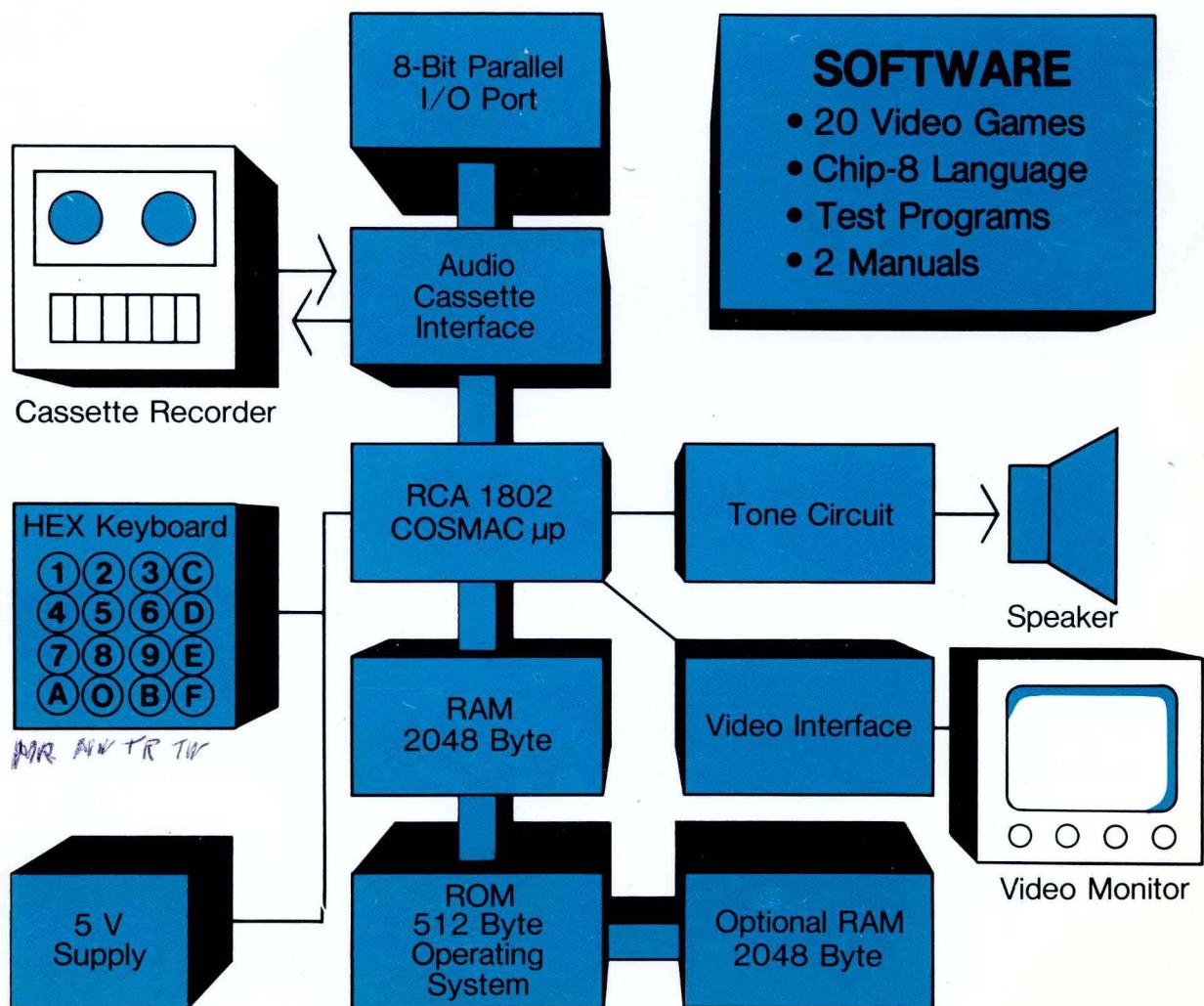


RCA COSMAC VIP CDP18S711

Instruction Manual



RCA COSMAC VIP CDP18S711

Instruction Manual

RCA Solid State Division, Somerville, N. J. 08876

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ACKNOWLEDGMENT

COSMAC VIP has been created by Joe Weisbecker of the RCA Laboratories, Princeton, N.J. so that everyone can have fun and useful personal computer experiences. The elegant and simple hardware system design and the powerful video output together with the customized CHIP-8 language interpreter constitute a fresh and promising approach to personal computers.

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III. CHIP-8 Language Programming

CHIP-8 is an easy-to-learn programming language that lets you write your own programs. To use the CHIP-8 language, you must first store the 512-byte CHIP-8 language program at memory locations 0000 to 01FF. The CHIP-8 language program is shown in Appendix C in hex form so you can enter it directly in memory using the hex keyboard. You can then record it on a memory cassette for future use. Each CHIP-8 instruction is a two-byte (4-hex-digit) code. There are 31, easy-to-use CHIP-8 instructions as shown in Table I.

When using CHIP-8 instructions your program must always begin at location 0200. There are 16 one-byte variables labeled 0-F. VX or VY refers to the value of one of these variables. A 63FF instruction sets variable 3 to the value FF (V3=FF). I is a memory pointer that can be used to specify any location in RAM. An A232 instruction would set I=0232. I would then address memory location 0232.

Branch Instructions

There are several types of jump or branch instructions in the CHIP-8 language. Instruction 1242 would cause an unconditional branch to the instruction at memory location 0242. Instruction BMMM lets you index the branch address by adding the value of variable 0 to it before branching. Eight conditional skip instructions let you test the values of the 16 one-byte variables or determine if a specific hex key is being pressed. This latter capability is useful in video game programs. (Only the least significant hex digit of VX is used to specify the key.)

A 2570 instruction would branch to a subroutine starting at location 0570. 00EE at the end of this subroutine will return program execution to the

instruction following the 2570. The subroutine itself could use another 2MMM instruction to branch to (or call) another subroutine. This technique is known as subroutine nesting. Note that all subroutines called (or branched to) by 2MMM instructions must end with 00EE. Ignoring this rule will cause hard-to-find program bugs.

How to Change and Use the Variables

The CXKK instruction sets a random byte value into VX. This random byte would have any bits matching 0 bit positions in KK set to 0. For example, a C407 instruction would set V4 equal to a random byte value between 00 and 07.

A timer (or real-time clock) can be set to any value between 00 and FF by a FX15 instruction. This timer is automatically decremented by one, 60 times per second until it reaches 00. Setting it to FF would require about 4 seconds for it to reach 00. This timer can be examined with a FX07 instruction. A FX18 instruction causes a tone to be sounded for the time specified by the value of VX. A value of FF would result in a 4-second tone. The minimum time that the speaker will respond to is that corresponding to the variable value 02.

A FX33 instruction converts the value of VX to decimal form. Suppose I=0422 and V9=A7. A F933 instruction would cause the following bytes to be stored in memory:

0422	01
0423	06
0424	07

Since A7 in hex equals 167 in decimal, we see that the

Table I – CHIP-8 Instructions

Instruction	Operation
1MMM	Go to 0MMM
BMMM	Go to 0MMM + VO
2MMM	Do subroutine at 0MMM (must end with 00EE)
00EE	Return from subroutine
3XKK	Skip next instruction if VX = KK
4XKK	Skip next instruction if VX ≠ KK
5XY0	Skip next instruction if VX = VY
9XY0	Skip next instruction if VX ≠ VY
EX9E	Skip next instruction if VX = Hex key (LSD)
EXA1	Skip next instruction if VX ≠ Hex key (LSD)
6XKK	Let VX = KK
CXKK	Let VX = Random Byte (KK = Mask)
7XKK	Let VX = VX + KK
8XY0	Let VX = VY
8XY1	Let VX = VX/VY (VF changed)
8XY2	Let VX = VX & VY (VF changed)
8XY4	Let VX = VX + VY (VF = 00 if VX + VY ≤ FF, VF = 01 if VX + VY > FF)
8XY5	Let VX = VX - VY (VF = 00 if VX < VY, VF = 01 if VX ≥ VY)
FX07	Let VX = current timer value
FX0A	Let VX = hex key digit (waits for any key pressed)
FX15	Set timer = VX (01 = 1/60 second)
FX18	Set tone duration = VX (01 = 1/60 second)
AMMM	Let I = 0MMM
FX1E	Let I = I + VX
FX29	Let I = 5-byte display pattern for LSD of VX
FX33	Let MI = 3-decimal digit equivalent of VX (I unchanged)
FX55	Let MI = VO : VX (I = I + X + 1)
FX65	Let VO : VX = MI (I = I + X + 1)
00E0	Erase display (all 0's)
DXYN	Show n-byte MI pattern at VX-VY coordinates. I unchanged. MI pattern is combined with existing display via EXCLUSIVE-OR function. VF = 01 if a 1 in MI pattern matches 1 in existing display.
0MMM	Do machine language subroutine at 0MMM (subroutine must end with D4 byte)

three RAM bytes addressed by I contain the decimal equivalent of the value of V9.

If I=0327, a F355 instruction will cause the values of V0, V1, V2, and V3 to be stored at memory locations 0327, 0328, 0329, and 032A. If I=0410, a F265 instruction would set V0, V1, and V2 to the values of the bytes stored at RAM locations 0410, 0411, and 0412. FX55 and FX65 let you store the values of variables in RAM and set the values of variables to RAM bytes. A sequence of variables (V0 to VX) is always transferred to or from RAM. If X=0, only V0 is transferred.

The 8XY1, 8XY2, and 8XY4, and 8XY5 instructions perform logic and binary arithmetic operations on two 1-byte variables. VF is used for overflow in the arithmetic operations.

Using the Display Instructions

An 00E0 instruction erases the screen to all 0's. When the CHIP-8 language is used, 256 bytes of RAM are displayed on the screen as an array of spots 64 wide by 32 high. A white spot represents a 1 bit in RAM, while a dark (or off) spot represents a 0 bit in RAM. Each spot position on the screen can be located by a pair of coordinates as shown in Fig. 1.

The VX byte value specifies the number of horizontal spot positions from the upper left corner of the display. The VY byte value specifies the number of vertical spot positions from the upper left corner of the display.

The DXYN instruction is used to show a pattern of spots on the screen. Suppose we wanted to form the

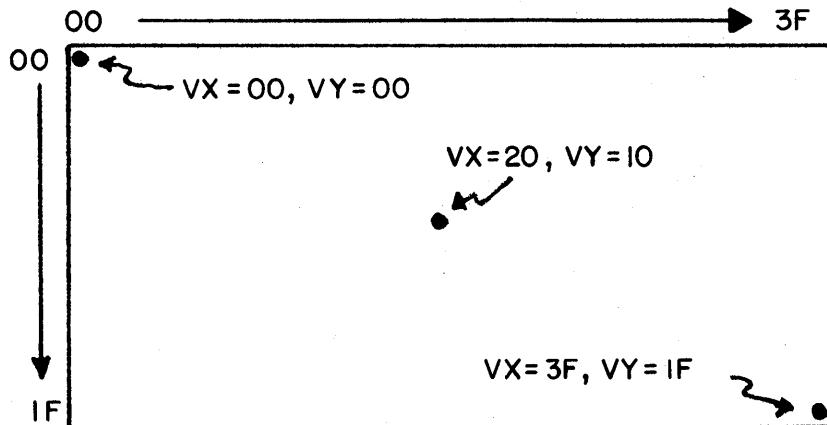


Fig. 1 – Display screen coordinate structure.

pattern for the digit “8” on the screen. First we make up a pattern of bits to form “8” as shown in Fig. 2.

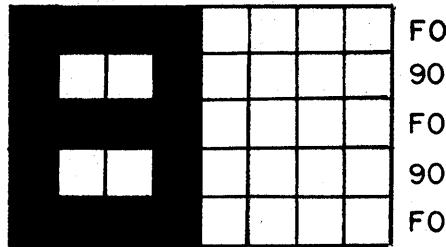


Fig. 2 – Pattern of bits forming digit 8.

In this example we made the “8” pattern five spots high by four spots wide. Patterns to be shown on the screen using the DXYN instruction must always be one byte wide and no more than fifteen bytes high. (Several small patterns can be combined to form larger ones on the screen when required). To the right of the “8” pattern in Fig. 2 are the equivalent byte values in hex form. We could now store this pattern as a list of five bytes at RAM location 020A as follows:

020A	F0
020B	90
020C	F0
020D	90
020E	F0

Suppose we now want to show this pattern in the upper left corner of the screen. We'll assign $V1=VX$ and $V2=VY$. Now we let $V1=V2=00$ and set $I=020A$. If we now do a D125 instruction, the “8”

pattern will be shown on the screen in the upper left corner.

You can write a program to show the “8” pattern on the screen as follows:

0200	A20A	I=020A
0202	6100	V1=00
0204	6200	V2=00
0206	D125	SHOW 5MI@V1V2
0208	1208	GO 0208
020A	F090	
020C	F090	
020E	F000	

The first column of this program shows the memory locations at which the instruction bytes in the second column are stored. The third column indicates the function performed by each instruction in shorthand form. Only the bytes in the second column are actually stored in memory.

With the CHIP-8 interpreter stored at 0000-01FF, you can load the above program in memory and run it. Set $V1$ and $V2$ to different values to relocate the “8” pattern on the screen. The VX - VY coordinates always specify the screen position of the upper left-hand bit of your pattern. This bit can be either 0 or 1. The last digit of the DXYN instruction specifies the height of your patterns or the number of bytes in your pattern list.

When a pattern is displayed, it is compared with any pattern already on the screen. If a 1 bit in your pattern matches a 1 bit already on the screen, then a 0 bit will be shown at this spot position and VF will be set to a value of 01. You can test VF following a DXYN instruction to determine if your pattern

touched any part of a previously displayed pattern. This feature permits programming video games which require knowing if one moving pattern touches or hits another pattern.

Because trying to display two 1 spots at the same position on the screen results in a 0 spot, you can use the DXYN instruction to erase a previously displayed pattern by displaying it a second time in the same position. (The entire screen can be erased with a single 00E0 instruction.) The following program shows the "8" pattern, shows it again to erase it, and then changes VX and VY coordinates to create a moving pattern:

```

0200 A210 I=0210
0202 6100 V1=00
0204 6200 V2=00
0206 D125 SHOW 5MI@V1V2
0208 D125 SHOW 5MI@V1V2
020A 7101 V1+01
020C 7201 V2+01
020E 1206 GO 0206
0210 F090
0212 F090
0214 F000

```

The "8" pattern byte list was moved to 0210 to make room for the other instructions. Try changing the values that V1 and V2 are incremented by for different movement speeds and angles. A delay could be inserted between the two DXYN instructions for slower motion.

The FX29 instruction sets I to the RAM address of a five-byte pattern representing the least significant hex digit of VX. If VX=07, then I would be set to the address of a "7" pattern which could then be shown on the screen with a DXYN instruction. N should always be 5 for these built-in hex-digit patterns. Appendix C shows the format for these standard hex patterns. The following program illustrates the use of the FX29 and FX33 instructions:

```

0200 6300 V3=00
0202 A300 I=0300
0204 F333 MI=V3(3DD)
0206 F265 V0:V2=MI
0208 6400 V4=00
020A 6500 V5=00
020C F029 I=V0(LSDP)
020E D455 SHOW 5MI@V4V5
0210 7405 V4+05
0212 F129 I=V1(LSDP)
0214 D455 SHOW 5MI@V4V5
0216 7405 V4+05

```

```

0218 F229 I=V2(LSDP)
021A D455 SHOW 5MI@V4V5
021C 6603 V6=03
021E F618 TONE=V6
0220 6620 V6=20
0222 F615 TIME=V6
0224 F607 V6=TIME
0226 3600 SKIP;V6 EQ 00
0228 1224 GO 0224
022A 7301 V3+01
022C 00E0 ERASE
022E 1202 GO 0202

```

This program continuously increments V3, converts it to decimal form, and displays it on the screen.

The FXOA instruction waits for a hex key to be pressed, VX is then set to the value of the pressed key, and program execution continues when the key is released. (If key 3 is pressed, VX=03). A tone is heard while the key is pressed. This instruction is used to wait for keyboard input.

Applying CHIP-8

You should now be able to write some simple CHIP-8 programs of your own. Here are some things to try:

1. Wait for a key to be pressed and show it on the display in decimal form.
2. Show an 8-bit by 8-bit square on the screen and make it move left or right when keys 4 or 6 are held down.
3. Show an 8-bit square on the screen. Make it move randomly around the screen.
4. Show a single bit and make it move randomly around the screen leaving a trail.
5. Program a simple number game. Show 100 (decimal) on the screen. Take turns with another player. On each turn you can subtract 1-9 from the number by pressing key 19. The first player to reach 000 wins. The game is more interesting if you are only allowed to press a key which is horizontally or vertically adjacent to the last key pressed.

If you are unsure of the operation of any CHIP-8 instruction, just write a short program using it. This step should clear up any questions regarding its operation. In your CHIP-8 programs be careful not to write into memory locations 0000-01FF or you will

lose the CHIP-8 interpreter and will have to reload it. You can insert stopping points in your program for debugging purposes. Suppose you want to stop and examine variables when your program reaches the instruction at 0260. Just write a 1260 instruction at location 0260. Flip RUN down and use operating system mode A to examine variables V0-VF. The memory map in Appendix C shows where you can find them.

After the above practice you are ready to design more sophisticated CHIP-8 programs. Always prepare a flowchart before actually writing a program. The last 352 bytes of on-card RAM are used for variables and display refresh. In a 2048-byte RAM system you can use locations 0200-069F for your programs. This area is enough for 592 CHIP-8 instructions (1184 bytes). In a 4096-byte RAM system you can use locations 0200-0E8F. This area is equal to 1608-CHIP-8 instructions (3216 bytes).

Some Program Ideas

Here are a few ideas for programs to write using the CHIP-8 language:

1. INTOXICATION TESTER - Display a six-digit random number on the screen for several seconds. You must remember this number and enter it from the keyboard within ten seconds after the screen goes blank to prove that you're sober and score.
2. NUMBER BASE QUIZ - Display numbers in binary or octal on the screen. You must enter their decimal equivalent to score points.
3. DICE - Push any key to simulate rolling dice displayed on the screen.
4. PUPPETS - Show large face on the screen. Let small children move mouth and roll eyes by pushing keys.
5. BUSY BOX - Let small children push keys to make different object appear on the screen, move, and make sounds.
6. SHUFFLEBOARD - Simulate shuffleboard-type games on the screen.
7. COMPUTER ART - Design new programs to generate pleasing geometric moving patterns on the screen.
8. INVISIBLE MAZE - Try to move a spot through an invisible maze. Tones indicate when you bump into a wall.
9. LUNAR LANDING - Program a graphic lunar landing game.
10. COLLIDE - Try to maneuver a spot from one edge of the screen to the other without hitting randomly moving obstacles.
11. CAPTURE - Try to chase and catch randomly moving spots within a specified time limit.
12. LEARNING EXPERIENCES - Program graphic hand and eye coordination exercises for young children or those with learning disabilities.
13. NUMBER RECOGNITION - Show groups of objects or spots on the screen. Young child must press key representing number of objects shown to score.
14. WALL BALL - Program a wall-ball-type paddle game for one player.
15. FOOTBALL - Each player enters his play via the hex keyboard and the computer moves the ball on the screen.
16. BLACKJACK - Play "21" against the computer dealer.
17. HOLIDAY DISPLAYS - Design custom, animated displays for birthdays, Halloween, Christmas, etc.
18. METRIC CONVERSION - Help children learn metric by showing lengths on screen in inches and requiring centimeter equivalent to be entered to score.
19. TURING MACHINE - Simulate a simplified Turing machine on the screen.
20. TIMER - Use the computer to time chess games, etc.
21. HEXAPAWN - Program Hexapawn so that the computer learns to play a perfect game.
22. NIM - Program Nim with groups of spots shown on the screen.
23. BLOCK PUZZLES - You can simulate a variety of sliding block-type puzzles on the screen.
24. BOMBS AWAY - Show a moving ship at the bottom of the screen. Try to hit the ship by releasing bombs from a moving plane at the top of the screen.

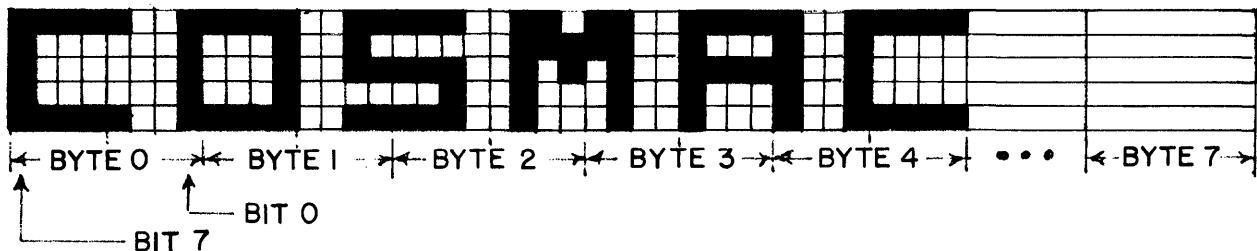
25. PROGRAMMED SPOT - Introduce children to programming concepts by letting them preprogram the movements of a spot or object on the screen.

The next section will discuss machine language programming. You can even combine machine language subroutines with CHIP-8 programs if desired.

Appendix A - Test and Operating Data

Byte Pattern for Displaying “COSMAC”

The following figure shows how the word “COSMAC” would be formed by spots (or bits) on the display screen.



The following bytes when loaded into memory will cause the word “COSMAC” to be shown on the display in a 2048-byte RAM system. Start pattern of bytes at location 0F00 in a 4096-byte system.

0700	F9	F3	E6	CF	9F	00	00	00
0708	81	12	07	C8	90	00	00	00
0710	81	13	E5	4F	90	00	00	00
0718	81	10	24	48	90	00	00	00
0720	F9	F3	E4	48	9F	00	00	00
0728	00	00	00	00	00	00	00	00

Beeper Program

This machine-language program flashes the Q light and beeps at a rate determined by the byte at location 0002. Change this byte for faster or slower rates.

0000	7A	F8	0F	BF	2F	9F	3A	04
0008	31	00	7B	30	01	00	00	00

CHIP-8 Memory Map

Location	Use
0000 . . . 01FF	CHIP-8 LANGUAGE INTERPRETER
0200 . . .	User programs using CHIP-8 instruction set (1184 bytes available in 2048-byte system)
0YAO . . .	CHIP-8 stack (48 bytes max. for up to 12 levels of subroutine nesting)
0YCF	
0YD0 . . .	Reserved for CHIP-8 INTERPRETER work area
0YEF	
0YF0	V0
0YF1	V1
0YF2	V2
0YF3	V3
0YF4	V4
0YF5	V5
0YF6	V6
0YF7	V7
0YF8	V8
0YF9	V9
0YFA	VA
0YFB	VB
0YFC	VC
0YFD	VD
0YFE	VE
0YFF	VF
0X00 . . .	256-byte RAM area for display refresh
0XFF	

CDP1802 Register Use for CHIP-8 Interpreter

R0 = DMA pointer (page 0X for display refresh)
R1 = INTERRUPT routine program counter
R2 = Stack pointer
R3 = INTERPRETER subroutine program counter
R4 = CALL subroutine program counter
R5 = CHIP-8 instruction program counter
R6 = VX pointer (R6.1 must not be changed)
R7 = VY pointer (available for machine-language subroutines)
R8 = Timers (R8.1 = timer, R8.0 = tone duration)
R9 = Random number (+1 in INTERRUPT routine)
RA = I pointer
RB = Display page pointer (RB.1 = 0X)
RC = Available
RD = Available
RE = Available
RF = Available

0X = Highest on-card RAM page (07 for 2048-byte system)

0Y = 0X - 1 (06 for 2048-byte system)

CHIP-8/Operating System Standard Digit Display Format

	HEX	ROM DIGIT	ADDRESS	BYTE	BITS 7 6 5 4 3 2 1 0	
E-	8110			F0		
	11			80		
F-	8112			F0		
	13			80		
C-	8114			F0		
	15			80		
	16			80		
	17			80		
B-	8118			F0		
	19			50		
	1A			70		
	1B			50		
D-	811C			F0		
	1D			50		
	1E			50		
	1F			50		
S-	8120			F0		
	21			80		
Z-	8122			F0		
	23			10		
6-	8124			F0		
	25			80		
8-	8126			F0		
	27			90		
9-	8128			F0		
	29			90		
3-	812A			F0		
	2B			10		
	2C			F0		
	2D			10		
A-	812E			F0		
	2F			90		
O-	8130			F0		
	31			90		
	32			90		
	33			90		
7-	8134			F0		
	35			10		
	36			10		
	37			10		
	38			10		
I-	8139			60		
	3A			20		
	3B			20		
	3C			20		
	3D			70		
4-	813E			A0		
	3F			A0		
	40			F0		
	41			20		
	42			20		

CHIP-8 User Notes

1. Do not use any of the CDP1802 three-cycle machine language instructions in CHIP-8 programs.
2. CDP1802 R5 is used as the CHIP-8 instruction counter. It will be addressing the byte following a 0MMM instruction for machine language subroutines and can be used to pass 2-byte parameters. Refer to the operating system register table in Appendix B to examine this register during CHIP-8 program debugging.
3. Display page 0X is erased to all 0's before beginning CHIP-8 programs at 0200. To inhibit erasing page 0X, change 00E0 at location 01FC to 11FE.
4. To change the display page from 0X, use a machine language subroutine to set RB.1 equal to the new display page.
5. R7, RC, RD, RE, and RF can be used as working registers in machine language subroutines. Changing other registers can cause the CHIP-8 interpreter to malfunction.
6. Do not turn off the CDP1861 video display chip in machine language subroutines. This will interfere with proper operation of the CHIP-8 interpreter.
7. Program bugs can destroy the CHIP-8 interpreter at locations 0000-01FF. If you suspect that this has happened, reload the interpreter.
8. The CHIP-8 interpreter uses subroutines and digit patterns contained in the operating system ROM. If you modify this operating system, the CHIP-8 interpreter should not be used.

Appendix D - Video Games

This Appendix contains program listings for twenty video games. These games, which illustrate entertainment applications of COSMAC VIP, were developed by Joe Weisbecker (games 1 through 8), Joyce Weisbecker (games 9 and 10), Jef Winsor (games 11, 12, and 13), Tom Chen (games 14, 15, and 16), and Phil Baltzer (games 17 through 20).

In the listing for each game, the first column is the memory location at which the instruction bytes in the second column are stored. The comments in the third column indicate the function of the instruction byte. The comments are not stored in memory.

The game titles are listed below:

Game Title	Page
1. VIP Kaleidoscope	40
2. VIP Video Display Drawing Game	41
3. VIP Wipe Off	42
4. VIP Space Intercept.....	43
5. VIP 4096-Bit Picture	44
6. VIP Figure Shooting at Moving Target	45
7. VIP Tick-Tack-Toe Game	46
8. VIP Spooky Spot	48
9. VIP Jackpot	49
10. VIP Snake Race	51
11. VIP Card Matching Game	52
12. VIP Armored Vehicle Clash	54
13. VIP Hi-Lo	56
14. VIP Hex Reflex	57
15. VIP Dot-Dash	58
16. VIP A-Mazing	60
17. VIP Deduce	62
18. VIP Shooting Stars	63
19. VIP Strike-9	64
20. VIP Card Game (like the well-known acey- ducey)	66

1. VIP Kaleidoscope

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Four spots appear in a group at the center of the screen. Press keys 2, 4, 6, or 8 to create a pattern. Keep your pattern smaller than 138 key depressions. Push key 0 to terminate pattern

```

0200 6000 V0=00
0202 6380 V3=80
0204 611F V1=1F
0206 620F V2=0F
0208 2232 DO 0232
020A A200 I=0200
020C F31E I=I+V3
020E F00A V0=KEY
0210 F055 MI=V0:V0
0212 4000 SKIP;V0 NE 00
0214 121C GO 021C
0216 7301 V3+01
0218 3300 SKIP;V3 EQ 00
021A 1208 GO 0208
021C 6380 V3=80
021E A200 I=0200
0220 F31E I=I+V3
0222 F065 V0:V0=MI
0224 4000 SKIP;V0 NE 00
0226 121C GO 021C
0228 7301 V3+01
022A 4300 SKIP;V3 NE 00
022C 121C GO 021C
022E 2232 DO 0232
0230 121E GO 021E
0232 4002 SKIP;V0 NE 02
0234 72FF V2+FF
0236 4004 SKIP;V0 NE 04
0238 71FF V1+FF
023A 4006 SKIP;V0 NE 06

```

entry. Pushing key 0 causes your pattern to be continuously repeated forming a fascinating, changing kaleidoscope display on the screen. A "44444442220" key sequence provides a very nice effect. Experiment to find other nice patterns. The subroutine at 0232-0274 causes your pattern to be duplicated in the four quadrants of the screen.

```

023C 7101 V1+01
023E 4008 SKIP;V0 NE 08
0240 7201 V2+01
0242 A277 I=0277
0244 6AE0 VA=E0
0246 8A12 VA=VA&V1
0248 6B1F VB=1F
024A 81B2 V1=V1&VB
024C 3A00 SKIP;VA EQ 00
024E 7201 V2+01
0250 6AF0 VA=F0
0252 8A22 VA=VA&V2
0254 6B0F VB=0F
0256 82B2 V2=V2&VB
0258 3A00 SKIP;VA EQ 00
025A 7101 V1+01
025C 6B1F VB=1F
025E 81B2 V1=V1&VB
0260 D121 SHOW 1MI@V1V2
0262 8A10 VA=V1
0264 6B1F VB=1F
0266 8B25 VB=VB-V2
0268 DAB1 SHOW 1MI@VAVB
026A 6A3F VA=3F
026C 8A15 VA=VA-V1
026E DAB1 SHOW 1MI@VAVB
0270 8B20 VB=V2
0272 DAB1 SHOW 1MI@VAVB
0274 00EE RET
0276 0180
0278 0000

```

2. VIP Video Display Drawing Game

This program uses the CHIP-8 INTERPRETER at 0000-01FF. A flashing spot appears in the upper left corner of the screen. You can move the spot by holding key 2, 4, 6, or 8. Press key 5 and you can draw a picture with the spot. Press key 0 and the spot can be moved without drawing or used to erase a previously drawn line. 0245-024E is a list of

initial values for V0-V9. In this program, locations 0300-03FF are used for the picture. After drawing a picture, you can change M(0208) from 00E0 to 120A. Write locations 0000-03FF (4 pages) to tape to save your picture. When you load these four pages back into memory you will see your original picture. Changing the 00E0 instruction in the program to 120A prevents your picture from being erased when the program is started.

```

0200 A245 I=0245
0202 F965 V0:V9=MI
0204 A24F I=024F
0206 0236 MLS@0236
0208 00E0 ERASE
020A F915 TIME=V9
020C FA07 VA=TIME
020E 3A00 SKIP;VA EQ 00
0210 120C GO 020C
0212 D121 SHOW 1MI@V1V2
0214 3F00 SKIP;VF EQ 00
0216 D121 SHOW 1MI@V1V2
0218 E3A1 SKIP;V3 NE KEY
021A 8030 V0=V3
021C E4A1 SKIP;V4 NE KEY
021E 8040 V0=V4
0220 4000 SKIP;V0 NE 00
0222 123C GO 023C
0224 E5A1 SKIP;V5 NE KEY
0226 72FF V2+FF

```

```

0228 E6A1 SKIP;V6 NE KEY
022A 71FF V1+FF
022C E7A1 SKIP;V7 NE KEY
022E 7101 V1+01
0230 E8A1 SKIP;V8 NE KEY
0232 7201 V2+01
0234 120A GO 020A
0236 01F8
0238 03BB
023A E2D4
023C D121 SHOW 1MI@V1V2
023E 4F00 SKIP;VF NE 00
0240 D121 SHOW 1MI@V1V2
0242 1224 GO 0224
0244 0100
0246 0000
0248 0005
024A 0204
024C 0608
024E 0880

```

3. VIP Wipe Off

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Serve the ball by pressing any key. Move the paddle left or right by

```

0200 A2CC I=02CC
0202 6A07 VA=07
0204 6100 V1=00
0206 6B08 VB=08
0208 6000 V0=00
020A D011 SHOW 1MI@V0V1
020C 7008 V0+08
020E 7BFF VB+FF
0210 3B00 SKIP;VB EQ 00
0212 120A GO 020A
0214 7104 V1+04
0216 7AFF VA+FF
0218 3A00 SKIP;VA EQ 00
021A 1206 GO 0206
021C 6600 V6=00
021E 6714 V7=14
0220 A2CD I=02CD
0222 6020 V0=20
0224 611E V1=1E
0226 D011 SHOW 1MI@V0V1
0228 631D V3=1D
022A 623F V2=3F
022C 8202 V2=V2&V0
022E 77FF V7+FF
0230 4700 SKIP;V7 NE 00
0232 12AA GO 02AA
0234 FF0A VF=KEY
0236 A2CB I=02CB
0238 D231 SHOW 1MI@V2V3
023A 65FF V5=FF
023C C401 V4=RND
023E 3401 SKIP;V4 EQ 01
0240 64FF V4=FF
0242 A2CD I=02CD
0244 6C00 VC=00
0246 6E04 VE=04
0248 EEA1 SKIP;VE NE KEY
024A 6cff VC=FF
024C 6E06 VE=06
024E EEA1 SKIP;VE NE KEY
0250 6C01 VC=01
0252 D011 SHOW 1MI@V0V1
0254 80C4 V0=V0+VC
0256 D011 SHOW 1MI@V0V1
0258 4F01 SKIP;VF NE 01
025A 1298 GO 0298
025C 4200 SKIP;V2 NE 00
025E 6401 V4=01
0260 423F SKIP;V2 NE 3F
0262 64FF V4=FF
0264 4300 SKIP;V3 NE 00

```

pressing key 4 or 6. Try to wipe out as many spots as possible. Each spot counts one point. You get 20 balls. You see your final score at the end of the game. You can make the paddle wider by changing the E0 byte at 02CD to F8 or FF.

```

0266 6501 V5=01
0268 431F SKIP;V3 NE 1F
026A 12A4 GO 02A4
026C A2CB I=02CB
026E D231 SHOW 1MI@V2V3
0270 8244 V2=V2+V4
0272 8354 V3=V3+V5
0274 D231 SHOW 1MI@V2V3
0276 3F01 SKIP;VF EQ 01
0278 1242 GO 0242
027A 431E SKIP;V3 NE 1E
027C 1298 GO 0298
027E 6A02 VA=02
0280 FA18 TONE=VA
0282 7601 V6+01
0284 4670 SKIP;V6 NE 70
0286 12AA GO 02AA
0288 D231 SHOW 1MI@V2V3
028A C401 V4=RND
028C 3401 SKIP;V4 EQ 01
028E 64FF V4=FF
0290 C501 V5=RND
0292 3501 SKIP;V5 EQ 01
0294 65FF V5=FF
0296 1242 GO 0242
0298 6A03 VA=03
029A FA18 TONE=VA
029C A2CB I=02CB
029E D231 SHOW 1MI@V2V3
02A0 73FF V3+FF
02A2 1236 GO 0236
02A4 A2CB I=02CB
02A6 D231 SHOW 1MI@V2V3
02A8 1228 GO 0228
02AA A2CD I=02CD
02AC D011 SHOW 1MI@V0V1
02AE A2F0 I=02F0
02B0 F633 MI=V6(3DD)
02B2 F265 V0:V2=MI
02B4 6318 V3=18
02B6 641B V4=1B
02B8 F029 I=V0(LSDP)
02BA D345 SHOW 5MI@V3V4
02BC 7305 V3+05
02BE F129 I=V1(LSDP)
02C0 D345 SHOW 5MI@V3V4
02C2 7305 V3+05
02C4 F229 I=V2(LSDP)
02C6 D345 SHOW 5MI@V3V4
02C8 12C8 GO 02C8
02CA 0180
02CC 44E0

```

4. VIP Space Intercept

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Launch your rocket by pressing key 4, 5, or 6. Hit the UFO's to score. The

big UFO counts 5 points. The small UFO counts 15 points. You get 15 rockets as shown in the lower right corner of the screen. Your score is shown in the lower left corner of the screen.

0200 A2CD I=02CD	024C 8BD4 VB=VB+VD	0298 6D03 VD=03
0202 6938 V9=38	024E DBC3 SHOW 3MI@VBVC	029A FD18 TONE=VD
0204 6A08 VA=08	0250 3F00 SKIP;VF EQ 00	029C A2D3 I=02D3
0206 D9A3 SHOW 3MI@V9VA	0252 1292 GO 0292	029E D453 SHOW 3MI@V4V5
0208 A2D0 I=02D0	0254 A2CD I=02CD	02A0 1286 GO 0286
020A 6B00 VB=00	0256 D9A3 SHOW 3MI@V9VA	02A2 A2F8 I=02F8
020C 6C03 VC=03	0258 CD01 VD=RND	02A4 F733 MI=V7(3DD)
020E DBC3 SHOW 3MI@VBVC	025A 3D00 SKIP;VD EQ 00	02A6 6300 V3=00
0210 A2D6 I=02D6	025C 6DFF VD=FF	02A8 22B6 DO 02B6
0212 641D V4=1D	025E 79FE V9+FE	02AA 00EE RET
0214 651F V5=1F	0260 D9A3 SHOW 3MI@V9VA	02AC A2F8 I=02F8
0216 D451 SHOW 1MI@V4V5	0262 3F00 SKIP;VF EQ 00	02AE F833 MI=V8(3DD)
0218 6700 V7=00	0264 128C GO 028C	02B0 6332 V3=32
021A 680F V8=0F	0266 4E00 SKIP;VE NE 00	02B2 22B6 DO 02B6
021C 22A2 DO 02A2	0268 122E GO 022E	02B4 00EE RET
021E 22AC DO 02AC	026A A2D3 I=02D3	02B6 6D1B VD=1B
0220 4800 SKIP;V8 NE 00	026C D453 SHOW 3MI@V4V5	02B8 F265 V0:V2=MI
0222 1222 GO 0222	026E 4500 SKIP;V5 NE 00	02BA F029 I=V0(LSDP)
0224 641E V4=1E	0270 1286 GO 0286	02BC D3D5 SHOW 5MI@V3VD
0226 651C V5=1C	0272 75FF V5+FF	02BE 7305 V3+05
0228 A2D3 I=02D3	0274 8464 V4=V4+V6	02C0 F129 I=V1(LSDP)
022A D453 SHOW 3MI@V4V5	0276 D453 SHOW 3MI@V4V5	02C2 D3D5 SHOW 5MI@V3VD
022C 6E00 VE=00	0278 3F01 SKIP;VF EQ 01	02C4 7305 V3+05
022E 6680 V6=80	027A 1246 GO 0246	02C6 F229 I=V2(LSDP)
0230 6D04 VD=04	027C 6D08 VD=08	02C8 D3D5 SHOW 5MI@V3VD
0232 EDA1 SKIP;VD NE KEY	027E 8D52 VD=VD&V5	02CA 00EE RET
0234 66FF V6=FF	0280 4D08 SKIP;VD NE 08	02CC 017C
0236 6D05 VD=05	0282 128C GO 028C	02CE FE7C
0238 EDA1 SKIP;VD NE KEY	0284 1292 GO 0292	02D0 60F0
023A 6600 V6=00	0286 22AC DO 02AC	02D2 6040
023C 6D06 VD=06	0288 78FF V8+FF	02D4 E0A0
023E EDA1 SKIP;VD NE KEY	028A 121E GO 021E	02D6 F8D4
0240 6601 V6=01	028C 22A2 DO 02A2	02D8 6E01 VE=01
0242 3680 SKIP;V6 EQ 80	028E 7705 V7+05	02DA 6D10 VD=10
0244 22D8 DO 02D8	0290 1296 GO 0296	02DC FD18 TONE=VD
0246 A2D0 I=02D0	0292 22A2 DO 02A2	02DE 00EE RET
0248 DBC3 SHOW 3MI@VBVC	0294 770F V7+0F	
024A CD01 VD=RND	0296 22A2 DO 02A2	

6. VIP Figure Shooting at Moving Target

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Fire the gun by

pressing key 3(up), 6(straight), or 9(down) to hit the moving target. You get 25 shots (bottom number). Each hit scores 10 points (top number).

0200 6719 V7=19	0262 333E SKIP;V3 EQ 3E	02C4 F733 MI=V7(3DD)
0202 6800 V8=00	0264 126E GO 026E	02C6 6E1B VE=1B
0204 22C2 DO 02C2	0266 4700 SKIP;V7 NE 00	02C8 6F10 VF=10
0206 22DE DO 02DE	0268 1268 GO 0268	02CA F265 V0:V2=MI
0208 6525 V5=25	026A 230C DO 030C	02CC F029 I=V0(LSDP)
020A 660D V6=0D	026C 1210 GO 0210	02CE DFE5 SHOW 5MI@VFVE
020C 22E6 DO 02E6	026E 7302 V3+02	02D0 6F15 VF=15
020E D565 SHOW 5MI@V5V6	0270 4400 SKIP;V4 NE 00	02D2 F129 I=V1(LSDP)
0210 CD01 VD=RND	0272 6B01 VB=01	02D4 DFE5 SHOW 5MI@VFVE
0212 3D01 SKIP;VD EQ 01	0274 441D SKIP;V4 NE 1D	02D6 6F1A VF=1A
0214 6D07 VD=07	0276 6BFF VB=FF	02D8 F229 I=V2(LSDP)
0216 230C DO 030C	0278 84B4 V4=V4+VB	02DA DFE5 SHOW 5MI@VFVE
0218 6410 V4=10	027A D341 SHOW 1MI@V3V4	02DC 00EE RET
021A 630B V3=0B	027C 4F00 SKIP;VF NE 00	02DE A3F8 I=03F8
021C 83D4 V3=V3+VD	027E 123C GO 023C	02E0 F833 MI=V8(3DD)
021E A2BF I=02BF	0280 6002 V0=02	02E2 6E00 VE=00
0220 D341 SHOW 1MI@V3V4	0282 F018 TONE=V0	02E4 12C8 GO 02C8
0222 6C00 VC=00	0284 A2BF I=02BF	02E6 C901 V9=RND
0224 6B80 VB=80	0286 D341 SHOW 1MI@V3V4	02E8 3901 SKIP;V9 EQ 01
0226 6003 V0=03	0288 A2B3 I=02B3	02EA 69FF V9=FF
0228 E0A1 SKIP;V0 NE KEY	028A D565 SHOW 5MI@V5V6	02EC CA01 VA=RND
022A 6BFF VB=FF	028C 22DE DO 02DE	02EE 3A01 SKIP;VA EQ 01
022C 6006 V0=06	028E 780A V8+0A	02F0 6AFF VA=FF
022E E0A1 SKIP;V0 NE KEY	0290 22DE DO 02DE	02F2 A2B3 I=02B3
0230 6B00 VB=00	0292 4700 SKIP;V7 NE 00	02F4 00EE RET
0232 6009 V0=09	0294 1294 GO 0294	02F6 6901 V9=01
0234 E0A1 SKIP;V0 NE KEY	0296 230C DO 030C	02F8 12EC GO 02EC
0236 6B01 VB=01	0298 1208 GO 0208	02FA 69FF V9=FF
0238 3B80 SKIP;VB EQ 80	029A 6C01 VC=01	02FC 12EC GO 02EC
023A 229A DO 029A	029C 6007 V0=07	02FE 6A01 VA=01
023C A2B3 I=02B3	029E F018 TONE=V0	0300 C901 V9=RND
023E D565 SHOW 5MI@V5V6	02A0 22C2 DO 02C2	0302 3901 SKIP;V9 EQ 01
0240 8594 V5=V5+V9	02A2 77FF V7+FF	0304 69FF V9=FF
0242 86A4 V6=V6+VA	02A4 22C2 DO 02C2	0306 00EE RET
0244 4520 SKIP;V5 NE 20	02A6 00EE RET	0308 6AFF VA=FF
0246 22F6 DO 02F6	02A8 017C	030A 1300 GO 0300
0248 453B SKIP;V5 NE 3B	02AA 7CFE	030C 6E08 VE=08
024A 22FA DO 02FA	02AC 7C7C	030E A2A9 I=02A9
024C 4600 SKIP;V6 NE 00	02AE 707C	0310 DDEF SHOW FMI@VDVE
024E 22FE DO 02FE	02B0 387F	0312 7E0F VE+OF
0250 461B SKIP;V6 NE 1B	02B2 7F7C	0314 A2B8 I=02B8
0252 2308 DO 0308	02B4 7C7C	0316 DDE6 SHOW 6MI@VDVE
0254 D565 SHOW 5MI@V5V6	02B6 7C7C	0318 6E10 VE=10
0256 3F00 SKIP;VF EQ 00	02B8 3838	031A 6008 V0=08
0258 1280 GO 0280	02BA 3838	031C 80D4 V0=V0+VD
025A 4C00 SKIP;VC NE 00	02BC 383E	031E 8F00 VF=V0
025C 1224 GO 0224	02BE E080	0320 A2BE I=02BE
025E A2BF I=02BF	02C0 00D4	0322 DFE2 SHOW 2MI@VFVE
0260 D341 SHOW 1MI@V3V4	02C2 A3F8 I=03F8	0324 00EE RET

7. VIP Tick-Tack-Toe Game

This program uses the CHIP-8 INTERPRETER at 0000-01FF. You are "O", VIP is "X". You move first. Press key 1-9 to put your "O" into a square. Squares are in the same positions as

keys 1-9. VIP then puts an "X" into an empty square. If you get three "O"'s in a row you win the game. If VIP gets three "X"'s in a row you lose the game. The game is a draw when all squares are filled without getting 3 in a row. You can beat VIP because it is programmed to make a mistake once in a while.

0200 02E4 MLS@02E4	024E 135A GO 035A	029C A3F5 I=03F5
0202 232E DO 032E	0250 6402 V4=02	029E F065 V0:V0=MI
0204 FD0A VD=KEY	0252 6C01 VC=01	02A0 3001 SKIP;V0 EQ 01
0206 6009 V0=09	0254 2390 DO 0390	02A2 1380 GO 0380
0208 9D00 SKIP;VD NE V0	0256 3510 SKIP;V5 EQ 10	02A4 A3F3 I=03F3
020A 1214 GO 0214	0258 1360 GO 0360	02A6 F065 V0:V0=MI
020C 70FF V0+FF	025A C703 V7=RND	02A8 4000 SKIP;V0 NE 00
020E 3000 SKIP;V0 EQ 00	025C 4700 SKIP;V7 NE 00	02AA 138C GO 038C
0210 1208 GO 0208	025E 1268 GO 0268	02AC 2314 DO 0314
0212 1204 GO 0204	0260 A3F5 I=03F5	02AE 22F8 DO 02F8
0214 A3F0 I=03F0	0262 F065 V0:V0=MI	02B0 1204 GO 0204
0216 FD1E I=I+VD	0264 4000 SKIP;V0 NE 00	02B2 0100
0218 F065 V0:V0=MI	0266 1364 GO 0364	02B4 1401
021A 3000 SKIP;V0 EQ 00	0268 A3F2 I=03F2	02B6 1C01
021C 1204 GO 0204	026A F065 V0:V0=MI	02B8 2401
021E 22F2 DO 02F2	026C 4001 SKIP;V0 NE 01	02BA 1409
0220 6130 V1=30	026E 1368 GO 0368	02BC 1C09
0222 6002 V0=02	0270 A3F4 I=03F4	02BE 2409
0224 F018 TONE=V0	0272 F065 V0:V0=MI	02C0 1411
0226 C007 V0=RND	0274 4001 SKIP;V0 NE 01	02C2 1C11
0228 F015 TIME=V0	0276 1368 GO 0368	02C4 2411
022A F007 V0=TIME	0278 A3F5 I=03F5	02C6 0104
022C 3000 SKIP;V0 EQ 00	027A F065 V0:V0=MI	02C8 0303
022E 122A GO 022A	027C 4001 SKIP;V0 NE 01	02CA 0203
0230 71FF V1+FF	027E 1368 GO 0368	02CC 0103
0232 3100 SKIP;V1 EQ 00	0280 C703 V7=RND	02CE 0701
0234 1222 GO 0222	0282 4700 SKIP;V7 NE 00	02D0 0401
0236 6403 V4=03	0284 1296 GO 0296	02D2 0101
0238 6C01 VC=01	0286 A3F6 I=03F6	02D4 0302
023A 2390 DO 0390	0288 F065 V0:V0=MI	02D6 4224
023C 3510 SKIP;V5 EQ 10	028A 4001 SKIP;V0 NE 01	02D8 1818
023E 134C GO 034C	028C 1374 GO 0374	02DA 2442
0240 2314 DO 0314	028E A3F8 I=03F8	02DC 7E42
0242 4D00 SKIP;VD NE 00	0290 F065 V0:V0=MI	02DE 4242
0244 1356 GO 0356	0292 4001 SKIP;V0 NE 01	02E0 427E
0246 6402 V4=02	0294 1374 GO 0374	02E2 FFFF
0248 6C02 VC=02	0296 C703 V7=RND	02E4 F803
024A 2390 DO 0390	0298 4700 SKIP;V7 NE 00	02E6 BFF8
024C 3510 SKIP;V5 EQ 10	029A 12A4 GO 02A4	02E8 FOAF

(Continued on next page)

7. VIP Tick-Tack-Toe Game (Continued)

02EA F800	0338 D011 SHOW 1MI@V0V1	0386 12A4 GO 02A4
02EC 5F1F	033A 72FF V2+FF	0388 6D02 VD=02
02EE 8F3A	033C 7101 V1+01	038A 1360 GO 0360
02F0 EAD4	033E 3200 SKIP;V2 EQ 00	038C 6D03 VD=03
02F2 6C01 VC=01	0340 1338 GO 0338	038E 1360 GO 0360
02F4 22FC DO 02FC	0342 73FF V3+FF	0390 6500 V5=00
02F6 00EE RET	0344 7008 V0+08	0392 A2C6 I=02C6
02F8 6C02 VC=02	0346 3300 SKIP;V3 EQ 00	0394 6603 V6=03
02FA 12F4 GO 02F4	0348 1334 GO 0334	0396 F51E I=I+V5
02FC A3F0 I=03F0	034A 00EE RET	0398 F165 V0:V1=MI
02FE FD1E I=I+VD	034C A2DC I=02DC	039A 8200 V2=V0
0300 80C0 V0=VC	034E 601C V0=1C	039C 6300 V3=00
0302 F055 MI=V0:V0	0350 611A V1=1A	039E 6D00 VD=00
0304 A2B2 I=02B2	0352 D016 SHOW 6MI@V0V1	03A0 A3F0 I=03F0
0306 13D0 GO 03D0	0354 1354 GO 0354	03A2 23BE DO 03BE
0308 F165 V0:V1=MI	0356 1358 GO 0358	03A4 3600 SKIP;V6 EQ 00
030A A2DC I=02DC	0358 1358 GO 0358	03A6 13A0 GO 03A0
030C 3C01 SKIP;VC EQ 01	035A 22F8 DO 02F8	03A8 9340 SKIP;V3 NE V4
030E A2D6 I=02D6	035C A2D6 I=02D6	03AA 13B4 GO 03B4
0310 D016 SHOW 6MI@V0V1	035E 134E GO 034E	03AC 7502 V5+02
0312 00EE RET	0360 22F8 DO 02F8	03AE 4510 SKIP;V5 NE 10
0314 6D00 VD=00	0362 1204 GO 0204	03B0 00EE RET
0316 6101 V1=01	0364 6D05 VD=05	03B2 1392 GO 0392
0318 A3F0 I=03F0	0366 1360 GO 0360	03B4 4403 SKIP;V4 NE 03
031A F11E I=I+V1	0368 A3F1 I=03F1	03B6 00EE RET
031C F065 V0:V0=MI	036A F065 V0:V0=MI	03B8 3D00 SKIP;VD EQ 00
031E 4000 SKIP;V0 NE 00	036C 3000 SKIP;V0 EQ 00	03BA 00EE RET
0320 132A GO 032A	036E 1280 GO 0280	03BC 13AC GO 03AC
0322 4109 SKIP;V1 NE 09	0370 6D01 VD=01	03BE F21E I=I+V2
0324 00EE RET	0372 1360 GO 0360	03C0 F065 V0:V0=MI
0326 7101 V1+01	0374 A3F9 I=03F9	03C2 90C0 SKIP;V0 NE VC
0328 1318 GO 0318	0376 F065 V0:V0=MI	03C4 7301 V3+01
032A 8D10 VD=V1	0378 3000 SKIP;V0 EQ 00	03C6 4000 SKIP;V0 NE 00
032C 00EE RET	037A 1296 GO 0296	03C8 8D20 VD=V2
032E A2E2 I=02E2	037C 6D09 VD=09	03CA 8214 V2=V2+V1
0330 6303 V3=03	037E 1360 GO 0360	03CC 76FF V6+FF
0332 6014 V0=14	0380 A3F2 I=03F2	03CE 00EE RET
0334 6100 V1=00	0382 F065 V0:V0=MI	03D0 FD1E I=I+VD
0336 6218 V2=18	0384 3000 SKIP;V0 EQ 00	03D2 FD1E I=I+VD 03D4 1308 GO 0308

8. VIP Spooky Spot

This program uses the CHIP-8 INTERPRETER at locations 0000-01FF. Now you can let the computer make your big decisions or predict the future just like government or industry leaders do.

```

0200 00E0 ERASE
0202 2242 DO 0242
0204 2254 DO 0254
0206 FA0A VA=KEY
0208 A290 I=0290
020A 6100 V1=00
020C 6210 V2=10
020E D121 SHOW 1MI@V1V2
0210 3F00 SKIP;VF EQ 00
0212 1236 GO 0236
0214 6A04 VA=04
0216 FA18 TONE=VA
0218 6A0A VA=0A
021A FA15 TIME=VA
021C FA07 VA=TIME
021E 3A00 SKIP;VA EQ 00
0220 121C GO 021C
0222 7101 V1+01
0224 CA01 VA=RND
0226 3A01 SKIP;VA EQ 01
0228 6AFF VA=FF
022A 82A4 V2=V2+VA
022C 4207 SKIP;V2 NE 07
022E 7201 V2+01
0230 4218 SKIP;V2 NE 18
0232 72FF V2+FF
0234 120E GO 020E
0236 6A10 VA=10
0238 8A22 VA=VA&V2
023A 3A00 SKIP;VA EQ 00
023C 1240 GO 0240
023E 225A DO 025A
0240 226A DO 026A
0242 A270 I=0270
0244 6408 V4=08
0246 6330 V3=30
0248 D348 SHOW 8MI@V3V4
024A 6A08 VA=08

```

Flip RUN up. You will see the words YES and NO at the right of the screen. Ask the computer any question that can be answered with YES or NO. Press KEY 0 and the spooky spot will show you the computer's answer. This program replaces your old fashioned mechanical OUIJA board.

```

024C FA1E I=I+VA
024E 7308 V3+08
0250 D348 SHOW 8MI@V3V4
0252 00EE RET
0254 A280 I=0280
0256 6410 V4=10
0258 1246 GO 0246
025A 6408 V4=08
025C 6331 V3=31
025E A290 I=0290
0260 D348 SHOW 8MI@V3V4
0262 7301 V3+01
0264 3340 SKIP;V3 EQ 40
0266 1260 GO 0260
0268 1268 GO 0268
026A 6410 V4=10
026C 125C GO 025C
026E 0101
0270 7F7F
0272 6A6A
0274 6276
0276 767F
0278 FFFF
027A 23EF
027C 63FB
027E 23FF
0280 7F76
0282 7270
0284 7476
0286 7F7F
0288 FF87
028A B7B7
028C B787
028E FFFF
0290 8080
0292 8080
0294 8080
0296 8080
0298 80D4

```

9. VIP Jackpot

This program uses the CHIP-8 INTERPRETER at 0000-01FF. You start with \$10. It costs you \$1 each time you play. Push any key to start the 3 wheels spinning. Push keys 1, 2, and 3 (one at a

time) to stop the wheels. You win \$3 if you stop with 3 different symbols. You win \$5 if you stop with 3 identical symbols. You get a \$5 bonus for 3 solid squares. You break the bank if you get your winnings up to \$50.

0200 6E0A VE=0A	025C 4000 SKIP;V0 NE 00
0202 00E0 ERASE	025E 126E GO 026E
0204 601A V0=1A	0260 E5A1 SKIP;V5 NE KEY
0206 610B V1=0B	0262 6A00 VA=00
0208 A333 I=0333	0264 E6A1 SKIP;V6 NE KEY
020A D017 SHOW 7MI@V0V1	0266 6B00 VB=00
020C 22D6 DO 02D6	0268 EDA1 SKIP;VD NE KEY
020E FF0A VF=KEY	026A 6C00 VC=00
0210 22D6 DO 02D6	026C 1236 GO 0236
0212 7EFF VE+FF	026E 6D00 VD=00
0214 22D6 DO 02D6	0270 8670 V6=V7
0216 6102 V1=02	0272 8685 V6=V6-V8
0218 6216 V2=16	0274 4600 SKIP;V6 NE 00
021A 631E V3=1E	0276 1286 GO 0286
021C 6426 V4=26	0278 8895 V8=V8-V9
021E 6501 V5=01	027A 4800 SKIP;V8 NE 00
0220 6602 V6=02	027C 1292 GO 0292
0222 6A01 VA=01	027E 8795 V7=V7-V9
0224 6B01 VB=01	0280 3700 SKIP;V7 EQ 00
0226 6C01 VC=01	0282 6D03 VD=03
0228 6D03 VD=03	0284 1292 GO 0292
022A C70C V7=RND	0286 8895 V8=V8-V9
022C C80C V8=RND	0288 3800 SKIP;V8 EQ 00
022E C90C V9=RND	028A 1292 GO 0292
0230 22BE DO 02BE	028C 4700 SKIP;V7 NE 00
0232 22C6 DO 02C6	028E 6D05 VD=05
0234 22CE DO 02CE	0290 7D05 VD+05
0236 4A00 SKIP;VA NE 00	0292 4D00 SKIP;VD NE 00
0238 1240 GO 0240	0294 129C GO 029C
023A 22BE DO 02BE	0296 2302 DO 0302
023C C70C V7=RND	0298 22F6 DO 02F6
023E 22BE DO 02BE	029A 2302 DO 0302
0240 4B00 SKIP;VB NE 00	029C 22F6 DO 02F6
0242 124A GO 024A	029E 22D6 DO 02D6
0244 22C6 DO 02C6	02A0 8ED4 VE=VE+VD
0246 C80C V8=RND	02A2 22D6 DO 02D6
0248 22C6 DO 02C6	02A4 4E00 SKIP;VE NE 00
024A 4C00 SKIP;VC NE 00	02A6 1326 GO 0326
024C 1254 GO 0254	02A8 6631 V6=31
024E 22CE DO 02CE	02AA 86E5 V6=V6-VE
0250 C90C V9=RND	02AC 3F00 SKIP;VF EQ 00
0252 22CE DO 02CE	02AE 1202 GO 0202
0254 6000 V0=00	02B0 A368 I=0368
0256 80A4 V0=V0+VA	02B2 6419 V4=19
0258 80B4 V0=V0+VB	02B4 6518 V5=18
025A 80C4 V0=V0+VC	02B6 22EC DO 02EC

9. VIP Jackpot (Continued)

02B8 22EC DO 02EC	0314 A400 I=0400
02BA 22F6 DO 02F6	0316 FD33 MI=VD(3DD)
02BC 12B0 GO 02B0	0318 F265 V0:V2=MI
02BE A33A I=033A	031A F129 I=V1(LSDP)
02C0 F71E I=I+V7	031C D535 SHOW 5MI@V5V3
02C2 D214 SHOW 4MI@V2V1	031E 7505 V5+05
02C4 00EE RET	0320 F229 I=V2(LSDP)
02C6 A33A I=033A	0322 D535 SHOW 5MI@V5V3
02C8 F81E I=I+V8	0324 00EE RET
02CA D314 SHOW 4MI@V3V1	0326 A35E I=035E
02CC 00EE RET	0328 6418 V4=18
02CE A33A I=033A	032A 6518 V5=18
02D0 F91E I=I+V9	032C 22EC DO 02EC
02D2 D414 SHOW 4MI@V4V1	032E 22EC DO 02EC
02D4 00EE RET	0330 1330 GO 0330
02D6 A400 I=0400	0332 0140
02D8 FE33 MI=VE(3DD)	0334 E0C0
02DA F265 V0:V2=MI	0336 E060
02DC 601E V0=1E	0338 E040
02DE 630C V3=0C	033A F0F0
02E0 F129 I=V1(LSDP)	033C F0F0
02E2 D035 SHOW 5MI@V0V3	033E 60F0
02E4 7005 V0+05	0340 F060
02E6 F229 I=V2(LSDP)	0342 9060
02E8 D035 SHOW 5MI@V0V3	0344 6090
02EA 00EE RET	0346 F090
02EC D455 SHOW 5MI@V4V5	0348 90F0
02EE 6605 V6=05	034A F42A
02F0 F61E I=I+V6	034C 2E2A
02F2 7408 V4+08	034E EAEA
02F4 00EE RET	0350 8C8C
02F6 6660 V6=60	0352 8AEA
02F8 F615 TIME=V6	0354 EAAA
02FA F607 V6=TIME	0356 EA8A
02FC 3600 SKIP;V6 EQ 00	0358 8EE0
02FE 12FA GO 02FA	035A 4040
0300 00EE RET	035C 4040
0302 A34A I=034A	035E 8E8A
0304 640D V4=0D	0360 8A8A
0306 6518 V5=18	0362 EEEE
0308 22EC DO 02EC	0364 88EC
030A 22EC DO 02EC	0366 28EE
030C 22EC DO 02EC	0368 8B89
030E 22EC DO 02EC	036A A9F9
0310 652A V5=2A	036C DBA4
0312 6318 V3=18	036E 343C
	0370 2CA4

10. VIP Snake Race

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Flip the RUN switch

up to see the four snakes race to the finish line. You and your friends can have hours of fun betting on the winner.

0200 6400 V4=00	0248 D9A8 SHOW 8MI@V9VA	0290 3901 SKIP;V9 EQ 01
0202 6500 V5=00	024A 6A18 VA=18	0292 12AE GO 02AE
0204 6101 V1=01	024C D9A5 SHOW 5MI@V9VA	0294 F518 TONE=V5
0206 F129 I=V1(LSDP)	024E C901 V9=RND	0296 7301 V3+01
0208 D455 SHOW 5MI@V4V5	0250 3901 SKIP;V9 EQ 01	0298 D373 SHOW 3MI@V3V7
020A 6102 V1=02	0252 126E GO 026E	029A 603E V0=3E
020C 6508 V5=08	0254 F518 TONE=V5	029C 8035 V0=V0-V3
020E F129 I=V1(LSDP)	0256 7101 V1+01	029E 3000 SKIP;V0 EQ 00
0210 D455 SHOW 5MI@V4V5	0258 D153 SHOW 3MI@V1V5	02A0 12AE GO 02AE
0212 6103 V1=03	025A 603E V0=3E	02A2 D373 SHOW 3MI@V3V7
0214 6510 V5=10	025C 8015 V0=V0-V1	02A4 F715 TIME=V7
0216 F129 I=V1(LSDP)	025E 3000 SKIP;V0 EQ 00	02A6 FA07 VA=TIME
0218 D455 SHOW 5MI@V4V5	0260 126E GO 026E	02A8 3A00 SKIP;VA EQ 00
021A 6104 V1=04	0262 D153 SHOW 3MI@V1V5	02AA 12A6 GO 02A6
021C 6518 V5=18	0264 F715 TIME=V7	02AC 12A2 GO 02A2
021E F129 I=V1(LSDP)	0266 FA07 VA=TIME	02AE C901 V9=RND
0220 D455 SHOW 5MI@V4V5	0268 3A00 SKIP;VA EQ 00	02B0 3901 SKIP;V9 EQ 01
0222 6105 V1=05	026A 1266 GO 0266	02B2 124E GO 024E
0224 6205 V2=05	026C 1262 GO 0262	02B4 F518 TONE=V5
0226 6305 V3=05	026E C901 V9=RND	02B6 7401 V4+01
0228 6405 V4=05	0270 3901 SKIP;V9 EQ 01	02B8 D483 SHOW 3MI@V4V8
022A 6501 V5=01	0272 128E GO 028E	02BA 603E V0=3E
022C 6609 V6=09	0274 F518 TONE=V5	02BC 8045 V0=V0-V4
022E 6711 V7=11	0276 7201 V2+01	02BE 3000 SKIP;V0 EQ 00
0230 6819 V8=19	0278 D263 SHOW 3MI@V2V6	02C0 124E GO 024E
0232 A2CF I=02CF	027A 603E V0=3E	02C2 D483 SHOW 3MI@V4V8
0234 D153 SHOW 3MI@V1V5	027C 8025 V0=V0-V2	02C4 F715 TIME=V7
0236 D263 SHOW 3MI@V2V6	027E 3000 SKIP;V0 EQ 00	02C6 FA07 VA=TIME
0238 D373 SHOW 3MI@V3V7	0280 128E GO 028E	02C8 3A00 SKIP;VA EQ 00
023A D483 SHOW 3MI@V4V8	0282 D263 SHOW 3MI@V2V6	02CA 12C6 GO 02C6
023C 693F V9=3F	0284 F715 TIME=V7	02CC 12C2 GO 02C2
023E 6A00 VA=00	0286 FA07 VA=TIME	02CE 0180
0240 D9A8 SHOW 8MI@V9VA	0288 3A00 SKIP;VA EQ 00	02D0 8080
0242 6A08 VA=08	028A 1286 GO 0286	02D2 8080
0244 D9A8 SHOW 8MI@V9VA	028C 1282 GO 0282	02D4 8080
0246 6A10 VA=10	028E C901 V9=RND	02D6 80D4

11. VIP Card Matching Game

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Two players, A and B, alternately try to match up pairs of symbols arranged in a four by four matrix. The positions in the matrix correspond to the arrangement of the input keyboard

of the COSMAC VIP. The player whose turn it is will be shown at the left or right of the screen. When a player successfully matches a pair, his letter replaces the symbols and he goes again. The positions of the symbols are shown for a brief time at the beginning of the game. If it is too brief or too long a time, change location 0316 from 6020 to 60—.

```

0200 A385 I=0385
0202 6002 V0=02
0204 6102 V1=02
0206 6202 V2=02
0208 6302 V3=02
020A 6402 V4=02
020C 6502 V5=02
020E 6602 V6=02
0210 6702 V7=02
0212 F755 MI=V0:V7
0214 6300 V3=00
0216 A385 I=0385
0218 C107 V1=RND
021A F11E I=I+V1
021C F065 V0:V0=MI
021E 4000 SKIP;V0 NE 00
0220 1216 GO 0216
0222 70FF V0+FF
0224 A385 I=0385
0226 F11E I=I+V1
0228 F055 MI=V0:V0
022A A38E I=038E
022C F31E I=I+V3
022E 8010 V0=V1
0230 F055 MI=V0:V0
0232 7301 V3+01
0234 3310 SKIP;V3 EQ 10
0236 1216 GO 0216
0238 2314 DO 0314
023A C501 V5=RND
023C 22C4 DO 02C4
023E 6B00 VB=00
0240 6D10 VD=10
0242 F00A V0=KEY
0244 A375 I=0375
0246 F01E I=I+V0
0248 F065 V0:V0=MI
024A 90D0 SKIP;V0 NE VD
024C 1242 GO 0242
024E 8D00 VD=V0
0250 22D8 DO 02D8
0252 3B00 SKIP;VB EQ 00
0254 125E GO 025E
0256 6B0F VB=0F
0258 8CD0 VC=VD
025A 89A0 V9=VA
025C 1242 GO 0242

025E 6020 V0=20
0260 F015 TIME=V0
0262 F007 V0=TIME
0264 3000 SKIP;V0 EQ 00
0266 1262 GO 0262
0268 99A0 SKIP;V9 NE VA
026A 1278 GO 0278
026C 22C4 DO 02C4
026E 7501 V5+01
0270 6001 V0=01
0272 8502 V5=V5&V0
0274 22A0 DO 02A0
0276 123C GO 023C
0278 6020 V0=20
027A F018 TONE=V0
027C 7E01 VE+01
027E 22A0 DO 02A0
0280 A385 I=0385
0282 FA1E I=I+VA
0284 60DD V0=DD
0286 F055 MI=V0:V0
0288 4500 SKIP;V5 NE 00
028A 1296 GO 0296
028C A367 I=0367
028E D346 SHOW 6MI@V3V4
0290 A367 I=0367
0292 D126 SHOW 6MI@V1V2
0294 12B8 GO 02B8
0296 A33F I=033F
0298 D346 SHOW 6MI@V3V4
029A A33F I=033F
029C D126 SHOW 6MI@V1V2
029E 12B8 GO 02B8
02A0 22D8 DO 02D8
02A2 8130 V1=V3
02A4 8240 V2=V4
02A6 8DC0 VD=VC
02A8 22D8 DO 02D8
02AA 00EE RET
02AC A36D I=036D
02AE FA1E I=I+VA
02B0 F065 V0:V0=MI
02B2 A334 I=0334
02B4 F01E I=I+V0
02B6 00EE RET
02B8 3E07 SKIP;VE EQ 07
02BA 123E GO 023E

```

(Continued on next page)

11. VIP Card Matching Game (Continued)

02BC 22C4 DO 02C4	0320 2324 DO 0324
02BE 6060 V0=60	0322 00EE RET
02C0 F018 TONE=V0	0324 6D00 VD=00
02C2 12C2 GO 02C2	0326 22D8 DO 02D8
02C4 6300 V3=00	0328 7D01 VD+01
02C6 6408 V4=08	032A 4D10 SKIP;VD NE 10
02C8 A33F I=033F	032C 1330 GO 0330
02CA 4500 SKIP;V5 NE 00	032E 1326 GO 0326
02CC 12D2 GO 02D2	0330 00EE RET
02CE 633A V3=3A	0332 0101
02D0 A367 I=0367	0334 1010
02D2 D346 SHOW 6MI@V3V4	0336 1E78
02D4 00EE RET	0338 0808
02D6 5555 SKIP;V5 EQ V5	033A 1818
02D8 A38E I=038E	033C 7E7E
02DA FD1E I=I+VD	033E 1818
02DC F065 V0:V0=MI	0340 2424
02DE 8A00 VA=V0	0342 3C24
02E0 A385 I=0385	0344 2466
02E2 F01E I=I+V0	0346 6618
02E4 F065 V0:V0=MI	0348 1866
02E6 40DD SKIP;V0 NE DD	034A 667E
02E8 1242 GO 0242	034C 2424
02EA 22AC DO 02AC	034E 7E66
02EC 6310 V3=10	0350 4224
02EE 6400 V4=00	0352 1818
02F0 600C V0=0C	0354 2442
02F2 80D2 V0=V0&VD	0356 7E52
02F4 4004 SKIP;V0 NE 04	0358 5252
02F6 6408 V4=08	035A 527E
02F8 4008 SKIP;V0 NE 08	035C 4242
02FA 6410 V4=10	035E 7E42
02FC 400C SKIP;V0 NE 0C	0360 7E14
02FE 6418 V4=18	0362 7C26
0300 6003 V0=03	0364 643E
0302 80D2 V0=V0&VD	0366 287C
0304 4001 SKIP;V0 NE 01	0368 243C
0306 6318 V3=18	036A 2424
0308 4002 SKIP;V0 NE 02	036C 7C00
030A 6320 V3=20	036E 0611
030C 4003 SKIP;V0 NE 03	0370 161C
030E 6328 V3=28	0372 2227
0310 D346 SHOW 6MI@V3V4	0374 2D0D
0312 00EE RET	0376 0001
0314 2324 DO 0324	0378 0204
0316 6020 V0=20	037A 0506
0318 F015 TIME=V0	037C 0809
031A F007 V0=TIME	037E 0A0C
031C 3000 SKIP;V0 EQ 00	0380 0E03
031E 131A GO 031A	0382 070B
	0384 0FD4

12. VIP Armored Vehicle Clash

This program uses the CHIP-8 INTERPRETER at 0000-01FF. At the start of the game and after every score change, the score, on the left, and number of shots remaining, on the right, are shown. The tank may be moved by pressing keys 2, 4,

6, or 8 for up, left, right, or down, respectively. To fire a shell press key F. After the score is shown the target will come on the screen at one of eight positions and change direction randomly. Every time you hit the target you score 10 points, but if you are hit by the target you lose 5 shots.

0200 6E00 VE=00	025A 6202 V2=02	02B4 F555 MI=V0:V5
0202 6DA0 VD=A0	025C E8A1 SKIP;V8 NE KEY	02B6 A3E9 I=03E9
0204 6A08 VA=08	025E 6204 V2=04	02B8 D341 SHOW 1MI@V3V
0206 6906 V9=06	0260 E9A1 SKIP;V9 NE KEY	02BA 00EE RET
0208 6804 V8=04	0262 6206 V2=06	02BC A423 I=0423
020A 6702 V7=02	0264 EAA1 SKIP;VA NE KEY	02BE F565 V0:V5=MI
020C 6619 V6=19	0266 6208 V2=08	02C0 4500 SKIP;V5 NE 0
020E 6410 V4=10	0268 4200 SKIP;V2 NE 00	02C2 00EE RET
0210 630C V3=0C	026A 00EE RET	02C4 A3E9 I=03E9
0212 6200 V2=00	026C 227E DO 027E	02C6 D341 SHOW 1MI@V3V
0214 6106 V1=06	026E 8120 V1=V2	02C8 236A DO 036A
0216 A412 I=0412	0270 236A DO 036A	02CA 6C02 VC=02
0218 FA55 MI=V0:VA	0272 237C DO 037C	02CC 238E DO 038E
021A 23A4 DO 03A4	0274 6C01 VC=01	02CE 4BBB SKIP;VB NE BI
021C 6040 V0=40	0276 6200 V2=00	02D0 12DA GO 02DA
021E F015 TIME=V0	0278 6F00 VF=00	02D2 D341 SHOW 1MI@V3V
0220 F007 V0=TIME	027A A412 I=0412	02D4 A423 I=0423
0222 3000 SKIP;V0 EQ 00	027C F555 MI=V0:V5	02D6 F555 MI=V0:V5
0224 1220 GO 0220	027E A3CF I=03CF	02D8 00EE RET
0226 23A4 DO 03A4	0280 4102 SKIP;V1 NE 02	02DA 6500 V5=00
0228 22DA DO 02DA	0282 6000 V0=00	02DC 6000 V0=00
022A 2332 DO 0332	0284 4104 SKIP;V1 NE 04	02DE A417 I=0417
022C A412 I=0412	0286 6013 V0=13	02E0 F055 MI=V0:V0
022E F565 V0:V5=MI	0288 4106 SKIP;V1 NE 06	02E2 12D4 GO 02D4
0230 227E DO 027E	028A 600D V0=0D	02E4 A41D I=041D
0232 2296 DO 0296	028C 4108 SKIP;V1 NE 08	02E6 F565 V0:V5=MI
0234 22BC DO 02BC	028E 6006 V0=06	02E8 350F SKIP;V5 EQ 0F
0236 3F01 SKIP;VF EQ 01	0290 F01E I=I+V0	02EA 1314 GO 0314
0238 22E4 DO 02E4	0292 D347 SHOW 7MI@V3V4	02EC A3EA I=03EA
023A 3F01 SKIP;VF EQ 01	0294 00EE RET	02EE D345 SHOW 5MI@V3V4
023C 22BC DO 02BC	0296 600F V0=0F	02F0 3200 SKIP;V2 EQ 0C
023E 3F01 SKIP;VF EQ 01	0298 E09E SKIP;V0 EQ KEY	02F2 1302 GO 0302
0240 22BC DO 02BC	029A 00EE RET	02F4 C103 V1=RND
0242 3F01 SKIP;VF EQ 01	029C 450F SKIP;V5 NE OF	02F6 A419 I=0419
0244 224C DO 024C	029E 00EE RET	02F8 F11E I=I+V1
0246 4F01 SKIP;VF NE 01	02A0 650F V5=0F	02FA F065 V0:V0=MI
0248 1336 GO 0336	02A2 76FF V6+FF	02FC 8100 V1=V0
024A 1232 GO 0232	02A4 A412 I=0412	02FE C20F V2=RND
024C A412 I=0412	02A6 F555 MI=V0:V5	0300 7201 V2+01
024E F565 V0:V5=MI	02A8 7403 V4+03	0302 236A DO 036A
0250 4600 SKIP;V6 NE 00	02AA 7303 V3+03	0304 A3EA I=03EA
0252 3500 SKIP;V5 EQ 00	02AC 236A DO 036A	0306 6C03 VC=03
0254 1258 GO 0258	02AE 236A DO 036A	0308 72FF V2+FF
0256 135C GO 035C	02B0 236A DO 036A	030A 6F00 VF=00
0258 E7A1 SKIP;V7 NE KEY 02B2 A423 I=0423		

12. VIP Armored Vehicle Clash (Continued)

030C D345 SHOW 5MI@V3V4	0360 6060 V0=60	03B4 F633 MI=V6 (3DD)
030E A41D I=041D	0362 F018 TONE=V0	03B6 F265 V0:V2=MI
0310 F555 MI=V0:V5	0364 1364 GO 0364	03B8 23C2 DO 03C2
0312 00EE RET	0366 6E00 VE=00	03BA 00EE RET
0314 C407 V4=RND	0368 1354 GO 0354	03BC F029 I=V0 (LSDP)
0316 A3EF I=03EF	036A 4102 SKIP;V1 NE 02	03BE D345 SHOW 5MI@V3V4
0318 F41E I=I+V4	036C 74FF V4+FF	03C0 7306 V3+06
031A F065 V0:V0=MI	036E 4104 SKIP;V1 NE 04	03C2 F129 I=V1 (LSDP)
031C 8300 V3=V0	0370 73FF V3+FF	03C4 D345 SHOW 5MI@V3V4
031E A3F7 I=03F7	0372 4106 SKIP;V1 NE 06	03C6 7306 V3+06
0320 F41E I=I+V4	0374 7301 V3+01	03C8 F229 I=V2 (LSDP)
0322 F065 V0:V0=MI	0376 4108 SKIP;V1 NE 08	03CA D345 SHOW 5MI@V3V4
0324 8400 V4=V0	0378 7401 V4+01	03CC 00EE RET
0326 A3EA I=03EA	037A 00EE RET	03CE 0110
0328 D345 SHOW 5MI@V3V4	037C 4400 SKIP;V4 NE 00	03D0 547C
032A 6020 V0=20	037E 7401 V4+01	03D2 6C7C
032C F018 TONE=V0	0380 4300 SKIP;V3 NE 00	03D4 7C44
032E 650F V5=0F	0382 7301 V3+01	03D6 7C7C
0330 130E GO 030E	0384 4338 SKIP;V3 NE 38	03D8 6C7C
0332 6500 V5=00	0386 73FF V3+FF	03DA 5410
0334 130E GO 030E	0388 4418 SKIP;V4 NE 18	03DC 00FC
0336 4C01 SKIP;VC NE 01	038A 74FF V4+FF	03DE 786E
0338 1400 GO 0400	038C 00EE RET	03E0 78FC
033A 4C02 SKIP;VC NE 02	038E 6B00 VB=00	03E2 003F
033C 1352 GO 0352	0390 4400 SKIP;V4 NE 00	03E4 1E76
033E A423 I=0423	0392 139E GO 039E	03E6 1E3F
0340 F565 V0:V5=MI	0394 4300 SKIP;V3 NE 00	03E8 0080
0342 4500 SKIP;V5 NE 00	0396 139E GO 039E	03EA A870
0344 1400 GO 0400	0398 433F SKIP;V3 NE 3F	03EC F870
0346 A3E9 I=03E9	039A 139E GO 039E	03EE A80B
0348 D341 SHOW 1MI@V3V4	039C 441F SKIP;V4 NE 1F	03F0 1B28
034A 6F00 VF=00	039E 6BBB VB=BB	03F2 3830
034C D341 SHOW 1MI@V3V4	03A0 6F00 VF=00	03F4 2010
034E 3F01 SKIP;VF EQ 01	03A2 00EE RET	03F6 0000
0350 1400 GO 0400	03A4 6308 V3=08	03F8 0000
0352 7E0A VE+OA	03A6 6408 V4=08	03FA 081B
0354 6040 V0=40	03A8 A429 I=0429	03FC 1B1B
0356 F018 TONE=V0	03AA FE33 MI=VE (3DD)	03FE 13D4
0358 00E0 ERASE	03AC F265 V0:V2=MI	0400 76FB V6+FB
035A 121A GO 021A	03AE 23BC DO 03BC	0402 6020 V0=20
035C 00E0 ERASE	03B0 6328 V3=28	0404 8065 V0=V0-V6
035E 23A4 DO 03A4	03B2 A429 I=0429	0406 4F00 SKIP;VF NE 00 0408 6600 V6=00 040A 1354 GO 0354

13. VIP Hi-Lo

This program uses the CHIP-8 INTERPRETER at 0000-01FF. You have 10 chances to guess the value of a random number between 00 and 99 selected by the program. The number at the right of the screen shows the number of the guess you are using. Enter a two digit number and the computer

tells you if you are high or low. Press any key to erase this number and then, try again. If you have failed after ten guesses, press any key and the number will be shown. If you are good you will never need more than seven guesses. If you are not so good, alter the program to allow more guesses by changing location 0292 from 4E0A to 4E99.

0200 6C09 VC=09	0254 8195 V1=V1-V9
0202 CD0F VD=RND	0256 3100 SKIP;V1 EQ 00
0204 8CD5 VC=VC-VD	0258 1272 GO 0272
0206 4F00 SKIP;VF NE 00	025A 82A5 V2=V2-VA
0208 1200 GO 0200	025C 3200 SKIP;V2 EQ 00
020A 89D0 V9=VD	025E 1286 GO 0286
020C 6C09 VC=09	0260 6B20 VB=20
020E CD0F VD=RND	0262 6518 V5=18
0210 8CD5 VC=VC-VD	0264 F929 I=V9(LSDP)
0212 4F00 SKIP;VF NE 00	0266 DBC5 SHOW 5MI@VBVC
0214 120C GO 020C	0268 7B05 VB+05
0216 8AD0 VA=VD	026A FA29 I=VA(LSDP)
0218 6E00 VE=00	026C DBC5 SHOW 5MI@VBVC
021A A2AA I=02AA	026E FC18 TONE=VC
021C 7E01 VE+01	0270 1270 GO 0270
021E FE33 MI=VE(3DD)	0272 65F0 V5=F0
0220 F265 V0:V2=MI	0274 8152 V1=V1&V5
0222 6B30 VB=30	0276 3100 SKIP;V1 EQ 00
0224 6C10 VC=10	0278 128E GO 028E
0226 680F V8=0F	027A A29F I=029F
0228 F129 I=V1(LSDP)	027C 6B10 VB=10
022A DBC5 SHOW 5MI@VBVC	027E 6C18 VC=18
022C 7B05 VB+05	0280 DBC5 SHOW 5MI@VBVC
022E F229 I=V2(LSDP)	0282 F60A V6=KEY
0230 DBC5 SHOW 5MI@VBVC	0284 1292 GO 0292
0232 4800 SKIP;V8 NE 00	0286 65F0 V5=F0
0234 1254 GO 0254	0288 8252 V2=V2&V5
0236 660A V6=0A	028A 4200 SKIP;V2 NE 00
0238 F10A V1=KEY	028C 127A GO 027A
023A 8165 V1=V1-V6	028E A2A4 I=02A4
023C 3F00 SKIP;VF EQ 00	0290 127C GO 027C
023E 1236 GO 0236	0292 4E0A SKIP;VE NE 0A
0240 710A V1+0A	0294 129A GO 029A
0242 660A V6=0A	0296 00E0 ERASE
0244 F20A V2=KEY	0298 121A GO 021A
0246 8265 V2=V2-V6	029A DBC5 SHOW 5MI@VBVC
0248 3F00 SKIP;VF EQ 00	029C 1260 GO 0260
024A 1242 GO 0242	029E 0197
024C 720A V2+0A	02A0 92F2
024E 6B10 VB=10	02A2 9297
0250 6800 V8=00	02A4 8F89
0252 1228 GO 0228	02A6 8989
	02A8 EFD4

14. VIP Hex Reflex

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Key 1 selects decimal-to-hexadecimal conversion. Key 2 selects binary-to-hexadecimal conversion. Convert the decimal or binary number as quickly as possible and press the

corresponding hexadecimal key. UA is the random number counter. M(0225) is the limit of the count for the random numbers. By changing this memory location, the amount of random numbers per game can be increased or decreased. The score is a function of your response time. The faster you respond, the higher the score.

0200 F80A V8=KEY	0250 120E GO 020E	02A0 D025 SHOW 5MI@V0V2
0202 3801 SKIP;V8 EQ 01	0252 5090 SKIP;V0 EQ V9	02A2 F529 I=V5(LSDP)
0204 4802 SKIP;V8 NE 02	0254 124A GO 024A	02A4 D125 SHOW 5MI@V1V2
0206 120A GO 020A	0256 6C10 VC=10	02A6 00EE RET
0208 1200 GO 0200	0258 FC18 TONE=VC	02A8 A2D3 I=02D3
020A 6700 V7=00	025A A2E4 I=02E4	02AA F665 V0:V6=MI
020C 6A00 VA=00	025C F265 V0:V2=MI	02AC 6E08 VE=08
020E 00E0 ERASE	025E 63F0 V3=F0	02AE 22C6 DO 02C6
0210 A2DD I=02DD	0260 83B2 V3=V3&VB	02B0 D045 SHOW 5MI@V0V4
0212 F733 MI=V7(3DD)	0262 3300 SKIP;V3 EQ 00	02B2 6E04 VE=04
0214 A2DD I=02DD	0264 126A GO 026A	02B4 22C6 DO 02C6
0216 F665 V0:V6=MI	0266 7701 V7+01	02B6 D145 SHOW 5MI@V1V4
0218 F029 I=V0(LSDP)	0268 127C GO 027C	02B8 6E02 VE=02
021A D435 SHOW 5MI@V4V3	026A 81B2 V1=V1&VB	02BA 22C6 DO 02C6
021C F129 I=V1(LSDP)	026C 8114 V1=V1+V1	02BC D245 SHOW 5MI@V2V4
021E D535 SHOW 5MI@V5V3	026E 83F0 V3=VF	02BE 6E01 VE=01
0220 F229 I=V2(LSDP)	0270 8224 V2=V2+V2	02C0 22C6 DO 02C6
0222 D635 SHOW 5MI@V6V3	0272 8234 V2=V2+V3	02C2 D345 SHOW 5MI@V3V4
0224 4A0F SKIP;VA NE 0F	0274 7001 V0+01	02C4 00EE RET
0226 1200 GO 0200	0276 3004 SKIP;V0 EQ 04	02C6 8E92 VE=VE&V9
0228 C90F V9=RND	0278 126C GO 026C	02C8 4E00 SKIP;VE NE 00
022A 4801 SKIP;V8 NE 01	027A 8724 V7=V7+V2	02CA F529 I=V5(LSDP)
022C 2296 DO 0296	027C 2280 DO 0280	02CC 3E00 SKIP;VE EQ 00
022E 4802 SKIP;V8 NE 02	027E 120E GO 020E	02CE F629 I=V6(LSDP)
0230 22A8 DO 02A8	0280 A2E7 I=02E7	02D0 00EE RET
0232 6BFF VB=FF	0282 F365 V0:V3=MI	02D2 0114
0234 FB15 TIME=VB	0284 D013 SHOW 3MI@V0V1	02D4 1A20
0236 7A01 VA+01	0286 F929 I=V9(LSDP)	02D6 260D
0238 6000 V0=00	0288 D235 SHOW 5MI@V2V3	02D8 0001
023A E0A1 SKIP;V0 NE KEY	028A 6B80 VB=80	02DA 2026
023C 1252 GO 0252	028C FB15 TIME=VB	02DC 0D00
023E 7001 V0+01	028E FB07 VB=TIME	02DE 0009
0240 4010 SKIP;V0 NE 10	0290 3B00 SKIP;VB EQ 00	02E0 0030
0242 1238 GO 0238	0292 128E GO 028E	02E2 363C
0244 FB07 VB=TIME	0294 00EE RET	02E4 00F0
0246 3B00 SKIP;VB EQ 00	0296 A2DD I=02DD	02E6 002B
0248 123A GO 023A	0298 F933 MI=V9(3DD)	02E8 0E30
024A 6C80 VC=80	029A A2DA I=02DA	02EA 0DE0
024C FC18 TONE=VC	029C F565 V0:V5=MI	02EC 00E0
024E 2280 DO 0280	029E F429 I=V4(LSDP)	02EE 00D4

15. VIP Dot-Dash

This program uses the CHIP-8 INTERPRETER at 0000-01FF. The track or obstacle pattern is copied from 0400-04FF into the display page. The direction of the dot is controlled by keys 2, 4, 6, and 8. The dot is accelerated so long as key 0 is not pressed. Key 0 is used as a brake. New tracks or

obstacle patterns can be created by using the VIP Video Display Drawing Game. When you create new patterns, the timer area (upper right corner) should be left blank. The dot starts at the left and the finish is any opening on the right edge of the display. The dot can wrap around at the top and bottom but not the right or left edges. A crash stops the clock and the dot blinks at the crash site. The finish blinks the final clock time.

0200 A2EC I=02EC	0254 7701 V7+01	02AA 12A6 GO 02A6
0202 FE65 V0:VE=MI	0256 57AD SKIP;V7 EQ VA	02AC 22CE DO 02CE
0204 FE18 TONE=VE	0258 1230 GO 0230	02AE 6D40 VD=40
0206 00E0 ERASE	025A 67FF V7=FF	02B0 FD15 TIME=VD
0208 A400 I=0400	025C 6100 V1=00	02B2 FD07 VD=TIME
020A 6400 V4=00	025E E1A1 SKIP;V1 NE KEY	02B4 3D00 SKIP;VD EQ 00
020C D451 SHOW 1MI@V4V5	0260 126A GO 026A	02B6 12B2 GO 02B2
020E F71E I=I+V7	0262 7AFF VA+FF	02B8 12A0 GO 02A0
0210 8464 V4=V4+V6	0264 4AFF SKIP;VA NE FF	02BA A2FB I=02FB
0212 633F V3=3F	0266 6A00 VA=00	02BC D891 SHOW 1MI@V8V9
0214 8342 V3=V3&V4	0268 1270 GO 0270	02BE 6E10 VE=10
0216 3300 SKIP;V3 EQ 00	026A 7A01 VA+01	02C0 FE18 TONE=VE
0218 120C GO 020C	026C 4A00 SKIP;VA NE 00	02C2 6D20 VD=20
021A 8574 V5=V5+V7	026E 6AFF VA=FF	02C4 FD15 TIME=VD
021C 631F V3=1F	0270 A2FB I=02FB	02C6 FD07 VD=TIME
021E 8352 V3=V3&V5	0272 D891 SHOW 1MI@V8V9	02C8 3D00 SKIP;VD EQ 00
0220 3300 SKIP;V3 EQ 00	0274 3F01 SKIP;VF EQ 01	02CA 12C6 GO 02C6
0222 120A GO 020A	0276 D891 SHOW 1MI@V8V9	02CC 12BA GO 02BA
0224 122A GO 022A	0278 3B04 SKIP;VB EQ 04	02CE A2FD I=02FD
0226 22CE DO 02CE	027A 1282 GO 0282	02D0 FC33 MI=VC(3DD)
0228 7C01 VC+01	027C 3800 SKIP;V8 EQ 00	02D2 F265 V0:V2=MI
022A 22CE DO 02CE	027E 78FF V8+FF	02D4 F229 I=V2(LSDP)
022C 6D15 VD=15	0280 8000 V0=V0	02D6 643C V4=3C
022E FD15 TIME=VD	0282 4B06 SKIP;VB NE 06	02D8 6500 V5=00
0230 FD07 VD=TIME	0284 7801 V8+01	02DA D455 SHOW 5MI@V4V5
0232 4D00 SKIP;VD NE 00	0286 4B02 SKIP;VB NE 02	02DC 6436 V4=36
0234 1226 GO 0226	0288 79FF V9+FF	02DE F129 I=V1(LSDP)
0236 A2EC I=02EC	028A 4B08 SKIP;VB NE 08	02EO D455 SHOW 5MI@V4V5
0238 F365 V0:V3=MI	028C 7901 V9+01	02E2 6430 V4=30
023A EOAL SKIP;V0 NE KEY	028E 6FFF VF=FF	02E4 F029 I=V0(LSDP)
023C 8B00 VB=V0	0290 A2FB I=02FB	02E6 D455 SHOW 5MI@V4V5
023E E1A1 SKIP;V1 NE KEY	0292 D891 SHOW 1MI@V8V9	02E8 00EE RET
0240 8B10 VB=V1	0294 4F01 SKIP;VF NE 01	02EA 0100
0242 E2A1 SKIP;V2 NE KEY	0296 12BA GO 02BA	02EC 0406
0244 8B20 VB=V2	0298 383F SKIP;V8 EQ 3F	02EE 0208
0246 E3A1 SKIP;V3 NE KEY	029A 1230 GO 0230	02F0 0000
0248 8B30 VB=V3	029C 6E80 VE=80	02F2 0801
024A 1254 GO 0254	029E FE18 TONE=VE	02F4 000E
024C 7602 V6+02	02A0 22CE DO 02CE	02F6 1506
024E FD07 VD=TIME	02A2 6D20 VD=20	02F8 0030
0250 56D0 SKIP;V6 EQ VD	02A4 FD15 TIME=VD	02FA 2080
0252 124E GO 024E	02A6 FD07 VD=TIME	02FC D4D4
	02A8 3D00 SKIP;VD EQ 00	02FE 0100

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15. VIP Dot-Dash (Continued)

0400 FFC0	0456 0387	04AC 0100
0402 0000	0458 0070	04AE 0003
0404 3F82	045A 03E0	04B0 0000
0406 0000	045C 001F	04B2 C002
0408 8FC0	045E 0003	04B4 8500
040A 0000	0460 0020	04B6 70E1
040C 3F82	0462 03FF	04B8 0000
040E 0000	0464 FFFF	04BA C002
0410 DF00	0466 0003	04BC 4900
0412 3000	0468 0020	04BE F9F0
0414 3F82	046A 03E0	04C0 0000
0416 0000	046C 001F	04C2 C001
0418 DF00	046E 0001	04C4 3200
041A 0000	0470 0020	04C6 3F78
041C 7F82	0472 01C0	04C8 0000
041E 0000	0474 000E	04CA C001
0420 F800	0476 0001	04CC 8400
0422 7800	0478 07FF	04CE OFF8
0424 FF82	047A 0080	04D0 0000
0426 0000	047C 0004	04D2 C000
0428 8800	047E 1DC0	04D4 7830
042A 7801	0480 03FE	04D6 0788
042C AA82	0482 0000	04D8 0000
042E 0000	0484 0000	04DA C000
0430 B83F	0486 0880	04DC 0078
0432 F800	0488 00F8	04DE C708
0434 2A83	048A 0000	04E0 0003
0436 FFFF	048C 7800	04E2 F00E
0438 883F	048E 3FC0	04E4 00FC
043A F800	0490 0020	04E6 7F08
043C 2A80	0492 0001	04E8 000F
043E 010F	0494 8600	04EA FC1F
0440 F800	0496 0880	04EC 00FC
0442 0000	0498 0020	04EE 1FF8
0444 2A00	049A 0001	04F0 003F
0446 010F	049C 0200	04F2 FFFF
0448 F000	049E 1DC0	04F4 8078
044A 0080	04A0 0020	04F6 07C0
044C 0804	04A2 C002	04F8 003F
044E 0387	04A4 4900	04FA FFFF
0450 F0F8	04A6 0001	04FC C031
0452 01C0	04A8 0000	04FE FFFF
0454 000E	04AA C002	0500 00D4

16. VIP A-Mazing

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Key 1 or key 2 starts the program. Key 1 is used to generate a maze at 0400-04FF. Key 2 skips the generation of a maze. The maze pattern at 0400-04FF is copied into the display page. Traversing the maze is controlled by keys 2, 4, 6, or 8. The spot always starts on the left (the 15th line (0E-hex) from the top), and the finish is any opening on the right border. The maze wraps around at the top and bottom but not from left-to-right or right-to-left. An internal clock keeps track of the time used to traverse the maze but is also incremented whenever a collision occurs. This clock is

displayed in the upper right corner when the end of the maze is reached. The background pattern may be changed by changing 0211 to: 8F for a checker-board pattern; 90 for a cross-hatch pattern; and 91 for a solid pattern. The starting location can be changed by setting 0381 and 0388 to the X-coordinate and setting 0382 and 0389 to the Y-coordinate. V6=M(0386) and V7=M(0387) are parameters used in generating a new maze. V6 is used to determine how often moving to the left of the screen is disallowed (1/V6). V7 is used to determine the length of randomly occurring excursions. M(0251) is the bit mask which is used to set the probability of excursions occurring. Maze patterns can be saved on cassette tape and reloaded into 0400-04FF using the operating system.

```

0200 6001 V0=01
0202 6102 V1=02
0204 E1A1 SKIP;V1 NE KEY
0206 1280 GO 0280
0208 E09E SKIP;V0 EQ KEY
020A 1204 GO 0204
020C 036C MLS@036C
020E 00E0 ERASE
0210 A391 I=0391
0212 6100 V1=00
0214 6000 V0=00
0216 D012 SHOW 2MI@V0V1
0218 7008 V0+08
021A 6240 V2=40
021C 8205 V2=V2-V0
021E 3200 SKIP;V2 EQ 00
0220 1216 GO 0216
0222 7102 V1+02
0224 6220 V2=20
0226 8215 V2=V2-V1
0228 3200 SKIP;V2 EQ 00
022A 1214 GO 0214
022C A380 I=0380
022E F965 V0:V9=MI
0230 CB03 VB=RND
0232 4600 SKIP;V6 NE 00
0234 1240 GO 0240
0236 73FF V3+FF
0238 3300 SKIP;V3 EQ 00
023A 1240 GO 0240
023C 8360 V3=V6
023E 7B01 VB+01
0240 A377 I=0377
0242 D891 SHOW 1MI@V8V9
0244 3F01 SKIP;VF EQ 01
0246 D891 SHOW 1MI@V8V9
0248 4700 SKIP;V7 NE 00
024A 1266 GO 0266
024C 5470 SKIP;V4 EQ V7
024E 125A GO 025A
0250 C501 V5=RND

0252 3500 SKIP;V5 EQ 00
0254 1266 GO 0266
0256 8180 V1=V8
0258 8290 V2=V9
025A 74FF V4+FF
025C 3400 SKIP;V4 EQ 00
025E 1266 GO 0266
0260 8810 V8=V1
0262 8920 V9=V2
0264 8470 V4=V7
0266 2332 DO 0332
0268 4FED SKIP;VF NE ED
026A 1278 GO 0278
026C D891 SHOW 1MI@V8V9
026E 3F01 SKIP;VF EQ 01
0270 D891 SHOW 1MI@V8V9
0272 2332 DO 0332
0274 3FED SKIP;VF EQ ED
0276 1230 GO 0230
0278 D891 SHOW 1MI@V8V9
027A 3F01 SKIP;VF EQ 01
027C D891 SHOW 1MI@V8V9
027E 0373 MLS@0373
0280 00E0 ERASE
0282 A400 I=0400
0284 6001 V0=01
0286 6200 V2=00
0288 6100 V1=00
028A D121 SHOW 1MI@V1V2
028C F01E I=I+V0
028E 7108 V1+08
0290 6540 V5=40
0292 8515 V5=V5-V1
0294 3500 SKIP;V5 EQ 00
0296 128A GO 028A
0298 7201 V2+01
029A 6520 V5=20
029C 8525 V5=V5-V2
029E 3500 SKIP;V5 EQ 00
02A0 1288 GO 0288
02A2 A380 I=0380

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16. VIP A-Mazing (Continued)

02A4 FE65 V0:VE=MI	02F4 D891 SHOW 1MI@V8V9	0344 6900 V9=00
02A6 A377 I=0377	02F6 4402 SKIP;V4 NE 02	0346 48FF SKIP;V8 NE FF
02A8 D891 SHOW 1MI@V8V9	02F8 6B01 VB=01	0348 6800 V8=00
02AA FE18 TONE=VE	02FA 4401 SKIP;V4 NE 01	034A 4840 SKIP;V8 NE 40
02AC 6D40 VD=40	02FC 6B02 VB=02	034C 683F V8=3F
02AE FD15 TIME=VD	02FE 4400 SKIP;V4 NE 00	034E 483F SKIP;V8 NE 3F
02B0 7C01 VC+01	0300 6B03 VB=03	0350 6FED VF=ED
02B2 FD07 VD=TIME	0302 4403 SKIP;V4 NE 03	0352 00EE RET
02B4 4D00 SKIP;VD NE 00	0304 6B00 VB=00	0354 0100
02B6 12AC GO 02AC	0306 7C01 VC+01	0356 9BBD
02B8 85A0 V5=VA	0308 FE18 TONE=VE	0358 F806
02BA 85D2 V5=V5&VD	030A 12E8 GO 02E8	035A ADAF
02BC 3500 SKIP;V5 EQ 00	030C D891 SHOW 1MI@V8V9	035C F800
02BE 12B2 GO 02B2	030E 4F01 SKIP;VF NE 01	035E 5D1D
02C0 D891 SHOW 1MI@V8V9	0310 12F4 GO 02F4	0360 5D8D
02C2 6BBD VB=BD	0312 12B2 GO 02B2	0362 FC07
02C4 6502 V5=02	0314 0356 MLS@0356	0364 AD2F
02C6 E5A1 SKIP;V5 NE KEY	0316 A378 I=0378	0366 8F3A
02C8 6B02 VB=02	0318 FC33 MI=VC (3DD)	0368 5CD4
02CA 6508 V5=08	031A A378 I=0378	036A 0100
02CC E5A1 SKIP;V5 NE KEY	031C F665 V0:V6=MI	036C 9BBE
02CE 6B01 VB=01	031E F029 I=V0(LSDP)	036E F804
02D0 6504 V5=04	0320 D435 SHOW 5MI@V4V3	0370 BBD4
02D2 E5A1 SKIP;V5 NE KEY	0322 F129 I=V1(LSDP)	0372 109E
02D4 6B00 VB=00	0324 D535 SHOW 5MI@V5V3	0374 BBD4
02D6 6506 V5=06	0326 F229 I=V2(LSDP)	0376 0180
02D8 E5A1 SKIP;V5 NE KEY	0328 D635 SHOW 5MI@V6V3	0378 0007
02DA 6B03 VB=03	032A 6E80 VE=80	037A 0500
02DC 84B0 V4=VB	032C FE18 TONE=VE	037C 3237
02DE 4BBD SKIP;VB NE BD	032E F00A V0=KEY	037E 3C00
02E0 12B2 GO 02B2	0330 1200 GO 0200	0380 0000
02E2 D891 SHOW 1MI@V8V9	0332 4B00 SKIP;VB NE 00	0382 0E02
02E4 3F01 SKIP;VF EQ 01	0334 78FF V8+FF	0384 0000
02E6 D891 SHOW 1MI@V8V9	0336 4B01 SKIP;VB NE 01	0386 0220
02E8 2332 DO 0332	0338 7901 V9+01	0388 000E
02EA 3FED SKIP;VF EQ ED	033A 4B02 SKIP;VB NE 02	038A 0F06
02EC 130C GO 030C	033C 79FF V9+FF	038C 0010
02EE D891 SHOW 1MI@V8V9	033E 4B03 SKIP;VB NE 03	038E 20AA
02F0 3F01 SKIP;VF EQ 01	0340 7801 V8+01	0390 55FF
02F2 1314 GO 0314	0342 4920 SKIP;V9 NE 20	0392 FFD4

17. VIP Deduce

This program uses the CHIP-8 INTERPRETER at 0000-01FF. This game is an old favorite, described as BAGELS in David Ahl's "101 Computer Games"; "What to Do After You Hit Return", p. 10 and 11 (People's Computer Company); and many other places. The computer is thinking of a secret three-digit number. You should determine this secret number in a minimum of turns,

indicated in lower right corner. Enter your guess - using any number 0-9. Each digit will be examined in the same way. For example, the digit in the first location is checked to see if it is the same as in the secret number. If it is, it receives a score of 2; if not, but does occur elsewhere in number, it receives a score of 1; and if not at all, a score of 0. The computer then gives you the total score below your guess as a clue. A score of 6 indicates that you have determined the secret number.

0200 6E00 VE=00	0256 125C GO 025C	02AC 00EE RET
0202 A3F0 I=03F0	0258 74FF V4+FF	02AE 6600 V6=00
0204 22A0 DO 02A0	025A 1236 GO 0236	02B0 3500 SKIP;V5 EQ 00
0206 22A0 DO 02A0	025C 6508 V5=08	02B2 12C6 GO 02C6
0208 22A0 DO 02A0	025E 22D0 DO 02D0	02B4 A3F3 I=03F3
020A 6500 V5=00	0260 6534 V5=34	02B6 F265 V0:V2=MI
020C 6000 V0=00	0262 22D0 DO 02D0	02B8 F029 I=V0(LSDP)
020E 6100 V1=00	0264 7E01 VE+01	02BA 22CA DO 02CA
0210 6200 V2=00	0266 6534 V5=34	02BC F129 I=V1(LSDP)
0212 F255 MI=V0:V2	0268 22D0 DO 02D0	02BE 22CA DO 02CA
0214 22AE DO 02AE	026A 4D06 SKIP;VD NE 06	02C0 F229 I=V2(LSDP)
0216 6534 V5=34	026C 1288 GO 0288	02C2 22CA DO 02CA
0218 22D0 DO 02D0	026E 4E63 SKIP;VE NE 63	02C4 00EE RET
021A A3F6 I=03F6	0270 1282 GO 0282	02C6 A3F0 I=03F0
021C 22E2 DO 02E2	0272 61C0 V1=C0	02C8 12B6 GO 02B6
021E 22E2 DO 02E2	0274 F115 TIME=V1	02CA D565 SHOW 5MI@V5V6
0220 22E2 DO 02E2	0276 F107 V1=TIME	02CC 7508 V5+08
0222 6500 V5=00	0278 3100 SKIP;V1 EQ 00	02CE 00EE RET
0224 22AE DO 02AE	027A 1276 GO 0276	02D0 6618 V6=18
0226 A3F6 I=03F6	027C 6508 V5=08	02D2 3508 SKIP;V5 EQ 08
0228 F265 V0:V2=MI	027E 22D0 DO 02D0	02D4 12DA GO 02DA
022A A3F3 I=03F3	0280 121A GO 021A	02D6 FD29 I=VD(LSDP)
022C F255 MI=V0:V2	0282 A3F0 I=03F0	02D8 12CA GO 02CA
022E 6500 V5=00	0284 652C V5=2C	02DA A3F6 I=03F6
0230 22AE DO 02AE	0286 22AE DO 02AE	02DC FE33 MI=VE(3DD)
0232 6402 V4=02	0288 6108 V1=08	02DE F265 V0:V2=MI
0234 6D00 VD=00	028A 6002 V0=02	02E0 12BC GO 02BC
0236 A3F3 I=03F3	028C F018 TONE=V0	02E2 F00A V0=KEY
0238 22F4 DO 02F4	028E 6F10 VF=10	02E4 400F SKIP;V0 NE OF
023A A3F3 I=03F3	0290 71FF V1+FF	02E6 1282 GO 0282
023C F255 MI=V0:V2	0292 FF15 TIME=VF	02E8 6109 V1=09
023E 8500 V5=V0	0294 FF07 VF=TIME	02EA 8105 V1=V1-V0
0240 A3F0 I=03F0	0296 3F00 SKIP;VF EQ 00	02EC 4F00 SKIP;VF NE 00
0242 22F4 DO 02F4	0298 1294 GO 0294	02EE 12E2 GO 02E2
0244 A3F0 I=03F0	029A 3100 SKIP;V1 EQ 00	02F0 F055 MI=V0:V0
0246 F255 MI=V0:V2	029C 128A GO 028A	02F2 00EE RET
0248 9500 SKIP;V5 NE V0	029E 129E GO 029E	02F4 F265 V0:V2=MI
024A 1300 GO 0300	02A0 6409 V4=09	02F6 8300 V3=V0
024C 9510 SKIP;V5 NE V1	02A2 C00F V0=RND	02F8 8010 V0=V1
024E 1252 GO 0252	02A4 8405 V4=V4-V0	02FA 8120 V1=V2
0250 9520 SKIP;V5 NE V2	02A6 4F00 SKIP;VF NE 00	02FC 8230 V2=V3
0252 7D01 VD+01	02A8 12A0 GO 02A0	02FE 00EE RET
0254 4400 SKIP;V4 NE 00	02AA F055 MI=V0:V0	0300 7D02 VD+02
		0302 1254 GO 0254

18. VIP Shooting Stars

This program uses the CHIP-8 INTERPRETER at 0000-01FF. Each location in universe is either a Black Hole or a Star. The goal is to obtain a central Black Hole surrounded by all Stars in a minimum number of turns. To shoot Star, press corresponding number (1-9) on keyboard. When Star

is shot, it will turn into a Black Hole and all other states in its galaxy are complemented. If your universe becomes all Black Holes, you lose and are given a score of 99. For further discussion of game, see "What to Do After You Hit Return", p. 54, 55 (People's Computer Company) and BYTE Magazine, May 1976, p. 42-49, W. I. Nico.

0200 00E0 ERASE	025C 6608 V6=08	02B8 8774 V7=V7+V7
0202 6E00 VE=00	025E A3FD I=03FD	02BA 4F00 SKIP;VF NE 00
0204 A2E9 I=02E9	0260 FE33 MI=VE (3DD)	02BC 12C0 GO 02C0
0206 67FF V7=FF	0262 F265 V0:V2=MI	02BE D565 SHOW 5MI@V5V6
0208 6801 V8=01	0264 F129 I=V1(LSDP)	02C0 75F8 V5+F8
020A 228E DO 028E	0266 D565 SHOW 5MI@V5V6	02C2 74FF V4+FF
020C 6900 V9=00	0268 7505 V5+05	02C4 12A4 GO 02A4
020E 6A00 VA=00	026A F229 I=V2(LSDP)	02C6 4800 SKIP;V8 NE 00
0210 A2E4 I=02E4	026C D565 SHOW 5MI@V5V6	02C8 12C0 GO 02C0
0212 228E DO 028E	026E 00EE RET	02CA 12BE GO 02BE
0214 225A DO 025A	0270 6109 V1=09	02CC 225A DO 025A
0216 4E63 SKIP;VE NE 63	0272 E1A1 SKIP;V1 NE KEY	02CE 6E63 VE=63
0218 12D2 GO 02D2	0274 00EE RET	02D0 225A DO 025A
021A 3900 SKIP;V9 EQ 00	0276 4100 SKIP;V1 NE 00	02D2 6002 V0=02
021C 1222 GO 0222	0278 00EE RET	02D4 F018 TONE=V0
021E 4A00 SKIP;VA NE 00	027A 71FF V1+FF	02D6 6F10 VF=10
0220 12CC GO 02CC	027C 1272 GO 0272	02D8 FF15 TIME=VF
0222 3A00 SKIP;VA EQ 00	027E 60FF V0=FF	02DA FF07 VF=TIME
0224 122A GO 022A	0280 61FF V1=FF	02DC 3F00 SKIP;VF EQ 00
0226 49FF SKIP;V9 NE FF	0282 8035 V0=V0-V3	02DE 12DA GO 02DA
0228 12D2 GO 02D2	0284 8125 V1=V1-V2	02E0 12D2 GO 02D2
022A A2EE I=02EE	0286 8202 V2=V2&V0	02E2 01FF
022C 2270 DO 0270	0288 8132 V1=V1&V3	02E4 1C3E
022E 4100 SKIP;V1 NE 00	028A 8211 V2=V2/V1	02E6 3E3E
0230 122C GO 022C	028C 00EE RET	02E8 1C14
0232 71FF V1+FF	028E 8370 V3=V7	02EA 2200
0234 8114 V1=V1+V1	0290 8290 V2=V9	02EC 2214
0236 8114 V1=V1+V1	0292 227E DO 027E	02EE 0100
0238 F11E I=I+V1	0294 8920 V9=V2	02F0 0B01
023A F365 V0:V3=MI	0296 8380 V3=V8	02F2 0200
023C 6402 V4=02	0298 82A0 V2=VA	02F4 0700
023E F418 TONE=V4	029A 227E DO 027E	02F6 0400
0240 8092 V0=V0&V9	029C 8A20 VA=V2	02F8 1601
0242 3000 SKIP;V0 EQ 00	029E 6409 V4=09	02FA 0800
0244 124C GO 024C	02A0 6610 V6=10	02FC 2900
0246 81A2 V1=V1&VA	02A2 6510 V5=10	02FE 0001
0248 4100 SKIP;V1 NE 00	02A4 4400 SKIP;V4 NE 00	0300 5A01
024A 122A GO 022A	02A6 00EE RET	0302 1000
024C 8720 V7=V2	02A8 4405 SKIP;V4 NE 05	0304 9400
024E 8830 V8=V3	02AA 12C6 GO 02C6	0306 2000
0250 A2E4 I=02E4	02AC 4406 SKIP;V4 NE 06	0308 6801
0252 228E DO 028E	02AE 12B4 GO 02B4	030A 4000
0254 225A DO 025A	02B0 3403 SKIP;V4 EQ 03	030C E000
0256 7E01 VE+01	02B2 12B8 GO 02B8	030E 8000
0258 1214 GO 0214	02B4 76F8 V6+F8	0310 D001
025A 6520 V5=20	02B6 6510 V5=10	0312 00D4

19. VIP Strike-9

This program uses the CHIP-8 INTERPRETER at 0000-01FF. STRIKE-9 is based on the roll of dice. To roll dice, press key "0". Select

0200 00E0 ERASE	0250 1248 GO 0248
0202 6401 V4=01	0252 1240 GO 0240
0204 60FF V0=FF	0254 22EA DO 02EA
0206 22EA DO 02EA	0256 F265 V0:V2=MI
0208 F055 MI=V0:V0	0258 4000 SKIP;V0 NE 00
020A 7401 V4+01	025A 1240 GO 0240
020C 340A SKIP;V4 EQ 0A	025C F618 TONE=V6
020E 1206 GO 0206	025E F429 I=V4(LSDP)
0210 6401 V4=01	0260 D125 SHOW 5MI@V1V2
0212 22EA DO 02EA	0262 22EA DO 02EA
0214 F265 V0:V2=MI	0264 6000 V0=00
0216 F429 I=V4(LSDP)	0266 F055 MI=V0:V0
0218 D125 SHOW 5MI@V1V2	0268 8945 V9=V9-V4
021A 7401 V4+01	026A 4F00 SKIP;VF NE 00
021C 340A SKIP;V4 EQ 0A	026C 1284 GO 0284
021E 1212 GO 0212	026E 3900 SKIP;V9 EQ 00
0220 6108 V1=08	0270 12A4 GO 02A4
0222 22B4 DO 02B4	0272 22AC DO 02AC
0224 6112 V1=12	0274 620A V2=0A
0226 22B4 DO 02B4	0276 6109 V1=09
0228 6000 V0=00	0278 F729 I=V7(LSDP)
022A 22FA DO 02FA	027A D125 SHOW 5MI@V1V2
022C 6109 V1=09	027C 6113 V1=13
022E 22BC DO 02BC	027E F829 I=V8(LSDP)
0230 8700 V7=V0	0280 D125 SHOW 5MI@V1V2
0232 6113 V1=13	0282 1228 GO 0228
0234 22BC DO 02BC	0284 A310 I=0310
0236 8800 V8=V0	0286 128A GO 028A
0238 8980 V9=V8	0288 A301 I=0301
023A 8974 V9=V9+V7	028A 6005 V0=05
023C 60FF V0=FF	028C 6218 V2=18
023E F015 TIME=V0	028E 6108 V1=08
0240 F007 V0=TIME	0290 D125 SHOW 5MI@V1V2
0242 4000 SKIP;V0 NE 00	0292 6110 V1=10
0244 1284 GO 0284	0294 F01E I=I+V0
0246 6401 V4=01	0296 D125 SHOW 5MI@V1V2
0248 E4A1 SKIP;V4 NE KEY	0298 6118 V1=18
024A 1254 GO 0254	029A F01E I=I+V0
024C 7401 V4+01	029C D125 SHOW 5MI@V1V2
024E 340A SKIP;V4 EQ 0A	029E 6077 V0=77
	02A0 F018 TONE=V0

from the numbers 1-9 those adding up to total on dice, then roll again. To win you must just eliminate all the starting nine numbers. You are given up to 4 seconds to hit any valid key. Refer to Creative Computing, Vol. 3, 88 (1977), Bruce Gembowski.

19. VIP Strike-9 (Continued)

02A2 12A2 GO 02A2	02F2 00EE RET
02A4 22D8 DO 02D8	02F4 F21E I=I+V2
02A6 3000 SKIP;V0 EQ 00	02F6 73FF V3+FF
02A8 123C GO 023C	02F8 12F0 GO 02F0
02AA 1284 GO 0284	02FA E09E SKIP;V0 EQ KEY
02AC 22D8 DO 02D8	02FC 12FA GO 02FA
02AE 3000 SKIP;V0 EQ 00	02FE 00EE RET
02B0 00EE RET	0300 0189
02B2 1288 GO 0288	0302 89A9
02B4 A33A I=033A	0304 A9F9
02B6 6208 V2=08	0306 2232
02B8 D129 SHOW 9MI@V1V2	0308 2A26
02BA 00EE RET	030A 2222
02BC 6601 V6=01	030C 2222
02BE 620A V2=0A	030E 0022
02C0 6001 V0=01	0310 8382
02C2 F029 I=V0(LSDP)	0312 8282
02C4 D125 SHOW 5MI@V1V2	0314 F3CF
02C6 F618 TONE=V6	0316 484F
02C8 C307 V3=RND	0318 41CF
02CA 4300 SKIP;V3 NE 00	031A 3C20
02CC 00EE RET	031C 3820
02CE 7001 V0+01	031E 3C00
02D0 D125 SHOW 5MI@V1V2	0320 2808
02D2 3007 SKIP;V0 EQ 07	0322 0030
02D4 12C2 GO 02C2	0324 0800
02D6 12C0 GO 02C0	0326 3808
02D8 6401 V4=01	0328 0028
02DA 22EA DO 02EA	032A 1000
02DC F065 V0:V0=MI	032C 3010
02DE 3000 SKIP;V0 EQ 00	032E 0038
02E0 00EE RET	0330 1000
02E2 7401 V4+01	0332 2818
02E4 340A SKIP;V4 EQ 0A	0334 0030
02E6 12DA GO 02DA	0336 1800
02E8 00EE RET	0338 3818
02EA 6203 V2=03	033A FCFC
02EC 8340 V3=V4	033C FCFC
02EE A31F I=031F	033E FCFC
02F0 4301 SKIP;V3 NE 01	0340 FCFC
	0342 FC00

20. VIP Card Game

(like the well-known acey-ducey)

This program uses the CHIP-8 INTERPRETER at 0000-01FF. ACEY-DUCEY is a card game in which the dealer shows two cards from deck. You bet (from 1 to 9) that the next dealer card

lies between or equal to the first two cards in face value (ACES are low).

In order to obtain a new deal, press the zero key, and then bet as before. Try for a score of 100 or greater.

0200 A350 I=0350	025C F065 V0:V0=MI	02BA 7201 V2+01
0202 600A V0=0A	025E 8015 V0=V0-V1	02BC 7101 V1+01
0204 F055 MI=V0:V0	0260 3F00 SKIP;VF EQ 00	02BE 22D4 DO 02D4
0206 00E0 ERASE	0262 127E GO 027E	02C0 D125 SHOW 5MI@V1V2
0208 2284 DO 0284	0264 6000 V0=00	02C2 00EE RET
020A 6113 V1=13	0266 E09E SKIP;V0 EQ KEY	02C4 2284 DO 0284
020C 22A2 DO 02A2	0268 1266 GO 0266	02C6 A350 I=0350
020E 8540 V5=V4	026A 1206 GO 0206	02C8 F065 V0:V0=MI
0210 6127 V1=27	026C 8675 V6=V6-V7	02CA 8085 V0=V0-V8
0212 22A2 DO 02A2	026E 4600 SKIP;V6 NE 00	02CC A350 I=0350
0214 8740 V7=V4	0270 124E GO 024E	02CE F055 MI=V0:V0
0216 6801 V8=01	0272 3F00 SKIP;VF EQ 00	02D0 2284 DO 0284
0218 E8A1 SKIP;V8 NE KEY	0274 124E GO 024E	02D2 00EE RET
021A 1224 GO 0224	0276 A350 I=0350	02D4 6001 V0=01
021C 7801 V8+01	0278 F065 V0:V0=MI	02D6 8045 V0=V0-V4
021E 380A SKIP;V8 EQ 0A	027A 3000 SKIP;V0 EQ 00	02D8 4000 SKIP;V0 NE 00
0220 1218 GO 0218	027C 1264 GO 0264	02DA 12F2 GO 02F2
0222 1216 GO 0216	027E 6040 V0=40	02DC 6009 V0=09
0224 A350 I=0350	0280 F018 TONE=V0	02DE 8045 V0=V0-V4
0226 F065 V0:V0=MI	0282 1282 GO 0282	02E0 3F00 SKIP;VF EQ 00
0228 8085 V0=V0-V8	0284 A350 I=0350	02E2 12EE GO 02EE
022A 3F01 SKIP;VF EQ 01	0286 F065 V0:V0=MI	02E4 A2ED I=02ED
022C 1216 GO 0216	0288 F033 MI=V0(3DD)	02E6 F41E I=I+V4
022E 6002 V0=02	028A 641B V4=1B	02E8 F065 V0:V0=MI
0230 F018 TONE=V0	028C 6318 V3=18	02EA F01E I=I+V0
0232 22C4 DO 02C4	028E F265 V0:V2=MI	02EC 00EE RET
0234 611D V1=1D	0290 F029 I=V0(LSDP)	02EE F429 I=V4(LSDP)
0236 22A2 DO 02A2	0292 D345 SHOW 5MI@V3V4	02F0 00EE RET
0238 8640 V6=V4	0294 7306 V3+06	02F2 A303 I=0303
023A 8565 V5=V5-V6	0296 F129 I=V1(LSDP)	02F4 00EE RET
023C 4500 SKIP;V5 NE 00	0298 D345 SHOW 5MI@V3V4	02F6 0114
023E 124E GO 024E	029A 7306 V3+06	02F8 0205
0240 3F00 SKIP;VF EQ 00	029C F229 I=V2(LSDP)	02FA 0C10
0242 126C GO 026C	029E D345 SHOW 5MI@V3V4	02FC 1010
0244 8675 V6=V6-V7	02A0 00EE RET	02FE 90F0
0246 4600 SKIP;V6 NE 00	02A2 C40F V4=RND	0300 9090
0248 124E GO 024E	02A4 4400 SKIP;V4 NE 00	0302 B0F0
024A 3F00 SKIP;VF EQ 00	02A6 12A2 GO 02A2	0304 90F0
024C 1276 GO 0276	02A8 600D V0=0D	0306 9090
024E 6000 V0=00	02AA 8045 V0=V0-V4	0308 B0E0
0250 8085 V0=V0-V8	02AC 3F01 SKIP;VF EQ 01	030A B090
0252 8085 V0=V0-V8	02AE 12A2 GO 02A2	030C F060
0254 8800 V8=V0	02B0 6002 V0=02	030E 6060
0256 22C4 DO 02C4	02B2 F018 TONE=V0	0310 60FC
0258 6164 V1=64	02B4 6200 V2=00	0312 FCFC
025A A350 I=0350	02B6 A311 I=0311	0314 FCFC
	02B8 D127 SHOW 7MI@V1V2	0316 FCFC

