

FILE 060000 247062
READY
ASSM

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247063 0100 *SOFTWARE REV #28 10 AUG. '77; AUTHOR, G.L. PETERSON
247063 0110 *THIS FDOS FOR REV.3 CONTROLLER PROTOTYPE BOARD
247063 0120 *THIS IS A FLOPPY DISC CONTROLLER PROGRAM
247063 0130 *BASED ON PUBLISHED DATA FOR THE NEC UPD372 CHIP
247063 0140 *
247063 0150 * CHIP DATA EQUATES
247063 0160 WORST EQU 80H RESET
247063 0170 WOMBL EQU 40H MUST BE LOW
247063 0180 WOHL D EQU 08H HEAD LOAD
247063 0190 WOLCT EQU 04H LOW CURRENT
247063 0200 WOWFR EQU 02H WRITE FAULT RESET
247063 0210 W1CBS EQU 80H CLOCK BIT STROBE
247063 0220 W1CBN EQU 38H CLOCK BITS FOR NORMAL DATA
247063 0230 W1CBI EQU 10H CLOCK BITS FOR INDEX ADDRESS MARK
247063 0240 W1CBD EQU 00H CLOCK BITS FOR ID,DATA,OR DELETED DATA
247063 0250 W1UAS EQU 04H UNIT A STROBE
247063 0260 W1UAA EQU 03H UNIT A ADDRESS MASK
247063 0270 W3RCS EQU 80H READ CLOCK SET
247063 0280 W3WCS EQU 40H WRITE CLOCK SET
247063 0290 W3STT EQU 20H START READ OR WRITE OPERATION
247063 0300 W3WES EQU 10H WRITE ENABLE SET
247063 0310 W3IXS EQU 08H INDEX START
247063 0320 W3WER EQU 04H WRITE ENABLE RESET
247063 0330 W3CCG EQU 02H CYCLIC CHECK GENERATE
247063 0340 W3CCW EQU 01H CYCLIC CHECK WORDS
247063 0350 W4STS EQU 80H STEP STROBE
247063 0360 W4SID EQU 40H STEP IN OR DIRECTION
247063 0370 W4SOS EQU 20H STEP OUT OR STEP
247063 0380 W4SNS EQU 0DFH THIS IS W4SOS BAR
247063 0390 W4UBS EQU 04H UNIT B STROBE
247063 0400 W4UBA EQU 03H UNIT B ADDRESS MASK
247063 0410 W6TRR EQU 04H TIMER REQUEST RESET
247063 0420 W6IRR EQU 02H INDEX REQUEST RESET
247063 0430 W6DRR EQU 01H DATA REQUEST RESET
247063 0440 ROALH EQU 80H ALWAYS HIGH UNDER NORMAL POWER CONDITIONS
247063 0450 RORYB EQU 40H READY B
247063 0460 ROUBA EQU 30H UNIT B ADDRESS MASK
247063 0470 ROERR EQU 08H WRITE FAULT ORDRIVE A READY OR COMMAND
247063 0480 *OVERRUN ERROR; MUST BE CORRECTED BEFORE COMMANDING DRIVE
247063 0490 ROTRQ EQU 04H TIMER REQUEST
247063 0500 ROIRQ EQU 02H INDEX REQUEST
247063 0510 RODRQ EQU 01H DATA REQUEST
247063 0520 R1WRT EQU 80H WRITE MODE
247063 0530 R1T00 EQU 40H TRACK 00
247063 0540 R1DER EQU 20H DATA ERROR (CRC TYPE )
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247063      0550 RICOR EQU 10H COMMAND OVERRUN
247063      0560 RIRYA EQU 08H READY ON DRIVE A
247063      0570 RIWFT EQU 04H WRITE FAULT
247063      0580 RIUAA EQU 03H UNIT A ADDRESS MASK
247063      0590 * SYSTEM PARAMETERS
247063      0600 NU EQU 01D NUMBER OF FLOPPY DISC DRIVES
247063      0610 NTRKS FQU 77D NUMBER OF TRACKS ON A DISC
247063      0620 NSCTR EQU 26D NUMBER OF SECTORS ON A DISC
247063      0630 NBSCT EQU 128D NUMBER OF DATA BYTES IN A SECTOR
247063      0640 NTRYS EQU 03H NUMBER OF READ RETRYS
247063      0650 LHCTK EQU 43D LAST HI CURRENT TRACK
247063      0660 RVLIM EQU 04H REVOLUTIN LIMIT IN IDLE LOOP WITH HD LDED
247063      0670 STACK EQU 002000 PUT THE STACK HERE
247063      0680 *
247063      0690 * I/O ASSIGNMENTS
247063      0700 IOBAS EQU 0F0H THIS IS THE START OF THE PORT ARRAY
247063      0710 W0 EQU IOBAS+0
247063      0720 W1 EQU IOBAS+1
247063      0730 W2 EQU IOBAS+2
247063      0740 W3 EQU IOBAS+3
247063      0750 W4 EQU IOBAS+4
247063      0760 W6 EQU IOBAS+6
247063      0770 W7 EQU IOBAS+7
247063      0780 DATA EQU W2
247063      0790 WAIT EQU W7
247063      0800 HALT EQU W7
247063      0810 R0 EQU IOBAS+0
247063      0820 R1 EQU IOBAS+1
247063      0830 R2 EQU IOBAS+2
247063      0840 *
247063      0850 *****
010000      0860 ST 0800H PUT ALL THIS ABOVE THE SUDING OP SYSTEM
010000      0870 *****
010000      0880 * INCOMING BRANCH TABLE
010000 303 076 010 0890 JP INIT INITIALIZE DISC DRIVES AND SOFTWARE
010003 303 206 012 0900 JP SEEK SEEK TO A TRACK AND SECTOR
010006 303 156 011 0910 JP READ READ A SECTOR FROM A TRACK
010011 303 374 011 0920 JP WRITE WRITE A SECTOR TO A TRACK
010014 303 161 013 0930 JP FRMAT PUT AN IBM FORMAT ON A VIRGIN DISC
010017      0940 *
010017      0950 * OUTGOING BRANCH TABLE
010017 303 000 005 0960 VMON JP 0500H VIDEO MONITOR RETURN
010022      0970 *XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
010022      0980 *INITIALIZE, COMMAND RETURN AND IDLE LOOP
010022 363 0990 RSTO DI NO INTERRUPTS
010023 355 106 1000 IM 00 SET 8080 INTERRUPT MODE
010025 076 200 1010 LD A,<WORST
010027 323 360 1020 OUT <W0
010031 061 000 002 1030 LD SP,STACK

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010034		1040 *INITIALIZE DATA AREA TO ZERO
010034	041 263 014	1050 RS020 LD HL,CMND HL POINTS TO THE DATA AREA
010037	006 027	1060 LD B,NB NUMBER OF BYTES IN THE DATA AREA
010041	257	1070 XOR A 00 TO THE ACC
010042	167	1080 RS030 LD M,A WRITE A 00
010043	043	1090 INC HL
010044	005	1100 DEC B LOOP COUNT
010045	040 373	1110 JR NZ,RS030 LOOP WRITING ZEROS TO DATA AREA
010047		1120 * INITIALIZE THE SECTOR SIZE
010047	076 200	1130 LD A,NBSCT NUMBER OF BYTES IN A SECTOR TO ACC
010051	062 267 014	1140 LD (SCTS),A
010054		1150 * INITIALIZE ALL DISC UNITS
010054	076 001	1160 LD A,01H START WITH DRIVE 1
010056	062 264 014	1170 RS010 LD (UNIT),A SET UNIT # IN PARAMETER ARFA
010061	315 076 010	1180 CALL INIT 00 TO WRO,UNLOAD THE HEAD, MOVE HEAD TO
010064		1190 *TRACK 00, AND SET UP THE TRACK POINTER "TKPTR"
010064	072 264 014	1200 LD A,(UNIT) LOAD UNIT # JUST INITIALIZED
010067	376 001	1210 CP NU LAST UNIT?
010071	050 072	1220 JR Z,RT010 IF DONE EXIT
010073	074	1230 INC A NEXT DRIVE #
010074	030 360	1240 JR RS010 GO DO NEXT UNIT
010076		1250 *-----
010076		1260 * INITIALIZE DISC UNIT SUBROUTINE
010076		1270 *00 TO WRO, UNLOAD THE HEAD,GO TO TRACK 00. SET TKPTR
010076		1280 INIT EQU \$
010076	021 306 014	1290 LD DE,WRO BASE ADDRESS OF STORAGE LOCATIONS
010101	315 150 013	1300 CALL INDXA INDEXED ADDRESSING ROUTINE DE+(UNIT-1)
010104		1310 * GOES TO HL
010104	257	1320 XOR A 00 TO A
010105	167	1330 LD M,A SET WRO THIS DRIVE TO 00
010106	315 376 012	1340 CALL UNLD UNLOAD THE HEAD
010111		1350 * MOVE HEAD TO TRACK 00
010111	016 114	1360 LD C,NTRKS-1 LOOP LIMIT FOR TRACK SEEKING
010113		1370 * EQUALS NUMBER OF TRACKS-1
010113	333 361	1380 IN010 IN R1 READ STATUS OF THIS DRIVE
010115	057	1390 CPL
010116	346 100	1400 AND R100 ARE WE ON TRACK 00?
010120	040 006	1410 JK NZ,IN020 IF YES WE ARE DONE SO EXIT
010122	315 255 012	1420 CALL STO IF NOT CALL ROUTINE TO STEP OUT ONE TRACK
010125	015	1430 DEC C DROP THE LOOP COUNT
010126	040 363	1440 JR NZ,IN010 IF STILL IN THE LOOP STEP OUT AGAIN
010130		1450 IN020 EQU \$
010130	021 307 014	1460 LD DE,TKPTR THIS IS TRACK POINTER, THIS DRIVE
010133	315 150 013	1470 CALL INDXA
010136	257	1480 XOR A 00 TO ACC
010137	167	1490 LD M,A MAKE THIS TRACK 00 TO INITIALIZE SOFTWARE
010140	041 312 014	1500 LD HL,BUF SET UP THE NORMAL BUFFER AREA
010143	042 261 014	1510 LD (BUFR),HL
010146	311	1520 RET WE ARE DONE

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010147
010147
010147 363
010150 050 013
010152 076 001
010154 062 270 014
010157 315 376 012
010162 303 315 010
010165 315 376 012
010170 076 000
010172 062 263 014
010175 072 263 014
010200 267
010201 040 003
010203 303 000 005
010206
010206
010206
010206 117
010207
010207 021 270 014
010212 006 015
010214 257
010215 022
010216
010216 023
010217 005
010220 040 373
010222 076 006
010224 271
010225 362 235 010
010230 062 271 014
010233 030 060
010235
010235 021 264 014
010240 041 235 014
010243 006 004
010245 032
010246 276
010247 332 310 010
010252 043
010253 276
010254 322 310 010
010257 043
010260 023
010261 005
010262 040 361
010264
010264 171
1530 *-----
1540 *RETURN FROM A COMMAND TO THIS POINT
1550 RETRN DI OUR UNDIVIDED ATTENTION
1560 JR Z,R1010 WAS THERE AN ERROR ON THE OPERATION?
1570 LD A,01H YES! LOAD 01 CODE
1580 LD (MERF),A AND SET THE MASTER ERROR FLAG
1590 CALL UNLD
1600 JP ERROR
1610 RT010 CALL UNLD
1620 LD A,00H
1630 LD (CMND),A
1640 IDL10 LD A,(CMND)
1650 OR A
1660 JR NZ,EXEC
1670 JP 0500H
1680 *****
1690 * COMMAND EXECUTION
1700 * A=COMMAND
1710 EXEC LD C,A SAVE THE COMMAND IN C
1720 * ZERO OUT THE FLAGS
1730 LD DE,MERF MASTER ERROR FLAG
1740 LD B,NF NUMBER OF FLAGS
1750 XOR A
1760 EX005 LD (DE),A WRITE A ZERO TO ALL ERROR FLAGS FROM
1770 * MERF ON DOWN FOR THE COUNT IN B
1780 INC DE
1790 DEC B
1800 JR NZ,EX005
1810 LD A,<NCMDS LIMIT OF VALID COMMANDS
1820 CP C COMMAND<MAX NUMBER OF VALID COMMANDS?
1830 JP P,EX010 YES
1840 LD (CMDE),A NO, SET COMMAND ERROR FLAG
1850 JR ERROR
1860 * CHECK ALL PARAMETERS FOR THE EXECUTION OF THIS COMMAND
1870 EX010 LD DE,UNIT DE=ADDRESS OF UNIT, FIRST PARAMETER
1880 LD HL,LMTBL HL=ADDRESS OF THE LIMIT TABLE
1890 LD B,NP B=NUMBER OF PARAMETERS
1900 EX020 LD A,(DE) A=PARAMETER TO BE CHECKED
1910 CP M LOWER LIMIT OK?
1920 JP C,EX040 NO, AN ERROR
1930 INC HL YES
1940 CP M UPPER LIMIT OK?
1950 JP NC,EX040 NO, AN ERROR
1960 INC HL YES, NEXT PARAMETER LOWER LIMIT IN TABLE
1970 INC DE NEXT PARAMETER
1980 DEC B LOOP DONE?
1990 JR NZ,EX020 NO
2000 *COMMAND AND PARAMETERS OK
2010 LD A,C RETRIEVE THE COMMAND

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010265 041 245 014	2020	LD HL,CTBL
010270 075	2030	DEC A A={0-(N-1)}
010271 313 047	2040	SLA A A=2*A
010273 137	2050	LD E,A
010274 026 000	2060	LD D,00H
010276 031	2070	ADD HL,DE HL=ADDRESS OF ENTRY IN COMMAND TABLE
010277 136	2080	LD E,M
010300 043	2090	INC HL
010301 126	2100	LD D,M DE=ADDRESS OF COMMAND SERVICE ROUTINE
010302 353	2110	EX DE,HL IN HL NOW
010303 021 147 010	2120	LD DE,RETRN THIS IS THE POINT TO RETURN TO
010306 325	2130	PUSH DE SET UP RETURN ADDRESS
010307 351	2140	JP (HL) JUMP TO SERVICE ROUTINE
010310	2150	*PARAMETER ERROR SERVICE SUBROUTINE
010310 076 001	2160 EX040	LD A,01H ERROR CODE
010312 062 272 014	2170	LD (PRMER),A SET THE PARAMETER ERROR FLAG
010315 062 270 014	2180 FRROR	LD (MERF),A SET MASTER ERROR FLAG
010320 061 000 002	2190	LD SP,STACK RESET THE STACK POINTER
010323 315 346 000	2200	CALL 00E6H SCREEN ERASE
010326 041 270 014	2210	LD HL,MERF
010331 006 015	2220	LD B,NF
010333 136	2230 ERRLP	LD E,M
010334 315 041 002	2240	CALL 002041 HEX CHAR
010337 076 254	2250	LD A,CACH
010341 315 372 000	2260	CALL 000372
010344 043	2270	INC HL
010345 005	2280	DEC B
010346 040 363	2290	JR NZ,ERRLP
010350 315 250 001	2300 ERLP1	CALL 01A8H KEYBOARD
010353 376 240	2310	CP OAOH
010355 040 3/1	2320	JR NZ,ERLP1
010357 303 000 005	2330	JP 0500H
010362	2340	*****
010362	2350	*READ ID RECORD ROUTINE
010362 315 206 012	2360 RID	CALL SEEK POSITION THE HEAD TO TRACK # IN "TRACK"
010365 315 332 012	2370	CALL HDLD LOAD THE HEAD
010370 016 004	2380	LD C,04H THIS IS THE LIMIT OF REVOLUTIONS
010372	2390	*PERMITTED WITHOUT FINDING CORRECT ID RECORD. 4 ASSURES
010372	2400	*THREE COMPLETE REVOLUTIONS OF THE DISC
010372 041 265 014	2410 RIA	LD HL,TRACK INITIALIZE TRACK/SECTR POINTER IN HL
010375 021 275 014	2420	LD DE,WTRK INITIALIZE FLAG POINTER IN DE
011000 257	2430	XOR A
011001 107	2440	LD B,A B=A=00
011002 323 363	2450	OUT <W3 RESET SIT FOR RETRY
011004 076 240	2460	LD A,W3RCS+W3STT READ CLOCK AND START BITS OF W3
011006 323 363	2470	OUT <W3 GO TO READ CLOCK, SET STT AUTOMATICALLY
011010	2480	*START READ OPERATION WHEN ADDRESS MARK IS READ
011010 323 367	2490	OUT WAIT
011012	2500	*WAITING FOR ADDRESS MARK

011012	333 362	2510	IN <R2 READ THE DATA
011014	057	2520	CPL
011015	356 376	2530	XOR OFEH IS IT AN ID ADDRESS MARK?
011017	040 105	2540	JR NZ,RIM IF NOT JUMP TO ERROR SUBROUTINE
011021	323 367	2550	OUT WAIT
011023		2560	*WAITING FOR TRACK ADDRESS
011023		2570	*WAITING FOR TRACK ADDRESS
011023	333 362	2580	IN <R2 READ THE TRACK NUMBER
011025	057	2590	CPL
011026	256	2600	XOR M COMPARE WITH DESIRED TRACK
011027	022	2610	LD (DE),A WIRK=00 FOR OK
011030	023	2620	INC DE DE POINTS TO ZERO1 BYTE
011031	323 367	2630	OUT WAIT
011033		2640	*WAITING FOR FIRST ZERO BYTE
011033	333 362	2650	IN <R2 READ THE ZERO BYTE
011035	057	2660	CPL
011036	022	2670	LD (DE),A ZERO1=00FOR OK
011037	023	2680	INC DE DE POINTS TO ZERO2
011040	043	2690	INC HL HL POINTS TO SECTR
011041	323 367	2700	OUT WAIT
011043		2710	*WAITING FOR SECTOR ADDRESS
011043	333 362	2720	IN <R2 READ SECTOR ADDRESS BYTE
011045	057	2730	CPL
011046	256	2740	XOR M COMPARE WITH DESIRED SECTOR
011047	107	2750	LD B,A B=00 FOR OK
011050	076 041	2760	LD A,W3STT+W3CCW
011052	323 363	2770	OUT <W3 THIS COMMAND SENT TO W3 SETS CCW.(STT BIT
011054		2780	*MUST ALSO BE SET TO AVOID RESETTING STT.) THE BIT RING
011054		2790	*PULSE (BRP) FOLLOWING THE SETTING OF CCW WILL START A
011054		2800	*BIT BY BIT COMPARISON OF THE DATA READ FROM THE DISC
011054		2810	*WITH THE DATA READ FROM THE CRC REGISTER. THE CPU WILL
011054		2820	*READ THE COMPLETED SECOND ZERO BYTE AT THE NEXT BRP,BUT
011054		2830	*THE DRIVE HEAD WILL BEGIN READING THE FIRST CRC BYTE
011054	323 367	2840	OUT WAIT
011056		2850	*WAITING FOR SECOND ZERO BYTE
011056	333 362	2860	IN <R2 READ SECOND ZERO BYTE
011060	057	2870	CPL
011061	022	2880	LD (DF),A ZERO2=00 FOR OK
011062	023	2890	INC DE
011063	323 367	2900	OUT WAIT
011065		2910	*WAITING FOR CRC BYTE #1
011065	076 040	2920	LD A,W3STT TURN OFF CCW
011067	323 363	2930	OUT <W3 STT=1; CCW=0; CCW IS RESET AT NEXT BRP
011071		2940	*BIT-BY-BIT CRC COMPARISON WILL END
011071	323 367	2950	OUT WAIT
011073		2960	*WAITING FOR CRC BYTE #2
011073	333 361	2970	IN R1 GET STATUS
011075	057	2980	CPL
011076	346 040	2990	AND RIDLR WAS THERE A CRC ERROR ON THE READ?

011100 022	3000	LD (DE),A CRCID=00 FOR OK
011101 170	3010	LD A,B B HAS COMPARISON OF DESIRED SECTOR WITH
011102	3020	*THE SECTOR READ
011102 267	3030	OR A SECTOR OK?
011103 040 021	3040	JR NZ,RIM ERROR HERE
011105	3050	*PROPER SECTOR ID READ WITHOUT ERROR
011105 323 367	3060	OUT WAIT
011107	3070	*WAITING FOR FIRST GAP BYTE
011107 353	3080	EX DE,HL HL POINTS TO CRCID, A=00
011110 266	3090	OR M TEST CRCID
011111 053	3100	DEC HL
011112 000	3110	NOP SHOULD BE OR,M TO TEST ZERO BYTE #2
011113 053	3120	DEC HL
011114 266	3130	OR M TEST ZERO1
011115 323 367	3140	OUT WAIT
011117	3150	*WAITING FOR SECOND GAP BYTE
011117 053	3160	DEC HL
011120 266	3170	OR M TEST WTRK; TRACK ADDRESS=TRACK POINTER
011121 040 003	3180	JR NZ,RIM ERROR IF ANY BITS SET IN THE ABOVE
011123 323 367	3190	OUT WAIT
011125	3200	*WAITING FOR THIRD GAP BYTE
011125 311	3210	REI NORMAL RETURN, ZERO FLAG=1
011126	3220	*
011126	3230	*ERROR PROCESSING ROUTINE FOR READ ID RECORD ROUTINE
011126 333 360	3240	RIM IN <R0 READ STATUS
011130 057	3250	CPL
011131 346 002	3260	AND ROIrq WAS INTERRUPT AN INDEX REQUEST?
011133 312 372 010	3270	JP Z,RIA NO, WAIT FOR NEXT MARK
011136 323 366	3280	OUT <W6 YES, AN IRQ RESET TO W6
011140 015	3290	DEC C DECREMENT REVOLUTION LIMIT COUNTER
011141 302 372 010	3300	JP NZ,RIA WAIT FOR NEXT MARK IF NOT THIRD REV
011144 257	3310	XOR A THIRD REV WITHOUT SUCCESS SO QUIT
011145 323 363	3320	OUT <W3 RESET STT
011147 076 001	3330	LD A,01H ERROR CODE
011151 062 274 014	3340	LD (NOGO),A COULD NOT FIND REQUESTED ID
011154 267	3350	OR A CLEAR THE ZERO FLAG
011155 311	3360	RET AND TAKE THIS ERROR RETURN
011156	3370	*****
011156	3380	*READ DATA RECORD COMMAND ROUTINE
011156	3390	*READ DATA RECORD ROUTINE
011156	3400	*CALLS READ ID RECORD FIRST
011156 315 362 010	3410	READ CALL RID READ THE ID RECORD
011161 300	3420	RET NZ IF ERROR FOUND IN READ, RETURN
011162 076 140	3430	LD A,<W3WCS+<W3STT WRITE CLOCK SET AND START
011164 323 363	3440	OUT <W3 SET WRITE CLOCK, LEAVE STT SET
011166 006 011	3450	LD B,09H PASS GAP BYTES 4-12
011170 323 367	3460	RGAP OUT WAIT
011172	3470	*.WAITING FOR GAP BYTES 4 THROUGH 12
011172 005	3480	DEC B

011173 040 373	3490 JR NZ, RGAP
011175 323 367	3500 OUT WAIT WAIT FOR GAP BYTE 13 HEAD PAST AREA
011177	3510 *IN GAP THAT CONTAINS UNKNOWN INFORMATION GENERATED WHEN
011177	3520 *WRITE CURRENT WAS TURNED ON TO WRITE DATA RECORD.
011177	3530 *
011177	3540 *WAITING FOR GAP BYTE 13
011177 076 100	3550 LD A, <W3WCS RESET STT, SET WRITE CLOCK, PREVENTS
011201 323 363	3560 OUT <W3 INTERRUPTS UNTIL THE FOLLOWING IS DONE
011203 052 261 014	3570 LD HL, (BUFFER) HL POINTS TO FIRST BYTE OF DATA
011206 026 041	3580 LD D, W3STT+W3CCW COMMAND TO SET CCW IN D
011210 016 373	3590 LD C, OFBH DATA ADDRESS MARK CODE TO C
011212 072 267 014	3600 LD A, (SCTS2) SET SECTOR SIZE IN ACC
011215 326 003	3610 SUB 03H
011217 107	3620 LD B, A SAVE THE COUNT IN B
011220 076 240	3630 LD A, W3RCS+W3STT SET READ CLOCK AND STT
011222 323 363	3640 OUT <W3
011224 323 367	3650 OUT WAIT
011226	3660 *WAITING FOR ADDRESS MARK
011226 333 362	3670 IN <R2
011230 057	3680 CPL
011231 271	3690 CP C IS IT A DATA ADDRESS MARK?
011232 040 076	3700 JR NZ, MARK IF NOT JUMP TO MARK
011234 323 367	3710 OUT WAIT
011236	3720 *WAITING FOR DATA BYTE #1
011236 333 362	3730 IN <R2 IT WAS AN ADDRESS MARK, GET DATA BYTE 1
011240 057	3740 CPL
011241 167	3750 LD M, A STORE FIRST DATA BYTE
011242 043	3760 RLOOP INC HL READ AND STORE DATA BYTES
011243 323 367	3770 OUT WAIT
011245	3780 *WAITING FOR DATA BYTES 2 THROUGH SECTOR SIZE-2
011245 333 362	3790 IN <R2
011247 057	3800 CPL
011250 167	3810 LD M, A
011251 005	3820 DEC B
011252 302 242 011	3830 JP NZ, RLOOP RELATIVE ADDRESSING TOO SLOW!
011255 043	3840 INC HL
011256 323 367	3850 OUT WAIT
011260	3860 *WAITING FOR DATA BYTE # SECTOR SIZE-1
011260 333 362	3870 IN <R2
011262 057	3880 CPL
011263 167	3890 LD M, A
011264 172	3900 LD A, D SET CCW TO ACCUMULATOR
011265 323 363	3910 OUT <W3
011267 323 367	3920 OUT WAIT
011271	3930 *WAITING FOR DATA BYTE # SECTOR SIZE
011271 043	3940 INC HL
011272 333 362	3950 IN <R2
011274 057	3960 CPL
011275 167	3970 LD M, A

011276 323 367	3980	OUT	WAIT
011300	3990	*WAITING FOR FIRST CRC BYTE	
011300 076 040	4000	LD	A,W3STT
011302 323 363	4010	OUT	<W3 RESET CCW
011304 323 367	4020	OUT	WAIT
011306	4030	*WAITING FOR THE SECOND CRC BYTE	
011306 333 361	4040	IN	R1 READ THE STATUS
011310 057	4050	CPL	
011311 107	4060	LD	B,A SAVE STATUS IN B
011312 257	4070	XOR	A 00 TO ACC
011313 323 363	4080	OUT	<W3 RESET STT. CHIP GOES TO WRITE CLOCK
011315 170	4090	LD	A,B RECALL STATUS
011316 346 040	4100	AND	RIDER IS THERE A CRC ERROR?
011320 062 301 014	4110	LD	(CRCDR),A SET CRC DATA RECORD FLAG
011323 050 003	4120	JR	Z,RD010 TAKE THIS EXIT IF ALL OK
011325 303 360 011	4130	JP	MK030 A CRC ERROR FOUND
011330 000	4140	RD010 NOP	LD (BUFFER),HL HERE SAVES UPDATED POINTER
011331 311	4150	RET	
011332	4160	*READ DATA RECORD ERROR SERVICE ROUTINE	
011332 257	4170	MARK XOR	A
011333 323 363	4180	OUT	<W3 RESET STT
011335 333 362	4190	IN	<R2 READ MARK AGAIN
011337 057	4200	CPL	
011340 326 370	4210	SUB	0F8H IS IT A DELETED DATA MARK?
011342 062 302 014	4220	LD	(ILLMK),A SET ILLEGAL MARK FLAG
011345 302 354 011	4230	JP	NZ,MK010 ILLEGAL MARK
011350 074	4240	INC	A DELETED DATA MARK
011351 303 355 011	4250	JP	MK020
011354	4260	*ILLEGAL MARK SERVICE ROUTINE	
011354 257	4270	MK010 XOR	A ILLEGAL MARK
011355 062 303 014	4280	MK020 LD	(DELMK),A SET DELETED DATA MARK FLAG
011360 041 305 014	4290	MK030 LD	HL,RRTRY CHECK FOR A RETRY
011363 065	4300	DEC	M
011364 302 156 011	4310	JP	NZ,READ TRY AGAIN
011367 257	4320	XOR	A
011370 323 363	4330	OUT	<W3 RESET STT
011372 074	4340	INC	A CLEAR ZERO FLAG TO INDICATE ERROR CONDITION
011373 311	4350	RET	
011374	4360	*****	
011374	4370	*WRITE DATA RECORD COMMAND ROUTINE	
011374	4380	*PARAMETER AREA HAS THE #'S CONTROLLING THIS WRITE	
011374 315 017 013	4390	WRITE CALL	FUR
011377 315 362 010	4400	CALL	RID READ ID RECORD FIRST
012002 300	4410	RET	NZ EXIT IF ERROR IN ID RECORD READ
012003 006 011	4420	LD	B,09H WE WILL COUNT 9 INTERRUPTS FROM ID
012005 323 367	4430	WGAP	OUT WAIT
012007	4440	*WAITING FOR DRIVE TO BEGIN READING THE 10TH BYTE	
012007 005	4450	DEC	B
012010 040 373	4460	JR	NZ,WGAP

012012 076 270	4470	LD	A,W1CBS+W1CBN SET CLOCK BITS AND STROBE
012014 323 361	4480	OUT	<W1 SET THE WRITE CLOCK TO WRITE ALL POSSIBLE
012016	4490	*CLOCK	BITS (FF) FOR DATA
012016 257	4500	XOR	A
012017 323 362	4510	OUT	<W2 SET WRITE DATA REGISTER TM 00
012021 323 367	4520	OUT	WAIT
012023	4530	*WAITING	FMR 10TH INTERRUPT SINCE ID RECORD. HEAD IS
012023	4540	*READING	GAP BYTE 11
012023 076 160	4550	LD	A,<W3WCS+W3STT+<W3WES WCS=STT=WES=1
012025 323 363	4560	OUT	<W3 WRITE CURRENT & WRITE CLOCK WILL START
012027	4570	*AT	NEXT BRP
012027 333 361	4580	IN	R1 READ STATUS
012031 057	4590	CPL	
012032 346 004	4600	AND	R1WFT WRITE FAULT PRESENT?
012034 312 052 012	4610	JP	Z,WRO10 IF NOT CONTINUE
012037 315 017 013	4620	CALL	FUR RESET FILE UNSAFE
012042 076 001	4630	LD	A,01H
012044 062 304 014	4640	LD	(WRITF),A SET THE WRITE FAULT FLAG
012047 303 315 010	4650	JP	ERROR AND TAKE THE ERROR EXIT
012052 323 367	4660	WRO10	OUT WAIT
012054	4670	*	
012054 323 367	4680	OUT	WAIT HEAD BEGINS WRITING 00 IN GAP BYTE 12
012056	4690	*	
012056 323 367	4700	OUT	WAIT 12TH INTERRUPT; 00 TO BYTE 13
012060	4710	*	
012060 323 367	4720	OUT	WAIT 13TH INTERRUPT; 00 TO BYTE 14
012062	4730	*	
012062 052 261 014	4740	LD	HL,(BUFFER) SET HL TO START OF WRITE DATA
012065 323 367	4750	OUT	WAIT 14TH INTERRUPT 00 TO BYTE 15
012067	4760	*	
012067 006 373	4770	LD	B,0FBH LOAD A DATA MARK IN B
012071 323 367	4780	OUT	WAIT 15TH INTERRUPT; 00 TO BYTE 16
012073	4790	*	
012073 016 062	4800	LD	C,W3STT+W3CCG+W3WES SET CCG COMMAND TO C
012075 026 270	4810	LD	D,W1CBS+W1CBN STORE FF CLOCK PATTERN COMMAND
012077 036 060	4820	LD	E,W3STT+W3WES RESET CCG COMMAND TO E
012101 076 200	4830	LD	A,W1CBS+W1CBD STORE C7 DATA MARK CLOCK
012103	4840	*PATTERN	COMMAND IN A
012103 323 367	4850	OUT	WAIT
012105	4860	*16TH	INTERRUPT, HEAD IS WRITING 17TH AND LAST GAP BYTE
012105 323 361	4870	OUT	<W1 SET C7 DATA MARK CLOCK PATTERN. 16TH
012107 170	4880	LD	A,B SET FB DATA BITS FOR DATA MARK
012110 323 362	4890	OUT	<W2
012112 171	4900	LD	A,C SET CCG CAUSING CRC CALCULATION TO BEGIN
012113	4910	*AT	THE NEXT BRP
012113 323 363	4920	OUT	<W3
012115 172	4930	LD	A,D GET FF DATA BIT CLOCK PATTERN IN A
012116 323 367	4940	OUT	HALI
012120	4950	*HEAD	STARTS DATA MARK NEXT

012120 323 361	4960	OUT	<W1 SET FF CLOCK, HEAD NOW BEGINS WRITING THE
012122	4970	*DATA MARK	
012122 173	4980	LD	A,E RESET CCG. CCG MUST BE RESET BEFORE NEXT
012123	4990	*BRP OR CRC CALCULATION WOULD BEGIN AGAIN	
012123 323 363	5000	OUT	<W3
012125 176	5010	LD	A,M LOAD IN FIRST DATA BYTE
012126 323 362	5020	OUT	<W2 WRITE BYTE #1
012130 323 367	5030	OUT	HALT
012132	5040	*WAITING FOR CHIP TO FINISH DATA MARK AND START DATA	
012132 072 267 014	5050	LD	A,(SCTS) SET THE SECTOR SIZE
012135 075	5060	DEC	A LESS THE BYTE JUST WRITTEN
012136 107	5070	LD	B,A THIS IS THE LOOP COUNT IN B
012137 043	5080	WLOOP INC	HL WRITE DATA BYTES 2 THROUGH NBSCT
012140 176	5090	LD	A,M
012141 323 362	5100	OUT	<W2
012143 323 367	5110	OUT	HALT
012145	5120	*HEAD WRITING DATA BYTES 2 THROUGH SCTSIZ	
012145 005	5130	DEC	B
012146 302 137 012	5140	JP	NZ,WLOOP RELATIVE ADDRESSING TOO SLOW
012151 076 061	5150	LD	A,W3STT+W3CCW+W3WES SET CCW; IN WRITE MODE
012153	5160	*CHIP WILL BEGIN WRITING BITS FROM THE CRC REGISTER AT	
012153	5170	*THE NEXT BRP FOLLOWING THE SETTING OF CCW. HEAD IS	
012153	5180	*WRITING DATA BYTE 128	
012153	5190	*WAITING FOR HEAD TO FINISH DATA	
012153 323 363	5200	OUT	<W3
012155 323 367	5210	OUT	HALT
012157	5220	*	
012157 323 367	5230	OUT	HALT
012161	5240	*	
012161 076 377	5250	LD	A,OFFH LOAD FF GAP BYTE IN WRITE DATA REG.
012163 323 362	5260	OUT	<W2 HEAD BEGINS WRITING 2ND CRC BYTE
012165 076 060	5270	LD	A,W3STT+W3WES RESET CCW; WRITING
012167 323 363	5280	OUT	<W3 WILL STOP AT NEXT BRP
012171 323 367	5290	OUT	HALT
012173	5300	*WAITING FOR HEAD TO FINISH 2ND CRC BYTE	
012173 076 044	5310	LD	A,W3STT+W3WER WRITE ENABLE RESET. WRITE
012175	5320	*CURRENT WILL STOP AT NEXT BRP. HEAD BEGINS WRITING FIRST	
012175	5330	*GAP BYTE	
012175 323 363	5340	OUT	<W3 RESET CCW
012177 323 367	5350	OUT	HALT
012201	5360	*WAITING FOR HEAD TO FINISH 1ST GAP BYTE	
012201 257	5370	XOR	A RESET STT
012202 323 363	5380	OUT	<W3
012204 000	5390	NOP	LD (BUFFER),HL HERE SAVES UPDATED POINTER
012205 311	5400	RET	DATA RECORD HAS BEEN WRITTEN
012206	5410	*****	
012206	5420	*GENERAL SUBROUTINES FOR CONTROL OF DRIVE	
012206	5430	*SEEK TRACK ROUTINE	
012206	5440	SEEK	EQU \$

012206 021 307 014	5450	LD DE,TKPTR ADDRESS OF CURRENT DISC TRACK
012211 315 150 013	5460	CALL INDXA HL WILL EQUAL ADDRESS OF TRACK POINTER
012214 072 265 014	5470	LD A,(TRACK) THIS IS THE TRACK DESIRED
012217 276	5480	CP M
012220 050 015	5490	JR Z,SKO20 EXIT IF WE ARE THERE
012222 372 232 012	5500	JP M,SKO10 TKPTR>TRACK, SO STEP OUT
012225 315 243 012	5510	CALL STI TKPTR<TRACK, STEP IN
012230 030 354	5520	JR SEEK
012232 315 255 012	5530 SKO10	CALL STO
012235 030 347	5540	JR SEEK
012237 315 324 012	5550 SKO20	CALL STO40 AN ADDITIONAL 10 MS FOR HEAD SETTLING
012242 311	5560	RET
012243	5570 *	-----
012243	5580	*STEP SUBROUTINES
012243	5590	*STEP IN
012243 315 053 013	5600 STI	CALL UNSCL PREPARE TO COMMAND THE DRIVE
012246 006 340	5610	LD B,W4STS+W4SID+W4SOS
012250 076 001	5620	LD A,01H INCREMENT TKPTR
012252 303 264 012	5630	JP STO10
012255	5640	*STEP OUT
012255 315 053 013	5650 STO	CALL UNSCL MAKE THE DRIVE CURRENT
012260 006 240	5660	LD B,W4STS+W4SOS STEP STROBE AND STEP OUT
012262 076 377	5670	LD A,OFFH DECREMENT THE TRACK POINTER
012264	5680 STO10	EQU \$
012264 021 307 014	5690	LD DE,TKPTR
012267 315 150 013	5700	CALL INDXA INDEXED ADDRESSING
012272 206	5710	ADD M INC/DEC TKPTR
012273 167	5720	LD M,A RESTORE THE TKPTR
012274 072 053 000	5730	LD A,(LHCTK) CHECK FOR WRITE CURRENT CHANGE
012277	5740	*LHCTK=LAST HIGH CURRENT TRACK
012277 276	5750	CP M A=LHCTK=TKPTR
012300 076 004	5760	LD A,WOLCT LOW CURRENT BIT OF WO
012302 372 312 012	5770	JP M,STO20 TRACK>LHCTK
012305 315 034 013	5780	CALL CLRWO TRACK<=LHCTK TURN OFF LOW CURRENT
012310 030 003	5790	JR STO30
012312 315 043 013	5800 STO20	CALL SETWO TRACK>LHCTK SO SET THE BIT
012315 170	5810 STO30	LD A,B STEP STROBE+STEP OUT
012316 323 364	5820	OUT <W4 RISING EDGE OF SOS
012320 346 337	5830	AND W4SNS W4SNS IS W4SOS BAR; TURN OFF SOS
012322 323 364	5840	OUT <W4 TRAILING EDGE OF SOS
012324	5850	*DELAY 10 MS FOR THE MOTOR TO RESPOND
012324 006 012	5860 STO40	LD B,10D
012326 315 131 013	5870	CALL DELAY
012331 311	5880	RET
012332	5890 *	-----
012332	5900	*HEAD LOAD SUBROUTINE
012332	5910 HDLD	EQU \$ CHECK THE HEAD STATUS
012332 021 311 014	5920	LD DE,HEAD BASE ADDRESS
012335 315 150 013	5930	CALL INDXA INDEXED ADDRESSING

012340 176	5940	LD A,M HEAD LOADED FLAG TO A; 1=LOADED
012341 267	5950	OR A SET FLAGS; IS THE HEAD LOADED ALREADY?
012342 300	5960	RET NZ IF SO RETURN
012343 315 053 013	5970	CALL UNSCL IF HEAD NOT LOADED SELECT THE DRIVE
012346 076 010	5980	LD A,WOHLD
012350 315 043 013	5990	CALL SETWO LOAD THE HEAD
012353 006 036	6000	LD B,30D WAIT 30 MS
012355 315 131 013	6010	CALL DELAY
012360 076 002	6020	LD A,WOWFR
012362 315 043 013	6030	CALL SETWO
012365 076 002	6040	LD A,WOWFR
012367 315 034 013	6050	CALL CLRWO
012372 076 001	6060	LD A,01H SET THE HEAD STATUS
012374 030 011	6070	JR ULO10
012376	6080	*UNLOAD HEAD SUBROUTINE
012376 315 053 013	6090	UNLD CALL UNSCL SET UP THE DRIVE
013001 076 010	6100	LD A,WOHLD
013003 315 034 013	6110	CALL CLRWO UNLOAD THE HEAD
013006 257	6120	XOR A
013007	6130	ULO10 EQU \$
013007 021 311 014	6140	LD DE,HEAD BASE ADDRESS
013012 315 150 013	6150	CALL INDXA
013015 167	6160	LD M,A SET UP THE HEAD FLAG
013016 311	6170	RET
013017	6180	*-----
013017	6190	*FILE UNSAFE RESET ROUTINE
013017 076 002	6200	FUR LD A,02H
013021 345	6210	PUSH HL
013022 315 043 013	6220	CALL SETWO
013025 076 002	6230	LD A,02H
013027 315 034 013	6240	CALL CLRWO
013032 341	6250	POP HL
013033 311	6260	RET
013034	6270	*-----
013034	6280	*WRO MANAGER; MAINTAINS A SOFTWARE IMAGE OF WO
013034 041 306 014	6290	CLRWO LD HL,WRO
013037 057	6300	CPL
013040 246	6310	AND M CLEAR
013041 030 004	6320	JR CRO10
013043 041 306 014	6330	SETWO LD HL,WRO
013046 266	6340	OR M SET
013047 323 360	6350	CRO10 OUT <WO
013051 167	6360	LD M,A SAVE A COPY OF WO
013052 311	6370	RET
013053	6380	*-----
013053	6390	*UNIT SELECT SUBROUTINE
013053 076 004	6400	UNSCL LD A,W1UAS SET THE SELECT STROBE
013055 323 361	6410	OUT W1 DESELECT ALL "A" DRIVES
013057 323 364	6420	OUT W4 DESELECT ALL "B" DRIVES

013061 072 264 014	6430	LD	A,(UNIT) THIS IS THE DRIVE WE WANT
013064 376 003	6440	CP	03H DRIVES A OR B?
013066 362 116 013	6450	JP	P,UN010 DRIVE 3 OR 4 IF NEGATIVE
013071 346 003	6460	AND	W1UAA MASK OUT THE UNIT NUMBER
013073 366 004	6470	OR	W1UAS TURN ON THE SELECT STROBE
013075 323 361	6480	OUT	W1 AND SELECT THE UNIT
013077 000	6490 UNOUT	NOP	
013100 000	6500	NOP	GIVD THE DRIVE SOME TIME TO RESPOND
013101 333 361	6510	IN	R1 DRIVE STATUS
013103 057	6520	CPL	
013104 346 010	6530	AND	R1RYA DRIVE READY?
013106 300	6540	RET	NZ YES
013107 057	6550	CPL	DRIVE NOT READY
013110 062 273 014	6560	LD	(SLCTF),A SET SELECT ERROR FLAG
013113 303 315 010	6570	JP	ERROR
013116 346 003	6580 UN010	AND	W4UBA MASK OUT UNIT NUMBER
013120 326 002	6590	SUB	O2H BIAS DOWN FOR DRIVE 3 OR 4
013122 366 004	6600	OR	W4UBS TURN ON THE SELECT STROBE
013124 323 364	6610	OUT	W4 SELECT THE UNIT
013126 303 077 013	6620	JP	UNOUT AND GO SEE IF IT COMES READY
013131	6630	*-----	
013131	6640	*DELAY SUBROUTINE	
013131 076 004	6650 DELAY	LD	A,W6TRR TURN ON TIMER REQUEST
013133 323 366	6660	OUT	<W6 RESET TIMER REQUEST
013135	6670	*WAIT FOR TRQ RST STATUS	
013135 333 360	6680 D010	IN	<R0 READ STATUS
013137 057	6690	CPL	
013140 346 004	6700	AND	<R0TRQ CHECK TRQ
013142 050 371	6710	JR	Z,D010 WAIT FOR A MS
013144 005	6720	DEC	B DONE?
013145 040 362	6730	JR	NZ,DELAY NO
013147 311	6740	RET	YES
013150	6750	*-----	
013150	6760	*INDEXED ADDRESSING SUBROUTINE	
013150	6770	*INPUT: DE=BASE; UNIT=INDEX. OUTPUT: HL=DE+(UNIT-1)	
013150 041 264 014	6780 INDXA	LD	HL,UNIT DRIVE BEING COMMANDED
013153 156	6790	LD	L,M
013154 046 000	6800	LD	H,00H
013156 055	6810	DEC	L
013157 031	6820	ADD	HL,DE
013160 311	6830	RET	
013161	6840	*-----	
013161	6850	*DISC FORMATTING COMMAND ROUTINE	
013161 315 076 010	6860 FRMAT	CALL	INIT HEAD TO TRACK 00
013164 315 332 012	6870	CALL	HOLD LOAD THE HEAD
013167 041 001 000	6880	LD	HL,0001H H=00-TRACK ADDRESS; L=01=SECTOR
013172	6890	*SET UP COMMANDS	
013172 315 017 013	6900 FM030	CALL	FUR
013175 076 270	6910	LD	A,<W1CBS+<W1CBN

013177	323	361	6920	OUT	<W1 SET THE CLOCK BITS
013201	076	377	6930	LD	A,OFFH
013203	323	362	6940	OUT	<W2
013205	257		6950	XOR	A RESET STT
013206	323	363	6960	OUT	<W3
013210	076	170	6970	LD	A,<W3WCS+<W3STT+<W3WES+<W3IXS
013212	323	363	6980	OUT	<W3 SET CHIP TO START WRITING AT INDEX HOLE
013214	323	367	6990	OUT	HALT
013216			7000	*INDEX	START HEAD IS WRITING FIRST GAP BYTE
013216	076	002	7010	LD	A,<W6IRR
013220	323	366	7020	OUT	<W6 RESET INDEX REQUEST
013222			7030	*WRITE	PRE INDEX GAP
013222	006	047	7040	LD	B,39D B=# OF OFFH GAP BYTES
013224	323	367	7050	FM040	OUT HALT
013226			7060	*	
013226			7070	*HEAD	WRITES GAP BYTES 2 THROUGH 40
013226	005		7080	DEC	B DONE?
013227	040	373	7090	JR	NZ,FM040 IF NOT REPEAT
013231	257		7100	XOR	A YES, CHANGE GAP
013232	323	362	7110	OUT	<W2 BYTE TO 00H
013234	006	005	7120	LD	B,05H B=BYTE COUNT
013236	323	367	7130	FM050	OUT HALT
013240			7140	*	
013240			7150	*HEAD	WRITES GAP BYTES 41 THROUGH 45
013240	005		7160	DEC	B DONE?
013241	040	373	7170	JR	NZ,FM050 NO, REPEAT
013243	323	367	7180	OUT	HALT
013245			7190	*	
013245			7200	*HEAD	IS WRITING GAP BYTE 46
013245			7210	*WRITE	INDEX ADDRESS MARK
013245	076	220	7220	LD	A,<W1CBS+<W1CBI
013247	323	361	7230	OUT	<W1 CHANGE CLOCK BITS TO D7
013251	076	374	7240	LD	A,0FCH
013253	323	362	7250	OUT	<W2 SET WRITE DATA=0FCH
013255	323	367	7260	OUT	HALT
013257			7270	*	
013257			7280	*HEAD	IS WRITING INDEX ADDRESS MARK
013257			7290	*WRITE	POST INDEX GAP
013257	076	270	7300	LD	A,<W1CBS+<W1CBN
013261	323	361	7310	OUT	<W1 SET CLOCK BITS TO FF
013263	076	377	7320	LD	A,0FFH
013265	323	362	7330	OUT	<W2 SET WRITE DATA TO 0FFH
013267	006	031	7340	LD	B,25D B=BYTE COUNT
013271	323	367	7350	FM060	OUT HALT
013273			7360	*	
013273			7370	*HEAD	WRITES GAP BYTES 1 THROUGH 26
013273	005		7380	DEC	B DONE?
013274	040	373	7390	JR	NZ,FM060 NO, REPEAT
013276	257		7400	FM070	XOR A BEGINNING OF SECTOR WRITE LOOP. EXECUTED

013277		7410	*26 TIMES
013277	323 362	7420	OUT <W2 SET WRITE DATA=00H
013301	323 367	7430	OUT HALT
013303		7440	*
013303		7450	*HEAD IS WRITING FIRST OF 6 00 BYTES
013303	323 367	7460	OUT HALT
013305		7470	*2ND OF 6
013305	323 367	7480	OUT HALT
013307		7490	*3RD OF 6
013307	323 367	7500	OUT HALT
013311		7510	*4TH OF 6
013311	323 367	7520	OUT HALT
013313		7530	*5TH OF 6
013313	006 376	7540	LD B, OFEH LOAD ID MARK IN B
013315	016 062	7550	LD C, <W3STT+W3CCG+W3WES SET CCG CMND TO C
013317		7560	*(ALSO RESETS IXS)
013317	026 270	7570	LD D, <W1CBS+<W1CBN STORE FF CLOCK PATTERN TO D
013321	036 060	7580	LD E, <W3STT+W3WES STORE RESET CCG IN E
013323	076 200	7590	LD A, <W1CBS+<W1CBD "C7" DATA MARK CLOCK PATTERN
013325	323 367	7600	OUT HALT
013327		7610	*
013327		7620	*HEAD IS WRITING 6TH OF 6 00 GAP BYTES
013327	323 361	7630	OUT <W1 SET "C7" DATA MARK CLOCK PATTERN
013331	170	7640	LD A, B SET "FE" DATA BITS
013332	323 362	7650	OUT <W2 FOR ID MARK
013334	171	7660	LD A, C SET CCG THIS CAUSES CRC
013335	323 363	7670	OUT <W3 CALCULATION TO BEGIN AT NEXT BRP
013337	172	7680	LD A, D GET "FF" DATA CLOCK BIT PATTERN
013340	323 367	7690	OUT HALT
013342		7700	*
013342		7710	*HEAD IS WRITING ID ADDRESS MARK
013342	323 361	7720	OUT <W1 SET FF DATA CLOCK FOR NEXT BYTE.
013344	173	7730	LD A, E RESET CCG.
013345	323 363	7740	OUT <W3
013347		7750	*CRC MUST BE RESET BEFORE NEXT BRP OR CRC CALCULATION
013347		7760	*WOULD BEGIN AGAIN
013347	174	7770	LD A, H LOAD TRACK ADDRESS
013350	323 362	7780	OUT <W2
013352	323 367	7790	OUT HALT
013354		7800	*HEAD IS WRITING TRACK ADDRESS
013354	257	7810	XOR A
013355	323 362	7820	OUT <W2 1ST ZERO BYTE
013357	323 367	7830	OUT HALT
013361		7840	*HEAD IS WRITING FIRST ZERO BYTE
013361	175	7850	LD A, L
013362	323 362	7860	OUT <W2 SET DATA BYTE=SECTOR ADDRESS
013364	323 367	7870	OUT HALT
013366		7880	*HEAD IS WRITING SECTOR ADDRESS
013366	257	7890	XOR A

013367 323 362	7900	OUT <W2 2ND ZERO BYTE
013371 323 367	7910	OUT HALT
013373	7920	*HEAD IS WRITING 2ND ZERO BYTE
013373 076 061	7930	LD A,<W3STT+W3CCW+W3WES SET CCW; IN WRITE MODE
013375	7940	*WILL BEGIN WRITING BITS FROM THE CRC REGISTERS AT NEXT
013375	7950	*BRP FOLLOWING THE SETTING OF CCW
013375 323 363	7960	OUT <W3
013377 323 367	7970	OUT HALT
014001	7980	*HEAD IS WRITING FIRST CRC BYTE
014001 323 367	7990	OUT HALT
014003	8000	*HEAD IS WRITING 2ND CRC BYTE
014003 076 377	8010	LD A,OFFH LOAD "FF" GAP BYTE IN WRITE DATA REG
014005 323 362	8020	OUT <W2
014007 076 060	8030	LD A,W3STT+W3WES RESET CCW; BIT WRITING
014011 323 363	8040	OUT <W3 WILL STOP AT NEXT BRP
014013 006 013	8050	LD B,11D B= BYTE COUNT
014015 323 367	8060	OUT HALT
014017 323 367	8070 FM080	OUT HALT
014021	8080	*HEAD WRITES GAP BYTES 1 THROUGH 11
014021 005	8090	DEC B DONE?
014022 040 373	8100	JR NZ,FM080 NO, REPEAT
014024 257	8110	XOR A YES, CHANGE GAP BYTE
014025 323 362	8120	OUT <W2 TO 00H
014027 323 367	8130	OUT HALT
014031	8140	*BYTE 12
014031 323 367	8150	OUT HALT
014033	8160	*BYTE 13
014033 323 367	8170	OUT HALT
014035	8180	*BYTE 14
014035 323 367	8190	OUT HALT
014037	8200	*BYTE 15
014037 323 367	8210	OUT HALT
014041	8220	*HEAD IS WRITING GAP BYTE 16
014041 006 373	8230	LD B,OFBH LOAD DATA MARK TO B
014043 016 062	8240	LD C,<W3STT+W3CCG+W3WES SET CCG COMMAND TO C
014045 026 270	8250	LD D,<W1CBS+<W1CBN STORE FF CLOCK PATTERN
014047 036 040	8260	LD E,<W3STT
014051 076 200	8270	LD A,<W1CBS+<W1CBD STORE "C7" DATA MARK CLOCK
014053 323 367	8280	OUT HALT
014055	8290	*HEAD IS WRITING GAP BYTE 17
014055 323 361	8300	OUT <W1 SET C7 DATA MARK CLOCK PATTERN
014057 170	8310	LD A,B SET "FB" DATA BITS FOR DATA MARK
014060 323 362	8320	OUT <W2
014062 171	8330	LD A,C SET CCG. THIS CAUSES CRC CALCULATION TO
014063 323 363	8340	OUT <W3 BEGIN AT NEXT BRP
014065 172	8350	LD A,D GET "FF" DATA BIT CLOCK PATTERN CMND
014066 323 367	8360	OUT HALT
014070	8370	A
014070	8380	*HEAD IS WRITING DATA ADDRESS MARK

014070 323 361	8390	OUT <W1 SET FF DATA BIT CLOCK FOR NEXT BYTE
014072 173	8400	LD A,E RESET CCG. CCG MUST BE RESET BEFORE NEXT
014073	8410	*BRP OR CRC CALCULATION WOULD BEGIN AGAIN
014073 323 363	8420	OUT <W3
014075 076 345	8430	LD A,0E5H LOAD DATA
014077 323 362	8440	OUT <W2
014101 323 367	8450	OUT HALT
014103	8460	*HEAD WRITES DATA BYTE 1
014103 006 177	8470	LD B,<NBSCT-1
014105 323 367	8480	FM100 OUT HALT
014107	8490	*
014107	8500	*HEAD WRITES DATA BYTES 2 THROUGH NBSCT
014107 005	8510	DEC B
014110 302 105 014	8520	JP NZ,FM100
014113 076 061	8530	LD A,<W3STT+<W3CCW+<W3WES SET CCW; IN WRITE CHIP
014115	8540	*WILL BEGIN WRITING BITS FROM THE CRC REGISTERS AT THE
014115	8550	*NEXT BRP FOLLOWING THE SETTING OF CCW
014115 323 363	8560	OUT <W3
014117 323 367	8570	OUT HALT
014121	8580	*HEAD IS WRITING FIRST CRC BYTE
014121 323 367	8590	OUT HALT
014123	8600	*HEAD IS WRITING 2ND CRC BYTE
014123 076 377	8610	LD A,OFFH LOAD "FF" GAP BYTE IN WRITE DATA REG
014125 323 362	8620	OUT <W2
014127 076 060	8630	LD A,<W3STT+<W3WES RESET CCW; CRC WRITING ENDS
014131 323 363	8640	OUT <W3
014133 006 033	8650	LD B,27D B= BYTE COUNT
014135 323 367	8660	OUT HALT
014137 323 367	8670	FM110 OUT HALT
014141	8680	*HEAD WRITES GAP BYTES 1 THROUGH 27
014141 005	8690	DEC B DONE?
014142 040 373	8700	JR NZ,FM110 NO, REPEAT
014144 054	8710	INC L INCREMENT SECTOR ADDRESS
014145 076 032	8720	LD A,26D
014147 275	8730	CP L LAST SECTOR?
014150 362 276 013	8740	JP P,FM070 NO, WRITE ANOTHER SECTOR
014153	8750	*WRITE FF'S TO END OF TRACK
014153 323 367	8760	FM120 OUT HALT
014155	8770	*
014155	8780	*HEAD WRITES GAP BYTES 28 TO 247
014155 333 360	8790	IN <R0 READ STATUS
014157 057	8800	CPL
014160 346 002	8810	AND ROIRQ INDEX REQUEST?
014162 312 153 014	8820	JP Z,FM120 NO, CONTINUE
014165	8830	*END OF TRACK
014165 076 004	8840	LD A,<W3WER
014167 323 363	8850	OUT <W3 WRITE ENABLE AND STT RESET
014171 333 360	8860	IN <R0 LOAD STATUS
014173 057	8870	CPL

014174 346 010	8880	AND ROERR ERRORS?
014176 040 024	8890	JR NZ,FM130
014200	8900	*INDEX REQUEST IS AUTOMATICALLY RESET BY STT RESET
014200 076 114	8910	LD A,<NTRKS-1
014202 274	8920	CP H LAST TRACK?
014203 310	8930	RET Z YES, FORMATTING COMPLETE
014204 056 001	8940	LD I,01H NO, RESET SECTOR ADDRESS
014206 044	8950	INC H INCREMENT TRACK ADDRESS
014207 345	8960	PUSH HL SAVE HL
014210 006 002	8970	LD B,02H WAIT FOR TUNNEL ERASE HEAD
014212 315 131 013	8980	CALL DELAY TO REACH END OF TRACK BEFORE
014215 315 243 012	8990	CALL STI STEPPING HEAD
014220 341	9000	POP HL RESTORE DATA IN HL
014221 303 172 013	9010	JP FM030 AND CONTINUE
014224	9020	*ERROR SERVICE ROUTINE
014224 062 304 014	9030	FM130 LD (WRITF),A
014227 062 270 014	9040	LD (MERF),A
014232 303 315 010	9050	JP ERROR
014235	9060	*****
014235	9070	*TABLES, COUNTERS, POINTERS, ETC.
014235	9080	*LIMIT TABLE (UPPER AND LOWER FOR PARAMETERS
014235	9090	LMTBL DB 1
001		
014236	9100	DB NU+1 UNIT
002		
014237	9110	DB 0
000		
014240	9120	DB NTRKS TRACK
115		
014241	9130	DB 1
001		
014242	9140	DB NSCTR+1 SECTR
033		
014243	9150	DB 4
004		
014244	9160	DB NBSCT+1 SCTSZ
201		
014245	9170	*-----
014245	9180	*COMMAND TABLE
014245	9190	CTBL DW READ 1
156 011		
014247	9200	DW WRITE 2
374 011		
014251	9210	DW SEEK 3
206 012		
014253	9220	DW INIT 4
076 010		
014255	9230	DW FRMAT 5
161 013		

014257	9240	DW	RSTO	6
022 010				
014261	9250	*		
014261	9260	NCMDS	EQU	06H
014261	9270	*	-----	
014261	9280	BUFFR	DW	BUF THIS IS THE POINTER TO THE DATA
312 014				
014263	9290	*COMMAND		
014263	9300	CMND	DS	01H COMMAND (1-NCMDS)
014264	9310	*	-----	
014264	9320	*PARAMETERS		
014264	9330	UNIT	DS	01H DRIVE NUMBER BEING COMMANDED
014265	9340	TRACK	DS	01H TRACK DESIRED
014266	9350	SECTR	DS	01H SECTOR DESIRED
014267	9360	SCTSZ	DS	01H SECTOR SIZE
014270	9370	NP	EQU	\$-UNIT NUMBER OF PARAMETERS
014270	9380	*	-----	
014270	9390	*FLAGS		
014270	9400	MERF	DS	01H MASTER ERROR FLAG
014271	9410	CMDER	DS	01H COMMAND ERROR
014272	9420	PKMER	DS	01H PARAMETER ERROR
014273	9430	SLCTF	DS	01H SELECT FAULT (DRIVE DID NOT COME READY)
014274	9440	NOGO	DS	01H FAILED TO FIND SECTOR FLAG
014275	9450	WTRK	DS	01H WRONG TRACK
014276	9460	ZERO1	DS	01H ZERO BYTE 1 NOT ZERO
014277	9470	ZERO2	DS	01H ZERO BYTE 2 NOT ZERO
014300	9480	CRCID	DS	01H CRC ERROR IN ID
014301	9490	CRCOR	DS	01H CRC ERROR IN DATA READ
014302	9500	ILLMK	DS	01H ILLEGAL DATA MARK FLAG
014303	9510	DELMK	DS	01H DELETED DATA MARK FLAG
014304	9520	WRITF	DS	01H WRITE FAULT
014305	9530	NF	EQU	\$-MERF NUMBER OF FLAGS
014305	9540	*	-----	
014305	9550	*COUNTERS, POINTERS, STATUSES		
014305	9560	RRTRY	DS	01H READ RETRY COUNTER
014306	9570	WRO	DS	NU COPIES OF LATEST WO
014307	9580	TKPTR	DS	NU TRACK POINTER FOR EACH UNIT
014310	9590	REVS	DS	NU ELAPSED IDLE REVOLUTIONS
014311	9600	HEAD	DS	NU HEAD STATUS; 1=LOADED, 0=UNLOADED
014312	9610	NB	EQU	\$-CMND NUMBER OF BYTES IN DATA AREA
014312	9620	*	-----	
014312	9630	*		
014312	9640	BUF	DS	NBSCT THIS IS NORMALLY THE DATA BUFFER AREA
015112	9650	*		
015112	9660	END		

FILE 060000 247002
READY