

# **FlexOS™ 286 Version 1.3**

## **Release Note 01**

**December 1986**

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**SOFTWARE**

FlexOS 286 Version 1.3 software is shipped on twelve 5<sup>1/4</sup> inch quad density (1.12 Mb) disks organized into four distinct product assemblies: Developer Kit, Developer Kit Supplement, OEM Redistribution Kit, and OEM Source. The following list shows the contents of the disks in each assembly.

**Developer Kit Disk 1 - System Disk****Files:**

BLOAD286	IMG	FLEX286	SYS	COMMAND	286	CONFIG	BAT	BIN
DRIVERS		AUTOEXEC	BAT					

**Subdirectories: BIN  
DRIVERS**

**Subdirectory BIN****Files:**

.		..		TIME	286	COMP	286	BACKUP	286
COPY	286	CHKDSK	286	DATE	286	DIR	286	DISKCOMP	286
DISKSET	286	FIND	286	FSET	286	CONFIG	286	LOGON	286
PASSWORD	286	PRINT	286	SPOOL	286	DESPOOL	286	PROCESS	286
RECDIR	286	RENAME	286	DISKCOPY	286	RESTORE	286	SORT	286
TREE	286	MORE	286	TYPE	286	VER	286	VOL	286
DREDIX	286	FDISK	286	RECFILE	286	SYS	286	FORMAT	286
WMEX	286	STUDENT	BAT	TEXT		LSN	EDX	HELP	EDX
USER	TAB								

**Subdirectories: None**

**Subdirectory DRIVERS****Files:**

.		..		SDRV	DRV	RAMDSK	DRV	ATHD	DRV
PRINTER	DRV	SPLDRV	DRV	RAMDISK	BAT				

**Subdirectories: None**

**Developer Kit Disk 2 - HD Boot System and VDI**

Subdirectories: HD\_SYS  
 VDI\_DRVS  
 VDI\_LIBS  
 VDI\_SMPL  
 FNTS

Subdirectory HD\_SYS

Files:

FDO:\HD\_SYS .. FLEX286H SYS

Subdirectories: None

Subdirectory VDI\_DRVS

Files:

. .. METAFIL1 SYS CGASCR1 SYS EGASCR1 SYS  
 MX80PRH1 SYS MX80PRL1 SYS

Subdirectories: None

Subdirectory VDI\_LIBS

Files:

. .. VDIBINDS L86 VDIBINDB L86

Subdirectories: None

Subdirectory VDI\_SMPL

Files:

.		..		DOLINK	BAT	HC	BIG	HC	SML
LDVDI	BAT	LOGOS	286	LOGOS	C	POLYLINE	286	POLYLINE	C
THING	286	THING	C	VDIBIND	H	VDILIB	H		

Subdirectories: None

**Subdirectory FNTS****Files:**

.	..	IBMLSS10 FNT	IBMLSS14 FNT	IBMLSS18 FNT
IBMLSS36 FNT	IBMLTR10 FNT	IBMLTR14 FNT	IBMLTR18 FNT	IBMLTR36 FNT
IBMHSS07 FNT	IBMHSS10 FNT	IBMHSS14 FNT	IBMHSS18 FNT	IBMHSS36 FNT
IBMHTR07 FNT	IBMHTR10 FNT	IBMHTR14 FNT	IBMHTR18 FNT	IBMHTR36 FNT
EPSLSS10 FNT	EPSLSS14 FNT	EPSLSS20 FNT	EPSLSS28 FNT	EPSLSS36 FNT
EPSLTR10 FNT	ASSIGN SYS	EPSLTR14 FNT	EPSLTR20 FNT	EPSLTR28 FNT
EPSLTR36 FNT	EPSHSS07 FNT	EPSHSS10 FNT	EPSHSS14 FNT	EPSHSS20 FNT
EPSHSS28 FNT	EPSHSS36 FNT	EPSHTR07 FNT	EPSHTR10 FNT	EPSHTR14 FNT
EPSHTR20 FNT	EPSHTR28 FNT	EPSHTR36 FNT		

**Subdirectories: None**

**Developer Kit 3 Disk 3 - Tools and Utilities**

Subdirectories: UNIX\_286  
TOOLS

**Subdirectory UNIX\_286**

Files:

.		..		DUMP	286	CAT	286	CMP	286
CUT	286	DIFF	286	DUP	286	ECHOX	286	FGREP	286
GREP	286	LC2UC	286	PASTE	286	PR	286	SPLIT	286
STRINGS	286	SUM	286	UC2LC	286	WC	286		

Subdirectories: None

**Subdirectory TOOLS**

Files:

.		..		SID	286	HSET	286	LINK86	286
LIB86	286	RASM86	286	POSTLINK	286	XREF86	EXE	CKERMIT	286

Subdirectories: None

**Supplement Disk - Driver Sources**

Subdirectories: SYS\_OBJS  
 SYS\_LIBS  
 CNFG\_SRC  
 HDRV\_SRC  
 RDRV\_SRC  
 PDRV\_SRC  
 SDRV\_SRC  
 TOOLS

**Subdirectory SYS\_OBJS**

Files:

.	..	ACONFAT	OBJ	CLOCK	OBJ	CLOCKAT	OBJ
CONFIG	OBJ	DISP286	OBJ				

Subdirectories: None

**Subdirectory SYS\_LIBS**

Files:

.	..	ATLIB	L86	COMLIB	L86	DRTL	L86
FELIB	L86	FILESYS	L86	GIFLIB	L86	XTRCTMOD	BAT

Subdirectories: None

**Subdirectory CNFG\_SRC**

Files:

.	..	BASPAG	H	BLDCNFG	BAT	BOOTALL	INP
CONFIG	C	CONFIG	H	DH	H	EGA	H
ICDRV	C	ICDRV	H	IMC286	H	IPDRV	C
MOUSEADD	BAT	PANIC	H	PORTAB	H	STRUCT	H
SYSBUILD	H	SYSTEM	H	SYSTEM	PRO	SUP	H

Subdirectories: None

**Subdirectory HDRV\_SRC**

Files:

.	..	ATHDDRV	BAT	GETCMOS	C	MKLDHD	INP
SYSBUILD	EQU	YDK	C	YDK	H	YDKMD	C
YHDHOOK	C	YHDMD	C	YIO	H	YMD	H
YPORT286	A86					YPHD	C

Subdirectories: None

Subdirectory RDRV\_SRC

Files:

.		..		BTOOLS	A86	BTOOLS.H	IO	H
MKLRD	INP	MKRDD	BAT	RDD	C			

Subdirectories: None

Subdirectory PDRV\_SRC

Files:

.		..		PRINTER	BAT	PRINTER	C	PROTOS	H
PRINTER	INP								

Subdirectories: None

Subdirectory SRDV\_SRC

Files:

.		..		CHAR	H	SDRV	C	SDRV	H
SDRV	INP	SDRVBLD	BAT	SDRVTOOL	A86				

Subdirectories: None

Subdirectory TOOLS

Files:

.		..		FIX286	286				
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Subdirectories: None

**OEM Redistribution Disk 1 - Configuration Sources and Build Tools**

Subdirectories: BAT\_INP  
 SOURCES  
 TOOLS

**Subdirectory BAT\_INP**

Files:

.	..	ATBUILD	BAT	ATFELNK	INP	ATGIFLNK	INP
ATLINK	INP	BLOAD286	BAT	BOOTAT	INP	BOOTFE	INP
CGASYS	INP	COMMON	BAT	EGASYS	INP	FEBUILD	BAT
GIFBUILD	BAT	IT286	INP	LINKALL	INP	MAKEALL	MAKEAT
MAKEFE		MAKEGIF		METASYS	INP	MKATLIB	INP
MKFELIB	INP	MKFSLIB	INP	MKGIFLIB	INP	MX80HSYS	INP

Subdirectories: None

**Subdirectory SOURCES**

Files:

.	..	ACONFAT	A86	ATMC286	H	ATMDBS	H
BLOAD286	A86	CD	EQU	CLOCK	C	CLOCKAT	A86
DISP286	A86	EGA	EQU	FD	C	FD	H
ICDRCOPY	C	ICDRTOOL	C	ICDRVKB	C	ICDRVWRT	C
IFD	C	IFDASR	C	IFDGLob	C	IFDHOOK	C
IFDMA	H	IFDMD	C	IIFDDMA	C	IIFDMOT	C
IIFDTIM	C	IRESET	A86	PANIC	EQU	SEGS	EQU
SYSTEM	EQU						

Subdirectories: None

**Subdirectory TOOLS**

Files:

.	..	PSN	CMD	ATLSID	CMD	ATLD	CMD
MAKE	286	TOUCH	286				

Subdirectories: None

**OEM Redistribution Disk 2 - System Objects****Files:**

8X8 OBJ

**Subdirectories:** SYS\_OBJS  
 UTL\_OBJS  
 SHL\_OBJS  
 CGA\_OBJS  
 EGA\_OBJS  
 MTA\_OBJS  
 MXH\_OBJS  
 MXL\_OBJS  
 SPD\_OBJS

**Subdirectory SYS\_OBJS****Files:**

.	..	ABORT	OBJ	AFLAG	OBJ	ALLOCATE	OBJ
AFLAG286	OBJ	ASYNCR	OBJ	ASYNCR286	OBJ	BASE	OBJ
BLOAD286	OBJ	BTOOLS	OBJ	CRMINST	OBJ	CRMXLAT	OBJ
CRMKB	OBJ	COMMAND	OBJ	CRMAN	OBJ	CRMCONVB	OBJ
CRMCREAT	OBJ	CRMDL	OBJ	CRMGSL	OBJ	CRMOPEN	OBJ
CRMDEL	OBJ	CRMWIND	OBJ	CRMWRITE	OBJ	CRMGSX	OBJ
COMFEU	OBJ	CRMB000	OBJ	DIVL	OBJ	DINIT	OBJ
DOSFE1	OBJ	DOSFE2	OBJ	DOSFEINT	OBJ	DOSINIT	OBJ
DOSMAN	OBJ	EXCEPT	OBJ	EM86	OBJ	FSVOL	OBJ
FSWINDOW	OBJ	FSPATH	OBJ	FPOOL	OBJ	FE	OBJ
FREE	OBJ	FD	OBJ	FSDM	OBJ	FSNAME	OBJ
FEU	OBJ	GMAN	OBJ	GETCMOS	OBJ	GP	OBJ
HEAP	OBJ	HOOK	OBJ	IFD	OBJ	INSTALL	OBJ
IFDASR	OBJ	ICDRCOPY	OBJ	ICDRVWRT	OBJ	ICDRT00L	OBJ
ICDRVKB	OBJ	IRESET	OBJ	ICDRT00L	OBJ	IFDGL0B	OBJ
IFDISR	OBJ	IFDMD	OBJ	KFUNCS	OBJ	KTOOLS	OBJ
LUTILS	OBJ	L286	OBJ	LF286	OBJ	LEXECOM	OBJ
M286	OBJ	MGETBLK	OBJ	MISMAN	OBJ	MIS286	OBJ
NULLDEV	OBJ	OFIL	OBJ	OSMEM	OBJ	OVERLAY	OBJ
PEWTER	OBJ	PIPE	OBJ	PMGET	OBJ	PIPE286	OBJ
PRINTER	OBJ	RTMIF	OBJ	RDELIM	OBJ	RDD	OBJ
SUPERMAN	OBJ	SUP286	OBJ	SWI	OBJ	SWI286	OBJ
SDRV	OBJ	SDRVTOOL	OBJ	TABLES	OBJ	TOOLS	OBJ
YDK	OBJ	YDKMD	OBJ	YHDMD	OBJ	YHDHOOK	OBJ
YPORT286	OBJ					YPHD	OBJ

**Subdirectories: None**

Subdirectory UTL\_OBJS

## Files:

.	..	BRCOM	OBJ	BRCOMMSG	OBJ	BACKUP2	OBJ
BACKUP1	OBJ	BKUPMSG	OBJ	BKUPERR	OBJ	BOOT	OBJ
CHKDSK1	OBJ	CHKDSK2	OBJ	CKDSKMSG	OBJ	COMPMSG	OBJ
COPYMSG	OBJ	COPY	OBJ	CLIB	OBJ	COMMON	OBJ
DISKCOPY	OBJ	DIRMSG	OBJ	DIR	OBJ	DATE	OBJ
DCOMPMSG	OBJ	DCOMP	OBJ	DISKSET	OBJ	DSETMSG	OBJ
ECMDBLK	OBJ	EBUF	OBJ	ECMDGLB	OBJ	ECMDSTA	OBJ
ED	OBJ	EHELP	OBJ	EKEY	OBJ	ELESSON	OBJ
EMEM	OBJ	EPAT	OBJ	EWDV	OBJ	EWV	OBJ
FINDMSG	OBJ	FSET	OBJ	FSETMSG	OBJ	FFMAIN	OBJ
FFDIR	OBJ	FFFAT	OBJ	FFERR	OBJ	FFMSG	OBJ
FMTLIB	OBJ	FORMAT	OBJ	FMERHAND	OBJ	FMUTLS	OBJ
FDMSG	OBJ	FDISK	OBJ	FDUTLS	OBJ	HDBOOT	OBJ
KONXFACE	OBJ	KONERR	OBJ	LSTART	OBJ	LOGMAIN	OBJ
LOGMSG	OBJ	MOREMSG	OBJ	MORE	OBJ	PSTART	OBJ
PASSMAIN	OBJ	PASSMSG	OBJ	PRINT	OBJ	PROCMSG	OBJ
RENAME	OBJ	RENMSG	OBJ	REMLOGON	OBJ	RESTORE1	OBJ
RESTORE2	OBJ	RESTERR	OBJ	RECDIR	OBJ	RECD1	OBJ
RECDMSG	OBJ	SPLMSG	OBJ	SPTOOLS	OBJ	SPLPLD	OBJ
SPLMEM	OBJ	SORT	OBJ	SORTMSG	OBJ	STREAM	OBJ
SYSMSG	OBJ	SETFIP	OBJ	TREE	OBJ	TIME	OBJ
TREEMSG	OBJ	TYPE	OBJ	TYPMSG	OBJ	VER	OBJ
VDTERM	OBJ	VOL	OBJ	VOLMSG	OBJ	WMEX	OBJ
WMEXDATA	OBJ	XBACKUP	OBJ	XCHKDSK	OBJ	XCOMP	OBJ
XDATE	OBJ	XDCOMP	OBJ	XDESPool	OBJ	XDSKCPY	OBJ
XDSET	OBJ	XFIND	OBJ	XFSET	OBJ	XMORE	OBJ
XPROCESS	OBJ	XREN	OBJ	XRESTORE	OBJ	XSORT	OBJ
XTIME	OBJ	XTREE	OBJ	XTYPE	OBJ	XVER	OBJ
XPASSWD	OBJ	XFORMAT	OBJ	XSYS	OBJ	XFDISK	OBJ
WMUTLS	OBJ					XWMEX	OBJ

Subdirectories: None

Subdirectory SHL\_OBJS

## Files:

.	..	ASSIGN	OBJ	ASNMSG	OBJ	BREAK	OBJ
BREAKMSG	OBJ	CMDTAB	OBJ	CTTY	OBJ	CHDIR	OBJ
CANCEL	OBJ	CANCEMSG	OBJ	DVRLINK	OBJ	DVRLOAD	OBJ
DVRUNLK	OBJ	DVRTOOLS	OBJ	DEFINE	OBJ	DEFMSG	OBJ
ERAMSG	OBJ	MKDIR	OBJ	MKDIRMSG	OBJ	RMDIR	OBJ
SHMAIN	OBJ	SHMEM	OBJ	SHELL	OBJ	SHSYM	OBJ
SHTOOLS	OBJ	SHSWI	OBJ	SHERR	OBJ	SHMSG	OBJ
SECURMSG	OBJ	SHSTART	OBJ	UTVERIFY	OBJ	VFYMSG	OBJ
XECHO	OBJ	XEXIT	OBJ	XLIST	OBJ	XLOGOFF	OBJ
XPATH	OBJ	XPAUSE	OBJ	XPROMPT	OBJ	XREM	OBJ

Subdirectories: None

Subdirectory CGA\_OBJS

## Files:

.	..	ABLINE	OBJ	CLEARMEM	OBJ	CONCAT	OBJ
HLINE	OBJ	ISIN	OBJ	JMPTBL	OBJ	SCRASM	OBJ
SCRDEVDP	OBJ	SCRDVIND	OBJ	SCRENTRY	OBJ	SCRFILL	OBJ
SCRINES	OBJ	SCRPMARK	OBJ	SCRTEXT	OBJ	USELESS	OBJ

Subdirectories: None

Subdirectory EGA\_OBJS

## Files:

.	..	ABLINE2	OBJ	CONCAT	OBJ	HLINE2	OBJ
ISIN	OBJ	JMPTBL	OBJ	SCRASM	OBJ	SCRASTER	OBJ
SCRDVIND	OBJ	SCREGA	OBJ	SCREGASM	OBJ	SCRENTRY	OBJ
SCRGDP	OBJ	SCRINES	OBJ	SCRPMARK	OBJ	SCRTEXT	OBJ
XFERFORM	OBJ	XFERIMAG	OBJ			USELESS	OBJ

Subdirectories: None

Subdirectory MTA\_OBJS

## Files:

.	..	METAASM	OBJ	MENTRY	OBJ	MSYSINTF	OBJ
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Subdirectories: None

**Subdirectory MXH\_OBJS****Files:**

.	..	ISIN	OBJ	JMPTBL	OBJ	PRNPCODE	OBJ
SCRASM	OBJ	SCRASTER	OBJ	SCRDEVDP	OBJ	SCRDVIND	OBJ
SCRFILL	OBJ	SCRGDP	OBJ	SCR LINES	OBJ	SCRPMARK	OBJ
SYSINTF	OBJ	USELESS	OBJ			SCRTEXT	OBJ

**Subdirectories: None****Subdirectory MXL\_OBJS****Files:**

.	..	ISIN	OBJ	JMPTBL	OBJ	PRNPCODE	OBJ
SCRASM	OBJ	SCRASTER	OBJ	SCRDEVDP	OBJ	SCRDVIND	OBJ
SCRFILL	OBJ	SCRGDP	OBJ	SCR LINES	OBJ	SCRPMARK	OBJ
SYSINTF	OBJ	USELESS	OBJ			SCRTEXT	OBJ

**Subdirectories: None****Subdirectory SPD\_OBJS****Files:**

.	..	SPTOOLS	OBJ	SPLDRV	OBJ	SPLMSG	OBJ
SPLMEM	OBJ						

**Subdirectories: None**

**OEM Redistribution Disk 3 – Utility message sources and build files**

Subdirectories: MSG\_SRC  
 CNFG\_UTL  
 INPFILES  
 UTL\_LIBS  
 CCMSGS

**Subdirectory MSG\_SRC**

Files:

.	..	CMN_HDRS	UTL_MSGS	SHL_MSGS
BAT_TXT				

Subdirectories: CMN\_HDRS  
 UTL\_MSGS  
 SHL\_MSGS

**Subdirectory MSG\_SRC\CMN\_HDRS**

Files:

.	..	PORTAB	H	CONCUR	H
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Subdirectories: None

**Subdirectory MSG\_SRC\UTL\_MSGS**

Files:

.	..	BKUPMSG	C	BRCOMMSG	C	COPYMSG	C
CKDSKMSG	C	COMPMSG	C	DCOPYMSG	C	DIRMSG	C
DSETMSG	C	DCOMPMSG	C	FDMSG	C	FMTMSG	C
FINDMSG	C	FSETMSG	C	LOGMSG	C	MOREMSG	C
PROCMSG	C	RECDMSG	C	REMSG	C	SORTMSG	C
SYSMSG	C	SPLMSG	C	TIMMSG	C	TYPMSG	C
VERMSG	C	VOLMSG	C	FIXMSG	C		

Subdirectories: None

**Subdirectory MSG\_SRC\SHL\_MSGS**

Files:

.	..	ASNMSG	C	BREAKMSG	C	CANCEMSG	C
CHDIRMSG	C	DEFMSG	C	ERMSG	C	MKDIRMSG	C
SHMSG	C	SECURMSG	C	VFYMSG	C	RMDIRMSG	C

Subdirectories: None

Subdirectory MSG\_SRC\BAT\_TXT

Files:

.	..	BLDUTLS	BAT	DREDIX	BAT	LNKBLTIN	BAT
RASMXX	BAT	SHELL	BAT	FIX286	BAT	HC	PRO

Subdirectories: None

Subdirectory CNFG\_UTL

Subdirectories: CMN\_SRC  
 FDISK  
 FORMAT  
 SYS  
 WMEX

Subdirectory CNFG\_UTL\CMN\_SRC

Files:

.	..	BOOT	A86	HDBOOT	A86	SETFIP	C
CCUTLS	H	UTLERRS	H				

Subdirectories: None

Subdirectory CNFG\_UTL\FDISK

Files:

.	..	XFDISK	A86	FDISK	C	FDUTLS	C
FDISK	H	FDISK	INP	FDISK	BAT		

Subdirectories: None

Subdirectory CNFG\_UTL\FORMAT

Files:

.	..	XFORMAT	A86	FMTLIB	C	FORMAT	C
FMUTLS	C	FMERHAND	C	FORMAT	H	FORMAT	BAT

Subdirectories: None

Subdirectory CNFG\_UTL\SYS

Files:

.	..	XSYS	A86	SYS	C	SYSUT	H
SYS	INP	SYS	BAT				

Subdirectories: None

Subdirectory CNFG\_UTLWMEX

## Files:

.	..	XWMEX	A86	WMEX	C	WMUTLS	C
WMEXDATA	C	WMEXNUT	C	WMCHAR	H	WMOS	H
WMEX	INP	WMEX	BAT				

Subdirectories: None

Subdirectory INPFILES

## Files:

.	..	ASSIGN	INP	BACKUP	INP	BREAK	INP
COMP	INP	CHKDSK	INP	COPY	INP	CANCEL	INP
CTTY	INP	DATE	INP	DISKCOPY	INP	DISKCOMP	INP
DISKSET	INP	DREDIX	INP	DIR	INP	DEFINE	INP
FIND	INP	FSET	INP	KONFIG	INP	LOGON	INP
MKDIR	INP	PASSWORD	INP	PROCESS	INP	PRINT	INP
RENAME	INP	RECFILE	INP	RESTORE	INP	RMDIR	INP
SPOOL	INP	SPLDRV	INP	SECURITY	INP	SHELL	INP
TREE	INP	TYPE	INP	VOL	INP	VER	INP
FIX286	INP						

Subdirectories: None

Subdirectory UTL\_LIBS

## Files:

.	..	CCUTLS	L86	SLIB	L86	ERRLIB	L86
CCRTL	L86	40PRO	L86	CCMSGs	L86	UTTOOLS	L86

Subdirectories: None

Subdirectory CCMsGS

## Files:

.	..	BACKSPC	C	BELL	C	BLANK	C
BOOTDEV	C	CARRET	C	CCMSGs	INP	CC0290	C
CC0292	C	CC0293	C	CC0294	C	CC0295	C
CC0301	C	CC0302	C	CC0303	C	CC0304	C
CC0306	C	CC0307	C	CC0308	C	CC0309	C
CC0311	C	CC0312	C	CC0313	C	CC0314	C
CC0316	C	CC0317	C	CC0318	C	CC0319	C
CC0410	C	CC0411	C	CC0412	C	CC0413	C
CC0415	C	CC0416	C	CC0420	C	CC0430	C
CC0440	C	CC0441	C	CC0442	C	CC0443	C
CC0445	C	CC0446	C	CC0447	C	CC0448	C
						CC0450	C

CC0451	C	CC0452	C	CC0453	C	CC0454	C	CC0455	C
CC0456	C	CC0457	C	CC0458	C	CC0459	C	CC045A	C
CC0460	C	CC0461	C	CC0462	C	CC0463	C	CC0464	C
CC0465	C	CC0466	C	CC0467	C	CC0468	C	CC0469	C
CC0470	C	CC0471	C	CC0472	C	CC0473	C	CC0474	C
CC0475	C	CC0477	C	CC0478	C	CC0479	C	CC0480	C
CC0481	C	CC0490	C	CC0491	C	CC0492	C	CC0493	C
CC0476	C	CC0500	C	CC0510	C	CC0511	C	CC0512	C
CC0513	C	CC0514	C	CC0515	C	CC0516	C	CC0517	C
CC0518	C	CC0519	C	CC0520	C	CC0521	C	CC0522	C
CC0523	C	CC0524	C	CC0525	C	CC0526	C	CC0528	C
CC0529	C	CC0530	C	CC0531	C	CC0532	C	CC0533	C
CC0534	C	CC0535	C	CC0536	C	CC0537	C	CC0538	C
CC0539	C	CC0540	C	CC0541	C	CC0542	C	CC0543	C
CC0544	C	CC0545	C	CC0546	C	CC0547	C	CC0548	C
CC0549	C	CC0550	C	CC0551	C	CC0552	C	CC0553	C
CC0554	C	CC0555	C	CC0556	C	CC0557	C	CC0558	C
CC0559	C	CC0560	C	CC0561	C	CC0570	C	CC0571	C
CC0572	C	CC0573	C	CC0574	C	CC0575	C	CC0576	C
CC0577	C	CC0578	C	CC0579	C	CC0580	C	CC0581	C
CC0527	C	CC0600	C	CC0601	C	CC0602	C	CC0700	C
CC0701	C	CC0703	C	CC0704	C	CC0705	C	CC0706	C
CC0800	C	CC0801	C	CC0802	C	CC0810	C	CC0811	C
CC0812	C	CC0813	C	CC0900	C	CC0910	C	ACONV	C
COMMA	C	CONAME	C	CRLFMSG	C	DBLSLANT	C	DEFNAME	C
DEVDELIM	C	DIR1DLIM	C	DIR2DLIM	C	DIR3DLIM	C	DLIMS	C
EOFCHAR	C	EQUAL	C	ERARSTCP	C	ESCHAR	C	EXTDELIM	C
HELPLVL	C	IFILE	C	ICDLDR	C	LINEFEED	C	NEG	C
NETNODE	C	NEXTLINE	C	NULLMSG	C	NULLSTR	C	NUMCONV	C
PLUS	C	RSTCP	C	SAVECP	C	SCDLDR	C	SEMICOL	C
SFILE	C	SNAME	C	STDENAME	C	STDINAME	C	STDONAME	C
TAB	C	VALCHAR	C	WILDCHAR	C	WILDDEV	C	WILDFILE	C
WILDNOT	C	WLDFIELD	C	YNTXT	C	CCMSG	BAT		

Subdirectories: None

**OEM Source Disk 1**

Subdirectories: CMN\_SRC

Subdirectory CMN\_SRC

Files:

.		..		ALLOCATE	C	ASync	C	AFLAG286	A86
ABORT	C	ASync286	A86	AFLAG	C	BASE	C	BREAKPT	A86
BCBIO	F	CRMGSL	C	CRMEXRN	H	CRMDel	C	CRMKB	C
CRMMOUSE	C	CPACK	H	CRMCONV8	C	CRMCOPY	C	CRMCREAT	C
CRMWIND	C	CRMOPEN	C	CRMDEL	C	CRMREAD	C	CRMWRITE	C
CRMAN	C	COMMAND	C	CRMINST	C	CONSOLE	H	CRMXLAT	C
DINIT	C	DRW	F	DOCC	F	DSGL	F	DINITM	F
DMDEF	H	DISPATCH	H	DMG	H	DMINIT	F	DMTBL	H
DOSFESUP	F	DPATH	F	DUTILS	F	DVRIF	A86	DVRLOCK	F
DINSTALL	F	DM	F	EXCEPT	C	EXCEPT	H	EVb	H
FLAGS	EQU	FPOOL	C	FEPROT	C	FATIO	F	FE	C
FRAME	H	FREE	C	FSCACHE	C	FSPATH	C	FSNAME	C
FSVOL	C	FSWINDOW	C	FSDM	C	GP	H	HASH	F
HOOK	C	HEAP	C	INSTALL	C	INSTALL	H	KTOOLS	C
KFUNCS	C	KGETBLK	A86						

Subdirectories: None

**OEM Source Disk 2**

Subdirectories: CMN\_SRC  
 FE\_SRC  
 GIF\_SRC

**Subdirectory CMN\_SRC****Files:**

.		..		L286	C	LF286	C	LOCK	F
LUTILS	C	LOAD	H	MALLOC	H	MDBS	H	MIS286	A86
MISMAN	C	M286	C	MGETBLK	A86	NULLDEV	C	OFFILE	EQU
OFFILE	C	OSMEM	C	OFFILE	H	OSDEF	H	OVERLAY	C
PBLK	EQU	PEWTER	C	PD	H	PANIC86	C	PARSE	F
PBLK	H	PIPE286	A86	PIPE	C	PROCESS	C	PMGET	C
PROTECT	F	PIPE	H	RTMIF	C	RDELIM	C	RENAME	F
SUP	C	SSTRUCT	H	SUP	EQU	SUP286	A86	SWAP	A86
SUPERMAN	C	SWAP	H	SWI	C	SWI286	A86	SPECIAL	F
TABLES	C	TOOLS	A86	VCB	H	WINDOW	F	XHAND	A86
XLAT	H								

Subdirectories: None

**Subdirectory FE\_SRC****Files:**

.		..		COMFEU	C	CRMB000	C	COMFE	C
DOSFE	H	DOSFE2	C	DOSFE1	C	DOSINIT	C	DOSMAIN	C
DOSMAN	C	DOSFEINT	C	EM86	A86	FEU	C	FRNTEND	H
FEEXTRN	H	FEIO	C	GP	A86	GPEQU	EQU	LEXECOM	C
MDB	H								

Subdirectories: None

**Subdirectory GIF\_SRC****Files:**

.		..		CRMGSX	C	GMAN	C	GMAN	H
GMANL	A86	L286	H	MISGSX	C	VDI	H		

Subdirectories: None

**OEM Source Disk 3**

Subdirectories: GIF\_DRV  
                  BIND\_SRC  
                  SHL\_SRC

Subdirectory GIF\_DRV

Files:

.	..	CGADRV	COMVDI	EGADRV
METADRV	PRNVDI	BLDTOOLS		

Subdirectories: CGADRV  
                  COMVDI  
                  EGADRV  
                  METADRV  
                  PRNVDI  
                  BLDTOOLS

Subdirectory GIF\_DRV\CGADRV

Files:

.	..	ABLINE	A86	CGASYS	INP	CLEARMEM	A86
CONCAT	A86	EGA	EQU	GSXDEF	H	HLINE	A86
MKCGA	BAT	SCRASM	A86	SCRDEVDP	C	USELESS	A86
XFERIMAG	A86					VDI	EQU

Subdirectories: None

Subdirectory GIF\_DRV\COMVDI

Files:

.	..	ISIN	C	JMPTBL	C	JMPTBL	H
RVALS	H	SCRASTER	C	SCRDVIND	C	SCRENTRY	C
SCRGDP	C	SCR LINES	C	SCRPMARK	C	SCRTEXT	C
						VDI	PRO

Subdirectories: None

Subdirectory GIF\_DRV\EGADRV

## Files:

.	..	ABLINE2	A86	CLEARMEM	A86	CONCAT	A86
EGA	EQU	EGA	H	EGASYS	INP	EGATABS	H
HLINE2	A86	MAKEEGA		MKEGA	BAT	SCRASM	A86
SCREGA	C	SCREGASM	A86	USELESS	A86	VDI	EQU
XFERIMAG	A86						XPERFORM

Subdirectories: None

Subdirectory GIF\_DRV\METADRV

## Files:

.	..	MAKEMETA		MENTRY	C	METAASM	A86
METASYS	INP	MKMETA	BAT	MSYSINTF	C		

Subdirectories: None

Subdirectory GIF\_DRV\PRNVDI

## Files:

.	..	GSXDEF	H	ISIN	C	JMPTBL	C
JMPTBL	H	MAKEFILE		MAKEMX8H		MX80HSYS	INP
MX80LSYS	INP	PRNPCODE	C	RVALS	H	SCRASMT	A86
SCRDEVDP	C	SCRDVIND	C	SCRENTRY	C	SCRFILL	C
SCRLINES	C	SCRPMARK	C	SCRTEXT	C	SYSINTF	C
VDI	EQU	VDI	H	VDI	PRO	USELESS	A86

Subdirectories: None

Subdirectory GIF\_DRV\BLDTOOLS

## Files:

.	..	GOMAKE	BAT	CPYFILE	BAT
---	----	--------	-----	---------	-----

Subdirectories: None

Subdirectory BIND\_SRC

## Files:

.	..	VARC	C	VATEXT	C	VBAR	C
VBITIMAG	C	VCIRCLE	C	VCLARRAY	C	VCLRDIST	C
VCLSVWK	C	VCLSWK	C	VCONTURF	C	VCURADDR	C
VCURHOME	C	VCURLEFT	C	VCURRGHT	C	VCURTEXT	C
VDIIF	C	VDSPCUR	C	VEEOL	C	VEEOS	C
VELLIPSE	C	VELLPIE	C	VENTRCUR	C	VEXBUTV	C
						VEXCURV	C

VEXITCUR C	VEXMOTV C	VEXTIMV C	VFLAREA C	VFORMADV C
VGETPIXE C	VGTEXT C	VHIDE C	VHRDCOPY C	VJUSTIFY C
VMEXTNTS C	VMFILEN C	VOPNVWK C	VOPNWK C	VOUWNDW C
VPALETTE C	VPIESLIC C	VPLINE C	VPMARKER C	VQCELLS C
VQCELLAR C	VQCOLOR C	VQEXTEND C	VQFATTR C	VQINMODE C
VQKEYS C	VQLATTR C	VQMATTR C	VQMOUSE C	VQPFILMN C
VQSCAN C	VQTATTR C	VQTBSTAT C	VQTEXTNT C	VQTFONTI C
VQTNAME C	VQTWIDTH C	VQURADDR C	VRBOX C	VRFBX C
VRMCUR C	VROCPYFM C	VRQCHOIC C	VRQLOCAT C	VRQSTRNG C
VRQVALUA C	VRRECFL C	VRTCPYFM C	VRTRNFM C	VRVOFF C
VRVON C	VSCFORM C	VSCLIP C	VSCOLOR C	VSFOLOR C
VSFINTER C	VSFPERIM C	VSFSTYLE C	VSFUDPAT C	VSHOWC C
V SINMODE C	VSLCOLOR C	V SLEND S C	VSLTYPE C	VSLUDSTY C
VSLWIDTH C	VSMCHOIC C	VSMCOLOR C	VSMHT C	VSMLOCAT C
VSMSTRNG C	VSMTYPE C	VSMVALUA C	VSPFILM C	VSTALIGN C
VSTCOLOR C	VSTEFFCT C	VSTFONT C	VSTHT C	VSTLFONT C
VSTPOINT C	VSTROTAT C	VSTUFONT C	VSWRMODE C	VUPDWK C
VWRTMETA C	PBLOK C	VIPTR C	HCSMALL PRO	HCBIG PRO
BILDBIND BAT	MKVDILIB INP			

Subdirectories: None

### Subdirectory SHL\_SRC

Files:

.	..	ASSIGN C	ASSIGN H	BERROR H
BOOTINIT H	BREAK C	BREAK H	CANCEL C	CANCEL H
CHDIR C	CHDIR H	CMDTAB C	CTTY C	CTTY H
DEFINE C	DEFINE H	DVRLINK C	DVRLOAD C	DVRTOOLS C
DVRUNIT C	DVRUNLK C	ERASE C	ERASE H	ERR H
MKDIR C	MKDIR H	RMDIR C	RMDIR H	SECURITY C
SECURITY H	SHELL C	SHELL H	SHERR C	SHMAIN C
SHMEM C	SHSTART A86	SHSTRUCT C	SHSWI C	SHSYM C
SHTOOLS C	UC H	UTILS H	UTVERIFY C	VERIFY H
XASSIGN A86	XBREAK A86	XCANCEL A86	XCHDIR A86	XCLS C
XCTTY A86	XDEFINE A86	XECHO C	XERASE A86	XEXIT C
XLIST C	XLOGOFF C	XMKDIR A86	XORDER C	XPATH C
XPAUSE C	XPROMPT C	XREM C	XRMDIR A86	XSECUR A86
XVERIFY A86				

Subdirectories: None

**OEM Source Disk 4**

Subdirectories: UTL\_SRC  
 UTL\_HDRS

**Subdirectory UTL\_CSRC****Files:**

.	..	BACKUP1	C	BACKUP2	C	BKUPERR	C
BRCOM	C	CHKDSK1	C	CHKDSK2	C	CHKDSK3	C
COMMON	C	COMP	C	COPY	C	DATE	C
DESPOOL	C	DIR	C	DISKCOPY	C	DISKSET	C
ECMDBLK	C	ECMDGLB	C	ECMDIO	C	ECMDSTA	C
EHELP	C	EKEY	C	ELESSON	C	EMALLOC	C
EPAT	C	EWDV	C	EWV	C	FFDIR	C
FFFAT	C	FFINIT	C	FFMAIN	C	FFSYS	C
FIX286	C	FSET	C	KONERR	C	KONFIG	C
LOCLOGON	C	LOGMAIN	C	MORE	C	PASSMAIN	C
PROCUTL	C	PROTOOLS	C	RECDIR	C	RECDS1	C
REMLOGON	C	RENAME	C	RESTERR	C	RESTORE1	C
SORT	C	SPLDRV	C	SPLMEM	C	SPLPLD	C
SPTOOLS	C	STREAM	C	TIME	C	TREE	C
VDTERM	C	VER	C	VOL	C	XLOGON	C
						CLIB	C
						DCOMP	C
						EBUF	C
						ED	C
						EMEM	C
						FFERR	C
						FIND	C
						KONXFACE	C
						PRINT	C
						RECDS2	C
						RESTORE2	C
						SPOOL	C
						TYPE	C
						XPASSWD	C

Subdirectories: None

**Subdirectory UTL\_HDRS****Files:**

.	..	BACKUP	H	BRCOM	H	BUTIL	H
CDOS	H	CHKDSK	H	COMP	H	DATE	H
DCOMP	H	DIR	H	DISKCOPY	H	DISKSET	H
ENV	H	FF	H	FIND	H	FSET	H
KONFIG	H	KSWAP	H	LOGON	H	MORE	H
NSTRUCT	H	OSRTL	H	PROCESS	H	PROTOOLS	H
						DREDIX	H
						IOD	H
						NETWORK	H

Subdirectories: None



Subdirectory ERRLIB

## Files:

.	..	ABORTMSG	C	CREATMSG	C	DEFGETM	C
DEFSETM	C	DELEMSG	C	OPENMSG	C	ERRLIB	INP
LKUPMSG	C	MALLOCMS	C	NUMMSG	C	OPENDEV	C
RENSMSG	C	SETMSG	C	SWMSG	C	TAILMSG	C
ERRLIB	BAT					WRITEMSG	C

## Subdirectories: None

Subdirectory DRTL

## Files:

.	..	ASRMX	A86	ASRWAIT	A86	DOASR	A86
DSPTCH	A86	DVR	A86	EVASR	A86	FLAGCLR	A86
FLAGGET	A86	FLAGREL	A86	FLAGSET	A86	IO	A86
MAPU	A86	MLOCK	A86	MRANGE	A86	MUNLOCK	A86
MXINIT	A86	MXREL	A86	MXUNINIT	A86	NEXTASR	A86
NODISP	A86	OKABORT	A86	OKDISP	A86	PADDR	A86
POLLEV	A86	SADDR	A86	SALLOC	A86	SETVEC	A86
UADDR	A86	UNMAPU	A86	CXC33	A86	CXD33	A86
SUPIF	A86	DRFUNCS	LIB	DOPENS	C	DCLOSE	C
DCREATES	C	DDELETES	C	DRETURNS	C	DCONTRLE	C
DWAITS	C	DREADS	C	DWRITES	C	DREADE	C
DBWAITE	C	DCOMANDE	C	DCOMANDS	C	DCONTRLS	C
DCREATEV	C	DDEVLOCKS	C	DENABLE	C	DEXCEPTS	C
DGETS	C	DGIVES	C	DINSTALS	C	DKCTRL	C
DLOCKE	C	DLOCKS	C	DMALLOCS	C	DMCTRLS	C
DORDER	C	DOVERLAY	C	DABORTS	C	DREADDEL	C
DRWAITE	C	DRWAITS	C	DSEKES	C	DSETS	C
DSPECALS	C	DSTATUS	C	DABORTE	C	DBWAITS	C
DTIMER	C	DTIMERS	C	DWRITEE	C	DXLATS	C
DDISABLE	C	DLOOKUPS	C	DRTL	H	DRTL	INP
							BAT

## Subdirectories: None

Subdirectory SL\_UT\_40

## Files:

.	..	40PRO	INP	ALLBLANK	C	ANYWILD	C
ATOB	C	ATOI	C	BTOA	C	BVLTOA	C
CKDIR	C	CLNLABEL	C	CLNSPEC	C	CLNTAIL	C
COMBARGV	C	DEBLANK	C	DELAY	C	EXPANDF	C
FGETS	C	FPUTS	C	GETDEFSW	C	GETPHY	C
IBYTE	C	INDEX	C	INDEX1	C	INDEXR	C
INDX	C	INITF4SP	C	ISATTY	C	ISDIR	C
						ISFLOPPY	C

ISMORE	C	ISYES	C	ITOA	C	KMAIN	C	KPRINTFO	C
KPRINTF1	A86	LASTCH	C	LCASE	C	LONWORD	C	LTOA	C
LTOHA	C	MAKEARG	C	MATCHF2	C	NCSTRCMP	C	NEWLINE	C
NONOT	C	ONOFF	C	PAD	C	PARSE	C	PONESWI	C
PRDISK	C	PUTCOUT	C	PUTPOUT	C	PUTSERR	C	PUTSOUT	C
REVERSE	C	SETCON	C	SETNOECH	C	SKIPEND	C	SKIPWHIT	C
SKPDELIM	C	SLIB	INP	STRCAT	C	STRCHAR	C	STRCMP	C
STRCPY	C	STRLCPY	C	STRLEN	C	STRNBCPY	C	STRNCPY	C
SUBSTR	C	SWORD	C	TOINTEG	C	UCASE	C	ULTOA	C
UPCHPTR	C	UPPER	C	UPPERCH	C	KOSIF	A86	UTOOLS	BAT
VERIFY	C	VFYDATE	C	WILDQUES	C	XGETOPT	C	XWILD	C
XXCKSTD	C	40PRO	BAT	SLIB	BAT	CX	A86	COMBSPEC	C
HDLNET	C	UTOOLS	INP	STRCHR	C				

Subdirectories: None

Subdirectory POSTLINK

Files:

.	..	POSTLINK	DOC	POSTLINK	INP	POSTLINK	C
POSTLINK	BAT						

Subdirectories: None

Subdirectory UTL\_A86

Files:

.	..	LSTART	A86	PSTART	A86	XBACKUP	A86
XCHKDSK	A86	XCOMP	A86	XCOPY	A86	XDCOMP	A86
XDESPOOL	A86	XDIR	A86	XDSET	A86	XFIND	A86
XFSET	A86	XMORE	A86	XNEWDATE	A86	XPROCESS	A86
XREN	A86	XRESTORE	A86	XSORT	A86	XSPOOL	A86
XTREE	A86	XTYPE	A86	XUTDATE	A86	XVER	A86

Subdirectories: None

Subdirectory UTL\_HDRS

Files:

.	..	RECDIR	H	RENAME	H	RESTORE	H
SORT	H	SPLDRV	H	SPLPLD	H	SPOOL	H
TREE	H	TYPE	H	VER	H	VOL	H

Subdirectories: None

Subdirectory KRMT\_SRC

## Files:

.		..		CDOSTAB	H	CKBUILD	BAT	CKCMD	C
CKCMD	H	CKCONU	C	CKDEBU	H	CKDIAL	C	CKERMI	H
CKFNS	C	CKFNS2	C	CKLINK	INP	CKLOGI	C	CKMAIN	C
CKPROT	C	CKPROT	W	CKSYS	C	CKUSER	C	CKUSER	H
CKUSR2	C	CKUSR3	C	CKWART	C	CKX286	C	CKZ286	C
KERMIT	PRO								

Subdirectories: None

End of Section 1



## GENERAL SYSTEM INFORMATION

### 2.1 Hardware Requirements

The FlexOS 286 development environment requires an IBM<sup>®</sup> PC AT<sup>®</sup> with the following minimum hardware resources:

- 20 or 30 Mb hard disk with up to 3 partitions (PC-DOS or CP/M<sup>®</sup>)
- Quad density 1.2 Mb floppy disk drive
- Serial port - COM1
- Centronics port - PRN or LPT1
- 1.1 Mb memory as follows:
  - 512Kb on the mother board
  - 128Kb low (configured by hardware switches as being next to the mother board memory)
  - 512Kb high (configured by hardware switches to be at 1Mb)
- Zenith<sup>®</sup> Z-29 terminal connected to the serial port

The system should have Concurrent<sup>™</sup> PC-DOS version 3.1, 3.2, 4.1, or 5.0<sup>1</sup> already running.

---

<sup>1</sup>version 5.0 is also called XM (expanded memory)

## 2.2 Configuring Your System

Section 3.2 of the FlexOS System Guide describes modifying the CONFIG module, which controls system configuration and initialization. In this release, the CONFIG module consists of the files CONFIG.H and CONFIG.C. These files allow you to:

- configure memory
- install all drivers
- indicate whether drivers are static or dynamic
- set up some of the initial FlexOS system definitions
- tell FlexOS where the PC-DOS hard disk partition is located

The system boot script CONFIG.BAT, must be on the "boot" disk. The boot script allows you to further configure your system by installing drivers and sub-drivers, setting up system definitions, and bringing up the user interface as either a single shell or a window manager.

For non-bootable systems, the serial terminal is used for debugging, and should be connected.

FlexOS is built primarily from library modules generated by LIB-86™. There are three main libraries: COMLIB.L86 contains nonconfigurable modules, ATLIB.L86 contains configurable driver modules, and FILESYS.L86 contains the file system manager. The Developer Kit Supplement contains all the batch and input files necessary to generate ATLIB.L86, as well as to add or replace modules. The OEM Redistribution Kit contains all the batch and input files necessary to generate COMLIB.L86, FILESYS.L86, and the DOS Front End and VDI libraries.

The files DISP286.OBJ, CONFIG.OBJ, ACONFAT.OBJ, CLOCK.OBJ, and CLOCKAT.OBJ are linked together with the modules in the ATLIB.L86, FILESYS.L86, and COMLIB.L86 libraries to form FlexOS. Link the system using the ATLINK.INP<sup>2</sup> input file to create a non-bootable system, or use BOOTAT.INP to create a bootable system. Input files to create systems that include the PC-DOS front end or the VDI are also provided.

### 2.3 Building a Bootable System

To complete building a bootable system, process the output file from the linker with the FIX286.286 utility and then write the resulting file to the boot disk using the SYS.286 utility or FORMAT.286 under FlexOS.

### 2.4 Building a Non-Bootable System (OEM option only)

First link the system as described previously. Execute ATLD.CMD under Concurrent PC-DOS<sup>3</sup> to load the debugger ATLSID.CMD, which in turn loads the RTM for execution. The debugger executes from the attached serial terminal; Concurrent PC-DOS executes on the primary console.

**Note:** The non-bootable system requires the serial terminal be connected because it is necessary to run the debugger on this terminal.

---

<sup>2</sup>OEM option only

<sup>3</sup>either version 4.1 or version 5.0

The version of ATLD provided is designed specifically to be run under Concurrent DOS 86 version 4.1 on an IBM PC AT equipped with one quad density floppy disk drive and one 20 megabyte hard disk. If your hardware configuration differs from this or if you want to run ATLD.COM under Concurrent PC-DOS version 5.0, see the file ATLD.DOC for an explanation of the procedure you must follow.

## 2.5 Adding Drivers

Digital Research® provides driver source code for:

- Hard Disk
- Printer Driver
- Serial Driver
- RAMdisk Driver

**Note:** This code is subject to ongoing revisions and optimizations. It is provided only as an example of how the driver code interfaces with FlexOS.

Drivers in this release are linked into the system by including the driver object files in the system build INP files.

When you make changes to system configuration files and recompile them, be sure the object files you create do not write over object files of the same name provided with this release.

All the C modules for version 1.3 were compiled using MetaWare™ High C™ version 1.3. Because of parameter passing conventions and other differences, you must also use High C to compile your driver code.

End of Section 2

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## THE MAKE UTILITY

MAKE is a utility for building programs from modules. It can keep track of which modules have changed, and automatically executes the commands necessary to build up-to-date versions of the programs.

MAKE has the following syntax:

```
make [-f makefile] [-i] [-n] [-s] [names]
```

The options are defined as follows:

- f        tells MAKE that the following argument is the name of a makefile to be used instead of the default (MAKEFILE).
- i        tells MAKE to continue even if an error is encountered while executing a command.
- n        tells MAKE not to execute the commands, but write the ones that should be executed to the standard output. This is useful for creating batch files, for example.
- s        tells MAKE not to echo commands. Only text echoed from an invoked program appears on the screen.

### 3.1 MAKE Operation

First, MAKE reads all of the makefiles. The first makefile read is MAKE.INI, which can be located anywhere along the PATH. MAKE then reads the default makefile, whose name is MAKEFILE and is located in the current directory on the default drive. An alternate makefile can be specified using the -f option on the command line.

MAKE then proceeds through all of the **names** arguments, "making" each one in turn. If no filename arguments were specified, MAKE makes the first target item in the makefile. A file is remade if it is out of date with respect to a file it depends on, or if a file that it depends on does not exist.

Dependencies (see below) are processed so that the lowest-order files are remade first. To ensure the proper order, put the higher-order dependencies before the lower-order ones in your makefile.

Commands to build target files are either executed directly from MAKE or, if the `-n` option is specified, written to the standard output without executing them.

Any line in a makefile starting with a `#` character is considered to be a **comment** line and is ignored by MAKE. So is a line that is completely blank.

A line in a makefile that starts with a tab or space is a **command** line and consists of a command name followed by optional arguments. When commands are executed, MAKE uses the `PATH` and `ORDER` definitions to find the command, in the same manner as the shell. Command lines apply to the most recently preceding dependency line. It is an error for a command line to precede the first dependency line.

Command lines can have any combination of the following characters to the left of the command:

- @ will not echo the command line.
- MAKE will ignore the exit code of the command, i.e. the `ERRORLEVEL`. Without this, MAKE terminates when a nonzero exit code is returned.
- + MAKE will use the shell to execute the command. You must use this if the command is a shell built-in command, a batch file, or if you use I/O redirection with `<` or `>` or `|`.

A line of the form:

```
FOOBAR = THIS AND THAT AND MORE OF THOSE
```

is a **symbol definition** line. Later in the makefile, any line containing the symbol reference `$FOOBAR` or `$(FOOBAR)` will have that symbol replaced by "THIS AND THAT AND MORE OF THOSE" (without the quotes).

To indicate a single "\$" character, precede it with another "\$". For example, a makefile command line such as:

```
echo $$test
```

will be executed as:

```
echo $test
```

Any other non-blank line is a **dependency** line. Dependency lines consist of one or more filenames, then ':', then the filenames on which the previous ones depend. If one of the files to the left of the ':' (called a target) needs to be made, first all the files to right will be made.

Then if any of the dates on the right is more recent than the target, the command lines (if any) following this dependency line will be executed. If there weren't any command lines, then we try to make the target according to any existing wildcard dependency lines (described below).

Special allowance is made for the colons that are needed to specify files on other drives. For example:

```
c:foo.bar : a:fee.ber
```

should work as intended.

There is a special sort of dependency line that allows for wildcards in the file names; it has the form:

```
*.obj : *.c  
      hc $*
```

This command tells MAKE that whenever a file of the form \*.obj needs to be made (say it's called foo.obj), then provided foo.c can be made, MAKE will make foo.obj using the command:

```
hc foo
```

The special symbol \$\* is defined to be the name of the target file without its extension. It is valid only while MAKE is processing a wildcard dependency.

If a line ends with a backslash character "\", MAKE ignores the backslash and the end-of-line characters (carriage return and line feed) following it. This allows long lines to be constructed conveniently in a makefile. For example, the following makefile fragment:

```
OBJ1 = basic.o \  
      buffer.o \  
      cinfo.o \  
      display.o \  
      echo.o
```

is identical to the following line:

```
OBJ1 = basic.o buffer.o cinfo.o display.o echo.o
```

### EXAMPLE

The following fragment is from the MAKEFILE used to build MAKE itself on Concurrent DOS-68K.

```
OBJS = make.o mstring.o chdir.o makeio.o  
mstring.o make.o : mstring.h  
make.68k : $OBJS clib.168  
          link68 [co[make.com]]
```

The first line defines a symbol called OBJS that contains the names of four object files.

The second line tells MAKE that the object files mstring.o and make.o depend on a header file called mstring.h. This means that MAKE must rebuild mstring.o and make.o if mstring.h is changed.

The third line tells MAKE that the executable program make.68k depends on those object files defined by the symbol OBJS, and on the library file clib.168. This means that if any of the object files or the library is changed, MAKE must rebuild the file make.68k.

The last line tells MAKE how to rebuild make.68k; namely, by running the LINK86 program.

The following fragment is from a MAKE.INI file that tells MAKE how to build the object files:

```
*.o : *.c
      cp68 -i 0: $*.c m:$*.i
      ... <some more commands> ...
```

This dependency tells MAKE how to rebuild a file with the extension .o if there exists a file with the extension .c with a more recent date. The second and subsequent lines give the commands to invoke the C compiler on Concurrent DOS-68K. Note the use of the special symbol \$\*. MAKE expands this to the name of the file being made, without its extension.

### 3.2 BUGS

Due to a bug in the shell, error codes returned by programs executed through the shell are not returned to make.

MAKE reports an error if it tries to execute a .BAT command that does not have a "+" character preceding it. This error occurs even if there is a program file with the same name, if MAKE finds the .BAT file in its search through the PATH before it finds the program file.

### 3.3 MAKE Authors

Jeffrey Spidle, Systems Analyst, Office of Continuing Education, Iowa State University, Ames, IA 50011, wrote much of this document.

The MAKE program itself was written by or hacked at by the following persons:

- Larry Campbell, 73 Concord St, Maynard, Mass.
- Mike Hickey, Systems Programmer, Computer Center, University of DC, Washington, DC.
- Peter da Silva (the mad Australian), UUCP: ... !shell!neuro!{hyd-ptd,baylor,datafac}!peter
- Dan Grayson, 2409 S. Vine St., Urbana, IL 61801.

- Mark Alexander, Digital Research Inc., Box DRI, Monterey, CA 93942.

### **3.4 Copyrights**

MAKE comes with complete C source code. It is in the public domain, but certain portions of the code are copyrighted by Mick Hickey and Larry Campbell. The copyright notice in the source code says: "Permission is given to freely copy and use these portions for any purpose, with the exception that those persons or corporations who claim a copyright on the program or a part of it may not use these portions for any commercial purpose whatsoever. In particular, they may not collect royalties on any version of the program which includes these portions."

The comments in the program source code explain which portions are copyrighted. Even though most of the copyrighted portions have been modified, it would be safe to avoid nastiness with the copyrights by observing the following cautions:

1. Do not copyright any portions of MAKE in the future.
2. Do not charge money for MAKE, or use MAKE as an excuse for increasing the cost of a package in which MAKE is included.

End of Section 3

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## VDI DEMO PROGRAMS

Developer Disk 2 contains four programs that demonstrate the capabilities of the Virtual Device Interface (VDI).

All of the programs have the following switches in common:

- f device**            Sends output to the specified device instead of the screen.
- m**                    Emulate monochrome on color devices.
- c colors**            Set the maximum number of colors to the argument. If too many colors are specified, the number defaults to the maximum available. **-m** overrides this switch.

The four demo programs are:

**thing** [ **-l** <# of points> ]

**thing** draws a simple line-figure; it is useful for testing lines and line colors. The **-l** switch tells **thing** to draw a design with the specified number of points around the perimeter. By default, **thing** draws the figures with from four to ten points around the perimeter.

**pyramid** [ **-l** <level> ]

**pyramid** draws a recursive pyramid figure; it uses lines and the fill polygon calls. The **-l** switch specifies the level of recursion when drawing the figure; it defaults to three on non-screen devices. On a screen, **pyramid** steps down through recursion levels with the left mouse button, up through the levels using the middle mouse button, and the right mouse button exits the program.

**sphere** [ **-a** <angle> ] [ **-p** <portions> ]

**sphere** simply draws a three-dimensional sphere, using shading or colors, whichever is appropriate.

The sphere is normally tilted at a 315 degree angle; for another angle, set the **-a** switch and add the degree of tilt. For more or less facets on the sphere, set the **-p** switch and give the new number of facets; the default is ten.

### **logos**

**logos** uses copy transparent to draw a number of Digital Research logos on the screen, DRI's slogan over that using a loaded font, and then cycles the colors with **vs\_color** on 16 color screens.

End of Section 4

## KNOWN PROBLEMS

This section contains a list of known problems in FlexOS 286 Version 1.3 as of the time of release. The list is arranged in the order of severity where the severity levels are defined as follows:

- Severity 1: Causes system to halt indefinitely and/or loss of data integrity.
- Severity 2: Can cause system failure, but the impact is less severe and can generally be avoided with less difficulty.
- Severity 3: Does not cause system failure in most cases and has less impact than severity 2 problems.

### 5.1 Severity 1 Problems

There are no known severity 1 problems in FlexOS Version 1.3.

### 5.2 Severity 2 Problems

**Problem:** Asynchronous non-destructive F\_READ of keyboard enables keyboard wait state.

Description: An async non-destructive read of the keyboard should return immediately to the calling process; instead, it acts as if it were a synchronous read and waits until a key is pressed before returning. It should return with an event mask.

**Problem:** Failure of Background pipelines

Description: The command line:

```
'BACK DIR | FIND "BAT" > TEST'
```

fails to produce complete output in the file 'TEST'. The problem is in the SHELL (COMMAND.286), and the workaround is to add another piped command to the command line. For example:

```
'BACK DIR | FIND "BAT" | FIND "BAT" > TEST'
```

**Problem:** Failing DVRLOAD does not free driver memory.

Description: When an attempt is made to load a device driver, memory is allocated in the system memory area. If the resource manager cannot deal with the driver and then rejects it on an error condition, the memory in the system memory area is not released. This condition is only known to happen in the Network implementation.

**Problem:** SYS.286 utility searches wrong root directory for the BLOAD286.IMG.

Description: If SYS.286 is executed from a subdirectory of a bootable device, (but not the device the current system booted from), it attempts to access the wrong root directory.

**Problem:** XON/XOFF does not function correctly in the serial port driver, SDRV.DRV.

Description: After a user, (or the system) sends XON/XOFF multiple times to the serial port driver, either XON/XOFF stops working, or a system General Protection Error occurs.

**Problem:** LOADER shared-code checking insufficient.

Description: When executing a program that is designated as shared-code, the source can be compiled and linked and re-executed while the first copy is executing and the loader will use the old executable code and the new program's data. This can lead to a catastrophic system failure.

**Problem:** No graceful recovery of file size after a system crash.

Description: If a system crash occurs during a file update, the size of the file as indicated in the directory may not reflect the actual file size.

**Problem:** S\_COMMAND SVC CHAIN option does not use PINFO data.

Description: The NAME and PRIORITY information from the PINFO parameter block is not used by the S\_COMMAND SVC CHAIN option. These fields should replace the existing NAME and PRIORITY fields in the Process Descriptor.

**Problem:** Passing bad array pointers or structure pointers to the VDI may cause a GP error.

Description: If you pass bad pointers to the Virtual Device Interface the most likely result is a system failure (General Protection Error). Therefore, take care to ensure that all pointers are valid.

**GENERAL CAUTION:**

Running PC-DOS programs that use command line I/O redirection is strongly discouraged.

End of Section 5



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**DOCUMENTATION ERRATA**

The figure on page A-3 of the FlexOS System Guide is incorrect. It should appear as follows:

bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
-----																
								A				Key				
-----																

End of Release Note

