

WORKSHEET FILE FORMAT

FROM LOTUS

SUMMARY OF RECORD TYPES

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161 First Street
Cambridge, Massachusetts 02142
(617) 492-7171
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BOF

Record Type	Code	Body length
BOF	0 (00H)	2 bytes

Record Description

Beginning of file

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0-1	file format revision number
	1028 (0404h) = 1-2-3 file

1029 (0405h) = Symphony file

Example

Body	Record Header				Record
	Record		Record		
	Type		Length		
	Byte Number				
1	0	1	2	3	0
Hex Code	00	00	02	00	04
Dec.Equivalent	0		2		
1028					

EOF

Record Type	Code	Body length
EOF	1 (01H)	0 bytes

Record Description

End of file

Used by both 1-2-3 and Symphony

Byte Number	Byte Description
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-no record body-

Example

Record Header

	Record Type		Record Length	
Byte Number	0	1	2	3
Hex Code	01	00	00	00
Decimal Equivalent	1		0	

Note: End of file is only a header. EOF has a record length of 0; therefore, no record body follows.

CALCMODE

Record Type	Code	Body length
CALCMODE	2 (02h)	1 byte

Record Description

Calculation method

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0	0 = Manual mode FF = automatic

CALCORDER

Record Type	Code	Body length
CALCORDER	3 (03H)	1 BYTE

Record Description

Calculation order

Used by both 1-2-3 and Symphony

Byte Number	Byte Description
0	0 = natural
	1 = by column
	FF = by row

SPLIT

Record Type	Code	Body length
SPLIT	4(04h)	1 byte

Record Description

Split window type
Used in 1-2-3 only.

Byte Number	Byte Description
0	0 = not split
	1 = vertical split
	FF = horizontal split

SYNC

Record Type	Code	Body length
SYNC	5(05h)	1 byte

Record Description

Split window sync

This determines whether the two screens in 1-2-3's split-

screen feature
will move together with the cursor.

Used in 1-2-3 only.

Byte Number	Byte Description
0	0 = not synchronized FF = synchronized

RANGE

Record Type	Code	Body length
RANGE	6(06h)	8 bytes

Record Description

Range of cells written to worksheet file.
If the worksheet file was created using a File Save command, then this range describes the active area with trailing blank columns and rows removed. If the worksheet file was created using a File Xtract command, then this range describes the extract range with trailing blank columns and rows removed. If there is no data in the range, the starting column is set to -1.

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0-1	starting column

2-3	starting row
4-5	ending column
6-7	ending row

Example

Record Body				Record Header		rt_range			
Ending		Ending		Record		Starting		Starting	
Column		Row		Type	Length	Column		Row	
Byte Number				0	1	2	3	0	1
4	5	6	7						
Hex Code				06	00	08	00	00	00
01	00	03	00						
Dec.Equivalent				6		8		0	0
1		3							

The record displays the worksheet range as A1...B4.

WINDOW1

Record Type	Code	Body length
WINDOW1	7(07h)	31 bytes

Record Description

Window 1 record
Used in 1-2-3 only.

Byte Number	Byte Description
0-1	cursor column position
2-3	cursor row position
4	format (see Appendix A, Cell Format Encoding)

5	unused (0)
6-7	column width
8-9	number of columns on screen
10-11	number of rows on screen
12-13	left column
14-15	top row
16-17	number of title columns
18-19	number of title rows
20-21	left title column
22-23	top title row
24-25	border width column
26-27	border width row
28-29	window width
30	unused (0)

COLW1

Record Type	Code	Body length
COLW1	8(08h)	3 bytes

Record Type Description

Column width

Used by both 1-2-3 and Symphony.

In 1-2-3, this record contains the width of a column Window 1.

In symphony, it contains width information for the Window Record that it follows.

Byte Number	Byte Description
0-1	column
2	width

WINTWO

Record Type	Code	Body length
WINTWO	9(09h)	31 bytes

Record Description
Window 2 record
Used in 1-2-3 only.

Byte Number	Byte Description
0-1	cursor column position
2-3	cursor row position
4	format (see Appendix A, Cell Format Encoding)
5	unused (0)
6-7	column width
8-9	number of columns on screen
10-11	number of rows on screen
12-13	left column
14-15	top row
16-17	number of title columns
18-19	number of title rows
20-21	left titile column
22-23	top title row
24-25	border width column
26-27	border width row
28-29	window width
30	unused (0)

COLW2

Record Type	Code	Body length
COLW2	10(0Ah)	3 bytes

Record Description
Column width, Window 2
Used in 1-2-3 only.

Byte Number	Byte Description
0-1	column
2	width

NAME

Record Type	Code	Body length
NAME	11 (0Bh)	24 bytes

Record Description

Name of range

The worksheet contains one record for each range name.
Used in 1-2-3 only.

Byte Number	Byte Description
0-15	NULL terminated ASCII string
16-17	Starting column
18-19	Starting row
20-21	Ending column
22-23	Ending row

Example

Record Header			
Record Type		Record Length	
Byte Number	0 1	2 3	
Hex Code	0B 00	18 00	
Decimal Equivalent	11	24	

(cont.)

Record Body															
Range Name (Text)															
Decimal Equivalent Expressed in ASCII Text															
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
52	45	56	45	4E	55	45	53	00	00	00	00	00	00	00	00
R	E	V	E	N	U	E	S	/	Unfilled				Names		Area

(cont.)

Record Body							
Starting		Starting		Ending		Ending	
Column	Row	Column	Row	Column	Row	Column	Row
16	17	18	19	20	21	22	23
00	00	00	00	01	00	03	00
0		0		1		3	

Range name is REVENUES (encompasses A1 to B4).

BLANK

Record Type	Code	Body length
BLANK	12(0Ch)	5 bytes

Record Description

Blank cell

Blank cell records appear only for those cells that are protected, or do not have the default format.

Unprotected blank cells with the default format are omitted from the worksheet file.

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0	format (see Appendix A, Cell Format Encoding)
1-2	column
3-4	row

Example

		Record Header				Record	
Body		Record Type		Record Length		Format	
Column	Row	0	1	2	3	0	1
Byte Number							
2 3 4							
Hex Code		0C	00	05	00	22	05
00 0A 00							
Dec. Equivalent		12		5		34	5
10							

This record displays cell in location F11 (column 5, row 10).

INTEGER

Record Type	Code	Body length
INTEGER	13(0Dh)	7 bytes

Record Description

Integer number cell

An integer cell holds a single integer value in the range -32767.....+32767 (decimal).

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0	format (see Appendix A, Cell Format Encoding)
1-2	column
3-4	row
5-6	integer value

Example

		Record Header				Record		
Body		Record Type		Record Length		Format	Column	
Row	Integer							
Byte Number		0	1	2	3	0	1	2
3 4 5 6								
Hex Code		0D	00	07	00	00	00	00
00 00 DD 04								
Dec. Equivalent		13		7		0	0	
0 1245								

This example displays the integer 1245 located in cell A1 (column 0, row 0). When reading a 2-byte integer, the lower byte appears first. For example, DD04h is actually 04DDh (1245 decimal).

NUMBER

Record Type	Code	Body length
NUMBER	14 (0Eh)	13 bytes

Record Description

Floating point number
Used by both 1-2-3 and Symphony

Byte Number	Byte Description
0	format
1-2	column
3-4	row
5-12 value	(IEEE long real; 8087 double-precision floating-point format)

Example

The following describes a 64-bit long real format.

	S	Exponent	Fraction
	63	62 52	51
0			
	MSB		
LSB			
S	1-bit Sign field		
	0 = +		
	1 = -		
Exponent	11-bit Exponent field		
Thus, the true	Exponent is binary, excess 1023(base 10).		
	exponent is: $2^{(\text{exponent} - 1023)}$.		
Fraction	52-bit Fraction field		
beginning of the between the implied of the fraction	An implied leading 1 bit is at the		
	fraction. The implied binary point is		
	1 bit and the Most Significant Bit (MSB)		
	field.		

```
Special      NA:  S = 1 Exponent = 7FF Fraction = 0
Values      ERR:  S = 0 Exponent = 7FF Fraction = 0
```

STRING: S = 0 Exponent = 7FF Fraction =
non-zero
(Symphony
only)

LABEL

Record Type	Code	Body length
LABEL	15(0Fh)	variable

Record Description

Label cell
Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0	format (see Appendix A, Cell Format Encoding)
1-2	column
3-4	row
5+	NULL terminated ASCII string; 240 bytes maximum

Example

		Record Header						Record				
Body												
		Record Type		Record Length		Format		Column		Row		
Label												
Byte	Number	0	1	2	3	0	1	2	3	4		

The functions are discussed in greater detail in the 1-2-3 and Symphony documentation.

Appendix B discusses Lotus' proprietary formula compiler in greater detail.

Byte Number	Byte Description
0	format (see Appendix A, Cell Format
Encoding	
1-2	column
3-4	row
5-12	formula numeric value (IEEE long
real; see NUMBER)	
13-14	formula size (bytes)
15+	for code (see Table 1, Formula
Opcodes); Reverse	
	Polish Internal Notation; 2048 bytes
maximum	

FORMULA

Table 1-a Formula Compiler Opcode Table, Format

Dec	Hex	Operation	Description
0	0	constant	Code is
followed by an 8 byte			
Floating Point			IEEE Long Real
			Number
1	1	variable	Code followed
by 4 byte coordi-			nate Byte
0,1 = Column			
			Byte 2,3 = Row

2	2	range	Code followed
by 8 byte range			Byte 0,1 =
Start column			Byte 2,3 =
Start row			Byte 4,5 =
End column			Byte 6,7 =
End row			
3	3	return	End of
formula			
4	4	parentheses	Indicates
presence of paren-			theses in
original formula.			It is
ignored during recal-			culatation.
5	5	2 byte integer	Followed by
2 byte signed		constant	integer.

The above Opcodes will define the type and length of information that follows the Opcode. Opcode 3 defines the end of the formula.

For example, Opcode 0 is followed by an 8 byte floating point number.

Opcode 1 is followed by a 4 byte coordinate.
 Opcode 2 is followed by an 8 byte range specifier.
 Opcode 5 is followed by a 2 byte signed integer.

FORMULA

Table 1-b Formula Compiler Opcode Table, Operations

Dec	Hex	Operation	Description
8	8	unary -	Negation
9	9	+	Addition
10	A	-	Subtraction
11	B	*	Multiplication
12	C	/	Division
13	D	^	Exponentiation; ie. 3^2 is (3x3)
14	E	=	Equal to
15	F	< >	Not equal to
16	10	< =	Less than or equal
to			
17	11	> =	Greater than or
equal to			
18	12	<	Less than
19	13	>	Greater than
20	14	#AND#	Logical AND
21	15	#OR#	Logical OR
22	16	#NOT#	Logical NOT
23	17	unary +	(Ignored during
recalculation			
31	1F	na	@Na not applicable
32	20	err	@Err error
33	21	abs	@abs (x) Absolute
value of x			
34	22	int	@int (x) Integer
value of x			
35	23	sqrt	@sqrt (x) Square
root of x			
36	24	log	@log (x) Log base
10 of x			
37	25	ln	@ln (x) Log base e
of x			

38	26	pi	@pi
39	27	sin	@sin (x) Sine of x
40	28	cos	@cos (x) Cosine of x
41	29	tan	@tan (x) Tangent of x
42	2A	atan2	@atan2 (x) 4 quadrant arc tangent of x
43	2B	atan	@atan (x) 2 quadrant arc tangent of x
44	2C	asin	@asin (x) Arc sine of x
45	2D	acos	@acos (x) Arc cosine of x
46	2E	exp	@exp (x) Exponential anti-log of x
47	2F	mod	@mod (x,y)X Mod Y
48	30	sel	@Choose (x,v0,v1...vN)
49	31	isna	Match a list item. @isna (x)x = NA then 1 (true)

FORMULA

Table 1-b (continued) Formula Compiler Opcode Table,
Operations

Dec	Hex	Operation	Description
51	33	false	@false Return 0
52	34	true	@true Return 1
53	35	rand	@rand Generate

random number			between 0 and 1
54	36	date	@date (Y,M,D)
Generate the days			since 1/1/1900 (Y =
0-199,			M = 1-12, D = 1-31)
55	37	today	@today Output
serial date number			from cpu's clock
56	38	pmt	@pmt (princ, int,
term)Payment			
57	39	pv	@pv (pmt, int,
term) Present value			
58	3A	fv	@fv (pmt, int,
term) Future Value			
59	3B	if	@if (argument, them
else) Boolean			if
60	3C	day	@day (x) Print day
of the month from			a serial date
number			
61	3D	month	@month (x) Print
month of the year			from a serial
date number			
62	3E	round	@round (x,d) Round
number x to d			decimal places

The above Opcodes are variable, constant and argument related.

For example: @sqrt (9) is the square root of the constant 9

@sqrt (A1) is the square root of the variable A1

@sqrt ((A1*2)/3) is the square root of the argument (A1*2)/3

(Note that the argument ((A1*2)/3) will be

processed before
the @sqrt function.)

FORMULA

Table 1-c Formula Compiler Opcode Table, Multiple Arguments

Dec	Hex	Operation	Description
80 and/or to separate	50	sum	@sum (range and/or cell constant) Use commas arguments
81 and/or constant) separate arguments	51	avg	@avg (range and/or cell Use commas to
82 and/or constant) separate arguments	52	cnt	@cnt (range and/or cell Use commas to
83 and/or constant) separate arguments	53	min	@min (range and/or cell Use commas to
84 and/or constant separate arguments	54	max	@max (range and/or cell Use commas to
85 offset) X = Cell range = Table,	55	vlookup	@Vlookup (x, range, address or constant, Offset = Row in Table
86	56	npv	@npv (int, range) Net

present value;				Int = interest, Range
= cash flows				
87	57	var		@var (range) Variance
of all items in				
				list
88	58	std		@std (range) Standard
deviation of all				
				items in list
89	59	irr		@irr (guess,range)
Guess = % estimate;				
				Range = range of cash
flows				
90	5A	hlookup		@hlookup, (x, range,
offset) X = Cell				address or constant,
				Offseet = row in
range = Table,				
Table				
91	5B	dsum		Database statistical
functions				
92	5C	avg		Database statistical
functions				
93	5D	dcnt		Database statistical
functions				
94	5E	dmin		Database statistical
functions				
95	5F	dmax		Database statistical
functions				
96	60	dvar		Database statistical
functions				
97	61	dstd		Database statistical
functions				

The above Opcodes deal specifically with ranges and multiple arguments.

For example: @sum (A1...A10, B25, 9) contains a range, a variable and a constant as the arguments.

All function Opcodes which accept a variable

number of arguments
are followed by a 1-byte argument count.

FORMULA

Table 1-d Operator Precedence Table

Operator	Unary Precedence	Binary Precedence
+	6	4
-	6	4
*	na	5
/	na	5
^	na	7
=	na	3
< >	na	3
< =	na	3
> =	na	3
<	na	3
>	na	3
#and#	na	1
#or#	na	1
#not#	2	na

A Note on the Decompiler

The algorithm for the formula decompiler was taken
verbatim from:

Writing Interactive Compilers and Interpreters, P.J.
Brown, John Wiley
and Sons, 1979. See chapter 6.2. The algorithm itself is
described on
pages 216 and 217.

This algorithm is also described in the following article:

More on the Re-creation of Source Code from Reserve

Polish, P.J. Brown,
 Software Practice and Experience, Vol 7, 545-551 (1977).

TABLE

Record Type	Code	Body length
TABLE	24 (18h)	25 bytes

Record Description

Table range

Used by both 1-2-3 and Symphony.

In 1-2-3, the record refers to Data Tables 1 and 2.

In Symphony, it refers to What-if Tables 1 and 2.

Byte Number	Byte Description	
0	0 = no table	
	1 = Table 1	
	2 = Table 2	
1-2	Table Range;	starting
column		
3-4		starting row
5-6		ending column
7-8		ending row
9-10	Input Cell 1;	starting
column		
11-12		starting
row		
13-14		ending
column		
15-16		ending row
17-18	Input Cell 2;	starting
column		
19-20		starting row

21-22	ending column
23-24	ending row

QRANGE

Record Type	Code	Body length
QRANGE	25 (19h)	25 bytes

Record Description

Query range
Used in 1-2-3 only.

Byte Number	Byte Description	
0-1	Input ranges;	starting column
2-3		starting row
4-5		ending column
6-7		ending row
8-9	Output ranges	starting column
10-11		starting row
12-13		ending column
14-15		ending row
16-17	Criteria;	starting column
18-19		starting row
20-21		ending column
22-23		ending row
24	Command;	0 = no
command		1 = find
		2 = extract
		3 = delete
		4 = unique

PRANGE

Record Type	Code	Body length
PRANGE	26 (1Ah)	8 bytes

Record Description

Print range

Used in 1-2-3 only.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row

SRANGE

Record Type	Code	Body length
SRANGE	27 (1Bh)	8 bytes

Record Description

Sort range

Used in 1-2-3 only.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row

FRANGE

Record Type	Code	Body length
FRANGE	28 (1Ch)	8 bytes

Record Description

Fill range

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row

KRANGE

Record Type	Code	Body length
KRANGE	29 (1Dh)	9 bytes

Record Description

Primary sort key range

Used in 1-2-3 only.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row
8	Order: 0 = descending order FF = ascending order

HRANGE

Record Type	Code	Body length
HRANGE	32 (20h)	16 bytes

Record Description

Distribution range

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
0-1	Values range;
column	starting
2-3	starting row
4-5	ending column
6-7	ending row
8-9	Bin range
column	starting
10-11	starting
row	
12-13	ending
column	
14-15	ending row

KRANGE2

Record Type	Code	Body length
KRANGE2	35(23h)	9 bytes

Record Description

Secondary sort key range

Use in 1-2-3 only.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row
8	Order; 0 = descending order FF = ascending order

PROTEC

Record Type	Code	Body length
PROTEC	36(24h)	1 byte

Record Description

Global protection

Used by both 1-2-3 and Symphony.

Byte Number	Byte Description
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0 0 = global protection OFF
 1 = global protection ON

FOOTER

Record Type	Code	Body length
FOOTER	37(25h)	242 bytes

Record Description

Print footer

Used in 1-2-3 only.

Byte Number	Byte Description
0-242	NULL termination ASCII string

HEADER

Record Type	Code	Body length
HEADER	38(26h)	242 bytes

Record Description

Print header

Used in 1-2-3 only.

Byte Number	Byte Description
0-242	NULL termination ASCII string

SETUP

Record Type	Code	Body length
SETUP	39(27h)	40 bytes

Record Description

Print setup

Used in 1-2-3 only.

Byte Number	Byte Description
0-40	NULL terminated ASCII string

MARGINS

Record Type	Code	Body length
MARGINS	40(28h)	10 bytes

Record Description

Print margins code

Used in 1-2-3 only.

Byte Number	Byte Description
0-1	left margin
2-3	right margin
4-5	page length
6-7	top margin

8-9

bottom margin

LABELFMT

Record Type	Code	Body length
LABELFMT	41 (29h)	1 byte

Record Description

Label alignment

Used by both 1-2-3 and Symphony

Byte Number	Byte Description
0	27h = left 22h = right 5Eh = center

TITLES

Record Types	Code	Body length
TITLES	42 (2Ah)	16 bytes

Record Description

Print borders

Used in 1-2-3 only.

Byte Number	Byte Description	
0-1	Row border;	starting
column		
2-3		starting
row		
4-5		ending
column		
6-7		ending
row		
8-9	Column border;	
starting column		
10-11		
starting row		
12-13		ending
column		
14-15		ending
row		

GRAPH

Record Type	Code	Body length
GRAPH	45(2Dh)	437 bytes

Record Description

Current graph settings

Used in 1-2-3 only.

Byte Number	Byte Description
-------------	------------------

-- see Table 2 Graph Record

Structure --

GRAPH

Table 2 Graph Record Structure

Byte Number	Byte Description	
0-1 column	X Range;	starting
2-3		starting row
4-5		ending column
6-7		ending row
8-9 column	A Range;	starting
10-11		starting row
12-13		ending column
14-15		ending row
16-17 column	B Range;	starting
18-19		starting row
20-21		ending column
22-23		ending row
24-25 column	C Range;	stating
26-27		starting row
28-29		ending column
30-31		ending row
32-33 column	D Range;	starting
34-35		starting row
36-37		ending column
38-39		ending row
40-41 column	E Range;	starting
42-43		starting row
44-45		ending column

46-47		ending row
48-49	F Range;	starting
column		
50-51		starting row
52-53		ending column
54-55		ending row
56-57	A Labels;	starting
column		
58-59		starting row
60-61		ending column
62-63		ending row
64-65	B Labels;	starting
column		
66-67		starting row
68-69		ending column
70-71		ending row
72-73	C Labels;	starting
column		
74-75		starting row
76-77		ending column
78-79		ending row
80-81	D Labels;	starting
column		
82-83		starting row
84-85		ending column
86-87		ending row

GRAPH

Table 2 (continued) Graph Record Structure

Byte Number	Byte Description
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88-89 column	E Labels;	starting
90-91		starting row
92-93		ending column
94-95		ending row
96-97 column	F Labels;	starting
98-97		starting row
100-101		ending column
102-103		ending row
104 bar, 2 = pie, = stacked bar	Graph type	0 = XY, 1 = 4 = line, 5
105 horizontal, vertical, 3 = both	Grid;	0 = none, 1 = 2 =
106 white, FF = color	Color	0 = black-
107 line, 3 = line-symbol	A Range line format;	0 = none, 1 = 2 = symbol,
108 line, e = line-symbol	B Range line format;	0 = none, 1 = 2 = symbol,
109 line, 3 = line-symbol	C Range line format;	0 = none, 1 = 2 = symbol,
110	D Range line format;	0 = none, 1 =

line,		2 = symbol,
3 = line-symbol		
111	E Range line format;	0 = none, 1 =
line,		2 = symbol,
3 = line-symbol		
112	F Range line format;	0 = none, 1 =
line,		2 = symbol,
3 = line-symbol		
113	A Range data label	0 = center, 1
= right,	alignment;	2 = below,
3 = left,		4 = above
114	B Range data label	0 = center, 1
= right	alignment;	2 = below,
3 = left		4 = above
115	C Range data label	0 = center, 1
= right	alignment;	2 = below,
3 = left		4 = above
116	D Range data label	0 = center, 1
= right	alignment;	2 = below,
3 = left		4 = above
117	E Range data label	0 = center, 1
= right	alignment;	2 = below,

3 = left

4 = above

118
= right

F Range data label

0 = center, 1

alignment;

2 = below,

3 = left

4 = above

GRAPH

Table 2 (continued) Graph Record Structure

Byte Number	Byte Description
119	Scale
0 = auto	
FF = manual	
120-127	X lower limit in floating point format
128-135	X upper limit in floating point format
136	Y scale;
0 = automatic	
FF = manual	
137-144	Y lower limit in floating point format
145-152	Y upper limit in floating point format
153-192	First title
193-232	Second title

233-272	X title
273-312	Y title
313-332	A legend
333-352	B legend
353-372	C legend
373-392	D legend
393-412	E legend
413-432	F legend
433	X format
434	Y format
435-436	Skip factor

NGRAPH

Record Type	Code	Body length
NGRAPH	46 (2EH)	453 bytes

Record Description

Named current graph settings

Used in 1-2-3 only.

Bytes Number	Byte Description
--------------	------------------

-- see Table 3 Ngraph Record Structure

--

NGRAPH

Table 3 NGraph Record Structure

Byte Number	Byte Description	
0-15 ASCII string	Name;	NULL terminated
16-17	X Range;	starting column
18-19		starting row
20-21		ending column
22-23		ending row
24-25	A Range;	starting column
26-27		starting row
28-29		ending column
30-31		ending row
32-33	B Range;	starting column
34-35		starting row
36-37		ending column
38-39		ending row
40-41	C Range;	starting column
42-43		starting row
44-45		ending column
46-47		ending row
48-49	D Range;	starting column
50-51		starting row
52-53		ending column
54-55		ending row
56-57	E Range;	starting column

58-59		starting row
60-61		ending column
62-63		ending row
64-65	F Range;	starting column
66-67		starting row
68-69		ending column
70-71		ending row
72-73	A Labels;	starting column
74-75		starting row
76-77		ending column
78-79		ending row
80-81	B Labels;	starting column
82-83		starting row
84-85		ending column
86-87		ending row
88-89	C Labels;	starting column
90-91		starting row
92-93		ending column
94-95		ending row
96-97	D Labels;	starting column
98-99		starting row
100-101		ending column
102-103		ending row

NGRAPH

Table 3 (continued) NGraph Record Structure

Byte Number	Byte Description	
104-105	E Labels;	starting
column		
106-107		starting row
108-109		ending column

110-111		ending row
112-113	F Labels;	starting
column		
114-115		starting row
116-117		ending column
118-119		ending row
120	Graph type;	0 = XY, 1 =
bar, 2 = pie,		4 = line, 5
= stacked bar		
121	Grid	0 = none, 1 =
horizontal,		2 =
vertical, 3 = both		
122	Color;	0 = black-
white, FF = color		
123	A Range line format;	0 = none, 1 =
line,		2 = symbol,
3 = line-symbol		
124	B Range line format;	0 = none, 1 =
line,		2 = symbol,
3 = line-symbol		
125	C Range line format;	0 = none, 1 =
line		
2 = symbol, 3 = line-symbol		2 = symbol, 3
= line-symbol		
126	D Range line format;	0 = none, 1 =
line		2 = symbol,
3 = line-symbol		

127 line	E Range line format;	0 = none, 1 = 2 = symbol,
3 = line-symbol		
128 line	F Range line format;	0 = none, 1 = 2 = symbol,
3 = line-symbol		
129 = right	A Range data label alignment	0 = center, 1 2 = below,
3 = left,		4 = above
130 = right	B Range data label alignment	0 = center, 1 2 = below,
3 = left		4 = above
131 = right	C Range data label alignment	0 = center, 1 2 = below,
3 = left		4 = above
132 = right	D Range data label alignment	0 = center, 1 2 = below,
3 = left		4 = above
133 = right	E Range data label alignment	0 = center, 1 2 = below,
3 = left		4 = above

134	F Range data label	0 = center, 1
= right	alignment	2 = below,
3 = left		
135	Scale	0 = auto
		FF = manual

NGRAPH

Table 3 (continued) NGraph Record Structure

Byte Number	Byte Description	
136-143	X lower limit in floating point format	
144-151	X upper limit in floating point format	
152	Y scale;	0 =
automatic		FF
= manual		
153-160	Y lower limit in floating point format	
161-168	Y upper limit in floating point format	
209-224	First title	
225-248	Second title	
249-288	X title	
289-328	Y title	
329-348	A legend	

349-368	B legend
369-388	C legend
389-408	D legend
409-428	E legend
429-448	F legend
449	X format
450	Y format
451-452	Skip factor

CALCCOUNT

Record Type	Code	Body length
CALCCOUNT	47(2Fh)	1 byte

Record Description

Iteration count

Used in 1-2-3 and Symphony.

Byte Number	Byte Description
0	Iteration count

UNFORMATTED

Record Type	Code	Body length
UNFORMATTED	48(30h)	1 byte

Record Description

Formatted/unformatted print

Used in 1-2-3 only.

Byte Number	Byte Description
0	0 = formatted 1 = unformatted

CURSOW12

Record Type	Code	Body length
CURSOW12	49(31h)	1

Record Description

Cursor location

Used in 1-2-3 only.

Byte Number	Byte Description
0	1 = cursor in Window 1 2 = cursor in Window 2

WINDOW

Record Type	Code	Body length
WINDOW	50(32h)	144 bytes

Record Description

Window record structure

Used in Symphony only.

Byte Number	Byte Description
	-- see Table 4 Window Record Structure --

WINDOW

Table 4 Window Record Structure

Byte Number	Byte Description	
0-15 terminated ASCII	Window name	NULL
16-17	Cursor position;	string
18-19		column
20	Format (see Appendix A, Cell Format Encoding)	row
21	Unused	
22-23	Column width	
24-25	Total number of columns	
26-27	Total number of rows	
28-29	Non-Title Home Position;	column
30-31		row
32-33	Number of title columns	
34-35	Number of title rows	
36-37	Left title column	

38-39	Top title row	
40-41	Home position column	
42-43	Home position row	
44-45	Number of screen columns	
46-47	Number of screen rows	
48	Hidden Status;	0 =
hidden		FF =
not hidden		
49	Previous window;	0 =
SHEET		1 =
DOC		2 =
GRAPH		3 =
COMM		4 =
FORM		5 =
APPLICATION		
50	Border display;	0 =
cell		FF =
no cell		
51	Border display lines;	0 =
lines		FF =
no lines		
52-53	Window Range	
starting column		
54-55		
starting row		
56-57		ending
column		
58-59		ending

row		
60-61	Offset	
62	Insert mode flag;	0 =
OFF		non-
zero = ON		
63-78	Graph name	

WINDOW

Table 4 (continued) Window Record Structure

Byte Number	Byte Description	
79	Window type;	0 =
SHEET		1 = DOC
		2 =
GRAPH		3 = COMM
		4 = FORM
		5 =
APPLICATION		
80	Automatic display mode	"a" =
automatic (ASCII	flag;	lower
case "a")		else =
manual		

81 filter	Forms filter;	0 = non-zero
= no filter		
82-97 98-99	Associated form name Forms current record	
100 spaces	Space display;	0 = no non-zero
= spaces		
101 space	Line spacing;	1 = 1 2 = 2 3 = 3
spaces		
spaces		
102 left (ASCII lower	Justify type	"l" = case
"l")		"r" = case
right (ASCII lower		"c" = lower
"r")		"e" = case
center (ASCII		
case "c"		
even (ASCII lower		
"e"		
103-104 characters	Right Margin	0 = F0h =
right margin		

user-defined		FF = no
margin; use		right
default value		
105-106	Left Margin	0-FOh
characters = left		margin
107-108	Tab interval	
109	CR display;	0 = soft non-zero
= hard		
110	Auto-justify on copy/ move;	0 = no non-zero
= yes		
111-126	Associated application name	
127-143	Reserved Application Area	

STRING

Record Type	Code	Body length
STRING	51(33h)	variable

Record Description

Value of string formula

Used in Symphony only.

Byte Number	Byte Description
0	format (see Appendix A, Cell Format
Encoding)	
1-2	column

3-4	row
5+	NULL terminated ASCII string

PASSWORD

Record Type	Code	Body length
PASSWORD	55(37h)	4 byte

Record Description

File lockout (CHKSUM)

This is proprietary information.

Used in Symphony only.

Byte Number	Byte Description
	-- not available --

LOCKED

Record Type	Code	Body length
LOCKED	56(38h)	1 byte

Record Description

Lock Flag

Used in Symphony only.

Byte Number	Byte Description
0	0 = OFF
	1 = ON

QUERY

Record Type	Code	Body length
QUERY	60(Ch)	127 bytes

Record Description

Query settings

Used in Symphony only.

Byte Number	Byte Description
	-- see Table 5 Query Record Structure --

QUERY

Table 5 Query Record Structure

Byte Number	Byte Description	
0-15	Name;	NULL
termination ASCII string		
16-17	Input range;	starting
column		
18-19		starting row
20-21		ending column
22-23		ending row
24-25	Output Range;	starting
column		
26-27		starting row
28-29		ending column
30-31		ending row

32-33 column	Criteria Range;	starting
34-35		starting row
36-37		ending column
38-39		ending row
40-41 column	Form Entry;	starting
42-43		starting row
44-45		ending column
46-47		ending row
48-49 column	Form Def. Range;	starting
50-51		starting row
52-53		ending column
54-55		ending row
56-57 column	Report Output;	starting
58-59		starting row
60-61		ending column
62-63		ending row
64-65 column	Report Header;	starting
66-67		starting row
68-69		ending column
70-71		ending row
72-73 column	Report Footer;	starting
74-75		starting row
76-77		ending column
78-79		ending row
80-81 column	Table Range;	starting
82-83		starting row
84-85		ending column
86-87		ending row

88-89 column	Input Cell;	starting
90-91		starting row
92-93		ending column
94-95		ending row

QUERY

Table 5 (continued) Query Record Structure

Byte Number	Byte Description	
96-97 column	1st Key range;	starting
98-99 row		starting
100-101 column		ending
102-103 row		ending
104-105 column	2nd Key range;	starting
106-107 row		starting
108-109 column		ending
110-111 row		ending
112-113 column	3rd Key range;	starting
114-115 row		starting
116-117 column		ending
118-119 row		ending

120	Last command;	0 = no
command		1 = find
		2 =
extract		3 =
delete		4 =
unique		
121	1st Key order;	0 =
descending order		FF =
ascending order		
122	2nd Key order;	0 =
descending order		FF =
ascending order		
123	3rd Key order	0 =
descending order		FF =
ascending order		
124	Report number of records;	0 =
multiple		FF =
single		
125	Number of records;	0 =
multiple		FF =
single		
126	Marks;	0 = yes
		FF = no

QUERYNAME

Record Type	Code	Body length
QUERYNAME	61(3Dh)	16 bytes

Record Description

Current Query Name

Used in Symphony only.

Byte Number	Byte Description
0-15	NULL terminated ASCII string

PRINT

Record Type	Code	Body length
PRINT	62(3Eh)	679 bytes

Record Description

Print record

Used in Symphony only.

Byte Number	Byte Description
-------------	------------------

-- see Table 6 Print Record Structure

--

PRINT

Table 6 Print Record Structure

Byte Number	Byte Description
-------------	------------------

0-15	Print setting name; terminated ASCII string	NULL
16-17	Source range;	starting
column		
18-19		starting row
20-21		ending column
22-23		ending row
24-25	Row border;	starting
column		
26-27		starting row
28-29		ending column
30-31		ending row
32-33	Column border;	starting
column		
34-35		starting row
36-37		ending column
38-39		ending row
40-41	Destination;	starting
column		
42-43		starting row
44-45		ending column
46-47		ending row
48	Print format;	0 = as
displayed		non-zero =
formulas		
49	Page breaks	0 = yes non-zero = no
50	Line spacing	
51-52	Left Margin	
53-54	Right Margin	
55-56	Page length	
57-58	Top	
59-60	Bottom of page	

61-101	Setup string;	NULL
terminated ASCII string		
102-342	Header;	NULL
terminated ASCII string		
343-584	Footer;	NULL
terminated ASCII string		
585-600	Source database name;	NULL
terminated ASCII string		
601	Attribute;	0 = no non-zero =
yes		
602	Space compression;	0 = no non-zero =
yes		
603	Print destination	0 = printer 1 = file 2 = range
604-605	Starting page	
606-607	Ending page	
608-677	Destination filename;	NULL
terminated ASCII string		
678	Wait;	0 = no non-zero =
yes		

PRINTNAME

Record Type	Code	Body length
PRINTNAME	63(3Fh)	16 bytes

Record Description

Current Print Record Name

Used in Symphony only.

Byte Number	Byte Description
0-15	NULL terminated ASCII string

GRAPH2

Record Type	Code	Body length
GRAPH2	64(40h)	499 bytes

Record Description

Graph record

Used in Symphony only.

Byte Number	Byte Description
	-- see Table 7 Symphony Graph Record

Structure --

GRAPH2

Table 7 Symphony Graph Record Structure

Byte Number	Byte Description
0-15	Name; NULL terminated

ASCII string

16-17	XRange;	starting column
18-19		starting row
20-21		ending column
22-23		ending row
24-25	A Range;	starting column
26-27		starting row
28-29		ending column
30-31		ending row
32-33	B Range;	starting column
34-35		starting row
36-37		ending column
38-39		ending row
40-41	C Range;	starting column
42-43		starting row
44-45		ending column
46-47		ending row
48-49	D Range;	starting column
50-51		starting row
52-53		ending column
54-55		ending row
56-57	E Range;	starting column
58-59		starting row
60-61		ending column
62-63		ending row
64-65	F Range;	starting column
66-67		starting row
68-69		ending column
70-71		ending row
72-73	A Labels;	starting column
74-75		starting row
76-77		ending column
78-79		ending row
80-81	B Labels;	starting column

82-83		starting row
84-85		ending column
86-87		ending row
88-89	C Labels;	starting column
90-91		starting row
92-93		ending column
94-95		ending row

GRAPH2

Table 7 (continued) Symphony Graph Record Structure

Byte Number	Byte Description	
96-97	D Labels;	starting
column		
98-99		starting
row		
100-101		ending
column		
102-103		ending
row		
104-105	E Labels;	starting
column		
106-107		starting
row		
108-109		ending
column		
110-111		ending
row		
112-113	F Labels;	starting
column		
114-115		starting
row		
116-117		ending
column		

118-119		ending
row		
120	Graph type;	0 = XY,
1 = bar, 2 = pie,		4 =
line, 5 = stacked		bar
121	Grid;	0 =
none, 1 = horizontal,		2 =
vertical, 3 = both		
122	Color;	0 =
black-white,		FF =
color		
123	A Range line format;	0 =
none, 1 = line,		2 =
symbol,		3 =
line-symbol		
124	B Range line format;	0 =
none, 1 = line,		2 =
symbol,		3 =
line-symbol		
125	C Range line format;	0 =
none, 1 = line,		2 =
symbol,		3 =
line-symbol		
126	D Range line format;	0 =

none, 1 = line		2 =
symbol,		3 =
line-symbol		
127	E Range line format;	0 =
none, 1 = line		2 =
symbol,		3 =
line-symbol		
128	F Range line format;	0 =
none, 1 = line		2 =
symbol		3 =
line-symbol		
129	A Range data label alignment;	0 =
center, 1 = right,		2 =
below, 3 = left,		4 =
above		
130	B Range data label alignment;	0 =
center, 1 = right		2 =
below, 3 = left		4 =
above		
131	C Range data label alignment;	0 =
center, 1 = right		2 =
below, 3 = left		4 =
above		

132	D Range data label alignment; 0 =	
center, 1 = right		2 =
		4 =
below, 3 = left		
above		
133	E Range data label alignment; 0 =	
center, 1 = right		2 =
		4 =
below, 3 = left		
above		
134	F Range data label alignment; 0 =	
center, 1 = right		2 =
		4 =
below, 3 = left		
above		

GRAPH2

Table 7 (continued) Symphony Graph Record Structure

Byte Number	Byte Description	
135	X Scale	0 =
auto		
136-143	X lower limit in floating point format	FF
= manual		
144-151	X upper limit in floating point format	

152	Y scale;	0 =
automatic		FF
= manual		
153-160	Y lower limit in floating point format	
161-168	Y upper limit in floating point format	
169-208	First title	
209-248	Second title	
249-288	X title	
289-328	Y title	
329-348	A legend	
349-368	B legend	
369-388	C legend	
389-408	D legend	
409-428	E legend	
429-448	F legend	
449	X format	
450	Y format	
451-452	Skip factor	
453	X scale flag; (x1K)	0 =
ON		FF
= OFF		
454	Y scale flag;(x1K)	0 =
ON		FF
= OFF		
455	suppress;	0 =
no		
else = yes		
456-463	Bar origin (float)	
464-471	X linear scale (float)	
472-479	Y linear scale (float)	
480	X log scale	
481	Y log scale	

482	graph region color;	X
hue code		
483		A
hue code		
484		B
hue code		
485		C
hue code		
487		D
hue code		
488		F
hue code		
489-490	Y width	
491-498	Aspect (float)	

GRAPHNAME

Record Type	Code	Body length
GRAPHNAME	65 (41h)	16 bytes

Record Description

Current Graph Record Name

Used in Symphony only.

Byte Number	Byte Description
0-15	NULL terminated ASCII string

ZOOM

Record Type	Code	Body length
-------------	------	-------------

ZOOM 66 (42h) 9 bytes

Record Description

Original coordinates expanded window

Used in Symphony only.

Byte Number	Byte Description	
0	iszoom?	0 = no 1 = yes
1-2	X coordinates	
3-4	Y coordinates	
5-6	column depth	
7-8	row depth	

SYMSPLIT

Record Type	Code	Body length
SYMSPLIT	67 (43h)	2 bytes

Record Description

Number of split windows

Used in Symphony only.

Byte Number	Byte Description
0-1	number of split windows

NSROWS

Record Type	Code	Body length
-------------	------	-------------

NSROWS	Code	Body length
--------	------	-------------

NSROWS	68 (44h)	2 bytes
--------	----------	---------

Record Description

Number of screen rows

Used in Symphony only.

Byte Number	Byte Description
-------------	------------------

0-1	number of screen rows
-----	-----------------------

NSCOLS

Record Type	Code	Body length
-------------	------	-------------

NSCOLS	69 (45h)	2 bytes
--------	----------	---------

Record Description

Number of screen columns

Used in Symphony only.

Byte Number	Byte Description
-------------	------------------

0-1	Number of screen columns
-----	--------------------------

RULER

Record Type	Code	Body length
-------------	------	-------------

RULER	70 (46h)	25 bytes
-------	----------	----------

Record Description

Name ruler range

Used in Symphony only.

Byte Number	Byte Description
-------------	------------------

0-15	Name;	NULL terminated
ASCII string		
16-17	Range;	starting column
18-19		starting row
20-21		ending column
22-23		ending row
24	Range type;	0 = single cell 1 = range

NNAME

Record Type	Code	Body length
-------------	------	-------------

NNAME	71 (47h)	25 bytes
-------	----------	----------

Record Description

Named sheet range

Used in Symphony only.

Byte Number	Byte Description
-------------	------------------

0-15	Name;	NULL terminated
ASCII string		
16-17	Range;	starting column
18-19		starting row
20-21		ending column
22-23		ending row
24	Range type;	0 = single cell 1 = range

ACCOM

Record Type	Code	Body length
ACOMM	72 (48h)	65 bytes

Record Description

Autoload communications file

Used in Symphony only.

Byte Number	Byte Description
0-64	Path name to Autoload file; NULL terminated ASCII string

AMACRO

Record Type	Code	Body length
AMACRO	73 (49h)	8 bytes

Record Description

Autoexecute macro address

Used in Symphony only.

Byte Number	Byte Description
0-1	starting column
2-3	starting row
4-5	ending column
6-7	ending row

PARSE

Record Type	Code	Body length
PARSE	74 (4Ah)	16 bytes

Record Description

Query parse information

Used in Symphony only.

Byte Number	Byte Description
0-1	Parse range; starting column
2-3	starting row
4-5	ending column
6-7	ending row
8-9	Review range; starting column
10-11	starting row
12-13	ending column
14-15	ending row