

# GNU LibreDWG

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for version 0.12.4, 30 December 2020

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This manual is for GNU LibreDWG (version 0.12.4, 30 December 2020).

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# 1 Overview

LibreDWG is a free C library to read and write *DWG files*. The DWG file format was created in the 1970s for the then-emerging CAD applications.

This library is part of the GNU project, released under the aegis of GNU. It is made available under GPLv3+, i.e., under the terms of the GNU General Public License version 3, or (at your option) any later version.

It came out of code from the QCad Community Edition product from Ribbonsoft.

## 1.1 API/ABI version

LibreDWG 0.12.4 provides the API/ABI version 1. We hope that this doesn't need to change much in the future.

See `include/dwg.h` for `LIBREDWG_VERSION_MAJOR`, `LIBREDWG_VERSION_MINOR` and `LIBREDWG_SO_VERSION`.

## 1.2 Coverage

Because the DWG file format is not open, its specification had to be reverse-engineered. The specification is almost complete. The LibreDWG implementation of the specification is an ongoing process; as of version 0.12.4, coverage is approximately 99%.

It can read the formats R13, R14, R2000, R2004, R2007, R2010, R2013 and R2018 for 99%. R11 and earlier cannot be read yet, only partially. Reading R11 and earlier is only enabled with the development git checkout, not the released tarball.

Here is a list of features that are still missing.

### Reading pre-R13 DWG

Reading DWG formats for pre-R13 and some R2010+ non-graphical objects is an ongoing effort, some minor parts are missing. Most DWG's can be read, some undocumented classes are skipped.

### Writing pre-R13 and R2004+ DWG

Writing DWG formats for R2004 and later: R2007, R2010, R2013, R2018 is an ongoing effort. You need to patch the code to enable writing to the R2004+ format. See the `work/2004` branch. Writing to the specific R2007 format is not implemented. We write as default in the R2000 format only.

### Reading binary DXF

DXF support is now mostly implemented. ASCII DXF's are generated fully, with much more elements and fields and other free libraries, but AutoCAD fails to import some of them. See the `TODO` file for a detailed coverage report.

Reading binary DXF is still under construction, done about 80%.

Enabled entities and objects, but unstable, undertested. Field names may change:

For a detailed overview see the file `src/classes.inc` or `src/classes.c`.

```
ACSH_BREP_CLASS    ACSH_CHAMFER_CLASS    ACSH_CONE_CLASS
ACSH_PYRAMID_CLASS    ARC_DIMENSION    ASSOCACTION
ASSOCBLENDSSURFACEACTIONBODY    ASSOCEXTENDSUR-
FACEACTIONBODY    ASSOCEXTRUDEDSURFACEACTIONBODY
```

ASSOCFILLETSSURFACEACTIONBODY ASSOCGEOMDEPENDENCY ASSOCLOFTEDSURFACEACTIONBODY ASSOCNETWORKASSOCDEPENDENCY ASSOCVALUEDEPENDENCY ASSOCNETWORKSURFACEACTIONBODY ASSOCOFFSETSURFACEACTIONBODY ASSOCPATCHSURFACEACTIONBODY ASSOCPLANESURFACEACTIONBODY ASSOCREVOLVEDSURFACEACTIONBODY ASSOCTRIMSURFACEACTIONBODY BACKGROUND BLOCKLINEARPARAMETER BLOCKROTATIONPARAMETER BLOCKXYPARAMETER BLOCKVISIBILITYGRIP BLOCKVISIBILITYPARAMETER EVALUATION\_GRAPH HELIX LARGE\_RADIAL\_DIMENSION LIGHTLIST MATERIAL MENTALRAYRENDERSETTINGS OBJECT\_PTR RAPIDRTRENDERSETTINGS RENDERSETTINGS SECTION\_SETTINGS SPATIAL\_INDEX SUN TABLESTYLE (works only pre-2010)

Unhandled (fields spec'ed, but broken/undertested):

ACMECOMMANDHISTORY ACMESCOPE ACMESTATEMGR ACSH\_EXTRUSION\_CLASS ACSH\_LOFT\_CLASS ACSH\_REVOLVE\_CLASS ACSH\_SWEEP\_CLASS ALDIMOBJECTCONTEXTDATA ANNOTSCALEOBJECTCONTEXTDATA ASSOC2DCONSTRAINTGROUP ASSOCACTION ASSOCALIGNEDDIMACTIONBODY ASSOCEXTRUDEDSSURFACEACTIONBODY ASSOCGEOMDEPENDENCY ASSOCLOFTEDSURFACEACTIONBODY ASSOCNETWORKASSOCOSNAPPOINTREFACTIONPARAM ASSOCOSNAPPOINTREFACTIONPARAM ASSOCPERSSUBENTMANAGER ASSOCREVOLVEDSURFACEACTIONBODY ASSOCVERTEXACTIONPARAM ATEXT BLKREFOBJECTCONTEXTDATA CONTEXTDATAMANAGER CSACDOCUMENTOPTIONS CURVEPATH DATALINK DATATABLE DIMASSOC DYNAMICBLOCKPROXYNODE EXTRUDEDSSURFACE FCFOBJECTCONTEXTDATA GEOMAPIMAGE GEOPOSITIONMARKER LAYOUTPRINTCONFIG LEADEROBJECTCONTEXTDATA LOFTEDSSURFACE MLEADEROBJECTCONTEXTDATA MOTIONPATH MTEXTATTRIBUTEOBJECTCONTEXTDATA MTEXTOBJECTCONTEXTDATA NAVISWORKSMODEL NAVISWORKSMODELDEF NURBSURFACE PERSUBENTMGR PLANESURFACE POINTPATH RENDERENVIRONMENT RENDERENTRY RENDERGLOBAL REVOLVEDSSURFACE RTEXT SUNSTUDY SWEPTSSURFACE TABLE (works only pre-2010) TABLECONTENT TEXTOBJECTCONTEXTDATA TVDEVICEPROPERTIES

ASSOCDIMDEPENDENCYBODY BLOCKPARAMDEPENDENCYBODY ALIGNMENTPARAMETERENTITY BASEPOINTPARAMETERENTITY FLIPPARAMETERENTITY LINEARPARAMETERENTITY POINTPARAMETERENTITY ROTATIONPARAMETERENTITY VISIBILITYPARAMETERENTITY VISIBILITYGRIPENTITY XYPARAMETERENTITY BLOCKALIGNEDCONSTRAINTPARAMETER BLOCKANGULARCONSTRAINTPARAMETER BLOCKARRAYACTION BLOCKDIAMETRICCONSTRAINTPARAMETER BLOCKHORIZONTALCONSTRAINTPARAMETER BLOCKLINEARCONSTRAINTPARAMETER

TER BLOCKLOOKUPACTION BLOCKLOOKUPPARAMETER BLOCK-  
 POINTPARAMETER BLOCKPOLARGRIP BLOCKPOLARPARAMETER  
 BLOCKPOLARSTRETCHACTION BLOCKPROPERTIESTABLE BLOCK-  
 PROPERTIESTABLEGRIP BLOCKRADIALCONSTRAINTPARAMETER  
 BLOCKREPRESENTATION BLOCKSTRETCHACTION BLOCKUSER-  
 PARAMETER BLOCKVERTICALCONSTRAINTPARAMETER  
 BLOCKXYGRIP POINTCLOUD POINTCLOUDEX POINTCLOUDDEF  
 POINTCLOUDDEFEX POINTCLOUDDEF\_REACTOR POINTCLOUD-  
 DEF\_REACTOR\_EX POINTCLOUDCOLORMAP

See `src/classes.inc`.

Missing:

\* PROXY subentities, PROXY\_ENTITY

Halfway:

SUNSTUDY VBA\_PROJECT ASSOCACTION ASSOCNET-  
 WORK ASSOCALIGNEDDIMACTIONBODY ASSOCOSNAP-  
 POINTREFACTIONPARAM ASSOCPESSUBENTMANAGER  
 PERSUBENTMGR ASSOC2DCONSTRAINTGROUP EVAL-  
 UATION\_GRAPH ASSOCOSNAPPOINTREFACTIONPARAM  
 ACSH\_BOX\_CLASS ACSH\_EXTRUSION\_CLASS ACSH\_HISTORY\_CLASS  
 ACSH\_SWEEP\_CLASS NAVISWORKSMODEL (i.e. COORDINATION  
 MODEL) NAVISWORKSMODELDEF DATATABLE TABLESTYLE  
 ASSOCGEOMDEPENDENCY LAYOUTPRINTCONFIG RENDERENVI-  
 RONMENT RENDERGLOBAL LIGHTLIST SECTION\_SETTINGS

Unhandled (i.e. passed through, no DXF and fields):

ACDSRECORD ACDSSHEMA NPOCOLLECTION RAPIDRTREN-  
 DERENVIRONMENT XREFPANELOBJECT

no test coverage for entities:

I.e. we need an extended `example_2018.dwg` with all types, with the following  
 missing entities:

ARCALIGNEDTEXT BODY CAMERA DIMENSION\_ANG3PT DIMEN-  
 SION\_DIAMETER DIMENSION\_RADIUS DGNUNDERLAY DWFUNDER-  
 LAY GEOPOSITIONMARKER IMAGE LEADER LONG\_TRANSACTION  
 MESH MINSERT OLE2FRAME OLEFRAME POLYLINE\_2D POLY-  
 LINE\_MESH PROXY\_ENTITY PROXY\_LWPOLYLINE SHAPE  
 TOLERANCE VERTEX\_2D VERTEX\_MESH

and objects:

CSACDOCUMENTOPTIONS XREFPANELOBJECT IDBUFFER  
 IMAGEDEF IMAGEDEF\_REACTOR LAYER\_INDEX LIGHTLIST  
 NPOCOLLECTION OBJECT\_PTR PLOTSETTINGS PROXY\_OBJECT  
 RASTERVARIABLES SPATIAL\_INDEX UCS VBA\_PROJECT

## 1.3 Related projects

Some projects that use DWG (and specifically LibreDWG) are:

FreeCAD <https://freecadweb.org/>

## GRASS GIS

<http://grass.osgeo.org/>

Plans are to add support for SolveSpace, OpenSCAD and PythonCAD.

Related libraries:

`libdwg`      The old version (documented in Esperanto) which was forked to LibreDWG in 2009. But in the meantime it got a DXF reader.

`libdxfrw`    Read the DWG format for all versions r13+ but with much less elements, only those needed for DXF. Written in C++, under the GPLv2 license.

`libopencad`    Read the R2000 DWG format. Written in C++, under the GPLv2 license.

## OpenDWG

The OpenDWG's license does not allow the usage in free software projects.

Compared to `libdwg`, `libdxfrw` and `libopencad`, LibreDWG can read and write much more details. Which is especially important for attached links and data from third party applications: BIM, MAP, GIS, AEC, MECH, ... and for 3D solids and dynamic parametric constraints.



## 2 Usage

This chapter describes how to compile and link a program against LibreDWG. To access LibreDWG interface elements (see Chapter 3 [Types], page 6, see Chapter 7 [Functions], page 264), include its header file in the C code.

```
#include <dwg.h>
```

Optionally you can also use the

```
#include <dwg_api.h>
```

API.

Make sure you specify ‘`-lredwg`’ when linking, such as in this `Makefile.am` fragment:

```
AM_LDFLAGS += -lredwg
```

Note that the shared object library is named `libredwg` (with some system-specific extension, e.g., `.so`), so you do **not** want to specify `-llibredwg`, as that would (try to) link against `liblibredwg` and fail.

### 3 Types

LibreDWG types map closely to the type system of the DWG file format. This chapter describes the enums and structs used to define the single DWG structure, which is passed around the functions (see Chapter 7 [Functions], page 264).

<b>BITCODE_RC</b> <b>char</b>	[define]
1 raw unsigned char, uint8_t	
<b>BITCODE_RS</b> <b>short</b>	[define]
1 raw unsigned short int, uint16_t	
<b>BITCODE_RL</b> <b>long</b>	[define]
1 raw unsigned long int, uint32_t	
<b>BITCODE_RD</b> <b>double</b>	[define]
1 raw IEEE-754 double	
<b>BITCODE_B</b> <b>byte</b>	[define]
1 bit	
<b>BITCODE_BB</b> <b>byte</b>	[define]
2 bits	
<b>BITCODE_3B</b> <b>byte</b>	[define]
1-3 bits	
<b>BITCODE_4BITS</b> <b>byte</b>	[define]
4 bits (for VIEW view_mode)	
<b>BITCODE_BS</b> <b>short</b>	[define]
1 bit-encoded unsigned short	
<b>BITCODE_BL</b> <b>long</b>	[define]
1 bit-encoded unsigned long (max 32bit)	
<b>BITCODE_BLL</b> <b>uint64_t</b>	[define]
1 bit-encoded unsigned 64bit long	
<b>BITCODE_BD</b> <b>double</b>	[define]
1 bit-encoded double	
<b>BITCODE_DD</b> <b>double</b>	[define]
1 bit-encoded double with default	
<b>BITCODE_MC</b> <b>long int</b>	[define]
1-4 modular chars	
<b>BITCODE_UMC</b> <b>long unsigned int</b>	[define]
1-4 unsigned modular chars	
<b>BITCODE_MS</b> <b>long unsigned int</b>	[define]
1 modular short, max 2 words	

**BITCODE\_BE double[3]** [define]

1 bitencoded extrusion vector.

Note that this specifies an OCS (Object Coordinate System) for each entity, with the default (0, 0, 1). An extrusion of (0, 0, -1) is typically caused by exploding a block inserted with a negative x scale, i.e. the sign of each X point needs to be flipped. For more see the vendor DXF documentation on OCS and `programs/geom.c`.

**BITCODE\_BT double** [define]

1 bitencoded thickness value

**BITCODE\_TV char\*** [define]

length + ASCIIZ string The default text type until r2004.

**BITCODE\_TU wchar\*** [define]

length + windows 2-byte wchar string (UCS-2). The default text type since r2007.

**BITCODE\_TF char\*** [define]

Fixed length buffer, which can include NUL characters.

**BITCODE\_TFF char\*** [define]

Embedded fixed length string, which can include NUL characters.

**BITCODE\_H void\*** [define]

handle-references

**BITCODE\_CMC struct *Dwg\_Color*** [define]

*Dwg\_Color* struct with index or rgb, alpha and optional DBCOLOR handle, name, book\_name.

[and some more]

Two types that do not derive from the type system of the DWG file format are the enums for return codes and error codes.

On non-C99 systems ensure that `stdint.h` and `inttypes.h` are available to use the proper C99 `int32_t`,... types, and not just the native fallback types `int/long`, which are different across platforms.

## 4 Objects

### 4.1 HEADER

All header variables.

ACADMAINTVER	
	RC, DXF 90
ANGBASE	BD, DXF 50
ANGDIR	B, DXF 70
APPID_CONTROL_OBJECT	
	H
ATTDIA	B, DXF 70
ATTMODE	BS, DXF 70
ATTREQ	B, DXF 70
AUNITS	BS, DXF 70
AUPREC	BS, DXF 70
BLIPMODE	B, DXF 70
BLOCK_CONTROL_OBJECT	
	H
BLOCK_RECORD_MSPACE	
	H
BLOCK_RECORD_PSPACE	
	H
CAMERADISPLAY	
	B, DXF 290
CAMERAHEIGHT	
	BD, DXF 40
CECOLOR	CMC, DXF 62
CELTSCALE	
	BD, DXF 40
CELTYPE	H, DXF 6
CELWEIGHT	
	BSd, DXF 370
CEPSNTYPE	
	BS, DXF 380
CHAMFERA	BD, DXF 40
CHAMFERB	BD, DXF 40

CHAMFERC	BD, DXF 40
CHAMFERD	BD, DXF 40
CLAYER	H, DXF 8
CMATERIAL	H, DXF 347
CMLJUST	BS, DXF 70
CMLSCALE	BD, DXF 40
CMLSTYLE	H, DXF 2
COORDS	BS, DXF 70
CPSNID	H, DXF 390
CSHADOW	RC, DXF 280
DELOBJ	B, DXF 70
DGNFRAME	RC, DXF 280
DICTIONARY_ACAD_GROUP	H
DICTIONARY_ACAD_MLINESTYLE	H
DICTIONARY_COLOR	H
DICTIONARY_LAYOUT	H
DICTIONARY_LIGHTLIST	H
DICTIONARY_MATERIAL	H
DICTIONARY_NAMED_OBJECT	H
DICTIONARY_PLOTSETTINGS	H
DICTIONARY_PLOTSTYLENAME	H
DICTIONARY_VISUALSTYLE	H
DIMADEC	BS, DXF 70
DIMALT	B, DXF 70
DIMALTD	BS, DXF 70

DIMALTF BD, DXF 40  
DIMALTMZF  
BD  
DIMALTMZS  
T, DXF 1  
DIMALTRND  
BD, DXF 40  
DIMALTTD BS, DXF 70  
DIMALTTZ BS, DXF 70  
DIMALTU BS, DXF 70  
DIMALTZ BS, DXF 70  
DIMAPOST TV, DXF 1  
DIMAPOST\_T  
T  
DIMARCSYM  
BS, DXF 70  
DIMASO B, DXF 70  
DIMASSOC RC, DXF 280  
DIMASZ BD, DXF 40  
DIMATFIT BS, DXF 70  
DIMAUNIT BS, DXF 70  
DIMAZIN BS, DXF 70  
DIMBLK H, DXF 1  
DIMBLK1 H, DXF 1  
DIMBLK1\_T  
T  
DIMBLK2 H, DXF 1  
DIMBLK2\_T  
T  
DIMBLK\_T T  
DIMCEN BD, DXF 40  
DIMCLRD CMC, DXF 70  
DIMCLRD\_C  
RS  
DIMCLRE CMC, DXF 70

DIMCLRE_C	RS
DIMCLRT	CMC, DXF 70
DIMCLRT_C	RS
DIMDEC	BS, DXF 70
DIMDLE	BD, DXF 40
DIMDLI	BD, DXF 40
DIMDSEP	BS, DXF 70
DIMEXE	BD, DXF 40
DIMEXO	BD, DXF 40
DIMFIT	BS, DXF 70
DIMFRAC	BS, DXF 70
DIMFXL	BD, DXF 40
DIMFXLON	B, DXF 70
DIMGAP	BD, DXF 40
DIMJOGANG	BD, DXF 40
DIMJUST	BS, DXF 70
DIMLDRBLK	H, DXF 1
DIMLFAC	BD, DXF 40
DIMLIM	B, DXF 70
DIMLTEX1	H, DXF 6
DIMLTEX2	H, DXF 6
DIMLTYPE	H, DXF 6
DIMLUNIT	BS, DXF 70
DIMLWD	BSd, DXF 70
DIMLWE	BSd, DXF 70
DIMMALTTZ	BS
DIMMALTZ	BS
DIMMZf	BD
DIMMZS	T, DXF 1

DIMPOST	TV, DXF 1
DIMPOST_T	T
DIMRND	BD, DXF 40
DIMSAH	B, DXF 70
DIMSAV	B
DIMSCALE	BD, DXF 40
DIMSD1	B, DXF 70
DIMSD2	B, DXF 70
DIMSE1	B, DXF 70
DIMSE2	B, DXF 70
DIMSH0	B, DXF 70
DIMSOXD	B, DXF 70
DIMSTYLE	H, DXF 2
DIMSTYLE_CONTROL_OBJECT	H
DIMTAD	BS, DXF 70
DIMTDEC	BS, DXF 70
DIMTFAC	BD, DXF 40
DIMTFILL	BS, DXF 70
DIMTFILLCLR	CMC, DXF 70
DIMTIH	B, DXF 70
DIMTIX	B, DXF 70
DIMTM	BD, DXF 40
DIMTMOVE	BS, DXF 70
DIMTOFL	B, DXF 70
DIMTOH	B, DXF 70
DIMTOL	B, DXF 70
DIMTOLJ	BS, DXF 70
DIMTP	BD, DXF 40
DIMTSZ	BD, DXF 40
DIMTVP	BD, DXF 40
DIMTXSTY	H, DXF 7



DIMTXT	BD, DXF 40
DIMTXTDIRECTION	B, DXF 70
DIMTZIN	BS, DXF 70
DIMUNIT	BS, DXF 70
DIMUPT	B, DXF 70
DIMZIN	BS, DXF 70
DISPSILH	B, DXF 70
DRAGMODE	BS, DXF 70
DRAGVS	H, DXF 349
DWFFRAME	RC, DXF 280
DWGCODEPAGE	TV, DXF 3
ELEVATION	BD, DXF 40
ENDCAPS	B, DXF 280
EXTMAX	3BD, DXF 30
EXTMIN	3BD, DXF 30
EXTNAMES	B, DXF 290
FACETRES	BD
FILLETRAD	BD, DXF 40
FILLMODE	B, DXF 70
FINGERPRINTGUID	TV, DXF 2
FLAGS	BL
GRIDMODE	RS
GRIDUNIT	2RD
HALOGAP	RC, DXF 280
HANDLING	BS, DXF 70
HANDSEED	H, DXF 5
HIDETEXT	RC, DXF 280
HYPERLINKBASE	T, DXF 1
INDEXCTL	RC, DXF 280

INSBASE 3BD, DXF 30

INSUNITS BS, DXF 70

INTERFERECOLOR  
CMC, DXF 62

INTERFEREOBJVS  
H, DXF 345

INTERFEREVPVS  
H, DXF 346

INTERSECTIONCOLOR  
BS, DXF 70

INTERSECTIONDISPLAY  
RC, DXF 280

ISOLINES BS

JOINSTYLE  
B, DXF 280

LATITUDE BD, DXF 40

LAYER\_CONTROL\_OBJECT  
H

LENSLENGTH  
BD, DXF 40

LIGHTGLYPHDISPLAY  
RC, DXF 280

LIMCHECK B, DXF 70

LIMMAX 2DPOINT, DXF 20

LIMMIN 2DPOINT, DXF 20

LOFTANG1 BD, DXF 40

LOFTANG2 BD, DXF 40

LOFTMAG1 BD, DXF 40

LOFTMAG2 BD, DXF 40

LOFTNORMALS  
RC, DXF 280

LOFTPARAM  
BS, DXF 70

LONGITUDE  
BD, DXF 40

LTSCALE BD, DXF 40

LTYPE\_BYBLOCK  
H

LTYPE\_BYLAYER  
H

LTYPE\_CONTINUOUS  
H

LTYPE\_CONTROL\_OBJECT  
H

LUNITS BS, DXF 70

LUPREC BS, DXF 70

LWDISPLAY  
B, DXF 290

MAXACTVP BS, DXF 70

MEASUREMENT  
BS, DXF 70

MENU TV, DXF 1

MIRRTEXT B, DXF 70

NORTHDIRECTION  
BD, DXF 40

OBSCOLOR BS, DXF 70

OBSLTYPE RC, DXF 280

OLESTARTUP  
B, DXF 290

ORTHOMODE  
B, DXF 70

OSMODE BS, DXF 70

PDMODE BS, DXF 70

PDSIZE BD, DXF 40

PELEVATION  
BD, DXF 40

PELLIPSE B

PEXTMAX 3BD, DXF 30

PEXTMIN 3BD, DXF 30

PICKSTYLE  
BS, DXF 70

PINSBASE 3BD, DXF 30

PLIMCHECK  
B, DXF 70

PLIMMAX 2DPOINT, DXF 20

PLIMMIN 2DPOINT, DXF 20

PLINEGEN B, DXF 70

PLINEWID BD, DXF 40

PROJECTNAME  
TV, DXF 1

PROXYGRAPHICS  
BS, DXF 70

PSLTSCALE  
B, DXF 70

PSOLHEIGHT  
BD, DXF 40

PSOLWIDTH  
BD, DXF 40

PSTYLEMODE  
B, DXF 290

PSVPSCALE  
BD, DXF 40

PUCSBASE H, DXF 2

PUCSNAME H, DXF 2

PUCSORG 3BD, DXF 30

PUCSORGBACK  
3BD, DXF 30

PUCSORGBOTTOM  
3BD, DXF 30

PUCSORGFRONT  
3BD, DXF 30

PUCSORGGLEFT  
3BD, DXF 30

PUCSORGRIGHT  
3BD, DXF 30

PUCSORGTOP  
3BD, DXF 30

PUCSORTHOREF  
H, DXF 2

PUCSORTHOVIEW  
BS, DXF 70

PUCSXDIR 3BD, DXF 30

PUCSYDIR 3BD, DXF 30

QTEXTMODE  
B, DXF 70

REALWORLDSCALE  
B, DXF 290

REGENMODE  
B, DXF 70

REQUIREDVERSIONS  
BLL, DXF 160

SAVEIMAGES  
BS

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SHADEDIF BS, DXF 70

SHADOWPLANELOCATION  
BD, DXF 40

SHOWHIST RC, DXF 280

SKETCHINC  
BD, DXF 40

SKPOLY B, DXF 70

SNAPANG RD

SNAPBASE 2RD

SNAPISOPAIR  
RS

SNAPMODE RS

SNAPSTYL RS

SNAPUNIT 2RD

SOLIDHIST  
RC, DXF 280

SORTENTS RC, DXF 280

SPLFRAME B, DXF 70

SPLINESEGS  
BS, DXF 70

SPLINETYPE  
BS, DXF 70

STEPSIZE BD, DXF 40  
STEPSPERSEC  
BD, DXF 40  
STYLESHEET  
TV, DXF 1  
STYLE\_CONTROL\_OBJECT  
H  
SURFTAB1 BS, DXF 70  
SURFTAB2 BS, DXF 70  
SURFTYPE BS, DXF 70  
SURFU BS, DXF 70  
SURFV BS, DXF 70  
TDCREATE TIMEBLL, DXF 40  
TDINDWG TIMEBLL, DXF 40  
TDUCREATE  
TIMEBLL, DXF 40  
TDUPDATE TIMEBLL, DXF 40  
TDUSRTIMER  
TIMEBLL, DXF 40  
TDUUPDATE  
TIMEBLL, DXF 40  
TEXTQLTY BS  
TEXTSIZE BD, DXF 40  
TEXTSTYLE  
H, DXF 7  
THICKNESS  
BD, DXF 40  
TILEMODE B, DXF 70  
TILEMODELIGHTSYNCH  
RC, DXF 280  
TIMEZONE BL, DXF 70  
TRACEWID BD, DXF 40  
TREEDEPTH  
BS, DXF 70  
TSTACKALIGN  
BS

TSTACKSIZE  
BS

UCSBASE H, DXF 2

UCSNAME H, DXF 2

UCSORG 3BD, DXF 30

UCSORGBACK  
3BD, DXF 30

UCSORGBOTTOM  
3BD, DXF 30

UCSORGFRONT  
3BD, DXF 30

UCSORGGLEFT  
3BD, DXF 30

UCSORGRIGHT  
3BD, DXF 30

UCSORGTOP  
3BD, DXF 30

UCSORTHOREF  
H, DXF 2

UCSORTHOVVIEW  
BS, DXF 70

UCSXDIR 3BD, DXF 30

UCSYDIR 3BD, DXF 30

UCS\_CONTROL\_OBJECT  
H

UNITMODE BS, DXF 70

USERI1 BS, DXF 70

USERI2 BS, DXF 70

USERI3 BS, DXF 70

USERI4 BS, DXF 70

USERI5 BS, DXF 70

USERR1 BD, DXF 40

USERR2 BD, DXF 40

USERR3 BD, DXF 40

USERR4 BD, DXF 40

USERR5 BD, DXF 40

USRTIMER B, DXF 70  
VERSIONGUID  
TV, DXF 2  
VIEWCTR 2RD  
VIEWSIZE RD  
VIEW\_CONTROL\_OBJECT  
H  
VISRETAIN  
B, DXF 70  
VPORT\_CONTROL\_OBJECT  
H  
VX\_CONTROL\_OBJECT  
H  
VX\_TABLE\_RECORD  
H  
WIREFRAME  
B  
WORLDVIEW  
B, DXF 70  
XCLIPFRAME  
RC, DXF 290  
XEDIT B, DXF 290  
\_3DDWFPREC  
BD, DXF 40  
bitsize RL  
bitsize\_hi  
RL  
size RL  
unknown\_0  
BD  
unknown\_1  
BD  
unknown\_10  
BS  
unknown\_11  
B  
unknown\_12  
BL



unknown\_13  
BL

unknown\_14  
BL

unknown\_14b  
BL

unknown\_15  
BL

unknown\_16  
BL

unknown\_17  
BL

unknown\_2  
BD

unknown\_20  
H

unknown\_21  
BL

unknown\_22  
BL

unknown\_23  
BD

unknown\_3  
BD

unknown\_54  
BS

unknown\_55  
BS

unknown\_56  
BS

unknown\_57  
BS

unknown\_8  
BL

unknown\_9  
BL

unknown\_text1  
TV

```

unknown_text2
    TV

unknown_text3
    TV

unknown_text4
    TV

```

## 4.2 ENTITIES

All graphical objects with its fields. See [Common Entity fields], page 255,

### 3DFACE

```

parent      struct _dwg_object_entity*

has_no_flags
    B

z_is_zero
    B

corner1      3BD, DXF 10
corner2      3BD, DXF 11
corner3      3BD, DXF 12
corner4      3BD, DXF 13

invis_flags
    BS, DXF 70

```

### 3DSOLID

```

parent      struct _dwg_object_entity*

acis_empty
    B, DXF 290

unknown      B

version      BS, DXF 70

num_blocks
    BL

block_size
    BL*

encr_sat_data
    char **, DXF 1

sab_size     BL

acis_data
    RC*

```

```

wireframe_data_present
    B

point_present
    B

point      3BD

isolines   BL

isoline_present
    B

num_wires
    BL

wires      Dwg_3DSOLID_wire*

num_silhouettes
    BL

silhouettes
    Dwg_3DSOLID_silhouette*

_dxf_sab_converted
    B

acis_empty2
    B

extra_acis_data
    struct _dwg_entity_3DSOLID*

num_materials
    BL

materials
    Dwg_3DSOLID_material*

revision_guid[39]
    RC, DXF 2

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

```

has\_revision\_guid  
B

acis\_empty\_bit  
B

#### **ALIGNMENTPARAMETERENTITY**

parent struct \_dwg\_object\_entity\*

#### **ARC**

parent struct \_dwg\_object\_entity\*

center 3BD, DXF 10

radius BD, DXF 40

thickness  
BT, DXF 39

extrusion  
BE, DXF 210

start\_angle  
BD, DXF 50

end\_angle  
BD, DXF 51

#### **ARCALIGNEDTEXT**

parent struct \_dwg\_object\_entity\*

text\_size  
D2T, DXF 42

xscale D2T, DXF 41

char\_spacing  
D2T, DXF 43

style T, DXF 7

t2 T, DXF 2

t3 T, DXF 3

text\_value  
T, DXF 1

offset\_from\_arc  
D2T, DXF 44

right\_offset  
D2T, DXF 45

left\_offset  
D2T, DXF 46

```

center      3BD, DXF 10
radius      BD, DXF 40
start_angle
            BD, DXF 50
end_angle
            BD, DXF 51
extrusion
            3BD, DXF 210
color       BL, DXF 90
is_reverse
            BS, DXF 70
text_direction
            BS, DXF 71
alignment
            BS, DXF 72
text_position
            BS, DXF 73
font_19     BS, DXF 74
bs2         BS, DXF 75
is_underlined
            BS, DXF 76
bs1         BS, DXF 77
font        BS, DXF 78
is_shx      BS, DXF 79
wizard_flag
            BS, DXF 280
arc_handle
            H, DXF 330

```

#### **ARC\_DIMENSION**

```

parent      struct _dwg_object_entity*
class_version
            RC, DXF 280
extrusion
            BE, DXF 210
def_pt      3BD, DXF 10
text_midpt
            2RD, DXF 11

```

elevation	BD, DXF 31
flag	RC, DXF 70
flag1	RC
user_text	T, DXF 1
text_rotation	BD, DXF 53
horiz_dir	BD, DXF 51
ins_scale	3BD_1
ins_rotation	BD, DXF 54
attachment	BS, DXF 71
lspace_style	BS, DXF 72
lspace_factor	BD, DXF 41
act_measurement	BD, DXF 42
unknown	B, DXF 73
flip_arrow1	B, DXF 74
flip_arrow2	B, DXF 75
clone_ins_pt	2RD, DXF 12
dimstyle	H, DXF 3
block	H
xline1_pt	3BD, DXF 13
xline2_pt	3BD, DXF 14
center_pt	3BD, DXF 15

`is_partial`  
B, DXF 70

`arc_start_param`  
BD, DXF 41

`arc_end_param`  
BD, DXF 42

`has_leader`  
B, DXF 71

`leader1_pt`  
3BD, DXF 16

`leader2_pt`  
3BD, DXF 17

**ATTDEF**

`parent` struct `_dwg_object_entity*`

`elevation`  
BD, DXF 30

`ins_pt` 2DPOINT, DXF 10

`alignment_pt`  
2DPOINT, DXF 11

`extrusion`  
BE, DXF 210

`thickness`  
RD, DXF 39

`oblique_angle`  
RD, DXF 51

`rotation` RD, DXF 50

`height` RD, DXF 40

`width_factor`  
RD, DXF 41

`default_value`  
T, DXF 1

`generation`  
BS, DXF 71

`horiz_alignment`  
BS, DXF 72

`vert_alignment`  
BS, DXF 74

```

dataflags      RC
class_version  RC, DXF 280
type           RC, DXF 70
tag            T, DXF 2
field_length   BS
flags          RC
lock_position_flag B
style          H, DXF 7
mtext_handles H, DXF 340
annotative_data_size BS, DXF 70
annotative_data_bytes RC
annotative_app H
annotative_short BS
attdef_class_version RC
prompt        T, DXF 3

```

**ATTRIB**

```

parent      struct _dwg_object_entity*
elevation    BD, DXF 30
ins_pt       2DPOINT, DXF 10
alignment_pt 2DPOINT, DXF 11
extrusion    BE, DXF 210
thickness    RD, DXF 39
oblique_angle RD, DXF 51

```



```

rotation    RD, DXF 50
height      RD, DXF 40
width_factor
            RD, DXF 41
text_value
            T, DXF 1
generation
            BS, DXF 71
horiz_alignment
            BS, DXF 72
vert_alignment
            BS, DXF 74
dataflags
            RC
class_version
            RC, DXF 280
type        RC, DXF 70
tag         T, DXF 2
field_length
            BS
flags       RC
lock_position_flag
            B
style       H, DXF 7
mtext_handles
            H, DXF 340
annotative_data_size
            BS, DXF 70
annotative_data_bytes
            RC
annotative_app
            H
annotative_short
            BS

```

#### **BASEPOINTPARAMETERENTITY**

```

parent      struct _dwg_object_entity*

```

#### **BLOCK**

```

parent      struct _dwg_object_entity*

```

name T, DXF 2

filename T, DXF 4

## **BODY**

See [3DSOLID], page 22,

## **CAMERA**

parent struct \_dwg\_object\_entity\*

view H

## **CIRCLE**

parent struct \_dwg\_object\_entity\*

center 3BD, DXF 10

radius BD, DXF 40

thickness  
BT, DXF 39

extrusion  
BE, DXF 210

## **DGNUNDERLAY**

parent struct \_dwg\_object\_entity\*

extrusion  
BE, DXF 210

ins\_pt 3BD, DXF 10

scale 3BD\_1, DXF 41

angle BD, DXF 50

flag RC, DXF 280

contrast RC, DXF 281

fade RC, DXF 282

num\_clip\_verts  
BL

clip\_verts  
2RD\*, DXF 11

num\_clip\_inverts  
BS, DXF 170

clip\_inverts  
2RD\*, DXF 12

definition\_id  
H, DXF 340

**DIMENSION\_ALIGNED**

```
parent      struct _dwg_object_entity*
class_version
            RC, DXF 280

extrusion
            BE, DXF 210

def_pt      3BD, DXF 10

text_midpt
            2RD, DXF 11

elevation
            BD, DXF 31

flag        RC, DXF 70

flag1       RC

user_text
            T, DXF 1

text_rotation
            BD, DXF 53

horiz_dir
            BD, DXF 51

ins_scale
            3BD_1

ins_rotation
            BD, DXF 54

attachment
            BS, DXF 71

lspace_style
            BS, DXF 72

lspace_factor
            BD, DXF 41

act_measurement
            BD, DXF 42

unknown     B, DXF 73

flip_arrow1
            B, DXF 74

flip_arrow2
            B, DXF 75

clone_ins_pt
            2RD, DXF 12
```

dimstyle H, DXF 3  
block H  
xline1\_pt  
3BD, DXF 13  
xline2\_pt  
3BD, DXF 14  
oblique\_angle  
BD

#### **DIMENSION\_ANG2LN**

parent struct \_dwg\_object\_entity\*  
class\_version  
RC, DXF 280  
extrusion  
BE, DXF 210  
def\_pt 3BD, DXF 10  
text\_midpt  
2RD, DXF 11  
elevation  
BD, DXF 31  
flag RC, DXF 70  
flag1 RC  
user\_text  
T, DXF 1  
text\_rotation  
BD, DXF 53  
horiz\_dir  
BD, DXF 51  
ins\_scale  
3BD\_1  
ins\_rotation  
BD, DXF 54  
attachment  
BS, DXF 71  
lspace\_style  
BS, DXF 72  
lspace\_factor  
BD, DXF 41

```

act_measurement
    BD, DXF 42

unknown    B, DXF 73

flip_arrow1
    B, DXF 74

flip_arrow2
    B, DXF 75

clone_ins_pt
    2RD, DXF 12

dimstyle   H, DXF 3

block      H

xline1start_pt
    3BD, DXF 13

xline1end_pt
    3BD, DXF 14

xline2start_pt
    3BD, DXF 15

xline2end_pt
    3BD, DXF 16

```

#### **DIMENSION\_ANG3PT**

```

parent      struct _dwg_object_entity*

class_version
    RC, DXF 280

extrusion
    BE, DXF 210

def_pt      3BD, DXF 10

text_midpt
    2RD, DXF 11

elevation
    BD, DXF 31

flag        RC, DXF 70

flag1       RC

user_text
    T, DXF 1

text_rotation
    BD, DXF 53

horiz_dir
    BD, DXF 51

```

```

ins_scale      3BD_1

ins_rotation   BD, DXF 54

attachment     BS, DXF 71

lspace_style   BS, DXF 72

lspace_factor  BD, DXF 41

act_measurement BD, DXF 42

unknown        B, DXF 73

flip_arrow1    B, DXF 74

flip_arrow2    B, DXF 75

clone_ins_pt   2RD, DXF 12

dimstyle       H, DXF 3

block          H

xline1_pt      3BD, DXF 13

xline2_pt      3BD, DXF 14

center_pt      3BD, DXF 15

```

**DIMENSION\_DIAMETER**

```

parent         struct _dwg_object_entity*

class_version   RC, DXF 280

extrusion       BE, DXF 210

def_pt         3BD, DXF 10

text_midpt      2RD, DXF 11

elevation       BD, DXF 31

```

```

flag      RC, DXF 70
flag1     RC
user_text
          T, DXF 1
text_rotation
          BD, DXF 53
horiz_dir
          BD, DXF 51
ins_scale
          3BD_1
ins_rotation
          BD, DXF 54
attachment
          BS, DXF 71
lspace_style
          BS, DXF 72
lspace_factor
          BD, DXF 41
act_measurement
          BD, DXF 42
unknown   B, DXF 73
flip_arrow1
          B, DXF 74
flip_arrow2
          B, DXF 75
clone_ins_pt
          2RD, DXF 12
dimstyle  H, DXF 3
block     H
first_arc_pt
          3BD, DXF 15
leader_len
          BD, DXF 40

```

**DIMENSION\_LINEAR**

```

parent     struct _dwg_object_entity*
class_version
          RC, DXF 280

```

extrusion	BE, DXF 210
def_pt	3BD, DXF 10
text_midpt	2RD, DXF 11
elevation	BD, DXF 31
flag	RC, DXF 70
flag1	RC
user_text	T, DXF 1
text_rotation	BD, DXF 53
horiz_dir	BD, DXF 51
ins_scale	3BD_1
ins_rotation	BD, DXF 54
attachment	BS, DXF 71
lspace_style	BS, DXF 72
lspace_factor	BD, DXF 41
act_measurement	BD, DXF 42
unknown	B, DXF 73
flip_arrow1	B, DXF 74
flip_arrow2	B, DXF 75
clone_ins_pt	2RD, DXF 12
dimstyle	H, DXF 3
block	H
xline1_pt	3BD, DXF 13



xline2\_pt  
3BD, DXF 14

oblique\_angle  
BD, DXF 52

dim\_rotation  
BD, DXF 50

#### **DIMENSION\_ORDINATE**

parent struct \_dwg\_object\_entity\*

class\_version  
RC, DXF 280

extrusion  
BE, DXF 210

def\_pt 3BD, DXF 10

text\_midpt  
2RD, DXF 11

elevation  
BD, DXF 31

flag RC, DXF 70

flag1 RC

user\_text  
T, DXF 1

text\_rotation  
BD, DXF 53

horiz\_dir  
BD, DXF 51

ins\_scale  
3BD\_1

ins\_rotation  
BD, DXF 54

attachment  
BS, DXF 71

lspace\_style  
BS, DXF 72

lspace\_factor  
BD, DXF 41

act\_measurement  
BD, DXF 42

unknown B, DXF 73

flip\_arrow1  
    B, DXF 74

flip\_arrow2  
    B, DXF 75

clone\_ins\_pt  
    2RD, DXF 12

dimstyle    H, DXF 3

block        H

feature\_location\_pt  
    3BD, DXF 13

leader\_endpt  
    3BD, DXF 14

flag2        RC

#### **DIMENSION\_RADIUS**

parent        struct \_dwg\_object\_entity\*

class\_version  
    RC, DXF 280

extrusion  
    BE, DXF 210

def\_pt        3BD, DXF 10

text\_midpt  
    2RD, DXF 11

elevation  
    BD, DXF 31

flag          RC, DXF 70

flag1        RC

user\_text  
    T, DXF 1

text\_rotation  
    BD, DXF 53

horiz\_dir  
    BD, DXF 51

ins\_scale  
    3BD\_1

ins\_rotation  
    BD, DXF 54

attachment  
    BS, DXF 71

lspace\_style  
     BS, DXF 72  
 lspace\_factor  
     BD, DXF 41  
 act\_measurement  
     BD, DXF 42  
 unknown    B, DXF 73  
 flip\_arrow1  
     B, DXF 74  
 flip\_arrow2  
     B, DXF 75  
 clone\_ins\_pt  
     2RD, DXF 12  
 dimstyle   H, DXF 3  
 block       H  
 first\_arc\_pt  
     3BD, DXF 15  
 leader\_len  
     BD, DXF 40

**DWFUNDERLAY**

See [UNDERLAY], page 30,

**ELLIPSE**

parent      struct \_dwg\_object\_entity\*  
 center      3BD, DXF 10  
 sm\_axis     3BD, DXF 11  
 extrusion  
     BE, DXF 210  
 axis\_ratio  
     BD, DXF 40  
 start\_angle  
     BD, DXF 41  
 end\_angle  
     BD, DXF 42

**ENDBLK**

parent      struct \_dwg\_object\_entity\*

**EXTRUDESURFACE**

parent      struct \_dwg\_object\_entity\*

```
    acis_empty
        B, DXF 290

    unknown    B

    version    BS, DXF 70

    num_blocks
        BL

    block_size
        BL*

    encr_sat_data
        char **, DXF 1

    sab_size    BL

    acis_data
        RC*

    wireframe_data_present
        B

    point_present
        B

    point        3BD

    isolines    BL

    isoline_present
        B

    num_wires
        BL

    wires        Dwg_3DSOLID_wire*

    num_silhouettes
        BL

    silhouettes
        Dwg_3DSOLID_silhouette*

    _dxf_sab_converted
        B

    acis_empty2
        B

    extra_acis_data
        struct _dwg_entity_3DSOLID*

    num_materials
        BL

    materials
        Dwg_3DSOLID_material*
```

```
revision_guid[39]
    RC, DXF 2

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

has_revision_guid
    B

acis_empty_bit
    B

modeler_format_version
    BS

bindata_size
    BL

bindata    TF

u_isolines
    BS, DXF 71

v_isolines
    BS, DXF 72

class_version
    BL

draft_angle
    BD, DXF 42

draft_start_distance
    BD, DXF 43

draft_end_distance
    BD, DXF 44

twist_angle
    BD, DXF 45

scale_factor
    BD, DXF 48
```

```

align_angle
    BD, DXF 49

sweep_entity_transmatrix
    BD*, DXF 46

path_entity_transmatrix
    BD*, DXF 47

is_solid    B, DXF 290

sweep_alignment_flags
    BS, DXF 70

path_flags
    BS, DXF 71

align_start
    B, DXF 292

bank        B, DXF 293

base_point_set
    B, DXF 294

sweep_entity_transform_computed
    B, DXF 295

path_entity_transform_computed
    B, DXF 296

reference_vector_for_controlling_twist
    3BD, DXF 11

sweep_entity
    H

path_entity
    H

sweep_vector
    3BD, DXF 10

sweep_transmatrix
    BD*, DXF 40

```

**FLIPPARAMETERENTITY**

```

parent    struct _dwg_object_entity*

```

**GEOPOSITIONMARKER**

```

parent    struct _dwg_object_entity*

class_version
    BS, DXF 90

position  3BD, DXF 10

```

radius BD, DXF 40  
landing\_gap  
BD, DXF 40  
notes T, DXF 1  
text\_alignment  
RC, DXF 280  
mtext\_visible  
B, DXF 290  
enable\_frame\_text  
B, DXF 290  
mtext struct \_dwg\_object\*

## HATCH

parent struct \_dwg\_object\_entity\*  
is\_gradient\_fill  
BL, DXF 450  
reserved BL, DXF 451  
gradient\_angle  
BD, DXF 460  
gradient\_shift  
BD, DXF 461  
single\_color\_gradient  
BL, DXF 452  
gradient\_tint  
BD, DXF 462  
num\_colors  
BL, DXF 453  
colors Dwg\_HATCH\_Color\*  
gradient\_name  
T, DXF 470  
elevation  
BD, DXF 30  
extrusion  
BE, DXF 210  
name T, DXF 2  
is\_solid\_fill  
B, DXF 70  
is\_associative  
B, DXF 71

```

num_paths      BL, DXF 91

paths          Dwg_HATCH_Path*

style          BS, DXF 75

pattern_type   BS, DXF 76

angle          BD, DXF 52

scale_spacing  BD, DXF 41

double_flag    B, DXF 77

num_deflines   BS, DXF 78

deflines       Dwg_HATCH_DefLine*

has_derived    B

pixel_size     BD, DXF 47

num_seeds      BL, DXF 98

seeds          2RD*, DXF 10

```

**HELIX**

```

parent         struct _dwg_object_entity*

flag           BS, DXF 70

scenario       BS

degree         BS, DXF 71

splineflags1   BL

knotparam      BL

fit_tol        BD, DXF 44

beg_tan_vec     3BD, DXF 12

end_tan_vec     3BD, DXF 13

rational       B

```



```

closed_b    B
periodic    B
weighted    B
knot_tol    BD, DXF 42
ctrl_tol    BD, DXF 43
num_fit_pts
            BS, DXF 74
fit_pts     3DPOINT*, DXF 11
num_knots
            BL, DXF 72
knots       BD*, DXF 40
num_ctrl_pts
            BL, DXF 73
ctrl_pts     Dwg_SPLINE_control_point*
major_version
            BL, DXF 90
maint_version
            BL, DXF 91
axis_base_pt
            3BD, DXF 10
start_pt    3BD, DXF 11
axis_vector
            3BD, DXF 12
radius       BD, DXF 40
turns        BD, DXF 41
turn_height
            BD, DXF 42
handedness
            B, DXF 290
constraint_type
            RC, DXF 280

```

**IMAGE**

```

parent       struct _dwg_object_entity*
class_version
            BL, DXF 90
pt0          3BD, DXF 10

```

uvec        3BD, DXF 11  
vvec        3BD, DXF 12  
size        2RD, DXF 13  
display\_props  
            BS, DXF 70  
clipping    B, DXF 280  
brightness  
            RC, DXF 281  
contrast    RC, DXF 282  
fade        RC, DXF 283  
clip\_mode  
            B, DXF 290  
clip\_boundary\_type  
            BS, DXF 71  
num\_clip\_verts  
            BL, DXF 91  
clip\_verts  
            2RD\*, DXF 14  
imagedef    H, DXF 340  
imagedefreactor  
            H, DXF 360

## INSERT

parent      struct \_dwg\_object\_entity\*  
ins\_pt      3DPOINT, DXF 10  
scale\_flag  
            BB  
scale        3BD\_1, DXF 41  
rotation    BD, DXF 50  
extrusion  
            BE, DXF 210  
has\_attribs  
            B, DXF 66  
num\_owned  
            BL  
block\_header  
            H, DXF 2

```
first_attrb
    H
```

```
last_attrb
    H
```

```
attribs    H*
```

```
seqend     H
```

## **LARGE\_RADIAL\_DIMENSION**

```
parent      struct _dwg_object_entity*
```

```
class_version
    RC, DXF 280
```

```
extrusion
    BE, DXF 210
```

```
def_pt      3BD, DXF 10
```

```
text_midpt
    2RD, DXF 11
```

```
elevation
    BD, DXF 31
```

```
flag        RC, DXF 70
```

```
flag1       RC
```

```
user_text
    T, DXF 1
```

```
text_rotation
    BD, DXF 53
```

```
horiz_dir
    BD, DXF 51
```

```
ins_scale
    3BD_1
```

```
ins_rotation
    BD, DXF 54
```

```
attachment
    BS, DXF 71
```

```
lspace_style
    BS, DXF 72
```

```
lspace_factor
    BD, DXF 41
```

```
act_measurement
    BD, DXF 42
```

unknown    B, DXF 73

flip\_arrow1  
            B, DXF 74

flip\_arrow2  
            B, DXF 75

clone\_ins\_pt  
            2RD, DXF 12

dimstyle   H, DXF 3

block      H

first\_arc\_pt  
            3BD, DXF 15

leader\_len  
            BD, DXF 40

ovr\_center  
            3BD, DXF 12

jog\_point  
            3BD, DXF 13

## LEADER

parent      struct \_dwg\_object\_entity\*

unknown\_bit\_1  
            B

path\_type  
            BS, DXF 72

annot\_type  
            BS, DXF 73

num\_points  
            BL, DXF 76

points      3DPOINT\*, DXF 10

origin      3DPOINT

extrusion  
            BE, DXF 210

x\_direction  
            3DPOINT, DXF 211

inspt\_offset  
            3DPOINT, DXF 212

endptproj  
            3DPOINT

```

dimgap      BD
box_height
             BD, DXF 40
box_width
             BD
hookline_dir
             B, DXF 74
arrowhead_on
             B, DXF 71
arrowhead_type
             BS
dimasz      BD
unknown_bit_2
             B
unknown_bit_3
             B
unknown_short_1
             BS
byblock_color
             BS, DXF 77
hookline_on
             B, DXF 75
unknown_bit_5
             B
associated_annotation
             H, DXF 340
dimstyle     H, DXF 3

```

**LIGHT**

```

parent      struct _dwg_object_entity*
class_version
             BL, DXF 90
name        T, DXF 1
type        BL, DXF 70
status      B, DXF 290
color       CMC, DXF 63
plot_glyph
             B, DXF 291

```

intensity  
BD, DXF 40

position 3BD, DXF 10

target 3BD, DXF 11

attenuation\_type  
BL, DXF 72

use\_attenuation\_limits  
B, DXF 292

attenuation\_start\_limit  
BD, DXF 41

attenuation\_end\_limit  
BD, DXF 42

hotspot\_angle  
BD, DXF 50

falloff\_angle  
BD, DXF 51

cast\_shadows  
B, DXF 293

shadow\_type  
BL, DXF 73

shadow\_map\_size  
BS, DXF 91

shadow\_map\_softness  
RC, DXF 280

is\_photometric  
B

has\_photometric\_data  
B, DXF 1

has\_webfile  
B, DXF 290

webfile T, DXF 300

physical\_intensity\_method  
BS, DXF 70

physical\_intensity  
BD, DXF 40

illuminance\_dist  
BD, DXF 41

lamp\_color\_type  
BS, DXF 71

lamp\_color\_temp  
BD, DXF 42

lamp\_color\_preset  
BS, DXF 72

lamp\_color\_rgb  
BL

web\_rotation  
3BD\_1, DXF 43

extlight\_shape  
BS, DXF 73

extlight\_length  
BD, DXF 46

extlight\_width  
BD, DXF 47

extlight\_radius  
BD, DXF 48

webfile\_type  
BS, DXF 74

web\_symetry  
BS, DXF 75

has\_target\_grip  
BS, DXF 76

web\_flux BD, DXF 49

web\_angle1  
BD, DXF 50

web\_angle2  
BD, DXF 51

web\_angle3  
BD, DXF 52

web\_angle4  
BD, DXF 53

web\_angle5  
BD, DXF 54

glyph\_display\_type  
BS, DXF 77

**LINE**

parent struct \_dwg\_object\_entity\*

z\_is\_zero  
RC

start        3BD, DXF 10

end         3BD, DXF 11

thickness  
             BT, DXF 39

extrusion  
             BE, DXF 210

#### **LINEARPARAMETERENTITY**

parent       struct \_dwg\_object\_entity\*

#### **LOFTEDSURFACE**

parent       struct \_dwg\_object\_entity\*

acis\_empty  
             B, DXF 290

unknown     B

version     BS, DXF 70

num\_blocks  
             BL

block\_size  
             BL\*

encr\_sat\_data  
             char \*\*, DXF 1

sab\_size    BL

acis\_data  
             RC\*

wireframe\_data\_present  
             B

point\_present  
             B

point       3BD

isolines    BL

isoline\_present  
             B

num\_wires  
             BL

wires       Dwg\_3DSOLID\_wire\*

num\_silhouettes  
             BL



```
silhouettes
    Dwg_3DSOLID_silhouette*

_dxf_sab_converted
    B

acis_empty2
    B

extra_acis_data
    struct _dwg_entity_3DSOLID*

num_materials
    BL

materials
    Dwg_3DSOLID_material*

revision_guid[39]
    RC, DXF 2

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

has_revision_guid
    B

acis_empty_bit
    B

modeler_format_version
    BS, DXF 70

u_isolines
    BS, DXF 71

v_isolines
    BS, DXF 72

loft_entity_transmatrix
    BD*, DXF 40
```

```

plane_normal_lofting_type
    BL, DXF 70

start_draft_angle
    BD, DXF 41

end_draft_angle
    BD, DXF 42

start_draft_magnitude
    BD, DXF 43

end_draft_magnitude
    BD, DXF 44

arc_length_parameterization
    B, DXF 290

no_twist    B, DXF 291

align_direction
    B, DXF 292

simple_surfaces
    B, DXF 293

closed_surfaces
    B, DXF 294

solid      B, DXF 295

ruled_surface
    B, DXF 296

virtual_guide
    B, DXF 297

num_cross_sections
    BS

num_guide_curves
    BS

cross_sections
    H*, DXF 310

guide_curves
    H*, DXF 310

path_curve
    H

```

**LWPOLYLINE**

```

parent    struct _dwg_object_entity*

flag      BS, DXF 70

```

```

const_width      BD, DXF 43

elevation        BD, DXF 38

thickness        BD, DXF 39

extrusion        BE, DXF 210

num_points       BL, DXF 90

points          2RD*, DXF 10

num_bulges       BL

bulges          BD*, DXF 42

num_vertexids    BL

vertexids        BL*, DXF 91

num_widths       BL

widths          Dwg_LWPOLYLINE_width*

```

**MESH**

```

parent          struct _dwg_object_entity*

dlevel          BS, DXF 71

is_watertight    B, DXF 72

num_subdiv_vertex BL, DXF 91

subdiv_vertex    3DPOINT*, DXF 10

num_vertex       BL, DXF 92

vertex          3DPOINT*, DXF 10

num_faces        BL, DXF 93

faces           BL*, DXF 90

num_edges        BL, DXF 94

```

edges      Dwg\_MESH\_edge\*  
num\_crease  
            BL, DXF 95  
crease      BD\*, DXF 140

**MININSERT**

parent      struct \_dwg\_object\_entity\*  
ins\_pt      3DPOINT, DXF 10  
scale\_flag  
            BB  
scale      3BD\_1, DXF 41  
rotation    BD, DXF 50  
extrusion  
            BE, DXF 210  
has\_attribs  
            B, DXF 66  
num\_owned  
            BL  
num\_cols    BS, DXF 70  
num\_rows    BS, DXF 71  
col\_spacing  
            BD, DXF 44  
row\_spacing  
            BD, DXF 45  
block\_header  
            H, DXF 2  
first\_attrib  
            H  
last\_attrib  
            H  
attribs     H\*  
seqend      H

**MLINE**

parent      struct \_dwg\_object\_entity\*  
scale      BD, DXF 40  
justification  
            RC, DXF 70

`base_point`  
3BD, DXF 10

`extrusion`  
BE, DXF 210

`flags` BS, DXF 71

`num_lines`  
RC, DXF 73

`num_verts`  
BS, DXF 72

`verts` Dwg\_MLINE\_vertex\*

`mlinestyle`  
H, DXF 340

## **MPOLYGON**

`parent` struct \_dwg\_object\_entity\*

`is_gradient_fill`  
BL

`reserved` BL

`gradient_angle`  
BD

`gradient_shift`  
BD

`single_color_gradient`  
BL

`gradient_tint`  
BD

`num_colors`  
BL

`colors` Dwg\_HATCH\_Color\*

`gradient_name`  
T

`elevation`  
BD, DXF 30

`extrusion`  
BE, DXF 210

`name` T, DXF 2

`is_solid_fill`  
B, DXF 70

`is_associative`  
B, DXF 71

`num_paths`  
BL, DXF 91

`paths` Dwg\_HATCH\_Path\*

`style` BS, DXF 75

`pattern_type`  
BS, DXF 76

`angle` BD, DXF 52

`scale_spacing`  
BD, DXF 41

`double_flag`  
B, DXF 77

`num_deflines`  
BS, DXF 78

`deflines` Dwg\_HATCH\_DefLine\*

`color` CMC, DXF 62

`x_dir` 2RD, DXF 11

`num_boundary_handles`  
BL, DXF 99

## **MTEXT**

`parent` struct \_dwg\_object\_entity\*

`ins_pt` 3BD, DXF 10

`extrusion`  
BE, DXF 210

`x_axis_dir`  
3BD, DXF 11

`rect_height`  
BD, DXF 41

`rect_width`  
BD, DXF 40

`text_height`  
BD, DXF 40

`attachment`  
BS, DXF 71

`flow_dir` BS, DXF 72

extents\_width  
    BD, DXF 42

extents\_height  
    BD, DXF 43

text    T, DXF 1

style    H, DXF 7

linespace\_style  
    BS, DXF 73

linespace\_factor  
    BD, DXF 44

unknown\_b0  
    B

bg\_fill\_flag  
    BL, DXF 90

bg\_fill\_scale  
    BL, DXF 45

bg\_fill\_color  
    CMC, DXF 63

bg\_fill\_trans  
    BL, DXF 441

is\_not\_annotative  
    B

class\_version  
    BS

default\_flag  
    B, DXF 70

appid    H

ignore\_attachment  
    BL

column\_type  
    BS, DXF 71

numfragments  
    BL, DXF 72

column\_width  
    BD, DXF 44

gutter    BD, DXF 45

auto\_height  
    B, DXF 73

`flow_reversed`  
B, DXF 74

`num_column_heights`  
BL, DXF 72

`column_heights`  
BD\*, DXF 46

## **MULTILEADER**

`parent` struct `_dwg-object_entity*`

`class_version`  
BS, DXF 270

`ctx` Dwg\_MLEADER\_AnnotContext

`mleaderstyle`  
H, DXF 340

`flags` BL, DXF 90

`type` BS, DXF 170

`color` CMC, DXF 91

`ltype` H, DXF 341

`linewt` BLd, DXF 171

`has_landing`  
B, DXF 290

`has_dogleg`  
B, DXF 291

`landing_dist`  
BD, DXF 41

`arrow_handle`  
H, DXF 342

`arrow_size`  
BD, DXF 42

`style_content`  
BS, DXF 172

`text_style`  
H, DXF 343

`text_left`  
BS, DXF 173

`text_right`  
BS, DXF 95

`text_angletype`  
BS, DXF 174



`text_alignment`  
BS, DXF 175

`text_color`  
CMC, DXF 92

`has_text_frame`  
B, DXF 292

`block_style`  
H, DXF 344

`block_color`  
CMC, DXF 93

`block_scale`  
3BD, DXF 10

`block_rotation`  
BD, DXF 43

`style_attachment`  
BS, DXF 176

`is_annotative`  
B, DXF 293

`num_arrowheads`  
BL

`arrowheads`  
Dwg\_LEADER\_ArrowHead\*

`num_blocklabels`  
BL

`blocklabels`  
Dwg\_LEADER\_BlockLabel\*

`is_neg_textdir`  
B, DXF 294

`ipe_alignment`  
BS, DXF 178

`justification`  
BS, DXF 179

`scale_factor`  
BD, DXF 45

`attach_dir`  
BS, DXF 271

`attach_top`  
BS, DXF 273

attach\_bottom  
BS, DXF 272

is\_text\_extended  
B, DXF 295

### NAVISWORKSMODEL

parent struct \_dwg\_object\_entity\*

flags BS, DXF 70

definition  
H, DXF 340

transmatrix  
BD\*, DXF 40

unitfactor  
BD, DXF 40

### NURBSURFACE

parent struct \_dwg\_object\_entity\*

acis\_empty  
B, DXF 290

unknown B

version BS, DXF 70

num\_blocks  
BL

block\_size  
BL\*

encr\_sat\_data  
char \*\*, DXF 1

sab\_size BL

acis\_data  
RC\*

wireframe\_data\_present  
B

point\_present  
B

point 3BD

isolines BL

isoline\_present  
B

```
num_wires
    BL

wires      Dwg_3DSOLID_wire*

num_silhouettes
    BL

silhouettes
    Dwg_3DSOLID_silhouette*

_dxf_sab_converted
    B

acis_empty2
    B

extra_acis_data
    struct _dwg_entity_3DSOLID*

num_materials
    BL

materials
    Dwg_3DSOLID_material*

revision_guid[39]
    RC, DXF 2

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

has_revision_guid
    B

acis_empty_bit
    B

u_isolines
    BS, DXF 71

v_isolines
    BS, DXF 72
```

`short170` BS, DXF 170

`cv_hull_display`  
B, DXF 290

`uvec1` 3BD, DXF 10

`vvec1` 3BD, DXF 11

`uvec2` 3BD, DXF 12

`vvec2` 3BD, DXF 13

### **OLE2FRAME**

`parent` struct `_dwg_object_entity*`

`type` BS, DXF 71

`mode` BS, DXF 72

`lock_aspect`  
RC, DXF 73

`data_size`  
BL, DXF 90

`data` TF, DXF 310

`oleversion`  
BS, DXF 70

`oleclient`  
TF, DXF 3

`pt1` 3BD, DXF 10

`pt2` 3BD, DXF 11

### **OLEFRAME**

`parent` struct `_dwg_object_entity*`

`flag` BS, DXF 70

`mode` BS

`data_size`  
BL, DXF 90

`data` TF, DXF 310

### **PDFUNDERLAY**

See [UNDERLAY], page 30,

### **PLANESURFACE**

`parent` struct `_dwg_object_entity*`

`acis_empty`  
B, DXF 290

```
unknown    B
version    BS, DXF 70
num_blocks
           BL
block_size
           BL*
encr_sat_data
           char **, DXF 1
sab_size   BL
acis_data
           RC*
wireframe_data_present
           B
point_present
           B
point      3BD
isolines   BL
isoline_present
           B
num_wires
           BL
wires      Dwg_3DSOLID_wire*
num_silhouettes
           BL
silhouettes
           Dwg_3DSOLID_silhouette*
_dxf_sab_converted
           B
acis_empty2
           B
extra_acis_data
           struct _dwg_entity_3DSOLID*
num_materials
           BL
materials
           Dwg_3DSOLID_material*
revision_guid[39]
           RC, DXF 2
```

```

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

has_revision_guid
    B

acis_empty_bit
    B

modeler_format_version
    BS, DXF 70

u_isolines
    BS, DXF 71

v_isolines
    BS, DXF 72

class_version
    BL

```

**POINT**

```

parent    struct _dwg_object_entity*

x          BD, DXF 10

y          BD, DXF 20

z          BD, DXF 30

thickness
    BT, DXF 39

extrusion
    BE, DXF 210

x_ang     BD, DXF 50

```

**POINTCLOUD**

```

parent    struct _dwg_object_entity*

class_version
    BS, DXF 70

```

origin      3BD, DXF 10

saved\_filename  
            T, DXF 1

num\_source\_files  
            BL, DXF 90

source\_files  
            TV\*, DXF 2

extents\_min  
            3BD, DXF 11

extents\_max  
            3BD, DXF 12

numpoints  
            RLL, DXF 92

ucs\_name    T, DXF 3

ucs\_origin  
            3BD, DXF 13

ucs\_x\_dir  
            3BD, DXF 210

ucs\_y\_dir  
            3BD, DXF 211

ucs\_z\_dir  
            3BD, DXF 212

pointclouddef  
            H, DXF 330

reactor    H, DXF 360

show\_intensity  
            B

intensity\_scheme  
            BS, DXF 71

intensity\_style  
            Dwg\_POINTCLOUD\_IntensityStyle

show\_clipping  
            B

num\_clippings  
            BL

clippings  
            Dwg\_POINTCLOUD\_Clippings\*

**POINTCLOUDEX**

```
parent      struct _dwg_object_entity*
class_version
            BS, DXF 70
extents_min
            3BD, DXF 10
extents_max
            3BD, DXF 11
ucs_origin
            3BD, DXF 12
ucs_x_dir
            3BD, DXF 210
ucs_y_dir
            3BD, DXF 211
ucs_z_dir
            3BD, DXF 212
is_locked
            B, DXF 290
pointclouddefex
            H, DXF 330
reactor      H, DXF 360
name         T, DXF 1
show_intensity
            B, DXF 291
stylization_type
            BS, DXF 71
intensity_colorscheme
            T, DXF 1
cur_colorscheme
            T, DXF 1
classification_colorscheme
            T, DXF 1
elevation_min
            BD, DXF 40
elevation_max
            BD, DXF 41
intensity_min
            BL, DXF 90
```



```

intensity_max
    BL, DXF 91

intensity_out_of_range_behavior
    BS, DXF 71

elevation_out_of_range_behavior
    BS, DXF 72

elevation_apply_to_fixed_range
    B, DXF 292

intensity_as_gradient
    B, DXF 293

elevation_as_gradient
    B, DXF 294

show_cropping
    B, DXF 295

unknown_b10
    BL, DXF 93

unknown_b11
    BL, DXF 93

num_croppings
    BL, DXF 92

croppings
    Dwg_POINTCLOUDEX_Croppings*

```

**POINTPARAMETERENTITY**

```

parent    struct _dwg_object_entity*

```

**POLARGRIPENTITY**

```

parent    struct _dwg_object_entity*

```

**POLYLINE\_2D**

```

parent    struct _dwg_object_entity*

has_vertex
    B, DXF 66

num_owned
    BL

first_vertex
    H

last_vertex
    H

vertex    H*

```

```
seqend      H
flag        BS, DXF 70
curve_type  BS, DXF 75
start_width BD, DXF 40
end_width   BD, DXF 41
thickness   BT, DXF 39
elevation   BD
extrusion   BE, DXF 210
```

**POLYLINE\_3D**

```
parent      struct _dwg_object_entity*
has_vertex   B, DXF 66
num_owned    BL
first_vertex H
last_vertex  H
vertex       H*
seqend       H
curve_type   RC, DXF 75
flag         RC, DXF 70
```

**POLYLINE\_MESH**

```
parent      struct _dwg_object_entity*
has_vertex   B, DXF 66
num_owned    BL
first_vertex H
```

```
last_vertex    H
vertex         H*
seqend         H
flag           BS, DXF 70
curve_type     BS, DXF 75
num_m_verts    BS, DXF 71
num_n_verts    BS, DXF 72
m_density      BS, DXF 73
n_density      BS, DXF 74
```

**POLYLINE\_PFACE**

```
parent         struct _dwg_object_entity*
has_vertex      B, DXF 66
num_owned       BL
first_vertex    H
last_vertex     H
vertex          H*
seqend          H
numverts        BS, DXF 71
numfaces        BS, DXF 72
```

**PROXY\_ENTITY**

```
parent         struct _dwg_object_entity*
class_id        BL, DXF 91
version         BL, DXF 95
maint_version    BL, DXF 97
from_dxf        B, DXF 70
```

```

data_numbits
    BL

data_size
    BL, DXF 93

data
    TF, DXF 310

num_objids
    BL

objids
    H*, DXF 340

```

**RAY**

```

parent    struct _dwg_object_entity*

point     3BD, DXF 10

vector    3BD, DXF 11

```

**REGION**

See [3DSOLID], page 22,

**REVOLVEDSURFACE**

```

parent    struct _dwg_object_entity*

acis_empty
    B, DXF 290

unknown    B

version    BS, DXF 70

num_blocks
    BL

block_size
    BL*

encr_sat_data
    char **, DXF 1

sab_size    BL

acis_data
    RC*

wireframe_data_present
    B

point_present
    B

point     3BD

isolines    BL

isoline_present
    B

```

```
num_wires
    BL

wires      Dwg_3DSOLID_wire*

num_silhouettes
    BL

silhouettes
    Dwg_3DSOLID_silhouette*

_dxf_sab_converted
    B

acis_empty2
    B

extra_acis_data
    struct _dwg_entity_3DSOLID*

num_materials
    BL

materials
    Dwg_3DSOLID_material*

revision_guid[39]
    RC, DXF 2

revision_major
    BL

revision_minor1
    BS

revision_minor2
    BS

revision_bytes[9]
    RC

end_marker
    BL

history_id
    H, DXF 350

has_revision_guid
    B

acis_empty_bit
    B

modeler_format_version
    BS, DXF 70

u_isolines
    BS, DXF 71
```

```

v_isolines
    BS, DXF 72

class_version
    BL, DXF 90

id
    BL, DXF 90

axis_point
    3BD, DXF 10

axis_vector
    3BD, DXF 11

revolve_angle
    BD, DXF 40

start_angle
    BD, DXF 41

revolved_entity_transmatrix
    BD*, DXF 42

draft_angle
    BD, DXF 43

draft_start_distance
    BD, DXF 44

draft_end_distance
    BD, DXF 45

twist_angle
    BD, DXF 46

solid
    B, DXF 290

close_to_axis
    B, DXF 291

```

#### **ROTATIONPARAMETERENTITY**

```

parent    struct _dwg_object_entity*

```

#### **RTEXT**

```

parent    struct _dwg_object_entity*

pt        3BD, DXF 10

extrusion
    BE, DXF 210

rotation  BD, DXF 50

height    BD, DXF 50

flags     BS, DXF 70

```

text\_value  
T, DXF 1

style H, DXF 7

## SECTIONOBJECT

parent struct \_dwg\_object\_entity\*

state BL, DXF 90

flags BL, DXF 91

name T, DXF 1

vert\_dir 3BD, DXF 10

top\_height  
BD, DXF 40

bottom\_height  
BD, DXF 41

indicator\_alpha  
BS, DXF 70

indicator\_color  
CMC, DXF 62

num\_verts  
BL, DXF 92

verts 3BD\*, DXF 11

num\_blverts  
BL, DXF 93

blverts 3BD\*, DXF 12

section\_settings  
H, DXF 360

## SEQEND

parent struct \_dwg\_object\_entity\*

## SHAPE

parent struct \_dwg\_object\_entity\*

ins\_pt 3BD, DXF 10

scale BD, DXF 40

rotation BD, DXF 50

width\_factor  
BD, DXF 41

oblique\_angle  
BD, DXF 51

thickness BD, DXF 39  
style\_id BS  
extrusion BE, DXF 210  
style H, DXF 7

**SOLID**

parent struct \_dwg\_object\_entity\*  
thickness BT, DXF 39  
elevation BD, DXF 38  
corner1 2RD, DXF 10  
corner2 2RD, DXF 11  
corner3 2RD, DXF 12  
corner4 2RD, DXF 13  
extrusion BE, DXF 210

**SPLINE**

parent struct \_dwg\_object\_entity\*  
flag RS  
scenario BS  
degree BS, DXF 71  
splineflags1 BL  
knotparam BL  
fit\_tol BD, DXF 44  
beg\_tan\_vec 3BD, DXF 12  
end\_tan\_vec 3BD, DXF 13  
closed\_b B  
periodic B  
rational B



```

weighted  B
knot_tol  BD, DXF 42
ctrl_tol  BD, DXF 43
num_fit_pts
           BS, DXF 74
fit_pts   3DPOINT*, DXF 11
num_knots
           BL, DXF 72
knots     BD*, DXF 40
num_ctrl_pts
           BL, DXF 73
ctrl_pts  Dwg_SPLINE_control_point*

```

**SWEPTSURFACE**

```

parent    struct _dwg_object_entity*
acis_empty
           B, DXF 290
unknown   B
version   BS, DXF 70
num_blocks
           BL
block_size
           BL*
encr_sat_data
           char **, DXF 1
sab_size  BL
acis_data
           RC*
wireframe_data_present
           B
point_present
           B
point     3BD
isolines  BL
isoline_present
           B
num_wires
           BL

```

```
wires      Dwg_3DSOLID_wire*
num_silhouettes
    BL
silhouettes
    Dwg_3DSOLID_silhouette*
_dxf_sab_converted
    B
acis_empty2
    B
extra_acis_data
    struct _dwg_entity_3DSOLID*
num_materials
    BL
materials
    Dwg_3DSOLID_material*
revision_guid[39]
    RC, DXF 2
revision_major
    BL
revision_minor1
    BS
revision_minor2
    BS
revision_bytes[9]
    RC
end_marker
    BL
history_id
    H, DXF 350
has_revision_guid
    B
acis_empty_bit
    B
modeler_format_version
    BS, DXF 70
u_isolines
    BS, DXF 71
v_isolines
    BS, DXF 72
```

`class_version`  
BL, DXF 90

`sweep_entity_id`  
BL, DXF 90

`sweepdata_size`  
BL, DXF 90

`sweepdata`  
TF, DXF 310

`path_entity_id`  
BL, DXF 90

`pathdata_size`  
BL, DXF 90

`pathdata` TF, DXF 310

`draft_angle`  
BD, DXF 42

`draft_start_distance`  
BD, DXF 43

`draft_end_distance`  
BD, DXF 44

`twist_angle`  
BD, DXF 45

`scale_factor`  
BD, DXF 48

`align_angle`  
BD, DXF 49

`sweep_entity_transmatrix`  
BD\*, DXF 46

`path_entity_transmatrix`  
BD\*, DXF 47

`is_solid` B, DXF 290

`sweep_alignment_flags`  
BS, DXF 70

`path_flags`  
BS, DXF 71

`align_start`  
B, DXF 292

`bank` B, DXF 293

`base_point_set`  
B, DXF 294

```

sweep_entity_transform_computed
    B, DXF 295

path_entity_transform_computed
    B, DXF 296

reference_vector_for_controlling_twist
    3BD, DXF 11

sweep_entity
    H

path_entity
    H

```

**TABLE**

```

parent      struct _dwg_object_entity*

ldata       Dwg_LinkedData

tdata       Dwg_LinkedTableData

fdata       Dwg_FormattedTableData

tablestyle
    H, DXF 342

unknown_rc
    RC

unknown_h
    H

unknown_bl
    BL

unknown_b
    B

unknown_bl1
    BL

ins_pt      3BD, DXF 10

scale       3BD_1, DXF 41

scale_flag
    BB

rotation    BD, DXF 50

extrusion
    BE, DXF 210

has_attribs
    B, DXF 66

num_owned
    BL

```

flag\_for\_table\_value  
BS, DXF 90

horiz\_direction  
3BD, DXF 11

num\_cols BL, DXF 92

num\_rows BL, DXF 91

num\_cells  
unsigned long

col\_widths  
BD\*, DXF 142

row\_heights  
BD\*, DXF 141

cells Dwg-TABLE-Cell\*

has\_table\_overrides  
B

table\_flag\_override  
BL, DXF 93

title\_suppressed  
B, DXF 280

header\_suppressed  
B, DXF 281

flow\_direction  
BS, DXF 70

horiz\_cell\_margin  
BD, DXF 40

vert\_cell\_margin  
BD, DXF 41

title\_row\_color  
CMC, DXF 64

header\_row\_color  
CMC, DXF 64

data\_row\_color  
CMC, DXF 64

title\_row\_fill\_none  
B, DXF 283

header\_row\_fill\_none  
B, DXF 283

data\_row\_fill\_none  
B, DXF 283

title\_row\_fill\_color  
CMC, DXF 63

header\_row\_fill\_color  
CMC, DXF 63

data\_row\_fill\_color  
CMC, DXF 63

title\_row\_alignment  
BS, DXF 170

header\_row\_alignment  
BS, DXF 170

data\_row\_alignment  
BS, DXF 170

title\_text\_style  
H, DXF 7

header\_text\_style  
H, DXF 7

data\_text\_style  
H, DXF 7

title\_row\_height  
BD, DXF 140

header\_row\_height  
BD, DXF 140

data\_row\_height  
BD, DXF 140

has\_border\_color\_overrides  
B

border\_color\_overrides\_flag  
BL, DXF 94

title\_horiz\_top\_color  
CMC, DXF 64

title\_horiz\_ins\_color  
CMC, DXF 65

title\_horiz\_bottom\_color  
CMC, DXF 66

title\_vert\_left\_color  
CMC, DXF 63

title\_vert\_ins\_color  
CMC, DXF 68

title\_vert\_right\_color  
CMC, DXF 69

header\_horiz\_top\_color  
CMC, DXF 64

header\_horiz\_ins\_color  
CMC, DXF 65

header\_horiz\_bottom\_color  
CMC, DXF 66

header\_vert\_left\_color  
CMC, DXF 63

header\_vert\_ins\_color  
CMC, DXF 68

header\_vert\_right\_color  
CMC, DXF 69

data\_horiz\_top\_color  
CMC, DXF 64

data\_horiz\_ins\_color  
CMC, DXF 65

data\_horiz\_bottom\_color  
CMC, DXF 66

data\_vert\_left\_color  
CMC, DXF 63

data\_vert\_ins\_color  
CMC, DXF 68

data\_vert\_right\_color  
CMC, DXF 69

has\_border\_lineweight\_overrides  
B

border\_lineweight\_overrides\_flag  
BL, DXF 95

title\_horiz\_top\_linewt  
BS

title\_horiz\_ins\_linewt  
BS

title\_horiz\_bottom\_linewt  
BS

title\_vert\_left\_linewt  
BS

```
title_vert_ins_linewt
    BS

title_vert_right_linewt
    BS

header_horiz_top_linewt
    BS

header_horiz_ins_linewt
    BS

header_horiz_bottom_linewt
    BS

header_vert_left_linewt
    BS

header_vert_ins_linewt
    BS

header_vert_right_linewt
    BS

data_horiz_top_linewt
    BS

data_horiz_ins_linewt
    BS

data_horiz_bottom_linewt
    BS

data_vert_left_linewt
    BS

data_vert_ins_linewt
    BS

data_vert_right_linewt
    BS

has_border_visibility_overrides
    B

border_visibility_overrides_flag
    BL, DXF 96

title_horiz_top_visibility
    BS

title_horiz_ins_visibility
    BS

title_horiz_bottom_visibility
    BS
```



```
title_vert_left_visibility
    BS

title_vert_ins_visibility
    BS

title_vert_right_visibility
    BS

header_horiz_top_visibility
    BS

header_horiz_ins_visibility
    BS

header_horiz_bottom_visibility
    BS

header_vert_left_visibility
    BS

header_vert_ins_visibility
    BS

header_vert_right_visibility
    BS

data_horiz_top_visibility
    BS

data_horiz_ins_visibility
    BS

data_horiz_bottom_visibility
    BS

data_vert_left_visibility
    BS

data_vert_ins_visibility
    BS

data_vert_right_visibility
    BS

block_header
    H, DXF 2

first_attrib
    H

last_attrib
    H

attribs    H*

seqend    H
```

```

    title_row_style_override
        H, DXF 7

    header_row_style_override
        H

    data_row_style_override
        H

    unknown_bs
        BS

    hor_dir    3BD, DXF 11

    has_break_data
        BL

    break_flag
        BL

    break_flow_direction
        BL

    break_spacing
        BD

    break_unknown1
        BL

    break_unknown2
        BL

    num_break_heights
        BL

    break_heights
        Dwg_TABLE_BreakHeight*

    num_break_rows
        BL

    break_rows
        Dwg_TABLE_BreakRow*

```

**TEXT**

```

    parent    struct _dwg_object_entity*

    dataflags
        RC

    elevation
        RD, DXF 30

    ins_pt    2DPOINT, DXF 10

    alignment_pt
        2DPOINT, DXF 11

```

extrusion  
    BE, DXF 210

thickness  
    RD, DXF 39

oblique\_angle  
    RD, DXF 51

rotation    RD, DXF 50

height      RD, DXF 40

width\_factor  
    RD, DXF 41

text\_value  
    T, DXF 1

generation  
    BS, DXF 71

horiz\_alignment  
    BS, DXF 72

vert\_alignment  
    BS, DXF 73

style       H, DXF 7

**TOLERANCE**

parent      struct \_dwg\_object\_entity\*

unknown\_short  
    BS

height      BD

dimgap      BD

ins\_pt      3BD, DXF 10

x\_direction  
    3BD, DXF 11

extrusion  
    BE

text\_value  
    T, DXF 1

dimstyle    H, DXF 3

**TRACE**

parent      struct \_dwg\_object\_entity\*

thickness  
    BT, DXF 39

elevation  
     BD, DXF 38  
 corner1    2RD, DXF 10  
 corner2    2RD, DXF 11  
 corner3    2RD, DXF 12  
 corner4    2RD, DXF 13  
 extrusion  
     BE, DXF 210

**UNKNOWN\_ENT**

parent      struct \_dwg\_object\_entity\*

**VERTEX\_2D**

parent      struct \_dwg\_object\_entity\*  
 flag        RC, DXF 70  
 point       3BD, DXF 10  
 start\_width  
     BD, DXF 40  
 end\_width  
     BD, DXF 41  
 id          BL, DXF 91  
 bulge       BD, DXF 42  
 tangent\_dir  
     BD, DXF 50

**VERTEX\_3D**

parent      struct \_dwg\_object\_entity\*  
 flag        RC, DXF 70  
 point       3BD, DXF 10

**VERTEX\_MESH**

See [VERTEX\_3D], page 88,

**VERTEX\_PFACE**

See [VERTEX\_3D], page 88,

**VERTEX\_PFACE\_FACE**

parent      struct \_dwg\_object\_entity\*  
 flag        RC, DXF 70  
 vertind[4]  
     BS

**VIEWPORT**

parent	struct _dwg_object_entity*
center	3BD, DXF 10
width	BD, DXF 40
height	BD, DXF 41
on_off	RS, DXF 68
id	RS, DXF 69
view_target	3BD, DXF 17
VIEWDIR	3BD, DXF 16
twist_angle	BD, DXF 51
VIEWSIZE	BD, DXF 45
lens_length	BD, DXF 42
front_clip_z	BD, DXF 43
back_clip_z	BD, DXF 44
SNAPANG	BD, DXF 50
VIEWCTR	2RD, DXF 12
SNAPBASE	2RD, DXF 13
SNAPUNIT	2RD, DXF 14
GRIDUNIT	2RD, DXF 15
circle_zoom	BS, DXF 72
grid_major	BS, DXF 61
num_frozen_layers	BL
status_flag	BL, DXF 90
style_sheet	T, DXF 1
render_mode	RC, DXF 281

ucs\_at\_origin  
    B, DXF 74

UCSVP    B, DXF 71

ucsorg    3BD, DXF 110

ucsxdir    3BD, DXF 111

ucsydir    3BD, DXF 112

ucs\_elevation  
    BD, DXF 146

UCSORTHOVIEW  
    BS, DXF 79

shadeplot\_mode  
    BS, DXF 170

use\_default\_lights  
    B, DXF 292

default\_lighting\_type  
    RC, DXF 282

brightness  
    BD, DXF 141

contrast    BD, DXF 142

ambient\_color  
    CMC, DXF 63

vport\_entity\_header  
    H

frozen\_layers  
    H\*, DXF 341

clip\_boundary  
    H, DXF 340

named\_ucs  
    H, DXF 345

base\_ucs    H, DXF 346

background  
    H, DXF 332

visualstyle  
    H, DXF 348

shadeplot  
    H, DXF 333

sun        H, DXF 361

**VISIBILITYGRIPENTITY**

parent struct \_dwg\_object\_entity\*

**VISIBILITYPARAMETERENTITY**

parent struct \_dwg\_object\_entity\*

**WIPEOUT**

parent struct \_dwg\_object\_entity\*

class\_version  
BL, DXF 90

pt0 3BD, DXF 10

uvec 3BD, DXF 11

vvec 3BD, DXF 12

size 2RD, DXF 13

display\_props  
BS, DXF 70

clipping B, DXF 280

brightness  
RC, DXF 281

contrast RC, DXF 282

fade RC, DXF 283

clip\_mode  
B, DXF 290

clip\_boundary\_type  
BS, DXF 71

num\_clip\_verts  
BL, DXF 91

clip\_verts  
2RD\*, DXF 14

imagedef H, DXF 340

imagedefreactor  
H, DXF 360

**XLINE**

See [RAY], page 72,

**XYPARAMETERENTITY**

parent struct \_dwg\_object\_entity\*

### 4.3 OBJECTS

All non-graphical objects with its fields. See [Common Object fields], page 257,

#### **ACMECOMMANDHISTORY**

```
parent    struct _dwg_object_object*
class_version
          BS
```

#### **ACMESCOPE**

```
parent    struct _dwg_object_object*
class_version
          BS
```

#### **ACMESTATEMGR**

```
parent    struct _dwg_object_object*
class_version
          BS
```

#### **ACSH\_BOOLEAN\_CLASS**

```
parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
history_node
          Dwg_ACSH_HistoryNode
major     BL, DXF 90
minor     BL, DXF 91
operation
          RCd, DXF 280
operand1  BL, DXF 92
operand2  BL, DXF 93
```

#### **ACSH\_BOX\_CLASS**

```
parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
history_node
          Dwg_ACSH_HistoryNode
major     BL, DXF 90
minor     BL, DXF 91
length    BD, DXF 40
width     BD, DXF 41
height    BD, DXF 42
```



**ACSH\_BREP\_CLASS**

```
parent      struct _dwg_object_object*
acis_empty
            B, DXF 290
unknown     B
version     BS, DXF 70
num_blocks
            BL
block_size
            BL*
encr_sat_data
            char **, DXF 1
sab_size    BL
acis_data
            RC*
wireframe_data_present
            B
point_present
            B
point       3BD
isolines    BL
isoline_present
            B
num_wires
            BL
wires       Dwg_3DSOLID_wire*
num_silhouettes
            BL
silhouettes
            Dwg_3DSOLID_silhouette*
_dxf_sab_converted
            B
acis_empty2
            B
extra_acis_data
            struct _dwg_entity_3DSOLID*
num_materials
            BL
```

```

materials      Dwg_3DSOLID_material*

revision_guid[39]
                RC, DXF 2

revision_major
                BL

revision_minor1
                BS

revision_minor2
                BS

revision_bytes[9]
                RC

end_marker
                BL

history_id
                H, DXF 350

has_revision_guid
                B

acis_empty_bit
                B

evalexpr      Dwg_EvalExpr

history_node
                Dwg_ACSH_HistoryNode

major          BL, DXF 90

minor          BL, DXF 91

```

**ACSH\_CHAMFER\_CLASS**

```

parent        struct _dwg_object_object*

evalexpr      Dwg_EvalExpr

history_node
                Dwg_ACSH_HistoryNode

major          BL, DXF 90

minor          BL, DXF 91

b192          BL, DXF 92

base_dist
                BD, DXF 41

other_dist
                BD, DXF 42

```

num\_edges      BL, DXF 93  
edges          BL\*, DXF 94  
b195          BL, DXF 95

#### **ACSH\_CONE\_CLASS**

parent      struct \_dwg\_object\_object\*  
evalexpr    Dwg\_EvalExpr  
history\_node  
            Dwg\_ACSH\_HistoryNode  
major      BL, DXF 90  
minor      BL, DXF 91  
height      BD, DXF 40  
major\_radius  
            BD, DXF 41  
minor\_radius  
            BD, DXF 42  
x\_radius    BD, DXF 43

#### **ACSH\_CYLINDER\_CLASS**

parent      struct \_dwg\_object\_object\*  
evalexpr    Dwg\_EvalExpr  
history\_node  
            Dwg\_ACSH\_HistoryNode  
major      BL, DXF 90  
minor      BL, DXF 91  
height      BD, DXF 40  
major\_radius  
            BD, DXF 41  
minor\_radius  
            BD, DXF 42  
x\_radius    BD, DXF 43

#### **ACSH\_EXTRUSION\_CLASS**

parent      struct \_dwg\_object\_object\*  
evalexpr    Dwg\_EvalExpr  
history\_node  
            Dwg\_ACSH\_HistoryNode

major	BL, DXF 90
minor	BL, DXF 91
direction	3BD, DXF 10
bl92	BL, DXF 92
shsw_text_size	BL, DXF 90
shsw_text	TF, DXF 310
shsw_bl93	BL, DXF 93
shsw_text2_size	BL, DXF 90
shsw_text2	TF, DXF 310
draft_angle	BD, DXF 42
start_draft_dist	BD, DXF 43
end_draft_dist	BD, DXF 44
scale_factor	BD, DXF 45
twist_angle	BD, DXF 48
align_angle	BD, DXF 49
sweepentity_transform	BD*, DXF 46
pathentity_transform	BD*, DXF 47
align_option	RC, DXF 70
miter_option	RC, DXF 71
has_align_start	B, DXF 290
bank	B, DXF 292

`check_intersections`  
B, DXF 293

`shsw_b294`  
B, DXF 294

`shsw_b295`  
B, DXF 295

`shsw_b296`  
B, DXF 296

`pt2` 3BD, DXF 11

### **ACSH\_FILLET\_CLASS**

`parent` struct `_dwg_object_object*`

`evalexpr` `Dwg_EvalExpr`

`history_node`  
`Dwg_ACSH_HistoryNode`

`major` BL, DXF 90

`minor` BL, DXF 91

`b192` BL, DXF 92

`num_edges`  
BL, DXF 93

`edges` BL\*, DXF 94

`num_radiuses`  
BL, DXF 95

`num_startsetbacks`  
BL, DXF 96

`num_endsetbacks`  
BL, DXF 97

`radiuses` BD\*, DXF 41

`startsetbacks`  
BD\*, DXF 42

`endsetbacks`  
BD\*, DXF 43

### **ACSH\_HISTORY\_CLASS**

`parent` struct `_dwg_object_object*`

`major` BL, DXF 90

`minor` BL, DXF 91

`owner` H, DXF 360

h\_nodeid BL, DXF 92

show\_history  
B, DXF 280

record\_history  
B, DXF 281

### **ACSH\_LOFT\_CLASS**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

history\_node  
Dwg\_ACSH\_HistoryNode

major BL, DXF 90

minor BL, DXF 91

num\_crosssects  
BL, DXF 92

crosssects  
H\*

num\_guides  
BL, DXF 95

guides H\*

### **ACSH\_PYRAMID\_CLASS**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

history\_node  
Dwg\_ACSH\_HistoryNode

major BL, DXF 90

minor BL, DXF 91

height BD, DXF 40

sides BL, DXF 92

radius BD, DXF 41

topradius  
BD, DXF 42

### **ACSH\_REVOLVE\_CLASS**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

history\_node  
Dwg\_ACSH\_HistoryNode

```

major      BL, DXF 90
minor      BL, DXF 91
axis_pt    3BD, DXF 10
direction  2RD, DXF 11

revolve_angle
          BD, DXF 40

start_angle
          BD, DXF 41

draft_angle
          BD, DXF 43

bd44       BD, DXF 44
bd45       BD, DXF 45

twist_angle
          BD, DXF 46

b290       B, DXF 290

is_close_to_axis
          B, DXF 291

sweep_entity
          H

```

**ACSH\_SPHERE\_CLASS**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
history_node
            Dwg_ACSH_HistoryNode

major      BL, DXF 90
minor      BL, DXF 91
radius     BD, DXF 40

```

**ACSH\_SWEEP\_CLASS**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
history_node
            Dwg_ACSH_HistoryNode

major      BL, DXF 90
minor      BL, DXF 91

```

direction  
3BD, DXF 10

bl92  
BL, DXF 92

shsw\_text\_size  
BL, DXF 90

shsw\_text  
TF, DXF 310

shsw\_bl93  
BL, DXF 93

shsw\_text2\_size  
BL, DXF 90

shsw\_text2  
TF, DXF 310

draft\_angle  
BD, DXF 42

start\_draft\_dist  
BD, DXF 43

end\_draft\_dist  
BD, DXF 44

scale\_factor  
BD, DXF 45

twist\_angle  
BD, DXF 48

align\_angle  
BD, DXF 49

sweepentity\_transform  
BD\*, DXF 46

pathentity\_transform  
BD\*, DXF 47

align\_option  
RC, DXF 70

miter\_option  
RC, DXF 71

has\_align\_start  
B, DXF 290

bank  
B, DXF 292

check\_intersections  
B, DXF 293



shsw\_b294  
B, DXF 294

shsw\_b295  
B, DXF 295

shsw\_b296  
B, DXF 296

pt2 3BD, DXF 11

#### **ACSH\_TORUS\_CLASS**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

history\_node  
Dwg\_ACSH\_HistoryNode

major BL, DXF 90

minor BL, DXF 91

major\_radius  
BD, DXF 40

minor\_radius  
BD, DXF 41

#### **ACSH\_WEDGE\_CLASS**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

history\_node  
Dwg\_ACSH\_HistoryNode

major BL, DXF 90

minor BL, DXF 91

length BD, DXF 40

width BD, DXF 41

height BD, DXF 42

#### **ALDIMOBJECTCONTEXTDATA**

parent struct \_dwg\_object\_object\*

class\_version  
BS, DXF 70

is\_default  
B, DXF 290

scale H, DXF 340

```
dimension
    Dwg_OCD_Dimension
```

```
dimline_pt
    3BD, DXF 11
```

#### **ANGDIMOBJECTCONTEXTDATA**

```
parent    struct _dwg_object_object*
```

```
class_version
    BS, DXF 70
```

```
is_default
    B, DXF 290
```

```
scale     H, DXF 340
```

```
dimension
    Dwg_OCD_Dimension
```

```
arc_pt    3BD, DXF 11
```

#### **ANNOTSCALEOBJECTCONTEXTDATA**

```
parent    struct _dwg_object_object*
```

```
class_version
    BS, DXF 70
```

```
is_default
    B, DXF 290
```

```
scale     H, DXF 340
```

#### **APPID**

APPID is a table object.

```
parent    struct _dwg_object_object*
```

```
flag      RC
```

```
name      TV
```

```
used      RS
```

```
is_xref_ref
    B
```

```
is_xref_resolved
    BS
```

```
is_xref_dep
    B
```

```
xref      H
```

```
unknown   RC, DXF 71
```

**APPID\_CONTROL**

APPID\_CONTROL is a table\_control object.

```
parent      struct _dwg_object_object*
num_entries
            BS, DXF 70
entries     H*
```

**ASSOC2DCONSTRAINTGROUP**

```
parent      struct _dwg_object_object*
class_version
            BS, DXF 90
geometry_status
            BL, DXF 90
owningnetwork
            H, DXF 330
actionbody
            H, DXF 360
action_index
            BL, DXF 90
max_assoc_dep_index
            BL, DXF 90
num_deps    BL, DXF 90
deps        Dwg_ASSOCACTION_Deps*
num_owned_params
            BL
owned_params
            H*
num_values
            BL
values      struct _dwg_VALUEPARAM*
version     BL, DXF 90
b1          B, DXF 70
workplane[3]
            3BD
h1          H, DXF 360
num_actions
            BL, DXF 90
actions     H*, DXF 360
```

```

num_nodes      BL, DXF 90
nodes          Dwg_CONSTRAINTGROUPNODE*

```

### **ASSOC3POINTANGULARDIMACTIONBODY**

```

parent         struct _dwg_object_object*
aaab_version   BS, DXF 90
assoc_dep      H, DXF 330
aab_version    BS, DXF 90
actionbody     H, DXF 360
pab            Dwg ASSOCPARAMBASEDACTIONBODY
class_version  BS, DXF 90
r_node        H, DXF 330
d_node        H, DXF 330
assocdep      H, DXF 330

```

### **ASSOCACTION**

```

parent         struct _dwg_object_object*
class_version  BS, DXF 90
geometry_status BL, DXF 90
owningnetwork  H, DXF 330
actionbody     H, DXF 360
action_index   BL, DXF 90
max_assoc_dep_index BL, DXF 90
num_deps      BL, DXF 90
deps          Dwg ASSOCACTION_Deps*
num_owned_params
              BL

```

```

owned_params
    H*

num_values
    BL

values    struct _dwg_VALUEPARAM*

```

#### **ASSOCACTIONPARAM**

```

parent    struct _dwg_object_object*

is_r2013  BS, DXF 90

aap_version
    BL, DXF 90

name      T, DXF 1

```

#### **ASSOCALIGNEDDIMACTIONBODY**

```

parent    struct _dwg_object_object*

aaab_version
    BS, DXF 90

assoc_dep
    H, DXF 330

aab_version
    BS, DXF 90

actionbody
    H, DXF 360

pab       Dwg-ASSOCPARAMBASEDACTIONBODY

class_version
    BL, DXF 90

r_node    H, DXF 330

d_node    H, DXF 330

```

#### **ASSOCARRAYACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab       Dwg-ASSOCPARAMBASEDACTIONBODY

aaab_version
    BL, DXF 90

paramblock
    T, DXF 1

transmatrix
    BD*, DXF 40

```

**ASSOCARRAYMODIFYACTIONBODY**

```

parent      struct _dwg_object_object*
aab_version
            BL, DXF 90
pab         Dwg ASSOCPARAMBASEDACTIONBODY
aaab_version
            BL, DXF 90
paramblock
            T, DXF 1
transmatrix
            BD*, DXF 40
status      BS, DXF 70
num_items
            BL, DXF 90
items       Dwg_ARRAYITEMLOCATOR*
```

**ASSOCASMBODYACTIONPARAM**

```

parent      struct _dwg_object_object*
is_r2013    BS, DXF 90
aap_version
            BL, DXF 90
name        T, DXF 1
asdap_class_version
            BL, DXF 90
dep         H, DXF 330
class_version
            BL, DXF 90
acis_empty
            B
unknown     B
version     BS
num_blocks
            BL
block_size
            BL*
encr_sat_data
            char **
```

```
sab_size    BL
acis_data    RC*
wireframe_data_present
            B
point_present
            B
point        3BD
isolines     BL
isoline_present
            B
num_wires    BL
wires        Dwg_3DSOLID_wire*
num_silhouettes
            BL
silhouettes  Dwg_3DSOLID_silhouette*
_dxf_sab_converted
            B
acis_empty2  B
extra_acis_data
            struct _dwg_entity_3DSOLID*
num_materials
            BL
materials    Dwg_3DSOLID_material*
revision_guid[39]
            RC
revision_major
            BL
revision_minor1
            BS
revision_minor2
            BS
revision_bytes[9]
            RC
```

```

end_marker
    BL

history_id
    H

has_revision_guid
    B

acis_empty_bit
    B

```

### **ASSOCBLENDSURFACEACTIONBODY**

```

parent      struct _dwg_object_object*

aab_version
    BL, DXF 90

pab          Dwg ASSOCPARAMBASEDACTIONBODY
sab          Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

b1           B, DXF 290
b2           B, DXF 291
b3           B, DXF 292
b4           B, DXF 293
b5           B, DXF 294

blend_options
    BS, DXF 72

bs2          BS, DXF 73

```

### **ASSOCCOMPOUNDACTIONPARAM**

```

parent      struct _dwg_object_object*

is_r2013     BS, DXF 90

aap_version
    BL, DXF 90

name         T, DXF 1

class_version
    BS, DXF 90

bs1          BS, DXF 90

```



```

num_params      BL, DXF 90

params          H*, DXF 360

has_child_param
                B

child_status
                BS, DXF 90

child_id        BL, DXF 90

child_param
                H, DXF 330

h330_2          H, DXF 330

b12             BL, DXF 90

h330_3          H, DXF 330

```

**ASSOCDEPENDENCY**

```

parent          struct _dwg_object_object*

class_version
                BS, DXF 90

status          BL, DXF 90

is_read_dep
                B, DXF 290

is_write_dep
                B, DXF 290

is_attached_to_object
                B, DXF 290

is_delegating_to_owning_action
                B, DXF 290

order           BLd, DXF 90

dep_on          H, DXF 330

has_name        B, DXF 290

name            T, DXF 1

depbodyid
                BLd, DXF 90

readdep         H, DXF 330

dep_body        H, DXF 360

node            H, DXF 330

```

**ASSOCDIMDEPENDENCYBODY**

```

parent      struct _dwg_object_object*
adb_version
            BS, DXF 90
dimbase_version
            BS, DXF 90
name        T, DXF 1
class_version
            BS, DXF 90

```

**ASSOCEDGEACTIONPARAM**

```

parent      struct _dwg_object_object*
is_r2013    BS, DXF 90
aap_version
            BL, DXF 90
name        T, DXF 1
asdap_class_version
            BL, DXF 90
dep         H, DXF 330
class_version
            BL, DXF 90
param       H, DXF 330
has_action
            B, DXF 290
action_type
            BL, DXF 90
subent      H

```

**ASSOCEDGECHAMFERACTIONBODY**

```

parent      struct _dwg_object_object*
aab_version
            BL, DXF 90
pab         Dwg_ASSOCPARAMBASEDACTIONBODY
sab         Dwg ASSOCSURFACEACTIONBODY
pbsab_status
            BL, DXF 90

```

**ASSOCEDGEFILLETACTIONBODY**

```

parent      struct _dwg_object_object*

```

```

aab_version
    BL, DXF 90

pab      Dwg ASSOCPARAMBASEDACTIONBODY

sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

```

#### **ASSOCEXTENDSURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab      Dwg ASSOCPARAMBASEDACTIONBODY

sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

option    RC, DXF 280

```

#### **ASSOCEXTRUDESURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab      Dwg ASSOCPARAMBASEDACTIONBODY

sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

```

#### **ASSOCFACEACTIONPARAM**

```

parent    struct _dwg_object_object*

is_r2013  BS, DXF 90

aap_version
    BL, DXF 90

name      T, DXF 1

asdap_class_version
    BL, DXF 90

dep       H, DXF 330

```

```
class_version
    BL, DXF 90
```

```
index    BL, DXF 90
```

#### **ASSOCFILLETSURFACEACTIONBODY**

```
parent    struct _dwg_object_object*
aab_version
    BL, DXF 90
pab        Dwg_ASSOCPARAMBASEDACTIONBODY
sab        Dwg ASSOCSURFACEACTIONBODY
pbsab_status
    BL, DXF 90
class_version
    BL, DXF 90
status    BS, DXF 70
pt1        2RD, DXF 10
pt2        2RD, DXF 10
```

#### **ASSOCGEOMDEPENDENCY**

```
parent    struct _dwg_object_object*
assocdep   Dwg_Object_ASSOCDEPENDENCY
class_version
    BS, DXF 90
enabled    B, DXF 290
classname
    T, DXF 1
dependent_on_compound_object
    B, DXF 290
```

#### **ASSOCLOFTEDSURFACEACTIONBODY**

```
parent    struct _dwg_object_object*
aab_version
    BL, DXF 90
pab        Dwg_ASSOCPARAMBASEDACTIONBODY
sab        Dwg ASSOCSURFACEACTIONBODY
pbsab_status
    BL, DXF 90
class_version
    BL, DXF 90
```

**ASSOCMLEADERACTIONBODY**

```
parent      struct _dwg_object_object*
aaab_version
            BS, DXF 90
assoc_dep
            H, DXF 330
aab_version
            BS, DXF 90
actionbody
            H, DXF 360
pab         Dwg ASSOCPARAMBASEDACTIONBODY
class_version
            BL, DXF 90
num_actions
            BL, DXF 90
actions     Dwg ASSOCACTIONBODY_action*
```

**ASSOCNETWORK**

```
parent      struct _dwg_object_object*
class_version
            BS, DXF 90
geometry_status
            BL, DXF 90
owningnetwork
            H, DXF 330
actionbody
            H, DXF 360
action_index
            BL, DXF 90
max_assoc_dep_index
            BL, DXF 90
num_deps    BL, DXF 90
deps        Dwg ASSOCACTION_Deps*
num_owned_params
            BL
owned_params
            H*
num_values
            BL
```

```

values      struct _dwg_VALUEPARAM*
network_version
            BS, DXF 90
network_action_index
            BL, DXF 90
num_actions
            BL, DXF 90
actions     Dwg_ASSOCACTION_Deps*
num_owned_actions
            BL, DXF 90
owned_actions
            H*, DXF 330

```

#### **ASSOCNETWORKSURFACEACTIONBODY**

```

parent      struct _dwg_object_object*
aab_version
            BL, DXF 90
pab         Dwg ASSOCPARAMBASEDACTIONBODY
sab         Dwg ASSOCSURFACEACTIONBODY
pbsab_status
            BL, DXF 90
class_version
            BL, DXF 90

```

#### **ASSOCOBJECTACTIONPARAM**

```

parent      struct _dwg_object_object*
is_r2013    BS, DXF 90
aap_version
            BL, DXF 90
name        T, DXF 1
asdap_class_version
            BL, DXF 90
dep         H, DXF 330
class_version
            BS, DXF 90

```

#### **ASSOCOFFSETSURFACEACTIONBODY**

```

parent      struct _dwg_object_object*
aab_version
            BL, DXF 90

```

```

pab      Dwg ASSOCPARAMBASEDACTIONBODY
sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
          BL, DXF 90

class_version
          BL, DXF 90

b1       B, DXF 290

```

#### **ASSOCORDINATEDIMACTIONBODY**

```

parent    struct _dwg_object_object*

aaab_version
          BS, DXF 90

assoc_dep
          H, DXF 330

aab_version
          BS, DXF 90

actionbody
          H, DXF 360

pab      Dwg ASSOCPARAMBASEDACTIONBODY

class_version
          BL, DXF 90

r_node    H, DXF 330

d_node    H, DXF 330

```

#### **ASSOCOSNAPPOINTREFACTIONPARAM**

```

parent    struct _dwg_object_object*

is_r2013  BS, DXF 90

aap_version
          BL, DXF 90

name      T, DXF 1

class_version
          BS, DXF 90

bs1       BS, DXF 90

num_params
          BL, DXF 90

params    H*, DXF 360

has_child_param
          B

```

```

child_status
    BS, DXF 90

child_id    BL, DXF 90

child_param
    H, DXF 330

h330_2     H, DXF 330

b12        BL, DXF 90

h330_3     H, DXF 330

status     BS, DXF 90

osnap_mode
    RC, DXF 90

param      BD, DXF 40

```

#### **ASSOCPATCHSURFACEACTIONBODY**

```

parent      struct _dwg_object_object*

aab_version
    BL, DXF 90

pab         Dwg ASSOCPARAMBASEDACTIONBODY

sab         Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

```

#### **ASSOCPATHACTIONPARAM**

```

parent      struct _dwg_object_object*

is_r2013    BS, DXF 90

aap_version
    BL, DXF 90

name        T, DXF 1

class_version
    BS, DXF 90

bs1         BS, DXF 90

num_params
    BL, DXF 90

params      H*, DXF 360

has_child_param
    B

```



```

child_status
    BS, DXF 90

child_id    BL, DXF 90

child_param
    H, DXF 330

h330_2     H, DXF 330

b12        BL, DXF 90

h330_3     H, DXF 330

version    BL, DXF 90

```

### **ASSOCPERSSUBENTMANAGER**

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

unknown_3
    BL, DXF 90

unknown_0
    BL, DXF 90

unknown_2
    BL, DXF 90

num_steps
    BL, DXF 90

num_subents
    BL, DXF 90

steps       BL*, DXF 90

subents     BL*

unknown_b16
    BL, DXF 90

unknown_b16a
    BL, DXF 90

unknown_b17a
    BL, DXF 90

unknown_b17
    BL, DXF 90

unknown_b18
    BL, DXF 90

unknown_b19
    BL, DXF 90

```

unknown\_b110  
BL, DXF 90

unknown\_b111  
BL, DXF 90

unknown\_b112  
BL, DXF 90

unknown\_b113  
BL, DXF 90

unknown\_b114  
BL, DXF 90

unknown\_b115  
BL, DXF 90

unknown\_b116  
BL, DXF 90

unknown\_b117  
BL, DXF 90

unknown\_b118  
BL, DXF 90

unknown\_b119  
BL, DXF 90

unknown\_b120  
BL, DXF 90

unknown\_b121  
BL, DXF 90

unknown\_b122  
BL, DXF 90

unknown\_b123  
BL, DXF 90

unknown\_b124  
BL, DXF 90

unknown\_b125  
BL, DXF 90

unknown\_b126  
BL, DXF 90

unknown\_b127  
BL, DXF 90

unknown\_b128  
BL, DXF 90

```

unknown_b129
    BL, DXF 90

unknown_b130
    BL, DXF 90

unknown_b131
    BL, DXF 90

unknown_b132
    BL, DXF 90

unknown_b133
    BL, DXF 90

unknown_b134
    BL, DXF 90

unknown_b135
    BL, DXF 90

unknown_b136
    BL, DXF 90

unknown_b37
    B, DXF 290

```

#### **ASSOCPLANESURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab        Dwg ASSOCPARAMBASEDACTIONBODY

sab        Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

```

#### **ASSOCPOINTREFACTIONPARAM**

```

parent    struct _dwg_object_object*

is_r2013   BS, DXF 90

aap_version
    BL, DXF 90

name       T, DXF 1

class_version
    BS, DXF 90

bs1        BS, DXF 90

```

```

num_params
    BL, DXF 90

params    H*, DXF 360

has_child_param
    B

child_status
    BS, DXF 90

child_id  BL, DXF 90

child_param
    H, DXF 330

h330_2    H, DXF 330

b12       BL, DXF 90

h330_3    H, DXF 330

```

#### **ASSOCRESTOREENTITYSTATEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

class_version
    BL, DXF 90

entity    H, DXF 330

```

#### **ASSOCREVOLVEDSURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab       Dwg_ASSOCPARAMBASEDACTIONBODY

sab       Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

```

#### **ASSOCROTATEDDIMACTIONBODY**

```

parent    struct _dwg_object_object*

aaab_version
    BS, DXF 90

assoc_dep
    H, DXF 330

```

```

aab_version
    BS, DXF 90

actionbody
    H, DXF 360

pab      Dwg ASSOCPARAMBASEDACTIONBODY

class_version
    BS, DXF 90

r_node   H, DXF 330

d_node   H, DXF 330

```

#### **ASSOCWEPTSURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab      Dwg ASSOCPARAMBASEDACTIONBODY

sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

```

#### **ASSOCTRIMSURFACEACTIONBODY**

```

parent    struct _dwg_object_object*

aab_version
    BL, DXF 90

pab      Dwg ASSOCPARAMBASEDACTIONBODY

sab      Dwg ASSOCSURFACEACTIONBODY

pbsab_status
    BL, DXF 90

class_version
    BL, DXF 90

b1        B, DXF 290

b2        B, DXF 290

distance  BD, DXF 40

```

#### **ASSOCVALUEDEPENDENCY**

```

parent    struct _dwg_object_object*

assocdep  Dwg_Object_ASSOCDEPENDENCY

```

**ASSOCVARIABLE**

```

parent      struct _dwg_object_object*

av_class_version
            BS, DXF 90

class_version
            BS, DXF 90

geometry_status
            BL, DXF 90

owningnetwork
            H, DXF 330

actionbody
            H, DXF 360

action_index
            BL, DXF 90

max_assoc_dep_index
            BL, DXF 90

num_deps    BL, DXF 90

deps        Dwg-ASSOCACTION_Deps*

num_owned_params
            BL

owned_params
            H*

num_values
            BL

values      struct _dwg_VALUEPARAM*

name        T, DXF 1

t58         T, DXF 1

evaluator
            T, DXF 1

desc        T, DXF 1

value       Dwg_EvalVariant

has_t78     B, DXF 290

t78         T, DXF 1

b290        B, DXF 290

```

**ASSOCVERTEXACTIONPARAM**

```

parent      struct _dwg_object_object*

```

```

is_r2013    BS, DXF 90
aap_version
            BL, DXF 90
name        T, DXF 1
asdap_class_version
            BL, DXF 90
dep         H, DXF 330
class_version
            BL, DXF 90
pt          3BD, DXF 10

```

#### **BLKREFOBJECTCONTEXTDATA**

```

parent      struct _dwg_object_object*
class_version
            BS, DXF 70
is_default
            B, DXF 290
scale       H, DXF 340
rotation    BD, DXF 50
ins_pt      3BD, DXF 10
scale_factor
            3BD_1, DXF 42

```

#### **BLOCKALIGNEDCONSTRAINTPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept
            3BD, DXF 1010
def_endpt
            3BD, DXF 1011

```

```

prop1      Dwg_BLOCKPARAMETER_PropInfo
prop2      Dwg_BLOCKPARAMETER_PropInfo
prop3      Dwg_BLOCKPARAMETER_PropInfo
prop4      Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177

upd_basept
            3BD

basept     3BD

upd_endpt
            3BD

endpt      3BD

dependency
            H, DXF 330

expr_name
            T, DXF 305

expr_description
            T, DXF 306

value      BD, DXF 140

value_set
            Dwg_BLOCKPARAMVALUESSET

```

**BLOCKALIGNMENTGRIP**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
bg_b191     BL, DXF 91
bg_b192     BL, DXF 92
bg_location
            3BD, DXF 1010

bg_insert_cycling
            B, DXF 280

```



`bg_insert_cycling_weight`  
BLd, DXF 93

`orientation`  
3BD\_1, DXF 140

### **BLOCKALIGNMENTPARAMETER**

`parent`     `struct _dwg_object_object*`

`evalexpr`   `Dwg_EvalExpr`

`name`        `T`, DXF 300

`be_major`    `BL`, DXF 98

`be_minor`    `BL`, DXF 99

`eed1071`     `BL`, DXF 1071

`show_properties`  
`B`, DXF 280

`chain_actions`  
`B`, DXF 281

`def_basept`  
3BD, DXF 1010

`def_endpt`  
3BD, DXF 1011

`prop1`        `Dwg_BLOCKPARAMETER_PropInfo`

`prop2`        `Dwg_BLOCKPARAMETER_PropInfo`

`prop3`        `Dwg_BLOCKPARAMETER_PropInfo`

`prop4`        `Dwg_BLOCKPARAMETER_PropInfo`

`prop_states`  
`BL*`, DXF 91

`parameter_base_location`  
`BS`, DXF 177

`upd_basept`  
3BD

`basept`       3BD

`upd_endpt`  
3BD

`endpt`        3BD

`align_perpendicular`  
`B`, DXF 280

### **BLOCKANGULARCONSTRAINTPARAMETER**

`parent`     `struct _dwg_object_object*`

```
evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_basept
          3BD, DXF 1010
def_endpt
          3BD, DXF 1011
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo
prop3     Dwg_BLOCKPARAMETER_PropInfo
prop4     Dwg_BLOCKPARAMETER_PropInfo
prop_states
          BL*, DXF 91
parameter_base_location
          BS, DXF 177
upd_basept
          3BD
basept    3BD
upd_endpt
          3BD
endpt     3BD
dependency
          H, DXF 330
center_pt
          3BD, DXF 1011
end_pt    3BD, DXF 1012
expr_name
          T, DXF 305
expr_description
          T, DXF 306
```

```

angle      BD, DXF 140
orientation_on_both_grips
            B, DXF 280

value_set
            Dwg_BLOCKPARAMVALUESSET

```

**BLOCKARRAYACTION**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
display_location
            3BD, DXF 1010

num_actions
            BL, DXF 70

actions     BL*, DXF 91
num_deps    BL, DXF 71
deps        H*, DXF 330
conn_pts    Dwg_BLOCKACTION_connectionpts
column_offset
            BD, DXF 140

row_offset
            BD, DXF 141

```

**BLOCKBASEPOINTPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280

chain_actions
            B, DXF 281

```

```

def_pt      3BD, DXF 1010
num_propinfos
            BL, DXF 93
prop1      Dwg_BLOCKPARAMETER_PropInfo
prop2      Dwg_BLOCKPARAMETER_PropInfo
pt         3BD, DXF 1011
base_pt    3BD, DXF 1012

```

### **BLOCKDIAMETRICCONSTRAINTPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept  3BD, DXF 1010
def_endpt   3BD, DXF 1011
prop1      Dwg_BLOCKPARAMETER_PropInfo
prop2      Dwg_BLOCKPARAMETER_PropInfo
prop3      Dwg_BLOCKPARAMETER_PropInfo
prop4      Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept  3BD
basept      3BD
upd_endpt   3BD

```

```

endpt      3BD
dependency
            H, DXF 330

expr_name
            T, DXF 305

expr_description
            T, DXF 306

distance   BD, DXF 140

orientation_on_both_grips
            B

value_set
            Dwg_BLOCKPARAMVALUESET

```

**BLOCKFLIPACTION**

```

parent      struct _dwg_object_object*

evalexpr    Dwg_EvalExpr

name        T, DXF 300

be_major    BL, DXF 98

be_minor    BL, DXF 99

eed1071     BL, DXF 1071

display_location
            3BD, DXF 1010

num_actions
            BL, DXF 70

actions     BL*, DXF 91

num_deps    BL, DXF 71

deps        H*, DXF 330

conn_pts    Dwg_BLOCKACTION_connectionpts

action_offset_x
            BD

action_offset_y
            BD

angle_offset
            BD

```

**BLOCKFLIPGRIP**

```

parent      struct _dwg_object_object*

evalexpr    Dwg_EvalExpr

```

```

name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
bg_b191   BL, DXF 91
bg_b192   BL, DXF 92
bg_location
          3BD, DXF 1010
bg_insert_cycling
          B, DXF 280
bg_insert_cycling_weight
          BLd, DXF 93
combined_state
          BL, DXF 93
orientation
          3BD_1, DXF 140
upd_state
          BS
state     BS

```

**BLOCKFLIPPARAMETER**

```

parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_basept
          3BD, DXF 1010
def_endpt
          3BD, DXF 1011
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo

```

```

prop3      Dwg_BLOCKPARAMETER_PropInfo
prop4      Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD
basept     3BD
upd_endpt
            3BD
endpt      3BD
flip_label
            T, DXF 305
flip_label_desc
            T, DXF 306
base_state_label
            T, DXF 307
flipped_state_label
            T, DXF 308
def_label_pt
            3BD, DXF 1012
b196      BL, DXF 96
tooltip    T, DXF 309

```

#### **BLOCKGRIPLOCATIONCOMPONENT**

```

parent     struct _dwg_object_object*
evalexpr   Dwg_EvalExpr
grip_type
            BL, DXF 91
grip_expr
            T, DXF 300

```

#### **BLOCKHORIZONTALCONSTRAINTPARAMETER**

```

parent     struct _dwg_object_object*
evalexpr   Dwg_EvalExpr
name       T, DXF 300
be_major   BL, DXF 98

```

```

be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept
            3BD, DXF 1010
def_endpt
            3BD, DXF 1011
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
prop3       Dwg_BLOCKPARAMETER_PropInfo
prop4       Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD
basept      3BD
upd_endpt
            3BD
endpt       3BD
dependency
            H, DXF 330
expr_name
            T, DXF 305
expr_description
            T, DXF 306
value       BD, DXF 140
value_set
            Dwg_BLOCKPARAMVALUESET

```

#### **BLOCKLINEARCONSTRAINTPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr

```



```

name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_basept
          3BD, DXF 1010
def_endpt
          3BD, DXF 1011
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo
prop3     Dwg_BLOCKPARAMETER_PropInfo
prop4     Dwg_BLOCKPARAMETER_PropInfo
prop_states
          BL*, DXF 91
parameter_base_location
          BS, DXF 177
upd_basept
          3BD
basept    3BD
upd_endpt
          3BD
endpt     3BD
dependency
          H, DXF 330
expr_name
          T, DXF 305
expr_description
          T, DXF 306
value     BD, DXF 140
value_set
          Dwg_BLOCKPARAMVALUESSET

```

**BLOCKLINEARGRIP**

```

parent    struct _dwg_object_object*

```

```

evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
bg_b191   BL, DXF 91
bg_b192   BL, DXF 92
bg_location
          3BD, DXF 1010
bg_insert_cycling
          B, DXF 280
bg_insert_cycling_weight
          BLd, DXF 93
orientation
          3BD_1, DXF 140

```

### **BLOCKLINEARPARAMETER**

```

parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_basept
          3BD, DXF 1010
def_endpt
          3BD, DXF 1011
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo
prop3     Dwg_BLOCKPARAMETER_PropInfo
prop4     Dwg_BLOCKPARAMETER_PropInfo
prop_states
          BL*, DXF 91

```

```

parameter_base_location
    BS, DXF 177

upd_basept
    3BD

basept    3BD

upd_endpt
    3BD

endpt     3BD

distance_name
    T, DXF 305

distance_desc
    T, DXF 306

distance  BD, DXF 140

value_set
    Dwg_BLOCKPARAMVALUESSET

```

### **BLOCKLOOKUPACTION**

```

parent      struct _dwg_object_object*

evalexpr    Dwg_EvalExpr

name        T, DXF 300

be_major    BL, DXF 98

be_minor    BL, DXF 99

eed1071     BL, DXF 1071

display_location
    3BD, DXF 1010

num_actions
    BL, DXF 70

actions     BL*, DXF 91

num_deps    BL, DXF 71

deps        H*, DXF 330

numelems    BL

numrows     BL, DXF 92

numcols     BL, DXF 93

lut         Dwg_BLOCKLOOKUPACTION_lut*

exprs       TV*, DXF 302

b280        B, DXF 280

```

**BLOCKLOOKUPGRIP**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
bg_b191     BL, DXF 91
bg_b192     BL, DXF 92
bg_location
            3BD, DXF 1010
bg_insert_cycling
            B, DXF 280
bg_insert_cycling_weight
            BLd, DXF 93

```

**BLOCKLOOKUPPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_pt      3BD, DXF 1010
num_propinfos
            BL, DXF 93
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
lookup_name
            T, DXF 303
lookup_desc
            T, DXF 304

```

index BL, DXF 94

unknown\_t  
T

### **BLOCKMOVEACTION**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

name T, DXF 300

be\_major BL, DXF 98

be\_minor BL, DXF 99

eed1071 BL, DXF 1071

display\_location  
3BD, DXF 1010

num\_actions  
BL, DXF 70

actions BL\*, DXF 91

num\_deps BL, DXF 71

deps H\*, DXF 330

conn\_pts Dwg\_BLOCKACTION\_connectionpts

action\_offset\_x  
BD, DXF 140

action\_offset\_y  
BD, DXF 141

angle\_offset  
BD

### **BLOCKPARAMDEPENDENCYBODY**

parent struct \_dwg\_object\_object\*

adb\_version  
BS, DXF 90

dimbase\_version  
BS, DXF 90

name T, DXF 1

class\_version  
BS, DXF 90

### **BLOCKPOINTPARAMETER**

parent struct \_dwg\_object\_object\*

```

evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
           B, DXF 280

chain_actions
           B, DXF 281

def_pt    3BD, DXF 1010
num_propinfos
           BL, DXF 93
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo
position_name
           T, DXF 303
position_desc
           T, DXF 304
def_label_pt
           3BD, DXF 1011

```

**BLOCKPOLARGRIP**

```

parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
bg_b191   BL, DXF 91
bg_b192   BL, DXF 92
bg_location
           3BD, DXF 1010
bg_insert_cycling
           B, DXF 280
bg_insert_cycling_weight
           BLd, DXF 93

```

**BLOCKPOLARPARAMETER**

```
parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept
            3BD, DXF 1010
def_endpt
            3BD, DXF 1011
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
prop3       Dwg_BLOCKPARAMETER_PropInfo
prop4       Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD
basept      3BD
upd_endpt
            3BD
endpt       3BD
angle_name
            T, DXF 305
angle_desc
            T, DXF 306
distance_name
            T, DXF 305
distance_desc
            T, DXF 306
```

```

offset      BD, DXF 140
angle_value_set
            Dwg_BLOCKPARAMVALUESET
distance_value_set
            Dwg_BLOCKPARAMVALUESET

```

### **BLOCKPOLARSTRETCHACTION**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
display_location
            3BD, DXF 1010
num_actions
            BL, DXF 70
actions     BL*, DXF 91
num_deps    BL, DXF 71
deps        H*, DXF 330
conn_pts    Dwg_BLOCKACTION_connectionpts
num_pts     BL, DXF 72
pts         2RD*, DXF 10
num_hdls    BL, DXF 73
hdls        H*, DXF 331
shorts      BS*, DXF 74
num_codes
            BL, DXF 75
codes       BL*, DXF 76

```

### **BLOCKPROPERTIESTABLE**

```

parent      struct _dwg_object_object*

```

### **BLOCKPROPERTIESTABLEGRIP**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300

```



```

be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
bg_b191     BL, DXF 91
bg_b192     BL, DXF 92
bg_location
            3BD, DXF 1010
bg_insert_cycling
            B, DXF 280
bg_insert_cycling_weight
            BLd, DXF 93

```

### **BLOCKRADIALCONSTRAINTPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept
            3BD, DXF 1010
def_endpt
            3BD, DXF 1011
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
prop3       Dwg_BLOCKPARAMETER_PropInfo
prop4       Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD

```

```

basept      3BD
upd_endpt   3BD
endpt       3BD
dependency
            H, DXF 330
expr_name
            T, DXF 305
expr_description
            T, DXF 306
distance    BD, DXF 140
value_set
            Dwg_BLOCKPARAMVALUESSET

```

**BLOCKREPRESENTATION**

```

parent      struct _dwg_object_object*
flag        BS, DXF 70
block       H, DXF 340

```

**BLOCKROTATEACTION**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
display_location
            3BD, DXF 1010
num_actions
            BL, DXF 70
actions     BL*, DXF 91
num_deps    BL, DXF 71
deps        H*, DXF 330
offset      3BD, DXF 1011
conn_pts    Dwg_BLOCKACTION_connectionpts
dependent
            B, DXF 280

```

base\_pt 3BD, DXF 1012

### **BLOCKROTATIONGRIP**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

name T, DXF 300

be\_major BL, DXF 98

be\_minor BL, DXF 99

eed1071 BL, DXF 1071

bg\_b191 BL, DXF 91

bg\_b192 BL, DXF 92

bg\_location  
3BD, DXF 1010

bg\_insert\_cycling  
B, DXF 280

bg\_insert\_cycling\_weight  
BLd, DXF 93

### **BLOCKROTATIONPARAMETER**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

name T, DXF 300

be\_major BL, DXF 98

be\_minor BL, DXF 99

eed1071 BL, DXF 1071

show\_properties  
B, DXF 280

chain\_actions  
B, DXF 281

def\_basept  
3BD, DXF 1010

def\_endpt  
3BD, DXF 1011

prop1 Dwg\_BLOCKPARAMETER\_PropInfo

prop2 Dwg\_BLOCKPARAMETER\_PropInfo

prop3 Dwg\_BLOCKPARAMETER\_PropInfo

prop4 Dwg\_BLOCKPARAMETER\_PropInfo

```

prop_states
    BL*, DXF 91

parameter_base_location
    BS, DXF 177

upd_basept
    3BD

basept    3BD

upd_endpt
    3BD

endpt     3BD

def_base_angle_pt
    3BD, DXF 1011

angle_name
    T, DXF 305

angle_desc
    T, DXF 306

angle     BD, DXF 140

angle_value_set
    Dwg_BLOCKPARAMVALUESSET

```

### **BLOCKSCALEACTION**

```

parent    struct _dwg_object_object*

evalexpr  Dwg_EvalExpr

name      T, DXF 300

be_major  BL, DXF 98

be_minor  BL, DXF 99

eed1071   BL, DXF 1071

display_location
    3BD, DXF 1010

num_actions
    BL, DXF 70

actions   BL*, DXF 91

num_deps  BL, DXF 71

deps      H*, DXF 330

offset    3BD, DXF 1011

conn_pts  Dwg_BLOCKACTION_connectionpts

```

dependent      B, DXF 280  
 base\_pt      3BD, DXF 1012

### **BLOCKSTRETCHACTION**

parent      struct \_dwg\_object\_object\*  
 evalexpr      Dwg\_EvalExpr  
 name      T, DXF 300  
 be\_major      BL, DXF 98  
 be\_minor      BL, DXF 99  
 eed1071      BL, DXF 1071  
 display\_location  
             3BD, DXF 1010  
 num\_actions  
             BL, DXF 70  
 actions      BL\*, DXF 91  
 num\_deps      BL, DXF 71  
 deps      H\*, DXF 330  
 conn\_pts      Dwg\_BLOCKACTION\_connectionpts  
 num\_pts      BL, DXF 72  
 pts      2RD\*, DXF 1011  
 num\_hdls      BL, DXF 73  
 hdls      H\*, DXF 331  
 shorts      BS\*, DXF 74  
 num\_codes  
             BL, DXF 75  
 codes      BL\*, DXF 76  
 action\_offset\_x  
             BD, DXF 140  
 action\_offset\_y  
             BD, DXF 141  
 angle\_offset  
             BD

### **BLOCKUSERPARAMETER**

parent      struct \_dwg\_object\_object\*  
 evalexpr      Dwg\_EvalExpr

```

name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_pt    3BD, DXF 1010
num_propinfos
          BL, DXF 93
prop1     Dwg_BLOCKPARAMETER_PropInfo
prop2     Dwg_BLOCKPARAMETER_PropInfo
flag      BS, DXF 90
assocvariable
          H, DXF 330
expr      T, DXF 301
value     Dwg_EvalVariant
type      BS, DXF 170

```

### **BLOCKVERTICALCONSTRAINTPARAMETER**

```

parent    struct _dwg_object_object*
evalexpr  Dwg_EvalExpr
name      T, DXF 300
be_major  BL, DXF 98
be_minor  BL, DXF 99
eed1071   BL, DXF 1071
show_properties
          B, DXF 280
chain_actions
          B, DXF 281
def_basept
          3BD, DXF 1010
def_endpt
          3BD, DXF 1011
prop1     Dwg_BLOCKPARAMETER_PropInfo

```

```

prop2      Dwg_BLOCKPARAMETER_PropInfo
prop3      Dwg_BLOCKPARAMETER_PropInfo
prop4      Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD
basept     3BD
upd_endpt
            3BD
endpt      3BD
dependency
            H, DXF 330
expr_name
            T, DXF 305
expr_description
            T, DXF 306
value      BD, DXF 140
value_set
            Dwg_BLOCKPARAMVALUESSET

```

**BLOCKVISIBILITYGRIP**

```

parent     struct _dwg_object_object*
evalexpr   Dwg_EvalExpr
name       T, DXF 300
be_major   BL, DXF 98
be_minor   BL, DXF 99
eed1071    BL, DXF 1071
bg_b191    BL, DXF 91
bg_b192    BL, DXF 92
bg_location
            3BD, DXF 1010
bg_insert_cycling
            B, DXF 280

```

```
bg_insert_cycling_weight
    BLd, DXF 93
```

### **BLOCKVISIBILITYPARAMETER**

```
parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
    B, DXF 280
chain_actions
    B, DXF 281
def_pt      3BD, DXF 1010
num_propinfos
    BL, DXF 93
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
is_initialized
    B, DXF 281
unknown_bool
    B, DXF 91
blockvisi_name
    T, DXF 301
blockvisi_desc
    T, DXF 302
num_blocks
    BL, DXF 93
blocks      H*, DXF 331
num_states
    BL, DXF 92
states      Dwg_BLOCKVISIBILITYPARAMETER_state*
```

### **BLOCKXYGRIP**

```
parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
```



```

be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
bg_b191     BL, DXF 91
bg_b192     BL, DXF 92
bg_location
            3BD, DXF 1010
bg_insert_cycling
            B, DXF 280
bg_insert_cycling_weight
            BLd, DXF 93

```

### **BLOCKXYPARAMETER**

```

parent      struct _dwg_object_object*
evalexpr    Dwg_EvalExpr
name        T, DXF 300
be_major    BL, DXF 98
be_minor    BL, DXF 99
eed1071     BL, DXF 1071
show_properties
            B, DXF 280
chain_actions
            B, DXF 281
def_basept
            3BD, DXF 1010
def_endpt
            3BD, DXF 1011
prop1       Dwg_BLOCKPARAMETER_PropInfo
prop2       Dwg_BLOCKPARAMETER_PropInfo
prop3       Dwg_BLOCKPARAMETER_PropInfo
prop4       Dwg_BLOCKPARAMETER_PropInfo
prop_states
            BL*, DXF 91
parameter_base_location
            BS, DXF 177
upd_basept
            3BD

```

```

basept      3BD
upd_endpt   3BD

endpt       3BD
x_label     T, DXF 305
x_label_desc      T, DXF 306
y_label     T, DXF 307
y_label_desc      T, DXF 308

x_value     BD, DXF 142
y_value     BD, DXF 141
x_value_set      Dwg_BLOCKPARAMVALUESSET
y_value_set      Dwg_BLOCKPARAMVALUESSET

```

**BLOCK\_CONTROL**

BLOCK\_CONTROL is a table\_control object.

```

parent      struct _dwg_object_object*

num_entries      BS, DXF 70

entries      H*

model_space      H

paper_space      H

```

**BLOCK\_HEADER**

BLOCK\_HEADER is a table object.

```

parent      struct _dwg_object_object*

flag        RC

name        TV

used        RS

is_xref_ref      B

is_xref_resolved      BS

```

```
is_xref_dep
    B

xref      H

__iterator
    BL

flag2     RC

flag3     RS

anonymous
    B

hasattrs  B

blkisxref
    B

xrefoverlaid
    B

loaded_bit
    B

num_owned
    BL

base_pt   3DPOINT, DXF 10

xref_pname
    T, DXF 1

num_inserts
    RL

description
    T, DXF 4

preview_size
    BL

preview   TF, DXF 310

insert_units
    BS, DXF 70

explodable
    B, DXF 280

block_scaling
    RC, DXF 281

block_entity
    H

first_entity
    H
```

last\_entity  
    H  
entities    H\*  
endblk\_entity  
    H  
inserts    H\*, DXF 331  
layout     H, DXF 340

**CELLSTYLEMAP**

parent     struct \_dwg\_object\_object\*  
num\_cells  
    BL, DXF 90  
cells      Dwg\_TABLESTYLE\_CellStyle\*

**CONTEXTDATAMANAGER**

parent     struct \_dwg\_object\_object\*  
objectcontext  
    H  
num\_submgrs  
    BL  
submgrs    Dwg\_CONTEXTDATA\_submgr\*

**CSACDOCUMENTOPTIONS**

parent     struct \_dwg\_object\_object\*  
class\_version  
    BS

**CURVEPATH**

parent     struct \_dwg\_object\_object\*  
class\_version  
    BS, DXF 90  
entity     H, DXF 340

**DATALINK**

parent     struct \_dwg\_object\_object\*  
class\_version  
    BS  
data\_adapter  
    T, DXF 1  
description  
    T, DXF 300

```

tooltip    T, DXF 301
connection_string
            T, DXF 302
option     BL, DXF 90
update_option
            BL, DXF 91
b192       BL, DXF 92
year       BS, DXF 170
month      BS, DXF 171
day        BS, DXF 172
hour       BS, DXF 173
minute     BS, DXF 174
seconds    BS, DXF 175
msec       BS, DXF 176
path_option
            BS, DXF 177
b193       BL, DXF 93
update_status
            T, DXF 304
num_customdata
            BL, DXF 94
customdata
            Dwg_DATALINK_customdata*
hardowner
            H, DXF 360

```

**DATATABLE**

```

parent     struct _dwg_object_object*
flags      BS, DXF 70
num_cols   BL, DXF 90
num_rows   BL, DXF 91
table_name
            T, DXF 1
cols       Dwg_DATATABLE_column*

```

**DBCOLOR**

```

parent     struct _dwg_object_object*

```

color CMC, DXF 62

### **DETAILVIEWSTYLE**

parent struct \_dwg\_object\_object\*

mdoc\_class\_version  
BS, DXF 70

desc T, DXF 3

is\_modified\_for\_recompute  
B, DXF 290

display\_name  
T, DXF 300

viewstyle\_flags  
BL, DXF 90

class\_version  
BS, DXF 70

flags BL, DXF 90

identifier\_style  
H, DXF 340

identifier\_color  
CMC, DXF 62

identifier\_height  
BD, DXF 40

identifier\_exclude\_characters  
T, DXF 300

identifier\_offset  
BD, DXF 40

identifier\_placement  
RC, DXF 280

arrow\_symbol  
H, DXF 340

arrow\_symbol\_color  
CMC, DXF 62

arrow\_symbol\_size  
BD, DXF 40

boundary\_ltype  
H, DXF 340

boundary\_linewt  
BLd, DXF 90

`boundary_line_color`  
CMC, DXF 62

`viewlabel_text_style`  
H, DXF 340

`viewlabel_text_color`  
CMC, DXF 62

`viewlabel_text_height`  
BD, DXF 40

`viewlabel_attachment`  
BL, DXF 90

`viewlabel_offset`  
BD, DXF 40

`viewlabel_alignment`  
BL, DXF 90

`viewlabel_pattern`  
T, DXF 300

`connection_ltype`  
H, DXF 340

`connection_linewt`  
BLd, DXF 90

`connection_line_color`  
CMC, DXF 62

`borderline_ltype`  
H, DXF 340

`borderline_linewt`  
BLd, DXF 90

`borderline_color`  
CMC, DXF 62

`model_edge`  
RC, DXF 280

## DICTIONARY

`parent`     `struct _dwg_object_object*`

`numitems`   `BL`

`is_hardowner`  
RC, DXF 280

`cloning`    `BS`, DXF 281

`texts`       `T*`, DXF 3

itemhandles  
H\*, DXF 350

cloning\_r14  
RC

### DICTIONARYVAR

parent struct \_dwg\_object\_object\*  
schema RC, DXF 280  
strvalue T, DXF 1

### DICTIONARYWDFLT

parent struct \_dwg\_object\_object\*  
numitems BL  
is\_hardowner  
RC, DXF 280  
cloning BS, DXF 281  
texts T\*, DXF 3  
itemhandles  
H\*, DXF 350  
cloning\_r14  
RL  
defaultid  
H, DXF 340

### DIMASSOC

parent struct \_dwg\_object\_object\*  
dimensionobj  
H, DXF 330  
associativity  
BL, DXF 90  
trans\_space\_flag  
B, DXF 70  
rotated\_type  
RC, DXF 71  
ref Dwg\_DIMASSOC\_Ref\*

### DIMSTYLE

DIMSTYLE is a table object.

parent struct \_dwg\_object\_object\*  
flag RC, DXF 70



name	T
used	RS
is_xref_ref	B
is_xref_resolved	BS
is_xref_dep	B
xref	H
DIMTOL	B, DXF 71
DIMLIM	B, DXF 72
DIMTIH	B, DXF 73
DIMTOH	B, DXF 74
DIMSE1	B, DXF 75
DIMSE2	B, DXF 76
DIMALT	B, DXF 170
DIMTOFL	B, DXF 172
DIMSAH	B, DXF 173
DIMTIX	B, DXF 174
DIMSOXD	B, DXF 175
DIMALTD	BS, DXF 171
DIMZIN	BS, DXF 78
DIMSD1	B, DXF 281
DIMSD2	B, DXF 282
DIMTOLJ	BS, DXF 283
DIMJUST	BS, DXF 280
DIMFIT	BS, DXF 287
DIMUPT	B, DXF 288
DIMTZIN	BS, DXF 284
DIMMALTZ	BS, DXF 285
DIMMALTZ	BS, DXF 286
DIMTAD	BS, DXF 77
DIMUNIT	BS, DXF 270

DIMAUNIT	BS, DXF 275
DIMDEC	BS, DXF 271
DIMTDEC	BS, DXF 272
DIMALTU	BS, DXF 273
DIMALTTD	BS, DXF 274
DIMSCALE	BD, DXF 40
DIMASZ	BD, DXF 41
DIMEXO	BD, DXF 42
DIMDLI	BD, DXF 43
DIMEXE	BD, DXF 44
DIMRND	BD, DXF 45
DIMDLE	BD, DXF 46
DIMTP	BD, DXF 47
DIMTM	BD, DXF 48
DIMFXL	BD, DXF 49
DIMJOGANG	BD, DXF 50
DIMTFILL	BS, DXF 69
DIMTFILLCLR	CMC, DXF 70
DIMAZIN	BS, DXF 79
DIMARCSYM	BS, DXF 90
DIMTXT	BD, DXF 140
DIMCEN	BD, DXF 141
DIMTSZ	BD, DXF 142
DIMALTF	BD, DXF 143
DIMLFAC	BD, DXF 144
DIMTVP	BD, DXF 145
DIMTFAC	BD, DXF 146
DIMGAP	BD, DXF 147
DIMPOST	T, DXF 3
DIMAPOST	T, DXF 4
DIMBLK_T	TV, DXF 5

DIMBLK1_T	TV, DXF 6
DIMBLK2_T	TV, DXF 7
DIMALTRND	BD, DXF 148
DIMCLRD_N	RS, DXF 176
DIMCLRE_N	RS, DXF 177
DIMCLRT_N	RS, DXF 178
DIMCLRD	CMC, DXF 176
DIMCLRE	CMC, DXF 177
DIMCLRT	CMC, DXF 178
DIMADEC	BS, DXF 179
DIMFRAC	BS, DXF 276
DIMLUNIT	BS, DXF 277
DIMDSEP	BS, DXF 278
DIMTMOVE	BS, DXF 279
DIMALTZ	BS, DXF 285
DIMALTTZ	BS, DXF 286
DIMATFIT	BS, DXF 289
DIMFXLON	B, DXF 290
DIMTXTDIRECTION	B, DXF 295
DIMALTMZF	BD
DIMALTMZS	T
DIMMZF	BD
DIMMZS	T
DIMLWD	BSd, DXF 371
DIMLWE	BSd, DXF 372
flag0	B

DIMTXSTY H, DXF 340

DIMLDRBLK  
H, DXF 341

DIMBLK H, DXF 342

DIMBLK1 H, DXF 343

DIMBLK2 H, DXF 344

DIMLTYPE H, DXF 345

DIMLTEX1 H, DXF 346

DIMLTEX2 H, DXF 347

### **DIMSTYLE\_CONTROL**

DIMSTYLE\_CONTROL is a table\_control object.

parent struct \_dwg\_object\_object\*

num\_entries  
BS, DXF 70

entries H\*

num\_morehandles  
RC, DXF 71

morehandles  
H\*, DXF 340

### **DMDIMOBJECTCONTEXTDATA**

parent struct \_dwg\_object\_object\*

class\_version  
BS, DXF 70

is\_default  
B, DXF 290

scale H, DXF 340

dimension  
Dwg\_OCD\_Dimension

first\_arc\_pt  
3BD, DXF 11

def\_pt 3BD, DXF 12

### **DUMMY**

parent struct \_dwg\_object\_object\*

### **DYNAMICBLOCKPROXYNODE**

parent struct \_dwg\_object\_object\*

evalexpr Dwg\_EvalExpr

### **DYNAMICBLOCKPURGEPREVENTER**

parent struct \_dwg\_object\_object\*

flag BS, DXF 70

block H

### **EVALUATION\_GRAPH**

parent struct \_dwg\_object\_object\*

major BL

minor BL

first\_nodeid  
BLd, DXF 96

first\_nodeid\_copy  
BLd, DXF 97

num\_nodes  
BL

nodes Dwg\_EVAL\_Node\*

has\_graph  
B

num\_edges  
BL

edges Dwg\_EVAL\_Edge\*

### **FCFOBJECTCONTEXTDATA**

parent struct \_dwg\_object\_object\*

class\_version  
BS, DXF 70

is\_default  
B, DXF 290

scale H, DXF 340

location 3BD, DXF 10

horiz\_dir  
3BD, DXF 11

### **FIELD**

parent struct \_dwg\_object\_object\*

id T, DXF 1

code T, DXF 2

```

num_childs
    BL, DXF 90

childs    H*, DXF 360

num_objects
    BL, DXF 97

objects   H*, DXF 331

format    TV, DXF 4

evaluation_option
    BL, DXF 91

filing_option
    BL, DXF 92

field_state
    BL, DXF 94

evaluation_status
    BL, DXF 95

evaluation_error_code
    BL, DXF 96

evaluation_error_msg
    T, DXF 300

value     Dwg_TABLE_value

value_string
    T, DXF 301

value_string_length
    BL, DXF 98

num_childval
    BL, DXF 93

childval  Dwg_FIELD_ChildValue*

```

**FIELDLIST**

```

parent    struct _dwg_object_object*

num_fields
    BL, DXF 90

unknown   B

fields    H*, DXF 330

```

**GEODATA**

```

parent    struct _dwg_object_object*

class_version
    BL, DXF 90

```

host\_block  
H, DXF 330

coord\_type  
BS, DXF 70

design\_pt  
3BD, DXF 10

ref\_pt 3BD\_1, DXF 11

obs\_pt 3BD, DXF 11

scale\_vec  
3BD\_1, DXF 43

unit\_scale\_horiz  
BD, DXF 40

units\_value\_horiz  
BL, DXF 91

unit\_scale\_vert  
BD, DXF 41

units\_value\_vert  
BL, DXF 92

up\_dir 3BD, DXF 210

north\_dir  
3BD, DXF 12

scale\_est  
BL, DXF 95

user\_scale\_factor  
BD, DXF 141

do\_sea\_level\_corr  
B, DXF 294

sea\_level\_elev  
BD, DXF 142

coord\_proj\_radius  
BD, DXF 143

coord\_system\_def  
T, DXF 301

geo\_rss\_tag  
T, DXF 302

coord\_system\_datum  
T, DXF 303

coord\_system\_wkt  
T, DXF 304

```

observation_from_tag
    T, DXF 305

observation_to_tag
    T, DXF 306

observation_coverage_tag
    T, DXF 307

num_geomesh_pts
    BL, DXF 93

geomesh_pts
    Dwg_GEODATA_meshpt*

num_geomesh_faces
    BL, DXF 96

geomesh_faces
    Dwg_GEODATA_meshface*

has_civil_data
    B

obsolete_false
    B, DXF 292

ref_pt2d    2RD, DXF 15

zero1      3BD, DXF 16

unknown1   BL, DXF 93

unknown2   BL, DXF 94

unknown_b
    B, DXF 293

north_dir_angle_deg
    BD, DXF 54

north_dir_angle_rad
    BD, DXF 140

```

**GEOMAPIIMAGE**

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

pt0         3BD, DXF 10

size        2RD, DXF 13

display_props
    BS, DXF 70

clipping    B, DXF 280

```



brightness  
RC, DXF 281

contrast RC, DXF 282

fade RC, DXF 283

rotation BD

image\_width  
BD

image\_height  
BD

name T

image\_file  
BD

image\_visibility  
BD

transparency  
BS

height BD

width BD

show\_rotation  
B

scale\_factor  
BD

geoimage\_brightness  
BS

geoimage\_contrast  
BS

geoimage\_fade  
BS

geoimage\_position  
BS

geoimage\_width  
BS

geoimage\_height  
BS

**GRADIENT\_BACKGROUND**

parent struct \_dwg\_object\_object\*

class\_version  
BL, DXF 90

color\_top  
BLx, DXF 90

color\_middle  
BLx, DXF 91

color\_bottom  
BLx, DXF 92

horizon BD, DXF 140

height BD, DXF 141

rotation BD, DXF 142

### **GROUND\_PLANE\_BACKGROUND**

parent struct \_dwg\_object\_object\*

class\_version  
BL, DXF 90

color\_sky\_zenith  
BLx, DXF 90

color\_sky\_horizon  
BLx, DXF 91

color\_underground\_horizon  
BLx, DXF 92

color\_underground\_azimuth  
BLx, DXF 93

color\_near  
BLx, DXF 94

color\_far  
BLx, DXF 95

### **GROUP**

parent struct \_dwg\_object\_object\*

name T, DXF 300

unnamed BS, DXF 70

selectable  
BS, DXF 71

num\_groups  
BL

groups H\*, DXF 340

### **IBL\_BACKGROUND**

parent struct \_dwg\_object\_object\*

```
class_version
    BL, DXF 90

enable    B, DXF 290

name      T, DXF 1

rotation  BD, DXF 40

display_image
    B, DXF 290

secondary_background
    H, DXF 340
```

**IDBUFFER**

```
parent    struct _dwg_object_object*

unknown    RC

num_obj_ids
    BL

obj_ids    H*, DXF 330
```

**IMAGEDEF**

```
parent    struct _dwg_object_object*

class_version
    BL, DXF 90

image_size
    2RD, DXF 10

file_path
    T, DXF 1

is_loaded
    B, DXF 280

resunits  RC, DXF 281

pixel_size
    2RD, DXF 11
```

**IMAGEDEF\_REACTOR**

```
parent    struct _dwg_object_object*

class_version
    BL, DXF 90
```

**IMAGE\_BACKGROUND**

```
parent    struct _dwg_object_object*

class_version
    BL, DXF 90
```

```

filename  T, DXF 300
fit_to_screen
           B, DXF 290
maintain_aspect_ratio
           B, DXF 291
use_tiling
           B, DXF 292
offset    2BD_1, DXF 140
scale     2BD_1, DXF 142

```

**INDEX**

```

parent    struct _dwg_object_object*
last_updated
           TIMEBLL, DXF 40

```

**LAYER**

LAYER is a table object.

```

parent    struct _dwg_object_object*
flag      BS
name      T
used      RS
is_xref_ref
           B
is_xref_resolved
           BS
is_xref_dep
           B
xref      H
frozen    B
on        B
frozen_in_new
           B
locked    B
plotflag  B, DXF 290
linewt    RC, DXF 370
color     CMC, DXF 62
color_rs  short, DXF 62

```

```

ltype_rs    RS, DXF 7
plotstyle
            H, DXF 390
material    H, DXF 347
ltype       H, DXF 6
visualstyle
            H, DXF 348

```

**LAYERFILTER**

```

parent      struct _dwg_object_object*
num_names
            BL
names       TV*, DXF 8

```

**LAYER\_CONTROL**

LAYER\_CONTROL is a table\_control object.

```

parent      struct _dwg_object_object*
num_entries
            BS, DXF 70
entries     H*

```

**LAYER\_INDEX**

```

parent      struct _dwg_object_object*
last_updated
            TIMEBLL, DXF 40
num_entries
            BL
entries     Dwg_LAYER_entry*

```

**LAYOUT**

```

parent      struct _dwg_object_object*
plotsettings
            Dwg_Object_PLOTSETTINGS
layout_name
            T, DXF 1
tab_order
            BS, DXF 71
layout_flags
            BS, DXF 70
INSBASE     3DPOINT, DXF 12

```

```

LIMMIN    2DPOINT, DXF 10
LIMMAX    2DPOINT, DXF 11
UCSORG    3DPOINT, DXF 13
UCSXDIR   3DPOINT, DXF 16
UCSYDIR   3DPOINT, DXF 17
ucs_elevation
    BD, DXF 146
UCSORTHOVIEW
    BS, DXF 76
EXTMIN    3DPOINT, DXF 14
EXTMAX    3DPOINT, DXF 15
block_header
    H, DXF 330
active_viewport
    H, DXF 331
base_ucs   H, DXF 346
named_ucs
    H, DXF 345
num_viewports
    BL
viewports
    H*
```

**LAYOUTPRINTCONFIG**

```

parent     struct _dwg_object_object*
class_version
    BS
flag       BS, DXF 93
```

**LEADEROBJECTCONTEXTDATA**

```

parent     struct _dwg_object_object*
class_version
    BS, DXF 70
is_default
    B, DXF 290
scale      H, DXF 340
num_points
    BL, DXF 70
```

```

points      3DPOINT*, DXF 10
b290        B, DXF 290
x_direction
             3DPOINT, DXF 11
inspt_offset
             3DPOINT, DXF 12
endptproj   3DPOINT, DXF 13

```

**LIGHTLIST**

```

parent      struct _dwg_object_object*
class_version
             BL, DXF 90
num_lights
             BL, DXF 90
lights      Dwg_LIGHTLIST_light*

```

**LONG\_TRANSACTION**

```

parent      struct _dwg_object_object*

```

**LTYPE**

LTYPE is a table object.

```

parent      struct _dwg_object_object*
flag        RC
name        TV
used        RS
is_xref_ref
             B
is_xref_resolved
             BS
is_xref_dep
             B
xref        H
description
             T, DXF 3
pattern_len
             BD, DXF 40
alignment
             RC, DXF 72

```

```

num_dashes
    RC, DXF 73

dashes    Dwg_LTYPE_dash*

dashes_r11
    RD*

has_strings_area
    B

strings_area
    TF

```

**LTYPE\_CONTROL**

LTYPE\_CONTROL is a table\_control object.

```

parent    struct _dwg_object_object*

num_entries
    BS, DXF 70

entries    H*

bylayer    H

byblock    H

```

**MATERIAL**

```

parent    struct _dwg_object_object*

name      T, DXF 1

description
    T, DXF 2

ambient_color
    Dwg_MATERIAL_color

diffuse_color
    Dwg_MATERIAL_color

diffusemap
    Dwg_MATERIAL_mapper

specular_gloss_factor
    BD, DXF 44

specular_color
    Dwg_MATERIAL_color

specularmap
    Dwg_MATERIAL_mapper

reflectionmap
    Dwg_MATERIAL_mapper

```



`opacity_percent`  
BD, DXF 140

`opacitymap`  
Dwg\_MATERIAL\_mapper

`bumpmap` Dwg\_MATERIAL\_mapper

`refraction_index`  
BD, DXF 145

`refractionmap`  
Dwg\_MATERIAL\_mapper

`color_bleed_scale`  
BD, DXF 460

`indirect_bump_scale`  
BD, DXF 461

`reflectance_scale`  
BD, DXF 462

`transmittance_scale`  
BD, DXF 463

`two_sided_material`  
B, DXF 290

`luminance`  
BD, DXF 464

`luminance_mode`  
BS, DXF 270

`translucence`  
BD, DXF 148

`self_illumination`  
BD, DXF 149

`reflectivity`  
BD, DXF 468

`illumination_model`  
BL, DXF 93

`channel_flags`  
BL, DXF 94

`mode` BL, DXF 282

`genprocname`  
T

`genproctype`  
BS

```

genprocvalbool
    B

genprocvalint
    BS

genprocvalreal
    BD

genprocvaltext
    T

genprocvalcolor
    CMC

genproctableend
    B

num_gentextures
    BS

gentextures
    Dwg_MATERIAL_gentexture*

```

## MENTALRAYRENDERSETTINGS

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

name        T, DXF 1

fog_enabled
    B, DXF 290

fog_background_enabled
    B, DXF 290

backfaces_enabled
    B, DXF 290

environ_image_enabled
    B, DXF 290

environ_image_filename
    T, DXF 1

description
    T, DXF 1

display_index
    BL, DXF 90

has_predefined
    B, DXF 290

mr_version
    BL, DXF 90

```

sampling1  
BL, DXF 90

sampling2  
BL, DXF 90

sampling\_mr\_filter  
BS, DXF 70

sampling\_filter1  
BD, DXF 40

sampling\_filter2  
BD, DXF 40

sampling\_contrast\_color1  
BD, DXF 40

sampling\_contrast\_color2  
BD, DXF 40

sampling\_contrast\_color3  
BD, DXF 40

sampling\_contrast\_color4  
BD, DXF 40

shadow\_mode  
BS, DXF 70

shadow\_maps\_enabled  
B, DXF 290

ray\_tracing\_enabled  
B, DXF 290

ray\_trace\_depth1  
BL, DXF 90

ray\_trace\_depth2  
BL, DXF 90

ray\_trace\_depth3  
BL, DXF 90

global\_illumination\_enabled  
B, DXF 290

gi\_sample\_count  
BL, DXF 90

gi\_sample\_radius\_enabled  
B, DXF 290

gi\_sample\_radius  
BD, DXF 40

gi\_photons\_per\_light  
BL, DXF 90

photon\_trace\_depth1  
BL, DXF 90

photon\_trace\_depth2  
BL, DXF 90

photon\_trace\_depth3  
BL, DXF 90

final\_gathering\_enabled  
B, DXF 290

fg\_ray\_count  
BL, DXF 90

fg\_sample\_radius\_state1  
B, DXF 290

fg\_sample\_radius\_state2  
B, DXF 290

fg\_sample\_radius\_state3  
B, DXF 290

fg\_sample\_radius1  
BD, DXF 40

fg\_sample\_radius2  
BD, DXF 40

light\_luminance\_scale  
BD, DXF 40

diagnostics\_mode  
BS, DXF 70

diagnostics\_grid\_mode  
BS, DXF 70

diagnostics\_grid\_float  
BD, DXF 40

diagnostics\_photon\_mode  
BS, DXF 70

diagnostics\_bsp\_mode  
BS, DXF 70

export\_mi\_enabled  
B, DXF 290

mr\_description  
T, DXF 1

`tile_size`  
BL, DXF 90

`tile_order`  
BS, DXF 70

`memory_limit`  
BL, DXF 90

`diagnostics_samples_mode`  
B, DXF 290

`energy_multiplier`  
BD, DXF 40

#### **MLEADEROBJECTCONTEXTDATA**

`parent` struct `_dwg_object_object*`

`class_version`  
BS, DXF 70

`is_default`  
B, DXF 290

`scale` H, DXF 340

#### **MLEADERSTYLE**

`parent` struct `_dwg_object_object*`

`class_version`  
BS, DXF 179

`content_type`  
BS, DXF 170

`mleader_order`  
BS, DXF 171

`leader_order`  
BS, DXF 172

`max_points`  
BL, DXF 90

`first_seg_angle`  
BD, DXF 40

`second_seg_angle`  
BD, DXF 41

`type` BS, DXF 173

`line_color`  
CMC, DXF 91

`line_type`  
H, DXF 340

`linewt`      BLd, DXF 92

`has_landing`  
              B, DXF 290

`has_dogleg`  
              B, DXF 291

`landing_gap`  
              BD, DXF 42

`landing_dist`  
              BD, DXF 43

`description`  
              T, DXF 3

`arrow_head`  
              H, DXF 341

`arrow_head_size`  
              BD, DXF 44

`text_default`  
              T, DXF 300

`text_style`  
              H, DXF 342

`attach_left`  
              BS, DXF 174

`attach_right`  
              BS, DXF 178

`text_angle_type`  
              BS, DXF 175

`text_align_type`  
              BS, DXF 176

`text_color`  
              CMC, DXF 93

`text_height`  
              BD, DXF 45

`has_text_frame`  
              B, DXF 292

`text_always_left`  
              B, DXF 297

`align_space`  
              BD, DXF 46

`block`      H, DXF 343

`block_color`  
CMC, DXF 94

`block_scale`  
3BD

`use_block_scale`  
B, DXF 293

`block_rotation`  
BD, DXF 141

`use_block_rotation`  
B, DXF 294

`block_connection`  
BS, DXF 177

`scale` BD, DXF 142

`is_changed`  
B, DXF 295

`is_annotative`  
B, DXF 296

`break_size`  
BD, DXF 143

`attach_dir`  
BS, DXF 271

`attach_top`  
BS, DXF 273

`attach_bottom`  
BS, DXF 272

`text_extended`  
B, DXF 298

**MLINESTYLE**

`parent` struct `_dwg_object_object*`

`name` T, DXF 2

`description`  
T, DXF 3

`flag` BS, DXF 70

`fill_color`  
CMC, DXF 62

`start_angle`  
BD, DXF 51

```

    end_angle      BD, DXF 52

    num_lines      RC, DXF 71

    lines          Dwg_MLINESTYLE_line*

```

**MOTIONPATH**

```

    parent      struct _dwg_object_object*

    class_version
                BS, DXF 90

    camera_path
                H, DXF 340

    target_path
                H, DXF 340

    viewtable
                H, DXF 340

    frames      BS, DXF 90

    frame_rate
                BS, DXF 90

    corner_decel
                B, DXF 290

```

**MTEXTATTRIBUTEOBJECTCONTEXTDATA**

```

    parent      struct _dwg_object_object*

    class_version
                BS, DXF 70

    is_default
                B, DXF 290

    scale       H, DXF 340

    horizontal_mode
                BS, DXF 70

    rotation    BD, DXF 50

    ins_pt      2RD, DXF 10

    alignment_pt
                2RD, DXF 11

    enable_context
                B, DXF 290

    context     struct _dwg_object*

```



**MTEXTOBJECTCONTEXTDATA**

```
parent      struct _dwg_object_object*
class_version
            BS, DXF 70
is_default
            B, DXF 290
scale       H, DXF 340
attachment
            BL, DXF 70
ins_pt      3BD, DXF 10
x_axis_dir
            3BD, DXF 11
rect_height
            BD, DXF 41
rect_width
            BD, DXF 40
extents_width
            BD, DXF 42
extents_height
            BD, DXF 43
column_type
            BL, DXF 71
column_width
            BD, DXF 44
gutter      BD, DXF 45
auto_height
            B, DXF 73
flow_reversed
            B, DXF 74
num_column_heights
            BL, DXF 72
column_heights
            BD*, DXF 46
```

**NAVISWORKSMODELDEF**

```
parent      struct _dwg_object_object*
flags       BS, DXF 70
path        T, DXF 1
```

```

status      B, DXF 290

min_extent
            3BD, DXF 10

max_extent
            3BD, DXF 11

host_drawing_visibility
            B, DXF 290

```

**OBJECT\_PTR**

```

parent      struct _dwg_object_object*

```

**ORDDIMOBJECTCONTEXTDATA**

```

parent      struct _dwg_object_object*

class_version
            BS, DXF 70

is_default
            B, DXF 290

scale       H, DXF 340

dimension
            Dwg_OCD_Dimension

feature_location_pt
            3BD, DXF 11

leader_endpt
            3BD, DXF 12

```

**PARTIAL\_VIEWING\_INDEX**

```

parent      struct _dwg_object_object*

num_entries
            BL

has_entries
            B

entries     Dwg_PARTIAL_VIEWING_INDEX_Entry*

```

**PERSUBENTMGR**

```

parent      struct _dwg_object_object*

class_version
            BL, DXF 90

unknown_0
            BL, DXF 90

unknown_2
            BL, DXF 90

```

```
numassocsteps
    BL, DXF 90

numassocsubents
    BL, DXF 90

num_steps
    BL, DXF 90

steps    BL*, DXF 90

num_subents
    BL, DXF 90

subents  BL*, DXF 90
```

**PLACEHOLDER**

```
parent    struct _dwg_object_object*
```

**PLOTSETTINGS**

```
parent    struct _dwg_object_object*

printer_cfg_file
    T, DXF 1

paper_size
    T, DXF 2

canonical_media_name
    T, DXF 4

plot_flags
    BS, DXF 70

plotview  H, DXF 6

plotview_name
    T, DXF 6

left_margin
    BD, DXF 40

bottom_margin
    BD, DXF 41

right_margin
    BD, DXF 42

top_margin
    BD, DXF 43

paper_width
    BD, DXF 44

paper_height
    BD, DXF 45
```

`plot_origin`  
2BD\_1, DXF 46

`plot_window_ll`  
2BD\_1, DXF 48

`plot_window_ur`  
2BD\_1, DXF 140

`plot_paper_unit`  
BS, DXF 72

`plot_rotation_mode`  
BS, DXF 73

`plot_type`  
BS, DXF 74

`paper_units`  
BD, DXF 142

`drawing_units`  
BD, DXF 143

`stylesheet`  
T, DXF 7

`std_scale_type`  
BS, DXF 75

`std_scale_factor`  
BD, DXF 147

`paper_image_origin`  
2BD\_1, DXF 148

`shadeplot_type`  
BS, DXF 76

`shadeplot_reslevel`  
BS, DXF 77

`shadeplot_customdpi`  
BS, DXF 78

`shadeplot`  
H, DXF 333

#### **POINTCLOUDCOLORMAP**

`parent`     `struct _dwg_object_object*`

`class_version`  
BS, DXF 70

`def_intensity_colorscheme`  
T, DXF 1

```

def_elevation_colorscheme
    T, DXF 1

def_classification_colorscheme
    T, DXF 1

num_colorramps
    BL, DXF 90

colorramps
    Dwg_POINTCLOUDCOLORMAP_Ramp*

num_classification_colorramps
    BL, DXF 90

classification_colorramps
    Dwg_POINTCLOUDCOLORMAP_Ramp*

```

### **POINTCLOUDDEF**

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

source_filename
    T, DXF 1

is_loaded
    B, DXF 280

numpoints
    RLL, DXF 160

extents_min
    3BD, DXF 10

extents_max
    3BD, DXF 11

```

### **POINTCLOUDDEFEX**

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

source_filename
    T, DXF 1

is_loaded
    B, DXF 280

numpoints
    RLL, DXF 160

extents_min
    3BD, DXF 10

```

```
    extents_max
        3BD, DXF 11
```

#### **POINTCLOUDDEF\_REACTOR**

```
    parent      struct _dwg_object_object*
    class_version
        BL, DXF 90
```

#### **POINTCLOUDDEF\_REACTOR\_EX**

```
    parent      struct _dwg_object_object*
    class_version
        BL, DXF 90
```

#### **POINTPATH**

```
    parent      struct _dwg_object_object*
    class_version
        BS, DXF 90
    point        3BD, DXF 10
```

#### **PROXY\_OBJECT**

```
    parent      struct _dwg_object_object*
    class_id     BL, DXF 91
    version      BL, DXF 71
    maint_version
        BL, DXF 97
    from_dxf     B, DXF 70
    data_numbits
        BL
    data_size
        BL, DXF 93
    data         TF, DXF 310
    num_objids
        BL
    objids       H*, DXF 340
```

#### **RADIMLGOBJECTCONTEXTDATA**

```
    parent      struct _dwg_object_object*
    class_version
        BS, DXF 70
    is_default
        B, DXF 290
```

```

scale      H, DXF 340
dimension   Dwg_OCD_Dimension

ovr_center  3BD, DXF 12

jog_point   3BD, DXF 13

```

**RADIMOBJECTCONTEXTDATA**

```

parent      struct _dwg_object_object*
class_version
            BS, DXF 70

is_default   B, DXF 290

scale      H, DXF 340
dimension   Dwg_OCD_Dimension

first_arc_pt 3BD, DXF 11

```

**RAPIDRTRENDERSETTINGS**

```

parent      struct _dwg_object_object*
class_version
            BL, DXF 90

name        T, DXF 1

fog_enabled  B, DXF 290

fog_background_enabled
            B, DXF 290

backfaces_enabled
            B, DXF 290

environ_image_enabled
            B, DXF 290

environ_image_filename
            T, DXF 1

description  T, DXF 1

display_index
            BL, DXF 90

```

`has_predefined`  
B, DXF 290

`rapidrt_version`  
BL, DXF 90

`render_target`  
BL, DXF 70

`render_level`  
BL, DXF 90

`render_time`  
BL, DXF 90

`lighting_model`  
BL, DXF 70

`filter_type`  
BL, DXF 70

`filter_width`  
BD, DXF 40

`filter_height`  
BD, DXF 40

#### **RASTERVARIABLES**

`parent` struct `_dwg_object_object*`

`class_version`  
BL, DXF 90

`image_frame`  
BS, DXF 70

`image_quality`  
BS, DXF 71

`units` BS, DXF 72

#### **RENDERENTRY**

`parent` struct `_dwg_object_object*`

`class_version`  
BL, DXF 90

`image_file_name`  
T, DXF 1

`preset_name`  
T, DXF 1

`view_name`  
T, DXF 1



`dimension_x`  
BL, DXF 90

`dimension_y`  
BL, DXF 90

`start_year`  
BS, DXF 70

`start_month`  
BS, DXF 70

`start_day`  
BS, DXF 70

`start_minute`  
BS, DXF 70

`start_second`  
BS, DXF 70

`start_msec`  
BS, DXF 70

`render_time`  
BD, DXF 40

`memory_amount`  
BL, DXF 90

`material_count`  
BL, DXF 90

`light_count`  
BL, DXF 90

`triangle_count`  
BL, DXF 90

`display_index`  
BL, DXF 90

## **RENDERENVIRONMENT**

`parent` struct `_dwg_object_object*`

`class_version`  
BL, DXF 90

`fog_enabled`  
B, DXF 290

`fog_background_enabled`  
B, DXF 290

`fog_color`  
CMC, DXF 280

```
fog_density_near
    BD, DXF 40

fog_density_far
    BD, DXF 40

fog_distance_near
    BD, DXF 40

fog_distance_far
    BD, DXF 40

environ_image_enabled
    B, DXF 290

environ_image_filename
    T, DXF 1
```

## RENDERGLOBAL

```
parent      struct _dwg_object_object*

class_version
    BL, DXF 90

procedure
    BL, DXF 90

destination
    BL, DXF 90

save_enabled
    B, DXF 290

save_filename
    T, DXF 1

image_width
    BL, DXF 90

image_height
    BL, DXF 90

predef_presets_first
    B, DXF 290

highlevel_info
    B, DXF 290
```

## RENDERSETTINGS

```
parent      struct _dwg_object_object*

class_version
    BL, DXF 90

name        T, DXF 1
```

`fog_enabled`  
B, DXF 290

`fog_background_enabled`  
B, DXF 290

`backfaces_enabled`  
B, DXF 290

`environ_image_enabled`  
B, DXF 290

`environ_image_filename`  
T, DXF 1

`description`  
T, DXF 1

`display_index`  
BL, DXF 90

`has_predefined`  
B, DXF 290

## **SCALE**

`parent` struct `_dwg_object_object*`

`flag` BS, DXF 70

`name` T, DXF 300

`paper_units`  
BD, DXF 140

`drawing_units`  
BD, DXF 141

`is_unit_scale`  
B, DXF 290

## **SECTIONVIEWSTYLE**

`parent` struct `_dwg_object_object*`

`mdoc_class_version`  
BS, DXF 70

`desc` T, DXF 3

`is_modified_for_recompute`  
B, DXF 290

`display_name`  
T, DXF 300

`viewstyle_flags`  
BL, DXF 90

```
class_version
    BS, DXF 70

flags
    BL, DXF 90

identifier_style
    H, DXF 340

identifier_color
    CMC, DXF 62

identifier_height
    BD, DXF 40

arrow_start_symbol
    H, DXF 340

arrow_end_symbol
    H, DXF 340

arrow_symbol_color
    CMC, DXF 62

arrow_symbol_size
    BD, DXF 40

identifier_exclude_characters
    T, DXF 300

identifier_position
    BLd, DXF 90

identifier_offset
    BD, DXF 40

arrow_position
    BLd, DXF 90

arrow_symbol_extension_length
    BD, DXF 40

plane_ltype
    H, DXF 340

plane_linewt
    BLd, DXF 90

plane_line_color
    CMC, DXF 62

bend_ltype
    H, DXF 340

bend_linewt
    BLd, DXF 90

bend_line_color
    CMC, DXF 62
```

`bend_line_length`  
BD, DXF 40

`end_line_overshoot`  
BD, DXF 40

`end_line_length`  
BD, DXF 40

`viewlabel_text_style`  
H, DXF 340

`viewlabel_text_color`  
CMC, DXF 62

`viewlabel_text_height`  
BD, DXF 40

`viewlabel_attachment`  
BL, DXF 90

`viewlabel_offset`  
BD, DXF 40

`viewlabel_alignment`  
BL, DXF 90

`viewlabel_pattern`  
T, DXF 300

`hatch_color`  
CMC, DXF 62

`hatch_bg_color`  
CMC, DXF 62

`hatch_pattern`  
T, DXF 300

`hatch_scale`  
BD, DXF 40

`hatch_transparency`  
BLd, DXF 90

`unknown_b1`  
B, DXF 290

`unknown_b2`  
B, DXF 290

`num_hatch_angles`  
BL, DXF 90

`hatch_angles`  
BD\*, DXF 40

**SECTION\_MANAGER**

parent     struct \_dwg\_object\_object\*  
is\_live    B, DXF 70  
num\_sections  
          BS, DXF 90  
sections   H\*, DXF 330

**SECTION\_SETTINGS**

parent     struct \_dwg\_object\_object\*  
curr\_type  
          BS, DXF 90  
num\_types  
          BL, DXF 91  
types      Dwg\_SECTION\_typesettings\*

**SKYLIGHT\_BACKGROUND**

parent     struct \_dwg\_object\_object\*  
class\_version  
          BL, DXF 90  
sunid      H, DXF 340

**SOLID\_BACKGROUND**

parent     struct \_dwg\_object\_object\*  
class\_version  
          BL, DXF 90  
color      BLx, DXF 90

**SORTENTSTABLE**

parent     struct \_dwg\_object\_object\*  
num\_ents   BL  
sort\_ents  
          H\*, DXF 5  
block\_owner  
          H  
ents       H\*, DXF 331

**SPATIAL\_FILTER**

parent     struct \_dwg\_object\_object\*  
num\_clip\_verts  
          BS, DXF 70

```

clip_verts      2RD*, DXF 10

extrusion       BE, DXF 210

origin         3BD, DXF 11

display_boundary_on
               BS, DXF 71

front_clip_on   BS, DXF 72

front_clip_z    BD, DXF 40

back_clip_on    BS, DXF 73

back_clip_z     BD, DXF 41

inverse_transform
               BD*, DXF 40

transform       BD*, DXF 40

```

**SPATIAL\_INDEX**

```

parent         struct _dwg_object_object*

last_updated    TIMEBLL, DXF 40

num1           BD, DXF 40

num_hdls       BL, DXF 90

hdls           H*, DXF 330

bindata_size    BL, DXF 90

bindata        TF, DXF 310

```

**STYLE**

STYLE is a table object.

```

parent         struct _dwg_object_object*

flag           RC

name           TV

used           RS

is_xref_ref    B

```

```

is_xref_resolved
    BS

is_xref_dep
    B

xref      H

is_shape  B

is_vertical
    B

text_size
    BD, DXF 40

width_factor
    BD, DXF 41

oblique_angle
    BD, DXF 50

generation
    RC, DXF 71

last_height
    BD, DXF 42

font_file
    T, DXF 3

bigfont_file
    T, DXF 4

```

**STYLE\_CONTROL**

STYLE\_CONTROL is a table\_control object.

```

parent      struct _dwg_object_object*

num_entries
    BS, DXF 70

entries     H*

```

**SUN**

```

parent      struct _dwg_object_object*

class_version
    BL, DXF 90

is_on       B, DXF 290

color       CMC, DXF 63

intensity
    BD, DXF 40

```



`has_shadow`  
B, DXF 291

`julian_day`  
BL, DXF 91

`msecs` BL, DXF 92

`is_dst` B, DXF 292

`shadow_type`  
BL, DXF 70

`shadow_mapsize`  
BS, DXF 71

`shadow_softness`  
RC, DXF 280

## **SUNSTUDY**

`parent` struct `_dwg_object_object*`

`class_version`  
BL, DXF 90

`setup_name`  
T, DXF 1

`description`  
T, DXF 2

`output_type`  
BL, DXF 70

`sheet_set_name`  
T, DXF 3

`use_subset`  
B, DXF 290

`sheet_subset_name`  
T, DXF 4

`select_dates_from_calendar`  
B, DXF 291

`num_dates`  
BL, DXF 91

`dates` Dwg\_SUNSTUDY\_Dates\*

`select_range_of_dates`  
B, DXF 292

`start_time`  
BL, DXF 93

`end_time` BL, DXF 94

interval BL, DXF 95  
 num\_hours  
     BL, DXF 91  
 hours B\*, DXF 290  
 shade\_plot\_type  
     BL, DXF 74  
 numviewport  
     BL, DXF 75  
 numrows BL, DXF 76  
 numcols BL, DXF 77  
 spacing BD, DXF 40  
 lock\_viewports  
     B, DXF 293  
 label\_viewports  
     B, DXF 294  
 page\_setup\_wizard  
     H, DXF 340  
 view H, DXF 341  
 visualstyle  
     H, DXF 342  
 text\_style  
     H, DXF 343

**TABLECONTENT**

parent struct \_dwg\_object\_object\*  
 ldata Dwg\_LinkedData  
 tdata Dwg\_LinkedTableData  
 fdata Dwg\_FormattedTableData  
 tablestyle  
     H, DXF 340

**TABLEGEOMETRY**

parent struct \_dwg\_object\_object\*  
 numrows BL, DXF 90  
 numcols BL, DXF 91  
 num\_cells  
     BL, DXF 92  
 cells Dwg\_TABLEGEOMETRY\_Cell\*

**TABLESTYLE**

```

parent      struct _dwg_object_object*
class_version
            BS

name        T, DXF 3
flags       BS, DXF 71
flow_direction
            BS, DXF 70
horiz_cell_margin
            BD, DXF 40
vert_cell_margin
            BD, DXF 41
is_title_suppressed
            B, DXF 280
is_header_suppressed
            B, DXF 281
unknown_rc
            RC, DXF 70
unknown_bl1
            BL
unknown_bl2
            BL
cellstyle
            H
sty         Dwg_TABLESTYLE_CellStyle
numoverrides
            BL
unknown_bl3
            BL
ovr         Dwg_TABLESTYLE_CellStyle
num_rowstyles
            BL
rowstyles
            Dwg_TABLESTYLE_rowstyles*

```

**TEXTOBJECTCONTEXTDATA**

```

parent      struct _dwg_object_object*
class_version
            BS, DXF 70

```

```

is_default      B, DXF 290
scale           H, DXF 340
horizontal_mode BS, DXF 70
rotation        BD, DXF 50
ins_pt          2RD, DXF 10
alignment_pt    2RD, DXF 11

```

### TVDEVICEPROPERTIES

```

parent      struct _dwg_object_object*
flags       BL
max_regen_threads BS
use_lut_palette BL
alt_hlt     BLL
alt_hltcolor BLL
geom_shader_usage BLL
blending_mode BL
antialiasing_level BD
bd2         BD

```

### UCS

UCS is a table object.

```

parent      struct _dwg_object_object*
flag        RC
name        TV
used        RS
is_xref_ref B
is_xref_resolved BS

```

```

    is_xref_dep
        B

    xref      H

    ucsorg    3BD, DXF 10

    ucsxdir   3BD, DXF 11

    ucsydir   3BD, DXF 12

    ucs_elevation
        BD, DXF 146

    UCSORTHOVIEW
        BS, DXF 79

    base_ucs  H, DXF 346

    named_ucs
        H

    num_orthopts
        BS

    orthopts  Dwg_UCS_orthopts*

```

**UCS\_CONTROL**

UCS\_CONTROL is a table\_control object.

```

    parent    struct _dwg_object_object*

    num_entries
        BS, DXF 70

    entries   H*

```

**UNKNOWN\_OBJ**

```

    parent    struct _dwg_object_object*

```

**VBA\_PROJECT**

```

    parent    struct _dwg_object_object*

    data_size
        BL, DXF 90

    data      TF, DXF 310

```

**VIEW**

VIEW is a table object.

```

    parent    struct _dwg_object_object*

    flag      RC

    name      TV

    used      RS

```

```
is_xref_ref
    B

is_xref_resolved
    BS

is_xref_dep
    B

xref      H

VIEWSIZE  BD, DXF 40

view_width
    BD, DXF 41

aspect_ratio
    BD

VIEWCTR   2RD, DXF 10

view_target
    3BD, DXF 12

VIEWDIR   3BD, DXF 11

twist_angle
    BD, DXF 50

lens_length
    BD, DXF 42

front_clip_z
    BD, DXF 43

back_clip_z
    BD, DXF 44

VIEWMODE  4BITS, DXF 71

render_mode
    RC, DXF 281

use_default_lights
    B, DXF 292

default_lightning_type
    RC, DXF 282

brightness
    BD, DXF 141

contrast  BD, DXF 142

ambient_color
    CMC, DXF 63

is_pspace
    B
```

```

associated_ucs
    B, DXF 72

ucsorg    3BD, DXF 110
ucsxdir   3BD, DXF 111
ucsydir   3BD, DXF 112
ucs_elevation
    BD, DXF 146

UCSORTHOVIEW
    BS, DXF 79

is_camera_plottable
    B, DXF 73

background
    H, DXF 332

visualstyle
    H, DXF 348

sun       H, DXF 361

base_ucs  H, DXF 346

named_ucs
    H, DXF 345

livesection
    H, DXF 334

```

## VIEW\_CONTROL

VIEW\_CONTROL is a table\_control object.

```

parent    struct _dwg_object_object*

num_entries
    BS, DXF 70

entries   H*

```

## VISUALSTYLE

```

parent    struct _dwg_object_object*

description
    T, DXF 2

style_type
    BL, DXF 70

ext_lighting_model
    BS, DXF 177

internal_only
    B, DXF 291

```

`face_lighting_model`  
BL, DXF 71

`face_lighting_model_int`  
BS, DXF 176

`face_lighting_quality`  
BL, DXF 72

`face_lighting_quality_int`  
BS, DXF 176

`face_color_mode`  
BL, DXF 73

`face_color_mode_int`  
BS, DXF 176

`face_opacity`  
BD, DXF 40

`face_opacity_int`  
BS, DXF 176

`face_specular`  
BD, DXF 41

`face_specular_int`  
BS, DXF 176

`face_modifier`  
BL, DXF 90

`face_modifier_int`  
BS, DXF 176

`face_mono_color`  
CMC, DXF 63

`face_mono_color_int`  
BS, DXF 176

`edge_model`  
BS, DXF 74

`edge_model_int`  
BS, DXF 176

`edge_style`  
BL, DXF 91

`edge_style_int`  
BS, DXF 176

`edge_intersection_color`  
CMC, DXF 64



`edge_intersection_color_int`  
BS, DXF 176

`edge_obscurd_color`  
CMC, DXF 65

`edge_obscurd_color_int`  
BS, DXF 176

`edge_obscurd_ltype`  
BL, DXF 75

`edge_obscurd_ltype_int`  
BS, DXF 176

`edge_intersection_ltype`  
BL, DXF 175

`edge_intersection_ltype_int`  
BS, DXF 176

`edge_crease_angle`  
BD, DXF 42

`edge_crease_angle_int`  
BS, DXF 176

`edge_modifier`  
BL, DXF 92

`edge_modifier_int`  
BS, DXF 176

`edge_color`  
CMC, DXF 66

`edge_color_int`  
BS, DXF 176

`edge_opacity`  
BD, DXF 43

`edge_opacity_int`  
BS, DXF 176

`edge_width`  
BL, DXF 76

`edge_width_int`  
BS, DXF 176

`edge_overhang`  
BL, DXF 77

`edge_overhang_int`  
BS, DXF 176

- edge\_jitter
  - BL, DXF 78
- edge\_jitter\_int
  - BS, DXF 176
- edge\_silhouette\_color
  - CMC, DXF 67
- edge\_silhouette\_color\_int
  - BS, DXF 176
- edge\_silhouette\_width
  - BL, DXF 79
- edge\_silhouette\_width\_int
  - BS, DXF 176
- edge\_halo\_gap
  - BL, DXF 170
- edge\_halo\_gap\_int
  - BS, DXF 176
- edge\_isolines
  - BL, DXF 171
- edge\_isolines\_int
  - BS, DXF 176
- edge\_do\_hide\_precision
  - B, DXF 290
- edge\_do\_hide\_precision\_int
  - BS, DXF 176
- edge\_style\_apply
  - BL, DXF 174
- edge\_style\_apply\_int
  - BS
- display\_settings
  - BL, DXF 93
- display\_settings\_int
  - BS, DXF 176
- display\_brightness\_bl
  - BLd, DXF 44
- display\_brightness
  - BD, DXF 44
- display\_brightness\_int
  - BS, DXF 176

display\_shadow\_type  
BL, DXF 173

display\_shadow\_type\_int  
BS, DXF 176

bd2007\_45  
BD, DXF 45

num\_props  
BS, DXF 70

b\_prop1c B, DXF 290

b\_prop1c\_int  
BS, DXF 176

b\_prop1d B, DXF 290

b\_prop1d\_int  
BS, DXF 176

b\_prop1e B, DXF 290

b\_prop1e\_int  
BS, DXF 176

b\_prop1f B, DXF 290

b\_prop1f\_int  
BS, DXF 176

b\_prop20 B, DXF 290

b\_prop20\_int  
BS, DXF 176

b\_prop21 B, DXF 290

b\_prop21\_int  
BS, DXF 176

b\_prop22 B, DXF 290

b\_prop22\_int  
BS, DXF 176

b\_prop23 B, DXF 290

b\_prop23\_int  
BS, DXF 176

b\_prop24 B, DXF 290

b\_prop24\_int  
BS, DXF 176

bl\_prop25  
BL, DXF 90

bl\_prop25\_int  
BS, DXF 176

bd\_prop26  
BD, DXF 40

bd\_prop26\_int  
BS, DXF 176

bd\_prop27  
BD, DXF 40

bd\_prop27\_int  
BS, DXF 176

bl\_prop28  
BL, DXF 90

bl\_prop28\_int  
BS, DXF 176

c\_prop29 CMC, DXF 62

c\_prop29\_int  
BS, DXF 176

bl\_prop2a  
BL, DXF 90

bl\_prop2a\_int  
BS, DXF 176

bl\_prop2b  
BL, DXF 90

bl\_prop2b\_int  
BS, DXF 176

c\_prop2c CMC, DXF 62

c\_prop2c\_int  
BS, DXF 176

b\_prop2d B, DXF 290

b\_prop2d\_int  
BS, DXF 176

bl\_prop2e  
BL, DXF 90

bl\_prop2e\_int  
BS, DXF 176

bl\_prop2f  
BL, DXF 90

bl\_prop2f\_int  
BS, DXF 176

```

bl_prop30
    BL, DXF 90
bl_prop30_int
    BS, DXF 176
b_prop31    B, DXF 290
b_prop31_int
    BS, DXF 176
bl_prop32
    BL, DXF 90
bl_prop32_int
    BS, DXF 176
c_prop33    CMC, DXF 62
c_prop33_int
    BS, DXF 176
bd_prop34
    BD, DXF 40
bd_prop34_int
    BS, DXF 176
edge_wiggle
    BL, DXF 90
edge_wiggle_int
    BS, DXF 176
strokes     T, DXF 1
strokes_int
    BS, DXF 176
b_prop37    B, DXF 290
b_prop37_int
    BS, DXF 176
bd_prop38
    BD, DXF 40
bd_prop38_int
    BS, DXF 176
bd_prop39
    BD, DXF 40
bd_prop39_int
    BS, DXF 176

```

**VPORT**

VPORT is a table object.

```
parent    struct _dwg_object_object*
```

flag	RC
name	TV
used	RS
is_xref_ref	B
is_xref_resolved	BS
is_xref_dep	B
xref	H
VIEWSIZE	BD, DXF 40
view_width	BD
aspect_ratio	BD, DXF 41
VIEWCTR	2RD, DXF 12
view_target	3BD, DXF 17
VIEWDIR	3BD, DXF 16
view_twist	BD, DXF 51
lens_length	BD, DXF 42
front_clip_z	BD, DXF 43
back_clip_z	BD, DXF 44
VIEWMODE	4BITS, DXF 71
render_mode	RC, DXF 281
use_default_lights	B, DXF 292
default_lightning_type	RC, DXF 282
brightness	BD, DXF 141
contrast	BD, DXF 142

`ambient_color`  
CMC, DXF 63

`lower_left`  
2RD, DXF 10

`upper_right`  
2RD, DXF 11

`UCSFOLLOW`  
B, DXF 71

`circle_zoom`  
BS, DXF 72

`FASTZOOM` B, DXF 73

`UCSICON` RC, DXF 74

`GRIDMODE` B, DXF 76

`GRIDUNIT` 2RD, DXF 15

`SNAPMODE` B, DXF 75

`SNAPSTYLE`  
B, DXF 77

`SNAPISOPAIR`  
BS, DXF 78

`SNAPANG` BD, DXF 50

`SNAPBASE` 2RD, DXF 13

`SNAPUNIT` 2RD, DXF 14

`ucs_at_origin`  
B

`UCSVP` B, DXF 71

`ucsorg` 3BD, DXF 110

`ucsxdir` 3BD, DXF 111

`ucsydir` 3BD, DXF 112

`ucs_elevation`  
BD, DXF 146

`UCSORTHOVIEW`  
BS, DXF 79

`grid_flags`  
BS, DXF 60

`grid_major`  
BS, DXF 61

```

background
    H, DXF 332

visualstyle
    H, DXF 348

sun
    H, DXF 361

named_ucs
    H, DXF 345

base_ucs
    H, DXF 346

```

**VPORT\_CONTROL**

VPORT\_CONTROL is a table\_control object.

```

parent      struct _dwg_object_object*

num_entries
    BS, DXF 70

entries     H*

```

**VX\_CONTROL**

VX\_CONTROL is a table\_control object.

```

parent      struct _dwg_object_object*

num_entries
    BS, DXF 70

entries     H*

```

**VX\_TABLE\_RECORD**

VX\_TABLE\_RECORD is a table object.

```

parent      struct _dwg_object_object*

flag        RC

name        TV

used        RS

is_xref_ref
    B

is_xref_resolved
    BS

is_xref_dep
    B

xref        H

is_on       B, DXF 290

viewport    H, DXF 338

```



```
prev_entry
    H, DXF 340
```

### **WIPEOUTVARIABLES**

```
parent    struct _dwg_object_object*
display_frame
    BS, DXF 70
```

### **XRECORD**

```
parent    struct _dwg_object_object*
cloning    BS, DXF 280
xdata_size
    BL
num_xdata
    BL
xdata      Dwg_Resbuf*
num_objid_handles
    BL
objid_handles
    H*, DXF 340
```

### **PDFDEFINITION**

```
parent    struct _dwg_object_object*
filename   T, DXF 1
name       T, DXF 2
```

### **DGNDEFINITION**

See [UNDERLAYDEFINITION], page 213,

### **DWFDEFINITION**

See [UNDERLAYDEFINITION], page 213,

### **ASSOCARRAYMODIFYPARAMETERS**

```
parent    struct _dwg_object_object*
aap_version
    BL
num_items
    BL
classname
    TV
items      Dwg_ASSOCARRAYITEM*
numitems   BL
```

numrows BL

numlevels  
BL

#### **ASSOCARRAYPATHPARAMETERS**

See [ASSOCARRAYPARAMETERS], page 213,

#### **ASSOCARRAYPOLARPARAMETERS**

See [ASSOCARRAYPARAMETERS], page 213,

#### **ASSOCARRAYRECTANGULARPARAMETERS**

See [ASSOCARRAYPARAMETERS], page 213,

#### **Dwg\_3DSOLID\_material**

parent struct \_dwg\_entity\_3DSOLID\*

array\_index  
BL

mat\_absref  
BL

material\_handle  
H

#### **Dwg\_3DSOLID\_silhouette**

parent struct \_dwg\_entity\_3DSOLID\*

vp\_id BL

vp\_target  
3BD

vp\_dir\_from\_target  
3BD

vp\_up\_dir  
3BD

vp\_perspective  
B

has\_wires  
B

num\_wires  
BL

wires Dwg\_3DSOLID\_wire\*

#### **Dwg\_3DSOLID\_wire**

parent struct \_dwg\_entity\_3DSOLID\*

type RC

selection\_marker  
    BLd  
  
color    BL  
  
acis\_index  
    BLd  
  
num\_points  
    BL  
  
points    3BD\*  
  
transform\_present  
    B  
  
axis\_x    3BD  
axis\_y    3BD  
axis\_z    3BD  
  
translation  
    3BD  
  
scale    3BD  
  
has\_rotation  
    B  
  
has\_reflection  
    B  
  
has\_shear  
    B

**Dwg\_ACSH\_HistoryNode**

major    BL  
minor    BL  
trans    BD\*, DXF 40  
color    CMC  
step\_id  BL  
material  H

**Dwg\_ACSH\_SubentColor**

major    BL  
minor    BL  
transparency  
    BL  
bl193    BL

```
is_face_variable
    B
```

#### **Dwg\_ACSH\_SubentMaterial**

```
major    BL
minor    BL
reflectance
    BL
displacement
    BL
```

#### **Dwg\_ACTIONBODY**

```
parent    struct _dwg_object_ASSOCNETWORK*
evaluatorid
    T
expression
    T
value     BL
```

#### **Dwg\_ARRAYITEMLOCATOR**

```
parent    struct _dwg_object_ASSOCARRAYMODIFYACTIONBODY*
itemloc1  BL, DXF 90
itemloc2  BL, DXF 90
itemloc3  BL, DXF 90
```

#### **Dwg\_ASSOCACTIONBODY\_action**

```
parent    struct _dwg_object_ASSOCMLEADERACTIONBODY*
depid     BL
dep       H, DXF 330
```

#### **Dwg\_ASSOCACTION\_Deps**

```
parent    struct _dwg_object_ASSOCACTION*
is_owned  B
dep       H
```

#### **Dwg\_ASSOCARRAYITEM**

```
parent    struct _dwg_abstractobject_ASSOCARRAYPARAMETERS*
class_version
    BL, DXF 90
itemloc[3]
    BL
```

```

flags      BL
is_default_transmatrix
           int
x_dir      3BD
transmatrix
           BD*
rel_transform
           BD*
has_h1     int
h1         H
h2         H

```

#### **Dwg ASSOCPARAMBASEDACTIONBODY**

```

parent     struct _dwg_object_object*
version    BL
minor      BL
num_deps   BL, DXF 90
deps       H*
14         BL
15         BL
assocdep   H
num_values
           BL
values     struct _dwg_VALUEPARAM*

```

#### **Dwg ASSOCSURFACEACTIONBODY**

```

parent     struct _dwg_object_object*
version    BL
is_semi_assoc
           B
12         BL
is_semi_ovr
           B
grip_status
           BS
assocdep   H

```

**Dwg\_AcDs**

file_signature	RL
file_header_size	RL
unknown_1	RL
version	RL
unknown_2	RL
ds_version	RL
segidx_offset	RL
segidx_unknown	RL
num_segidx	RL
schidx_segidx	RL
datidx_segidx	RL
search_segidx	RL
prvsav_segidx	RL
file_size	RL
total_segments	BL
segidx	Dwg_AcDs_SegmentIndex*
datidx	Dwg_AcDs_DataIndex
data	Dwg_AcDs_Data*
blob01	Dwg_AcDs_DataBlob
schidx	Dwg_AcDs_SchemaIndex
schdat	Dwg_AcDs_SchemaData
search	Dwg_AcDs_Search

segments Dwg\_AcDs\_Segment\*

### **Dwg\_AcDs\_Data**

record\_hdrs  
Dwg\_AcDs\_Data\_RecordHdr\*

records Dwg\_AcDs\_Data\_Record\*

### **Dwg\_AcDs\_DataBlob**

data\_size  
RLL

page\_count  
RL

record\_size  
RL

page\_size  
RL

unknown\_1  
RL

unknown\_2  
RL

ref Dwg\_AcDs\_DataBlobRef\*

### **Dwg\_AcDs\_DataBlob01**

total\_data\_size  
RLL

page\_start\_offset  
RLL

page\_index  
int32\_t

page\_count  
int32\_t

page\_data\_size  
RLL

page\_data  
RC\*

### **Dwg\_AcDs\_DataBlobRef**

total\_data\_size  
RLL

num\_pages  
RL

```

    record_size
        RL

    page_size
        RL

    unknown_1
        RL

    unknown_2
        RL

    pages      Dwg_AcDs_DataBlobRef_Page*
```

**Dwg\_AcDs\_DataBlobRef\_Page**

```

    segidx     RL

    size       RL
```

**Dwg\_AcDs\_DataIndex**

```

    num_entries
        RL

    di_unknown
        RL

    entries     Dwg_AcDs_DataIndex_Entry*
```

**Dwg\_AcDs\_DataIndex\_Entry**

```

    segidx     RL

    offset     RL

    schidx     RL
```

**Dwg\_AcDs\_Data\_Record**

```

    data_size
        RL

    blob       RC*
```

**Dwg\_AcDs\_Data\_RecordHdr**

```

    entry_size
        RL

    unknown    RL

    handle     RLL

    offset     RL
```

**Dwg\_AcDs\_Schema**

```

    num_index
        RS
```



```

index      RLL*
num_props
           RS
props      Dwg_AcDs_Schema_Prop*

```

**Dwg\_AcDs\_SchemaData**

```

num_uprops
           RL
uprops     Dwg_AcDs_SchemaData_UProp*
num_schemas
           RL
schemas    Dwg_AcDs_Schema*
num_propnames
           RL
propnames
           TV*

```

**Dwg\_AcDs\_SchemaData\_UProp**

```

size       RL
flags      RL

```

**Dwg\_AcDs\_SchemaIndex**

```

num_props
           RL
si_unknown_1
           RL
props      Dwg_AcDs_SchemaIndex_Prop*
si_tag     RLL
num_prop_entries
           RL
si_unknown_2
           RL
prop_entries
           Dwg_AcDs_SchemaIndex_Prop*

```

**Dwg\_AcDs\_SchemaIndex\_Prop**

```

index      RL
segidx     RL
offset     RL

```

**Dwg\_AcDs\_Schema\_Prop**

flags	RL
namidx	RL
type	RL
type_size	RL
unknown_1	RL
unknown_2	RL
num_values	RS
values	RC*

**Dwg\_AcDs\_Search**

num_search	RL
search	Dwg_AcDs_Search_Data*

**Dwg\_AcDs\_Search\_Data**

schema_namidx	RL
num_sortedidx	RL
sortedidx	RLL*
num_ididxs	RL
unknown	RL
ididxs	Dwg_AcDs_Search_IdIdxs*

**Dwg\_AcDs\_Search\_IdIdx**

handle	RLL
num_ididx	RL
ididx	RLL*

**Dwg\_AcDs\_Search\_IdIdxs**

num_ididx	RL
-----------	----

```

    ididx      Dwg_AcDs_Search_IdIdx*
Dwg_AcDs_Segment
    signature
        RL
    name[7]    RC
    type       RCd
    segment_idx
        RL
    is_blob01
        RL
    segsize    RL
    unknown_2
        RL
    ds_version
        RL
    unknown_3
        RL
    data_algn_offset
        RL
    objdata_algn_offset
        RL
    padding[9]
        RC
Dwg_AcDs_SegmentIndex
    offset     RLL
    size       RL
Dwg_BLOCKACTION_connectionpts
    code       BL
    name       TV
Dwg_BLOCKLOOKUPACTION_lut
    parent     struct _dwg_object_BLOCKLOOKUPACTION*
    conn_pts   Dwg_BLOCKACTION_connectionpts
    b282       B, DXF 282
    b281       B, DXF 281
Dwg_BLOCKPARAMETER_PropInfo
    num_connections
        BL

```

```

    connections
        Dwg_BLOCKPARAMETER_connection*

Dwg_BLOCKPARAMETER_connection

    code      BL
    name      T

Dwg_BLOCKPARAMVALUESET

    desc      TV
    flags     BL
    minimum   BD
    maximum   BD
    increment
        BD
    num_valuelist
        BS
    valuelist
        BD*

Dwg_BLOCKVISIBILITYPARAMETER_state

    parent    struct _dwg_object_BLOCKVISIBILITYPARAMETER*
    name      T, DXF 303
    num_blocks
        BL, DXF 94
    blocks    H*, DXF 332
    num_params
        BL, DXF 95
    params    H*, DXF 333

Dwg_COMPOUNDOBJECTID

    parent    struct _dwg_object_object*
    has_object
        B
    name      T
    object    H

Dwg_CONSTRAINTGROUPNODE

    parent    struct _dwg_object_ASSOC2DCONSTRAINTGROUP*
    nodeid    BL
    status    RC

```

num\_connections  
BL

connections  
BL\*

#### **Dwg\_CONTEXTDATA\_dict**

parent struct \_dwg\_CONTEXTDATA\_submgr\*  
text T, DXF 3  
itemhandle  
H, DXF 350

#### **Dwg\_CONTEXTDATA\_submgr**

parent struct \_dwg\_object\_CONTEXTDATAMANAGER\*  
handle H  
num\_entries  
BL, DXF 90  
entries Dwg\_CONTEXTDATA\_dict\*

#### **Dwg\_CellContentGeometry**

dist\_top\_left  
3BD, DXF 10  
dist\_center  
3BD, DXF 11  
content\_width  
BD, DXF 43  
content\_height  
BD, DXF 44  
width BD, DXF 45  
height BD, DXF 46  
unknown BL, DXF 95  
cell\_parent  
struct \_dwg\_TableCell\*  
geom\_parent  
struct \_dwg\_TABLEGEOMETRY\_Cell\*

#### **Dwg\_CellStyle**

type BL, DXF 90  
data\_flags  
BS, DXF 170  
property\_override\_flags  
BL, DXF 91

```

merge_flags
    BL, DXF 92

bg_color    CMC, DXF 62

content_layout
    BL, DXF 93

content_format
    Dwg_ContentFormat

margin_override_flags
    BS, DXF 171

vert_margin
    BD, DXF 40

horiz_margin
    BD, DXF 40

bottom_margin
    BD, DXF 40

right_margin
    BD, DXF 40

margin_horiz_spacing
    BD, DXF 40

margin_vert_spacing
    BD, DXF 40

num_borders
    BL, DXF 94

borders    Dwg_GridFormat*

tablerow_parent
    struct _dwg_TableRow*

tabledatacolumn_parent
    struct _dwg_TableDataColumn*

```

**Dwg\_ColorRamp**

```

parent    struct _dwg_POINTCLOUDCOLORMAP_Ramp*

colorscheme
    T, DXF 1

unknown_bl
    BL, DXF 91

unknown_b
    B, DXF 290

```

**Dwg\_ContentFormat**

```

property_override_flags
    BL, DXF 90

```

```

property_flags
    BL, DXF 91

value_data_type
    BL, DXF 92

value_unit_type
    BL, DXF 93

value_format_string
    T, DXF 300

rotation    BD, DXF 40

block_scale
    BD, DXF 140

cell_alignment
    BL, DXF 94

content_color
    CMC, DXF 62

text_style
    H

text_height
    BD, DXF 144

```

**Dwg-DATALINK\_customdata**

```

parent    struct _dwg-object-DATALINK*

target    H

text      T, DXF 304

```

**Dwg-DATATABLE\_column**

```

parent    struct _dwg-object-DATATABLE*

type      BL, DXF 92

text      T, DXF 2

rows      Dwg-DATATABLE_row*

```

**Dwg-DATATABLE\_row**

```

parent    struct _dwg-DATATABLE_column*

value     Dwg-TABLE_value

```

**Dwg-DIMASSOC\_Ref**

```

parent    struct _dwg-object-DIMASSOC*

classname
    T, DXF 1

```

```

osnap_type      RC, DXF 72

osnap_dist      BD, DXF 40

osnap_pt        3BD, DXF 10

num_xrefs        BS

xrefs           H*, DXF 331

main_subent_type BS, DXF 73

main_gsmarker    BL, DXF 91

num_xrefpaths    BS

xrefpaths        TV*, DXF 301

has_lastpt_ref   B, DXF 75

lastpt_ref       3BD

num_intsectobj    BL, DXF 74

intsectobj       H*, DXF 332

```

**Dwg\_DIMENSION\_common**

```

parent          struct _dwg_object_entity*

class_version    RC, DXF 280

extrusion        BE, DXF 210

def_pt          3BD, DXF 10

text_midpt       2RD, DXF 11

elevation        BD, DXF 31

flag            RC, DXF 70

flag1           RC

```



```

user_text      TV, DXF 1

text_rotation  BD, DXF 53

horiz_dir      BD, DXF 51

ins_scale      3BD

ins_rotation   BD, DXF 54

attachment     BS, DXF 71

lspace_style   BS, DXF 72

lspace_factor  BD, DXF 41

act_measurement BD, DXF 42

unknown        B, DXF 73

flip_arrow1    B, DXF 74

flip_arrow2    B, DXF 75

clone_ins_pt   2RD, DXF 12

dimstyle       H, DXF 3

block          H

```

**Dwg\_EVAL\_Edge**

```

parent         struct _dwg_object_EVALUATION_GRAPH*

id              BL, DXF 92

nextid          BLd, DXF 93

e1              BLd, DXF 94

e2              BLd, DXF 91

e3              BLd, DXF 91

out_edge[5]     BLd

```

**Dwg\_EVAL\_Node**

```

parent    struct _dwg_object_EVALUATION_GRAPH*
id        BL, DXF 91
edge_flags
          BL, DXF 93
nextid    BLd, DXF 95
evalexpr  H, DXF 360
node[4]   BLd
active_cycles
          B

```

**Dwg\_EvalExpr**

```

parentid  BLd
major     BL
minor     BL
value_code
          BSd
value.num40
          BD
value.pt2d
          2RD
value.pt3d
          3BD
value.text1
          TV
value.long90
          BL
value.handle91
          H
value.short70
          BS
nodeid    BL

```

**Dwg\_EvalVariant**

```

code      BS
u.bd      BD
u.bl      BL
u.bs      BS

```

```

u.rc      RC
u.text    TV
u.handle  H

```

**Dwg\_FIELD\_ChildValue**

```

parent    struct _dwg_object_FIELD*
key       TV, DXF 6
value     Dwg_TABLE_value

```

**Dwg\_FileDepList\_Files**

```

filename  T32
filepath  T32
fingerprint
          T32
version   T32
feature_index
          RL
timestamp
          RL
filesize  RL
affects_graphics
          RS
refcount  RL

```

**Dwg\_FormattedTableData**

```

parent    struct _dwg_object_TABLECONTENT*
cellstyle
          Dwg_CellStyle
num_merged_cells
          BL, DXF 90
merged_cells
          Dwg_FormattedTableMerged*

```

**Dwg\_FormattedTableMerged**

```

parent    struct _dwg_FormattedTableData*
top_row   BL, DXF 91
left_col  BL, DXF 92
bottom_row
          BL, DXF 93

```

right\_col  
BL, DXF 94

#### **Dwg\_GEODATA\_meshface**

face1 BL  
face2 BL  
face3 BL

#### **Dwg\_GEODATA\_meshpt**

source\_pt 2RD  
dest\_pt 2RD

#### **Dwg\_GridFormat**

parent struct \_dwg\_CellStyle\*  
index\_mask  
BL, DXF 95  
border\_overrides  
BL, DXF 90  
border\_type  
BL, DXF 91  
color CMC, DXF 62  
linewt BLd, DXF 92  
ltype H, DXF 340  
visible B, DXF 93  
double\_line\_spacing  
BD, DXF 40

#### **Dwg\_HATCH\_Color**

parent struct \_dwg\_entity\_HATCH\*  
shift\_value  
BD, DXF 463  
color CMC, DXF 63

#### **Dwg\_HATCH\_ControlPoint**

parent struct \_dwg\_HATCH\_PathSeg\*  
point 2RD, DXF 10  
weight BD, DXF 40

#### **Dwg\_HATCH\_DefLine**

parent struct \_dwg\_entity\_HATCH\*

`angle`      BD, DXF 53  
`pt0`        2BD, DXF 43  
`offset`     2BD, DXF 45  
`num_dashes`  
             BS, DXF 79  
`dashes`     BD\*

**Dwg\_HATCH\_Path**

`parent`     struct `_dwg_entity_HATCH*`  
`flag`        BL, DXF 92  
`num_segs_or_paths`  
             BL, DXF 93  
`segs`        Dwg\_HATCH\_PathSeg\*  
`bulges_present`  
             B, DXF 72  
`closed`     B, DXF 73  
`polyline_paths`  
             Dwg\_HATCH\_PolylinePath\*  
`num_boundary_handles`  
             BL, DXF 97  
`boundary_handles`  
             H\*, DXF 330

**Dwg\_HATCH\_PathSeg**

`parent`     struct `_dwg_HATCH_Path*`  
`curve_type`  
             RC, DXF 72  
`first_endpoint`  
             2RD, DXF 10  
`second_endpoint`  
             2RD, DXF 11  
`center`     2RD, DXF 10  
`radius`     BD, DXF 40  
`start_angle`  
             BD, DXF 50  
`end_angle`  
             BD, DXF 51  
`is_ccw`     B, DXF 73

```

    endpoint    2RD, DXF 11
    minor_major_ratio
                BD, DXF 40
    degree      BL, DXF 94
    is_rational
                B, DXF 73
    is_periodic
                B, DXF 74
    num_knots
                BL, DXF 95
    num_control_points
                BL, DXF 96
    knots       BD*
    control_points
                Dwg_HATCH_ControlPoint*
    num_fitpts
                BL, DXF 97
    fitpts      2RD*
    start_tangent
                2RD
    end_tangent
                2RD

```

#### **Dwg\_HATCH\_PolylinePath**

```

    parent      struct _dwg_HATCH_Path*
    point       2RD, DXF 10
    bulge       BD, DXF 42

```

#### **Dwg\_LAYER\_entry**

```

    parent      struct _dwg_object_LAYER_INDEX*
    numlayers
                BL, DXF 90
    name        T, DXF 8
    handle      H, DXF 360

```

#### **Dwg\_LEADER\_ArrowHead**

```

    parent      struct _dwg_entity_MULTILEADER*
    is_default
                B, DXF 94

```

arrowhead  
H, DXF 345

### **Dwg\_LEADER\_BlockLabel**

parent struct \_dwg\_entity\_MULTILEADER\*  
attdef H, DXF 330  
label\_text  
TV, DXF 302  
ui\_index BS, DXF 177  
width BD, DXF 44

### **Dwg\_LEADER\_Break**

parent struct \_dwg\_LEADER\_Line\*  
start 3BD, DXF 11  
end 3BD, DXF 12

### **Dwg\_LEADER\_Line**

parent struct \_dwg\_LEADER\_Node\*  
num\_points  
BL  
points 3DPOINT\*  
num\_breaks  
BL  
breaks Dwg\_LEADER\_Break\*  
line\_index  
BL, DXF 91  
type BS, DXF 170  
color CMC, DXF 92  
ltype H, DXF 340  
linewt BLd, DXF 171  
arrow\_size  
BD, DXF 40  
arrow\_handle  
H, DXF 341  
flags BL, DXF 93

### **Dwg\_LEADER\_Node**

parent struct \_dwg\_entity\_MULTILEADER\*

`has_lastleaderlinepoint`  
B, DXF 290

`has_dogleg`  
B, DXF 291

`lastleaderlinepoint`  
3BD, DXF 10

`dogleg_vector`  
3BD, DXF 11

`branch_index`  
BL, DXF 90

`dogleg_length`  
BD, DXF 40

`num_lines`  
BL

`lines` Dwg\_LEADER\_Line\*

`num_breaks`  
BL

`breaks` Dwg\_LEADER\_Break\*

`attach_dir`  
BS, DXF 271

#### **Dwg\_LIGHTLIST\_light**

`parent` struct \_dwg\_object\_LIGHTLIST\*

`name` T, DXF 1

`handle` H, DXF 5

#### **Dwg\_LTYPE\_dash**

`parent` struct \_dwg\_object\_LTYPE\*

`length` BD, DXF 49

`complex_shapecode`  
BS, DXF 75

`style` H, DXF 340

`x_offset` RD, DXF 44

`y_offset` RD, DXF 45

`scale` BD, DXF 46

`rotation` BD, DXF 50

`shape_flag`  
BS, DXF 74



text T, DXF 9

### **Dwg\_LWPOLYLINE\_width**

start BD, DXF 40

end BD, DXF 41

### **Dwg\_LinkedData**

name T, DXF 1

description  
T, DXF 300

### **Dwg\_LinkedTableData**

num\_cols BL, DXF 90

cols Dwg\_TableDataColumn\*

num\_rows BL, DXF 90

rows Dwg\_TableRow\*

num\_field\_refs  
BL

field\_refs  
H\*

### **Dwg\_MATERIAL\_color**

parent struct \_dwg\_object\_object\*

flag RC

factor BD

rgb BL

### **Dwg\_MATERIAL\_gentexture**

parent struct \_dwg\_object\_MATERIAL\*

genprocname  
T

material struct \_dwg\_object\_MATERIAL\*

### **Dwg\_MATERIAL\_mapper**

parent struct \_dwg\_object\_object\*

blendfactor  
BD

transmatrix  
BD\*

filename T

color1 Dwg\_MATERIAL\_color

```

color2    Dwg_MATERIAL_color
source    RC
projection
          RC
tiling     RC
autotransform
          RC
texturemode
          BS

```

**Dwg\_MESH\_edge**

```

parent     struct _dwg_entity_MESH*
idxfrom    BL, DXF 90
idxto      BL, DXF 90

```

**Dwg\_MLEADER\_AnnotContext**

```

num_leaders
          BL
leaders     Dwg_LEADER_Node*
attach_dir
          BS
scale_factor
          BD, DXF 40
content_base
          3BD, DXF 10
text_height
          BD, DXF 41
arrow_size
          BD, DXF 140
landing_gap
          BD, DXF 145
text_left
          BS, DXF 174
text_right
          BS, DXF 175
text_angletype
          BS, DXF 176
text_alignment
          BS, DXF 177

```

has\_content\_txt  
    B, DXF 290

has\_content\_blk  
    B, DXF 296

content    Dwg\_MLEADER\_Content

base      3BD, DXF 110

base\_dir   3BD, DXF 111

base\_vert  
    3BD, DXF 112

is\_normal\_reversed  
    B, DXF 297

text\_top   BS, DXF 273

text\_bottom  
    BS, DXF 272

**Dwg\_MLEADER\_Content\_Block**

type      RC

normal     3BD

location   3BD

rotation   BD

block\_table  
    H

scale      3BD

color      CMC

transform  
    BD\*

**Dwg\_MLEADER\_Content\_MText**

type      RC

normal     3BD

location   3BD

rotation   BD

default\_text  
    T

style      H

direction  
    3BD

```

width      BD
height     BD
line_spacing_factor
           BD
line_spacing_style
           BS
color      CMC
alignment
           BS
flow       BS
bg_color   CMC
bg_scale   BD
bg_transparency
           BL
is_bg_fill
           B
is_bg_mask_fill
           B
col_type   BS
is_height_auto
           B
col_width
           BD
col_gutter
           BD
is_col_flow_reversed
           B
num_col_sizes
           BL
col_sizes
           BD*
word_break
           B
unknown    B

```

**Dwg\_MLINESTYLE\_line**

```

parent      struct _dwg_object_MLINESTYLE*
offset      BD, DXF 49

```

color CMC, DXF 62

lt\_index BSd, DXF 6

lt\_ltype H, DXF 6

### **Dwg\_MLINE\_line**

parent struct \_dwg\_MLINE\_vertex\*

num\_segparms  
BS, DXF 74

segparms BD\*

num\_areafillparms  
BS, DXF 75

areafillparms  
BD\*

### **Dwg\_MLINE\_vertex**

parent struct \_dwg\_entity\_MLINE\*

vertex 3BD, DXF 11

vertex\_direction  
3BD, DXF 12

miter\_direction  
3BD, DXF 13

num\_lines  
RC

lines Dwg\_MLINE\_line\*

### **Dwg\_OCD\_Dimension**

b293 B, DXF 293

def\_pt 2RD, DXF 10

is\_def\_textloc  
B, DXF 294

text\_rotation  
BD, DXF 140

block H, DXF 2

dimtofl B, DXF 298

dimosxd B, DXF 291

dimatfit B, DXF 70

dimtix B, DXF 292

dimtmove B, DXF 71

override\_code  
RC, DXF 280

has\_arrow2  
B, DXF 295

flip\_arrow2  
B, DXF 296

flip\_arrow1  
B, DXF 297

#### **Dwg\_PARTIAL\_VIEWING\_INDEX\_Entry**

parent struct \_dwg\_object\_PARTIAL\_VIEWING\_INDEX\*

extents\_min  
3BD

extents\_max  
3BD

object H

#### **Dwg\_POINTCLOUDCOLORMAP\_Ramp**

parent struct \_dwg\_object\_POINTCLOUDCOLORMAP\*

class\_version  
BS, DXF 70

num\_ramps  
BL, DXF 90

ramps Dwg\_ColorRamp\*

#### **Dwg\_POINTCLOUDEX\_Croppings**

parent struct \_dwg\_entity\_POINTCLOUDEX\*

type BS, DXF 280

is\_inside  
B, DXF 290

is\_inverted  
B, DXF 290

crop\_plane  
3BD, DXF 13

crop\_x\_dir  
3BD, DXF 213

crop\_y\_dir  
3BD, DXF 213

num\_pts BL, DXF 93

pts 3BD\*

**Dwg\_POINTCLOUD\_Clippings**

```
parent    struct _dwg_entity_POINTCLOUD*
is_inverted
          B
type      BS
num_vertices
          BL
vertices  2RD*
z_min     BD
z_max     BD
```

**Dwg\_POINTCLOUD\_IntensityStyle**

```
parent    struct _dwg_entity_POINTCLOUD*
min_intensity
          BD
max_intensity
          BD
intensity_low_treshold
          BD
intensity_high_treshold
          BD
```

**Dwg\_PROXY\_LWPOLYLINE**

```
parent    struct _dwg_entity_PROXY_ENTITY*
size      RL
flags     BS
const_width
          BD
elevation
          BD
thickness
          BD
extrusion
          BE
num_points
          BL
points    2RD*
num_bulges
          BL
```

```
bulges      BD*
num_widths
            BL
widths      Dwg_LWPOLYLINE_width*
unknown_1
            RC
unknown_2
            RC
unknown_3
            RC
```

**Dwg\_R2004\_Header**

```
file_ID_string[12]
            RC
header_address
            RLx
header_size
            RL
x04         RL
root_tree_node_gap
            RLd
lowermost_left_tree_node_gap
            RLd
lowermost_right_tree_node_gap
            RLd
unknown_long
            RL
last_section_id
            RL
last_section_address
            RLL
second_header_address
            RLL
numgaps     RL
numsections
            RL
x20         RL
x80         RL
```



```

x40      RL
section_map_id
          RL
section_map_address
          RLL
section_info_id
          RLd
section_array_size
          RL
gap_array_size
          RL
crc32     RLx
padding[12]
          RC
section_type
          RL
decomp_data_size
          RL
comp_data_size
          RL
compression_type
          RL
checksum  RLx

```

#### **Dwg\_SECTION\_geometrysettings**

```

parent    struct _dwg_SECTION_typesettings*
num_geoms
          BL, DXF 90
hexindex  BL, DXF 91
flags     BL, DXF 92
color     CMC, DXF 62
layer     T, DXF 8
ltype     T, DXF 6
ltype_scale
          BD, DXF 40
plotstyle
          T, DXF 1
linewt    BLd, DXF 370

```

`face_transparency`  
BS, DXF 70

`edge_transparency`  
BS, DXF 71

`hatch_type`  
BS, DXF 72

`hatch_pattern`  
T, DXF 2

`hatch_angle`  
BD, DXF 41

`hatch_spacing`  
BD, DXF 42

`hatch_scale`  
BD, DXF 43

#### **Dwg\_SECTION\_typesettings**

`parent` struct `_dwg_object_SECTION_SETTINGS*`

`type` BS, DXF 90

`generation`  
BS, DXF 91

`num_sources`  
BL, DXF 92

`sources` H\*, DXF 330

`destblock`  
H, DXF 331

`destfile` T, DXF 1

`num_geom` BL, DXF 93

`geom` Dwg\_SECTION\_geometrysettings\*

#### **Dwg\_SPLINE\_control\_point**

`parent` struct `_dwg_entity_SPLINE*`

`x` BD

`y` BD

`z` BD

`w` BD, DXF 41

#### **Dwg\_SUNSTUDY\_Dates**

`julian_day`  
BL, DXF 90

msecs        BL, DXF 90

### **Dwg\_SummaryInfo\_Property**

tag        TU

value       TU

### **Dwg\_TABLEGEOMETRY\_Cell**

parent       struct \_dwg\_object\_TABLEGEOMETRY\*

geom\_data\_flag  
             BL, DXF 93

width\_w\_gap  
             BD, DXF 40

height\_w\_gap  
             BD, DXF 41

tablegeometry  
             H, DXF 330

num\_geometry  
             BL, DXF 94

geometry     Dwg\_CellContentGeometry\*

### **Dwg\_TABLESTYLE\_CellStyle**

parent       struct \_dwg\_object\_TABLESTYLE\*

id        BL, DXF 90

type       BL, DXF 91

name       T, DXF 300

cellstyle.type  
             BL

cellstyle.data\_flags  
             BS

cellstyle.property\_override\_flags  
             BL

cellstyle.merge\_flags  
             BL

cellstyle.bg\_color  
             CMC

cellstyle.content\_layout  
             BL

cellstyle.content\_format  
             Dwg\_ContentFormat

```

cellstyle.margin_override_flags
    BS

cellstyle.vert_margin
    BD

cellstyle.horiz_margin
    BD

cellstyle.bottom_margin
    BD

cellstyle.right_margin
    BD

cellstyle.margin_horiz_spacing
    BD

cellstyle.margin_vert_spacing
    BD

cellstyle.num_borders
    BL

cellstyle.borders
    Dwg_GridFormat*

cellstyle.tablerow_parent
    struct _dwg_TableRow*

cellstyle.tabledatacolumn_parent
    struct _dwg_TableDataColumn*

cellstyle
    struct _dwg_CellStyle

```

#### **Dwg\_TABLESTYLE\_border**

```

linewt    BSd
visible   B
color     CMC

```

#### **Dwg\_TABLESTYLE\_rowstyles**

```

parent     struct _dwg_object_TABLESTYLE*
text_style
    H, DXF 7
text_height
    BD, DXF 140
text_alignment
    BS, DXF 170
text_color
    CMC, DXF 62

```

```

fill_color      CMC, DXF 63

has_bgcolor     B, DXF 283

num_borders     BL

borders        Dwg_TABLESTYLE_border*

data_type       BL, DXF 90

unit_type       BL, DXF 91

format_string    TU, DXF 1

```

**Dwg\_TABLE\_AttrDef**

```

parent      struct _dwg_TABLE_Cell*

attdef      H, DXF 331

index       BS, DXF 179

text        T, DXF 300

```

**Dwg\_TABLE\_BreakHeight**

```

parent      struct _dwg_entity_TABLE*

position     3BD

height       BD

flag         BL

```

**Dwg\_TABLE\_BreakRow**

```

parent      struct _dwg_entity_TABLE*

position     3BD

start        BL

end          BL

```

**Dwg\_TABLE\_Cell**

```

parent      struct _dwg_entity_TABLE*

type        BS, DXF 171

flags       RC, DXF 172

is_merged_value
            B, DXF 173

```

`is_autofit_flag`  
B, DXF 174

`merged_width_flag`  
BL, DXF 175

`merged_height_flag`  
BL, DXF 176

`rotation` BD, DXF 145

`text_value`  
T, DXF 1

`text_style`  
H, DXF 7

`block_handle`  
H, DXF 340

`block_scale`  
BD, DXF 144

`additional_data_flag`  
B

`cell_flag_override`  
BL, DXF 177

`virtual_edge_flag`  
RC, DXF 178

`cell_alignment`  
RS, DXF 170

`bg_fill_none`  
B, DXF 283

`bg_color` CMC, DXF 63

`content_color`  
CMC, DXF 64

`text_height`  
BD, DXF 140

`top_grid_color`  
CMC, DXF 69

`top_grid_linewt`  
BS, DXF 279

`top_visibility`  
BS, DXF 289

`right_grid_color`  
CMC, DXF 65

```

right_grid_linewt
    BS, DXF 275

right_visibility
    BS, DXF 285

bottom_grid_color
    CMC, DXF 66

bottom_grid_linewt
    BS, DXF 276

bottom_visibility
    BS, DXF 286

left_grid_color
    CMC, DXF 68

left_grid_linewt
    BS, DXF 278

left_visibility
    BS, DXF 288

unknown    BL

value      Dwg_TABLE_value

num_attr_defs
    BL

attr_defs
    Dwg_TABLE_AttrDef*

```

#### **Dwg\_TABLE\_CustomDataItem**

```

name      T, DXF 300

value     Dwg_TABLE_value

cell_parent
    struct _dwg_TableCell*

row_parent
    struct _dwg_TableRow*

```

#### **Dwg\_TABLE\_value**

```

flags     BL

format_flags
    BL

data_type
    BL, DXF 90

data_size
    BL, DXF 92

```

`data_long`  
BL, DXF 91

`data_double`  
BD, DXF 140

`data_string`  
T, DXF 1

`data_date`  
TF

`data_point`  
2RD, DXF 11

`data_3dpoint`  
3RD, DXF 11

`data_handle`  
H

`unit_type`  
BL, DXF 94

`format_string`  
T, DXF 300

`value_string`  
T, DXF 302

**Dwg\_TableCell**

`flag` BL, DXF 90

`tooltip` TV, DXF 300

`customdata`  
BL, DXF 91

`num_customdata_items`  
BL, DXF 90

`customdata_items`  
Dwg\_TABLE\_CustomDataItem\*

`has_linked_data`  
BL

`data_link`  
H

`num_rows` BL

`num_cols` BL

`unknown` BL

`num_cell_contents`  
BL



```

cell_contents
    Dwg_TableCellContent*

style_id    BL

has_geom_data
    BL

geom_data_flag
    BL

width_w_gap
    BD

height_w_gap
    BD

tablegeometry
    H

num_geometry
    BL

geometry    Dwg_CellContentGeometry*

style_parent
    struct _dwg_CellStyle*

row_parent
    struct _dwg_TableRow*

```

#### **Dwg\_TableCellContent**

```

parent      struct _dwg_TableCell*

type        BL, DXF 90

value       Dwg_TABLE_value

handle      H, DXF 340

num_attrs   BL, DXF 91

attrs       Dwg_TableCellContent_Attr*

has_content_format_overrides
    BS

content_format
    Dwg_ContentFormat

```

#### **Dwg\_TableCellContent\_Attr**

```

parent      struct _dwg_TableCellContent*

attdef      H, DXF 330

value       TV, DXF 301

```

index BL, DXF 92

### **Dwg\_TableDataColumn**

parent struct \_dwg\_LinkedTableData\*

name T, DXF 300

custom\_data  
BL, DXF 91

cellstyle  
Dwg\_CellStyle

cellstyle\_id  
BL

width BL

### **Dwg\_TableRow**

parent struct \_dwg\_LinkedTableData\*

num\_cells  
BL

cells Dwg\_TableCell\*

custom\_data  
BL

num\_customdata\_items  
BL

customdata\_items  
Dwg\_TABLE\_CustomDataItem\*

cellstyle  
Dwg\_CellStyle

style\_id BL

height BL

### **Dwg\_UCS\_orthopts**

parent struct \_dwg\_object\_UCS\*

type BS, DXF 71

pt 3BD, DXF 13

### **Dwg\_VALUEPARAM**

parent struct \_dwg\_object\_object\*

class\_version  
BL

name T

```

unit_type      BL
num_vars      BL
vars          Dwg_VALUEPARAM_vars*
controlled_objdep
              H

```

**Dwg\_VALUEPARAM\_vars**

```

value         Dwg_EvalVariant
handle        H

```

**Dwg\_MLEADER\_Content**

```

txt           Dwg_MLEADER_Content_MText
blk           Dwg_MLEADER_Content_Block

```

**Common Entity fields**

```

__iterator    BL
color         CMC, DXF 62
color_r11     RC, DXF 62
dwg           struct _dwg_struct*
edge_visualstyle
              H, DXF 348
eed           Dwg_Eed*
elevation_r11 RD
entmode       BB, DXF 67
extra_r11     RC
face_visualstyle
              H, DXF 348
flag_r11      RC
full_visualstyle
              H, DXF 348
has_ds_data   B
has_edge_visualstyle
              B

```

```
has_face_visualstyle
    B

has_full_visualstyle
    B

invisible
    BS, DXF 60

is_xdic_missing
    B

isbylayerlt
    B

kind_r11    RS

layer       H, DXF 8

layer_r11
    RS

linewt      RC, DXF 370

ltype       H, DXF 6

ltype_flags
    BB

ltype_r11
    RS

ltype_scale
    BD, DXF 48

material    H, DXF 347

material_flags
    BB

next_entity
    H

nolinks     B

num_eed     BL

num_reactors
    BL

objid       BL

opts_r11    RS

ownerhandle
    H, DXF 330

paper_r11
    RS, DXF 67
```

```

plotstyle
    H, DXF 390

plotstyle_flags
    BB

prev_entity
    H

preview    TF, DXF 310

preview_exists
    B

preview_is_proxy
    B

preview_size
    BLL, DXF 160

reactors   H*, DXF 330

shadow     H

shadow_flags
    RC, DXF 284

thickness_r11
    RD

xdicobjhandle
    H, DXF 360

```

#### **Common Object fields**

```

dwg        struct _dwg_struct*

eed        Dwg_Eed*

handleref
    Dwg_Handle*

has_ds_data
    B

is_xdic_missing
    B

num_eed     BL

num_reactors
    BL

objid       BL

ownerhandle
    H, DXF 330

reactors    H*, DXF 330

```

`xdicobjhandle`  
H, DXF 360

### **SummaryInfo fields**

see Section 5.7 [SummaryInfo], page 260,

TITLE TU16, DXF 1

SUBJECT TU16, DXF 1

AUTHOR TU16, DXF 1

KEYWORDS TU16, DXF 1

COMMENTS TU16, DXF 1

LASTSAVEDBY  
TU16, DXF 1

REVISIONNUMBER  
TU16, DXF 1

HYPERLINKBASE  
TU16, DXF 1

TDINDWG TIMERLL

TDCREATE TIMERLL

TDUPDATE TIMERLL

num\_props  
RS

props Dwg\_SummaryInfo\_Property\*

unknown1 RL

unknown2 RL

## 5 Sections

The r2000 format (used for r13-r2000) knows the following 6 sections:

HEADER CLASSES HANDLES 2NDHEADER MEASUREMENT AUXHEADER  
(only r2000)

The r2004 and r2007 format (used for r2004-r2018) knows the following sections:

R2004.Header UNKNOWN SUMMARYINFO PREVIEW VBAPROJECT APPINFO  
APPINFOHISTORY FILEDEPLIST ACDS REVHISTORY SECURITY OBJECTS  
OBJFREESPACE TEMPLATE HANDLES CLASSES AUXHEADER HEADER  
SIGNATURE INFO SYSTEM\_MAP

### 5.1 HEADER Section

See Chapter 4 [Objects], page 8.

### 5.2 OBJECTS Section

The OBJECTS Section is usually split up into multiple pages (separate sections of type AcDbObjects) and contains all entities and objects. It is indexed by Section 5.4 [HANDLES], page 260.

See Chapter 4 [Objects], page 8.

### 5.3 CLASSES Section

The **Classes** Section contains the basic info for all dynamically loaded types for entities and objects. It's types start with 500, and are variable. An entity which has no class loaded is displayed as proxy.

LibreDWG contains support for many classes, but not all. See `src/classes.inc` and `src/classes.c`. We define a stability for each class, one of stable, unstable, debugging and unhandled.

Objects in **stable** classes are treated as the fixed-type objects with full support. Changes are treated as API breaking.

Objects in **unstable** classes are sometimes written to DXF or JSON, but not to DWG. Changes are not treated as API breaking. Usually such objects are converted to UNKNOWN\_OBJ or UNKNOWN\_ENT objects, and when written to DWG converted to PLACEHOLDER, DUMMY or POINT objects with EED pointing to the original class and content. Only when rewriting from-to the very same version with the full known unknown\_bits blob (e.g. dwgrewrite or json) such classes can persist as such.

Objects in **debugging** classes are only handled with the developer `configure --enable-debug` flag, otherwise ignored. See unstable above.

Objects in **undhandled** classes are always ignored. There are no fields known, only it's type.

## 5.4 HANDLES Section

The Handles section contains a sorted list of all object handles and it's position in the Objects stream. All values are stored relatively, as offsets. Handles only increase and can contain holes when an object is deleted, offsets can jump back also.

## 5.5 R2004\_Header

The R2004\_Header section at fixed position 0x100 in the DWG contains some meta-data for r2004 sections to find the two important sections INFO and SYSTEM\_MAP.

## 5.6 UNKNOWN Section

The content of the UNKNOWN section with type 0 is unknown and does not always exist.

## 5.7 SummaryInfo

All Section SummaryInfo fields:

TITLE	TU16, DXF 1
SUBJECT	TU16, DXF 1
AUTHOR	TU16, DXF 1
KEYWORDS	TU16, DXF 1
COMMENTS	TU16, DXF 1
LASTSAVEDBY	
	TU16, DXF 1
REVISIONNUMBER	
	TU16, DXF 1
HYPERLINKBASE	
	TU16, DXF 1
TDINDWG	TIMERLL
TDCREATE	TIMERLL
TDUPDATE	TIMERLL
num_props	
	RS
props	Dwg_SummaryInfo_Property*
unknown1	RL
unknown2	RL

See [Dwg\_SummaryInfo\_Property], page 247,

## 5.8 Preview

The optional Preview section contains the thumbnail stream of BMP or WMF data of the drawing. Note that blocks or proxy objects can also contain it's own preview fields. The program **dwgbmp** can extract the bitmap from this section.



## **5.9 VBAProject**

## **5.10 AppInfo**

Which product and version exactly created that DWG.

## **5.11 AppInfoHistory**

## **5.12 FileDepList**

Features and File Dependencies. Image files, fonts, xrefs, plotconfigs.

## **5.13 AcDS**

The AcDsPrototype\_1b DataStorage, used mostly for binary ACIS blobs, embedded fonts, ...

## **5.14 RevHistory**

Revision History

## **5.15 Security**

Password Info

## **5.16 ObjFreeSpace**

Some Objects meta-data

## **5.17 Template**

Contains one Measurement Header variable.

## **5.18 AuxHeader**

In case the original Header gets lost.

## **5.19 Signature**

## **5.20 INFO**

The info of all used sections.

## **5.21 SYSTEM\_MAP**

The map of all used sections and its chunked pages.

## 6 Structures

### 6.1 EED

“Extended Entity Data” (EED) may be optionally attached to each object. They consist of a handle to the registered APPID, and a list of typed data. Each block is preceded with a size, the processing stops with size 0.

Internally libredwg stores each eed line as an array of num\_eed structs. If the size > 0, then new block starts with a handle, an optional raw string (when reading from a DWG), and a number of typed data entries. Only the first eed struct of each block has a size, all subsequent eed structs have size 0.

Example:

```
EED[0] size: 109 [BS]
EED[0] handle: 5.2.762
EED[0] code: 70 [RC] short: 2 [RS]
EED[1] code: 70 [RC] short: 0 [RS]
EED[2] code: 70 [RC] short: 0 [RS]
EED[3] code: 11 [RC] 3dpoint: (0.000000, 0.000000, 0.000000) [3RD]
EED[4] code: 11 [RC] 3dpoint: (1.000000, 0.000000, 0.000000) [3RD]
EED[5] code: 11 [RC] 3dpoint: (0.000000, 1.000000, 0.000000) [3RD]
EED[6] code: 11 [RC] 3dpoint: (0.000000, 0.000000, 1.000000) [3RD]
EED[7] size: 6 [BS]
EED[7] handle: 5.2.763
EED[7] code: 70 [RC] short: 0 [RS]
EED[8] code: 70 [RC] short: 0 [RS]
EED[9] size: 23 [BS]
EED[9] handle: 5.1.12
EED[9] code: 0 [RC] string: "RTMaterial" len=10 cp=30
EED[10] code: 5 [RC] entity: 0x6507000000000000 [RLL]
- size: 0 [BS]
```

These 10 num\_eed structs consist of 3 blocks with 3 size and handle entries. EED[0] starts with size 109, the handle pointing to object 762, 3 shorts and 4 points. The next block at EED[7] has size 6, the handle pointing to object 763 and 2 shorts. The last block at EED[9] has size 9, the handle pointing to object 12 (the APPID.ACAD application) and a string and an entity reference. The size is calculated by the needed room for all data code + values, without the handle. E.g. EED[7] size: 6 is 1 + 2 for EED[7] RC + RS, and 1 + 2 for EED[8] RC + RS.

Each data block consists of a RC code, and a variable value. A string may be a an old pre-r2007 ASCII string with a RC length (max 255 chars), a codepage and the string. Or a r2007+ wide string with a RS length (max 32767 chars) and a UCS-2 wide string.

decode stores both, the raw data, and the structured data. in\_dxf just the data. encode prefers raw over the data.

## 6.2 XDATA

XRECORD XDATA are very similar to the EED array, but internally it is a single linked-list, consisting of something like the EED data code + value pairs. There's only one size, `xdata_size`, and only one handle to the APPID, which handles this XRECORD XDATA.

## 7 Functions

You can use LibreDWG immediately upon loading, without any particular initialization. Only when using some see Section 7.4 [dynapi], page 267, functions you might need to initialize the version via `dwg_api_init_version(&dwg)`, when you need other formats than r2000 and you call an API function which does not store the version internally. Most do. This limitation will soon be fixed.

You usually use one set of functions - either decoding or encoding - at a time. All functions use the common data types (see Chapter 3 [Types], page 6). All functions return an error code, and the high-level functions for multiple objects add the error bitmask, which is sorted by severity. When the error exceeds `DWG_ERR_CRITICAL`, processing is stopped.

The new see Section 7.4 [dynapi], page 267, has dynamic get and set functions for all objects and its fields. You can get and set a property value from any object pointer by the object name and the field name.

### 7.1 Decoding

The highest level function for decoding a file is `dwg_read_file`.

`int dwg_read_file (char *filename, Dwg_Data *dwg)` [Function]  
Open *filename* and decode it, saving information into *dwg*. Return 0 if successful.

You can then iterate over the entities in model space or paper space via two ways:

1. by using the `dwg.h` data structures. Via `dwg->object[0]`, which is of type `Dwg_Object_BLOCK_CONTROL`, and a custom void `process_BLOCK_HEADER(Dwg_Object_Ref* ref)`:

```
Dwg_Object_BLOCK_CONTROL* block_control = dwg->block_control;
// first all entities in the model space
process_BLOCK_HEADER(dwg->header_vars.BLOCK_RECORD_MSPACE);
// then all entities in the blocks
for (i=0; i < block_control->num_entries; i++)
{
    process_BLOCK_HEADER(block_control->block_headers[i]);
}
// and last all entities in the paper space
process_BLOCK_HEADER(dwg->header_vars.BLOCK_RECORD_PSPACE);
```

or 2. by using the API functions from `dwg_api.h`:

```
Dwg_Object_BLOCK_CONTROL* block_control = dwg_block_control(dwg);
process_BLOCK_HEADER(dwg_model_space_ref(dwg));
for (i=0; i < block_control->num_entries; i++)
{
    process_BLOCK_HEADER(block_control->block_headers[i]);
}
process_BLOCK_HEADER(dwg_paper_space_ref(dwg));
```

and inside the `process_BLOCK_HEADER` function, you iterate over the entities from the `block_header` via:

```
Dwg_Object* obj = get_first_owned_entity(ref->obj);
while (obj)
{
    process_object(obj);
    obj = get_next_owned_entity(ref->obj, obj);
}
```

where `process_object` checks the type of each entity under the *Dwg\_Object\* obj*.

For each entity or object type (i.e. a non-graphical dwg object, also tables) there also exist the simple and expensive `dwg_getall_ENTITY` and `dwg_getall_OBJECT` functions:

```
int dwg_getall_ENTITY (Dwg_Object_Ref *block_header_ref) [Function]
    Return a malloc'ed NULL-terminated array of all such entities for Model Space, Paper Space or an individual block.
```

```
int dwg_getall_OBJECT (Dwg_Data *dwg) [Function]
    Return a malloc'ed NULL-terminated array of all such DWG objects.
```

The decoder is driven by the fields definition in the `src/dwg.spec`, which adds each field to the object. This is done in the `src/decode.c` or `src/decode_r2007.c`.

```
int dwg_decode_OBJECT (Bit_Chain *dat, Dwg_Object *obj) [Function]
    Sets the fields for the object from the DWG bitstream.
```

## 7.2 Encoding

Encoding DWG files, i.e. DWG write support, can be disabled via `./configure --disable-write`. The default format and only useful one is currently `r13-r2000`. Experimentally work is ongoing for the `r2004` format, which is also used for `r2010`, `r2013`, and `r2018`. Only the pre-`r13` and `r2007` versions are not covered yet.

See `src/in_dxf.c` for a high-level usage example. The default codepage is Latin-1, 30.

The highest level function for encoding a bitstream to a file is `dwg_write_file`, which dumps the dwg to a file.

```
int dwg_write_file (char *filename, Dwg_Data *dwg) [Function]
    Open filename and write the dwg to it. Return 0 if successful.
```

See Section 7.3 [add api], page 266, for:

```
Dwg_Data* dwg_add_Document (const Dwg_Version_Type version, [Function]
    const int imperial, const int loglevel) Creates an initial template dwg structure in
    memory, suitable to be written to a DWG or DXF file, without any additional table
    records or entities. Creates ModelSpace, PaperSpace and most Tables and basic
    Dictionaries.
```

and how to add entities and objects from scratch.

Low level-functions:

```
int dwg_add_object (Dwg_Data *dwg) [Function]
    Adds a new uninitialized object to the dwg->object[] array. Return 0 or -1 if successful,
    otherwise DWG_ERR_OUTOFMEM. -1 is the array was re-allocated.
```

Then for each object or entity type there is a

```
int dwg_setup_OBJECT (Dwg_Object *obj) [Function]
    Initializes an object for the given OBJECT or ENTITY type, with all fields being
    zero'ed. This does not initialize the obj size, type, address, handlestream_size, bitsize
    fields.
```

The encoder is driven by the fields definition in the `src/dwg.spec` and the generated `src/dynapi.c`, which adds each field to the object. This is done by `src/encode.c` or any `src/in_*.c` import module.

```
int dwg_encode_OBJECT (Bit_Chain *dat, Dwg_Object *obj) [Function]
    Encodes the DWG bitstream from the fields of the object.
```

The iterator is similar to above, but you want to encode all data structures, not just the entities. But note that you need many helper functions, such as the Section 7.4 [dynapi], page 267, to create all needed sections to store a DWG if you didn't read a DWG into the right a *Dwg\_Data\* dwg* struct already. This is especially important when importing from DXF or from an earlier or later DWG version.

## 7.3 add api

The add api functions are useful for CAD programs which want to write DWG. All the other API's are mostly to convert from and to DWG, so the main structures and links already do exist. With the add api you can easily create an empty DWG from scratch, add table entries (into fixed Tables or variables Dictionaries), and add entities. To set more entity fields use the Section 7.4 [dynapi], page 267.

For each almost each entity and table exists a function at to add it, with arguments to initialize some fields as in the VBA object model. The other objects are either created automatically, or handled seperately.

All BITCODE\_T strings are encoded as UTF-8, as with the dynapi. See Section 7.5 [strings], page 269. Most names are copied, since most names are considered to be constant. If not, you need to free them by yourself. Exceptions are `dxfname` (there exists a seperate `dxfname_u` variant), the `VX` name, which does not exists anymore since `r2000`.

A very simple example using the add API is the example program See [dwgadd], page 274.

```
Dwg_Data dwg_add_Document (const Dwg_Version_Type version, [Function]
    const int imperial, const int loglevel))
```

Creates an initial template dwg structure in memory, suitable to be written to a DWG or DXF file, without any additional table records or entities. Creates ModelSpace, PaperSpace and most Tables and basic Dictionaries.

When writing DWG, a *version* of `R_2000` is recommended, only `R_13` - `R_2000` are supported yet. For DXF you can try all versions `>= R_13`.

For each OBJECT and ENTITY type there exists a specific `dwg_add_<OBJECT>` function, which takes the owner and some default arguments. Entities are normally added to a block header, like modelspace, paperspace or any block. Objects are normally added to the dwg, or to some other object or entity. E.g.

```
Dwg_Entity_LINE *line = dwg_add_LINE [Function]
    (Dwg_Object_BLOCK_HEADER *modelspace,
     dwg_point_3d *start_pt, dwg_point_3d *end_pt)
```

```
Dwg_Entity_TEXT* dwg_add_TEXT (Dwg_Object_BLOCK_HEADER [Function]
    *restrict blkhdr, const char* restrict text_value, const dwg_point_3d
    *restrict ins_pt, const double height)
```

Adds a TEXT entity to the ModelSpace, PaperSpace or a Block. Entity specific arguments are here the text, the point (as pointer to the struct of 3 doubles), and the text height.

```
Dwg_Object_LAYER *layer = dwg_add_LAYER (Dwg_Data *dwg, [Function]
    const char *name)
```

Adds a new layer the Layer Table, i.e. creates the new LAYER object, and adds it to LAYER\_CONTROL object, the list of layers.

Names and strings are encoded as UTF-8 and will be translated to type BITCODE\_T (i.e. versions specific TU or TV types, either UCS-2 unicode or single-byte codepage) internally, as with the **dynapi**. Only internally you will have to deal with 2 different DWG text representations: UCS-2 since r2007, single-byte before. see Section 7.5 [strings], page 269.

To understand the object model for the add API see some VBA Object model documentation, such as e.g. <http://entercad.ru/acadauto.en/>.

The new add API mostly handles the direct `Dwg_Entity_ENTITY` structs, not all the generic `Dwg_Object` structs. Thus you can access the object specific fields directly, the common fields, not so easily.

The DWG Document consists of 3 basic entity containers `ModelSpace`, `PaperSpace` and `Blocks`, plus `Tables` (`Layers`, `Linetypes`, ...), `Dictionaries` as generic replacements of `Tables` with a root Dictionary, the `NOD` ("Named Object Dictionary"), and more support objects and complex entity groups.

Helper functions:

```
dwg_add_u8_input (Dwg_Data *restrict dwg, const char *restrict [Function]
    u8str)
```

Convert UTF-8 strings to BITCODE\_T fields. Returns a copy of the string. All external API's only deal with UTF-8 strings.

## 7.4 dynapi

The new dynapi replaced the old `dwg_api` functions to access each object field. The old `dwg_api` functions were deprecated, and need to be re-enabled by defining `CFLAGS="-DUSE_DEPRECATED_API"`. See see Chapter 4 [Objects], page 8, for an description of each object and its fields..

For each of header, entity, common or subclass there is a function to get and set the value of any type, or converted utf8 string.

`bool dwg_dynapi_entity_value (void *entity, const char [Function]  
                               *dxfname, const char *fieldname, void *out, Dwg_DYNAPI_field *fp)`  
*entity* is of type `dwg_ent_generic`, that is the pointer to the object specific struct.  
*dxfname* is the *dxfname* of the object, *fieldname* is the field or property name of the  
 field to be read from, *\*out* the result pointer and the optional *\*fp* is filled by the  
 information for this field.

`bool dwg_dynapi_common_value (void *entity, const char [Function]  
                               *fieldname, void *out, Dwg_DYNAPI_field *fp)`  
 This accesses the common `Dwg_Object_Object*` or `Dwg_Object_Entity*` fields.

`bool dwg_dynapi_header_value (void *dwg, const char *fieldname, [Function]  
                               void *out, Dwg_DYNAPI_field *fp)`  
 This accesses the Header (or sometimes also called Database) fields.

`bool dwg_dynapi_subclass_value (void *ptr, const char [Function]  
                               *subclass, const char *fieldname, void *out, Dwg_DYNAPI_field *fp)`  
 This accesses a subclass, a structure within the object.

The `utf8text` functions convert version-specific text strings to UTF-8 strings. Internally the `dwg` stores strings as TU (unicode) or TV (single-byte codepage). The API treats all strings as UTF-8, as with JSON, DXF or the add API.

`bool dwg_dynapi_entity_utf8text (void *entity, const char [Function]  
                               *dxfname, const char *fieldname, char *textp, int *isnewp,  
                               Dwg_DYNAPI_field *fp)`  
*isnewp* is set to 1 if the string is a fresh copy, for unicode strings.

`bool dwg_dynapi_common_utf8text (void *entity, const char [Function]  
                               *fieldname, char *textp, int *isnewp, Dwg_DYNAPI_field *fp)`

`bool dwg_dynapi_header_utf8text (void *dwg, const char [Function]  
                               *fieldname, char *textp, int *isnewp, Dwg_DYNAPI_field *fp)`  
 This accesses the Header (or sometimes also called Database) fields.

`bool dwg_dynapi_subclass_utf8text (void *ptr, const char [Function]  
                               *subclass, const char *fieldname, char *textp, int *isnewp,  
                               Dwg_DYNAPI_field *fp)`  
 This accesses a subclass, a structure within the object.

The setters don't differentiate between common values and strings.

`bool dwg_dynapi_entity_set_value (dwg_ent_generic *_obj, const [Function]  
                               char *fieldname, const void *value, const bool is_utf8)`  
 Sets the `ENTITY.fieldname` to a value. A malloc'ed struct is passed by *ptr*, not by  
 the content. A non-malloc'ed struct is set by content. Arrays or strings must be  
 malloced before. We just set the new pointer, the old value will be freed. If *is\_utf8*  
 is set, the given value is a UTF-8 string, and will be converted to TV or TU



```
bool dwg_dynapi_header_set_value (Dwg_Data *dwg, const char      [Function]
                                *fieldname, const void *value, const bool is_utf8)
```

```
bool dwg_dynapi_common_set_value (dwg_ent_generic *_obj, const  [Function]
                                char *fieldname, const void *value, const bool is_utf8)
```

See the sourcecode of the importers or programs for the usage of the API's.

## 7.5 strings

Internally the DWG consists of multiple different string formats, see Chapter 3 [Types], page 6. The most important are BITCODE\_TV (i.e. `char*`) encoded according to `dwg->header.codepage`, and BITCODE\_TU (i.e. `wchar_t` on Windows, UCS-2).

Externally most functions get and set strings as UTF-8, as in DXF or JSON.

Before r2007 DWG's the TV and T strings are encoded in its codepage, they are not yet converted from and to their proper codepage to UTF-8, but will eventually. Not via `libiconv`, just via the locale specific `libc btowc()`. To encode unicode characters special `\U+XXXX` sequences are used, and with japanese shift-jis for Katagana and Hiregana `\M+1XXXX` sequences.

On DWG's r2007 and later most strings (T and TU) are encoded in the Microsoft specific two-byte UCS-2 Unicode encoding, without proper support for surrogate pairs and the upper planes (i.e. emojis).

Fixed TF strings are not encoded and have a length stored also. Normal strings are all zero-delimited. EED and XDATA strings do have a length though, but have length limitations.

Strings in DXF and JSON also have quoting rules for special characters, like `\r`, `\n`, `\"` and so on.

### Transformations:

DWG to DWG: decode reads the T and TU strings in its natural format into the field. encode translate it to TV or TU. encode needs `header.from_version` and how it was read, from DWG or from an importer (`in_dxf` or `in_json`) or the Section 7.3 [add api], page 266, (`DWG_OPTS_IN`).

DXF/JSON to DWG: `in_dxf/json` keeps the T and TU strings as TV. encode to <r2007 keeps it as TV, r2007+ translates it to TU. it sets `DWG_OPTS_IN`.

DWG to DXF/JSON: decode keeps the T and TU strings as TV or TU. `out_dxf/json` translate them to TV or UTF-8 and quote them via `\U+XXXX`

add api to DWG/DXF: add reads strings as UTF-8, and encodes it from UTF-8 to TV or TU. (TU not yet, as we don't encode R2004+ yet). add sets `DWG_OPTS_IN`.

## 7.6 Other Formats

### 7.6.1 DXF

We can write ASCII DXF files in various versions, with much more data than other free DWG libraries, but not as stable as the unfree Teigha library yet. AutoCAD fails to import some of our files still (~10% failure rate).

Options: `--minimal` (see `dwg2dxf` or `dwgread`) creates only a short header with a `ACAD-VER` and `HANDSEED` element, and the entities, without any subclass markers, reactors or handles.

Reading DXF is under construction and works for most entities.

### 7.6.2 DXFB

We can almost write Binary DXF files in various versions.

Reading DXFB is under construction and un-tested.

### 7.6.3 JSON

We write to and read back from our own JSON format, which is a readable 1:1 mapping of the DWG structures, and carries much more information than the DXF format. The idea is to dump a DWG to JSON and filter/query or postprocess it with more powerful JSON query tools such as `jq` (<https://stedolan.github.io/jq/>), and optionally import it back in. See Chapter 9 [Programs: `dwgfilter`], page 272. JSON is much better structured than DXF.

The current first level objects are all the section names, like “HEADER”, “CLASSES”, “OBJECTS”. For more see the specs.

### 7.6.4 GeoJSON

`dwgread` supports writing to the GeoJSON format as specified at <http://geojson.org/geojson-spec.html>. See `dwgread` with the `--fmt GeoJSON` option.

We write in the RFC7946 format, the new GeoJSON format since 2016, which means smaller, less precision, and normalized polygons with proper right-hand rule orientation.

We write all coordinates as `[x, y]`, not `[y, x]`. z-coordinates are optional, and only written if not 0.0. Colors are either written as palette index as integer if not 256 (ByLayer), or as TrueColor RGB hex string values for all r2004+ DWG’s.

Missing entities: No 3D entities, HATCH by definition. ELLIPSE, ARC, CIRCLE would need segmentation into lines. MLINE, SPLINE, MINsert, SOLID, TRACE, RAY(?), XLINE(?)

Due to implementation quirks with ending commas in JSON, we mostly add an empty dummy feature at the very end, with null properties and null geometry.

## 8 Errors

LibreDWG is mostly a library, and as such collects error codes from the highest level function down to the lowest level functions. The error codes are sorted by severity, and only if the error exceeds *DWG\_ERR\_CRITICAL*, i.e. *DWG\_ERR\_CLASSESNOTFOUND*, processing is stopped.

All error bitmasks are collected during read or write and returned at the end.

```
DWG_ERR_WRONGCRC
    1

DWG_ERR_NOTYETSUPPORTED
    2

DWG_ERR_UNHANDLEDCLASS
    4

DWG_ERR_INVALIDTYPE
    8

DWG_ERR_INVALIDHANDLE
   16

DWG_ERR_INVALIDEED
   32

DWG_ERR_VALUEOUTOFBOUNDS
   64

DWG_ERR_CLASSESNOTFOUND
  128 = DWG_ERR_CRITICAL

DWG_ERR_SECTIONNOTFOUND
  256

DWG_ERR_PAGENOTFOUND
  512

DWG_ERR_INTERNALERROR
 1024

DWG_ERR_INVALIDDWG
 2048

DWG_ERR_IOERROR
 4096

DWG_ERR_OUTOFMEM
 8192
```

Additionally, verbose warning and error messages are printed to stderr.

Unhandled class and Invalid type errors of objects are not severe. A DWG format can store a serialization of many third party classes and objects, and thus we will never be able read all possible types. Unknown types are just stored as binary blob without any DXF codes.

## 9 Programs

LibreDWG installs some binary programs to read or write DWG files.

### dwgread

This reads a DWG file, and optionally converts its content to some output formats: JSON, GeoJSON, DXF, DXFB (i.e. Binary DXF), SVG.

`dwgread [OPTION]... DWGFILE`

Options:

`-v[0-9]`, `-verbose [0-9]` verbosity

`-O fmt`, `-format fmt` `fmt`: JSON, DXF, DXFB, GeoJSON.

More planned formats: YAML, XML/OGR, GPX, SVG, PS.

`-o outfile`, `-file outfile` also defines the output `fmt`. Default: `stdout`

`-a rNNNN`, `-as rNNNN` writes the output format as another version. Valid versions are `r13`, `r14`, `r2000`, `r2004`, `r2007`, `r2010`, `r2013`, `r2018`.

`-help` display this help and exit

`-version` output version information and exit

### dwgwrite

Create a DWG from a given input file (see Section 7.6.1 [DXF], page 269, see Section 7.6.2 [DXFB], page 270, see Section 7.6.3 [JSON], page 270), optionally via `--as=rNNNN` as another version. For now can only create `r13`-`r2018`, but not `r2007` DWG files.

### dxfwrite

Create a DXF from a given input file (DWG, see Section 7.6.1 [DXF], page 269, see Section 7.6.2 [DXFB], page 270, see Section 7.6.3 [JSON], page 270), optionally via `--as=rNNNN` as another version. Highly experimental. Supports the same options as `dwg2dxf`.

### dwg2dxf

Converts DWG files to DXF, optionally via `--as=rNNNN` as another version, an earlier or later version, or via `-m` or `--minimal` as a minimal DXF version, skipping most headers vars, classes, tables and objects.

`--binary` as a binary DXF file, with full precision, under construction.

The DXF files are created in the current directory and not overwritten, unless the option `--overwrite` or `-y` is given.

### dx2dwg

Converts DXF (or Binary DXF) files to DWG, optionally via `--as=rVER` as another version, an earlier or later version.

The DWG files are created in the current directory and not overwritten, unless the option `--overwrite` or `-y` is given.

This program is experimental and AutoCAD may fail to import it. For now can only create `r13`-`r2018`, but not `r2007` DWG files. Currently the default is writing as `r2000`.

**dwgrewrite**

Read and write the DWG, optionally via `--as=rNNNN` as another version, an earlier or later version. The default is writing as r2000. Pre-r13 and r2007 DWG files cannot be written yet.

**dwglayers**

Prints all layers in a DWG. With `-x` or `--extnames` prints the extended displayed layer name with spaces, not the internally stored old-style name with `_` instead. Only relevant with old r13 and r14 DWGs, after that layers are always stored in the extended format. With `-f` or `--flags` also the status of frozen, on/off and locked. With `--on` only the visible layers, which are on and not frozen.

You can get the same effect via this json filter:

```
dwgfilter '.OBJECTS[]' example.dwg | \
  grep -A22 '"object": "LAYER"' | grep name
```

**dwggrep**

Search regex pattern in all text values in a list of DWGs. `dwggrep` uses PCRE. With `-i` searches case-insensitive. With `-c` prints only the count of found texts. With `-h` or `--no-filename` does not print the filename. With `--type NAME` search only NAME entities or objects. With `--dxf NUM` search only in DXF group NUM fields. With `--text` searches only TEXT-like entities: TEXT, MTEXT, ATTRIB, ATTDEF.

**dwgfilter**

Search and modify a single DWG file via `jq`, using the powerful JQ query expression language on a temporary json file. See `man jq`.

With `-i` replaces the DWG in-place. This only makes sense with an JQ expression which changes values.

**dwg2SVG**

Convert a DWG to a limited SVG. All paperspace or modelspace entities of type: TEXT, LINE, CIRCLE, ARC, POLYLINE\_2D, LWPOLYLINE, INSERT, ELLIPSE (unrotated), SOLID, 3DFACE, RAY, XLINE.

With `-m` or `--mspace` all paper-space entities are ignored, and only model-space is printed. The default is to print all paper-space entities. But if there are none, print all model-space entities instead.

Limitations: Many other graphical entities and some properties are still missing.

**dwg2ps**

Convert a DWG to a very limited Postscript file. All paperspace and modelspace entities of type LINE, POLYLINE\_2D, LWPOLYLINE, ARC and CIRCLE.

This requires installation of `pslib` <http://pslib.sourceforge.net/doc/pslib.html>.

Note that the graphical representation for PS and SVG output is severely lacking, block references (insert entities) are not yet exploded, UCS and paper space transformations per entity are not yet done.

Planned is **dwgplot**, via GNU Plotutils <https://www.gnu.org/software/plotutils/>, to replace **dwg2SVG** and **dwg2ps**. This supports much more bitmap and vector formats.

There are also some more examples in the source distribution:

- load\_dwg** loads a DWG and adds some entities.
- dwg2svg2** converts a DWG to SVG similar to **dwg2SVG**, but via the **dwg\_api.h** only. The graphical representation for PS and SVG output is severely lacking, block references (insert entities) are not yet exploded, UCS and paper space transformations per entity are not yet done.
- unknown** lists the not yet reverse-engineered blobs from our examples files, and is the framework to guess the field layout for these. It is optionally using **picat** (<http://picat-lang.org/>) to solve some of the field-packing problems.
- dwgfuzz** afl++ fuzzing frontend, to test and debug various fast shared-memory options for afl-clang-fast, with the following runtime options: **-indxf**, **-injson**, **-rw**, **-dwg**, **-dxf**, **-dxfb**, **-json**, **-geojson**. All other output formats, like BMP, SVG, PS need to be fuzzed via their programs, which is the recommended way. The now default and fastest method INMEM does not need the 2nd file argument @@, the 2nd method STDIN neither.  
  
See also <https://github.com/LibreDWG/libredwg-fuzz> for our fuzzing setup to test new fuzzing campaigns automatically and find regressions.
- dwgadd** is the easiest way to create DWG's (or DXF, JSON) from scratch or add entities to an existing DWG. It accepts a very simple file with commands to create entities or objects. See **man 1 dwgadd** and **man 5 dwgadd**.

## 10 Bindings

LibreDWG generates library bindings to python and perl5 via swig. These can be quite huge, and it is recommended to use `ccache`. You can easily add bindings to other swig-supported languages, like Go, C#, ruby, php, D, lua, tcl, common lisp, ocaml, or others by yourself. Patches accepted.

Bindings for gambas (which looks very close to VBA) are at GitHub (<https://github.com/LibreDWG/gambas3-bindings>) and will soon be added to gambas3 as gb.dwg component. This is in development and about 80% finished.

## 11 Reference API

See the separate refman (<https://www.gnu.org/software/libredwg/refman/>) manual (in pdf or html format, the pdf has ~1800 pages) for a detailed API description, or see the relevant `dwg.h`, `dwg_api.h` or the `*.spec` files.

For reference you might also want to check the public AutoCAD DXF reference manuals, the VBA object model and the ODA `OpenDesign_Specification_for_dwg_files.pdf`.



## 12 Reporting bugs

To report bugs or suggest enhancements for GNU LibreDWG, please “submit a bug” at Savannah (<http://savannah.gnu.org/projects/libredwg>) or send electronic mail to [libredwg@gnu.org](mailto:libredwg@gnu.org). (If you use the web interface, you don’t need to also send email, since that is done automatically.) Pull requests at the github mirror (<https://github.com/LibreDWG/libredwg>) are also accepted for now.

For bug reports, please include enough information for the maintainers to reproduce the problem. Generally speaking, that means:

- The version numbers of LibreDWG and any other program(s) or manual(s) involved.
- Hardware and operating system names and versions.
- The contents of any input files necessary to reproduce the bug.
- The expected behavior and/or output.
- A description of the problem and samples of any erroneous output.
- Options you gave to **configure** other than specifying installation directories.
- Anything else that you think would be helpful. Usually that’s the failing part of the object processed with **dwgread -v5**, but only the failing part, not the whole output.

When in doubt whether something is needed or not, include it. It’s better to include too much than to leave out something important.

Patches are welcome; if possible, please make them with ‘**git format-patch**’ and include **ChangeLog** entries (see Section “Change Log” in *The GNU Emacs Manual*). Please follow the existing GNU coding conventions. See **CONTRIBUTING** in the source distribution.

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