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*****
*
* CP/M VERS 2.2 COLD START LOADER.
*
* THE FOLLOWING ROUTINES WILL BOOT CP/M FROM THE DISK
* JOCKEY 2D REV. B, OR FROM THE DISK JOCKEY HARD DISK
* CONTROLLER.
*
* FLOPPY BOOT:
* THE COLD BOOT LOADER (TRACK 0, SECTOR 1) IS LOADED INTO
* RAM ON THE CONTROLLER BY THE COLD BOOT ROUTINE IN THE
* FIRMWARE. THIS COLD BOOT LOADER WILL START LOADING THE
* CCP FROM TRACK 0, SECTOR 5 AND WILL FINISH UP WITH THE
* LAST PART OF THE CBIOS ON TRACK 1 SECTOR 7.
*
* DURING A WARM BOOT SECTORS 1, 2, AND PART OF 3 WILL BE
* LOADED FROM TRACK 1. TRACK 0 LOADING IS UNAFFECTED.

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*ABOOTH1.PRN*  
*8/24/82*  
*SAME AS ABOOT8. except*  
*62K*

TRACK	SECTOR	SYSGEN	LOAD ORDER	NAME
0	1	900	FF00 1	BOOT LOADER
0	2	980		UNUSED
0	3	A00		
0	4	A80		
0	5	B00	9500 2	CCP
0	6	B80	9580 13	
0	7	C00	9600 3	
0	8	C80	9680 14	
0	9	D00	9700 4	
0	10	D80	9780 15	
0	11	E00	9800 5	
0	12	E80	9880 16	
0	13	F00	9900 6	
0	14	F80	9980 17	
0	15	1000	9A00 7	
0	16	1080	9A80 18	
0	17	1100	9B00 8	
0	18	1180	9B80 19	
0	19	1200	9C00 9	
0	20	1280	9C80 20	
0	21	1300	9D00 10	BDOS
0	22	1380	9D80 21	
0	23	1400	9E00 11	
0	24	1480	9E80 22	
0	25	1500	9F00 12	
0	26	1580	9F80 23	

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* TRACK 1 IS RECORDED IN DOUBLE DENSITY FORMAT. THERE ARE
* 1024 BYTES PER SECTOR.

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1	1	1600	A000 4	
1	2	1A00	A400 1	
1	3	1E00	A800 5	CBIOS (@ AB00H)
1	4	2200	AC00 2	
1	5	2600	B000 6	
1	6	2A00	B400 3	

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*      1      7      2E00      B800      7
*      1      8      3200      BC00      UNUSED
*

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* NOTE THAT THE INTERLEAVE SEQUENCES FOR LOADING TRACKS 0 AND 1
* ARE DIFFERENT. THIS DIFFERENCE WAS DESIGNED SO THAT THE
* BOOT SEQUENCE COULD BE DONE IN 4 DISK REVOLUTIONS SINCE THE
* 2D MOD. B CAN NOT LOAD CONSECUTIVE SECTORS OFF OF THE DISK.
*

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* THREE SPARE SECTORS (TRACK 0, SECTORS 2 TO 4) HAVE BEEN
* PROVIDED FOR A MORE ADVANCED BOOT LOADER AT A LATER DATE.
*

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* HARD BOOT (M10, M20, M26):
* THE COLD BOOT LOADER (TRACK 0, SECTOR 1) IS LOADED INTO
* RAM AT EITHER 0100H OR THE 2DB'S RAM DEPENDING ON WHETHER
* THIS LOADER IS ASSEMBLED WITH A 2DB OR NOT. THIS COLD
* BOOT LOADER WILL START LOADING THE CCP FROM TRACK 0,
* SECTOR 2 AND WILL FINISH UP WITH THE LAST PART OF THE
* CBIOS ON TRACK 0 SECTOR 21.
*

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TRACK	SECTOR	SYSGEN	LOAD	ORDER	NAME
0	1	900	FC00	1	COLD BOOT
0	2	B00	9500	3	CCP
0	3	D00	9700	4	
0	4	F00	9900	5	
0	5	1100	9B00	6	
0	6	1300	9D00	7	BDOS
0	7	1500	9F00	8	
0	8	1700	A100	9	
0	9	1900	A300	10	
0	10	1B00	A500	11	
0	11	1D00	A700	12	
0	12	1F00	A900	13	
0	13	2100	AB00	14	CBIOS
0	14	2300	AD00	15	
0	15	2500	AF00	16	
0	16	2700	B100	17	
0	17	2900	B300	18	
0	18	2B00	B500	19	
0	19	2D00	B700	20	
0	20	2F00	B900	2	PARTIAL LOAD
0	21	3000			UNUSED

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* THE WARM BOOT LOAD SEQUENCE STARTS AT TRACK 0, SECTOR 2
* AND GOES STRAIGHT THROUGH TO SECTOR 12. THERE IS STILL
* PLENTY OF ROOM LEFT IN THIS LOADER FOR MORE ADVANCED
* THINGS LIKE SECTOR INTERLEAVING ALTHOUGH THIS IS HARDLY
* NECESSARY ON A HARD DISK.
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003E = MSIZE EQU 62 ;MEMORY SIZE OF TARGET CP/M
A800 = BIAS EQU (MSIZE-20)*1024 ;MEMORY OFFSET FROM 20K SYSTEM
CD00 = CCP EQU 2500H+BIAS ;CONSOLE COMMAND PROCESSOR
E300 = BIOS EQU CCP+1600H ;CBIOS ADDRESS
E300 = CBOOT EQU BIOS ;COLD BOOT ADDRESS FOR CP/M

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CD00 = LOADDR EQU CCP ;LOAD ADDRESS FOR FLOPPY  
000A = RETRIES EQU 10 ;MAXIMUM # OF DISK RETRIES

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\*  
\* THE FOLLOWING EQUATES SET UP THE RELATIONSHIP BETWEEN THE \*  
\* 2D FLOPPIES AND THE HARD DISK CONTROLLERS. \*  
\*  
\*\*\*\*\*

0001 = FIRST EQU 1 ;0 = FLOPPIES ARE A-D DRIVES AND  
; HARD DISK ARE E-P  
;1 = HARD DISKS ARE A-L DRIVES AND  
; FLOPPIES ARE M-P  
0001 = MAXHD EQU 1 ;SET TO NUMBER OF HARD DISKS  
0004 = MAXFLOP EQU 4 ;SET TO NUMBER OF FLOPPIES

\*\*\*\*\*  
\*  
\* THE FOLLOWING EQUATES ARE FOR THE DISKUS HARD DISK IF WANTED. \*  
\*  
\*\*\*\*\*

0050 = HDORG EQU 50H ;HARD DISK CONTROLLER  
0050 = HDSTAT EQU HDORG ;HARD DISK STATUS  
0050 = HDCNTL EQU HDORG ;HARD DISK CONTROL  
0053 = HDDATA EQU HDORG+3 ;HARD DISK DATA  
0052 = HDFUNC EQU HDORG+2 ;HARD DISK FUNCTION  
0051 = HDCMND EQU HDORG+1 ;HARD DISK COMMAND  
0051 = HDRESLT EQU HDORG+1 ;HARD DISK RESULT  
0002 = RETRY EQU 2 ;RETRY BIT OF RESULT  
0001 = TKZ EQU 1 ;TRACK ZERO BIT OF STATUS  
0002 = OPDONE EQU 2 ;OPERATION DONE BIT OF STATUS  
0004 = COMPLT EQU 4 ;COMPLETE BIT OF STATUS  
0008 = TMOUT EQU 8 ;TIME OUT BIT OF STATUS  
0010 = WFAULT EQU 10H ;WRITE FAULT BIT OF STATUS  
0020 = DRVRDY EQU 20H ;DRIVE READY BIT OF STATUS  
0040 = INDX EQU 40H ;INDEX BIT OF STATUS  
0004 = PSTEP EQU 4 ;STEP BIT OF FUNCTION  
00FB = NSTEP EQU 0FBH ;STEP BIT MASK OF FUNCTION  
0004 = HDRLN EQU 4 ;SECTOR HEADER LENGTH  
0200 = SECLN EQU 512 ;SECTOR DATA LENGTH  
000F = WENABL EQU 0FH ;WRITE ENABLE  
000B = WRESET EQU 0BH ;WRITE RESET OF FUNCTION  
0005 = SCENBL EQU 5 ;CONTROLLER CONTROL  
0007 = DSKCLK EQU 7 ;DISK CLOCK FOR CONTROL  
00F7 = MDIR EQU 0F7H ;DIRECTION MASK FOR FUNCTION  
00FC = NULL EQU 0FCH ;NULL COMMAND  
0000 = IDBUFF EQU 0 ;INITIALIZE DATA COMMAND  
0008 = ISBUFF EQU 8 ;INITIALIZE HEADER COMMAND  
0001 = RSECT EQU 1 ;READ SECTOR COMMAND  
0005 = WSECT EQU 5 ;WRITE SECTOR COMMAND

ENDIF

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*
* THE FOLLOWING EQUATES ARE FOR THE DISK JOCKEY 2D/B IF WANTED. *
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F800 = ORIGIN EQU MAXFLOP NE 0
FC00 = DJRAM EQU 0F800H ;ORGIN OF DJ 2D MOD B PROM

F809 = TKZERO EQU ORIGIN+9H ;DISK JOCKEY 2D MOD B ROUTINES
F80C = TRKSET EQU ORIGIN+0CH ;TRACK 0 SEEK
F80F = SETSEC EQU ORIGIN+0FH ;SET SECTOR
F812 = SETDMA EQU ORIGIN+12H ;SET DMA ADDRESS
F815 = DREAD EQU ORIGIN+15H ;READ SECTOR
F824 = DMAST EQU ORIGIN+24H ;GET DMA ADDRESS
F827 = STATUS EQU ORIGIN+27H ;DISK STATUS
F82A = DSKERR EQU ORIGIN+2AH ;FLASH ERROR LIGHT
F82D = SETDEN EQU ORIGIN+2DH ;SET DENSITY
ENDIF

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IF FIRST ;DEFINE START ADDRESS IF HARD DISK
IF IF MAXFLOP NE 0
FC00 = BOOT EQU DJRAM ;IF FLOPPY IS THERE THEN USE ITS RAM
ELSE EQU 0100H ;OTHERWISE START AT 0100H
ENDIF
ELSE ;DEFINE START ADDRESS IF FLOPPY
BOOT EQU DJRAM+0300H ;UPPER QUARTER OF FLOPPY RAM
ENDIF

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0D00 = OFFSET EQU 900H-BOOT ;DDT OFFSET

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*****
*
* COLD BOOT LOADER FOR DISCUS M10, M20, OR M26.
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IF FIRST ;FIRST = 1 IS HARD DISK
FC00 ORG BOOT

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FC00 31FEFD BOOTHD LXI SP,CSTKHD ;SET UP STACK AT END OF THIS SECTOR
FC03 011401 LXI B,1*100H+20 ;B = SECTOR COUNT, C = SECTOR #
FC06 CD28FC CALL CLODHD ;LOAD SECTOR 20 INTO CCP
FC09 2100EB LXI H,CCP+1E00H ;DESTINATION OF MOVE
FC0C 1100CD LXI D,CCP ;SOURCE OF MOVE
FC0F 0E00 MVI C,0
FC11 1A CMOVHD LDAX D ;GET A BYTE OF SOURCE
FC12 77 MOV M,A ;MOVE IT
FC13 23 INX H ;BUMP DESTINATION
FC14 13 INX D ;BUMP SOURCE
FC15 0D DCR C ;ALL DONE WITH THIS PAGE ?
FC16 C211FC JNZ CMOVHD
FC19 2100CB LXI H,CCP-200H ;INITIAL DMA ADDRESS
FC1C 222EFC SHLD CDMAHD

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VISI-READ

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FC1F 010212      LXI      B,18*100H+2      ;B = SECTOR COUNT, C = SECTOR #
FC22 CD28FC      CALL     CLODHD
FC25 C300E3      JMP      CBOOT           ;GO TO CP/M

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FC28 C5          CLODHD  PUSH  B           ;SAVE SECTOR AND COUNT

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FC29 79          MOV     A,C
FC2A 32ACFC      STA     HDSEC
FC2D 2100CB      LXI     H,CCP-200H      ;GET DMA ADDRESS (SELF MODIFYING)
FC2E =          CDMAHD  EQU     $-2      ;STORAGE FOR PREVIOUS DMA ADDRESS
FC30 110002      LXI     D,200H         ;OFFSET TO NEW DMA ADDRESS
FC33 19          DAD     D           ;ADD IN OFFSET, HL = NEW DMA ADDRESS

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FC34 222EFC      SHLD   CDMAHD         ;SAVE NEW DMA ADDRESS
FC37 CD41FC      CALL   CRDHD         ;ATTEMPT A READ
FC3A C1          POP     B           ;RECOVER SECTOR NUMBER AND COUNT

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;          B = COUNT, C = NUMBER
FC3B 05          DCR     B           ;UPDATE SECTOR COUNT
FC3C C8          RZ
;          ;ALL DONE ?

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FC3D 0C          INR     C
FC3E C328FC      JMP     CLODHD       ;CONTINUE READING

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*****
*
* RDHD DOES THE ACTUAL READ FROM THE CONTROLLER, THE DMA
* ADDRESS AND SECTOR # HAVE ALREADY BEEN SET UP.
*
*****

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FC41 01010A      CRDHD  LXI     B,RETRIES*100H+1 ;MAXIMUM # OF ATTEMPTS
FC44 C5          CRHD   PUSH  B           ;SAVE ERROR COUNT
FC45 CD51FC      CALL   HDREAD        ;ATTEMPT THE READ
FC48 C1          POP     B           ;RESTORE THE ERROR COUNT
FC49 D0          RNC
;          ;RETURN IF NO ERROR
FC4A 05          DCR     B           ;UPDATE ERROR COUNT
FC4B C244FC      JNZ    CRHD         ;TRY AGAIN IF NOT TO MANY ERRORS
FC4E C34EFC      JMP     $           ;DYNAMIC ERROR HALT

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FC51 CD98FC      HDREAD CALL   HDPREP        ;PREPARE THE SECTOR HEADER IMAGE
FC54 D8          RC
;          ;ERROR EXIT

```

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FC55 3E01        MVI     A,RSECT      ;READ SECTOR COMMAND
FC57 D351        OUT    HDCMND
FC59 CD7EFC      CALL   PROCESS      ;PROCESS THE READ

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FC5C D8          RC
;          ;ERROR EXIT
FC5D AF          XRA     A           ;POINTER TO DATA BUFFER
FC5E D351        OUT    HDCMND

```

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FC60 0680        MVI     B,SECLN/4    ;NUMBER OF BYTES TO READ
FC62 2A2EFC      LHLD   CDMAHD       ;GET DESTINATION OF DATA
FC65 DB53        IN      HDDATA      ;TWO DUMMY DATA BYTES

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FC67 DB53        IN      HDDATA
FC69 DB53        RTLOOP IN      HDDATA      ;MOVE FOUR BYTES
FC6B 77          MOV     M,A         ;BYTE ONE

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FC6C 23          INX    H
FC6D DB53        IN      HDDATA      ;BYTE TWO
FC6F 77          MOV     M,A

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FC70 23          INX    H
FC71 DB53        IN      HDDATA      ;BYTE THREE
FC73 77          MOV     M,A

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FC74 23          INX      H
FC75 DB53        IN      HDDATA      ;BYTE FOUR
FC77 77          MOV      M,A
FC78 23          INX      H
FC79 05          DCR      B          ;UPDATE BYTE COUNT

```

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FC7A C269FC     JNZ      RTLOOP
FC7D C9          RET

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FC7E DB50        PROCESS IN      HDSTAT      ;WAIT FOR COMMAND TO FINISH
FC80 47          MOV      B,A
FC81 E602        ANI      OPDONE

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FC83 CA7EFC     JZ       PROCESS
FC86 3E07        MVI      A,DSKCLK      ;TURN ON DISK CLOCK
FC88 D350        OUT     HDCNTL

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FC8A DB50        IN      HDSTAT
FC8C E608        ANI      TMOUT        ;TIMED OUT ?
FC8E 37          STC

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```

FC8F C0          RNZ
FC90 DB51        IN      HDRESLT
FC92 E602        ANI      RETRY        ;ANY RETRIES ?

```

```

FC94 37          STC
FC95 C0          RNZ
FC96 AF          XRA      A          ;NO ERROR EXIT

```

```

FC97 C9          RET

```

```

FC98 DB50        HDPREP IN      HDSTAT      ;IS DRIVE READY ?

```

```

FC9A E620        ANI      DRVRDY
FC9C 37          STC
FC9D C0          RNZ

```

```

FC9E 3E08        MVI      A,ISBUFF     ;INITIALIZE POINTER TO HEADER BUFFER
FCA0 D351        OUT     HDCMND
FCA2 3EFC        MVI      A,NULL

```

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FCA4 D352        OUT     HDFUNC      ;SELECT DRIVE A
FCA6 AF          XRA      A
FCA7 D353        OUT     HDDATA      ;FORM HEAD BYTE

```

```

FCA9 D353        OUT     HDDATA      ;FORM TRACK BYTE
FCAB 3E00        MVI      A,0          ;FORM SECTOR BYTE
FCAC =           HDSEC EQU     $-1

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FCAD D353        OUT     HDDATA
FCAF 3E80        MVI      A,80H        ;FORM KEY
FCB1 D353        OUT     HDDATA

```

```

FCB3 3E07        MVI      A,DSKCLK     ;TURN ON DISK CLOCK
FCB5 D350        OUT     HDCNTL
FCB7 3E0F        MVI      A,WENABL     ;WRITE ENABLE ON

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FCB9 D350        OUT     HDCNTL
FCBB C9          RET

```

```

FDFE            ORG      BOOTHD+200H-2

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```

FDFE =          CSTKHD EQU     $
FDFE 00FC        DW      BOOTHD

```

```

ELSE            ;FIRST = 0 IS FLOPPY DISK

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*

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MSI-READ

\* COLD BOOT LOADER FOR THE DISK JOCKEY 2D REVISION B CONTROLLER \*  
 \*  
 \*\*\*\*\*

	ORG	BOOT	
T0BOOT	MVI	A,5-2	;FIRST SECTOR - 2
NEWSEC	EQU	§-1	
	INR	A	;UPDATE SECTOR #
	INR	A	
	CPI	27	;SIZE OF TRACK IN SECTORS + 1
TRKSIZ	EQU	§-1	
	JC	NOWRAP	;SKIP IF NOT AT END OF TRACK
	JNZ	T1BOOT	;DONE WITH THIS TRACK
EXIT	EQU	§-2	
	SUI	27-6	;BACK UP TO SECTOR 6
BACKUP	EQU	§-1	
	LXI	H,LOADDR-80H	;MEMORY ADDRESS OF SECTOR - 100H
NXTDMA	EQU	§-2	
	SHLD	NEWDMA	
	STA	NEWSEC	;SAVE THE UPDATED SECTOR #
	MOV	C,A	
	CALL	SETSEC	;SET UP THE SECTOR
	LXI	H,LOADDR-100H	;MEMORY ADDRESS OF SECTOR - 100H
NEWDMA	EQU	§-2	
	LXI	D,100H	;UPDATE DMA ADDRESS
SECSIZ	EQU	§-2	
	DAD	D	
NOWRP	SHLD	NEWDMA	;SAVE THE UPDATED DMA ADDRESS
	MOV	B,H	
	MOV	C,L	
	CALL	SETDMA	;SET UP THE NEW DMA ADDRESS
	LXI	B,RETRIES*100H+0	;MAXIMUM # OF ERRORS, TRACK #
NXTRTY	EQU	§-2	
FREAD	PUSH	B	
	CALL	TRKSET	;SET UP THE PROPER TRACK
	CALL	DREAD	;READ THE SECTOR
	POP	B	
	JNC	T0BOOT	;CONTINUE IF NO ERROR
	DCR	B	
	JNZ	FREAD	;KEEP TRYING IF ERROR
	JMP	DSKERR	;TOO MANY ERRORS, FLASH THE LIGHT
T1BOOT	LXI	H,CBOOT	;WE JUMP TO CBOOT NEXT TIME
	SHLD	EXIT	
	MVI	C,1	;SELECT DOUBLE DENSITY
	CALL	SETDEN	
	XRA	A	;FIRST SECTOR - 2
	STA	NEWSEC	
	MVI	A,8	;SIZE OF (LOGICAL) TRACK + 1
	STA	TRKSIZ	
	DCR	A	;NUMBER OF SECTORS TO BACK UP
	STA	BACKUP	
	LXI	H,LOADDR+0700H	;DMA START ADDRESS FOR FIRST REVOLUTION - 2048
	SHLD	NEWDMA	
	LXI	H,LOADDR+0300H	;DMA START ADDRESS FOR SECOND REVOLUTION - 2048

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SHLD  NXTDMA
LXI   H,2048           ;DIFFERENCE BETWEEN DMA ADDRESSES
SHLD  SECSIZ
LXI   H,RETRIES*100H+1;MAXIMUM # OF ERRORS, TRACK #
SHLD  NXTRTY
JMP   T0BOOT          ;GO LOAD IN TRACK 1
ENDIF

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FE00      END
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A800 BIAS	E300 BIOS	FC00 BOOT	FC00 BOOTH	E300 CBOOT
CD00 CCP	FC2E CDMAHD	FC28 CLODHD	FC11 CMOVHD	0004 COMPLT
FC41 CRDHD	FC44 CRHD	FDFE CSTKHD	FC00 DJRAM	F824 DMAST
F815 DREAD	0020 DRVRDY	0007 DSKCLK	F82A DSKERR	0001 FIRST
0051 HDCMND	0050 HDCNTL	0053 HDDATA	0052 HDFUNC	0050 HDORG
FC98 HDPREP	FC51 HDREAD	0051 HDRESLT	0004 HDRLEN	FCAC HDSEC
0050 HDSTAT	0000 IDBUFF	0040 INDX	0008 ISBUFF	CD00 LOADDR
0004 MAXFLOP	0001 MAXHD	00F7 MDIR	003E MSIZE	00FB NSTEP
00FC NULL	0D00 OFFSET	0002 OPDONE	F800 ORIGIN	FC7E PROCESS
0004 PSTEP	000A RETRIES	0002 RETRY	0001 RSECT	FC69 RTLOOP
0005 SCENBL	0200 SECLN	F82D SETDEN	F812 SETDMA	F80F SETSEC
F827 STATUS	0001 TKZ	F809 TKZERO	0008 TMOUT	F80C TRKSET
000F WENABL	0010 WFAULT	000B WRESET	0005 WSECT	