the low-order 14 bits of the grbitColFirst and grbitColLast fields store the column offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitColFirst and grbitColLast fields.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	col	The column number or column offset (0-based)

ptgArea: Area Reference (Operand, ptg=25h)—BIFF7 and earlier

This ptg specifies a reference to a rectangle (range) of cells. ptgArea is followed by 6 bytes that define the first row, last row, first column, and last column of the rectangle. The numbers of the first and last rows are encoded.

Offset	Name	Size	Contents
0	grbitRwFirst	2	(See the following table)
2	grbitRwLast	2	(See the following table)
4	colFirst	1	The first column of the reference
5	colLast	1	The last column of the reference

Only the low-order 14 bits of the grbitRwFirst and grbitRwLast fields store the row offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitRwFirst and grbitRwLast fields.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

ptgMemArea: Constant Reference Subexpression (Operand, ptg=26h)

This ptg is used to optimize reference expressions. A reference expression consists of operands — usually references to cells or areas — joined by reference operators (intersection, union, and range). Three examples of reference expressions are given in the following table.

Reference expression	Evaluates to
(A1,C3,D3:D5)	Two single cells and a 3x1 area
(A1:C3) (B2:D4)	A 2x2 area (the space character is the intersection operator)
(Name C3)	The smallest area that contains both C3 and all the cells referenced in Name (the space character is the intersection operator)

Many reference expressions evaluate to constant references. In the preceding examples, the first two expressions always evaluate to the same reference. The third example doesn't evaluate to a constant reference because the name's definition may change, which might cause the reference expression to evaluate differently.

When a reference expression evaluates to a constant reference, Excel stores the constant reference in the parsed formula through a ptgMemArea token. This saves time during expression evaluation, because the constant part of the expression is pre-evaluated. This part of the expression is known as a reference subexpression.

The token value for ptgMemArea consists of two parts: the length of the reference subexpression, and the value of the reference subexpression. The length is stored immediately following the ptgMemArea, whereas the value is appended to the saved parsed expression, immediately following the last token.

The format of the length is shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

Immediately following this part of the token value is the reference subexpression itself.

The rest of the token value (that is, the value of the reference subexpression) is appended to the parsed expression in the format shown in the following table.

Offset	Name	Size	Contents
0	cref	2	The number of rectangles to follow
2	rgref	var	An array of rectangles

Each rgref rectangle is 6 bytes long and contains the fields listed in the following table.

Offset	Name	Size	Contents
0	rwFirst	2	The first row
2	rwLast	2	The last row
4	colFirst	1	The first column
5	colLast	1	The last column

If a formula contains more than one ptgMemArea, the token values are appended to the saved parsed expression in order: first the values for the first ptgMemArea, then the values for the second ptgMemArea, and so on.

If a formula contains very long reference expressions, the BIFF record containing the parsed expression may be too long to fit in a single record. Excel uses CONTINUE records to store long formulas. However, an individual rgref rectangle is never split between records; record boundaries occur between successive rectangles. For more information about the CONTINUE records, see "CONTINUE".

ptgMemErr: Erroneous Constant Reference Subexpression (Operand, ptg=27h)

This ptg is closely related to ptgMemArea. It is used for pre-evaluating reference subexpressions that do not evaluate to references.

For example, consider the formula =SUM(C:C 3:3), which is the sum of the intersection of column C and row 3 (the space between C:C and 3:3 is the intersection operator). The argument to the SUM function is a valid reference subexpression that generates a ptgMemArea for pre-evaluation. However, if you delete column C, the formula adjusts to =SUM(#REF! 3:3). In this case, the argument to SUM is still a constant reference subexpression, but it doesn't evaluate to a reference. Therefore, a ptgMemErr is used for pre-evaluation.

The token value consists of the error value and the length of the reference subexpression. Its format is shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

The reference subexpression will contain a ptgRefErr or ptgAreaErr.

ptgRefErr: Deleted Cell Reference (Operand, ptg=2Ah)—BIFF8

This ptg specifies a cell reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgRefErr is followed by4 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	4	

The original base type of the adjusted ptg is ptgRef or ptgRefN.

ptgRefErr: Deleted Cell Reference (Operand, ptg=2Ah)—BIFF7 and earlier

This ptg specifies a cell reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgRefErr is followed by 3 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	3	

The original base type of the adjusted ptg is ptgRef or ptgRefN.

ptgAreaErr: Deleted Area Reference (Operand, ptg=2Bh)—BIFF8

This ptg specifies an area reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgAreaErr is followed by 8 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	8	

The original base type of the adjusted ptg is ptgArea or ptgAreaN.

ptgAreaErr: Deleted Area Reference (Operand, ptg=2Bh)—BIFF7 and earlier

This ptg specifies an area reference that was adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgAreaErr is followed by 6 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	6	

The original base type of the adjusted ptg is ptgArea or ptgAreaN.

ptgRefN: Cell Reference Within a Shared Formula (Operand, ptg=2Ch)—BIFF8

Similar to its ptgRef counterpart, the ptgRefN specifies a reference to a single cell. It is followed by references for the row and column that contain the cell; the row number of the cell is encoded as bit fields.

In BIFF5 and later, ptgRefN is used only in shared formulas. In earlier versions of Excel, ptgRefN was used in names.

Offset	Name	Size	Contents
0	rw	2	The row (or row offset) of the reference
2	grbitCol	2	(See the following table)

Only the low-order 14 bits of the grbitCol field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitCol field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	col	The column number or column offset (0-based)

The only difference between ptgRefN and ptgRef is in the way relative references are stored. Relative references in shared formulas are stored as offsets, not as row and column numbers (as in ptgRef). For more information, see "SHRFMLA".

ptgRefN: Cell Reference Within a Shared Formula (Operand, ptg=2Ch)—BIFF7 and earlier

Similar to its ptgRef counterpart, the ptgRefN specifies a reference to a single cell. It is followed by references for the row and column that contain the cell; the row number of the cell is encoded as bit fields.

In BIFF5 and later, ptgRefN is used only in shared formulas. In earlier versions of Excel, ptgRefN was used in names.

Offset	Name	Size	Contents
0	grbitRw	2	(See the following table)
2	col	1	The column (or column offset) of the reference

Only the low-order 14 bits of the grbitRw field store the row number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitRw field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

The only difference between ptgRefN and ptgRef is in the way relative references are stored. Relative references in shared formulas are stored as offsets, not as row and column numbers (as in ptgRef). For more information, see "SHRFMLA".

ptgAreaN: Area Reference Within a Shared Formula (Operand, ptg=2Dh)—BIFF8

The ptgAreaN token specifies a reference to a rectangle of cells. Both the first column and last column are encoded.

In BIFF5 and later, ptgAreaN is used only in shared formulas. In earlier versions, it was used in names.

Offset	Name	Size	Contents
0	rwFirst	2	The first row of the absolute reference or relative reference
2	rwLast	2	The last row of the absolute reference or relative reference
4	grbitColFirst	2	(See the following table)
6	grbitColLast	2	(See the following table)

Only the low-order 14 bits of the grbitColFirst and grbitColLast fields store the column offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitColFirst and grbitColLast fields.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

Bits	Mask	Name	Contents
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	col	The column number or column offset (0-based)

The only difference between ptgAreaN and ptgArea is in the way relative references are stored.

ptgAreaN: Area Reference Within a Shared Formula (Operand, ptg=2Dh)—BIFF7 and earlier

The ptgAreaN token specifies a reference to a rectangle of cells. Both the first row and last row are stored as bit fields.

In BIFF5 and later, ptgAreaN is used only in shared formulas. In earlier versions, it was used in names.

Offset	Name	Size	Contents
0	grbitRwFirst	2	The first row of the absolute reference or relative reference offset bit fields
2	grbitRwLast	2	The last row of the absolute reference or relative reference offset bit fields
4	colFirst	1	The first column of the reference or column offset
5	colLast	1	The last column of the reference or column offset

Only the low-order 14 bits of the grbitRwFirst and grbitRwLast fields store the row offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitRwFirst and grbitRwLast fields.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

The only difference between ptgAreaN and ptgArea is in the way relative references are stored.

ptgNameX: Name or External Name (Operand, ptg=39h)—BIFF8

This ptg stores the index to a name.

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record
2	ilbl	2	The index to the NAME or EXTERNNAME table (1-based)
4	(Reserved)	2	Reserved; must be 0 (zero)

ptgNameX: Name or External Name (Operand, ptg=39h)—BIFF7 and earlier

This ptg stores the index to a name. If the name is in the current workbook (in which case ixals is negative), the ilbl field is a 1-based index to the table of NAME records. If the name is in another workbook (that is, if it is an external name), the ilbl field is a 1-based index to the table of EXTERNNAME records.

Offset	Name	Size	Contents
0	ixals	2	The index to the EXTERNSHEET records. If ixals is negative (for example, FFFFh), the name is in the current workbook.
2	(Reserved)	8	
10	ilbl	2	The index to the NAME or EXTERNNAME table (1-based).
12	(Reserved)	12	

ptgRef3d: 3-D Cell Reference (Operand, ptg=3Ah)—BIFF8

This ptg stores a 3-D cell reference (for example, Sheet1:Sheet3!$A$1).

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record.
2	rw	2	The row of the reference, or the row offset.
4	grbitCol	2	(See the following table.)

Only the low-order 8 bits of the grbitCol field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitCol field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13 – 8	3F00h	(Reserved)	
7 – 0	00FFh	col	The column number or column offset (0-based)

ptgRef3d: 3-D Cell Reference (Operand, ptg=3Ah)—BIFF7 and earlier

This ptg stores a 3-D cell reference (for example, Sheet1:Sheet3!$A$1). If the reference is to another workbook (in which case ixals is positive), itabFirst is not used (it will be 0000h), and itabLast is the ixals for the last sheet in the 3-D reference. If either itabFirst or itabLast is equal to FFFFh, that sheet is a deleted sheet.

Offset	Name	Size	Contents
0	ixals	2	The index to the EXTERNSHEET records. If ixals is negative (for example, FFFFh), the reference is in the current workbook.
2	(Reserved)	8	

Offset	Name	Size	Contents
10	itabFirst	2	The index to the first sheet in the 3-D reference (0-based); see the text.
12	itabLast	2	The index to the last sheet in the 3-D reference (0-based); see the text.
14	grbitRw	2	(See the following table.)
16	col	1	The column of the reference, or the column offset.

Only the low-order 14 bits of the grbitRw field store the row number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitRw field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

ptgArea3d: 3-D Area Reference (Operand, ptg=3Bh)—BIFF8

This ptg stores a 3-D area reference (for example, Sheet1:Sheet3!A1:E9).

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record.
2	rwFirst	2	The first row in the area.
4	rwLast	2	The last row in the area.
6	grbitColFirst	2	The first column of the reference, or the column offset; see following table.
8	grbitColLast	2	The last column of the reference, or the column offset; see following table.

Only the low-order 8 bits of the grbitColFirst and grbitColLast fields store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitCol field.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–8	3F00h	(Reserved)	
7–0	00FFh	col	The column number or column offset (0-based)

ptgArea3d: 3-D Area Reference (Operand, ptg=3Bh)—BIFF7 and earlier

This ptg stores a 3-D area reference (for example, Sheet1:Sheet3!A1:E9).

Offset	Name	Size	Contents
0	ixals	2	The index to the EXTERNSHEET records. If ixals is negative (for example, FFFFh), the reference is on another sheet in the same workbook.
2	(Reserved)	8	
10	itabFirst	2	The index to the first sheet in the 3-D reference (0-based).
12	itabLast	2	The index to the last sheet in the 3-D reference (0-based).
14	grbitRwFirst	2	The first row in the area; see the following table.
16	grbitRwLast	2	The last row in the area; see the following table.
18	colFirst	1	The first column of the reference, or the column offset.
19	colLast	1	The last column of the reference, or the column offset.

Only the low-order 14 bits of the grbitRwFirst and grbitRwLast fields store the row offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitRwFirst and grbitRwLast fields.

Bits	Mask	Name	Contents
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
13–0	3FFFh	rw	The row number or row offset (0-based)

ptgRefErr3d: Deleted 3-D Cell Reference (Operand, ptg=3Ch)

This ptg stores a 3-D cell reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgRefErr3d is identical to ptgRef3d.

ptgAreaErr3d: Deleted 3-D Area Reference (Operand, ptg=3Dh)

This ptg stores a 3-D area reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The ptgAreaErr3d is identical to ptgArea3d.

Control Tokens

ptgExp: Array Formula or Shared Formula (ptg=01h)

This ptg indicates an array formula or a shared formula. When ptgExp occurs in a formula, it is the only token in the formula. This indicates the cell containing the formula is part of an array or part of a shared formula. The actual formula is found in an ARRAY record.

The token value for ptgExp consists of the row and column of the upper-left corner of the array formula.

Offset	Name	Size	Contents
0	rwFirst	2	The row number of the upper-left corner
2	colFirst	2	The column number of the upper-left corner

ptgTbl: Data Table (ptg=02h)

This ptg indicates a data table. When ptgTbl occurs in a formula, it is the only token in the formula. This indicates the cell containing the formula is an interior cell in a data table; the table description is found in a TABLE record. Rows and columns that contain input values to be substituted in the table do not contain ptgTbl.

The token value for ptgTbl consists of the row and column of the upper-left corner of the table's interior.

Offset	Name	Size	Contents
0	rwFirst	2	The row number of the upper-left corner
2	colFirst	2	The column number of the upper-left corner

ptgParen: Parenthesis (ptg=15h)

This ptg is used only when Excel unparses a parsed expression (for example, to display it in the formula bar). This ptg is not used to evaluate parsed expressions. It indicates that the previous token in the parsed expression should be in parentheses. If the previous token is an operand, only that operand is in parentheses. If the previous token is an operator, the operator and all of its operands are in parentheses.

For example, the formula =1+(2) is stored as follows:

```
ptgInt      0001h
ptgInt      0002h
ptgParen
ptgAdd
```

In this case, only the integer operand 2 is in parentheses.

The formula =(1+2) is stored as follows:

```
ptgInt      0001h
ptgInt      0002h
ptgAdd
ptgParen
```

In this example, the parenthesized quantity consists of the ptgAdd operator and both of its operands.

ptgAttr: Special Attribute (ptg=19h)

This ptg is used for several different purposes. In all cases, the token value consists of a group of flag bits and a data word.

BIFF3 and BIFF4

Offset	Name	Size	Contents
0	grbit	1	Option flags
1	w	2	Data word

BIFF4 when bifFAttrSpace = 1

Offset	Name	Size	Contents
0	grbit	1	Option flags
1	bAttrSpace	1	Spacing attribute
2	bSpace	1	Number of spaces

The grbit field contains the following option flags:

Bits	Mask	Name	Contents
0	01h	bitFAttrSemi	=1 if the formula contains a volatile function
1	02h	bitFAttrIf	=1 to implement an optimized IF function
2	04h	bitFAttrChoose	=1 to implement an optimized CHOOSE function
3	08h	bitFAttrGoto	=1 to jump to another location within the parsed expression
4	10h	bitFAttrSum	=1 to implement an optimized SUM function
5	20h	bitFAttrBaxcel	=1 if the formula is a BASIC-style assignment statement
6	40h	bifFAttrSpace	=1 if the macro formula contains spaces after the equal sign (BIFF3 and BIFF4 only)
7	80	(unused)	

ptgAttr requires special handling when parsed expressions are scanned. For more information, see "Scanning a Parsed Expression".

bitFAttrSemi

Set to 1 if the formula contains a volatile function — that is, a function that is calculated in every recalculation. If ptgAttr is used to indicate a volatile function, it must be the first token in the parsed expression. If grbit=bitFAttrSemi, then the b (or w) field is don't-care.

bitFAttrIf

Indicates an optimized IF function. An IF function contains three parts: a condition, a TRUE subexpression, and a FALSE subexpression. The syntax of an associated Excel formula would be IF(condition, TRUE subexpression, FALSE subexpression).

bitFAttrIf immediately follows the condition portion of the parsed expression. The b (or w) field specifies the offset to the FALSE subexpression; the TRUE subexpression is found immediately following the ptgAttr token. At the end of the TRUE subexpression, there is a bitFAttrGoto token that causes a jump to beyond the FALSE subexpression. In this way, Excel evaluates only the correct subexpression instead of evaluating both of them and discarding the wrong one.

The FALSE subexpression is optional in Excel. If it is missing, the b (or w) field specifies an offset to beyond the TRUE subexpression.

bitFAttrChoose

Indicates an optimized CHOOSE function. The cCases (or wCases) field specifies the number of cases in the CHOOSE function. It is followed by an array of word offsets to those cases. The format of this complex token value is shown in the following table.

Offset	Name	Size	Contents
0	grbit	1	bitFAttrChoose (04h).
1	wCases	2	The number of cases in the CHOOSE function.
3	rgw	var	A sequence of word offsets to the CHOOSE cases. The number of words in this field is equal to wCases+1.

bitFAttrGoto

Instructs the expression evaluator to skip part of the parsed expression during evaluation. The b (or w) field specifies the number of bytes (or words) to skip, minus 1.

bitFAttrSum

Indicates an optimized SUM function (a SUM that has a single argument). For example, the sum of the cells in a 3-D reference — which has the formula =SUM(Sheet1:Sheet3!C11) — generates a ptgAttr with bitFAttrSum TRUE. The b (or w) field is don't-care.

bifFAttrSpace

Indicates a formula (macro sheet or worksheet) contains spaces or carriage returns. Excel retains spaces and returns in macro sheet and worksheet formulas (in version 3.0 and earlier, spaces and returns would have been eliminated when the formula was parsed). The bAttrSpace field contains an attribute code, and the bSpace field contains the number of spaces or returns. The attribute codes are listed in the following table.

Attribute	Value
bitFSpace	00h
bitFEnter	01h
bitFPreSpace	02h
bitFPreEnter	03h
bitFPostSpace	04h
bitFPostEnter	05h
bitFPreFmlaSpace	06h

The bitFSpace and bitFEnter attributes indicate that bSpace contains the number of spaces or returns before the next ptg in the formula.

The bitFPreSpace, bitFPreEnter, bitFPostSpace, and bitFPostEnter attributes occur with a ptgParen. Because one ptgParen represents two matched parentheses, the ptgAttr must encode the position of the space or return if it occurs before either parenthesis. For example, the ptgs that express the worksheet formula = ("spaces"), which contains four spaces before the opening and closing parentheses, would appear in a formula record as shown in the following table.

Hex dump	Ptg type	Decodes to
17 06 73 70 61 63 65 73	ptgStr	The string "spaces" (operand)
19 40 02 04	ptgAttr	Four spaces before the opening parenthesis
19 40 04 04	ptgAttr	Four spaces before the closing parenthesis

Hex dump	Ptg type	Decodes to
15	ptgParen	The enclose operand (ptgStr) in parentheses

The bitFPreFmlaSpace attribute provides compatibility with BIFF3, where spaces can occur only after the equal sign (before the formula) in macro formulas. If the spaces in a BIFF5/BIFF7 formula are also acceptable in a BIFF3 formula, Excel writes a bitFPreFmlaSpace attribute to indicate as much.

ptgMemNoMem: Incomplete Constant Reference Subexpression (ptg=28h)

This ptg is closely related to ptgMemArea. It is used to indicate a constant reference subexpression that could not be pre-evaluated because of insufficient memory.

The token value consists of the length of the reference subexpression, as shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

ptgMemFunc: Variable Reference Subexpression (ptg=29h)

This ptg indicates a reference subexpression that does not evaluate to a constant reference. Any reference subexpression that contains one or more of the following items generates a ptgMemFunc.

Subexpression contains	Example
A function	OFFSET(ACTIVE.CELL(),1,1):$C$2
A name	INDEX(first_cell:$D$2,1,1)
An external reference	SALES.XLS!$A$1:SALES.XLS!$C$3

The token value consists of the length of the reference subexpression.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

ptgMemAreaN: Reference Subexpression Within a Name (ptg=2Eh)

This ptg contains a constant reference subexpression within a name definition. Unlike ptgMemArea, ptgMemAreaN is not used to pre-evaluate the reference subexpression.

The token value consists of the length of the reference subexpression.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

ptgMemNoMemN: Incomplete Reference Subexpression Within a Name (ptg=2Fh)

This ptg is closely related to ptgMemAreaN. It is used to indicate a constant reference subexpression within a name that could not be evaluated because of insufficient memory.

The token value consists of the length of the reference subexpression, as shown in the following table.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

Function Operators

The following paragraphs describe the function operator ptgs. All of these operators pop arguments from the operand stack, compute a function, and then push the result back onto the operand stack. The number of operands popped from the stack is equal to the number of arguments passed to the Excel function. Some Excel functions always require a fixed number of arguments, whereas others accept a variable number of arguments. The SUM function, for example, accepts a variable number of arguments.

Although they're operators, function tokens also behave like operands in that they can occur in any of the three ptg classes: reference, value, or array.

ptgFunc: Function, Fixed Number of Arguments (Operator, ptg=21h)

This ptg indicates an Excel function with a fixed number of arguments. The ptgFunc is followed by the index to the function table.

Offset	Name	Size	Contents
0	iftab	2	The index to the function table;

ptgFuncVar: Function, Variable Number of Arguments (Operator, ptg=22h)

This ptg indicates an Excel function with a variable number of arguments. The ptgFuncVar is followed by the number of arguments (1 byte) and then the index to the function table (2 bytes).

Offset	Bits	Mask	Name	Contents
0	6–0	7Fh	cargs	The number of arguments to the function.
	7	80h	fPrompt	=1, function prompts the user (macro functions that end with a question mark).
1	14–0	7FFFh	iftab	The index to the function table;
	15	8000h	fCE	The function is a command-equivalent.

Revision History Stream

The "Revision History" stream will occur in any shared (revision-tracked) workbook. It contains the history of actions taken by each user, which allows other users to keep their versions of the workbook synchronized. The following are the only records that can legally be found in the Revision History stream. These records may not ever occur outside of the Revision History stream (unless otherwise indicated).

The record order for the Revision History stream is generally as follows:

RRDINFO

USRFILELOCK (always present, but doesn't necessarily mean the file's locked)

USREXCL (always present, but doesn't necessarily mean the file's locked)

0 or more blocks of the following:

- RRDHEAD
- RRTABID
- 0 or more of the following:
  - RRDRENSHT
  - RRDINSDEL block*****
  - RRDCONF
  - RRDINSERTSH
  - RRDCHGCELL block*
  - RRDMOVE block*****
  - RRDFORMAT
  - RRDAUTOFMT
  - RRDDEFNAME
  - RRDUSERVIEW
  - RRDNOTE
  - RRDTQSIF

***** blocks:

RRDINSDEL: if this is a row/col insert revision, the block will simply contain an RRDINSDEL, followed by 0 or more DUCR records. If this is a row/col delete revision, the block will be the following:

- RRDINSDELBEGIN
- RRDINSDEL
- DUCR (0 or more)
- RRDCHGCELL/RRDFORMAT (0 or more of each, in any, intermixed, order) – old values of the deleted rows/columns. This is the only time the RRDCHGCELL record should have the revid set to 0.
- RRDINSDELEND

RRDMOVE: similar to RRDINSDEL in the delete case:

RRDMOVEBEGIN

RRDMOVE

DUCR (0 or more)

RRDCHGCELL/RRDFORMAT (0 or more of each)

RRDMOVEEND

RRDCHGCELL:

RRDCHGCELL

RRDRSTETXP (0 or more)

EOF: End of File (10h)

This record indicates the end of the Revision History stream (can occur in other streams also).

Record Data

Offset	Name	Size	Contents

RRD: Revision Record on Disk Structure

The majority of the records that follow will begin with a 14-byte RRD structure, which contains general information that may be applicable to any of the revision record types.

Record Data

Offset	Name	Size	Contents
0	cb	4	Size of the corresponding memory revision record (not the disk structure).
4	revid	4	This revision record's id (only applicable for reviewable revision types).
8	revt	2	Revision type.
10	rrdInfo	2	Collection of flags for this revision record.
12	tabid	2	Id of the sheet on which the revision had occurred (if applicable).

The rrdInfo is a 16-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fAccepted	Flag indicating that this revision has been reviewed and accepted (Exception: insert sheet revision records are always marked as accepted).
1	0002h	fUndoAction	Flag indicating that this revision occurred due to an Undo action.
2	0004h	fRedoAction	Flag indicating that this revision occurred due to a Redo action

3	0008h	fDelAtEdgeOfSort	Only applicable to the row/column insert/delete revision type. Indicates that the row or column being deleted is at the edge of a sorted range.
15-4	FFF0h	(Reserved)	Reserved; must be zero (0).

The follwing are the only valid values for the revt field:

Value	Meaning
0	Insert Row (reviewable).
1	Insert Column (reviewable).
2	Delete Row (reviewable).
3	Delete Column (reviewable).
4	Cell(s) Move (reviewable).
5	Insert Sheet (reviewable).
8	Cell Change (reviewable).
9	Sheet Rename (reviewable).
10	Defined Name change (reviewable).
11	Formatting revision (non-reviewable).
12	Auto-formatting revision (non-reviewable).
13	Comment revision (non-reviewable).
32	Header (revision meta-data) (non-reviewable).
37	Conflict (non-reviewable).
38	Formatting Merge (non-reviewable).
43	Custom View Add (non-reviewable).
44	Custom View Delete (non-reviewable).
46	Query Table Field Removal (non-reviewable).

Reviewable vs. non-reviewable revisions: reviewable revisions are ones that will show in the revision history if the user chooses to Review History (Highlight Changes) or Accept/Reject Revisions. Additionally, conflicts between reviewable revisions will cause a conflict resolution dialog to be brought up, while conflicts in non-reviewable revisions will be resolved automatically by Excel.

RRDAUTOFMT: Auto-formatting revision (14Bh)

Revision record corresponding to an auto-formatting revision.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Non-reviewable revision – revid should be set to zero. Revision corresponds to a sheet – tabid should be set appropriately.
18	ref	8	Sheet reference identifying the location on the sheet where the Auto-formatting was applied.

26	itbl	2	Index identifying which autoformat was applied.
28	grbitAtr	2	Flags and attributes for this revision record.

The grbitAtr is a 16-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	applyNumberFormats	Flag indicating that the specified autoformat applied number format properties.
1	0002h	applyFontFormats	Flag indicating that the specified autoformat applied font properties.
2	0004h	applyAlignmentFormats	Flag indicating that the specified autoformat applied text alignment properties.
3	0008h	applyBorderFormats	Flag indicating that the specified autoformat applied border properties.
4	0010h	applyPatternFormats	Flag indicating that the specified autoformat applied color pattern properties.
5	0020h	applyWidthHeightFormats	Flag indicating that the specified autoformat applied height and/or width properties.
15-4	FFC0h	(Reserved)	Reserved; must be zero (0).

RRDCHGCELL: Change Cell revision (13Bh)

Revision record corresponding to a cell change revision.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero (unless it's an old value, preserved for Undo). Revision corresponds to a sheet – tabid should be set appropriately.
18	dwCellInfo	4	Collection of flags for the Change Cell revision.
22	row	2	Row location of the cell that was changed.
24	column	2	Column location of the cell that was changed.
26	cbOldVal	4	Memory (not disk) size of the buffer for the old cell value.
30	cetxRst	2	Count of RRDRSTETXP structures that follow.
32	dxfOld	var	If the fOldFmtDxf flag is set and the fOldFmtNull flag is not set, there will be a DXF structure for the formatting of the old cell value at the 32nd-bit offset.
var	dxf	var	If the fDxf flag is set and the fDxfNull flag is not set, there will be a DXF structure for the formatting of the new cell value at this location.

var	rgbOld	var	If the cbOldVal value is greater than zero, the old value of the cell will be stored at this location. The contents of the buffer will depend on the value of the vtOld flag (see text).
var	rgb	var	The new value of the cell is stored at this location. The contents of the buffer will depend on the value of the vt flag (see text).

The dwCellInfo is a 32-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
2-0	00000007h	vt	Value type – indicates the cell type of the new cell contents.
5-3	00000038h	vtOld	Old value type – indicates the cell type of the old cell contents.
6	00000040h	f123Prefix	Flag indicating whether or not the new value is to be preceded by a single quote mark (‘text).
7	00000080h	f123PrefixOld	Flag indicating whether or not the old value was to be preceded by a single quote mark (‘text).
8	00000100h	fOldFmt	Flag indicating that there is old formatting information available for this cell.
9	00000200h	fOldFmtNull	Flag indicating that the old DXF is NULL.
10	00000400h	fXfDxf	Flag indicating that the formatting change had an affect on the formatting of the entire row or column that this cell belongs to (Only applicable for Undo operations).
11	00000800h	fStyXfDxf	Flag indicating that formatting change for this cell affected the cell's style (Only applicable for Undo operations).
12	00001000h	fDxf	Flag indicating that there was a formatting change for this cell.
13	00002000h	fDxfNull	Flag indicating that the new DXF is NULL.
14	00004000h	fNewRw	Flag indicating a newly inserted row (Only applicable for Undo operations).
15	00008000h	fNewCol	Flag indicating a newly inserted column (Only applicable for Undo operations).
23-16	00FF0000h	ifmtDisp	Zero-based index of the number format (Fmt) record used by this cell format (XF).
24	00100000h	fPhShow	Flag indicating whether or not the cell now has to show phonetic.
25	00200000h	fPhShowOld	Flag indicating whether or not the cell had to show phonetic before.
26	00400000h	fEOLFmlaUpdate	Flag indicating that this cell change occurred due to an End Of List formula update.

31-27	F8000000h	(Reserved)	Reserved; must be zero (0).

The only supported values for vt and vtOld (cell value type) are:

Value	Meaning
0	Blank.
1,2	Number.
3	String.
4	Boolean/Error.
5	Expression.

The rgb and rgbOld buffers will contain the new and old, respectively, cell values, formatted according to the value type. The format of the buffer is the same as is normally used to save out the corresponding values in the normal cell table.

If the new or old cell value contains any formatting runs, the RRDCHGCELL record will be followed by a number of RRDRSTETXP records, as indicated by the cetxRst property.

RRDCONF: Conflict record (152h)

This record indicates that there had been a conflict between two users' revisions and how the conflict was resolved.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. revid identifies the revision that won the conflict. Revision does not correspond to a specific sheet – tabid should be set to -1.

RRDDEFNAME: Defined name revision (153h)

Revision record corresponding to a defined name (named range) revision.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero. tabid field should be set appropriately if the affected named range is a sheet-level defined name, -1 otherwise.
18	tabidLocal	2	tabid of a local defined name's sheet (-1 otherwise).
20	fViewName	1	Flag indicating that this named range belongs to a custom view.
21	(Reserved)	1	Reserved. Must be zero (0).
22	grbit	6	Option flags and parameters for the new defined name.
28	grbitOld	6	Option flags and parameters for the old defined name.

34	rgb	var	Parsed expression for the new state of the defined name.
var	cchCustomMenuNew	1	If the defined name corresponds to a Custom Menu, the length of the new Custom Menu text is stored at this location.
var	stCustomMenuNew	var	If the defined name corresponds to a Custom Menu, the new Custom Menu text is stored at this location.
var	cchDescriptionNew	1	If the defined name corresponds to a description, the length of the new description text is stored at this location.
var	stDescriptionNew	var	If the defined name corresponds to a description, the new description text is stored at this location.
var	cchHelpTopicNew	1	If the defined name corresponds to a Help Topic, the length of the new Help Topic text is stored at this location.
var	stHelpTopicNew	var	If the defined name corresponds to a Help Topic, the new Help Topic text is stored at this location.
var	cchStatusTextNew	1	If the defined name has status bar text associated with it, the length of the new status bar text is stored at this location.
var	stStatusTextNew	var	If the defined name has status bar text associated with it, the new status bar text is stored at this location.
var	rgbOld	var	If an existing defined name was changed to create this revision (as opposed to a brand new defined name being created), the old parsed expression of this defined name will be stored at this location.
var	cchCustomMenuOld	1	If the defined name corresponds to a Custom Menu, the length of the old Custom Menu text is stored at this location. Applicable to revision changing an existing defined name only.
var	stCustomMenuOld	var	If the defined name corresponds to a Custom Menu, the old Custom Menu text is stored at this location. Applicable to revision changing an existing defined name only.
var	cchDescriptionOld	1	If the defined name corresponds to a description, the length of the old description text is stored at this location. Applicable to revision changing an existing defined name only.
var	stDescriptionOld	var	If the defined name corresponds to a description, the old description text is stored at this location. Applicable to revision changing an existing defined name only.

var	cchHelpTopicOld	1	If the defined name corresponds to a Help Topic, the length of the old Help Topic text is stored at this location. Applicable to revision changing an existing defined name only.
var	stHelpTopicOld	var	If the defined name corresponds to a Help Topic, the old Help Topic text is stored at this location. Applicable to revision changing an existing defined name only.
var	cchStatusTextOld	1	If the defined name has status bar text associated with it, the length of the old status bar text is stored at this location. Applicable to revision changing an existing defined name only.
var	stStatusTextOld	var	If the defined name has status bar text associated with it, the old status bar text is stored at this location. Applicable to revision changing an existing defined name only.

The grbit and grbitOld are 48-bit fields that contain the following flags and properties:

Bits	Mask	Flag Name	Contents
15-0	0000000000FFh	cce	Length of the parsed expression. The flag in grbit refers to the expression in the rgb buffer, while the flag in grbitOld corresponds to rgbOld.
16	000000000100h	fPli	Flag indicating that the defined name contains additional data (Custom Menu, Description, etc.).
17	000000000200h	fFunc	Flag indicating that the defined name identifies a function.
23-18	000000FC0000h	fgrp	Function group id.
31-24	00000FF00000h	chKey	Keyboard shortcut key to access this defined name.
32	000010000000h	fHidden	Flag indicating whether or not this defined name was/is hidden.
33	000020000000h	fCustomMenu	Flag indicating whether or not the corresponding Custom Menu string is set.
34	000040000000h	fDescription	Flag indicating whether or not the corresponding Description string is set.
35	000080000000h	fHelptopic	Flag indicating whether or not the corresponding Help Topic string is set.
36	000100000000h	fStatustext	Flag indicating whether or not the corresponding Status text string is set.
47-37	FFE000000000h	(Reserved)	Reserved; must be zero (0).

RRDFORMAT: Formatting revision (14Ah)

Revision record corresponding to a formatting revision.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Non-reviewable revision – revid should be set to zero. Revision corresponds to a sheet – tabid should be set appropriately.
18	grbit	2	Miscellaneous flags used by this revision record.
20	sqref	var	sqref record identifying the location(s) on the sheet where the new formatting was applied.
var	dxf	var	DXF structure containing the definition of the new cell formatting.

The grbit is a 16-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fXfDxf	Flag indicating that this formatting change had an affect on the formatting of an entire row or column that an affected cell(s) belongs to. (Only applicable for undo operations).
1	0002h	fXfDxfNull	Flag indicating that the DXF in this record is NULL.
2	0004h	fStyXfDxf	Flag indicating that this formatting change affected a cell's style. (Only applicable for Undo operations).
15-3	FFF8h	(Reserved)	Reserved; must be zero (0).

RRDHEAD: Revision Header (138h)

This header record contains meta-data about a set of revisions that a user has made, which follow immediately after the header record.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Non-reviewable revision – revid should be set to zero. Revision does not correspond to a specific sheet – tabid should be set to -1.
18	guid	16	Unique identifier for this set of revisions.
34	wFileCodePage	2	Code Page Id.
36	cchUser	1	Length of the user name.
37	stzUser	114	User Name (for the user who made this set of revisions).
151	sdtr	8	SHORTDTR structure identifying the date and time when this user saved this set of revisions.
159	tabidMac	2	The next available sheet id in this user's instance of Excel.

RRDINFO: Revision History Information (196h)

This record stores the general information about this shared workbook.

Record Data

Offset	Name	Size	Contents
4	version	2	BIFF version of the instance of Excel which last updated the User Names stream.
6	(Reserved)	2	Reserved. Must be 0 (zero).
8	fss	2	File Sharing State flags.
10	guid	16	Unique identifier of the current latest revision set.
26	guidRoot	16	Unique identifier of the last revision set that was saved. Used for Timed Update mode only.
42	revid	4	Id of the last revision in the history.
46	version	4	The current version number of this shared workbook.
50	grf	2	Collection of flags governing how the revision history is to be treated.
52	wRevHistInterval	2	Number of days Excel is to keep the change history for this workbook.

The fss is a 16-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fssShared	The file is a shared workbook
1	0002h	fssDiskHasRev	Revision history on disk contains revisions
2	0004h	fssRevHist	No auto-purging of revisions
3	0008h	fssRevTrack	Revision tracking is on
4	0010h	fssExclusive	The shared workbook is in exclusive mode
15-5	FFE0h	(Reserved)	Reserved; must be zero (0).

The grf is a 16-bit field that contains the following option flags

Bits	Mask	Flag Name	Contents
0	0001h	fNoRevHist	This shared workbook does not preserve a revision history.
1	0002h	fProtRev	The revision history is protected.
15-2	FFFCh	(Reserved)	Reserved; must be zero (0).

RRDINSDEL: Row/Column Insert/Delete (137h)

Revision record corresponding to a row/column insert or delete operation.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero. Revision corresponds to a sheet – tabid should be set appropriately.

18	grf	2	Flags corresponding to this revision record.
20	ref	8	Sheet reference identifying the rows or columns that were affected.
28	cUcr	4	Count of DUCR records following.
32	rgUcr	var	0 or more DUCR records.

DUCR Structures

The DUCR structure contains the Undo data that will have to be applied to an expression that was affected by this row/column insert/delete (or cell move revision), if the revision is rejected.

Record Data

Offset	Field Name	Size	Contents
0	(Reserved)	4	Reserved. Must be 0 (zero).
4	iptg	2	Index of the affected ptg in the expression.
6	ptg	1	The ptg before the revision action occurred.
7	grbit	1	Flags for this DUCR.
8	duce	14	If ptg is a ptgExtend (ptg=18h), there is a DUCE structure at the 8-bit offset.
8	ref	8	If ptg is not a ptgExtend (ptg=18h), there is a sheet reference identifying the original reference that the expression had previously contained.

The following continues the DUCR structure either at the 16th bit offset (if ptg was not a ptgExtend, and thus the 8th bit contained a ref), or at the 22nd bit (if the ptg was a ptgExtend and the 8th bit contained a DUCE):

If the fLbl flag in the DUCR's grbit is set (the expression was part of a defined name), the structure will now be followed by the following:

Offset	Field Name	Size	Contents
16/22	tabid	2	Sheet id of the sheet where the defined name resides (only applicable for sheet-level names, set to -1 otherwise).
18/24	cchLen	1	Length of the defined name.
19/25	rgch	var	The name of the defined name.

Otherwise, it's followed by the following:

Offset	Field Name	Size	Contents
16/22	tabidUse	2	Sheet id where affected expression resides.
18/24	row	2	Row location of the cell where the affected expression resides.
20/26	column	2	Column location of the cell where the affected expression resides.

The grbit is an 8-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	01h	fLbl	Indicates that the expression affected by this Undo record was contained in a defined name.
1	02h	fUseSh2	Inidicates that the affected expression was on a different sheet.
7-2	FCh	(Reserved)	Reserved; must be zero (0).

DUCE Structures

The DUCE structure contains additional Undo data that is only used for English Language Formulas.

Record Data

Offset	Field Name	Size	Contents
0	rowSmall	2	Row affected.
2	colSmall	2	Column affected.
4	refRadical	8	The reference of the English Language Formula.
12	ptgRadical	1	The ptg of the English Language Formula.
13	eptg	1	The extended ptg of this English Language Formula.

RRDINSDELBEGIN: Beginning of a row/column insert/delete revision record block (150h)

This record is only used for row/column deletion revisions and for insert revisions that are caused by Undo actions and must be matched by a corresponding RRINSDELEND record. If applicable, a row/column delete revision will also contain all the necessary information to restore cell data and formatting that was affected by this revision, if the change is ever undone (rejected). Therefore, the general structure of a row/column delete record is the following:

RRDINSDELBEGIN

RRDINSDEL - describes the deleted rows/columns.

DUCR (0 or more) - Undo information for affected formulas.

RRDCHGCELL or RRDFORMAT (0 or more, in any order) - old values, which are to be restored if the revision is rejected. These RRCHGCELL's are not reviewable, therefore their revid's will be set to 0.

RRDINSDELEND

Record Data

Offset	Name	Size	Contents

RRDINSDELEND: End of a row/column insert/delete revision record block (151h)

This record is only used for row/column deletion revisions and for insert revisions that are caused by Undo actions and must match a corresponding RRINSDELBEGIN record.

Record Data			
Offset	**Name**	**Size**	**Contents**

RRDINSERTSH: Sheet insert revision (14Dh)

Revision record corresponding to a sheet insert revision.

Record Data			
Offset	**Name**	**Size**	**Contents**
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero. Revision corresponds to a sheet – tabid should be set appropriately.
18	itabPos	4	Position of the new sheet on the sheet tab.
22	cchLen	1	Length of the sheet name.
23	stzName	256	The name of the new sheet.

RRDMOVE: Cell(s) move revision (140h)

Revision record corresponding to a cell(s) move revision.

Record Data			
Offset	**Name**	**Size**	**Contents**
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero. tabid field should correspond to the destination sheet (can be different from tabidSrc for a cross-sheet move).
18	refSrc	8	Sheet reference identifying the original location of the moved cell(s).
26	refDst	8	Sheet reference identifying the new location of the moved cell(s).
34	tabidSrc	2	Id of the sheet, on which refSrc resides.
36	cUcr	4	Count of DUCR records following.
40	rgUcr	var	0 or more DUCR records.

RRDMOVEBEGIN: Beginning of a cell(s) move revision record block (14Eh)

This record must be matched by a corresponding RRDMOVEEND record.

Record Data			
Offset	**Name**	**Size**	**Contents**

RRDMOVEEND: End of a cell(s) move revision record block (14Fh)

This record must match a corresponding RRDMOVEBEGIN record.

Record Data

Offset	Name	Size	Contents

RRDNOTE: Comment revision (01Ch)

Revision record corresponding to a comment change revision. The 01Ch record number is shared with the record that normally stores the comment in the Workbook stream of the document. The contents and structure of the record following it, however, are completely different in the revision history stream.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Non-reviewable revision – revid should be set to zero. Revision corresponds to a sheet – tabid should be set appropriately.
18	grbitNoteOp	2	Identifies the action that was performed on this comment. 1 corresponds to Comment Deletion; 2 corresponds to Comment Insertion (also used when an existing comment is modified). All other values are illegal.
20	row	2	Row location of the cell where the comment resides.
22	column	2	Coulmn location of the cell where the affected expression resides.
24	grbitNote	2	Flags used by this revision record.
26	guid	16	Unique identifier (GUID) identifying the comment record in the Workbook stream of the document.
42	ichF	4	Length of the comment before this revision was made.
46	cchNote	4	Length of the comment text added in this revision.
50	cchAuthor	1	Length of the comment author's name.
51	stAuthor	var	String representing the comment author's name.

The grbitNote is a 16-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	0001h	(Reserved)	Reserved; must be zero (0).
1	0002h	fShow	Flag indicating whether or not the user has set this comment to always be visible.
2	0004h	fOld	Flag indicating whether or not this comment had originally been created by a version of Excel prior to Office 97.
6-3	0078h	(Reserved)	Reserved; must be zero (0).

7	0080h	fRowHidden	Flag indicating whether or not the comment belongs to a cell in a hidden row.
8	0100h	fColHidden	Flag indicating whether or not the comment belongs to a cell in a hidden column.
15-9	7F00h	(Reserved)	Reserved; must be zero (0).

RRDRENSHT: Sheet Rename Revision (13Eh)

Revision record corresponding to a sheet rename operation.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Reviewable revision – revid has to be greater than zero. Revision corresponds to a sheet – tabid should be set appropriately.
18	cchOldName	1	Length of the old sheet name.
19	stzOldName	256	Old sheet name.
275	cchNewName	1	Length of the new sheet name.
276	stzNewName	256	New sheet name.

RRDRSTETXP: Formatting run definition (154h)

This record stores the definition for a formatting run in a cell change revision record.

Record Data

Offset	Name	Size	Contents
4	ifnt	2	Index of the current formatting run (local to the current cell change record).
6	cchFontName	1	Length of the font name, if a non-default font was applied.
7	stFontName	63	Buffer containing the font name, if a non-default font name was applied.
70	stxp	16	STXP structure describing the various font properties of this formatting run.
86	icvFore	4	Zero-based index identifying the fore-ground color of this formatting run.
90	fntgrp	4	The font group.

STXP Structures

The STXP structure contains font information pertaining to a rich string value in a cell.

Record Data

Offset	Field Name	Size	Contents
0	twpHeight	4	Height of the font (in units of 1/20th of a point).
4	grbit	4	Font attributes (see below).
8	bls	2	Bold style; a number from 100dec to 1000dec (64h to 3E8h) that indicates the character weight (“boldness”). The default values are 190h for normal text and 2BCh for bold text.

10	sss	2	Superscript/subscript: 00h= None 01h= Superscript 02h= Subscript
12	uls	1	Underline style: 00h= None 01h= Single 02h= Double 21h= Single Accounting 22h= Double Accounting
13	bFamily	1	Font family, as defined by the Windows API LOGFONT structure.
14	bCharSet	1	Character set, as defined by the Windows API LOGFONT structure.
15	unused	1	Reserved; must be zero (0).

The grbit is a 32-bit field that contains the following option flags:

Bits	Mask	Flag Name	Contents
0	00000001h	(Reserved)	Reserved; must be zero (0).
1	00000002h	fItalic	Flag indicating whether or not the font is italic.
2	00000004h	(Reserved)	Reserved; must be zero (0).
3	00000008h	fOutline	Flag indicating whether or not the font is outline style (Macintosh only).
4	00000010h	fShadow	Flag indicating whether or not the font is a shadow style (Macintosh only).
6-5	00000060h	(Reserved)	Reserved.
7	00000080h	fStrikeout	Flag indicating whether or not the font is struck out.
8	00000100h	fRegular	Flag indicating whether or not the font is regular.
31-9	00001000h	(Reserved)	Reserved.

RRDTQSIF: Query Table field change revision (808h)

Revision record indicating that a query table field has been removed.

Record Data

Offset	Name	Size	Contents
4	rt	2	This field must duplicate the record type value (808h).
6	grbitFrt	2	Reserved for FRT functionality. Must be set to one (1).
8	ref	8	Sheet reference identifying the location of the affected query table.
16	rrd	14	RRD structure. Non-reviewable revision – revid should be set to zero. Revision corresponds to a sheet – tabid should be set appropriately.

30	idField	4	Identifier of the specific query table field that was removed.

RRDUSERVIEW: Custom View revision (1ACh)

Revision record corresponding to a custom view revision.

Record Data

Offset	Name	Size	Contents
4	rrd	14	RRD structure. Non-reviewable revision – revid should be zero. Revision does not correspond to a specific sheet – tabid should be set to -1.
18	guid	16	Unique identifier (GUID) of the Custom View definition in the Workbook stream of the document.

RRTABID: Map of Sheet Id's (13Dh)

This record stores an array of all the sheet id's in this user's version of the workbook.

Record Data

Offset	Name	Size	Contents
4	tabid	2	Sheet id of the first (left-most) sheet.
6	tabid	2 (repeated)	Repeated for each sheet in the shared workbook (in order of tab position from left to right).

USRFILELOCK: File Lock (195h)

This record indicates that the shared workbook has been locked by a particular user.

Record Data

Offset	Name	Size	Contents
4	lPurpose	4	The purpose of the lock. Possible values: 0x0000 – not locked. 0x0001 – write or free user info. 0x0002 – merge revisions. 0x0004 – for making the workbook exclusive. 0x0008 – just before delete/rename of a shared workbook. 0x0010 – just check if the file is exclusive.
8	cchUsr	1	The length of the user name.
9	stUsr	var	User Name (of the user who has locked the workbook).

USREXCL: Exclusive File Lock (194h)

This record indicates that the given user has acquired an exclusive lock on the shared workbook.

Record Data

Offset	Name	Size	Contents
4	fExcl	4	Flag indicating whether or not the user has an exclusive lock.
8	sdtr	8	SHORTDTR structure identifying the date and time when this user acquired the lock.
16	cchUsr	1	The length of the user name.
17	stUsr	var	User Name (of the user who has locked the workbook).

User Names Stream

The "User Names" stream will occur in any shared (revision-tracked) workbook. It contains information about each user, who currently has the workbook open, including the user name, when they opened the shared workbook, and the latest revision this user is synced to. The following are the only records that can legally be found in the User Names stream. These records may not ever occur outside of the User Names stream.

The records appear below in the order required in the file.

CUSR: Count of users (191h)

This record stores the number of unique users currently using the given shared workbook.

Record Data

Offset	Name	Size	Contents
4	iCount	2	Number of users who currently have this shared workbook open (max: 255)

USRCHK: Version info (198h)

This record stores the version info for the last user to have edited the User Names stream.

Record Data

Offset	Name	Size	Contents
4	version	2	BIFF version of the instance of Excel which last updated the User Names stream.
6	(Reserved)	2	Reserved. Must be 0 (zero).

CBUSR: User info byte offsets (192h)

This record stores a table of byte offsets to each individual user info record in the User Names stream.

Record Data

Offset	Name	Size	Contents
4	offset	2	Byte offset, from the start of the User Names stream, where the first user's info record is to be found.
	offset (repeated)	2 (each)	Repeated 255 times. (see text)

The first offset value is the byte offset from the start of the stream to the start of the first user info record, each consecutive one is the byte offset from the start of the previous info record to the start of the current one. Therefore, to get the byte offset of the n-th record, add the first (n-1) entries in the table. Only the first m records contain non-zero values, where m is the number of users who currently have the shared workbook open. The remainder of the table must contain 0's (zeros).

BCUsrs: Brief-case users (197h)

This record stores the number of Brief Case users who have this shared workbook open.

Record Data

Offset	Name	Size	Contents
4	iCount	2	Number of brief case users who currently have this shared workbook open.

USRINFO: User info (193h)

This record stores the information about a given user who currently has the workbook open.

Record Data

Offset	Name	Size	Contents
4	lUsrId	4	Unique user id (signed integer) for this user.
8	guid	16	Unique identifier (GUID) identifying the last set of revisions this user is synced to.
24	shortdtr	8	SHORTDTR structure identifying the date and time when this user opened the shared workbook.
32	cchUserName	1	Length of the user name.
33	stUserName	var	User Name.

SHORTDTR Structures

The short date/time structures (SHORTDTRs) are 8-byte structures that give a short form of a time and date.

Record Data

Offset	Field Name	Size	Contents
0	year	2	Year
2	month	1	Month
3	dom	1	Day of month

4	hour	1	Hour
5	mint	1	Minute
6	sec	1	Second
7	wdy	1	Day of the week (1-7 = Sunday – Saturday)

Chart Records

CHARTFRTINFO: Chart Future Record Type Info (850h)

Introduced in Excel 9 (2000) this BIFF record is an FRT record for Charts. This record contains information describing the versions of Excel that originally created and last saved the file, and the FRT ID's that are used in the file.

In a file written by Excel 2000 or later, this record appears before the end of CHART record block and before any other FRT in the Chart record stream. In a file written by Excel 97, this record may be missing or will appear after the CHART record block. If this record appears after the END record of CHART record block, the verWriter field is assumed to be 8 for Excel 97 regardless of the actual value in the record.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0850h
6	grbitFrt	2	FRT flags; must be zero
8	verOriginator	1	Excel version that originally created the file
9	verWriter	1	Excel version that last saved the file
10	cCFRTID	2	Count of FRT ID value ranges in list
12	rgCFRTID	var	List of FRT ID values used for charts

CFRTID Structure

Offset	Field Name	Size	Contents
0	rtFirst	2	First FRT in range
2	rtLast	2	Last FRT in range

FRTWRAPPER: Chart Future Record Type Wrapper (851h)

Introduced in Excel 9 (2000) this BIFF record is an FRT record for Charts. This record is used to disguise a normal, non-FRT record as a FRT record. This is necessary whenever a new Excel element must save a pre-Excel 9 record as a child record. As an FRT record, Excel 97 will keep the record together with its associated STARTOBJECT/ENDOBJECT when round-tripping FRT's.

The size of this record varies depending on the record that was wrapped.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0851h
6	grbitFrt	2	FRT flags; must be zero
8	rt	2	RT of wrapped record
10	cb	2	Size of wrapped RT's data in bytes
12	rgb	var	RT's data

STARTBLOCK: Chart Future Record Type Start Block (852h)

Introduced in Excel 9 (2000) this BIFF record is an FRT record for Charts.

Indicates the start of an object's scope for Pre-Excel 9 objects. These records are used to push a chart element scope onto the parent element stack. This stack is used to determine the containing element for records that are used by more than one type of element. The FRAME record, for instance, is used by at least four different elements.

The STARTBLOCK/ENDBLOCK records are used for pre-Excel 9 elements with child records (i.e., a record for the element followed by a BEGIN/END block for the child records.) STARTBLOCK/ENDBLOCK are only written to enclose one or more child CFRT records and can be placed outside the original BEGIN/END block. They may be omitted otherwise.

These records allow Excel 9 or later to determine the proper parent element even after Excel 97 moves CFRT's to the end of the stream. Since these records are CFRT's, they will stay with and keep contained any child CFRT's.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0852h
6	grbitFrt	2	FRT flags; must be zero
8	iObjectKind	2	See table below
10	iObjectContext	2	See table below
12	iObjectInstance1	2	See table below
14	iObjectInstance2	2	See table below

The following table describes the meaning of each set of possible values for iObjectKind, iObjectContext, iObjectInstance1, iObjectInstance2. In some cases, these fields are indexed, and the indexes are described in the documentation for the parent rt. The table also lists whether the STARTBLOCK/ENDBLOCK or STARTOBJECT/ENDOBJECT rts are used, and the parent rt.

iObject Kind	iObject Context	iObject Instance1	iObject Instance2	Class	rt	Description
0	0	0	0	BLOCK	AXIS PARENT	Primary axis group
0	0	1	0	BLOCK	AXIS PARENT	Secondary axis group
2	0	0	0	BLOCK	TEXT	Chart title
2	1	xi	yi	BLOCK	TEXT	Data label for point in hidden series
2	2	0	0	BLOCK	TEXT	Default data label for other cases
2	2	1	0	BLOCK	TEXT	Default data label for showing values only
2	4	0	0	BLOCK	TEXT	Category axis title
2	4	1	0	BLOCK	TEXT	Value axis title
2	4	2	0	BLOCK	TEXT	Series axis title
2	5	xi	yi	BLOCK	TEXT	Data label for point in visible series, iobjInstance1 and iobjInstance2 is the DATAFORMAT xi and yi
2	6	0	0	OBJECT	TEXT	Display unit label
4	0	0	0	BLOCK	AXIS	Category axis
4	0	1	0	BLOCK	AXIS	Value axis
4	0	2	0	BLOCK	AXIS	Series axis
4	0	3	0	BLOCK	AXIS	X-axis on scatter chart
5	0	index	0	BLOCK	CHART FORMAT	Chart group, iobjInstance1 is the index in the file
6	0	0	0	BLOCK	DAT	Data table
7	0	0	0	BLOCK	FRAME	Frame
7	1	0	0	BLOCK	FRAME	Frame for an axis
7	2	0	0	BLOCK	FRAME	Chart area frame
8	0	0	0	BLOCK	GELFRAME	Frame fill
8	1	0	0	BLOCK	GELFRAME	Series fill
8	2	0	0	BLOCK	GELFRAME	Up/down bars fill
8	3	0	0	BLOCK	GELFRAME	Floor fill
8	3	1	0	BLOCK	GELFRAME	Walls fill
9	0	0	0	BLOCK	LEGEND	Data table
9	1	0	0	BLOCK	LEGEND	Legend
10	0	iss	0	BLOCK	LEGENDXN	Legend entry
11	0	0	0	BLOCK	PICF	Picture fill
11	1	0	0	BLOCK	PICF	Data point picture fill
12	0	index	0	BLOCK	SERIES	Series, iobjInstance1 is the index in the file
13	0	0	0	BLOCK	CHART	Chart
14	-1	0	0	BLOCK	DATA FORMAT	Series formatting
14	yi	xi	0	BLOCK	DATA FORMAT	Data point formatting
15	0	0	0	BLOCK	DROPBAR	Up bars
15	0	1	0	BLOCK	DROPBAR	Down bars
15	0	2	0	BLOCK	AXISLINE FORMAT	Floor
15	0	3	0	BLOCK	AXISLINE FORMAT	Walls
16	0	0	0	OBJECT	YMULT	Axis multiplier
17	0	verChart	0	OBJECT	FRTFONT LIST	Fonts

ENDBLOCK: Chart Future Record Type End Block (853h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts that indicates end of an object's scope for Pre-Excel 9 objects. Paired with STARTBLOCK.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0853h
6	grbitFrt	2	FRT flags; must be zero
8	iObjectKind	2	Sanity check for object scope being ended
10	(unused)	6	Reserved; must be zero

STARTOBJECT: Chart Future Record Type Start Object (854h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts.

The STARTOBJECT/ENDOBJECT records are used for Excel 9+ elements with child records instead of the BEGIN/END records.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0854h
6	grbitFrt	2	FRT flags; must be zero
8	iObjectKind	2	Kinds of object, e.g., AI, CRT, SS, etc.
10	iObjectContext	2	Where the object lives, object-specific
12	iObjectInstance1	2	Which one from a collection, object-specific
14	iObjectInstance2	2	Which one from a collection, object-specific.

ENDOBJECT: Chart Future Record Type End Object (855h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts that indicates the end of an object's scope for Excel 9 and later objects.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0855h
6	grbitFrt	2	FRT flags; must be zero

8	iObjectKind	2	Sanity check for object scope being ended
10	(unused)	6	Reserved; must be zero

CATLAB: Category Labels (856h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0856h
6	grbitFrt	2	FRT flags; must be zero
10	wOffset	2	Distance between category label levels
12	at	2	Category axis label alignment
14	grbit	2	Option flags for category axis labels (see description below)
16	(unused)	2	Reserved; must be zero

The grbit field contains the following category axis label option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fAutoCatLabelReal	=1 if the category label skip is automatic =0 otherwise
15-1	FFFEh	(unused)	Reserved; must be zero

YMULT: Y Multiplier (857h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts.

This record describes the axis multiplier feature which scales the axis values displayed by the axis tick labels. For instance, an axis multiplier value of “millions” would cause the axis tick labels to show the axis value divided by one million (e.g., the tick label for an axis value of 20,000,000 would show “20”.)

This record is a “parent” record and is immediately followed by a set of records surrounded by rtStartObject and rtEndObject which describes the axis multiplier label.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0857h
6	grbitFrt	2	FRT flags; must be zero

8	axmid	2	Axis multiplier ID, one of the following values: -1 = multiplier value is stored in numLabelMultiplier 0 = no multiplier (same as 1.0) 1 = Hundreds, 10^2 2 = Thousands, 10^3 3 = Ten Thousands, 10^4 4 = Hundred Thousands, 10^5 5 = Millions, 10^6 6 = Ten Millions, 10^7 7 = Hundred Millions, 10^8 8 = Thousand Millions, 10^9 9 = Billions, 10^{12}
16	numLabelMultiplier	4	Numeric value
18	grbit	2	Option flags for y axis multiplier (see description below)

The grbit field contains the following category axis label option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fEnabled	=1 if the multiplier is enabled =0 otherwise
1	0002h	fAutoShowMultiplier	=1 if the multiplier label is shown =0 otherwise
15-2	FFFCh	(unused)	Reserved; must be zero

SXVIEWLINK: Chart PivotTable Name (858h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts. This record stores the name of the source PivotTable when this chart is a PivotChart. New for Excel 9, PivotCharts are charts based on PivotTables.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0858h
6	grbitFrt	2	FRT flags; must be zero
8	brst	var	String containing name of PivotTable

PIVOTCHARTBITS: PivotChart Bits (859h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts. This stores flags for a PivotChart.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0859h
6	grbitFrt	2	FRT flags; must be zero
8	grbit	2	Option flags for PivotCharts (see description below)
10	(unused)	6	Reserved; must be zero

The grbit field contains the following PivotChart option flags:

Bits	Mask	Flag Name	Contents
0	0001h	fGXHide	=1 if the field buttons are hidden =0 otherwise
15-1	FFFEh	(unused)	Reserved; must be zero

FRTFONTLIST: Chart Font List (85Ah)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts.

This record stores font information for Excel 9 or later chart objects. On round-tripping through an earlier version of Excel, the fonts for new chart objects are lost from the font table because earlier version of Excel do not load the newer objects and thus don't preserve the new object's fonts. This record contains a list of the font indices used by Excel 9 or later objects and whether the font is auto-scaled.

The fonts themselves are stored information in a STARTOBJECT/ENDOBJECT block that immediately follows. The block has objectKind = 17, objectContext = 0, objectInstance1 = 0, objectInstance2 = 0. The block has cfont FONT records and FBI records (for those with fScaled =1 only).

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =085Ah
6	grbitFrt	2	FRT flags; must be zero
8	verChart	1	Version of Charting this list applies to
9	cfont	2	Number of fonts in list
11	rgFontInfo	var	Array of font IDs

FontInfo Structure

Offset	Field Name	Size	Contents
0	grbit	2	Option flags for chart fonts (see description below)
2	ifnt	2	Font ID of this font entry

The grbit field contains the following chart font flags:

Bits	Mask	Flag Name	Contents
0	0001h	fScaled	=1 if the font is scaled =0 otherwise

Bits	Mask	Flag Name	Contents
15-1	FFFEh	(unused)	Reserved; must be zero

PIVOTCHARTLINK: Pivot Chart Link (861h)

Introduced in Excel 9 (2000), this BIFF record is an FRT record for Charts. This record stores the link to a PivotTable for a PivotChart. Similar in function to SXVIEWLINK but used only during copy & paste of a chart via BIFF.

Record Data

Offset	Field Name	Size	Contents
4	rt	2	Record type; this matches the BIFF rt in the first two bytes of the record; =0861h
6	grbitFrt	2	FRT flags; must be zero
8	ai	var	same as AI record

Information Rights Management (IRM)

Rights Management protected documents are encrypted in the same way that Microsoft OfficeXP documents are encrypted using a password.

This means:

- The macro streams in the document are not encrypted
- The Document Summary Information stream is not encrypted

Rights Management protected documents are in essence two documents in one. One is a simple, traditional backwards-compatible document which has fixed text telling the user they need a later version of Microsoft Office to access the protected content, and new streams added to support IRM protection which have not been previously found in Microsoft Office documents. The details of the differences are discussed in the sections that follow. An overview of Information rights Management can be found at http://download.microsoft.com/download/a/4/2/a4262821-6f21-450f-85d3-ebbba001a6ef/How%20to%20Use%20Information%20Rights%20Management.doc.

DataSpaces

Every rights managed file contains a new storage named "\006DataSpaces" which contains meta information used to help manage the process of protecting the content within the document.More information can be found at http://msdn2.microsoft.com/en-us/library/aa767782(VS.85).aspx..

The most important content in this storage is the information under the "TransformInfo" storage. This storage contains the issuance licenses and end-user licenses required to protect and open a rights managed file.

DRMContent

The new stream named "\011DRMContent" contains the encrypted binary content of the Excel document. The format of this stream contains a series of encrypted bytes. When you decrypt the whole stream and open the resultant byte stream as a

compound storage, then that storage will contain all streams and substorages that are found in a normal Excel document, using the exact same binary file format as a non-IRM-protected Excel file. Only the encrypted streams are located inside of this storage. The unencrypted streams (for example Document Summary Information and the macro stream in Word and Excel) are not stored inside this storage. They are found unencrypted off of the root of the document's storage.

DRMViewerContent

The final new stream that may exist within an IRM-protected file is the optional "\011DRMViewerContent" stream which contains a compressed, encrypted MHTML stream for users of the Rights Management Add-on for Internet Explorer. This is the option for users who need to see IRM protected content but do not have access to IRM enabled Microsoft Office client software.