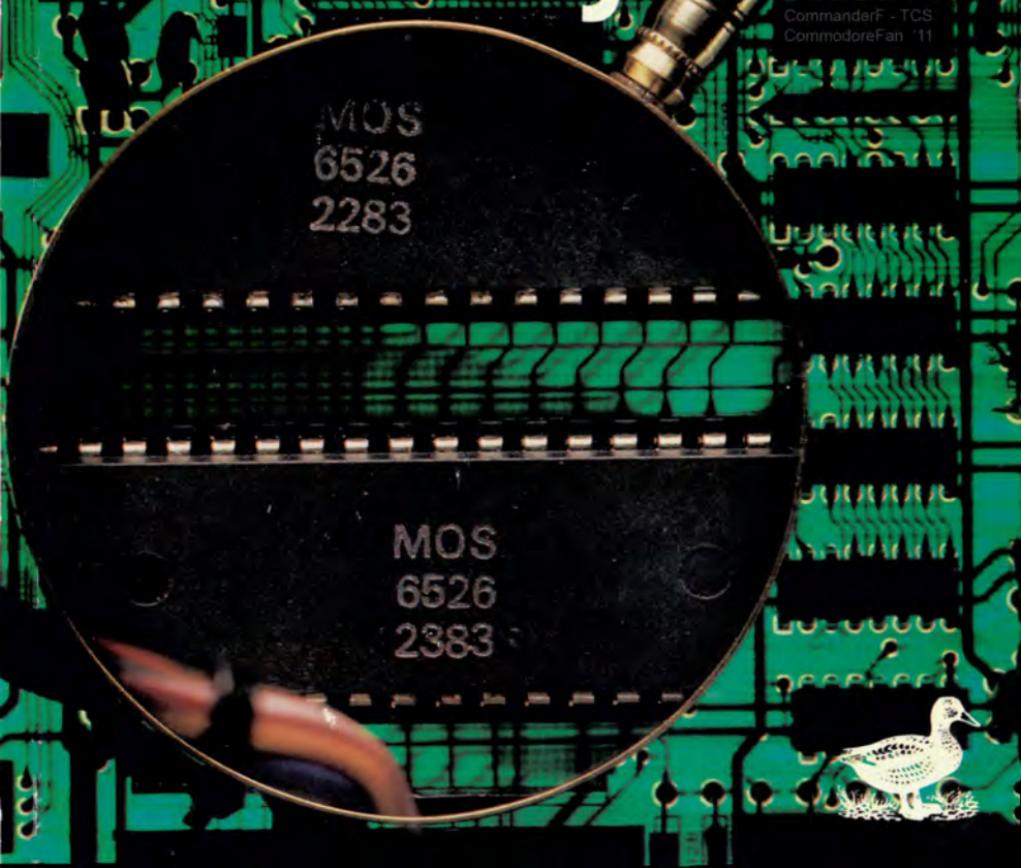


Peter Gerrard Kevin Bergin

# The Complete COMMODORE 64 ROM Disassembly

CommanderF - TCS  
CommodoreFan '11



# **The Complete Commodore 64 ROM Disassembly**

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**Peter Gerrard  
&  
Kevin Bergin**



**Duckworth**

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## Preface

This book is intended to be used by the serious Commodore 64 programmer, and gives a complete disassembly of all the 64 ROM routines.

Also included for reference is the complete 6510 machine code instruction set, together with a listing for a full assembler/disassembler for the Commodore 64.

Some sections of the code will obviously not make sense as disassemblies: error messages, for instance, will disassemble into pure garbage! However, for the sake of completeness, it's all been left in.

Many programmers could have produced this book, but not many programmers have access to amenable publishers, as we have. The book has been produced to serve purely as a reference guide and nothing else.

If it leads you to a better understanding of your computer and the way that it works, and if it helps you to write better machine code programs, then the purpose of this book will have been achieved.

We'd like to thank the publishers for their help and advice in producing this book, and also the Hare and Hounds public house in Ashford, where the idea for this series of books was first conceived.

P.G. & K.B.

# Fundamental memory map and ROM disassembly

## Complete Commodore 64 ROM Disassembly

0000	0	Chip directional register
0001	1	Chip I/O;memory & tape control
0003-0004	3-4	Float-Fixed vector
0005-0006	5-6	Fixed-Float vector
0007	7	Search character
0008	8	Scan-quotes flag
0009	9	TAB column save
000A	10	0=LOAD, 1=VERIFY
000B	11	Input buffer pointer/# subscript
000C	12	Default DIM flag
000D	13	Type:FF=string, 00=numeric
000E	14	Type:B0=integer, 00=floating point
000F	15	DATA scan/LIST quote/memory flag
0010	16	Subscript/FNx flag
0011	17	0=INPUT;\$40=GET;\$98=READ
0012	18	ATN sign/Comparison avel flag
0013	19	Current I/O prompt flag
0014-0015	20-21	Integer value
0016	22	Pointer:temporary string stack
0017-0018	23-24	Last temp string vector
0019-0021	25-33	Stack for temporary strings
0022-0025	34-37	Utility pointer area
0026-002A	38-42	Product area for multiplication
002B-002C	43-44	Pointer:Start of Basic

002D-002E	45-46	Pointer:Start of Variables
002F-0030	47-48	Pointer:Start of Arrays
0031-0032	49-50	Pointer:End of Arrays
0033-0034	51-52	Pointer:String-storage (moving down)
0035-0036	53-54	Utility string pointer
0037-0038	55-56	Pointer:Limit of memory
0039-003A	57-58	Current Basic line number
003B-003C	59-60	Previous Basic line number
003D-003E	61-62	Pointer:Basic statement for CONT
003F-0040	63-64	Current DATA line number
0041-0042	65-66	Current DATA address
0043-0044	67-68	Input vector
0045-0046	69-70	Current variable name
0047-0048	71-72	Current variable address
0049-004A	73-74	Variable pointer for FOR/NEXT
004B-004C	75-76	Y-save;op-save;Basic pointer save
004D	77	Comparison symbol accumulator
004E-0053	78-83	Misc. work area, pointers,etc.
0054-0056	84-86	Jump vector for functions
0057-0060	87-96	Misc. numeric work area
0061	97	Accum#1:Exponent
0062-0065	98-101	Accum#1:Mantissa
0066	102	Accum#1:Sign
0067	103	Series evaluation constant pointer
0068	104	Accum#1 hi-order (overflow)
0069-006E	105-110	Accum#2:Exponent,etc.
006F	111	Sign comparison,Ac#1 vs #2
0070	112	Accum#1 lo-order (rounding)
0071-0072	113-114	Cassette buff len/Series pointer
0073-008A	115-138	CHRGET subroutine;get Basic character

007A-007B	122-123	Basic pointer (within subroutine)
008B-00BF	139-143	RND seed value
0090	144	Status word ST
0091	145	Keyswitch PIA:STOP and RVS flags
0092	146	Timing constant for tape
0093	147	Load=0, Verify=1
0094	148	Serial output:deferred character flag
0095	149	Serial deferred character
0096	150	Tape EOT received
0097	151	Register save
0098	152	How many open files
0099	153	Input device, normally 0
009A	154	Output CMD device, normally 3
009B	155	Tape character parity
009C	156	Byte-received flag
009D	157	Direct=\$80/RUN=0 output control
009E	158	Tp Pass 1 error log/char. buffer
009F	159	Tp Pass 2 error log corrected
00A0-00A2	160-162	Jiffy Clock HML
00A3	163	Serial bit count/EOI flag
00A4	164	Cycle count
00A5	165	Countdown, tape write/bit count
00A6	166	Tape buffer pointer
00A7	167	Tp Wrt ldr count/Rd pass/inbit
00AB	168	Tp Wrt new byte/Rd error/inbit cnt
00A9	169	Wrt start bit/Rd bit err/stbit
00AA	170	Tp scan;Cnt;Ld;End/byte assy
00AB	171	Wr lead length/Rd checksum/parity
00AC-00AD	172-173	Pointer:tape buffer, scrolling
00AE-00AF	174-175	Tape end adds/End of program

00B0-00B1	176-177	Tape timing constants
00B2-00B3	178-179	Pntr:start of tape buffer
00B4	180	1=Tp timer enabled;bit count
00B5	181	Tp EOT/RS232 next bit to send
00B6	182	Read character error/outbyte buff.
00B7	183	# characters in file name
00B8	184	Current logical file
00B9	185	Current secondary address
00BA	186	Current device
00BB-00BC	187-188	Pointer to file name
00BD	189	Wr shift word/Rd input character
00BE	190	# blocks remaining to Wr/Rd
00BF	191	Serial word buffer
00C0	192	Tape monitor interlock
00C1-00C2	193-194	I/O start address
00C3-00C4	195-196	Kernel setup pointer
00C5	197	Last key pressed
00C6	198	# characters in keyboard buffer
00C7	199	Screen reverse flag
00C8	200	End-of-line for input pointer
00C9-00CA	201-202	Input cursor log (row, column)
00CB	203	Which key: 64 if no key
00CC	204	0=flash cursor
00CD	205	Cursor timing countdown
00CE	206	Character under cursor
00CF	207	Cursor in blink phase
00D0	208	Input from screen/from keyboard
00D1-00D2	209-210	Pointer to screen line
00D3	211	Position of cursor on above line
00D4	212	0=direct cursor, else programmed

00D5	213	Current screen line length
00D6	214	Row where cursor lives
00D7	215	Last inkey/checksum/buffer
00D8	216	# of INSERTs outstanding
00D9-00F2	217-242	Screen line link table
00F3-00F4	243-244	Screen colour pointer
00F5-00F6	245-246	Keyboard pointer
00F7-00FB	247-248	RS-232 Rev pntr
00F9-00FA	249-250	RS-232 Tx pntr
00FF-010A	256-266	Floating to ASCII work area
0100-013E	256-318	Tape error log
0100-01FF	256-511	Processor stack area
0200-0258	512-600	Basic input buffer
0259-0262	601-610	Logical file table
0263-026C	611-620	Device # table
026D-0276	621-630	Sec Adds table
0277-0280	631-640	Keyboard buffer
0281-0282	641-642	Start of Basic memory
0283-0284	643-644	Top of Basic memory
0285	645	Serial bus timeout flag
0286	646	Current colour code
0287	647	Colour under cursor
0288	648	Screen memory page
0289	649	Max size of keyboard buffer
028A	650	Repeat all keys
028B	651	Repeat speed counter
028C	652	Repeat delay counter
028D	653	Keyboard Shift/Control flag
028E	654	Last shift pattern
028F-0290	655-656	Keyboard table setup pointer

0291	657	Keyboard shift mode
0292	658	0=scroll enable
0293	659	RS-232 control reg.
0294	660	RS-232 command reg.
0295-0296	661-662	Bit timing
0297	663	RS-232 status
0298	664	# bits to send
0299-029A	665-666	RS-232 speed code
029B	667	RS232 receive pointer
029C	668	RS232 input pointer
029D	669	RS232 transmit pointer
029E	670	RS232 output pointer
029F-02A0	671-672	IRQ save during tape I/O
02A1	673	CIA 2 (NMI) Interrupt Control
02A2	674	CIA 1 Timer A control log
02A3	675	CIA 1 Interrupt log
02A4	676	CIA 1 Timer A enabled flag
02A5	677	Screen row marker
02C0-02FE	704-766	(Sprite 11)
0300-0301	768-769	Error message link
0302-0303	770-771	Basic warm start link
0304-0305	772-773	Crunch Basic tokens link
0306-0307	774-775	Print tokens link
0308-0309	776-777	Start new Basic code link
030A-030B	778-779	Get arithmetic element link
030C	780	SYS A-reg save
030D	781	SYS X-reg save
030E	782	SYS Y-reg save
030F	783	SYS status reg save
0310-0312	784-785	USR function jump

(B248)

0314-0315	788-789	Hardware interrupt vector	(EA31)
0316-0317	790-791	Break interrupt vector	(FE66)
0318-0319	792-793	NMI interrupt vector	(FE47)
031A-031B	794-795	OPEN vector	(F34A)
031C-031D	796-797	CLOSE vector	(F291)
031E-031F	798-799	Set-input vector	(F20E)
0320-0321	800-801	Set-output vector	(F250)
0322-0323	802-803	Restore I/O vector	(F333)
0324-0325	804-805	INPUT vector	(F157)
0326-0327	806-807	Output vector	(F1CA)
0328-0329	808-809	Test-STOP vector	(F6ED)
032A-032B	810-811	GET vector	(F13E)
032C-032D	812-813	Abort I/O vector	(F32F)
032E-032F	814-815	Warm start vector	(FE66)
0330-0331	816-817	LOAD link	(F4A5)
0332-0333	818-819	SAVE link	(F5ED)
033C-03FB	828-1019	Cassette buffer	
0340-037E	832-895	(Sprite 13)	
0380-03BE	896-958	(Sprite 14)	
03C0-03FE	960-1022	(Sprite 15)	
0400-07FF	1024-2047	Screen memory	
0800-9FFF	2048-40959	Basic RAM memory	
8000-9FFF	32768-40959	Alternate: ROM plug-in area	
A000-BFFF	40960 49151	ROM: Basic	
A000-BFFF	40960-49151	Alternate: RAM	
C000-CFFF	49152-53247	RAM memory, including alternate	
D000-D02E	53248-53294	Video chip (6566)	
D400-D41C	54272-54300	Sound chip (6581 SID)	
D800-DBFF	55296-56319	Colour nybble memory	
DC00-DC0F	56320-56335	Interface chip 1,IRQ (6526 CIA)	

DD00-DD0F	56576-56591 Interface chip 2,NMI (6526 CIA)
D000-DFFF	53248-57343 Alternate: Character set
E000-FFFF	57344-65535 ROM: Operating system
E000-FFFF	57344-65535 Alternate: RAM
FFB1-FFFF5	65409-65525 Jump table, Including:-
FFC6	-Set Input channel
FFC9	-Set Output channel
FFCC	-Restore default I/O channels
FFCF	-INPUT
FFD2	-PRINT
FFE1	-Test Stop key
FFE4	-GET

## **Commodore 64 - ROM Memory Map**

---

A000; ROM control vectors  
A00C; Keyword action vectors  
A052; Function vectors  
A080; Operator vectors  
A09E; Keywords  
A19E; Error messages  
A328; Error message vectors  
A35B; Misc. messages  
A389; Scan stack for FOR/GOSUB  
A3B8; Move memory  
A3FB; Check stack depth  
A408; Check memory space  
A435; 'out of memory'  
A437; Error routine  
A469; BREAK entry  
A474; 'ready'  
A480; Ready for Basic

A49C; .. .. ..

A533; Re-chain lines

A560; Receive input line

A579; Crunch tokens

A613; Find Basic line

A642; Perform [NEW]

A65E; Perform [CLR]

A68E; Back up text pointer

A69C; Perform [LIST]

A742; Perform [FOR]

A7ED; Execute statement

A81D; Perform [RESTORE]

A82C; Break

A82F; Perform [STOP]

A831; Perform [END]

A857; Perform [CONT]

A871; Perform [RUN]

A883; Perform [GOSUB]

A8A0; Perform [GOTO]

A8D2; Perform [RETURN]

A8F8; Perform [DATA]

A906; Scan for next statement  
A928; Perform [IF]  
A93B; Perform [REM]  
A94B; Perform [ON]  
A96B; Get fixed point number  
A9A5; Perform [LET]  
AA80; Perform [PRINT#]  
AA86; Perform [CMD]  
AAA0; Perform [PRINT]  
AB1E; Print string from (y.a)  
AB3B; Print format character  
AB4D; Bad input routine  
AB7B; Perform [GET]  
ABA5; Perform [INPUT#]  
ABB5; Perform [INPUT]  
ABF9; Prompt & input  
AC06; Perform [READ]  
ACFC; Input error messages  
AD1E; Perform [NEXT]  
AD78; Type match check  
AD9E; Evaluate expression

AEAB; Constant - pi  
AEF1; Evaluate within brackets  
AEF7; )  
AEFF; Comma..  
AF08; Syntax error  
AF14; Check range  
AF28; Search for variable  
AFA7; Setup FN reference  
AFE9; Perform [OR]  
AFF0; Perform [AND]  
B016; Compare  
B081; Perform [DIM]  
B08B; Locate variable  
B113; Check alphabetic  
B11D; Create variable  
B194; Array pointer subroutine  
B1A5; Value 32768  
B1B2; Float-fixed  
B1D1; Set up array  
B248; 'bad subscript'  
B24D; 'illegal quantity'

B34C; Compute array size  
B37D; Perform [FRE]  
B391; Fix-float  
B39E; Perform [POS]  
B3A6; Check direct  
B3B3; Perform [DEF]  
B3E1; Check fn syntax  
B3F4; Perform [FN]  
B465; Perform [STR\$]  
B475; Calculate string vector  
B487; Set up string  
B4F4; Make room for string  
B526; Garbage collection  
B5BD; Check salvageability  
B606; Collect string  
B63D; Concatenate  
B67A; Build string to memory  
B6A3; Discard unwanted string  
B6DB; Clean descriptor stack  
B6EC; Perform [CHR\$]  
B700; Perform [LEFT\$]

B72C; Perform [RIGHT\$]  
B737; Perform [MID\$]  
B761; Pull string parameters  
B77C; Perform [LEN]  
B782; Exit string-mode  
B78B; Perform [ASC]  
B79B; Input byte parameter  
B7AD; Perform [VAL]  
B7EB; Parameters for POKE/WAIT  
B7F7; Float-fixed  
B80D; Perform [PEEK]  
B824; Perform [POKE]  
B82D; Perform [WAIT]  
B849; Add 0.5  
B850; Subtract-from  
B853; Perform [subtract]  
B86A; Perform [add]  
B947; Complement FAC#1  
B97E; 'overflow'  
B983; Multiply by zero byte  
B9EA; Perform [LOG]

BA2B; Perform [multiply]  
BA59; Multiply-a-bit  
BABC; Memory tp FAC#2  
BAB7; Adjust FAC#1/#2  
BAD4; Underflow/overflow  
BAE2; Multiply by 10  
BAF9; + 10 in floating pt.  
BAFE; Divide by 10  
BB12; Perform [divide]  
BBA2; Memory to FAC#1  
BBC7; FAC#1 to memory  
BBFC; FAC#2 to FAC#1  
BC0C; FAC#1 to FAC#2  
BC1B; Round FAC#1  
BC2B; Get sign  
BC39; Perform [SGN]  
BC5B; Perform [ABS]  
BC5B; Compare FAC#1 to mem.  
BC9B; Float-fixed  
BCCC; Perform [int]  
BCF3; String to FAC

BD7E; Get ASCII digit  
BDC2; Print 'IN...'  
BDCD; Print line number  
BDDD; Float to ASCII  
BF16; Decimal constants  
BF3A; TI constants  
BF71; Perform [SQR]  
BF7B; Perform [power]  
BFB4; Perform [negative]  
BFED; Perform [EXP]  
E043; Series eval. 1  
E059; Series eval. 2  
E097; Perform [RND]  
EOF9; ?? breakpoints ??  
E12A; Perform [SYS]  
E156; Perform [SAVE]  
E165; Perform [LOAD]  
E1BE; Perform [OPEN]  
E1C7; Perform [CLOSE]  
E1D4; Parameters for LOAD/SAVE  
E206; Check default parameters

E20E; Check for comma  
E219; Parameters for OPEN/CLOSE  
E264; Perform [COS]  
E26B; Perform [SIN]  
E2B4; Perform [TAN]  
E30E; Perform [ATN]  
E37B; Warm restart  
R394; Initialize  
E3A2; CHRGET for zero page  
E3BF; Initialize Basic  
E447; Vectors for \$300  
R453; Initialize vectors  
E45F; Power-up message  
E500; Get I/O address  
E505; Get screen size  
E50A; Put/get row/column  
E518; Initialize I/O  
E544; Clear screen  
E566; Home cursor  
E56C; Set screen pointers  
E5A0; Set I/O defaults

E5B4; Input from keyboard  
E632; Input from screen  
E6B4; Quote test  
E691; Setup screen print  
E6B6; Advance cursor  
E6ED; Retreat cursor  
E701; Back into previous line  
E716; Output to screen  
E87C; Go to next line  
E891; Perform <return>  
E8A1; Check line decrement  
E8B3; Check line increment  
E8CB; Set colour code  
E8DA; Colour code table  
E8EA; Scroll screen  
E965; Open space on screen  
E9C8; Move a screen line  
E9E0; Synchronize colour transfer  
E9F0; Interrupt - clock etc.  
EA87; Read keyboard  
EB79; Keyboard select vectors

EB81; Keyboard 1 - unshifted  
EBC2; Keyboard 2 - shifted  
EC03; Keyboard 3 - 'comm'  
EC44; Graphics/text control  
EC4F; Set graphics/text mode  
EC78; Keyboard 4  
ECB9; Video chip setup  
ECE7; Shift/run equivalent  
ECF9; Screen in address low  
ED0B; Send 'talk'  
ED11; Send 'listen'  
ED40; Send to serial bus  
EDB2; Serial timeout  
EDB9; Send listen SA  
EDBE; Clear ATN  
EDC7; Send talk SA  
EDCC; Wait for clock  
EDDD; Send serial deferred  
EDEF; Send 'untalk'  
EE03; Send 'unlisten'  
EE13; Receive from serial bus

EE85; Serial clock on  
EE8E; Serial clock off  
EE97; Serial output '1'  
EEA0; Serial output '0'  
EEA9; Get serial in & clock  
EEB3; Delay 1 ms.  
EEBB; RS-232 send  
EF06; Send new RS-232 byte  
EF2E; No - DSR error  
EF33; No - CTS error  
EF3B; Disable timer  
EF4A; Compute bit count  
EF59; RS232 receive  
EF7E; Setup to receive  
EFC4; Receive parity error  
EFCC; Receive overflow  
EFCF; Receive break  
EFD2; Framing error  
EFE1; Submit to RS232  
FOOD; No - DSR error  
F017; Send to RS232 buffer

F04D; Input from RS232  
F086; Get from RS232  
F0A4; Check serial bus idle  
F0BD; Messages  
F12B; Print if direct  
F13E; Get..  
F14E; ..from RS232  
F157; Input  
F199; Get..tape/serial/RS232  
F1CA; Output..  
F1DD; ..to tape  
F20E; Set input device  
F250; Set output device  
F291; Close file  
F30F; Find file  
F31F; Set file values  
F32F; Abort all files  
F333; Restore default I/O  
F34A; Do open file  
F3D5; Send SA  
F409; Open RS232

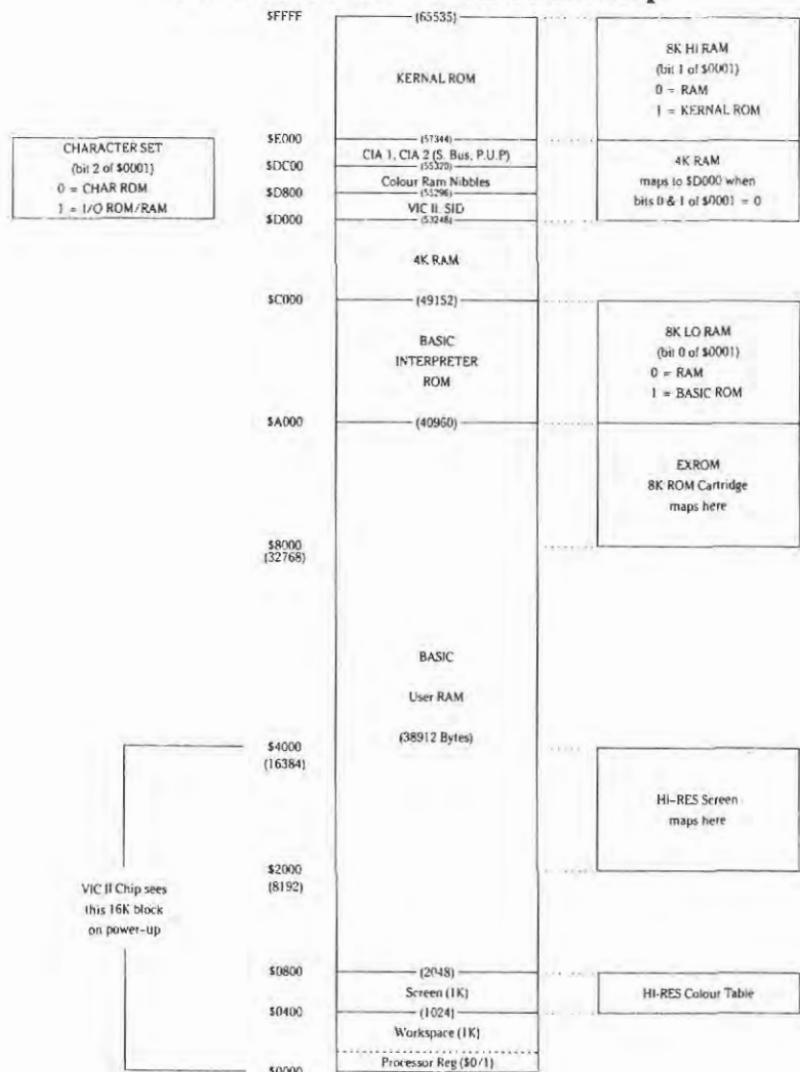
F49E; Load program  
F5AF; 'searching'  
F5C1; Print filename  
F5D2; 'loading/verifying'  
F5DD; Save program  
F68F; Print 'saving'  
F69B; Bump clock  
F6BC; Log PIA key reading  
F6DD; Get time  
F6E4; Set time  
F6ED; Check stop key  
F6FB; Output error messages  
F72C; Find any tape header  
F76A; Write tape header  
F7D0; Get buffer address  
F7D7; Set buffer start/end pointers  
F7EA; Find specific header  
FB0D; Bump tape pointer  
F817; 'press play'  
F82E; Check tape status  
F838; 'press record'

F841; Initiate tape read  
F864; Initiate tape write  
F875; Common tape code  
FBDO; Check tape stop  
FBE2; Set read timing  
F92C; Read tape bits  
FA60; Store tape chars.  
FB8E; Reset pointer  
FB97; New character setup  
FBA6; Send transition to tape  
FBC8; Write data to tape  
FBCE; IRQ entry point  
FC57; Write tape leader  
FC93; Restore normal IRQ  
FCBB; Set IRQ vector  
FCCA; Kill tape motor  
FCD1; Check r/w pointer  
FCDB; Bump r/w pointer  
FCE2; Power reset entry  
FD02; Check 8-rom  
FD10; 8-rom mask

FD15; Kernel reset  
FD1A; Kernel move  
FD30; Vectors  
FD50; Initialize system consts.  
FD9B; IRQ vectors  
FDA3; initialize I/O  
FDDD; Enable timer  
FDF9; Save filename data  
FE00; Save file details  
FE07; Get status  
FE18; Flag status  
FE1C; Set status  
FE21; Set timeout  
FE25; Read/set top of memory  
FE27; Read top of memory  
FE2D; Set top of memory  
FE34; Read/set bottom of memory  
FE43; NMI entry  
FE66; Warm start  
FEB6; Reset IRQ & exit  
FEBC; Interrupt exit

FEC2; RS-232 timing table  
FED6; NMI RS-232 in  
FF07; NMI RS-232 out  
FF43; Fake IRQ  
FF48; IRQ entry  
FF81; Jumbo jump table  
FFF6; Hardware vectors

## Commodore-64 Architecture Map



## Processor I/O Port (6510)

\$0000	IN	IN	OUT	IN	OUT	OUT	OUT	OUT	DDR 0
\$0001			Tape Motor	Tape Sense	Tape Write	D-ROM Switch	EF RAM Switch	AB RAM Switch	PR 1

## SID (6581)

Voice 1	Voice 2	Voice 3	Frequency				Voice 1	Voice 2	Voice 3				
\$D400	\$D407	\$D40E	L				54272	54279	54286				
\$D401	\$D408	\$D40F	H				54273	54280	54287				
\$D402	\$D409	\$D410	Pulse Width				54274	54281	54288				
\$D403	\$D40A	\$D411	0 0 0 0				54275	54282	54289				
\$D404	\$D40B	\$D412	NSE PUL SAW TRI				54276	54283	54290				
\$D405	\$D40C	\$D413	Attack Time 2ms - 8ms				54277	54284	54291				
\$D406	\$D40D	\$D414	Decay Time 6ms - 24 sec				54278	54285	54292				
Sustain Level													
Release Time 6ms - 24 sec													

Voices (write only)

\$D415	0	0	0	0	0	L	54293
\$D416	Filter Frequency					H	54294
\$D417	Resonance			Filter Voices		V3 V2 V1	54295
\$D418	Passband: V3 off HI BP LO			Master Volume			54296

Filter & Volume (write only)

\$D419	Paddle X (A/D #1)					54297
\$D41A	Paddle Y (A/D #2)					54298
\$D41B	Noise 3 (random)					54299
\$D41C	Envelope 3					54300

Sense (read only)

Note: Special Voice Features  
(TEST, RING MOD, SYNC)  
are omitted from the above diagram.

## CIA 1 (IRQ) (6526)

\$DC00	Paddle Sel A . B	Fire	Right	Joystick 0 Left	Down	Up	PRA 56320
Keyboard Row Select (inverted)							
\$DC01		Fire	Right	Joystick 1 Left	Down	Up	PRB 56321
Keyboard Column Read							
\$DC02	\$FF - All Output						DDRA 56322
\$DC03	\$00 - All Input						DDR B 56323
\$DC04	Timer A						TAL 56324
\$DC05							TAH 56325
\$DC06							TBL 56326
\$DC07	Timer B						TBH 56327
~							
\$DC0D		Tape Input			Timer Interrupt B	A	ICR 56333
\$DC0E			One Shot	Out Mode	Time PB6 Out	Timer A Start	CRA 56334
\$DC0F			One Shot	Out Mode	Time PB7 Out	Timer B Start	CRB 56335

## CIA 2 (NMI) (6526)

\$DD00	Serial IN	Clock IN	Serial OUT	Clock OUT	ATN OUT	RS-232 OUT	VIC II addr 15	VIC II addr 14	PRA 56576					
\$DD01	DSR IN	CTS IN		DCD* IN	RI* IN	DTR OUT	RTS OUT	RS-232 IN	PRB 56577					
\$3F - Serial														
\$DD03	\$00 - P.U.P. All Input				or \$06 - RS-232									
\$DD04														
\$DD05	Timer A													
\$DD06														
\$DD07	Timer B													
~														
\$DD0D			RS-232 IN			Timer Interrupt B	A		ICR 56589					
\$DD0E							Timer A Start		CRA 56590					
\$DD0F							Timer B Start		CRB 56591					

\* Connected but not used by O.S.

# ROM disassembly

**A000; ROM control vectors**

A000 94 E3	STY \$E3,X	A03F AA	TAX
A002 7B	???	A040 56 A8	LSR #\$A8,X
A003 E3	???	A042 9B	???
A004 43	???	A043 A6 5D	LDX #\$5D
A005 42	???	A045 A6 85	LDX #\$85
A006 4D 42 41	EOR \$4142	A047 AA	TAX
A009 53	???	A048 29 E1	AND #\$E1
A00A 49 43	EOR #\$43	A04A BD E1 C6	LDA \$C6E1,X
		A04D E1 7A	SBC (\$7A,X)
		A04F AB	???
		A050 41 A6	EOR (\$A6,X)

**A00C; Keyword action vectors**

A00C 30 AB	BMI \$9FB6
A00E 41 A7	EOR (\$A7,X)
A010 1D AD F7	DRA \$F7AD,X
A013 AB	TAY
A014 A4 AB	LDY \$AB
A016 BE AB B0	LDX \$B0AB,Y
A019 B0 05	BCS \$A020
A01B AC A4 A9	LDY \$A9A4
A01E 9F	???
A01F AB	TAY
A020 70 AB	BVS \$9FCA
A022 27	???
A023 A9 1C	LDA #\$1C
A025 AB	TAY
A026 82	???
A027 AB	TAY
A028 D1 AB	CMP (\$AB),Y
A02A 3A	???
A02B A9 2E	LDA #\$2E
A02D AB	TAY
A02E 4A	LSR
A02F A9 2C	LDA #\$2C
A031 BB	CLV
A032 67	???
A033 E1 55	SBC (\$55,X)
A035 E1 64	SBC (\$64,X)
A037 E1 B2	SBC (\$B2,X)
A039 B3	???
A03A 23	???
A03B B8	CLV
A03C 7F	???
A03D AA	TAX
A03E 9F	???

**A03F; Function vectors**

A052 39 BC CC	AND \$CCBC,Y
A055 BC 58 BC	LDY \$BC58,X
A058 10 03	BPL \$A05D
A05A 7D B3 9E	ADC \$9EB3,X
A05D B3	???
A05E 71 BF	ADC (\$BF),Y
A060 97	???
A061 E0 EA	CPX #\$EA
A063 B9 ED BF	LDA \$BFED,Y
A066 64	???
A067 E2	???
A068 6B	???
A069 E2	???
A06A B4 E2	LDY \$E2,X
A06C 0E E3 OD	ASL \$0DE3
A06F B8	CLV
A070 7C	???
A071 B7	???
A072 65 B4	ADC \$B4
A074 AD B7 BB	LDA \$BBB7
A077 B7	???
A078 EC B6 00	CPX \$00B6
A07B B7	???
A07C 2C B7 37	BIT \$37B7
A07F B7	???
A080; Operator vectors	
A080 79 69 B8	ADC \$BB69,Y
A083 79 52 B8	ADC \$BB52,Y
A086 7B	???

A087 2A	ROL	A0D0 C5 47	CMP \$47
A088 BA	TSX	A0D2 4F	???
A089 7B	???	A0D3 53	???
A08A 11 BB	ORA (\$BB),Y	A0D4 55 C2	EDR \$C2,X
A08C 7F	???	A0D6 52	???
A08D 7A	???	A0D7 45 54	EDR \$54
A08E BF	???	A0D9 55 52	EDR \$52,X
A08F 50 E8	BVC \$A079	A0DB CE 52 45	DEC \$4552
A091 AF	???	A0DE CD 53 54	CMP \$5453
A092 46 E5	LSR \$E5	A0E1 4F	???
A094 AF	???	A0E2 D0 4F	BNE \$A133
A095 7D B3 BF	ADC \$BFBD,X	A0E4 CE 57 41	DEC \$4157
A098 5A	???	A0E7 49 D4	EDR #\$D4
A099 D3	???	A0E9 4C 4F 41	JMP \$414F
A09A AE 64 15	LDX \$1564	A0EC C4 53	CPY \$53
A09D B0 45	BCS \$A0E4	A0EE 41 56	EDR (\$56,X)
<b>A09E; Keywords</b>			
A09F 4E C4 46	LSR \$46C4	A0F0 C5 56	CMP \$56
A0A2 4F	???	A0F2 45 52	EDR \$52
A0A3 D2	???	A0F4 49 46	EDR #\$46
A0A4 4E 45 58	LSR \$5845	A0F6 D9 44 45	CMP \$4544,Y
A0A7 D4	???	A0F9 C6 50	DEC \$50
A0A8 44	???	A0FB 4F	???
A0A9 41 54	EDR (\$54,X)	A0FC 4B	???
A0AB C1 49	CMP (\$49,X)	A0FD C5 50	CMP \$50
A0AD 4E 50 55	LSR \$5550	A0FF 52	???
A0B0 54	???	A100 49 4E	EDR #\$4E
A0B1 A3	???	A102 54	???
A0B2 49 4E	EDR #\$4E	A103 A3	???
A0B4 50 55	BVC \$A10B	A104 50 52	BVC \$A158
A0B6 D4	???	A106 49 4E	EDR #\$4E
A0B7 44	???	A108 D4	???
A0B8 49 CD	EDR #\$CD	A109 43	???
A0BA 52	???	A10A 4F	???
A0BB 45 41	EDR \$41	A10B 4E D4 4C	LSR \$4CD4
A0BD C4 4C	CPY \$4C	A10E 49 53	EDR #\$53
A0BF 45 D4	EDR \$D4	A110 D4	???
A0C1 47	???	A111 43	???
A0C2 4F	???	A112 4C D2 43	JMP \$43D2
A0C3 54	???	A115 4D C4 53	EDR \$53C4
A0C4 CF	???	A118 59 D3 4F	EDR \$4FD3,Y
A0C5 52	???	A11B 50 45	BVC \$A162
A0C6 55 CE	EDR \$CE,X	A11D CE 43 4C	DEC \$4C43
A0CB 49 C6	EDR #\$C6	A120 4F	???
A0CA 52	???	A121 53	???
A0CB 45 53	EDR \$53	A122 C5 47	CMP \$47
A0CD 54	???	A124 45 D4	EDR \$D4
A0CE 4F	???	A126 4E 45 D7	LSR \$D745
A0CF 52	???	A129 54	???
		A12A 41 42	EDR (\$42,X)
		A12C A8	TAY
		A12D 54	???
		A12E CF	???

A12F 46 CE	LSR \$CE	A185 41 53	EOR (\$53,X)
A131 53	???	A187 C3	???
A132 50 43	BVC \$A177	A188 43	???
A134 A8	TAY	A189 48	PHA
A135 54	???	A18A 52	???
A136 48	PHA	A18B A4 4C	LDY \$4C
A137 45 CE	EOR \$CE	A18D 45 46	EOR \$46
A139 4E 4F D4	LSR \$D44F	A18F 54	???
A13C 53	???	A190 A4 52	LDY \$52
A13D 54	???	A192 49 47	EOR ##47
A13E 45 D0	EOR \$D0	A194 48	PHA
A140 AB	???	A195 54	???
A141 AD AA AF	LDA \$AFAA	A196 A4 4D	LDY \$4D
A144 DE 41 4E	DEC \$4E41,X	A198 49 44	EOR ##44
A147 C4 4F	CPY \$4F	A19A A4 47	LDY \$47
A149 D2	???	A19C CF	???
A14A BE BD BC	LDX \$BCBD,Y	A19D 00	BRK
A14D 53	???		
A14E 47	???		
A14F CE 49 4E	DEC \$4E49	A19E; Error messages	
A152 D4	???		
A153 41 42	EOR (\$42,X)	A19E 54	???
A155 D3	???	A19F 4F	???
A156 55 53	EOR \$53,X	A1A0 4F	???
A15B D2	???	A1A1 20 4D 41	JSR \$414D
A159 46 52	LSR \$52	A1A4 4E 59 20	LSR \$2059
A15B C5 50	CMP \$50	A1A7 46 49	LSR \$49
A15D 4F	???	A1A9 4C 45 D3	JMP \$D345
A15E D3	???	A1AC 46 49	LSR \$49
A15F 53	???	A1AE 4C 45 20	JMP \$2045
A160 51 D2	EOR (\$D2),Y	A1B1 4F	???
A162 52	???	A1B2 50 45	BVC \$A1F9
A163 4E C4 4C	LSR \$4CC4	A1B4 CE 46 49	DEC \$4946
A166 4F	???	A1B7 4C 45 20	JMP \$2045
A167 C7	???	A1BA 4E 4F 54	LSR \$544F
A168 45 58	EOR \$58	A1BD 20 4F 50	JSR \$504F
A16A D0 43	BNE \$A1AF	A1C0 45 CE	EOR \$CE
A16C 4F	???	A1C2 46 49	LSR \$49
A16D D3	???	A1C4 4C 45 20	JMP \$2045
A16E 53	???	A1C7 4E 4F 54	LSR \$544F
A16F 49 CE	EOR ##CE	A1CA 20 46 4F	JSR \$4F46
A171 54	???	A1CD 55 4E	EOR \$4E,X
A172 41 CE	EOR (\$CE,X)	A1CF C4 44	CPY \$44
A174 41 54	EOR (\$54,X)	A1D1 45 56	EOR \$56
A176 CE 50 45	DEC \$4550	A1D3 49 43	EOR ##43
A179 45 CB	EOR \$CB	A1D5 45 20	EOR \$20
A17B 4C 45 CE	JMP \$CE45	A1D7 4E 4F 54	LSR \$544F
A17E 53	???	A1DA 20 50 52	JSR \$5250
A17F 54	???	A1DD 45 53	EOR \$53
A180 52	???	A1DF 45 4E	EOR \$4E
A181 A4 56	LDY \$56	A1E1 D4	???
A183 41 CC	EOR (\$CC,X)	A1E2 4E 4F 54	LSR \$544F

A1E5 20 49 4E	JSR \$4E49	A24C 53	???
A1EB 50 55	BVC \$A23F	A24D 55 C2	EOR \$C2,X
A1EA 54	???	A24F 4F	???
A1EB 20 46 49	JSR \$4946	A250 55 54	EOR \$54,X
A1EE 4C C5 4E	JMP \$4EC5	A252 20 4F 46	JSR \$464F
A1F1 4F	???	A255 20 44 41	JSR \$4144
A1F2 54	???	A258 54	???
A1F3 20 4F 55	JSR \$554F	A259 C1 49	CMP (\$49,X)
A1F6 54	???	A25B 4C 4C 45	JMP \$454C
A1F7 50 55	BVC \$A24E	A25E 47	???
A1F9 54	???	A25F 41 4C	EOR (\$4C,X)
A1FA 20 46 49	JSR \$4946	A261 20 51 55	JSR \$5551
A1FD 4C C5 4D	JMP \$4DC5	A264 41 4E	EOR (\$4E,X)
A200 49 53	EOR #\$53	A266 54	???
A202 53	???	A267 49 54	EOR #\$54
A203 49 4E	EOR #\$4E	A269 D9 4F 56	CMP \$564F,Y
A205 47	???	A26C 45 52	EOR \$52
A206 20 46 49	JSR \$4946	A26E 46 4C	LSR \$4C
A209 4C 45 20	JMP \$2045	A270 4F	???
A20C 4E 41 4D	LSR \$4D41	A271 D7	???
A20F C5 49	CMP \$49	A272 4F	???
A211 4C 4C 45	JMP \$454C	A273 55 54	EOR \$54,X
A214 47	???	A275 20 4F 46	JSR \$464F
A215 41 4C	EOR (\$4C,X)	A27B 20 4D 45	JSR \$454D
A217 20 44 45	JSR \$4544	A27B 4D 4F 52	EOR \$524F
A21A 56 49	LSR \$49,X	A27E D9 55 4E	CMP \$4E55,Y
A21C 43	???	A281 44	???
A21D 45 20	EOR \$20	A282 45 46	EOR \$46
A21F 4E 55 4D	LSR \$4D55	A284 27	???
A222 42	???	A285 44	???
A223 45 D2	EOR \$D2	A286 20 53 54	JSR \$5453
A225 4E 45 58	LSR \$5845	A289 41 54	EOR (\$54,X)
A228 54	???	A28B 45 4D	EOR \$4D
A229 20 57 49	JSR \$4957	A28D 45 4E	EOR \$4E
A22C 54	???	A28F D4	???
A22D 48	PHA	A290 42	???
A22E 4F	???	A291 41 44	EOR (\$44,X)
A22F 55 54	EOR \$54,X	A293 20 53 55	JSR \$5553
A231 20 46 4F	JSR \$4F46	A296 42	???
A234 D2	???	A297 53	???
A235 53	???	A298 43	???
A236 59 4E 54	EOR \$544E,Y	A299 52	???
A239 41 D8	EOR (\$D8,X)	A29A 49 50	EOR #\$50
A23B 52	???	A29C D4	???
A23C 45 54	EOR \$54	A29D 52	???
A23E 55 52	EOR \$52,X	A29E 45 44	EOR \$44
A240 4E 20 57	LSR \$5720	A2A0 49 4D	EOR #\$4D
A243 49 54	EOR #\$54	A2A2 27	???
A245 48	PHA	A2A3 44	???
A246 4F	???	A2A4 20 41 52	JSR \$5241
A247 55 54	EOR \$54,X	A2A7 52	???
A249 20 47 4F	JSR \$4F47	A2A8 41 D9	EOR (\$D9,X)

A2AA 44	???	A30B 4E 55 C5	LSR \$C555
A2AB 49 56	EDR #\$56	A30E 55 4E	EDR \$4E,X
A2AD 49 53	EDR #\$53	A310 44	???
A2AF 49 4F	EDR #\$4F	A311 45 46	EDR \$46
A2B1 4E 20 42	LSR \$4220	A313 27	???
A2B4 59 20 5A	EDR \$5A20,Y	A314 44	???
A2B7 45 52	EDR \$52	A315 20 46 55	JSR \$5546
A2B9 CF	???	A318 4E 43 54	LSR \$5443
A2BA 49 4C	EDR #\$4C	A31B 49 4F	EDR #\$4F
A2BC 4C 45 47	JMP \$4745	A31D CE 56 45	DEC \$4556
A2BF 41 4C	EDR (\$4C,X)	A320 52	???
A2C1 20 44 49	JSR \$4944	A321 49 46	EDR #\$46
A2C4 52	???	A323 D9 4C 4F	CMP \$4F4C,Y
A2C5 45 43	EDR \$43	A326 41 C4	EDR (\$C4,X)
A2C7 D4	???		
A2CB 54	???		
A2C9 59 50 45	EDR \$4550,Y	A328; Error message vectors	
A2CC 20 4D 49	JSR \$494D	A328 9E	???
A2CF 53	???	A329 A1 AC	LDA (\$AC,X)
A2D0 4D 41 54	EDR \$5441	A32B A1 B5	LDA (\$B5,X)
A2D3 43	???	A32D A1 C2	LDA (\$C2,X)
A2D4 C8	INY	A32F A1 D0	LDA (\$D0,X)
A2D5 53	???	A331 A1 E2	LDA (\$E2,X)
A2D6 54	???	A333 A1 F0	LDA (\$F0,X)
A2D7 52	???	A335 A1 FF	LDA (\$FF,X)
A2D8 49 4E	EDR #\$4E	A337 A1 10	LDA (\$10,X)
A2DA 47	???	A339 A2 25	LDX #\$25
A2DB 20 54 4F	JSR \$4F54	A33B A2 35	LDX #\$35
A2DE 4F	???	A33D A2 3B	LDX #\$3B
A2DF 20 4C 4F	JSR \$4F4C	A33F A2 4F	LDX #\$4F
A2E2 4E C7 46	LSR \$46C7	A341 A2 5A	LDX #\$5A
A2E5 49 4C	EDR #\$4C	A343 A2 6A	LDX #\$6A
A2E7 45 20	EDR \$20	A345 A2 72	LDX #\$72
A2E9 44	???	A347 A2 7F	LDX #\$7F
A2EA 41 54	EDR (\$54,X)	A349 A2 90	LDX #\$90
A2EC C1 46	CMP (\$46,X)	A34B A2 9D	LDX #\$9D
A2EE 4F	???	A34D A2 AA	LDX #\$AA
A2EF 52	???	A34F A2 BA	LDX #\$BA
A2F0 4D 55 4C	EDR \$4C55	A351 A2 CB	LDX #\$CB
A2F3 41 20	EDR (\$20,X)	A353 A2 D5	LDX #\$D5
A2F5 54	???	A355 A2 E4	LDX #\$E4
A2F6 4F	???	A357 A2 ED	LDX #\$ED
A2F7 4F	???	A359 A2 00	LDX #\$00
A2FB 20 43 4F	JSR \$4F43		
A2FB 4D 50 4C	EDR \$4C50		
A2FE 45 D8	EDR \$D8		
A300 43	???	A35B; Misc. messages	
A301 41 4E	EDR (\$4E,X)	A35B A3	???
A303 27	???	A35C 0E A3 1E	ASL \$1EA3
A304 54	???	A35F A3	???
A305 20 43 4F	JSR \$4F43	A360 24 A3	BIT \$A3
A30B 4E 54 49	LSR \$4954		

A362 B3	???		
A363 A3	???		
A364 0D 4F 4B	ORA \$4B4F	A3B8; Move memory	
A367 0D 00 20	ORA \$2000	A3B8 20 0B A4	JSR \$A40B
A36A 20 45 52	JSR \$5245	A3B8 85 31	STA \$31
A36D 52	???	A3BD 84 32	STY \$32
A36E 4F	???	A3BF 38	SEC
A36F 52	???	A3C0 A5 5A	LDA \$5A
A370 00	BRK	A3C2 E5 5F	SBC \$5F
A371 20 49 4E	JSR \$4E49	A3C4 85 22	STA \$22
A374 20 00 0D	JSR \$0D00	A3C6 AB	TAY
A377 0A	ASL	A3C7 A5 5B	LDA \$5B
A378 52	???	A3C9 E5 60	SBC \$60
A379 45 41	EOR \$41	A3CB AA	TAX
A37B 44	???	A3CC E8	INX
A37C 59 2E 0D	EOR \$0D2E,Y	A3CD 98	TYA
A37F 0A	ASL	A3CE F0 23	BEQ \$A3F3
A380 00	BRK	A3D0 A5 5A	LDA \$5A
A381 0D 0A 42	ORA \$420A	A3D2 38	SEC
A384 52	???	A3D3 E5 22	SBC \$22
A385 45 41	EOR \$41	A3D5 85 5A	STA \$5A
A387 4B	???	A3D7 B0 03	BCS \$A3DC
A388 00	BRK	A3D9 C6 5B	DEC \$5B
		A3DB 3B	SEC
		A3DC A5 58	LDA \$5B
		A3DE E5 22	SBC \$22
A389 A0 BA	LDY #\$BA	A3E0 B5 58	STA \$5B
A38B E8	INX	A3E2 B0 08	BCS \$A3EC
A38C E8	INX	A3E4 C6 59	DEC \$59
A38D E8	INX	A3E6 90 04	BCC \$A3EC
A38E E8	INX	A3E8 B1 5A	LDA (\$5A),Y
A38F BD 01 01	LDA \$0101,X	A3EA 91 58	STA (\$5B),Y
A392 C9 81	CMP #\$81	A3EC 88	DEY
A394 D0 21	BNE \$A3B7	A3ED D0 F9	BNE \$A3E8
A396 A5 4A	LDA \$4A	A3EF B1 5A	LDA (\$5A),Y
A398 D0 0A	BNE \$A3A4	A3F1 91 58	STA (\$5B),Y
A39A BD 02 01	LDA \$0102,X	A3F3 C6 5B	DEC \$5B
A39D 85 49	STA \$49	A3F5 C6 59	DEC \$59
A39F BD 03 01	LDA \$0103,X	A3F7 CA	DEX
A3A2 85 4A	STA \$4A	A3FB D0 F2	BNE \$A3EC
A3A4 DD 03 01	CMP \$0103,X	A3FA 60	RTS
A3A7 D0 07	BNE \$A3B0		
A3A9 A5 49	LDA \$49		
A3AB DD 02 01	CMP \$0102,X	A3FB; Check stack depth	
A3AE F0 07	BEQ \$A3B7	A3FB 0A	ASL
A3B0 8A	TXA	A3FC 69 3E	ADC #\$3E
A3B1 1B	CLC	A3FE B0 35	BCS \$A435
A3B2 69 12	ADC #\$12	A400 B5 22	STA \$22
A3B4 AA	TAX	A402 BA	TSX
A3B5 D0 DB	BNE \$A3BF	A403 E4 22	CPX \$22
A3B7 60	RTS		

A405 90 2E	BCC \$A435	A44C 85 13	STA \$13
A407 60	RTS	A44E 20 D7 AA	JSR \$AAD7
<b>A408; Check memory space</b>			
A408 C4 34	CPY \$34	A451 20 45 AB	JSR \$AB45
A40A 90 2B	BCC \$A434	A454 A0 00	LDY #\$00
A40C D0 04	BNE \$A412	A456 B1 22	LDA (\$22),Y
A40E C5 33	CMP \$33	A458 48	PHA
A410 90 22	BCC \$A434	A459 29 7F	AND #\$7F
A412 4B	PHA	A45B 20 47 AB	JSR \$AB47
A413 A2 09	LDX #\$09	A45E CB	INY
A415 98	TYA	A45F 68	PLA
A416 4B	PHA	A460 10 F4	BPL \$A456
A417 B5 57	LDA \$57,X	A462 20 7A A6	JSR \$A67A
A419 CA	DEX	A465 A9 69	LDA #\$69
A41A 10 FA	BPL \$A416	A467 A0 A3	LDY #\$A3
A41C 20 26 B5	JSR \$B526	<b>A469; BREAK entry</b>	
A41F A2 F7	LDX #\$F7	A469 20 1E AB	JSR \$AB1E
A421 6B	PLA	A46C A4 3A	LDY \$3A
A422 95 61	STA \$61,X	A46E CB	INY
A424 E8	INX	A46F F0 03	BEQ \$A474
A425 30 FA	BMI \$A421	A471 20 C2 BD	JSR \$BDC2
A427 6B	PLA	<b>A474; 'ready'</b>	
A428 A8	TAY	A474 A9 76	LDA #\$76
A429 6B	PLA	A476 A0 A3	LDY #\$A3
A42A C4 34	CPY \$34	A478 20 1E AB	JSR \$AB1E
A42C 90 06	BCC \$A434	A47B A9 80	LDA #\$80
A42E D0 05	BNE \$A435	A47D 20 90 FF	JSR \$FFF90
A430 C5 33	CMP \$33	<b>A480; Ready for Basic</b>	
A432 B0 01	BCS \$A435	<b>A480; Ready for Basic</b>	
A434 60	RTS	<b>A480; Ready for Basic</b>	
<b>A435; 'out of memory'</b>			
A435 A2 10	LDX #\$10	A480 6C 02 03	JMP (\$0302)
<b>A437; Error routine</b>			
A437 6C 00 03	JMP (\$0300)	A483 20 60 A5	JSR \$A560
A43A 8A	TXA	A486 B6 7A	STX \$7A
A43B 0A	ASL	A488 B4 7B	STY \$7B
A43C AA	TAX	A48A 20 73 00	JSR \$0073
A43D BD 26 A3	LDA \$A326,X	A48D AA	TAX
A440 85 22	STA \$22	A48E F0 F0	BEQ \$A480
A442 BD 27 A3	LDA \$A327,X	A490 A2 FF	LDX #\$FF
A445 85 23	STA \$23	A492 B6 3A	STX \$3A
A447 20 CC FF	JSR \$FFCC	A494 90 06	BCC \$A49C
A44A A9 00	LDA #\$00	A496 20 79 A5	JSR \$A579
		A499 4C E1 A7	JMP \$A7E1
<b>A49C; Handle new line</b>			

A49C 20 6B A9	JSR \$A96B	A4FF 85 58	STA \$5B
A49F 20 79 A5	JSR \$A579	A501 A4 2E	LDY \$2E
A4A2 84 0B	STY \$0B	A503 84 5B	STY \$5B
A4A4 20 13 A6	JSR \$A613	A505 90 01	BCC \$A50B
A4A7 90 44	BCC \$A4ED	A507 CB	INY
A4A9 A0 01	LDY #\$01	A508 B4 59	STY \$59
A4AB B1 5F	LDA (\$5F),Y	A50A 20 B8 A3	JSR \$A3B8
A4AD 85 23	STA \$23	A50D A5 14	LDA \$14
A4AF A5 2D	LDA \$2D	A50F A4 15	LDY \$15
A4B1 85 22	STA \$22	A511 8D FE 01	STA \$01FE
A4B3 A5 60	LDA \$60	A514 BC FF 01	STY \$01FF
A4B5 85 25	STA \$25	A517 A5 31	LDA \$31
A4B7 A5 5F	LDA \$5F	A519 A4 32	LDY \$32
A4B9 88	DEY	A51B 85 2D	STA \$2D
A4BA F1 5F	SBC (\$5F),Y	A51D 84 2E	STY \$2E
A4BC 18	CLC	A51F A4 0B	LDY \$0B
A4BD 65 2D	ADC \$2D	A521 88	DEY
A4BF 85 2D	STA \$2D	A522 B9 FC 01	LDA \$01FC,Y
A4C1 85 24	STA \$24	A525 91 5F	STA (\$5F),Y
A4C3 A5 2E	LDA \$2E	A527 88	DEY
A4C5 69 FF	ADC #\$FF	A528 10 F8	BPL \$A522
A4C7 85 2E	STA \$2E	A52A 20 59 A6	JSR \$A659
A4C9 E5 60	SBC \$60	A52D 20 33 A5	JSR \$A533
A4CB AA	TAX	A530 4C 80 A4	JMP \$A4B0
A4CC 38	SEC		
A4CD A5 5F	LDA \$5F		
A4CF E5 2D	SBC \$2D	A533; Re-chain lines	
A4D1 AB	TAY		
A4D2 B0 03	BCS \$A4D7	A533 A5 2B	LDA \$2B
A4D4 E8	INX	A535 A4 2C	LDY \$2C
A4D5 C6 25	DEC \$25	A537 85 22	STA \$22
A4D7 18	CLC	A539 84 23	STY \$23
A4D8 65 22	ADC \$22	A53B 18	CLC
A4DA 90 03	BCC \$A4DF	A53C A0 01	LDY #\$01
A4DC C6 23	DEC \$23	A53E B1 22	LDA (\$22),Y
A4DE 18	CLC	A540 F0 1D	BEQ \$A55F
A4DF B1 22	LDA (\$22),Y	A542 A0 04	LDY #\$04
A4E1 91 24	STA (\$24),Y	A544 C8	INY
A4E3 C8	INY	A545 B1 22	LDA (\$22),Y
A4E4 D0 F9	BNE \$A4DF	A547 D0 FB	BNE \$A544
A4E6 E6 23	INC \$23	A549 C8	INY
A4E8 E6 25	INC \$25	A54A 98	TYA
A4EA CA	DEX	A54B 65 22	ADC \$22
A4EB D0 F2	BNE \$A4DF	A54D AA	TAX
A4ED 20 59 A6	JSR \$A659	A54E A0 00	LDY #\$00
A4F0 20 33 A5	JSR \$A533	A550 91 22	STA (\$22),Y
A4F3 AD 00 02	LDA \$0200	A552 A5 23	LDA \$23
A4F6 F0 88	BEQ \$A4B0	A554 69 00	ADC #\$00
A4F8 18	CLC	A556 C8	INY
A4F9 A5 2D	LDA \$2D	A557 91 22	STA (\$22),Y
A4FB 85 5A	STA \$5A	A559 86 22	STX \$22
A4FD 65 0B	ADC \$0B	A55B 85 23	STA \$23

A55D 90 DD	BCC \$A53C	A5B6 C8	INY
A55F 60	RTS	A5B7 E8	INX
		A5B8 BD 00 02	LDA \$0200,X
		A5B8 38	SEC
<b>A560; Receive input line</b>		A5B8 F9 9E A0	SBC \$A09E,Y
A560 A2 00	LDX #\$00	A5BF F0 F5	BEQ \$A5B6
A562 20 12 E1	JSR \$E112	A5C1 C9 80	CMP #\$80
A565 C9 0D	CMP #\$0D	A5C3 D0 30	BNE \$A5F5
A567 F0 0D	BEQ \$A576	A5C5 05 0B	DRA \$0B
A569 9D 00 02	STA \$0200,X	A5C7 A4 71	LDY \$71
A56C E8	INX	A5C9 E8	INX
A56D E0 59	CPX #\$59	A5CB 99 FB 01	STA \$01FB,Y
A56F 90 F1	BCC \$A562	A5CE B9 FB 01	LDA \$01FB,Y
A571 A2 17	LDX #\$17	A5D1 F0 36	BEQ \$A609
A573 4C 37 A4	JMP \$A437	A5D3 38	SEC
A576 4C CA AA	JMP \$AAAC	A5D4 E9 3A	SBC #\$3A
		A5D6 F0 04	BEQ \$A5DC
		A5D8 C9 49	CMP #\$49
<b>A579; Crunch tokens</b>		A5D9 D0 02	BNE \$A5DE
		A5DC B5 0F	STA \$0F
A579 6C 04 03	JMP (\$0304)	A5DE 38	SEC
A57C A6 7A	LDX \$7A	A5DF E9 55	SBC #\$55
A57E A0 04	LDY #\$04	A5E1 D0 9F	BNE \$A5B2
A580 B4 0F	STY \$0F	A5E3 B5 0B	STA \$0B
A582 BD 00 02	LDA \$0200,X	A5E5 BD 00 02	LDA \$0200,X
A585 10 07	BPL \$A58E	A5E8 F0 DF	BEQ \$A5C9
A587 C9 FF	CMP #\$FF	A5EA C5 0B	CMP \$0B
A589 F0 3E	BEQ \$A5C9	A5EC F0 DB	BEQ \$A5C9
A58B E8	INX	A5EE C8	INY
A58C D0 F4	BNE \$A5B2	A5EF 99 FB 01	STA \$01FB,Y
A58E C9 20	CMP #\$20	A5F2 E8	INX
A590 F0 37	BEQ \$A5C9	A5F3 D0 F0	BNE \$A5E5
A592 85 08	STA \$08	A5F5 A6 7A	LDX \$7A
A594 C9 22	CMP #\$22	A5F7 E6 0B	INC \$0B
A596 F0 56	BEQ \$A5EE	A5F9 C8	INY
A598 24 0F	BIT \$0F	A5FA B9 9D A0	LDA \$A09D,Y
A59A 70 2D	BVS \$A5C9	A5FD 10 FA	BPL \$A5F9
A59C C9 3F	CMP #\$3F	A5FF B9 9E A0	LDA \$A09E,Y
A59E D0 04	BNE \$A5A4	A602 D0 B4	BNE \$A5B8
A5A0 A9 99	LDA #\$99	A604 BD 00 02	LDA \$0200,X
A5A2 D0 25	BNE \$A5C9	A607 10 BE	BPL \$A5C7
A5A4 C9 30	CMP #\$30	A609 99 FD 01	STA \$01FD,Y
A5A6 90 04	BCC \$A5AC	A60C C6 7B	DEC \$7B
A5A8 C9 3C	CMP #\$3C	A60E A9 FF	LDA #\$FF
A5AA 90 1D	BCC \$A5C9	A610 85 7A	STA \$7A
A5AC B4 71	STY \$71	A612 60	RTS
A5AE A0 00	LDY #\$00		
A5B0 B4 0B	STY \$0B		
A5B2 88	DEY	<b>A613; Find Basic line</b>	
A5B3 86 7A	STX \$7A		
A5B5 CA	DEX	A613 A5 2B	LDA \$2B

A615 A6 2C	LDX #\$2C	A663 A5 37	LDA \$37
A617 A0 01	LDY #\$01	A665 A4 38	LDY \$38
A619 B5 5F	STA \$5F	A667 85 33	STA \$33
A61B B6 60	STX \$60	A669 84 34	STY \$34
A61D B1 5F	LDA (\$5F),Y	A66B A5 2D	LDA \$2D
A61F F0 1F	BEQ \$A640	A66D A4 2E	LDY \$2E
A621 C8	INY	A66F 85 2F	STA \$2F
A622 C8	INY	A671 84 30	STY \$30
A623 A5 15	LDA \$15	A673 85 31	STA \$31
A625 D1 5F	CMP (\$5F),Y	A675 84 32	STY \$32
A627 90 18	BCC \$A641	A677 20 1D A8	JSR \$A81D
A629 F0 03	BEQ \$A62E	A67A A2 19	LDX #\$19
A62B 88	DEY	A67C B6 16	STX \$16
A62C D0 09	BNE \$A637	A67E 68	PLA
A62E A5 14	LDA \$14	A67F A8	TAY
A630 B8	DEY	A680 68	PLA
A631 D1 5F	CMP (\$5F),Y	A681 A2 FA	LDX #\$FA
A633 90 0C	BCC \$A641	A683 9A	TXS
A635 F0 0A	BEQ \$A641	A684 48	PHA
A637 B8	DEY	A685 98	TYA
A638 B1 5F	LDA (\$5F),Y	A686 48	PHA
A63A AA	TAX	A687 A9 00	LDA #\$00
A63B B8	DEY	A689 85 3E	STA \$3E
A63C B1 5F	LDA (\$5F),Y	A68B 85 10	STA \$10
A63E B0 D7	BCS \$A617	A68D 60	RTS
A640 18	CLC		
A641 60	RTS		

**A68E; Back up text pointer**

**A642; Perform [NEW]**

A642 D0 FD	BNE \$A641
A644 A9 00	LDA #\$00
A646 A8	TAY
A647 91 2B	STA (\$2B),Y
A649 C8	INY
A64A 91 2B	STA (\$2B),Y
A64C A5 2B	LDA \$2B
A64E 18	CLC
A64F 69 02	ADC #\$02
A651 85 2D	STA \$2D
A653 A5 2C	LDA \$2C
A655 69 00	ADC #\$00
A657 85 2E	STA \$2E
A659 20 BE A6	JSR \$A68E
A65C A9 00	LDA #\$00

A68E 18	CLC
A68F A5 2B	LDA \$2B
A691 69 FF	ADC #\$FF
A693 85 7A	STA \$7A
A695 A5 2C	LDA \$2C
A697 69 FF	ADC #\$FF
A699 85 7B	STA \$7B
A69B 60	RTS

**A69C; Perform [LIST]**

**A65E; Perform [CLR]**

A65E D0 2D	BNE \$A6BD
A660 20 E7 FF	JSR \$FFE7

A69C 90 06	BCC \$A6A4
A69E F0 04	BEQ \$A6A4
A6A0 C9 AB	CMP #\$AB
A6A2 D0 E9	BNE \$A6BD
A6A4 20 6B A9	JSR \$A96B
A6A7 20 13 A6	JSR \$A613
A6AA 20 79 00	JSR \$0079
A6AD F0 0C	BEQ \$A6BB
A6AF C9 AB	CMP #\$AB
A6B1 D0 BE	BNE \$A641
A6B3 20 73 00	JSR \$0073

A6B6 20 6B A9	JSR \$A96B	A71C C9 FF	CMP #\$FF
A6B9 D0 86	BNE \$A641	A71E F0 D3	BEQ \$A6F3
A6BB 68	PLA	A720 24 0F	BIT \$0F
A6BC 68	PLA	A722 30 CF	BMI \$A6F3
A6BD A5 14	LDA \$14	A724 38	SEC
A6BF 05 15	ORA \$15	A725 E9 7F	SBC #\$7F
A6C1 D0 06	BNE \$A6C9	A727 AA	TAX
A6C3 A9 FF	LDA #\$FF	A728 84 49	STY \$49
A6C5 B5 14	STA \$14	A72A A0 FF	LDY #\$FF
A6C7 B5 15	STA \$15	A72C CA	DEX
A6C9 A0 01	LDY #\$01	A72D F0 08	BEQ \$A737
A6CB 84 0F	STY \$0F	A72F C8	INY
A6CD B1 5F	LDA (\$5F),Y	A730 B9 9E A0	LDA \$A09E,Y
A6CF F0 43	BEQ \$A714	A733 10 FA	BPL \$A72F
A6D1 20 2C AB	JSR \$AB2C	A735 30 F5	BMI \$A72C
A6D4 20 D7 AA	JSR \$AAD7	A737 C8	INY
A6D7 C8	INY	A738 B9 9E A0	LDA \$A09E,Y
A6D8 B1 5F	LDA (\$5F),Y	A73B 30 B2	BMI \$A6EF
A6DA AA	TAX	A73D 20 47 AB	JSR \$AB47
A6DB C8	INY	A740 D0 F5	BNE \$A737
A6DC B1 5F	LDA (\$5F),Y		
A6DE C5 15	CMP \$15		
A6E0 D0 04	BNE \$A6E6	A742; Perform [FOR]	
A6E2 E4 14	CPX \$14		
A6E4 F0 02	BEQ \$A6E8	A742 A9 B0	LDA #\$80
A6E6 B0 2C	BCS \$A714	A744 B5 10	STA \$10
A6EB B4 49	STY \$49	A746 20 A5 A9	JSR \$A9A5
A6EA 20 CD BD	JSR \$BDCD	A749 20 BA A3	JSR \$A3BA
A6ED A9 20	LDA #\$20	A74C D0 05	BNE \$A753
A6EF A4 49	LDY \$49	A74E BA	TXA
A6F1 29 7F	AND #\$7F	A74F 69 0F	ADC #\$0F
A6F3 20 47 AB	JSR \$AB47	A751 AA	TAX
A6F6 C9 22	CMP #\$22	A752 9A	TXS
A6FB D0 06	BNE \$A700	A753 68	PLA
A6FA A5 0F	LDA \$0F	A754 68	PLA
A6FC 49 FF	EOR #\$FF	A755 A9 09	LDA #\$09
A6FE B5 0F	STA \$0F	A757 20 FB A3	JSR \$A3FB
A700 C8	INY	A75A 20 06 A9	JSR \$A906
A701 F0 11	BEQ \$A714	A75D 18	CLC
A703 B1 5F	LDA (\$5F),Y	A75E 98	TYA
A705 D0 10	BNE \$A717	A75F 65 7A	ADC \$7A
A707 A8	TAY	A761 48	PHA
A708 B1 5F	LDA (\$5F),Y	A762 A5 7B	LDA \$7B
A70A AA	TAX	A764 69 00	ADC #\$00
A70B C8	INY	A766 48	PHA
A70C B1 5F	LDA (\$5F),Y	A767 A5 3A	LDA \$3A
A70E B6 5F	STX \$5F	A769 48	PHA
A710 B5 60	STA \$60	A76A A5 39	LDA \$39
A712 D0 B5	BNE \$A6C9	A76C 48	PHA
A714 4C B6 E3	JMP \$E3B6	A76D A9 A4	LDA #\$A4
A717 6C 06 03	JMP (\$0306)	A76F 20 FF AE	JSR \$AEFF
A71A 10 D7	BPL \$A6F3	A772 20 8D AD	JSR \$ADBD

A775 20 8A AD	JSR \$AD8A	A7DF E6 7B	INC \$7B
A778 A5 66	LDA \$66	A7E1 6C 08 03	JMP (\$030B)
A77A 09 7F	ORA #\$7F	A7E4 20 73 00	JSR \$0073
A77C 25 62	AND \$62	A7E7 20 ED A7	JSR \$A7ED
A77E 85 62	STA \$62	A7EA 4C AE A7	JMP \$A7AE
A780 A9 BB	LDA #\$BB		
A782 A0 A7	LDY #\$A7		
A784 B5 22	STA \$22	A7ED; Execute statement	
A786 84 23	STY \$23		
A788 4C 43 AE	JMP \$AE43	A7ED F0 3C	BEQ \$A02B
A78B A9 BC	LDA #\$BC	A7EF E9 B0	SBC #\$B0
A78D A0 B9	LDY #\$B9	A7F1 90 11	BCC \$A004
A78F 20 A2 BB	JSR \$BBA2	A7F3 C9 23	CMP #\$23
A792 20 79 00	JSR \$0079	A7F5 B0 17	BCS \$A00E
A795 C9 A9	CMP #\$A9	A7F7 0A	ASL
A797 D0 06	BNE \$A79F	A7F8 A8	TAY
A799 20 73 00	JSR \$0073	A7F9 B9 0D A0	LDA \$A00D,Y
A79C 20 8A AD	JSR \$AD8A	A7FC 48	PHA
A79F 20 2B BC	JSR \$BC2B	A7FD B9 0C A0	LDA \$A00C,Y
A7A2 20 38 AE	JSR \$AE38	A800 48	PHA
A7A5 A5 4A	LDA \$4A	A801 4C 73 00	JMP \$0073
A7A7 48	PHA	A804 4C A5 A9	JMP \$A9A5
A7AB A5 49	LDA \$49	A807 C9 3A	CMP #\$3A
A7AA 48	PHA	A809 F0 D6	BEQ \$A7E1
A7AB A9 B1	LDA #\$B1	A80B 4C 08 AF	JMP \$AF08
A7AD 48	PHA	A80E C9 4B	CMP #\$4B
A7AE 20 2C AB	JSR \$AB2C	A810 D0 F9	BNE \$AB0B
A7B1 A5 7A	LDA \$7A	A812 20 73 00	JSR \$0073
A7B3 A4 7B	LDY \$7B	A815 A9 A4	LDA #\$A4
A7B5 C0 02	CPY #\$02	A817 20 FF AE	JSR \$AEFF
A7B7 EA	NOP	A81A 4C A0 AB	JMP \$ABA0
A7B8 F0 04	BEQ \$A7BE		
A7BA 85 3D	STA \$3D		
A7BC 84 3E	STY \$3E	A81D; Perform [RESTORE]	
A7BE A0 00	LDY #\$00		
A7C0 B1 7A	LDA (\$7A),Y	A81D 38	SEC
A7C2 D0 43	BNE \$AB07	A81E A5 2B	LDA \$2B
A7C4 A0 02	LDY #\$02	A820 E9 01	SBC #\$01
A7C6 B1 7A	LDA (\$7A),Y	A822 A4 2C	LDY \$2C
A7CB 18	CLC	A824 B0 01	BCS \$A827
A7C9 D0 03	BNE \$A7CE	A826 B8	DEY
A7CB 4C 4B AB	JMP \$AB4B	A827 85 41	STA \$41
A7CE C8	INY	A829 84 42	STY \$42
A7CF B1 7A	LDA (\$7A),Y	A82B 60	RTS
A7D1 85 39	STA \$39		
A7D3 C8	INY		
A7D4 B1 7A	LDA (\$7A),Y	A82C; Break	
A7D6 85 3A	STA \$3A		
A7DB 98	TYA	A82C 20 E1 FF	JSR \$FFE1
A7D9 65 7A	ADC \$7A		
A7DB 85 7A	STA \$7A		
A7DD 90 02	BCC \$A7E1	A82F; Perform [STOP]	

A82F B0 01	BCS \$A832	A87D 20 60 A6 A880 4C 97 AB	JSR \$A660 JMP \$A897
<b>A831; Perform [END]</b>			
A831 18	CLC		
A832 D0 3C	BNE \$A870	A883 A9 03	LDA #\$03
A834 A5 7A	LDA \$7A	A885 20 FB A3	JSR \$A3FB
A836 A4 7B	LDY \$7B	A888 A5 7B	LDA \$7B
A838 A6 3A	LDX \$3A	A88A 48	PHA
A83A E8	INX	A88B A5 7A	LDA \$7A
A83B F0 0C	BEQ \$A849	A88D 48	PHA
A83D 85 3D	STA \$3D	A88E A5 3A	LDA #\$3A
A83F 84 3E	STY \$3E	A890 48	PHA
A841 A5 39	LDA \$39	A891 A5 39	LDA \$39
A843 A4 3A	LDY \$3A	A893 48	PHA
A845 85 3B	STA \$3B	A894 A9 8D	LDA #\$8D
A847 84 3C	STY \$3C	A896 48	PHA
A849 68	PLA	A897 20 79 00	JSR \$0079
A84A 68	PLA	A89A 20 A0 AB	JSR \$A8A0
A84B A9 81	LDA #\$81	A89D 4C AE A7	JMP \$A7AE
A84D A0 A3	LDY #\$A3		
A84F 90 03	BCC \$A854		
A851 4C 69 A4	JMP \$A469		
A854 4C B6 E3	JMP \$E386		
<b>A857; Perform [CONT]</b>			
A857 D0 17	BNE \$A870	A8A0 20 6B A9	JSR \$A96B
A859 A2 1A	LDX #\$1A	A8A3 20 09 A9	JSR \$A909
A85B A4 3E	LDY \$3E	A8A6 3B	SEC
A85D 00 03	BNE \$A862	A8A7 A5 39	LDA \$39
A85F 4C 37 A4	JMP \$A437	A8A9 E5 14	SBC \$14
A862 A5 3D	LDA \$3D	A8AB A5 3A	LDA \$3A
A864 85 7A	STA \$7A	A8AD E5 15	SBC \$15
A866 84 7B	STY \$7B	A8AF B0 0B	BCS \$A8BC
A868 A5 3B	LDA \$3B	A8B1 98	TYA
A86A A4 3C	LDY \$3C	A8B2 3B	SEC
A86C 85 39	STA \$39	A8B3 65 7A	ADC \$7A
A86E 84 3A	STY \$3A	A8B5 A6 7B	LDX \$7B
A870 60	RTS	A8B7 90 07	BCC \$A8C0
<b>A871; Perform [RUN]</b>			
A871 08	PHP	A8B9 E8	INX
A872 A9 00	LDA #\$00	A8BA B0 04	BCS \$A8C0
A874 20 90 FF	JSR \$FF90	A8BC A5 2B	LDA \$2B
A877 28	PLP	A8BE A6 2C	LDX \$2C
A878 D0 03	BNE \$A87D	A8C0 20 17 A6	JSR \$A617
A87A 4C 59 A6	JMP \$A659	A8C3 90 1E	BCC \$A8E3
		A8C5 A5 5F	LDA \$5F
		A8C7 E9 01	SBC #\$01
		A8C9 85 7A	STA \$7A
		A8CB A5 60	LDA \$60
		A8CD E9 00	SBC #\$00
		A8CF 85 7B	STA \$7B
		A8D1 60	RTS

		A91F F0 E4	BEQ \$A905
		A921 CB	INY
ABD2; Perform [RETURN]		A922 C9 22	CMP #\$22
ABD2 D0 FD	BNE \$ABD1	A924 D0 F3	BNE \$A919
ABD4 A9 FF	LDA #\$FF	A926 F0 E9	BEQ \$A911
ABD6 85 4A	STA \$4A		
ABDB 20 8A A3	JSR \$A38A	A928; Perform [1F]	
ABDB 9A	TXS		
ABDC C9 BD	CMP #\$BD	A928 20 9E AD	JSR \$AD9E
ABDE F0 0B	BEQ \$ABEB	A92B 20 79 00	JSR \$0079
ABE0 A2 0C	LDX #\$0C	A92E C9 B9	CMP #\$B9
ABE2 2C A2 11	BIT \$11A2	A930 F0 05	BEQ \$A937
ABE5 4C 37 A4	JMP \$A437	A932 A9 A7	LDA #\$A7
ABEB 4C 0B AF	JMP \$AF0B	A934 20 FF AE	JSR \$AEFF
ABEB 68	PLA	A937 A5 61	LDA \$61
ABEC 68	PLA	A939 D0 05	BNE \$A940
ABED 85 39	STA \$39		
ABEF 68	PLA		
ABF0 85 3A	STA \$3A	A93B; Perform [REM]	
ABF2 68	PLA		
ABF3 85 7A	STA \$7A	A93B 20 09 A9	JSR \$A909
ABF5 68	PLA	A93E F0 BB	BEQ \$A8FB
ABF6 85 7B	STA \$7B	A940 20 79 00	JSR \$0079
		A943 B0 03	BCS \$A948
		A945 4C A0 AB	JMP \$ABA0
ABFB; Perform [DATA]			
ABFB 20 06 A9	JSR \$A906	A94B; Perform [ON]	
ABFB 98	TYA		
ABFC 18	CLC	A94B 4C ED A7	JMP \$A7ED
ABFD 65 7A	ADC \$7A	A94B 20 9E B7	JSR \$B79E
ABFF 85 7A	STA \$7A	A94E 4B	PHA
A901 90 02	BCC \$A905	A94F C9 8D	CMP #\$BD
A903 E6 7B	INC \$7B	A951 F0 04	BEQ \$A957
A905 60	RTS	A953 C9 B9	CMP #\$B9
		A955 D0 91	BNE \$A8EB
		A957 C6 65	DEC \$65
		A959 D0 04	BNE \$A95F
		A95B 6B	PLA
A906 A2 3A	LDX #\$3A	A95C 4C EF A7	JMP \$A7EF
A908 2C A2 00	BIT \$00A2	A95F 20 73 00	JSR \$0073
A90B B6 07	STX #07	A962 20 6B A9	JSR \$A96B
A90D A0 00	LDY #\$00	A965 C9 2C	CMP #\$2C
A90F B4 08	STY \$0B	A967 F0 EE	BEQ \$A957
A911 A5 08	LDA \$0B	A969 6B	PLA
A913 A6 07	LDX #07	A96A 60	RTS
A915 85 07	STA #07		
A917 86 08	STX \$0B		
A919 B1 7A	LDA (\$7A),Y	A96B; Get fixed point number	
A91B F0 EB	BEQ \$A905	A96B A2 00	LDX #\$00
A91D C5 08	CMP \$0B		

A96D B6 14	STX \$14	A9CE 91 49	STA (\$49),Y
A96F B6 15	STX \$15	A9D0 C8	INY
A971 B0 F7	BCS \$A96A	A9D1 A5 65	LDA \$65
A973 E9 2F	SBC #\$2F	A9D3 91 49	STA (\$49),Y
A975 B5 07	STA \$07	A9D5 60	RTS
A977 A5 15	LDA \$15	A9D6 4C D0 BB	JMP \$BBDO
A979 B5 22	STA \$22	A9D9 68	PLA
A97B C9 19	CMP #\$19	A9DA A4 4A	LDY \$4A
A97D B0 D4	BCS \$A953	A9DC C0 BF	CPY #\$BF
A97F A5 14	LDA \$14	A9DE D0 4C	BNE \$AA2C
A981 0A	ASL	A9E0 20 A6 B6	JSR \$B6A6
A982 26 22	ROL \$22	A9E3 C9 06	CMP #\$06
A984 0A	ASL	A9E5 D0 3D	BNE \$AA24
A985 26 22	ROL \$22	A9E7 A0 00	LDY #\$00
A987 65 14	ADC \$14	A9E9 B4 61	STY \$61
A989 85 14	STA \$14	A9EB B4 66	STY \$66
A98B A5 22	LDA \$22	A9ED B4 71	STY \$71
A98D 65 15	ADC \$15	A9EF 20 1D AA	JSR \$AA1D
A98F B5 15	STA \$15	A9F2 20 E2 BA	JSR \$BAE2
A991 06 14	ASL \$14	A9F5 E6 71	INC \$71
A993 26 15	ROL \$15	A9F7 A4 71	LDY \$71
A995 A5 14	LDA \$14	A9F9 20 1D AA	JSR \$AA1D
A997 65 07	ADC \$07	A9FC 20 0C BC	JSR \$BC0C
A999 85 14	STA \$14	A9FF AA	TAX
A99B 90 02	BCC \$A99F	AA00 F0 05	BEQ \$AA07
A99D E6 15	INC \$15	AA02 EB	INX
A99F 20 73 00	JSR \$0073	AA03 BA	TXA
A9A2 4C 71 A9	JMP \$A971	AA04 20 ED BA	JSR \$BAED
		AA07 A4 71	LDY \$71
		AA09 CB	INY
		AA0A C0 06	CPY #\$06
		AA0C D0 DF	BNE \$A9ED
		AA0E 20 E2 BA	JSR \$BAE2

#### A9A5; Perform [LET]

A9A5 20 8B B0	JSR \$B0BB	AA11 20 9B BC	JSR \$BC9B
A9AB 85 49	STA \$49	AA14 A6 64	LDX \$64
A9AA 84 4A	STY \$4A	AA16 A4 63	LDY \$63
A9AC A9 B2	LDA #\$B2	AA18 A5 65	LDA \$65
A9AE 20 FF AE	JSR \$AEFF	AA1A 4C DB FF	JMP \$FFDB
A9B1 A5 0E	LDA \$0E	AA1D B1 22	LDA (\$22),Y
A9B3 48	PHA	AA1F 20 80 00	JSR \$0080
A9B4 A5 0D	LDA \$0D	AA22 90 03	BCC \$AA27
A9B6 48	PHA	AA24 4C 48 B2	JMP \$B248
A9B7 20 9E AD	JSR \$AD9E	AA27 E9 2F	SBC #\$2F
A9BA 68	PLA	AA29 4C 7E BD	JMP \$BD7E
A9BB 2A	ROL	AA2C A0 02	LDY #\$02
A9BC 20 90 AD	JSR \$AD90	AA2E B1 64	LDA (\$64),Y
A9BF D0 18	BNE \$A9D9	AA30 C5 34	CMP \$34
A9C1 68	PLA	AA32 90 17	BCC \$AA4B
A9C2 10 12	BPL \$A9D6	AA34 D0 07	BNE \$AA3D
A9C4 20 1B BC	JSR \$BC1B	AA36 B8	DEY
A9C7 20 BF B1	JSR \$B1BF	AA37 B1 64	LDA (\$64),Y
A9CA A0 00	LDY #\$00	AA39 C5 33	CMP \$33
A9CC A5 64	LDA \$64		

AA3B 90 0E	BCC \$AA4B	AA97 4C A0 AA	JMP \$AAAA0
AA3D A4 65	LDY \$65	AA9A 20 21 AB	JSR \$AB21
AA3F C4 2E	CPY \$2E	AA9D 20 79 00	JSR \$0079
AA41 90 08	BCC \$AA4B		
AA43 D0 0D	BNE \$AA52		
AA45 A5 64	LDA \$64	AAA0; Perform [PRINT]	
AA47 C5 2D	CMP \$2D		
AA49 B0 07	BCS \$AA52	AAA0 F0 35	BEQ \$AAD7
AA4B A5 64	LDA \$64	AAA2 F0 43	BEQ \$AAE7
AA4D A4 65	LDY \$65	AAA4 C9 A3	CMP #\$A3
AA4F 4C 68 AA	JMP \$AA68	AAA6 F0 50	BEQ \$AAFB
AA52 A0 00	LDY #\$00	AAA8 C9 A6	CMP #\$A6
AA54 B1 64	LDA (\$64),Y	AAA8 18	CLC
AA56 20 75 B4	JSR \$B475	AAAB F0 4B	BEQ \$AAFB
AA59 A5 50	LDA \$50	AAAD C9 2C	CMP #\$2C
AA5B A4 51	LDY \$51	AAAF F0 37	BEQ \$AAE8
AA5D 85 6F	STA \$6F	AAB1 C9 3B	CMP #\$3B
AA5F 84 70	STY \$70	AAB3 F0 5E	BEQ \$AB13
AA61 20 7A B6	JSR \$B67A	AAB5 20 9E AD	JSR \$AD9E
AA64 A9 61	LDA #\$61	AABB 24 0D	BIT \$0D
AA66 A0 00	LDY #\$00	AABA 30 DE	BMI \$AA9A
AA68 85 50	STA \$50	AABC 20 DD BD	JSR \$BDDD
AA6A B4 51	STY \$51	AABF 20 87 B4	JSR \$B487
AA6C 20 DB B6	JSR \$B6DB	AAC2 20 21 AB	JSR \$AB21
AA6F A0 00	LDY #\$00	AAC5 20 3B AB	JSR \$AB3B
AA71 B1 50	LDA (\$50),Y	AAC8 D0 D3	BNE \$AA9D
AA73 91 49	STA (\$49),Y	AAAC A9 00	LDA #\$00
AA75 C8	INY	AACC 9D 00 02	STA \$0200,X
AA76 B1 50	LDA (\$50),Y	AACF A2 FF	LDX #\$FF
AA78 91 49	STA (\$49),Y	AAD1 A0 01	LDY #\$01
AA7A CB	INY	AAD3 A5 13	LDA \$13
AA7B B1 50	LDA (\$50),Y	AAD5 D0 10	BNE \$AAE7
AA7D 91 49	STA (\$49),Y	AAD7 A9 0D	LDA #\$0D
AA7F 60	RTS	AAD9 20 47 AB	JSR \$AB47
		AAADC 24 13	BIT \$13
		AAADE 10 05	BPL \$AAE5
		AAEO A9 0A	LDA #\$0A
AA80 20 86 AA	JSR \$AA86	AAE2 20 47 AB	JSR \$AB47
AA83 4C B5 AB	JMP \$ABB5	AAE5 49 FF	EOR #\$FF
		AAE7 60	RTS
		AAE8 3B	SEC
		AAE9 20 F0 FF	JSR \$FFFF0
		AAEC 98	TYA
		AAED 3B	SEC
AA86 20 9E B7	JSR \$B79E	AAEE E9 0A	SBC #\$0A
AA89 F0 05	BEQ \$AA90	AAFO B0 FC	BCS \$AAEE
AA8B A9 2C	LDA #\$2C	AAF2 49 FF	EOR #\$FF
AA8D 20 FF AE	JSR \$AEFF	AAF4 69 01	ADC #\$01
AA90 08	PHP	AAF6 D0 16	BNE \$AB0E
AA91 86 13	STX \$13	AAF8 08	PHP
AA93 20 18 E1	JSR \$E11B	AAF9 3B	SEC
AA96 28	PLP	AAFA 20 F0 FF	JSR \$FFFF0

AAFD B4 09	STY \$09	AB4F F0 11	BEQ \$AB62
AAFF 20 9B B7	JSR \$B79B	AB51 30 04	BMI \$AB57
AB02 C9 29	CMP #\$29	AB53 A0 FF	LDY #\$FF
AB04 D0 59	BNE \$AB5F	AB55 D0 04	BNE \$AB5B
AB06 28	PLP	AB57 A5 3F	LDA \$3F
AB07 90 06	BCC \$AB0F	AB59 A4 40	LDY \$40
AB09 8A	TXA	AB5B 85 39	STA \$39
AB0A E5 09	SBC \$09	AB5D 84 3A	STY \$3A
AB0C 90 05	BCC \$AB13	AB5F 4C 08 AF	JMP \$AF08
AB0E AA	TAX	AB62 A5 13	LDA \$13
AB0F E8	INX	AB64 F0 05	BEQ \$AB6B
AB10 CA	DEX	AB66 A2 18	LDX #\$18
AB11 D0 06	BNE \$AB19	AB68 4C 37 A4	JMP \$A437
AB13 20 73 00	JSR \$0073	AB6B A9 0C	LDA #\$0C
AB16 4C A2 AA	JMP \$AAA2	AB6D A0 AD	LDY #\$AD
AB19 20 3B AB	JSR \$AB3B	AB6F 20 1E AB	JSR \$AB1E
AB1C D0 F2	BNE \$AB10	AB72 A5 3D	LDA \$3D
		AB74 A4 3E	LDY \$3E
		AB76 85 7A	STA \$7A
		AB78 84 7B	STY \$7B
		AB7A 60	RTS

**AB1E; Print string from (y.a)**

AB1E 20 B7 B4	JSR \$B487
AB21 20 A6 B6	JSR \$B6A6
AB24 AA	TAX
AB25 A0 00	LDY #\$00
AB27 E8	INX
AB28 CA	DEX
AB29 F0 BC	BEQ \$AAE7
AB2B B1 22	LDA (\$22),Y
AB2D 20 47 AB	JSR \$AB47
AB30 CB	INY
AB31 C9 0D	CMP #\$0D
AB33 D0 F3	BNE \$AB28
AB35 20 E5 AA	JSR \$AAE5
AB38 4C 28 AB	JMP \$AB28

**AB7B; Perform [GET]**

AB7B 20 A6 B3	JSR \$B3A6
AB7E C9 23	CMP #\$23
AB80 D0 10	BNE \$AB92
AB82 20 73 00	JSR \$0073
AB85 20 9E B7	JSR \$B79E
AB88 A9 2C	LDA #\$2C
ABBA 20 FF AE	JSR \$AEFF
ABBD B6 13	STX \$13
ABBF 20 1E E1	JSR \$E11E
AB92 A2 01	LDX #\$01
AB94 A0 02	LDY #\$02
AB96 A9 00	LDA #\$00
AB98 8D 01 02	STA \$0201
AB9B A9 40	LDA #\$40
AB9D 20 0F AC	JSR \$AC0F
ABA0 A6 13	LDX \$13
ABA2 D0 13	BNE \$ABB7
ABA4 60	RTS

**AB3B; Print format character**

AB3B A5 13	LDA \$13
AB3D F0 03	BEQ \$AB42
AB3F A9 20	LDA #\$20
AB41 2C A9 1D	BIT \$1DA9
AB44 2C A9 3F	BIT \$3FA9
AB47 20 0C E1	JSR \$E10C
AB4A 29 FF	AND #\$FF
AB4C 60	RTS

**AB45; Perform [INPUT#]**

AB45 20 9E B7	JSR \$B79E
AB48 A9 2C	LDA #\$2C
ABAA 20 FF AE	JSR \$AEFF
ABAD B6 13	STX \$13
ABA9 20 1E E1	JSR \$E11E

**AB4D; Bad input routine**

AB4D A5 11	LDA \$11
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ABB2 20 CE AB	JSR \$ABCE	AC13 B4 44	STY \$44
ABB5 A5 13	LDA \$13	AC15 20 BB B0	JSR \$B0B8
ABB7 20 CC FF	JSR \$FFCC	AC18 85 49	STA \$49
ABA A2 00	LDX #\$00	AC1A 84 4A	STY \$4A
ABB8 B6 13	STX \$13	AC1C A5 7A	LDA \$7A
ABBE 60	RTS	AC1E A4 7B	LDY \$7B
		AC20 85 4B	STA \$4B
		AC22 B4 4C	STY \$4C
		AC24 A6 43	LDX \$43
		AC26 A4 44	LDY \$44
ABBF C9 22	CMP #\$22	AC28 86 7A	STX \$7A
ABC1 D0 0B	BNE \$ABCE	AC2A B4 7B	STY \$7B
ABC3 20 BD AE	JSR \$AEBD	AC2C 20 79 00	JSR \$0079
ABC6 A9 3B	LDA #\$3B	AC2F D0 20	BNE \$AC51
ABC8 20 FF AE	JSR \$AEFF	AC31 24 11	BIT \$11
ABC9 20 21 AB	JSR \$AB21	AC33 50 0C	BVC \$AC41
ABCE 20 A6 B3	JSR \$B3A6	AC35 20 24 E1	JSR \$E124
ABD1 A9 2C	LDA #\$2C	AC38 8D 00 02	STA \$0200
ABD3 8D FF 01	STA \$01FF	AC3B A2 FF	LDX #\$FF
ABD6 20 F9 AB	JSR \$ABF9	AC3D A0 01	LDY #\$01
ABD9 A5 13	LDA \$13	AC3F D0 0C	BNE \$AC4D
ABDB F0 0D	BEQ \$ABEA	AC41 30 75	BMI \$ACBB
ABDD 20 B7 FF	JSR \$FFB7	AC43 A5 13	LDA \$13
ABE0 29 02	AND #\$02	AC45 D0 03	BNE \$AC4A
ABE2 F0 06	BEQ \$ABEA	AC47 20 45 AB	JSR \$AB45
ABE4 20 B5 AB	JSR \$ABB5	AC4A 20 F9 AB	JSR \$ABF9
ABE7 4C FB AB	JMP \$ABFB	AC4D 86 7A	STX \$7A
ABEA AD 00 02	LDA \$0200	AC4F B4 7B	STY \$7B
ABED D0 1E	BNE \$AC0D	AC51 20 73 00	JSR \$0073
ABEF A5 13	LDA \$13	AC54 24 0D	BIT \$0D
ABF1 D0 E3	BNE \$ABD6	AC56 10 31	BPL \$ACB9
ABF3 20 06 A9	JSR \$A906	AC58 24 11	BIT \$11
ABF6 4C FB AB	JMP \$ABFB	AC5A 50 09	BVC \$AC65
		AC5C E8	INX
		AC5D 86 7A	STX \$7A
		AC5F A9 00	LDA #\$00
		AC61 85 07	STA \$07
ABF9 A5 13	LDA \$13	AC63 F0 0C	BEQ \$AC71
ABFB D0 06	BNE \$AC03	AC65 85 07	STA \$07
ABFD 20 45 AB	JSR \$AB45	AC67 C9 22	CMP #\$22
AC00 20 3B AB	JSR \$AB3B	AC69 F0 07	BEQ \$AC72
AC03 4C 60 A5	JMP \$A560	AC6B A9 3A	LDA #\$3A
		AC6D 85 07	STA \$07
		AC6F A9 2C	LDA #\$2C
AC06; Perform [READ]		AC71 18	CLC
		AC72 85 08	STA \$08
AC06 A6 41	LDX \$41	AC74 A5 7A	LDA \$7A
AC08 A4 42	LDY \$42	AC76 A4 7B	LDY \$7B
AC0A A9 98	LDA #\$98	AC78 69 00	ADC #\$00
AC0C 2C A9 00	BIT \$00A9	AC7A 90 01	BCC \$AC7D
AC0F B5 11	STA \$11	AC7C C8	INY
AC11 B6 43	STX \$43	AC7D 20 8D B4	JSR \$B48D

ACB0 20 E2 B7	JSR \$B7E2	ACF0 A5 13	LDA \$13
ACB3 20 DA A9	JSR \$A9DA	ACF2 D0 07	BNE \$ACFB
ACB6 4C 91 AC	JMP \$AC91	ACF4 A9 FC	LDA #\$FC
ACB9 20 F3 BC	JSR \$BCF3	ACF6 A0 AC	LDY #\$AC
ACBC A5 0E	LDA \$0E	ACF8 4C 1E AB	JMP \$AB1E
ACBE 20 C2 A9	JSR \$A9C2	ACFB 60	RTS
AC91 20 79 00	JSR \$0079		
AC94 F0 07	BEQ \$AC9D		
AC96 C9 2C	CMP #\$2C	ACFC; Input error messages	
AC98 F0 03	BEQ \$AC9D	ACFC 3F	???
AC9A 4C 4D AB	JMP \$AB4D	ACFD 45 58	EOR \$58
AC9D A5 7A	LDA \$7A	ACFF 54	???
AC9F A4 7B	LDY \$7B	AD00 52	???
ACA1 B5 43	STA \$43	AD01 41 20	EOR (\$20,X)
ACA3 B4 44	STY \$44	AD03 49 47	EOR #\$47
ACA5 A5 4B	LDA \$4B	AD05 4E 4F 52	LSR \$524F
ACA7 A4 4C	LDY \$4C	AD08 45 44	EOR \$44
ACA9 85 7A	STA \$7A	AD0A 0D 00 3F	DRA \$3F00
ACAB B4 7B	STY \$7B	AD0D 52	???
ACAD 20 79 00	JSR \$0079	AD0E 45 44	EOR \$44
ACB0 F0 2D	BEQ \$ACDF	AD10 4F	???
ACB2 20 FD AE	JSR \$AEFD	AD11 20 46 52	JSR \$5246
ACB5 4C 15 AC	JMP \$AC15	AD14 4F	???
ACB8 20 06 A9	JSR \$A906	AD15 4D 20 53	EOR \$5320
ACBB C8	INY	AD18 54	???
ACBC AA	TAX	AD19 41 52	EOR (\$52,X)
ACBD D0 12	BNE \$ACD1	AD1B 54	???
ACBF A2 0D	LDX #\$0D	AD1C 0D 00 DO	DRA \$D000
ACC1 CB	INY		
ACC2 B1 7A	LDA (\$7A),Y		
ACC4 F0 6C	BEQ \$AD32		
ACC6 C8	INY	AD1E; Perform [NEXT]	
ACC7 B1 7A	LDA (\$7A),Y	AD1E D0 04	BNE \$AD24
ACC9 B5 3F	STA \$3F	AD20 A0 00	LDY #\$00
ACCB C8	INY	AD22 F0 03	BEQ \$AD27
ACCC B1 7A	LDA (\$7A),Y	AD24 20 BB B0	JSR \$B08B
ACCE C8	INY	AD27 85 49	STA \$49
ACCF 85 40	STA \$40	AD29 84 4A	STY \$4A
ACD1 20 FB AB	JSR \$A8FB	AD2B 20 8A A3	JSR \$A38A
ACD4 20 79 00	JSR \$0079	AD2E F0 05	BEQ \$AD35
ACD7 AA	TAX	AD30 A2 0A	LDX #\$0A
ACDB E0 B3	CPX #\$B3	AD32 4C 37 A4	JMP \$A437
ACDA D0 DC	BNE \$ACB8	AD35 9A	TXS
ACDC 4C 51 AC	JMP \$AC51	AD36 8A	TXA
ACDF A5 43	LDA \$43	AD37 18	CLC
ACE1 A4 44	LDY \$44	AD38 69 04	ADC #\$04
ACE3 A6 11	LDX \$11	AD3A 48	PHA
ACES 10 03	BPL \$ACEA	AD3B 69 06	ADC #\$06
ACE7 4C 27 AB	JMP \$A827	AD3D 85 24	STA \$24
ACEA A0 00	LDY #\$00	AD3F 68	PLA
ACEC B1 43	LDA (\$43),Y	AD40 A0 01	LDY #\$01
ACEE F0 0B	BEQ \$ACFB		

AD42 20 A2 BB	JSR \$BBA2	ADA2 C6 7B	DEC \$7B
AD45 BA	TSX	ADA4 C6 7A	DEC \$7A
AD46 BD 09 01	LDA \$0109,X	ADA6 A2 00	LDX #\$00
AD49 85 66	STA \$66	ADA8 24 48	BIT \$48
AD4B A5 49	LDA \$49	ADAA 8A	TXA
AD4D A4 4A	LDY \$4A	ADAB 48	PHA
AD4F 20 67 BB	JSR \$BB67	ADAC A9 01	LDA #\$01
AD52 20 D0 BB	JSR \$BBDO	ADAE 20 FB A3	JSR \$A3FB
AD55 A0 01	LDY #\$01	ADB1 20 B3 AE	JSR \$AE83
AD57 20 5D BC	JSR \$BC5D	ADB4 A9 00	LDA #\$00
AD5A BA	TSX	ADB6 85 4D	STA \$4D
AD5B 38	SEC	ADB8 20 79 00	JSR \$0079
AD5C FD 09 01	SBC \$0109,X	ADB8 38	SEC
AD5F F0 17	BEQ \$AD7B	ADBC E9 B1	SBC #\$B1
AD61 BD 0F 01	LDA \$010F,X	ADBE 90 17	BCC \$ADD7
AD64 85 39	STA \$39	ADC0 C9 03	CMP #\$03
AD66 BD 10 01	LDA \$0110,X	ADC2 B0 13	BCS \$ADD7
AD69 85 3A	STA \$3A	ADC4 C9 01	CMP #\$01
AD6B BD 12 01	LDA \$0112,X	ADC6 2A	ROL
AD6E 85 7A	STA \$7A	ADC7 49 01	EOR #\$01
AD70 BD 11 01	LDA \$0111,X	ADC9 45 4D	EOR \$4D
AD73 85 7B	STA \$7B	ADC9 C5 4D	CMP \$4D
AD75 4C AE A7	JMP \$A7AE	ADCD 90 61	BCC \$AE30
		ADCF 85 4D	STA \$4D
		ADD1 20 73 00	JSR \$0073
		ADD4 4C BB AD	JMP \$ADBB
		ADD7 A6 4D	LDX \$4D
AD78 8A	TXA	ADD9 D0 2C	BNE \$AE07
AD79 69 11	ADC #\$11	ADDB B0 7B	BCS \$AE5B
AD7B AA	TAX	ADDD 69 07	ADC #\$07
AD7C 9A	TXS	ADD9 90 77	BCC \$AE5B
AD7D 20 79 00	JSR \$0079	ADE1 65 0D	ADC \$0D
AD80 C9 2C	CMP #\$2C	ADE3 D0 03	BNE \$ADEB
AD82 D0 F1	BNE \$AD75	ADES 4C 3D B6	JMP \$B63D
AD84 20 73 00	JSR \$0073	ADE8 69 FF	ADC #\$FF
AD87 20 24 AD	JSR \$AD24	ADEA 85 22	STA \$22
AD8A 20 9E AD	JSR \$AD9E	ADEC 0A	ASL
ADBD 18	CLC	ADED 65 22	ADC \$22
AD8E 24 38	BIT \$38	ADEF A8	TAY
AD90 24 0D	BIT \$0D	ADFO 68	PLA
AD92 30 03	BMI \$AD97	ADF1 D9 B0 A0	CMP \$A0B0,Y
AD94 B0 03	BCS \$AD99	ADF4 B0 67	BCS \$AE5D
AD96 60	RTS	ADF6 20 B0 AD	JSR \$ADBD
AD97 B0 FD	BCS \$AD96	ADF9 48	PHA
AD99 A2 16	LDX #\$16	ADFA 20 20 AE	JSR \$AE20
AD9B 4C 37 A4	JMP \$A437	ADFD 68	PLA
		ADFE A4 4B	LDY \$4B
		AE00 10 17	BPL \$AE19
		AE02 AA	TAX
		AE03 F0 56	BEQ \$AE5B
		AE05 D0 5F	BNE \$AE66
		AE07 46 0D	LSR \$0D

**AD9E; Evaluate expression**

AD9E A6 7A	LDX \$7A
ADA0 D0 02	BNE \$ADA4

AE09 BA	TXA	AE6A 6B	PLA
AE0A 2A	ROL	AE6B 85 69	STA \$69
AE0B A6 7A	LDX \$7A	AE6D 6B	PLA
AE0D D0 02	BNE \$AE11	AE6E 85 6A	STA \$6A
AE0F C6 7B	DEC \$7B	AE70 6B	PLA
AE11 C6 7A	DEC \$7A	AE71 85 6B	STA \$6B
AE13 A0 1B	LDY #\$1B	AE73 6B	PLA
AE15 B5 4D	STA \$4D	AE74 85 6C	STA \$6C
AE17 D0 D7	BNE \$ADFO	AE76 6B	PLA
AE19 D9 80 A0	CMP \$A0B0,Y	AE77 85 6D	STA \$6D
AE1C B0 48	BCS \$AE66	AE79 6B	PLA
AE1E 90 D9	BCC \$ADF9	AE7A 85 6E	STA \$6E
AE20 B9 B2 A0	LDA \$A0B2,Y	AE7C 45 66	EDR \$66
AE23 48	PHA	AE7E 85 6F	STA \$6F
AE24 B9 B1 A0	LDA \$A0B1,Y	AE80 A5 61	LDA \$61
AE27 48	PHA	AE82 60	RTS
AE28 20 33 AE	JSR \$AE33	AE83 6C 0A 03	JMP (\$030A)
AE2B A5 4D	LDA \$4D	AE86 A9 00	LDA #\$00
AE2D 4C A9 AD	JMP \$ADA9	AE88 85 0D	STA \$0D
AE30 4C 08 AF	JMP \$AF08	AEBA 20 73 00	JSR \$0073
AE33 A5 66	LDA \$66	AEBD B0 03	BCS \$AE92
AE35 BE 80 A0	LDX \$A0B0,Y	AEBF 4C F3 BC	JMP \$BCF3
AE38 AB	TAY	AE92 20 13 B1	JSR \$B113
AE39 68	PLA	AE95 90 03	BCC \$AE9A
AE3A 85 22	STA \$22	AE97 4C 28 AF	JMP \$AF28
AE3C E6 22	INC \$22	AE9A C9 FF	CMP #\$FF
AE3E 68	PLA	AE9C D0 0F	BNE \$AEAD
AE3F 85 23	STA \$23	AE9E A9 A8	LDA #\$AB
AE41 98	TYA	AEA0 A0 AE	LDY #\$AE
AE42 48	PHA	AEA2 20 A2 BB	JSR \$BBA2
AE43 20 1B BC	JSR \$BC1B	AEAS 4C 73 00	JMP \$0073
AE46 A5 65	LDA \$65		
AE48 48	PHA		
AE49 A5 64	LDA \$64	AEAB; Constant - pi	
AE4B 48	PHA		
AE4C A5 63	LDA \$63	AEAB 82	???
AE4E 48	PHA	AEAB 49 0F	EDR #\$0F
AE4F A5 62	LDA \$62	AEAB DA	???
AE51 48	PHA	AEAC A1 C9	LDA (\$C9,X)
AE52 A5 61	LDA \$61	AEAE 2E F0 DE	ROL \$DEFO
AE54 48	PHA	AEB1 C9 AB	CMP #\$AB
AE55 6C 22 00	JMP (\$0022)	AEB3 F0 58	BEQ \$AF0D
AE58 A0 FF	LDY #\$FF	AEB5 C9 AA	CMP #\$AA
AE5A 68	PLA	AEB7 F0 D1	BEQ \$AEBA
AE5B F0 23	BEQ \$AEBO	AEB9 C9 22	CMP #\$22
AE5D C9 64	CMP #\$64	AEBB D0 0F	BNE \$AECC
AE5F F0 03	BEQ \$AE64	AEBD A5 7A	LDA \$7A
AE61 20 8D AD	JSR \$AD8D	AEBF A4 7B	LDV \$7B
AE64 B4 4B	STY \$4B	AEC1 69 00	ADC #\$00
AE66 68	PLA	AEC3 90 01	BCC \$AECC
AE67 4A	LSR	AEC5 C8	INY
AE68 B5 12	STA \$12	AEC6 20 87 B4	JSR \$B4B7

AEC9 4C E2 B7	JMP \$B7E2		
AECC C9 AB	CMP #\$AB		
AECE D0 13	BNE \$AEE3	AF14; Check range	
AED0 A0 18	LDY #\$18		
AED2 D0 3B	BNE \$AF0F	AF14 38	SEC
AED4 20 BF B1	JSR \$B1BF	AF15 A5 64	LDA \$64
AED7 A5 65	LDA \$65	AF17 E9 00	SBC #\$00
AED9 49 FF	EOR #\$FF	AF19 A5 65	LDA \$65
AEDB A8	TAY	AF1B E9 A0	SBC #\$A0
AEDC A5 64	LDA \$64	AF1D 90 08	BCC \$AF27
AEDE 49 FF	EOR #\$FF	AF1F A9 A2	LDA #\$A2
AEE0 4C 91 B3	JMP \$B391	AF21 E5 64	SBC \$64
AEE3 C9 A5	CMP #\$A5	AF23 A9 E3	LDA #\$E3
AEE5 D0 03	BNE \$AEEA	AF25 E5 65	SBC \$65
AEE7 4C F4 B3	JMP \$B3F4	AF27 60	RTS
AEEE C9 B4	CMP #\$B4		
AEEC 90 03	BCC \$AEF1		
AEFF 4C A7 AF	JMP \$AF07	AF28; Search for variable	
AEF1; Evaluate within brackets			
AEF1 20 FA AE	JSR \$AEFA	AF28 20 BB B0	JSR \$B0BB
AEF4 20 9E AD	JSR \$AD9E	AF2B 85 64	STA \$64
AEF7; )			
AEF7 A9 29	LDA #\$29	AF2D 84 65	STY \$65
AEF9 2C A9 28	BIT \$28A9	AF2F A6 45	LDX \$45
AEFC 2C A9 2C	BIT \$2CA9	AF31 A4 46	LDY \$46
AEFF; Comma..			
AEFF A0 00	LDY #\$00	AF33 A5 0D	LDA \$00
AF01 D1 7A	CMP (\$7A),Y	AF35 F0 26	BEQ \$AF5D
AF03 D0 03	BNE \$AF0B	AF37 A9 00	LDA #\$00
AF05 4C 73 00	JMP \$0073	AF39 85 70	STA \$70
AF08; Syntax error			
AF08 A2 0B	LDX #\$0B	AF3B 20 14 AF	JSR \$AF14
AF0A 4C 37 A4	JMP \$A437	AF3E 90 1C	BCC \$AF5C
AF0D A0 15	LDY #\$15	AF40 E0 54	CPX #\$54
AF0F 68	PLA	AF42 D0 18	BNE \$AF5C
AF10 68	PLA	AF44 C0 C9	CPY #\$C9
AF11 4C FA AD	JMP \$ADFA	AF46 D0 14	BNE \$AF5C
		AF48 20 84 AF	JSR \$AF84
		AF4B 84 5E	STY \$5E
		AF4D 88	DEY
		AF4E B4 71	STY \$71
		AF50 A0 06	LDY #\$06
		AF52 B4 5D	STY \$5D
		AF54 A0 24	LDY #\$24
		AF56 20 6B BE	JSR \$BE6B
		AF59 4C 6F B4	JMP \$B46F
		AF5C 60	RTS
		AF5D 24 0E	BIT \$0E
		AF5F 10 0D	BPL \$AF6E
		AF61 A0 00	LDY #\$00
		AF63 B1 64	LDA (\$64),Y
		AF65 AA	TAX
		AF66 CB	INY
		AF67 B1 64	LDA (\$64),Y
		AF69 AB	TAY

AF6A 8A	TXA	AFCB A8	TAY
AF6B 4C 91 B3	JMP \$B391	AFCC 8A	TXA
AF6E 20 14 AF	JSR \$AF14	AFCD 4B	PHA
AF71 90 2D	BCC \$AFA0	AFCE 4C D6 AF	JMP \$AFD6
AF73 E0 54	Cpx #\$54	AFD1 20 F1 AE	JSR \$AEF1
AF75 D0 1B	BNE \$AF92	AFD4 6B	PLA
AF77 C0 49	Cpy #\$49	AFD5 A8	TAY
AF79 D0 25	BNE \$AFA0	AFD6 B9 EA 9F.	LDA \$9FEA,Y
AF7B 20 84 AF	JSR \$AFB4	AFD9 85 55	STA \$55
AF7E 98	TYA	AFDB B9 EB 9F	LDA \$9FEB,Y
AF7F A2 A0	LDX #\$A0	AFDE 85 56	STA \$56
AF81 4C 4F BC	JMP \$BC4F	AFE0 20 54 00	JSR \$0054
AF84 20 DE FF	JSR \$FFDE	AFE3 4C 8D AD	JMP \$ADBD
AF87 86 64	STX \$64	AFE6 A0 FF	LDY #\$FF
AF89 84 63	STY \$63		
AF8B 85 65	STA \$65		
AF8D A0 00	LDY #\$00	AFE9; Perform [OR]	
AFBF 84 62	STY \$62		
AF91 60	RTS	AFE9 A0 00	LDY #\$00
AF92 E0 53	Cpx #\$53	AFEB 84 0B	STY \$0B
AF94 D0 0A	BNE \$AFA0	AFED 20 BF B1	JSR \$B1BF
AF96 C0 54	Cpy #\$54		
AF98 D0 06	BNE \$AFA0		
AF9A 20 B7 FF	JSR \$FFB7	AFF0; Perform [AND]	
AF9D 4C 3C BC	JMP \$BC3C		
AFA0 A5 64	LDA \$64	AFF0 A5 64	LDA \$64
AFA2 A4 65	LDY \$65	AFF2 45 0B	EDR \$0B
AFA4 4C A2 BB	JMP \$BBA2	AFF4 B5 07	STA \$07
		AFF6 A5 65	LDA \$65
		AFF8 45 0B	EDR \$0B
AFA7; Setup FN reference		AFFA B5 08	STA \$08
		AFFC 20 FC BB	JSR \$BBFC
AFA7 0A	ASL	AFFF 20 BF B1	JSR \$B1BF
AFA8 48	PHA	B002 A5 65	LDA \$65
AFA9 AA	TAX	B004 45 0B	EDR \$0B
AFAA 20 73 00	JSR \$0073	B006 25 0B	AND \$0B
AFAD E0 8F	Cpx #\$8F	B008 45 0B	EDR \$0B
AFAF 90 20	BCC \$AFD1	B00A AB	TAY
AFB1 20 FA AE	JSR \$AEFA	B00B A5 64	LDA \$64
AFB4 20 9E AD	JSR \$AD9E	B00D 45 0B	EDR \$0B
AFB7 20 FD AE	JSR \$AEFD	B00F 25 07	AND \$07
AFBA 20 8F AD	JSR \$AD8F	B011 45 0B	EDR \$0B
AFBD 68	PLA	B013 4C 91 B3	JMP \$B391
AFBE AA	TAX		
AFBF A5 65	LDA \$65		
AFC1 48	PHA	B016; Compare	
AFC2 A5 64	LDA \$64		
AFC4 48	PHA	B016 20 90 AD	JSR \$AD90
AFC5 8A	TXA	B019 B0 13	BCS \$B02E
AFC6 48	PHA	B01B A5 6E	LDA \$6E
AFC7 20 9E B7	JSR \$B79E	B01D 09 7F	DRA #\$7F
AFCA 6B	PLA	B01F 25 6A	AND \$6A

B021 85 6A	STA \$6A		
B023 A9 69	LDA #\$69		
B025 A0 00	LDY #\$00	B081; Perform [DIM]	
B027 20 5B BC	JSR \$BC5B		
B02A AA	TAX	B081 AA	TAX
B02B 4C 61 B0	JMP \$B061	B082 20 90 B0	JSR \$B090
B02E A9 00	LDA #\$00	B085 20 79 00	JSR \$0079
B030 85 0D	STA \$0D	B088 D0 F4	BNE \$B07E
B032 C6 4D	DEC \$4D	B08A 60	RTS
B034 20 A6 B6	JSR \$B6A6		
B037 85 61	STA \$61		
B039 86 62	STX \$62	B08B; Locate variable	
B03B 84 63	STY \$63		
B03D A5 6C	LDA \$6C	B08B A2 00	LDX #\$00
B03F A4 6D	LDY \$6D	B08D 20 79 00	JSR \$0079
B041 20 AA B6	JSR \$B6AA	B090 B6 0C	STX \$0C
B044 86 6C	STX \$6C	B092 B5 45	STA \$45
B046 B4 6D	STY \$6D	B094 20 79 00	JSR \$0079
B048 AA	TAX	B097 20 13 B1	JSR \$B113
B049 38	SEC	B09A B0 03	BCS \$B09F
B04A E5 61	SBC \$61	B09C 4C 08 AF	JMP \$AF08
B04C F0 08	BEQ \$B056	B09F A2 00	LDX #\$00
B04E A9 01	LDA #\$01	BOA1 B6 0D	STX \$0D
B050 90 04	BCC \$B056	BOA3 B6 0E	STX \$0E
B052 A6 61	LDX \$61	BOA5 20 73 00	JSR \$0073
B054 A9 FF	LDA #\$FF	BOAB 90 05	BCC \$B0AF
B056 85 66	STA \$66	BOAA 20 13 B1	JSR \$B113
B058 A0 FF	LDY #\$FF	BOAD 90 0B	BCC \$B0BA
B05A E8	INX	BOAF AA	TAX
B05B C8	INY	BOB0 20 73 00	JSR \$0073
B05C CA	DEX	BOB3 90 FB	BCC \$B0B0
B05D D0 07	BNE \$B066	BOB5 20 13 B1	JSR \$B113
B05F A6 66	LDX \$66	BOB8 B0 F6	BCS \$B0B0
B061 30 0F	BMI \$B072	BOBA C9 24	CMP #\$24
B063 18	CLC	BOBC D0 06	BNE \$B0C4
B064 90 0C	BCC \$B072	BOBE A9 FF	LDA #\$FF
B066 B1 6C	LDA (\$6C),Y	BOC0 85 0D	STA \$0D
B068 D1 62	CMP (\$62),Y	BOC2 D0 10	BNE \$B0D4
B06A F0 EF	BEQ \$B05B	BOC4 C9 25	CMP #\$25
B06C A2 FF	LDX #\$FF	BOC6 D0 13	BNE \$B0DB
B06E B0 02	BCS \$B072	BOCB A5 10	LDA \$10
B070 A2 01	LDX #\$01	BOCA D0 D0	BNE \$B09C
B072 EB	INX	BOCC A9 80	LDA #\$80
B073 8A	TXA	BOCE B5 0E	STA \$0E
B074 2A	ROL	BOD0 05 45	DRA \$45
B075 25 12	AND \$12	BOD2 85 45	STA \$45
B077 F0 02	BEQ \$B07B	BOD4 8A	TXA
B079 A9 FF	LDA #\$FF	BOD5 09 80	DRA #\$80
B07B 4C 3C BC	JMP \$BC3C	BOD7 AA	TAX
B07E 20 FD AE	JSR \$AEFD	BOD8 20 73 00	JSR \$0073

B0DB	B6	46	STX	\$46	B12A	A4	46	LDY	\$46	
B0DD	38		SEC		B12C	C9	54	CMP	#\$54	
B0DE	05	10	ORA	\$10	B12E	D0	0B	BNE	\$B13B	
BOE0	E9	28	SBC	#\$28	B130	C0	C9	CPY	#\$C9	
BOE2	D0	03	BNE	\$BOE7	B132	F0	EF	BEQ	\$B123	
BOE4	4C	D1	JMP	\$B1D1	B134	C0	49	CPY	#\$49	
BOE7	A0	00	LDY	#\$00	B136	D0	03	BNE	\$B13B	
BOE9	B4	10	STY	\$10	B138	4C	08	AF	JMP	\$AF08
BOEB	A5	2D	LDA	\$2D	B13B	C9	53	CMP	#\$53	
BOED	A6	2E	LDX	\$2E	B13D	D0	04	BNE	\$B143	
BOEF	B6	60	STX	\$60	B13F	C0	54	CPY	#\$54	
BOF1	85	5F	STA	\$5F	B141	F0	FS	BEQ	\$B13B	
BOF3	E4	30	CPX	\$30	B143	A5	2F	LDA	\$2F	
BOF5	D0	04	BNE	\$BOFB	B145	A4	30	LDY	\$30	
BOF7	C5	2F	CMP	\$2F	B147	B5	5F	STA	\$5F	
BOF9	F0	22	BEQ	\$B11D	B149	B4	60	STY	\$60	
BOFB	A5	45	LDA	\$45	B14B	A5	31	LDA	\$31	
BOFD	D1	5F	CMP	(\$5F),Y	B14D	A4	32	LDY	\$32	
BOFF	D0	08	BNE	\$B109	B14F	B5	5A	STA	\$5A	
B101	A5	46	LDA	\$46	B151	B4	5B	STY	\$5B	
B103	CB		INY		B153	18		CLC		
B104	D1	5F	CMP	(\$5F),Y	B154	B9	07	ADC	#\$07	
B106	F0	7D	BEQ	\$B185	B156	B9	01	BCC	\$B159	
B108	88		DEY		B158	C8		INY		
B109	18		CLC		B159	B5	58	STA	\$58	
B10A	A5	5F	LDA	\$5F	B15B	B4	59	STY	\$59	
B10C	69	07	ADC	#\$07	B15D	20	B8	A3	JSR	\$A3BB
B10E	90	E1	BCC	\$B0F1	B160	A5	58	LDA	\$58	
B110	E8		INX		B162	A4	59	LDY	\$59	
B111	D0	DC	BNE	\$BOEF	B164	C8		INY		
					B165	B5	2F	STA	\$2F	
					B167	B4	30	STY	\$30	
<b>B113; Check alphabetic</b>										
B113	C9	41	CMP	#\$41	B16D	91	5F	STA	(\$5F),Y	
B115	90	05	BCC	\$B11C	B16F	C8		INY		
B117	E9	5B	SBC	#\$5B	B170	A5	46	LDA	\$46	
B119	38		SEC		B172	91	5F	STA	(\$5F),Y	
B11A	E9	A5	SBC	#\$A5	B174	A9	00	LDA	#\$00	
B11C	60		RTS		B176	C8		INY		
					B177	91	5F	STA	(\$5F),Y	
					B179	C8		INY		
<b>B11D; Create variable</b>										
B11D	68		PLA		B17D	91	5F	STA	(\$5F),Y	
B11E	48		PHA		B17F	C8		INY		
B11F	C9	2A	CMP	#\$2A	B180	91	5F	STA	(\$5F),Y	
B121	D0	05	BNE	\$B128	B182	C8		INY		
B123	A9	13	LDA	#\$13	B183	91	5F	STA	(\$5F),Y	
B125	A0	BF	LDY	#\$BF	B185	A5	5F	LDA	\$5F	
B127	60		RTS		B187	18		CLC		
B128	A5	45	LDA	\$45	B188	B9	02	ADC	#\$02	

B18A A4 60	LDY \$60	B1D1 A5 0C	LDA \$0C
B18C 90 01	BCC \$B1BF	B1D3 05 0E	ORA \$0E
B18E C8	INY	B1D5 48	PHA
B18F 85 47	STA \$47	B1D6 A5 0D	LDA \$0D
B191 84 48	STY \$48	B1D8 48	PHA
B193 60	RTS	B1D9 A0 00	LDY #\$00
		B1DB 98	TYA
		B1DC 48	PHA
<b>B194; Array pointer subroutine</b>		B1DD A5 46	LDA \$46
		B1DF 48	PHA
B194 A5 0B	LDA \$0B	B1E0 A5 45	LDA \$45
B196 0A	ASL	B1E2 48	PHA
B197 69 05	ADC #\$05	B1E3 20 B2 B1	JSR \$B1B2
B199 65 5F	ADC \$5F	B1E6 68	PLA
B19B A4 60	LDY \$60	B1E7 85 45	STA \$45
B19D 90 01	BCC \$B1A0	B1E9 68	PLA
B19F C8	INY	B1EA 85 46	STA \$46
B1A0 85 58	STA \$58	B1EC 68	PLA
B1A2 84 59	STY \$59	B1ED AB	TAY
B1A4 60	RTS	B1EE BA	TSX
		B1EF BD 02 01	LDA \$0102,X
		B1F2 48	PHA
<b>B1A5; Value 32768</b>		B1F3 BD 01 01	LDA \$0101,X
		B1F6 48	PHA
B1A5 90 B0	BCC \$B127	B1F7 A5 64	LDA \$64
B1A7 00	BRK	B1F9 9D 02 01	STA \$0102,X
B1A8 00	BRK	B1FC A5 65	LDA \$65
B1A9 00	BRK	B1FE 9D 01 01	STA \$0101,X
B1AA 20 BF B1	JSR \$B1BF	B201 C8	INY
B1AD A5 64	LDA \$64	B202 20 79 00	JSR \$0079
B1AF A4 65	LDY \$65	B205 C9 2C	CMP #\$2C
B1B1 60	RTS	B207 F0 D2	BEQ \$B1DB
		B209 B4 0B	STY \$0B
		B20B 20 F7 AE	JSR \$AEF7
<b>B1B2; Float-fixed</b>		B20E 68	PLA
		B20F 85 0D	STA \$0D
B1B2 20 73 00	JSR \$0073	B211 68	PLA
B1B5 20 9E AD	JSR \$AD9E	B212 85 0E	STA \$0E
B1B8 20 8D AD	JSR \$ADBD	B214 29 7F	AND #\$7F
B1BB A5 66	LDA \$66	B216 85 0C	STA \$0C
B1BD 30 0D	BMI \$B1CC	B218 A6 2F	LDX \$2F
B1BF A5 61	LDA \$61	B21A A5 30	LDA \$30
B1C1 C9 90	CMP #\$90	B21C 86 5F	STX \$5F
B1C3 90 09	BCC \$B1CE	B21E 85 60	STA \$60
B1C5 A9 A5	LDA #\$A5	B220 C5 32	CMP \$32
B1C7 A0 B1	LDY #\$B1	B222 D0 04	BNE \$B228
B1C9 20 5B BC	JSR \$BC5B	B224 E4 31	CPX \$31
B1CC D0 7A	BNE \$B24B	B226 F0 39	BEQ \$B261
B1CE 4C 9B BC	JMP \$BC9B	B228 A0 00	LDY #\$00
		B22A B1 5F	LDA (\$5F),Y
		B22C C8	INY
<b>B1D1; Set up array</b>		B22D C5 45	CMP \$45

B22F D0 06	BNE \$B237	B283 C8	INY
B231 A5 46	LDA \$46	B284 91 5F	STA (\$5F),Y
B233 D1 5F	CMP (\$5F),Y	B286 A2 0B	LDX #\$0B
B235 F0 16	BEQ \$B24D	B288 A9 00	LDA #\$00
B237 C8	INY	B28A 24 0C	BIT \$0C
B238 B1 5F	LDA (\$5F),Y	B28C 50 08	BVC \$B296
B23A 18	CLC	B28E 68	PLA
B23B 65 5F	ADC \$5F	B28F 18	CLC
B23D AA	TAX	B290 69 01	ADC #\$01
B23E C8	INY	B292 AA	TAX
B23F B1 5F	LDA (\$5F),Y	B293 68	PLA
B241 65 60	ADC \$60	B294 69 00	ADC #\$00
B243 90 D7	BCC \$B21C	B296 C8	INY
B245 A2 12	LDX #\$12	B297 91 5F	STA (\$5F),Y
<b>B248; 'bad subscript'</b>			
B248 A2 0E	LDX #\$0E	B29B 91 5F	STA (\$5F),Y
B24A 4C 37 A4	JMP \$A437	B29D 20 4C B3	JSR \$B34C
<b>B24D; 'illegal quantity'</b>			
B24D A2 13	LDX #\$13	B2AC B0 5D	BCS \$B30B
B24F A5 0C	LDA \$0C	B2AE 85 59	STA \$59
B251 D0 F7	BNE \$B24A	B2B0 A8	TAY
B253 20 94 B1	JSR \$B194	B2B1 8A	TXA
B256 A5 0B	LDA \$0B	B2B2 65 58	ADC \$58
B258 A0 04	LDY #\$04	B2B4 90 03	BCC \$B2B9
B25A D1 5F	CMP (\$5F),Y	B2B6 C8	INY
B25C D0 E7	BNE \$B245	B2B7 F0 52	BEQ \$B30B
B25E 4C EA B2	JMP \$B2EA	B2B9 20 08 A4	JSR \$A40B
B261 20 94 B1	JSR \$B194	B2BC 85 31	STA \$31
B264 20 08 A4	JSR \$A40B	B2BE B4 32	STY \$32
B267 A0 00	LDY #\$00	B2C0 A9 00	LDA #\$00
B269 B4 72	STY \$72	B2C2 E6 72	INC \$72
B26B A2 05	LDX #\$05	B2C4 A4 71	LDY \$71
B26D A5 45	LDA \$45	B2C6 F0 05	BEQ \$B2CD
B26F 91 5F	STA (\$5F),Y	B2C8 88	DEY
B271 10 01	BPL \$B274	B2C9 91 58	STA (\$58),Y
B273 CA	DEX	B2CB D0 FB	BNE \$B2C8
B274 C8	INY	B2CD C6 59	DEC \$59
B275 A5 46	LDA \$46	B2CF C6 72	DEC \$72
B277 91 5F	STA (\$5F),Y	B2D1 D0 F5	BNE \$B2C8
B279 10 02	BPL \$B27D	B2D3 E6 59	INC \$59
B27B CA	DEX	B2D5 38	SEC
B27C CA	DEX	B2D6 A5 31	LDA \$31
B27D B6 71	STX \$71	B2D8 E5 5F	SBC \$5F
B27F A5 0B	LDA \$0B	B2DA A0 02	LDY #\$02
B281 C8	INY	B2DC 91 5F	STA (\$5F),Y
B282 C8	INY	B2DE A5 32	LDA \$32

B2E0 C8	INY	B33B 20 55 B3	JSR \$B355
B2E1 E5 60	SBC \$60	B33E 8A	TXA
B2E3 91 5F	STA (\$5F),Y	B33F 65 58	ADC \$58
B2E5 A5 0C	LDA \$0C	B341 85 47	STA \$47
B2E7 D0 62	BNE \$B34B	B343 98	TYA
B2E9 C8	INY	B344 65 59	ADC \$59
B2EA B1 5F	LDA (\$5F),Y	B346 85 48	STA \$48
B2EC 85 0B	STA \$0B	B348 A8	TAY
B2EE A9 00	LDA ##\$00	B349 A5 47	LDA \$47
B2F0 85 71	STA \$71	B34B 60	RTS
B2F2 85 72	STA \$72		
B2F4 C8	INY		
B2F5 68	PLA	B34C; Compute array size	
B2F6 AA	TAX		
B2F7 85 64	STA \$64	B34C 84 22	STY \$22
B2F9 68	PLA	B34E B1 5F	LDA (\$5F),Y
B2FA 85 65	STA \$65	B350 85 28	STA \$28
B2FC D1 5F	CMP (\$5F),Y	B352 88	DEY
B2FE 90 0E	BCC \$B30E	B353 B1 5F	LDA (\$5F),Y
B300 D0 06	BNE \$B30B	B355 85 29	STA \$29
B302 C8	INY	B357 A9 10	LDA ##\$10
B303 8A	TXA	B359 85 5D	STA \$5D
B304 D1 5F	CMP (\$5F),Y	B35B A2 00	LDX ##\$00
B306 90 07	BCC \$B30F	B35D A0 00	LDY ##\$00
B308 4C 45 B2	JMP \$B245	B35F 8A	TXA
B30B 4C 35 A4	JMP \$A435	B360 0A	ASL
B30E C8	INY	B361 AA	TAX
B30F A5 72	LDA \$72	B362 98	TYA
B311 05 71	ORA \$71	B363 2A	ROL
B313 18	CLC	B364 A8	TAY
B314 F0 0A	BEQ \$B320	B365 B0 A4	BCS \$B30B
B316 20 4C B3	JSR \$B34C	B367 06 71	ASL \$71
B319 BA	TXA	B369 26 72	ROL \$72
B31A 65 64	ADC \$64	B36B 90 0B	BCC \$B378
B31C AA	TAX	B36D 18	CLC
B31D 98	TYA	B36E 8A	TXA
B31E A4 22	LDY \$22	B36F 65 28	ADC \$28
B320 65 65	ADC \$65	B371 AA	TAX
B322 B6 71	STX \$71	B372 98	TYA
B324 C6 0B	DEC \$0B	B373 65 29	ADC \$29
B326 D0 CA	BNE \$B2F2	B375 AB	TAY
B328 85 72	STA \$72	B376 B0 93	BCS \$B30B
B32A A2 05	LDX ##\$05	B378 C6 5D	DEC ##\$05
B32C A5 45	LDA \$45	B37A D0 E3	BNE \$B35F
B32E 10 01	BPL \$B331	B37C 60	RTS
B330 CA	DEX		
B331 A5 46	LDA \$46		
B333 10 02	BPL \$B337	B37D; Perform [FRE]	
B335 CA	DEX		
B336 CA	DEX	B37D A5 0D	LDA \$0D
B337 B6 2B	STX \$2B	B37F F0 03	BEQ \$B384
B339 A9 00	LDA ##\$00	B381 20 A6 B6	JSR \$B6A6

B384 20 26 B5	JSR \$B526	B3D2 A5 47	LDA \$47
B387 38	SEC	B3D4 48	PHA
B388 A5 33	LDA \$33	B3D5 A5 7B	LDA \$7B
B38A E5 31	SBC \$31	B3D7 48	PHA
B38C A8	TAY	B3D8 A5 7A	LDA \$7A
B38D A5 34	LDA \$34	B3DA 48	PHA
B38F E5 32	SBC \$32	B3DB 20 FB A8	JSR \$ABF8
		B3DE 4C 4F B4	JMP \$B44F

#### B391; Fix-float

B391 A2 00	LDX #\$00
B393 86 0D	STX \$0D
B395 85 62	STA \$62
B397 84 63	STY \$63
B399 A2 90	LDX #\$90
B39B 4C 44 BC	JMP \$BC44

#### B39E; Perform [P0S]

B39E 38	SEC
B39F 20 F0 FF	JSR \$FFFF0
B3A2 A9 00	LDA #\$00
B3A4 F0 EB	BEQ \$B391

#### B3A6; Check direct

B3A6 A6 3A	LDX \$3A
B3AB EB	INX
B3A9 D0 A0	BNE \$B34B
B3AB A2 15	LDX #\$15
B3AD 2C A2 1B	BIT \$1BA2
B3B0 4C 37 A4	JMP \$A437

#### B3B3; Perform [DEF]

B3B3 20 E1 B3	JSR \$B3E1
B3B6 20 A6 B3	JSR \$B3A6
B3B9 20 FA AE	JSR \$AEFA
B3BC A9 B0	LDA #\$B0
B3BE B5 10	STA \$10
B3C0 20 BB B0	JSR \$B0BB
B3C3 20 BD AD	JSR \$ADBD
B3C6 20 F7 AE	JSR \$AEF7
B3C9 A9 B2	LDA #\$B2
B3CB 20 FF AE	JSR \$AEFF
B3CE 48	PHA
B3CF A5 48	LDA \$48
B3D1 48	PHA

B3D2 A5 47	LDA \$47
B3D4 48	PHA
B3D5 A5 7B	LDA \$7B
B3D7 48	PHA
B3D8 A5 7A	LDA \$7A
B3DA 48	PHA
B3DB 20 FB A8	JSR \$ABF8
B3DE 4C 4F B4	JMP \$B44F

#### B3E1; Check fn syntax

B3E1 A9 A5	LDA #\$A5
B3E3 20 FF AE	JSR \$AEFF
B3E6 09 B0	DRA #\$B0
B3E8 B5 10	STA \$10
B3EA 20 92 B0	JSR \$B092
B3ED B5 4E	STA \$4E
B3EF B4 4F	STY \$4F
B3F1 4C BD AD	JMP \$ADBD

#### B3F4; Perform [FN]

B3F4 20 E1 B3	JSR \$B3E1
B3F7 A5 4F	LDA \$4F
B3F9 48	PHA
B3FA A5 4E	LDA \$4E
B3FC 48	PHA

B3FD 20 F1 AE	JSR \$AEF1
B400 20 BD AD	JSR \$ADBD
B403 68	PLA
B404 B5 4E	STA \$4E
B406 68	PLA
B407 B5 4F	STA \$4F
B409 A0 02	LDY #\$02
B40B B1 4E	LDA (\$4E), Y
B40D B5 47	STA \$47
B40F AA	TAX
B410 C8	INY

B411 B1 4E	LDA (\$4E), Y
B413 F0 99	BEQ \$B3AE
B415 B5 48	STA \$48
B417 C8	INY
B418 B1 47	LDA (\$47), Y
B41A 48	PHA
B41B B8	DEY
B41C 10 FA	BPL \$B418
B41E A4 48	LDY \$48
B420 20 D4 BB	JSR \$BBD4
B423 A5 7B	LDA \$7B
B425 48	PHA

B426 A5 7A	LDA \$7A		
B428 4B	PHA		
B429 B1 4E	LDA (\$4E),Y	B475; Calculate string vector	
B42B 85 7A	STA \$7A		
B42D C8	INY	B475 A6 64	LDX \$64
B42E B1 4E	LDA (\$4E),Y	B477 A4 65	LDY \$65
B430 85 7B	STA \$7B	B479 86 50	STX \$50
B432 A5 4B	LDA \$4B	B47B 84 51	STY \$51
B434 4B	PHA	B47D 20 F4 B4	JSR \$B4F4
B435 A5 47	LDA \$47	B480 86 62	STX \$62
B437 4B	PHA	B482 84 63	STY \$63
B438 20 8A AD	JSR \$ADBA	B484 85 61	STA \$61
B43B 6B	PLA	B486 60	RTS
B43C 85 4E	STA \$4E		
B43E 6B	PLA		
B43F 85 4F	STA \$4F	B487; Set up string	
B441 20 79 00	JSR \$0079		
B444 F0 03	BEQ \$B449	B487 A2 22	LDX #\$22
B446 4C 0B AF	JMP \$AF08	B489 86 07	STX \$07
B449 6B	PLA	B48B 86 08	STX \$08
B44A 85 7A	STA \$7A	B48D 85 6F	STA \$6F
B44C 6B	PLA	B48F 84 70	STY \$70
B44D 85 7B	STA \$7B	B491 85 62	STA \$62
B44F A0 00	LDY #\$00	B493 84 63	STY \$63
B451 6B	PLA	B495 A0 FF	LDY #\$FF
B452 91 4E	STA (\$4E),Y	B497 C8	INY
B454 6B	PLA	B498 B1 6F	LDA (\$6F),Y
B455 C8	INY	B49A F0 0C	BEQ \$B4AB
B456 91 4E	STA (\$4E),Y	B49C C5 07	CMP \$07
B458 6B	PLA	B49E F0 04	BEQ \$B4A4
B459 C8	INY	B4A0 C5 08	CMP \$08
B45A 91 4E	STA (\$4E),Y	B4A2 D0 F3	BNE \$B497
B45C 6B	PLA	B4A4 C9 22	CMP #\$22
B45D C8	INY	B4A6 F0 01	BEQ \$B4A9
B45E 91 4E	STA (\$4E),Y	B4A8 18	CLC
B460 6B	PLA	B4A9 84 61	STY \$61
B461 C8	INY	B4AB 98	TYA
B462 91 4E	STA (\$4E),Y	B4AC 65 6F	ADC \$6F
B464 60	RTS	B4AE 85 71	STA \$71
		B4B0 A6 70	LDX \$70
		B4B2 90 01	BCC \$B4B5
<b>B465; Perform [STR\$]</b>			
		B4B4 E8	INX
		B4B5 86 72	STX \$72
B465 20 8D AD	JSR \$ADBD	B4B7 A5 70	LDA \$70
B468 A0 00	LDY #\$00	B4B9 F0 04	BEQ \$B4BF
B46A 20 DF BD	JSR \$BDDF	B4BB C9 02	CMP #\$02
B46D 6B	PLA	B4BD D0 0B	BNE \$B4CA
B46E 6B	PLA	B4BF 98	TYA
B46F A9 FF	LDA #\$FF	B4C0 20 75 B4	JSR \$B475
B471 A0 00	LDY #\$00	B4C3 A6 6F	LDX \$6F
B473 F0 12	BEQ \$B4B7	B4C5 A4 70	LDY \$70
		B4C7 20 88 86	JSR \$B6B8

B4CA A6 16	LDX \$16	B521 85 0F	STA \$0F
B4CC E0 22	Cpx #\$22	B523 68	PLA
B4CE D0 05	BNE \$B4D5	B524 D0 D0	BNE \$B4F6
B4D0 A2 19	LDX #\$19		
B4D2 4C 37 A4	JMP \$A437		
B4D5 A5 61	LDA \$61	B526; Garbage collection	
B4D7 95 00	STA \$00,X		
B4D9 A5 62	LDA \$62	B526 A6 37	LDX \$37
B4DB 95 01	STA \$01,X	B528 A5 38	LDA \$38
B4DD A5 63	LDA \$63	B52A 86 33	STX \$33
B4DF 95 02	STA \$02,X	B52C 85 34	STA \$34
B4E1 A0 00	LDY #\$00	B52E A0 00	LDY #\$00
B4E3 86 64	STX \$64	B530 84 4F	STY \$4F
B4E5 84 65	STY \$65	B532 84 4E	STY \$4E
B4E7 84 70	STY \$70	B534 A5 31	LDA \$31
B4E9 88	DEY	B536 A6 32	LDX \$32
B4EA 84 0D	STY \$0D	B538 85 5F	STA \$5F
B4EC 86 17	STX \$17	B53A 86 60	STX \$60
B4EE E8	INX	B53C A9 19	LDA #\$19
B4EF E8	INX	B53E A2 00	LDX #\$00
B4FO E8	INX	B540 85 22	STA \$22
B4F1 86 16	STX \$16	B542 86 23	STX \$23
B4F3 60	RTS	B544 C5 16	CMP \$16
		B546 F0 05	BEQ \$B54D
		B548 20 C7 B5	JSR \$B5C7
<b>B4F4; Make room for string</b>		B54B F0 F7	BEQ \$B544
		B54D A9 07	LDA #\$07
B4F4 46 0F	LSR \$0F	B54F 85 53	STA \$53
B4F6 48	PHA	B551 A5 2D	LDA \$2D
B4F7 49 FF	EOR #\$FF	B553 A6 2E	LDX \$2E
B4F9 38	SEC	B555 85 22	STA \$22
B4FA 65 33	ADC \$33	B557 86 23	STX \$23
B4FC A4 34	LDY \$34	B559 E4 30	CPX \$30
B4FE B0 01	BCS \$B501	B55B D0 04	BNE \$B561
B500 88	DEY	B55D C5 2F	CMP \$2F
B501 C4 32	CPY \$32	B55F F0 05	BEQ \$B566
B503 90 11	BCC \$B516	B561 20 BD B5	JSR \$B5BD
B505 D0 04	BNE \$B50B	B564 F0 F3	BEQ \$B559
B507 C5 31	CMP \$31	B566 85 58	STA \$58
B509 90 0B	BCC \$B516	B568 86 59	STX \$59
B50B 85 33	STA \$33	B56A A9 03	LDA #\$03
B50D 84 34	STY \$34	B56C 85 53	STA \$53
B50F 85 35	STA \$35	B56E A5 58	LDA \$58
B511 84 36	STY \$36	B570 A6 59	LDX \$59
B513 AA	TAX	B572 E4 32	CPX \$32
B514 68	PLA	B574 D0 07	BNE \$B57D
B515 60	RTS	B576 C5 31	CMP \$31
B516 A2 10	LDX #\$10	B578 D0 03	BNE \$B57D
B518 A5 0F	LDA \$0F	B57A 4C 06 B6	JMP \$B606
B51A 30 B6	BMI \$B4D2	B57D 85 22	STA \$22
B51C 20 26 B5	JSR \$B526	B57F 86 23	STX \$23
B51F A9 80	LDA #\$80	B581 A0 00	LDY #\$00

B5B3 B1 22	LDA (\$22),Y	B5D6 D0 1E	BNE \$B5F6
B5B5 AA	TAX	B5D8 E4 33	CPX \$33
B5B6 C8	INY	B5DA B0 1A	BCS \$B5F6
B5B7 B1 22	LDA (\$22),Y	B5DC C5 60	CMP \$60
B5B9 08	PHP	B5DE 90 16	BCC \$B5F6
B5BA C8	INY	B5E0 D0 04	BNE \$B5E6
B5BB B1 22	LDA (\$22),Y	B5E2 E4 5F	CPX \$5F
B5BD 65 58	ADC #58	B5E4 90 10	BCC \$B5F6
B5BF 85 58	STA \$58	B5E6 86 5F	STX \$5F
B591 C8	INY	B5E8 85 60	STA \$60
B592 B1 22	LDA (\$22),Y	B5EA A5 22	LDA \$22
B594 65 59	ADC #59	B5EC A6 23	LDX \$23
B596 85 59	STA \$59	B5EE 85 4E	STA \$4E
B598 28	PLP	B5F0 86 4F	STX \$4F
B599 10 D3	BPL \$B56E	B5F2 A5 53	LDA \$53
B59B BA	TXA	B5F4 85 55	STA \$55
B59C 30 D0	BMI \$B56E	B5F6 A5 53	LDA \$53
B59E CB	INY	B5F8 18	CLC
B59F B1 22	LDA (\$22),Y	B5F9 65 22	ADC \$22
B5A1 A0 00	LDY #\$00	B5FB 85 22	STA \$22
B5A3 0A	ASL	B5FD 90 02	BCC \$B601
B5A4 69 05	ADC #05	B5FF E6 23	INC \$23
B5A6 65 22	ADC \$22	B601 A6 23	LDX \$23
B5AB 85 22	STA \$22	B603 A0 00	LDY #\$00
B5AA 90 02	BCC \$B5AE	B605 60	RTS
B5AC E6 23	INC \$23		
B5AE A6 23	LDX \$23		
B5B0 E4 59	CPX \$59	B606; Collect string	
B5B2 D0 04	BNE \$B5B8		
B5B4 C5 58	CMP \$58	B606 A5 4F	LDA \$4F
B5B6 F0 BA	BEQ \$B572	B608 05 4E	ORA \$4E
B5B8 20 C7 B5	JSR \$B5C7	B60A F0 F5	BEQ \$B601
B5BB F0 F3	BEQ \$B5B0	B60C A5 55	LDA \$55
		B60E 29 04	AND #\$04
		B610 4A	LSR
B5BD; Check salvageability		B611 A8	TAY
		B612 85 55	STA \$55
B5BD B1 22	LDA (\$22),Y	B614 B1 4E	LDA (\$4E),Y
B5BF 30 35	BMI \$B5F6	B616 65 5F	ADC \$5F
B5C1 C8	INY	B618 85 5A	STA \$5A
B5C2 B1 22	LDA (\$22),Y	B61A A5 60	LDA \$60
B5C4 10 30	BPL \$B5F6	B61C 69 00	ADC #\$00
B5C6 C8	INY	B61E 85 5B	STA \$5B
B5C7 B1 22	LDA (\$22),Y	B620 A5 33	LDA \$33
B5C9 F0 2B	BEQ \$B5F6	B622 A6 34	LDX \$34
B5CB C8	INY	B624 85 58	STA \$58
B5CC B1 22	LDA (\$22),Y	B626 86 59	STX \$59
B5CE AA	TAX	B628 20 BF A3	JSR \$A3BF
B5CF C8	INY	B62B A4 55	LDY \$55
B5D0 B1 22	LDA (\$22),Y	B62D C8	INY
B5D2 C5 34	CMP \$34	B62E A5 58	LDA \$58
B5D4 90 06	BCC \$B5DC	B630 91 4E	STA (\$4E),Y

B632 AA	TAX	B688 B6 22	STX \$22
B633 E6 59	INC \$59	B68A B4 23	STY \$23
B635 A5 59	LDA \$59	B68C A8	TAY
B637 C8	INY	B68D F0 0A	BEQ \$B699
B638 91 4E	STA (\$4E),Y	B68F 48	PHA
B63A 4C 2A B5	JMP \$B52A	B690 88	DEY
		B691 B1 22	LDA (\$22),Y
		B693 91 35	STA (\$35),Y
<b>B63D; Concatenate</b>		B695 98	TYA
		B696 D0 FB	BNE \$B690
B63D A5 65	LDA \$65	B698 68	PLA
B63F 48	PHA	B699 18	CLC
B640 A5 64	LDA \$64	B69A 65 35	ADC \$35
B642 48	PHA	B69C 85 35	STA \$35
B643 20 B3 AE	JSR \$AE83	B69E 90 02	BCC \$B6A2
B646 20 BF AD	JSR \$ADBF	B6A0 E6 36	INC \$36
B649 68	PLA	B6A2 60	RTS
B64A 85 6F	STA \$6F		
B64C 68	PLA		
B64D 85 70	STA \$70	<b>B6A3; Discard unwanted string</b>	
B64F A0 00	LDY #\$00	B6A3 20 BF AD	JSR \$ADBF
B651 B1 6F	LDA (\$6F),Y	B6A6 A5 64	LDA \$64
B653 18	CLC	B6A8 A4 65	LDY \$65
B654 71 64	ADC (\$64),Y	B6AA 85 22	STA \$22
B656 90 05	BCC \$B65D	B6AC B4 23	STY \$23
B658 A2 17	LDX #\$17	B6AE 20 DB B6	JSR \$B6DB
B65A 4C 37 A4	JMP \$A437	B6B1 08	PHP
B65D 20 75 B4	JSR \$B475	B6B2 A0 00	LDY #\$00
B660 20 7A B6	JSR \$B67A	B6B4 B1 22	LDA (\$22),Y
B663 A5 50	LDA \$50	B6B6 48	PHA
B665 A4 51	LDY \$51	B6B7 C8	INY
B667 20 AA B6	JSR \$B6AA	B6B8 B1 22	LDA (\$22),Y
B66A 20 8C B6	JSR \$B6BC	B6BA AA	TAX
B66D A5 6F	LDA \$6F	B6BB C8	INY
B66F A4 70	LDY \$70	B6BC B1 22	LDA (\$22),Y
B671 20 AA B6	JSR \$B6AA	B6BE AB	TAY
B674 20 CA B4	JSR \$B4CA	B6BF 68	PLA
B677 4C BB AD	JMP \$ADBF	B6C0 28	PLP
<b>B67A; Build string to memory</b>		B6C1 D0 13	BNE \$B6D6
B67A A0 00	LDY #\$00	B6C3 C4 34	CPY \$34
B67C B1 6F	LDA (\$6F),Y	B6C5 D0 0F	BNE \$B6D6
B67E 48	PHA	B6C7 E4 33	CPX \$33
B67F C8	INY	B6C9 D0 0B	BNE \$B6D6
B680 B1 6F	LDA (\$6F),Y	B6CB 48	PHA
B682 AA	TAX	B6CC 18	CLC
B683 C8	INY	B6CD 65 33	ADC \$33
B684 B1 6F	LDA (\$6F),Y	B6CF 85 33	STA \$33
B686 A8	TAY	B6D1 90 02	BCC \$B6D5
B687 68	PLA	B6D3 E6 34	INC \$34
		B6D5 68	PLA
		B6D6 86 22	STX \$22

B6D8 B4 23	STY \$23	B71D 65 22	ADC \$22
B6DA 60	RTS	B71F 85 22	STA \$22
		B721 90 02	BCC \$B725
		B723 E6 23	INC \$23
<b>B6DB; Clean descriptor stack</b>		B725 98	TYA
B6DB C4 18	CPY \$18	B726 20 8C B6	JSR \$B6BC
B6DD D0 OC	BNE \$B6EB	B729 4C CA B4	JMP \$B4CA
B6DF C5 17	CMP \$17		
B6E1 D0 08	BNE \$B6EB	<b>B72C; Perform [RIGHT\$]</b>	
B6E3 85 16	STA \$16	B72C 20 61 B7	JSR \$B761
B6E5 E9 03	SBC #\$03	B72F 18	CLC
B6E7 85 17	STA \$17	B730 F1 50	SBC (\$50), Y
B6E9 A0 00	LDY #\$00	B732 49 FF	EOR #\$FF
B6EB 60	RTS	B734 4C 06 B7	JMP \$B706
<b>B6EC; Perform [CHR\$]</b>		<b>B737; Perform [MID\$]</b>	
B6EC 20 A1 B7	JSR \$B7A1	B737 A9 FF	LDA #\$FF
B6EF 8A	TXA	B739 85 65	STA \$65
B6F0 48	PHA	B73B 20 79 00	JSR \$0079
B6F1 A9 01	LDA #\$01	B73E C9 29	CMP #\$29
B6F3 20 7D B4	JSR \$B47D	B740 F0 06	BEQ \$B748
B6F6 68	PLA	B742 20 FD AE	JSR \$AEFD
B6F7 A0 00	LDY #\$00	B745 20 9E B7	JSR \$B79E
B6F9 91 62	STA (\$62), Y	B748 20 61 B7	JSR \$B761
B6FB 68	PLA	B74B F0 4B	BEQ \$B798
B6FC 68	PLA	B74D CA	DEX
B6FD 4C CA B4	JMP \$B4CA	B74E 8A	TXA
		B74F 48	PHA
<b>B700; Perform [LEFT\$]</b>		B750 18	CLC
B700 20 61 B7	JSR \$B761	B751 A2 00	LDX #\$00
B703 D1 50	CMP (\$50), Y	B753 F1 50	SBC (\$50), Y
B705 98	TYA	B755 B0 B6	BCS \$B70D
B706 90 04	BCC \$B70C	B757 49 FF	EOR #\$FF
B708 B1 50	LDA (\$50), Y	B759 C5 65	CMP \$65
B70A AA	TAX	B75B 90 B1	BCC \$B70E
B70B 98	TYA	B75D A5 65	LDA \$65
B70C 48	PHA	B75F B0 AD	BCS \$B70E
B70D 8A	TXA		
B70E 48	PHA	<b>B761; Pull string parameters</b>	
B70F 20 7D B4	JSR \$B47D	B761 20 F7 AE	JSR \$AEF7
B712 A5 50	LDA \$50	B764 68	PLA
B714 A4 51	LDY \$51	B765 A8	TAY
B716 20 AA B6	JSR \$B6AA	B766 68	PLA
B719 68	PLA	B767 85 55	STA \$55
B71A A8	TAY	B769 68	PLA
B71B 68	PLA	B76A 68	PLA
B71C 18	CLC		

B76B 68	PLA		
B76C AA	TAX		
B76D 68	PLA		
B76E 85 50	STA \$50		
B770 68	PLA	B7AD 20 82 B7	JSR \$B782
B771 85 51	STA \$51	B7B0 D0 03	BNE \$B7B5
B773 A5 55	LDA \$55	B7B2 4C F7 B8	JMP \$B8F7
B775 48	PHA	B7B5 A6 7A	LDX \$7A
B776 98	TYA	B7B7 A4 7B	LDY \$7B
B777 48	PHA	B7B9 B6 71	STX \$71
B778 A0 00	LDY #\$00	B7BB B4 72	STY \$72
B77A 8A	TXA	B7BD A6 22	LDX \$22
B77B 60	RTS	B7BF B6 7A	STX \$7A
		B7C1 18	CLC
		B7C2 65 22	ADC \$22
<b>B77C; Perform [LEN]</b>		B7C4 85 24	STA \$24
B77C 20 82 B7	JSR \$B782	B7C6 A6 23	LDX \$23
B77F 4C A2 B3	JMP \$B3A2	B7C8 B6 7B	STX \$7B
		B7CA 90 01	BCC \$B7CD
		B7CC E8	INX
		B7CD B6 25	STX \$25
<b>B782; Exit string-mode</b>		B7CF A0 00	LDY #\$00
B782 20 A3 B6	JSR \$B6A3	B7D1 B1 24	LDA (\$24),Y
B785 A2 00	LDX #\$00	B7D3 48	PHA
B787 B6 0D	STX \$0D	B7D4 98	TYA
B789 A8	TAY	B7D5 91 24	STA (\$24),Y
B78A 60	RTS	B7D7 20 79 00	JSR \$0079
		B7DA 20 F3 BC	JSR \$BCF3
		B7DD 68	PLA
		B7DE A0 00	LDY #\$00
<b>B78B; Perform [ASC]</b>		B7E0 91 24	STA (\$24),Y
B78B 20 82 B7	JSR \$B782	B7E2 A6 71	LDX \$71
B78E F0 08	BEQ \$B798	B7E4 A4 72	LDY \$72
B790 A0 00	LDY #\$00	B7E6 B6 7A	STX \$7A
B792 B1 22	LDA (\$22),Y	B7E8 B4 7B	STY \$7B
B794 A8	TAY	B7EA 60	RTS
B795 4C A2 B3	JMP \$B3A2		
B798 4C 48 B2	JMP \$B248		
		<b>B7EB; Parameters for POKE/WAIT</b>	
<b>B79B; Input byte parameter</b>		B7EB 20 8A AD	JSR \$AD8A
B79B 20 73 00	JSR \$0073	B7EE 20 F7 B7	JSR \$B7F7
B79E 20 8A AD	JSR \$AD8A	B7F1 20 FD AE	JSR \$AEFD
B7A1 20 BB B1	JSR \$B1BB	B7F4 4C 9E B7	JMP \$B79E
B7A4 A6 64	LDX \$64		
B7A6 D0 F0	BNE \$B798	<b>B7F7; Float-fixed</b>	
B7AB A6 65	LDX \$65	B7F7 A5 66	LDA \$66
B7AA 4C 79 00	JMP \$0079	B7F9 30 9D	BMI \$B79B
		B7FB A5 61	LDA \$61
		B7FD C9 91	CMP #\$91

B7FF B0 97	BCS \$B798		
B801 20 9B BC	JSR \$BC9B		
B804 A5 64	LDA \$64	B849; Add 0.5	
B806 A4 65	LDY \$65		
B808 B4 14	STY \$14	B849 A9 11	LDA #\$11
B80A B5 15	STA \$15	B84B A0 BF	LDY #\$BF
B80C 60	RTS	B84D 4C 67 BB	JMP \$B867

B80D: Perform [PEEK]

```

BB0D A5 15      LDA $15
BB0F 48      PHA
BB10 A5 14      LDA $14
BB12 48      PHA
BB13 20 F7 B7    JSR $B7F7
BB16 A0 00      LDY #$00
BB18 B1 14      LDA ($14),Y
BB1A A8      TAY
BB1B 68      PLA
BB1C 85 14      STA $14
BB1E 68      PLA
BB1F 85 15      STA $15
BB21 4C A2 B3    JMP $B3A2

```

**B850: Subtract-from**

```

B850 20 8C BA      JSR $BABC

B853; Perform [subtract]

B853 A5 66          LDA $66
B855 49 FF          EOR #$FF
B857 85 66          STA $66
B859 45 6E          EOR $6E
B85B 85 6F          STA $6F
B85D A5 61          LDA $61
B85F 4C 6A B8      JMP $B86A
B862 20 99 B9      JSR $B999
B865 90 3C          BCC $B8A3
B867 20 8C BA      JSR $BABC

```

**B824: Perform [POKE]**

```

B824 20 EB B7    JSR $B7EB
B827 BA          TXA
B82B A0 00        LDY #$00
B82A 91 14        STA ($14),Y
B82C 60          RTS

```

B86A; Perform [add]

BB6A	D0	03	BNE	\$BB6F
BB6C	4C	FC	JMP	\$BBFC
BB6F	A6	70	LDX	\$70
BB71	B6	56	STX	\$56
BB73	A2	69	LDX	#\$69
BB75	A5	69	LDA	\$69
BB77	A8		TAY	

BB2D: Perform [WALL]

B82D	20	EB	B7	JSR	\$B7EB
B830	86	49		STX	\$49
B832	A2	00		LDX	#\$00
B834	20	79	00	JSR	\$0079
B837	F0	03		BEQ	\$BB3C
B839	20	F1	B7	JSR	\$B7F1
B83C	B6	4A		STX	\$4A
B83E	A0	00		LDY	#\$00
B840	B1	14		LDA	(#14), Y
B842	45	4A		EOR	\$4A
B844	25	49		AND	\$49
B846	F0	F8		BEQ	\$BB40
B848	60			RTS	

B878	F0	CE	BEQ \$BB48
B87A	38		SEC
B87B	E5	61	SBC \$61
B87D	F0	24	BEQ \$B8A3
B87F	90	12	BCC \$B893
B881	B4	61	STY \$61
B883	A4	6E	LDY \$6E
B885	84	66	STY \$66
B887	49	FF	EOR #\$FF
B889	69	00	ADC #\$00
B88B	A0	00	LDY #\$00
B88D	B4	56	STY \$56
B88F	A2	61	LDX #\$61
B891	D0	04	BNE \$BB97
B893	A0	00	LDY #\$00

B895	84	70	STY	\$70	B8FE	65	56	ADC	\$56
B897	C9	F9	CMP	#\$F9	B900	85	70	STA	\$70
B899	30	C7	BMI	\$B862	B902	A5	65	LDA	\$65
B89B	A8		TAY		B904	65	6D	ADC	\$6D
B89C	A5	70	LDA	\$70	B906	85	65	STA	\$65
B89E	56	01	LSR	\$01,X	B908	A5	64	LDA	\$64
B8A0	20	B0	JSR	\$B9B0	B90A	65	6C	ADC	\$6C
B8A3	24	6F	BIT	\$6F	B90C	85	64	STA	\$64
B8A5	10	57	BPL	\$B8FE	B90E	A5	63	LDA	\$63
B8A7	A0	61	LDY	#\$61	B910	65	6B	ADC	\$6B
B8A9	E0	69	CPX	#\$69	B912	85	63	STA	\$63
B8AB	F0	02	BEQ	\$B8AF	B914	A5	62	LDA	\$62
B8AD	A0	69	LDY	#\$69	B916	65	6A	ADC	\$6A
B8AF	38		SEC		B918	85	62	STA	\$62
B8B0	49	FF	EOR	#\$FF	B91A	4C	36	B9	JMP \$B936
B8B2	65	56	ADC	\$56	B91D	69	01	ADC	#\$01
B8B4	85	70	STA	\$70	B91F	06	70	ASL	\$70
B8B6	B9	04	LDA	\$0004,Y	B921	26	65	ROL	\$65
B8B9	F5	04	SBC	\$04,X	B923	26	64	ROL	\$64
B8BB	85	65	STA	\$65	B925	26	63	ROL	\$63
B8BD	B9	03	LDA	\$0003,Y	B927	26	62	ROL	\$62
B8C0	F5	03	SBC	\$03,X	B929	10	F2	BPL	\$B91D
B8C2	85	64	STA	\$64	B92B	38		SEC	
B8C4	B9	02	LDA	\$0002,Y	B92C	E5	61	SBC	\$61
B8C7	F5	02	SBC	\$02,X	B92E	B0	C7	BCS	\$B8F7
B8C9	85	63	STA	\$63	B930	49	FF	EOR	#\$FF
B8CB	B9	01	LDA	\$0001,Y	B932	69	01	ADC	#\$01
B8CE	F5	01	SBC	\$01,X	B934	85	61	STA	\$61
B8D0	85	62	STA	\$62	B936	90	0E	BCC	\$B946
B8D2	B0	03	BCS	\$B8D7	B938	E6	61	INC	\$61
B8D4	20	47	JSR	\$B947	B93A	F0	42	BEQ	\$B97E
B8D7	A0	00	LDY	#\$00	B93C	66	62	RDR	\$62
B8D9	98		TYA		B93E	66	63	RDR	\$63
B8DA	18		CLC		B940	66	64	RDR	\$64
B8DB	A6	62	LDX	\$62	B942	66	65	RDR	\$65
B8DD	D0	4A	BNE	\$B929	B944	66	70	RDR	\$70
B8DF	A6	63	LDX	\$63	B946	60		RTS	
B8E1	86	62	STX	\$62					
B8E3	A6	64	LDX	\$64					
B8E5	86	63	STX	\$63	B947; Complement FAC#1				
B8E7	A6	65	LDX	\$65					
B8E9	86	64	STX	\$64	B947	A5	66	LDA	\$66
B8EB	A6	70	LDX	\$70	B949	49	FF	EOR	#\$FF
B8ED	86	65	STX	\$65	B94B	85	66	STA	\$66
B8EF	84	70	STY	\$70	B94D	A5	62	LDA	\$62
B8F1	69	08	ADC	#\$08	B94F	49	FF	EOR	#\$FF
B8F3	C9	20	CMP	#\$20	B951	85	62	STA	\$62
B8F5	D0	E4	BNE	\$B8DB	B953	A5	63	LDA	\$63
B8F7	A9	00	LDA	#\$00	B955	49	FF	EOR	#\$FF
B8F9	85	61	STA	\$61	B957	85	63	STA	\$63
B8FB	85	66	STA	\$66	B959	A5	64	LDA	\$64
B8FD	60		RTS		B95B	49	FF	EOR	#\$FF

B95D 85 64	STA \$64	B9B4 76 04	ROR \$04,X
B95F A5 65	LDA \$65	B9B6 6A	ROR
B961 49 FF	EOR #\$FF	B9B7 C8	INY
B963 B5 65	STA \$65	B9B8 D0 EC	BNE \$B9A6
B965 A5 70	LDA \$70	B9BA 18	CLC
B967 49 FF	EOR #\$FF	B9BB 60	RTS
B969 85 70	STA \$70	B9BC 81 00	STA (\$00,X)
B96B E6 70	INC \$70	B9BE 00	BRK
B96D D0 0E	BNE \$B97D	B9BF 00	BRK
B96F E6 65	INC \$65	B9C0 00	BRK
B971 D0 0A	BNE \$B97D	B9C1 03	???
B973 E6 64	INC \$64	B9C2 7F	???
B975 D0 06	BNE \$B97D	B9C3 5E 56 CB	LSR \$CB56,X
B977 E6 63	INC \$63	B9C6 79 80 13	ADC \$1380,Y
B979 D0 02	BNE \$B97D	B9C9 9B	???
B97B E6 62	INC \$62	B9CA 0B	???
B97D 60	RTS	B9CB 64	???
		B9CC 80	???
		B9CD 76 38	ROR \$38,X
<b>B97E; 'overflow'</b>		B9CF 93	???
B97E A2 0F	LDX #\$0F	B9D0 16 82	ASL \$82,X
B980 4C 37 A4	JMP \$A437	B9D2 38	SEC
		B9D3 AA	TAX
		B9D4 3B	???
		B9D5 20 80 35	JSR \$3580
<b>B983; Multiply by zero byte</b>		B9D8 04	???
		B9D9 F3	???
B983 A2 25	LDX #\$25	B9DA 34	???
B985 B4 04	LDY \$04,X	B9DB 81 35	STA (\$35,X)
B987 B4 70	STY \$70	B9DD 04	???
B989 B4 03	LDY \$03,X	B9DE F3	???
B98B 94 04	STY \$04,X	B9DF 34	???
B98D B4 02	LDY \$02,X	B9E0 80	???
B98F 94 03	STY \$03,X	B9E1 80	???
B991 B4 01	LDY \$01,X	B9E2 00	BRK
B993 94 02	STY \$02,X	B9E3 00	BRK
B995 A4 68	LDY \$68	B9E4 00	BRK
B997 94 01	STY \$01,X	B9E5 80	???
B999 69 08	ADC #\$08	B9E6 31 72	AND (\$72),Y
B99B 30 E8	BMI \$B985	B9E8 17	???
B99D F0 E6	BEQ \$B985	B9E9 F8	SED
B99F E9 08	SBC #\$08		
B9A1 A8	TAY		
B9A2 A5 70	LDA \$70	<b>B9EA; Perform [LOG]</b>	
B9A4 B0 14	BCS \$B9BA		
B9A6 16 01	ASL \$01,X	B9EA 20 2B BC	JSR \$BC2B
B9AB 90 02	BCC \$B9AC	B9ED F0 02	BEQ \$B9F1
B9AA F6 01	INC \$01,X	B9EF 10 03	BPL \$B9F4
B9AC 76 01	ROR \$01,X	B9F1 4C 48 B2	JMP \$B248
B9AE 76 01	ROR \$01,X	B9F4 A5 61	LDA \$61
B9B0 76 02	ROR \$02,X	B9F6 E9 7F	SBC #\$7F
B9B2 76 03	ROR \$03,X	B9F8 48	PHA

B9F9 A9 B0	LDA #\$B0	BA5F 09 B0	DRA #\$B0
B9FB 85 61	STA \$61	BA61 A8	TAY
B9FD A9 D6	LDA #\$D6	BA62 90 19	BCC \$BA7D
B9FF A0 B9	LDY #\$B9	BA64 1B	CLC
BA01 20 67 BB	JSR \$BB67	BA65 A5 29	LDA \$29
BA04 A9 DB	LDA #\$DB	BA67 65 6D	ADC \$6D
BA06 A0 B9	LDY #\$B9	BA69 85 29	STA \$29
BA08 20 0F BB	JSR \$BB0F	BA6B A5 28	LDA \$28
BA0B A9 BC	LDA #\$BC	BA6D 65 6C	ADC \$6C
BA0D A0 B9	LDY #\$B9	BA6F 85 28	STA \$28
BA0F 20 50 BB	JSR \$BB50	BA71 A5 27	LDA \$27
BA12 A9 C1	LDA #\$C1	BA73 65 6B	ADC \$6B
BA14 A0 B9	LDY #\$B9	BA75 85 27	STA \$27
BA16 20 43 E0	JSR \$E043	BA77 A5 26	LDA \$26
BA19 A9 E0	LDA #\$E0	BA79 65 6A	ADC \$6A
BA1B A0 B9	LDY #\$B9	BA7B 85 26	STA \$26
BA1D 20 67 BB	JSR \$BB67	BA7D 66 26	ROR \$26
BA20 68	PLA	BA7F 66 27	ROR \$27
BA21 20 7E BD	JSR \$BD7E	BA81 66 28	ROR \$28
BA24 A9 E5	LDA #\$E5	BA83 66 29	ROR \$29
BA26 A0 B9	LDY #\$B9	BA85 66 70	ROR \$70
BA28 20 BC BA	JSR \$BA8C	BA87 98	TYA
		BA88 4A	LSR
		BA89 D0 D6	BNE \$BA61
		BA8B 60	RTS

**BA2B; Perform [multiply]**

BA2B D0 03	BNE \$BA30
BA2D 4C 8B BA	JMP \$BA8B
BA30 20 B7 BA	JSR \$BAB7
BA33 A9 00	LDA #\$00
BA35 85 26	STA \$26
BA37 85 27	STA \$27
BA39 85 28	STA \$28
BA3B 85 29	STA \$29
BA3D A5 70	LDA \$70
BA3F 20 59 BA	JSR \$BA59
BA42 A5 65	LDA \$65
BA44 20 59 BA	JSR \$BA59
BA47 A5 64	LDA \$64
BA49 20 59 BA	JSR \$BA59
BA4C A5 63	LDA \$63
BA4E 20 59 BA	JSR \$BA59
BA51 A5 62	LDA \$62
BA53 20 5E BA	JSR \$BA5E
BA56 4C 8F BB	JMP \$BB8F

**BA59; Multiply-a-bit**

BA59 D0 03	BNE \$BA5E
BA5B 4C B3 B9	JMP \$B9B3
BASE 4A	LSR

**BABC; Memory to FAC#2**

BA8C B5 22	STA \$22
BA8E B4 23	STY \$23
BA90 A0 04	LDY #\$04
BA92 B1 22	LDA (\$22), Y
BA94 B5 6D	STA \$6D
BA96 B8	DEY
BA97 B1 22	LDA (\$22), Y
BA99 B5 6C	STA \$6C
BA9B B8	DEY
BA9C B1 22	LDA (\$22), Y
BA9E B5 6B	STA \$6B
BAA0 B8	DEY
BAA1 B1 22	LDA (\$22), Y
BAA3 B5 6E	STA \$6E
BAA5 45 66	EOR \$66
BAA7 B5 6F	STA \$6F
BAA9 A5 6E	LDA \$6E
BAA8 09 80	DRA #\$B0
BAA9 B5 6A	STA \$6A
BAAF B8	DEY
BAB0 B1 22	LDA (\$22), Y
BAB2 B5 69	STA \$69
BAB4 A5 61	LDA \$61

BAB6 60	RTS	BAF9 84 20	STY \$20
		BAFB 00	BRK
		BAFC 00	BRK
BAB7; Adjust FAC#1/#2		BAFD 00	BRK
BAB7 A5 69	LDA \$69		
BAB9 F0 1F	BEQ \$BADA	BAFE; Divide by 10	
BABB 18	CLC		
BABC 65 61	ADC \$61	BAFE 20 0C BC	JSR \$BC0C
BABE 90 04	BCC \$BAC4	BB01 A9 F9	LDA #\$F9
BAC0 30 1D	BMI \$BADF	BB03 A0 BA	LDY #\$BA
BAC2 18	CLC	BB05 A2 00	LDX #\$00
BAC3 2C 10 14	BIT \$1410	BB07 B6 6F	STX \$6F
BAC6 69 B0	ADC #\$80	BB09 20 A2 BB	JSR \$BBA2
BAC8 85 61	STA \$61	BB0C 4C 12 BB	JMP \$BB12
BACA D0 03	BNE \$BACF	BB0F 20 BC BA	JSR \$BA8C
BACC 4C FB B8	JMP \$BBFB		
BACF A5 6F	LDA \$6F		
BAD1 85 66	STA \$66	BB12; Perform [divide]	
BAD3 60	RTS	BB12 F0 76	BEQ \$BBBB
BAD4; Underflow/overflow			
BAD4 A5 66	LDA \$66	BB1A E5 61	SBC \$61
BAD6 49 FF	EOR #\$FF	BB1C 85 61	STA \$61
BAD8 30 05	BMI \$BADF	BB1E 20 B7 BA	JSR \$BAB7
BADA 68	PLA	BB21 E6 61	INC \$61
BADB 68	PLA	BB23 F0 BA	BEQ \$BADF
BADC 4C F7 B8	JMP \$BBF7	BB25 A2 FC	LDX #\$FC
BADF 4C 7E B9	JMP \$B97E	BB27 A9 01	LDA #\$01
BAE2; Multiply by 10			
BAE2 20 0C BC	JSR \$BC0C	BB29 A4 6A	LDY \$6A
BAE5 AA	TAX	BB2B C4 62	CPY \$62
BAE6 F0 10	BEQ \$BAF8	BB2D D0 10	BNE \$BB3F
BAE8 18	CLC	BB2F A4 6B	LDY \$6B
BAE9 69 02	ADC #\$02	BB31 C4 63	CPY \$63
BAEB B0 F2	BCS \$BADF	BB33 D0 0A	BNE \$BB3F
BAED A2 00	LDX #\$00	BB35 A4 6C	LDY \$6C
BAEF 86 6F	STX \$6F	BB37 C4 64	CPY \$64
BAF1 20 77 B8	JSR \$BB77	BB39 D0 04	BNE \$BB3F
BAF4 E6 61	INC \$61	BB3B A4 6D	LDY \$6D
BAF6 F0 E7	BEQ \$BADF	BB3D C4 65	CPY \$65
BAFB 60	RTS	BB3F 08	PHP
BAF9; + 10 in floating pt.			
		BB40 2A	ROL
		BB41 90 09	BCC \$BB4C
		BB43 E8	INX
		BB44 95 29	STA \$29,X
		BB46 F0 32	BEQ \$BB7A
		BB48 10 34	BPL \$BB7E
		BB4A A9 01	LDA #\$01
		BB4C 28	PLP
		BB4D B0 0E	BCS \$BB5D

BB4F 06 6D	ASL \$6D	BBAA 85 65	STA \$65
BB51 26 6C	ROL \$6C	BBAC 88	DEY
BB53 26 6B	ROL \$6B	BBAD B1 22	LDA (\$22),Y
BB55 26 6A	ROL \$6A	BBAF 85 64	STA \$64
BB57 80 E6	BCS \$BB3F	BBB1 88	DEY
BB59 30 CE	BMI \$BB29	BBB2 B1 22	LDA (\$22),Y
BB5B 10 E2	BPL \$BB3F	BBB4 85 63	STA \$63
BB5D A8	TAY	BBB6 88	DEY
BB5E A5 6D	LDA \$6D	BBB7 B1 22	LDA (\$22),Y
BB60 E5 65	SBC \$65	BBB9 85 66	STA \$66
BB62 85 6D	STA \$6D	BBBB 09 80	ORA #\$80
BB64 A5 6C	LDA \$6C	BBBD 85 62	STA \$62
BB66 E5 64	SBC \$64	BBBF 88	DEY
BB68 85 6C	STA \$6C	BBC0 B1 22	LDA (\$22),Y
BB6A A5 6B	LDA \$6B	BBC2 85 61	STA \$61
BB6C E5 63	SBC \$63	BBC4 B4 70	STY \$70
BB6E 85 6B	STA \$6B	BBC6 60	RTS
BB70 A5 6A	LDA \$6A		
BB72 E5 62	SBC \$62		
BB74 85 6A	STA \$6A	BBC7; FAC#1 to memory	
BB76 98	TYA		
BB77 4C 4F BB	JMP \$BB4F	BBC7 A2 5C	LDX #\$5C
BB7A A9 40	LDA #\$40	BBC9 2C A2 57	BIT \$57A2
BB7C D0 CE	BNE \$BB4C	BBCC A0 00	LDY #\$00
BB7E 0A	ASL	BBCE F0 04	BEQ \$BB04
BB7F 0A	ASL	BBD0 A6 49	LDX \$49
BB80 0A	ASL	BBD2 A4 4A	LDY \$4A
BB81 0A	ASL	BBD4 20 1B BC	JSR \$BC1B
BB82 0A	ASL	BBD7 B6 22	STX \$22
BB83 0A	ASL	BBD9 B4 23	STY \$23
BB84 85 70	STA \$70	BBDB A0 04	LDY #\$04
BB86 28	PLP	BBDD A5 65	LDA \$65
BB87 4C 8F BB	JMP \$BB8F	BBDF 91 22	STA (\$22),Y
BB8A A2 14	LDX #\$14	BBE1 88	DEY
BB8C 4C 37 A4	JMP \$A437	BBE2 A5 64	LDA \$64
BB8F A5 26	LDA \$26	BBE4 91 22	STA (\$22),Y
BB91 85 62	STA \$62	BBE6 88	DEY
BB93 A5 27	LDA \$27	BBE7 A5 63	LDA \$63
BB95 85 63	STA \$63	BBE9 91 22	STA (\$22),Y
BB97 A5 28	LDA \$28	BBEB 88	DEY
BB99 85 64	STA \$64	BBEC A5 66	LDA \$66
BB9B A5 29	LDA \$29	BBEE 09 7F	ORA #\$7F
BB9D 85 65	STA \$65	BBF0 25 62	AND \$62
BB9F 4C D7 BB	JMP \$BB0D7	BBF2 91 22	STA (\$22),Y
		BBF4 88	DEY
		BBF5 A5 61	LDA \$61
		BBF7 91 22	STA (\$22),Y
		BBF9 84 70	STY \$70
		BBFB 60	RTS
BBA2; Memory to FAC#1			
BBA2 85 22	STA \$22		
BBA4 84 23	STY \$23		
BBA6 A0 04	LDY #\$04		
BBA8 B1 22	LDA (\$22),Y	BBFC; FAC#2 to FAC#1	

BBFC A5 6E	LDA \$6E	BC42 A2 88	LDX #\$88
BBFE B5 66	STA \$66	BC44 A5 62	LDA \$62
BC00 A2 05	LDX #\$05	BC46 49 FF	EOR #\$FF
BC02 B5 68	LDA \$68,X	BC48 2A	ROL
BC04 95 60	STA \$60,X	BC49 A9 00	LDA #\$00
BC06 CA	DEX	BC4B 85 65	STA \$65
BC07 D0 F9	BNE \$BC02	BC4D 85 64	STA \$64
BC09 86 70	STX \$70	BC4F 86 61	STX \$61
BC0B 60	RTS	BC51 85 70	STA \$70
		BC53 85 66	STA \$66
		BC55 4C D2 B8	JMP \$BBD2

BC0C; FAC#1 to FAC#2

BC0C 20 1B BC	JSR \$BC1B
BC0F A2 06	LDX #\$06
BC11 B5 60	LDA \$60,X
BC13 95 68	STA \$68,X
BC15 CA	DEX
BC16 D0 F9	BNE \$BC11
BC18 86 70	STX \$70
BC1A 60	RTS

BC58; Perform [ABS]

BC58 46 66	LSR \$66
BC5A 60	RTS

BC5B; Compare FAC#1 to mem.

BC5B 85 24	STA \$24
BC5D 84 25	STY \$25
BC5F A0 00	LDY #\$00
BC61 B1 24	LDA (\$24),Y

BC1B; Round FAC#1

BC1B A5 61	LDA \$61
BC1D F0 FB	BEQ \$BC1A
BC1F 06 70	ASL \$70
BC21 90 F7	BCC \$BC1A
BC23 20 6F B9	JSR \$B96F
BC26 D0 F2	BNE \$BC1A
BC28 4C 38 B9	JMP \$B93B

BC63 C8	INY
BC64 AA	TAX
BC65 F0 C4	BEQ \$BC2B
BC67 B1 24	LDA (\$24),Y
BC69 45 66	EDR \$66
BC6B 30 C2	BMI \$BC2F
BC6D E4 61	CPX \$61
BC6F D0 21	BNE \$BC92
BC71 B1 24	LDA (\$24),Y

BC2B; Get sign

BC2B A5 61	LDA \$61
BC2D F0 09	BEQ \$BC3B
BC2F A5 66	LDA \$66
BC31 2A	ROL
BC32 A9 FF	LDA #\$FF
BC34 B0 02	BCS \$BC3B
BC36 A9 01	LDA #01
BC38 60	RTS

BC77 D0 19	BNE \$BC92
BC79 C8	INY
BC7A B1 24	LDA (\$24),Y
BC7C C5 63	CMP \$63
BC7E D0 12	BNE \$BC92
BC80 C8	INY
BC81 B1 24	LDA (\$24),Y
BC83 C5 64	CMP \$64
BC85 D0 0B	BNE \$BC92
BC87 C8	INY

BC39; Perform [SSN]

BC39 20 2B BC	JSR \$BC2B
BC3C B5 62	STA \$62
BC3E A9 00	LDA #\$00
BC40 B5 63	STA \$63

BC88 A9 7F	LDA #\$7F
BC8A C5 70	CMP \$70
BC8C B1 24	LDA (\$24),Y
BC8E E5 65	SBC \$65
BC90 F0 28	BEQ \$BCBA
BC92 A5 66	LDA \$66

BC94 90 02	BCC \$BC98	BCEB 85 63	STA \$63
BC96 49 FF	EOR #\$FF	BCED 85 64	STA \$64
BC98 4C 31 BC	JMP \$BC31	BCEF 85 65	STA \$65
		BCF1 A8	TAY
		BCF2 60	RTS

**BC9B; Float-fixed**

BC9B A5 61	LDA \$61	BCF3; String to FAC	
BC9D F0 4A	BEQ \$BCE9	BCF3 A0 00	LDY #\$00
BC9F 38	SEC	BCF5 A2 0A	LDX #\$0A
BCA0 E9 A0	SBC #\$A0	BCF7 94 5D	STY \$5D,X
BCA2 24 66	BIT \$66	BCF9 CA	DEX
BCA4 10 09	BPL \$BCAF	BCFA 10 FB	BPL \$BCF7
BCA6 AA	TAX	BCFC 90 0F	BCC \$BDOD
BCA7 A9 FF	LDA #\$FF	BCFE C9 2D	CMP #\$2D
BCA9 B5 68	STA \$68	BD00 D0 04	BNE \$BD06
BCAB 20 4D B9	JSR \$B94D	BD02 86 67	STX \$67
BCAE 8A	TXA	BD04 F0 04	BEQ \$BD0A
BCAF A2 61	LDX #\$61	BD06 C9 2B	CMP #\$2B
BCB1 C9 F9	CMP #\$F9	BD08 D0 05	BNE \$BD0F
BCB3 10 06	BPL \$BCBB	BD0A 20 73 00	JSR \$0073
BCB5 20 99 B9	JSR \$B999	BD0D 90 5B	BCC \$BD6A
BCB8 84 68	STY \$68	BD0F C9 2E	CMP #\$2E
BCBA 60	RTS	BD11 F0 2E	BEQ \$BD41
BCBB A8	TAY	BD13 C9 45	CMP #\$45
BCBC A5 66	LDA \$66	BD15 D0 30	BNE \$BD47
BCBE 29 80	AND #\$80	BD17 20 73 00	JSR \$0073
BCC0 46 62	LSR \$62	BD1A 90 17	BCC \$BD33
BCC2 05 62	ORA \$62	BD1C C9 AB	CMP #\$AB
BCC4 85 62	STA \$62	BD1E F0 0E	BEQ \$BD2E
BCC6 20 B0 B9	JSR \$B9B0	BD20 C9 2D	CMP #\$2D
BCC9 84 68	STY \$68	BD22 F0 0A	BEQ \$BD2E
BCCB 60	RTS	BD24 C9 AA	CMP #\$AA
		BD26 F0 08	BEQ \$BD30
		BD28 C9 2B	CMP #\$2B
		BD2A F0 04	BEQ \$BD30

**BCCC; Perform [int]**

BCCC A5 61	LDA \$61	BD2C D0 07	BNE \$BD35
BCCE C9 A0	CMP #\$A0	BD2E 66 60	ROR \$60
BCD0 B0 20	BPS \$BCF2	BD30 20 73 00	JSR \$0073
BCD2 20 9B BC	JSR \$BC9B	BD33 90 5C	BCC \$BD91
BCD5 84 70	STY \$70	BD35 24 60	BIT \$60
BCD7 A5 66	LDA \$66	BD37 10 0E	BPL \$BD47
BCD9 84 66	STY \$66	BD39 A9 00	LDA #\$00
BCDB 49 80	EOR #\$80	BD3B 38	SEC
BCDD 2A	ROL	BD3C E5 5E	SBC \$5E
BCDE A9 A0	LDA #\$A0	BD3E 4C 49 BD	JMP \$BD49
BCE0 85 61	STA \$61	BD41 66 5F	ROR \$5F
BCE2 A5 65	LDA \$65	BD43 24 5F	BIT \$5F
BCE4 85 07	STA \$07	BD45 50 C3	BVC \$BD0A
BCE6 4C D2 B8	JMP \$BBD2	BD47 A5 5E	LDA \$5E
BCE9 85 62	STA \$62	BD49 38	SEC

BD4A E5 5D	SBC \$5D	BDA9 71 7A	ADC (\$7A),Y
BD4C 85 5E	STA \$5E	BDAB 38	SEC
BD4E F0 12	BEQ \$BD62	BDAC E9 30	SBC #\$30
BD50 10 09	BPL \$BD5B	BDAE 85 5E	STA \$5E
BD52 20 FE BA	JSR \$BAFE	BDB0 4C 30 BD	JMP \$BD30
BD55 E6 5E	INC \$5E	BDB3 9B	???
BD57 D0 F9	BNE \$BD52	BDB4 3E BC 1F	ROL \$1FBC,X
BD59 F0 07	BEQ \$BD62	BDB7 FD 9E 6E	SBC \$6E9E,X
BD5B 20 E2 BA	JSR \$BAE2	BDBA 6B	???
BD5E C6 5E	DEC \$5E	BDBB 27	???
BD60 D0 F9	BNE \$BD5B	BDBC FD 9E 6E	SBC \$6E9E,X
BD62 A5 67	LDA \$67	BDBF 6B	???
BD64 30 01	BMI \$BD67	BDC0 28	PLP
BD66 60	RTS	BDC1 00	BRK
BD67 4C B4 BF	JMP \$BFB4		
BD6A 48	PHA		
BD6B 24 5F	BIT \$5F	BDC2; Print 'IN...'	
BD6D 10 02	BPL \$BD71		
BD6F E6 5D	INC \$5D	BDC2 A9 71	LDA #\$71
BD71 20 E2 BA	JSR \$BAE2	BDC4 A0 A3	LDY #\$A3
BD74 68	PLA	BDC6 20 DA BD	JSR \$BDDA
BD75 38	SEC	BDC9 A5 3A	LDA \$3A
BD76 E9 30	SBC #\$30	BDCB A6 39	LDX \$39
BD78 20 7E BD	JSR \$BD7E		
BD7B 4C 0A BD	JMP \$BDOA		

#### BDCD; Print line number

##### BD7E; Get ASCII digit

BD7E 48	PHA		
BD7F 20 0C BC	JSR \$BC0C		
BD82 68	PLA		
BD83 20 3C BC	JSR \$BC3C		
BD86 A5 6E	LDA \$6E		
BD88 45 66	EOR \$66		
BD8A 85 6F	STA \$6F		
BD8C A6 61	LDX \$61		
BD8E 4C 6A B8	JMP \$B86A		
BD91 A5 5E	LDA \$5E		
BD93 C9 0A	CMP #\$0A		
BD95 90 09	BCC \$BDAO		
BD97 A9 64	LDA #\$64		
BD99 24 60	BIT \$60		
BD9B 30 11	BMI \$BDAE		
BD9D 4C 7E B9	JMP \$B97E		
BDA0 0A	ASL		
BDA1 0A	ASL		
BDA2 1B	CLC		
BDA3 65 5E	ADC \$5E		
BDA5 0A	ASL		
BDA6 1B	CLC		
BDA7 A0 00	LDY #\$00		

#### BDD0; Float to ASCII

BDD0 A0 01	LDY #\$01		
BDDF A9 20	LDA #\$20		
BDE1 24 66	BIT \$66		
BDE3 10 02	BPL \$BDE7		
BDE5 A9 2D	LDA #\$2D		
BDE7 99 FF 00	STA \$00FF,Y		
BDEA 85 66	STA \$66		
BDEC 84 71	STY \$71		
BDEF A9 30	INY		
BDF1 A6 61	LDA #\$30		
BDF3 D0 03	LDX \$61		
BDF5 4C 04 BF	BNE \$BDF8		
BDF8 A9 00	JMP \$BF04		
	LDA #\$00		

BDFA E0 80	CPX #\$B0	BE64 B4 71	STY \$71
BDFC F0 02	BEQ \$BE00	BE66 A0 00	LDY #\$00
BDFE B0 09	BCS \$BE09	BE68 A2 80	LDX #\$80
BE00 A9 BD	LDA #\$BD	BE6A A5 65	LDA \$65
BE02 A0 BD	LDY #\$BD	BE6C 18	CLC
BE04 20 28 BA	JSR \$BA28	BE6D 79 19 BF	ADC \$BF19,Y
BE07 A9 F7	LDA #\$F7	BE70 85 65	STA \$65
BE09 85 5D	STA \$5D	BE72 A5 64	LDA \$64
BE0B A9 B8	LDA #\$B8	BE74 79 18 BF	ADC \$BF18,Y
BE0D A0 BD	LDY #\$BD	BE77 85 64	STA \$64
BE0F 20 5B BC	JSR \$BC5B	BE79 A5 63	LDA \$63
BE12 F0 1E	BEQ \$BE32	BE7B 79 17 BF	ADC \$BF17,Y
BE14 10 12	BPL \$BE28	BE7E 85 63	STA \$63
BE16 A9 B3	LDA #\$B3	BE80 A5 62	LDA \$62
BE18 A0 BD	LDY #\$BD	BE82 79 16 BF	ADC \$BF16,Y
BE1A 20 5B BC	JSR \$BC5B	BE85 85 62	STA \$62
BE1D F0 02	BEQ \$BE21	BE87 E8	INX
BE1F 10 0E	BPL \$BE2F	BE88 B0 04	BCS \$BE8E
BE21 20 E2 BA	JSR \$BAE2	BE8A 10 DE	BPL \$BE6A
BE24 C6 5D	DEC \$5D	BE8C 30 02	BMI \$BE90
BE26 D0 EE	BNE \$BE16	BE8E 30 DA	BMI \$BE6A
BE28 20 FE BA	JSR \$BAFE	BE90 8A	TXA
BE2B E6 5D	INC \$5D	BE91 90 04	BCC \$BE97
BE2D D0 DC	BNE \$BE0B	BE93 49 FF	EOR #\$FF
BE2F 20 49 B8	JSR \$BB49	BE95 69 0A	ADC #\$0A
BE32 20 9B BC	JSR \$BC9B	BE97 69 2F	ADC #\$2F
BE35 A2 01	LDX #\$01	BE99 C8	INY
BE37 A5 5D	LDA \$5D	BE9A C8	INY
BE39 18	CLC	BE9B C8	INY
BE3A 69 0A	ADC #\$0A	BE9C C8	INY
BE3C 30 09	BMI \$BE47	BE9D 84 47	STY \$47
BE3E C9 0B	CMP #\$0B	BE9F A4 71	LDY \$71
BE40 B0 06	BCS \$BE48	BEA1 C8	INY
BE42 69 FF	ADC #\$FF	BEA2 AA	TAX
BE44 AA	TAX	BEA3 29 7F	AND #\$7F
BE45 A9 02	LDA #\$02	BEA5 99 FF 00	STA \$00FF,Y
BE47 38	SEC	BEAB C6 5D	DEC \$5D
BE48 E9 02	SBC #\$02	BEAA D0 06	BNE \$BE2B
BE4A 85 5E	STA \$5E	BEAC A9 2E	LDA #\$2E
BE4C 86 5D	STX \$5D	BEAE C8	INY
BE4E 8A	TXA	BEAF 99 FF 00	STA \$00FF,Y
BE4F F0 02	BEQ \$BE53	BEB2 84 71	STY \$71
BE51 10 13	BPL \$BE66	BEB4 A4 47	LDY \$47
BE53 A4 71	LDY \$71	BEB6 8A	TXA
BE55 A9 2E	LDA #\$2E	BEB7 49 FF	EOR #\$FF
BE57 C8	INY	BEB9 29 80	AND #\$80
BE58 99 FF 00	STA \$00FF,Y	BEBB AA	TAX
BE5B 8A	TXA	BEBC C0 24	CPY #\$24
BE5C F0 06	BEQ \$BE64	BEBE F0 04	BEQ \$BEC4
BE5E A9 30	LDA #\$30	BEC0 C0 3C	CPY #\$3C
BE60 C8	INY	BEC2 D0 A6	BNE \$BE6A
BE61 99 FF 00	STA \$00FF,Y	BEC4 A4 71	LDY \$71

BEC6 B9 FF 00	LDA \$00FF,Y	BF1B 98	TYA
BEC9 B8	DEY	BF1C 96 80	STX \$80,Y
BECA C9 30	CMP #\$30	BF1E FF	???
BECC F0 FB	BEQ \$BED6	BF1F F0 BD	BEQ \$BEDE
BECE C9 2E	CMP #\$2E	BF21 C0 00	CPY #\$00
BED0 F0 01	BEQ \$BED3	BF23 01 86	DRA (\$86,X)
BED2 C8	INY	BF25 A0 FF	LDY #\$FF
BED3 A9 2B	LDA #\$2B	BF27 FF	???
BED5 A6 5E	LDX \$5E	BF28 D8	CLD
BED7 F0 2E	BEQ \$BF07	BF29 F0 00	BEQ \$BF2B
BED9 10 08	BPL \$BEE3	BF2B 00	BRK
BEDB A9 00	LDA #\$00	BF2C 03	???
BEDD 38	SEC	BF2D E8	INX
BEDE E5 5E	SBC \$5E	BF2E FF	???
BEE0 AA	TAX	BF2F FF	???
BEE1 A9 2D	LDA #\$2D	BF30 FF	???
BEE3 99 01 01	STA \$0101,Y	BF31 9C	???
BEE6 A9 45	LDA #\$45	BF32 00	BRK
BEEB 99 00 01	STA \$0100,Y	BF33 00	BRK
BEEB BA	TXA	BF34 00	BRK
BEEC A2 2F	LDX #\$2F	BF35 0A	ASL
BEEE 38	SEC	BF36 FF	???
BEEF E8	INX	BF37 FF	???
BEFO E9 0A	SBC #\$0A	BF38 FF	???
BEF2 B0 FB	BCS \$BEEF	BF39 FF	???
BEF4 69 3A	ADC #\$3A		
BEF6 99 03 01	STA \$0103,Y		
BEF9 BA	TXA	BF3A; TI constants	
BEFA 99 02 01	STA \$0102,Y	BF3A FF	???
BEFD A9 00	LDA #\$00	BF3B DF	???
BEFF 99 04 01	STA \$0104,Y	BF3C 0A	ASL
BF02 F0 08	BEQ \$BF0C	BF3D B0	???
BF04 99 FF 00	STA \$00FF,Y	BF3E 00	BRK
BF07 A9 00	LDA #\$00	BF3F 03	???
BF09 99 00 01	STA \$0100,Y	BF40 4B	???
BF0C A9 00	LDA #\$00	BF41 C0 FF	CPY #\$FF
BF0E A0 01	LDY #\$01	BF43 FF	???
BF10 60	RTS	BF44 73	???
BF11 B0	???	BF45 60	RTS
BF12 00	BRK	BF46 00	BRK
BF13 00	BRK	BF47 00	BRK
BF14 00	BRK	BF48 0E 10 FF	ASL \$FFF10
BF15 00	BRK	BF4B FF	???
BF16; Decimal constants		BF4C FD A8 00	SBC \$00A8,X
BF16 FA	???	BF4F 00	BRK
BF17 0A	ASL	BF50 00	BRK
BF18 1F	???	BF51 3C	???
BF19 00	BRK	BF52 EC AA AA	CPX \$AAAA
BF1A 00	BRK	BF55 AA	TAX
		BF56 AA	TAX
		BF57 AA	TAX

BF5B AA	TAX	BF9C A4 07	LDY \$07
BF59 AA	TAX	BF9E 20 FE BB	JSR \$BBFE
BF5A AA	TAX	BFA1 98	TYA
BF5B AA	TAX	BFA2 48	PHA
BF5C AA	TAX	BFA3 20 EA B9	JSR \$B9EA
BF5D AA	TAX	BFA6 A9 4E	LDA #\$4E
BF5E AA	TAX	BFA8 A0 00	LDY #\$00
BF5F AA	TAX	BFAA 20 28 BA	JSR \$BA28
BF60 AA	TAX	BFAD 20 ED BF	JSR \$BFED
BF61 AA	TAX	BFB0 68	PLA
BF62 AA	TAX	BFB1 4A	LSR
BF63 AA	TAX	BFB2 90 OA	BCC \$BFBE
BF64 AA	TAX		
BF65 AA	TAX		
BF66 AA	TAX	BFB4; Perform [negative]	
BF67 AA	TAX		
BF68 AA	TAX	BFB4 A5 61	LDA \$61
BF69 AA	TAX	BFB6 F0 06	BEQ \$BFBE
BF6A AA	TAX	BFB8 A5 66	LDA \$66
BF6B AA	TAX	BFBA 49 FF	EOR #\$FF
BF6C AA	TAX	BFBC 85 66	STA \$66
BF6D AA	TAX	BFBE 60	RTS
BF6E AA	TAX	BFBF 81 38	STA (\$38,X)
BF6F AA	TAX	BFC1 AA	TAX
BF70 AA	TAX	BFC2 38	???
		BFC3 29 07	AND #\$07
		BFC5 71 34	ADC (\$34),Y
BF71; Perform [SQR]		BFC7 58	CLI
BF71 20 0C BC	JSR \$BC0C	BFC8 3E 56 74	ROL \$7456,X
BF74 A9 11	LDA #\$11	BFCB 16 7E	ASL \$7E,X
BF76 A0 BF	LDY #\$BF	BFCD B3	???
BF78 20 A2 BB	JSR \$BBA2	BFCE 1B	???
		BFCF 77	???
		BFD0 2F	???
		BFD1 EE E3 85	INC \$85E3
BF7B; Perform [power]		BFD4 7A	???
BF7B F0 70	BEQ \$BFED	BFD5 1D 84 1C	ORA \$1C84,X
BF7D A5 69	LDA \$69	BFD8 2A	ROL
BF7F D0 03	BNE \$BF84	BFD9 7C	???
BF81 4C F9 BB	JMP \$BBF9	BFDA 63	???
BF84 A2 4E	LDX #\$4E	BFDB 59 58 0A	EOR \$0A58,Y
BF86 A0 00	LDY #\$00	BFDE 7E 75 FD	ROR \$FD75,X
BF88 20 D4 BB	JSR \$BBD4	BFE1 E7	???
BF8B A5 6E	LDA \$6E	BFE2 C6 80	DEC \$80
BF8D 10 0F	BPL \$BF9E	BFE4 31 72	AND (\$72),Y
BF8F 20 CC BC	JSR \$BCCC	BFE6 18	CLC
BF92 A9 4E	LDA #\$4E	BFE7 10 B1	BPL \$BF6A
BF94 A0 00	LDY #\$00	BFE9 00	BRK
BF96 20 5B BC	JSR \$BC5B	BFEA 00	BRK
BF99 D0 03	BNE \$BF9E	BFEB 00	BRK
BF9B 98	TYA	BFEC 00	BRK

## BFED; Perform [EXP]

BFED A9 BF LDA ##BF  
 BFEF A0 BF LDY ##BF  
 BFF1 20 28 BA JSR \$BA28  
 BFF4 A5 70 LDA \$70  
 BFF6 69 50 ADC ##50  
 BFFB 90 03 BCC \$BFFD  
 BFFA 20 23 BC JSR \$BC23  
 BFFD 4C 00 E0 JMP \$E000  
 E000 85 56 STA \$56  
 E002 20 0F BC JSR \$BC0F  
 E005 A5 61 LDA \$61  
 E007 C9 88 CMP ##88  
 E009 90 03 BCC \$E00E  
 E00B 20 D4 BA JSR \$BAD4  
 E00E 20 CC BC JSR \$BCCC  
 E011 A5 07 LDA \$07  
 E013 18 CLC  
 E014 69 B1 ADC ##B1  
 E016 F0 F3 BEQ \$E00B  
 E018 38 SEC  
 E019 E9 01 SBC #\$01  
 E01B 48 PHA  
 E01C A2 05 LDX #\$05  
 E01E B5 69 LDA \$69,X  
 E020 B4 61 LDY \$61,X  
 E022 95 61 STA \$61,X  
 E024 94 69 STY \$69,X  
 E026 CA DEX  
 E027 10 F5 BPL \$E01E  
 E029 A5 56 LDA \$56  
 E02B 85 70 STA \$70  
 E02D 20 53 B8 JSR \$B853  
 E030 20 B4 BF JSR \$BFB4  
 E033 A9 C4 LDA #\$C4  
 E035 A0 BF LDY ##BF  
 E037 20 59 E0 JSR \$E059  
 E03A A9 00 LDA #\$00  
 E03C 85 6F STA \$6F  
 E03E 68 PLA  
 E03F 20 B9 BA JSR \$BAB9  
 E042 60 RTS

E04A A9 57 LDA #\$57  
 E04C 20 2B BA JSR \$BA28  
 E04F 20 5D E0 JSR \$E05D  
 E052 A9 57 LDA ##57  
 E054 A0 00 LDY #\$00  
 E056 4C 28 BA JMP \$BA28  
  
 E059; Series eval. 2  
 E059 85 71 STA \$71  
 E05B 84 72 STY \$72  
 E05D 20 C7 BB JSR \$BBC7  
 E060 B1 71 LDA (\$71),Y  
 E062 85 67 STA \$67  
 E064 A4 71 LDY \$71  
 E066 C8 INY  
 E067 98 TYA  
 E068 D0 02 BNE \$E06C  
 E06A E6 72 INC \$72  
 E06C 85 71 STA \$71  
 E06E A4 72 LDY \$72  
 E070 20 28 BA JSR \$BA28  
 E073 A5 71 LDA \$71  
 E075 A4 72 LDY \$72  
 E077 18 CLC  
 E078 69 05 ADC ##05  
 E07A 90 01 BCC \$E07D  
 E07C C8 INY  
 E07D 85 71 STA \$71  
 E07F B4 72 STY \$72  
 E081 20 67 B8 JSR \$B867  
 E084 A9 5C LDA ##5C  
 E086 A0 00 LDY #\$00  
 E088 C6 67 DEC \$67  
 E08A D0 E4 BNE \$E070  
 E08C 60 RTS  
 E08D 98 TYA  
 E08E 35 44 AND \$44,X  
 E090 7A ???  
 E091 00 BRK  
 E092 68 PLA  
 E093 28 PLP  
 E094 B1 46 LDA (\$46),Y  
 E096 00 BRK

## E043; Series eval. 1

E043 85 71 STA \$71  
 E045 B4 72 STY \$72  
 E047 20 CA BB JSR \$BBCA

## E097; Perform [RND]

E097 20 2B BC JSR \$BC2B  
 E09A 30 37 BMI \$E0D3  
 E09C D0 20 BNE \$EOBE

E09E 20 F3 FF	JSR \$FFF3	E104 AA	TAX
E0A1 B6 22	STX \$22	E105 D0 02	BNE \$E109
E0A3 B4 23	STY \$23	E107 A2 1E	LDX #\$1E
E0A5 A0 04	LDY #\$04	E109 4C 37 A4	JMP \$A437
E0A7 B1 22	LDA (\$22),Y	E10C 20 D2 FF	JSR \$FFD2
E0A9 B5 62	STA \$62	E10F B0 E8	BCS \$EOF9
E0AB C8	INY	E111 60	RTS
E0AC B1 22	LDA (\$22),Y	E112 20 CF FF	JSR \$FFCF
E0AE B5 64	STA \$64	E115 B0 E2	BCS \$EOF9
E0B0 A0 08	LDY #\$08	E117 60	RTS
E0B2 B1 22	LDA (\$22),Y	E118 20 AD E4	JSR \$E4AD
E0B4 B5 63	STA \$63	E11B B0 DC	BCS \$EOF9
E0B6 C8	INY	E11D 60	RTS
E0B7 B1 22	LDA (\$22),Y	E11E 20 C6 FF	JSR \$FFC6
E0B9 B5 65	STA \$65	E121 B0 D6	BCS \$EOF9
E0BB 4C E3 E0	JMP \$E0E3	E123 60	RTS
E0BE A9 BB	LDA #\$BB	E124 20 E4 FF	JSR \$FFE4
E0CO A0 00	LDY #\$00	E127 B0 D0	BCS \$EOF9
E0C2 20 A2 BB	JSR \$BBA2	E129 60	RTS
E0C5 A9 8D	LDA #\$BD		
E0C7 A0 E0	LDY #\$E0		
E0C9 20 28 BA	JSR \$BA28		
E0CC A9 92	LDA #\$92	E12A; Perform [SYS]	
E0CE A0 E0	LDY #\$E0		
E0D0 20 67 BB	JSR \$BB67	E12A 20 8A AD	JSR \$AD8A
E0D3 A6 65	LDX \$65	E12D 20 F7 B7	JSR \$B7F7
E0D5 A5 62	LDA \$62	E130 A9 E1	LDA #\$E1
E0D7 B5 65	STA \$65	E132 48	PHA
E0D9 B6 62	STX \$62	E133 A9 46	LDA #\$46
E0DB A6 63	LDX \$63	E135 48	PHA
E0DD A5 64	LDA \$64	E136 AD 0F 03	LDA \$030F
E0DF B5 63	STA \$63	E139 48	PHA
E0E1 B6 64	STX \$64	E13A AD 0C 03	LDA \$030C
E0E3 A9 00	LDA #\$00	E13D AE 0D 03	LDX \$030D
E0E5 B5 66	STA \$66	E140 AC 0E 03	LDY \$030E
E0E7 A5 61	LDA \$61	E143 28	PLP
E0E9 B5 70	STA \$70	E144 6C 14 00	JMP (\$0014)
E0EB A9 80	LDA #\$80	E147 08	PHP
E0ED B5 61	STA \$61	E148 BD 0C 03	STA \$030C
E0EF 20 D7 BB	JSR \$BBD7	E14B BE 0D 03	STX \$030D
E0F2 A2 BB	LDX #\$BB	E14E BC 0E 03	STY \$030E
E0F4 A0 00	LDY #\$00	E151 68	PLA
E0F6 4C D4 BB	JMP \$BBD4	E152 BD 0F 03	STA \$030F
		E155 60	RTS
E0F9; ?? breakpoints ??		E156; Perform [SAVE]	
E0F9 C9 F0	CMP #\$F0	E156 20 D4 E1	JSR \$E1D4
E0FB D0 07	BNE \$E104	E159 A6 2D	LDX \$2D
E0FD B4 38	STY \$38	E15B A4 2E	LDY \$2E
E0FF B6 37	STX \$37	E15D A9 2B	LDA #\$2B
E101 4C 63 A6	JMP \$A663	E15F 20 D8 FF	JSR \$FFD8

E162 B0 95  
E164 60

BCS \$E0F9  
RTS

E1C6 60

RTS

E165; Perform [LOAD]

E165 A9 01 LDA #\$01  
E16B A9 00 LDA #\$00  
E16A B5 0A STA \$0A  
E16C 20 D4 E1 JSR \$E1D4  
E16F A5 0A LDA \$0A  
E171 A6 2B LDX #2B  
E173 A4 2C LDY #2C  
E175 20 D5 FF JSR \$FFD5  
E178 B0 57 BCS \$E1D1  
E17A A5 0A LDA \$0A  
E17C F0 17 BEQ \$E195  
E17E A2 1C LDX #\$1C  
E180 20 B7 FF JSR \$FFB7  
E183 29 10 AND #\$10  
E185 D0 17 BNE \$E19E  
E187 A5 7A LDA \$7A  
E189 C9 02 CMP #\$02  
E18B F0 07 BEQ \$E194  
E18D A9 64 LDA #\$64  
E18F A0 A3 LDY #\$A3  
E191 4C 1E AB JMP \$AB1E  
E194 60 RTS  
E195 20 B7 FF JSR \$FFB7  
E198 29 BF AND #\$BF  
E19A F0 05 BEQ \$E1A1  
E19C A2 1D LDX #\$1D  
E19E 4C 37 A4 JMP \$A437  
E1A1 A5 7B LDA \$7B  
E1A3 C9 02 CMP #\$02  
E1A5 D0 0E BNE \$E1B5  
E1A7 86 2D STX \$2D  
E1A9 84 2E STY \$2E  
E1AB A9 76 LDA #\$76  
E1AD A0 A3 LDY #\$A3  
E1AF 20 1E AB JSR \$AB1E  
E1B2 4C 2A A5 JMP \$A52A  
E1B5 20 8E A6 JSR \$A68E  
E1BB 20 33 A5 JSR \$A533  
E1BB 4C 77 A6 JMP \$A677

E1C7; Perform [CLOSE]

E1C7 20 19 E2 JSR \$E219  
E1CA A5 49 LDA \$49  
E1CC 20 C3 FF JSR \$FFC3  
E1CF 90 C3 BCC \$E194  
E1D1 4C F9 E0 JMP \$EOF9  
  
E1D4; Parameters for LOAD/SAVE  
  
E1D4 A9 00 LDA #\$00  
E1D6 20 BD FF JSR \$FFBD  
E1D9 A2 01 LDX #\$01  
E1DB A0 00 LDY #\$00  
E1DD 20 BA FF JSR \$FFBA  
E1E0 20 06 E2 JSR \$E206  
E1E3 20 57 E2 JSR \$E257  
E1E6 20 06 E2 JSR \$E206  
E1E9 20 00 E2 JSR \$E200  
E1EC A0 00 LDY #\$00  
E1EE 86 49 STX \$49  
E1F0 20 BA FF JSR \$FFBA  
E1F3 20 06 E2 JSR \$E206  
E1F6 20 00 E2 JSR \$E200  
E1F9 8A TXA  
E1FA 8B TAY  
E1FB A6 49 LDX #\$49  
E1FD 4C BA FF JMP \$FFBA  
E200 20 0E E2 JSR \$E20E  
E203 4C 9E B7 JMP \$B79E

E206; Check default parameters

E206 20 79 00 JSR \$0079  
E209 D0 02 BNE \$E20D  
E20B 68 PLA  
E20C 68 PLA  
E20D 60 RTS

E20E; Check for comma

E20E 20 FD AE JSR \$AEFD  
E211 20 79 00 JSR \$0079  
E214 D0 F7 BNE \$E20D  
E216 4C 08 AF JMP \$AF08

E1BE; Perform [OPEN]

E1BE 20 19 E2 JSR \$E219  
E1C1 20 C0 FF JSR \$FFC0  
E1C4 B0 0B BCS \$E1D1

**E219; Parameters for OPEN/CLOSE**

E219 A9 00	LDA #\$00	E274 20 07 BB	JSR \$BB07
E21B 20 BD FF	JSR \$FFBD	E277 20 0C BC	JSR \$BC0C
E21E 20 11 E2	JSR \$E211	E27A 20 CC BC	JSR \$BCCC
E221 20 9E B7	JSR \$B79E	E27D A9 00	LDA #\$00
E224 B6 49	STX \$49	E27F 85 6F	STA \$6F
E226 BA	TXA	E281 20 53 BB	JSR \$BB53
E227 A2 01	LDX #\$01	E284 A9 EA	LDA #\$EA
E229 A0 00	LDY #\$00	E286 A0 E2	LDY #\$E2
E22B 20 BA FF	JSR \$FFBA	E288 20 50 BB	JSR \$BB50
E22E 20 06 E2	JSR \$E206	E28B A5 66	LDA \$66
E231 20 00 E2	JSR \$E200	E28D 48	PHA
E234 B6 4A	STX \$4A	E28E 10 0D	BPL \$E29D
E236 A0 00	LDY #\$00	E290 20 49 BB	JSR \$BB49
E238 A5 49	LDA \$49	E293 A5 66	LDA \$66
E23A E0 03	Cpx #\$03	E295 30 09	BMI \$E2A0
E23C 90 01	BCC \$E23F	E297 A5 12	LDA \$12
E23E 88	DEY	E299 49 FF	EDR #\$FF
E23F 20 BA FF	JSR \$FFBA	E29B 85 12	STA \$12
E242 20 06 E2	JSR \$E206	E29D 20 B4 BF	JSR \$BFB4
E245 20 00 E2	JSR \$E200	E2A0 A9 EA	LDA #\$EA
E248 BA	TXA	E2A2 A0 E2	LDY #\$E2
E249 AB	TAY	E2A4 20 67 BB	JSR \$BB67
E24A A6 4A	LDX \$4A	E2A7 68	PLA
E24C A5 49	LDA \$49	E2AB 10 03	BPL \$E2AD
E24E 20 BA FF	JSR \$FFBA	E2AA 20 B4 BF	JSR \$BFB4
E251 20 06 E2	JSR \$E206	E2AD A9 EF	LDA #\$EF
E254 20 0E E2	JSR \$E20E	E2AF A0 E2	LDY #\$E2
E257 20 9E AD	JSR \$AD9E	E2B1 4C 43 E0	JMP \$E043
E25A 20 A3 B6	JSR \$B6A3		
E25D A6 22	LDX \$22		
E25F A4 23	LDY \$23		
E261 4C BD FF	JMP \$FFBD		

**E264; Perform [COS]**

E264 A9 E0	LDA #\$E0
E266 A0 E2	LDY #\$E2
E268 20 67 BB	JSR \$BB67

**E26B; Perform [SIN]**

E26B 20 0C BC	JSR \$BC0C
E26E A9 E5	LDA #\$E5
E270 A0 E2	LDY #\$E2
E272 A6 6E	LDX \$6E

**E2B4; Perform [TAN]**

E2B4 20 CA BB	JSR \$BBCA
E2B7 A9 00	LDA #\$00
E2B9 85 12	STA \$12
E2BB 20 6B E2	JSR \$E26B
E2BE A2 4E	LDX #\$4E
E2C0 A0 00	LDY #\$00
E2C2 20 F6 E0	JSR \$EOF6
E2C5 A9 57	LDA #\$57
E2C7 A0 00	LDY #\$00
E2C9 20 A2 BB	JSR \$BBAZ
E2CC A9 00	LDA #\$00
E2CE 85 66	STA \$66
E2D0 A5 12	LDA \$12
E2D2 20 DC E2	JSR \$E2DC
E2D5 A9 4E	LDA #\$4E
E2D7 A0 00	LDY #\$00
E2D9 4C 0F BB	JMP \$BB0F
E2DC 48	PHA
E2DD 4C 9D E2	JMP \$E29D
E2E0 B1 49	STA (\$49,X)

E2E2 0F	???	E334 20 50 BB	JSR \$B850
E2E3 DA	???	E337 68	PLA
E2E4 A2 B3	LDX #\$B3	E338 10 03	BPL \$E33D
E2E6 49 0F	EOR #\$0F	E33A 4C B4 BF	JMP \$BF4
E2E8 DA	???	E33D 60	RTS
E2E9 A2 7F	LDX #\$7F	E33E 0B	???
E2EB 00	BRK	E33F 76 B3	ROR \$B3,X
E2EC 00	BRK	E341 83	???
E2ED 00	BRK	E342 BD D3 79	LDA \$79D3,X
E2EE 00	BRK	E345 1E F4 A6	ASL \$A6F4,X
E2EF 05 B4	ORA \$B4	E348 F5 7B	SBC \$7B,X
E2F1 E6 1A	INC \$1A	E34A 83	???
E2F3 2D 1B B6	AND \$B61B	E34B FC	???
E2F6 28	PLP	E34C B0 10	BCS \$E35E
E2F7 07	???	E34E 7C	???
E2F8 F8	???	E34F 0C	???
E2F9 F8	SED	E350 1F	???
E2FA 87	???	E351 67	???
E2FB 99 68 B9	STA \$B968,Y	E352 CA	DEX
E2FE 01 87	ORA (\$B7,X)	E353 7C	???
E300 23	???	E354 DE 53 CB	DEC \$CB53,X
E301 35 DF	AND \$DF,X	E357 C1 7D	CMP (\$7D,X)
E303 E1 86	SBC (\$B6,X)	E359 14	???
E305 A5 5D	LDA \$5D	E35A 64	???
E307 E7	???	E35B 70 4C	BVS \$E3A9
E308 2B	PLP	E35D 7D B7 EA	ADC \$EAB7,X
E309 83	???	E360 51 7A	EOR (\$7A),Y
E30A 49 0F	EOR #\$0F	E362 7D 63 30	ADC \$3063,X
E30C DA	???	E365 88	DEY
		E366 7E 7E 92	ROR \$927E,X
		E369 44	???
E30E; Perform [ATN]		E36A 99 3A 7E	STA \$7E3A,Y
		E36D 4C CC 91	JMP \$91CC
		E370 C7	???
E30E A5 66	LDA \$66	E371 7F	???
E30F 66 48	ROR \$48	E372 AA	TAX
E311 10 03	BPL \$E316	E373 AA	TAX
E313 20 B4 BF	JSR \$BF4	E374 AA	TAX
E316 A5 61	LDA \$61	E375 13	???
E318 48	PHA	E376 81 00	STA (\$00,X)
E319 C9 B1	CMP #\$B1	E378 00	BRK
E31B 90 07	BCC \$E324	E379 00	BRK
E31D A9 BC	LDA #\$BC	E37A 00	BRK
E31F A0 B9	LDY #\$B9		
E321 20 0F BB	JSR \$BB0F		
E324 A9 3E	LDA #\$3E		
E326 A0 E3	LDY #\$E3		
E328 20 43 E0	JSR \$E043		
E32B 68	PLA	E37B 20 CC FF	JSR \$FFCC
E32C C9 B1	CMP #\$B1	E37E A9 00	LDA #\$00
E32E 90 07	BCC \$E337	E380 85 13	STA \$13
E330 A9 E0	LDA #\$E0	E382 20 7A A6	JSR \$A67A
E332 A0 E2	LDY #\$E2	E385 58	CLI

E386 A2 80	LDX #\$80	E3D6 B4 06	STY \$06
E388 6C 00 03	JMP (\$0300)	E3D8 A9 AA	LDA #\$AA
E38B 8A	TXA	E3DA A0 B1	LDY #\$B1
E38C 30 03	BMI \$E391	E3DC 85 03	STA \$03
E38E 4C 3A A4	JMP \$A43A	E3DE B4 04	STY \$04
E391 4C 74 A4	JMP \$A474	E3E0 A2 1C	LDX #\$1C
		E3E2 BD A2 E3	LDA \$E3A2,X
		E3E5 95 73	STA \$73,X
R394; Initialize			
E394 20 53 E4	JSR \$E453	E3E7 CA	DEX
E397 20 BF E3	JSR \$E3BF	E3E8 10 FB	BPL \$E3E2
E39A 20 22 E4	JSR \$E422	E3EA A9 03	LDA #\$03
E39D A2 FB	LDX #\$FB	E3EC 85 53	STA \$53
E39F 9A	TXS	E3EE A9 00	LDA #\$00
E3A0 D0 E4	BNE \$E386	E3F0 85 68	STA \$68
		E3F2 85 13	STA \$13
		E3F4 85 18	STA \$18
		E3F6 A2 01	LDX #\$01
		E3FB 8E FD 01	STX \$01FD
E3A2; CHRGET for zero page			
E3A2 E6 7A	INC \$7A	E400 B6 16	STX \$16
E3A4 D0 02	BNE \$E3AB	E402 38	SEC
E3A6 E6 7B	INC \$7B	E403 20 9C FF	JSR \$FF9C
E3AB AD 60 EA	LDA \$EA60	E406 B6 2B	STX \$2B
E3AB C9 3A	CMP #\$3A	E408 B4 2C	STY \$2C
E3AD B0 0A	BCS \$E3B9	E40A 38	SEC
E3AF C9 20	CMP #\$20	E40B 20 99 FF	JSR \$FF99
E3B1 F0 EF	BEQ \$E3A2	E40E B6 37	STX \$37
E3B3 3B	SEC	E410 B4 38	STY \$38
E3B4 E9 30	SBC #\$30	E412 B6 33	STX \$33
E3B6 3B	SEC	E414 B4 34	STY \$34
E3B7 E9 D0	SBC #\$D0	E416 A0 00	LDY #\$00
E3B9 60	RTS	E418 98	TYA
E3BA 80	???	E419 91 2B	STA (\$2B),Y
E3BB 4F	???	E41B E6 2B	INC \$2B
E3BC C7	???	E41D D0 02	BNE \$E421
E3BD 52	???	E41F E6 2C	INC \$2C
E3BE 5B	CLI	E421 60	RTS
		E422 A5 2B	LDA \$2B
		E424 A4 2C	LDY \$2C
E3BF; Initialize Basic			
E3BF A9 4C	LDA #\$4C	E426 20 08 A4	JSR \$A408
E3C1 85 54	STA \$54	E429 A9 73	LDA #\$73
E3C3 8D 10 03	STA \$0310	E42B A0 E4	LDY #\$E4
E3C6 A9 48	LDA #\$48	E42D 20 1E AB	JSR \$AB1E
E3C8 A0 B2	LDY #\$B2	E430 A5 37	LDA #\$37
E3CA 8D 11 03	STA \$0311	E432 38	SEC
E3CD 8C 12 03	STY \$0312	E433 E5 2B	SBC \$2B
E3D0 A9 91	LDA #\$91	E435 AA	TAX
E3D2 A0 B3	LDY #\$B3	E436 A5 38	LDA \$38
E3D4 85 05	STA \$05	E438 E5 2C	SBC \$2C
		E43A 20 CD BD	JSR \$BDCD
		E43D A9 60	LDA #\$60

E43F A0 E4	LDY #\$E4	E48D 53	???
E441 20 1E AB	JSR \$AB1E	E48E 49 43	EOR #\$43
E444 4C 44 A6	JMP \$A644	E490 20 56 32	JSR \$3256
		E493 20 2A 2A	JSR \$2A2A
		E496 2A	ROL
E447; Vectors for \$300		E497 2A	ROL
E447 8B	???	E498 0D 0D 20	ORA \$200D
E448 E3	???	E49B 36 34	ROL \$34,X
E449 83	???	E49D 4B	???
E44A A4 7C	LDY \$7C	E49E 20 52 41	JSR \$4152
E44C A5 1A	LDA \$1A	E4A1 4D 20 53	EOR \$5320
E44E A7	???	E4A4 59 53 54	EOR \$5453,Y
E44F E4 A7	Cpx \$A7	E4A7 45 4D	EOR \$4D
E451 B6 AE	STX \$AE	E4A9 20 20 00	JSR \$0020
		E4AC 5C	???
		E4AD 4B	PHA
		E4AE 20 C9 FF	JSR \$FFC9
R453; Initialize vectors		E4B1 AA	TAX
		E4B2 68	PLA
E453 A2 0B	LDX #\$0B	E4B3 90 01	BCC \$E4B6
E455 BD 47 E4	LDA \$E447,X	E4B5 8A	TXA
E458 9D 00 03	STA \$0300,X	E4B6 60	RTS
E45B CA	DEX	E4B7 AA	TAX
E45C 10 F7	BPL \$E455	E4B8 AA	TAX
E45E 60	RTS	E4B9 AA	TAX
		E4BA AA	TAX
		E4BB AA	TAX
E45F; Power-up message		E4BC AA	TAX
		E4BD AA	TAX
E45F 00	BRK	E4BE AA	TAX
E460 20 42 41	JSR \$4142	E4BF AA	TAX
E463 53	???	E4C0 AA	TAX
E464 49 43	EOR #\$43	E4C1 AA	TAX
E466 20 42 59	JSR \$5942	E4C2 AA	TAX
E469 54	???	E4C3 AA	TAX
E46A 45 53	EOR \$53	E4C4 AA	TAX
E46C 20 46 52	JSR \$5246	E4C5 AA	TAX
E46F 45 45	EOR \$45	E4C6 AA	TAX
E471 0D 00 93	DRA \$9300	E4C7 AA	TAX
E474 0D 20 20	DRA \$2020	E4C8 AA	TAX
E477 20 20 2A	JSR \$2A20	E4C9 AA	TAX
E47A 2A	ROL	E4CA AA	TAX
E47B 2A	ROL	E4CB AA	TAX
E47C 2A	ROL	E4CC AA	TAX
E47D 20 43 4F	JSR \$4F43	E4CD AA	TAX
E480 4D 4D 4F	EOR \$4F4D	E4CE AA	TAX
E483 44	???	E4CF AA	TAX
E484 4F	???	E4D0 AA	TAX
E485 52	???	E4D1 AA	TAX
E486 45 20	EOR \$20	E4D2 AA	TAX
E488 36 34	ROL \$34,X	E4D3 AA	TAX
E48A 20 42 41	JSR \$4142	E4D4 AA	TAX

E4D5 AA	TAX	
E4D6 AA	TAX	
E4D7 AA	TAX	<b>E518; Initialize I/O</b>
E4D8 AA	TAX	
E4D9 AA	TAX	
E4DA AD 21 D0	LDA \$D021	E518 20 A0 E5 JSR \$E5A0
E4DD 91 F3	STA (\$F3),Y	E51B A9 00 LDA #\$00
E4DF 60	RTS	E51D 8D 91 02 STA \$0291
E4E0 69 02	ADC #\$02	E520 85 CF STA \$CF
E4E2 A4 91	LDY #91	E522 A9 48 LDA #\$48
E4E4 C8	INY	E524 8D 8F 02 STA \$028F
E4E5 D0 04	BNE \$E4EB	E527 A9 EB LDA #\$EB
E4E7 C5 A1	CMP \$A1	E529 8D 90 02 STA \$0290
E4E9 D0 F7	BNE \$E4E2	E52C A9 0A LDA #\$0A
E4EB 60	RTS	E52E 8D 89 02 STA \$0289
E4EC 19 26 44	ORA \$4426,Y	E531 8D BC 02 STA \$028C
E4EF 19 1A 11	ORA \$111A,Y	E534 A9 0E LDA #\$0E
E4F2 E8	INX	E536 8D B6 02 STA \$0286
E4F3 0D 70 0C	ORA \$0C70	E539 A9 04 LDA #\$04
E4F6 06 06	ASL \$06	E53B 8D BB 02 STA \$028B
E4FB D1 02	CMP (\$02),Y	E53E A9 0C LDA #\$0C
E4FA 37	???	E540 85 CD STA \$CD
E4FB 01 AE	ORA (\$AE,X)	E542 85 CC STA \$CC
E4FD 00	BRK	
E4FE 69 00	ADC #\$00	<b>E544; Clear screen</b>
<b>E500; Set I/O address</b>		
E500 A2 00	LDX #\$00	E544 AD 88 02 LDA \$0288
E502 A0 DC	LDY #\$DC	E547 09 80 ORA #\$80
E504 60	RTS	E549 A8 TAY
<b>E505; Get screen size</b>		
E505 A2 28	LDX #\$28	E54A A9 00 LDA #\$00
E507 A0 19	LDY #\$19	E54C AA TAX
E509 60	RTS	E54D 94 D9 STY \$D9,X
<b>E50A; Put/get row/column</b>		
E50A B0 07	BCS \$E513	E54F 18 CLC
E50C 86 D6	STX \$D6	E550 69 28 ADC #\$28
E50E 84 D3	STY \$D3	E552 90 01 BCC \$E555
E510 20 6C E5	JSR \$E56C	E554 C8 INY
E513 A6 D6	LDX \$D6	E555 E8 INX
E515 A4 D3	LDY \$D3	E556 E0 1A CPX #\$1A
E517 60	RTS	E558 D0 F3 BNE \$E54D
<b>E566; Home cursor</b>		
		E55A A9 FF LDA #\$FF
		E55C 95 D9 STA \$D9,X
		E55E A2 18 LDX #\$18
		E560 20 FF E9 JSR \$E9FF
		E563 CA DEX
		E564 10 FA BPL \$E560
		E566 A0 00 LDY #\$00
		E568 B4 D3 STY \$D3
		E56A B4 D6 STY \$D6

**E56C; Set screen pointers**

E56C A6 D6	LDX \$D6
E56E A5 D3	LDA \$D3
E570 B4 D9	LDY \$D9,X
E572 30 08	BMI \$E57C
E574 18	CLC
E575 69 28	ADC #\$28
E577 85 D3	STA \$D3
E579 CA	DEX
E57A 10 F4	BPL \$E570
E57C B5 D9	LDA \$D9,X
E57E 29 03	AND #\$03
E580 0D 88 02	ORA \$0288
E583 85 D2	STA \$D2
E585 BD F0 EC	LDA \$ECF0,X
E588 B5 D1	STA \$D1
E58A A9 27	LDA #\$27
E58C E8	INX
E58D B4 D9	LDY \$D9,X
E58F 30 06	BMI \$E597
E591 18	CLC
E592 69 28	ADC #\$28
E594 E8	INX
E595 10 F6	BPL \$E58D
E597 85 D5	STA \$D5
E599 60	RTS
E59A 20 A0 E5	JSR \$E5A0
E59D 4C 66 E5	JMP \$E566

E5BC 9D 77 02	STA \$0277,X
E5BF E8	INX
E5C0 E4 C6	CPX \$C6
E5C2 D0 F5	BNE \$E5B9
E5C4 C6 C6	DEC \$C6
E5C6 98	TYA
E5C7 58	CLI
E5C8 18	CLC
E5C9 60	RTS
E5CA 20 16 E7	JSR \$E716
E5CD A5 C6	LDA \$C6
E5CF 85 CC	STA \$CC
E5D1 8D 92 02	STA \$0292
E5D4 F0 F7	BEQ \$E5CD
E5D6 78	SEI
E5D7 A5 CF	LDA \$CF
E5D9 F0 0C	BEQ \$E5E7
E5DB A5 CE	LDA \$CE
E5DD AE 87 02	LDX \$0287
E5E0 A0 00	LDY #\$00
E5E2 84 CF	STY \$CF
E5E4 20 13 EA	JSR \$EA13
E5E7 20 B4 E5	JSR \$E5B4
E5EA C9 B3	CMP #\$B3
E5EC D0 10	BNE \$E5FE
E5EE A2 09	LDX #\$09
E5F0 78	SEI
E5F1 86 C6	STX \$C6
E5F3 BD E6 EC	LDA \$ECE6,X
E5F6 9D 76 02	STA \$0276,X
E5F9 CA	DEX
E5FA D0 F7	BNE \$E5F3
E5FC F0 CF	BEQ \$E5CD
E5FE C9 0D	CMP #\$0D
E600 D0 C8	BNE \$E5CA
E602 A4 D5	LDY \$D5
E604 B4 D0	STY \$D0
E606 B1 D1	LDA (\$D1),Y
E608 C9 20	CMP #\$20
E60A D0 03	BNE \$E60F
E60C B8	DEY
E60D D0 F7	BNE \$E606
E60F C8	INY
E610 B4 C8	STY \$C8
E612 A0 00	LDY #\$00
E614 BC 92 02	STY \$0292
E617 B4 D3	STY \$D3
E619 B4 D4	STY \$D4
E61B A5 C9	LDA \$C9
E61D 30 1B	BMI \$E63A
E61F A6 D6	LDX \$D6
E621 20 ED E6	JSR \$E6ED

**E5A0; Set I/O defaults**

E5A0 A9 03	LDA #\$03
E5A2 85 9A	STA \$9A
E5A4 A9 00	LDA #\$00
E5A6 85 99	STA \$99
E5A8 A2 2F	LDX #\$2F
E5AA BD B8 EC	LDA \$ECB8,X
E5AD 9D FF CF	STA \$CFFF,X
E5B0 CA	DEX
E5B1 D0 F7	BNE \$E5AA
E5B3 60	RTS

**E5B4; Input from keyboard**

ESB4 AC 77 02	LDY \$0277
ESB7 A2 00	LDX #\$00
ESB9 BD 7B 02	LDA \$0278,X

E624 E4 C9	CPX \$C9	E67E D0 02	BNE \$E6B2
E626 D0 12	BNE \$E63A	E680 A9 FF	LDA #\$FF
E628 A5 CA	LDA \$CA	E682 18	CLC
E62A B5 D3	STA \$D3	E683 60	RTS
E62C C5 C8	CMP \$C8		
E62E 90 0A	BCC \$E63A		
E630 B0 2B	BCS \$E65D		
E684; Quote test			
E632; Input from screen		E684 C9 22	CMP #\$22
		E686 D0 08	BNE \$E690
		E688 A5 D4	LDA \$D4
		E68A 49 01	EOR #\$01
E632 98		E68C 85 D4	STA \$D4
E633 48		E68E A9 22	LDA #\$22
E634 8A		E690 60	RTS
E635 48			
E636 A5 D0		LDA \$D0	
E638 F0 93		BEQ \$E5CD	
E63A A4 D3		LDY \$D3	
E63C B1 D1		LDA (\$D1),Y	
E63E 85 D7		STA \$D7	E691 09 40
E640 29 3F		AND #\$3F	DRA #\$40
E642 06 D7		ASL \$D7	E693 A6 C7
E644 24 D7		BIT \$D7	LDX \$C7
E646 10 02		BPL \$E64A	E695 F0 02
E648 09 B0		DRA #\$B0	BEQ \$E699
E64A 90 04		BCC \$E650	E697 09 B0
E64C A6 D4		LDX \$D4	E699 A6 D8
E64E D0 04		BNE \$E654	E69B F0 02
E650 70 02		BVS \$E654	BEQ \$E69F
E652 09 40		DRA #\$40	E69D C6 D8
E654 E6 D3		INC \$D3	DEC \$D8
E656 20 84 E6		JSR \$E6B4	E69F AE 86 02
E659 C4 C8		CPY \$CB	LDX \$02B6
E65B D0 17		BNE \$E674	E6A2 20 13 EA
E65D A9 00		LDA #\$00	JSR \$EA13
E65F 85 D0		STA \$D0	E6A5 20 B6 E6
E661 A9 0D		LDA #\$0D	JSR \$E6B6
E663 A6 99		LDX #99	E6AB 68
E665 E0 03		CPX #\$03	E6A9 A8
E667 F0 06		BEQ \$E66F	TAY
E669 A6 9A		LDX #9A	E6AA A5 D8
E66B E0 03		CPX #\$03	LDA \$D8
E66D F0 03		BEQ \$E672	BEQ \$E6B0
E66F 20 16 E7		JSR \$E716	LSR \$D4
E672 A9 0D		LDA #\$0D	PLA
E674 85 D7		STA \$D7	E6B1 AA
E676 68		PLA	TAX
E677 AA		TAX	E6B2 68
E678 68		PLA	PLA
E679 AB		TAY	E6B3 18
E67A A5 D7		LDA \$D7	CLC
E67C C9 DE		CMP #\$DE	E6B4 5B
E6B6; Advance cursor			
		E6B6 20 B3 EB	JSR \$E8B3
		E6B9 E6 D3	INC \$D3
		E6BB A5 D5	LDA \$D5
		E6BD C5 D3	CMP \$D3
		E6BF B0 3F	BCS \$E700
		E6C1 C9 4F	CMP #\$4F
		E6C3 F0 32	BEQ \$E6F7
		E6C5 AD 92 02	LDA \$0292

E6CB F0 03	BEQ \$E6CD	E716 4B	PHA
E6CA 4C 67 E9	JMP \$E967	E717 85 D7	STA \$D7
E6CD A6 D6	LDX \$D6	E719 8A	TXA
E6CF E0 19	Cpx #\$19	E71A 4B	PHA
E6D1 90 07	BCC \$E6DA	E71B 9B	TYA
E6D3 20 EA EB	JSR \$E8EA	E71C 4B	PHA
E6D6 C6 D6	DEC \$D6	E71D A9 00	LDA #\$00
E6D8 A6 D6	LDX \$D6	E71F 85 D0	STA \$D0
E6DA 16 D9	ASL \$D9,X	E721 A4 D3	LDY \$D3
E6DC 56 D9	LSR \$D9,X	E723 A5 D7	LDA \$D7
E6DE EB	INX	E725 10 03	BPL \$E72A
E6DF B5 D9	LDA \$D9,X	E727 4C D4 E7	JMP \$E7D4
E6E1 09 B0	ORA #\$80	E72A C9 0D	CMP #\$0D
E6E3 95 D9	STA \$D9,X	E72C D0 03	BNE \$E731
E6E5 CA	DEX	E72E 4C 91 E8	JMP \$E891
E6E6 A5 D5	LDA \$D5	E731 C9 20	CMP #\$20
E6EB 18	CLC	E733 90 10	BCC \$E745
E6E9 69 28	ADC #\$28	E735 C9 60	CMP #\$60
E6EB 85 D5	STA \$D5	E737 90 04	BCC \$E73D
		E739 29 DF	AND #\$DF
		E73B D0 02	BNE \$E73F
		E73D 29 3F	AND #\$3F
		E73F 20 B4 E6	JSR \$E6B4

**E6ED; Retreat cursor**

E6ED B5 D9	LDA \$D9,X	E742 4C 93 E6	JMP \$E693
E6EF 30 03	BMI \$E6F4	E745 A6 D8	LDX \$D8
E6F1 CA	DEX	E747 F0 03	BEQ \$E74C
E6F2 D0 F9	BNE \$E6ED	E749 4C 97 E6	JMP \$E697
E6F4 4C F0 E9	JMP \$E9F0	E74C C9 14	CMP #\$14
E6F7 C6 D6	DEC \$D6	E74E D0 2E	BNE \$E77E
E6F9 20 7C EB	JSR \$E87C	E750 9B	TYA
E6FC A9 00	LDA #\$00	E751 D0 06	BNE \$E759
E6FE 85 D3	STA \$D3	E753 20 01 E7	JSR \$E701
E700 60	RTS	E756 4C 73 E7	JMP \$E773
		E759 20 A1 E8	JSR \$E8A1
		E75C 8B	DEY
		E75D 84 D3	STY \$D3
		E75F 20 24 EA	JSR \$EA24
		E762 C8	INY

**E701; Back into previous line**

E701 A6 D6	LDX \$D6	E763 B1 D1	LDA (\$D1),Y
E703 D0 06	BNE \$E70B	E765 8B	DEY
E705 86 D3	STX \$D3	E766 91 D1	STA (\$D1),Y
E707 6B	PLA	E768 C8	INY
E708 6B	PLA	E769 B1 F3	LDA (\$F3),Y
E709 D0 9D	BNE \$E6AB	E76B 8B	DEY
E70B CA	DEX	E76C 91 F3	STA (\$F3),Y
E70C 86 D6	STX \$D6	E76E C8	INY
E70E 20 6C E5	JSR \$E56C	E76F C4 D5	CPY \$D5
E711 A4 D5	LDY \$D5	E771 D0 EF	BNE \$E762
E713 84 D3	STY \$D3	E773 A9 20	LDA #\$20
E715 60	RTS	E775 91 D1	STA (\$D1),Y
		E777 AD B6 02	LDA \$02B6
		E77A 91 F3	STA (\$F3),Y

**E716; Output to screen**

E77C 10 4D	BPL \$E7CB	E7EA A6 D4	LDX \$D4
E77E A6 D4	LDX \$D4	E7EC D0 3F	BNE \$E82D
E780 F0 03	BEQ \$E785	E7EE C9 14	CMP #\$14
E782 4C 97 E6	JMP \$E697	E7F0 D0 37	BNE \$E829
E785 C9 12	CMP #\$12	E7F2 A4 D5	LDY \$D5
E787 D0 02	BNE \$E78B	E7F4 B1 D1	LDA (\$D1),Y
E789 85 C7	STA \$C7	E7F6 C9 20	CMP #\$20
E78B C9 13	CMP #\$13	E7FB D0 04	BNE \$E7FE
E78D D0 03	BNE \$E792	E7FA C4 D3	CPY \$D3
E78F 20 66 E5	JSR \$E566	E7FC D0 07	BNE \$EB05
E792 C9 1D	CMP #\$1D	E7FE C0 4F	CPY #\$4F
E794 D0 17	BNE \$E7AD	E800 F0 24	BEQ \$E826
E796 C8	INY	E802 20 65 E9	JSR \$E965
E797 20 B3 E8	JSR \$E8B3	E805 A4 D5	LDY \$D5
E79A 84 D3	STY \$D3	E807 20 24 EA	JSR \$EA24
E79C 88	DEY	E80A 88	DEY
E79D C4 D5	CPY \$D5	E80B B1 D1	LDA (\$D1),Y
E79F 90 09	BCC \$E7AA	E80D C8	INY
E7A1 C6 D6	DEC \$D6	E80E 91 D1	STA (\$D1),Y
E7A3 20 7C E8	JSR \$E87C	E810 88	DEY
E7A6 A0 00	LDY #\$00	E811 B1 F3	LDA (\$F3),Y
E7A8 84 D3	STY \$D3	E813 C8	INY
E7AA 4C A8 E6	JMP \$E6AB	E814 91 F3	STA (\$F3),Y
E7AD C9 11	CMP #\$11	E816 88	DEY
E7AF D0 1D	BNE \$E7CE	E817 C4 D3	CPY \$D3
E7B1 18	CLC	E819 D0 EF	BNE \$EB0A
E7B2 98	TYA	E81B A9 20	LDA #\$20
E7B3 69 28	ADC #\$28	E81D 91 D1	STA (\$D1),Y
E7B5 A8	TAY	E81F AD B6 02	LDA \$0286
E7B6 E6 D6	INC \$D6	E822 91 F3	STA (\$F3),Y
E7B8 C5 D5	CMP \$D5	E824 E6 D8	INC \$D8
E7BA 90 EC	BCC \$E7AB	E826 4C A8 E6	JMP \$E6AB
E7BC F0 EA	BEQ \$E7AB	E829 A6 D8	LDX \$D8
E7BE C6 D6	DEC \$D6	E82B F0 05	BEQ \$E832
E7C0 E9 28	SBC #\$28	E82D 09 40	DRA #\$40
E7C2 90 04	BCC \$E7CB	E82F 4C 97 E6	JMP \$E697
E7C4 85 D3	STA \$D3	E832 C9 11	CMP #\$11
E7C6 D0 F8	BNE \$E7C0	E834 D0 16	BNE \$EB4C
E7C8 20 7C E8	JSR \$E87C	E836 A6 D6	LDX \$D6
E7CB 4C A8 E6	JMP \$E6AB	E838 F0 37	BEQ \$E871
E7CE 20 CB E8	JSR \$E8CB	E83A C6 D6	DEC \$D6
E7D1 4C 44 EC	JMP \$EC44	E83C A5 D3	LDA \$D3
E7D4 29 7F	AND #\$7F	E83E 38	SEC
E7D6 C9 7F	CMP #\$7F	E83F E9 28	SBC #\$28
E7D8 D0 02	BNE \$E7DC	E841 90 04	BCC \$E847
E7DA A9 5E	LDA #\$5E	E843 85 D3	STA \$D3
E7DC C9 20	CMP #\$20	E845 10 2A	BPL \$E871
E7DE 90 03	BCC \$E7E3	E847 20 6C E5	JSR \$E56C
E7E0 4C 91 E6	JMP \$E691	E84A D0 25	BNE \$E871
E7E3 C9 0D	CMP #\$0D	E84C C9 12	CMP #\$12
E7E5 D0 03	BNE \$E7EA	E84E D0 04	BNE \$EB54
E7E7 4C 91 EB	JMP \$EB91	E850 A9 00	LDA #\$00

E852 85 C7	STA \$C7	E8AA 69 28	ADC #\$28
E854 C9 1D	CMP #\$1D	E8AC CA	DEX
E856 D0 12	BNE \$EB6A	E8AD D0 F6	BNE \$E8A5
E858 98	TYA	E8AF 60	RTS
E859 F0 09	BEQ \$EB64	E8B0 C6 D6	DEC \$D6
E85B 20 A1 E8	JSR \$EBA1	E8B2 60	RTS
E85E 88	DEY		
E85F 84 D3	STY \$D3		
E861 4C A8 E6	JMP \$E6A8	<b>E8B3; Check line increment</b>	
E864 20 01 E7	JSR \$E701	E8B3 A2 02	LDX #\$02
E867 4C A8 E6	JMP \$E6A8	E8B5 A9 27	LDA #\$27
E86A C9 13	CMP #\$13	E8B7 C5 D3	CMP \$D3
E86C D0 06	BNE \$E874	E8B9 F0 07	BEQ \$EBC2
E86E 20 44 E5	JSR \$E544	E8BB 18	CLC
E871 4C A8 E6	JMP \$E6A8	E8BC 69 28	ADC #\$28
E874 09 80	DRA #\$80	E8BE CA	DEX
E876 20 CB E8	JSR \$E8CB	E8BF D0 F6	BNE \$E8B7
E879 4C 4F EC	JMP \$ED4F	E8C1 60	RTS
		E8C2 A6 D6	LDX \$D6
<b>E87C; Go to next line</b>		E8C4 E0 19	CPX #\$19
E87C 46 C9	LSR \$C9	E8C6 F0 02	BEQ \$E8CA
E87E A6 D6	LDX \$D6	E8CA 60	INC \$D6
E880 E8	INX		RTS
E881 E0 19	CPX #\$19	<b>E8CB; Set colour code</b>	
E883 D0 03	BNE \$E888	E8CB A2 0F	LDX #\$0F
E885 20 EA E8	JSR \$E8EA	E8CD DD DA EB	CMP \$E8DA,X
E888 B5 D9	LDA \$D9,X	E8D0 F0 04	BEQ \$E8D6
E88A 10 F4	BPL \$E8B0	E8D2 CA	DEX
E88C B6 D6	STX \$D6	E8D3 10 FB	BPL \$E8CD
E88E 4C 6C E5	JMP \$E56C	E8D5 60	RTS
		E8D6 8E B6 02	STX \$0286
<b>E891; Perform &lt;return&gt;</b>		E8D9 60	RTS
E891 A2 00	LDX #\$00	<b>E8DA; Colour code table</b>	
E893 B6 D8	STX \$D8	E8DA 90 05	BCC \$E8E1
E895 B6 C7	STX \$C7	E8DC 1C	???
E897 B6 D4	STX \$D4	E8DD 9F	???
E899 B6 D3	STX \$D3	E8DE 9C	???
E89B 20 7C E8	JSR \$E87C	E8DF 1E 1F 9E	ASL \$9E1F,X
E89E 4C A8 E6	JMP \$E6A8	E8E2 81 95	STA (\$95,X)
		E8E4 96 97	STX \$97,Y
<b>E8A1; Check line decrement</b>		E8E6 98	TYA
E8A1 A2 02	LDX #\$02	E8E7 99 9A 9B	STA \$9B9A,Y
E8A3 A9 00	LDA #\$00		
E8A5 C5 D3	CMP \$D3		
E8A7 F0 07	BEQ \$E8B0		
E8A9 18	CLC	<b>E8EA; Scroll screen</b>	

E8EA A5 AC	LDA \$AC	E951 88	DEY
E8EC 48	PHA	E952 D0 F9	BNE \$E94D
E8ED A5 AD	LDA \$AD	E954 84 C6	STY \$C6
E8EF 48	PHA	E956 A6 D6	LDX \$D6
E8F0 A5 AE	LDA \$AE	E958 68	PLA
E8F2 48	PHA	E959 85 AF	STA \$AF
E8F3 A5 AF	LDA \$AF	E95B 68	PLA
E8F5 48	PHA	E95C 85 AE	STA \$AE
E8F6 A2 FF	LDX #\$FF	E95E 68	PLA
E8F8 C6 D6	DEC \$D6	E95F 85 AD	STA \$AD
E8FA C6 C9	DEC \$C9	E961 68	PLA
E8FC CE A5 02	DEC \$02A5	E962 85 AC	STA \$AC
E8FF EB	INX	E964 60	RTS
E900 20 F0 E9	JSR \$E9F0		
E903 E0 18	CPX #\$18		
E905 B0 0C	BCS \$E913		
E907 BD F1 EC	LDA \$ECF1,X	E965; Open space on screen	
E90A 85 AC	STA \$AC	E965 A6 D6	LDX \$D6
E90C B5 DA	LDA \$DA,X	E967 E8	INX
E90E 20 C8 E9	JSR \$E9C8	E968 B5 D9	LDA \$D9,X
E911 30 EC	BMI \$EBFF	E96A 10 FB	BPL \$E967
E913 20 FF E9	JSR \$E9FF	E96C BE A5 02	STX \$02A5
E916 A2 00	LDX #\$00	E96F E0 18	CPX #\$18
E918 B5 D9	LDA \$D9,X	E971 F0 0E	BEQ \$E981
E91A 29 7F	AND #\$7F	E973 90 0C	BCC \$E981
E91C B4 DA	LDY \$DA,X	E975 20 EA E8	JSR \$E8EA
E91E 10 02	BPL \$E922	E978 AE A5 02	LDX \$02A5
E920 09 B0	ORA #\$B0	E97B CA	DEX
E922 95 D9	STA \$D9,X	E97C C6 D6	DEC \$D6
E924 EB	INX	E97E 4C DA E6	JMP \$E6DA
E925 E0 18	CPX #\$18	E981 A5 AC	LDA \$AC
E927 D0 EF	BNE \$E918	E983 48	PHA
E929 A5 F1	LDA \$F1	E984 A5 AD	LDA \$AD
E92B 09 B0	ORA #\$B0	E986 48	PHA
E92D 85 F1	STA \$F1	E987 A5 AE	LDA \$AE
E92F A5 D9	LDA \$D9	E989 48	PHA
E931 10 C3	BPL \$E8F6	E98A A5 AF	LDA \$AF
E933 E6 D6	INC \$D6	E98C 48	PHA
E935 EE A5 02	INC \$02A5	E98D A2 19	LDX #\$19
E938 A9 7F	LDA #\$7F	E98F CA	DEX
E93A 8D 00 DC	STA \$DC00	E990 20 F0 E9	JSR \$E9F0
E93D AD 01 DC	LDA \$DC01	E993 EC A5 02	CPX \$02A5
E940 C9 FB	CMP #\$FB	E996 90 0E	BCC \$E9A6
E942 08	PHP	E998 F0 0C	BEQ \$E9A6
E943 A9 7F	LDA #\$7F	E99A BD EF EC	LDA \$ECEF,X
E945 8D 00 DC	STA \$DC00	E99D 85 AC	STA \$AC
E948 28	PLP	E99F B5 D8	LDA \$DB,X
E949 D0 0B	BNE \$E956	E9A1 20 C8 E9	JSR \$E9C8
E94B A0 00	LDY #\$00	E9A4 30 E9	BMI \$E98F
E94D EA	NOP	E9A6 20 FF E9	JSR \$E9FF
E94E CA	DEX	E9A9 A2 17	LDX #\$17
E94F D0 FC	BNE \$E94D	E9AB EC A5 02	CPX \$02A5

E9AE 90 0F	BCC \$E9BF	E9FE 60	RTS
E9B0 B5 DA	LDA \$DA,X	E9FF A0 27	LDY #\$27
E9B2 29 7F	AND #\$7F	EA01 20 F0 E9	JSR \$E9F0
E9B4 B4 D9	LDY \$D9,X	EA04 20 24 EA	JSR \$EA24
E9B6 10 02	BPL \$E9BA	EA07 A9 20	LDA #\$20
E9BB 09 80	ORA #\$80	EA09 91 D1	STA (\$D1),Y
E9BA 95 DA	STA \$DA,X	EA0B 20 DA E4	JSR \$E4DA
E9BC CA	DEX	EA0E EA	NOP
E9BD D0 EC	BNE \$E9AB	EA0F BB	DEY
E9BF AE A5 02	LDX \$02A5	EA10 10 F5	BPL \$EA07
E9C2 20 DA E6	JSR \$E6DA	EA12 60	RTS
E9C5 4C 5B E9	JMP \$E958	EA13 A8	TAY
		EA14 A9 02	LDA #\$02
		EA16 85 CD	STA \$CD
<b>E9C8; Move a screen line</b>		EA18 20 24 EA	JSR \$EA24
		EA1B 98	TYA
E9C8 29 03	AND #\$03	EA1C A4 D3	LDY \$D3
E9CA 0D 88 02	ORA \$0288	EA1E 91 D1	STA (\$D1),Y
E9CD B5 AD	STA \$AD	EA20 8A	TXA
E9CF 20 E0 E9	JSR \$E9E0	EA21 91 F3	STA (\$F3),Y
E9D2 A0 27	LDY #\$27	EA23 60	RTS
E9D4 B1 AC	LDA (\$AC),Y	EA24 A5 D1	LDA \$D1
E9D6 91 D1	STA (\$D1),Y	EA26 85 F3	STA \$F3
E9D8 B1 AE	LDA (\$AE),Y	EA28 A5 D2	LDA \$D2
E9DA 91 F3	STA (\$F3),Y	EA2A 29 03	AND #\$03
E9DC 88	DEY	EA2C 09 D8	ORA #\$D8
E9DD 10 F5	BPL \$E9D4	EA2E 85 F4	STA \$F4
E9DF 60	RTS	EA30 60	RTS
		EA31 20 EA FF	JSR \$FFEA
		EA34 A5 CC	LDA \$CC
<b>E9E0; Synchronize colour transfer</b>		EA36 D0 29	BNE \$EA61
		EA38 C6 CD	DEC \$CD
		EA3A D0 25	BNE \$EA61
		EA3C A9 14	LDA #\$14
E9E0 20 24 EA	JSR \$EA24	EA3E B5 CD	STA \$CD
E9E3 A5 AC	LDA \$AC	EA40 A4 D3	LDY \$D3
E9E5 B5 AE	STA \$AE	EA42 46 CF	LSR \$CF
E9E7 A5 AD	LDA \$AD	EA44 AE 87 02	LDX \$0287
E9E9 29 03	AND #\$03	EA47 B1 D1	LDA (\$D1),Y
E9EB 09 D8	ORA #\$D8	EA49 B0 11	BCS \$EA5C
E9ED 85 AF	STA \$AF	EA4B E6 CF	INC \$CF
E9EF 60	RTS	EA4D 85 CE	STA \$CE
		EA4F 20 24 EA	JSR \$EA24
		EA52 B1 F3	LDA (\$F3),Y
<b>E9F0; Interrupt - clock etc.</b>		EA54 8D 87 02	STA \$0287
E9F0 BD F0 EC	LDA \$ECF0,X	EA57 AE 86 02	LDX \$0286
E9F3 85 D1	STA \$D1	EA5A A5 CE	LDA \$CE
E9F5 B5 D9	LDA \$D9,X	EA5C 49 B0	EOR #\$B0
E9F7 29 03	AND #\$03	EA5E 20 1C EA	JSR \$EA1C
E9F9 0D 88 02	ORA \$0288	EA61 A5 01	LDA \$01
E9FC 85 D2	STA \$D2	EA63 29 10	AND #\$10
		EA65 F0 0A	BEQ \$EA71

EA67 A0 00	LDY #\$00	EAC7 10 02	BPL \$EACB
EA69 84 C0	STY \$C0	EAC9 84 CB	STY \$CB
EA6B A5 01	LDA \$01	EACB 68	PLA
EA6D 09 20	ORA #\$20	EACC C8	INY
EA6F D0 08	BNE \$EA79	EACD C0 41	CPY #\$41
EA71 A5 C0	LDA \$C0	EACF B0 0B	BCS \$EADC
EA73 D0 06	BNE \$EA7B	EAD1 CA	DEX
EA75 A5 01	LDA \$01	EAD2 D0 DF	BNE \$EAB3
EA77 29 1F	AND #\$1F	EAD4 38	SEC
EA79 85 01	STA \$01	EAD5 68	PLA
EA7B 20 87 EA	JSR \$EA87	EAD6 2A	ROL
EA7E AD 0D DC	LDA \$DC00	EAD7 8D 00 DC	STA \$DC00
EA81 68	PLA	EADA D0 CC	BNE \$EAAB
EA82 A8	TAY	EADC 68	PLA
EA83 68	PLA	EADD 6C BF 02	JMP (\$02BF)
EA84 AA	TAX	EAE0 A4 CB	LDY \$CB
EA85 68	PLA	EAE2 B1 F5	LDA (\$F5), Y
EA86 40	RTI	EAE4 AA	TAX
		EAE5 C4 C5	CPY \$C5
		EAE7 F0 07	BEQ \$EAFO
		EAE9 A0 10	LDY #\$10
		EAEB BC BC 02	STY \$02BC

**EA87; Read keyboard**

EA87 A9 00	LDA #\$00	EAEE D0 36	BNE \$EB26
EA89 8D BD 02	STA \$02BD	EAFO 29 7F	AND #\$7F
EA8C A0 40	LDY #\$40	EAF2 2C 8A 02	BIT \$028A
EA8E 84 CB	STY \$CB	EAF5 30 16	BMI \$EBOD
EA90 BD 00 DC	STA \$DC00	EAF7 70 49	BVS \$EB42
EA93 AE 01 DC	LDX \$DC01	EAF9 C9 7F	CMP #\$7F
EA96 E0 FF	CPX #\$FF	EAFB F0 29	BEQ \$EB26
EA98 F0 61	BEQ \$EAFB	EAFD C9 14	CMP #\$14
EA9A A8	TAY	EAFF F0 0C	BEQ \$EBOD
EA9B A9 81	LDA #\$B1	EB01 C9 20	CMP #\$20
EA9D 85 F5	STA \$F5	EB03 F0 0B	BEQ \$EBOD
EA9F A9 EB	LDA #\$EB	EB05 C9 1D	CMP #\$1D
EAA1 85 F6	STA \$F6	EB07 F0 04	BEQ \$EBOD
EAA3 A9 FE	LDA #\$FE	EB09 C9 11	CMP #\$11
EAA5 BD 00 DC	STA \$DC00	EB0B D0 35	BNE \$EB42
EAA8 A2 08	LDX #\$0B	EB0D AC BC 02	LDY \$02BC
EAAA 48	PHA	EB10 F0 05	BEQ \$EB17
Eaab AD 01 DC	LDA \$DC01	EB12 CE 8C 02	DEC \$02BC
EAAE CD 01 DC	CMP \$DC01	EB15 D0 2B	BNE \$EB42
EAB1 D0 F8	BNE \$EAAB	EB17 CE 8B 02	DEC \$02BB
EAB3 4A	LSR	EB1A D0 26	BNE \$EB42
EAB4 B0 16	BCS \$EACC	EB1C A0 04	LDY #\$04
EAB6 48	PHA	EB1E BC BB 02	STY \$02BB
EAB7 B1 F5	LDA (\$F5), Y	EB21 A4 C6	LDY \$C6
EAB9 C9 05	CMP #\$05	EB23 88	DEY
EABB B0 0C	BCS \$EAC9	EB24 10 1C	BPL \$EB42
EABD C9 03	CMP #\$03	EB26 A4 CB	LDY \$CB
EABF F0 08	BEQ \$EAC9	EB28 84 C5	STY \$C5
EAC1 0D BD 02	ORA \$02BD	EB2A AC BD 02	LDY \$02BD
EAC4 8D BD 02	STA \$02BD	EB2D BC BE 02	STY \$02BE

EB30 E0 FF	CPX #\$FF	EB8B 41 34	EOR (\$34,X)
EB32 F0 0E	BEQ \$EB42	EB8D 5A	???
EB34 8A	TXA	EB8E 53	???
EB35 A6 C6	LDX \$C6	EB8F 45 01	EOR \$01
EB37 EC 89 02	CPX \$0289	EB91 35 52	AND \$52,X
EB3A B0 06	BCS \$EB42	EB93 44	???
EB3C 9D 77 02	STA \$0277,X	EB94 36 43	ROL \$43,X
EB3F E8	INX	EB96 46 54	LSR \$54
EB40 86 C6	STX \$C6	EB98 58	CLI
EB42 A9 7F	LDA #\$7F	EB99 37	???
EB44 BD 00 DC	STA \$DC00	EB9A 59 47 38	EOR \$3847,Y
EB47 60	RTS	EB9D 42	???
EB48 AD BD 02	LDA \$02BD	EB9E 48	PHA
EB4B C9 03	CMP #\$03	EB9F 55 56	EOR \$56,X
EB4D D0 15	BNE \$EB64	EBA1 39 49 4A	AND \$4A49,Y
EB4F CD 8E 02	CMP \$028E	EBA4 30 4D	BMI \$EBF3
EB52 F0 EE	BEQ \$EB42	EBA6 4B	???
EB54 AD 91 02	LDA \$0291	EBA7 4F	???
EB57 30 1D	BMI \$EB76	EBA8 4E 2B 50	LSR \$502B
EB59 AD 18 D0	LDA \$D01B	EBA8 4C 2D 2E	JMP \$2E2D
EB5C 49 02	EOR #\$02	EBAE 3A	???
EB5E BD 18 D0	STA \$D01B	EBAF 40	RTI
EB61 4C 76 EB	JMP \$EB76	EBB0 2C 5C 2A	BIT \$2A5C
EB64 0A	ASL	EBB3 3B	???
EB65 C9 08	CMP #\$08	EBB4 13	???
EB67 90 02	BCC \$EB6B	EBB5 01 3D	ORA (\$3D,X)
EB69 A9 06	LDA #\$06	EBB7 5E 2F 31	LSR \$312F,X
EB6B AA	TAX	EBBA 5F	???
EB6C BD 79 EB	LDA \$EB79,X	E BBB 04	???
EB6F 85 F5	STA \$F5	E BBC 32	???
EB71 BD 7A EB	LDA \$EB7A,X	E BBD 20 02 51	JSR \$5102
EB74 85 F6	STA \$F6	E BC0 03	???
EB76 4C E0 EA	JMP \$EAEO	E BC1 FF	???

#### EB79; Keyboard select vectors

EB79 81 EB	STA (\$EB,X)
EB7B C2	???
EB7C EB	???
EB7D 03	???
EB7E EC 78 EC	CPX \$EC78

#### EB81; Keyboard 1 - unshifted

EB81 14	???
EB82 0D 1D 88	ORA \$881D
EB85 85 86	STA \$86
EB87 87	???
EB88 11 33	ORA (\$33),Y
EB8A 57	???

#### EBC2; Keyboard 2 - shifted

EBC2 94 8D	STY \$8D,X
EBC4 9D 8C B9	STA \$898C,X
EBC7 8A	TXA
EBC8 8B	???
EBC9 91 23	STA (\$23),Y
EBCB D7	???
EBC C1 24	CMP (\$24,X)
EBC E DA	???
EBC F D3	???
EBD0 C5 01	CMP \$01
EBD2 C5 D2	AND \$D2
EBD4 C4 26	CPY \$26
EBD6 C3	???
EBD7 C6 D4	DEC \$D4
EBD9 D8	CLD

EBDA 27	???	EC2F 3E 5B A4	RDL \$A45B,X
EBDB D9 C7 28	CMP \$28C7,Y	EC32 3C	???
EBDE C2	???	EC33 A8	TAY
EBDF C8	INY	EC34 DF	???
EBE0 D5 D6	CMP \$D6,X	EC35 5D 93 01	EDR \$0193,X
EBE2 29 C9	AND #\$C9	EC38 3D DE 3F	AND \$3FDE,X
EBE4 CA	DEX	EC3B B1 5F	STA (\$5F,X)
EBE5 30 CD	BMI \$EBB4	EC3D 04	???
EBE7 CB	???	EC3E 95 A0	STA \$A0,X
EBE8 CF	???	EC40 02	???
EBE9 CE DB D0	DEC \$D0DB	EC41 AB	???
EBC0 CC DD 3E	CPY \$3EDD	EC42 B3	???
EBCF 5B	???	EC43 FF	???
EBF0 BA	TSX		
EBF1 3C	???		
EBF2 A9 C0	LDA #\$C0	EC44; Graphics/text control	
EBF4 5D 93 01	EDR \$0193,X	EC44 C9 0E	CMP #\$0E
EBF7 3D DE 3F	AND \$3FDE,X	EC46 D0 07	BNE \$EC4F
EBFA 21 5F	AND (\$5F,X)	EC48 AD 18 D0	LDA \$D018
EBFC 04	???	EC4B 09 02	ORA #\$02
EBFD 22	???	EC4D D0 09	BNE \$EC5B
EBFE A0 02	LDY #\$02		
EC00 D1 B3	CMP (\$B3),Y		
EC02 FF	???		

#### EC4F; Set graphics/text mode

EC03; Keyboard 3 - 'comm'			
EC03 94 8D	STY \$8D,X	EC4F C9 8E	CMP #\$8E
EC05 9D 8C B9	STA \$B98C,X	EC51 D0 0B	BNE \$EC5E
EC08 8A	TXA	EC53 AD 18 D0	LDA \$D018
EC09 BB	???	EC56 29 FD	AND #\$FD
EC0A 91 96	STA (\$96),Y	EC58 8D 18 D0	STA \$D018
EC0C B3	???	EC5B 4C A8 E6	JMP \$E6AB
EC0D B0 97	BCS \$EBA6	EC5E C9 08	CMP #\$08
EC0F AD AE B1	LDA \$B1AE	EC60 D0 07	BNE \$EC69
EC12 01 98	ORA (\$98,X)	EC62 A9 80	LDA #\$80
EC14 B2	???	EC64 0D 91 02	ORA \$0291
EC15 AC 99 BC	LDY \$BC99	EC67 30 09	BMI \$EC72
EC18 BB	???	EC69 C9 09	CMP #\$09
EC19 A3	???	EC6B D0 EE	BNE \$EC5B
EC1A BD 9A B7	LDA \$B79A,X	EC6D A9 7F	LDA #\$7F
EC1D A5 9B	LDA \$9B	EC6F 2D 91 02	AND \$0291
EC1F BF	???	EC72 8D 91 02	STA \$0291
EC20 B4 BB	LDY \$BB,X	EC75 4C A8 E6	JMP \$E6AB
EC22 BE 29 A2	LDX \$A229,Y		
EC25 B5 30	LDA \$30,X		
EC27 A7	???		
EC28 A1 B9	LDA (\$B9,X)	EC78; Keyboard 4	
EC2A AA	TAX	EC78 FF	???
EC2B A6 AF	LDX \$AF	EC79 FF	???
EC2D B6 DC	LDX \$DC,Y	EC7A FF	???

EC4F C9 8E	CMP #\$8E
EC51 D0 0B	BNE \$EC5E
EC53 AD 18 D0	LDA \$D018
EC56 29 FD	AND #\$FD
EC58 8D 18 D0	STA \$D018
EC5B 4C A8 E6	JMP \$E6AB
EC5E C9 08	CMP #\$08
EC60 D0 07	BNE \$EC69
EC62 A9 80	LDA #\$80
EC64 0D 91 02	ORA \$0291
EC67 30 09	BMI \$EC72
EC69 C9 09	CMP #\$09
EC6B D0 EE	BNE \$EC5B
EC6D A9 7F	LDA #\$7F
EC6F 2D 91 02	AND \$0291
EC72 8D 91 02	STA \$0291
EC75 4C A8 E6	JMP \$E6AB

#### EC78; Keyboard 4

EC78 FF	???
EC79 FF	???
EC7A FF	???
EC7B FF	???
EC7C FF	???

EC7D FF	???	ECC0 00	BRK
EC7E FF	???	ECC1 00	BRK
EC7F FF	???	ECC2 00	BRK
EC80 1C	???	ECC3 00	BRK
EC81 17	???	ECC4 00	BRK
EC82 01 9F	ORA (\$9F,X)	ECC5 00	BRK
EC84 1A	???	ECC6 00	BRK
EC85 13	???	ECC7 00	BRK
EC86 05 FF	ORA \$FF	ECC8 00	BRK
EC88 9C	???	ECC9 00	BRK
ECB9 12	???	ECCA 9B	???
EC8A 04	???	ECCB 37	???
EC8B 1E 03 06	ASL \$0603,X	ECCC 00	BRK
EC8E 14	???	ECCD 00	BRK
EC8F 18	CLC	ECCE 00	BRK
EC90 1F	???	ECCF 08	PHP
EC91 19 07 9E	ORA \$9E07,Y	ECD0 00	BRK
EC94 02	???	ECD1 14	???
EC95 08	PHP	ECD2 0F	???
EC96 15 16	ORA \$16,X	ECD3 00	BRK
EC98 12	???	ECD4 00	BRK
EC99 09 0A	ORA #\$0A	ECD5 00	BRK
EC9B 92	???	ECD6 00	BRK
EC9C 0D 0B 0F	ORA \$0F0B	ECD7 00	BRK
EC9F 0E FF 10	ASL \$10FF	ECD8 00	BRK
ECA2 0C	???	ECD9 0E 06 01	ASL \$0106
ECA3 FF	???	ECDC 02	???
ECA4 FF	???	ECDD 03	???
ECA5 1B	???	ECDE 04	???
ECA6 00	BRK	ECDF 00	BRK
ECA7 FF	???	ECE0 01 02	ORA (\$02,X)
ECA8 1C	???	ECE2 03	???
ECA9 FF	???	ECE3 04	???
ECAA 1D FF FF	ORA \$FFFF,X	ECE4 05 06	ORA \$06
ECAD 1F	???	ECE6 07	???
ECAE 1E FF 90	ASL \$90FF,X		
ECB1 06 FF	ASL \$FF		
ECB3 05 FF	ORA \$FF	ECE7; Shift/run equivalent	
ECB5 FF	???		
ECB6 11 FF	ORA (\$FF),Y	ECE7 4C 4F 41	JMP \$414F
ECB8 FF	???	ECEA 44	???
<b>ECB9; Video chip setup</b>		ECEB 0D 52 55	ORA \$5552
ECB9 00	BRK	ECEE 4E 0D 00	LSR \$000D
ECBA 00	BRK	ECF1 2B	PLP
ECBB 00	BRK	ECF2 50 78	BVC \$ED6C
ECBC 00	BRK	ECF4 A0 C8	LDY #\$C8
ECBD 00	BRK	ECF6 F0 18	BEQ \$ED10
ECBE 00	BRK	ECF8 40	RTI
ECBF 00	BRK		
<b>ECF9; Screen in address low</b>			

ECF9 68	PLA	ED4C 24 A3	BIT \$A3
ECFA 90 B8	BCC \$ECB4	ED4E 10 0A	BPL \$ED5A
ECFC E0 08	CPX #\$08	ED50 20 A9 EE	JSR \$EEA9
ECFE 30 58	BMI \$ED58	ED53 90 FB	BCC \$ED50
ED00 80	???	ED55 20 A9 EE	JSR \$EEA9
ED01 A8	TAY	ED58 B0 FB	BCS \$ED55
ED02 D0 F8	BNE \$ECFC	ED5A 20 A9 EE	JSR \$EEA9
ED04 20 48 70	JSR \$7048	ED5D 90 FB	BCC \$ED5A
ED07 98	TYA	ED5F 20 BE EE	JSR \$EE8E
ED08 C0 09	CPY #\$09	ED62 A9 08	LDA ##\$08
ED0A 40	RTI	ED64 85 A5	STA \$A5
		ED66 AD 00 DD	LDA \$DD00
		ED69 CD 00 DD	CMP \$DD00
<b>EDOB; Send 'talk'</b>		ED6C D0 F8	BNE \$ED66
		ED6E 0A	ASL
EDOB 2C 09 20	BIT \$2009	ED6F 90 3F	BCC \$EDB0
EDOE 20 A4 F0	JSR \$FOA4	ED71 66 95	ROR \$95
		ED73 B0 05	BCS \$ED7A
<b>ED11; Send 'listen'</b>		ED75 20 A0 EE	JSR \$EEA0
		ED78 D0 03	BNE \$ED7D
ED11 48	PHA	ED7A 20 97 EE	JSR \$EE97
ED12 24 94	BIT \$94	ED7D 20 85 EE	JSR \$EE85
ED14 10 0A	BPL \$ED20	ED80 EA	NOP
ED16 38	SEC	ED81 EA	NOP
ED17 66 A3	ROR \$A3	ED82 EA	NOP
ED19 20 40 ED	JSR \$ED40	ED83 EA	NOP
ED1C 46 94	LSR \$94	ED84 AD 00 DD	LDA \$DD00
ED1E 46 A3	LSR \$A3	ED87 29 DF	AND ##\$DF
ED20 68	PLA	ED89 09 10	ORA ##\$10
ED21 85 95	STA \$95	ED8B 8D 00 DD	STA \$DD00
ED23 78	SEI	ED8E C6 A5	DEC \$A5
ED24 20 97 EE	JSR \$EE97	ED90 D0 D4	BNE \$ED66
ED27 C9 3F	CMP #\$3F	ED92 A9 04	LDA ##\$04
ED29 D0 03	BNE \$ED2E	ED94 8D 07 DC	STA \$DC07
ED2B 20 85 EE	JSR \$EEB5	ED97 A9 19	LDA ##\$19
ED2E AD 00 DD	LDA \$DD00	ED99 8D 0F DC	STA \$DC0F
ED31 09 08	ORA ##\$08	ED9C AD 0D DC	LDA \$DC0D
ED33 8D 00 DD	STA \$DD00	ED9F AD 0D DC	LDA \$DC0D
ED36 78	SEI	EDA2 29 02	AND ##\$02
ED37 20 8E EE	JSR \$EE8E	EDA4 D0 0A	BNE \$EDB0
ED3A 20 97 EE	JSR \$EE97	EDA6 20 A9 EE	JSR \$EEA9
ED3D 20 B3 EE	JSR \$EEB3	EDA9 B0 F4	BCS \$ED9F
		EDAB 58	CLI
		EDAC 60	RTS
		EDAD A9 B0	LDA ##\$B0
<b>ED40; Send to serial bus</b>		EDAF 2C A9 03	BIT \$03A9
ED40 78	SEI		
ED41 20 97 EE	JSR \$EE97	<b>EDB2; Serial timeout</b>	
ED44 20 A9 EE	JSR \$EEA9	EDB2 20 1C FE	JSR \$FE1C
ED47 B0 64	BCS \$EDAD	EDB5 58	CLI
ED49 20 85 EE	JSR \$EEB5		

EDB6 1B	CLC	EDEF 7B	SEI
EDB7 90 4A	BCC \$EE03	EDF0 20 BE EE	JSR \$EE8E
EDB9; Send listen SA			
EDB9 85 95	STA \$95	EDF3 AD 00 DD	LDA \$DD00
EDBB 20 36 ED	JSR \$ED36	EDF6 09 08	ORA #\$08
		EDFB 8D 00 DD	STA \$DD00
		EDFD 2C A9 3F	LDA #\$5F
		EE00 20 11 ED	BIT \$3FA9
			JSR \$ED11
EDBE; Clear ATN			
EDBE AD 00 DD	LDA \$DD00	EE03 20 BE ED	JSR \$EDBE
EDC1 29 F7	AND #\$F7	EE06 BA	TXA
EDC3 8D 00 DD	STA \$DD00	EE07 A2 0A	LDX #\$0A
EDC6 60	RTS	EE09 CA	DEX
EDC7; Send talk SA			
EDC7 85 95	STA \$95	EE0A D0 FD	BNE \$EE09
EDC9 20 36 ED	JSR \$ED36	EE0C AA	TAX
		EE0D 20 85 EE	JSR \$EE85
		EE10 4C 97 EE	JMP \$EE97
EE13; Receive from serial bus			
EDCC; Wait for clock			
EDCC 7B	SEI	EE13 7B	SEI
EDCD 20 A0 EE	JSR \$EEA0	EE14 A9 00	LDA #\$00
EDD0 20 BE ED	JSR \$EDBE	EE16 85 A5	STA \$A5
EDD3 20 85 EE	JSR \$EE85	EE18 20 85 EE	JSR \$EE85
EDD6 20 A9 EE	JSR \$EEA9	EE1B 20 A9 EE	JSR \$EEA9
EDD9 30 FB	BMI \$EDD6	EE1E 10 FB	BPL \$EE1B
EDDB 58	CLI	EE20 A9 01	LDA #\$01
EDDC 60	RTS	EE22 8D 07 DC	STA \$DC07
EDDD; Send serial deferred			
EDDD 24 94	BIT \$94	EE25 A9 19	LDA #\$19
EDDF 30 05	BMI \$EDE6	EE27 BD 0F DC	STA \$DC0F
EDE1 38	SEC	EE2A 20 97 EE	JSR \$EE97
EDE2 66 94	ROR \$94	EE2D AD 0D DC	LDA \$DC0D
EDE4 D0 05	BNE \$EDEB	EE30 AD 0D DC	LDA \$DC0D
EDE6 48	PHA	EE33 29 02	AND #\$02
EDE7 20 40 ED	JSR \$ED40	EE35 D0 07	BNE \$EE3E
EDEA 68	PLA	EE37 20 A9 EE	JSR \$EEA9
EDEB 85 95	STA \$95	EE3A 30 F4	BMI \$EE30
EDED 18	CLC	EE3C 10 18	BPL \$EE56
EDEE 60	RTS	EE3E A5 A5	LDA \$A5
EDEF; Send 'untalk'			
		EE40 F0 05	BEQ \$EE47
		EE42 A9 02	LDA #\$02
		EE44 4C B2 ED	JMP \$EDB2
		EE47 20 A0 EE	JSR \$EEA0
		EE4A 20 85 EE	JSR \$EE85
		EE4D A9 40	LDA #\$40
		EE4F 20 1C FE	JSR \$FE1C
		EE52 E6 A5	INC \$A5
		EE54 D0 CA	BNE \$EE20

EE56 A9 08	LDA #\$0B	EEA3 09 20	ORA #\$20
EE58 85 A5	STA \$A5	EEA5 8D 00 DD	STA \$DD00
EE5A AD 00 DD	LDA \$DD00	EEA8 60	RTS
EE5D CD 00 DD	CMP \$DD00		
EE60 D0 F8	BNE \$EE5A		
EE62 0A	ASL	EEA9; Get serial in & clock	
EE63 10 F5	BPL \$EE5A		
EE65 66 A4	ROR \$A4	EEA9 AD 00 DD	LDA \$DD00
EE67 AD 00 DD	LDA \$DD00	EEAC CD 00 DD	CMP \$DD00
EE6A CD 00 DD	CMP \$DD00	EEAF D0 F8	BNE \$EEA9
EE6D D0 F8	BNE \$EE67	EEB1 0A	ASL
EE6F 0A	ASL	EEB2 60	RTS
EE70 30 F5	BMI \$EE67		
EE72 C6 A5	DEC \$A5		
EE74 D0 E4	BNE \$EE5A	EEB3; Delay 1 ms.	
EE76 20 A0 EE	JSR \$EEA0		
EE79 24 90	BIT \$90	EEB3 8A	TXA
EE7B 50 03	BVC \$EE80	EEB4 A2 B8	LDX #\$B8
EE7D 20 06 EE	JSR \$EE06	EEB6 CA	DEX
EE80 A5 A4	LDA \$A4	EEB7 D0 FD	BNE \$EEB6
EE82 58	CLI	EEB9 AA	TAX
EE83 18	CLC	EEBA 60	RTS
EE84 60	RTS		

EE85; Serial clock on

EE85 AD 00 DD	LDA \$DD00
EE88 29 EF	AND #\$EF
EE8A BD 00 DD	STA \$DD00
EE8D 60	RTS

EE8E; Serial clock off

EE8E AD 00 DD	LDA \$DD00
EE91 09 10	ORA #\$10
EE93 BD 00 DD	STA \$DD00
EE96 60	RTS

EE97; Serial output '1'

EE97 AD 00 DD	LDA \$DD00
EE9A 29 DF	AND #\$DF
EE9C BD 00 DD	STA \$DD00
EE9F 60	RTS

EEA0; Serial output '0'

EEA0 AD 00 DD	LDA \$DD00
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EEBB; RS-232 send

EEBB A5 B4	LDA \$B4
EEBD F0 47	BEQ \$EF06
EEBF 30 3F	BMI \$EF00
EEC1 46 B6	LSR \$B6
EEC3 A2 00	LDX #\$00
EEC5 90 01	BCC \$EECB
EEC7 CA	DEX

EEC8 8A	TXA
EEC9 45 BD	EOR \$BD
EECB 85 BD	STA \$BD
EED1 C6 B4	DEC \$B4
EED2 F0 06	BEQ \$EED7
EED1 8A	TXA
EED2 29 04	AND #\$04
EED4 85 B5	STA \$B5

EED6 60	RTS
EED7 A9 20	LDA #\$20
EED9 2C 94 02	BIT \$0294
EEDC F0 14	BEQ \$EEF2
EEDF 30 1C	BMI \$EEFC
EEE0 70 14	BVS \$EEF6
EEE2 A5 BD	LDA \$BD
EEE4 D0 01	BNE \$EEE7
EEE6 CA	DEX
EEE7 C6 B4	DEC \$B4
EEE9 AD 93 02	LDA \$0293

EEEC 10 E3	BPL \$EED1	EF3B 8D 0D DD	STA \$DD0D
EEEE C6 B4	DEC \$B4	EF3E 4D A1 02	EOR \$02A1
EEFO D0 DF	BNE \$EED1	EF41 09 80	ORA #\$80
EEF2 E6 B4	INC \$B4	EF43 8D A1 02	STA \$02A1
EEF4 D0 F0	BNE \$EEE6	EF46 8D 0D DD	STA \$DD0D
EEF6 A5 BD	LDA \$BD	EF49 60	RTS
EEF8 F0 ED	BEQ \$EEE7		
EEFA D0 EA	BNE \$EEE6		
EEFC 70 E9	BVS \$EEE7		
EEFE 50 E6	BVC \$EEE6		
EF00 E6 B4	INC \$B4	EF4A; Compute bit count	
EF02 A2 FF	LDX #\$FF	EF4A A2 09	LDX #\$09
EF04 D0 CB	BNE \$EED1	EF4C A9 20	LDA #\$20
		EF4E 2C 93 02	BIT \$0293
		EF51 F0 01	BEQ \$EF54
		EF53 CA	DEX
		EF54 50 02	BVC \$EF58
		EF56 CA	DEX
		EF58 60	RTS
EF06; Send new RS-232 byte			
EF06 AD 94 02	LDA \$0294		
EF09 4A	LSR		
EF0A 90 07	BCC \$EF13		
EF0C 2C 01 DD	BIT \$DD01		
EF0F 10 1D	BPL \$EF2E	EF59; RS232 receive	
EF11 50 1E	BVC \$EF31	EF59 A6 A9	LDX \$A9
EF13 A9 00	LDA #\$00	EF5B D0 33	BNE \$EF90
EF15 85 BD	STA \$BD	EF5D C6 A8	DEC \$AB
EF17 85 B5	STA \$B5	EF5F F0 36	BEQ \$EF97
EF19 AE 98 02	LDX \$0298	EF61 30 0D	BMI \$EF70
EF1C 86 B4	STX \$B4	EF63 A5 A7	LDA \$A7
EF1E AC 9D 02	LDY \$029D	EF65 45 AB	EOR \$AB
EF21 CC 9E 02	CPY \$029E	EF67 85 AB	STA \$AB
EF24 F0 13	BEQ \$EF39	EF69 46 A7	LSR \$A7
EF26 B1 F9	LDA (\$F9),Y	EF6B 66 AA	ROR \$AA
EF28 85 B6	STA \$B6	EF6D 60	RTS
EF2A EE 9D 02	INC \$029D	EF6E C6 A8	DEC \$AB
EF2D 60	RTS	EF70 A5 A7	LDA \$A7
		EF72 F0 67	BEQ \$EFDB
EF2E; No - DSR error		EF74 AD 93 02	LDA \$0293
EF2E A9 40	LDA #\$40	EF77 0A	ASL
EF30 2C A9 10	BIT \$10A9	EF78 A9 01	LDA #\$01
		EF7A 65 A8	ADC \$AB
		EF7C D0 EF	BNE \$EF6D
EF33; No - CTS error			
EF33 0D 97 02	DRA \$0297	EF7E; Setup to receive	
EF36 8D 97 02	STA \$0297	EF7E A9 90	LDA #\$90
EF39 A9 01	LDA #\$01	EF80 8D 0D DD	STA \$DD0D
EF3B; Disable timer		EF83 0D A1 02	ORA \$02A1
		EF86 8D A1 02	STA \$02A1
		EF89 85 A9	STA \$A9
		EFBB A9 02	LDA #\$02

EF8D 4C 3B EF	JMP \$EF3B
EF90 A5 A7	LDA \$A7
EF92 D0 EA	BNE \$EF7E
EF94 85 A9	STA \$A9
EF96 60	RTS
EF97 AC 9B 02	LDY \$029B
EF9A C8	INY
EF9B CC 9C 02	CPY \$029C
EF9E F0 2A	BEQ \$EFCA
EFA0 8C 9B 02	STY \$029B
EFA3 88	DEY
EFA4 A5 AA	LDA \$AA
EFA6 AE 9B 02	LDX \$029B
EFA9 E0 09	CPX #\$09
EFAB F0 04	BEQ \$EFB1
EFAE 4A	LSR
EFAE E8	INX
EFAF D0 FB	BNE \$EFA9
EFB1 91 F7	STA (\$F7),Y
EFB3 A9 20	LDA #\$20
EFB5 2C 94 02	BIT \$0294
EFB8 F0 B4	BEQ \$EF6E
EFBA 30 B1	BMI \$EF6D
EFBC A5 A7	LDA \$A7
EFBE 45 AB	EOR \$AB
EFC0 F0 03	BEQ \$EFC5
EFC2 70 A9	BVS \$EF6D

**EFC4; Receive parity error**

EFC4 2C 50 A6	BIT \$A650
EFC7 A9 01	LDA #\$01
EFC9 2C A9 04	BIT \$04A9

**EFCC; Receive overflow**

EFCC 2C A9 B0	BIT \$80A9
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**EFCF; Receive break**

EFCF 2C A9 02	BIT \$02A9
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**EFD2; Framing error**

EFD2 D0 97 02	ORA \$0297
EFD5 BD 97 02	STA \$0297
EFD8 4C 7E EF	JMP \$EF7E
EFD8 A5 AA	LDA \$AA

EFDD D0 F1	BNE \$EFDO
EFDF F0 EC	BEQ \$EFCD

**EFE1; Submit to RS232**

EFE1 85 9A	STA \$9A
EFE3 AD 94 02	LDA \$0294
EFE6 4A	LSR
EFE7 90 29	BCC \$F012
EFE9 A9 02	LDA #\$02
EFEB 2C 01 DD	BIT \$DD01
EFEF 10 1D	BPL \$F00D
EFF0 D0 20	BNE \$F012
EFF2 AD A1 02	LDA \$02A1
EFF5 29 02	AND #\$02
EFF7 D0 F9	BNE \$EFF2
EFF9 2C 01 DD	BIT \$DD01
EFFC 70 FB	BVS \$EFF9
EFFE AD 01 DD	LDA \$DD01
F001 09 02	ORA #\$02
F003 BD 01 DD	STA \$DD01
F006 2C 01 DD	BIT \$DD01
F009 70 07	BVS \$F012
F00B 30 F9	BMI \$F006

**F00D; No - DSR error**

F00D A9 40	LDA \$\$40
F00F BD 97 02	STA \$0297
F012 1B	CLC
F013 60	RTS
F014 20 28 F0	JSR \$F028

**F017; Send to RS232 buffer**

F017 AC 9E 02	LDY \$029E
F01A C8	INY
F01B CC 9D 02	CPY \$029D
F01E F0 F4	BEQ \$F014
F020 8C 9E 02	STY \$029E
F023 88	DEY
F024 A5 9E	LDA \$9E
F026 91 F9	STA (\$F9),Y
F028 AD A1 02	LDA \$02A1
F02B 4A	LSR
F02C B0 1E	BCS \$F04C
F02E A9 10	LDA #\$10
F030 BD 0E DD	STA \$DD0E
F033 AD 99 02	LDA \$0299

F036 8D 04 DD	STA \$DD04	F09B 60	RTS
F039 AD 9A 02	LDA \$029A	F09C 09 08	DRA #\$0B
F03C BD 05 DD	STA \$DD05	F09E 8D 97 02	STA \$0297
F03F A9 81	LDA ##\$81	F0A1 A9 00	LDA ##\$00
F041 20 3B EF	JSR \$EF3B	F0A3 60	RTS
F044 20 06 EF	JSR \$EF06		
F047 A9 11	LDA ##\$11		
F049 BD 0E DD	STA \$DD0E	<b>F0A4; Check serial bus idle</b>	
F04C 60	RTS		
<b>F04D; Input from RS232</b>			
F04D 85 99	STA \$99	F0A4 4B	PHA
F04F AD 94 02	LDA \$0294	F0A5 AD A1 02	LDA \$02A1
F052 4A	LSR	F0A8 F0 11	BEQ \$F0BB
F053 90 28	BCC \$F07D	F0AA AD A1 02	LDA \$02A1
F055 29 08	AND #\$0B	F0AD 29 03	AND #\$03
F057 F0 24	BEQ \$F07D	F0AF D0 F9	BNE \$F0AA
F059 A9 02	LDA #\$02	F0B1 A9 10	LDA ##\$10
F05B 2C 01 DD	BIT \$DD01	F0B3 8D 0D DD	STA \$DD0D
F05E 10 AD	BPL \$F00D	F0B6 A9 00	LDA ##\$00
F060 F0 22	BEQ \$F084	F0B8 BD A1 02	STA \$02A1
F062 AD A1 02	LDA \$02A1	F0B8 68	PLA
F065 4A	LSR	F0BC 60	RTS
F066 B0 FA	BCS \$F062		
F068 AD 01 DD	LDA \$DD01	<b>F0BD; Messages</b>	
F06B 29 FD	AND #\$FD	F0BD OD 49 2F	DRA \$2F49
F06D BD 01 DD	STA \$DD01	F0C0 4F	???
F070 AD 01 DD	LDA \$DD01	F0C1 20 45 52	JSR \$5245
F073 29 04	AND #\$04	F0C4 52	???
F075 F0 F9	BEQ \$F070	F0C5 4F	???
F077 A9 90	LDA #\$90	F0C6 52	???
F079 18	CLC	F0C7 20 A3 0D	JSR \$0DA3
F07A 4C 3B EF	JMP \$EF3B	F0CA 53	???
F07D AD A1 02	LDA \$02A1	F0CB 45 41	EOR \$41
F080 29 12	AND #\$12	F0CD 52	???
F082 F0 F3	BEQ \$F077	F0CE 43	???
F084 18	CLC	F0CF 48	PHA
F085 60	RTS	F0D0 49 4E	EOR ##\$4E
<b>F086; Get from RS232</b>			
F086 AD 97 02	LDA \$0297	F0D2 47	???
F089 AC 9C 02	LDY \$029C	F0D3 A0 46	LDY ##\$46
F08C CC 9B 02	CPY \$029B	F0D5 4F	???
F08F F0 0B	BEQ \$F09C	F0D6 52	???
F091 29 F7	AND #\$F7	F0D7 A0 0D	LDY ##\$0D
F093 BD 97 02	STA \$0297	F0D9 50 52	BVC \$F12D
F096 B1 F7	LDA (\$F7),Y	F0DB 45 53	EOR \$53
F098 EE 9C 02	INC \$029C	F0DD 53	???
		F0DE 20 50 4C	JSR \$4C50
		F0E1 41 59	EOR (\$59,X)
		F0E3 20 4F 4E	JSR \$4E4F
		F0E6 20 54 41	JSR \$4154
		F0E9 50 C5	BVC \$F0B0
		F0EB 50 52	BVC \$F13F

FOED 45 53	EOR \$53	F142 A5 C6	LDA \$C6
FOEF 53	???	F144 F0 0F	BEQ \$F155
FOFO 20 52 45	JSR \$4552	F146 78	SEI
FOF3 43	???	F147 4C B4 E5	JMP \$E5B4
FOF4 4F	???	F14A C9 02	CMP #\$02
FOF5 52	???	F14C D0 18	BNE \$F166
FOF6 44	???		
FOF7 20 26 20	JSR \$2026		
FOFA 50 4C	BVC \$F148	F14E; ..from RS232	
FOFC 41 59	EOR (\$59,X)		
FOFE 20 4F 4E	JSR \$4E4F	F14E 84 97	STY \$97
F101 20 54 41	JSR \$4154	F150 20 86 F0	JSR \$F086
F104 50 C5	BVC \$FOCB	F153 A4 97	LDY \$97
F106 0D 4C 4F	ORA \$4F4C	F155 1B	CLC
F107 41 44	EOR (\$44,X)	F156 60	RTS
F10B 49 4E	EOR #\$4E		
F10D C7	???		
F10E 0D 53 41	ORA \$4153	F157; Input	
F111 56 49	LSR \$49,X		
F113 4E 47 A0	LSR \$A047		
F116 0D 56 45	ORA \$4556	F157 A5 99	LDA \$99
F119 52	???	F159 D0 0B	BNE \$F166
F11A 49 46	EOR #\$46	F15B A5 D3	LDA \$D3
F11C 59 49 4E	EOR \$4E49,Y	F15D 85 CA	STA \$CA
F11F C7	???	F15F A5 D6	LDA \$D6
F120 0D 46 4F	ORA \$4F46	F161 85 C9	STA \$C9
F123 55 4E	EOR \$4E,X	F163 4C 32 E6	JMP \$E632
F125 44	???	F166 C9 03	CMP #\$03
F126 A0 0D	LDY #\$0D	F168 D0 09	BNE \$F173
F128 4F	???	F16A 85 D0	STA \$D0
F129 4B	???	F16C A5 D5	LDA \$D5
		F16E 85 C8	STA \$C8
		F170 4C 32 E6	JMP \$E632
F12B; Print if direct		F173 B0 3B	BCS \$F1AD
F12B 24 9D	BIT \$9D	F175 C9 02	CMP #\$02
F12D 10 0D	BPL \$F13C	F177 F0 3F	BEQ \$F1BB
F12F B9 BD F0	LDA \$FOBD,Y	F179 B6 97	STX \$97
F132 08	PHP	F17B 20 99 F1	JSR \$F199
F133 29 7F	AND #\$7F	F17E B0 16	BCS \$F196
F135 20 D2 FF	JSR \$FFD2	F180 48	PHA
F138 C8	INY	F181 20 99 F1	JSR \$F199
F139 28	PLP	F184 B0 0D	BCS \$F193
F13A 10 F3	BPL \$F12F	F186 D0 05	BNE \$F18D
F13C 18	CLC	F188 A9 40	LDA #\$40
F13D 60	RTS	F18A 20 1C FE	JSR \$FE1C
		F18D C6 A6	DEC \$A6
		F18F A6 97	LDX \$97
		F191 68	PLA
		F192 60	RTS
F13E; Get..		F193 AA	TAX
F13E A5 99	LDA \$99	F194 68	PLA
F140 D0 0B	BNE \$F14A	F195 8A	TXA
		F196 A6 97	LDX \$97

F198 60	RTS	F1E2 4B	PHA
		F1E3 90 23	BCC \$F20B
		F1E5 20 0D F8	JSR \$FB0D
		F1E8 D0 0E	BNE \$F1F8
F199; Get..tape/serial/R5232		F1EA 20 64 FB	JSR \$FB64
		F1ED B0 0E	BCS \$F1FD
F199 20 0D F8	JSR \$FB0D	F1EF A9 02	LDA #\$02
F19C D0 OB	BNE \$F1A9	F1F1 A0 00	LDY #\$00
F19E 20 41 F8	JSR \$FB41	F1F3 91 B2	STA (\$B2),Y
F1A1 B0 11	BCS \$F1B4	F1F5 C8	INY
F1A3 A9 00	LDA #\$00	F1F6 B4 A6	STY \$A6
F1A5 B5 A6	STA \$A6	F1F8 A5 9E	LDA \$9E
F1A7 F0 F0	BEQ \$F199	F1FA 91 B2	STA (\$B2),Y
F1A9 B1 B2	LDA (\$B2),Y	F1FC 18	CLC
F1AB 18	CLC	F1FD 68	PLA
F1AC 60	RTS	F1FE A8	TAY
F1AD A5 90	LDA \$90	F1FF 68	PLA
F1AF F0 04	BEQ \$F1B5	F200 AA	TAX
F1B1 A9 0D	LDA #\$0D	F201 A5 9E	LDA \$9E
F1B3 18	CLC	F203 90 02	BCC \$F207
F1B4 60	RTS	F205 A9 00	LDA #\$00
F1B5 4C 13 EE	JMP \$EE13	F207 60	RTS
F1B8 20 4E F1	JSR \$F14E	F208 20 17 F0	JSR \$F017
F1BB B0 F7	BCS \$F1B4	F20B 4C FC F1	JMP \$F1FC
F1BD C9 00	CMP #\$00		
F1BF D0 F2	BNE \$F1B3		
F1C1 AD 97 02	LDA \$0297		
F1C4 29 60	AND #\$60		
F1C6 D0 E9	BNE \$F1B1		
F1C8 F0 EE	BEQ \$F1BB		
F20E; Set input device			
F1CA 48	PHA	F20E 20 0F F3	JSR \$F30F
F1CB A5 9A	LDA \$9A	F211 F0 03	BEQ \$F216
F1CD C9 03	CMP #\$03	F213 4C 01 F7	JMP \$F701
F1CF D0 04	BNE \$F1D5	F216 20 1F F3	JSR \$F31F
F1D1 6B	PLA	F219 A5 BA	LDA \$BA
F1D2 4C 16 E7	JMP \$E716	F21B F0 16	BEQ \$F233
F1D5 90 04	BCC \$F1DB	F21D C9 03	CMP #\$03
F1D7 6B	PLA	F21F F0 12	BEQ \$F233
F1D8 4C DD ED	JMP \$EDDD	F221 B0 14	BCS \$F237
F1DB 4A	LSR	F223 C9 02	CMP #\$02
F1DC 6B	PLA	F225 D0 03	BNE \$F22A
F1DD; ..to tape		F227 4C 4D F0	JMP \$F04D
F1DD 85 9E	STA \$9E	F22A A6 B9	LDX \$B9
F1DF 8A	TXA	F22C E0 60	CPX #\$60
F1E0 4B	PHA	F22E F0 03	BEQ \$F233
F1E1 9B	TYA	F230 4C 0A F7	JMP \$F70A
		F233 B5 99	STA \$99
		F235 18	CLC
		F236 60	RTS
		F237 AA	TAX
		F23B 20 09 ED	JSR \$ED09
		F23B A5 B9	LDA \$B9
		F23D 10 06	BPL \$F245
		F23F 20 CC ED	JSR \$EDCC

F242 4C 48 F2	JMP \$F248	F29F F0 50	BEQ \$F2F1
F245 20 C7 ED	JSR \$EDC7	F2A1 C9 03	CMP #\$03
F248 8A	TXA	F2A3 F0 4C	BEQ \$F2F1
F249 24 90	BIT \$90	F2A5 B0 47	BCS \$F2EE
F24B 10 E6	BPL \$F233	F2A7 C9 02	CMP #\$02
F24D 4C 07 F7	JMP \$F707	F2A9 D0 1D	BNE \$F2CB
		F2AB 68	PLA
		F2AC 20 F2 F2	JSR \$F2F2
<b>F250; Set output device</b>		F2AF 20 83 F4	JSR \$F483
		F2B2 20 27 FE	JSR \$FE27
F250 20 0F F3	JSR \$F30F	F2B5 A5 F8	LDA \$F8
F253 F0 03	BEQ \$F258	F2B7 F0 01	BEQ \$F2BA
F255 4C 01 F7	JMP \$F701	F2B9 C8	INY
F258 20 1F F3	JSR \$F31F	F2BA A5 FA	LDA \$FA
F25B A5 BA	LDA \$BA	F2BC F0 01	BEQ \$F2BF
F25D D0 03	BNE \$F262	F2BE C8	INY
F25F 4C 0D F7	JMP \$F70D	F2BF A9 00	LDA \$\$00
F262 C9 03	CMP #\$03	F2C1 85 F8	STA \$F8
F264 F0 0F	BEQ \$F275	F2C3 85 FA	STA \$FA
F266 B0 11	BCS \$F279	F2C5 4C 7D F4	JMP \$F47D
F268 C9 02	CMP #\$02	F2C8 A5 B9	LDA \$B9
F26A D0 03	BNE \$F26F	F2CA 29 0F	AND #\$0F
F26C 4C E1 EF	JMP \$FEF1	F2CC F0 23	BEQ \$F2F1
F26F A6 B9	LDX \$B9	F2CE 20 D0 F7	JSR \$F7D0
F271 E0 60	CPX \$\$60	F2D1 A9 00	LDA \$\$00
F273 F0 EA	BEQ \$F25F	F2D3 38	SEC
F275 85 9A	STA \$9A	F2D4 20 DD F1	JSR \$F1DD
F277 18	CLC	F2D7 20 64 FB	JSR \$FB64
F278 60	RTS	F2DA 90 04	BCC \$F2E0
F279 AA	TAX	F2DC 68	PLA
F27A 20 0C ED	JSR \$EDOC	F2DD A9 00	LDA \$\$00
F27D A5 B9	LDA \$B9	F2DF 60	RTS
F27F 10 05	BPL \$F286	F2E0 A5 B9	LDA \$B9
F281 20 BE ED	JSR \$EDBE	F2E2 C9 62	CMP \$\$62
F284 D0 03	BNE \$F289	F2E4 D0 0B	BNE \$F2F1
F286 20 B9 ED	JSR \$EDB9	F2E6 A9 05	LDA \$\$05
F289 8A	TXA	F2E8 20 6A F7	JSR \$F76A
F28A 24 90	BIT \$90	F2EB 4C F1 F2	JMP \$F2F1
F28C 10 E7	BPL \$F275	F2EE 20 42 F6	JSR \$F642
F28E 4C 07 F7	JMP \$F707	F2F1 68	PLA
		F2F2 AA	TAX
		F2F3 C6 98	DEC \$98
<b>F291; Close file</b>		F2F5 E4 98	CPX \$98
		F2F7 F0 14	BEQ \$F30D
F291 20 14 F3	JSR \$F314	F2F9 A4 98	LDY \$98
F294 F0 02	BEQ \$F298	F2FB B9 59 02	LDA \$0259,Y
F296 18	CLC	F2FE 9D 59 02	STA \$0259,X
F297 60	RTS	F301 B9 63 02	LDA \$0263,Y
F298 20 1F F3	JSR \$F31F	F304 9D 63 02	STA \$0263,X
F29B 8A	TXA	F307 B9 6D 02	LDA \$026D,Y
F29C 48	PHA	F30A 9D 6D 02	STA \$026D,X
F29D A5 BA	LDA \$BA	F30D 18	CLC

F30E 60	RTS	F34E 4C 0A F7	JMP \$F70A
F30F; Find file		F351 20 0F F3	JSR \$F30F
F30F A9 00	LDA #\$00	F354 D0 03	BNE \$F359
F311 85 90	STA \$90	F356 4C FE F6	JMP \$F6FE
F313 8A	TXA	F359 A6 98	LDX \$98
F314 A6 98	LDX \$98	F35B E0 0A	CPX #\$0A
F316 CA	DEX	F35D 90 03	BCC \$F362
F317 30 15	BMI \$F32E	F35F 4C FB F6	JMP \$F6FB
F319 DD 59 02	CMP \$0259,X	F362 E6 98	INC \$98
F31C D0 FB	BNE \$F316	F364 A5 B8	LDA \$B8
F31E 60	RTS	F366 9D 59 02	STA \$0259,X
F31F; Set file values		F369 A5 B9	LDA \$B9
F31F BD 59 02	LDA \$0259,X	F36B 09 60	ORA #\$60
F322 85 B8	STA \$B8	F36D 85 B9	STA \$B9
F324 BD 63 02	LDA \$0263,X	F36F 9D 6D 02	STA \$026D,X
F327 85 BA	STA \$BA	F372 A5 BA	LDA \$BA
F329 BD 6D 02	LDA \$026D,X	F374 9D 63 02	STA \$0263,X
F32C 85 B9	STA \$B9	F377 F0 5A	BEQ \$F3D3
F32E 60	RTS	F379 C9 03	CMP #\$03
F32F; Abort all files		F37B F0 56	BEQ \$F3D3
F32F A9 00	LDA #\$00	F37D 90 05	BCC \$F384
F331 85 98	STA \$98	F37F 20 D5 F3	JSR \$F3D5
F333; Restore default I/O		F382 90 4F	BCC \$F3D3
F333 A2 03	LDX #\$03	F384 C9 02	CMP #\$02
F335 E4 9A	CPX \$9A	F386 D0 03	BNE \$F38B
F337 B0 03	BCS \$F33C	F388 4C 09 F4	JMP \$F409
F339 20 FE ED	JSR \$EDFE	F38B 20 D0 F7	JSR \$F7D0
F33C E4 99	CPX \$99	F38E B0 03	BCS \$F393
F33E B0 03	BCS \$F343	F390 4C 13 F7	JMP \$F713
F340 20 EF ED	JSR \$EDEF	F393 A5 B9	LDA \$B9
F343 B6 9A	STX \$9A	F395 29 0F	AND #\$0F
F345 A9 00	LDA #\$00	F397 D0 1F	BNE \$F38B
F347 85 99	STA \$99	F399 20 17 F8	JSR \$FB17
F349 60	RTS	F39C B0 36	BCS \$F3D4
F34A; Do open file		F39E 20 AF F5	JSR \$F5AF
F34A A6 B8	LDX \$B8	F3A1 A5 B7	LDA \$B7
F34C D0 03	BNE \$F351	F3A3 F0 0A	BEQ \$F3AF
		F3A5 20 EA F7	JSR \$F7EA
		F3AB 90 18	BCC \$F3C2
		F3AA F0 28	BEQ \$F3D4
		F3AC 4C 04 F7	JMP \$F704
		F3AF 20 2C F7	JSR \$F72C
		F3B2 F0 20	BEQ \$F3D4
		F3B4 90 0C	BCC \$F3C2
		F3B6 B0 F4	BCS \$F3AC
		F3B8 20 38 F8	JSR \$FB38
		F3BB B0 17	BCS \$F3D4
		F3BD A9 04	LDA #\$04
		F3BF 20 6A F7	JSR \$F76A
		F3C2 A9 BF	LDA #\$BF
		F3C4 A4 B9	LDY \$B9
		F3C6 C0 60	CPY #\$60

F3C8 F0 07	BEQ \$F3D1	F423 AD 93 02	LDA \$0293
F3CA A0 00	LDY #\$00	F426 29 0F	AND #\$0F
F3CC A9 02	LDA #\$02	F428 F0 1C	BEQ \$F446
F3CE 91 B2	STA (\$B2),Y	F42A 0A	ASL
F3D0 98	TYA	F42B AA	TAX
F3D1 85 A6	STA \$A6	F42C AD A6 02	LDA \$02A6
F3D3 18	CLC	F42F DO 09	BNE \$F43A
F3D4 60	RTS	F431 BC C1 FE	LDY \$FEC1,X
		F434 BD C0 FE	LDA \$FEC0,X
		F437 4C 40 F4	JMP \$F440
		F43A BC EB E4	LDY \$E4EB,X
		F43D BD EA E4	LDA \$E4EA,X
F3D5 A5 B9	LDA \$B9	F440 8C 96 02	STY \$0296
F3D7 30 FA	BMI \$F3D3	F443 8D 95 02	STA \$0295
F3D9 A4 B7	LDY \$B7	F446 AD 95 02	LDA \$0295
F3DB F0 F6	BEQ \$F3D3	F449 0A	ASL
F3DD A9 00	LDA #\$00	F44A 20 2E FF	JSR \$FF2E
F3DF 85 90	STA \$90	F44D AD 94 02	LDA \$0294
F3E1 A5 BA	LDA \$BA	F450 4A	LSR
F3E3 20 0C ED	JSR \$ED0C	F451 90 09	BCC \$F45C
F3E6 A5 B9	LDA \$B9	F453 AD 01 DD	LDA \$DD01
F3E8 09 F0	ORA #\$F0	F456 0A	ASL
F3EA 20 B9 ED	JSR \$EDB9	F457 B0 03	BCS \$F45C
F3ED A5 90	LDA \$90	F459 20 0D F0	JSR \$F00D
F3EF 10 05	BPL \$F3F6	F45C AD 9B 02	LDA \$029B
F3F1 68	PLA	F45F 8D 9C 02	STA \$029C
F3F2 68	PLA	F462 AD 9E 02	LDA \$029E
F3F3 4C 07 F7	JMP \$F707	F465 8D 9D 02	STA \$029D
F3F6 A5 B7	LDA \$B7	F468 20 27 FE	JSR \$FE27
F3F8 F0 0C	BEQ \$F406	F46B A5 F8	LDA \$F8
F3FA A0 00	LDY #\$00	F46D D0 05	BNE \$F474
F3FC B1 BB	LDA (\$BB),Y	F46F 88	DEY
F3FE 20 DD ED	JSR \$EDDD	F470 B4 F8	STY \$F8
F401 C8	INY	F472 B6 F7	STX \$F7
F402 C4 B7	CPY \$B7	F474 A5 FA	LDA \$FA
F404 D0 F6	BNE \$F3FC	F476 D0 05	BNE \$F47D
F406 4C 54 F6	JMP \$F654	F478 88	DEY
		F479 B4 FA	STY \$FA
		F47B B6 F9	STX \$F9
		F47D 38	SEC
		F47E A9 F0	LDA \$\$FO
F409 20 83 F4	JSR \$F483	F480 4C 2D FE	JMP \$FE2D
F40C 8C 97 02	STY \$0297	F483 A9 7F	LDA #\$7F
F40F C4 B7	CPY \$B7	F485 8D 0D DD	STA \$DD0D
F411 F0 0A	BEQ \$F41D	F488 A9 06	LDA #\$06
F413 B1 BB	LDA (\$BB),Y	F48A 8D 03 DD	STA \$DD03
F415 99 93 02	STA \$0293,Y	F48D 8D 01 DD	STA \$DD01
F418 C8	INY	F490 A9 04	LDA #\$04
F419 C0 04	CPY #\$04	F492 0D 00 DD	ORA \$DD00
F41B D0 F2	BNE \$F40F	F495 8D 00 DD	STA \$DD00
F41D 20 4A EF	JSR \$EF4A	F498 A0 00	LDY #\$00
F420 BE 9B 02	STX \$0298	F49A BC A1 02	STY \$02A1

F49D 60	RTS	F505 A5 90	LDA \$90
		F507 4A	LSR
		F508 4A	LSR
F49E; Load program		F509 B0 EB	BCS \$F4F3
		F50B 8A	TXA
F49E B6 C3	STX \$C3	F50C A4 93	LDY \$93
F4A0 84 C4	STY \$C4	F50E F0 0C	BEQ \$F51C
F4A2 6C 30 03	JMP (\$0330)	F510 A0 00	LDY #\$00
F4A5 85 93	STA \$93	F512 D1 AE	CMP (\$AE), Y
F4A7 A9 00	LDA #\$00	F514 F0 08	BEQ \$F51E
F4A9 85 90	STA \$90	F516 A9 10	LDA #\$10
F4AB A5 BA	LDA \$BA	F518 20 1C FE	JSR \$FE1C
F4AD D0 03	BNE \$F4B2	F51B 2C 91 AE	BIT \$AE91
F4AF 4C 13 F7	JMP \$F713	F51E E6 AE	INC \$AE
F4B2 C9 03	CMP #\$03	F520 D0 02	BNE \$F524
F4B4 F0 F9	BEQ \$F4AF	F522 E6 AF	INC \$AF
F4B6 90 7B	BCC \$F533	F524 24 90	BIT \$90
F4BB A4 B7	LDY \$B7	F526 50 CB	BVC \$F4F3
F4BA D0 03	BNE \$F4BF	F528 20 EF ED	JSR \$EDEF
F4BC 4C 10 F7	JMP \$F710	F52B 20 42 F6	JSR \$F642
F4BF A6 B9	LDX \$B9	F52E 90 79	BCC \$F5A9
F4C1 20 AF F5	JSR \$F5AF	F530 4C 04 F7	JMP \$F704
F4C4 A9 60	LDA #\$60	F533 4A	LSR
F4C6 85 B9	STA \$B9	F534 B0 03	BCS \$F539
F4CB 20 D5 F3	JSR \$F3D5	F536 4C 13 F7	JMP \$F713
F4CB A5 BA	LDA \$BA	F539 20 D0 F7	JSR \$F7D0
F4CD 20 09 ED	JSR \$ED09	F53C B0 03	BCS \$F541
F4D0 A5 B9	LDA \$B9	F53E 4C 13 F7	JMP \$F713
F4D2 20 C7 ED	JSR \$EDC7	F541 20 17 F8	JSR \$F817
F4D5 20 13 EE	JSR \$EE13	F544 B0 68	BCS \$F5AE
F4D8 85 AE	STA \$AE	F546 20 AF F5	JSR \$F5AF
F4DA A5 90	LDA \$90	F549 A5 B7	LDA \$B7
F4DC 4A	LSR	F54B F0 09	BEQ \$F556
F4DD 4A	LSR	F54D 20 EA F7	JSR \$F7EA
F4DE B0 50	BCS \$F530	F550 90 0B	BCC \$F55D
F4E0 20 13 EE	JSR \$EE13	F552 F0 5A	BEQ \$F5AE
F4E3 85 AF	STA \$AF	F554 B0 DA	BCS \$F530
F4E5 BA	TXA	F556 20 2C F7	JSR \$F72C
F4E6 D0 08	BNE \$F4F0	F559 F0 53	BEQ \$F5AE
F4EB A5 C3	LDA \$C3	F55B B0 D3	BCS \$F530
F4EA 85 AE	STA \$AE	F55D A5 90	LDA \$90
F4EC A5 C4	LDA \$C4	F55F 29 10	AND #\$10
F4EE 85 AF	STA \$AF	F561 38	SEC
F4F0 20 D2 F5	JSR \$F5D2	F562 D0 4A	BNE \$F5AE
F4F3 A9 FD	LDA #\$FD	F564 E0 01	CPX #\$01
F4F5 25 90	AND \$90	F566 F0 11	BEQ \$F579
F4F7 85 90	STA \$90	F568 E0 03	CPX #\$03
F4F9 20 E1 FF	JSR \$FFE1	F56A D0 DD	BNE \$F549
F4FC D0 03	BNE \$F501	F56C A0 01	LDY #\$01
F4FE 4C 33 F6	JMP \$F633	F56E B1 B2	LDA (\$B2), Y
F501 20 13 EE	JSR \$EE13	F570 85 C3	STA \$C3
F504 AA	TAX	F572 C8	INY

F573 B1 B2	LDA (\$B2),Y	F5C9 20 D2 FF	JSR \$FFD2
F575 B5 C4	STA \$C4	F5CC C8	INY
F577 B0 04	BCS \$F57D	F5CD C4 B7	CPY \$B7
F579 A5 B9	LDA \$B9	F5CF D0 F6	BNE \$F5C7
F57B D0 EF	BNE \$F56C	F5D1 60	RTS
F57D A0 03	LDY #\$03		
F57F B1 B2	LDA (\$B2),Y		
F581 A0 01	LDY #\$01	F5D2; 'loading/verifying'	
F583 F1 B2	SBC (\$B2),Y		
F585 AA	TAX	F5D2 A0 49	LDY #\$49
F586 A0 04	LDY #\$04	F5D4 A5 93	LDA \$93
F588 B1 B2	LDA (\$B2),Y	F5D6 F0 02	BEQ \$F5DA
F58A A0 02	LDY #\$02	F5D8 A0 59	LDY #\$59
F58C F1 B2	SBC (\$B2),Y	F5DA 4C 2B F1	JMP \$F12B
F58E A8	TAY		
F58F 18	CLC		
F590 8A	TXA	F5DD; Save program	
F591 65 C3	ADC \$C3		
F593 85 AE	STA \$AE	F5DD 86 AE	STX \$AE
F595 98	TYA	F5DF 84 AF	STY \$AF
F596 65 C4	ADC \$C4	F5E1 AA	TAX
F598 85 AF	STA \$AF	F5E2 B5 00	LDA \$00,X
F59A A5 C3	LDA \$C3	F5E4 85 C1	STA \$C1
F59C 85 C1	STA \$C1	F5E6 B5 01	LDA \$01,X
F59E A5 C4	LDA \$C4	F5E8 B5 C2	STA \$C2
F5A0 85 C2	STA \$C2	F5EA 6C 32 03	JMP (\$0332)
F5A2 20 D2 F5	JSR \$F5D2	F5ED A5 BA	LDA \$BA
F5A5 20 4A F8	JSR \$FB4A	F5EF D0 03	BNE \$F5F4
F5A8 24 18	BIT \$18	F5F1 4C 13 F7	JMP \$F713
F5AA A6 AE	LDX \$AE	F5F4 C9 03	CMP #\$03
F5AC A4 AF	LDY \$AF	F5F6 F0 F9	BEQ \$F5F1
F5AE 60	RTS	F5F8 90 5F	BCC \$F659
		F5FA A9 61	LDA #\$61
		F5FC 85 B9	STA \$B9
F5AF; 'searching'		F5FE A4 B7	LDY \$B7
F5AF A5 9D	LDA \$9D	F600 D0 03	BNE \$F605
F5B1 10 1E	BPL \$F5D1	F602 4C 10 F7	JMP \$F710
F5B3 A0 0C	LDY #\$0C	F605 20 D5 F3	JSR \$F3D5
F5B5 20 2F F1	JSR \$F12F	F608 20 8F F6	JSR \$F68F
F5B8 A5 B7	LDA \$B7	F60B A5 BA	LDA \$BA
F5B9 F0 15	BEQ \$F5D1	F60D 20 0C ED	JSR \$EDOC
F5BC A0 17	LDY #\$17	F610 A5 B9	LDA \$B9
F5BE 20 2F F1	JSR \$F12F	F612 20 B9 ED	JSR \$EDB9
		F615 A0 00	LDY #\$00
		F617 20 8E FB	JSR \$FB8E
		F61A A5 AC	LDA \$AC
F5C1; Print filename		F61C 20 DD ED	JSR \$EDDD
F5C1 A4 B7	LDY \$B7	F61F A5 AD	LDA \$AD
F5C3 F0 0C	BEQ \$F5D1	F621 20 DD ED	JSR \$EDDD
F5C5 A0 00	LDY #\$00	F624 20 D1 FC	JSR \$FC01
F5C7 B1 BB	LDA (\$BB),Y	F627 B0 16	BCS \$F63F
		F629 B1 AC	LDA (\$AC),Y

F62B 20 DD ED	JSR \$EDDD	F693 A0 51	LDY #\$51
F62E 20 E1 FF	JSR \$FFE1	F695 20 2F F1	JSR \$F12F
F631 D0 07	BNE \$F63A	F698 4C C1 F5	JMP \$F5C1
F633 20 42 F6	JSR \$F642		
F636 A9 00	LDA #\$00		
F638 38	SEC	F69B; Bump clock	
F639 60	RTS		
F63A 20 DB FC	JSR \$FCDB	F69B A2 00	LDX #\$00
F63D D0 E5	BNE \$F624	F69D E6 A2	INC \$A2
F63F 20 FE ED	JSR \$EDFE	F69F D0 06	BNE \$F6A7
F642 24 B9	BIT \$B9	F6A1 E6 A1	INC \$A1
F644 30 11	BMI \$F657	F6A3 D0 02	BNE \$F6A7
F646 A5 BA	LDA \$BA	F6A5 E6 A0	INC \$A0
F648 20 0C ED	JSR \$EDOC	F6A7 38	SEC
F64B A5 B9	LDA \$B9	F6AB A5 A2	LDA \$A2
F64D 29 EF	AND #\$EF	F6AA E9 01	SBC #\$01
F64F 09 E0	ORA #\$EO	F6AC A5 A1	LDA \$A1
F651 20 B9 ED	JSR \$EDB9	F6AE E9 1A	SBC #\$1A
F654 20 FE ED	JSR \$EDFE	F6B0 A5 A0	LDA \$A0
F657 18	CLC	F6B2 E9 4F	SBC #\$4F
F658 60	RTS	F6B4 90 06	BCC \$F6BC
F659 4A	LSR	F6B6 B6 A0	STX \$A0
F65A B0 03	BCS \$F65F	F6B8 B6 A1	STX \$A1
F65C 4C 13 F7	JMP \$F713	F6BA B6 A2	STX \$A2
F65F 20 D0 F7	JSR \$F7D0		
F662 90 BD	BCC \$F5F1		
F664 20 38 F8	JSR \$F838	F6BC; Log PIA key reading	
F667 B0 25	BCS \$F68E		
F669 20 8F F6	JSR \$F68F	F6BC AD 01 DC	LDA \$DC01
F66C A2 03	LDX #\$03	F6BF CD 01 DC	CMP \$DC01
F66E A5 B9	LDA \$B9	F6C2 D0 FB	BNE \$F6BC
F670 29 01	AND #\$01	F6C4 AA	TAX
F672 D0 02	BNE \$F676	F6C5 30 13	BMI \$F6DA
F674 A2 01	LDX #\$01	F6C7 A2 BD	LDX #\$BD
F676 8A	TXA	F6C9 BE 00 DC	STX \$DC00
F677 20 6A F7	JSR \$F76A	F6CC AE 01 DC	LDX \$DC01
F67A B0 12	BCS \$F68E	F6CF EC 01 DC	CPX \$DC01
F67C 20 67 F8	JSR \$FB67	F6D2 D0 FB	BNE \$F6CC
F67F B0 0D	BCS \$F68E	F6D4 8D 00 DC	STA \$DC00
F681 A5 B9	LDA \$B9	F6D7 E8	INX
F683 29 02	AND #\$02	F6D8 D0 02	BNE \$F6DC
F685 F0 06	BEQ \$F68D	F6DA B5 91	STA \$91
F687 A9 05	LDA #\$05	F6DC 60	RTS
F689 20 6A F7	JSR \$F76A		
F68C 24 18	BIT \$1B		
F68E 60	RTS	F6DD; Get time	

F68F; Print 'saving'

F68F A5 9D	LDA \$9D
F691 10 FB	BPL \$F6BE

F6DD 78	SEI
F6DE A5 A2	LDA \$A2
F6E0 A6 A1	LDX \$A1
F6E2 A4 A0	LDY \$A0

F6E4; Set time		F72C A5 93 F72E 48 F72F 20 41 FB F732 6B F733 B5 93 F735 B0 32 F737 A0 00 F739 B1 B2 F73B C9 05 F73D F0 2A F73F C9 01 F741 F0 08 F743 C9 03 F745 F0 04 F747 C9 04 F749 D0 E1 F74B AA F74C 24 9D F74E 10 17 F750 A0 63 F752 20 2F F1 F755 A0 05 F757 B1 B2 F759 20 D2 FF F75C C8	LDA \$93 PHA JSR \$FB41 PLA STA \$93 BCS \$F769 LDY #\$00 LDA (\$B2), Y CMP #\$05 BEQ \$F769 CMP #\$01 BEQ \$F74B CMP #\$03 BEQ \$F74B CMP #\$04 BNE \$F72C TAX BIT \$9D BPL \$F767 LDY #\$63 JSR \$F12F LDY #\$05 LDA (\$B2), Y JSR \$FFD2 INY CPY #\$15 BNE \$F757 LDA \$A1 JSR \$E4E0 NOP CLC DEY RTS
F6ED; Check stop key		F75D C0 15 F75F D0 F6 F761 A5 A1 F763 20 E0 E4 F766 EA F767 18 F768 88 F769 60	
F6FB; Output error messages		F76A; Write tape header	
F6FB A9 01 F6FD 2C A9 02 F700 2C A9 03 F703 2C A9 04 F706 2C A9 05 F709 2C A9 06 F70C 2C A9 07 F70F 2C A9 08 F712 2C A9 09 F715 48 F716 20 CC FF F719 A0 00 F71B 24 9D F71D 50 0A F71F 20 2F F1 F722 68 F723 48 F724 09 30 F726 20 D2 FF F729 68 F72A 38 F72B 60	JSR \$FFCC LDY #\$00 BIT \$02A9 BIT \$03A9 BIT \$04A9 BIT \$05A9 BIT \$06A9 BIT \$07A9 BIT \$08A9 BIT \$09A9 PHA JSR \$FFCC LDY #\$00 BIT \$9D BVC \$F729 JSR \$F12F PLA PHA ORA #\$30 JSR \$FFD2 PLA SEC RTS	F76A B5 9E F76C 20 D0 F7 F76F 90 5E F771 A5 C2 F773 48 F774 A5 C1 F776 48 F777 A5 AF F779 48 F77A A5 AE F77C 48 F77D A0 BF F77F A9 20 F781 91 B2 F783 88	STA \$9E JSR \$F7D0 BCC \$F7CF LDA \$C2 PHA LDA \$C1 PHA LDA \$AF PHA LDA \$AE PHA LDY #\$BF LDA #\$20 STA (\$B2), Y DEY
F72C; Find any tape header			

F7B4 D0 FB	BNF \$F7B1	
F7B6 A5 9E	LDA \$9E	
F7B8 91 B2	STA (\$B2),Y	F7D7; Set buffer start/end
F7B8 C8	INY	pointers
F7B8 A5 C1	LDA \$C1	
F7BD 91 B2	STA (\$B2),Y	F7D7 20 D0 F7 JSR \$F7D0
F7BF C8	INY	F7DA 8A TXA
F790 A5 C2	LDA \$C2	F7DB 85 C1 STA \$C1
F792 91 B2	STA (\$B2),Y	F7DD 18 CLC
F794 C8	INY	F7DE 69 C0 ADC #\$C0
F795 A5 AE	LDA \$AE	F7E0 85 AE STA \$AE
F797 91 B2	STA (\$B2),Y	F7E2 98 TYA
F799 C8	INY	F7E3 85 C2 STA \$C2
F79A A5 AF	LDA \$AF	F7E5 69 00 ADC #\$00
F79C 91 B2	STA (\$B2),Y	F7E7 85 AF STA \$AF
F79E C8	INY	F7E9 60 RTS
F79F 84 9F	STY \$9F	
F7A1 A0 00	LDY #\$00	
F7A3 84 9E	STY \$9E	F7EA; Find specific header
F7A5 A4 9E	LDY \$9E	
F7A7 C4 B7	CPY \$B7	F7EA 20 2C F7 JSR \$F72C
F7A9 F0 0C	BEQ \$F7B7	F7ED B0 1D BCS \$F80C
F7AB B1 BB	LDA (\$BB),Y	F7EF A0 05 LDY #\$05
F7AD A4 9F	LDY \$9F	F7F1 84 9F STY \$9F
F7AF 91 B2	STA (\$B2),Y	F7F3 A0 00 LDY #\$00
F7B1 E6 9E	INC \$9E	F7F5 84 9E STY \$9E
F7B3 E6 9F	INC \$9F	F7F7 C4 B7 CPY \$B7
F7B5 D0 EE	BNE \$F7A5	F7F9 F0 10 BEQ \$F80B
F7B7 20 D7 F7	JSR \$F7D7	F7FB B1 BB LDA (\$BB),Y
F7BA A9 69	LDA #\$69	F7FD A4 9F LDY \$9F
F7BC 85 AB	STA \$AB	F7FF D1 B2 CMP (\$B2),Y
F7BE 20 6B FB	JSR \$FB6B	FB01 D0 E7 BNE \$F7EA
F7C1 A8	TAY	FB03 E6 9E INC \$9E
F7C2 68	PLA	FB05 E6 9F INC \$9F
F7C3 85 AE	STA \$AE	FB07 A4 9E LDY \$9E
F7C5 68	PLA	FB09 D0 EC BNE \$F7F7
F7C6 85 AF	STA \$AF	FB0B 1B CLC
F7C8 68	PLA	FB0C 60 RTS
F7C9 85 C1	STA \$C1	
F7CB 68	PLA	
F7CC 85 C2	STA \$C2	FB0D; Bump tape pointer
F7CE 98	TYA	
F7CF 60	RTS	FB0D 20 D0 F7 JSR \$F7D0
F7D0; Get buffer address		FB10 E6 A6 INC \$A6
F7D0 A6 B2	LDX \$B2	FB12 A4 A6 LDY \$A6
F7D2 A4 B3	LDY \$B3	FB14 C0 C0 CPY #\$C0
F7D4 C0 02	CPY #\$02	FB16 60 RTS
F7D6 60	RTS	
		FB17; 'press play'
		FB17 20 2E FB JSR \$FB2E

F81A F0 1A	BEQ \$FB36	F867 A9 14	LDA \$\$14
F81C A0 1B	LDY #\$1B	F869 85 AB	STA \$AB
F81E 20 2F F1	JSR \$F12F	F86B 20 38 FB	JSR \$F838
F821 20 D0 F8	JSR \$F8D0	F86E B0 6C	BCS \$F8DC
F824 20 2E F8	JSR \$F82E	F870 7B	SEI
F827 D0 F8	BNE \$FB21	F871 A9 82	LDA \$\$82
F829 A0 6A	LDY #\$6A	F873 A2 08	LDX \$\$08
F82B 4C 2F F1	JMP \$F12F		

**F82E; Check tape status**

F82E A9 10	LDA \$\$10
F830 24 01	BIT \$01
F832 D0 02	BNE \$FB36
F834 24 01	BIT \$01
F836 18	CLC
F837 60	RTS

**F838; 'press record'**

F838 20 2E F8	JSR \$F82E
F83B F0 F9	BEQ \$FB36
F83D A0 2E	LDY \$\$2E
F83F D0 DD	BNE \$FB1E

**F841; Initiate tape read**

F841 A9 00	LDA \$\$00
F843 85 90	STA \$90
F845 85 93	STA \$93
F847 20 D7 F7	JSR \$F7D7
F84A 20 17 F8	JSR \$FB17
F84D B0 1F	BCS \$F86E
F84F 78	SEI
F850 A9 00	LDA \$\$00
F852 85 AA	STA \$AA
F854 85 B4	STA \$B4
F856 85 B0	STA \$B0
F858 85 9E	STA \$9E
F85A 85 9F	STA \$9F
F85C 85 9C	STA \$9C
F85E A9 90	LDA \$\$90
F860 A2 0E	LDX \$\$0E
F862 D0 11	BNE \$FB75

**F864; Initiate tape write**

F864 20 D7 F7	JSR \$F7D7
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**F875; Common tape code**

F875 A0 7F	LDY \$\$7F
F877 8C 0D DC	STY \$DCOD
F87A 8D 0D DC	STA \$DCOD
F87D AD 0E DC	LDA \$DCOE
F880 09 19	ORA \$\$19
F882 8D 0F DC	STA \$DCOF
F885 29 91	AND \$\$91
F887 8D A2 02	STA \$02A2
F88A 20 A4 F0	JSR \$FOA4
F88D AD 11 D0	LDA \$D011
F890 29 EF	AND \$\$EF
F892 8D 11 D0	STA \$D011
F895 AD 14 03	LDA \$0314
F898 8D 9F 02	STA \$029F
F89B AD 15 03	LDA \$0315
F89E 8D A0 02	STA \$02A0
F8A1 20 BD FC	JSR \$FCBD
F8A4 A9 02	LDA \$\$02
F8A6 85 BE	STA \$BE
F8A8 20 97 FB	JSR \$FB97
F8AB A5 01	LDA \$01
F8AD 29 1F	AND \$\$1F
F8AF 85 01	STA \$01
F8B1 85 C0	STA \$C0
F8B3 A2 FF	LDX \$\$FF
F8B5 A0 FF	LDY \$\$FF
F8B7 88	DEY
F8BB D0 FD	BNE \$FBB7
F8BA CA	DEX
F8BB D0 F8	BNE \$FBB5
F8BD 58	CLI
F8BE AD A0 02	LDA \$02A0
F8C1 CD 15 03	CMP \$0315
F8C4 18	CLC
F8C5 F0 15	BEQ \$F8DC
F8C7 20 D0 F8	JSR \$F8D0
F8CA 20 BC F6	JSR \$F6BC
F8CD 4C BE F8	JMP \$FB8E

**F8D0; Check tape stop**

F8D0 20 E1 FF	JSR \$FFE1	F92B 60	RTS
F8D3 18	CLC		
F8D4 D0 0B	BNE \$F8E1		
F8D6 20 93 FC	JSR \$FC93		
F8D9 38	SEC	F92C; Read tape bits	
F8DA 68	PLA	F92C AE 07 DC	LDX \$DC07
F8DB 68	PLA	F92F A0 FF	LDY #\$FF
F8DC A9 00	LDA #\$00	F931 98	TYA
F8DE 8D A0 02	STA \$02A0	F932 ED 06 DC	SBC \$DC06
F8E1 60	RTS	F935 EC 07 DC	CPX \$DC07
		F938 D0 F2	BNE \$F92C
		F93A 86 B1	STX \$B1
		F93C AA	TAX
		F93D 8C 06 DC	STY \$DC06
F8E2 B6 B1	STX \$B1	F940 8C 07 DC	STY \$DC07
F8E4 A5 B0	LDA \$B0	F943 A9 19	LDA #\$19
F8E6 0A	ASL	F945 8D 0F DC	STA \$DC0F
F8E7 0A	ASL	F948 AD 0D DC	LDA \$DC0D
F8E8 18	CLC	F94B 8D A3 02	STA \$02A3
F8E9 65 B0	ADC \$B0	F94E 98	TYA
F8EB 18	CLC	F94F E5 B1	SBC \$B1
F8EC 65 B1	ADC \$B1	F951 86 B1	STX \$B1
F8EE 85 B1	STA \$B1	F953 4A	LSR
F8F0 A9 00	LDA #\$00	F954 66 B1	ROR \$B1
F8F2 24 B0	BIT \$B0	F956 4A	LSR
F8F4 30 01	BMI \$FBF7	F957 66 B1	ROR \$B1
F8F6 2A	ROL	F959 A5 B0	LDA \$B0
F8F7 06 B1	ASL \$B1	F95B 18	CLC
F8F9 2A	ROL	F95C 69 3C	ADC #\$3C
F8FA 06 B1	ASL \$B1	F95E C5 B1	CMP \$B1
F8FC 2A	ROL	F960 B0 4A	BCS \$F9AC
F8FD AA	TAX	F962 A6 9C	LDX \$9C
F8FE AD 06 DC	LDA \$DC06	F964 F0 03	BEQ \$F969
F901 C9 16	CMP #\$16	F966 4C 60 FA	JMP \$FA60
F903 90 F9	BCC \$F8FE	F969 A6 A3	LDX \$A3
F905 65 B1	ADC \$B1	F96B 30 1B	BMI \$F988
F907 BD 04 DC	STA \$DC04	F96D A2 00	LDX #\$00
F90A 8A	TXA	F96F 69 30	ADC #\$30
F90B 6D 07 DC	ADC \$DC07	F971 65 B0	ADC \$B0
F90E BD 05 DC	STA \$DC05	F973 C5 B1	CMP \$B1
F911 AD A2 02	LDA \$02A2	F975 B0 1C	BCS \$F993
F914 BD 0E DC	STA \$DC0E	F977 EB	INX
F917 BD A4 02	STA \$02A4	F978 69 26	ADC #\$26
F91A AD 0D DC	LDA \$DC0D	F97A 65 B0	ADC \$B0
F91D 29 10	AND #\$10	F97C C5 B1	CMP \$B1
F91F F0 09	BEQ \$F92A	F97E B0 17	BCS \$F997
F921 A9 F9	LDA #\$F9	F980 69 2C	ADC #\$2C
F923 48	PHA	F982 65 B0	ADC \$B0
F924 A9 2A	LDA #\$2A	F984 C5 B1	CMP \$B1
F926 48	PHA	F986 90 03	BCC \$F98B
F927 4C 43 FF	JMP \$FF43	F988 4C 10 FA	JMP \$FA10
F92A 58	CLI	F98B A5 B4	LDA \$B4

F98D F0 1D	BEQ \$F9AC	F9FB 45 9B	EOR \$9B
F98F 85 A8	STA \$A8	F9FA 85 9B	STA \$9B
F991 D0 19	BNE \$F9AC	F9FC A5 B4	LDA \$B4
F993 E6 A9	INC \$A9	F9FE F0 D2	BEQ \$F9D2
F995 B0 02	BCS \$F999	FA00 C6 A3	DEC \$A3
F997 C6 A9	DEC \$A9	FA02 30 C5	BMI \$F9C9
F999 38	SEC	FA04 46 D7	LSR \$D7
F99A E9 13	SBC #\$13	FA06 66 BF	ROR \$BF
F99C E5 B1	SBC \$B1	FA08 A2 DA	LDX #\$DA
F99E 65 92	ADC \$92	FA0A 20 E2 F8	JSR \$F8E2
F9A0 85 92	STA \$92	FA0D 4C BC FE	JMP \$FEBC
F9A2 A5 A4	LDA \$A4	FA10 A5 96	LDA \$96
F9A4 49 01	EOR #\$01	FA12 F0 04	BEQ \$FA18
F9A6 85 A4	STA \$A4	FA14 A5 B4	LDA \$B4
F9A8 F0 2B	BEQ \$F9D5	FA16 F0 07	BEQ \$FA1F
F9AA B6 D7	STX \$D7	FA18 A5 A3	LDA \$A3
F9AC A5 B4	LDA \$B4	FA1A 30 03	BMI \$FA1F
F9AE F0 22	BEQ \$F9D2	FA1C 4C 97 F9	JMP \$F997
F9B0 AD A3 02	LDA \$02A3	FA1F 46 B1	LSR \$B1
F9B3 29 01	AND #\$01	FA21 A9 93	LDA #\$93
F9B5 D0 05	BNE \$F9BC	FA23 38	SEC
F9B7 AD A4 02	LDA \$02A4	FA24 E5 B1	SBC \$B1
F9BA D0 16	BNE \$F9D2	FA26 65 B0	ADC \$B0
F9BC A9 00	LDA #\$00	FA28 0A	ASL
F9BE 85 A4	STA \$A4	FA29 AA	TAX
F9C0 8D A4 02	STA \$02A4	FA2A 20 E2 F8	JSR \$F8E2
F9C3 A5 A3	LDA \$A3	FA2D E6 9C	INC \$9C
F9C5 10 30	BPL \$F9F7	FA2F A5 B4	LDA \$B4
F9C7 30 BF	BMI \$F988	FA31 D0 11	BNE \$FA44
F9C9 A2 A6	LDX #\$A6	FA33 A5 96	LDA \$96
F9CB 20 E2 F8	JSR \$F8E2	FA35 F0 26	BEQ \$FA5D
F9CE A5 9B	LDA \$9B	FA37 B5 A8	STA \$A8
F9D0 D0 B9	BNE \$F98B	FA39 A9 00	LDA #\$00
F9D2 4C BC FE	JMP \$FEBC	FA3B 85 96	STA \$96
F9D5 A5 92	LDA \$92	FA3D A9 81	LDA #\$81
F9D7 F0 07	BEQ \$F9E0	FA3F 8D 0D DC	STA \$DC0D
F9D9 30 03	BMI \$F9DE	FA42 85 B4	STA \$B4
F9DB C6 B0	DEC \$B0	FA44 A5 96	LDA \$96
F9DD 2C E6 B0	BIT \$B0E6	FA46 85 B5	STA \$B5
F9E0 A9 00	LDA #\$00	FA48 F0 09	BEQ \$FA53
F9E2 85 92	STA \$92	FA4A A9 00	LDA #\$00
F9E4 E4 D7	CPX \$D7	FA4C 85 B4	STA \$B4
F9E6 D0 0F	BNE \$F9F7	FA4E A9 01	LDA #\$01
F9E8 BA	TXA	FA50 8D 0D DC	STA \$DC0D
F9E9 D0 A0	BNE \$F98B	FA53 A5 BF	LDA \$BF
F9EB A5 A9	LDA \$A9	FA55 85 BD	STA \$BD
F9ED 30 BD	BMI \$F9AC	FA57 A5 AB	LDA \$AB
F9EF C9 10	CMP #\$10	FA59 05 A9	DRA \$A9
F9F1 90 B9	BCC \$F9AC	FA5B 85 B6	STA \$B6
F9F3 85 96	STA \$96	FA5D 4C BC FE	JMP \$FEBC
F9F5 B0 B5	BCS \$F9AC		
F9F7 BA	TXA		

## FA60; Store tape chars.

FA60 20 97 FB	JSR \$FB97	FAC2 F0 0A	BEQ \$FACE
FA63 B5 9C	STA \$9C	FAC4 A9 04	LDA #\$04
FA65 A2 DA	LDX #\$DA	FAC6 20 1C FE	JSR \$FE1C
FA67 20 E2 FB	JSR \$FBE2	FAC9 A9 00	LDA #\$00
FA6A A5 BE	LDA \$BE	FACB 4C 4A FB	JMP \$FB4A
FA6C F0 02	BEQ \$FA70	FACE 20 D1 FC	JSR \$FC01
FA6E B5 A7	STA \$A7	FAD1 90 03	BCC \$FAD6
FA70 A9 0F	LDA #\$0F	FAD3 4C 48 FB	JMP \$FB48
FA72 24 AA	BIT \$AA	FAD6 A6 A7	LDX \$A7
FA74 10 17	BPL \$FABD	FAD8 CA	DEX
FA76 A5 B5	LDA \$B5	FAD9 F0 2D	BEQ \$FB0B
FA78 D0 0C	BNE \$FAB6	FADB A5 93	LDA \$93
FA7A A6 BE	LDX \$BE	FADD F0 0C	BEQ \$FAEB
FA7C CA	DEX	FADF A0 00	LDY #\$00
FA7D D0 0B	BNE \$FABA	FAE1 A5 BD	LDA \$BD
FA7F A9 0B	LDA #\$0B	FAE3 D1 AC	CMP (\$AC), Y
FAB1 20 1C FE	JSR \$FE1C	FAE5 F0 04	BEQ \$FAEB
FAB4 D0 04	BNE \$FABA	FAE7 A9 01	LDA #\$01
FAB6 A9 00	LDA #\$00	FAE9 85 B6	STA \$B6
FAB8 85 AA	STA \$AA	FAEB A5 B6	LDA \$B6
FABA 4C BC FE	JMP \$FEBC	FAED F0 4B	BEQ \$FB3A
FABD 70 31	BVS \$FAC0	FAEF A2 3D	LDX #\$3D
FABF D0 18	BNE \$FAA9	FAF1 E4 9E	CPX \$9E
FA91 A5 B5	LDA \$B5	FAF3 90 3E	BCC \$FB33
FA93 D0 F5	BNE \$FABA	FAF5 A6 9E	LDX \$9E
FA95 A5 B6	LDA \$B6	FAF7 A5 AD	LDA \$AD
FA97 D0 F1	BNE \$FABA	FAF9 9D 01 01	STA \$0101, X
FA99 A5 A7	LDA \$A7	FAFC A5 AC	LDA \$AC
FA9B 4A	LSR	FAFE 9D 00 01	STA \$0100, X
FA9C A5 BD	LDA \$BD	FB01 E8	INX
FA9E 30 03	BMI \$FAA3	FB02 E8	INX
FAA0 90 1B	BCC \$FABA	FB03 86 9E	STX \$9E
FAA2 18	CLC	FB05 4C 3A FB	JMP \$FB3A
FAA3 B0 15	BCS \$FABA	FB08 A6 9F	LDX \$9F
FAA5 29 0F	AND #\$0F	FB0A E4 9E	CPX \$9E
FAA7 B5 AA	STA \$AA	FB0C F0 35	BEQ \$FB43
FAA9 C6 AA	DEC \$AA	FB0E A5 AC	LDA \$AC
FAAB D0 DD	BNE \$FABA	FB10 DD 00 01	CMP \$0100, X
FAAD A9 40	LDA #\$40	FB13 D0 2E	BNE \$FB43
FAAF 85 AA	STA \$AA	FB15 A5 AD	LDA \$AD
FAB1 20 BE FB	JSR \$FB8E	FB17 DD 01 01	CMP \$0101, X
FAB4 A9 00	LDA #\$00	FB1A D0 27	BNE \$FB43
FAB6 85 AB	STA \$AB	FB1C E6 9F	INC \$9F
FABB F0 D0	BEQ \$FABA	FB1E E6 9F	INC \$9F
FABA A9 B0	LDA #\$B0	FB20 A5 93	LDA \$93
FABC 85 AA	STA \$AA	FB22 F0 0B	BEQ \$FB2F
FABE D0 CA	BNE \$FABA	FB24 A5 BD	LDA \$BD
FAC0 A5 B5	LDA \$B5	FB26 A0 00	LDY #\$00
		FB28 D1 AC	CMP (\$AC), Y
		FB2A F0 17	BEQ \$FB43
		FB2C C8	INY
		FB2D B4 B6	STY \$B6

FB2F A5 B6	LDA \$B6	FB96 60	RTS
FB31 F0 07	BEQ \$FB3A		
FB33 A9 10	LDA #\$10		
FB35 20 1C FE	JSR \$FE1C	FB97; New character setup	
FB38 D0 09	BNE \$FB43		
FB3A A5 93	LDA \$93	FB97 A9 0B	LDA \$\$0B
FB3C D0 05	BNE \$FB43	FB99 85 A3	STA \$A3
FB3E A8	TAY	FB9B A9 00	LDA \$\$00
FB3F A5 BD	LDA \$BD	FB9D 85 A4	STA \$A4
FB41 91 AC	STA (\$AC),Y	FB9F 85 AB	STA \$AB
FB43 20 DB FC	JSR \$FCDB	FBA1 85 9B	STA \$9B
FB46 D0 43	BNE \$FB8B	FBA3 85 A9	STA \$A9
FB48 A9 80	LDA #\$80	FBA5 60	RTS
FB4A 85 AA	STA \$AA		
FB4C 78	SEI		
FB4D A2 01	LDX #\$01	FBA6; Send transition to tape	
FB4F 8E 0D DC	STX \$DC0D	FBA6 A5 BD	LDA \$BD
FB52 AE 0D DC	LDX \$DC0D	FBA8 4A	LSR
FB55 A6 BE	LDX \$BE	FBA9 A9 60	LDA \$\$60
FB57 CA	DEX	FBAB 90 02	BCC \$FBAB
FB58 30 02	BMI \$FB5C	FBAD A9 B0	LDA \$\$B0
FB5A B6 BE	STX \$BE	FBAF A2 00	LDX \$\$00
FB5C C6 A7	DEC \$A7	FBB1 8D 06 DC	STA \$DC06
FB5E F0 08	BEQ \$FB68	FBB4 8E 07 DC	STX \$DC07
FB60 A5 9E	LDA \$9E	FBB7 AD 0D DC	LDA \$DC0D
FB62 D0 27	BNE \$FB8B	FBBC 8D 0F DC	STA \$\$19
FB64 85 BE	STA \$BE	FBBB A9 19	STA \$DC0F
FB66 F0 23	BEQ \$FB8B	FBBF A5 01	LDA \$01
FB68 20 93 FC	JSR \$FC93	FBC1 49 08	EOR \$\$0B
FB6B 20 8E FB	JSR \$FB8E	FBC3 85 01	STA \$01
FB6E A0 00	LDY #\$00	FBC5 29 08	AND \$\$0B
FB70 B4 AB	STY \$AB	FBC7 60	RTS
FB72 B1 AC	LDA (\$AC),Y		
FB74 45 AB	EDR \$AB		
FB76 85 AB	STA \$AB	FBC8; Write data to tape	
FB78 20 DB FC	JSR \$FCDB	FBC8 38	SEC
FB7B 20 D1 FC	JSR \$FC01	FBC9 66 B6	ROR \$B6
FB7E 90 F2	BCC \$FB72	FBCB 30 3C	BMI \$FC09
FB80 A5 AB	LDA \$AB		
FB82 45 BD	EDR \$BD		
FB84 F0 05	BEQ \$FB8B		
FB86 A9 20	LDA #\$20		
FB88 20 1C FE	JSR \$FE1C	FBCD; IRQ entry point	
FB8B 4C BC FE	JMP \$FEBC		
<b>FB8E; Reset pointer</b>			
FB8E A5 C2	LDA \$C2	FBCD A5 A8	LDA \$AB
FB90 85 AD	STA \$AD	FBCF D0 12	BNE \$FB8E
FB92 A5 C1	LDA \$C1	FBD1 A9 10	LDA \$\$10
FB94 85 AC	STA \$AC	FBD3 A2 01	LDX \$\$01
		FBD5 20 B1 FB	JSR \$FB81
		FBD8 D0 2F	BNE \$FC09
		FBD A6 A8	INC \$AB
		FBD C5 B6	LDA \$B6

FBDE 10 29	BPL \$FC09	FC4C D0 BB	BNE \$FC09
FBE0 4C 57 FC	JMP \$FC57	FC4E A5 9B	LDA \$9B
FBE3 A5 A9	LDA \$A9	FC50 49 01	EOR ##\$01
FBE5 D0 09	BNE \$FBF0	FC52 85 BD	STA \$BD
FBE7 20 AD FB	JSR \$FBAD	FC54 4C BC FE	JMP \$FEBC
FBEA D0 1D	BNE \$FC09	FC57; Write tape leader	
FBE C E6 A9	INC \$A9	FC57 C6 BE	DEC \$BE
FBE D0 19	BNE \$FC09	FC59 D0 03	BNE \$FC5E
FBF0 20 A6 FB	JSR \$FBA6	FC5B 20 CA FC	JSR \$FCCA
FBF3 D0 14	BNE \$FC09	FC5E A9 50	LDA #\$50
FBF5 A5 A4	LDA \$A4	FC60 85 A7	STA \$A7
FBF7 49 01	EOR ##\$01	FC62 A2 08	LDX #\$08
FBF9 85 A4	STA \$A4	FC64 78	SEI
FBFB F0 0F	BEQ \$FC0C	FC65 20 BD FC	JSR \$FCBD
FBFD A5 BD	LDA \$BD	FC68 D0 EA	BNE \$FC54
FBFF 49 01	EOR ##\$01	FC6A A9 78	LDA #\$78
FC01 85 BD	STA \$BD	FC6C 20 AF FB	JSR \$FBAF
FC03 29 01	AND ##\$01	FC6F D0 E3	BNE \$FC54
FC05 45 9B	EOR \$9B	FC71 C6 A7	DEC \$A7
FC07 85 9B	STA \$9B	FC73 D0 DF	BNE \$FC54
FC09 4C BC FE	JMP \$FEBC	FC75 20 97 FB	JSR \$FB97
FC0C 46 BD	LSR \$BD	FC78 C6 AB	DEC \$AB
FC0E C6 A3	DEC \$A3	FC7A 10 DB	BPL \$FC54
FC10 A5 A3	LDA \$A3	FC7C A2 0A	LDX #\$0A
FC12 F0 3A	BEQ \$FC4E	FC7E 20 BD FC	JSR \$FCBD
FC14 10 F3	BPL \$FC09	FC81 58	CLI
FC16 20 97 FB	JSR \$FB97	FC82 E6 AB	INC \$AB
FC19 58	CLI	FC84 A5 BE	LDA \$BE
FC1A A5 A5	LDA \$A5	FC86 F0 30	BEQ \$FCBB
FC1C F0 12	BEQ \$FC30	FC88 20 BE FB	JSR \$FB8E
FC1E A2 00	LDX #\$00	FC8B A2 09	LDX #\$09
FC20 86 D7	STX \$D7	FC8D 86 A5	STX \$A5
FC22 C6 A5	DEC \$A5	FC8F 86 B6	STX \$B6
FC24 A6 BE	LDX \$BE	FC91 D0 B3	BNE \$FC16
FC26 E0 02	Cpx ##\$02	FC93; Restore normal IRQ	
FC28 D0 02	BNE \$FC2C	FC93 08	PHP
FC2A 09 B0	ORA ##\$08	FC94 78	SEI
FC2C 85 BD	STA \$BD	FC95 AD 11 D0	LDA \$D011
FC2E D0 D9	BNE \$FC09	FC98 09 10	ORA ##\$10
FC30 20 D1 FC	JSR \$FC01	FC9A BD 11 D0	STA \$D011
FC33 90 0A	BCC \$FC3F	FC9D 20 CA FC	JSR \$FCCA
FC35 D0 91	BNE \$FB8B	FCA0 A9 7F	LDA ##\$7F
FC37 E6 AD	INC \$AD	FCA2 BD 0D DC	STA \$DC0D
FC39 A5 D7	LDA \$D7	FCA5 20 DD FD	JSR \$FDDD
FC3B 85 BD	STA \$BD	FCA8 AD A0 02	LDA \$02A0
FC3D B0 CA	BCS \$FC09	FCAB F0 09	BEQ \$FCB6
FC3F A0 00	LDY ##\$00		
FC41 B1 AC	LDA (\$AC),Y		
FC43 85 BD	STA \$BD		
FC45 45 D7	EOR \$D7		
FC47 85 D7	STA \$D7		
FC49 20 DB FC	JSR \$FCDB		

FCAD 8D 15 03	STA \$0315	FCEC 6C 00 B0	JMP (\$B000)
FCB0 AD 9F 02	LDA \$029F	FCEF BE 16 D0	STX \$D016
FCB3 8D 14 03	STA \$0314	FCF2 20 A3 FD	JSR \$FDA3
FCB6 28	PLP	FCF5 20 50 FD	JSR \$FD50
FCB7 60	RTS	FCFB 20 15 FD	JSR \$FD15
		FCFE 58	CLI
		FCFF 6C 00 A0	JMP (\$A000)
<b>FCB8; Set IRQ vector</b>			
FCB8 20 93 FC	JSR \$FC93		
FCBB F0 97	BEQ \$FC54	<b>FD02; Check 8-rom</b>	
FCBD BD 93 FD	LDA \$FD93,X	FD02 A2 05	LDX #\$05
FCC0 8D 14 03	STA \$0314	FD04 BD 0F FD	LDA \$FD0F,X
FCC3 BD 94 FD	LDA \$FD94,X	FD07 DD 03 80	CMP \$B003,X
FCC6 8D 15 03	STA \$0315	FDOA D0 03	BNE \$FD0F
FCC9 60	RTS	FDOC CA	DEX
		FDOD D0 F5	BNE \$FD04
		FDOF 60	RTS
<b>FCCA; Kill tape motor</b>			
FCCA A5 01	LDA \$01	<b>FD10; 8-rom mask</b>	
FCCC 09 20	ORA #\$20		
FCCE 85 01	STA \$01	FD10 C3	???
FCDD 60	RTS	FD11 C2	???
		FD12 CD 38 30	CMP \$3038
<b>FCD1; Check r/w pointer</b>			
<b>FD15; Kernal reset</b>			
FCD1 38	SEC		
FCD2 A5 AC	LDA \$AC	FD15 A2 30	LDX #\$30
FCD4 E5 AE	SBC \$AE	FD17 A0 FD	LDY #\$FD
FCD6 A5 AD	LDA \$AD	FD19 18	CLC
FCD8 E5 AF	SBC \$AF		
FCDA 60	RTS		
<b>FD1A; Kernal move</b>			
<b>FCDB; Bump r/w pointer</b>			
FCDB E6 AC	INC \$AC	FD1A B6 C3	STX \$C3
FCDD D0 02	BNE \$FCE1	FD1C B4 C4	STY \$C4
FCDF E6 AD	INC \$AD	FD1E A0 1F	LDY #\$1F
FCE1 60	RTS	FD20 B9 14 03	LDA \$0314,Y
<b>FCE2; Power reset entry</b>			
FCE2 A2 FF	LDX #\$FF	FD23 B0 02	BCS \$FD27
FCE4 78	SEI	FD25 B1 C3	LDA (\$C3),Y
FCE5 9A	TXS	FD27 91 C3	STA (\$C3),Y
FCE6 D8	CLD	FD29 99 14 03	STA \$0314,Y
FCE7 20 02 FD	JSR \$FD02	FD2C B8	DEY
FCEA D0 03	BNE \$FCEF	FD2D 10 F1	BPL \$FD20
		FD2F 60	RTS
<b>FD30; Vectors</b>			

FD30 31 EA	AND (\$EA),Y	FD88 98	TYA
FD32 66 FE	ROR \$FE	FD89 AA	TAX
FD34 47	???	FD8A A4 C2	LDY \$C2
FD35 FE 4A F3	INC \$F34A,X	FD8C 18	CLC
FD38 91 F2	STA (\$F2),Y	FD8D 20 2D FE	JSR \$FE2D
FD3A 0E F2 50	ASL \$50F2	FD90 A9 0B	LDA #\$0B
FD3D F2	???	FD92 8D 82 02	STA \$0282
FD3E 33	???	FD95 A9 04	LDA #\$04
FD3F F3	???	FD97 8D 88 02	STA \$0288
FD40 57	???	FD9A 60	RTS
FD41 F1 CA	SBC (\$CA),Y		
FD43 F1 ED	SBC (\$ED),Y		
FD45 F6 3E	INC \$3E,X		
FD47 F1 2F	SBC (\$2F),Y		
FD49 F3	???		
FD4A 66 FE	ROR \$FE	FD9B 6A	ROR
FD4C A5 F4	LDA \$F4	FD9C FC	???
FD4E ED F5 A9	SBC \$A9F5	FD9D CD FB 31	CMP \$31FB
		FDAO EA	NOP
		FDA1 2C F9 A9	BIT \$A9F9

#### FD50; Initialize system

consts.

FD50 A9 00	LDA #\$00	FDA3 A9 7F	LDA #\$7F
FD52 AB	TAY	FDA5 8D 0D DC	STA \$DC0D
FD53 99 02 00	STA \$0002,Y	FDA8 8D 0D DD	STA \$DD0D
FD56 99 00 02	STA \$0200,Y	FDAE 8D 00 DC	STA \$DC00
FD59 99 00 03	STA \$0300,Y	FDB0 8D 0E DC	STA \$DC0E
FD5C CB	INY	FDB3 8D 0E DD	STA \$DD0E
FD5D D0 F4	BNE \$FD53	FDB6 8D 0F DC	STA \$DC0F
FD5F A2 3C	LDX #\$3C	FDB9 8D 0F DD	STA \$DD0F
FD61 A0 03	LDY #\$03	FDBC A2 00	LDX #\$00
FD63 86 B2	STX \$B2	FDBE BE 03 DC	STX \$DC03
FD65 84 B3	STY \$B3	FDC1 BE 03 DD	STX \$DD03
FD67 AB	TAY	FDC4 BE 18 D4	STX \$D418
FD6B A9 03	LDA #\$03	FDC7 CA	DEX
FD6A 85 C2	STA \$C2	FDC8 BE 02 DC	STX \$DC02
FD6C E6 C2	INC \$C2	FDCB A9 07	LDA #\$07
FD6E B1 C1	LDA (\$C1),Y	FDCD 8D 00 DD	STA \$DD00
FD70 AA	TAX	FDD0 A9 3F	LDA #\$3F
FD71 A9 55	LDA #\$55	FDD2 8D 02 DD	STA \$DD02
FD73 91 C1	STA (\$C1),Y	FDD5 A9 E7	LDA #\$E7
FD75 D1 C1	CMP (\$C1),Y	FDD7 85 01	STA \$01
FD77 D0 0F	BNE \$FD88	FDD9 A9 2F	LDA #\$2F
FD79 2A	ROL	FDDB 85 00	STA \$00
FD7A 91 C1	STA (\$C1),Y		
FD7C D1 C1	CMP (\$C1),Y		
FD7E D0 08	BNE \$FD88		
FD80 8A	TXA		
FD81 91 C1	STA (\$C1),Y	FDDD; Enable timer	
FD83 C8	INY		
FD84 D0 EB	BNE \$FD6E	FDDD AD A6 02	LDA \$02A6
FD86 F0 E4	BEQ \$FD6C	FDE0 F0 0A	BEQ \$FDEC

FDE2 A9 25	LDA #\$25		
FDE4 8D 04 DC	STA \$DC04		
FDE7 A9 40	LDA #\$40	FE21; Set timeout	
FDE9 4C F3 FD	JMP \$FD03		
FDEC A9 95	LDA #\$95	FE21 8D 85 02 STA \$0285	
FDEE 8D 04 DC	STA \$DC04	FE24 60 RTS	
FDF1 A9 42	LDA #\$42		
FDF3 8D 05 DC	STA \$DC05		
FDF6 4C 6E FF	JMP \$FF6E	FE25; Read/set top of memory	
		FE25 90 06 BCC \$FE2D	
<b>FDF9; Save filename data</b>			
FDF9 85 B7	STA \$B7	FE27; Read top of memory	
FDFB 86 BB	STX \$BB		
FDFD 84 BC	STY \$BC	FE27 AE 83 02 LDX \$0283	
FDFF 60	RTS	FE2A AC 84 02 LDY \$0284	
<b>FE00; Save file details</b>			
FE00 85 BB	STA \$BB	FE2D; Set top of memory	
FE02 86 BA	STX \$BA	FE2D 8E 83 02 STX \$0283	
FE04 84 B9	STY \$B9	FE30 BC 84 02 STY \$0284	
FE06 60	RTS	FE33 60 RTS	
<b>FE07; Get status</b>			
FE07 A5 BA	LDA \$BA	FE34 90 06 BCC \$FE3C	
FE09 C9 02	CMP #\$02	FE36 AE B1 02 LDX \$0281	
FE0B D0 0D	BNE \$FE1A	FE39 AC B2 02 LDY \$0282	
FE0D AD 97 02	LDA \$0297	FE3C BE B1 02 STX \$0281	
FE10 48	PHA	FE3F 8C B2 02 STY \$0282	
FE11 A9 00	LDA #\$00	FE42 60 RTS	
FE13 8D 97 02	STA \$0297		
FE16 68	PLA		
FE17 60	RTS		
		<b>FE43; NMI entry</b>	
<b>FE18; Flag status</b>			
FE18 85 9D	STA \$9D	FE43 78 SEI	
FE1A A5 90	LDA \$90	FE44 6C 1B 03 JMP (\$0318)	
<b>FE1C; Set status</b>			
FE1C 05 90	DRA \$90	FE47 48 PHA	
FE1E 85 90	STA \$90	FE48 8A TXA	
FE20 60	RTS	FE49 48 PHA	
		FE4A 98 TYA	
		FE4B 48 PHA	
		FE4C A9 7F LDA #\$7F	
		FE4E 8D 0D DD STA \$DD0D	
		FE51 AC 0D DD LDY \$DD0D	
		FE54 30 1C BMI \$FE72	
		FE56 20 02 FD JSR \$FD02	
		FE59 D0 03 BNE \$FE5E	

FE5B	6C	02	80	JMP (\$8002)	FEBC	68	PLA
FE5E	20	BC	F6	JSR \$F6BC	FEBD	A8	TAY
FE61	20	E1	FF	JSR \$FFE1	FEBE	68	PLA
FE64	D0	0C		BNE \$FE72	FEBF	AA	TAX
					FEC0	68	PLA
					FEC1	40	RTI
<b>FE66; Warm start</b>							
FE66	20	15	FD	JSR \$FD15	<b>FEC2; RS-232 timing table</b>		
FE69	20	A3	FD	JSR \$FDA3	FEC2	C1	27
FE6C	20	18	E5	JSR \$E518	FEC4	3E	1A C5
FE6F	6C	02	A0	JMP (\$A002)	FEC7	11	74
FE72	98			TYA	FEC9	0E	ED 0C
FE73	2D	A1	02	AND \$02A1	FECC	45	06
FE76	AA			TAX	FECE	F0	02
FE77	29	01		AND #\$01	FED0	46	01
FE79	F0	28		BEQ \$FEA3	FED2	B8	CLV
FE7B	AD	00	DD	LDA \$DD00	FED3	00	BRK
FE7E	29	FB		AND #\$FB	FED4	71	00
FE80	05	B5		ORA \$B5			ADC (\$00), Y
FE82	BD	00	DD	STA \$DD00			
FE85	AD	A1	02	LDA \$02A1			
FE88	BD	0D	DD	STA \$DD0D			
FE8B	BA			TXA			
FE8C	29	12		AND #\$12			
FE8E	F0	0D		BEQ \$FE9D			
FE90	29	02		AND #\$02			
FE92	F0	06		BEQ \$FE9A			
FE94	20	D6	FE	JSR \$FED6			
FE97	4C	9D	FE	JMP \$FE9D			
FE9A	20	07	FF	JSR \$FF07			
FE9D	20	BB	EE	JSR \$EEBB			
FEA0	4C	B6	FE	JMP \$FEB6			
FEA3	8A			TXA			
FEA4	29	02		AND #\$02			
FEA6	F0	06		BEQ \$FEAE			
FEAB	20	D6	FE	JSR \$FED6			
FEAB	4C	B6	FE	JMP \$FEB6			
FEAE	8A			TXA			
FEAF	29	10		AND #\$10			
FEB1	F0	03		BEQ \$FEB6			
FEB3	20	07	FF	JSR \$FF07			

<b>FEB6; Reset IRQ &amp; exit</b>				<b>FF07; NMI RS-232 out</b>			
FEB6	AD	A1	02	LDA \$02A1	FF07	AD	95 02
FEB9	BD	0D	DD	STA \$DD0D	FF0A	BD	06 DD
					FF0D	AD	96 02
					FF10	BD	07 DD
					FF13	A9	11
					FF15	BD	0F DD
<b>FEBC; Interrupt exit</b>							

FF18 A9 12	LDA #\$12	FF6E A9 B1	LDA #\$81
FF1A 4D A1 02	EDR \$02A1	FF70 BD 0D DC	STA \$DC0D
FF1D 8D A1 02	STA \$02A1	FF73 AD 0E DC	LDA \$DC0E
FF20 A9 FF	LDA #\$FF	FF76 29 80	AND #\$80
FF22 8D 06 DD	STA \$DD06	FF78 09 11	ORA #\$11
FF25 8D 07 DD	STA \$DD07	FF7A 8D 0E DC	STA \$DC0E
FF28 AE 98 02	LDX \$0298	FF7D 4C 8E EE	JMP \$EEE8
FF2B 86 A8	STX \$A8	FF80 00	BRK
FF2D 60	RTS		
FF2E AA	TAX		
FF2F AD 96 02	LDA \$0296	<b>FF81; Jumbo jump table</b>	
FF32 2A	ROL		
FF33 AB	TAY	FF81 4C 5B FF	JMP \$FF5B
FF34 8A	TXA	FF84 4C A3 FD	JMP \$FDA3
FF35 69 C8	ADC #\$C8	FF87 4C 50 FD	JMP \$FD50
FF37 8D 99 02	STA \$0299	FF8A 4C 15 FD	JMP \$FD15
FF3A 98	TYA	FF8D 4C 1A FD	JMP \$FD1A
FF3B 69 00	ADC #\$00	FF90 4C 18 FE	JMP \$FE18
FF3D 8D 9A 02	STA \$029A	FF93 4C B9 ED	JMP \$EDB9
FF40 60	RTS	FF96 4C C7 ED	JMP \$EDC7
FF41 EA	NOP	FF99 4C 25 FE	JMP \$FE25
FF42 EA	NOP	FF9C 4C 34 FE	JMP \$FE34
		FF9F 4C 87 EA	JMP \$EA87
		FFA2 4C 21 FE	JMP \$FE21
<b>FF43; Fake IRQ</b>		FFA5 4C 13 EE	JMP \$EE13
FF43 08	PHP	FFAB 4C EF ED	JMP \$EDEF
FF44 68	PLA	FFAE 4C FE ED	JMP \$EDFE
FF45 29 EF	AND #\$EF	FFB1 4C 0C ED	JMP \$EDOC
FF47 48	PHA	FFB4 4C 09 ED	JMP \$ED09
		FFB7 4C 07 FE	JMP \$FE07
		FFBA 4C 00 FE	JMP \$FE00
<b>FF48; IRQ entry</b>		FFBD 4C F9 FD	JMP \$FDF9
FF48 48	PHA	FFC0 6C 1A 03	JMP (\$031A)
FF49 8A	TXA	FFC3 6C 1C 03	JMP (\$031C)
FF4A 48	PHA	FFC6 6C 1E 03	JMP (\$031E)
FF4B 98	TYA	FFC9 6C 20 03	JMP (\$0320)
FF4C 48	PHA	FFCC 6C 22 03	JMP (\$0322)
FF4D BA	TSX	FFCF 6C 24 03	JMP (\$0324)
		FFD2 6C 26 03	JMP (\$0326)
FF4E BD 04 01	LDA \$0104,X	FFD5 4C 9E F4	JMP \$F49E
FF51 29 10	AND #\$10	FFDB 4C DD F5	JMP \$F5DD
FF53 F0 03	BEQ \$FF58	FFDB 4C E4 F6	JMP \$F6E4
FF55 6C 16 03	JMP (\$0316)	FFDE 4C DD F6	JMP \$F6DD
FF58 6C 14 03	JMP (\$0314)	FFE1 6C 2B 03	JMP (\$0328)
FF5B 20 18 E5	JSR \$E518	FFE4 6C 2A 03	JMP (\$032A)
FF5E AD 12 D0	LDA \$D012	FFE7 6C 2C 03	JMP (\$032C)
FF61 D0 FB	BNE \$FF5E	FFEA 4C 9B F6	JMP \$F69B
FF63 AD 19 D0	LDA \$D019	FFED 4C 05 E5	JMP \$E505
FF66 29 01	AND #\$01	FFF0 4C 0A E5	JMP \$E50A
FF68 8D A6 02	STA \$02A6	FFF3 4C 00 E5	JMP \$E500
FF6B 4C DD FD	JMP \$FDDD		

**FFF6; Hardware vectors**

FFF6 52	???
FFF7 52	???
FFF8 42	???
FFF9 59 43 FE	EOR \$FE43,Y
FFFC E2	???
FFFD FC	???
FFFE 48	PHA
FFFF FF	???

## M/C instruction set

The following notation applies to this summary:

A	Accumulator
X, Y	Index registers
M	Memory
P	Processor status register
S	Stack Pointer
✓	Change
-	No change
+	Add
^	Logical AND
-	Subtract
V	Logical Exclusive-OR
→, ←	Transfer to
✗	Logical (inclusive) OR
PC	Program counter
PCH	Program counter high
PCL	Program counter low
#dd	8-bit immediate data value (2 hexadecimal digits)
aa	8-bit zero page address (2 hexadecimal digits)
aaaa	16-bit absolute address (4 hexadecimal digits)
↑	Transfer from stack (Pull)
↓	Transfer onto stack (Push)

## ADC

### Add to Accumulator with Carry

Operation:  $A + M + C \rightarrow A, C$

N Z C I D V  
✓ ✓ ✓ -- ✓

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	ADC #dd	69	2	2
Zero Page	ADC aa	65	2	3
Zero Page, X	ADC aa,X	75	2	4
Absolute	ADC aaaa	6D	3	4
Absolute, X	ADC aaaa,X	7D	3	4*
Absolute, Y	ADC aaaa,Y	79	3	4*
(Indirect, X)	ADC (aa,X)	61	2	6
(Indirect), Y	ADC (aa),Y	71	2	5*

\*Add 1 if page boundary is crossed.

## AND

### AND Memory with Accumulator

Logical AND to the accumulator

Operation:  $A \wedge M \rightarrow A$

N Z C I D V  
✓ ✓ --- -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	AND #dd	29	2	2
Zero Page	AND aa	25	2	3
Zero Page, X	AND aa,X	35	2	4
Absolute	AND aaaa	2D	3	4
Absolute, X	AND aaaa,X	3D	3	4*
Absolute, Y	AND aaaa,Y	39	3	4*
(Indirect, X)	AND (aa,X)	21	2	6
(Indirect), Y	AND (aa),Y	31	2	5*

\*Add 1 if page boundary is crossed.

## ASL

*Accumulator Shift Left*

Operation: C ← [7 6 5 4 3 2 1 0] ← 0

N Z C I D V  
✓ ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Accumulator	ASL A	0A	1	2
Zero Page	ASL aa	06	2	5
Zero Page, X	ASL aa,X	16	2	6
Absolute	ASL aaaa	0E	3	6
Absolute, X	ASL aaaa,X	1E	3	7

## BCC

*Branch on Carry Clear*

Operation: Branch on C = 0

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BCC aa	90	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BCC aaaa), and convert it to a relative address.

## BCS

*Branch on Carry Set*

Operation: Branch on C = 1

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BCS aa	B0	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to next page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BCS aaaa), and convert it to a relative address.

## BEQ

### *Branch on Result Equal to Zero*

Operation: Branch on Z = 1

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BEQ aa	F0	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to next page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BEQ aaaa), and convert it to a relative address.

## BIT

### *Test Bits in Memory with Accumulator*

Operation: A M, M<sub>7</sub> → N, M<sub>6</sub> → V

Bit 6 and 7 are transferred to the Status Register. If the result of A M is zero then Z = 1, otherwise Z = 0

N Z C I D V  
M<sub>7</sub> ✓ — — M<sub>6</sub>

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	BIT aa	24	2	3
Absolute	BIT aaaa	2C	3	4

## BMI

### *Branch on Result Minus*

Operation: Branch on N = 1

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BMI aa	30	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BMI aaaa), and convert it to a relative address.

## **BNE**

*Branch on Result Not Equal to Zero*

Operation: Branch on Z = 0

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BNE aa	D0	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BNE aaaa), and convert it to a relative address.

## **BPL**

*Branch on Result Plus*

Operation: Branch on N = 0

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BPL aa	10	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BPL aaaa), and convert it to a relative address.

## **BRK**

*Force Break*

Operation: Forced Interrupt PC + 2 ↓ P ↓

B N Z C I D V  
1 - - - 1 - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	BRK	00	1	7

## BVC

### *Branch on Overflow Clear*

Operation: Branch on V = 0

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BVC aa	50	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BVC aaaa), and convert it to a relative address.

## BVS

### *Branch on Overflow Set*

Operation: Branch on V = 1

N Z C I D V

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Relative	BVS aa	70	2	2*

\*Add 1 if branch occurs to same page.

Add 2 if branch occurs to different page.

Note: AIM 65 will accept an absolute address as the operand (instruction format BVS aaaa), and convert it to a relative address.

## CLC

### *Clear Carry Flag*

Operation: 0 → C

N Z C I D V

-- 0 --

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	CLC	18	1	2

## **CLD**

*Clear Decimal Mode*

Operation:  $0 \rightarrow D$

N Z C I D V  
----- 0 -----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	CLD	D8	1	2

## **CLI**

*Clear Interrupt Disable Bit*

Operation:  $0 \rightarrow I$

N Z C I D V  
----- 0 -----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	CLI	58	1	2

## **CLV**

*Clear Overflow Flag*

Operation:  $0 \rightarrow V$

N Z C I D V  
----- 0 -----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	CLV	B8	1	2

## CMP

### *Compare Memory and Accumulator*

Operation: A — M

N Z C I D V  
✓ ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	CMP #dd	C9	2	2
Zero Page	CMP aa	C5	2	3
Zero Page, X	CMP aa,X	D5	2	4
Absolute	CMP aaaa	CD	3	4
Absolute, X	CMP aaaa,X	DD	3	4*
Absolute, Y	CMP aaaa,Y	D9	3	4*
(Indirect, X)	CMP (aa,X)	C1	2	6
(Indirect), Y	CMP (aa),Y	D1	2	5*

\*Add 1 if page boundary is crossed.

## CPX

### *Compare Memory and Index X*

Operation: X — M

N Z C I D V  
✓ ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	CPX #dd	E0	2	2
Zero Page	CPX aa	E4	2	3
Absolute	CPX aaaa	EC	3	4

## CPY

### *Compare Memory and Index Y*

Operation: Y — M

N Z C I D V  
✓ ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	CPY #dd	C0	2	2
Zero Page	CPY aa	C4	2	3
Absolute	CPY aaaa	CC	3	4

## DEC

### *Decrement Memory by One*

Operation:  $M - 1 \rightarrow M$

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	DEC aa	C6	2	5
Zero Page, X	DEC aa,X	D6	2	6
Absolute	DEC aaaa	CE	3	6
Absolute, X	DEC aaaa,X	DE	3	7

## DEX

### *Decrement Index X by One*

Operation:  $X - 1 \rightarrow X$

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	DEX	CA	1	2

## DEY

### *Decrement Index Y by One*

Operation:  $Y - 1 \rightarrow Y$

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	DEY	88	1	2

## EOR

### *Exclusive-OR Memory with Accumulator*

Operation:  $A \vee M \rightarrow A$

N Z C I D V  
✓ ✓ - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	EOR #dd	49	2	2
Zero Page	EOR aa	45	2	3
Zero Page, X	EOR aa,X	55	2	4
Absolute	EOR aaaa	4D	3	4
Absolute, X	EOR aaaa,X	5D	3	4*
Absolute, Y	EOR aaaa,Y	59	3	4*
(Indirect, X)	EOR (aa,X)	41	2	6
(Indirect), Y	EOR (aa),Y	51	2	5*

\*Add 1 if page boundary is crossed.

## INC

### *Increment Memory by One*

Operation:  $M + 1 \rightarrow M$

N Z C I D V  
✓ ✓ - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	INC aa	E6	2	5
Zero Page, X	INC aa,X	F6	2	6
Absolute	INC aaaa	EE	3	6
Absolute, X	INC aaaa,X	FE	3	7

## INX

### *Increment Index X by One*

Operation:  $X + 1 \rightarrow X$

N Z C I D V  
✓ ✓ - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	INX	E8	1	2

## **INY**

*Increment Index Y by One*

Operation:  $Y + 1 \rightarrow Y$

N Z C I D V  
✓ ✓ -----

<b>Addressing Mode</b>	<b>Assembly Language Form</b>	<b>OP Code</b>	<b>No. Bytes</b>	<b>No. Cycles</b>
Implied	INY	C8	1	2

## **JMP**

*Jump*

Operation:  $(PC + 1) \rightarrow PCL$   
 $(PC + 2) \rightarrow PCH$

N Z C I D V  
-----

<b>Addressing Mode</b>	<b>Assembly Language Form</b>	<b>OP CODE</b>	<b>No. Bytes</b>	<b>No. Cycles</b>
Absolute Indirect	JMP aaaa JMP (aaaa)	4C 6C	3 3	3 5

## **JSR**

*Jump to Subroutine*

Operation:  $PC + 2 \downarrow, (PC + 1) \rightarrow PCL$   
 $(PC + 2) \rightarrow PCH$

N Z C I D V  
-----

<b>Addressing Mode</b>	<b>Assembly Language Form</b>	<b>OP CODE</b>	<b>No. Bytes</b>	<b>No. Cycles</b>
Absolute	JSR aaaa	20	3	6

## LDA

### *Load Accumulator with Memory*

Operation: M → A

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	LDA #dd	A9	2	2
Zero Page	LDA aa	A5	2	3
Zero Page, X	LDA aa,X	B5	2	4
Absolute	LDA aaaa	AD	3	4
Absolute, X	LDA aaaa,X	BD	3	4*
Absolute, Y	LDA aaaa,Y	B9	3	4*
(Indirect, X)	LDA (aa,X)	A1	2	6
(Indirect), Y	LDA (aa),Y	B1	2	5*

\*Add 1 if page boundary is crossed.

## LDX

### *Load Index X with Memory*

Operation: M → X

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	LDX #dd	A2	2	2
Zero Page	LDX aa	A6	2	3
Zero Page, Y	LDX aa,Y	B6	2	4
Absolute	LDX aaaa	AE	3	4
Absolute, Y	LDX aaaa,Y	BE	3	4*

\*Add 1 when page boundary is crossed.

## LDY

*Load Index Y with Memory*

Operation: M → Y

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	LDY #dd	A0	2	2
Zero Page	LDY aa	A4	2	3
Zero Page, X	LDY aea,X	B4	2	4
Absolute	LDY aaaa	AC	3	4
Absolute, X	LDY aaaa,X	BC	3	4*

\*Add 1 when page boundary is crossed.

## LSR

*Local Shift Right*

Operation: 0 → 

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

 → C

N Z C I D V  
0 ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Accumulator	LSR A	4A	1	2
Zero Page	LSR aa	46	2	5
Zero Page, X	LSR aea,X	56	2	6
Absolute	LSR aaaa	4E	3	6
Absolute, X	LSR aaaa,X	5E	3	7

## NOP

*No Operation*

Operation: No Operation (2 cycles)

N Z C I D V  
---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	NOP	EA	1	2

## ORA

### *OR Memory with Accumulator*

Operation: A V M → A

N Z C I D V  
✓ ✓ -----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	ORA #dd	09	2	2
Zero Page	ORA aa	05	2	3
Zero Page, X	ORA aa,X	15	2	4
Absolute	ORA aaaa	0D	3	4
Absolute, X	ORA aaaa,X	1D	3	4*
Absolute, Y	ORA aaaa,Y	19	3	4*
(Indirect, X)	ORA (aa,X)	01	2	6
(Indirect), Y	ORA (aa),Y	11	2	5*

\*Add 1 on page crossing.

## PHA

### *Push Accumulator on Stack*

Operation: A ↓

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	PHA	48	1	3

## PHP

### *Push Processor Status on Stack*

Operation: P↓

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	PHP	08	1	3

## PLA

*Pull Accumulator from Stack*

Operation: A↑

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	PLA	68	1	4

## PLP

*Pull Processor Status from Stack*

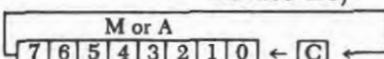
Operation: P↑

N Z C I D V  
From Stack

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	PLP	28	1	4

## ROL

*Rotate Left*

Operation: M or A      

N Z C I D V  
✓ ✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Accumulator	ROL A	2A	1	2
Zero Page	ROL aa	26	2	5
Zero Page, X	ROL aa,X	36	2	6
Absolute	ROL aaaa	2E	3	6
Absolute, X	ROL aaaa,X	3E	3	7

## ROR

*Rotate Right*

Operation:	C	→	M or A	N Z C I D V
			7 6 5 4 3 2 1 0	✓ ✓ ✓ — —

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Accumulator	ROR A	6A	1	2
Zero Page	ROR aa	66	2	5
Zero Page, X	ROR aa,X	76	2	6
Absolute	ROR aaaa	6E	3	6
Absolute, X	ROR aaaa,X	7E	3	7

## RTI

*Return from Interrupt*

Operation: P↑ PC↑

N Z C I D V  
From Stack

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	RTI	40	1	6

## RTS

*Return from Subroutine*

Operation: PC↑, PC + 1 → PC

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	RTS	60	1	6

## SBC

### *Subtract from Accumulator with Carry*

Operation:  $A - M - \bar{C} \rightarrow A$

Note:  $\bar{C} = \text{Borrow}$

N	Z	C	I	D	V
✓	✓	✓	-	-	✓

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Immediate	SBC #dd	E9	2	2
Zero Page	SBC aa	E5	2	3
Zero Page, X	SBC aa,X	F5	2	4
Absolute	SBC aaaa	ED	3	4
Absolute, X	SBC aaaa,X	FD	3	4*
Absolute, Y	SBC aaaa,Y	F9	3	4*
(Indirect, X)	SBC (aa,X)	E1	2	6
(Indirect), Y	SBC (aa),Y	F1	2	5*

\*Add 1 when page boundary is crossed.

## SEC

### *Set Carry Flag*

Operation: 1 → C

N	Z	C	I	D	V
-	-	1	-	-	-

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	SEC	38	1	2

## SED

### *Set Decimal Mode*

Operation: 1 → D

N	Z	C	I	D	V
-	-	-	-	1	-

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	SED	F8	1	2

## SEI

*Set Interrupt Disable Status*

Operation:  $1 \rightarrow I$

N Z C I D V  
--- 1 ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	SEI	78	1	2

## STA

*Store Accumulator in Memory*

Operation:  $A \rightarrow M$

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	STA aa	85	2	3
Zero Page, X	STA aa,X	95	2	4
Absolute	STA aaaa	8D	3	4
Absolute, X	STA aaaa,X	9D	3	5
Absolute, Y	STA aaaa,Y	99	3	5
(Indirect, X)	STA (aa,X)	81	2	6
(Indirect, Y)	STA (aa),Y	91	2	6

## STX

*Store Index X in Memory*

Operation:  $X \rightarrow M$

N Z C I D V  
-----

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	STX aa	86	2	3
Zero Page, Y	STX aa,Y	96	2	4
Absolute	STX aaaa	8E	3	4

## **STY**

*Store Index Y in Memory*

Operation:  $Y \rightarrow M$

N Z C I D V  
/ / - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Zero Page	STY aa	84	2	3
Zero Page, X	STY aa,X	94	2	4
Absolute	STY aaaa	8C	3	4

## **TAX**

*Transfer Accumulator to Index X*

Operation:  $A \rightarrow X$

N Z C I D V  
/ / - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TAX	AA	1	2

## **TAY**

*Transfer Accumulator to Index Y*

Operation:  $A \rightarrow Y$

N Z C I D V  
/ / - - -

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TAY	A8	1	2

## TSX

*Transfer Stack Pointer to Index X*

Operation: S → X

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TSX	BA	1	2

## TXA

*Transfer Index X to Accumulator*

Operation: X → A

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TXA	8A	1	2

## TXS

*Transfer Index X to Stack Pointer*

Operation: X → S

N Z C I D V  
---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TXS	9A	1	2

## TYA

*Transfer Index Y to Accumulator*

Operation: Y → A

N Z C I D V  
✓ ✓ ---

Addressing Mode	Assembly Language Form	OP CODE	No. Bytes	No. Cycles
Implied	TYA	98	1	2

## Extramon: A Machine Code Assembler

```
100 PRINT "TINY PEEKER/POKER"
110 X$="*": INPUT X$: IF X$="*" THEN END
120 GOSUB 500
130 IF E GOTO 280
140 A=V
150 IF J > LEN(X$) GOTO 300
160 FOR I=0 TO 7
170 P=J: GOSUB 550
180 C(I)=V
190 IF E GOTO 280
200 NEXT I
210 T=0
220 FOR I=0 TO 7
230 POKE A+I, C(I)
240 T=T+C(I)
250 NEXT I
260 PRINT "CHECKSUM="; T
270 GOTO 110
280 PRINT MID$(X$, 1, J); "?": GOTO 110
300 T=0
310 FOR I=0 TO 7
320 V=PEEK(A+I)
330 T=T+V
340 V=V/16
350 PRINT " ";
360 FOR J=1 TO 2
370 V% = V
380 V=(V-V%)*16
390 IF V% > 9 THEN V% = V% + 7
400 PRINT CHR$(V%+48);
410 NEXT J
420 NEXT I
430 PRINT "/";
440 GOTO 110
500 P=1
510 L=4
520 GOTO 600
550 P=J
560 L=2
600 E=0
610 V=0
620 FOR J=P TO LEN(X$)
630 X=ASC(MID$(X$, J))
640 IF X=32 THEN NEXT J
650 IF J > LEN(X$) THEN 790
660 P=J
670 FOR J=PTOLEN(X$)
680 X=ASC(MID$(X$, J))
```

690 IF X<>32 THEN NEXT J  
 700 IF J-P<>L THEN 790  
 710 FORK=PTDJ-1  
 720 X=ASC(MID\$(X\$,K))  
 730 IF X<58 THEN X=X-48  
 740 IF X>64 THEN X=X-55  
 750 IF X<0 OR X>15 THEN 790  
 760 V=V\*16+X  
 770 NEXT K  
 780 RETURN  
 790 E=-1  
 800 RETURN

```

.:0800 00 1A 0B 64 00 99 22 93  .:0800 02 20 4B FA 00 A0 3B 02  .:0C00 60 A2 02 2C A2 00 00 B4 00 02 E6
.:0808 12 1D 10 1D 53 55 50  .:0808 20 4B FA 00 20 87 FB 00  .:0C08 C1 00 08 B4 C2 00 02 E6
.:0810 45 52 20 36 34 2D 4F  .:0810 20 4B FB 00 F0 5C 20 3E  .:0C10 26 06 C2 D6 C1 00 02 E6
.:0818 4E 00 31 0E 06 09 22  .:0818 FB 00 20 79 FA 00 90 33  .:0C1B FB 00 C9 20 F0 F9 00 09 49
.:0820 11 20 20 20 20 20 20  .:0820 20 69 FA 00 20 3E FB 00  .:0C20 00 00 00 00 01 20 CC
.:0828 20 20 20 20 20 20 20  .:0828 20 79 FA 00 90 26 20 69  .:0C28 FA 00 20 BF FA 00 00 20 7C
.:0830 00 48 0B 78 00 99 22 11  .:0830 FA 00 A9 90 20 D2 FF 20  .:0C30 FA 00 99 05 60 20 3E FB
.:0838 20 2E 4B 49 4D 20 42  .:0838 E1 FF F0 3C A6 26 00 38  .:0C38 00 20 79 FA 00 B0 DE AE
.:0840 55 54 54 45 52 44 49 45  .:0840 A5 C3 C5 C1 A5 C4 E5 C2  .:0C40 3F 02 9A A9 00 20 D2 FF
.:0848 44 40 40 40 40 40 40 40  .:0848 50 2E A0 3A 20 C2 FB 00  .:0C48 A9 2F 20 D2 FF AC 47 FB
.:0850 28 C2 28 34 33 29 40 32  .:0850 20 41 FA 00 20 BB FB 00  .:0C50 00 20 54 FD 00 CR DO FA
.:0855 35 AC C2 28 34 34 29 29  .:0855 E0 EC 4D ED FA 00 20 79  .:0C58 60 E6 C5 00 02 E6 CA 60
.:0860 A1 31 32 37 29 00 00 00  .:0860 FA 00 90 03 20 80 FB 00  .:0C60 A2 02 B5 CO 4B P5 27 95
.:0868 00 AA AA AA AA AA AA AA  .:0868 20 FB 00 00 07 20 79  .:0C68 C0 69 95 27 CA 00 F3 60
.:0870 AA AA AA AA AA AA AA AA  .:0870 FA 00 90 EB A9 00 85 1D  .:0C70 A5 C3 A4 C4 58 E9 02 80
.:0879 AA AA AA AA AA AA AA AA  .:0879 20 3E FB 00 20 41 FB 00  .:0C78 0E BB 90 08 A5 2B 44 29

```

```

.:0880 A5 2D B5 22 A5 2E B5 23  .:0880 00 00 00 00 00 00 00 00  .:0C80 4C 23 FB 00 00 A5 C3 A8 EA
.:0888 A5 37 B5 24 A5 3B 85 25  .:0888 FB F9 4C 47 FB 00 20 CF  .:0C88 36 E5 C1 B5 1E 98 E5 C2
.:0890 A0 00 A5 22 D0 02 C3 23  .:0890 D1 20 79 FA 00 90 03 20  .:0C90 00 00 00 00 00 00 00 00
.:0898 C6 22 B1 22 00 3C A5 22  .:0898 FB 00 89 90 20 02 FF  .:0C98 20 69 FA 00 20 E5 FA 00
.:08A0 D1 02 C6 23 C6 22 B1 22  .:08A0 3E 02 00 00 00 00 00 00  .:0CA0 20 0C FB 00 20 E5 FA 00
.:08AB F1 21 B5 26 A5 22 00 02  .:08AB 48 AD 54 02 4B AD 3B 02  .:0CAB 20 2F FB 00 26 69 FA 00
.:08BD C6 23 C6 22 B1 22 18 A5  .:08AB 48 AD 5C 02 A6 3D 02 AC  .:0CB0 90 15 A6 25 04 00 20 28
.:08BC 24 A5 26 65 25 48 4F  .:08BC 3E 02 40 A9 96 20 02 FF  .:0CBB FB 00 90 5F A1 C1 B1 C3
.:08BD 37 D6 02 C6 38 C6 37 66  .:08AC E0 3F 02 9A 8C 02 A0 00  .:0CC0 20 05 FB 00 20 35 FB 00
.:08CB 91 37 BA 4B 37 00 02  .:08CB 01 B4 86 B4 89 BB 88 B7  .:0CCE 60 EB 20 28 FB 00 18 00 00
.:08D0 D6 C6 28 D6 37 66 91 37 18  .:08D0 B4 90 84 93 A9 40 85 BE  .:0CD0 1E 65 C5 83 C3 98 65 C4
.:08D8 90 B6 C9 4F D6 ED A5 37  .:08D8 09 02 85 BC 20 CF F9 C9  .:0CDE 85 C4 20 0C FB 00 A6 26
.:08E0 B5 35 AS 38 B5 34 3C 37  .:08E0 20 F0 F9 C9 00 F0 3B C9  .:0CDE 00 3D A1 C1 B1 C3 20 28
.:08E8 00 4F 4F 4F 4D 6E FF  .:08E8 22 D0 14 20 CF FF C9 22  .:0CEB FB 00 B0 34 20 BB FA 00
.:08F0 00 16 D2 02 ED F7 FF 00  .:08F0 F0 10 C9 00 F0 29 91 B8  .:0CF0 20 BB FA 00 00 4C TD FB 00
.:08FB BD 17 03 A9 B0 20 90 FF  .:08FB E6 B7 CB C0 10 00 E1 4C  .:0CFB 20 D4 FA 00 20 89 FA 00

```

```

.:0900 00 00 DB 6B 8D 3E 02 6B  .:0800 ED FA 00 20 CF FF C9 00  .:0D00 20 E5 FA 00 20 69 FA 00
.:0908 BD 3D 02 6B 6B 3C 02 6B  .:0808 F0 16 C9 2C 00 DC 20 88  .:0D08 20 3E FB 00 20 BB FA 00
.:0910 BD 3B 02 6B 6A 6B 3B 2B  .:0810 FA 00 29 F0 E9 C9 03  .:0D10 90 14 B5 1D AB 26 00 11
.:0918 8B 02 BD 34 02 99 E9  .:0818 F0 E5 85 20 20 CF FF C9  .:0D18 20 2F FB 00 90 00 05 1D
.:0920 00 00 00 00 00 00 00 00  .:0820 00 60 6C 30 05 6C 32 03  .:0D20 81 C1 20 33 F9 00 00 DE
.:0928 02 20 57 FD 00 A2 42 49  .:0828 20 96 F9 00 00 D4 A9 90  .:0D28 4C ED FA 00 00 4C 47 FB 00
.:0930 24 20 57 FA 00 09 52 00  .:0830 20 B2 FF 00 00 20 EF  .:0D30 20 D4 FA 00 20 69 FA 00
.:0938 34 E6 C1 00 06 E2 C2 00  .:0838 F9 00 05 A9 29 10 00 C4  .:0D38 20 E5 FA 00 20 69 FA 00
.:0940 E2 66 20 60 CF FF C9  .:0840 4C 47 FB 00 20 96 F9 00  .:0D40 20 3E FB 00 A2 00 00 20
.:0948 UD FD 6B 6B A9 90 20  .:0848 C9 2C 00 20 80 20 79 FA 00  .:0D48 3E FB 00 C9 27 00 14 20
.:0950 BD F6 00 00 00 00 00 00  .:0850 20 65 FA 00 20 CF FF C9  .:0D50 3E FB 00 90 10 02 0E 20
.:0958 0B A9 2E 20 57 FA 00 A9  .:0858 20 20 80 20 80 20 79 FA 00  .:0D58 CF FF C9 00 F0 22 ED 20
.:0960 05 20 D2 02 ED 3E BB 00  .:0860 C1 85 BE 05 C2 85 4F 20  .:0D60 00 F1 FO IC 9E 00 00 01
.:0968 C9 JE FA F9 C9 20 FD F5  .:0868 69 FA 00 20 CF FF C9 0D  .:0D68 20 BB FA 00 90 C6 90 10
.:0970 A2 0E D2 02 FD 00 00 00 00  .:0870 00 98 99 90 20 D2 FF 20  .:0D70 02 EB 20 CF FF C9 00 00
.:0978 BA 00 AA BD U7 FF 00 4B  .:0878 F2 F9 00 4C 47 FB 00 A5  .:0D78 09 20 88 FA 00 90 B6 E0

```

```

.:0980 BD C6 FF 00 4B 60 CA 10  .:0880 C2 20 4B FA 00 A5 C1 4B  .:0D80 20 D0 EC B6 1C A9 90 20
.:0988 EL 4C ED FA 00 A5 C1 4B  .:0888 4A 46 4A 20 60 FA 00  .:0D88 D2 FF 00 57 FD 00 A2 00
.:0990 5A 02 A5 C2 B9 39 02 60  .:0890 AA 6B 29 F0 20 60 FA 00  .:0D90 00 A0 90 00 B1 C1 D0 10
.:0998 A9 08 B5 JD A0 00 00 20  .:0898 4B 8A 20 D2 FF 6B 4C D2  .:0D98 02 D0 0C CB EB E4 1C D0
.:09A0 54 FD 00 B1 C1 20 4B FA  .:08A0 F0 09 30 C9 3A 90 02 69  .:0DA0 F5 20 41 FA 00 20 54 FD
.:09A8 00 20 33 FB 00 C4 1D D0  .:08A8 06 60 A2 02 B5 C0 4B B5  .:0DAB 00 20 33 FB 00 A6 26 00
.:09B1 F1 60 20 BB FA 00 90 0B  .:08B0 C9 95 C0 6B 95 C2 CB D0  .:0DB0 80 20 2F FB 00 B0 00 D4 4C
.:09B8 A2 00 00 B1 C1 C1 C1 F0  .:08B8 F3 60 20 88 FA 00 90 02  .:0DB8 47 FB 00 20 D4 FA 00 B5
.:09C0 03 4C ED FA 00 20 32 FB  .:08C0 B5 C2 20 BB FA 00 90 02  .:0DC0 20 A5 C2 85 21 A2 00 00
.:09CB 00 C6 1D 60 A9 3B 85 C1  .:08CB C1 60 A9 00 00 85 2A  .:0DCB 86 29 A9 93 20 D2 FF A9
.:09D0 A9 02 B5 C2 A9 05 60 98  .:08D0 20 3E FB 00 C9 20 00 09  .:0DD0 90 20 D2 FF A9 16 85 1D
.:09D8 4B 20 57 FD 00 60 A2 2E  .:08D8 20 3E FB 00 C9 20 00 06  .:0DD8 20 6A FC 00 20 CA FC 00
.:09E0 4C 57 FA 00 A9 90 20 D2  .:08E0 18 60 20 AF FA 00 00 04  .:0DE0 85 C1 B4 C2 C6 1D D2 F2
.:09E8 FF A2 00 00 BD EA FF 00  .:08E8 0A 0A B5 24 20 3E FB 00  .:0DEB A9 41 20 D2 FF 4C 47 FB
.:09F0 20 D2 FD EB E6 1D 00 F5  .:08F0 20 AF FA 00 05 2A 36 60  .:0DF0 00 A0 2C 20 C2 FB 00 20
.:09FB A0 3B 20 C2 F0 00 AD 39  .:08FB C9 34 90 A2 69 08 29 0F  .:0DFB 54 F0 00 20 41 FA 00 20

```

```

.10EB00 54 FD 00 A2 00 00 A1 C1 .10FB8F F6 00 ED A2 02 20 CF .1100 59 00 00 58 24 24 00 00
.10EB02 20 D9 FC 00 48 20 1F FD .10FB88 FF C9 0D F0 1E C5 20 F0 .110B 1C 8A 1C 23 50 BB 18 A1
.10EB10 00 68 20 35 FD 00 A2 06 .10FB90 F5 20 D0 FE 00 80 0F 20 .1110 90 BB 1D 23 9D BB 1D A1
.10EB18 EU 03 D0 12 42 1F FC 0E .10FB98 9C FA 0U A4 CI B4 C2 B5 .111B 00 00 29 19 AE 69 AB 19
.10EB20 A5 24 C9 EB B1 C1 B0 1C .10FB9A C1 A9 30 9D 10 02 EB 9D .1120 23 24 53 18 23 23 53 19
.10EB28 20 C2 FC 00 BB 00 F2 06 .10FBAB 10 02 EB DD B6 26 A2 .112B A1 00 00 16 58 BB A5 69
.10EB30 2A 90 0E 8D 2A FF 00 20 .10FB80 00 00 B6 26 F0 04 E6 26 .1130 24 24 AE AE AB AD 29 00
.10EB38 A5 FD 00 8D 30 FF 00 F0 .10FB88 F0 75 A2 00 00 86 1D A5 .113B 00 7C 00 00 15 9C 6D 9C
.10EB40 03 20 A5 FD 00 CA DD 05 .10FC0 26 20 D9 FC 00 A6 2A B6 .1140 A5 69 29 53 84 13 34 11
.10EB48 60 20 CD FC 00 AA EB 00 .10FCB 29 AA BC 37 FF 00 80 77 .114B A5 69 23 A0 DB 62 5A 4B
.10EB50 01 CB 9C 20 C2 FC 00 8A .10FD0 FF 00 20 B9 FE 00 00 E0 E3 .1150 26 62 94 88 54 44 CB 54
.10EB58 B1 20 4B FA 00 A6 1C .10FD8 A2 06 E0 05 D0 19 A4 1F .115B 68 44 EB 94 00 00 BA 08
.10EB60 50 A5 1F 3B 4A C2 A0 10 .10FE0 F0 15 A5 2A C9 84 A9 30 .1160 B4 74 84 28 AE 74 FC CC
.10EB68 01 BB 65 C1 90 01 CB 60 .10FEB 80 21 20 BF FE 00 00 DC .116B 4A 72 F2 AA 84 00 00 AA
.10EB70 A8 44 90 0B 8A 80 17 C9 .10FFB 20 21 FE 00 00 27 BB 80 .1170 A2 A2 74 74 74 72 44 68
.10EB78 22 F0 04 13 29 07 09 B0 4A .10FFB E0 04 2A 90 00 BC 30 FF .117B B2 32 B2 00 00 22 00

```

```

.10EBH AA BD 04 FE 00 BD 04 4A .11000 00 BD 2A FF 00 20 B9 FE .1180 1A 1A 26 26 72 72 BB CB
.10EBH 4A 4A 29 0F 00 04 A0 .11008 00 00 D0 B5 CA 00 D1 F0 0A .118B C4 CA 26 4B 44 44 A2 CB
.10E90 80 A9 00 00 AA 00 10 FF .11010 20 BB FE 00 00 AB 20 BB .1190 3A 3B 52 40 47 58 4C 53
.10E98 00 85 26 29 03 85 1F 98 .11018 FE 00 00 D0 A6 AS 28 CS 1D .119B 54 46 48 44 50 2C 41 42
.10EA0 29 AF 98 00 03 E0 B0 .11020 D0 A0 20 69 FA 00 04 AF 1E .11A0 F9 00 35 F9 00 CC FB 90
.10EB8 F0 08 46 90 00 4A 09 .11028 F0 28 AS 29 C9 9D 00 JA .11AB F7 FB 00 06 F9 00 89 F9
.10EB0 20 BB 00 FA CB BB 00 F2 .11030 20 1C FB 00 90 00 9B 00 .11B0 00 F4 F9 00 0C FA 00 3E
.10EBB 60 B1 C1 20 C2 FC 00 A2 .11038 04 A5 1E 10 04 AC ED FA .11B8 FB 00 92 FB 00 CO FB 00
.10ED0 00 20 FE FA 00 C4 1F CB .11040 00 CB 00 FA AS 1E 10 F6 .11C0 3B FC 00 5B FD 00 8A FD
.10ECB 90 F1 A2 03 CO 04 90 F2 .11048 A4 JF D0 03 B9 C2 00 00 .11CB 00 AC FD 00 46 FB 00 FF
.10EDU 60 B9 37 FF 00 8B 28 .11050 91 C1 BB 00 FB 85 26 91 .11D0 F7 00 ED F7 00 00 00 20 20
.10EDB B9 77 FF 00 85 29 49 00 .11058 C1 20 CA FC 00 B5 CI 84 .11DB 20 50 43 20 20 53 52 20
.10EED 00 A0 05 06 29 26 28 9A .11060 C2 49 20 20 D2 FF 00 41 .11E0 41 43 20 58 52 20 59 52
.10EEB 90 D0 F8 69 3F 20 02 FF .11068 20 2C FB 00 20 54 FD 00 .11EB 20 53 50 58 80 01 22 20
.10EF0 00 D0 EC AF 20 2C A9 00 .11070 20 41 FA 00 20 54 FD 00
.10EFB 4C D2 FF 20 D4 FA 00 20 .11078 AF 05 20 02 FF AC 00

```

#### Instructions for entering and using Supermon64

##### Entering the program

##### Enter in immediate mode:

POKE 8192,0:POKE 44,32:NEW <return>

This moves the start of Basic to decimal 12800, and gives us room to put in Supermon. Now type in Tinv Peeker/Poker.

Run the program, and in answer to the question prompt type in the memory address and memory contents as given in the 20 blocks of data at the end of this section. You can look at memory just by entering the memory address.

When you've finished, type in immediate mode :

POKE 44,0B:CLR <return>

which puts Basic back to normal again. You can now save Supermon by using a normal Basic SAVE. Before running it, you'll need to check that its all there, so in immediate mode, enter the following line (you'll need to use Basic abbreviations e.g. ? for PRINT, P shifted E for PEEK, and so on, to fit it all in):

```
M=1:FORJ=0TO1B:FORI=2048+128*NTO2047+128*N:A=A+
PEEK(I):NEXTI:PRINTA;J:A=0:N=N+1:M=M+1:NEXTJ
```

This should display the following numbers on your screen, together with the block number :

```
10021, 13841, 14762, 15283, 14641, 16091, 16771,
13076, 15720, 14716, 14189, 15165, 14543, 15051,
14669, 16467, 16259, 9635, 11241
```

although they'll be in column form on the screen. Due to the vagaries of Basic the first number might differ (I got 12205 once!), but running the check again should sort it out. If one of your numbers disagrees, we'll need to go back to the beginning with Tiny Peeker again. So, enter the first set of POKEs again (Supermon will still be there), enter or re-load Tiny Peeker, and check each incorrect block. The last block will have to be checked by hand.

When you've done that, enter POKE 44,0B:CLR again, re-SAVE Supermon, and run the checking program. When you've finally got it right, the 64 is yours for the disassembling!

#### Using Supermon 64

This will be given in the form COMMAND, followed by the syntax.

##### 1) Simple Assembler

```
.A 2000 LDA#12
start assembly at 2000 hex.
```

##### 2) Disassembler

```
.D 2000
disassemble hex from 2000 onwards.
```

##### 3) Printing Disassembler

```
.P 2000,2040
engage printer beforehand with OPEN4,4:CMD4.
```

##### 4) Fill memory

```
.F 1000 J100 FF
fill memory from 1000 to J100 hex with the byte FF.
```

##### 5) Go run

```
.G 1000
go to hex 1000 and execute program there.
```

##### 6) Hunt memory

```
.H C000 D000 READ
look from C000 to D000 for the ASCII string READ.
```

##### 7) Load

```
.L "FRED",0B
```

##### 8) Memory display

```
.M 0800 0B20
display memory from hex 0800 to 0B20.
```

##### 9) Register display

```
.R
displays register values when Extension was entered.
```

##### 10) Save

```
.S "0MFRED",0B,0B00,0B20
save memory from hex 0B00 to 0B20 onto device 0B
drive 1, and call that portion of memory FRED.
```

##### 11) Transfer memory

```
.T 1000 1100 5000
transfer memory in the range hex 1000 to 1100 and start storing it at hex 5000 onwards.
```

##### 12) Exit to Basic

```
.Q
return to Basic ready mode. Perform a CLR before doing anything.
```

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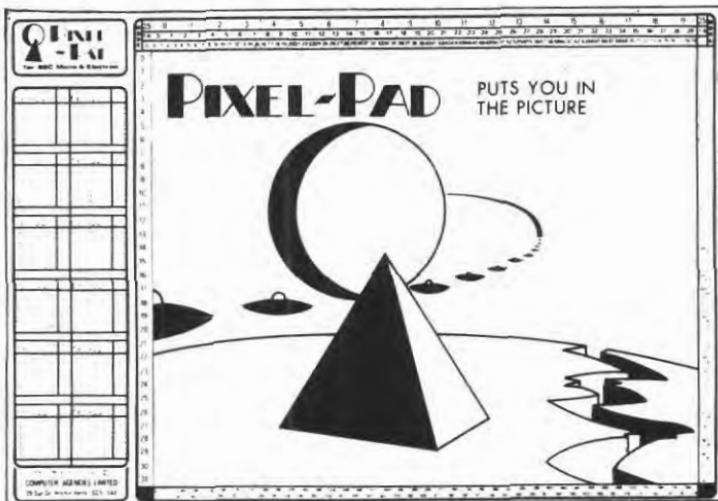
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