

Paperware4

Aanvullende informatie omtrent het aansluiten van de VDU-kaart op de Junior Computer met cassette- of floppy disk-interface.

Indeling:

- Source-listing voor de Junior met cassette-interface.
- Source-listing voor de Junior met floppy disk-interface.
- Twee grafische demo-programma's in BASIC.



Junior computer met cassette-interface

Bij het aansluiten van de VDU-kaart op junior computers met cassette-interface worden alle variabelen voor de beeldscherm-sturing in pag. \$1A geschreven. De geheugenplaatsen \$1A29 . . . \$1A59 bevatten de variabelen voor de video-driver. Deze driver is ondergebracht in de EPROM's IC4 en IC5 op de interface-kaart. Wegens plaatsgebrek is in beide EPROM's het programma PME komen te vervallen. De adressen van alle routines zijn ekwivalent aan die van de EPROM-set die met de ELEKTERMINAL werkt. De Junior met cassette-interface heeft een seriële keyboard-ingang en hij wordt, zoals tot nu toe gebruikelijk was, via deze ingang met behulp van de RUBOUT-toets gestart.

Men heeft nu de beschikking over twee uitgangen die door het zetten of terugzetten van flags in- en uitgeschakeld kunnen worden:

1. Centronics-interface met flag 1A56 (CENFLG)
2. Seriële printer-uitgang met flag 1A58 (PRIFLG)

Staat in deze flags de waarde 00, dan zijn de uitgangen uitgeschakeld. De uitgangen kunnen worden ingeschakeld door het ingeven van een willekeurige waarde die niet gelijk is aan de waarde 00. De beeldscherm-uitgang is altijd actief.

Uitgeverij. Elektuur B.V				
Library				
Filenummer				

```

0010: 0C80          ORG    $0C80
0020:
0030:
0040: SOURCE LISTING OF THE VIDEO HANDLER FOR
0050: ELEKTOR'S JUNIOR COMPUTER
0060:
0070: WRITTEN BY A. NACHTMANN
0080:
0090: © 1983
0100:
0110: COPYRIGHT BY ELEKTOR/ELEKTUUR
0120:
0130:
0140: PROCESSOR:      6502 OR 65C02
0150: CRT CONTROLLER: 6845 MOTOROLA, ROCKWELL, SYNERTEC
0160:
0170:
0180: SCREEN COMMANDS OF THE DOS JUNIOR COMPUTER
0190:
0200: OPERATING SYSTEM: OS-65D V3.3 (OHIO SCIENTIFIC)
0210:
0220:
0230: CARRIAGE RETURN
0240: LINE FEED
0250: <ESC><1> CLEAR SCREEN & HOME
0260: <ESC><2> CLEAR SCREEN & HOME
0270: <ESC><3> HOME CURSOR
0280: <ESC><4> ERASE TO EOS
0290: <ESC><5> CURSOR UP
0300: <ESC><6> CURSOR DOWN
0310: <ESC><8> ERASE TO EOL
0320: <CTL-H> CURSOR LEFT
0330: <CTL-P> CURSOR RIGHT
0340: <CTL-F> CURSOR TO FRONT OF LINE (EMULATED)
0350: <CTL-R> CURSOR TO REAR OF LINE (EMULATED)
0360: <CTL-I> TAB 8 COLUMNS (EMULATED)
0370: <CTL-T> RETYPE THE CURRENT LINE (EMULATED)
0380: *POINTERS AND TEMPS*
0390:
0400: 0C80          RAMPTR *      $00FC THIS POINTER IS SWAPPED TO
                                PAGE $1A
0410: 0C80          TOPPIA *      $1A59 TOP OF THE PIA (6532) RAM
0420: 0C80          FLN      *      TOPPIA -2B FIRST LINE POINTER
0430: 0C80          CLN      *      FLN      +02 CURRENT LINE POINTER
0440: 0C80          LLN      *      CLN      +02 LAST LINE POINTER
0450: 0C80          SCRPT *      LLN      +02 SLAVE SCREEN POINTER
0460: 0C80          CURSOR *      SCRPT +02 CURRENT CURSOR
0470: 0C80          INLINE *      CURSOR +02 IN LINE OF WINDOW
0480: 0C80          COL      *      INLINE +01 CURRENT COLUMN
0490: 0C80          ESCFLG *      COL      +01 ESC FLAG
0500: 0C80          TEMCOL *      ESCFLG +01 SLAVE COLUMN
0510: 0C80          RAMBEG *      TEMCOL +01 THE REFRESH RAM STARTS HERE
0520: 0C80          CHAPLN *      RAMBEG +02 CHARACTER/LINE
0530: 0C80          LPSCR  *      CHAPLN +01 LINES/SCREEN
0540: 0C80          FORMAT *      LPSCR  +01 SCREEN FORMAT
0550: 0C80          DUPLEX *      FORMAT +01 0=WITHOUT ECHO, 1=WITH ECHO
0560: 0C80          TABLE *      DUPLEX +01 CRT FORMAT TABLE

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0570:	0C80	JMPVEC	*	TABLE	+12	COMMAND ADDRESS POINTER
0580:	0C80	CENFLG	*	JMPVEC	+02	CENTRONICS FLAG
0590:	0C80	TRAPRO	*	CENFLG	+01	PROCESSOR FLAG (NOT USED)
0600:	0C80	PRIFLG	*	TRAPRO	+01	SERIAL PRINTER FLAG
0610:						
0620:	0C80	AHOLD	*	FLN	-01	SAVE A
0630:	0C80	XHOLD	*	AHOLD	-01	SAVE X
0640:	0C80	YHOLD	*	XHOLD	-01	SAVE Y
0650:	0C80	PZPTR	*	YHOLD	-02	WE NEED IT FOR KB-9 BASIC
0660:						
0670:						
0680:						
0690:						
0700:						
0710:	0C80	SPACE	*	\$0020		
0720:	0C80	ESC	*	\$001B		
0730:						
0740:						
0750:						
0760:						
0770:	0C80	SPAD	*	\$1A80	6532	IC ON THE STANDART JC
0780:						
0790:						
0800:						
0810:						
0820:						
0830:	0C80	VAPBD	*	\$1800		PORT B DATA
0840:	0C80	VAPAD	*	VAPBD	+01	PORT A DATA
0850:	0C80	VAPBDD	*	VAPBD	+02	PORT B DATA DIRECTION
0860:	0C80	VAPADD	*	VAPBD	+03	PORT A DATA DIRECTION
0870:	0C80	VATACL	*	VAPBD	+04	T1, LATCH-LOW, COUNTER-LO
0880:	0C80	VATACH	*	VAPBD	+05	T1, COUNTER-HIGH
0890:	0C80	VATALL	*	VAPBD	+06	T1, LATCH-LOW
0900:	0C80	VATALH	*	VAPBD	+07	T1, LATCH-HIGH
0910:	0C80	VATBCL	*	VAPBD	+08	T2, LATCH-LOW, COUNTER-LOW
0920:	0C80	VATBCH	*	VAPBD	+09	T2, COUNTER-HIGH
0930:	0C80	VASR	*	VAPBD	+0A	SHIFT REGISTER
0940:	0C80	VAACR	*	VAPBD	+0B	AUXILARY CONTROL REGISTER
0950:	0C80	VAPCR	*	VAPBD	+0C	PERIPHERAL CONTROL REGIST
0960:	0C80	VAIFR	*	VAPBD	+0D	INTERUPT FLAG REGISTER
0970:	0C80	VAIER	*	VAPBD	+0E	INTERUPT ENABLE REGISTER
0980:	0C80	VAPADN	*	VAPBD	+0F	PORT A DATA, NO HANDSHAKE
0990:						
1000:						
1010:						
1020:						
1030:	0C80	AR	*	\$D800		ADDRESS REGISTER OF THE CRT
1040:	0C80	RFILE	*	AR	+01	REGISTER FILE OF CRT
1050:						
1060:						
1070:						
1080:						
1090:						
1100:						
1110:						
1120:						

SPECIAL CHARACTERS

JUNIOR'S SERIAL I/O

VIA ON THE EXPANSION BOARD OF THE JUNIOR COMP.

CRT ADDRESSES

* VT 52 COMPATIBLE TERMINAL *

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1130:
1140: *INTERNAL 6845 REGISTER FILE*
1150:
1160: 0C80 HORTOT * $0000 HORIZONTAL TOTAL-1
1170: 0C80 HORDIS * $0001 HORIZONTAL DISPLAYED
1180: 0C80 HSYPOS * $0002 HORIZONTAL SYNC POSSTION
1190: 0C80 VHSYWI * $0003 VERTICAL, HORIZONTAL SYNC WIDTH
1200: 0C80 VERTOT * $0004 VERTICAL TOTAL-1
1210: 0C80 VTOTAJ * $0005 VERTICAL TOTAL ADJUST
1220: 0C80 VERDIS * $0006 VERTICAL DISPLAYED
1230: 0C80 VSYPOS * $0007 VERTICAL SYNC POSITION
1240: 0C80 MODE * $0008 INTERLACE MODE REGISTER
1250: 0C80 SCANLN * $0009 CHARACTER SCAN LINES-1
1260: 0C80 CURSTA * $000A CURSOR START
1270: 0C80 CUREND * $000B CURSOR END
1280: 0C80 DSPSTH * $000C DISPLAY START HIGH
1290: 0C80 DSPSTL * $000D DISPLAY START LOW
1300: 0C80 CURPOH * $000E CURSOR POSITION HIGH
1310: 0C80 CURPOL * $000F CURSOR POSITION LOW
1320: 0C80 LIPENH * $0010 LIGHT PEN HIGH
1330: 0C80 LIPENL * $0011 LIGHT PEN LOW
1340: 0C80 UPDATH * $0012 UPDATE HIGH (ROCKWELL, SYNERTEK)
1350: 0C80 UPDATL * $0013 UPDATE LOW
1360: 0C80 DUMMY * $001F DUMMY REGISTER

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1370:

1380:

1390:

1400:

1410:

1420:

VIDEO HANDLER

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1430:
1440: 0C80 AD 2D 1A VIDEO LDA AHOLD GET THE CHARACTER
1450: 0C83 C9 1B CMPIM ESC IS IT THE ESC CHAR.?
1460: 0C85 D0 09 BNE CHECK
1470: 0C87 8D 3A 1A STA ESCFLG SET THE ESC FLAG
1480:
1490: 0C8A EA VIDEND NOP
1500: 0C8B EA NOP
1510: 0C8C EA NOP
1520: 0C8D EA NOP
1530: 0C8E EA NOP
1540: 0C8F 60 RTS
1550:
1560:
1570: 0C90 20 F4 14 CHECK JSR COMCOM COMPUTE THE COMMAND INDEX
1580: 0C93 B0 10 BCS VALVEC THERE WAS NO COMMAND
1590: 0C95 BD 39 15 LDAX COMADR SET THE COMMAND VECTOR
1600: 0C98 8D 54 1A STA JMPVEC
1610: 0C9B E8 INX
1620: 0C9C BD 39 15 LDAX COMADR
1630: 0C9F 8D 55 1A STA JMPVEC +01
1640: 0CA2 6C 54 1A JMI JMPVEC
1650:
1660: 0CA5 4C FA 0C VALVEC JMP VALID
1670:
1680:

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1690:          ***EXECUTE A VIDEO COMMAND***
1700:
1710:
1720:          *CARRIAGE RETURN*
1730:
1740: 0CA8 A2 00      RETURN LDXIM $00
1750: 0CAA 8E 39 1A      STX   COL   COL=0
1760: 0CAD 20 88 0D      JSR   ADJUST ADJUST THE CURSOR
1770: 0CB0 4C 8A 0C      JMP   VIDEND
1780:
1790:          *LINE FEED*
1800:
1810: 0CB3 20 38 0F      FEED  JSR   CURDN
1820: 0CB6 4C 8A 0C      JMP   VIDEND
1830:
1840:          *CLEAR SCREEN & HOME CURSOR*
1850:
1860: 0CB9 20 87 0F      CLRHOM JSR   HOME
1870: 0CBC 20 A2 0E      JSR   ERTEOS
1880: 0CBF 4C 8A 0C      JMP   VIDEND
1890:
1900:          *CURSOR LEFT*
1910:
1920: 0CC2 20 7B 0F      LEFT  JSR   CURLFT
1930: 0CC5 4C 8A 0C      JMP   VIDEND
1940:
1950:          *HOME CURSOR*
1960:
1970: 0CC8 20 87 0F      HOCU  JSR   HOME
1980: 0CCB 4C 8A 0C      JMP   VIDEND
1990:
2000:
2010:
2020:          *CURSOR UP*
2030:
2040: 0CCE 20 5C 0F      UP    JSR   CURUP
2050: 0CD1 4C 8A 0C      JMP   VIDEND
2060:
2070:          *CURSOR DOWN*
2080:
2090: 0CD4 20 38 0F      DOWN  JSR   CURDN
2100: 0CD7 4C 8A 0C      JMP   VIDEND
2110:
2120:          *CURSOR RIGHT*
2130:
2140: 0CDA 20 81 0F      RIGHT JSR   CURRGT
2150: 0CDD 4C 8A 0C      JMP   VIDEND
2160:
2170:          *ERASE TO END OF LINE*
2180:
2190: 0CE0 20 6E 0E      ERLNX JSR   ERTEOL
2200: 0CE3 4C 8A 0C      JMP   VIDEND
2210:
2220:          *ERASE TO END OF SCREEN*
2230:
2240: 0CE6 20 A2 0E      ERSCRX JSR   ERTEOS

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2250: 0CE9 4C 8A 0C          JMP  VIDEND
2260:
2270:
2280:
2290:
2300:          *DELETE THE CURRENT LINE*
2310:
2320: 0CEC A2 00          DELLIN LDXIM $00
2330: 0CEE 8E 39 1A          STX  COL
2340: 0CF1 20 DB 0D          JSR  ADJCUR MOVE CURSOR TO COL 0
2350: 0CF4 20 6E 0E          JSR  ERTEOL
2360: 0CF7 4C 8A 0C          JMP  VIDEND
2370:
2380:
2390:
2400:
2410:          *FILTER < SPACE*
2420:
2430: 0CFA AD 2D 1A          VALID LDA  AHOLD
2440: 0CFD C9 20          CMPIM '
2450: 0CFF B0 03          BCS  TOSCR
2460: 0D01 4C 8A 0C          JMP  VIDEND
2470:
2480:          *TRANSFER TO SCREEN*
2490:
2500: 0D04 20 08 0F          TOSCR JSR  TVPUT
2510: 0D07 4C 8A 0C          JMP  VIDEND
2520:
2530:
2540:
2550:          ***SUBROUTINES***
2560:
2570:
2580:          *FIRST LINE UP*
2590:
2600: 0D0A 38          FLNUP SEC
2610: 0D0B AD 2E 1A          LDA  FLN
2620: 0D0E ED 3E 1A          SBC  CHAPLN FLN=FLN-CHAPLN
2630: 0D11 8D 2E 1A          STA  FLN
2640: 0D14 AD 2F 1A          LDA  FLN      +01
2650: 0D17 E9 00          SBCIM $00
2660: 0D19 29 07          ANDIM $07      MAX IS $7FF
2670: 0D1B 8D 2F 1A          STA  FLN      +01
2680: 0D1E 60          RTS
2690:
2700:          *CURRENT LINE UP*
2710:
2720: 0D1F 38          CLNUP SEC
2730: 0D20 AD 30 1A          LDA  CLN
2740: 0D23 ED 3E 1A          SBC  CHAPLN
2750: 0D26 8D 30 1A          STA  CLN
2760: 0D29 AD 31 1A          LDA  CLN      +01
2770: 0D2C E9 00          SBCIM $00
2780: 0D2E 29 07          ANDIM $07      MAX IS $7FF
2790: 0D30 8D 31 1A          STA  CLN      +01
2800: 0D33 60          RTS

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2810:
2820:                *LAST LINE UP*
2830:
2840: 0D34 38        LLNUP  SEC
2850: 0D35 AD 32 1A  LDA    LLN
2860: 0D38 ED 3E 1A  SBC   CHAPLN
2870: 0D3B 8D 32 1A  STA   LLN
2880: 0D3E AD 33 1A  LDA   LLN    +01
2890: 0D41 E9 00      SBCIM $00
2900: 0D43 29 07      ANDIM $07    MAX IS $7FF
2910: 0D45 8D 33 1A  STA   LLN    +01
2920: 0D48 60        RTS
2930:
2940:                *FIRST LINE DOWN*
2950:
2960: 0D49 18        FLNDN  CLC
2970: 0D4A AD 2E 1A  LDA   FLN
2980: 0D4D 6D 3E 1A  ADC   CHAPLN
2990: 0D50 8D 2E 1A  STA   FLN    FLN=FLN+CHAPLN
3000: 0D53 AD 2F 1A  LDA   FLN    +01
3010: 0D56 69 00      ADCIM $00
3020: 0D58 29 07      ANDIM $07    MAX IS $7FF
3030: 0D5A 8D 2F 1A  STA   FLN    +01
3040: 0D5D 60        RTS
3050:
3060:                *CURRENT LINE DOWN*
3070:
3080: 0D5E 18        CLNDN  CLC
3090: 0D5F AD 30 1A  LDA   CLN
3100: 0D62 6D 3E 1A  ADC   CHAPLN
3110: 0D65 8D 30 1A  STA   CLN    CLN=CLN+CHAPLN
3120: 0D68 AD 31 1A  LDA   CLN    +01
3130: 0D6B 69 00      ADCIM $00
3140: 0D6D 29 07      ANDIM $07    MAX IS $7FF
3150: 0D6F 8D 31 1A  STA   CLN    +01
3160: 0D72 60        RTS
3170:
3180:                *LAST LINE DOWN*
3190:
3200: 0D73 18        LLNDN  CLC
3210: 0D74 AD 32 1A  LDA   LLN
3220: 0D77 6D 3E 1A  ADC   CHAPLN
3230: 0D7A 8D 32 1A  STA   LLN    LLN=LLN+CHAPLN
3240: 0D7D AD 33 1A  LDA   LLN    +01
3250: 0D80 69 00      ADCIM $00
3260: 0D82 29 07      ANDIM $07    MAX IS $7FF
3270: 0D84 8D 33 1A  STA   LLN    +01
3280: 0D87 60        RTS
3290:
3300:                *ADJUST THE LINE POINTERS*
3310:
3320: 0D88 AC 39 1A  ADJUST LDY   COL    IS COLUMN NEGATIVE?
3330: 0D8B 10 23      BPL   ADSA   BRANCH ON NO
3340: 0D8D CE 38 1A  DEC   INLINE GO BACK ONE LINE
3350: 0D90 10 11      BPL   ADJU   BRANCH IF WE ARE STILL
                                     ON THE SCREEN
3360: 0D92 20 0A 0D  JSR   FLNUP  FIRST LINE UP

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3370:	0D95	20	32	0E		JSR	FLNCRT	ADJUST DISPLAY START
3380:	0D98	20	DC	0E		JSR	ERAFLN	ERASE THE FIRST LINE
3390:	0D9B	20	34	0D		JSR	LLNUP	LAST LINE UP
3400:	0D9E	A0	00			LDYIM	\$00	RESET INLINE
3410:	0DA0	8C	38	1A		STY	INLINE	
3420:								
3430:	0DA3	20	1F	0D	ADJU	JSR	CLNUP	CURRENT LINE UP
3440:	0DA6	AC	3E	1A		LDY	CHAPLN	
3450:	0DA9	88				DEY		COL=CHAPLN-1
3460:	0DAA	8C	39	1A		STY	COL	
3470:	0DAD	4C	DB	0D		JMP	ADJCUR	
3480:								
3490:								
3500:	0DB0	CC	3E	1A	ADSA	CPY	CHAPLN	IS COL>=CHAPLN?
3510:	0DB3	90	26			BCC	ADJCUR	BRANCH ON NO
3520:	0DB5	A0	00			LDYIM	\$00	
3530:	0DB7	8C	39	1A		STY	COL	COL=0
3540:	0DBA	EE	38	1A		INC	INLINE	MOVE DOWN FOR 1 LINE
3550:	0DBD	AC	38	1A		LDY	INLINE	
3560:	0DC0	CC	3F	1A		CPY	LPSCR	ARE WE STILL ON THE SCREEN?
3570:	0DC3	90	13			BCC	ADJV	IS INLINE>=LPSCR?
3580:	0DC5	20	49	0D		JSR	FLNDN	FIRST LINE DOWN
3590:	0DC8	20	32	0E		JSR	FLNCRT	ADJUST DISPLAY START
3600:	0DCB	20	73	0D		JSR	LLNDN	LAST LINE DOWN
3610:	0DCE	AC	3F	1A		LDY	LPSCR	
3620:	0DD1	88				DEY		
3630:	0DD2	8C	38	1A		STY	INLINE	INLINE=LPSCR-1
3640:	0DD5	20	F2	0E		JSR	ERALLN	ERASE LAST LINE
3650:								
3660:	0DD8	20	5E	0D	ADJV	JSR	CLNDN	CURRENT LINE DOWN
3670:								
3680:	0ddb	A2	00		ADJCUR	LDXIM	\$00	
3690:	0ddd	8E	36	1A		STX	CURSOR	RESET CURSOR
3700:	0de0	8E	37	1A		STX	CURSOR	+01
3710:	0de3	AE	38	1A		LDX	INLINE	IS INLINE=0?
3720:	0de6	F0	12			BEQ	ACURX	BRANCH ON YES
3730:								
3740:	0de8	18			ACURA	CLC		
3750:	0de9	AD	3E	1A		LDA	CHAPLN	
3760:	0dec	6D	36	1A		ADC	CURSOR	
3770:	0def	8D	36	1A		STA	CURSOR	
3780:	0df2	90	03			BCC	ACURB	
3790:	0df4	EE	37	1A		INC	CURSOR	+01 CURSOR=INLINE*CHAPLN
3800:								
3810:	0df7	CA			ACURB	DEX		
3820:	0df8	D0	EE			BNE	ACURA	
3830:								
3840:	0dfa	18			ACURX	CLC		
3850:	0dfb	AD	2E	1A		LDA	FLN	
3860:	0dfe	6D	36	1A		ADC	CURSOR	
3870:	0e01	8D	36	1A		STA	CURSOR	CURSOR=CURSOR+FLN
3880:	0e04	AD	2F	1A		LDA	FLN	+01
3890:	0e07	6D	37	1A		ADC	CURSOR	+01
3900:	0e0a	8D	37	1A		STA	CURSOR	+01
3910:								
3920:	0e0d	18				CLC		

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3930: 0E0E AD 39 1A      LDA    COL
3940: 0E11 6D 36 1A      ADC    CURSOR  CURSOR=CURSOR+COL
3950: 0E14 8D 36 1A      STA    CURSOR
3960: 0E17 90 03          BCC    ACURC
3970: 0E19 EE 37 1A      INC    CURSOR  +01
3980:
3990: 0E1C A2 0E          ACURC  LDXIM  CURPOH
4000: 0E1E AD 37 1A      LDA    CURSOR  +01
4010: 0E21 8E 00 D8      STX    AR
4020: 0E24 8D 01 D8      STA    RFILE  CURSOR--->CRT CONTROLLER
4030: 0E27 E8            INX
4040: 0E28 AD 36 1A      LDA    CURSOR
4050: 0E2B 8E 00 D8      STX    AR
4060: 0E2E 8D 01 D8      STA    RFILE
4070: 0E31 60          RTS
4080:
4090:                    *FIRST LINE TO CRT*
4100:
4110: 0E32 A2 0C          FLNCRT LDXIM  DSPSTH
4120: 0E34 AD 2F 1A      LDA    FLN      +01
4130: 0E37 8E 00 D8      STX    AR
4140: 0E3A 8D 01 D8      STA    RFILE
4150: 0E3D E8            INX
4160: 0E3E AD 2E 1A      LDA    FLN
4170: 0E41 8E 00 D8      STX    AR
4180: 0E44 8D 01 D8      STA    RFILE
4190: 0E47 60          RTS
4200:
4210:
4220:                    *COMPUTE THE RAM POINTER*
4230:
4240: 0E48 18          CRAMPT CLC
4250: 0E49 AD 34 1A      LDA    SCRPTR
4260: 0E4C 6D 3C 1A      ADC    RAMBEG  RAMPTR=SCRPTR+RAMBEG
4270: 0E4F 85 FC          STA    RAMPTR
4280: 0E51 AD 35 1A      LDA    SCRPTR  +01
4290: 0E54 6D 3D 1A      ADC    RAMBEG  +01
4300: 0E57 29 D7          ANDIM  $D7     MAX IS $D7FF
4310: 0E59 85 FD          STA    RAMPTR  +01
4320: 0E5B 18          CLC
4330: 0E5C A5 FC          LDA    RAMPTR  RAMPTR=RAMBEG+SCRPTR+TEMCOL
4340: 0E5E 6D 3B 1A      ADC    TEMCOL
4350: 0E61 85 FC          STA    RAMPTR
4360: 0E63 90 08          BCC    CRAMP
4370: 0E65 E6 FD          INC    RAMPTR  +01
4380: 0E67 A5 FD          LDA    RAMPTR  +01
4390: 0E69 29 D7          ANDIM  $D7     MAX IS $D7FF
4400: 0E6B 85 FD          STA    RAMPTR  +01
4410:
4420: 0E6D 60          CRAMP  RTS
4430:
4440:                    *ERASE TO END OF LINE*
4450:
4460: 0E6E AE 30 1A      ERTEOL LDX    CLN
4470: 0E71 AC 31 1A      LDY    CLN      +01
4480: 0E74 8E 34 1A      STX    SCRPTR  SCRPTR=CLN

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4490: 0E77 8C 35 1A      STY   SCRPTR +01
4500: 0E7A AC 39 1A      LDY   COL     GET THE CURR. COLUMN
4510: 0E7D 8C 3B 1A      STY   TEMCOL TEMCOL=COL
4520: 0E80 A2 20          LDXIM '       SPACE TO X
4530: 0E82 A0 00          LDYIM $00     INDEX=0
4540:
4550: 0E84 20 48 0E     EREOL JSR     CRAMPT RAMPTR=RAMBEG+SCRPTR+TEMCOL
4560:
4570: 0E87 8A          EROLX TXA          SPACE--->RAM
4580: 0E88 91 FC          STAIY RAMPTR
4590: 0E8A EE 3B 1A      INC   TEMCOL TEMCOL=TEMCOL+1
4600: 0E8D E6 FC          INC   RAMPTR
4610: 0E8F D0 08          BNE   EROXX
4620: 0E91 E6 FD          INC   RAMPTR +01 RAMPTR=RAMPTR+1
4630: 0E93 A5 FD          LDA   RAMPTR +01
4640: 0E95 29 D7          ANDIM $D7     MAX IS $D7FF
4650: 0E97 85 FD          STA   RAMPTR +01
4660:
4670: 0E99 AD 3B 1A      EROXX LDA   TEMCOL IS TEMCOL>=CHAPLN?
4680: 0E9C CD 3E 1A      CMP   CHAPLN
4690: 0E9F 90 E6          BCC   EROLX   BRANCH ON NO
4700: 0EA1 60          RTS
4710:
4720:                *ERASE TO END OF SCREEN*
4730:
4740: 0EA2 AE 38 1A      ERTEOS LDX   INLINE ARE WE ALREADY IN THE
4750: 0EA5 E8          INX          LAST LINE?
4760: 0EA6 EC 3F 1A      CPX   LPSCR
4770: 0EA9 F0 C3          BEQ   ERTEOL IF YES DO ONLY "EOL"
4780: 0EAB 20 6E 0E      JSR   ERTEOL DO "EOL" FOR THIS LINE
4790:
4800: 0EAE 18          EREOS CLC
4810: 0EAF AD 34 1A      LDA   SCRPTR
4820: 0EB2 6D 3E 1A      ADC   CHAPLN SCRPTR=SCRPTR+CHAPLN
4830: 0EB5 8D 34 1A      STA   SCRPTR OR SCREEN POINTER DOWN
4840: 0EB8 AD 35 1A      LDA   SCRPTR +01
4850: 0EBB 69 00          ADCIM $00
4860: 0EBD 29 07          ANDIM $07     MAX IS $7FF
4870: 0EBF 8D 35 1A      STA   SCRPTR +01
4880: 0EC2 CD 33 1A      CMP   LLN    +01 IS SCRPTR=LLN?
4890: 0EC5 D0 08          BNE   EEOL
4900: 0EC7 AD 34 1A      LDA   SCRPTR
4910: 0ECA CD 32 1A      CMP   LLN
4920: 0ECD F0 08          BEQ   EEOLB  ERASE LAST LINE AND STOP
4930:
4940: 0ECF 8C 3B 1A      EEOL  STY   TEMCOL TEMCOL=0
4950: 0ED2 20 84 0E      JSR   EREOL
4960: 0ED5 B0 D7          BCS   EREOS
4970:
4980:
4990: 0ED7 8C 3B 1A      EEOLB STY   TEMCOL TEMCOL=0
5000: 0EDA F0 A8          BEQ   EREOL
5010:
5020:                *ERASE THE FIRST LINE*
5030:
5040: 0EDC A0 00          ERAFLN LDYIM $00

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5050: 0EDE 8C 3B 1A      STY   TEMCOL
5060: 0EE1 A2 20          LDXIM '
5070: 0EE3 AD 2E 1A      LDA   FLN
5080: 0EE6 8D 34 1A      STA   SCRPTR  SCRPTR=FLN
5090: 0EE9 AD 2F 1A      LDA   FLN      +01
5100: 0EEC 8D 35 1A      STA   SCRPTR  +01
5110: 0EEF 4C 84 0E      JMP   EREOL   NOW ERASE THE FIRST LINE
5120:
5130:                    *ERASE THE LAST LINE*
5140:
5150: 0EF2 A0 00          ERALLN LDYIM $00
5160: 0EF4 8C 3B 1A      STY   TEMCOL  TEMCOL=0
5170: 0EF7 A2 20          LDXIM '
5180: 0EF9 AD 32 1A      LDA   LLN
5190: 0EFC 8D 34 1A      STA   SCRPTR  SCRPTR=LLN
5200: 0EFF AD 33 1A      LDA   LLN      +01
5210: 0F02 8D 35 1A      STA   SCRPTR  +01
5220: 0F05 4C 84 0E      JMP   EREOL   NOW ERASE THE LAST LINE
5230:
5240:                    *PUT A CHARACTER ON THE SCREEN*
5250:
5260: 0F08 18            TVPUT  CLC
5270: 0F09 AD 30 1A      LDA   CLN
5280: 0F0C 6D 3C 1A      ADC   RAMBEG
5290: 0F0F 85 FC          STA   RAMPTR  RAMPTR=CLN+RAMBEG
5300: 0F11 AD 31 1A      LDA   CLN      +01
5310: 0F14 6D 3D 1A      ADC   RAMBEG  +01
5320: 0F17 85 FD          STA   RAMPTR  +01
5330: 0F19 A0 00          LDYIM $00
5340: 0F1B 18            CLC
5350: 0F1C AD 39 1A      LDA   COL      RAMPTR=CLN+RAMBEG+COL
5360: 0F1F 65 FC          ADC   RAMPTR
5370: 0F21 85 FC          STA   RAMPTR
5380: 0F23 90 08          BCC   TPX
5390: 0F25 E6 FD          INC   RAMPTR  +01
5400: 0F27 A5 FD          LDA   RAMPTR  +01
5410: 0F29 29 D7          ANDIM $D7     MAX IS $D7FF
5420: 0F2B 85 FD          STA   RAMPTR  +01
5430:
5440: 0F2D AD 2D 1A      TPX   LDA   AHOLD
5450: 0F30 91 FC          STAIY RAMPTR
5460: 0F32 EE 39 1A      INC   COL     COL=COL+01
5470: 0F35 4C 88 0D      JMP   ADJUST
5480:
5490:                    *CURSOR DOWN*
5500:
5510: 0F38 EE 38 1A      CURDN INC   INLINE  INLINE=INLINE+1
5520: 0F3B 20 5E 0D          JSR   CLNDN  CUREENT LINE DOWN
5530: 0F3E AC 38 1A      LDY   INLINE
5540: 0F41 CC 3F 1A      CPY   LPSCR   IS INLINE>=LPSCR?
5550: 0F44 90 13          BCC   CURDNX  BRANCH ON NO
5560: 0F46 20 49 0D          JSR   FLNDN  FIRST LINE DOWN
5570: 0F49 20 32 0E          JSR   FLNCRT  FIRST LINE--->CRT
5580: 0F4C 20 73 0D          JSR   LLNDN  LAST LINE DOWN
5590: 0F4F 20 F2 0E          JSR   ERALLN  ERASE LAST LINE
5600: 0F52 AC 3F 1A      LDY   LPSCR

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5610: 0F55 88          DEY
5620: 0F56 8C 38 1A    STY      INLINE  INLINE=LPCSR-1
5630:
5640: 0F59 4C DB 0D    CURDNX JMP      ADJCUR  ADJUST THE CURSOR AND RETURN
5650:
5660:                *CURSOR UP*
5670:
5680: 0F5C CE 38 1A    CURUP  DEC      INLINE  INLINE=INLINE-1
5690: 0F5F 20 1F 0D          JSR      CLNUP  CURRENT LINE UP
5700: 0F62 AC 38 1A          LDY      INLINE  IS INLINE=NEGATIVE?
5710: 0F65 10 11          BPL      CURUPX BRANCH ON NO
5720: 0F67 20 0A 0D          JSR      FLNUP  FIRST LINE UP
5730: 0F6A 20 32 0E          JSR      FLNCRT FLN--->CRT
5740: 0F6D 20 34 0D          JSR      LLNUP  LAST LINE UP
5750: 0F70 20 DC 0E          JSR      ERAFLN ERASE THE FIRST LINE
5760: 0F73 A0 00          LDYIM $00
5770: 0F75 8C 38 1A    STY      INLINE  INLINE=0
5780:
5790: 0F78 4C DB 0D    CURUPX JMP      ADJCUR  ADJUST THE CURSOR AND RETURN
5800:
5810:                *CURSOR LEFT*
5820:
5830: 0F7B CE 39 1A    CURLFT DEC      COL      COL=COL-1
5840: 0F7E 4C 88 0D          JMP      ADJUST  ADJUST THE CURSOR AND RETURN
5850:
5860:                *CURSOR RIGHT*
5870:
5880: 0F81 EE 39 1A    CURRGT INC      COL      COL=COL+1
5890: 0F84 4C 88 0D          JMP      ADJUST  ADJUST THE CURSOR AND RETURN
5900:
5910:                *HOME CURSOR*
5920:
5930: 0F87 A2 00          HOME    LDXIM $00
5940: 0F89 8E 38 1A          STX     INLINE  INLINE=0
5950: 0F8C 8E 39 1A          STX     COL      COL=0
5960: 0F8F AE 2E 1A          LDX     FLN
5970: 0F92 8E 30 1A          STX     CLN      CLN=FLN
5980: 0F95 AE 2F 1A          LDX     FLN      +01
5990: 0F98 8E 31 1A          STX     CLN      +01
6000: 0F9B 4C 88 0D    JMP      ADJUST  ADJUST THE CURSOR AND RETURN
6010:
6020:                *MASTER RESET OF THE MEMORY MAPPED VDU*
6030:
6040: 0F9E A9 00          RESET  LDAIM $00
6050: 0FA0 8D 2E 1A          STA     FLN      FLN=$0000
6060: 0FA3 8D 2F 1A          STA     FLN      +01
6070: 0FA6 8D 30 1A          STA     CLN      CLN=$0000
6080: 0FA9 8D 31 1A          STA     CLN      +01
6090: 0FAC 8D 32 1A          STA     LLN      RESET LAST LINE
6100: 0FAF 8D 33 1A          STA     LLN      +01
6110: 0FB2 8D 39 1A          STA     COL      COL=0
6120: 0FB5 8D 38 1A          STA     INLINE  INLINE=0
6130: 0FB8 AE 3F 1A          LDX     LPCSR
6140: 0FBB CA          DEX      X=LPCSR-1
6150:
6160: 0FBC 18          RSA     CLC

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6170: 0FBD AD 3E 1A          LDA    CHAPLN
6180: 0FC0 6D 32 1A          ADC    LLN
6190: 0FC3 8D 32 1A          STA    LLN      LLN=(LPSCR-1)*CHAPLN
6200: 0FC6 90 03              BCC    RSB
6210: 0FC8 EE 33 1A          INC    LLN      +01
6220:
6230: 0FCB CA                RSB    DEX
6240: 0FCC D0 EE              BNE    RSA
6250: 0FCE 20 DA 0F          JSR    CRTINT  SET THE CRT TIMING REGISTERS
6260: 0FD1 20 87 0F          JSR    HOME    HOME CURSOR
6270: 0FD4 20 A2 0E          JSR    ERTEOS  CLEAR THE SCREEN
6280: 0FD7 4C 32 0E          JMP    FLNCRT  FLN--->CRT AND RETURN
6290:
6300:                          *INITIALIZE THE CRT CONTROLLER*
6310:
6320: 0FDA A2 00              CRTINT LDXIM $00
6330:
6340: 0FDC 8E 00 D8          CIA    STX    AR      SET THE FILE INDEX
6350: 0FDF BD 42 1A          LDAX   TABLE
6360: 0FE2 8D 01 D8          STA    RFILE  VALUE--->FILE
6370: 0FE5 E8                INX
6380: 0FE6 E0 10              CPXIM  $10     SET ONLY THE TIMING REGISTERS
6390: 0FE8 D0 F2              BNE    CIA
6400: 0FEA 60                RTS
6410:
0010:
0020:
0030:
0040:
0050:
0060: 14F4                    ORG    $14F4
0070:
0080:
0090:                          *COMPUTE THE COMMAND ADDRESS INDEX*
0100:
0110: 14F4 A2 00              COMCOM LDXIM $00
0120: 14F6 A0 01              LDYIM  $01
0130:
0140: 14F8 BD 19 15          COMCOA LDAX   COMTAB
0150: 14FB CD 3A 1A          CMP    ESCFLG  FIND THE COMMAND
0160: 14FE D0 0B              BNE    COMCOB
0170: 1500 B9 19 15          LDAY   COMTAB
0180: 1503 CD 2D 1A          CMP    AHOLD
0190: 1506 D0 03              BNE    COMCOB
0200: 1508 18                  CLC
0210: 1509 90 08              BCC    COMCOC  C=0 --> X=ADDRESS INDEX
0220:                          AND RESET THE ESC-FLAG
0230: 150B E8                COMCOB INX
0240: 150C E8                INX
0250: 150D C8                INY
0260: 150E C8                INY
0270: 150F E0 16              CPXIM  $16
0280: 1511 90 E5              BCC    COMCOA  C=1 --> NO COMMAND
0290:
0300: 1513 A9 00              COMCOC LDAIM  $00
0310: 1515 8D 3A 1A          STA    ESCFLG  RESET THE ESCAPE FLAG

```

0320: 1518 60

RTS

0330:

0340:

0350:

COMMAND TABLE

0360:

0370: 1519 00

COMTAB = \$00

0380: 151A 0D

= \$0D <CR>

0390: 151B 00

= \$00

0400: 151C 0A

= \$0A <LF>

0410: 151D 00

= \$00

0420: 151E 08

= \$08 <BS>,<CTL-H> BACK SPACE

0430: 151F 1B

= \$1B

0440: 1520 31

= '1 <ESC><1> CLEAR SCREEN & HOME

0450: 1521 1B

= \$1B

0460: 1522 32

= '2 <ESC><2> CLEAR SCREEN & HOME

0470: 1523 1B

= \$1B

0480: 1524 33

= '3 <ESC><3> HOME CURSOR

0490: 1525 1B

= \$1B

0500: 1526 34

= '4 <ESC><4> ERASE TO EOS

0510: 1527 1B

= \$1B

0520: 1528 35

= '5 <ESC><5> CURSOR UP

0530: 1529 1B

= \$1B

0540: 152A 36

= '6 <ESC><6> CURSOR DOWN

0550: 152B 1B

= \$1B

0560: 152C 38

= '8 <ESC><8> ERASE TO EOL

0570:

0580: 152D 00

COTABA = \$00

0590: 152E 10

= \$10 <CTL-P> CURSOR RIGHT

0600: 152F FF

= \$FF

0610: 1530 FF

= \$FF

0620: 1531 FF

= \$FF

0630: 1532 FF

= \$FF

0640: 1533 FF

= \$FF

0650: 1534 FF

= \$FF

0660: 1535 FF

= \$FF

0670: 1536 FF

= \$FF

0680: 1537 FF

= \$FF

0690: 1538 FF

= \$FF

0700:

0710:

COMMAND ADDRESS TABLE

0720:

0730: 1539 A8

COMADR = \$A8 CR

0740: 153A 0C

= \$0C

0750: 153B B3

= \$B3 LF

0760: 153C 0C

= \$0C

0770: 153D C2

= \$C2 CURSOR LEFT

0780: 153E 0C

= \$0C

0790: 153F B9

= \$B9 CLEAR SCREEN & HOME

0800: 1540 0C

= \$0C

0810: 1541 B9

= \$B9 CLEAR SCREEN & HOME

0820: 1542 0C

= \$0C

0830: 1543 C8

= \$C8 HOME CURSOR

0840: 1544 0C

= \$0C

0850: 1545 E6

= \$E6 ERASE TO EOS

0860: 1546 0C

= \$0C

0870: 1547 CE

= \$CE CURSOR UP

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0880: 1548 0C           =      $0C
0890: 1549 D4           =      $D4      CURSOR DOWN
0900: 154A 0C           =      $0C
0910: 154B E0           =      $E0      ERASE TO EOL
0920: 154C 0C           =      $0C
0930:
0940:
0950:                  *NORMAL VIDEO COMMANDS*
0960:
0970: 154D DA           =      $DA      CURSOR RIGHT
0980: 154E 0C           =      $0C
0990: 154F FF           =      $FF
1000: 1550 FF           =      $FF
1010: 1551 FF           =      $FF
1020: 1552 FF           =      $FF
1030: 1553 FF           =      $FF
1040: 1554 FF           =      $FF
1050: 1555 FF           =      $FF
1060: 1556 FF           =      $FF
1070: 1557 FF           =      $FF
1080: 1558 FF           =      $FF
1090:
1100:
1110:
1120:                  *CENTRONICS OUTPUT*
1130:
1140:
1150: 1559 20 94 15  CENOUT JSR  INICEN INIT. PRINTER I/O
1160: 155C 4C 5F 15          JMP  CENTRO AND OUTPUT THE CHARACTER
1170:
1180:
1190:
1200:                  > VIA DEFINITIONS:
1210:                  > PA7...PA0 = DATA OUTPUT
1220:                  >      CA1 = /ACKN INPUT
1230:                  >      CA2 = /STB OUTPUT
1240:                  >      PB1 = PE INPUT
1250:                  >      PB0 = SEL INPUT
1260:
1270:
1280: 155F AD 00 18  CENTRO LDA  VAPBD
1290: 1562 29 01          ANDIM $01      IS THE PRINTER SELECTED?
1300: 1564 F0 2D          BEQ  CTROB    PB0 = SEL INPUT
1310: 1566 AD 00 18          LDA  VAPBD
1320: 1569 29 02          ANDIM $02    PAPER EMPTY?
1330: 156B D0 26          BNE  CTROB    PB1 = PE INPUT
1340:
1350: 156D AD 2D 1A  CTROA LDA  AHOLD
1360: 1570 8D 01 18          STA  VAPAD    OUTPUT THE CHARACTER AND
1370:
1380: 1573 AD 00 18  WAIT  LDA  VAPBD
1390: 1576 29 01          ANDIM $01    IS THE PRINTER SELECTED
1400: 1578 F0 19          BEQ  CTROB
1410: 157A AD 00 18          LDA  VAPBD
1420: 157D 29 02          ANDIM $02    PAPER EMPTY?
1430: 157F D0 12          BNE  CTROB

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1440: 1581 AD 0D 18      LDA   VAIFR   SAMPLE CA1 FLAG
1450: 1584 29 02      ANDIM $02
1460: 1586 F0 EB      BEQ   WAIT    WAIT FOR ACKNOWLEDGE
1470: 1588 AD 0D 18      LDA   VAIFR
1480: 158B 09 03      ORAIM $03
1490: 158D 8D 0D 18      STA   VAIFR   RESET CA1, CA2 FLAGS
1500: 1590 8D 0D 18      STA   VAIFR
1510:
1520: 1593 60          CTROB  RTS
1530:
1540:
1550:          *INITIALZE CENTRONICS*
1560:
1570: 1594 A9 FF      INICEN LDAIM $FF      PA0...PA7 = OUTPUT
1580: 1596 8D 03 18      STA   VAPADD
1590: 1599 A9 0A      LDAIM $0A      CA2 = WRITE HANDSHAKE
                          PULSE OUTPUT
1600: 159B 8D 0C 18      STA   VAPCR    CA1 = NEG. EDGE SENSITIVE
1610: 159E AD 02 18      LDA   VAPBDD
1620: 15A1 29 FC      ANDIM $FC      PA0,PA1 = INPUT
1630: 15A3 8D 02 18      STA   VAPBDD
1640: 15A6 EA          NOP
1650: 15A7 EA          NOP
1660: 15A8 EA          NOP
1670: 15A9 EA          NOP
1680: 15AA EA          NOP
1690: 15AB 60          RTS
1700:
1710:          *MOVE THE CRT FILE FROM ROM TO RAM*
1720:
1730: 15AC A9 00      MOVCRT LDAIM $00      REFRESH RAM STARTS AT $D000
1740: 15AE A2 D0      LDXIM $D0
1750: 15B0 8D 3C 1A      STA   RAMBEG
1760: 15B3 8E 3D 1A      STX   RAMBEG +01
1770: 15B6 A9 00      LDAIM $00
1780: 15B8 A8          TAY
1790: 15B9 AE 40 1A      LDX   FORMAT   GET THE CURR. FORMAT
1800: 15BC F0 06      BEQ   MCRTB
1810:
1820: 15BE 18          MCRTA  CLC
1830: 15BF 69 12      ADCIM $12      COMPUTE THE INDEX
1840: 15C1 CA          DEX
1850: 15C2 D0 FA      BNE   MCRTA
1860:
1870: 15C4 AA          MCRTB  TAX
1880:
1890: 15C5 BD E0 15      MCRTC  LDAX  CRTINA
1900: 15C8 99 42 1A      STAY  TABLE   MOVE THE TABLE
1910: 15CB E8          INX
1920: 15CC C8          INY
1930: 15CD C0 12      CPYIM $12
1940: 15CF D0 F4      BNE   MCRTC
1950: 15D1 88          DEY
1960: 15D2 B9 42 1A      LDAY  TABLE   SET SCREEN PARAMETERS
1970: 15D5 8D 3F 1A      STA   LPSCR
1980: 15D8 88          DEY
1990: 15D9 B9 42 1A      LDAY  TABLE

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2000: 15DC 8D 3E 1A STA CHAPLN
 2010: 15DF 60 RTS

2020:
 2030:
 2040:
 2050:
 2060:
 2070:

CRT TIMING TABLES

- 80*24 -

2080:			
2090:	15E0	80	CRTINA = \$80 HORIZONTAL TOTAL-1 = 129-1 CHAR.
2100:	15E1	50	= \$50 HORIZONTAL DISPLAYED = 80 CHAR.
2110:	15E2	60	= \$60 HORIZ. SYNC. POSITION = 96 CHAR.
2120:	15E3	08	= \$08 VERT./HORIZ. SYNC WIDTH = 16/8
2130:	15E4	22	= \$22 VERTICAL TOTAL-1 = 34 CHAR. LINES
2140:	15E5	00	= \$00 VERT. TOTAL ADJ. = 0*64 MICRO SEC.
2150:	15E6	18	= \$18 VERTICAL DISPLAYED = 24 LINES
2160:	15E7	1C	= \$1C VERT. SYNC. POSITION = 29 CHAR. LINE
2170:	15E8	00	= \$00 MODE CONTROL
2180:	15E9	08	= \$08 SCAN LINES-1 = 9-1
2190:	15EA	00	= \$00 CURSOR START
2200:	15EB	09	= \$09 CURSOR END
2210:	15EC	00	= \$00 DISPLAY START (NOT NEEDED)
2220:	15ED	00	= \$00
2230:	15EE	00	= \$00 CURSOR POSITION (NOT NEEDED)
2240:	15EF	00	= \$00
2250:	15F0	50	= \$50 CHARACTERS/LINE
2260:	15F1	18	= \$18 LINES/SCREEN
2270:			
2280:			

- 80*25 -

2290:			
2300:			
2310:	15F2	80	= \$80
2320:	15F3	50	= \$50
2330:	15F4	60	= \$60
2340:	15F5	08	= \$08
2350:	15F6	22	= \$22
2360:	15F7	00	= \$00
2370:	15F8	19	= \$19
2380:	15F9	1C	= \$1C
2390:	15FA	00	= \$00
2400:	15FB	08	= \$08
2410:	15FC	00	= \$00
2420:	15FD	09	= \$09
2430:	15FE	00	= \$00
2440:	15FF	00	= \$00
2450:	1600	00	= \$00
2460:	1601	00	= \$00
2470:	1602	50	= \$50
2480:	1603	19	= \$19
2490:			

- 64*16 -

2500:			
2510:			
2520:	1604	64	= \$64
2530:	1605	40	= \$40
2540:	1606	49	= \$49
2550:	1607	05	= \$05

2560:	1608	16	=	\$16
2570:	1609	0E	=	\$0E
2580:	160A	10	=	\$10
2590:	160B	12	=	\$12
2600:	160C	00	=	\$00
2610:	160D	0C	=	\$0C
2620:	160E	00	=	\$00
2630:	160F	09	=	\$09
2640:	1610	00	=	\$00
2650:	1611	00	=	\$00
2660:	1612	00	=	\$00
2670:	1613	00	=	\$00
2680:	1614	40	=	\$40
2690:	1615	10	=	\$10
2700:				
2710:			- 64*24 -	
2720:				
2730:	1616	64	=	\$64
2740:	1617	40	=	\$40
2750:	1618	52	=	\$52
2760:	1619	05	=	\$05
2770:	161A	22	=	\$22
2780:	161B	00	=	\$00
2790:	161C	18	=	\$18
2800:	161D	1C	=	\$1C
2810:	161E	00	=	\$00
2820:	161F	08	=	\$08
2830:	1620	00	=	\$00
2840:	1621	09	=	\$09
2850:	1622	00	=	\$00
2860:	1623	00	=	\$00
2870:	1624	00	=	\$00
2880:	1625	00	=	\$00
2890:	1626	40	=	\$40
2900:	1627	18	=	\$18
2910:				
2920:			- 90*22 -	
2930:				
2940:	1628	87	=	\$87
2950:	1629	5A	=	\$5A
2960:	162A	6A	=	\$6A
2970:	162B	08	=	\$08
2980:	162C	22	=	\$22
2990:	162D	00	=	\$00
3000:	162E	16	=	\$16
3010:	162F	1C	=	\$1C
3020:	1630	00	=	\$00
3030:	1631	08	=	\$08
3040:	1632	00	=	\$00
3050:	1633	09	=	\$09
3060:	1634	00	=	\$00
3070:	1635	00	=	\$00
3080:	1636	00	=	\$00
3090:	1637	00	=	\$00
3100:	1638	5A	=	\$5A
3110:	1639	16	=	\$16

3120:			
3130:		- 48*12 -	
3140:			
3150:	163A	46	= \$46
3160:	163B	30	= \$30
3170:	163C	3A	= \$3A
3180:	163D	05	= \$05
3190:	163E	16	= \$16
3200:	163F	0E	= \$0E
3210:	1640	0C	= \$0C
3220:	1641	12	= \$12
3230:	1642	00	= \$00
3240:	1643	0C	= \$0C
3250:	1644	00	= \$00
3260:	1645	09	= \$09
3270:	1646	00	= \$00
3280:	1647	00	= \$00
3290:	1648	00	= \$00
3300:	1649	00	= \$00
3310:	164A	30	= \$30
3320:	164B	0C	= \$0C
3330:			
3340:		- 24*24 -	
3350:			
3360:	164C	38	= \$38
3370:	164D	18	= \$18
3380:	164E	26	= \$26
3390:	164F	05	= \$05
3400:	1650	22	= \$22
3410:	1651	00	= \$00
3420:	1652	18	= \$18
3430:	1653	1C	= \$1C
3440:	1654	00	= \$00
3450:	1655	08	= \$08
3460:	1656	00	= \$00
3470:	1657	09	= \$09
3480:	1658	00	= \$00
3490:	1659	00	= \$00
3500:	165A	00	= \$00
3510:	165B	00	= \$00
3520:	165C	18	= \$18
3530:	165D	18	= \$18
3540:			
3550:		- 80*24 (USA) -	
3560:			
3570:	165E	00	= \$00
3580:	165F	00	= \$00
3590:	1660	00	= \$00
3600:	1661	00	= \$00
3610:	1662	00	= \$00
3620:	1663	00	= \$00
3630:	1664	00	= \$00
3640:	1665	00	= \$00
3650:	1666	00	= \$00
3660:	1667	00	= \$00
3670:	1668	00	= \$00

```

3680: 1669 00           =      $00
3690: 166A 00           =      $00
3700: 166B 00           =      $00
3710: 166C 00           =      $00
3720: 166D 00           =      $00
3730: 166E 50           =      $50
3740: 166F 18           =      $18
3750:
3760:
3770:
3780: 1670           RESTTY *      $14BC
3790: 1670           RECCHA *     $12AE
3800:
3810:
3820: 1670 20 BC 14   CHE      JSR      RESTTY
3830: 1673 A9 00           LDAIM $00
3840: 1675 8D 40 1A     STA      FORMAT 80*24 DISPLAY
3850: 1678 8D 41 1A     STA      DUPLEX DON'T ECHO TO SCREEN
3860: 167B 20 AC 15     JSR      MOVCR T
3870: 167E 20 9E 0F     JSR      RESET
3880:
3890: 1681 20 AE 12   CHECKA JSR      RECCHA
3900: 1684 20 80 0C           JSR      VIDEO
3910: 1687 4C 81 16           JMP      CHECKA
3920:
3930:           *NEW PRCHA ROUTINE*
3940:
3950: 168A 8E 60 1A   NPRCHA STX      $1A60  SAVE X
3960: 168D 8D 62 1A           STA      $1A62  SAVE THE CHAR.
3970:
3980:           *OUTPUT TO ALL DEVICES*
3990:
4000: 1690 8D 2D 1A   OUTALL STA      AHOLD  SAVE REGISTERS
4010: 1693 8E 2C 1A           STX      XHOLD
4020: 1696 8C 2B 1A           STY      YHOLD
4030: 1699 A5 FC           LDA      RAMPTR SWAP SCREEN POINTER
4040: 169B A6 FD           LDX      RAMPTR +01
4050: 169D 8D 29 1A     STA      PZPTR
4060: 16A0 8E 2A 1A     STX      PZPTR  +01
4070: 16A3 20 80 0C     JSR      VIDEO  OUTPUT TO SCREEN
4080: 16A6 AD 58 1A     LDA      PRIFLG
4090: 16A9 F0 03           BEQ      OUTALA IS THE PRINTER FLAG RESET?
4100: 16AB 20 3A 13     JSR      $133A OUTPUT THE CHAR. ON THE SERIAL
                                PORT
4110:
4120: 16AE AD 56 1A   OUTALA LDA      CENFLG IS THE CENTRONICS PORT SELRCTED
4130: 16B1 F0 03           BEQ      OUTALB
4140: 16B3 20 59 15     JSR      CENOUT OUTPUT THE CHAR. TO CENTRONICS
4150:
4160: 16B6 AD 29 1A   OUTALB LDA      PZPTR  SWAP PAGE ZERO BYTES
4170: 16B9 AE 2A 1A     LDX      PZPTR  +01
4180: 16BC 85 FC           STA      RAMPTR
4190: 16BE 86 FD           STX      RAMPTR +01
4200: 16C0 AD 2D 1A     LDA      AHOLD  RESTORE THE REGISTERS
4210: 16C3 AE 2C 1A     LDX      XHOLD
4220: 16C6 AC 2B 1A     LDY      YHOLD
4230: 16C9 2C 80 1A     BIT      $1A80  BREAK TEST

```

```

4240: 16CC 10 01          BPL   BRKTST
4250: 16CE 60             RTS
4260:
4270:                    *EXIT FOR BREAK KEY*
4280:
4290: 16CF 2C 80 1A  BRKTST BIT   $1A80  WAIT UNTIL KEY IS RELEASED
4300: 16D2 10 FB          BPL   BRKTST
4310: 16D4 A2 FF          LDXIM $FF
4320: 16D6 9A             TXS           RESET THE STACK POINTER
4330: 16D7 6C 7C 1A      JMI   $1A7C
4340:
4350:
4360:
4370:
4380:
4390:                    *NEW INITIALIZE PROGRAM*
4400:
4410:
4420: 16DA 8D 82 1A  NEWINI STA   $1A82
4430: 16DD A9 00          LDAIM $00
4440: 16DF 8D 56 1A      STA   CENFLG RESET THE CENTRONICS FLAG
4450: 16E2 8D 58 1A      STA   PRIFLG RESET THE SERIAL PRINTER FLAG
4460: 16E5 A9 00          LDAIM $00   THE USER CAN CHANGE IT TO 0...7
4470: 16E7 A2 01          LDXIM $01   SET THE DUPLEX FLAG FOR ECHO
4480: 16E9 8D 40 1A      STA   FORMAT WE DO A 80*24 VIDEO SCAN
4490: 16EC 8E 41 1A      STX   DUPLEX
4500: 16EF 20 AC 15      JSR   MOVCRT MOVE THE CRT TABLE TO RAM
4510: 16F2 20 9E 0F      JSR   RESET  RESET THE CRT CONTROLLER
4520: 16F5 4C 07 10      JMP   $1007 GOTO OLD RESET PROGRAM
4530:
4540:
4550:                    *GENERAL INPUT WITH ECHO TO THE OUTPUT DEVICES*
4560:
4570:
4580: 16F8 8D 2D 1A  INALL  STA   AHOLD
4590:
4600: 16FB AD 41 1A      LDA   DUPLEX ECHO/NO ECHO
4610: 16FE F0 06          BEQ   INALLX
4620: 1700 AD 2D 1A      LDA   AHOLD  GET THE CHAR. AGAIN
4630: 1703 20 8A 16      JSR   NPRCHA ECHO THE CHARACTER
4640:
4650: 1706 AD 2D 1A  INALLX LDA   AHOLD  GET THE CHAR. AGAIN
4660: 1709 AE 61 1A      LDX   $1A61 RESTORE X
4670: 170C 60             RTS
4680:
4690:
-T

```

SYMBOL TABLE 3400 37A8

ACURA 0DE8	ACURB 0DF7	ACURC 0E1C	ACURX 0DFA
ADJCUR 0DDB	ADJU 0DA3	ADJUST 0D88	ADJV 0DD8
ADSA 0DB0	AHOLD 1A2D	AR D800	BRKTST 16CF
CENFLG 1A56	CENOUT 1559	CENTRO 155F	CHAPLN 1A3E
CHECK 0C90	CHECKA 1681	CHE 1670	CIA 0FDC
CLNDN 0D5E	CLNUP 0D1F	CLN 1A30	CLRHOM 0CB9
COL 1A39	COMADR 1539	COMCOA 14F8	COMCOB 150B
COMCOC 1513	COMCOM 14F4	COMTAB 1519	COTABA 152D
CRAMP 0E6D	CRAMPT 0E48	CRTINA 15E0	CRTINT 0FDA
CTROA 156D	CTROB 1593	CURDN 0F38	CURDNX 0F59
CUREND 000B	CURLFT 0F7B	CURPOH 000E	CURPOL 000F
CURRGT 0F81	CURSOR 1A36	CURSTA 000A	CURUP 0F5C
CURUPX 0F78	DELLIN 0CEC	DOWN 0CD4	DSPSTH 000C
DSPSTL 000D	DUMMY 001F	DUPLEX 1A41	EEOL 0ECF
EEOLB 0ED7	ERAFLN 0EDC	ERALLN 0EF2	EREOL 0E84
EREOS 0EAE	ERLNX 0CE0	EROLX 0E87	EROXX 0E99
ERSCRX 0CE6	ERTEOL 0E6E	ERTEOS 0EA2	ESCFLG 1A3A
ESC 001B	FEED 0CB3	FLNCRT 0E32	FLNDN 0D49
FLNUP 0D0A	FLN 1A2E	FORMAT 1A40	HOCU 0CC8
HOME 0F87	HORDIS 0001	HORTOT 0000	HSYPOS 0002
INALL 16F8	INALLX 1706	INICEN 1594	INLINE 1A38
JMPVEC 1A54	LEFT 0CC2	LIPENH 0010	LIPENL 0011
LLNDN 0D73	LLNUP 0D34	LLN 1A32	LPSCR 1A3F
MCRTA 15BE	MCRTB 15C4	MCRTC 15C5	MODE 0008
MOVCRN 15AC	NEWINI 16DA	NPRCHA 168A	OUTALA 16AE
OUTALB 16B6	OUTALL 1690	PRIFLG 1A58	PZPTR 1A29
RAMBEG 1A3C	RAMPTR 00FC	RECCHA 12AE	RESET 0F9E
RESTTY 14BC	RETURN 0CA8	RFILE D801	RIGHT 0CDA
RSA 0FBC	RSB 0FCB	SCANLN 0009	SCRPTR 1A34
SPACE 0020	SPAD 1A80	TABLE 1A42	TEMCOL 1A3B
TOPPIA 1A59	TOSCR 0D04	TPX 0F2D	TRAPRO 1A57
TVPUT 0F08	UP 0CCE	UPDATH 0012	UPDATL 0013
VAACR 180B	VAIER 180E	VAIFR 180D	VALID 0CFA
VALVEC 0CA5	VAPAD 1801	VAPADD 1803	VAPADN 180F
VAPBD 1800	VAPBDD 1802	VAPCR 180C	VASR 180A
VATACH 1805	VATACL 1804	VATALH 1807	VATALL 1806
VATBCH 1809	VATBCL 1808	VERDIS 0006	VERTOT 0004
VHSYWI 0003	VIDEND 0C8A	VIDEO 0C80	VSYPOS 0007
VTOTAJ 0005	WAIT 1573	XHOLD 1A2C	YHOLD 1A2B

SYMBOL TABLE 3400 37A8

HORTOT	0000	HORDIS	0001	HSYPOS	0002	VHSYWI	0003
VERTOT	0004	VTOTAJ	0005	VERDIS	0006	VSYPOS	0007
MODE	0008	SCANLN	0009	CURSTA	000A	CUREND	000B
DSPSTH	000C	DSPSTL	000D	CURPOH	000E	CURPOL	000F
LIPENH	0010	LIPENL	0011	UPDATA	0012	UPDATL	0013
ESC	001B	DUMMY	001F	SPACE	0020	RAMPTR	00FC
VIDEO	0C80	VIDEND	0C8A	CHECK	0C90	VALVEC	0CA5
RETURN	0CA8	FEED	0CB3	CLRHOM	0CB9	LEFT	0CC2
HOCU	0CC8	UP	0CCE	DOWN	0CD4	RIGHT	0CDA
ERLNX	0CE0	ERSCRX	0CE6	DELLIN	0CEC	VALID	0CFA
TOSCR	0D04	FLNUP	0D0A	CLNUP	0D1F	LLNUP	0D34
FLNDN	0D49	CLNDN	0D5E	LLNDN	0D73	ADJUST	0D88
ADJU	0DA3	ADSA	0DB0	ADJV	0DD8	ADJCUR	0DDB
ACURA	0DE8	ACURB	0DF7	ACURX	0DFA	ACURC	0E1C
FLNCRT	0E32	CRAMPT	0E48	CRAMP	0E6D	ERTEOL	0E6E
EREOL	0E84	EROLX	0E87	EROXX	0E99	ERTEOS	0EA2
EREOS	0EAE	EEOL	0ECF	EEOLB	0ED7	ERAFLN	0EDC
ERALLN	0EF2	TVPUT	0F08	TPX	0F2D	CURDN	0F38
CURDNX	0F59	CURUP	0F5C	CURUPX	0F78	CURLFT	0F7B
CURRGT	0F81	HOME	0F87	RESET	0F9E	RSA	0FBC
RSB	0FCB	CRTINT	0FDA	CIA	0FDC	RECCHA	12AE
RESTTY	14BC	COMCOM	14F4	COMCOA	14F8	COMCOB	150B
COMCOC	1513	COMTAB	1519	COTABA	152D	COMADR	1539
CENOUT	1559	CENTRO	155F	CTROA	156D	WAIT	1573
CTROB	1593	INICEN	1594	MOVCR	15AC	MCR	15BE
MCR	15C4	MCR	15C5	CRTINA	15E0	CHE	1670
CHECKA	1681	NPRCHA	168A	OUTALL	1690	OUTALA	16AE
OUTALB	16B6	BRKTST	16CF	NEWINI	16DA	INALL	16F8
INALLX	1706	VAPBD	1800	VAPAD	1801	VAPBDD	1802
VAPADD	1803	VATACL	1804	VATACH	1805	VATALL	1806
VATALH	1807	VATBCL	1808	VATBCH	1809	VASR	180A
VAACR	180B	VAPCR	180C	VAIFR	180D	VAIER	180E
VAPADN	180F	PZPTR	1A29	YHOLD	1A2B	XHOLD	1A2C
AHOLD	1A2D	FLN	1A2E	CLN	1A30	LLN	1A32
SCRPTR	1A34	CURSOR	1A36	INLINE	1A38	COL	1A39
ESCFLG	1A3A	TEMCOL	1A3B	RAMBEG	1A3C	CHAPLN	1A3E
LPSCR	1A3F	FORMAT	1A40	DUPLEX	1A41	TABLE	1A42
JMPVEC	1A54	CENFLG	1A56	TRAPRO	1A57	PRIFLG	1A58
TOPPIA	1A59	SPAD	1A80	AR	D800	RFILE	D801

Junior computer met floppy disk-interface

Wordt de VDU-kaart op een Junior met floppy disk-interface aangesloten, dan moet op de interface-kaart zowel in het IC-voetje van IC4 als in het IC-voetje van IC5 een EPROM van het type 2716 worden geplaatst. Alle andere noodzakelijke aanpassingen zijn in Elektuur september 1983 beschreven.

De parameters voor de video-driver zijn opgeslagen in de geheugenplaatsen EFC0 . . . EFFF. Ook het I/O-gedeelte van de DOS funktioneert nu volledig:

LIST#4 zend listing naar Centronics-interface.
DISK!"IO ,05" zend listing naar het beeldscherm en naar de seriële interface van de Junior.
DISK!"IO ,0D" zend listing naar Centronics-interface, naar het beeldscherm en naar de seriële interface.
DISK!"IO , 01" zend listing naar het beeldscherm.

De editor-kommando's zijn nu compatibel met het DOS-systeem OS65D-V3.3:

CTL-F beweeg de cursor naar het begin van de regel.
CTL-I TAB-functie. Beweeg de cursor acht posities naar rechts.
CTL-R beweeg de cursor naar het einde van de regel.
CTL-H beweeg de cursor een positie naar links.
CTL-P beweeg de cursor een positie naar rechts.

Enkele opmerkingen over de video-software

Met de VDU-kaart is het mogelijk om 7 verschillende beeldschermformaten te programmeren, één formaat kan men nog in de EPROM programmeren. Het omschakelen van het ene beeldschermformaat naar het ander gebeurt door het schrijven in de geheugenplaats FORMAT en het oproepen van de subroutines MOVCRD en RESET. Staat in FORMAT 00, dan is het formaat van het beeldscherm 80 x 24; staat in FORMAT 01, dan is het formaat 82 x 25, etc.

De subroutine MOVCRD kopieert de door FORMAT gespecificeerde lookup-tabel vanuit de EPROM naar de RAM. De subroutine CRTINT, die in RESET opgeroepen wordt, leest alle data die voor het programmeren van de CRT-controller nodig is uit de RAM en kopieert die vervolgens in de CRT-controller.

Met behulp van POKE's kan de data vanaf de geheugenplaats TABLE veranderd worden. Met het kommando DISK!"GO F330" (DOS-Junior) kan de CRT-controller tijdens een programma opnieuw geprogrammeerd worden. De CRT-controller kan (zie demo-programma's!) ook met X = USR(X) geïnitieerd worden.

```

0001: F000          ORG    $F000
0002:
0003:
0004:          SOURCE LISTING OF THE VIDEO HANDLER FOR
0005:          ELEKTOR'S DOS JUNIOR COMPUTER
0006:
0007:          WRITTEN BY A. NACHTMANN
0008:
0009:          © 1983
0010:
0011:          COPYRIGHT BY ELEKTOR/ELEKTUUR
0012:
0013:
0014:          PROCESSOR:      6502 OR 65C02
0015:          CRT CONTROLLER: 6845 MOTOROLA, ROCKWELL, SYNERTEC
0016:
0017:
0018:          SCREEN COMMANDS OF THE DOS JUNIOR COMPUTER
0019:
0020:          OPERATING SYSTEM: OS-65D V3.3 (OHIO SCIENTIFIC)
0021:
0022:
0023:          CARRIAGE RETURN
0024:          LINE FEED
0025:          <ESC><1> CLEAR SCREEN & HOME
0026:          <ESC><2> CLEAR SCREEN & HOME
0027:          <ESC><3> HOME CURSOR
0028:          <ESC><4> ERASE TO EOS
0029:          <ESC><5> CURSOR UP
0030:          <ESC><6> CURSOR DOWN
0031:          <ESC><8> ERASE TO EOL
0032:          <CTL-H> CURSOR LEFT
0033:          <CTL-P> CURSOR RIGHT
0034:          <CTL-F> CURSOR TO FRONT OF LINE (EMULATED)
0035:          <CTL-R> CURSOR TO REAR OF LINE (EMULATED)
0036:          <CTL-I> TAB 8 COLUMNS (EMULATED)
0037:          <CTL-T> RETYPE THE CURRENT LINE (EMULATED)
0038:          *POINTERS AND TEMPS*
0039:
0040: F000          RAMPTR *      $006C  RAMPOINTER
0041: F000          AHOLD  *      $2363  SAVE THE CHARACTER HERE
0042: F000          FLN    *      $EFC0  FIRST LINE POINTER
0043: F000          CLN    *      FLN    +02  CURRENT LINE POINTER
0044: F000          LLN    *      CLN    +02  LAST LINE POINTER
0045: F000          SCRPTR *      LLN    +02  SLAVE SCREEN POINTER
0046: F000          CURSOR *      SCRPTR +02  CURRENT CURSOR
0047: F000          INLINE *      CURSOR +02  IN LINE OF WINDOW
0048: F000          COL    *      INLINE +01  CURRENT COLUMN
0049: F000          ESCFLG *      COL    +01  ESC FLAG
0050: F000          TEMCOL *      ESCFLG +01  SLAVE COLUMN
0051: F000          RAMBEG *      TEMCOL +01  THE REFRESH RAM STARTS HEF
0052: F000          CHAPLN *      RAMBEG +02  CHARACTER/LINE
0053: F000          LPSCR  *      CHAPLN +01  LINES/SCREEN
0054: F000          FORMAT *      LPSCR  +01  SCREEN FORMAT
0055: F000          INDEX  *      FORMAT +01  SOFTWARE STACK FOR CHAR.
                                INPUT
0056: F000          BUFFER *      INDEX  +01

```

```

0057: F000      TABLE *      BUFFER +08 CRT FORMAT TABLE
0058: F000      JMPVEC *     TABLE +12 COMMAND ADDRESS POINTER
0059: F000      CENFLG *    JMPVEC +02 CENTRONICS FLAG
0060: F000      DUPLEX *    CENFLG +01 0=FULL, 1=HALF DUPLEX
0061: F000      AUTOLF *    DUPLEX +01 0=NO, 1=AUTO CRLF TO
                                CENTRONICS
0062: F000      NMIVVEC *   AUTOLF +01 (NMI VECTOR)
0063: F000      IRQVEC *   NMIVVEC +02 (IRQ VECTOR)
0064: F000      TRAPRO *   IRQVEC +02 PROCESSOR FLAG (NOT USED)
0065:
0066:
0067:
0068:
0069: F000      SPACE *     $0020
0070: F000      ESC *      $001B
0071:
0072:
0073:
0074:
0075: F000      SPAD *     $FA80 6532 IC ON THE STANDART JC
0076:
0077:
0078:
0079:
0080:
0081: F000      VAPBD *    $F800 PORT B DATA
0082: F000      VAPAD *    VAPBD +01 PORT A DATA
0083: F000      VAPBDD *   VAPBD +02 PORT B DATA DIRECTION
0084: F000      VAPADD *   VAPBD +03 PORT A DATA DIRECTION
0085: F000      VATACL *   VAPBD +04 T1, LATCH-LOW, COUNTER-LOW
0086: F000      VATACH *   VAPBD +05 T1, COUNTER-HIGH
0087: F000      VATALL *   VAPBD +06 T1, LATCH-HIGH
0088: F000      VATALH *   VAPBD +07 T1, LATCH-HIGH
0089: F000      VATBCL *   VAPBD +08 T2, LATCH-LOW, COUNTER-LOW
0090: F000      VATBCH *   VAPBD +09 T2, COUNTER-HIGH
0091: F000      VASR *     VAPBD +0A SHIFT REGISTER
0092: F000      VAACR *    VAPBD +0B AUXILARY CONTROL REGISTER
0093: F000      VAPCR *    VAPBD +0C PERIPHERAL CONTROL REGISTER
0094: F000      VAIFR *    VAPBD +0D INTERRUPT FLAG REGISTER
0095: F000      VAIER *    VAPBD +0E INTERRUPT ENABLE REGISTER
0096: F000      VAPADN *   VAPBD +0F PORT A DATA, NO HANDSHAKE
0097:
0098:
0099:
0100:
0101: F000      AR *       $D800 ADDRESS REGISTER OF THE CRT
0102: F000      RFILE *    AR +01 REGISTER FILE OF CRT
0103:
0104:
0105:
0106:
0107:
0108:
0109:
0110:
0111:
0112:

```

SPECIAL CHARACTERS

JUNIOR'S SERIAL I/O

VIA ON THE EXPANSION BOARD OF THE JUNIOR COMP.

CRT ADDRESSES

* VT 52 COMPATIBLE TERMINAL *

INTERNAL 6845 REGISTER FILE

0113:				
0114:	F000	HORTOT	*	\$0000 HORIZONTAL TOTAL-1
0115:	F000	HORDIS	*	\$0001 HORIZONTAL DISPLAYED
0116:	F000	HSYPOS	*	\$0002 HORIZONTAL SYNC POSSTION
0117:	F000	VHSYWI	*	\$0003 VERTICAL, HORIZONTAL SYNC WIDTH
0118:	F000	VERTOT	*	\$0004 VERTICAL TOTAL-1
0119:	F000	VTOTAJ	*	\$0005 VERTICAL TOTAL ADJUST
0120:	F000	VERDIS	*	\$0006 VERTICAL DISPLAYED
0121:	F000	VSYPOS	*	\$0007 VERTICAL SYNC POSITION
0122:	F000	MODE	*	\$0008 INTERLACE MODE REGISTER
0123:	F000	SCANLN	*	\$0009 CHARACTER SCAN LINES-1
0124:	F000	CURSTA	*	\$000A CURSOR START
0125:	F000	CUREND	*	\$000B CURSOR END
0126:	F000	DSPSTH	*	\$000C DISPLAY START HIGH
0127:	F000	DSPSTL	*	\$000D DISPLAY START LOW
0128:	F000	CURPOH	*	\$000E CURSOR POSITION HIGH
0129:	F000	CURPOL	*	\$000F CURSOR POSITION LOW
0130:	F000	LIPENH	*	\$0010 LIGHT PEN HIGH
0131:	F000	LIPENL	*	\$0011 LIGHT PEN LOW
0132:	F000	UPDATH	*	\$0012 UPDATE HIGH (ROCKWELL, SYNERTEK)
0133:	F000	UPDATL	*	\$0013 UPDATE LOW
0134:	F000	DUMMY	*	\$001F DUMMY REGISTER
0135:				
0136:				
0137:				
0138:				
0139:				

VIDEO HANDLER

0140:				
0141:				
0142:	F000 48	VIDEO PHA		SAVE THE REGISTERS
0143:	F001 8A	TXA		
0144:	F002 48	PHA		
0145:	F003 98	TYA		
0146:	F004 48	PHA		
0147:	F005 AD 63 23	LDA AHOLD		GET THE CHARACTER
0148:	F008 C9 1B	CMPIM ESC		IS IT THE ESC CHAR.?
0149:	F00A D0 16	BNE CHECK		
0150:	F00C 8D CC EF	STA ESCFLG		SET THE ESC FLAG
0151:				
0152:	F00F 68	VIDEND PLA		RESTORE THE REGISTERS
0153:	F010 A8	TAY		
0154:	F011 68	PLA		
0155:	F012 AA	TAX		
0156:	F013 68	PLA		
0157:	F014 2C 80 FA	BIT SPAD		BIT SPAD CHECK FOR BREAK DURING OUTPUT
0158:	F017 10 01	BPL BRKTST		
0159:	F019 60	RTS		
0160:				
0161:	F01A 2C 80 FA	BRKTST BIT		BIT SPAD WAIT TILL KEY IS RELEASED
0162:	F01D 10 FB	BPL BRKTST		
0163:	F01F 6C 7C FA	JMI \$FA7C		GOTO BREAK HANDLER
0164:				
0165:	F022 20 7D F3	CHECK JSR		COMCOM COMPUTE THE COMMAND INDEX
0166:	F025 B0 10	BCS VALVEC		THERE WAS NO COMMAND
0167:	F027 BD C2 F3	LDAX COMADR		SET THE COMMAND VECTOR
0168:	F02A 8D EE EF	STA JMPVEC		

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0169: F02D E8                INX
0170: F02E BD C2 F3          LDAX  COMADR
0171: F031 8D EF EF          STA   JMPVEC +01
0172: F034 6C EE EF          JMI   JMPVEC
0173:
0174: F037 4C 8C F0  VALVEC JMP   VALID
0175:
0176:
0177:                ***EXECUTE A VIDEO COMMAND***
0178:
0179:
0180:                *CARRIAGE RETURN*
0181:
0182: F03A A2 00          RETURN LDXIM $00
0183: F03C 8E CB EF          STX   COL      COL=0
0184: F03F 20 1A F1          JSR   ADJUST  ADJUST THE CURSOR
0185: F042 4C 0F F0          JMP   VIDEND
0186:
0187:                *LINE FEED*
0188:
0189: F045 20 CA F2  FEED   JSR   CURDN
0190: F048 4C 0F F0          JMP   VIDEND
0191:
0192:                *CLEAR SCREEN & HOME CURSOR*
0193:
0194: F04B 20 19 F3  CLRHOM JSR   HOME
0195: F04E 20 34 F2          JSR   ERTEOS
0196: F051 4C 0F F0          JMP   VIDEND
0197:
0198:                *CURSOR LEFT*
0199:
0200: F054 20 0D F3  LEFT   JSR   CURLFT
0201: F057 4C 0F F0          JMP   VIDEND
0202:
0203:                *HOME CURSOR*
0204:
0205: F05A 20 19 F3  HOCU   JSR   HOME
0206: F05D 4C 0F F0          JMP   VIDEND
0207:
0208:
0209:
0210:                *CURSOR UP*
0211:
0212: F060 20 EE F2  UP     JSR   CURUP
0213: F063 4C 0F F0          JMP   VIDEND
0214:
0215:                *CURSOR DOWN*
0216:
0217: F066 20 CA F2  DOWN   JSR   CURDN
0218: F069 4C 0F F0          JMP   VIDEND
0219:
0220:                *CURSOR RIGHT*
0221:
0222: F06C 20 13 F3  RIGHT  JSR   CURRGT
0223: F06F 4C 0F F0          JMP   VIDEND
0224:

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0225:                                *ERASE TO END OF LINE*
0226:
0227: F072 20 00 F2  ERLNX JSR   ERTEOL
0228: F075 4C 0F F0           JMP   VIDEND
0229:
0230:                                *ERASE TO END OF SCREEN*
0231:
0232: F078 20 34 F2  ERSCRX JSR   ERTEOS
0233: F07B 4C 0F F0           JMP   VIDEND
0234:
0235:
0236:
0237:
0238:                                *DELETE THE CURRENT LINE*
0239:
0240: F07E A2 00           DELLIN LDXIM $00
0241: F080 8E CB EF           STX   COL
0242: F083 20 6D F1           JSR   ADJCUR MOVE CURSOR TO COL 0
0243: F086 20 00 F2           JSR   ERTEOL
0244: F089 4C 0F F0           JMP   VIDEND
0245:
0246:
0247:
0248:
0249:                                *FILTER < SPACE*
0250:
0251: F08C AD 63 23  VALID  LDA   AHOLD
0252: F08F C9 20           CMPIM '
0253: F091 B0 03           BCS  TOSCR
0254: F093 4C 0F F0           JMP   VIDEND
0255:
0256:                                *TRANSFER TO SCREEN*
0257:
0258: F096 20 9A F2  TOSCR JSR   TVPUT
0259: F099 4C 0F F0           JMP   VIDEND
0260:
0261:
0262:
0263:                                ***SUBROUTINES***
0264:
0265:
0266:                                *FIRST LINE UP*
0267:
0268: F09C 38           FLNUP  SEC
0269: F09D AD C0 EF           LDA   FLN
0270: F0A0 ED D0 EF           SBC  CHAPLN FLN=FLN-CHAPLN
0271: F0A3 8D C0 EF           STA  FLN
0272: F0A6 AD C1 EF           LDA  FLN      +01
0273: F0A9 E9 00           SBCIM $00
0274: F0AB 29 07           ANDIM $07      MAX IS $7FF
0275: F0AD 8D C1 EF           STA  FLN      +01
0276: F0B0 60           RTS
0277:
0278:                                *CURRENT LINE UP*
0279:
0280: F0B1 38           CLNUP  SEC

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0281:	F0B2 AD C2 EF	LDA	CLN	
0282:	F0B5 ED D0 EF	SBC	CHAPLN	
0283:	F0B8 8D C2 EF	STA	CLN	
0284:	F0BB AD C3 EF	LDA	CLN	+01
0285:	F0BE E9 00	SBCIM	\$00	
0286:	F0C0 29 07	ANDIM	\$07	MAX IS \$7FF
0287:	F0C2 8D C3 EF	STA	CLN	+01
0288:	F0C5 60	RTS		
0289:				
0290:		*LAST LINE UP*		
0291:				
0292:	F0C6 38	LLNUP	SEC	
0293:	F0C7 AD C4 EF	LDA	LLN	
0294:	F0CA ED D0 EF	SBC	CHAPLN	
0295:	F0CD 8D C4 EF	STA	LLN	
0296:	F0D0 AD C5 EF	LDA	LLN	+01
0297:	F0D3 E9 00	SBCIM	\$00	
0298:	F0D5 29 07	ANDIM	\$07	MAX IS \$7FF
0299:	F0D7 8D C5 EF	STA	LLN	+01
0300:	F0DA 60	RTS		
0301:				
0302:		*FIRST LINE DOWN*		
0303:				
0304:	F0DB 18	FLNDN	CLC	
0305:	F0DC AD C0 EF	LDA	FLN	
0306:	F0DF 6D D0 EF	ADC	CHAPLN	
0307:	F0E2 8D C0 EF	STA	FLN	FLN=FLN+CHAPLN
0308:	F0E5 AD C1 EF	LDA	FLN	+01
0309:	F0E8 69 00	ADCIM	\$00	
0310:	F0EA 29 07	ANDIM	\$07	MAX IS \$7FF
0311:	F0EC 8D C1 EF	STA	FLN	+01
0312:	F0EF 60	RTS		
0313:				
0314:		*CURRENT LINE DOWN*		
0315:				
0316:	F0F0 18	CLNDN	CLC	
0317:	F0F1 AD C2 EF	LDA	CLN	
0318:	F0F4 6D D0 EF	ADC	CHAPLN	
0319:	F0F7 8D C2 EF	STA	CLN	CLN=CLN+CHAPLN
0320:	F0FA AD C3 EF	LDA	CLN	+01
0321:	F0FD 69 00	ADCIM	\$00	
0322:	F0FF 29 07	ANDIM	\$07	MAX IS \$7FF
0323:	F101 8D C3 EF	STA	CLN	+01
0324:	F104 60	RTS		
0325:				
0326:		*LAST LINE DOWN*		
0327:				
0328:	F105 18	LLNDN	CLC	
0329:	F106 AD C4 EF	LDA	LLN	
0330:	F109 6D D0 EF	ADC	CHAPLN	
0331:	F10C 8D C4 EF	STA	LLN	LLN=LLN+CHAPLN
0332:	F10F AD C5 EF	LDA	LLN	+01
0333:	F112 69 00	ADCIM	\$00	
0334:	F114 29 07	ANDIM	\$07	MAX IS \$7FF
0335:	F116 8D C5 EF	STA	LLN	+01
0336:	F119 60	RTS		

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0337:
0338:                *ADJUST THE LINE POINTERS*
0339:
0340: F11A AC CB EF  ADJUST LDY   COL   IS COLUMN NEGATIVE?
0341: F11D 10 23      BPL   ADSA  BRANCH ON NO
0342: F11F CE CA EF  DEC   INLINE GO BACK ONE LINE
0343: F122 10 11      BPL   ADJU  BRANCH IF WE ARE STILL ON
                                THE SCREEN
0344: F124 20 9C F0  JSR   FLNUP  FIRST LINE UP
0345: F127 20 C4 F1  JSR   FLNCRT ADJUST DISPLAY START
0346: F12A 20 6E F2  JSR   ERAFLN ERASE THE FIRST LINE
0347: F12D 20 C6 F0  JSR   LLNUP  LAST LINE UP
0348: F130 A0 00      LDYIM $00  RESET INLINE
0349: F132 8C CA EF  STY   INLINE
0350:
0351: F135 20 B1 F0  ADJU  JSR   CLNUP  CURRENT LINE UP
0352: F138 AC D0 EF  LDY   CHAPLN
0353: F13B 88        DEY           COL=CHAPLN-1
0354: F13C 8C CB EF  STY   COL
0355: F13F 4C 6D F1  JMP   ADJCUR
0356:
0357:
0358: F142 CC D0 EF  ADSA  CPY   CHAPLN IS COL>=CHAPLN?
0359: F145 90 26      BCC   ADJCUR BRANCH ON NO
0360: F147 A0 00      LDYIM $00
0361: F149 8C CB EF  STY   COL   COL=0
0362: F14C EE CA EF  INC   INLINE MOVE DOWN FOR 1 LINE
0363: F14F AC CA EF  LDY   INLINE
0364: F152 CC D1 EF  CPY   LPSCR  ARE WE STILL ON THE SCREEN?
0365: F155 90 13      BCC   ADJV  IS INLINE>=LPSCR?
0366: F157 20 DB F0  JSR   FLNDN  FIRST LINE DOWN
0367: F15A 20 C4 F1  JSR   FLNCRT ADJUST DISPLAY START
0368: F15D 20 05 F1  JSR   LLNDN  LAST LINE DOWN
0369: F160 AC D1 EF  LDY   LPSCR
0370: F163 88        DEY
0371: F164 8C CA EF  STY   INLINE INLINE=LPSCR-1
0372: F167 20 84 F2  JSR   ERALLN ERASE LAST LINE
0373:
0374: F16A 20 F0 F0  ADJV  JSR   CLNDN  CURRENT LINE DOWN
0375:
0376: F16D A2 00      ADJCUR LDXIM $00
0377: F16F 8E C8 EF  STX   CURSOR RESET CURSOR
0378: F172 8E C9 EF  STX   CURSOR +01
0379: F175 AE CA EF  LDX   INLINE IS INLINE=0?
0380: F178 F0 12      BEQ   ACURX  BRANCH ON YES
0381:
0382: F17A 18        ACURA CLC
0383: F17B AD D0 EF  LDA   CHAPLN
0384: F17E 6D C8 EF  ADC   CURSOR
0385: F181 8D C8 EF  STA   CURSOR
0386: F184 90 03      BCC   ACURB
0387: F186 EE C9 EF  INC   CURSOR +01  CURSOR=INLINE*CHAPLN
0388:
0389: F189 CA        ACURB  DEX
0390: F18A D0 EE      BNE   ACURA
0391:
0392: F18C 18        ACURX  CLC

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0393: F18D AD C0 EF      LDA    FLN
0394: F190 6D C8 EF      ADC    CURSOR
0395: F193 8D C8 EF      STA    CURSOR CURSOR=CURSOR+FLN
0396: F196 AD C1 EF      LDA    FLN    +01
0397: F199 6D C9 EF      ADC    CURSOR +01
0398: F19C 8D C9 EF      STA    CURSOR +01
0399:
0400: F19F 18            CLC
0401: F1A0 AD CB EF      LDA    COL
0402: F1A3 6D C8 EF      ADC    CURSOR CURSOR=CURSOR+COL
0403: F1A6 8D C8 EF      STA    CURSOR
0404: F1A9 90 03        BCC    ACURC
0405: F1AB EE C9 EF      INC    CURSOR +01
0406:
0407: F1AE A2 0E        ACURC  LDXIM CURPOH
0408: F1B0 AD C9 EF      LDA    CURSOR +01
0409: F1B3 8E 00 D8      STX    AR
0410: F1B6 8D 01 D8      STA    RFILE CURSOR--->CRT CONTROLLER
0411: F1B9 E8            INX
0412: F1BA AD C8 EF      LDA    CURSOR
0413: F1BD 8E 00 D8      STX    AR
0414: F1C0 8D 01 D8      STA    RFILE
0415: F1C3 60            RTS
0416:
0417:                    *FIRST LINE TO CRT*
0418:
0419: F1C4 A2 0C        FLNCRT LDXIM DSPSTH
0420: F1C6 AD C1 EF      LDA    FLN    +01
0421: F1C9 8E 00 D8      STX    AR
0422: F1CC 8D 01 D8      STA    RFILE
0423: F1CF E8            INX
0424: F1D0 AD C0 EF      LDA    FLN
0425: F1D3 8E 00 D8      STX    AR
0426: F1D6 8D 01 D8      STA    RFILE
0427: F1D9 60            RTS
0428:
0429:
0430:                    *COMPUTE THE RAM POINTER*
0431:
0432: F1DA 18            CRAMPT CLC
0433: F1DB AD C6 EF      LDA    SCRPT
0434: F1DE 6D CE EF      ADC    RAMBEG RAMPTR=SCRPT+RAMBEG
0435: F1E1 85 6C        STA    RAMPTR
0436: F1E3 AD C7 EF      LDA    SCRPT +01
0437: F1E6 6D CF EF      ADC    RAMBEG +01
0438: F1E9 29 D7        ANDIM  $D7    MAX IS $D7FF
0439: F1EB 85 6D        STA    RAMPTR +01
0440: F1ED 18            CLC
0441: F1EE A5 6C        LDA    RAMPTR RAMPTR=RAMBEG+SCRPT+TEMCOL
0442: F1F0 6D CD EF      ADC    TEMCOL
0443: F1F3 85 6C        STA    RAMPTR
0444: F1F5 90 08        BCC    CRAMP
0445: F1F7 E6 6D        INC    RAMPTR +01
0446: F1F9 A5 6D        LDA    RAMPTR +01
0447: F1FB 29 D7        ANDIM  $D7    MAX IS $D7FF
0448: F1FD 85 6D        STA    RAMPTR +01

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0449:
0450: F1FF 60          CRAMP  RTS
0451:
0452:                *ERASE TO END OF LINE*
0453:
0454: F200 AE C2 EF     ERTEOL LDX   CLN
0455: F203 AC C3 EF             LDY   CLN   +01
0456: F206 8E C6 EF             STX   SCRPTR SCRPTR=CLN
0457: F209 8C C7 EF             STY   SCRPTR +01
0458: F20C AC CB EF             LDY   COL   GET THE CURR. COLUMN
0459: F20F 8C CD EF             STY   TEMCOL TEMCOL=COL
0460: F212 A2 20          LDXIM '    SPACE TO X
0461: F214 A0 00          LDYIM $00   INDEX=0
0462:
0463: F216 20 DA F1     EREOL  JSR   CRAMPT RAMPTR=RAMBEG+SCRPTR+TEMCOL
0464:
0465: F219 8A          EROLX  TXA           SPACE--->RAM
0466: F21A 91 6C             STAIY RAMPTR
0467: F21C EE CD EF             INC   TEMCOL TEMCOL=TEMCOL+1
0468: F21F E6 6C             INC   RAMPTR
0469: F221 D0 08             BNE   EROXX
0470: F223 E6 6D             INC   RAMPTR +01 RAMPTR=RAMPTR+1
0471: F225 A5 6D             LDA   RAMPTR +01
0472: F227 29 D7          ANDIM $D7   MAX IS $D7FF
0473: F229 85 6D             STA   RAMPTR +01
0474:
0475: F22B AD CD EF     EROXX  LDA   TEMCOL IS TEMCOL>=CHAPLN?
0476: F22E CD D0 EF             CMP   CHAPLN
0477: F231 90 E6             BCC   EROLX  BRANCH ON NO
0478: F233 60             RTS
0479:
0480:                *ERASE TO END OF SCREEN*
0481:
0482: F234 AE CA EF     ERTEOS LDX   INLINE ARE WE ALREADY IN THE
0483: F237 E8             INX           LAST LINE?
0484: F238 EC D1 EF     CPX   LPSCR
0485: F23B F0 C3             BEQ   ERTEOL IF YES DO ONLY "EOL"
0486: F23D 20 00 F2     JSR   ERTEOL DO "EOL" FOR THIS LINE
0487:
0488: F240 18          EREOS  CLC
0489: F241 AD C6 EF     LDA   SCRPTR
0490: F244 6D D0 EF     ADC   CHAPLN SCRPTR=SCRPTR+CHAPLN
0491: F247 8D C6 EF     STA   SCRPTR OR SCREEN POINTER DOWN
0492: F24A AD C7 EF     LDA   SCRPTR +01
0493: F24D 69 00          ADCIM $00
0494: F24F 29 07          ANDIM $07   MAX IS $7FF
0495: F251 8D C7 EF     STA   SCRPTR +01
0496: F254 CD C5 EF     CMP   LLN   +01 IS SCRPTR=LLN?
0497: F257 D0 08             BNE   EEOL
0498: F259 AD C6 EF     LDA   SCRPTR
0499: F25C CD C4 EF     CMP   LLN
0500: F25F F0 08             BEQ   EEOLB  ERASE LAST LINE AND STOP
0501:
0502: F261 8C CD EF     EEOL  STY   TEMCOL TEMCOL=0
0503: F264 20 16 F2     JSR   EREOL
0504: F267 B0 D7             BCS   EREOS

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0505:
0506:
0507: F269 8C CD EF  EEOLB  STY   TEMCOL TEMCOL=0
0508: F26C F0 A8      BEQ   EREOL
0509:
0510:                *ERASE THE FIRST LINE*
0511:
0512: F26E A0 00      ERAFLN LDYIM $00
0513: F270 8C CD EF      STY   TEMCOL
0514: F273 A2 20      LDXIM '
0515: F275 AD C0 EF      LDA   FLN
0516: F278 8D C6 EF      STA  SCRPTR SCRPTR=FLN
0517: F27B AD C1 EF      LDA  FLN    +01
0518: F27E 8D C7 EF      STA  SCRPTR +01
0519: F281 4C 16 F2      JMP  EREOL  NOW ERASE THE FIRST LINE
0520:
0521:                *ERASE THE LAST LINE*
0522:
0523: F284 A0 00      ERALLN LDYIM $00
0524: F286 8C CD EF      STY   TEMCOL TEMCOL=0
0525: F289 A2 20      LDXIM '
0526: F28B AD C4 EF      LDA  LLN
0527: F28E 8D C6 EF      STA  SCRPTR SCRPTR=LLN
0528: F291 AD C5 EF      LDA  LLN    +01
0529: F294 8D C7 EF      STA  SCRPTR +01
0530: F297 4C 16 F2      JMP  EREOL  NOW ERASE THE LAST LINE
0531:
0532:                *PUT A CHARACTER ON THE SCREEN*
0533:
0534: F29A 18      TVPUT  CLC
0535: F29B AD C2 EF  LDA  CLN
0536: F29E 6D CE EF  ADC  RAMBEG
0537: F2A1 85 6C      STA  RAMPTR RAMPTR=CLN+RAMBEG
0538: F2A3 AD C3 EF  LDA  CLN    +01
0539: F2A6 6D CF EF  ADC  RAMBEG +01
0540: F2A9 85 6D      STA  RAMPTR +01
0541: F2AB A0 00      LDYIM $00
0542: F2AD 18      CLC
0543: F2AE AD CB EF  LDA  COL    RAMPTR=CLN+RAMBEG+COL
0544: F2B1 65 6C      ADC  RAMPTR
0545: F2B3 85 6C      STA  RAMPTR
0546: F2B5 90 08      BCC  TPX
0547: F2B7 E6 6D      INC  RAMPTR +01
0548: F2B9 A5 6D      LDA  RAMPTR +01
0549: F2BB 29 D7      ANDIM $D7  MAX IS $D7FF
0550: F2BD 85 6D      STA  RAMPTR +01
0551:
0552: F2BF AD 63 23  TPX  LDA  AHOLD
0553: F2C2 91 6C      STAIY RAMPTR
0554: F2C4 EE CB EF  INC  COL    COL=COL+01
0555: F2C7 4C 1A F1  JMP  ADJUST
0556:
0557:                *CURSOR DOWN*
0558:
0559: F2CA EE CA EF  CURDN INC  INLINE  INLINE=INLINE+1
0560: F2CD 20 F0 F0  JSR  CLNDN  CUREENT LINE DOWN

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0561: F2D0 AC CA EF      LDY    INLINE
0562: F2D3 CC D1 EF      CPY    LPSCR    IS INLINE>=LPSCR?
0563: F2D6 90 13         BCC    CURDNX  BRANCH ON NO
0564: F2D8 20 DB F0      JSR    FLNDN   FIRST LINE DOWN
0565: F2DB 20 C4 F1      JSR    FLNCRT  FIRST LINE--->CRT
0566: F2DE 20 05 F1      JSR    LLNDN   LAST LINE DOWN
0567: F2E1 20 84 F2      JSR    ERALLN  ERASE LAST LINE
0568: F2E4 AC D1 EF      LDY    LPSCR
0569: F2E7 88           DEY
0570: F2E8 8C CA EF      STY    INLINE  INLINE=LPSCR-1
0571:
0572: F2EB 4C 6D F1      CURDNX JMP    ADJCUR  ADJUST THE CURSOR AND RETURN
0573:
0574:                      *CURSOR UP*
0575:
0576: F2EE CE CA EF      CURUP  DEC    INLINE  INLINE=INLINE-1
0577: F2F1 20 B1 F0      JSR    CLNUP   CURRENT LINE UP
0578: F2F4 AC CA EF      LDY    INLINE  IS INLINE=NEGATIVE?
0579: F2F7 10 11         BPL    CURUPX  BRANCH ON NO
0580: F2F9 20 9C F0      JSR    FLNUP   FIRST LINE UP
0581: F2FC 20 C4 F1      JSR    FLNCRT  FLN--->CRT
0582: F2FF 20 C6 F0      JSR    LLNUP   LAST LINE UP
0583: F302 20 6E F2      JSR    ERAFLN  ERASE THE FIRST LINE
0584: F305 A0 00         LDYIM  $00
0585: F307 8C CA EF      STY    INLINE  INLINE=0
0586:
0587: F30A 4C 6D F1      CURUPX JMP    ADJCUR  ADJUST THE CURSOR AND RETURN
0588:
0589:                      *CURSOR LEFT*
0590:
0591: F30D CE CB EF      CURLFT DEC    COL      COL=COL-1
0592: F310 4C 1A F1      JUMP   ADJUST  ADJUST THE CURSOR AND RETURN
0593:
0594:                      *CURSOR RIGHT*
0595:
0596: F313 EE CB EF      CURRGT INC    COL      COL=COL+1
0597: F316 4C 1A F1      JUMP   ADJUST  ADJUST THE CURSOR AND RETURN
0598:
0599:                      *HOME CURSOR*
0600:
0601: F319 A2 00         HOME   LDXIM  $00
0602: F31B 8E CA EF      STX    INLINE  INLINE=0
0603: F31E 8E CB EF      STX    COL      COL=0
0604: F321 AE C0 EF      LDX    FLN
0605: F324 8E C2 EF      STX    CLN      CLN=FLN
0606: F327 AE C1 EF      LDX    FLN      +01
0607: F32A 8E C3 EF      STX    CLN      +01
0608: F32D 4C 1A F1      JMP    ADJUST  ADJUST THE CURSOR AND RETURN
0609:
0610:                      *MASTER RESET OF THE MEMORY MAPPED VDU*
0611:
0612: F330 A9 00         RESET  LDAIM  $00
0613: F332 8D C0 EF      STA    FLN      FLN=$0000
0614: F335 8D C1 EF      STA    FLN      +01
0615: F338 8D C2 EF      STA    CLN      CLN=$0000
0616: F33B 8D C3 EF      STA    CLN      +01

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0617: F33E 8D C4 EF          STA   LLN   RESET LAST LINE
0618: F341 8D C5 EF          STA   LLN   +01
0619: F344 8D CB EF          STA   COL   COL=0
0620: F347 8D CA EF          STA   INLINE  INLINE=0
0621: F34A AE D1 EF          LDX   LPSCR
0622: F34D CA                DEX                X=LPSCR-1
0623:
0624: F34E 18                RSA   CLC
0625: F34F AD D0 EF          LDA   CHAPLN
0626: F352 6D C4 EF          ADC   LLN
0627: F355 8D C4 EF          STA   LLN   LLN=(LPSCR-1)*CHAPLN
0628: F358 90 03            BCC   RSB
0629: F35A EE C5 EF          INC   LLN   +01
0630:
0631: F35D CA                RSB   DEX
0632: F35E D0 EE            BNE   RSA
0633: F360 20 6C F3          JSR   CRTINT SET THE CRT TIMING REGISTERS
0634: F363 20 19 F3          JSR   HOME   HOME CURSOR
0635: F366 20 34 F2          JSR   ERTEOS CLEAR THE SCREEN
0636: F369 4C C4 F1          JMP   FLNCRT FLN--->CRT AND RETURN
0637:
0638:                          *INITIALIZE THE CRT CONTROLLER*
0639:
0640: F36C A2 00            CRTINT LDXIM $00
0641:
0642: F36E 8E 00 D8        CIA   STX   AR   SET THE FILE INDEX
0643: F371 BD DC EF          LDAX  TABLE
0644: F374 8D 01 D8        STA   RFILE  VALUE--->FILE
0645: F377 E8                INX
0646: F378 E0 10            CPXIM $10   SET ONLY THE TIMING REGISTERS
0647: F37A D0 F2            BNE   CIA
0648: F37C 60                RTS
0649:
0650:
0651:
0652:                          *COMPUTE THE COMMAND ADDRESS INDEX*
0653:
0654: F37D A2 00            COMCOM LDXIM $00
0655: F37F A0 01            LDYIM $01
0656:
0657: F381 BD A2 F3        COMCOA LDAX  COMTAB
0658: F384 CD CC EF          CMP   ESCFLG FIND THE COMMAND
0659: F387 D0 0B            BNE   COMCOB
0660: F389 B9 A2 F3        LDAY  COMTAB
0661: F38C CD 63 23        CMP   AHOLD
0662: F38F D0 03            BNE   COMCOB
0663: F391 18                CLC                C=0 --> X=ADDRESS INDEX
0664: F392 90 08            BCC   COMCOC AND RESET THE ESC-FLAG
0665:
0666: F394 E8                COMCOB INX
0667: F395 E8                INX
0668: F396 C8                INY
0669: F397 C8                INY
0670: F398 E0 16            CPXIM $16
0671: F39A 90 E5            BCC   COMCOA C=1 --> NO COMMAND
0672:

```

```

0673: F39C A9 00      COMCOC LDAIM $00
0674: F39E 8D CC EF      STA   ESCFLG RESET THE ESCAPE FLAG
0675: F3A1 60          RTS

```

0676:

0677:

0678:

COMMAND TABLE

0679:

```

0680: F3A2 00      COMTAB =      $00
0681: F3A3 0D      =      $0D      <CR>
0682: F3A4 00      =      $00
0683: F3A5 0A      =      $0A      <LF>
0684: F3A6 00      =      $00
0685: F3A7 08      =      $08      <BS>,<CTL-H> BACK SPACE
0686: F3A8 1B      =      $1B
0687: F3A9 31      =      '1      <ESC><1> CLEAR SCREEN & HOME
0688: F3AA 1B      =      $1B
0689: F3AB 32      =      '2      <ESC><2> CLEAR SCREEN & HOME
0690: F3AC 1B      =      $1B
0691: F3AD 33      =      '3      <ESC><3> HOME CURSOR
0692: F3AE 1B      =      $1B
0693: F3AF 34      =      '4      <ESC><4> ERASE TO EOS
0694: F3B0 1B      =      $1B
0695: F3B1 35      =      '5      <ESC><5> CURSOR UP
0696: F3B2 1B      =      $1B
0697: F3B3 36      =      '6      <ESC><6> CURSOR DOWN
0698: F3B4 1B      =      $1B
0699: F3B5 38      =      '8      <ESC><8> ERASE TO EOL
0700:
0701: F3B6 00      COTABA =      $00
0702: F3B7 10      =      $10      <CTL-P> CURSOR RIGHT
0703: F3B8 FF      =      $FF
0704: F3B9 FF      =      $FF
0705: F3BA FF      =      $FF
0706: F3BB FF      =      $FF
0707: F3BC FF      =      $FF
0708: F3BD FF      =      $FF
0709: F3BE FF      =      $FF
0710: F3BF FF      =      $FF
0711: F3C0 FF      =      $FF
0712: F3C1 FF      =      $FF

```

0713:

0714:

COMMAND ADDRESS TABLE

0715:

```

0716: F3C2 3A      COMADR =      $3A      CR
0717: F3C3 F0      =      $F0
0718: F3C4 45      =      $45      LF
0719: F3C5 F0      =      $F0
0720: F3C6 54      =      $54      CURSOR LEFT
0721: F3C7 F0      =      $F0
0722: F3C8 4B      =      $4B      CLEAR SCREEN & HOME
0723: F3C9 F0      =      $F0
0724: F3CA 4B      =      $4B      CLEAR SCREEN & HOME
0725: F3CB F0      =      $F0
0726: F3CC 5A      =      $5A      HOME CURSOR
0727: F3CD F0      =      $F0
0728: F3CE 78      =      $78      ERASE TO EOS

```

```

0729: F3CF F0           =      $F0
0730: F3D0 60           =      $60      CURSOR UP
0731: F3D1 F0           =      $F0
0732: F3D2 66           =      $66      CURSOR DOWN
0733: F3D3 F0           =      $F0
0734: F3D4 72           =      $72      ERASE TO EOL
0735: F3D5 F0           =      $F0

```

NORMAL VIDEO COMMANDS

```

0736:
0737:
0738:
0739:
0740: F3D6 6C           =      $6C      CURSOR RIGHT
0741: F3D7 F0           =      $F0
0742: F3D8 FF           =      $FF
0743: F3D9 FF           =      $FF
0744: F3DA FF           =      $FF
0745: F3DB FF           =      $FF
0746: F3DC FF           =      $FF
0747: F3DD FF           =      $FF
0748: F3DE FF           =      $FF
0749: F3DF FF           =      $FF
0750: F3E0 FF           =      $FF
0751: F3E1 FF           =      $FF

```

CENTRONICS OUTPUT

```

0752:
0753:
0754:
0755:
0756:
0757:
0758: F3E2 20 1D F4  CENOUT JSR   INICEN INIT. PRINTER I/O
0759: F3E5 4C E8 F3          JMP   CENTRO AND OUTPUT THE CHARACTER

```

> VIA DEFINITIONS:

```

0760:
0761:
0762:
0763:
0764: > PA7...PA0 = DATA OUTPUT
0765: > CA1 = /ACKN INPUT
0766: > CA2 = /STB OUTPUT
0767: > PB1 = PE INPUT
0768: > PB0 = SEL INPUT

```

```

0769:
0770:
0771: F3E8 AD 00 F8  CENTRO LDA   VAPBD
0772: F3EB 29 01          ANDIM $01  IS THE PRINTER SELECTED?
0773: F3ED F0 2D          BEQ   CTROB  PB0 = SEL INPUT
0774: F3EF AD 00 F8          LDA   VAPBD
0775: F3F2 29 02          ANDIM $02  PAPER EMPTY?
0776: F3F4 D0 26          BNE   CTROB  PB1 = PE INPUT
0777:
0778: F3F6 AD 63 23  CTROA  LDA   AHOLD
0779: F3F9 8D 01 F8          STA   VAPAD  OUTPUT THE CHARACTER AND
0780:
0781: F3FC AD 00 F8  WAIT   LDA   VAPBD
0782: F3FF 29 01          ANDIM $01  IS THE PRINTER SELECTED
0783: F401 F0 19          BEQ   CTROB
0784: F403 AD 00 F8          LDA   VAPBD

```

```

0785: F406 29 02          ANDIM $02      PAPER EMPTY?
0786: F408 D0 12          BNE   CTROB
0787: F40A AD 0D F8       LDA   VAIFR    SAMPLE CA1 FLAG
0788: F40D 29 02          ANDIM $02
0789: F40F F0 EB          BEQ   WAIT     WAIT FOR ACKNOWLEDGE
0790: F411 AD 0D F8       LDA   VAIFR
0791: F414 09 03          ORAIM $03
0792: F416 8D 0D F8       STA   VAIFR    RESET CA1, CA2 FLAGS
0793: F419 8D 0D F8       STA   VAIFR
0794:
0795: F41C 60             CTROB  RTS
0796:
0797:
0798:                      *INITIALZE CENTRONICS*
0799:
0800: F41D A9 FF          INICEN LDAIM $FF    PA0...PA7 = OUTPUT
0801: F41F 8D 03 F8       STA   VAPADD
0802: F422 A9 0A          LDAIM $0A      CA2 = WRITE HANDSHAKE PULSE
                                OUTPUT
0803: F424 8D 0C F8       STA   VAPCR    CA1 = NEG. EDGE SENSITIVE
0804: F427 AD 02 F8       LDA   VAPBDD
0805: F42A 29 FC          ANDIM $FC      PA0,PA1 = INPUT
0806: F42C 8D 02 F8       STA   VAPBDD
0807: F42F A9 00          LDAIM $00      RESET THE PRINTER FLAG
0808: F431 8D F0 EF       STA   CENFLG
0809: F434 60             RTS
0810:
0811:                      *MOVE THE CRT FILE FROM ROM TO RAM*
0812:
0813: F435 A9 00             MOVCRT LDAIM $00    REFRESH RAM STARTS AT $D000
0814: F437 A2 D0             LDXIM $D0
0815: F439 8D CE EF         STA   RAMBEG
0816: F43C 8E CF EF         STX   RAMBEG +01
0817: F43F A9 00             LDAIM $00
0818: F441 A8                 TAY
0819: F442 AE D2 EF         LDX   FORMAT    GET THE CURR. FORMAT
0820: F445 F0 06             BEQ   MCRTB
0821:
0822: F447 18                 MCRTA  CLC
0823: F448 69 12             ADCIM $12      COMPUTE THE INDEX
0824: F44A CA                 DEX
0825: F44B D0 FA             BNE   MCRTA
0826:
0827: F44D AA                 MCRTB  TAX
0828:
0829: F44E BD 69 F4         MCRTC  LDAX  CRTINA
0830: F451 99 DC EF         STAY  TABLE    MOVE THE TABLE
0831: F454 E8                 INX
0832: F455 C8                 INY
0833: F456 C0 12             CPYIM $12
0834: F458 D0 F4             BNE   MCRTC
0835: F45A 88                 DEY
0836: F45B B9 DC EF         LDAY  TABLE    SET SCREEN PARAMETERS
0837: F45E 8D D1 EF         STA   LPSCR
0838: F461 88                 DEY
0839: F462 B9 DC EF         LDAY  TABLE
0840: F465 8D D0 EF         STA   CHAPLN

```


0841: F468 60

RTS

0842:

0843:

0844:

0845:

CRT TIMING TABLES

0846:

- 80*24 -

0847:

0848:

0849: F469 80

CRTINA	=	\$80 HORIZONTAL TOTAL-1 = 129-1 CHAR.
	=	\$50 HORIZONTAL DISPLAYED = 80 CHAR.
	=	\$60 HORIZ. SYNC. POSITION = 96 CHAR.
	=	\$08 VERT./HORIZ. SYNC WIDTH = 16/8
	=	\$22 VERTICAL TOTAL-1 = 34 CHAR. LINES
	=	\$00 VERT. TOTAL ADJ. = 0*64 MICRO SEC.
	=	\$18 VERTICAL DISPLAYED = 24 LINES
	=	\$1C VERT. SYNC. POSITION = 29 CHAR. LINES
	=	\$00 MODE CONTROL
	=	\$08 SCAN LINES-1 = 9-1
	=	\$00 CURSOR START
	=	\$09 CURSOR END
	=	\$00 DISPLAY START (NOT NEEDED)
	=	\$00
	=	\$00 CURSOR POSITION (NOT NEEDED)
	=	\$00
	=	\$50 CHARACTERS/LINE
	=	\$18 LINES/SCREEN

0850: F46A 50

0851: F46B 60

0852: F46C 08

0853: F46D 22

0854: F46E 00

0855: F46F 18

0856: F470 1C

0857: F471 00

0858: F472 08

0859: F473 00

0860: F474 09

0861: F475 00

0862: F476 00

0863: F477 00

0864: F478 00

0865: F479 50

0866: F47A 18

0867:

0868:

0869:

- 80*25 -

0870:

0871: F47B 80

0872: F47C 50

0873: F47D 60

0874: F47E 08

0875: F47F 22

0876: F480 00

0877: F481 19

0878: F482 1C

0879: F483 00

0880: F484 08

0881: F485 00

0882: F486 09

0883: F487 00

0884: F488 00

0885: F489 00

0886: F48A 00

0887: F48B 50

0888: F48C 19

0889:

0890:

- 64*16 -

0891:

0892: F48D 64

0893: F48E 40

0894: F48F 49

0895: F490 05

0896: F491 16

	=	\$64
	=	\$40
	=	\$49
	=	\$05
	=	\$16

0897:	F492	0E	=	\$0E
0898:	F493	10	=	\$10
0899:	F494	12	=	\$12
0900:	F495	00	=	\$00
0901:	F496	0C	=	\$0C
0902:	F497	00	=	\$00
0903:	F498	09	=	\$09
0904:	F499	00	=	\$00
0905:	F49A	00	=	\$00
0906:	F49B	00	=	\$00
0907:	F49C	00	=	\$00
0908:	F49D	40	=	\$40
0909:	F49E	10	=	\$10
0910:				
0911:			- 64*24 -	
0912:				
0913:	F49F	64	=	\$64
0914:	F4A0	40	=	\$40
0915:	F4A1	52	=	\$52
0916:	F4A2	05	=	\$05
0917:	F4A3	22	=	\$22
0918:	F4A4	00	=	\$00
0919:	F4A5	18	=	\$18
0920:	F4A6	1C	=	\$1C
0921:	F4A7	00	=	\$00
0922:	F4A8	08	=	\$08
0923:	F4A9	00	=	\$00
0924:	F4AA	09	=	\$09
0925:	F4AB	00	=	\$00
0926:	F4AC	00	=	\$00
0927:	F4AD	00	=	\$00
0928:	F4AE	00	=	\$00
0929:	F4AF	40	=	\$40
0930:	F4B0	18	=	\$18
0931:				
0932:			- 90*22 -	
0933:				
0934:	F4B1	87	=	\$87
0935:	F4B2	5A	=	\$5A
0936:	F4B3	6A	=	\$6A
0937:	F4B4	08	=	\$08
0938:	F4B5	22	=	\$22
0939:	F4B6	00	=	\$00
0940:	F4B7	16	=	\$16
0941:	F4B8	1C	=	\$1C
0942:	F4B9	00	=	\$00
0943:	F4BA	08	=	\$08
0944:	F4BB	00	=	\$00
0945:	F4BC	09	=	\$09
0946:	F4BD	00	=	\$00
0947:	F4BE	00	=	\$00
0948:	F4BF	00	=	\$00
0949:	F4C0	00	=	\$00
0950:	F4C1	5A	=	\$5A
0951:	F4C2	16	=	\$16
0952:				

0953:		- 48*12 -	
0954:			
0955:	F4C3 46	=	\$46
0956:	F4C4 30	=	\$30
0957:	F4C5 3A	=	\$3A
0958:	F4C6 05	=	\$05
0959:	F4C7 16	=	\$16
0960:	F4C8 0E	=	\$0E
0961:	F4C9 0C	=	\$0C
0962:	F4CA 12	=	\$12
0963:	F4CB 00	=	\$00
0964:	F4CC 0C	=	\$0C
0965:	F4CD 00	=	\$00
0966:	F4CE 09	=	\$09
0967:	F4CF 00	=	\$00
0968:	F4D0 00	=	\$00
0969:	F4D1 00	=	\$00
0970:	F4D2 00	=	\$00
0971:	F4D3 30	=	\$30
0972:	F4D4 0C	=	\$0C
0973:			
0974:		- 24*24 -	
0975:			
0976:	F4D5 38	=	\$38
0977:	F4D6 18	=	\$18
0978:	F4D7 26	=	\$26
0979:	F4D8 05	=	\$05
0980:	F4D9 22	=	\$22
0981:	F4DA 00	=	\$00
0982:	F4DB 18	=	\$18
0983:	F4DC 1C	=	\$1C
0984:	F4DD 00	=	\$00
0985:	F4DE 08	=	\$08
0986:	F4DF 00	=	\$00
0987:	F4E0 09	=	\$09
0988:	F4E1 00	=	\$00
0989:	F4E2 00	=	\$00
0990:	F4E3 00	=	\$00
0991:	F4E4 00	=	\$00
0992:	F4E5 18	=	\$18
0993:	F4E6 18	=	\$18
0994:			
0995:		- 80*24 (USA) -	
0996:			
0997:	F4E7 00	=	\$00
0998:	F4E8 00	=	\$00
0999:	F4E9 00	=	\$00
1000:	F4EA 00	=	\$00
1001:	F4EB 00	=	\$00
1002:	F4EC 00	=	\$00
1003:	F4ED 00	=	\$00
1004:	F4EE 00	=	\$00
1005:	F4EF 00	=	\$00
1006:	F4F0 00	=	\$00
1007:	F4F1 00	=	\$00
1008:	F4F2 00	=	\$00

```

1009: F4F3 00           =      $00
1010: F4F4 00           =      $00
1011: F4F5 00           =      $00
1012: F4F6 00           =      $00
1013: F4F7 50           =      $50
1014: F4F8 18           =      $18
1015:
1016:
1017:
1018: F4F9             RESTTY *      $FF03
1019: F4F9             RECCHA *      $FE1B
1020:
1021:
1022: F4F9 20 03 FF    CHE      JSR      RESTTY
1023: F4FC A9 00                LDAIM $00
1024: F4FE 8D D2 EF                STA      FORMAT 80*24 DISPLAY
1025: F501 20 35 F4                JSR      MOVCR7
1026: F504 20 30 F3                JSR      RESET
1027:
1028: F507 20 1B FE    CHECKA JSR      RECCHA
1029: F50A 20 00 F0                JSR      VIDEO
1030: F50D 4C 07 F5                JMP      CHECKA
1031:
-T

```

SYMBOL TABLE 3400 377E

ACURA	F17A	ACURB	F189	ACURC	F1AE	ACURX	F18C
ADJCUR	F16D	ADJU	F135	ADJUST	F11A	ADJV	F16A
ADSA	F142	AHOLD	2363	AR	D800	AUTOLF	EFF2
BRKTST	F01A	BUFFER	EFD4	CENFLG	EFF0	CENOUT	F3E2
CENTRO	F3E8	CHAPLN	EFD0	CHECK	F022	CHECKA	F507
CHE	F4F9	CIA	F36E	CLNDN	F0F0	CLNUP	F0B1
CLN	EFC2	CLRHOM	F04B	COL	EFCB	COMADR	F3C2
COMCOA	F381	COMCOB	F394	COMCOC	F39C	COMCOM	F37D
COMTAB	F3A2	COTABA	F3B6	CRAMP	F1FF	CRAMPT	F1DA
CRTINA	F469	CRTINT	F36C	CTROA	F3F6	CTROB	F41C
CURDN	F2CA	CURDNX	F2EB	CUREND	000B	CURLFT	F30D
CURPOH	000E	CURPOL	000F	CURRGT	F313	CURSOR	EFC8
CURSTA	000A	CURUP	F2EE	CURUPX	F30A	DELLIN	F07E
DOWN	F066	DSPSTH	000C	DSPSTL	000D	DUMMY	001F
DUPLEX	EFF1	EEOL	F261	EEOLB	F269	ERAFLN	F26E
ERALLN	F284	EREOL	F216	EREOS	F240	ERLNX	F072
EROLX	F219	EROXX	F22B	ERSCRX	F078	ERTEOL	F200
ERTEOS	F234	ESCFLG	EFCC	ESC	001B	FEED	F045
FLNCRT	F1C4	FLNDN	F0DB	FLNUP	F09C	FLN	EFC0
FORMAT	EFD2	HOCU	F05A	HOME	F319	HORDIS	0001
HORTOT	0000	HSYPOS	0002	INDEX	EFD3	INICEN	F41D
INLINE	EFCA	IRQVEC	EFF5	JMPVEC	EFEE	LEFT	F054
LIPENH	0010	LIPENL	0011	LLNDN	F105	LLNUP	F0C6
LLN	EFC4	LPSCR	EFD1	MCRTA	F447	MCRTB	F44D
MCRTC	F44E	MODE	0008	MOVCRT	F435	NMIVEC	EFF3
RAMBEG	EFCE	RAMPTR	006C	RECCHA	FE1B	RESET	F330
RESTTY	FF03	RETURN	F03A	RFILE	D801	RIGHT	F06C
RSA	F34E	RSB	F35D	SCANLN	0009	SCRPTR	EFC6
SPACE	0020	SPAD	FA80	TABLE	EFDC	TEMCOL	EFGD
TOSCR	F096	TPX	F2BF	TRAPRO	EFF7	TVPUT	F29A
UP	F060	UPDATH	0012	UPDATL	0013	VAACR	F80B
VAIER	F80E	VAIFR	F80D	VALID	F08C	VALVEC	F037
VAPAD	F801	VAPADD	F803	VAPADN	F80F	VAPBD	F800
VAPBDD	F802	VAPCR	F80C	VASR	F80A	VATACH	F805
VATACL	F804	VATALH	F807	VATALL	F806	VATBCH	F809
VATBCL	F808	VERDIS	0006	VERTOT	0004	VHSYWI	0003
VIDEND	F00F	VIDEO	F000	VSYPOS	0007	VTOTAJ	0005
WAIT	F3FC						

SYMBOL TABLE 3400 377E

HORTOT 0000	HORDIS 0001	HSYPOS 0002	VHSYWI 0003
VERTOT 0004	VTOTAJ 0005	VERDIS 0006	VSYPOS 0007
MODE 0008	SCANLN 0009	CURSTA 000A	CUREND 000B
DSPSTH 000C	DSPSTL 000D	CURPOH 000E	CURPOL 000F
LIPENH 0010	LIPENL 0011	UPDATA 0012	UPDATL 0013
ESC 001B	DUMMY 001F	SPACE 0020	RAMPTR 006C
AHOLD 2363	AR D800	RFILE D801	FLN EFC0
CLN EFC2	LLN EFC4	SCRPTR EFC6	CURSOR EFC8
INLINE EFCA	COL EFCB	ESCFLG EFCC	TEMCOL EFCD
RAMBEG EFCE	CHAPLN EFD0	LPSCR EFD1	FORMAT EFD2
INDEX EFD3	BUFFER EFD4	TABLE Efdc	JMPVEC EFEE
CENFLG EFF0	DUPLEX EFF1	AUTOLF EFF2	NMIVEC EFF3
IRQVEC EFF5	TRAPRO EFF7	VIDEO F000	VIDEND F00F
BRKTST F01A	CHECK F022	VALVEC F037	RETURN F03A
FEED F045	CLRHOM F04B	LEFT F054	HOCU F05A
UP F060	DOWN F066	RIGHT F06C	ERLNX F072
ERSCRX F078	DELLIN F07E	VALID F08C	TOSCR F096
FLNUP F09C	CLNUP F0B1	LLNUP F0C6	FLNDN F0DB
CLNDN F0F0	LLNDN F105	ADJUST F11A	ADJU F135
ADSA F142	ADJV F16A	ADJCUR F16D	ACURA F17A
ACURB F189	ACURX F18C	ACURC F1AE	FLNCRT F1C4
CRAMPT F1DA	CRAMP F1FF	ERTEOL F200	EREOL F216
EROLX F219	EROXX F22B	ERTEOS F234	EREOS F240
EEOL F261	EEOLB F269	ERAFLN F26E	ERALLN F284
TVPUT F29A	TPX F2BF	CURDN F2CA	CURDNX F2EB
CURUP F2EE	CURUPX F30A	CURLFT F30D	CURRGT F313
HOME F319	RESET F330	RSA F34E	RSB F35D
CRTINT F36C	CIA F36E	COMCOM F37D	COMCOA F381
COMCOB F394	COMCOC F39C	COMTAB F3A2	COTABA F3B6
COMADR F3C2	CENOUT F3E2	CENTRO F3E8	CTROA F3F6
WAIT F3FC	CTROB F41C	INICEN F41D	MOVCRT F435
MCRTA F447	MCRTB F44D	MCRTC F44E	CRTINA F469
CHE F4F9	CHECKA F507	VAPBD F800	VAPAD F801
VAPBDD F802	VAPADD F803	VATACL F804	VATACH F805
VATALL F806	VATALH F807	VATBCL F808	VATBCH F809
VASR F80A	VAACR F80B	VAPCR F80C	VAIFR F80D
VAIER F80E	VAPADN F80F	SPAD FA80	RECCHA FE1B
RESTTY FF03			

DEMO 1

"Teken de Junior-Computer"

Dit demonstratieprogramma is voor de DOS-Junior geschreven. Als dit programma op een Junior-Computer met cassette-interface en KB-9 BASIC gedraaid wordt, dan moeten twee regels gewijzigd worden:

regel 83: POKE6722+5,34 : POKE5722+9,7 : POKE8256,158 :
POKE8256,158 : POKE8257,15 : X =USR(X)

regel 92: POKE6722+5,0 : POKE6722+9,8 : POKE8256,158 :
POKE8257,15 : X =USR(X)

```

1 FORTZ=1T03
2 GOSUB73
3 PT=13*16^3
4 DEF FNX (X)=(Y*80)+X+PT
5 DEF FNY (Y)=(Y*80)+X+PT
6 GOTO16
7 A=18:B=12
8 L=10:Y=B:T=A+3:GOSUB95:T=A+3:Y=B-1:GOSUB98:T=A+2:Y=B-1
9 GOSUB103:T=A+1:Y=B-1:GOSUB100:X=A:T=B-1:GOSUB106:T=A-1:Y=B-1
10 GOSUB109:T=A-2:Y=B-1:GOSUB121:T=A-3:Y=B-1:GOSUB125:T=A-L-3
11 Y=B:GOSUB95:T=A-L-4:Y=B+L/2+1:GOSUB98:T=T+2:Y=Y+L+1:GOSUB103
12 T=T+1:Y=B+2*L+2:GOSUB101:T=B+1+L:X=A:GOSUB107:T=A+1+L
13 Y=B+2*L+2:GOSUB110:T=A+L+2:Y=B+1+L:GOSUB122:T=T+2:Y=B+L/2+1
14 GOSUB125
15 GOTO68
16 X=38:B=6:D=-1:L=5:CH=161:GOSUB136:A=X:D=1:CH=154:L=40
17 GOSUB133:B=Y+1:X=X-1:L=4:CH=161:GOSUB136:A=X:D=-1:CH=155:L=78
18 GOSUB133:B=Y:X=X+1:D=1:L=16:CH=161:GOSUB136:A=X:L=79:CH=151
19 GOSUB133:B=Y-1:D=-1:L=16:CH=161:X=X-1:GOSUB136
20 X=35:Y=10
21 GOSUB 112
22 GOSUB112
23 GOSUB112::GOSUB112:X=X+3:GOSUB112
24 X=X+2:GOSUB129:X=X+2:GOSUB129
25 X=X-39:Y=Y+3
26 GOSUB112:GOSUB112:GOSUB112:GOSUB112
27 X=X+3:GOSUB112::GOSUB112
28 X=X-39:Y=Y+3
29 GOSUB112:GOSUB112:GOSUB112:GOSUB112
30 X=X+3:GOSUB112::GOSUB112
31 X=X-39:Y=Y+3
32 GOSUB112:GOSUB112:GOSUB112:GOSUB112
33 X=X+3:GOSUB112::GOSUB112
34 X=38:Y=11
35 DATA67,68,69,70,56,57,65,66,52,53,54,55,48,49,50,51
36 FORT=1T016:READCH:POKEFNX (X),CH:X=X+6
37 IFT/4<>INT (T/4)GOTO39
38 Y=Y+3:X=X-24
39 NEXT
40 DATA32,43,68,65,65,68,80,67,71,79,110,109,105,114,115,116
41 Y=Y-3
42 X=X+26:FORT=1T04:READCH:POKEFNX (X),CH:X=X+1:READCH:POKEFNX (X),CH
43 X=X-1:Y=Y-3:NEXT
44 X=X+6:Y=Y+6:READCH:POKEFNX (X),CH:X=X+1:READCH:POKEFNX (X),CH
45 X=X-1:Y=Y+3:FORT=1T06:READCH:POKEFNX (X),CH:X=X+1:IFT<>3GOTO47
46 X=X-3:Y=Y+3
47 NEXT
48 X=44:Y=4
49 A=X:FORX=ATO+20
50 IFX=46ORX=47ORX=50ORX=51ORX=60ORX=61THENPOKEFNX (X),151
51 NEXT
52 Y=3:FORX=ATO+20
53 IFX=45ORX=49ORX=53ORX=57ORX=59ORX=63THENPOKEFNX (X),153
54 IFX=48ORX=52ORX=56ORX=62THENPOKEFNX (X),156
55 NEXT
56 Y=2:FORX=ATO+20
57 IFX=48THENPOKEFNX (X),156
58 IFX=54ORX=55ORX=60ORX=61ORX=65ORX=64THENPOKEFNX (X),150
59 NEXT
60 A=8:Y=14:L=20:D=1:L=20:CH=217:GOSUB133:POKEFNX (X),168
61 B=Y-1:CH=156:L=3:D=-1:GOSUB136:POKEFNX (X),167
62 A=X-1:CH=215:L=20:GOSUB133:POKEFNX (X),165
63 B=Y+1:D=1:L=3:CH=157:GOSUB136:POKEFNX (X),166

```



```

64 A=X+10:Y=Y-2:X=A
65 DATA54,53,48,50
66 GOSUB138
67 GOTO7
68 FORZ=1TO2000:NEXT:RESTORE
69 NEXT
70 END
71 REM
72 REM ::::::::::::::::::::::::::::::::::::::::::::
73 REM SCREEN RESET = $F330; $F3=243/$30=48
74 REM SET GRAPHIC MODE (8*8 DOT MATRIX)
75 REM LOOKUP TABLE OF THE CRT CONTROLLER
76 REM TABLE = $EFDC; $EF=239/$DC=220
77 REM R5 = VERTIKAL TOTAL ADJ. = TABLE+5
78 REM R9 = SCAN LINES = TABLE+9
79 REM RESET = $F330 = 62256
80 REM TABLE = $EFDC = 61404
81 REM ::::::::::::::::::::::::::::::::::::::::::::
82 REM
83 POKE61404+5,34:POKE61404+9,7:POKE574,48:POKE575,243:X=USR(X)
84 RETURN
85 REM
86 REM ::::::::::::::::::::::::::::::::::::::::::::
87 REM NORMAL SCREEN RESET = $F330
88 REM SET NORMAL CHARACTER MODE (8*9 DOT MATRIX)
89 REM MODIFY THE LOOKUP TABLE
90 REM ::::::::::::::::::::::::::::::::::::::::::::
91 REM
92 POKE61404+5,0:POKE61404+9,8:POKE574,48:POKE575,243:X=USR(X)
93 RETURN
94 REM HORIZONTAL BEAM
95 FOR X=T TOT+L:POKEFNX(X),131:NEXT
96 RETURN
97 REM 30 DEGREE BEAM
98 FORX=TTOT+LSTEP2:POKEFNX(X),196:POKEFNX(X+1),195:Y=Y-1:NEXT
99 RETURN
100 REM 60 DEGREE BEAM
101 FORX=T TOT+L:POKEFNX(X),202:Y=Y-1:POKEFNX(X),201:Y=Y-1:NEXT
102 RETURN
103 REM 45 DEGREE BEAM
104 FORX=TTOT+L:POKEFNX(X),189:Y=Y-1:NEXT
105 RETURN
106 REM 90 DEGREE BEAM
107 FORY=TTOT-LSTEP-1:POKEFNY(Y),139:NEXT
108 RETURN
109 REM 120 DEGREE BEAM
110 FORX=TTOT-LSTEP-1:POKEFNX(X),199:Y=Y-1:POKEFNX(X),200:Y=Y-1:NEXT
111 RETURN
112 REM KEYBOARD KEY
113 X=X+1:POKEFNX(X),149:Y=Y+1:POKEFNX(X),149:Y=Y+1:POKEFNX(X),166
114 A=X+1:FORX=ATOA+3:POKEFNX(X),162:NEXT
115 POKEFNX(X),168
116 Y=Y-1:POKEFNX(X),149:Y=Y-1:POKEFNX(X),149
117 RETURN
118 FORX=ATOA+3:POKE FN(X),161:NEXT
119 FORY=B+1TOB+3:POKEFNX(X),136:NEXT
120 RETURN
121 REM 135 DEGREE BEAM
122 FORX=TTOT-LSTEP-1:POKEFNX(X),190:Y=Y-1:NEXT
123 RETURN
124 REM
125 REM 150 DEGREE BEAM

```

```
126 Y=Y+1:PO=FNY (Y):POKEPO,145
127 X=X+1:PO=FNY (Y):POKEPO,152
128 Y=Y+1:PO=FNY (Y):POKEPO,152
129 X=X-1:PO=FNY (Y):POKEPO,144
130 X=X-1:PO=FNY (Y):POKEPO,153
131 Y=Y-1:PO=FNY (Y):POKEPO,153
132 X=X+1:Y=Y+2:PO=FNY (Y):POKEPO,149:RETURN
133 REM
134 REM
135 POKE6104+5,0:POKE61404+9,8:POKE574,48:POKE575,243:x=USR (x):RETURN
```

Ok

DEMO 2

"Tekenen een schakelschema"

Dit demonstratieprogramma is voor de DOS-Junior geschreven. Als dit programma op een Junior-Computer met cassette-interface en KB-9 BASIC gedraaid wordt, dan moeten twee regels gemodificeerd worden:

regel 104: POKE6722+5,34 : POKE6722+9,7 : POKE8256,158 :
POKE8257,15

regel 135: POKE6722+5,0 : POKE6722+9,8 : POKE8256,158:
POKE8257,15 : X = USR(X) : RETURN

```

1 REM ::::::::::::::::::::::::::::::::::::
2 REM PLOT A CIRCUIT DIAGRAM ON THE SCREEN
3 REM ::::::::::::::::::::::::::::::::::::
4 REM
5 DEF FNX (X) = (Y*80)+X+13*16^3
6 DEF FNY (Y) = (Y*80)+X+13*16^3
7 REM
8 REM
9 pt=13*16^3:GOSUB134
10 FORx=0TO255:POKEpt,x:pt=pt+4:NEXT:FORx=1TO2000:NEXT
11 REM
12 GOSUB102
13 GOSUB15:FORx=1TO10000:NEXT
14 END
15 GOSUB102
16 X=10:Y=23:X$="*** ELEKTOR's Junior Computer Graphic Demo ***"
17 GOSUB106
18 REM
19 HB=16:HE=HB+15:Y=6:CH=155:D=1:GOSUB95
20 VB=6:VE=VB+8:X=HE:CH=161:GOSUB98
21 HB=X-1:HE=HB-15:D=(-1):Y=VE:CH=154:GOSUB95
22 VB=Y:VE=VB-8:D=(-1):X=HE:CH=161:GOSUB98
23 X=X+5:Y=(VB+VE)/2:X$="NE 555":GOSUB109
24 X=38:Y=2:POKEFNY (Y),149:GOSUB124:Y=Y+1:PO=FNY (Y):POKEPO,218
25 GOSUB124:Y=Y+1:PO=FNY (Y):POKEPO,218:Y=Y+1:POKEFNY (Y),218
26 Y=Y+1:POKEFNY (Y),149:GOSUB113
27 VB=2:VE=VB+3:D=1:X=28:CH=149:GOSUB98
28 Y=VE+9:GOSUB113
29 VB=2:VE=VB+3:D=1:X=19:CH=149:GOSUB98
30 VB=VE+10:VE=VB+3:D=1:X=19:CH=149:GOSUB98
31 HB=19:HE=HB+40:D=1:Y=1:CH=128:GOSUB95
32 HB=19+13:HE=HB+5:D=1:Y=7:CH=131:GOSUB95
33 HB=19-5:HE=HB-10:D=(-1):Y=7:CH=131:GOSUB95
34 HB=19+13:HE=HB+5:D=1:Y=7+5:CH=131:GOSUB95
35 HB=19+13:HE=HB+5:D=1:Y=Y+1:CH=131:GOSUB95
36 HB=19:HE=HB+40:D=1:Y=19:CH=135:GOSUB95
37 REM
38 DATA143,135,196,195,32,32,199,32,32,196,195,200,143,135
39 REM
40 VB=13:VE=13+4:X=45:D=1:READ CH:GOSUB98
41 HB=X+1:HE=HB+20:Y=VE:D=1:READ CH:GOSUB95
42 REM
43 Y=16
44 FORK=1TO2
45 X=46:FORV=0TO4:READ T:V (V)=T:NEXT
46 FORI=0TO2
47 FORJ=0TO4:CH=V (J):POKE (FNX (X)+J+5*I),CH:NEXT
48 NEXT
49 Y=Y-1
50 NEXT
51 REM
52 VB=15:VE=VB+4:X=0:D=1:READ CH:GOSUB98
53 HB=X+1:HE=HB+16:Y=VE:D=1:READ CH:GOSUB95
54 REM
55 HE=HB+4:Y=VE-2:D=1:GOSUB95
56 VB=Y:VE=Y+1:CH=136:GOSUB98
57 VB=VE:VE=VB-1:X=X+1:CH=143:D=-1:GOSUB98
58 HB=X+1:HE=HB+4:D=1:CH=128:GOSUB95
59 VB=Y+1:VE=Y+2:CH=136:GOSUB98
60 VB=VE:VE=VB-1:X=X+1:CH=143:D=-1:GOSUB98
61 HB=X+1:HE=HB+2:D=1:CH=128:GOSUB95
62 REM
63 X=40:Y=4:X$="100 K":GOSUB106

```

```

64 YT=Y:Y=Y+1:X$="Ra":GOSUB106:Y=YT
65 Y=9:X$="27 K":GOSUB106
66 YT=Y:Y=Y+1:X$="Rb":GOSUB106:Y=YT
67 Y=17:X$="10 n":GOSUB106
68 YT=Y:Y=Y-1:X$="C":GOSUB106:Y=YT
69 XT=X:YT=Y:X=X+7:Y=Y-3:X$="Uc":GOSUB106:X=XT:Y=YT
70 X=X-10:Y=17:X$="10 n":GOSUB106
71 REM
72 X=62:Y=5:X$="1.44":GOSUB106
73 X=55:Y=Y+1:X$="F":GOSUB106:HB=58:HE=HB+10:CH=131:D=1:GOSUB95
74 Y=Y+1:X=HB:X$="(Ra+2*Rb)*C":GOSUB106
75 REM
76 F=1.44/((100E3+2*27E3)*10E-9)
77 X=55:Y=Y+4:X$="F":GOSUB106:X=58:X$=STR$(F):GOSUB106
78 X=X+10:X$=" Hz":GOSUB106
79 REM
80 X=2:Y=9:X$="Output":GOSUB106
81 X=2:Y=16:X$="Uout":GOSUB106
82 X=13:Y=8:X$="3":GOSUB106
83 X=13+20:X$="7":GOSUB106
84 Y=Y+3:X$="6":GOSUB106
85 Y=Y+3:X$="2":GOSUB106
86 X=X-8:Y=Y+2:X$="5":GOSUB106
87 X=X-4:X$="1":GOSUB106
88 Y=Y-12:X$="4":GOSUB106
89 X=X+4:X$="8":GOSUB106
90 RETURN
91 END
92 REM
93 REM normal screen reset
94 VB=Y+1:VE=Y+1:CH=136:GOSUB98
95 REM WRITE horizontal
96 FOR X=HB TO HE STEP 10): PO=FNX(X): POKE PO,CH: NEXT
97 RETURN
98 REM
99 REM WRITE VERTICAL
100 FOR Y=VB TO VE STEP 10): PO=FNY(Y): POKE PO,CH: NEXT
101 RETURN
102 REM
103 REM reset the screen
104 POKE61404+5,34:POKE61404+9,7:POKE574,48:POKE575,243
105 X=USR(X):RETURN
106 REM
107 REM poke X$ on the screen
108 REM INPUT: x,y and X$="string"
109 REM
110 PT=FNY(Y)
111 FOR S=1 TO LEN(X$):POKE PT,ASC(MID$(X$,S,1)):PT=PT+1:NEXT
112 RETURN
113 REM
114 REM vertical C subroutine
115 Y=Y+1:PO=FNY(Y):POKEPO,149
116 X=X-1:Y=Y+1:PO=FNY(Y):POKEPO,148
117 X=X+1:PO=FNY(Y):POKEPO,215
118 X=X+1:PO=FNY(Y):POKEPO,148
119 Y=Y+1:PO=FNY(Y):POKEPO,148
120 X=X-1:PO=FNY(Y):POKEPO,217
121 X=X-1:PO=FNY(Y):POKEPO,148
122 X=X+1:Y=Y+1:PO=FNY(Y):POKEPO,149:RETURN
123 REM
124 REM vertical R subroutine
125 Y=Y+1:PO=FNY(Y):POKEPO,149

```

```
126 Y=Y+1:PO=FNY (Y):POKEPO,145
127 X=X+1:PO=FNY (Y):POKEPO,152
128 Y=Y+1:PO=FNY (Y):POKEPO,152
129 X=X-1:PO=FNY (Y):POKEPO,144
130 X=X-1:PO=FNY (Y):POKEPO,153
131 Y=Y-1:PO=FNY (Y):POKEPO,153
132 X=X+1:Y=Y+2:PO=FNY (Y):POKEPO,149:RETURN
133 REM
134 REM
135 POKE6104+5,0:POKE61404+9,8:POKE574,48:POKE575,243:x=USR (x):RETURN
```

Ok

