AutoCAD R13/R14 DWG File Specification

Version 1.0

The OpenDWG$^{\hat{o}}$ Alliance

http://www.opendwg.org

AUTOCAD R13/R14 DWG FILE STRUCTURE

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1) BIT CODES AND DATA DEFINITIONS

NOTE: Unless otherwise stated, all data in this manual is in little-endian order, with the least significant byte first.

Much of the data in an R13/14 format file must be read at the bit level. Various parts of the drawing use data in compressed forms, which are explained below. Here are the abbreviations used in this document for the various compressed forms:

```
  B : bit (1 or 0)
 BB : special 2 bit code (entmode in entities, for instance)
 BS : bitshort
 BL : bitlong
 BD : bitdouble
2BD : 2D point (2 bitdoubles)
3BD : 3D point (3 bitdoubles)
 RC : raw char (not compressed)
 RS : raw short (not compressed)
 RD : raw double (not compressed)
 RL : raw long (not compressed)
2RD : 2 raw doubles
3RD : 3 raw doubles
 MC : modular char
 MS : modular short
  H : handle reference (see the HANDLE REFERENCES section)
  T : text  (bitshort length, followed by the string).
  X : special form
  U : unknown
 SN : 16 byte sentinel
```

A “seeker” is an RL-type object which indicates either an absolute address in the file, or an offset from some known address.

A “sentinel” is 16 bytes of data used for file recovery purposes.

Generally, the compressed forms are used to allow for compression of common data, usually values like 0.0 and 1.0 for doubles, 0 and 256 for shorts. The method for interpreting the code is to read the first two bits, which indicate either the size of the data to follow, or the actual value for the common values. Here are the compressed formats and some examples of how they appear in the file:

BITSHORT:

1st 2 bits	:	what it is
00	:	A short (2 bytes) follows, little-endian order (LSB first)
01	:	An unsigned char (1 byte) follows
10	:	0
11	:	256

The char size is used when positive shorts less than 256 are being stored. The short size is used when values <0 or >=256 are being stored. Obviously the special cases for 0 and 256 are used when those values are being stored.

Negative numbers use the short form, not the char form. That is, -1 is `00.11111111.11111111`, not `01.11111111`.

For instance, if we were known to be reading 5 shorts from the following stream of bits:

```
0000000001000000011011010000111110
```

it would be parsed like this:

```
00 00000001 00000001  (short 257)
10                    (0)
11                    (256)
01 00001111           (15)
10                    (0)
```

BITLONG:

1st 2 bits	:	what it is
00	:	A long (4 bytes) follows, little-endian order (LSB first)
01	:	An unsigned char (1 byte) follows
10	:	0
11	:	not used

The char size is used when positive longs less than 256 are being stored. The long size is used when values <0 or >=256 are being stored. Obviously the special case for 0 is used when storing 0.

Negative numbers use the short form, not the char form. That is, -1 is

```
00.11111111.11111111.11111111.11111111, not 01.11111111.
```

For instance, if we were known to be reading 5 longs from the following stream of bits:

```
0000000001000000010000000000000010010000111110
```

it would be parsed like this:

```
00 00000001 00000001 00000000 00000000 (long 257)
10                    (0)
01 00001111           (15)
10                    (0)
```

BITDOUBLE:

1st 2 bits : what it is	
00	: A double follows
01	: 1.0
10	: 0.0
11	: not used

Doubles are eight byte IEEE standard floating point values.

MODULAR CHARS:

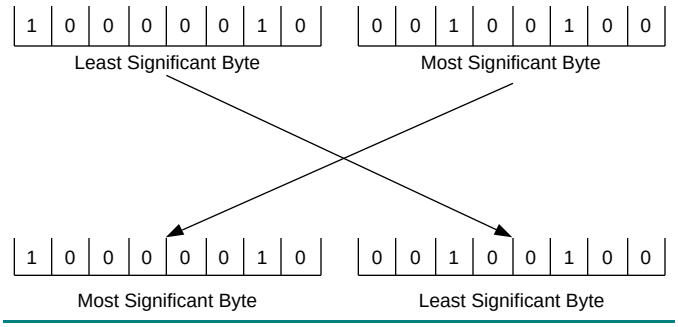
Modular characters are a method of storing compressed integer values. They are used in the object map to indicate both handle offsets and file location offsets. They consist of a stream of bytes, terminating when the high bit of the byte is 0.

In each byte, the high bit is a flag; when set, it indicates that another byte follows. The concept is not difficult to understand, but is a little difficult to explain. Let's look at an example:

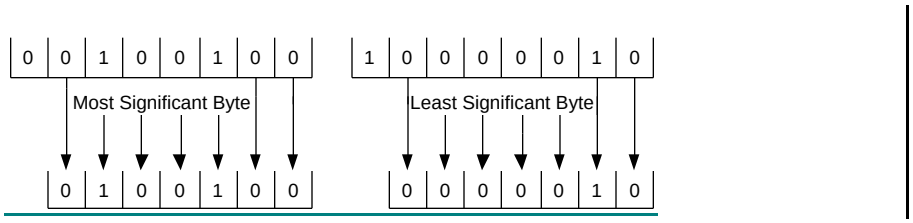
Assume the next two bytes in the file are:

```
10000010 00100100
```

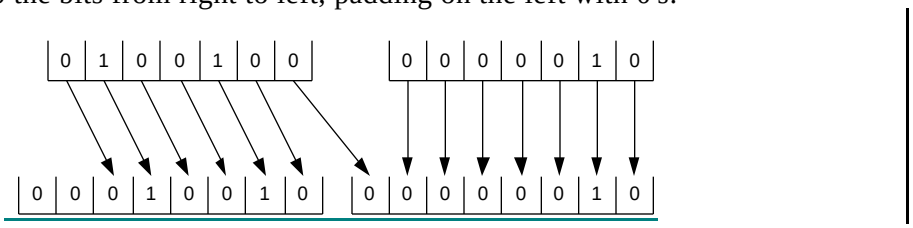
1) We read bytes until we reach a byte with a high bit of 0. Obviously the second byte meets that criterion. Since we are reading from least significant to most significant, let's reverse the order of the bytes so that they read MSB to LSB from left to right.



2) Now we drop the high order flag bits:



3) And then re-group the bits from right to left, padding on the left with 0's:

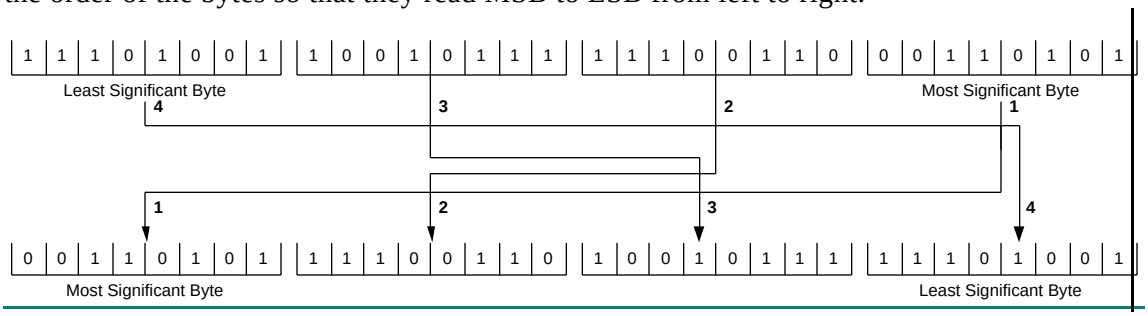


Result = 2 + 18*256 = 4610

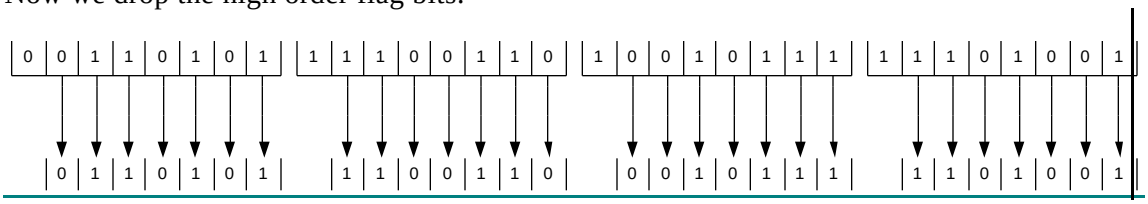
Here's another example using the basic form `F1101001 F0010111 F1100110 00110101`:

```
11101001 10010111 11100110 00110101
```

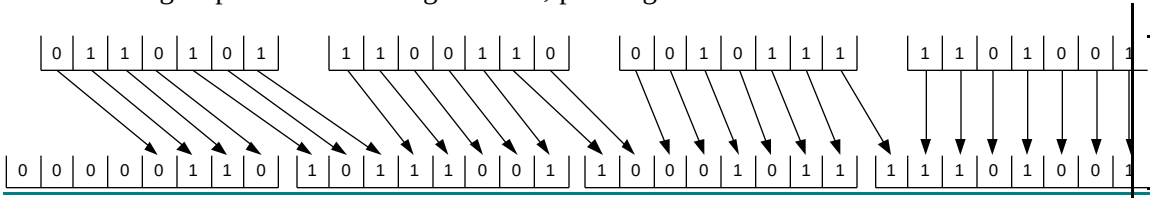
1) We read bytes until we reach a byte with a high bit of 0. Obviously the fourth byte meets that criterion. Since we are reading from least significant to most significant, let's reverse the order of the bytes so that they read MSB to LSB from left to right.



2) Now we drop the high order flag bits:



3) And then re-group the bits from right to left, padding on the left with 0's:

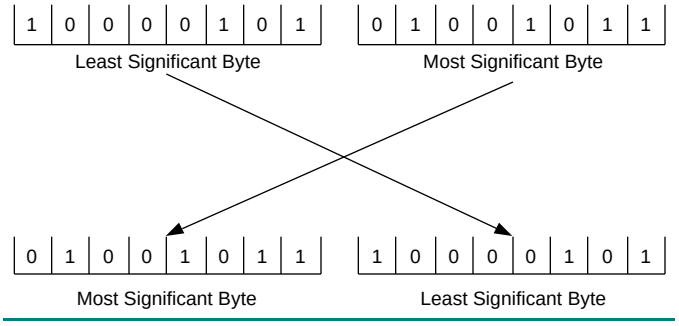


Result: 233+139*256+185*256^2+6*256^3=112823273

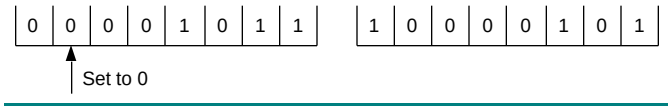
This process is further complicated by the fact that if the final byte (high bit 0) also has the 64 bit (0x40) set, this means to negate the number.

This is a negative number: `10000101 01001011`

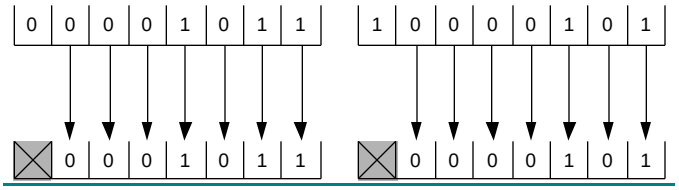
1) Since we are reading from least significant to most significant, let's reverse the order of the bytes so that they read MSB to LSB from left to right.



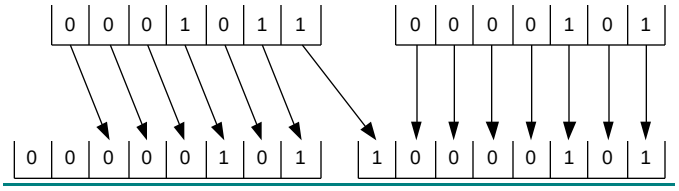
2) We then clear the bit that was used to represent the negative number, and note that the result must be negated:



3) Now we drop the high order flag bits:



4) And then re-group the bits from right to left, padding on the left with 0's:



Result: 133+5*256=1413, which we negate to get –1413

Modular chars are also used to store handle offsets in the object map. In this case there is no negation used; handles in the object map are always in increasing order.

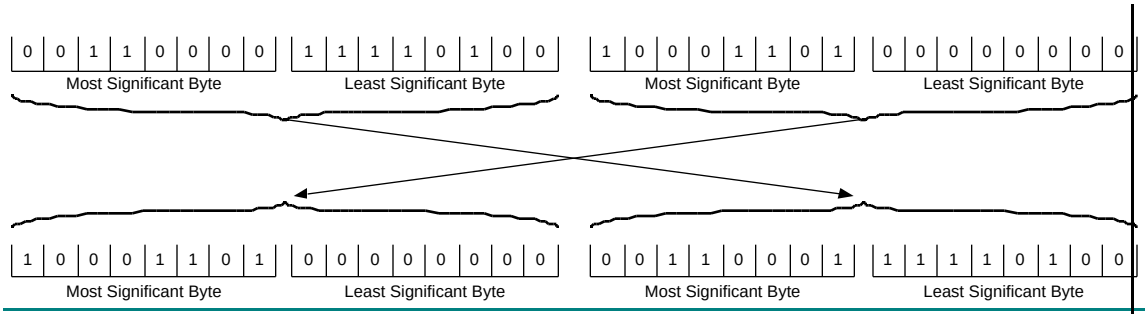
MODULAR SHORTS

Modular shorts work just like modular chars -- except that the base module is a short instead of a char.

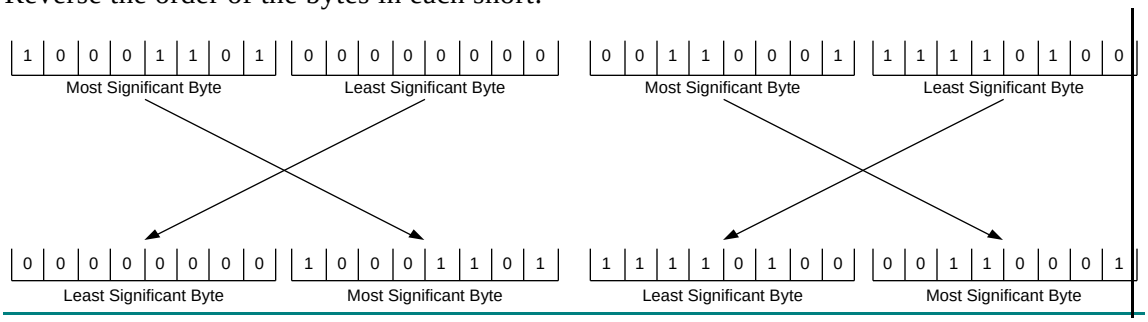
There are only two cases to worry about here (from a practical point of view), because, in the case of shorts, two modules make a long, and since these are used only to indicate object sizes, a maximum object size of 1 GB is probably correct.

```
00110001 11110100 10001101 00000000.
```

1) Reverse the order of the shorts:

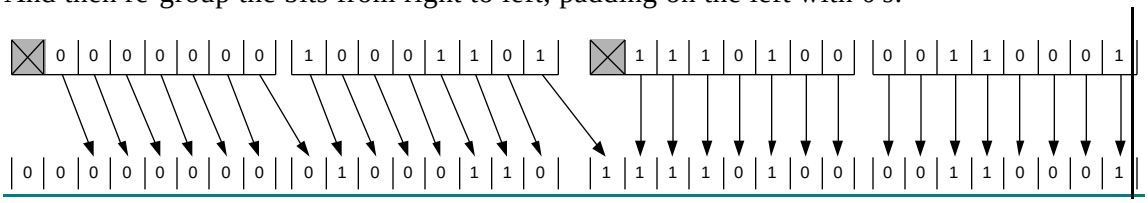


2) Reverse the order of the bytes in each short:



3) Drop the high order flag bit of each short:

4) And then re-group the bits from right to left, padding on the left with 0's:



Result: 62513+70*65536=4650033

HANDLE REFERENCES:

All objects in R13/R14 files are referred to by object handles. These handles are stored in the file in the following form:

```
|CODE (4 bits)|COUNTER (4 bits)|HANDLE or OFFSET|
```

In this document we write these as CODE.COUNTER.BYTE.BYTE..., such as 0101.0001.00001111 (the usual reference to LAYER 0 for drawings created under R13, which has handle F). In abbreviated form, we write 5.1.0F.

The CODE has different meanings depending on the handle. Certain object handles in AutoCAD have "ownership" relations with other objects. In these cases the code indicates the type of relation:

ARBITRARY 2 (no relation)SOFT_POINTER 3HARD_POINTER 4SOFT_OWNER 5HARD_OWNER 6

We will call these TYPEDOBJHANDLEs. Often their type is fixed to some value at all times; in other words, for instance in a certain position only a HARD_POINTER TYPEDOBJHANDLE would be allowed.

In other cases, the handle is stored as an offset from some other handle, and the code indicates how the offset is to be applied. See the table below:

Code:	Action:
0x2, 0x3, 0x4, 0x5	none - just read offset and use it as the result
0x6	result is reference handle + 1 (length is 0 in this case)
0x8	result is reference handle – 1 (length is 0 in this case)
0xA	result is reference handle plus offset
0xC	result is reference handle minus offset

We will call these OFFSETOBJHANDLEs. These handles are described with (CODE X), where X indicates the code if the offset is an ABSOLUTE reference (0x2 – 0x5).

COUNTER tells how many bytes of HANDLE follow.

EXAMPLE: An entity on a layer whose handle is 5E7 has the following handle reference near the end of the entity data (its code being 5):

```
   5   2    0   5    E   7
01010010 00000101 11100111  (0101.0010.00000101.11100111)
```

CRCS:

AutoCAD DWG files use a modification of a standard cyclic redundancy check as an error detecting mechanism. CRCs are always 2 bytes long, and are not stored in any sort of bit

code form. They also always appear on byte boundaries; they are not embedded within the stream of bits. Thus there may be extra unused bits at the end of an object. For instance, consider an object containing one bitshort, as follows:

```
01000000 11100000 01010101 01010101
```

This parses as:

```
01  bitshort with one character
00000011 the value of the bitshort (3)
100000 unused bits
01010101 01010101  the CRC
```

The modification that is made to the CRC is that a starting value different from 0 is used. Autodesk also uses a method whereby the result of the CRC is XORed with a "magic number". This method is used extensively in pre-R13 files, but seems only to be used in the header for R13 and beyond.

Here is the CRC function we use; it is simply a standard 8 bit CRC calculation:

```
int crctable[256]= {

0x0000,0xC0C1,0xC181,0x0140,0xC301,0x03C0,0x0280,0xC241,0xC601,0x06C0,0x0780,0xC741,0x
0500,0xC5C1,0xC481,0x0440,0xCC01,0x0CC0,0x0D80,0xCD41,0x0F00,0xCFC1,0xCE81,0x0E40,
0x0A00,0xCAC1,0xCB81,0x0B40,0xC901,0x09C0,0x0880,0xC841,
0xD801,0x18C0,0x1980,0xD941,0x1B00,0xDBC1,0xDA81,0x1A40,
0x1E00,0xDEC1,0xDF81,0x1F40,0xDD01,0x1DC0,0x1C80,0xDC41,
0x1400,0xD4C1,0xD581,0x1540,0xD701,0x17C0,0x1680,0xD641,
0xD201,0x12C0,0x1380,0xD341,0x1100,0xD1C1,0xD081,0x1040,
0xF001,0x30C0,0x3180,0xF141,0x3300,0xF3C1,0xF281,0x3240,
0x3600,0xF6C1,0xF781,0x3740,0xF501,0x35C0,0x3480,0xF441,
0x3C00,0xFCC1,0xFD81,0x3D40,0xFF01,0x3FC0,0x3E80,0xFE41,
0xFA01,0x3AC0,0x3B80,0xFB41,0x3900,0xF9C1,0xF881,0x3840,
0x2800,0xE8C1,0xE981,0x2940,0xEB01,0x2BC0,0x2A80,0xEA41,
0xEE01,0x2EC0,0x2F80,0xEF41,0x2D00,0xEDC1,0xEC81,0x2C40,
0xE401,0x24C0,0x2580,0xE541,0x2700,0xE7C1,0xE681,0x2640,
0x2200,0xE2C1,0xE381,0x2340,0xE101,0x21C0,0x2080,0xE041,
0xA001,0x60C0,0x6180,0xA141,0x6300,0xA3C1,0xA281,0x6240,
0x6600,0xA6C1,0xA781,0x6740,0xA501,0x65C0,0x6480,0xA441,
0x6C00,0xACC1,0xAD81,0x6D40,0xAF01,0x6FC0,0x6E80,0xAE41,
0xAA01,0x6AC0,0x6B80,0xAB41,0x6900,0xA9C1,0xA881,0x6840,
0x7800,0xB8C1,0xB981,0x7940,0xBB01,0x7BC0,0x7A80,0xBA41,
0xBE01,0x7EC0,0x7F80,0xBF41,0x7D00,0xBDC1,0xBC81,0x7C40,
0xB401,0x74C0,0x7580,0xB541,0x7700,0xB7C1,0xB681,0x7640,
0x7200,0xB2C1,0xB381,0x7340,0xB101,0x71C0,0x7080,0xB041,
0x5000,0x90C1,0x9181,0x5140,0x9301,0x53C0,0x5280,0x9241,
0x9601,0x56C0,0x5780,0x9741,0x5500,0x95C1,0x9481,0x5440,
0x9C01,0x5CC0,0x5D80,0x9D41,0x5F00,0x9FC1,0x9E81,0x5E40,
0x5A00,0x9AC1,0x9B81,0x5B40,0x9901,0x59C0,0x5880,0x9841,
0x8801,0x48C0,0x4980,0x8941,0x4B00,0x8BC1,0x8A81,0x4A40,
0x4E00,0x8EC1,0x8F81,0x4F40,0x8D01,0x4DC0,0x4C80,0x8C41,
0x4400,0x84C1,0x8581,0x4540,0x8701,0x47C0,0x4680,0x8641,
0x8201,0x42C0,0x4380,0x8341,0x4100,0x81C1,0x8081,0x4040 };

short crc8(unsigned short dx,char *p,unsigned short n)
{
  register unsigned char al;

  while (n-- > 0) {
    al = (unsigned char)((*p) ^ ((char)(dx & 0xFF)));
    dx = (dx>>8) & 0xFF;
    dx = dx ^ crctable[al & 0xFF];
```

```
    p++;
  }
  return(dx);
}
```

This function takes as its input an initial CRC value, a pointer to the data to be CRC'd, and the number of bytes of data. The return value is the new CRC. This function can be used to accumulate a CRC by running the first set of bytes with an initial value of 0 (or the "starting value" for this type of object), and subsequent calls with the initial value equal to the last returned CRC.

2) GENERAL STRUCTURE

The structure of the DWG file changed between R13 C2 and R13 C3. Notations regarding C3 below indicate the differences.

The general arrangement of data in an R13 or R14 file is as follows:

```
HEADER
  FILE HEADER
  DWG HEADER VARIABLES
  CRC

CLASS DEFINITIONS
PADDING (R13C3 AND LATER)
IMAGE DATA (PRE-R13C3)
OBJECT DATA
  All entities, table entries, dictionary entries, etc. go in this
  section.
OBJECT MAP
UNKNOWN SECTION (R13C3 AND LATER)
SECOND HEADER
IMAGE DATA (R13C3 AND LATER)
```

3) FILE HEADER

VERSION ID:

The first 6 bytes are "AC1012" for R13, "AC1014" for R14.

The next 7 starting at offset 0x06 are to be six bytes of 0 (in R14, 5 0's and the ACADMAINTVER variable) and a byte of 1. We have occasionally seen other values here but their meaning (and importance) is unclear.

IMAGE SEEKER:

At 0x0D is a seeker (4 byte long absolute address) for the beginning sentinel of the image data.

UNKNOWN SECTION:

Bytes at 0x11 and 0x12 are still unknown; usually 0.

DWGCODEPAGE:

Bytes at 0x13 and 0x14 are a raw short indicating the value of the code page for this drawing file.

SECTION-LOCATOR RECORDS:

At 0x15 is a long that tells how many sets of recno/seeker/length records follow. Each record has the following format:

```
Record number (raw byte) | Seeker (raw long) | Size (raw long)
```

The records are as follows:

```
0 : Header variables (covers beginning and ending sentinels).

1 : Class section.

2 : Object map.

3 : (C3 and later.)  A special table (no sentinels). See unknown section
    (R13 C3 and later). The presence of the 4th record (3) indicates that
    the C3 file format applies.  Just look at the long at 21; if it's 4 or
    greater, it's the C3-and-later format.
```

4 : In R14, points to a location where there may be data stored. Currently we have seen only the MEASUREMENT variable stored here.

We have seen files with up to 6 sets in this section; the meaning of the sixth one is unknown. The OpenDWG Toolkit emits files with the first 5 sets only.

RS : CRC for BOF to this point. Use 0 for the initial value, and depending on the number of sets of section-locators, XOR the result with one of the following:

3 : 0xA598

4 : 0x8101

5 : 0x3CC4

6 : 0x8461

The following 16 byte sentinel appears after the CRC:

0x95,0xA0,0x4E,0x28,0x99,0x82,0x1A,0xE5,0x5E,0x41,0xE0,0x5F,0x9D,0x3A,0x4D,0x00

4) DWG HEADER VARIABLES

The header variables section indicated by section-locator 0 has the following form:

```
Beginning sentinel
Size of the section (a 4 byte long)
Data (system variables and possibly other data at the beginning)
CRC (covers the stepper and the data)
Ending sentinel
```

This data section appear as one long stream, with no gaps. Most are bit coded. (See the BIT CODES section.)

The following 16 byte sentinel introduces this section:

```
0xCF,0x7B,0x1F,0x23,0xFD,0xDE,0x38,0xA9,0x5F,0x7C,0x68,0xB8,0x4E,0x6D,0x33,0x5F
    RL : Size of the section.
```

Next come the data items, as listed below:

TYPE	DESCRIPTION
BD	Unknown, default value 412148564080.0
BD	Unknown, default value 1.0
BD	Unknown, default value 1.0
BD	Unknown, default value 1.0
T	Unknown text string, default ""
T	Unknown text string, default ""
T	Unknown text string, default ""
T	Unknown text string, default ""
BL	Unknown long, default value 24L
BL	Unknown long, default value 0L;
BS	Unknown short, default value 0
H	Handle of the current viewport entity header
B	DIMASO
B	DIMSHO
B	DIMSAV Undocumented.
B	PLINEGEN
B	ORTHOMODE
B	REGENMODE
B	FILLMODE
B	QTEXTMODE
B	PSLTSCALE
B	LIMCHECK
B	BLIPMODE

B : User timer on/off.
B : SKPOLY
B : ANGDIR
B : SPLFRAME
B : ATTREQ
B : ATTDIA
B : MIRRTEXT
B : WORLDVIEW
B : WIREFRAME Undocumented.
B : TILEMODE
B : PLIMCHECK
B : VISRETAIN
B : DELOBJ
B : DISPSILH
B : PELLIPSE
BS : SAVEIMAGES(R13), PROXYGRAPHICS(R14).
BS : DRAGMODE
BS : TREEDEPTH
BS : LUNITS
BS : LUPREC
BS : AUNITS
BS : AUPREC
BS : OSMODE
BS : ATTMODE
BS : COORDS
BS : PDMODE
BS : PICKSTYLE
BS : USERI1
BS : USERI2
BS : USERI3
BS : USERI4
BS : USERI5
BS : SPLINESEGS
BS : SURFU
BS : SURFV
BS : SURFTYPE
BS : SURFTAB1
BS : SURFTAB2
BS : SPLINETYPE
BS : SHADEDGE
BS : SHADEDIF
BS : UNITMODE

BS : MAXACTVP

BS : ISOLINES

BS : CMLJUST

BS : TEXTQLTY

BD : LTSCALE

BD : TEXTSIZE

BD : TRACEWID

BD : SKETCHINC

BD : FILLETRAD

BD : THICKNESS

BD : ANGBASE

BD : PDSIZE

BD : PLINEWID

BD : USERR1

BD : USERR2

BD : USERR3

BD : USERR4

BD : USERR5

BD : CHAMFERA

BD : CHAMFERB

BD : CHAMFERC

BD : CHAMFERD

BD : FACETRES

BD : CMLSCALE

BD : CELTSCALE

T : MENUNAME

BL : TDCREATE (Julian day)

BL : TDCREATE (Milliseconds into the day)

BL : TDUPDATE (Julian day)

BL : TDUPDATE (Milliseconds into the day)

BL : TDINDWG (Days)

BL : TDINDWG (Milliseconds into the day)

BL : TDUSRTIMER (Days)

BL : TDUSRTIMER (Milliseconds into the day)

BS : CECOLOR

H : HANDSEED The next handle, with an 8-bit length specifier preceding the handle bytes (standard hex handle form).

H : CLAYER

H : TEXTSTYLE

H : CELTYPE

H : DIMSTYLE

H : CMLSTYLE

```
3BD : INSBASE                    (PSPACE)
3BD : EXTMIN                     (PSPACE)
3BD : EXTMAX                     (PSPACE)
2RD : LIMMIN                     (PSPACE)
2RD : LIMMAX                     (PSPACE)
 BD : ELEVATION                  (PSPACE)
3BD : UCSORG                     (PSPACE)
3BD : UCSXDIR                    (PSPACE)
3BD : UCSYDIR                    (PSPACE)
  H : UCSNAME                    (PSPACE)
3BD : INSBASE                    (MSPACE)
3BD : EXTMIN                     (MSPACE)
3BD : EXTMAX                     (MSPACE)
2RD : LIMMIN                     (MSPACE)
2RD : LIMMAX                     (MSPACE)
 BD : ELEVATION                  (MSPACE)
3BD : UCSORG                     (MSPACE)
3BD : UCSXDIR                    (MSPACE)
3BD : UCSYDIR                    (MSPACE)
  H : UCSNAME                    (MSPACE)
  B : DIMTOL
  B : DIMLIM
  B : DIMTIH
  B : DIMTOH
  B : DIMSE1
  B : DIMSE2
  B : DIMALT
  B : DIMTOFL
  B : DIMSAH
  B : DIMTIX
  B : DIMSOXD
 RC : DIMALTD
 RC : DIMZIN
  B : DIMSD1
  B : DIMSD2
 RC : DIMTOLJ
 RC : DIMJUST
 RC : DIMFIT

  B : DIMUPT
 RC : DIMTZIN
 RC : DIMALTZ
```

RC : DIMALTTZ

RC : DIMTAD

BS : DIMUNIT

BS : DIMAUNIT

BS : DIMDEC

BS : DIMTDEC

BS : DIMALTU

BS : DIMALTTD

H : DIMTXSTY

BD : DIMSCALE

BD : DIMASZ

BD : DIMEXO

BD : DIMDLI

BD : DIMEXE

BD : DIMRND

BD : DIMDLE

BD : DIMTP

BD : DIMTM

BD : DIMTXT

BD : DIMCEN

BD : DIMTSZ

BD : DIMALTF

BD : DIMLFAC

BD : DIMTVP

BD : DIMTFAC

BD : DIMGAP

T : DIMPOST

T : DIMAPOST

T : DIMBLK

T : DIMBLK1

T : DIMBLK2

BS : DIMCLRD

BS : DIMCLRE

BS : DIMCLRT

H : BLOCK CONTROL OBJECT

H : LAYER CONTROL OBJECT

H : STYLE CONTROL OBJECT

H : LINETYPE CONTROL OBJECT

H : VIEW CONTROL OBJECT

H : UCS CONTROL OBJECT

H : VPORT CONTROL OBJECT

H : APPID CONTROL OBJECT

H	:	DIMSTYLE CONTROL OBJECT
H	:	VIEWPORT ENTITY HEADER CONTROL OBJECT
H	:	DICTIONARY (ACAD_GROUP)
H	:	DICTIONARY (ACAD_MLINESTYLE)
H	:	DICTIONARY (NAMED OBJECTS)
H	:	BLOCK_RECORD (*PAPER_SPACE)
H	:	BLOCK_RECORD (*MODEL_SPACE)
H	:	LTYPE (BYLAYER)
H	:	LTYPE (BYBLOCK)
H	:	LTYPE (CONTINUOUS)
H	:	unknown short (type 5/6 only) these do not seem to be required,
H	:	unknown short (type 5/6 only) even for type 5.
H	:	unknown short (type 5/6 only)
H	:	unknown short (type 5/6 only)
RS	:	CRC for the data section, starting after the sentinel. Use 0xC0C1 for the initial value.

This following 16-byte sentinel appears after the CRC:

0x30,0x84,0xE0,0xDC,0x02,0x21,0xC7,0x56,0xA0,0x83,0x97,0x47,0xB1,0x92,0xCC,0xA0

Here is a dump of a complete header:

```
empty14.dwg  02/24/98  11:40:03
          0  1  2  3  4  5  6  7
    00000 41 43 31 30 31 34 00 00   AC1014..   0100 0001 0100 0011 0011 0001 0011 0000 0011 0001 0011 0100 0000 0000 0000 0000

    00008 00 00 00 00 01 3F 0C 00   .....?..   0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0011 1111 0000 1100 0000 0000

    00010 00 00 00 1E 00 05 00 00   ........   0000 0000 0000 0000 0000 0000 0001 1110 0000 0000 0000 0101 0000 0000 0000 0000

    00018 00 00 58 00 00 00 ED 01   ..X.....   0000 0000 0000 0000 0101 1000 0000 0000 0000 0000 0000 0000 1110 1101 0000 0001

    00020 00 00 01 45 02 00 00 26   ...E...&   0000 0000 0000 0000 0000 0001 0100 0101 0000 0010 0000 0000 0000 0000 0010 0110

    00028 00 00 00 02 27 0B 00 00   ....'...   0000 0000 0000 0000 0000 0000 0000 0010 0010 0111 0000 1011 0000 0000 0000 0000

    00030 50 00 00 00 03 77 0B 00   P....w..   0101 0000 0000 0000 0000 0000 0000 0000 0000 0011 0111 0111 0000 1011 0000 0000

    00038 00 35 00 00 00 04 3B 0C   .5....;.   0000 0000 0011 0101 0000 0000 0000 0000 0000 0000 0000 0100 0011 1011 0000 1100
          0  1  2  3  4  5  6  7
    00040 00 00 04 00 00 00 2D 5C   ......-\   0000 0000 0000 0000 0000 0100 0000 0000 0000 0000 0000 0000 0010 1101 0101 1100

    00048 95 A0 4E 28 99 82 1A E5   ..N(....   1001 0101 1010 0000 0100 1110 0010 1000 1001 1001 1000 0010 0001 1010 1110 0101

    00050 5E 41 E0 5F 9D 3A 4D 00   ^A._.:M.   0101 1110 0100 0001 1110 0000 0101 1111 1001 1101 0011 1010 0100 1101 0000 0000

    00058 CF 7B 1F 23 FD DE 38 A9   .{.#..8.   1100 1111 0111 1011 0001 1111 0010 0011 1111 1101 1101 1110 0011 1000 1010 1001

    00060 5F 7C 68 B8 4E 6D 33 5F   _|h.Nm3_   0101 1111 0111 1100 0110 1000 1011 1000 0100 1110 0110 1101 0011 0011 0101 1111

    00068 C7 01 00 00 00 00 07 00   ........   1100 0111 0000 0001 0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 0000 0000

    00070 1F BF 55 D0 95 40 5B 6A   ..U..@[j   0001 1111 1011 1111 0101 0101 1101 0000 1001 0101 0100 0000 0101 1011 0110 1010

    00078 51 A9 43 1A 65 AC 40 50   Q.C.e.@P   0101 0001 1010 1001 0100 0011 0001 1010 0110 0101 1010 1100 0100 0000 0101 0000
```

```
       0  1  2  3  4  5  6  7
00080 23 30 2D 02 41 2A 40 50   #0-.A*@P   0010 0011 0011 0000 0010 1101 0000 0010 0100 0001 0010 1010 0100 0000 0101 0000

00088 19 01 AA 90 84 19 06 41   .......A   0001 1001 0000 0001 1010 1010 1001 0000 1000 0100 0001 1001 0000 0110 0100 0001

00090 90 64 19 06 40 D4 69 30   .d..@.i0   1001 0000 0110 0100 0001 1001 0000 0110 0100 0000 1101 0100 0110 1001 0011 0000

00098 41 24 C9 26 A6 66 66 66   A$.&.fff   0100 0001 0010 0100 1100 1001 0010 0110 1010 0110 0110 0110 0110 0110 0110 0110

000A0 66 72 4F C9 A9 99 99 99   frO.....   0110 0110 0111 0010 0100 1111 1100 1001 1010 1001 1001 1001 1001 1001 1001 1001

000A8 99 9A 93 F2 6A 66 66 66   ....jfff   1001 1001 1001 1010 1001 0011 1111 0010 0110 1010 0110 0110 0110 0110 0110 0110

000B0 66 66 E4 FC 00 00 00 00   ff......   0110 0110 0110 0110 1110 0100 1111 1100 0000 0000 0000 0000 0000 0000 0000 0000

000B8 00 00 E0 3F AA AA 80 00   ...?....   0000 0000 0000 0000 1110 0000 0011 1111 1010 1010 1010 1010 1000 0000 0000 0000

        0  1  2  3  4  5  6  7
000C0 00 00 00 00 0E 03 F0 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 1110 0000 0011 1111 0000 0000 0000

000C8 00 00 00 00 03 80 FD 80   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0011 1000 0000 1111 1101 1000 0000

000D0 00 00 00 00 00 0E 03 F5   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1110 0000 0011 1111 0101

000D8 40 4B 8B 56 52 50 02 D1   @K.VRP..   0100 0000 0100 1011 1000 1011 0101 0110 0101 0010 0101 0000 0000 0010 1101 0001

000E0 A6 00 08 B5 65 25 00 20   ....e%.    1010 0110 0000 0000 0000 1000 1011 0101 0110 0101 0010 0101 0000 0000 0010 0000

000E8 29 E0 00 A3 30 F4 00 02   )...0...   0010 1001 1110 0000 0000 0000 1010 0011 0011 0000 1111 0100 0000 0000 0000 0010

000F0 33 0F 40 00 30 14 D5 10   3.@.0...   0011 0011 0000 1111 0100 0000 0000 0000 0011 0000 0001 0100 1101 0101 0001 0000

000F8 F5 11 05 11 45 11 D5 11   ....E...   1111 0101 0001 0001 0000 0101 0001 0001 0100 0101 0001 0001 1101 0101 0001 0001

       0  1  2  3  4  5  6  7
00100 CA 84 08 CB 57 81 DA F1   ....W...   1100 1010 1000 0100 0000 1000 1100 1011 0101 0111 1000 0001 1101 1010 1111 0001

00108 54 41 02 32 D5 E0 76 BC   TA.2..v.   0101 0100 0100 0001 0000 0010 0011 0010 1101 0101 1110 0000 0111 0110 1011 1100

00110 55 10 40 8C B5 78 1D AF   U.@..x..   0101 0101 0001 0000 0100 0000 1000 1100 1011 0101 0111 1000 0001 1101 1010 1111

00118 15 44 10 23 2D 5E 07 6B   .D.#-^.k   0001 0101 0100 0100 0001 0000 0010 0011 0010 1101 0101 1110 0000 0111 0110 1011

00120 C5 71 04 08 CB 57 81 DA   .q...W..   1100 0101 0111 0001 0000 0100 0000 1000 1100 1011 0101 0111 1000 0001 1101 1010

00128 F1 5C 41 02 32 D5 E0 76   .\A.2..v   1111 0001 0101 1100 0100 0001 0000 0010 0011 0010 1101 0101 1110 0000 0111 0110

00130 BC 57 10 00 00 00 00 00   .W......   1011 1100 0101 0111 0001 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00138 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

        0  1  2  3  4  5  6  7
00140 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00148 00 A1 00 00 00 00 00 00   ........   0000 0000 1010 0001 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00150 00 89 02 A9 A9 94 2A 10   ......*.   0000 0000 1000 1001 0000 0010 1010 1001 1010 1001 1001 0100 0010 1010 0001 0000

00158 23 2D 5E 07 6B C5 51 04   #-^.k.Q.   0010 0011 0010 1101 0101 1110 0000 0111 0110 1011 1100 0101 0101 0001 0000 0100

00160 08 CB 57 81 DA F1 54 41   ..W...TA   0000 1000 1100 1011 0101 0111 1000 0001 1101 1010 1111 0001 0101 0100 0100 0001

00168 02 32 D5 E0 76 BC 55 10   .2..v.U.   0000 0010 0011 0010 1101 0101 1110 0000 0111 0110 1011 1100 0101 0101 0001 0000

00170 40 8C B5 78 1D AF 15 C4   @..x....   0100 0000 1000 1100 1011 0101 0111 1000 0001 1101 1010 1111 0001 0101 1100 0100
```

```
00178 10 23 2D 5E 07 6B C5 71   .#-^.k.q   0001 0000 0010 0011 0010 1101 0101 1110 0000 0111 0110 1011 1100 0101 0111 0001

        0  1  2  3  4  5  6  7
00180 04 08 CB 57 81 DA F1 5C   ...W...\   0000 0100 0000 1000 1100 1011 0101 0111 1000 0001 1101 1010 1111 0001 0101 1100

00188 40 00 00 00 00 00 00 00   @.......   0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00190 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00198 00 00 00 00 00 00 02 84   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 1000 0100

001A0 00 00 00 00 00 00 02 24   .......$   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 0010 0100

001A8 0A A6 A6 50 30 00 40 00   ...P0.@.   0000 1010 1010 0110 1010 0110 0101 0000 0011 0000 0000 0000 0100 0000 0000 0000

001B0 08 00 18 00 00 00 01 02   ........   0000 1000 0000 0000 0001 1000 0000 0000 0000 0000 0000 0000 0000 0001 0000 0010

001B8 90 44 11 02 40 94 44 10   .D..@.D.   1001 0000 0100 0100 0001 0001 0000 0010 0100 0000 1001 0100 0100 0100 0001 0000

       0  1  2  3  4  5  6  7
001C0 2B 5E 8D C0 F4 2B 1C FC   +^...+..   0010 1011 0101 1110 1000 1101 1100 0000 1111 0100 0010 1011 0001 1100 1111 1100

001C8 00 00 00 00 00 00 B0 3F   .......?   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1011 0000 0011 1111

001D0 14 AE 07 A1 7A D4 76 0F   ....z.v.   0001 0100 1010 1110 0000 0111 1010 0001 0111 1010 1101 0100 0111 0110 0000 1111

001D8 C0 AD 7A 37 03 D0 AC 73   ..z7...s   1100 0000 1010 1101 0111 1010 0011 0111 0000 0011 1101 0000 1010 1100 0111 0011

001E0 FA A0 2B 5E 8D C0 F4 2B   ..+^...+   1111 1010 1010 0000 0010 1011 0101 1110 1000 1101 1100 0000 1111 0100 0010 1011

001E8 1C FC 0A D7 A3 70 3D 0A   .....p=.   0001 1100 1111 1100 0000 1010 1101 0111 1010 0011 0111 0000 0011 1101 0000 1010

001F0 B7 3F 86 66 66 66 66 66   .?.fffff   1011 0111 0011 1111 1000 0110 0110 0110 0110 0110 0110 0110 0110 0110 0110 0110

001F8 63 94 06 40 AD 7A 37 03   c..@.z7.   0110 0011 1001 0100 0000 0110 0100 0000 1010 1101 0111 1010 0011 0111 0000 0011

       0  1  2  3  4  5  6  7
00200 D0 AB 73 FA AA A3 10 13   ..s.....   1101 0000 1010 1011 0111 0011 1111 1010 1010 1010 1010 0011 0001 0000 0001 0011

00208 10 23 10 33 10 53 10 63   .#.3.S.c   0001 0000 0010 0011 0001 0000 0011 0011 0001 0000 0101 0011 0001 0000 0110 0011

00210 10 73 10 83 10 93 10 A3   .s......   0001 0000 0111 0011 0001 0000 1000 0011 0001 0000 1001 0011 0001 0000 1010 0011

00218 10 B5 10 D5 10 E3 10 C5   ........   0001 0000 1011 0101 0001 0000 1101 0101 0001 0000 1110 0011 0001 0000 1100 0101

00220 11 65 11 95 11 45 11 35   .e...E.5   0001 0001 0110 0101 0001 0001 1001 0101 0001 0001 0100 0101 0001 0001 0011 0101

00228 11 51 D5 58 D4 A0 34 26   .Q.X..4&   0001 0001 0101 0001 1101 0101 0101 1000 1101 0100 1010 0000 0011 0100 0010 0110

00230 4B 76 E0 5B 27 30 84 E0   Kv.['0..   0100 1011 0111 0110 1110 0000 0101 1011 0010 0111 0011 0000 1000 0100 1110 0000

00238 DC 02 21 C7 56 A0 83 97   ..!.V...   1101 1100 0000 0010 0010 0001 1100 0111 0101 0110 1010 0000 1000 0011 1001 0111

       0  1  2  3  4  5  6  7
00240 47 B1 92 CC A0            G....      0100 0111 1011 0001 1001 0010 1100 1100 1010 0000
```

5) CLASS DEFINITIONS

This section contains the defined classes for the drawing.

```
SN :  0x8D 0xA1 0xC4 0xB8 0xC4 0xA9 0xF8 0xC5 0xC0 0xDC 0xF4 0x5F 0xE7 0xCF
      0xB6 0x8A.

RL :  size of class data area.
```

Then follow the class data:

```
BS :  classnum

BS :  version – in R14, becomes a flag indicating whether objects can be
      moved, edited, etc.  We are still examining this.

 T :  appname

 T :  cplusplusclassname

 T :  classdxfname

 B :  wasazombie

BS :  itemclassid -- 0x1F2 for classes which produce entities, 0x1F3 for
      classes which produce objects.
```

We read sets of these until we exhaust the data.

```
RS :  CRC
```

This following 16-byte sentinel appears after the CRC:

0x72,0x5L,0x3B,0x47,0x3B,0x56,0x07,0x3A,0x3F,0x23,0x0B,0xA0,0x18,0x30,0x49,0x75

6) PADDING (R13C3 AND LATER)

0x200 bytes of padding. Can be ignored. When writing, the OpenDWG Toolkit writes all 0s. Occasionally AutoCAD will use the first 4 bytes of this area to store the value of the "measurement" variable. This padding was evidently required to allow pre-R13C3 versions of AutoCAD to read files produced by R13C3 and later.

7) IMAGE DATA (PRE-R13C3)

The BMP (or, sometimes, WMF) image of this file, if any. Only stored here for pre-R13C3 files. Later files place the data at the end. The format of this data is discussed in the section illustrating where R13C4 and beyond store it.

8) OBJECTS

This region holds the actual objects in the drawing. These can be entities, table entries, dictionary entries, and objects. This second use of objects is somewhat confusing; all items stored in the file are “objects”, but only some of them are object objects. Others are entities, table entries, etc. The objects in this section can appear in any order.

Objects have the following general format:

```
MS  :  Size of object, not including the CRC
BS  :  Object type
 H  :  Object’s handle
BS  :  Size of extended object data, if any
 X  :  Extended object data, if any
 B  :  Flag indicating presence of graphic image.  Only entities have this
       flag
       if (graphicimageflag is 1) {
         RL : Size of graphic image in bytes
          X : The graphic image
       }
RL  :  Size of object data in bits
 X  :  Object data (varies by type of object)
 X  :  Handles associated with this object
RS  :  CRC
```

The CRC includes the size bytes.

Drawing entities, which are of course objects, have the same format as objects, with some additional standard items:

```
MS  :  Size of object, not including the CRC
BS  :  Object type
 H  :  Object’s handle
BS  :  Size of extended object data, if any
 X  :  Extended object data, if any
 B  :  Flag indicating presence of graphic image.
      if (graphicimageflag is 1) {
        RL: Size of graphic image in bytes
         X: The graphic image
```

```
      }
RL  : Size of object data in bits
6B  : Flags
6B  : Common parameters
 X  : Object data (varies by type of object)
 X  : Handles associated with this object
RS  : CRC
```

The FLAGS area (6 bits) indicates which handle references are present in the HANDLE REFS area. They are as follows:

FEDCBA

```
FE  : Entity mode (entmode).  Generally, this indicates whether or not the
      subentity relative handle reference is present.  The values go as
      follows:
      00 : The subentity relative handle reference is present.
           Applies to the following:
              VERTEX, ATTRIB, and SEQEND.
              BLOCK, ENDBLK, and the defining entities in all
              block defs except *MODEL_SPACE and *PAPER_SPACE.
      01 : PSPACE entity without a relative handle ref.
      10 : MSPACE entity without a relative handle ref.
      11 : Not used.

DC  : This is the number of reactors attached to an entity as a bitshort. This
      feature may have been dormant in R13, but it appears in R14, and in
      files saved as R13 by R14.
 B  : 0 if a linetype reference is present; 1 if it's not (the default being
      BYLAYER -- even though there IS a BYLAYER linetype entity and it has a
      handle).
 A  : 0 if the previous and next linkers are present; 1 if they are BOTH
      defaults (1 back and 1 forward).
```

The COMMON PARAMETERS (6 bits):

CCSSII

```
CC  : Color bitshort
SS  : Linetype scale bitdouble
II  : "Invisible" flag bitshort
```

The ENTITY-SPECIFIC PARAMETERS area is coded with bitcodes. Each entity has its own parameter prescription. Some parameters ALWAYS appear in raw form -- even if bitcode abbreviations could be used (the 10 and 11 points in TEXT, for example). Generally the raw form is used in conditions wherein it cannot reasonably be assumed that the likely value for the particular parameter is one of the compressible values.

One method for loading these objects is to follow the object map. Doing so will cause each object to be loaded once and only once. Alternatively one can try to scan the objects as they are found, and replace objects with duplicated object handles with the ones found later in the file. The OpenDWG Toolkit uses a hybrid approach, loading the control objects first, then the objects they contain.

Some object types have fixed values, others have values which vary with the drawing. Here are the fixed values:

UNUSED	0	RAY	0x28
TEXT	1	XLINE	0x29
ATTRIB	2	DICTIONARY	0x2A
ATTDEF	3		0x2B
BLOCK	4	MTEXT	0x2C
ENDBLK	5	LEADER	0x2D
SEQEND	6	TOLERANCE	0x2E
INSERT	7	MLINE	0x2F
MINSERT	8	BLOCK CONTROL OBJ	0x30
	9	BLOCK HEADER	0x31
VERTEX (2D)	0x0A	LAYER CONTROL OBJ	0x32
VERTEX (3D)	0x0B	LAYER	0x33
VERTEX (MESH)	0x0C	STYLE CONTROL OBJ	0x34
VERTEX (PFACE)	0x0D	STYLE	0x35
VERTEX (PFACE FACE)	0x0E		0x36
POLYLINE (2D)	0x0F		0x37
POLYLINE (3D)	0x10	LTYPE CONTROL OBJ	0x38
ARC	0x11	LTYPE	0x39
CIRCLE	0x12		0x3A
LINE	0x13		0x3B
DIMENSION (ORDINATE)	0x14	VIEW CONTROL OBJ	0x3C
DIMENSION (LINEAR)	0x15	VIEW	0x3D
DIMENSION (ALIGNED)	0x16	UCS CONTROL OBJ	0x3E
DIMENSION (ANG 3-Pt)	0x17	UCS	0x3F
DIMENSION (ANG 2-Ln)	0x18	VPORT CONTROL OBJ	0x40
DIMENSION (RADIUS)	0x19	VPORT	0x41
DIMENSION (DIAMETER)	0x1A	APPID CONTROL OBJ	0x42
POINT	0x1B	APPID	0x43
3DFACE	0x1C	DIMSTYLE CONTROL OBJ	0x44
POLYLINE (PFACE)	0x1D	DIMSTYLE	0x45
POLYLINE (MESH)	0x1E	VP ENT HDR CTRL OBJ	0x46
SOLID	0x1F	VP ENT HDR	0x47
TRACE	0x20	GROUP	0x48

SHAPE	0x21	MLINESTYLE	0x49
VIEWPORT	0x22		
ELLIPSE	0x23		
SPLINE	0x24		
REGION	0x25		
3DSOLID	0x26		
BODY	0x27		

There are a number of objects with non-fixed values. These are:

```
DICTIONARYVAR
HATCH
IDBUFFER
IMAGE
IMAGEDEF
IMAGEDEFREACTOR
LAYER_INDEX
LWPLINE
OLE2FRAME
RASTERVARIABLES
SORTENTSTABLE
SPATIAL_FILTER
SPATIAL_INDEX
XRECORD
```

For objects with non-fixed values, taking the object type minus 500 gives an index into the class list, which then determines the type of object. For instance, an object type of 501 means that this object is of the class which is second in the class list; the **classdxfname** field determines the type of the object.

See the sections on EED a description of that areas.

OBJECT PRESCRIPTIONS

The object prescriptions are given in the following form:

```
ITEM    TYPE-CODE    DXF-CODE    DESCRIPTION
```

See the top of this document for the key to the data types used here.

TEXT (1)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	1 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here.

			See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Elevation	BD	---	
Insertion pt	2RD	10	
Alignment pt	2RD	11	
Extrusion	3BD	210	
Thickness	BD	39	
Oblique ang	BD	51	
Rotation ang	BD	50	
Height	BD	40	
Width factor	BD	41	
Text value	T	1	
Generation	BS	71	
Horiz align.	BS	72	
Vert align.	BS	73	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		7	STYLE (CODE 5)
CRC	X	---	

Example:

```
OBJECT: text (1H), len 49H (73), handle: 4C    00559 49 00                    I.        0100 1001 0000 0000
    0055B 40 40 53 20 58 10 00 05   @@S X...   0100 0000 0100 0000 0101 0011 0010 0000 0101 1000 0001 0000 0000 0000 0000 0101
    00563 5B 40 00 00 00 00 00 01   [@......   0101 1011 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001
    0056B 08 00 00 00 00 00 00 02   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010
    00573 08 00 00 00 00 00 00 00   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    0057B 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    00583 00 14 D4 4D 4C CC CC CC   ...ML...   0000 0000 0001 0100 1101 0100 0100 1101 0100 1100 1100 1100 1100 1100 1100 1100
    0058B CC E4 9F A8 63 A3 43 4B   ....c.CK   1100 1100 1110 0100 1001 1111 1010 1000 0110 0011 1010 0011 0100 0011 0100 1011
    00593 99 03 4B 99 03 A3 2B C3   ..K...+.   1001 1001 0000 0011 0100 1011 1001 1001 0000 0011 1010 0011 0010 1011 1100 0011
```

```
    0059B A5 46 0A 21 E8 08 0A 22   .F.!...."   1010 0101 0100 0110 0000 1010 0010 0001 1110 1000 0000 1000 0000 1010 0010 0010
    005A3 00                        .          0000 0000
    005A4 C9 72                     crc
ENDOBJECT
```

ATTRIB (2)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	2 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Elevation	BD	---	
Ins pt	2RD	10	
Align pt	2RD	11	
Extrusion	3BD	210	
Thickness	BD	39	
Oblique ang	BD	51	
Rotation ang	BD	50	
Height	BD	40	
Width factor	BD	41	
Value	T	1	
Generation	BS	71	
Horiz align.	BS	72	
Vert align.	BS	74	(It's 73 in TEXT.)
Tag	T	2	
Field length	BS	73	unused
Flags	EC	70	NOT bit-pair-coded.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)] (OFFSET)
			[NEXT ENTITY (CODE 4)] (OFFSET)
		7	STYLE (CODE 5)
CRC	X	---	

Example:

```
OBJECT: attrib (2H), len 58H (88), handle: 52
    00614 58 00                   X.        0101 1000 0000 0000
    00616 40 80 54 A3 F8 10 00 01 @.T.....  0100 0000 1000 0000 0101 0100 1010 0011 1111 1000 0001 0000 0000 0000 0000 0001
    0061E 5B 40 00 00 00 00 00 02 [@.....   0101 1011 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010
    00626 88 00 00 00 00 00 00 03 ........  1000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0011
    0062E 88 00 00 00 00 00 00 00 ........  1000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    00636 00 00 00 00 00 00 00 00 ........  0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    0063E 00 14 D4 4D CC CC CC CC ...M....  0000 0000 0001 0100 1101 0100 0100 1101 1100 1100 1100 1100 1100 1100 1100 1100
    00646 CC E4 9F 9F FF FF FF FF ........  1100 1100 1110 0100 1001 1111 1001 1111 1111 1111 1111 1111 1111 1111 1111 1111
    0064E FF FD E7 E8 5B 6B CB 0B ....[k..  1111 1111 1111 1101 1110 0111 1110 1000 0101 1011 0110 1011 1100 1011 0000 1011
    00656 A3 A1 03 B3 0B 63 AB 2D .....c.-  1010 0011 1010 0001 0000 0011 1011 0011 0000 1011 0110 0011 1010 1011 0010 1101
    0065E 48 2A 6A CA 0A A2 A4 01 H*j.....  0100 1000 0010 1010 0110 1010 1100 1010 0000 1010 1010 0010 1010 0100 0000 0001
    00666 00 60 A2 1E 80 80 A2 21 .`.....!  0000 0000 0110 0000 1010 0010 0001 1110 1000 0000 1000 0000 1010 0010 0010 0001

    0066E 6F A6                   crc
```

ATTDEF (3)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	3 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphic	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Elevation	BD	---	
Ins pt	2RD	10	
Align pt	2RD	11	
Extrusion	3BD	210	

Thickness	BD	39	
Oblique ang	BD	51	
Rotation ang	BD	50	
Height	BD	40	
Width factor	BD	41	
Default value	T	1	
Generation	BS	71	
Horiz align.	BS	72	
Vert align.	BS	74	(It's 73 in TEXT.)
Tag	T	2	
Field length	BS	73	unused
Flags	RC	70	NOT bit-pair-coded.
Prompt	T	3	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		7	STYLE (CODE 5)
CRC	X	---	

Example:

```
spec3.dwg

OBJECT: attdef (3H), len 50H (80), handle: 4C

    00559 50 00                   P.        0101 0000 0000 0000

    0055B 40 C0 53 22 08 10 00 05   @.S"....   0100 0000 1100 0000 0101 0011 0010 0010 0000 1000 0001 0000 0000 0000 0000 0101

    00563 5B 40 00 00 00 00 00 01   [@......   0101 1011 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001

    0056B 08 00 00 00 00 00 00 02   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010

    00573 08 00 00 00 00 00 00 00   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0057B 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    00583 00 14 D4 4D 4C CC CC CC   ...ML...   0000 0000 0001 0100 1101 0100 0100 1101 0100 1100 1100 1100 1100 1100 1100 1100

    0058B CC E4 9F B5 48 2A 6A CA   ....H*j.   1100 1100 1110 0100 1001 1111 1011 0101 0100 1000 0010 1010 0110 1010 1100 1010

    00593 0A A2 A4 00 85 A2 B7 3A   .......:   0000 1010 1010 0010 1010 0100 0000 0000 1000 0101 1010 0010 1011 0111 0011 1010

    0059B 32 B9 10 36 BC B0 BA 3A   2..6...:   0011 0010 1011 1001 0001 0000 0011 0110 1011 1100 1011 0000 1011 1010 0011 1010

    005A3 18 28 87 A0 20 28 88 00   .(.. (..   0001 1000 0010 1000 1000 0111 1010 0000 0010 0000 0010 1000 1000 1000 0000 0000
```

```
005AB 78 53                crc
```

BLOCK (4)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	4 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Block name	T	2	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: block (4H), len 16H (22), handle: 4E
    00BC2 16 00                   ..        0001 0110 0000 0000
    00BC4 41 00 53 A3 D8 00 00 01   A.S.....   0100 0001 0000 0000 0101 0011 1010 0011 1101 1000 0000 0000 0000 0000 0000 0001
    00BCC 5B 20 A9 AB 28 49 89 70   [ ..(I.p   0101 1011 0010 0000 1010 1001 1010 1011 0010 1000 0100 1001 1000 1001 0111 0000
    00BD4 06 0A 21 E8 08 00         ..!...    0000 0110 0000 1010 0010 0001 1110 1000 0000 1000 0000 0000
    00BDA 39 F3                   crc
```

NOTES: The BLOCK_RECORD entity seems to have all the goodies that show up in a BLOCK entget -- except for the common parameters. The actual BLOCK entity seems to be almost a dummy.

ENDBLK (5)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	5 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: endblk (5H), len FH (15), handle: 1B
    00685 0F 00                  ..        0000 1111 0000 0000
    00687 41 40 46 E2 48 00 00 05   A@F.H...   0100 0001 0100 0000 0100 0110 1110 0010 0100 1000 0000 0000 0000 0000 0000 0101
    0068F 5B 18 28 87 A0 20 20     [.(..     0101 1011 0001 1000 0010 1000 1000 0111 1010 0000 0010 0000 0010 0000
    00696 2E 8B                  crc
```

SEQEND (6)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	6 (internal DWG type code).
Handle	H	6	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present

Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: seqend (6H), len 11H (17), handle: 53
    00670 11 00                   ..        0001 0001 0000 0000
    00672 41 80 54 E2 48 00 00 01   A.T.H...   0100 0001 1000 0000 0101 0100 1110 0010 0100 1000 0000 0000 0000 0000 0000 0001
    0067A 5B 60 81 18 28 87 A0 20   [`..(..    0101 1011 0110 0000 1000 0001 0001 1000 0010 1000 1000 0111 1010 0000 0010 0000
    00682 08                      .         0000 1000
    00683 88 C7                   crc
```

INSERT (7)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	7 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0

Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Ins pt	3BD	10	
X Scale	BD	41	
Y Scale	BD	42	
Z Scale	BD	43	
Rotation	BD	50	
Extrusion	3BD	210	
Has ATTRIBs	B	66	Single bit; 1 if ATTRIBs follow.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		2	BLOCK HEADER (CODE 5)
			[1st ATTRIB (CODE 4)] if 66 bit set; can be NULL
			[last ATTRIB](CODE 4)] if 66 bit set; can be NULL
			[SEQEND (CODE 3)] if 66 bit set
CRC	X	---	

Example:

```
OBJECT: insert (7H), len 29H (41), handle: 51
    005E7 29 00                   ).        0010 1001 0000 0000    005E9 41 C0 54 66 F0 00 00 05   A.Tf....   0100 0001 1100 0000 0101 0100
0110 0110 1111 0000 0000 0000 0000 0000 0000 0101
    005F1 5B 00 00 00 00 00 00 01   [.......   0101 1011 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001
    005F9 08 00 00 00 00 00 00 00   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    00601 82 04 AD 4C C1 44 3D 01   ...L.D=.   1000 0010 0000 0100 1010 1101 0100 1100 1100 0001 0100 0100 0011 1101 0000 0001
    00609 01 45 35 05 49 05 48 C5   .E5.I.H.   0000 0001 0100 0101 0011 0101 0000 0101 0100 1001 0000 0101 0100 1000 1100 0101
    00611 4C                      L         0100 1100
    00612 CB 54                   crc
```

MINSERT (8)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	8 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present

Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Ins pt	3BD	10	
X Scale	BD	41	
Y Scale	BD	42	
Z Scale	BD	43	
Rotation	BD	50	
Extrusion	3BD	210	
Has ATTRIBs	B	66	Single bit; 1 if ATTRIBs follow.
Numcols	BS	70	
Numrows	BS	71	
Col spacing	BD	44	
Row spacing	BD	45	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		2	BLOCK HEADER (CODE 5)
			[1st ATTRIB (CODE 4)] if 66 bit set; can be NULL
			[last ATTRIB](CODE 4)] if 66 bit set; can be NULL
			[SEQEND (CODE 3)] if 66 bit set
CRC	X	---	

Example:

```
OBJECT: minsert (8H), len 36H (54), handle: 59
    0069E 36 00                   6.         0011 0110 0000 0000
    006A0 42 00 56 63 B0 08 00 05   B.Vc....   0100 0010 0000 0000 0101 0110 0110 0011 1011 0000 0000 1000 0000 0000 0000 0101
    006A8 5B 00 00 00 00 00 00 00   [.......   0101 1011 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    006B0 08 00 00 00 00 00 00 00   ........   0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
    006B8 42 04 AD 49 04 40 C0 00   B..I.@..   0100 0010 0000 0100 1010 1101 0100 1001 0000 0100 0100 0000 1100 0000 0000 0000
```

```
006C0 00 00 00 00 00 84 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1000 0100 0000 0000 0000 0000
006C8 00 00 00 00 00 01 00 C1   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0000 0000 1100 0001
006D0 44 3D 01 01 45 44         D=..ED     0100 0100 0011 1101 0000 0001 0000 0001 0100 0101 0100 0100
006D6 84 2E                     crc
```

VERTEX (2D) (10)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	10 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flags	EC	70	NOT bit-pair-coded.
Point	3BD	10	NOTE THAT THE Z SEEMS TO ALWAYS BE 0.0! The Z must be taken from the 2D POLYLINE elevation.
Start width	BD	40	If it's negative, use the abs val for start AND end widths (and note that no end width will be present). This is a compression trick for cases where the start and end widths are identical and non-0.
End width	BD	41	Not present if the start width is < 0.0; see above.
Bulge	BD	42	
Tangent dir	BD	50	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: pline vert (AH), len 22H (34), handle: 4D

    00B39 22 00                    ".        0010 0010 0000 0000

    00B3B 42 80 53 66 F8 00 00 01  B.Sf....  0100 0010 1000 0000 0101 0011 0110 0110 1111 1000 0000 0000 0000 0000 0000 0001

    00B43 5B 00 00 00 00 00 00 00  [.......  0101 1011 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    00B4B 00 08 00 00 00 00 00 00  ........  0000 0000 0000 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    00B53 00 02 05 55 00 60 A2 1E  ...U.`..  0000 0000 0000 0010 0000 0101 0101 0101 0000 0000 0110 0000 1010 0010 0001 1110

    00B5B 80 C1                    ..        1000 0000 1100 0001

    00B5D B2 FC                    crc
```

NOTES: Neither elevation nor thickness are present in the 2D VERTEX data. Both should be taken from the 2D POLYLINE entity (15).

VERTEX (3D) (11)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	11 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flags	EC	70	NOT bit-pair-coded.
Point	3BD	10	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]

			[NEXT ENTITY (CODE 4)]
CRC		X	---

Example:

```
OBJECT: 3d pline vert (BH), len 1AH (26), handle: 62

    00D74 1A 00                     ..        0001 1010 0000 0000

    00D76 42 C0 58 A4 B8 00 00 01   B.X.....  0100 0010 1100 0000 0101 1000 1010 0100 1011 1000 0000 0000 0000 0000 0000 0001

    00D7E 5B 10 00 00 00 00 00 00   [.......  0101 1011 0001 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    00D86 00 08 0D 82 08 60 A2 1F   .....`..  0000 0000 0000 1000 0000 1101 1000 0010 0000 1000 0110 0000 1010 0010 0001 1111

    00D8E 00 80                     ..        0000 0000 1000 0000

    00D90 8C 03                     crc
```

VERTEX (MESH) (12)

Same as VERTEX (3D) (11) except for type code.

Example:

```
OBJECT: 3d surf sol vert (CH), len 21H (33), handle: 67

    00E36 21 00                     !.        0010 0001 0000 0000

    00E38 43 00 59 E6 B8 00 00 01   C.Y.....  0100 0011 0000 0000 0101 1001 1110 0110 1011 1000 0000 0000 0000 0000 0000 0001

    00E40 5B 20 19 1D 70 D1 7F E3   [ ..p...  0101 1011 0010 0000 0001 1001 0001 1101 0111 0000 1101 0001 0111 1111 1110 0011

    00E48 FF 47 E1 72 DB 05 A8 C4   .G.r....  1111 1111 0100 0111 1110 0001 0111 0010 1101 1011 0000 0101 1010 1000 1100 0100

    00E50 58 CA 05 00 60 A2 1E 80   X...`...  0101 1000 1100 1010 0000 0101 0000 0000 0110 0000 1010 0010 0001 1110 1000 0000

    00E58 C0                        .         1100 0000

    00E59 B3 50                     crc
```

VERTEX (PFACE) (13)

Same as VERTEX (3D) (11) except for type code.

R13 DWGs seem to have color and linetype data for all PFACE VERTEXs (both types), but R12 and SAVEASR12 seem to omit color and linetype when writing out the location VERTEXs.

Example:

```
OBJECT: pface pt (DH), len 21H (33), handle: 56

    00BDD 21 00                     !.        0010 0001 0000 0000

    00BDF 43 40 55 A6 B8 00 00 01   C@U.....  0100 0011 0100 0000 0101 0101 1010 0110 1011 1000 0000 0000 0000 0000 0000 0001

    00BE7 5B 60 20 00 00 00 00 00   [` .....  0101 1011 0110 0000 0010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

```
00BEF 00 02 00 00 00 00 00 00   ........   0000 0000 0000 0010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

00BF7 00 10 81 00 60 A2 1E 80   ....`...   0000 0000 0001 0000 1000 0001 0000 0000 0110 0000 1010 0010 0001 1110 1000 0000

00BFF C1                        .          1100 0001

00C00 3D 1E                     crc
```

VERTEX (PFACE FACE) (14)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	14 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Vert index	BS	71	1-based vertex index (see DXF doc)
Vert index	BS	72	1-based vertex index (see DXF doc)
Vert index	BS	73	1-based vertex index (see DXF doc)
Vert index	BS	74	1-based vertex index (see DXF doc)
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: pface face def (EH), len 13H (19), handle: 5A

   00C7E 13 00                  ..         0001 0011 0000 0000
```

```
00C80 43 80 56 A3 48 00 00 01   C.V.H...   0100 0011 1000 0000 0101 0110 1010 0011 0100 1000 0000 0000 0000 0000 0000 0001

00C88 7B 20 28 1A 05 60 82 98   { (..`..   0111 1011 0010 0000 0010 1000 0001 1010 0000 0101 0110 0000 1000 0010 1001 1000

00C90 28 87 80                  (..       0010 1000 1000 0111 1000 0000

00C93 C3 BA                     crc
```

2D POLYLINE (15)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	15 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flags	BS	70	
Curve type	BS	75	Curve and smooth surface type.
Start width	BD	40	Default start width
End width	BD	41	Default end width
Thickness	BD	39	
Elevation	BD	10	The 10-pt is (0,0,elev)
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			1st VERTEX (CODE 4)
			last VERTEX (CODE 4)
			SEQEND (CODE 3)

CRC	X	---	

Example:

```
OBJECT: pline st (FH), len 18H (24), handle: 4C

    00B1D 18 00                   ..        0001 1000 0000 0000

    00B1F 43 C0 53 22 D8 00 00 05   C.S"....   0100 0011 1100 0000 0101 0011 0010 0010 1101 1000 0000 0000 0000 0000 0000 0101

    00B27 5B 55 55 26 0A 21 E8 14   [UU&.!..   0101 1011 0101 0101 0101 0101 0010 0110 0000 1010 0010 0001 1110 1000 0001 0100

    00B2F 21 28 29 A8 29 E6 2A 01   !().).*.   0010 0001 0010 1000 0010 1001 1010 1000 0010 1001 1110 0110 0010 1010 0000 0001

    00B37 13 EA                   crc
```

3D POLYLINE (16)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	16 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flags	RC	70	NOT DIRECTLY THE 75. Bit-coded (76543210):
		75	0 : Splined (75 value is 5)
			1 : Splined (75 value is 6)
			(If either is set, set 70 bit 2 (4) to indicate splined.)
Flags	RC	70	NOT DIRECTLY THE 70. Bit-coded (76543210):
			0 : Closed (70 bit 0 (1))
			(Set 70 bit 3 (8) because this is a 3D POLYLINE.)
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			first VERTEX (CODE 4)
			last VERTEX (CODE 4)
			SEQEND (CODE 3)
CRC	X	---	

Example:

```
OBJECT: 3d poly start (10H), len 19H (25), handle: 5E

    00CDA 19 00                    ..        0001 1001 0000 0000

    00CDC 44 00 57 A2 C8 00 00 05  D.W.....  0100 0100 0000 0000 0101 0111 1010 0010 1100 1000 0000 0000 0000 0000 0000 0101

    00CE4 5B 00 00 18 28 87 E0 84  [...(...  0101 1011 0000 0000 0000 0000 0001 1000 0010 1000 1000 0111 1110 0000 1000 0100

    00CEC D0 83 20 AF A0 B1 18 B1  .. .....  1101 0000 1000 0011 0010 0000 1010 1111 1010 0000 1011 0001 0001 1000 1011 0001

    00CF4 80                       .         1000 0000

    00CF5 4A A6                    crc
```

ARC (17)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	17 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Center	3BD	10	
Radius	BD	40	
Thickness	BD	39	

Extrusio	3BD	210	
Start angle	BD	50	
End angle	BD	51	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: arc (11H), len 3AH (58), handle: 64

    00DA7 3A 00                  :.        0011 1010 0000 0000

    00DA9 44 40 59 24 E8 08 00 05   D@Y$....   0100 0100 0100 0000 0101 1001 0010 0100 1110 1000 0000 1000 0000 0000 0000 0101

    00DB1 5B 0F 61 AA 41 EB F9 A0   [.a.A...   0101 1011 0000 1111 0110 0001 1010 1010 0100 0001 1110 1011 1111 1001 1010 0000

    00DB9 88 05 DD 50 53 3A 0A 70   ...PS:.p   1000 1000 0000 0101 1101 1101 0101 0000 0101 0011 0011 1010 0000 1010 0111 0000

    00DC1 EA 04 13 B4 FD AC 6D CB   ......m.   1110 1010 0000 0100 0001 0011 1011 0100 1111 1101 1010 1100 0110 1101 1100 1011

    00DC9 7A 9F D4 88 6D E1 F9 BC   z...m...   0111 1010 1001 1111 1101 0100 1000 1000 0110 1101 1110 0001 1111 1001 1011 1100

    00DD1 BC 60 08 00 27 5B 70 E5   .`..'[p.   1011 1100 0110 0000 0000 1000 0000 0000 0010 0111 0101 1011 0111 0000 1110 0101

    00DD9 02 68 7A 01 82 88 7E 08   .hz...~.   0000 0010 0110 1000 0111 1010 0000 0001 1000 0010 1000 1000 0111 1110 0000 1000

    00DE1 33 05                  3.        0011 0011 0000 0101

    00DE3 91 5F                  crc
```

CIRCLE (18)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	18 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode		BB	entity mode
Numreactors	BL		number of persistent reactors attached to this object

Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Center	3BD	10	
Radius	BD	40	
Thickness	BD	39	
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: circle (12H), len 2BH (43), handle: 92

    0154E 2B 00                   +.        0010 1011 0000 0000

    01550 44 80 64 A0 C8 08 00 05   D.d.....   0100 0100 1000 0000 0110 0100 1010 0000 1100 1000 0000 1000 0000 0000 0000 0101

    01558 5B 0A 88 A1 BF 90 3F C3   [.....?.   0101 1011 0000 1010 1000 1000 1010 0001 1011 1111 1001 0000 0011 1111 1100 0011

    01560 48 00 45 2D C2 C7 6F 28   H.E-..o(   0100 1000 0000 0000 0100 0101 0010 1101 1100 0010 1100 0111 0110 1111 0010 1000

    01568 FA 04 6A 9D CD 75 A2 1A   ..j..u..   1111 1010 0000 0100 0110 1010 1001 1101 1100 1101 0111 0101 1010 0010 0001 1010

    01570 72 9F D4 98 28 87 E0 96   r...(...   0111 0010 1001 1111 1101 0100 1001 1000 0010 1000 1000 0111 1110 0000 1001 0110

    01578 50 86 6D                P.m       0101 0000 1000 0110 0110 1101

    0157B 36 1C                   crc
```

LINE (19)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	19 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.

Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Start pt	3BD	10	
End pt	3BD	11	
Thickness	BD	39	
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: line (13H), len 35H (53), handle: CC

    004A5 35 00                   5.        0011 0101 0000 0000

    004A7 44 C0 73 22 E8 08 00 01   D.s"....   0100 0100 1100 0000 0111 0011 0010 0010 1110 1000 0000 1000 0000 0000 0000 0001

    004AF 13 00 6B B5 95 B2 D9 24   ..k....$   0001 0011 0000 0000 0110 1011 1011 0101 1001 0101 1011 0010 1101 1001 0010 0100

    004B7 08 04 88 93 FD FD 9A 00   ........   0000 1000 0000 0100 1000 1000 1001 0011 1111 1101 1111 1101 1001 1010 0000 0000

    004BF FA 04 53 E6 F4 DB B6 B6   ..S.....   1111 1010 0000 0100 0101 0011 1110 0110 1111 0100 1101 1011 1011 0110 1011 0110

    004C7 90 20 12 02 4F F7 F6 68   . ..O..h   1001 0000 0010 0000 0001 0010 0000 0010 0100 1111 1111 0111 1111 0110 0110 1000

    004CF 03 E8 15 4E 08 11 82 88   ...N....   0000 0011 1110 1000 0001 0101 0100 1110 0000 1000 0001 0001 1000 0010 1000 1000

    004D7 7A 88 9A 03 06          z....     0111 1010 1000 1000 1001 1010 0000 0011 0000 0110

    004DC FA FE                   crc
```

DIMENSION (ORDINATE) (20)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	20 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.

EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags 1	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 3 things: 6 for being an ordinate DIMENSION, plus whatever bits "Flags 1" and "Flags 2" specify.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
10-pt	3BD	10	See DXF documentation.
13-pt	3BD	13	See DXF documentation.

14-pt	3BD	14	See DXF documentation.
Flags 2	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the lowest bit is used; it's bit 6 (64) of the 70 group.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim ordinate (14H), len 5CH (92), handle: 9E

    0157D 5C 00                   \.        0101 1100 0000 0000

    0157F 45 00 67 A4 08 10 00 05   E.g.....   0100 0101 0000 0000 0110 0111 1010 0100 0000 1000 0001 0000 0000 0000 0000 0101

    01587 5B 52 6B 24 C2 1F B9 8C   [Rk$....   0101 1011 0101 0010 0110 1011 0010 0100 1100 0010 0001 1111 1011 1001 1000 1100

    0158F 32 80 21 6E 4C 98 C7 73   2.!nL..s   0011 0010 1000 0000 0010 0001 0110 1110 0100 1100 1001 1000 1100 0111 0111 0011

    01597 F0 7F 05 D4 AC 00 00 00   ........   1111 0000 0111 1111 0000 0101 1101 0100 1010 1100 0000 0000 0000 0000 0000 0000

    0159F 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    015A7 00 00 00 00 01 50 D8 84   .....P..   0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0101 0000 1101 1000 1000 0100

    015AF 7F 51 B7 94 26 80 2C 78   .Q..&.,x   0111 1111 0101 0001 1011 0111 1001 0100 0010 0110 1000 0000 0010 1100 0111 1000

    015B7 71 23 C3 5B 81 20 40 61   q#.[. @a   0111 0001 0010 0011 1100 0011 0101 1011 1000 0001 0010 0000 0100 0000 0110 0001

    015BF B6 92 67 34 E8 BA 00 21   ..g4...!   1011 0110 1001 0010 0110 0111 0011 0100 1110 1000 1011 1010 0000 0000 0010 0001

    015C7 6E 4C 98 C7 73 F0 7F 00   nL..s...   0110 1110 0100 1100 1001 1000 1100 0111 0111 0011 1111 0000 0111 1111 0000 0000

    015CF 18 28 87 E0 86 50 87 28   .(...P.(   0001 1000 0010 1000 1000 0111 1110 0000 1000 0110 0101 0000 1000 0111 0010 1000

    015D7 8E A8 C9 80             ....      1000 1110 1010 1000 1100 1001 1000 0000

    015DB 8E 48                   crc
```

DIMENSION (LINEAR) (21)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	21 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any

EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 2 things: 0 for being a linear DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
13-pt	3BD	13	See DXF documentation.
14-pt	3BD	14	See DXF documentation.
10-pt	3BD	10	See DXF documentation.

Ext ln rot	BD	52	Extension line rotation; see DXF documentation.
Dim rot	BD	50	Linear dimension rotation; see DXF documentation.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			8 LAYER (CODE 5)
			6 [LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim linear (15H), len 6BH (107), handle: AC

    015DD 6B 00                   k.         0110 1011 0000 0000

    015DF 45 40 6B 27 E8 10 00 05   E@k'....   0100 0101 0100 0000 0110 1011 0010 0111 1110 1000 0001 0000 0000 0000 0000 0101

    015E7 5B 52 A8 5F BD 44 3D 70   [R._.D=p   0101 1011 0101 0010 1010 1000 0101 1111 1011 1101 0100 0100 0011 1101 0111 0000

    015EF 3C 80 80 18 62 E8 57 62   <...b.Wb   0011 1100 1000 0000 1000 0000 0001 1000 0110 0010 1110 1000 0101 0111 0110 0010

    015F7 24 81 05 D4 AC 00 00 00   $.......   0010 0100 1000 0001 0000 0101 1101 0100 1010 1100 0000 0000 0000 0000 0000 0000

    015FF 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    01607 00 00 00 00 00 72 6E 2A   .....rn*   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 0010 0110 1110 0010 1010

    0160F 01 C0 D2 8D 20 09 11 EC   .... ...   0000 0001 1100 0000 1101 0010 1000 1101 0010 0000 0000 1001 0001 0001 1110 1100

    01617 04 B1 82 01 48 11 C5 80   ....H...   0000 0100 1011 0001 1000 0010 0000 0001 0100 1000 0001 0001 1100 0101 1000 0000

    0161F 66 42 BC CA 42 80 5C 7C   fB..B.\|   0110 0110 0100 0010 1011 1100 1100 1010 0100 0010 1000 0000 0101 1100 0111 1100

    01627 B9 38 1C BB 05 20 47 16   .8... G.   1011 1001 0011 1000 0001 1100 1011 1011 0000 0101 0010 0000 0100 0111 0001 0110

    0162F 01 99 0A F3 29 0A 00 80   ....)...   0000 0001 1001 1001 0000 1010 1111 0011 0010 1001 0000 1010 0000 0000 1000 0000

    01637 18 62 E8 57 62 24 81 51   .b.Wb$.Q   0001 1000 0110 0010 1110 1000 0101 0111 0110 0010 0010 0100 1000 0001 0101 0001

    0163F 82 88 7E 08 75 08 72 88   ..~.u.r.   1000 0010 1000 1000 0111 1110 0000 1000 0111 0101 0000 1000 0111 0010 1000 1000

    01647 EA 8C FB                ...        1110 1010 1000 1100 1111 1011

    0164A 48 DA                   crc
```

DIMENSION (ALIGNED) (22)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	22 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.

EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 2 things: 1 for being an aligned DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
13-pt	3BD	13	See DXF documentation.
14-pt	3BD	14	See DXF documentation.
10-pt	3BD	10	See DXF documentation.

Ext ln rot	BD	52	Extension line rotation; see DXF documentation.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim aligned (16H), len 6BH (107), handle: BA

    0164C 6B 00                   k.        0110 1011 0000 0000

    0164E 45 80 6E A7 D8 10 00 05   E.n.....   0100 0101 1000 0000 0110 1110 1010 0111 1101 1000 0001 0000 0000 0000 0000 0101

    01656 5B 53 B7 92 B9 9A CA CA   [S......   0101 1011 0101 0011 1011 0111 1001 0010 1011 1001 1001 1010 1100 1010 1100 1010

    0165E 1C 81 55 6D 19 67 3E 90   ..Um.g>.   0001 1100 1000 0001 0101 0101 0110 1101 0001 1001 0110 0111 0011 1110 1001 0000

    01666 28 81 05 D4 AC 00 00 00   (.......   0010 1000 1000 0001 0000 0101 1101 0100 1010 1100 0000 0000 0000 0000 0000 0000

    0166E 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    01676 00 00 00 00 00 2A 41 59   .....*AY   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 1010 0100 0001 0101 1001

    0167E E6 59 20 09 20 04 E7 DE   .Y . ...   1110 0110 0101 1001 0010 0000 0000 1001 0010 0000 0000 0100 1110 0111 1101 1110

    01686 65 A9 1D 81 E8 11 E8 B7   e.......   0110 0101 1010 1001 0001 1101 1000 0001 1110 1000 0001 0001 1110 1000 1011 0111

    0168E 57 AB F5 B4 22 80 6E 48   W...".nH   0101 0111 1010 1011 1111 0101 1011 0100 0010 0010 1000 0000 0110 1110 0100 1000

    01696 CB DF EC 81 08 20 46 F7   ..... F.   1100 1011 1101 1111 1110 1100 1000 0001 0000 1000 0010 0000 0100 0110 1111 0111

    0169E 1E 19 C7 7A E8 92 00 60   ...z...`   0001 1110 0001 1001 1100 0111 0111 1010 1110 1000 1001 0010 0000 0000 0110 0000

    016A6 DD 30 19 D6 34 28 81 46   .0..4(.F   1101 1101 0011 0000 0001 1001 1101 0110 0011 0100 0010 1000 1000 0001 0100 0110

    016AE 0A 21 F8 21 D4 21 EA 23   .!.!.!.#   0000 1010 0010 0001 1111 1000 0010 0001 1101 0100 0010 0001 1110 1010 0010 0011

    016B6 AA 35 BB                .5.       1010 1010 0011 0101 1011 1011

    016B9 EA 25                   crc
```

DIMENSION (ANGULAR, 3-PT) (23)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	23 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any

EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 2 things: 5 for being an angular-3pt DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
10-pt	3BD	10	See DXF documentation.
13-pt	3BD	13	See DXF documentation.
14-pt	3BD	14	See DXF documentation.
15-pt	3BD	15	See DXF documentation.

Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim angular (17H), len 7BH (123), handle: C9

    016BB 7B 00                   {.        0111 1011 0000 0000

    016BD 45 C0 72 63 F8 18 00 05   E.rc....   0100 0101 1100 0000 0111 0010 0110 0011 1111 1000 0001 1000 0000 0000 0000 0101

    016C5 5B 53 DC 3A 57 CD 05 40   [S.:W..@   0101 1011 0101 0011 1101 1100 0011 1010 0101 0111 1100 1101 0000 0101 0100 0000

    016CD 2E 80 C0 5E B2 D6 6F 22   ...^..o"   0010 1110 1000 0000 1100 0000 0101 1110 1011 0010 1101 0110 0110 1111 0010 0010

    016D5 40 81 05 D4 AC 00 00 00   @.......   0100 0000 1000 0001 0000 0101 1101 0100 1010 1100 0000 0000 0000 0000 0000 0000

    016DD 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    016E5 00 00 00 00 00 68 08 AF   .....h..   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0110 1000 0000 1000 1010 1111

    016ED 7C 2C 5E 0C A0 11 C0 E9   |,^.....   0111 1100 0010 1100 0101 1110 0000 1100 1010 0000 0001 0001 1100 0000 1110 1001

    016F5 18 9D 34 04 28 10 D2 BA   ..4.(...   0001 1000 1001 1101 0011 0100 0000 0100 0010 1000 0001 0000 1101 0010 1011 1010

    016FD AD A6 B9 2C 3A 80 61 CA   ...,:.a.   1010 1101 1010 0110 1011 1001 0010 1100 0011 1010 1000 0000 0110 0001 1100 1010

    01705 13 3A 13 1C 90 20 45 65   .:... Ee   0001 0011 0011 1010 0001 0011 0001 1100 1001 0000 0010 0000 0100 0101 0110 0101

    0170D 3A 06 5E 80 38 EA 00 D8   :.^.8...   0011 1010 0000 0110 0101 1110 1000 0000 0011 1000 1110 1010 0000 0000 1101 1000

    01715 3B 7A 98 A2 88 3A 81 0A   ;z...:..   0011 1011 0111 1010 1001 1000 1010 0010 1000 1000 0011 1010 1000 0001 0000 1010

    0171D 88 A1 BF 90 3F C3 48 00   ....?.H.   1000 1000 1010 0001 1011 1111 1001 0000 0011 1111 1100 0011 0100 1000 0000 0000

    01725 55 2D C2 C7 6F 28 FA 04   U-..o(..   0101 0101 0010 1101 1100 0010 1100 0111 0110 1111 0010 1000 1111 1010 0000 0100

    0172D 60 A2 1F 82 1F 42 18 A2   `....B..   0110 0000 1010 0010 0001 1111 1000 0010 0001 1111 0100 0010 0001 1000 1010 0010

    01735 3A A3 76                :.v       0011 1010 1010 0011 0111 0110

    01738 42 38                   crc
```

DIMENSION (ANGULAR, 2-LINE) (24)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	24 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.

EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	
		16	
Flags	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 2 things: 2 for being an angular 2-line DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
16-pt	2RD	16	See DXF documentation.
13-pt	3BD	13	See DXF documentation.
14-pt	3BD	14	See DXF documentation.
15-pt	3BD	15	See DXF documentation.
10-pt	3BD	10	See DXF documentation.
Handle refs	H		[Subentity ref handle (CODE 3)]

			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

DIMENSION (RADIUS) (25)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	25 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	B	S	size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	D	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags	EC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD).

			The actual 70-group value comes from 2 things:
			4 for being an radius DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	D	53	See DXF documentation.
Horiz dir	D	51	See DXF documentation.
Ins X-scale	D	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	D	42	anonymous block. None of them can be
Ins Z-scale	D	43	dealt with via entget/entmake/entmod.
Ins rotation	D	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
10-pt	3BD	10	See DXF documentation.
15-pt	3BD	15	See DXF documentation.
Leader len	D	40	Leader length.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim radial (19H), len 71H (113), handle: D5

    0173A 71 00                   q.         0111 0001 0000 0000

    0173C 46 40 75 51 45 11 10 00   F@uQE...   0100 0110 0100 0000 0111 0101 0101 0001 0100 0101 0001 0001 0001 0000 0000 0000

    01744 60 01 E4 45 35 45 94 C4   `..E5E..   0110 0000 0000 0001 1110 0100 0100 0101 0011 0101 0100 0101 1001 0100 1100 0100

    0174C 50 20 04 62 00 14 60 10   P .b..`.   0101 0000 0010 0000 0000 0100 0110 0010 0000 0000 0001 0100 0110 0000 0001 0000

    01754 00 20 18 5E 06 00 01 56   . .^...V   0000 0000 0010 0000 0001 1000 0101 1110 0000 0110 0000 0000 0000 0001 0101 0110

    0175C D4 BE B8 AD 7A BB 82 11   ....z...   1101 0100 1011 1110 1011 1000 1010 1101 0111 1010 1011 1011 1000 0010 0001 0001

    01764 20 48 89 3F DF D9 A0 0F    H.?....   0010 0000 0100 1000 1000 1001 0011 1111 1101 1111 1101 1001 1010 0000 0000 1111

    0176C A0 41 55 2B 00 00 00 00   .AU+....   1010 0000 0100 0001 0101 0101 0010 1011 0000 0000 0000 0000 0000 0000 0000 0000

    01774 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0177C 00 00 00 00 0A A8 A1 BF   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 1010 1010 1000 1010 0001 1011 1111
```

```
01784 90 3F C3 48 00 55 2D C2   .?.H.U-.   1001 0000 0011 1111 1100 0011 0100 1000 0000 0000 0101 0101 0010 1101 1100 0010

0178C C7 6F 28 FA 04 27 F9 9E   .o(..'..   1100 0111 0110 1111 0010 1000 1111 1010 0000 0100 0010 0111 1111 1001 1001 1110

01794 65 FB 50 0E A0 07 FF E7   e.P.....   0110 0101 1111 1011 0101 0000 0000 1110 1010 0000 0000 0111 1111 1111 1110 0111

0179C 46 14 F3 63 E8 14 60 A2   F..c..`.   0100 0110 0001 0100 1111 0011 0110 0011 1110 1000 0001 0100 0110 0000 1010 0010

017A4 1F 82 19 42 18 A2 3A A3   ...B..:.   0001 1111 1000 0010 0001 1001 0100 0010 0001 1000 1010 0010 0011 1010 1010 0011

017AC 94                        .          1001 0100

017AD EA 1E                     crc
```

DIMENSION (DIAMETER) (26)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	26 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Extrusion	3BD	210	
Text midpt	2RD	11	See DXF documentation.
Elevation	BD	11	Z-coord for the ECS points (11, 12, 16).
		12	(The 16 remains (0,0,0) in entgets of this entity, since the 16 is not used in this type of dimension and is not present in the binary form here.)
Flags	RC	70	Non-bit-pair-coded. NOT the 70 group, but helps define it. Apparently only the two lowest bit are used: 76543210: Bit 0 : The OPPOSITE of bit 7 (128) of 70. Bit 1 : Same as bit 5 (32) of the 70 (but 32 is not doc'd by ACAD). The actual 70-group value comes from 2 things:

			3 for being an radius DIMENSION, plus whatever bits this byte specifies.
User text	T	1	
Text rot	BD	53	See DXF documentation.
Horiz dir	BD	51	See DXF documentation.
Ins X-scale	BD	41	Undoc'd. These apply to the insertion of the
Ins Y-scale	BD	42	anonymous block. None of them can be
Ins Z-scale	BD	43	dealt with via entget/entmake/entmod.
Ins rotation	BD	54	The last 2 (43 and 54) are reported by DXFOUT (when not default values). ALL OF THEM can be set via DXFIN, however.
12-pt	2RD	12	See DXF documentation.
15-pt	3BD	15	See DXF documentation.
10-pt	3BD	10	See DXF documentation.
Leader len	BD	40	Leader length.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		3	DIMSTYLE (CODE 5)
		2	anonymous BLOCK (CODE 5)
CRC	X	---	

Example:

```
OBJECT: dim diameter (1AH), len 70H (112), handle: E1

    017AF 70 00                   p.        0111 0000 0000 0000

    017B1 46 80 78 51 45 11 10 00   F.xQE...   0100 0110 1000 0000 0111 1000 0101 0001 0100 0101 0001 0001 0001 0000 0000 0000

    017B9 60 01 E4 45 35 45 94 C4   `..E5E..   0110 0000 0000 0001 1110 0100 0100 0101 0011 0101 0100 0101 1001 0100 1100 0100

    017C1 50 20 04 62 00 14 60 10   P .b..`.   0101 0000 0010 0000 0000 0100 0110 0010 0000 0000 0001 0100 0110 0000 0001 0000

    017C9 00 20 18 5E 06 00 01 56   . .^...V   0000 0000 0010 0000 0001 1000 0101 1110 0000 0110 0000 0000 0000 0001 0101 0110

    017D1 D4 AE 72 3A F7 9A B2 10   ..r:....   1101 0100 1010 1110 0111 0010 0011 1010 1111 0111 1001 1010 1011 0010 0001 0000

    017D9 A0 4A 92 A4 03 41 DC 0E   .J...A..   1010 0000 0100 1010 1001 0010 1010 0100 0000 0011 0100 0001 1101 1100 0000 1110

    017E1 20 41 55 2B 00 00 00 00    AU+....   0010 0000 0100 0001 0101 0101 0010 1011 0000 0000 0000 0000 0000 0000 0000 0000

    017E9 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    017F1 00 00 00 00 1B 6E ED 97   .....n..   0000 0000 0000 0000 0000 0000 0000 0000 0001 1011 0110 1110 1110 1101 1001 0111

    017F9 4E 85 E3 A8 06 3F D6 3A   N....?.:   0100 1110 1000 0101 1110 0011 1010 1000 0000 0110 0011 1111 1101 0110 0011 1010
```

```
01801 B1 4B 40 F2 04 65 89 57   .K@..e.W   1011 0001 0100 1011 0100 0000 1111 0010 0000 0100 0110 0101 1000 1001 0101 0111

01809 1E C7 E6 8C 20 14 94 EA   .... ...   0001 1110 1100 0111 1110 0110 1000 1100 0010 0000 0001 0100 1001 0100 1110 1010

01811 95 BB 16 24 08 14 60 A2   ...$..`.   1001 0101 1011 1011 0001 0110 0010 0100 0000 1000 0001 0100 0110 0000 1010 0010

01819 1F 82 18 C0 A2 3A A3 AD   .....:..   0001 1111 1000 0010 0001 1000 1100 0000 1010 0010 0011 1010 1010 0011 1010 1101

01821 37 B4                   crc
```

POINT (27)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	27 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Point	3BD	10	
Thickness	BD	39	
Extrusion	3BD	210	
X-axis ang	BD	50	See DXF documentation
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: point (1BH), len 23H (35), handle: D2
```

```
0062A 23 00                   #.        0010 0011 0000 0000

0062C 46 C0 74 A6 C8 00 00 01 F.t.....  0100 0110 1100 0000 0111 0100 1010 0110 1100 1000 0000 0000 0000 0000 0000 0001

00634 33 09 FE 67 99 7E D4 03 3..g.~..  0011 0011 0000 1001 1111 1110 0110 0111 1001 1001 0111 1110 1101 0100 0000 0011

0063C A8 01 FF F9 D1 85 3C D8 ......<.  1010 1000 0000 0001 1111 1111 1111 1001 1101 0001 1000 0101 0011 1100 1101 1000

00644 FA 05 53 60 84 18 28 CC ..S`..(.  1111 1010 0000 0101 0101 0011 0110 0000 1000 0100 0001 1000 0010 1000 1100 1100

0064C A8 89 86                ...       1010 1000 1000 1001 1000 0110

0064F 09 DF                   crc
```

3DFACE (28)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	28 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
1st corner	3BD	10	
2nd corner	3BD	11	
3rd corner	3BD	12	
4th corner	3BD	13	
Invis flags	BS	70	Invisible edge flags
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: 3d face (1CH), len 50H (80), handle: E3

    01846 50 00                   P.        0101 0000 0000 0000

    01848 47 00 78 E3 18 10 00 05   G.x.....   0100 0111 0000 0000 0111 1000 1110 0011 0001 1000 0001 0000 0000 0000 0000 0101

    01850 7B 06 54 B1 62 D9 BA E4   {.T.b...   0111 1011 0000 0110 0101 0100 1011 0001 0110 0010 1101 1001 1011 1010 1110 0100

    01858 28 00 02 01 84 E7 8E 80   (.......   0010 1000 0000 0000 0000 0010 0000 0001 1000 0100 1110 0111 1000 1110 1000 0000

    01860 12 04 4F 73 C2 29 98 53   ..Os.).S   0001 0010 0000 0100 0100 1111 0111 0011 1100 0010 0010 1001 1001 1000 0101 0011

    01868 12 20 16 8C 3C B6 E3 69   . ..<..i   0001 0010 0010 0000 0001 0110 1000 1100 0011 1100 1011 0110 1110 0011 0110 1001

    01870 E2 08 10 14 77 8D 5D FA   ....w.].   1110 0010 0000 1000 0001 0000 0001 0100 0111 0111 1000 1101 0101 1101 1111 1010

    01878 52 4C 80 50 0B 36 A4 30   RL.P.6.0   0101 0010 0100 1100 1000 0000 0101 0000 0000 1011 0011 0110 1010 0100 0011 0000

    01880 F0 FF 1F C5 51 57 68 85   ....QWh.   1111 0000 1111 1111 0001 1111 1100 0101 0101 0001 0101 0111 0110 1000 1000 0101

    01888 48 51 12 00 40 84 CA FB   HQ..@...   0100 1000 0101 0001 0001 0010 0000 0000 0100 0000 1000 0100 1100 1010 1111 1011

    01890 AF DF EC 7F 46 0A 21 FA   ....F.!.   1010 1111 1101 1111 1110 1100 0111 1111 0100 0110 0000 1010 0010 0001 1111 1010

    01898 1A A6                   crc
```

POLYLINE (PFACE) (29)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	29 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Numverts	BS	71	Number of vertices in the mesh.
Numfaces	BS	72	Number of faces
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]

			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			first VERTEX (CODE 4)
			last VERTEX (CODE 4)
			SEQEND (CODE 3)
CRC	X	---	

Example:

```
OBJECT: pface start (1DH), len 19H (25), handle: 55

    00BC0 19 00                   ..        0001 1001 0000 0000

    00BC2 47 40 55 62 E8 00 00 05   G@Ub....   0100 0111 0100 0000 0101 0101 0110 0010 1110 1000 0000 0000 0000 0000 0000 0101

    00BCA 5B 20 88 19 82 88 7E 08   [ ....~.   0101 1011 0010 0000 1000 1000 0001 1001 1000 0010 1000 1000 0111 1110 0000 1000

    00BD2 4D 08 4A 0A B2 0A E1 8A   M.J.....   0100 1101 0000 1000 0100 1010 0000 1010 1011 0010 0000 1010 1110 0001 1000 1010

    00BDA E8                      .         1110 1000

    00BDB D7 3E                   crc
```

POLYLINE (MESH) (30)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	30 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flags	BS	70	
Curve type	BS	75	Curve and smooth surface type.

M vert count	BS	71	M vertex count
N vert count	BS	72	N vertex count
M density	BS	73	M vertex count
N density	BS	74	N vertex count
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			FIRST VERTEX (CODE 4)
			LAST VERTEX (CODE 4)
			SEQEND (CODE 3)
CRC	X	---	

Example:

```
OBJECT: 3d surf sol st (1EH), len 1AH (26), handle: 66

    00E18 1A 00                   ..        0001 1010 0000 0000

    00E1A 47 80 59 A3 68 00 00 05   G.Y.h...   0100 0111 1000 0000 0101 1001 1010 0011 0110 1000 0000 0000 0000 0000 0000 0101

    00E22 5B 22 32 0C 83 D1 82 88   ["2.....   0101 1011 0010 0010 0011 0010 0000 1100 1000 0011 1101 0001 1000 0010 1000 1000

    00E2A 7C 05 09 62 0B 3A 0C 81   |..b.:..   0111 1100 0000 0101 0000 1001 0110 0010 0000 1011 0011 1010 0000 1100 1000 0001

    00E32 8C 8C                   ..        1000 1100 1000 1100

    00E34 3C E7                   crc
```

SOLID (31)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	31 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0

Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Thickness	BD	39	
Elevation	BD	---	Z for 10 - 13.
1st corner	2RD	10	
2nd corner	2RD	11	
3rd corner	2RD	12	
4th corner	2RD	13	
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CR	X	---	

Example:

```
OBJECT: solid (1FH), len 52H (82), handle: CF

    00566 52 00                   R.        0101 0010 0000 0000

    00568 47 C0 73 E2 98 10 00 01   G.s.....   0100 0111 1100 0000 0111 0011 1110 0010 1001 1000 0001 0000 0000 0000 0000 0001

    00570 33 50 A8 BE 18 24 52 D8   3P...$R.   0011 0011 0101 0000 1010 1000 1011 1110 0001 1000 0010 0100 0101 0010 1101 1000

    00578 F2 07 52 C3 01 40 1D 30   ..R..@.0   1111 0010 0000 0111 0101 0010 1100 0011 0000 0001 0100 0000 0001 1101 0011 0000

    00580 FA 00 FF 31 0A 96 82 A0   ...1....   1111 1010 0000 0000 1111 1111 0011 0001 0000 1010 1001 0110 1000 0010 1010 0000

    00588 F2 06 8B FA 70 47 8B 40   ....pG.@   1111 0010 0000 0110 1000 1011 1111 1010 0111 0000 0100 0111 1000 1011 0100 0000

    00590 FA 02 7F 99 E6 5F B5 00   ....._..   1111 1010 0000 0010 0111 1111 1001 1001 1110 0110 0101 1111 1011 0101 0000 0000

    00598 EA 01 FF F9 D1 85 3C D8   ......<.   1110 1010 0000 0001 1111 1111 1111 1001 1101 0001 1000 0101 0011 1100 1101 1000

    005A0 FA 02 7F 99 E6 5F B5 00   ....._..   1111 1010 0000 0010 0111 1111 1001 1001 1110 0110 0101 1111 1011 0101 0000 0000

    005A8 EA 01 FF F9 D1 85 3C D8   ......<.   1110 1010 0000 0001 1111 1111 1111 1001 1101 0001 1000 0101 0011 1100 1101 1000

    005B0 FA 05 38 20 A6 0A 21 EA   ..8 ..!.   1111 1010 0000 0101 0011 1000 0010 0000 1010 0110 0000 1010 0010 0001 1110 1010

    005B8 22 6A                   "j        0010 0010 0110 1010

    005BA 18 03                   crc
```

TRACE (32)

Length	MS	---	Entity length (not counting itself or CRC).

Type	BS	0	32 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Thickness	BD	39	
Elevation	BD	---	Z for 10 - 13.
1st corner	2RD	10	
2nd corner	2RD	11	
3rd corner	2RD	12	
4th corner	2RD	13	
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: trace (20H), len 51H (81), handle: E7

    018EF 51 00                  Q.        0101 0001 0000 0000

    018F1 48 00 79 E2 98 10 00 05   H.y.....   0100 1000 0000 0000 0111 1001 1110 0010 1001 1000 0001 0000 0000 0000 0000 0101

    018F9 5B 53 70 DA A0 AD EE C1   [Sp.....   0101 1011 0101 0011 0111 0000 1101 1010 1010 0000 1010 1101 1110 1110 1100 0001

    01901 42 05 BA E0 2A DA A9 60   B...*..`   0100 0010 0000 0101 1011 1010 1110 0000 0010 1010 1101 1010 1010 1001 0110 0000

    01909 02 05 75 29 DE 3E FF 89   ..u).>..   0000 0010 0000 0101 0111 0101 0010 1001 1101 1110 0011 1110 1111 1111 1000 1001
```

```
01911 42 03 4E 20 B3 8F 50 C0   B.N ..P.   0100 0010 0000 0011 0100 1110 0010 0000 1011 0011 1000 1111 0101 0000 1100 0000
01919 02 00 4B 2A 12 65 70 A9   ..K*.ep.   0000 0010 0000 0000 0100 1011 0010 1010 0001 0010 0110 0101 0111 0000 1010 1001
01921 52 04 9E 9B A5 92 BF 40   R......@   0101 0010 0000 0100 1001 1110 1001 1011 1010 0101 1001 0010 1011 1111 0100 0000
01929 A2 06 1D 16 C2 A5 61 81   ......a.   1010 0010 0000 0110 0001 1101 0001 0110 1100 0010 1010 0101 0110 0001 1000 0001
01931 52 02 6F 4E 85 D6 E7 88   R.oN....   0101 0010 0000 0010 0110 1111 0100 1110 1000 0101 1101 0110 1110 0111 1000 1000
01939 A2 05 26 0A 21 F8 20 6C   ..&.!. l   1010 0010 0000 0101 0010 0110 0000 1010 0010 0001 1111 1000 0010 0000 0110 1100
01941 1A                        .          0001 1010
01942 7E C2                     crc
```

SHAPE (33)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	33 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Ins pt	3BD	10	
Scale	BD	40	
Rotation	BD	50	
Width factor	BD	41	
Oblique	BD	51	
Thickness	BD	39	
Shapeno	BS	2	(string in DXF)
Extrusion	3BD	210	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			SHAPEFILE (CODE 5)
CRC	X	--	

Example:

```
OBJECT: shape (21H), len 26H (38), handle: F5

    008BC 26 00                   &.        0010 0110 0000 0000

    008BE 48 40 7D 67 48 00 00 01   H@}gH...   0100 1000 0100 0000 0111 1101 0110 0111 0100 1000 0000 0000 0000 0000 0000 0001

    008C6 5B 14 AF 3D 96 39 59 A1   [..=.9Y.   0101 1011 0001 0100 1010 1111 0011 1101 1001 0110 0011 1001 0101 1001 1010 0001

    008CE 48 04 20 D5 14 35 41 08   H. ..5A.   0100 1000 0000 0100 0010 0000 1101 0101 0001 0100 0011 0101 0100 0001 0000 1000

    008D6 8A 04 CD 32 F4 C0 18 28   ...2...(   1000 1010 0000 0100 1100 1101 0011 0010 1111 0100 1100 0000 0001 1000 0010 1000

    008DE 87 A0 30 28 F9 ED         ..0(..     1000 0111 1010 0000 0011 0000 0010 1000 1111 1001 1110 1101

    008E4 38 74                   crc
```

VIEWPORT ENTITY (34)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	34 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Center	3BD	10	
Width	BD	40	
Height	BD	41	
Handle refs	H		[Subentity ref handle (CODE 3)]

```
                                        [Reactors (CODE 4)]
                                        xdicobjhandle (CODE 3)
                                    8   LAYER (CODE 5)
                                    6   [LTYPE (CODE 5)]
                                        [PREVIOUS ENTITY (CODE 4)]
                                        [NEXT ENTITY (CODE 4)]
                                        VIEWPORT ENT HEADER (CODE 5)
```

Example:

```
OBJECT: vpent (22H), len 117H (279), handle: 01 26

    03934 17 01                    ..         0001 0111 0000 0001

    03936 48 80 80 49 9D F5 11 10  H..I....   0100 1000 1000 0000 1000 0000 0100 1001 1001 1101 1111 0101 0001 0001 0001 0000

    0393E 00 50 01 E4 D5 64 94 55  .P...d.U   0000 0000 0101 0000 0000 0001 1110 0100 1101 0101 0110 0100 1001 0100 0101 0101

    03946 70 20 04 61 00 00 A0 00  p .a....   0111 0000 0010 0000 0000 0100 0110 0001 0000 0000 0000 0000 1010 0000 0000 0000

    0394E 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03956 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0395E 00 00 00 00 00 00 00 A0  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1010 0000

    03966 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0396E 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03976 00 00 00 00 00 0F 03 F2  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1111 0000 0011 1111 0010

    0397E 80 00 00 00 00 00 00 00  ........   1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03986 02 80 00 00 00 00 00 02  ........   0000 0010 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010

    0398E 24 02 87 89 21 A6 5A CA  $...!.Z.   0010 0100 0000 0010 1000 0111 1000 1001 0010 0001 1010 0110 0101 1010 1100 1010

    03996 21 A4 02 80 00 00 00 00  !.......   0010 0001 1010 0100 0000 0010 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0399E 00 01 24 02 80 00 00 00  ..$.....   0000 0000 0000 0001 0010 0100 0000 0010 1000 0000 0000 0000 0000 0000 0000 0000

    039A6 00 00 04 94 02 80 00 00  ........   0000 0000 0000 0000 0000 0100 1001 0100 0000 0010 1000 0000 0000 0000 0000 0000

    039AE 00 00 00 00 00 02 80 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 1000 0000 0000 0000

    039B6 00 00 00 00 00 00 04 60  .......`   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0100 0110 0000

    039BE 00 04 66 40 04 60 10 04  ..f@.`..   0000 0000 0000 0100 0110 0110 0100 0000 0000 0100 0110 0000 0001 0000 0000 0100

    039C6 60 10 04 60 00 04 60 00  `..`..`.   0110 0000 0001 0000 0000 0100 0110 0000 0000 0000 0000 0100 0110 0000 0000 0000

    039CE 04 60 00 04 60 00 02 80  .`..`...   0000 0100 0110 0000 0000 0000 0000 0100 0110 0000 0000 0000 0000 0010 1000 0000

    039D6 00 00 00 00 00 00 00 02  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010

    039DE 80 00 00 00 00 00 00 00  ........   1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    039E6 02 80 00 00 00 00 00 00  ........   0000 0010 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    039EE 00 02 80 00 00 00 00 00  ........   0000 0000 0000 0010 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

```
039F6 0E 03 F2 80 00 00 00 00   ........   0000 1110 0000 0011 1111 0010 1000 0000 0000 0000 0000 0000 0000 0000 0000

039FE 00 0E 03 F2 80 00 00 00   ........   0000 0000 0000 1110 0000 0011 1111 0010 1000 0000 0000 0000 0000 0000 0000

03A06 00 00 0E 03 F2 80 00 00   ........   0000 0000 0000 0000 0000 1110 0000 0011 1111 0010 1000 0000 0000 0000 0000

03A0E 00 00 00 0E 03 F4 60 00   ......`.   0000 0000 0000 0000 0000 0000 0000 1110 0000 0011 1111 0100 0110 0000 0000 0000

03A16 00 20 00 20 10 20 18 DA   . . . ..   0000 0000 0010 0000 0000 0000 0010 0000 0001 0000 0010 0000 0001 1000 1101 1010

03A1E 10 00 00 D6 C3 C4 90 D3   ........   0001 0000 0000 0000 0000 0000 1101 0110 1100 0011 1100 0100 1001 0000 1101 0011

03A26 2D 65 10 D2 00 00 00 00   -e......   0010 1101 0110 0101 0001 0000 1101 0010 0000 0000 0000 0000 0000 0000 0000 0000

03A2E 00 00 00 24 81 0F 12 43   ...$...C   0000 0000 0000 0000 0000 0000 0010 0100 1000 0001 0000 1111 0001 0010 0100 0011

03A36 4C B5 94 45 48 00 00 00   L..EH...   0100 1100 1011 0101 1001 0100 0100 0101 0100 1000 0000 0000 0000 0000 0000 0000

03A3E 00 00 00 01 12 01 82 88   ........   0000 0000 0000 0000 0000 0000 0000 0001 0001 0010 0000 0001 1000 0010 1000 1000

03A46 7A 05 08 12 90 09 28      z.....(    0111 1010 0000 0101 0000 1000 0001 0010 1001 0000 0000 1001 0010 1000

03A4D 6C 19                     crc
```

ELLIPSE (35)

Note that the 10 pt and the 11 vector are WCS -- even though an ellipse is planar and has an extrusion vector (210-group).

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	35 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Center	3BD	10	(WCS)
SM axis vec	3BD	11	Semi-major axis vector (WCS)
Extrusion	3BD	210	
Axis ratio	BD	40	Minor/major axis ratio

Beg angle	BD	41	Starting angle (eccentric anomaly, radians)
End angle	BD	42	Ending angle (eccentric anomaly, radians)
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: ellipse (23H), len 4CH (76), handle: 01 22

    0381E 4C 00                   L.        0100 1100 0000 0000

    03820 48 C0 80 48 A1 48 10 00   H..H.H..   0100 1000 1100 0000 1000 0000 0100 1000 1010 0001 0100 1000 0001 0000 0000 0000

    03828 05 5B 0C 0A 03 29 8A E7   .[...)..   0000 0101 0101 1011 0000 1100 0000 1010 0000 0011 0010 1001 1000 1010 1110 0111

    03830 42 48 01 F0 9F BC 53 10   BH....S.   0100 0010 0100 1000 0000 0001 1111 0000 1001 1111 1011 1100 0101 0011 0001 0000

    03838 40 DA 04 51 23 D0 F1 D6   @..Q#...   0100 0000 1101 1010 0000 0100 0101 0001 0010 0011 1101 0000 1111 0001 1101 0110

    03840 AF 7B 9F 9A 89 15 EA 36   .{.....6   1010 1111 0111 1011 1001 1111 1001 1010 1000 1001 0001 0101 1110 1010 0011 0110

    03848 B2 DD 17 F5 00 20 00 00   ..... ..   1011 0010 1101 1101 0001 0111 1111 0101 0000 0000 0010 0000 0000 0000 0000 0000

    03850 00 00 1E 07 E5 D2 A4 7D   .......}   0000 0000 0000 0000 0001 1110 0000 0111 1110 0101 1101 0010 1010 0100 0111 1101

    03858 B0 4C 5E F9 FC 0C 16 A2   .L^.....   1011 0000 0100 1100 0101 1110 1111 1001 1111 1100 0000 1100 0001 0110 1010 0010

    03860 2A 7D 90 8C A0 18 28 87   *}....(.   0010 1010 0111 1101 1001 0000 1000 1100 1010 0000 0001 1000 0010 1000 1000 0111

    03868 E0 83 A0 69             ...i      1110 0000 1000 0011 1010 0000 0110 1001

    0386C ED 08                   crc
```

SPLINE (36)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	36 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode

Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Scenario	BS		a flag which is 2 for fitpts only, 1 for ctrlpts/knots
Degree	BS		degree of this spline
If (scenario==2) {			
Fit Tol	BD	44	
Beg tan vec (normalized).	3BD	12	Beginning tangent direction vector
End tan vec (normalized).	3BD	13	Ending tangent direction vector
num fit pts	BS	74	Stored as a LONG, defined as a short. See # of knots below.
Fit points	3BD	11	As many as specified by the 74.
}			
if (scenario==1) {			
Rational	B		flag bit 2
Closed	B		flag bit 0
Periodic	B		flag bit 1
Knot tol	BD	42	
Ctrl tol	BD	43	
Numknots	BL	72	This is stored as a LONG, although it is defined in DXF as a short. You can see this if you create a spline with >=256 knots, fitpts, etc.
Numctrlpts	BL	73	Number of 10's (and 41's, if weighted) that follow. Same, stored as LONG, defined as short.
Weight	B		Seems to be an echo of the 4 bit on the flag for "weights present".
}			
Repeat numknots times {			
Knot	BD		knot value
}			
Repeat numctrlpts times {			
Control pt	3BD	10	
Weight	D	41	if present as indicated by 4 bit on flag
}			
Repeat numfitpts times {			
Fit pt	3BD		
}			

Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: spline (24H), len 61H (97), handle: 01 01

    01AC5 61 00                    a.         0110 0001 0000 0000

    01AC7 49 00 80 40 66 A8 10 00  I..@f...   0100 1001 0000 0000 1000 0000 0100 0000 0110 0110 1010 1000 0001 0000 0000 0000

    01ACF 05 5B 20 48 19 77 7B AF  .[ H.w{.   0000 0101 0101 1011 0010 0000 0100 1000 0001 1001 0111 0111 0111 1011 1010 1111

    01AD7 B3 BE F9 B6 7B 55 48 21  ....{UH!   1011 0011 1011 1110 1111 1001 1011 0110 0111 1011 0101 0101 0100 1000 0010 0001

    01ADF D1 F6 EC 49 3D 16 1C 80  ...I=...   1101 0001 1111 0110 1110 1100 0100 1001 0011 1101 0001 0110 0001 1100 1000 0000

    01AE7 60 3C 07 63 43 16 F8 9F  `<.cC...   0110 0000 0011 1100 0000 0111 0110 0011 0100 0011 0001 0110 1111 1000 1001 1111

    01AEF C0 E4 4E 53 64 CA 30 B2  ..NSd.0.   1100 0000 1110 0100 0100 1110 0101 0011 0110 0100 1100 1010 0011 0000 1011 0010

    01AF7 01 F0 33 3C 1C A7 C2 0E  ..3<....   0000 0001 1111 0000 0011 0011 0011 1100 0001 1100 1010 0111 1100 0010 0000 1110

    01AFF 81 01 85 80 9A FE 6F 63  ......oc   1000 0001 0000 0001 1000 0101 1000 0000 1001 1010 1111 1110 0110 1111 0110 0011

    01B07 88 02 07 89 BE 3C 1B 4F  .....<.O   1000 1000 0000 0010 0000 0111 1000 1001 1011 1110 0011 1100 0001 1011 0100 1111

    01B0F 51 FC 5F 51 14 FA 2F CF  Q._Q../.   0101 0001 1111 1100 0101 1111 0101 0001 0001 0100 1111 1010 0010 1111 1100 1111

    01B17 94 20 04 18 CB 8B BB C6  . ......   1001 0100 0010 0000 0000 0100 0001 1000 1100 1011 1000 1011 1011 1011 1100 0110

    01B1F 9D 67 F1 82 88 7E 08 13  .g...~..   1001 1101 0110 0111 1111 0001 1000 0010 1000 1000 0111 1110 0000 1000 0001 0011

    01B27 05                       .          0000 0101

    01B28 99 F5                    crc

OBJECT: spline (24H), len BBH (187), handle: 01 02

    01B2A BB 00                    ..         1011 1011 0000 0000

    01B2C 49 00 80 40 A5 C8 28 00  I..@..(.   0100 1001 0000 0000 1000 0000 0100 0000 1010 0101 1100 1000 0010 1000 0000 0000

    01B34 05 7B 20 28 18 12 2B EF  .{ (..+.   0000 0101 0111 1011 0010 0000 0010 1000 0001 1000 0001 0010 0010 1011 1110 1111

    01B3C 26 BC B5 DE 8F 84 8A FB  &.......   0010 0110 1011 1100 1011 0101 1101 1110 1000 1111 1000 0100 1000 1010 1111 1011

    01B44 C9 AF 2D 77 A3 E4 29 06  ..-w..).   1100 1001 1010 1111 0010 1101 0111 0111 1010 0011 1110 0100 0010 1001 0000 0110

    01B4C 55 01 E2 91 A5 D0 17 80  U.......   0101 0101 0000 0001 1110 0010 1001 0001 1010 0101 1101 0000 0001 0111 1000 0000

    01B54 88 04 31 35 FD 44 D0 08  ..15.D..   1000 1000 0000 0100 0011 0001 0011 0101 1111 1101 0100 0100 1101 0000 0000 1000

    01B5C AA 01 79 09 BE 48 77 C4  ..y..Hw.   1010 1010 0000 0001 0111 1001 0000 1001 1011 1110 0100 1000 0111 0111 1100 0100
```

```
01B64 48 80 5E 42 6F 92 1D F1   H.^Bo...   0100 1000 1000 0000 0101 1110 0100 0010 0110 1111 1001 0010 0001 1101 1111 0001

01B6C 12 20 17 90 9B E4 87 7C   . .....|   0001 0010 0010 0000 0001 0111 1001 0000 1001 1011 1110 0100 1000 0111 0111 1100

01B74 44 88 05 E4 26 F9 21 DF   D...&.!.   0100 0100 1000 1000 0000 0101 1110 0100 0010 0110 1111 1001 0010 0001 1101 1111

01B7C 11 22 00 51 81 5C A9 30   .".Q.\.0   0001 0001 0010 0010 0000 0000 0101 0001 1000 0001 0101 1100 1010 1001 0011 0000

01B84 EA 18 80 40 1B 4B CF 66   ...@.K.f   1110 1010 0001 1000 1000 0000 0100 0000 0001 1011 0100 1011 1100 1111 0110 0110

01B8C F3 7D 9F C4 63 6D AF 9B   .}..cm..   1111 0011 0111 1101 1001 1111 1100 0100 0110 0011 0110 1101 1010 1111 1001 1011

01B94 7D A8 82 00 51 75 80 5C   }...Qu.\   0111 1101 1010 1000 1000 0010 0000 0000 0101 0001 0111 0101 1000 0000 0101 1100

01B9C B0 1C 0C 81 09 D0 81 4C   .......L   1011 0000 0001 1100 0000 1100 1000 0001 0000 1001 1101 0000 1000 0001 0100 1100

01BA4 07 B7 62 A8 05 58 F7 A1   ..b..X..   0000 0111 1011 0111 0110 0010 1010 1000 0000 0101 0101 1000 1111 0111 1010 0001

01BAC 59 01 E8 9A 04 5B 36 58   Y....[6X   0101 1001 0000 0001 1110 1000 1001 1010 0000 0100 0101 1011 0011 0110 0101 1000

01BB4 8C 6B 16 0E 20 1F C2 20   .k.. ..    1000 1100 0110 1011 0001 0110 0000 1110 0010 0000 0001 1111 1100 0010 0010 0000

01BBC 5C 89 E6 DA 97 F1 0C 22   \......"   0101 1100 1000 1001 1110 0110 1101 1010 1001 0111 1111 0001 0000 1100 0010 0010

01BC4 B6 2B 1A 3A 48 80 23 05   .+.:H.#.   1011 0110 0010 1011 0001 1010 0011 1010 0100 1000 1000 0000 0010 0011 0000 0101

01BCC 1E F2 8C 22 74 9F C6 74   ..."t..t   0001 1110 1111 0010 1000 1100 0010 0010 0111 0100 1001 1111 1100 0110 0111 0100

01BD4 99 BC 06 F0 C9 42 01 A0   .....B..   1001 1001 1011 1100 0000 0110 1111 0000 1100 1001 0100 0010 0000 0001 1010 0000

01BDC 40 6E 0F 6C A7 F0 7F 18   @n.l....   0100 0000 0110 1110 0000 1111 0110 1100 1010 0111 1111 0000 0111 1111 0001 1000

01BE4 28 87 D7                  (..        0010 1000 1000 0111 1101 0111

01BE7 E3 F3                     crc
```

REGION (37) 3DSOLID (38) BODY (39)

These are all ACIS entities. We do not have a complete decryption of these, although we can step them, and write them, properly.

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	37/38/39 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object

```
        Isbylayerlt            B             1 if bylayer linetype, else 0
        Nolinks                B             1 if major links are assumed +1, -1, else 0
        Color                  BS      62
        Ltype scale            BD      48
        Invisibility           BS      60
```

After this, data are read as groups starting with a short which seems to indicate the type of data. This is not completely understood. The current algorithm is:

```
itemtype  BS
        if (itemtype==64) {
          Unknown    BD      unknown double, seems to always be 1.0.
          do {
            characters in block   BL
            repeat characters in block times {
              satdata   RC   ACIS SAT data character. if value is between 0x20
                             and 0x7E, calculate 0x9F-the value to get the real
                             character.  If it's a tab, we convert to a space.
            }
          } while (characters in block !=0L)
        }
```

At this point we compute the number of bits of the object that we have read so far so that we can determine how many are left to read. This is internal data which we have not been able to break. If this data is not present, however, generally AutoCAD will refuse to load the entity. This is why we have not been able to originate ACIS in DWG. There are some entities which ARE missing this data, however, so we have to handle that case.

```
        Handle refs            H             [Subentity ref handle (CODE 3)]
                                             [Reactors (CODE 4)]
                                             xdicobjhandle (CODE 3)
                                       8     LAYER (CODE 5)
                                       6     [LTYPE (CODE 5)]
                                             [PREVIOUS ENTITY (CODE 4)]
                                             [NEXT ENTITY (CODE 4)]
        CRC                    X     ---
```

Example:

```
OBJECT: region (25H), len 22DH (557), handle: 01 03

   01BE9 2D 02                  -.        0010 1101 0000 0010

   01BEB 49 40 80 40 E2 48 88 00   I@.@.H..   0100 1001 0100 0000 1000 0000 0100 0000 1110 0010 0100 1000 1000 1000 0000 0000

   01BF3 05 7B 28 08 0C 04 00 00   .{(.....   0000 0101 0111 1011 0010 1000 0000 1000 0000 1100 0000 0100 0000 0000 0000 0000

   01BFB DC DE D2 40 DC DC 40 DC   ...@..@.   1101 1100 1101 1110 1101 0010 0100 0000 1101 1100 1101 1100 0100 0000 1101 1100
```

```
01C03 40 DE 40 40 40 40 40 40   @.@@@@@@   0100 0000 1101 1110 0100 0000 0100 0000 0100 0000 0100 0000 0100 0000 0100 0000

01C0B 40 40 40 40 1A 14 7A 60   @@@@..z`   0100 0000 0100 0000 0100 0000 0100 0000 0001 1010 0001 0100 0111 1010 0110 0000

01C13 76 4C 40 F6 E4 DC 40 F6   vL@...@.   0111 0110 0100 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110

01C1B DC 40 F6 E4 DC 40 F6 E4   .@...@..   1101 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1110 0100

01C23 DC 40 F8 1A 14 66 54 64   .@...fTd   1101 1100 0100 0000 1111 1000 0001 1010 0001 0100 0110 0110 0101 0100 0110 0100

01C2B 5E 40 F6 E4 DC 40 F6 E4   ^@...@..   0101 1110 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1110 0100

01C33 DC 40 F6 DA 40 F6 DE 40   .@..@..@   1101 1100 0100 0000 1111 0110 1101 1010 0100 0000 1111 0110 1101 1110 0100 0000

01C3B F8 1A 14 58 6E 74 66 66   ...Xntff   1111 1000 0001 1010 0001 0100 0101 1000 0110 1110 0111 0100 0110 0110 0110 0110

01C43 40 F6 E4 DC 40 F6 E4 DC   @...@...   0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1110 0100 1101 1100

01C4B 40 F6 E4 DC 40 F6 D8 40   @...@..@   0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1101 1000 0100 0000

01C53 F6 DC 40 F8 1A 14 72 7C   ..@...r|   1111 0110 1101 1100 0100 0000 1111 1000 0001 1010 0001 0100 0111 0010 0111 1100

01C5B 78 74 40 F6 E4 DC 40 F6   xt@...@.   0111 1000 0111 0100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110

01C63 E4 DC 40 F6 D6 40 F6 DA   ..@..@..   1110 0100 1101 1100 0100 0000 1111 0110 1101 0110 0100 0000 1111 0110 1101 1010

01C6B 40 F6 E4 DC 40 F6 D4 40   @...@..@   0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1101 0100 0100 0000

01C73 72 60 5A 50 7C 5A 76 40   r`ZP|Zv@   0111 0010 0110 0000 0101 1010 0101 0000 0111 1100 0101 1010 0111 0110 0100 0000

01C7B 76 60 54 7A 66 74 40 60   v`Tzft@`   0111 0110 0110 0000 0101 0100 0111 1010 0110 0110 0111 0100 0100 0000 0110 0000

01C83 54 56 40 F8 1A 14 66 60   TV@...f`   0101 0100 0101 0110 0100 0000 1111 1000 0001 1010 0001 0100 0110 0110 0110 0000

01C8B 60 5E 40 F6 E4 DC 40 F6   `^@...@.   0110 0000 0101 1110 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110

01C93 E4 DC 40 F6 D2 40 F6 D8   ..@..@..   1110 0100 1101 1100 0100 0000 1111 0110 1101 0010 0100 0000 1111 0110 1101 1000

01C9B 40 F8 1A 14 5E 66 7C 62   @...^f|b   0100 0000 1111 1000 0001 1010 0001 0100 0101 1110 0110 0110 0111 1100 0110 0010

01CA3 74 E4 58 54 5A 72 7C 78   t.XTZr|x   0111 0100 1110 0100 0101 1000 0101 0100 0101 1010 0111 0010 0111 1100 0111 1000

01CAB 74 40 F6 E4 DC 40 CE E2   t@...@..   0111 0100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1100 1110 1110 0010

01CB3 DC DE DC CC D0 D2 D8 DC   ........   1101 1100 1101 1110 1101 1100 1100 1100 1101 0000 1101 0010 1101 1000 1101 1100

01CBB DA D6 D6 D0 D6 CC CC D4   ........   1101 1010 1101 0110 1101 0110 1101 0000 1101 0110 1100 1100 1100 1100 1101 0100

01CC3 40 DC E2 CE D0 D6 DC D0   @.......   0100 0000 1101 1100 1110 0010 1100 1110 1101 0000 1101 0110 1101 1100 1101 0000

01CCB DC D2 DC CE D4 D4 DA DE   ........   1101 1100 1101 0010 1101 1100 1100 1110 1101 0100 1101 0100 1101 1010 1101 1110

01CD3 D2 DC D2 40 DE 40 DE 40   ...@.@.@   1101 0010 1101 1100 1101 0010 0100 0000 1101 1110 0100 0000 1101 1110 0100 0000

01CDB DE 40 DC 40 DC 40 DE 40   .@.@.@.@   1101 1110 0100 0000 1101 1100 0100 0000 1101 1100 0100 0000 1101 1110 0100 0000

01CE3 DE 40 DE 40 AC 40 AC 40   .@.@.@.@   1101 1110 0100 0000 1101 1110 0100 0000 1010 1100 0100 0000 1010 1100 0100 0000

01CEB AC 40 AC 40 F8 1A 14 78   .@.@...x   1010 1100 0100 0000 1010 1100 0100 0000 1111 1000 0001 1010 0001 0100 0111 1000

01CF3 60 74 76 70 74 40 F6 E4   `tvpt@..   0110 0000 0111 0100 0111 0110 0111 0000 0111 0100 0100 0000 1111 0110 1110 0100

01CFB DC 40 F6 D2 40 F6 D2 40   .@..@..@   1101 1100 0100 0000 1111 0110 1101 0010 0100 0000 1111 0110 1101 0010 0100 0000

01D03 F6 E4 DC 40 F6 D0 40 DE   ...@..@.   1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1101 0000 0100 0000 1101 1110

01D0B 40 F6 D6 40 F6 E4 DC 40   @..@...@   0100 0000 1111 0110 1101 0110 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000
```

```
01D13 F8 1A 14 74 76 70 74 40   ...tvpt@   1111 1000 0001 1010 0001 0100 0111 0100 0111 0110 0111 0000 0111 0100 0100 0000
01D1B F6 E4 DC 40 F6 CE 40 F6   ...@..@.   1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1100 1110 0100 0000 1111 0110
01D23 CE 40 F6 D2 40 F6 CC 40   .@..@..@   1100 1110 0100 0000 1111 0110 1101 0010 0100 0000 1111 0110 1100 1100 0100 0000
01D2B DE 40 F8 1A 14 52 74 5A   .@...RtZ   1101 1110 0100 0000 1111 1000 0001 1010 0001 0100 0101 0010 0111 0100 0101 1010
01D33 56 74 4E 40 F6 E4 DC 40   VtN@...@   0101 0110 0111 0100 0100 1110 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000
01D3B F6 D0 40 F6 DC DE 40 F8   ..@...@.   1111 0110 1101 0000 0100 0000 1111 0110 1101 1100 1101 1110 0100 0000 1111 1000
01D43 1A 14 74 66 66 6C 5E 58   ..tffl^X   0001 1010 0001 0100 0111 0100 0110 0110 0110 0110 0110 1100 0101 1110 0101 1000
01D4B 74 E4 78 54 5A 52 74 40   t.xTZRt@   0111 0100 1110 0100 0111 1000 0101 0100 0101 1010 0101 0010 0111 0100 0100 0000
01D53 F6 E4 DC 40 CE E2 DC DE   ...@....   1111 0110 1110 0100 1101 1100 0100 0000 1100 1110 1110 0010 1101 1100 1101 1110
01D5B DC CC D0 D2 D8 DC DA D6   ........   1101 1100 1100 1100 1101 0000 1101 0010 1101 1000 1101 1100 1101 1010 1101 0110
01D63 D6 D0 D4 DE DC D8 40 DC   ......@.   1101 0110 1101 0000 1101 0100 1101 1110 1101 1100 1101 1000 0100 0000 1101 1100
01D6B E2 CE D0 D6 DC D0 DC D2   ........   1110 0010 1100 1110 1101 0000 1101 0110 1101 1100 1101 0000 1101 1100 1101 0010
01D73 DC CE D4 D4 DA DE D2 D8   ........   1101 1100 1100 1110 1101 0100 1101 0100 1101 1010 1101 1110 1101 0010 1101 1000
01D7B D6 40 DE 40 DE 40 DE 40   .@.@.@.@   1101 0110 0100 0000 1101 1110 0100 0000 1101 1110 0100 0000 1101 1110 0100 0000
01D83 DC 40 DE E2 D2 D8 D0 D4   .@......   1101 1100 0100 0000 1101 1110 1110 0010 1101 0010 1101 1000 1101 0000 1101 0100
01D8B DE D2 D8 CE DA D2 D0 D4   ........   1101 1110 1101 0010 1101 1000 1100 1110 1101 1010 1101 0010 1101 0000 1101 0100
01D93 D6 DA CE DC D6 40 E4 DE   .....@..   1101 0110 1101 1010 1100 1110 1101 1100 1101 0110 0100 0000 1110 0100 1101 1110
01D9B E2 CC DA DA D0 DA D0 CC   ........   1110 0010 1100 1100 1101 1010 1101 1010 1101 0000 1101 1010 1101 0000 1100 1100
01DA3 DE DA D2 D6 D8 D6 D8 D0   ........   1101 1110 1101 1010 1101 0010 1101 0110 1101 1000 1101 0110 1101 1000 1101 0000
01DAB DA CC 40 DE 40 DE E2 D6   ..@.@...   1101 1010 1100 1100 0100 0000 1101 1110 0100 0000 1101 1110 1110 0010 1101 0110
01DB3 D4 D0 D4 DA D4 CC D4 DC   ........   1101 0100 1101 0000 1101 0100 1101 1010 1101 0100 1100 1100 1101 0100 1101 1100
01DBB D8 D0 CC DC DA D8 D4 D4   ........   1101 1000 1101 0000 1100 1100 1101 1100 1101 1010 1101 1000 1101 0100 1101 0100
01DC3 40 AC 40 AC 40 F8 1A 14   @.@.@...   0100 0000 1010 1100 0100 0000 1010 1100 0100 0000 1111 1000 0001 1010 0001 0100
01DCB 5E 60 6C 62 56 40 F6 E4   ^`lbV@..   0101 1110 0110 0000 0110 1100 0110 0010 0101 0110 0100 0000 1111 0110 1110 0100
01DD3 DC 40 CE E2 D0 D8 CC D6   .@......   1101 1100 0100 0000 1100 1110 1110 0010 1101 0000 1101 1000 1100 1100 1101 0110
01DDB CE DA D2 CC D4 DC DA DA   ........   1100 1110 1101 1010 1101 0010 1100 1100 1101 0100 1101 1100 1101 1010 1101 1010
01DE3 CC DA CE D0 40 DE E2 CC   ....@...   1100 1100 1101 1010 1100 1110 1101 0000 0100 0000 1101 1110 1110 0010 1100 1100
01DEB D4 DC D6 D6 D8 D0 DC D4   ........   1101 0100 1101 1100 1101 0110 1101 0110 1101 1000 1101 0000 1101 1100 1101 0100
01DF3 CC DE CE D2 DA D2 DE CC   ........   1100 1100 1101 1110 1100 1110 1101 0010 1101 1010 1101 0010 1101 1110 1100 1100
01DFB 40 DE 40 F8 1A 15 63 F6   @.@...c.   0100 0000 1101 1110 0100 0000 1111 1000 0001 1010 0001 0101 0110 0011 1111 0110
01E03 D9 E9 E9 B1 A1 02 00 50   .......P   1101 1001 1110 1001 1110 1001 1011 0001 1010 0001 0000 0010 0000 0000 0101 0000
01E0B B8 18 C3 37 F9 FA 7F 20   ...7...    1011 1000 0001 1000 1100 0011 0011 0111 1111 1001 1111 1010 0111 1111 0010 0000
01E13 9A 98 28 87 80            ..(..      1001 1010 1001 1000 0010 1000 1000 0111 1000 0000
```

```
    01E18 07 33                     crc

OBJECT: 3d solid (26H), len 334H (820), handle: 01 04

    01E1A 34 03                     4.          0011 0100 0000 0011

    01E1C 49 80 80 41 24 30 C8 00   I..A$0..   0100 1001 1000 0000 1000 0000 0100 0001 0010 0100 0011 0000 1100 1000 0000 0000

    01E24 05 7B 28 0B E4 DC DE D2   .{(.....   0000 0101 0111 1011 0010 1000 0000 1011 1110 0100 1101 1100 1101 1110 1101 0010

    01E2C 40 D4 40 DC 40 DE 40 40   @.@.@.@@   0100 0000 1101 0100 0100 0000 1101 1100 0100 0000 1101 1110 0100 0000 0100 0000

    01E34 40 40 40 40 40 40 40 40   @@@@@@@@   0100 0000 0100 0000 0100 0000 0100 0000 0100 0000 0100 0000 0100 0000 0100 0000

    01E3C 40 1A 14 7A 60 76 4C 40   @..z`vL@   0100 0000 0001 1010 0001 0100 0111 1010 0110 0000 0111 0110 0100 1100 0100 0000

    01E44 F6 E4 DC 40 F6 DC 40 F6   ...@..@.   1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1101 1100 0100 0000 1111 0110

    01E4C E4 DC 40 F6 E4 DC 40 F8   ..@...@.   1110 0100 1101 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 1000

    01E54 1A 14 66 54 64 5E 40 F6   ..fTd^@.   0001 1010 0001 0100 0110 0110 0101 0100 0110 0100 0101 1110 0100 0000 1111 0110

    01E5C E4 DC 40 F6 E4 DC 40 F6   ..@...@.   1110 0100 1101 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110

    01E64 DA 40 F6 DE 40 F8 1A 14   .@..@...   1101 1010 0100 0000 1111 0110 1101 1110 0100 0000 1111 1000 0001 1010 0001 0100

    01E6C 58 6E 74 66 66 40 F6 E4   Xntff@..   0101 1000 0110 1110 0111 0100 0110 0110 0110 0110 0100 0000 1111 0110 1110 0100

    01E74 DC 40 F6 E4 DC 40 F6 E4   .@...@..   1101 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1110 0100

    01E7C DC 40 F6 D8 40 F6 DC 40   .@..@..@   1101 1100 0100 0000 1111 0110 1101 1000 0100 0000 1111 0110 1101 1100 0100 0000

    01E84 F8 1A 14 72 7C 78 74 40   ...r|xt@   1111 1000 0001 1010 0001 0100 0111 0010 0111 1100 0111 1000 0111 0100 0100 0000

    01E8C F6 E4 DC 40 F6 E4 DC 40   ...@...@   1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1110 0100 1101 1100 0100 0000

    01E94 F6 E4 DC 40 F6 DA 40 F6   ...@..@.   1111 0110 1110 0100 1101 1100 0100 0000 1111 0110 1101 1010 0100 0000 1111 0110

    01E9C E4 DC 40 F6 D6 40 72 60   ..@..@r`   1110 0100 1101 1100 0100 0000 1111 0110 1101 0110 0100 0000 0111 0010 0110 0000

    01EA4 5A 50 7C 5A 76 40 58 6C   ZP|Zv@Xl   0101 1010 0101 0000 0111 1100 0101 1010 0111 0110 0100 0000 0101 1000 0110 1100

    01EAC 62 70 66 74 40 F8 1A 14   bpft@...   0110 0010 0111 0000 0110 0110 0111 0100 0100 0000 1111 1000 0001 1010 0001 0100

    01EB4 58 5E 6E 74 5A 74 E4 58   X^ntZt.X   0101 1000 0101 1110 0110 1110 0111 0100 0101 1010 0111 0100 1110 0100 0101 1000

    01EBC 54 5A 72 7C 78 74 40 F6   TZr|xt@.   0101 0100 0101 1010 0111 0010 0111 1100 0111 1000 0111 0100 0100 0000 1111 0110

    01EC4 E4 DC 40 DC DE E2 DA D2   ..@.....   1110 0100 1101 1100 0100 0000 1101 1100 1101 1110 1110 0010 1101 1010 1101 0010

    01ECC DA D4 DE D8 D8 D6 D8 CC   ........   1101 1010 1101 0100 1101 1110 1101 1000 1101 1000 1101 0110 1101 1000 1100 1100

    01ED4 CE D8 DC DA D8 40 CE E2   .....@..   1100 1110 1101 1000 1101 1100 1101 1010 1101 1000 0100 0000 1100 1110 1110 0010

    01EDC D6 D6 D2 DC CE D6 DE D6   ........   1101 0110 1101 0110 1101 0010 1101 1100 1100 1110 1101 0110 1101 1110 1101 0110

    01EE4 CC D0 DE CC D4 CC D0 40   .......@   1100 1100 1101 0000 1101 1110 1100 1100 1101 0100 1100 1100 1101 0000 0100 0000

    01EEC DE 40 DE E2 CE D6 D8 DE   .@......   1101 1110 0100 0000 1101 1110 1110 0010 1100 1110 1101 0110 1101 1000 1101 1110

    01EF4 D4 D4 D2 D4 CE D4 DC DE   ........   1101 0100 1101 0100 1101 0010 1101 0100 1100 1110 1101 0100 1101 1100 1101 1110

    01EFC DC CC CC CC DA 40 DC 40   .....@.@   1101 1100 1100 1100 1100 1100 1100 1100 1101 1010 0100 0000 1101 1100 0100 0000

    01F04 DE 40 DE 40 DE 40 DE 40   .@.@.@.@   1101 1110 0100 0000 1101 1110 0100 0000 1101 1110 0100 0000 1101 1110 0100 0000

    01F0C DC 40 DE 40 AC 40 AC 40   .@.@.@.@   1101 1100 0100 0000 1101 1110 0100 0000 1010 1100 0100 0000 1010 1100 0100 0000
```

```
01F14 AC 40 AC 40 F8 1A 15 60   .@.@...`   1010 1100 0100 0000 1010 1100 0100 0000 1111 1000 0001 1010 0001 0101 0110 0000

01F1C 77 FC D6 B3 34 31 22 01   w...41".   0111 0111 1111 1100 1101 0110 1011 0011 0011 0100 0011 0001 0010 0010 0000 0001

01F24 8D FE B4 78 E5 C8 40 81   ...x..@.   1000 1101 1111 1110 1011 0100 0111 1000 1110 0101 1100 1000 0100 0000 1000 0001

01F2C 20 94 1C 0C FF FF FF FF    .......   0010 0000 1001 0100 0001 1100 0000 1100 1111 1111 1111 1111 1111 1111 1111 1111

01F34 CF FF FF FF F4 0C 0E FF   ........   1100 1111 1111 1111 1111 1111 1111 1111 1111 0100 0000 1100 0000 1110 1111 1111

01F3C 9A D6 66 86 24 40 32 3F   ..f.$@2?   1001 1010 1101 0110 0110 0110 1000 0110 0010 0100 0100 0000 0011 0010 0011 1111

01F44 D6 8F 1C B9 08 10 02 84   ........   1101 0110 1000 1111 0001 1100 1011 1001 0000 1000 0001 0000 0000 0010 1000 0100

01F4C A4 0D C4 FF AE AB F0 33   .......3   1010 0100 0000 1101 1100 0100 1111 1111 1010 1110 1010 1011 1111 0000 0011 0011

01F54 FE 6B 59 9A 18 91 00 47   .kY....G   1111 1110 0110 1011 0101 1001 1001 1010 0001 1000 1001 0001 0000 0000 0100 0111

01F5C F6 2D 7D 9A 69 1E 40 80   .-}.i.@.   1111 0110 0010 1101 0111 1101 1001 1010 0110 1001 0001 1110 0100 0000 1000 0000

01F64 EF F9 AD 66 68 62 44 03   ...fhbD.   1110 1111 1111 1001 1010 1101 0110 0110 0110 1000 0110 0010 0100 0100 0000 0011

01F6C 23 FD 68 F1 CB 90 81 00   #.h.....   0010 0011 1111 1101 0110 1000 1111 0001 1100 1011 1001 0000 1000 0001 0000 0000

01F74 28 4A 40 DC 4F FA EA 3F   (J@.O..?   0010 1000 0100 1010 0100 0000 1101 1100 0100 1111 1111 1010 1110 1010 0011 1111

01F7C 01 9F FF FF FF F9 FF FF   ........   0000 0001 1001 1111 1111 1111 1111 1111 1111 1111 1111 1001 1111 1111 1111 1111

01F84 FF FE 81 81 9F F3 5A CC   ......Z.   1111 1111 1111 1110 1000 0001 1000 0001 1001 1111 1111 0011 0101 1010 1100 1100

01F8C D0 C4 88 06 37 FA D1 E3   ....7...   1101 0000 1100 0100 1000 1000 0000 0110 0011 0111 1111 1010 1101 0001 1110 0011

01F94 97 21 02 00 60 94 81 B8   .!..`...   1001 0111 0010 0001 0000 0010 0000 0000 0110 0000 1001 0100 1000 0001 1011 1000

01F9C 9F F5 D5 7E 58 81 AF EA   ...~X...   1001 1111 1111 0101 1101 0101 0111 1110 0101 1000 1000 0001 1010 1111 1110 1010

01FA4 05 9B 13 20 18 DF EB 47   ... ...G   0000 0101 1001 1011 0001 0011 0010 0000 0001 1000 1101 1111 1110 1011 0100 0111

01FAC 8E 5C 84 08 10 19 FF 35   .\.....5   1000 1110 0101 1100 1000 0100 0000 1000 0001 0000 0001 1001 1111 1111 0011 0101

01FB4 AC CD 0C 48 80 63 7F AD   ...H.c..   1010 1100 1100 1101 0000 1100 0100 1000 1000 0000 0110 0011 0111 1111 1010 1101

01FBC 1E 39 72 10 20 06 09 48   .9r. ..H   0001 1110 0011 1001 0111 0010 0001 0000 0010 0000 0000 0110 0000 1001 0100 1000

01FC4 1B 89 FF 5D 47 E0 33 FF   ...]G.3.   0001 1011 1000 1001 1111 1111 0101 1101 0100 0111 1110 0000 0011 0011 1111 1111

01FCC FF FF FF 3F FF FF FF D0   ...?....   1111 1111 1111 1111 1111 1111 0011 1111 1111 1111 1111 1111 1111 1111 1101 0000

01FD4 30 3B FE 6B 59 9A 18 91   0;.kY...   0011 0000 0011 1011 1111 1110 0110 1011 0101 1001 1001 1010 0001 1000 1001 0001

01FDC 00 C4 FF 5A 3C 72 E4 20   ...Z<r.    0000 0000 1100 0100 1111 1111 0101 1010 0011 1100 0111 0010 1110 0100 0010 0000

01FE4 40 0C 12 90 37 13 FE BA   @...7...   0100 0000 0000 1100 0001 0010 1001 0000 0011 0111 0001 0011 1111 1110 1011 1010

01FEC AF C0 CF F9 AD 66 68 62   .....fhb   1010 1111 1100 0000 1100 1111 1111 1001 1010 1101 0110 0110 0110 1000 0110 0010

01FF4 44 01 A4 10 7C E8 5E 50   D...|.^P   0100 0100 0000 0001 1010 0100 0001 0000 0111 1100 1110 1000 0101 1110 0101 0000

01FFC 89 02 03 BF E6 B5 99 A1   ........   1000 1001 0000 0010 0000 0011 1011 1111 1110 0110 1011 0101 1001 1001 1010 0001

02004 89 10 0C 4F F5 A3 C7 2E   ...O....   1000 1001 0001 0000 0000 1100 0100 1111 1111 0101 1010 0011 1100 0111 0010 1110

0200C 42 04 00 C1 29 03 71 3F   B...).q?   0100 0010 0000 0100 0000 0000 1100 0001 0010 1001 0000 0011 0111 0001 0011 1111

02014 EB A8 FC 06 7F FF FF FF   ........   1110 1011 1010 1000 1111 1100 0000 0110 0111 1111 1111 1111 1111 1111 1111 1111
```

```
0201C E7 FF FF FF FA 06 08 7F   ........   1110 0111 1111 1111 1111 1111 1111 1111 1010 0000 0110 0000 1000 0111 1111

02024 CD 6B 33 43 12 20 18 DF   .k3C. ..   1100 1101 0110 1011 0011 0011 0100 0011 0001 0010 0010 0000 0001 1000 1101 1111

0202C EB 47 8E 5C 84 08 01 82   .G.\....   1110 1011 0100 0111 1000 1110 0101 1100 1000 0100 0000 1000 0000 0001 1000 0010

02034 52 06 E2 7F D7 55 F8 D7   R....U..   0101 0010 0000 0110 1110 0010 0111 1111 1101 0111 0101 0101 1111 1000 1101 0111

0203C F5 AD B1 83 AC 44 80 61   .....D.a   1111 0101 1010 1101 1011 0001 1000 0011 1010 1100 0100 0100 1000 0000 0110 0001

02044 FF AD 1E 39 72 10 20 40   ...9r. @   1111 1111 1010 1101 0001 1110 0011 1001 0111 0010 0001 0000 0010 0000 0100 0000

0204C 87 FC D6 B3 34 31 22 01   ....41".   1000 0111 1111 1100 1101 0110 1011 0011 0011 0100 0011 0001 0010 0010 0000 0001

02054 8D FE B4 78 E5 C8 40 80   ...x..@.   1000 1101 1111 1110 1011 0100 0111 1000 1110 0101 1100 1000 0100 0000 1000 0000

0205C 18 25 20 6E 27 FD 75 1F   .% n'.u.   0001 1000 0010 0101 0010 0000 0110 1110 0010 0111 1111 1101 0111 0101 0001 1111

02064 80 8F FF FF FF FC FF FF   ........   1000 0000 1000 1111 1111 1111 1111 1111 1111 1111 1111 1100 1111 1111 1111 1111

0206C FF FF 40 CA A3 08 AD 62   ..@....b   1111 1111 1111 1111 0100 0000 1100 1010 1010 0011 0000 1000 1010 1101 0110 0010

02074 E5 52 34 03 23 FD 68 F1   .R4.#.h.   1110 0101 0101 0010 0011 0100 0000 0011 0010 0011 1111 1101 0110 1000 1111 0001

0207C CB 90 81 00 5B E6 0C 01   ....[...   1100 1011 1001 0000 1000 0001 0000 0000 0101 1011 1110 0110 0000 1100 0000 0001

02084 80 13 E3 BF 37 25 E4 B5   ....7%..   1000 0000 0001 0011 1110 0011 1011 1111 0011 0111 0010 0101 1110 0100 1011 0101

0208C B2 BB 48 D0 0F 62 D3 7F   ..H..b..   1011 0010 1011 1011 0100 1000 1101 0000 0000 1111 0110 0010 1101 0011 0111 1111

02094 FC 5E C2 14 01 6F 98 30   .^...o.0   1111 1100 0101 1110 1100 0010 0001 0100 0000 0001 0110 1111 1001 1000 0011 0000

0209C 06 00 4F 8E FC DC 97 92   ..O.....   0000 0110 0000 0000 0100 1111 1000 1110 1111 1100 1101 1100 1001 0111 1001 0010

020A4 D6 CA ED 23 40 0B 28 FF   ...#@.(.   1101 0110 1100 1010 1110 1101 0010 0011 0100 0000 0000 1011 0010 1000 1111 1111

020AC 7C 8F 2E 07 D0 05 BE 60   |......`   0111 1100 1000 1111 0010 1110 0000 0111 1101 0000 0000 0101 1011 1110 0110 0000

020B4 C0 18 01 3E 3B F0 11 FF   ...>;...   1100 0000 0001 1000 0000 0001 0011 1110 0011 1011 1111 0000 0001 0001 1111 1111

020BC FF FF FF 9F FF FF FF E8   ........   1111 1111 1111 1111 1111 1111 1001 1111 1111 1111 1111 1111 1111 1111 1110 1000

020C4 18 D7 F5 AD B1 83 AC 44   .......D   0001 1000 1101 0111 1111 0101 1010 1101 1011 0001 1000 0011 1010 1100 0100 0100

020CC 80 64 FF AD 1E 39 72 10   .d...9r.   1000 0000 0110 0100 1111 1111 1010 1101 0001 1110 0011 1001 0111 0010 0001 0000

020D4 20 45 EF E5 C2 BC A5 71    E.....q   0010 0000 0100 0101 1110 1111 1110 0101 1100 0010 1011 1100 1010 0101 0111 0001

020DC 1A 00 8B 93 7D CC 84 B4   ....}...   0001 1010 0000 0000 1000 1011 1001 0011 0111 1101 1100 1100 1000 0100 1011 0100

020E4 44 81 17 9F 97 0A F2 95   D.......   0100 0100 1000 0001 0001 0111 1001 1111 1001 0111 0000 1010 1111 0010 1001 0101

020EC C4 68 04 73 67 71 1A 1E   .h.sgq..   1100 0100 0110 1000 0000 0100 0111 0011 0110 0111 0111 0001 0001 1010 0001 1110

020F4 E8 F2 04 02 3F FF FF FF   ....?...   1110 1000 1111 0010 0000 0100 0000 0010 0011 1111 1111 1111 1111 1111 1111 1111

020FC F3 FF FF FF FD 03 2A 8C   ......*.   1111 0011 1111 1111 1111 1111 1111 1111 1111 1101 0000 0011 0010 1010 1000 1100

02104 22 B5 8B 95 48 D0 0C 8F   "...H...   0010 0010 1011 0101 1000 1011 1001 0101 0100 1000 1101 0000 0000 1100 1000 1111

0210C F5 A3 C7 2E 42 04 01 6F   ....B..o   1111 0101 1010 0011 1100 0111 0010 1110 0100 0010 0000 0100 0000 0001 0110 1111

02114 98 30 06 00 4F 8C FC DC   .0..O...   1001 1000 0011 0000 0000 0110 0000 0000 0100 1111 1000 1100 1111 1100 1101 1100

0211C 97 92 D6 CA ED 23 40 3D   .....#@=   1001 0111 1001 0010 1101 0110 1100 1010 1110 1101 0010 0011 0100 0000 0011 1101

02124 8B 4D FF F1 7B 08 50 05   .M..{.P.   1000 1011 0100 1101 1111 1111 1111 0001 0111 1011 0000 1000 0101 0000 0000 0101
```

```
0212C BE 60 C0 18 01 3E 33 F3   .`...>3.   1011 1110 0110 0000 1100 0000 0001 1000 0000 0001 0011 1110 0011 0011 1111 0011

02134 72 5E 4B 5B 2B B4 8D 00   r^K[+...   0111 0010 0101 1110 0100 1011 0101 1011 0010 1011 1011 0100 1000 1101 0000 0000

0213C 2C A3 FD F2 3C B8 1F 40   ,...<..@   0010 1100 1010 0011 1111 1101 1111 0010 0011 1100 1011 1000 0001 1111 0100 0000

02144 16 F9 83 00 60 04 F8 CF   ....`...   0001 0110 1111 1001 1000 0011 0000 0000 0110 0000 0000 0100 1111 1000 1100 1111

0214C D4 C1 44 3E               ..D>       1101 0100 1100 0001 0100 0100 0011 1110

02150 5A C5                     crc
```

RAY (40)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	40 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Point	3BD	10	
Vector	3BD	11	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

Example:

```
OBJECT: ray (28H), len 2FH (47), handle: 01 06
```

```
    02185 2F 00                   /.        0010 1111 0000 0000
    02187 4A 00 80 41 A2 E8 08 00 J..A....  0100 1010 0000 0000 1000 0000 0100 0001 1010 0010 1110 1000 0000 1000 0000 0000
    0218F 05 7B 12 4C 98 47 CA EF .{.L.G..  0000 0101 0111 1011 0001 0010 0100 1100 1001 1000 0100 0111 1100 1010 1110 1111
    02197 C4 A8 00 84 0B FC 98 72 .......r  1100 0100 1010 1000 0000 0000 1000 0100 0000 1011 1111 1100 1001 1000 0111 0010
    0219F 3F F9 FC 0F 91 CC D7 E5 ?.......  0011 1111 1111 1001 1111 1100 0000 1111 1001 0001 1100 1100 1101 0111 1110 0101
    021A7 CD 71 5F 99 7D 7E 4D 05 .q_.}~M.  1100 1101 0111 0001 0101 1111 1001 1001 0111 1101 0111 1110 0100 1101 0000 0101
    021AF C1 3D 47 F1 82 88 78    .=G...x   1100 0001 0011 1101 0100 0111 1111 0001 1000 0010 1000 1000 0111 1000
    021B6 AD CF                   crc
```

XLINE (41)

Same as RAY (40) -- except for type code.

Example:

```
OBJECT: const line (29H), len 2FH (47), handle: 01 05
    02152 2F 00                   /.        0010 1111 0000 0000
    02154 4A 40 80 41 62 E8 08 00 J@.Ab...  0100 1010 0100 0000 1000 0000 0100 0001 0110 0010 1110 1000 0000 1000 0000 0000
    0215C 05 7B 09 95 83 71 C8 B2 .{...q..  0000 0101 0111 1011 0000 1001 1001 0101 1000 0011 0111 0001 1100 1000 1011 0010
    02164 03 E8 03 C1 22 6C 91 8A ....."l..  0000 0011 1110 1000 0000 0011 1100 0001 0010 0010 0110 1100 1001 0001 1000 1010
    0216C 28 4A 04 28 B1 0A 5D F6 (J.(..].  0010 1000 0100 1010 0000 0100 0010 1000 1011 0001 0000 1010 0101 1101 1111 0110
    02174 48 76 1F 8D E0 E8 59 D8 Hv....Y.  0100 1000 0111 0110 0001 1111 1000 1101 1110 0000 1110 1000 0101 1001 1101 1000
    0217C 7A FB 87 F1 82 88 78    z.....x   0111 1010 1111 1011 1000 0111 1111 0001 1000 0010 1000 1000 0111 1000
    02183 FE 9C                   crc
```

DICTIONARY (42)

Basically a list of pairs of string/objhandle that constitute the dictionary entries.

Length	MS	---	Entity length (not counting itself or CRC).
Type	S	0	42 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits
Numreactors	S		number of reactors in this object
Numitems	L		number of dictonary items
Unknown R14	RC		Unknown R14 byte, has always been 0
Text	T		string name of dictionary entry, numitems entries
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			itemhandles (CODE 2)

Example:

```
OBJECT: dictionary (2AH), len 2CH (44), handle: 0C
```

```
0254B 2C 00                   ,.        0010 1100 0000 0000

0254D 4A 80 43 22 C0 10 00 09   J.C"....   0100 1010 1000 0000 0100 0011 0010 0010 1100 0000 0001 0000 0000 0000 0000 1001

02555 02 00 42 90 50 D0 51 17   ..B.P.Q.   0000 0010 0000 0000 0100 0010 1001 0000 0101 0000 1101 0000 0101 0001 0001 0111

0255D D1 D4 93 D5 54 10 F4 14   ....T...   1101 0001 1101 0100 1001 0011 1101 0101 0101 0100 0001 0000 1111 0100 0001 0100

02565 34 14 45 F4 D4 C4 94 E4   4.E.....   0011 0100 0001 0100 0100 0101 1111 0100 1101 0100 1100 0100 1001 0100 1110 0100

0256D 55 35 45 94 C4 54 03 02   U5E..T..   0101 0101 0011 0101 0100 0101 1001 0100 1100 0100 0101 0100 0000 0011 0000 0010

02575 10 D2 10 EC             ....      0001 0000 1101 0010 0001 0000 1110 1100

02579 D2 36                   crc
```

MTEXT (44)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	44 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Insertion pt3	BD	10	First picked point. (Location relative to text depends on attachment point (71).)
Extrusion	3BD	210	Undocumented; appears in DXF and entget, but ACAD doesn't even bother to adjust it to unit length.
X-axis dir	3BD	11	Apparently the text x-axis vector. (Why not just a rotation?) ACAD maintains it as a unit vector.
Rect width	BD	41	Reference rectangle width (width picked by the user).
Text height	BD	40	Undocumented
Attachment	BS	71	Similar to justification; see DXF doc
Drawing dir	BS	72	Left to right, etc.; see DXF doc

Extents	ht	BD	--- Undocumented and not present in DXF or entget
Extents wid	BD	---	Undocumented and not present in DXF or entget
			The extents rectangle, when rotated the same as the text, fits the actual text image on the screen (altough we've seen it include an extra row of text in height).
Text	T	1	All text in one long string (without '\n's
		3	for line wrapping). ACAD seems to add braces ({ }) and backslash-P's to indicate paragraphs based on the "\r\n"'s found in the imported file. But, all the text is in this one long string -- not broken into 1- and 3-groups as in DXF and entget.
			ACAD's entget breaks this string into 250-char pieces (not 255 as doc'd) – even if it's mid-word. The 1-group always gets the tag end; therefore, the 3's are always 250 chars long.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		7	STYLE (CODE 5)
CRC	X	---	

Example:

```
OBJECT: mtext (2CH), len 4DH (77), handle: CE

    00515 4D 00                   M.        0100 1101 0000 0000

    00517 4B 00 73 A0 C8 10 00 01   K.s.....   0100 1011 0000 0000 0111 0011 1010 0000 1100 1000 0001 0000 0000 0000 0000 0001

    0051F 33 0F AE 2B 5E AE E0 84   3..+^...   0011 0011 0000 1111 1010 1110 0010 1011 0101 1110 1010 1110 1110 0000 1000 0100

    00527 48 04 88 93 FD FD 9A 00   H.......   0100 1000 0000 0100 1000 1000 1001 0011 1111 1101 1111 1101 1001 1010 0000 0000

    0052F FA 05 4B 50 15 AF 46 E0   ..KP..F.   1111 1010 0000 0101 0100 1011 0101 0000 0001 0101 1010 1111 0100 0110 1110 0000

    00537 7A 15 8E 7E 82 A0 20 6E   z..~.. n   0111 1010 0001 0101 1000 1110 0111 1110 1000 0010 1010 0000 0010 0000 0110 1110

    0053F BD 1B 81 E8 56 39 F9 9B   ....V9..   1011 1101 0001 1011 1000 0001 1110 1000 0101 0110 0011 1001 1111 1001 1001 1011

    00547 99 99 99 99 99 E0 7E 85   ......~.   1001 1001 1001 1001 1001 1001 1001 1001 1001 1001 1001 1110 0000 0111 1110 1000 0101

    0054F AE 20 98 9D A9 18 17 1B   . ......   1010 1110 0010 0000 1001 1000 1001 1101 1010 1001 0001 1000 0001 0111 0001 1011

    00557 1B 19 1B 60 82 18 28 87   ...`..(.   0001 1011 0001 1001 0001 1011 0110 0000 1000 0010 0001 1000 0010 1000 1000 0111

    0055F A8 89 A8 88 00          .....     1010 1000 1000 1001 1010 1000 1000 1000 0000 0000

    00564 6F F0                   crc
```

LEADER (45)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	45 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Unknown bit	B	---	Always seems to be 0.
Annot type	BS	---	Annotation type (NOT bit-coded): Value 0 : MTEXT Value 1 : TOLERANCE Value 2 : INSERT Value 3 : None
path type	BS	---	
numpts	BS	---	number of points
point	3BD	10	As many as counter above specifies.
Endptproj	3BD	---	A non-planar leader gives a point that projects the endpoint back to the annotation. It's the offset from the endpoint of the leader to the annotation, taking into account the extrusion direction.
Extrusion	3BD	210	
x direction	3BD	211	
offsettoblockinspt	3BD	212	Used when the BLOCK option is used. Seems to be an unused feature.
Unknown	3BD		(R14 only – not in R13 format files)
DIMGAP	BD	---	The value of DIMGAP in the associated DIMSTYLE at the time of creation, multiplied by the dimscale in that dimstyle.
Box height	BD	40	MTEXT extents height. (A text box is slightly taller, probably by some DIMvar amount.)

Box width	BD	41	MTEXT extents width. (A text box is slightly wider, probably by some DIMvar amount.)
Hooklineonxdir	B		hook line is on x direction if 1
Arrowheadon	B		arrowhead on indicator
Arrowheadtype	BS		arrowhead type
Dimasz	BD		DIMASZ at the time of creation, multiplied by DIMSCALE
Unknown	B		
Unknown	B		
Unknown	BS		
Byblockcolor	BS		
Unknown	B		
Unknown	B		
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
		340	Associated annotation
			activated in R14. (CODE 5)
		2	DIMSTYLE (CODE 5)
CRC	X	---	

Example:

```
OBJECT: leader (2DH), len 80H (128), handle: 01 09

    02213 80 00                    ..        1000 0000 0000 0000

    02215 4B 40 80 42 65 20 18 00  K@.Be ..  0100 1011 0100 0000 1000 0000 0100 0010 0110 0101 0010 0000 0001 1000 0000 0000

    0221D 05 5B 29 03 25 AD 59 2D  .[).%.Y-  0000 0101 0101 1011 0010 1001 0000 0011 0010 0101 1010 1101 0101 1001 0010 1101

    02225 08 7D C9 50 04 41 FF AB  .}.P.A..  0000 1000 0111 1101 1100 1001 0101 0000 0000 0100 0100 0001 1111 1111 1010 1011

    0222D AF A2 81 04 08 2E E6 9D  ........  1010 1111 1010 0010 1000 0001 0000 0100 0000 1000 0010 1110 1110 0110 1001 1101

    02235 29 5D 0C 21 40 1C 3C C0  )].!@.<.  0010 1001 0101 1101 0000 1100 0010 0001 0100 0000 0001 1100 0011 1100 1100 0000

    0223D 0F B5 ED 05 D0 20 50 04  ..... P.  0000 1111 1011 0101 1110 1101 0000 0101 1101 0000 0010 0000 0101 0000 0000 0100

    02245 84 77 1E 34 65 00 78 56  .w.4e.xV  1000 0100 0111 0111 0001 1110 0011 0100 0110 0101 0000 0000 0111 1000 0101 0110

    0224D 18 21 BF AB 15 40 89 6B  .!...@.k  0001 1000 0010 0001 1011 1111 1010 1011 0001 0101 0100 0000 1000 1001 0110 1011

    02255 56 4B 42 1F 72 54 01 10  VKB.rT..  0101 0110 0100 1011 0100 0010 0001 1111 0111 0010 0101 0100 0000 0001 0001 0000

    0225D 7F EA EB E8 A0 41 02 A5  .....A..  0111 1111 1110 1010 1110 1011 1110 1000 1010 0000 0100 0001 0000 0010 1010 0101

    02265 AA AA 02 B5 E8 DC 0F 42  .......B  1010 1010 1010 1010 0000 0010 1011 0101 1110 1000 1101 1100 0000 1111 0100 0010
```

```
0226D AD CF C0 AD 7A 37 03 D0   ....z7..   1010 1101 1100 1111 1100 0000 1010 1101 0111 1010 0011 0111 0000 0011 1101 0000

02275 AC 73 F3 0B D4 A1 72 3F   .s....r?   1010 1100 0111 0011 1111 0011 0000 1011 1101 0100 1010 0001 0111 0010 0011 1111

0227D 0B B4 FF 80 AD 7A 37 03   .....z7.   0000 1011 1011 0100 1111 1111 1000 0000 1010 1101 0111 1010 0011 0111 0000 0011

02285 D0 AC 73 F2 C3 05 10 FC   ..s.....   1101 0000 1010 1100 0111 0011 1111 0010 1100 0011 0000 0101 0001 0000 1111 1100

0228D 10 26 05 20 10 A5 11 D6   .&. ....   0001 0000 0010 0110 0000 0101 0010 0000 0001 0000 1010 0101 0001 0001 1101 0110

02295 6E AB                     crc
```

TOLERANCE (46)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	46 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Unknown short	S		
Height	BD	--	
Dimgap(?)	BD		dimgap at time of creation, * dimscale
Ins pt	3BD	10	
X direction	3BD	11	
Extrusion	3BD	210	etc.
Text string	BS	1	
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]

DIMSTYLE (CODE 5)

Example:

```
OBJECT: tolerance (2EH), len 65H (101), handle: 01 0C

    022EB 65 00                   e.        0110 0101 0000 0000

    022ED 4B 80 80 43 27 18 10 00   K..C'...   0100 1011 1000 0000 1000 0000 0100 0011 0010 0111 0001 1000 0001 0000 0000 0000

    022F5 05 5B 40 56 BD 1B 81 E8   .[@V....   0000 0101 0101 1011 0100 0000 0101 0110 1011 1101 0001 1011 1000 0001 1110 1000

    022FD 56 39 F8 15 AF 46 E0 7A   V9...F.z   0101 0110 0011 1001 1111 1000 0001 0101 1010 1111 0100 0110 1110 0000 0111 1010

    02305 15 6E 7E 51 19 A0 47 00   .n~Q..G.   0001 0101 0110 1110 0111 1110 0101 0001 0001 1001 1010 0000 0100 0111 0000 0000

    0230D C7 13 A0 18 09 38 21 8A   .....8!.   1100 0111 0001 0011 1010 0000 0001 1000 0000 1001 0011 1000 0010 0001 1000 1010

    02315 5E A1 48 13 54 A5 CF 6B   ^.H.T..k   0101 1110 1010 0001 0100 1000 0001 0011 0101 0100 1010 0101 1100 1111 0110 1011

    0231D 88 CC EC 8E 87 6D 4F A4   .....mO.   1000 1000 1100 1100 1110 1100 1000 1110 1000 0111 0110 1101 0100 1111 1010 0100

    02325 A4 AE CF 6B 88 CC EC 8E   ...k....   1010 0100 1010 1110 1100 1111 0110 1011 1000 1000 1100 1100 1110 1100 1000 1110

    0232D 87 6D CF AC 2E 6C 8C CF   .m...l..   1000 0111 0110 1101 1100 1111 1010 1100 0010 1110 0110 1100 1000 1100 1100 1111

    02335 6B 88 CC EC 8E 87 6D AF   k.....m.   0110 1011 1000 1000 1100 1100 1110 1100 1000 1110 1000 0111 0110 1101 1010 1111

    0233D A4 A4 AE C4 A4 AE C4 A4   ........   1010 0100 1010 0100 1010 1110 1100 0100 1010 0100 1010 1110 1100 0100 1010 0100

    02345 AE C4 A4 AE C6 0A 21 F8   ......!.   1010 1110 1100 0100 1010 0100 1010 1110 1100 0110 0000 1010 0010 0001 1111 1000

    0234D 20 4C 0A 23 B4           L.#.      0010 0000 0100 1100 0000 1010 0010 0011 1011 0100

    02352 45 2F                   crc
```

MLINE (47)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	47 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED size	BS		size of extended entity data, if any
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Graphics	X		if graphicpresentflag is 1, the graphic goes here. See the section on Proxy Entity Graphics for the format of this section.
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	

```
Invisibility          BS      60
Scale                 BD      40
Just                  EC              top (0), bottom(2), or center(1)
Base point           3BD      10
Extrusion            3BD     210      etc.
Openclosed            BS              open (1), closed(3)
Linesinstyle          RC      73
Numverts              BS      72
do numverts times {
  vertex    3BD
  vertex direction 3BD
  miter direction  3BD
  do lineinstyle times {
    numsegparms    BS
    do numsegparms times {
      segparm         BD    segment parameter
    }
    numareafillparms BS
    do num area fill parms times {
      areafillparm   BD    area fill parameter
}
}
}

Handle refs            H              [Subentity ref handle (CODE 3)]
                                      [Reactors (CODE 4)]
                                      xdicobjhandle (CODE 3)
                                 8    LAYER (CODE 5)
                                 6    [LTYPE (CODE 5)]
                                      [PREVIOUS ENTITY (CODE 4)]
                                      [NEXT ENTITY (CODE 4)]
                                      mline style oject handle (CODE 5)
```

Example:

```
OBJECT: mline (2FH), len E4H (228), handle: 01 0D

    02354 E4 00                   ..        1110 0100 0000 0000

    02356 4B C0 80 43 66 C8 30 00   K..Cf.0.   0100 1011 1100 0000 1000 0000 0100 0011 0110 0110 1100 1000 0011 0000 0000 0000

    0235E 05 5B 20 04 61 AD 1E F2   .[ .a...   0000 0101 0101 1011 0010 0000 0000 0100 0110 0001 1010 1101 0001 1110 1111 0010

    02366 13 A8 8A 01 81 93 3C 67   ......<g   0001 0011 1010 1000 1000 1010 0000 0001 1000 0001 1001 0011 0011 1100 0110 0111

    0236E D4 2B C0 7F 52 80 81 20   .+..R..    1101 0100 0010 1011 1100 0000 0111 1111 0101 0010 1000 0000 1000 0001 0010 0000
```

```
02376 64 61 AD 1E F2 13 A8 8A   da......   0110 0100 0110 0001 1010 1101 0001 1110 1111 0010 0001 0011 1010 1000 1000 1010

0237E 01 81 93 3C 67 D4 2B C0   ...<g.+.   0000 0001 1000 0001 1001 0011 0011 1100 0110 0111 1101 0100 0010 1011 1100 0000

02386 7F 13 E9 CF 70 DE 47 3C   ....p.G<   0111 1111 0001 0011 1110 1001 1100 1111 0111 0000 1101 1110 0100 0111 0011 1100

0238E C7 E4 F8 6A 7B 9C 00 2F   ...j{../   1100 0111 1110 0100 1111 1000 0110 1010 0111 1011 1001 1100 0000 0000 0010 1111

02396 39 FC 4E 86 A7 B9 C0 02   9.N.....   0011 1001 1111 1100 0100 1110 1000 0110 1010 0111 1011 1001 1100 0000 0000 0010

0239E F3 DF 93 E9 CF 70 DE 47   .....p.G   1111 0011 1101 1111 1001 0011 1110 1001 1100 1111 0111 0000 1101 1110 0100 0111

023A6 3C C7 F2 05 52 04 00 00   <...R...   0011 1100 1100 0111 1111 0010 0000 0101 0101 0010 0000 0100 0000 0000 0000 0000

023AE 00 00 00 00 78 5F D0 38   ....x_.8   0000 0000 0000 0000 0000 0000 0000 0000 0111 1000 0101 1111 1101 0000 0011 1000

023B6 DD 69 B0 78 DE 38 80 44   .i.x.8.D   1101 1101 0110 1001 1011 0000 0111 1000 1101 1110 0011 1000 1000 0000 0100 0100

023BE 0A 1C 33 BD E1 05 20 40   ..3... @   0000 1010 0001 1100 0011 0011 1011 1101 1110 0001 0000 0101 0010 0000 0100 0000

023C6 62 C6 53 15 C9 57 71 F9   b.S..Wq.   0110 0010 1100 0110 0101 0011 0001 0101 1100 1001 0101 0111 0111 0001 1111 1001

023CE FB 6C F0 9B 58 B3 AB 7F   .l..X...   1111 1011 0110 1100 1111 0000 1001 1011 0101 1000 1011 0011 1010 1011 0111 1111

023D6 05 47 3C F4 7B 0B 79 B7   .G<.{.y.   0000 0101 0100 0111 0011 1100 1111 0100 0111 1011 0000 1011 0111 1001 1011 0111

023DE E0 8F 92 1D DC D1 2F 79   ....../y   1110 0000 1000 1111 1001 0010 0001 1101 1101 1100 1101 0001 0010 1111 0111 1001

023E6 FC 81 54 81 18 D6 BA 82   ..T.....   1111 1100 1000 0001 0101 0100 1000 0001 0001 1000 1101 0110 1011 1010 1000 0010

023EE C0 20 DE 77 F4 27 50 A1   . .w.'P.   1100 0000 0010 0000 1101 1110 0111 0111 1111 0100 0010 0111 0101 0000 1010 0001

023F6 65 46 02 92 A0 13 16 15   eF......   0110 0101 0100 0110 0000 0010 1001 0010 1010 0000 0001 0011 0001 0110 0001 0101

023FE 43 DA 24 00 28 10 1C B1   C.$.(...   0100 0011 1101 1010 0010 0100 0000 0000 0010 1000 0001 0000 0001 1100 1011 0001

02406 94 C5 72 55 DC 7E 7F 5B   ..rU.~.[   1001 0100 1100 0101 0111 0010 0101 0101 1101 1100 0111 1110 0111 1111 0101 1011

0240E 3C 26 D6 2C EA DF C7 65   <&.,...e   0011 1100 0010 0110 1101 0110 0010 1100 1110 1010 1101 1111 1100 0111 0110 0101

02416 B3 C2 6D 62 CE A9 F8 20   ..mb...    1011 0011 1100 0010 0110 1101 0110 0010 1100 1110 1010 1001 1111 1000 0010 0000

0241E B1 94 C5 72 55 DC 7F 20   ...rU..    1011 0001 1001 0100 1100 0101 0111 0010 0101 0101 1101 1100 0111 1111 0010 0000

02426 55 20 40 00 00 00 00 00   U @.....   0101 0101 0010 0000 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

0242E 07 85 FD 18 28 87 C0 50   ....(..P   0000 0111 1000 0101 1111 1101 0001 1000 0010 1000 1000 0111 1100 0000 0101 0000

02436 87 28 8E 4C               .(.L       1000 0111 0010 1000 1000 1110 0100 1100

0243A 91 88                     crc
```

BLOCK CONTROL (48)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	48 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	L		Number of persistent reactors attached to this obj

Numentries	BS	70	Doesn't count *MODEL_SPACE and *PAPER_SPACE.
Handle refs	H		NULL (CODE 4) xdicobjhandle (CODE 3) numentries handles of blockheaders in the file with codes of 2, then *MODEL_SPACE and *PAPER_SPACE with codes of 3.
CRC	X	---	

Example:

```
OBJECT: blk ctrl (30H), len 20H (32), handle: 01

    00464 20 00                     .        0010 0000 0000 0000

    00466 4C 00 40 64 80 00 00 09   L.@d....   0100 1100 0000 0000 0100 0000 0110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    0046E 08 40 30 21 93 21 9F 21   .@0!.!.!   0000 1000 0100 0000 0011 0000 0010 0001 1001 0011 0010 0001 1001 1111 0010 0001

    00476 AD 21 BB 21 CA 21 D6 21   .!.!.!.!   1010 1101 0010 0001 1011 1011 0010 0001 1100 1010 0010 0001 1101 0110 0010 0001

    0047E F4 22 01 13 31 19 31 16   ."..1.1.   1111 0100 0010 0010 0000 0001 0001 0011 0011 0001 0001 1001 0011 0001 0001 0110

    00486 C1 3A                   crc
```

BLOCK HEADER (49)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	49 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	L		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	block is dependent on an xref. (16 bit)
Anonymous	B	1	if this is an anonymous block (1 bit)
Hasatts	B	1	if block contains attdefs (2 bit)
Blkisxref	B	1	if block is xref (4 bit)
Xrefoverlaid	B	1	if an overlaid xref (8 bit)
Base pt	3BD	10	Base point of block.
Xref pname	T	1	Xref pathname. That's right: DXF 1 AND 3!

		3	1 appears in a tblnext/search elist; 3 appears in an entget.
Handle refs	H		Block control handle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
			BLOCK entity. (CODE 3)
			if (!blkisxref && !xrefisoverlaid) {
			first entity in the def. (CODE 4)
			last entity in the def. (CODE 4)
			}
			ENDBLK entity. (CODE 3)
CRC	X	---	

Example:

```
OBJECT: blk hdr (31H), len 19H (25), handle: CA

    00488 19 00                   ..        0001 1001 0000 0000

    0048A 4C 40 72 A6 80 00 00 09 L@r.....  0100 1100 0100 0000 0111 0010 1010 0110 1000 0000 0000 0000 0000 0000 0000 1001

    00492 02 2A 44 C8 AA 41 01 30 .*D..A.0   0000 0010 0010 1010 0100 0100 1100 1000 1010 1010 0100 0001 0000 0001 0011 0000

    0049A 50 31 CB 41 CC 41 D3 31 P1.A.A.1   0101 0000 0011 0001 1100 1011 0100 0001 1100 1100 0100 0001 1101 0011 0011 0001

    004A2 D4                      .         1101 0100

    004A3 E5 AA                   crc
```

LAYER CONTROL (50) (UNDOCUMENTED)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	50 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	Counts layer "0", too.
Handle refs	H		NULL (CODE 4)
			xdicobjhandle(CODE 3)
			layer objhandles (CODE 2)
CRC	X	---	

Example:

```
OBJECT: layer ctrl (32H), len FH (15), handle: 02
```

```
024B1 0F 00                   ..        0000 1111 0000 0000

024B3 4C 80 40 A4 80 00 00 09 L.@.....  0100 1100 1000 0000 0100 0000 1010 0100 1000 0000 0000 0000 0000 0000 0000 1001

024BB 02 40 30 21 0F 21 99    .@0!.!.   0000 0010 0100 0000 0011 0000 0010 0001 0000 1111 0010 0001 1001 1001

024C2 C3 1D                   crc
```

LAYER (51)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	51 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
Frozen	B	1	if frozen (1 bit)
On	B	1	if on. Normal Autodesk (and OpenDWG Toolkit) policy is not to report this per se, but rather to negate the color if the layer is off.
Frz in new	B	1	if frozen by default in new viewports (2 bit)
Locked	B	1	if locked (4 bit)
Color	BS	62	
Handle refs	H		Layer control (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
		6	linetype (CODE 5)
CRC	X	---	

Example:

```
OBJECT: layer (33H), len 1BH (27), handle: 99

   02F91 1B 00                   ..        0001 1011 0000 0000

   02F93 4C C0 66 6A 20 00 00 09 L.fj ...  0100 1100 1100 0000 0110 0110 0110 1010 0010 0000 0000 0000 0000 0000 0000 1001
```

```
02F9B 09 44 45 46 50 4F 49 4E   .DEFPOIN   0000 1001 0100 0100 0100 0101 0100 0110 0101 0000 0100 1111 0100 1001 0100 1110

02FA3 54 53 C0 41 D0 40 8C 14   TS.A.@..   0101 0100 0101 0011 1100 0000 0100 0001 1101 0000 0100 0000 1000 1100 0001 0100

02FAB 14 45 48                  .EH       0001 0100 0100 0101 0100 1000

02FAE 34 8F                     crc
```

SHAPEFILE CONTROL (52) (UNDOCUMENTED)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	52 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	number of style handles in refs section.
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			shapefile objhandles (CODE 2)
CRC	X	---	

Example:

```
OBJECT: shpfile ctrl (34H), len FH (15), handle: 03

    024C4 0F 00                     ..        0000 1111 0000 0000

    024C6 4D 00 40 E4 80 00 00 09   M.@.....   0100 1101 0000 0000 0100 0000 1110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    024CE 02 40 30 21 10 21 F3      .@0!.!.    0000 0010 0100 0000 0011 0000 0010 0001 0001 0000 0010 0001 1111 0011

    024D5 33 8B                     crc
```

SHAPEFILE (53)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	53 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this

			reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
Vertical	B	1	if vertical (1 bit of flag)
shape file	B	1	if a shape file rather than a font (4 bit)
Fixed height	BD	40	
Width factor	BD	41	
Oblique ang	BD	50	
Generation	RC	71	Generation flags (not bit-pair coded).
Last height	BD	42	
Font name	T	3	
Bigfont name	T	4	
Handle refs	H		Shapefile control (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
CRC	X	---	

Example:

```
OBJECT: shpfile (35H), len 25H (37), handle: 10

    02FB0 25 00                   %.        0010 0101 0000 0000

    02FB2 4D 40 44 20 20 10 00 09   M@D  ...   0100 1101 0100 0000 0100 0100 0010 0000 0010 0000 0001 0000 0000 0000 0000 1001

    02FBA 08 53 54 41 4E 44 41 52   .STANDAR   0000 1000 0101 0011 0101 0100 0100 0001 0100 1110 0100 0100 0100 0001 0101 0010

    02FC2 44 C2 60 02 6A 66 66 66   D.`.jfff   0100 0100 1100 0010 0110 0000 0000 0010 0110 1010 0110 0110 0110 0110 0110 0110

    02FCA 66 67 24 FD 03 74 78 74   fg$..txt   0110 0110 0110 0111 0010 0100 1111 1101 0000 0011 0111 0100 0111 1000 0111 0100

    02FD2 90 40 CC 14 28            .@..(     1001 0000 0100 0000 1100 1100 0001 0100 0010 1000

    02FD7 EC 6E                   crc
```

LINETYPE CONTROL (56) (UNDOCUMENTED)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	56 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	Doesn't count BYBLOCK and BYLAYER even though they both have entries. Counts the CODE 2 ones.

Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the linetypes, ending with BYLAYER and BYBLOCK.
			all have CODE 2 except BYLAYER and BYBLOCK, which have CODE 3.
CRC	X	---	

Example:

```
OBJECT: ltype ctrl (38H), len 11H (17), handle: 05

    024D7 11 00                   ..        0001 0001 0000 0000

    024D9 4E 00 41 64 80 00 00 09   N.Ad....   0100 1110 0000 0000 0100 0001 0110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    024E1 01 40 30 21 15 31 13 31   .@0!.1.1   0000 0001 0100 0000 0011 0000 0010 0001 0001 0101 0011 0001 0001 0011 0011 0001

    024E9 14                      .         0001 0100

    024EA 82 54                   crc
```

LTYPE (57)

Length	MS	---	Object length (not counting itself or CRC).
Type	BS	0&2	57 (internal DWG type code).
Handle	H	5	code 0, length followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
Description	T	3	
Pattern Len	BD	40	
Alignment	RC	72	Always 'A'.
Numdashes	RC	73	The number of repetitions of the 49...74 data.
repeat numdashes times {			
Dash length	BD	49	Dash or dot specifier.
Complex shapecode	BS	75	Shape number if shapeflag is 2, or index into the string area if shapeflag is 4.
X-offset	RD	44	(0.0 for a simple dash.)

Y-offset	RD	45	(0.0 for a simple dash.)
Scale	BD	46	(1.0 for a simple dash.)
Rotation	BD	50	(0.0 for a simple dash.)

Shapeflag	BS	74	bit coded:
			if (shapeflag & 1), text is rotated 0 degrees,
			otherwise it follows the segment
			if (shapeflag & 2), complexshapecode holds the
			index of the shape to be drawn
			if (shapeflag & 4), complexshapecode holds the index into the text area of the string to be drawn.

NOTE: OpenDWG Toolkit does not present the data this way. It uses a separate variable called stroffset which indicates the offets into the text string area. This is done in order to attempt to make the data easier to understand.

}

Strings area	X	9	256 bytes of text area. The complex dashes that have text use this area via the 75-group indices. It's basically a pile of 0-terminated strings. First byte is always 0 for R13 and data starts at byte 1. In R14 it is not a valid data start from byte 0. (The 9-group is undocumented.)
Handle refs	H		Ltype control (CODE 4) [Reactors (CODE 4)] xdicobjhandle (CODE 3) NULL (CODE 5)
		340	shapefile for dash/shape (1 each) (CODE 5)
CRC	X	---	

VIEW CONTROL (60) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	60 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL	---	size of object in bits, not including end handles
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	
Handle refs	H		NULL (CODE 4) xdicobjhandle (CODE 3) the views (CODE 2)
CRC	X	---	

Example:

```
OBJECT: view ctrl (3CH), len DH (13), handle: 06

    00A04 0D 00                   ..        0000 1101 0000 0000

    00A06 4F 00 41 A4 80 00 00 09 O.A.....  0100 1111 0000 0000 0100 0001 1010 0100 1000 0000 0000 0000 0000 0000 1001

    00A0E 01 40 30 21 3F          .@0!?     0000 0001 0100 0000 0011 0000 0010 0001 0011 1111

    00A13 E1 20                   crc
```

VIEW (61)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	61 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
View height	BD	40	
View width	BD	41	
View center	2RD	10	(Not bit-pair coded.)
Target	3BD	12	
View dir	3BD	11	DXF doc suggests from target toward camera.
Twist angle	BD	50	Radians
Lens length	BD	42	
Front clip	BD	43	
Back clip	BD	44	
View mode	X	71	4 bits: 0123 0 : 71's bit 0 (1) 1 : 71's bit 1 (2) 2 : 71's bit 2 (4) 3 : OPPOSITE of 71's bit 4 (16) Note that only bits 0, 1, 2, and 4 of the 71 can be specified -- not bit 3 (8).
Pspace flag	B	70	Bit 0 (1) of the 70-group.
Handle refs	H		view control object (CODE 4)

			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
CRC	X	---	

Example:

```
OBJECT: view (3DH), len 40H (64), handle: 3F

    01409 40 00                   @.        0100 0000 0000 0000

    0140B 4F 40 4F ED 90 10 00 09   O@O.....   0100 1111 0100 0000 0100 1111 1110 1101 1001 0000 0001 0000 0000 0000 0000 1001

    01413 06 4D 59 56 49 45 57 C2   .MYVIEW.   0000 0110 0100 1101 0101 1001 0101 0110 0100 1001 0100 0101 0101 0111 1100 0010

    0141B F1 38 4A E7 EB B4 A9 00   .8J.....   1111 0001 0011 1000 0100 1010 1110 0111 1110 1011 1011 0100 1010 1001 0000 0000

    01423 9E EA 45 5D 73 27 34 40   ..E]s'4@   1001 1110 1110 1010 0100 0101 0101 1101 0111 0011 0010 0111 0011 0100 0100 0000

    0142B 9D EA 45 5D 73 27 24 40   ..E]s'$@   1001 1101 1110 1010 0100 0101 0101 1101 0111 0011 0010 0111 0010 0100 0100 0000

    01433 BC 4E 12 B9 FA ED 1A 40   .N.....@   1011 1100 0100 1110 0001 0010 1011 1001 1111 1010 1110 1101 0001 1010 0100 0000

    0143B AA 98 00 00 00 00 00 00   ........   1010 1010 1001 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    01443 49 40 A1 20 83 18 28 00   I@. ..(.   0100 1001 0100 0000 1010 0001 0010 0000 1000 0011 0001 1000 0010 1000 0000 0000

    0144B 0C 90                   crc
```

UCS CONTROL (62) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	62 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL	---	Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the ucs’s (CODE 2)
CRC	X	---	

Example:

```
OBJECT: ucs ctrl (3EH), len DH (13), handle: 07

    0350B 0D 00                   ..        0000 1101 0000 0000

    0350D 4F 80 41 E4 80 00 00 09   O.A.....   0100 1111 1000 0000 0100 0001 1110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    03515 01 40 30 21 4C          .@0!L     0000 0001 0100 0000 0011 0000 0010 0001 0100 1100

    0351A A0 6F                   crc
```

UCS (63)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	63 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
Origin	3BD	10	
X-direction	3BD	11	
Y-direction	3BD	12	
Handle refs	H		ucs control object (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
CRC	X	---	

Example:

```
OBJECT: ucs (3FH), len 45H (69), handle: 4C

    03EB1 45 00                   E.        0100 0101 0000 0000

    03EB3 4F C0 53 20 60 20 00 09 O.S ` ..  0100 1111 1100 0000 0101 0011 0010 0000 0110 0000 0010 0000 0000 0000 0000 1001

    03EBB 05 4D 59 55 43 53 CA 8F .MYUCS..  0000 0101 0100 1101 0101 1001 0101 0101 0100 0011 0101 0011 1100 1010 1000 1111

    03EC3 DF FF FF FF FF FE 73 F2 ......s.  1101 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1110 0111 0011 1111 0010

    03ECB 14 E5 08 BB 73 23 90 FC ....s#..  0001 0100 1110 0101 0000 1000 1011 1011 0111 0011 0010 0011 1001 0000 1111 1100

    03ED3 EC FF FF FF FF FF BF BF ........  1110 1100 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1011 1111 1011 1111

    03EDB 2B D3 16 3A 1E AD B6 EF +..:....  0010 1011 1101 0011 0001 0110 0011 1010 0001 1110 1010 1101 1011 0110 1110 1111

    03EE3 CF 8F FF FF FF FF FE 33 .......3  1100 1111 1000 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1110 0011 0011

    03EEB F2 18 E5 08 BB 73 23 90 .....s#.  1111 0010 0001 1000 1110 0101 0000 1000 1011 1011 0111 0011 0010 0011 1001 0000

    03EF3 FD 04 1C C1 40          ....@     1111 1101 0000 0100 0001 1100 1100 0001 0100 0000

    03EF8 BE 62                   crc
```

TABLE (VPORT) (64) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	64 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	Counts all 0010.refs -- even the null ones (0010.0000). The actual 70-group value from an entget doesn't count the null ones.
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the vports (CODE 2)
CRC	X	---	

Example:

```
OBJECT: vport ctrl (40H), len 12H (18), handle: 08

    0351C 12 00                   ..        0001 0010 0000 0000

    0351E 50 00 42 24 80 00 00 09   P.B$....   0101 0000 0000 0000 0100 0010 0010 0100 1000 0000 0000 0000 0000 0000 0000 1001

    03526 04 40 30 20 21 4E 21 4F   .@0 !N!O   0000 0100 0100 0000 0011 0000 0010 0000 0010 0001 0100 1110 0010 0001 0100 1111

    0352E 21 50                   !P        0010 0001 0101 0000

    03530 9E 1F                   crc
```

VPORT (65)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	65 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
View height	BD	40	

Aspect ratio	BD	41	The number stored here is actually the aspect ratio times the view height (40), so this number must be divided by the 40-value to produce the aspect ratio that entget gives. (R13 quirk; R12 has just the aspect ratio.)
View Center	2RD	12	DCS. (If it's plan view, add the view target (17) to get the WCS coordinates. Careful! sometimes the DWG lies and you have to SAVE/OPEN to update it.) Note that it's WSC in R12.
View target	3BD	17	
View dir	3BD	16	
View twist	BD	51	
Lens length	BD	42	
Front clip	BD	43	
Back clip	BD	44	
View mode	X	71	4 bits: 0123 0 : 71's bit 0 (1) 1 : 71's bit 1 (2) 2 : 71's bit 2 (4) 3 : OPPOSITE of 71's bit 4 (16) Note that only bits 0, 1, 2, and 4 are given here; see UCSFOLLOW below for bit 3 (8) of the 71.
Lower left	2RD	10	In fractions of screen width and height.
Upper right	2RD	11	In fractions of screen width and height.
UCSFOLLOW	B	71	UCSFOLLOW. Bit 3 (8) of the 71-group.
Circle zoom	BS	72	Circle zoom percent.
Fast zoom	B	73	
UCSICON	X	74	2 bits: 01 0 : 74's bit 0 (1) 1 : 74's bit 1 (2)
Grid on/off	B	76	
Grd spacing	2RD	15	
Snap on/off	B	75	
Snap style	B	77	
Snap isopair	BS	78	
Snap rot	BD	50	
Snap base	2RD	13	
Snp spacing	2RD	14	
Handle refs	H		Vport control (CODE 4) [Reactors (CODE 4)] xdicobjhandle (CODE 3) NULL (CODE 5)
CRC	X	---	

Example:

```
OBJECT: vport (41H), len 93H (147), handle: 4E

    03EFA 93 00                    ..         1001 0011 0000 0000

    03EFC 50 40 53 A7 50 40 00 09  P@S.P@..   0101 0000 0100 0000 0101 0011 1010 0111 0101 0000 0100 0000 0000 0000 0000 1001

    03F04 07 2A 41 43 54 49 56 45  .*ACTIVE   0000 0111 0010 1010 0100 0001 0100 0011 0101 0100 0100 1001 0101 0110 0100 0101

    03F0C C2 1E 94 3B 21 CD A4 CD  ...;!...   1100 0010 0001 1110 1001 0100 0011 1011 0010 0001 1100 1101 1010 0100 1100 1101

    03F14 00 A5 86 68 4A 2C 0E 2D  ...hJ,.-   0000 0000 1010 0101 1000 0110 0110 1000 0100 1010 0010 1100 0000 1110 0010 1101

    03F1C 40 A5 86 68 4A 2C 0E 1D  @..hJ,..   0100 0000 1010 0101 1000 0110 0110 1000 0100 1010 0010 1100 0000 1110 0001 1101

    03F24 40 87 A5 0E C8 73 69 23  @....si#   0100 0000 1000 0111 1010 0101 0000 1110 1100 1000 0111 0011 0110 1001 0010 0011

    03F2C 40 AA 98 00 00 00 00 00  @.......   0100 0000 1010 1010 1001 1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03F34 00 49 40 A1 00 00 00 00  .I@.....   0000 0000 0100 1001 0100 0000 1010 0001 0000 0000 0000 0000 0000 0000 0000 0000

    03F3C 00 00 E0 3F 00 00 00 00  ...?....   0000 0000 0000 0000 1110 0000 0011 1111 0000 0000 0000 0000 0000 0000 0000 0000

    03F44 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03F4C 00 00 F0 3F 00 00 00 00  ...?....   0000 0000 0000 0000 1111 0000 0011 1111 0000 0000 0000 0000 0000 0000 0000 0000

    03F54 00 00 F0 3F 2C 98 00 00  ...?,...   0000 0000 0000 0000 1111 0000 0011 1111 0010 1100 1001 1000 0000 0000 0000 0000

    03F5C 00 00 00 01 C0 7E 00 00  .....~..   0000 0000 0000 0000 0000 0000 0000 0001 1100 0000 0111 1110 0000 0000 0000 0000

    03F64 00 00 00 01 C0 7E 50 00  .....~P.   0000 0000 0000 0000 0000 0000 0000 0001 1100 0000 0111 1110 0101 0000 0000 0000

    03F6C 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03F74 00 00 00 00 00 00 00 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    03F7C 00 00 00 00 07 01 F8 00  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 0000 0001 1111 1000 0000 0000

    03F84 00 00 00 00 07 01 FA 08  ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 0000 0001 1111 1010 0000 1000

    03F8C 41 82 80                 A..        0100 0001 1000 0010 1000 0000

    03F8F 7D 31                    crc
```

TABLE (APPID) (66) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	66 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the apps (CODE 2)

CRC	X	---	

Example:

```
OBJECT: regapp ctrl (42H), len FH (15), handle: 09

    03532 0F 00                   ..        0000 1111 0000 0000

    03534 50 80 42 64 80 00 00 09   P.Bd....   0101 0000 1000 0000 0100 0010 0110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    0353C 02 40 30 21 11 21 86      .@0!.!.   0000 0010 0100 0000 0011 0000 0010 0001 0001 0001 0010 0001 1000 0110

    03543 FA D9                   crc
```

APPID (67)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	67 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
Unknown	RC	71	Undoc'd 71-group; doesn't even appear in DXF or an entget if it's 0.
Handle refs	H		The app control (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
CRC	X	---	

Example:

```
OBJECT: regapp (43H), len 13H (19), handle: 11

    040BF 13 00                   ..        0001 0011 0000 0000

    040C1 50 C0 44 67 40 00 00 09   P.Dg@...   0101 0000 1100 0000 0100 0100 0110 0111 0100 0000 0000 0000 0000 0000 0000 1001

    040C9 04 41 43 41 44 C0 0C 10   .ACAD...   0000 0100 0100 0001 0100 0011 0100 0001 0100 0100 1100 0000 0000 1100 0001 0000

    040D1 83 05 0A                ...       1000 0011 0000 0101 0000 1010

    040D4 8C E9                   crc
```

DIMSTYLE CONTROL (68) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	68 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BS	70	
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the dimstyles (CODE 2)
CRC	X	---	

Example:

```
OBJECT: dimstyle ctrl (44H), len 10H (16), handle: 0A

    03545 10 00                   ..        0001 0000 0000 0000

    03547 51 00 42 A4 80 00 00 09   Q.B.....   0101 0001 0000 0000 0100 0010 1010 0100 1000 0000 0000 0000 0000 0000 0000 1001

    0354F 03 40 30 21 1D 21 4D 20   .@0!.!M    0000 0011 0100 0000 0011 0000 0010 0001 0001 1101 0010 0001 0100 1101 0010 0000

    03557 BA 14                   crc
```

DIMSTYLE (69)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	69 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
DIMTOL	B	71	
DIMLIM	B	72	
DIMTIH	B	73	
DIMTOH	B	74	

DIMSE1	B	75
DIMSE2	B	76
DIMALT	B	170
DIMTOFL	B	172
DIMSAH	B	173
DIMTIX	B	174
DIMSOXD	B	175
DIMALTD	RC	171
DIMZIN	RC	78
DIMSD1	B	281
DIMSD2	B	282
DIMTOLJ	RC	283
DIMJUST	RC	280
DIMFIT	RC	287
DIMUPT	B	288
DIMTZIN	RC	284
DIMALTZ	RC	285
DIMALTTZ	RC	286
DIMTAD	RC	77
DIMUNIT	BS	270
DIMAUNIT	BS	275
DIMDEC	BS	271
DIMTDEC	BS	272
DIMALTU	BS	273
DIMALTTD	BS	274
DIMSCALE	BD	40
DIMASZ	BD	41
DIMEXO	BD	42
DIMDLI	BD	43
DIMEXE	BD	44
DIMRND	BD	45
DIMDLE	BD	46
DIMTP	BD	47
DIMTM	BD	48
DIMTXT	BD	140
DIMCEN	BD	141
DIMTSZ	BD	142
DIMALTF	BD	143
DIMLFAC	BD	144
DIMTVP	BD	145
DIMTFAC	BD	146
DIMGAP	BD	147

DIMPOST	T	3	
DIMAPOST	T	4	
DIMBLK	T	5	
DIMBLK1	T	6	
DIMBLK2	T	7	
DIMCLRD	BS	176	
DIMCLRE	BS	177	
DIMCLRT	BS	178	
Unknown	B	70	Seems to set the 0-bit (1) of the 70-group.
Handle refs	H		Dimstyle control (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
		340	shapefile (CODE 5) (DIMTXSTY)
CRC	X	---	

Example:

```
OBJECT: dimstyle (45H), len 70H (112), handle: 1D

    040F0 70 00                   p.        0111 0000 0000 0000

    040F2 51 40 47 64 90 30 00 09   Q@Gd.0..   0101 0001 0100 0000 0100 0111 0110 0100 1001 0000 0011 0000 0000 0000 0000 1001

    040FA 08 53 54 41 4E 44 41 52   .STANDAR   0000 1000 0101 0011 0101 0100 0100 0001 0100 1110 0100 0100 0100 0001 0101 0010

    04102 44 C3 00 04 00 00 80 01   D.......   0100 0100 1100 0011 0000 0000 0000 0100 0000 0000 0000 0000 1000 0000 0000 0001

    0410A 80 00 00 00 10 29 04 41   .....).A   1000 0000 0000 0000 0000 0000 0000 0000 0001 0000 0010 1001 0000 0100 0100 0001

    04112 10 24 09 02 B5 E8 DC 0F   .$......   0001 0000 0010 0100 0000 1001 0000 0010 1011 0101 1110 1000 1101 1100 0000 1111

    0411A 42 B1 CF C0 00 00 00 00   B.......   0100 0010 1011 0001 1100 1111 1100 0000 0000 0000 0000 0000 0000 0000 0000 0000

    04122 00 0B 03 F1 4A E0 7A 17   ....J.z.   0000 0000 0000 1011 0000 0011 1111 0001 0100 1010 1110 0000 0111 1010 0001 0111

    0412A AD 47 60 FC 0A D7 A3 70   .G`....p   1010 1101 0100 0111 0110 0000 1111 1100 0000 1010 1101 0111 1010 0011 0111 0000

    04132 3D 0A C7 3F AA 02 B5 E8   =..?....   0011 1101 0000 1010 1100 0111 0011 1111 1010 1010 0000 0010 1011 0101 1110 1000

    0413A DC 0F 42 B1 CF C0 AD 7A   ..B....z   1101 1100 0000 1111 0100 0010 1011 0001 1100 1111 1100 0000 1010 1101 0111 1010

    04142 37 03 D0 AB 73 F8 66 66   7...s.ff   0011 0111 0000 0011 1101 0000 1010 1011 0111 0011 1111 1000 0110 0110 0110 0110

    0414A 66 66 66 66 39 40 64 0A   ffff9@d.   0110 0110 0110 0110 0110 0110 0110 0110 0011 1001 0100 0000 0110 0100 0000 1010

    04152 D7 A3 70 3D 0A B7 3F AA   ..p=..?.   1101 0111 1010 0011 0111 0000 0011 1101 0000 1010 1011 0111 0011 1111 1010 1010

    0415A AA 20 85 18 28 28 88 00   . ..((..   1010 1010 0010 0000 1000 0101 0001 1000 0010 1000 0010 1000 1000 1000 0000 0000

    04162 CC 33                   crc
```

VIEWPORT ENTITY CONTROL (70) (UNDOCUMENTED)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0&2	70 (internal DWG type code).

Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	B	L	Number of persistent reactors attached to this obj
Numentries	BS	70	
Handle refs	H		NULL (CODE 4)
			xdicobjhandle (CODE 3)
			the viewport entity headers (CODE 2)
CRC	X	---	

Example:

```
OBJECT: vpent ctrl (46H), len 17H (23), handle: 0B

    03559 17 00                   ..        0001 0111 0000 0000

    0355B 51 80 42 E4 80 00 00 09   Q.B.....   0101 0001 1000 0000 0100 0010 1110 0100 1000 0000 0000 0000 0000 0000 0000 1001

    03563 06 40 30 21 51 21 52 21   .@0!Q!R!   0000 0110 0100 0000 0011 0000 0010 0001 0101 0001 0010 0001 0101 0010 0010 0001

    0356B 54 21 56 21 58 21 5A      T!V!X!Z    0101 0100 0010 0001 0101 0110 0010 0001 0101 1000 0010 0001 0101 1010

    03572 9E 84                   crc
```

VIEWPORT ENTITY HEADER (71)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	71 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Entry name	T	2	
64-flag	B	70	The 64-bit of the 70 group.
xrefindex+1	BS	70	subtract one from this value when read. After that, -1 indicates that this reference did not come from an xref, otherwise this value indicates the index of the blockheader for the xref from which this came.
Xdep	B	70	dependent on an xref. (16 bit)
1 flag	B		The 1 bit of the 70 group
Handle refs	H		viewport entity control (CODE 4)
			xdicobjhandle (CODE 3)
			NULL (CODE 5)
			the corresponding viewport entity (CODE 2) objhandle of next vport ent header in chain (CODE 5) sometimes points to self; I change

			those to NULL. NULL indicates end of chain.
CRC	X	---	

Example:

```
OBJECT: vpent hdr (47H), len 11H (17), handle: 58

    03574 11 00                   ..        0001 0001 0000 0000

    03576 51 C0 56 24 50 00 00 0A   Q.V$P...   0101 0001 1100 0000 0101 0110 0010 0100 0101 0000 0000 0000 0000 0000 0000 1010

    0357E CA 08 59 82 82 0A CA 8A   ..Y.....   1100 1010 0000 1000 0101 1001 1000 0010 1000 0010 0000 1010 1100 1010 1000 1010

    03586 B4                      .         1011 0100

    03587 2F 9E                   crc
```

GROUP (72): Group of ACAD entities

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	72 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Str	T		name of group
Unnamed	BS	1	if group has no name
Selectable	BS	1	if group selectable
Numhandles	BL		# objhandles in this group
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			the entries in the group (CODE 5)

Example:

```
OBJECT: group (48H), len 27H (39), handle: 7B

    0431E 27 00                   '.        0010 0111 0000 0000

    04320 52 00 5E ED E0 00 00 04   R.^.....   0101 0010 0000 0000 0101 1110 1110 1101 1110 0000 0000 0000 0000 0000 0000 0100

    04328 05 0F 74 68 69 73 20 69   ..this i   0000 0101 0000 1111 0111 0100 0110 1000 0110 1001 0111 0011 0010 0000 0110 1001

    04330 73 20 6D 79 67 72 6F 75   s mygrou   0111 0011 0010 0000 0110 1101 0111 1001 0110 0111 0111 0010 0110 1111 0111 0101

    04338 70 90 14 0D 04 35 04 34   p....5.4   0111 0000 1001 0000 0001 0100 0000 1101 0000 0100 0011 0101 0000 0100 0011 0100

    04340 C1 45 E9 45 B5 45 A1      .E.E.E.    1100 0001 0100 0101 1110 1001 0100 0101 1011 0101 0100 0101 1010 0001

    04347 35 69                   crc
```

MLINESTYLE (73):

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	73 (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Name	T		Name of this style
Desc	T		Description of this style
Flags	BS		A short which reconstitutes the mlinestyle flags as defined in DXF. Here are the bits as they relate to DXF:

DWG bit	goes with	DXF bit
1		2
2		1
16		16
32		64
64		32
256		256
512		1024
1024		512

fillcolor	BS		Fill color for this style
startang	BD		Start angle
endang	BD		End angle
linesinstyle	RC		Number of lines in this style
REPEAT 'linesinstyle' times:			
Offset	BD		Offset of this segment
Color	BS		Color of this segment
Ltindex	BS		Linetype index (yes, index)
END REPEAT			
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: mlstyle (49H), len 55H (85), handle: 74

   0439B 55 00                  U.        0101 0101 0000 0000

   0439D 52 40 5D 27 C0 20 00 04   R@]'. ..   0101 0010 0100 0000 0101 1101 0010 0111 1100 0000 0010 0000 0000 0000 0000 0100

   043A5 05 09 4D 59 4D 4C 53 54   ..MYMLST   0000 0101 0000 1001 0100 1101 0101 1001 0100 1101 0100 1100 0101 0011 0101 0100
```

```
043AD 59 4C 45 44 9B 5E 48 1B   YLED.^H.   0101 1001 0100 1100 0100 0101 0100 0100 1001 1011 0101 1110 0100 1000 0001 1011

043B5 5D 5B 1D 1A 5B 1A 5B 99   ][..[.[.   0101 1101 0101 1011 0001 1101 0001 1010 0101 1011 0001 1010 0101 1011 1001 1001

043BD 48 1C DD 1E 5B 19 68 18   H...[.h.   0100 1000 0001 1100 1101 1101 0001 1110 0101 1011 0001 1001 0110 1000 0001 1000

043C5 2D 44 54 FB 21 F9 3F 06   -DT.!.?.   0010 1101 0100 0100 0101 0100 1111 1011 0010 0001 1111 1001 0011 1111 0000 0110

043CD 0B 51 15 3E C8 7E 4F C0   .Q.>.~O.   0000 1011 0101 0001 0001 0101 0011 1110 1100 1000 0111 1110 0100 1111 1100 0000

043D5 C0 00 00 00 00 00 0E 03   ........   1100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1110 0000 0011

043DD FD 01 90 44 08 00 00 00   ...D....   1111 1101 0000 0001 1001 0000 0100 0100 0000 1000 0000 0000 0000 0000 0000 0000

043E5 00 00 00 E0 BF 40 90 34   .....@.4   0000 0000 0000 0000 0000 0000 1110 0000 1011 1111 0100 0000 1001 0000 0011 0100

043ED 10 E4 10 E3 00            .....      0001 0000 1110 0100 0001 0000 1110 0011 0000 0000

043F2 8F AA                     crc
```

NOTE: OBJECTS LISTED AFTER THIS POINT DO NOT HAVE FIXED TYPES. THEIR TYPES ARE DETERMINED BY FINDING THE CLASS ENTRY WHOSE POSITION IN THE CLASS LIST + 500 EQUALS THE TYPE OF THIS OBJECT

DICTIONARYVAR (varies)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Intval	RC		an integer value
Str	BS		a string
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: proxy (1F9H), len 12H (18), handle: 01 EA

    0CDB4 12 00                 ..        0001 0010 0000 0000

    0CDB6 3E 40 40 80 7A A7 00 00   >@@.z...   0011 1110 0100 0000 0100 0000 1000 0000 0111 1010 1010 0111 0000 0000 0000 0000

    0CDBE 00 04 04 01 01 33 40 41   .....3@A   0000 0000 0000 0100 0000 0100 0000 0001 0000 0001 0011 0011 0100 0000 0100 0001

    0CDC6 A2 30                 .0        1010 0010 0011 0000

    0CDC8 AC DA                 crc
```

HATCH (varies)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Z coord	BD	30	X, Y always 0.0
Extrusion	3BD	210	
Name	T	2	name of hatch
Solidfill	B	70	1 if solidfill, else 0
Associative	B	71	1 if associative, else 0
Numpaths	BL	91	Number of paths enclosing the hatch

```
/* definitions of the hatch boundaries */

Repeat numpaths times:
  Pathflag     BL  92  Path flag
  if (!(pathflag & 2)) {
    Numpathsegs   BL  93  number of segments in this path
    Repeat numpathsegs times:
      pathtypestatus   RC  72  type of path
      if (pathtypestatus==1) {    /* LINE */
        pt0              2RD  10  first endpoint
        pt1              2RD  11  second endpoint
      }
      else if (pathtypestatus==2) {  /* CIRCULAR ARC */
        pt0              2RD  10  center
        radius            BD  40  radius
        startangle        BD  50  start angle
        endangle          BD  51  endangle
        isccw             B   73  1 if counter clockwise, otherwise 0
      }
      else if (pathtypestatus==3) {  /* ELLIPTICAL ARC */
```

```
        pt0              2RD  10  center
        endpoint         2RD  11  endpoint of major axis
        minormajoratio    BD  40  ratio of minor to major axis
        startangle        BD  50  start angle
        endangle          BD  51  endangle
        isccw              B  73  1 if counter clockwise, otherwise 0
      }
      else if (pathtypestatus==4) {  /* SPLINE */
        degree            BL  94  degree of the spline
        isrational         B  73  1 if rational (has weights), else 0
        isperiodic         B  74  1 if periodic, else 0
        numknots          BL  95  number of knots
        numctlpts         BL  96  number of control points
        Repeat numknots times:
           knot               BD  40  knot value
        End repeat
        Repeat numctlpts times:
          pt0                2RD  10  control point
          if (isrational)
            weight            BD  40  weight
          endif
        End repeat
      }
    End repeat (numpathsegs)
  } /* (!(pathflag & 2)) */
  else {  /* POLYLINE PATH */
    bulgespresent         B  72  bulges are present if 1
    closed                B  73  1 if closed
    numpathsegs          BL  91  number of path segments
    Repeat numpathsegs times:
      pt0                 2RD  10  point on polyline
      if (bulgespresent) {
        bulge               BD  42  bulge
      }
    End repeat
  }  /* pathflag & 2 */
  numboundaryobjhandles     BL  97  Number of boundary object handles for this path
End repeat (numpaths)

/* below this point is the definition of the hatch itself */
       style                BS     75     style of hatch  0==odd parity,
                                          1==outermost,     2==whole area
```

```
       patterntype          BS     76      pattern type  0==user-defined,
                                           1==predefined, 2==custom
if (!solidfill) {
  angle          BD  52  hatch angle
  scaleorspacing BD  41  scale or spacing (pattern fill only)
  doublehatch     B  77  1 for double hatch
  numdeflines    BS  78  number of definition lines
  Repeat numdeflines times:
    angle           BD  53  line angle
    pt0            2BD  43/44  pattern through this point (X,Y)
    offset         2BD  45/56  pattern line offset
    numdashes       BS  79  number of dash length items
    Repeat numdashes times:
      dashlength      BD  49  dash length
    End repeat
  End repeat
}
if (ANY of the pathflags & 4) {
  pixelsize        BD  47  pixel size
}
numseedpoints      BL  98  number of seed points
Repeat numseedpoints times:
  pt0               2RD  10  seed point
End repeat

       Handle refs           H             [Reactors (CODE 4)]
                                           xdicobjhandle (CODE 3)
                                     8     LAYER (CODE 5)
                                     6     [LTYPE (CODE 5)]
                                           [PREVIOUS ENTITY (CODE 4)]
                                           [NEXT ENTITY (CODE 4)]
Repeat totalbounditems (sum of all "numboundaryitems") times
  boundaryhandle    H  330  boundary handle
End repeat

       CRC                    X     ---
```

Example:

```
OBJECT: proxy (1F5H), len E2H (226), handle: 68

   069C4 E2 00                  ..        1110 0010 0000 0000

   069C6 3D 40 40 5A 26 70 30 00   =@@Z&p0.   0011 1101 0100 0000 0100 0000 0101 1010 0010 0110 0111 0000 0011 0000 0000 0000
```

```
069CE 02 80 DB 54 A0 C8 29 CA   ...T..).   0000 0010 1000 0000 1101 1011 0101 0100 1010 0000 1100 1000 0010 1001 1100 1010
069D6 69 26 66 22 02 80 A0 80   i&f"....   0110 1001 0010 0110 0110 0110 0010 0010 0000 0010 1000 0000 1010 0000 1000 0000
069DE 28 03 02 5A E2 89 80 68   (..Z...h   0010 1000 0000 0011 0000 0010 0101 1010 1110 0010 1000 1001 1000 0000 0110 1000
069E6 0D 0F 09 03 C3 C3 C0 88   ........   0000 1101 0000 1111 0000 1001 0000 0011 1100 0011 1100 0011 1100 0000 1000 1000
069EE 1C 12 5E 96 B9 91 BC A7   ..^.....   0001 1100 0001 0010 0101 1110 1001 0110 1011 1001 1001 0001 1011 1100 1010 0111
069F6 F6 1A C1 03 D6 06 A0 88   ........   1111 0110 0001 1010 1100 0001 0000 0011 1101 0110 0000 0110 1010 0000 1000 1000
069FE 00 3C 12 5E 96 B9 91 BC   .<.^....   0000 0000 0011 1100 0001 0010 0101 1110 1001 0110 1011 1001 1001 0001 1011 1100
06A06 A7 F6 1A C1 03 D6 06 A0   ........   1010 0111 1111 0110 0001 1010 1100 0001 0000 0011 1101 0110 0000 0110 1010 0000
06A0E 88 1A 0F A5 B5 4C A8 1F   .....L..   1000 1000 0001 1010 0000 1111 1010 0101 1011 0101 0100 1100 1010 1000 0001 1111
06A16 47 EC 11 0B 35 26 AC 5D   G...5&.]   0100 0111 1110 1100 0001 0001 0000 1011 0011 0101 0010 0110 1010 1100 0101 1101
06A1E C7 E0 3A 0F A5 B5 4C A8   ..:...L.   1100 0111 1110 0000 0011 1010 0000 1111 1010 0101 1011 0101 0100 1100 1010 1000
06A26 1F 47 EC 11 0B 35 26 AC   .G...5&.   0001 1111 0100 0111 1110 1100 0001 0001 0000 1011 0011 0101 0010 0110 1010 1100
06A2E 5D C7 EA 06 B5 C1 81 D1   ].......   0101 1101 1100 0111 1110 1010 0000 0110 1011 0101 1100 0001 1000 0001 1101 0001
06A36 80 28 10 04 08 44 05 F1   .(...D..   1000 0000 0010 1000 0001 0000 0000 0100 0000 1000 0100 0100 0000 0101 1111 0001
06A3E 1E 87 E0 2A 06 B5 C1 81   ...*....   0001 1110 1000 0111 1110 0000 0010 1010 0000 0110 1011 0101 1100 0001 1000 0001
06A46 D1 80 28 10 04 08 44 05   ..(...D.   1101 0001 1000 0000 0010 1000 0001 0000 0000 0100 0000 1000 0100 0100 0000 0101
06A4E F1 1E 87 E8 03 02 5A E2   ......Z.   1111 0001 0001 1110 1000 0111 1110 1000 0000 0011 0000 0010 0101 1010 1110 0010
06A56 89 80 68 0D 0F 09 03 C3   ..h.....   1000 1001 1000 0000 0110 1000 0000 1101 0000 1111 0000 1001 0000 0011 1100 0011
06A5E C3 C0 88 14 80 83 05 A8   ........   1100 0011 1100 0000 1000 1000 0001 0100 1000 0000 1000 0011 0000 0101 1010 1000
06A66 8A 9F 64 3F 27 E4 D4 CC   ..d?'...   1000 1010 1001 1111 0110 0100 0011 1111 0010 0111 1110 0100 1101 0100 1100 1100
06A6E CC CC CC CD C9 F9 01 34   .......4   1100 1100 1100 1100 1100 1100 1100 1101 1100 1001 1111 1001 0000 0001 0011 0100
06A76 88 4C DF DF 36 40 90 28   .L..6@.(   1000 1000 0100 1100 1101 1111 1101 1111 0011 0110 0100 0000 1001 0000 0010 1000
06A7E 0B 63 FF 51 18 1A 82 BF   .c.Q....   0000 1011 0110 0011 1111 1111 0101 0001 0001 1000 0001 1010 1000 0010 1011 1111
06A86 02 98 FF D4 46 06 A0 AF   ....F...   0000 0010 1001 1000 1111 1111 1101 0100 0100 0110 0000 0110 1010 0000 1010 1111
06A8E E4 04 00 00 00 00 00 00   ........   1110 0100 0000 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
06A96 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
06A9E 00 01 05 EC C1 44 3E 02   .....D>.   0000 0000 0000 0001 0000 0101 1110 1100 1100 0001 0100 0100 0011 1110 0000 0010
06AA6 84 17                     ..        1000 0100 0001 0111
06AA8 C2 EA                     crc
```

IDBUFFER (varies)

(holds list of references to an xref)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.

EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Unknown	RC		always 0?
Numobjids	BL		number of object ids
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		330	objids (CODE 4)

Example:

```
OBJECT: proxy (1FAH), len 12H (18), handle: 8B

    04437 12 00                   ..        0001 0010 0000 0000

    04439 3E 80 40 62 E6 00 00 00   >.@b....   0011 1110 1000 0000 0100 0000 0110 0010 1110 0110 0000 0000 0000 0000 0000 0000

    04441 04 04 01 01 80 41 8A 30   .....A.0   0000 0100 0000 0100 0000 0001 0000 0001 1000 0000 0100 0001 1000 1010 0011 0000

    04449 41 89                   A.        0100 0001 1000 1001

    0444B C9 64                   crc
```

IMAGE (varies)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Classversion	BL	90	class version
pt0	3BD	10	insertion point
uvec	3BD	11	u direction vector
vvec	3BD	12	v direction vector
size	2RD	13	size of image

displayprops	BS	70	display properties (bit coded), 1==show image, 2==show image when not aligned with screen, 4==use clipping boundary, 8==transparency on
clipping	B	280	1 if on
brightness	RC	281	brightness value (0—100, default 50)
contrast	RC	282	contrast value (0—100, default 50)
fade	RC	283	fade value (0—100, default 0)
clipbndtype	BS	71	type of clipping boundary, 1==rect, 2==polygon
if (clipbndtype==1) {			
pt0	2RD	14	first corner of clip boundary
pt1	2RD	14	second corner of clip boundary
}			
else {			
numclipverts	BL	91	number of vertices in clipping polygon
Repeat numclipverts times:			
pt0	2RD	14	a point on the polygon
End repeat			
}			
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
			imagedef (CODE 5)
			imagedefreactor (CODE 3)
CRC	X	---	

Example:

```
OBJECT: proxy (1F9H), len 109H (265), handle: 6D

    02D3E 09 01                   ..         0000 1001 0000 0001

    02D40 3E 40 40 5B 6C 60 00 00   >@@[l`..   0011 1110 0100 0000 0100 0000 0101 1011 0110 1100 0110 0000 0000 0000 0000 0000

    02D48 04 60 00 00 00 08 00 00   .`......   0000 0100 0110 0000 0000 0000 0000 0000 0000 0000 0000 1000 0000 0000 0000 0000

    02D50 04 20 00 00 00 30 00 00   . ...0..   0000 0100 0010 0000 0000 0000 0000 0000 0000 0000 0011 0000 0000 0000 0000 0000

    02D58 00 28 00 00 06 B5 6E 62   .(....nb   0000 0000 0010 1000 0000 0000 0000 0000 0000 0110 1011 0101 0110 1110 0110 0010

    02D60 0B AA E1 02 00 03 72 C5   ......r.   0000 1011 1010 1010 1110 0001 0000 0010 0000 0000 0000 0011 0111 0010 1100 0101

    02D68 63 F8 D8 AA 00 00 00 00   c.......   0110 0011 1111 1000 1101 1000 1010 1010 0000 0000 0000 0000 0000 0000 0000 0000
```

```
02D70 00 00 00 00 06 B5 6E 62   ......nb   0000 0000 0000 0000 0000 0000 0000 0000 0110 1011 0101 0110 1110 0110 0010
02D78 0B AA E1 02 00 03 72 C5   ......r.   0000 1011 1010 1010 1110 0001 0000 0010 0000 0000 0000 0011 0111 0010 1100 0101
02D80 63 F8 D8 CA 00 00 00 00   c.......   0110 0011 1111 1000 1101 1000 1100 1010 0000 0000 0000 0000 0000 0000 0000 0000
02D88 00 00 00 00 06 B5 6E 62   ......nb   0000 0000 0000 0000 0000 0000 0000 0000 0110 1011 0101 0110 1110 0110 0010
02D90 0B AA E1 12 00 03 72 C5   ......r.   0000 1011 1010 1010 1110 0001 0001 0010 0000 0000 0000 0011 0111 0010 1100 0101
02D98 63 F8 D8 CA 00 00 00 00   c.......   0110 0011 1111 1000 1101 1000 1100 1010 0000 0000 0000 0000 0000 0000 0000 0000
02DA0 00 00 00 00 06 B5 6E 62   ......nb   0000 0000 0000 0000 0000 0000 0000 0000 0110 1011 0101 0110 1110 0110 0010
02DA8 0B AA E1 12 00 03 72 C5   ......r.   0000 1011 1010 1010 1110 0001 0001 0010 0000 0000 0000 0011 0111 0010 1100 0101
02DB0 63 F8 D8 AA 00 00 00 00   c.......   0110 0011 1111 1000 1101 1000 1010 1010 0000 0000 0000 0000 0000 0000 0000 0000
02DB8 00 00 00 00 06 B5 6E 62   ......nb   0000 0000 0000 0000 0000 0000 0000 0000 0110 1011 0101 0110 1110 0110 0010
02DC0 0B AA E1 02 00 03 72 C5   ......r.   0000 1011 1010 1010 1110 0001 0000 0010 0000 0000 0000 0011 0111 0010 1100 0101
02DC8 63 F8 D8 AA 00 00 00 00   c.......   0110 0011 1111 1000 1101 1000 1010 1010 0000 0000 0000 0000 0000 0000 0000 0000
02DD0 00 00 00 00 06 D0 38 00   ......8.   0000 0000 0000 0000 0000 0000 0000 0000 0000 0110 1101 0000 0011 1000 0000 0000
02DD8 02 80 DB 46 B5 6E 62 0B   ...F.nb.   0000 0010 1000 0000 1101 1011 0100 0110 1011 0101 0110 1110 0110 0010 0000 1011
02DE0 AA E1 02 00 00 DC B1 58   .......X   1010 1010 1110 0001 0000 0010 0000 0000 0000 0000 1101 1100 1011 0001 0101 1000
02DE8 FE 36 2A 81 00 00 00 00   .6*.....   1111 1110 0011 0110 0010 1010 1000 0001 0000 0000 0000 0000 0000 0000 0000 0000
02DF0 00 00 10 07 F4 00 00 00   ........   0000 0000 0000 0000 0001 0000 0000 0111 1111 0100 0000 0000 0000 0000 0000 0000
02DF8 00 00 53 10 9E 00 00 00   ..S.....   0000 0000 0000 0000 0101 0011 0001 0000 1001 1110 0000 0000 0000 0000 0000 0000
02E00 00 00 00 10 07 F0 00 00   ........   0000 0000 0000 0000 0000 0000 0001 0000 0000 0111 1111 0000 0000 0000 0000 0000
02E08 00 00 00 03 02 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0011 0000 0010 0000 0000 0000 0000 0000 0000
02E10 00 00 00 03 02 02 0E 32   .......2   0000 0000 0000 0000 0000 0000 0000 0011 0000 0010 0000 0010 0000 1110 0011 0010
02E18 32 00 40 40 00 00 00 00   2.@@....   0011 0010 0000 0000 0100 0000 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000
02E20 00 38 2F C0 00 00 00 00   .8/.....   0000 0000 0011 1000 0010 1111 1100 0000 0000 0000 0000 0000 0000 0000 0000 0000
02E28 00 38 2F C0 00 00 00 00   .8/.....   0000 0000 0011 1000 0010 1111 1100 0000 0000 0000 0000 0000 0000 0000 0000 0000
02E30 38 17 D0 00 00 00 00 00   8.......   0011 1000 0001 0111 1101 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
02E38 38 17 D0 10 5E CC 14 43   8...^..C   0011 1000 0001 0111 1101 0000 0001 0000 0101 1110 1100 1100 0001 0100 0100 0011
02E40 F0 41 68 43 54 5A CC 5B   .AhCTZ.[   1111 0000 0100 0001 0110 1000 0100 0011 0101 0100 0101 1010 1100 1100 0101 1011
02E48 3F                        ?          0011 1111
02E49 0D 2A                     crc
```

IMAGEDEF (varies)

(used in conjunction with IMAGE entities)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.

EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Clsver	BL	0	class version
Imgsize	2RD	10	size of image in pixels
Filepath	T	1	path to file
Isloaded	B	280	0==no, 1==yes
Resunits	RC	281	0==none, 2==centimeters, 5==inches
Pixelsize	2RD	11	size of one pixel in AutoCAD units
Handle refs	H		parenthandle (CODE 3)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: proxy (1F7H), len 4EH (78), handle: 6B

    04349 4E 00                   N.        0100 1110 0000 0000

    0434B 3D C0 40 5A E3 B0 20 00   =.@Z.. .   0011 1101 1100 0000 0100 0000 0101 1010 1110 0011 1011 0000 0010 0000 0000 0000

    04353 04 0A 00 00 00 00 00 00   ........   0000 0100 0000 1010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0435B 60 40 00 00 00 00 00 00   `@......   0110 0000 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    04363 60 40 46 D0 CE 97 15 D2   `@F.....   0110 0000 0100 0000 0100 0110 1101 0000 1100 1110 1001 0111 0001 0101 1101 0010

    0436B 53 93 95 17 11 99 58 5D   S.....X]   0101 0011 1001 0011 1001 0101 0001 0111 0001 0001 1001 1001 0101 1000 0101 1101

    04373 1A 19 5C 95 19 5E 1D 1D   ..\..^..   0001 1010 0001 1001 0101 1100 1001 0101 0001 1001 0101 1110 0001 1101 0001 1101

    0437B 5C 99 4B 98 9B 5C 20 5E   \.K..\ ^   0101 1100 1001 1001 0100 1011 1001 1000 1001 1011 0101 1100 0010 0000 0101 1110

    04383 25 D4 EB 07 52 BA C7 FE   %...R...   0010 0101 1101 0100 1110 1011 0000 0111 0101 0010 1011 1010 1100 0111 1111 1110

    0438B 25 D4 EB 07 52 BA C7 F0   %...R...   0010 0101 1101 0100 1110 1011 0000 0111 0101 0010 1011 1010 1100 0111 1111 0000

    04393 08 2D 48 2D 86 11       .-H-..    0000 1000 0010 1101 0100 1000 0010 1101 1000 0110 0001 0001

    04399 E8 23                   crc
```

IMAGEDEFREACTOR (varies)

(used in conjunction with IMAGE entities)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj

Classver	BL	90	class version
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4])
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: proxy (1F8H), len CH (12), handle: 6C


   02E4B 0C 00                   ..        0000 1100 0000 0000


   02E4D 3E 00 40 5B 25 00 00 00   >.@[%...   0011 1110 0000 0000 0100 0000 0101 1011 0010 0101 0000 0000 0000 0000 0000 0000
   02E55 09 02 60 30               ..`0      0000 1001 0000 0010 0110 0000 0011 0000
   02E59 A1 13                   crc
```

LAYER_INDEX

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
timestamp1	BL	40	
timestamp2	BL	40	
numentries	BL		the number of entries
Repeat numentries times:			
Indexlong	BL		a long
Indexstr	T	8	a layer name
End repeat			
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4])
			xdicobjhandle (CODE 3)
			entry handles, 1 per entry

Example:

```
OBJECT: proxy (1FFH), len 59H (89), handle: 01 F8
```

```
0D1CD 59 00                   Y.        0101 1001 0000 0000

0D1CF 3F C0 40 80 7E 20 C0 20 ?.@.~ .   0011 1111 1100 0000 0100 0000 1000 0000 0111 1110 0010 0000 1100 0000 0010 0000

0D1D7 00 04 04 61 65 25 00 3B ...ae%.;  0000 0000 0000 0100 0000 0100 0110 0001 0110 0101 0010 0101 0000 0000 0011 1011

0D1DF 3A 89 80 90 64 DD 01 30 :...d..0  0011 1010 1000 1001 1000 0000 1001 0000 0110 0100 1101 1101 0000 0001 0011 0000

0D1E7 42 50 64 15 34 84 14 44 BPd.4..D  0100 0010 0101 0000 0110 0100 0001 0101 0011 0100 1000 0100 0001 0100 0100 0100

0D1EF 54 05 08 55 52 4C 4C 41 T..URLLA  0101 0100 0000 0101 0000 1000 0101 0101 0101 0010 0100 1100 0100 1100 0100 0001

0D1F7 59 45 52 90 94 44 54 65 YER..DTe  0101 1001 0100 0101 0101 0010 1001 0000 1001 0100 0100 0100 0101 0100 0110 0101

0D1FF 04 F4 94 E5 45 34 1D 03 ....E4..  0000 0100 1111 0100 1001 0100 1110 0101 0100 0101 0011 0100 0001 1101 0000 0011

0D207 52 45 44 41 10 44 24 C5 REDA.D$.  0101 0010 0100 0101 0100 0100 0100 0001 0001 0000 0100 0100 0010 0100 1100 0101

0D20F 54 58 04 20 1F 73 03 20 TX. .s.   0101 0100 0101 1000 0000 0100 0010 0000 0001 1111 0111 0011 0000 0011 0010 0000

0D217 1F A3 20 1F B3 20 1F C3 .. .. ..  0001 1111 1010 0011 0010 0000 0001 1111 1011 0011 0010 0000 0001 1111 1100 0011

0D21F 20 1F D3 20 1F E3 20 1F  .. .. .  0010 0000 0001 1111 1101 0011 0010 0000 0001 1111 1110 0011 0010 0000 0001 1111

0D227 FE                      .         1111 1110

0D228 46 E8                   crc
```

LWPLINE (varies)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	
Ltype scale	BD	48	
Invisibility	BS	60	
Flag	BS	70	
if (flag & 4) {			
constwidth	BD	43	Constant width for this lwpline
}			
if (flag & 8) {			
elevation	BD	38	Elevation of this lwpline
}			
if (flag & 2) {			

	thickness	BD	39	thickness of this lwpline
}				
if (flag & 1) {				
	normal	3BD	210	extrusion direction
}				
	numpoints	BL	90	number of verts
if (flag & 16) {				
	numbulges	BL		number of bulges (when present, always same as number of verts in all examples so far
}				
if (flag & 32) {				
	numwidths	BL		number of width entries (when present, always same as number of verts in all examples so far.
}				
repeat numpoints times				
	pt0	2RD	10	vertex location
end repeat				
repeat numbulges times				
	bulge	BD	42	bulge value
end repeat				
repeat numwidths times				
	widths	2BD	40/41	start, end widths
end repeat				
	Handle refs	H		[Subentity ref handle (CODE 3)]
				[Reactors (CODE 4)]
				xdicobjhandle (CODE 3)
			8	LAYER (CODE 5)
			6	[LTYPE (CODE 5)]
				[PREVIOUS ENTITY (CODE 4)]
				[NEXT ENTITY (CODE 4)]

Example:

```
OBJECT: proxy (1FBH), len C8H (200), handle: 01 0F

   03E52 C8 00                   ..        1100 1000 0000 0000

   03E54 3E C0 40 80 43 D0 35 20   >.@.C.5    0011 1110 1100 0000 0100 0000 1000 0000 0100 0011 1101 0000 0011 0101 0010 0000

   03E5C 10 94 60 10 08 2A 0C 00   ..`..*..   0001 0000 1001 0100 0110 0000 0001 0000 0000 1000 0010 1010 0000 1100 0000 0000

   03E64 00 5E A0 20 80 12 14 85   .^. ....   0000 0000 0101 1110 1010 0000 0010 0000 1000 0000 0001 0010 0001 0100 1000 0101

   03E6C 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

   03E74 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

   03E7C 00 00 00 00 00 00 14 A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0100 1010 0000
```

```
03E84 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
03E8C 00 00 00 00 00 00 14 A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0100 1010 0000
03E94 00 00 00 00 00 00 78 1F   ......x.   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 1000 0001 1111
03E9C 80 00 00 00 00 40 23 20   .....@#    1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0100 0000 0010 0011 0010 0000
03EA4 00 00 00 00 00 00 78 1F   ......x.   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0111 1000 0001 1111
03EAC 80 00 00 00 00 40 23 20   .....@#    1000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0100 0000 0010 0011 0010 0000
03EB4 00 00 00 00 00 00 00 20   .......    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 0000
03EBC 00 00 00 00 00 40 23 20   .....@#    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0100 0000 0010 0011 0010 0000
03EC4 00 00 00 00 00 00 1E 20   .......    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1110 0010 0000
03ECC 00 00 00 00 00 40 23 20   .....@#    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0100 0000 0010 0011 0010 0000
03ED4 00 00 00 00 00 00 1E A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1110 1010 0000
03EDC 00 00 00 00 00 00 14 A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0100 1010 0000
03EE4 00 00 00 00 00 00 1E A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1110 1010 0000
03EEC 00 00 00 00 00 00 14 A0   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0100 1010 0000
03EF4 00 00 00 00 00 00 1F 20   .......    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1111 0010 0000
03EFC 00 00 00 00 00 00 00 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
03F04 00 00 00 00 00 00 1F 20   .......    0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1111 0010 0000
03F0C 55 1F FF FF FF FF FF FD   U.......   0101 0101 0001 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1111 1101
03F14 F7 F5 56 08 19 82 88 7A   ..V....z   1111 0111 1111 0101 0101 0110 0000 1000 0001 1001 1000 0010 1000 1000 0111 1010
03F1C 85 93                     crc
```

OLE2FRAME (varies)

NOTE: THIS ENTITY WAS NOT COMPLETE AT PRESS TIME.

WE WILL BE RELEASING A REVISION TO THIS DOCUMENT WITH FURTHER INFORMATION.

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Graphic present Flag	B		1 if a graphic is present
Obj size	RL		size of object in bits, not including end handles
Entmode	BB		entity mode
Numreactors	BL		number of persistent reactors attached to this object
Isbylayerlt	B		1 if bylayer linetype, else 0
Nolinks	B		1 if major links are assumed +1, -1, else 0
Color	BS	62	

Ltype scale	BD	48	
Invisibility	BS	60	
Flags	BS	70	
Data Length	BL	--	Bit-pair-coded long giving the length of the data section that follows.

/ FURTHER INFO TO BE SUPPLIED IN THE NEXT REV OF THIS DOCUMENT */*

Unknown data	-	--	The OLE2 data.
Handle refs	H		[Subentity ref handle (CODE 3)]
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
		8	LAYER (CODE 5)
		6	[LTYPE (CODE 5)]
			[PREVIOUS ENTITY (CODE 4)]
			[NEXT ENTITY (CODE 4)]
CRC	X	---	

<<No example>>

PROXY (varies):

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Databits	X		databits, however many there are to the handles
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			objid object handles, as many as we can read until we run out of data. These are TYPEDOBJHANDLEs.

<<No example>>

RASTERVARIABLES (varies)

(used in conjunction with IMAGE entities)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).

Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Classver	BL	90	classversion
Dispfrm	BS	70	displayframe
Dispqual	BS	71	display quality
Units	BS	72	units
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: proxy (1F5H), len 11H (17), handle: 5A

    0CD78 11 00                   ..        0001 0001 0000 0000

    0CD7A 3D 40 40 56 A6 60 00 00   =@@V.`..   0011 1101 0100 0000 0100 0000 0101 0110 1010 0110 0110 0000 0000 0000 0000 0000

    0CD82 04 06 40 50 19 01 04 30   ..@P...0   0000 0100 0000 0110 0100 0000 0101 0000 0001 1001 0000 0001 0000 0100 0011 0000

    0CD8A C0                      .         1100 0000

    0CD8B DC D2                   crc
```

SORTENTSTABLE (varies)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numentries	BL		number of entries
Sorthandle	H		Sort handle (numentries of these, CODE 0)
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)
			owner handle (CODE 4)
			handles of objects (numentries of these, CODE 4)

Example:

```
OBJECT: proxy (1FAH), len 59H (89), handle: A5
```

```
0D015 59 00                   Y.        0101 1001 0000 0000

0D017 3E 80 40 69 67 80 10 00 >.@ig...  0011 1110 1000 0000 0100 0000 0110 1001 0110 0111 1000 0000 0001 0000 0000 0000

0D01F 04 05 12 01 6E 01 68 01 ....n.h.  0000 0100 0000 0101 0001 0010 0000 0001 0110 1110 0000 0001 0110 1000 0000 0001

0D027 6C 01 5E 01 53 01 6A 01 l.^.S.j.  0110 1100 0000 0001 0101 1110 0000 0001 0101 0011 0000 0001 0110 1010 0000 0001

0D02F 60 01 95 01 58 01 A6 01 `...X...  0110 0000 0000 0001 1001 0101 0000 0001 0101 1000 0000 0001 1010 0110 0000 0001

0D037 6F 01 6D 01 54 01 6B 01 o.m.T.k.  0110 1111 0000 0001 0110 1101 0000 0001 0101 0100 0000 0001 0110 1011 0000 0001

0D03F 56 01 69 01 76 01 55 40 V.i.v.U@  0101 0110 0000 0001 0110 1001 0000 0001 0111 0110 0000 0001 0101 0101 0100 0000

0D047 41 A4 30 41 19 41 6D 41 A.0A.AmA  0100 0001 1010 0100 0011 0000 0100 0001 0001 1001 0100 0001 0110 1101 0100 0001

0D04F 60 41 6B 41 56 41 A6 41 `AkAVA.A  0110 0000 0100 0001 0110 1011 0100 0001 0101 0110 0100 0001 1010 0110 0100 0001

0D057 69 41 58 41 76 41 54 41 iAXAvATA  0110 1001 0100 0001 0101 1000 0100 0001 0111 0110 0100 0001 0101 0100 0100 0001

0D05F 95 41 6E 41 6C 41 55 41 .AnAlAUA  1001 0101 0100 0001 0110 1110 0100 0001 0110 1100 0100 0001 0101 0101 0100 0001

0D067 6A 41 53 41 68 41 6F 41 jASAhAoA  0110 1010 0100 0001 0101 0011 0100 0001 0110 1000 0100 0001 0110 1111 0100 0001

0D06F 5E                      ^         0101 1110

0D070 D3 A5                   crc
```

SPATIAL_FILTER (varies)

(used to clip external references)

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numpts	BS	70	number of points /* really long? */

Repeat numpts times:

pt0	2RD	10	a point on the clip boundary

End repeat

Extrusion	3BD	210	extrusion
Clipbdorg	3BD	10	clip bound origin
Dispbound	BS	71	display boundary
Frontclipon	BS	72	1 if front clip on
Frontdist	BD	40	front clip dist (present if frontclipon==1)
Backclipon	BS	73	1 if back clip on
Backdist	BD	41	back clip dist (present if backclipon==1)
Invblktr	12BD	40	inverse block transformation matrix

			(double [4][3], column major order)
clipbdtr	12BD	40	clip bound transformation matrix
			(double [4][3], column major order)
Handle refs	H		parenthandle (CODE 4)
			[Reactors (CODE 4)]
			xdicobjhandle (CODE 3)

Example:

```
OBJECT: proxy (1FDH), len 7BH (123), handle: 02 15

    0D68A 7B 00                   {.        0111 1011 0000 0000

    0D68C 3F 40 40 80 85 6A A0 30   ?@@..j.0   0011 1111 0100 0000 0100 0000 1000 0000 1000 0101 0110 1010 1010 0000 0011 0000

    0D694 00 04 05 05 96 EA 02 5E   .......^   0000 0000 0000 0100 0000 0101 0000 0101 1001 0110 1110 1010 0000 0010 0101 1110

    0D69C 66 70 2E 40 3A AF B1 4B   fp.@:..K   0110 0110 0111 0000 0010 1110 0100 0000 0011 1010 1010 1111 1011 0001 0100 1011

    0D6A4 54 7F 16 40 27 E0 D7 48   T..@'..H   0101 0100 0111 1111 0001 0110 0100 0000 0010 0111 1110 0000 1101 0111 0100 1000

    0D6AC 12 9C 30 40 4A F2 5C DF   ..0@J.\.   0001 0010 1001 1100 0011 0000 0100 0000 0100 1010 1111 0010 0101 1100 1101 1111

    0D6B4 87 03 14 40 B5 AB 90 F2   ...@....   1000 0111 0000 0011 0001 0100 0100 0000 1011 0101 1010 1011 1001 0000 1111 0010

    0D6BC 93 F6 31 40 82 75 1C 3F   ..1@.u.?   1001 0011 1111 0110 0011 0001 0100 0000 1000 0010 0111 0101 0001 1100 0011 1111

    0D6C4 54 3A 17 40 75 79 73 B8   T:.@uys.   0101 0100 0011 1010 0001 0111 0100 0000 0111 0101 0111 1001 0111 0011 1011 1000

    0D6CC 56 D7 32 40 EF 3D 5C 72   V.2@.=\r   0101 0110 1101 0111 0011 0010 0100 0000 1110 1111 0011 1101 0101 1100 0111 0010

    0D6D4 DC 11 20 40 74 94 83 D9   .. @t...   1101 1100 0001 0001 0010 0000 0100 0000 0111 0100 1001 0100 1000 0011 1101 1001

    0D6DC 04 00 2E 40 E7 DF 2E FB   ...@....   0000 0100 0000 0000 0010 1110 0100 0000 1110 0111 1101 1111 0010 1110 1111 1011

    0D6E4 75 A7 20 40 A6 A4 06 9A   u. @....   0111 0101 1010 0111 0010 0000 0100 0000 1010 0110 1010 0100 0000 0110 1001 1010

    0D6EC 0F 88 C4 46 B0 5D 8A 70   ...F.].p   0000 1111 1000 1000 1100 0100 0100 0110 1011 0000 0101 1101 1000 1010 0111 0000

    0D6F4 26 06 E1 49 2C DE A1 C0   &..I,...   0010 0110 0000 0110 1110 0001 0100 1001 0010 1100 1101 1110 1010 0001 1100 0000

    0D6FC 70 29 9A A6 A9 90 10 80   p).....   0111 0000 0010 1001 1001 1010 1010 0110 1010 1001 1001 0000 0001 0000 1000 0000

    0D704 85 0C 10                 ...       1000 0101 0000 1100 0001 0000

    0D707 07 5E                   crc
```

SPATIAL_INDEX (varies):

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
timestamp1	BL		

timestamp2	BL	
unknown	X	rest of bits to handles
Handle refs	H	parenthandle (CODE 3)
		[Reactors (CODE 4)]
		xdictionary (CODE 3)

Example:

```
OBJECT: proxy (200H), len 406H (1030), handle: 01 F9

    0D280 06 04                    ..        0000 0110 0000 0100

    0D282 00 00 80 80 7E 63 A1 F0  ....~c..  0000 0000 0000 0000 1000 0000 1000 0000 0111 1110 0110 0011 1010 0001 1111 0000

    0D28A 00 04 04 61 65 25 00 3B  ...ae%.;  0000 0000 0000 0100 0000 0100 0110 0001 0110 0101 0010 0101 0000 0000 0011 1011

    0D292 3A 89 80 88 F8 D8 33 54  :.....3T  0011 1010 1000 1001 1000 0000 1000 1000 1111 1000 1101 1000 0011 0011 0101 0100

    0D29A 4E 3A 94 10 02 D6 3C 73  N:....<s  0100 1110 0011 1010 1001 0100 0001 0000 0000 0010 1101 0110 0011 1100 0111 0011

    0D2A2 98 D3 04 FC 1F CD 85 40  .......@  1001 1000 1101 0011 0000 0100 1111 1100 0001 1111 1100 1101 1000 0101 0100 0000

    0D2AA 69 D4 B2 41 18 08 F6 18  i..A....  0110 1001 1101 0100 1011 0010 0100 0001 0001 1000 0000 1000 1111 0110 0001 1000

    0D2B2 FB 39 79 2F C4 29 C3 30  .9y/.).0  1111 1011 0011 1001 0111 1001 0010 1111 1100 0100 0010 1001 1100 0011 0011 0000

    0D2BA E2 0C 6C 84 10 00 00 89  ..l.....  1110 0010 0000 1100 0110 1100 1000 0100 0001 0000 0000 0000 0000 0000 1000 1001

    0D2C2 17 FE A4 92 FC 25 03 00  .....%..  0001 0111 1111 1110 1010 0100 1001 0010 1111 1100 0010 0101 0000 0011 0000 0000

    0D2CA 00 01 00 00 00 FF FF 00  ........  0000 0000 0000 0001 0000 0000 0000 0000 0000 0000 1111 1111 1111 1111 0000 0000

    0D2D2 00 FF FF 00 00 FF FF 01  ........  0000 0000 1111 1111 1111 1111 0000 0000 0000 0000 1111 1111 1111 1111 0000 0001

    0D2DA 00 00 04 58 00 D4 08 00  ...X....  0000 0000 0000 0000 0000 0100 0101 1000 0000 0000 1101 0100 0000 1000 0000 0000

    0D2E2 00 01 08 00 00 FE 8F 00  ........  0000 0000 0000 0001 0000 1000 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000

    0D2EA 00 FE 8F 00 00 FE 8F 00  ........  0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000

    0D2F2 00 01 08 00 00 FE 50 00  ......P.  0000 0000 0000 0001 0000 1000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0000

    0D2FA 00 FE 50 00 00 FE 50 03  ..P...P.  0000 0000 1111 1110 0101 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0011

    0D302 00 00 09 56 00 8B 01 00  ...V....  0000 0000 0000 0000 0000 1001 0101 0110 0000 0000 1000 1011 0000 0001 0000 0000

    0D30A 36 00 00 08 00 00 02 01  6.......  0011 0110 0000 0000 0000 0000 0000 1000 0000 0000 0000 0000 0000 0010 0000 0001

    0D312 09 00 3F FE 8F 00 00 FE  ..?.....  0000 1001 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110

    0D31A 50 00 00 FE 50 02 00 00  P...P...  0101 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0010 0000 0000 0000 0000

    0D322 07 E2 01 00 33 00 36 00  ....3.6.  0000 0111 1110 0010 0000 0001 0000 0000 0011 0011 0000 0000 0011 0110 0000 0000

    0D32A 00 00 02 01 0A 00 00 FE  ........  0000 0000 0000 0000 0000 0010 0000 0001 0000 1010 0000 0000 0000 0000 1111 1110

    0D332 50 00 3F FE 8F 00 00 FE  P.?.....  0101 0000 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110

    0D33A 50 03 00 00 09 DE 01 00  P.......  0101 0000 0000 0011 0000 0000 0000 0000 0000 1001 1101 1110 0000 0001 0000 0000

    0D342 13 00 22 00 00 00 00 00  ..".....  0001 0011 0000 0000 0010 0010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

    0D34A 02 01 0B 00 3F FE 8F 00  ....?...  0000 0010 0000 0001 0000 1011 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000
```

```
0D352 3F FE 8F 00 00 FE 50 04   ?.....P.   0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0100

0D35A 00 00 0B CF 01 00 01 00   ........   0000 0000 0000 0000 0000 1011 1100 1111 0000 0001 0000 0000 0000 0001 0000 0000

0D362 01 00 34 00 00 10 00 00   ..4.....   0000 0001 0000 0000 0011 0100 0000 0000 0000 0000 0001 0000 0000 0000 0000 0000

0D36A 02 01 1A 00 00 FE 8F 00   ........   0000 0010 0000 0001 0001 1010 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000

0D372 3F FE 8F 00 00 FE 50 01   ?.....P.   0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001

0D37A 00 00 05 CD 01 00 01 00   ........   0000 0000 0000 0000 0000 0101 1100 1101 0000 0001 0000 0000 0000 0001 0000 0000

0D382 00 00 02 02 01 09 00 70   .......p   0000 0000 0000 0000 0000 0010 0000 0010 0000 0001 0000 1001 0000 0000 0111 0000

0D38A FF FF 00 00 FE 8F 00 00   ........   1111 1111 1111 1111 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000 0000 0000

0D392 FE 8F 00 00 01 08 00 70   .......p   1111 1110 1000 1111 0000 0000 0000 0000 0000 0001 0000 1000 0000 0000 0111 0000

0D39A FE C0 00 00 FE 50 00 00   .....P..   1111 1110 1100 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0000 0000 0000

0D3A2 FE 50 02 00 00 07 BD 01   .P......   1111 1110 0101 0000 0000 0010 0000 0000 0000 0000 0000 0111 1011 1101 0000 0001

0D3AA 00 22 00 00 00 00 00 02   ."......   0000 0000 0010 0010 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010

0D3B2 01 09 00 AF FF FF 00 00   ........   0000 0001 0000 1001 0000 0000 1010 1111 1111 1111 1111 1111 0000 0000 0000 0000

0D3BA FE 50 00 00 FE 50 00 00   .P...P..   1111 1110 0101 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0000 0000 0000

0D3C2 02 01 0A 00 70 FE C0 00   ....p...   0000 0010 0000 0001 0000 1010 0000 0000 0111 0000 1111 1110 1100 0000 0000 0000

0D3CA 3F FE 8F 00 00 FE 50 01   ?.....P.   0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001

0D3D2 00 00 05 E0 01 00 22 00   ......".   0000 0000 0000 0000 0000 0101 1110 0000 0000 0001 0000 0000 0010 0010 0000 0000

0D3DA 00 00 02 01 0B 00 AF FF   ........   0000 0000 0000 0000 0000 0010 0000 0001 0000 1011 0000 0000 1010 1111 1111 1111

0D3E2 FF 00 3F FE 8F 00 00 FE   ..?.....   1111 1111 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110

0D3EA 50 00 00 02 02 01 0A 00   P.......   0101 0000 0000 0000 0000 0000 0000 0010 0000 0010 0000 0001 0000 1010 0000 0000

0D3F2 00 FE 8F 00 70 FF FF 00   ....p...   0000 0000 1111 1110 1000 1111 0000 0000 0111 0000 1111 1111 1111 1111 0000 0000

0D3FA 00 FE 8F 00 00 01 08 00   ........   0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 0000 0001 0000 1000 0000 0000

0D402 00 FE 50 00 70 FE C0 00   ..P.p...   0000 0000 1111 1110 0101 0000 0000 0000 0111 0000 1111 1110 1100 0000 0000 0000

0D40A 00 FE 50 07 00 00 12 95   ..P.....   0000 0000 1111 1110 0101 0000 0000 0111 0000 0000 0000 0000 0001 0010 1001 0101

0D412 01 00 14 00 34 00 25 00   ....4.%.   0000 0001 0000 0000 0001 0100 0000 0000 0011 0100 0000 0000 0010 0101 0000 0000

0D41A 01 00 15 00 C7 01 00 57   .......W   0000 0001 0000 0000 0001 0101 0000 0000 1100 0111 0000 0001 0000 0000 0101 0111

0D422 02 00 00 02 01 09 00 3F   .......?   0000 0010 0000 0000 0000 0000 0000 0010 0000 0001 0000 1001 0000 0000 0011 1111

0D42A FE 8F 00 70 FE C0 00 00   ...p....   1111 1110 1000 1111 0000 0000 0111 0000 1111 1110 1100 0000 0000 0000 0000 0000

0D432 FE 50 03 00 00 09 81 02   .P......   1111 1110 0101 0000 0000 0011 0000 0000 0000 0000 0000 1001 1000 0001 0000 0010

0D43A 00 18 00 01 00 25 00 00   .....%..   0000 0000 0001 1000 0000 0000 0000 0001 0000 0000 0010 0101 0000 0000 0000 0000

0D442 00 02 01 0A 00 00 FE 50   .......P   0000 0000 0000 0010 0000 0001 0000 1010 0000 0000 0000 0000 1111 1110 0101 0000

0D44A 00 AF FF FF 00 00 FE 50   .......P   0000 0000 1010 1111 1111 1111 1111 1111 0000 0000 0000 0000 1111 1110 0101 0000

0D452 0F 00 00 21 D3 01 00 01   ...!....   0000 1111 0000 0000 0000 0000 0010 0001 1101 0011 0000 0001 0000 0000 0000 0001
```

```
0D45A 00 01 00 01 00 01 00 29   .......)   0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0010 1001

0D462 00 76 00 01 00 01 00 01   .v......   0000 0000 0111 0110 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0001

0D46A 00 01 00 01 00 01 00 01   ........   0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0001

0D472 00 5A 00 D0 9A 00 00 02   .Z......   0000 0000 0101 1010 0000 0000 1101 0000 1001 1010 0000 0000 0000 0000 0000 0010

0D47A 01 0B 00 3F FE 8F 00 AF   ...?....   0000 0001 0000 1011 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 1010 1111

0D482 FF FF 00 00 FE 50 00 00   .....P..   1111 1111 1111 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0000 0000 0000

0D48A 02 01 18 00 00 FE 8F 00   ........   0000 0010 0000 0001 0001 1000 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000

0D492 70 FE C0 00 00 FE 50 01   p.....P.   0111 0000 1111 1110 1100 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001

0D49A 00 00 04 54 00 00 00 00   ...T....   0000 0000 0000 0000 0000 0100 0101 0100 0000 0000 0000 0000 0000 0000 0000 0000

0D4A2 00 02 02 01 0B 00 70 FF   ......p.   0000 0000 0000 0010 0000 0010 0000 0001 0000 1011 0000 0000 0111 0000 1111 1111

0D4AA FF 00 70 FF FF 00 00 FE   ..p.....   1111 1111 0000 0000 0111 0000 1111 1111 1111 1111 0000 0000 0000 0000 1111 1110

0D4B2 8F 00 00 01 08 00 70 FE   ......p.   1000 1111 0000 0000 0000 0000 0000 0001 0000 1000 0000 0000 0111 0000 1111 1110

0D4BA C0 00 70 FE C0 00 00 FE   ..p.....   1100 0000 0000 0000 0111 0000 1111 1110 1100 0000 0000 0000 0000 0000 1111 1110

0D4C2 50 01 00 00 05 84 02 00   P.......   0101 0000 0000 0001 0000 0000 0000 0000 0000 0101 1000 0100 0000 0010 0000 0000

0D4CA 78 00 00 00 02 01 09 00   x.......   0111 1000 0000 0000 0000 0000 0000 0000 0000 0010 0000 0001 0000 1001 0000 0000

0D4D2 AF FF FF 00 70 FE C0 00   ....p...   1010 1111 1111 1111 1111 1111 0000 0000 0111 0000 1111 1110 1100 0000 0000 0000

0D4DA 00 FE 50 07 00 00 11 EE   ..P.....   0000 0000 1111 1110 0101 0000 0000 0111 0000 0000 0000 0000 0001 0001 1110 1110

0D4E2 03 00 01 00 01 00 01 00   ........   0000 0011 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000

0D4EA 03 00 01 00 01 00 00 77   .......w   0000 0011 0000 0000 0000 0001 0000 0000 0000 0001 0000 0000 0000 0000 0111 0111

0D4F2 00 00 02 01 0A 00 70 FE   ......p.   0000 0000 0000 0000 0000 0010 0000 0001 0000 1010 0000 0000 0111 0000 1111 1110

0D4FA C0 00 AF FF FF 00 00 FE   ........   1100 0000 0000 0000 1010 1111 1111 1111 1111 1111 0000 0000 0000 0000 1111 1110

0D502 50 00 00 02 01 0B 00 AF   P.......   0101 0000 0000 0000 0000 0000 0000 0010 0000 0001 0000 1011 0000 0000 1010 1111

0D50A FF FF 00 AF FF FF 00 00   ........   1111 1111 1111 1111 0000 0000 1010 1111 1111 1111 1111 1111 0000 0000 0000 0000

0D512 FE 50 02 00 00 07 F2 03   .P......   1111 1110 0101 0000 0000 0010 0000 0000 0000 0000 0000 0111 1111 0010 0000 0011

0D51A 00 01 00 FA FC 00 00 02   ........   0000 0000 0000 0001 0000 0000 1111 1010 1111 1100 0000 0000 0000 0000 0000 0010

0D522 02 01 18 00 00 FF FF 00   ........   0000 0010 0000 0001 0001 1000 0000 0000 0000 0000 1111 1111 1111 1111 0000 0000

0D52A 00 FE 8F 00 00 FE 8F 00   ........   0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000

0D532 00 01 18 00 00 FF FF 00   ........   0000 0000 0000 0001 0001 1000 0000 0000 0000 0000 1111 1111 1111 1111 0000 0000

0D53A 00 FE 50 00 00 FE 50 01   ..P...P.   0000 0000 1111 1110 0101 0000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001

0D542 00 00 05 EE 01 00 01 00   ........   0000 0000 0000 0000 0000 0101 1110 1110 0000 0001 0000 0000 0000 0001 0000 0000

0D54A 00 00 02 02 01 1A 00 00   ........   0000 0000 0000 0000 0000 0010 0000 0010 0000 0001 0001 1010 0000 0000 0000 0000

0D552 FF FF 00 70 FF FF 00 00   ...p....   1111 1111 1111 1111 0000 0000 0111 0000 1111 1111 1111 1111 0000 0000 0000 0000

0D55A FE 8F 01 00 00 05 A6 01   ........   1111 1110 1000 1111 0000 0001 0000 0000 0000 0000 0000 0101 1010 0110 0000 0001

0D562 00 00 00 00 00 01 1A 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0001 1010 0000 0000
```

```
0D56A 00 FF FF 00 AF FF FF 00   ........   0000 0000 1111 1111 1111 1111 0000 0000 1010 1111 1111 1111 1111 1111 0000 0000

0D572 00 FE 50 01 00 00 04 5E   ..P....^   0000 0000 1111 1110 0101 0000 0000 0001 0000 0000 0000 0000 0000 0100 0101 1110

0D57A 00 00 00 00 00 02 02 01   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 0000 0010 0000 0001

0D582 28 00 00 FE 8F 00 00 FF   (.......   0010 1000 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 1111 1111

0D58A FF 00 00 FE 8F 00 00 01   ........   1111 1111 0000 0000 0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 0000 0001

0D592 28 00 00 FE 50 00 00 FF   (...P...   0010 1000 0000 0000 0000 0000 1111 1110 0101 0000 0000 0000 0000 0000 1111 1111

0D59A FF 00 00 FE 50 01 00 00   ....P...   1111 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001 0000 0000 0000 0000

0D5A2 04 53 00 00 00 00 00 02   .S......   0000 0100 0101 0011 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010

0D5AA 01 29 00 3F FE 8F 00 00   .).?....   0000 0001 0010 1001 0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 0000 0000

0D5B2 FF FF 00 00 FE 50 01 00   .....P..   1111 1111 1111 1111 0000 0000 0000 0000 1111 1110 0101 0000 0000 0001 0000 0000

0D5BA 00 04 55 00 00 00 00 00   ..U.....   0000 0000 0000 0100 0101 0101 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

0D5C2 02 02 01 38 00 00 FE 8F   ...8....   0000 0010 0000 0010 0000 0001 0011 1000 0000 0000 0000 0000 1111 1110 1000 1111

0D5CA 00 00 FE 8F 00 00 FF FF   ........   0000 0000 0000 0000 1111 1110 1000 1111 0000 0000 0000 0000 1111 1111 1111 1111

0D5D2 00 00 01 3B 00 3F FE 8F   ...;.?..   0000 0000 0000 0000 0000 0001 0011 1011 0000 0000 0011 1111 1111 1110 1000 1111

0D5DA 00 3F FE 8F 00 00 FF FF   .?......   0000 0000 0011 1111 1111 1110 1000 1111 0000 0000 0000 0000 1111 1111 1111 1111

0D5E2 01 00 00 04 60 00 00 00   ....`...   0000 0001 0000 0000 0000 0000 0000 0100 0110 0000 0000 0000 0000 0000 0000 0000

0D5EA 00 00 02 02 02 00 42 1D   ......B.   0000 0000 0000 0000 0000 0010 0000 0010 0000 0010 0000 0000 0100 0010 0001 1101

0D5F2 FC 00 00 00 03 40 00 00   .....@..   1111 1100 0000 0000 0000 0000 0000 0000 0000 0011 0100 0000 0000 0000 0000 0000

0D5FA 34 3C 7C 40 32 6D 11 40   4<|@2m.@   0011 0100 0011 1100 0111 1100 0100 0000 0011 0010 0110 1101 0001 0001 0100 0000

0D602 3F FF FF FF F7 3C 7C 40   ?....<|@   0011 1111 1111 1111 1111 1111 1111 1111 1111 0111 0011 1100 0111 1100 0100 0000

0D60A 00 40 00 00 21 0E 21 40   .@..!.!@   0000 0000 0100 0000 0000 0000 0000 0000 0010 0001 0000 1110 0010 0001 0100 0000

0D612 A1 0E 21 40 98 00 77 C0   ..!@..w.   1010 0001 0000 1110 0010 0001 0100 0000 1001 1000 0000 0000 0111 0111 1100 0000

0D61A 06 3C BC 40 03 00 00 00   .<.@....   0000 0110 0011 1100 1011 1100 0100 0000 0000 0011 0000 0000 0000 0000 0000 0000

0D622 08 3C BC 40 05 00 00 00   .<.@....   0000 1000 0011 1100 1011 1100 0100 0000 0000 0101 0000 0000 0000 0000 0000 0000

0D62A 00 00 00 00 00 00 1E 00   ........   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 1110 0000 0000

0D632 70 88 95 C0 81 00 00 00   p.......   0111 0000 1000 1000 1001 0101 1100 0000 1000 0001 0000 0000 0000 0000 0000 0000

0D63A 11 84 50 C0 03 3C BC 40   ..P..<.@   0001 0001 1000 0100 0101 0000 1100 0000 0000 0011 0011 1100 1011 1100 0100 0000

0D642 3C 07 E4 C2 80 00 00 00   <.......   0011 1100 0000 0111 1110 0100 1100 0010 1000 0000 0000 0000 0000 0000 0000 0000

0D64A 00 00 1E 00 7F FF C0 00   ........   0000 0000 0000 0000 0001 1110 0000 0000 0111 1111 1111 1111 1100 0000 0000 0000

0D652 00 00 00 00 3A 40 00 00   ....:@..   0000 0000 0000 0000 0000 0000 0000 0000 0011 1010 0100 0000 0000 0000 0000 0000

0D65A 14 16 AB 40 00 00 00 00   ...@....   0001 0100 0001 0110 1010 1011 0100 0000 0000 0000 0000 0000 0000 0000 0000 0000

0D662 0F FC BC 40 11 0E D0 30   ...@...0   0000 1111 1111 1100 1011 1100 0100 0000 0001 0001 0000 1110 1101 0000 0011 0000

0D66A 40 90 80 7D CC 10 80 41   @..}...A   0100 0000 1001 0000 1000 0000 0111 1101 1100 1100 0001 0000 1000 0000 0100 0001
```

```
0D672 90 80 41 D0 80 42 10 80   ..A..B..   1001 0000 1000 0000 0100 0001 1101 0000 1000 0000 0100 0010 0001 0000 1000 0000

0D67A 48 50 80 48 90 80 48 D0   HP.H..H.   0100 1000 0101 0000 1000 0000 0100 1000 1001 0000 1000 0000 0100 1000 1101 0000

0D682 80 84 90 80 87 4E         .....N     1000 0000 1000 0100 1001 0000 1000 0000 1000 0111 0100 1110

0D688 54 B0                     crc
```

XRECORD (varies):

Length	MS	---	Entity length (not counting itself or CRC).
Type	BS	0	typecode (internal DWG type code).
Handle	H	5	Length (char) followed by the handle bytes.
EED	X	-3	See EED section.
Obj size	RL		Size of object in bits, not including end handles.
Numreactors	BL		Number of persistent reactors attached to this obj
Numdatabytes	BL		number of databytes
Databytes	X		databytes, however many there are to the handles
XRECORD data is pairs of:			RS indicator number, then data. The indicator number indicates the DXF number of the data, then the data follows, so for instance an indicator of 1 would be followed by the string length, the dwgcodepage, and then the string. An indicator of 70 would mean a 2 byte short following. An indicator of 10 indicates 3 8-byte doubles following. An indicator of 40 means 1 8-byte double. These indicator numbers all follow the normal AutoCAD DXF convention for group codes.
Handle refs	H		parenthandle (CODE 3)
			[Reactors (CODE 4)]
			xdictionary (CODE 3)
			objid object handles, as many as you can read until you run out of data

Example:

```
OBJECT: proxy (1F4H), len 65H (101), handle: 28

   00AC1 65 00                  e.        0110 0101 0000 0000

   00AC3 3D 00 40 4A 20 80 30 00   =.@J .0.   0011 1101 0000 0000 0100 0000 0100 1010 0010 0000 1000 0000 0011 0000 0000 0000

   00ACB 04 05 56 01 00 1B 00 0C   ..V.....   0000 0100 0000 0101 0101 0110 0000 0001 0000 0000 0001 1011 0000 0000 0000 1100

   00AD3 54 68 69 73 20 69 73 20   This is    0101 0100 0110 1000 0110 1001 0111 0011 0010 0000 0110 1001 0111 0011 0010 0000

   00ADB 61 20 74 65 73 74 20 78   a test x   0110 0001 0010 0000 0111 0100 0110 0101 0111 0011 0111 0100 0010 0000 0111 1000

   00AE3 72 65 63 6F 72 64 20 6C   record l   0111 0010 0110 0101 0110 0011 0110 1111 0111 0010 0110 0100 0010 0000 0110 1100

   00AEB 69 73 74 0A 00 00 00 00   ist.....   0110 1001 0111 0011 0111 0100 0000 1010 0000 0000 0000 0000 0000 0000 0000 0000
```

```
00AF3 00 00 00 F0 3F 00 00 00   ....?...   0000 0000 0000 0000 0000 0000 1111 0000 0011 1111 0000 0000 0000 0000 0000 0000

00AFB 00 00 00 00 40 00 00 00   ....@...   0000 0000 0000 0000 0000 0000 0000 0000 0100 0000 0000 0000 0000 0000 0000 0000

00B03 00 00 00 00 00 28 00 6F   .....(.o   0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0010 1000 0000 0000 0110 1111

00B0B 86 1B F0 F9 21 09 40 32   ....!.@2   1000 0110 0001 1011 1111 0000 1111 1001 0010 0001 0000 1001 0100 0000 0011 0010

00B13 00 D7 35 33 F0 F9 21 09   ..53..!.   0000 0000 1101 0111 0011 0101 0011 0011 1111 0000 1111 1001 0010 0001 0000 1001

00B1B 40 3E 00 01 00 46 00 B4   @>...F..   0100 0000 0011 1110 0000 0000 0000 0001 0000 0000 0100 0110 0000 0000 1011 0100

00B23 00 40 41 0C 30            .@A.0      0000 0000 0100 0000 0100 0001 0000 1100 0011 0000

00B28 45 76                     crc
```

9) OBJECT MAP

The Object Map is a table which gives the location of each object in the file This table is broken into sections. It is basically a list of handle/file loc pairs, and goes (something like) this:

```
Set the "last handle" to all 0 and the "last loc" to 0L;
Repeat until section size==2 (the last empty (except the CRC) section):
  Short: size of this section.  Note this is in BIGENDIAN order (MSB
         first)
  Repeat until out of data for this section:
    offset of this handle from last handle as modular char.
    offset of location in file from last loc as modular char.  (note
    that location offsets can be negative, if the terminating byte
    has the 4 bit set).
  End repeat.
  CRC
  End of section
End top repeat
```

Note that each section is cut off at a maximum length of 2032.

10) UNKNOWN SECTION

This section is largely unknown. The total size of this section is 53. We simply patch in "known to be valid" data. We first write a 0L, then the number of entries in the objmap +3, as a long. Then 45 bytes of "known to be valid data". Then we poke in the start address for objects at offset 16.

The 45 bytes of known to be valid data are:

```
0xA7,0x62,0x25,0x00,0xF6,0xAF,0x25,0x02,
0x3B,0x04,0x00,0x00,0x04,0x32,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x64,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x02,0x00,
0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,
0xFF,0x00,0x00,0x00,0x00
```

11) SECOND HEADER

Beginning sentinel

```
{0xD4,0x7B,0x21,0xCE,0x28,0x93,0x9F,0xBF,0x53,0x24,0x40,0x09,0x12,0x3C,0xAA,0x01 };
```

```
        RL : size of this section
         L : Location of this header (long, loc of start of sentinel).
        RC : "AC1012" or "AC1014" for R13 or R14 respectively
        RC : 6 0's
         B : 4 bits of 0
        RC : 0x18,0x78,0x01,0x04 for R13, 0x18,0x78,0x01,0x05 for R14

        RC : 0
         L : header address
         L : header size
        RC : 1
         L : class address
         L : class data size
        RC : 2
         L : Object map address (natural table)
         L : Object map size
        RC : 3
         L : Address of unknown section 3
         L : size of that section

         S : 14 (# of handle records following)

        RC : size of (valid chars in) handseed
        RC : 0
        RC : "size" characters of the handle

        RC : size of (valid chars in) block control objhandle
        RC : 1
        RC : "size" characters of the handle

        RC : size of (valid chars in) layer control objhandle
        RC : 2
        RC : "size" characters of the handle

        RC : size of (valid chars in) shapefile control objhandle
```

RC : 3

RC : "size" characters of the handle

RC : size of (valid chars in) linetype control objhandle

RC : 4

RC : "size" characters of the handle

RC : size of (valid chars in) view control objhandle

RC : 5

RC : "size" characters of the handle

RC : size of (valid chars in) ucs control objhandle

RC : 6

RC : "size" characters of the handle

RC : size of (valid chars in) vport control objhandle

RC : 7

RC : "size" characters of the handle

RC : size of (valid chars in) reg app control objhandle

RC : 8

RC : "size" characters of the handle

RC : size of (valid chars in) dimstyle control objhandle

RC : 9

RC : "size" characters of the handle

RC : size of (valid chars in) viewport entity header objhandle

RC : 10

RC : "size" characters of the handle

RC : size of (valid chars in) dictionary objhandle

RC : 11

RC : "size" characters of the handle

RC : size of (valid chars in) default multi-line style objhandle

RC : 12

RC : "size" characters of the handle

RC : size of (valid chars in) group dictionary objhandle

RC : 13

RC : "size" characters of the handle

CRC

RC : 8 bytes of junk (R14 only). Note that the junk is counted in the size of this section at the start.

Ending sentinel

{0x2B,0x84,0xDE,0x31,0xD7,0x6C,0x60,0x40,0xAC,0xDB,0xBF,0xF6,0xED,0xC3,0x55,0xFE}

12) IMAGE DATA (R13C3 AND LATER)

Start sentinel

```
{0x1F,0x25,0x6D,0x07,0xD4,0x36,0x28,0x28,0x9D,0x57,0xCA,0x3F,0x9D,0x44,0x10,0x2B }
       overall size          RL             overall size of image area
       imagespresent         RC             counter indicating what is present here
Repeat imagespresent times {
       Code                  RC             code indicating what follows
  if (code==1) {
       header data start     RL             start of header data
       header data size      RL             size of header data
  }
  if (code == 2) {
       start of bmp          RL             start of bmp data
       size of bmp           RL             size of bmp data
  }
  if (code == 3) {
       start of wmf          RL             start of wmf data
       size of wmf           RL             size of wmf data
  }
}
if (bmpdata is present) {
       bmp data              RC             (there are “size of bmp” bytes of data)
}
if (wmfdata is present) {
       wmf data              RC             (there are “size of wmf” bytes of data)
}
end sentinel
0xE0,0xDA,0x92,0xF8,0x2B,0xc9,0xD7,0xD7,0x62,0xA8,0x35,0xC0,0x62,0xBB,0xEF,0xD4 };
```

13) EXTENDED ENTITY DATA (EXTENDED OBJECT DATA)

EED directly follows the entity handle.

Each application's data is structured as follows:

```
|Length|Application handle|Data items|
```

Length is a bitshort indicating the length of the data for an app, not including itself, the bit-pair, or the app table handle. The above format repeats until a length of zero is found.

The application handle is a standard table handle reference: 0101|4-bit length|handle bytes|

Each data item has a 1-byte code (DXF group code minus 1000) followed by the value. It looks like there's no bit-pair coding within the data; that would throw off the length value (it would need to count bits, too). The form of the value is listed below for each type:

```
    0 (1000)   String.  1st byte of value is the length; this is followed by a 2-byte
short indicating the codepage.

    1 (1001)   This one seems to be invalid; can't even use as a string inside braces.
This would be a registered application that this data relates to, but we've already
had that above, so it would be redundant or irrelevant here.

    2 (1002)   A '{' or '}'; 1 byte; ASCII 0 means '{', ASCII 1 means '}'

    3 (1003)   A layer table reference.  The value is the handle of the layer; it's 8
bytes -- even if the leading ones are 0.  It's not a string; read it as hex, as usual
for handles.  (There's no length specifier this time.) Even layer 0 is referred to by
handle here.

    4 (1004)   Binary chunk.  The first byte of the value is a char giving the length;
the bytes follow.

    5 (1005)   An entity handle reference.  The value is given as 8 bytes -- even if
the leading ones are 0. It's not a string; read it as hex, as usual for handles.
(There's no length specifier this time.)

    10 - 13 (1010 - 1013)
               Points; 24 bytes (XYZ) -- 3 doubles

    40 - 42 (1040 - 1042)
               Reals; 8 bytes (double)

    70 (1070)  A short int; 2 bytes
    71 (1071)  A long  int; 4 bytes
```

14) PROXY ENTITY GRAPHICS

Proxy entities (zombies prior to R14) can have associated graphics data. The presence or absence of this data is indicated by the single bit which we call the “graphic present flag”, which mostly occurs on entity-type proxies, and very few other entities. Entity type proxies are proxies where the related class’s **itemclassid** field is equal to 0x1F2.

If that bit is 1, then following it, and preceding the RL which indicates the number of bits in the object, is an RL which indicates the number of bytes of proxy entity graphic data to follow.

Graphics data is padded to 4 byte boundaries! So, for instance, strings which are too short are padded out to the next 4 byte boundary. Similarly for lists of shorts.

We use the following defines to discriminate sub-item presence:

```
#define adHasPrimTraits(a)         (a & 0xFFFFL)
#define adPrimsHaveColors(a)       (a & 0x0001L)
#define adPrimsHaveLayers(a)       (a & 0x0002L)
#define adPrimsHaveLinetypes(a)    (a & 0x0004L)
#define adPrimsHaveMarkers(a)      (a & 0x0020L)
#define adPrimsHaveVisibilities(a) (a & 0x0040L)
#define adPrimsHaveNormals(a)      (a & 0x0080L)
#define adPrimsHaveOrientation(a)  (a & 0x0400L)
```

The graphics data comes in chunks with the following format:

```
        RL : size
        RL : type
type-specific data


valid types are:
```

CIRCLE 2

```
      3 RD : center of circle
        RD : radius
      3 RD : normal
```

CIRCLE3PT 3 (3 point circle)

```
      3 RD : first point
      3 RD : second point
      3 RD : third point
```

CIRCULARARC 4

```
      3 RD : center
        RD : radius
```

```
       3 RD  :  normal
       3 RD  :  start vector direction
         RD  :  sweep angle
         RL  :  arc type
```

CIRCULARARC3PT 5

```
       3 RD  :  first point
       3 RD  :  second point
       3 RD  :  third point
         RL  :  arc type
```

POLYLINE 6

```
         RL  :  number of points
       3 RD  :  a point (repeat "number of points" times)
```

POLYGON 7

```
         RL  :  number of points
       3 RD  :  a point (repeat "number of points" times)
```

MESH 8

```
RL:number of rows
RL:number of columns
Repeat "rows" times:
  Repeat "cols" times
    3 RD: vertex
  Endrep
Endrep

RL:edge primitive flags
if (adHasPrimTraits(edgeprimflag)) {
  compute nummeshedges as (rows-1)*cols + (cols-1) * rows
  if (adPrimsHaveColors(edgeprimflag) {
    RL: color for each edge
  }
  if (adPrimsHaveLayers(edgeprimflag)) {
    RL: layer ids, 1 for each edge
  }
  if (adPrimsHaveLinetypes(edgeprimflag)) {
    RL: linetype ids, 1 for each edge
  }
  if (adPrimsHaveMarkers(edgeprimflag)) {
    RL: marker indices, 1 for each edge
```

```
  }
  if (adPrimsHaveVisibilities(edgeprimflag)) {
    RL: visibility indicator, 1 for each edge
  }
}

RL: face primitive flags
if (adHasPrimTraits(faceprimflag)) {
  compute nummeshfaces as (rows-1)*(cols-1)
  if (adPrimsHaveColors(faceprimflag) {
    RL: color for each face
  }
  if (adPrimsHaveLayers(faceprimflag)) {
    RL: layer ids, 1 for each face
  }
  if (adPrimsHaveMarkers(faceprimflag)) {
    RL: marker indices, 1 for each face
  }
  if (adPrimsHaveNormals(faceprimflag)) {
    3 RD: normal, 1 for each face
  }
  if (adPrimsHaveVisibilities(faceprimflag)) {
    RL: visibility indicator, 1 for each face
  }
}

RL: vertex primitive flags
if (adHasPrimTraits(vertprimflag)) {
  compute numvertices as rows * cols
  if (adPrimsHaveNormals(vertprimflag)) {
    3 RD: normal, 1 for each vertex
  }
  if (adPrimsHaveOrientation(vertprimflag)) {
    RL: orientation indicator, 1 ONLY
  }
}
```

SHELL 9

```
         RL  :  number of points
       3 RD  :  vertex, 1 set of 3 for each vertex
         RL  :  number of face entries
```

RL : face entries, "number of face entries" of these indicates a face for the shell. negative entry indicates the number of entries to follow. then follow the entries, which indicate the vertices, read above, that make up that face. So for instance entries

-3,2,3,4 would mean a 3 sided face of vertices 2,3 and 4.

We scan this list and get the number of faces and edges.

```
RL: edge primitive flags
if (adHasPrimTraits(edgeprimflag)) {
  if (adPrimsHaveColors(edgeprimflag) {
    RL: color for each edge
  }
  if (adPrimsHaveLayers(edgeprimflag)) {
    RL: layer ids, 1 for each edge
  }
  if (adPrimsHaveLinetypes(edgeprimflag)) {
    RL: linetype ids, 1 for each edge
  }
  if (adPrimsHaveMarkers(edgeprimflag)) {
    RL: marker indices, 1 for each edge
  }
  if (adPrimsHaveVisibilities(edgeprimflag)) {
    RL: visibility indicator, 1 for each edge
  }
}

RL: face primitive flags
if (adHasPrimTraits(faceprimflag)) {
  if (adPrimsHaveColors(faceprimflag) {
    RL: color for each face
  }
  if (adPrimsHaveLayers(faceprimflag)) {
    RL: layer ids, 1 for each face
  }
  if (adPrimsHaveMarkers(faceprimflag)) {
    RL: marker indices, 1 for each face
  }
  if (adPrimsHaveNormals(faceprimflag)) {
    3 RD: normal, 1 for each face
  }
  if (adPrimsHaveVisibilities(faceprimflag)) {
    RL: visibility indicator, 1 for each face
  }
}

RL: vertex primitive flags
if (adHasPrimTraits(vertprimflag)) {
  compute numvertices as rows * cols
  if (adPrimsHaveNormals(vertprimflag)) {
    3 RD: normal, 1 for each vertex
  }
  if (adPrimsHaveOrientation(vertprimflag)) {
    RL: orientation indicator, 1 ONLY
  }
}
```

TEXT 10

3 RD : start point

3 RD : normal

3 RD : text direction

RD : height

RD : widthfactor

```
  RD : oblique angle
  PS : string, zero terminated and padded to 4 byte boundary
```

TEXT2 11

```
3 RD : start point
3 RD : normal
3 RD : text direction
  PS : string, padded to 4 byte boundary
  RL : length of string, -1 if zero terminated
  RL : "raw"; 0 if raw, 1 if not.  raw means don't interpret %% stuff
  RD : height
  RD : widthfactor
  RD : oblique angle
3 RD : x direction
  RL : ?
  PS : string, zero terminated, padded to 4 byte boundary name of font
  RL : ?
```

XLINE 12

```
3 RD : a point on the construction line
3 RD : another point
```

RAY 13

```
3 RD : a point on the construction line
3 RD : another point
```

These "SUBENT" items indicate changes for subsequently drawn items.

SUBENT_COLOR 14

```
  RL : color
```

SUBENT_LAYER 16

```
  RL : layer index
```

SUBENT_LINETYPE 18

```
  RL : linetype index, 0xFFFFFFFF for bylayer, 0xFFFFFFFE for byblock
```

SUBENT_MARKER 19

```
  RL : marker index
```

SUBENT_FILLON 20

```
  RL : fill on if 1, off if 0
```